City of Biddeford
Planning Board
June 05, 2024 6:00 PM City Hall
Council Chambers, & Zoom

STATUS: PLANNING BOARD MEETING, WEDNESDAY, JUNE 5, 2024, 6:00 PM, CITY COUNCIL CHAMBERS & ZOOM

1. PLEDGE OF ALLEGIANCE

2. DECLARATION OF QUORUM/VOTING MEMBERS

3. ADJUSTMENTS TO THE AGENDA

4. PLANNER'S BUSINESS

4.A. Planning Board cannot meet on June 19th due to the holiday; would the Board like to meet on Monday June 10th?

4.B. July 3rd may be a difficult time for the Planning Board to meet, will we have a quorum on the 3rd?

5. CONSENT AGENDA

5.A. Approval of Meeting Minutes from May 15, 2024
5-15-24-Meeting Minutes-DRAFT.pdf

6. OPEN PUBLIC HEARING

6.A. 2024.26 Biddeford Planning Board will have the SECOND READING for an amendment to Article XII-Floodplain Management Ordinance
Floodplain Management Ordinance FIRST READING PB MEMO 6-5-2024.pdf
Floodplain Management Ordinance Planning Board Hearing 2 6-6-24 FINAL red and blue.pdf

7. CLOSE PUBLIC HEARING

8. UNFINISHED BUSINESS

9. NEW BUSINESS

9.A. 2024.10 The Biddeford Planning Board will review and discuss a Final Site Plan Application for UNE to build Tennis Courts at 16 Old Pool Road (Tax Map 9, Lot 13) in the IN Zone.
2024.10 Findings of Fact and Conditions of Approval 6-5-24.pdf
2024.10 UNE Final Staff Report.pdf
2024_02_15 UNE Tennis Courts - Site Plan Application.pdf
2024-02-14_UNE Tennis Plan Set.pdf
20240604 UNE Biddeford Peer Review Letter.pdf
5-14-24 Wermenchuk.pdf
6-4-24 Fink.pdf
6-5-24 Smith.pdf

9.B. 2023.28 The Biddeford Planning Board will review and discuss a request from Tom Watson & Co for an amendment to the Conditions of Approval for 10, 20, 30 Upper Falls Way (Tax Map 40, Lots 55,55-3,56-1) in the MSRD-3 Zone.

2022.11 10_20_30 Upper Falls Way_Amendment COA 6-5-24.pdf

9.C. 2024.27 The Biddeford Planning Board will review and discuss a Sketch Plan submission by Josh Cushman for a subdivision located at Pepperell Mill Buildings 19 & 20 (Tax Map 71, Lots 10-4,
& 10-1) in the MSRD-3 Zone.
2024.27 Pepperell Mill Buildings Staff Review.pdf
Pepperell Mill Building 19 20 - Site Plan Application.pdf
Pepperell Mill Building 19 20 - Site Plan Application - Required Attachments - Combined.pdf
2024 0605 Pepperell Mill Building 19_20 - Planning Board Staff Comments - Responses.pdf
A1 - FLOOR PLANS.pdf
A2 - FLOOR PLANS.pdf
Pepperell Mill A0.04 - EXISTING BUILDING ELEVATIONS.pdf
Pepperell Mill A2.1 - NEW BUILDING ELEVATIONS.pdf
Renderings.pdf
6-5-24 Response from Thormann.pdf

9.D. 2024.29 The Biddeford Planning Board will review and discuss a Sketch Plan Application for Site Plan/Affordable Housing Subdivision for Westbrook Development Corporation at 37 Barra Road (Tax Map 2, Lot 42) in the I3 zone.
2024.29 WDC Staff Review.pdf
37 Barra Road - Sketch Plan Submission - 05.29.2024.pdf

9.E. 2024.21 The Planning Board will review and discuss a Preliminary Plan presented by Indian Cliff Development Corp for an 8-lot subdivision on Barra Road (Tax Map 7, Lot 15) in the R-3 & R-1 zones.
2024.21 Amended Indian Cliff Preliminary Plan FINAL.pdf
2024.21 Indian Cliff Preliminary Plan FINAL.pdf
Peer Review Engineering Comments of 05-28-24.pdf
Preliminary Submission.pdf
5-29-24 Barra Road Developments Stormwater Treatment Section Update (2024-05-28).pdf
Copy of 2024.21 Indian Cliff Preliminary Subdivision Plan Planning Drawing Checklist.xlsx
Preliminary Plans.pdf

9.F. 2024.18 The Planning Board will review & discuss a Preliminary application by AVESTA Housing to create a 46-unit elderly affordable housing project on Barra Road (Tax Map 7, Lot 15) in the R-3 zone.
2024.18 Amended Preliminary Plan Review.pdf
2024.18 Preliminary Plan Review.pdf
Barra Road Developments Stormwater Treatment Section Update (2024-05-28).pdf
Copy of 2024.18 Avesta Biddeford Preliminary Site and Subdivision Planning Drawing Checklist.xlsx
Preliminary Plans.pdf

10. OTHER BUSINESS

11. ADJOURN

The Board reserves the right to halt official business at 9:30 p.m. Items not heard at tonight's meeting shall be rescheduled to the next meeting of the Board. All materials pertaining to items on the agenda are available for public review at the Biddeford Planning Department, second floor, Biddeford City Hall during normal business hours.

CITY OF BIDDEFORD

Planning and Development Department

205 Main Street
P.O. Box 586
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(207) 284-9115

Planning Board Meeting
Meeting Minutes
DRAFT

Date: May 15, 2024
Time: 6:00 PM
Location: Council Chambers & Zoom

1. **Pledge of Allegiance**
2. **Declaration of Quorum/Voting Members: Larry Patoine (Chair), Susan Deschambault, Alexa Plotkin & Dylan Doughty (Alternate Member)**
   Doughty will be voting this evening due to the absence of Roch Angers & Stephen Beaudette
   Staff Present: David Galbraith & Nan Whitten
   Chair Patoine opened the meeting at 6:02 PM
3. **Adjustments to the Agenda-None**
4. **Planner's Business**
   - **Galbraith talked of the Freddy LLC that has made changes to the approved plan-changes will be explained in Other Business**
5. **Consent Agenda**
   5. A. Approval of Meeting Minutes from 5-1-24
   MOTIONS: 6:03PM
   Motion-Plotkin -Motion to approve minutes as presented
   Second-Doughty
   Vote: Motion passed by unanimous vote
6. **Open Public Hearing 6:03 PM**
   6. A. 2024.17 The Biddeford Planning Board will have the SECOND READING in a Public Hearing to review and discuss a proposed change of zone from MSRD 2 to MSRD.
   - **Galbraith re-introduced the item.**
   - **No public comments**

   MOTION: 6:06 PM
   Motion-Deschambault- Motion to approve Case # 2024.17 Final Rezoning Review for the property located at 118 Alfred Street (Tax Map & Lot# 38-303-1) from the MSRD-2 zoning district to the MSRD-1 zoning district.
   Second-Doughty
   Vote: Motion passed 2-1 (Deschambault & Doughty in favor, Plotkin against)

   6. B. 2024.26 Biddeford Planning Board will have the FIRST READING for an amendment to Article XII-Floodplain Management Ordinance
   - **Galbraith introduced the proposed change**
   - **He explained that the entire Floodplain Ordinance will be replaced and that this is not a request but a mandate from FEMA**

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- **If we fail to be in compliance by July 2024, all flood insurance in the City of Biddeford will be canceled.**
- **Deschambault asked what agency requested this change the answer is FEMA**
- **No public comments**

  MOTION: 6:11 PM

  Motion-Plotkin-Motion to APPROVE the proposed Zoning Ordinance Text Amendment: Code of Ordinances, Part III: Land Development Regulations, Article XII Floodplain Management Ordinance – FIRST READING, as written, and upon adoption replace the City's existing Floodplain Management Ordinance.

  Second-Doughty

  Vote: Motion passed unanimously

7. **Close Public Hearing 6:12 PM**
8. **New Business**

8. A. 2024.10 The Biddeford Planning Board will review and discuss a Preliminary Site Plan Application for UNE to build Tennis Courts at 16 Old Pool Road (Tax Map 9, Lot 13) in the IN Zone. Galbraith introduced the project

- **Galbraith introduced the project**
- **Andrew Phillippe of UNE, Tom Saucier of Site Design & Chris Huntress of Huntress Associates represented the application**
- **The applicant is requesting a slope waiver as the slope is greater than 2-1 and in a ledge area.**
- **Permit By Rule was approved on April 12, 2024**
- **Public**
- **Mr. Phillippe answered questions from an abutter that were emailed in.**
- **Deschambault asked the applicant to call the police instead of security when there are parking problems on Old Pool Road.**
- **Deschambault asked if the abutters will know when there will be events- they are on the website. Will there be music? No**
- **Patoine asked if there is a problem with people using the courts after dusk how will they rectify the problem. By keeping the gate locked.**
- **Galbraith reminded the Board that this is a PRELIMINARY application.**

  MOTION: 6:28 PM

  Motion-Plotkin-Motion to approve Case # 2024.10 Preliminary Plan Review for UNE to expand their tennis courts located at 16 Old Pool Road (Tax Map 9, Lot 13), with the recommended Conditions of Approval.

  Second-Deschambault

  Vote: Motion passed unanimously

8. B. 2024.25 The Biddeford Planning Board will review and discuss a Shoreland Zoning/Greatest Practical Extent Application for Jonathan & Elizabeth Beebe to raze and reconstruct the existing home, moving it towards the street side setback line to the greatest extent practicable. The property is located at 99 Fortunes Rocks Road (Tax Map 65, Lot 2) in the Coastal Residential and Shoreland Overlay Zone.

- **Galbraith introduced the project**

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- Werner Gilliam from Walsh Engineering represented the applicants
- DEP and IFW approvals have already been obtained
- There were no public comments
- Patoine asked for a clarification of the VE & AE flood zones. Gilliam explained the difference,
- Galbraith told the Board that he and the CEO have met to discuss this project and they both agree on the fact that it should be approved.

MOTION: 6:37 PM

Motion-Deschambault- Motion to approve Case # 2024.25 a Shoreland Zoning Permit request for Jonathan & Elizabeth Beebe to remove and reconstruct and existing non-conforming structure located at 99 Fortunes Rocks Road (Tax Map 65, Lot 2) in the Coastal Residential Zone and Shoreland Overlay.

Second-Doughty

Vote: Motion passed unanimously

8. C. 2024.14 The Biddeford Planning Board will meet to review and discuss a Site Plan Review submitted by BHV Biddeford, LLC for an internal change of use to a pickle ball court at 420 Alfred Street, Five Points Shopping Center (Tax Map 20, Lot 26-1) in the Industrial 3 Zone.

- Galbraith introduced the project
- Galbraith explained the sewer capacity issue in that area of town.
- Jordan Gagnon of Sebago Technics & Tony Orrino of BVH represented the applicant
- Public: Tony Curro of 182 May Street
- Patoine asked about public amenities, there will be bathrooms and changing rooms but no showers or locker rooms
- Patoine asked about the noise level and how other patrons in other areas of the building will be affected-the noise level is undetermined at this time but does not anticipate it being a problem where the walls were sound proofed for a movie theater.
- Deschambault asked about like facilities in the area-there is one in Portland
- Deschambault asked about the costs and fees-they will have monthly memberships as well as day passes-they are trying to remain flexible.
- Will there be instruction-it is in development now
- Patoine asked about the interior changes, it is being retro fit into a pickle ball court
- Doughty asked about taking sewer into consideration for the empty spaces-there is a formula for these spaces.

MOTIONS: 7:01 PM

Motion-Plotkin- Motion to waive Article XI, Full Site Plan Review. I motion to waive Article XI, full site plan review, as no site improvements are being made.

Second-Deschambault

Vote: Motion passed unanimously

Motion-Plotkin-Motion to approve the Preliminary Site Plan/Conditional Use Review for BVH Biddeford, LLC to change the use and develop a pickle ball recreation center, within the former Smitty's Cinema tenant space, located within

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the Five Points Shopping Center located at 420 Alfred Road (Tax Map 20, Lot 26-1) in the I-3 Zone.
Second-Doughty
Vote: Motion passed unanimously

8. D. **2024.20 The Biddeford Planning Board will meet to review and discuss a Conditional Use Application for JAR Co. CV LLC to open an Adult Use Retail Cannabis Shop at 420 Alfred Street (Tax Map 20, Lot 26-1) in the Industrial 3 Zone.**

- **Galbraith introduced the project**
- **Joel Pepin represented the applicant**
- **Deschambault asked where else they have businesses like this-Windham, South Portland, Portland, Newry & Carrabassett Valley**
- **Doughty asked how many employees they will have-2-4 per shift 7 days a week 6-10 in all. They hours will be 8:00 AM -9:00 PM but they will start with shorter hours until they have more traffic.**

MOTION: 7:07 PM
Motion-Plotkin-Motion to waive Article XI, Full Site Plan Review. I motion to waive Article XI, full site plan review, as no site improvements are being made.
Second-Doughty
Vote: Motion passed unanimously
Motion-Plotkin- Motion to approve the Conditional Use Permit and the Findings of Fact and Conclusions of Law for JAR Co. CV LLC for an adult-use recreational marijuana retail facility at 420 Alfred Street, Unit 11(Tax Map 20, Lot 26-1).
Second-Doughty
Vote: Motion passed unanimously

8. E. **2024.24 The Biddeford Planning Board will meet to review and discuss a Conditional Use Application for Orange Fitness to open Fitness Center/Gym at 420 Alfred Street (Tax Map 20, Lot 26-1) in the Industrial 3 Zone.**

- **Galbraith introduced the project**
- **Jordan Gagnon of Sebago Technics represented the applicant**
- **Patrick Welch the owner of Orange Fitness answered questions**
- **Public: Tony Curro of 182 May Street**
- **Deschambault asked about the hours being 24/7-it is being decided**
- **Doughty asked if this was a franchise-answer-No**
- **Doughty asked about Fitness Centers in other cities they have owned-they have owned and sold others in other towns**

MOTION: 7:15 PM
Motion-Plotkin-Motion to waive Article XI, Full Site Plan Review. I motion to waive Article XI, full site plan review, as no site improvements are being made.
Second-Deschambault
Vote: Motion passed unanimously
Motion-Plotkin-Motion to approve the Conditional Use Permit and the Findings of Fact and Conclusions of Law for Orange Fitness for Fitness Center/Gym at 420 Alfred Street (Tax Map 20, Lot 26-1).
Second-Doughty
Vote: Motion passed unanimously

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9. **Other Business**
    - **Galbraith told the Board of the changes made to Freddy LLC this was an administrative approval but the Board must sign the plan.**
    - **Galbraith told the Board that the new Assistant Planner, Adi Iriqat, will be in the office for his first day on Monday the 20th, he is in training this week.**

10. **Adjourn 7:49 PM**

_____ _____

Planning Board Chair/Vice Chair **Date**

These minutes are summary and are not intended to be verbatim. Archived meetings are viewable on the City's website: www.biddefordmaine.org.

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CITY OF BIDDEFORD

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Planning Board – Staff Report

TO: Chair Patoine and Members of the Biddeford Planning Board

FROM: David C.M. Galbraith, Deputy Director / City Planner

DATE: May 29, 2024

RE: Zoning Ordinance Text Amendment: Code of Ordinances, Part III: Land Development Regulations, Article XII Floodplain Management Ordinance – FIRST READING

MEETING DATE: June 5, 2024

Overview:

The proposed Ordinance amendment was first discussed at a public hearing at the Planning Board's May 15, 2024 meeting. As discussed at this hearing the City of Biddeford received a Letter of Final Determination (LFD) from the Federal Emergency Management Agency (FEMA) which sets the effective date of the new Digital Flood Insurance Rate Maps (DFIRMs) for York County for July 17, 2024. The LFD marks the beginning of a six-month time period for communities to update their local Floodplain Management Ordinances to reflect any changes since the last ordinance was adopted and to incorporate the new map date. **Biddeford must adopt an updated Floodplain Management Ordinance which references the new map date on or before July 17, 2024, in order to avoid being immediately suspended from the NFIP.**

Suspension from the NFIP will have immediate affects, particularly for those with flood insurance policies in effect. Policies cannot be renewed and new policies cannot be written if the community is suspended. Obviously, the City does not want to see that happen to our citizens / property owners. Participation in the NFIP provides protection to those members of our community who may be affected by flooding. In addition, federal flood insurance is available to those who have federally backed mortgages in the floodplain. Another important benefit is our community's eligibility for disaster funding and low interest loans if/when our county is in a declared disaster area. This is all possible by way of our community's commitment to adopt, administer, and enforce its floodplain ordinance and our commitment to regulate development within Biddeford's flood prone areas.

Attached is a copy of the most current state model Floodplain Management Ordinance that has been customized specifically for the City of Biddeford. The attached Ordinance contains all the changes that have occurred at the federal and state level since our Floodplain Management Ordinance was last adopted / amended. As FEMA has very specific requirements regarding ordinance language, the City is being encouraged to adopt the Ordinance without changes.

Zoning Ordinance Amendment: Code of Ordinances, Part III: Land Development Regulations, Article XII – Floodplain Management Ordinance to include the new map date and to be in compliance as dictated by the Federal Emergency Management Agency (FEMA) – FIRST READING

Planning Board Meeting: June 5, 2024 – SECOND HEARING

Staff Recommendation:

As outlined above, Biddeford must adopt an updated Floodplain Management Ordinance which references the new map date on or before July 17, 2024, in order to avoid being immediately suspended from the NFIP. Staff is recommending the adoption of the proposed / attached Ordinance in addition to repealing the City's existing Ordinance, immediately following the adoption of the proposed Ordinance. Staff recommends the Planning Board forward a positive recommendation for adoption of the proposed Ordinance to the City Council. Attached for the Board's review is the proposed Amendments to the City's Floodplain Management Ordinance with proposed text highlighted in blue underline and text deletions shown in ~~red strikethrough~~. These changes reflect the adoption of the new standards in their entirety, and deleting our existing ordinance in their entirety, as recommended by the Department of Agriculture, Conservation & Forestry – Maine Floodplain Management Program.

SAMPLE MOTIONS:

A. Motion to Approve: I motion to APPROVE the proposed Zoning Ordinance Text Amendment: Code of Ordinances, Part III: Land Development Regulations, Article XII Floodplain Management Ordinance – FIRST READING, as written, and upon adoption replace the City's existing Floodplain Management Ordinance.

B. Motion to Deny I motion to DENY the proposed Zoning Ordinance Text Amendment: Code of Ordinances, Part III: Land Development Regulations, Article XII Floodplain Management Ordinance – FIRST READING, for the following reasons:

1) _____.

2) _____.

3) _____.

C. Motion to Table: I motion to TABLE the proposed the proposed Zoning Ordinance Text Amendment: Code of Ordinances, Part III: Land Development Regulations, Article XII Floodplain Management Ordinance – FIRST READING, for the following reasons:

1) _____.

2) _____.

3) _____.

FLOODPLAIN MANAGEMENT ORDINANCE

FOR THE

CITY OF BIDDEFORD, MAINE

ENACTED: _____
Date

EFFECTIVE: _____
Date

CERTIFIED BY: _____
Signature

CERTIFIED BY: _____
Print Name

_____
Title

Affix Seal

City of Biddeford, Code of Ordinances
Part III: Land Development Regulations
Article XII Floodplain Management Ordinance

Planning Board Hearing # 2: June 5, 2024

FLOODPLAIN MANAGEMENT ORDINANCE

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City of Biddeford, Code of Ordinances
Part III: Land Development Regulations
Article XII Floodplain Management Ordinance

Planning Board Hearing # 2: June 5, 2024

ARTICLE I - PURPOSE AND ESTABLISHMENT

Certain areas of the City of Biddeford, Maine are subject to periodic flooding, causing serious damages to properties within these areas. Relief is available in the form of flood insurance as authorized by the National Flood Insurance Act of 1968.

Therefore, the City of Biddeford, Maine has chosen to become a participating community in the National Flood Insurance Program and agrees to comply with the requirements of the National Flood Insurance Act of 1968 (P.L. 90-488, as amended) as delineated in this Floodplain Management Ordinance.

It is the intent of the City of Biddeford, Maine to require the recognition and evaluation of flood hazards in all official actions relating to land use in the floodplain areas having special flood hazards.

The City of Biddeford has the legal authority to adopt land use and control measures to reduce future flood losses pursuant to Title 30-A MRSA, Sections 3001-3007, 4352, 4401-4407, and Title 38 MRSA, Section 440.

The National Flood Insurance Program, established in the aforesaid Act, provides that areas of the City of Biddeford having a special flood hazard be identified by the Federal Emergency Management Agency and that floodplain management measures be applied in such flood hazard areas. This Ordinance establishes a Flood Hazard Development Permit system and review procedure for development activities in the designated flood hazard areas of the City of Biddeford, Maine.

The areas of special flood hazard, Zones A, AE, and VE for the City of Biddeford, York County, Maine, identified by the Federal Emergency Management Agency in a report entitled “Flood Insurance Study – York County, Maine” dated July 17, 2024, with accompanying “Flood Insurance Rate Map” dated July 17, 2024, are hereby adopted by reference and declared to be a part of this Ordinance.

ARTICLE II - PERMIT REQUIRED

The Code Enforcement Officer shall be designated as the local Floodplain Administrator. The Floodplain Administrator shall have the authority to implement the commitment made to administer and enforce the requirements for participation in the National Flood Insurance Program.

Before any construction or other development (as defined in Article XIV), including the placement of manufactured homes, begins within any areas of special flood hazard established in Article I, a Flood Hazard Development Permit shall be obtained from the Code Enforcement Officer, except as provided in Article VII. This permit shall be in addition to any other permits which may be required pursuant to the codes and ordinances of the City of Biddeford, Maine.

ARTICLE III - APPLICATION FOR PERMIT

The application for a Flood Hazard Development Permit shall be submitted to the Code Enforcement Officer and shall include:

A. The name, address, and phone number of the applicant, owner, and contractor;

B. An address and a map indicating the location of the construction site;

C. A site plan showing locations of existing and/or proposed development, including but not limited to structures, sewage disposal facilities, water supply facilities, areas to be cut and filled, and lot dimensions;

D. A statement of the intended use of the structure and/or development;

E. A statement of the cost of the development including all materials and labor;

F. A statement as to the type of sewage system proposed;

G. Specification of dimensions of the proposed structure and/or development;

[Items H-K.3. apply only to new construction and substantial improvements.]

H. The elevation in relation to the National Geodetic Vertical Datum (NGVD), North American Vertical Datum (NAVD), or to a locally established datum in Zone A only, of the:

1. base flood at the proposed site of all new or substantially improved structures, which is determined:

a. in Zones AE, and VE from data contained in the "Flood Insurance Study - York County, Maine," as described in Article I; or,

b. in Zone A:

(1) from any base flood elevation data from federal, state, or other technical sources (such as FEMA's Quick-2 model, FEMA 265), including information obtained pursuant to Article VI.M. and IX.D.; or,

(2) in the absence of all data described in Article III.H.1.b.(1), information to demonstrate that the structure shall meet the elevation requirement in Article VI.H.2.b., Article VI.I.2.b., or Article VI.J.2.b.

2. highest and lowest grades at the site adjacent to the walls of the proposed building;

3. lowest floor, including basement; and whether or not such structures contain a basement;

4. lowest machinery and equipment servicing the building; and,

5. level, in the case of non-residential structures only, to which the structure will be floodproofed.

I. A description of an elevation reference point established on the site of all developments for which elevation standards apply as required in Article VI;

J. A written certification by:

1. a Professional Land Surveyor that the grade elevations shown on the application are accurate; and,

2. a Professional Land Surveyor, registered professional engineer or architect that the base flood elevation shown on the application is accurate.

K. The following certifications as required in Article VI by a registered professional engineer or architect:

1. a Floodproofing Certificate (FEMA Form FF-206-FY-22-153, as amended), to verify that the floodproofing methods for any non-residential structures will meet the floodproofing criteria of Article VI.I., and other applicable standards in Article VI;

2. a V-Zone Certificate to verify that the construction in coastal high hazard areas, Zone VE and Coastal AE Zone, will meet the criteria of Article VI.R.; and other applicable standards in Article VI;

3. a Hydraulic Openings Certificate to verify that engineered hydraulic openings in foundation walls will meet the standards of Article VI.N.2.a.;

4. a certified statement that bridges will meet the standards of Article VI.O.;

5. a certified statement that containment walls will meet the standards of Article VI.P.

L. A description of the extent to which any water course will be altered or relocated as a result of the proposed development; and,

M. A statement of construction plans describing in detail how each applicable development standard in Article VI will be met.

ARTICLE IV - APPLICATION FEE AND EXPERT'S FEE

A non-refundable application fee shall be paid to the City through the Code Enforcement Office. This fee is separate from the other required permit and review fees.

a. The fee for development projects will be $100.

b. In cases where projects meet the definition for minor development the fee shall be $50.

An additional fee may be charged if the Code Enforcement Officer, Planning Board, and/or Board of Appeals needs the assistance of a professional engineer or other expert. The expert's fee shall be paid in full by the applicant within 10 days after the town submits a bill to the applicant. Failure to pay the bill shall constitute a violation of the ordinance and be grounds for the issuance of a stop work order. An expert shall not be hired by the municipality at the expense of an applicant until the applicant has either consented to such hiring in writing or been given an opportunity to be heard on the subject. An applicant who is dissatisfied with a decision to hire expert assistance may appeal that decision to the Board of Appeals.

ARTICLE V - REVIEW STANDARDS FOR FLOOD HAZARD DEVELOPMENT PERMIT APPLICATIONS

The Code Enforcement Officer shall:

A. Review all applications for the Flood Hazard Development Permit to assure that proposed developments are reasonably safe from flooding and to determine that all pertinent requirements of Article VI (Development Standards) have been, or will be met;

B. Utilize, in the review of all Flood Hazard Development Permit applications:

1. the base flood and floodway data contained in the "Flood Insurance Study - York County, Maine," as described in Article I;

2. in special flood hazard areas where base flood elevation and floodway data are not provided, the Code Enforcement Officer shall obtain, review, and reasonably utilize any base flood elevation and floodway data from federal, state, or other technical sources, including information obtained pursuant to Article III.H.1.b.(1); Article VI.M.; and Article IX.D., in order to administer Article VI of this Ordinance; and,

3. when the community establishes a base flood elevation in a Zone A by methods outlined in Article III.H.1.b.(1), the community shall submit that data to the Maine Floodplain Management Program.

C. Make interpretations of the location of boundaries of special flood hazard areas shown on the maps described in Article I of this Ordinance;

D. In the review of Flood Hazard Development Permit applications, determine that all necessary permits have been obtained from those federal, state, and local government agencies from which prior approval is required by federal or state law, including but not limited to Section 404 of the Federal Water Pollution Control Act Amendments of 1972, 33 U.S.C. 1344;

E. Notify adjacent municipalities, the Department of Environmental Protection, and the Maine Floodplain Management Program prior to any alteration or relocation of a water course and submit copies of such notifications to the Federal Emergency Management Agency;

F. If the application satisfies the requirements of this Ordinance, approve the issuance of one of the following Flood Hazard Development Permits, based on the type of development:

1. A two-part Flood Hazard Development Permit for elevated structures. Part I shall authorize the applicant to build a structure to and including the first horizontal floor only above the base flood level. At that time the applicant shall provide the Code Enforcement Officer with an “under construction” Elevation Certificate completed by a Professional Land Surveyor based on the Part I permit construction for verifying compliance with the elevation requirements of Article VI, paragraphs H., I., J., or R. Following review of the Elevation Certificate data, which shall take place within 72 hours of receipt of the application, the Code Enforcement Officer shall issue Part II of the Flood Hazard Development Permit. Part II shall authorize the applicant to complete the construction project; or,

2. A Flood Hazard Development Permit for Floodproofing of Non-Residential Structures that are new construction or substantially improved non-residential structures that are not being elevated but that meet the floodproofing standards of Article VI.I.1. The application for this permit shall include a Floodproofing Certificate signed by a registered professional engineer or architect; or,

3. A Flood Hazard Development Permit for Minor Development for all development that is not new construction or a substantial improvement, such as repairs, maintenance, renovations, or additions, whose value is less than 50% of the market value of the structure. Minor development also includes but is not limited to: accessory structures as provided for in Article VI.L., mining, dredging, filling, grading, paving, excavation, drilling operations, storage of equipment or materials, deposition or extraction of materials, public or private sewage disposal systems or water supply facilities that do not involve structures; and non-structural projects such as bridges, dams, towers, fencing, pipelines, wharves, and piers.

For development that requires review and approval as a Conditional Use, as provided for in this Ordinance, the Flood Hazard Development Permit Application shall be acted upon by the Planning Board as required in Article VII.

G. Maintain, as a permanent record, copies of all Flood Hazard Development Permit Applications, corresponding Permits issued, and data relevant thereto, including reports of the Board of Appeals on variances granted under the provisions of Article X of this Ordinance, and copies of Elevation Certificates, Floodproofing Certificates, Certificates of Compliance, and certifications of design standards required under the provisions of Articles III, VI, and VIII of this Ordinance.

ARTICLE VI - DEVELOPMENT STANDARDS

All developments in areas of special flood hazard shall meet the following applicable standards:

A. **All Development** - All development shall:

1. be designed or modified and adequately anchored to prevent flotation (excluding piers and docks), collapse, or lateral movement of the development resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy;

2. use construction materials that are resistant to flood damage;

3. use construction methods and practices that will minimize flood damage; and,

4. use electrical, heating, ventilation, plumbing, and air conditioning equipment, and other service facilities that are designed and/or located to prevent water from entering or accumulating within the components during flooding conditions.

B. **Water Supply -** All new and replacement water supply systems shall be designed to minimize or eliminate infiltration of flood waters into the systems.

C. **Sanitary Sewage Systems** - All new and replacement sanitary sewage systems shall be designed and located to minimize or eliminate infiltration of flood waters into the system and discharges from the system into flood waters.

D. **On Site Waste Disposal Systems** - On site waste disposal systems shall be located and constructed to avoid impairment to them or contamination from them during floods.

E. **Watercourse Carrying Capacity** - All development associated with altered or relocated portions of a watercourse shall be constructed and maintained in such a manner that no reduction occurs in the flood carrying capacity of the watercourse.

F. **Utilities** - New construction or substantial improvement of any structure (including manufactured homes) located within:

1. Zones A and AE shall have the bottom of all electrical, heating, plumbing, ventilation and air conditioning equipment, permanent fixtures and components, HVAC ductwork and duct systems, and any other utility service equipment, facilities, machinery, or connections servicing a structure, elevated to at least one foot above the base flood elevation.

2. Zone VE shall meet the requirements of Article VI.R.2.

G. **Physical Changes to the Natural Landscape -** Certain development projects, including but not limited to, retaining walls, sea walls, levees, berms, and rip rap, can cause physical changes that affect flooding conditions.

1. All development projects in Zones AE and VE that cause physical changes to the natural landscape shall be reviewed by a Professional Engineer to determine whether or not the project changes the base flood elevation, zone, and/or the flood hazard boundary line.

   a. If the Professional Engineer determines, through the use of engineering judgement, that the project would not necessitate a Letter of Map Revision (LOMR), a certified statement shall be provided.

   b. If the Professional Engineer determines that the project may cause a change, a hydrologic and hydraulic analysis that meets current FEMA standards shall be performed.

2. If the hydrologic and hydraulic analysis performed indicates a change to the base flood elevation, zone, and/or the flood hazard boundary line, the applicant may submit a Conditional Letter of Map Revision (C-LOMR) request to the Federal Emergency Management Agency for assurance that the as-built project will result in a change to the Flood Insurance Rate Map. Once the development is completed, a request for a Letter of Map Revision (LOMR) shall be initiated.

3. If the hydrologic and hydraulic analysis performed show a change to the base flood elevation, zone, and/or the flood hazard boundary line, as soon as practicable, but no later than 6 months after the completion of the project, the applicant shall submit the technical data to FEMA in the form of a Letter of Map Revision request.

H. **Residential** - New construction or substantial improvement of any residential structure located within:

1. Zones AE shall have the lowest floor (including basement) elevated to at least one foot above the base flood elevation.

2. Zone A shall have the lowest floor (including basement) elevated:

a. to at least one foot above the base flood elevation utilizing information obtained pursuant to Article III.H.1.b.(1); Article V.B.; or Article IX.D., or;

b. in the absence of all data described in Article VI.H.2.a., to at least two feet above the highest adjacent grade to the structure.

3. Zone VE and Coastal AE Zone (as defined) shall meet the requirements of Article VI.R.

I. **Non-Residential** - New construction or substantial improvement of any non-residential structure located within:

1. Zones AE shall have the lowest floor (including basement) elevated to at least one foot above the base flood elevation, or together with attendant utility and sanitary facilities shall:

a. be floodproofed to at least one foot above the base flood elevation so that below that elevation the structure is watertight with walls substantially impermeable to the passage of water;

b. have structural components capable of resisting hydrostatic and hydrodynamic loads and the effects of buoyancy; and,

c. be certified by a registered professional engineer or architect that the floodproofing design and methods of construction are in accordance with accepted standards of practice for meeting the provisions of this section. Such certification shall be provided with the application for a Flood Hazard Development Permit, as required by Article III.K., and shall include a record of the elevation above mean sea level to which the structure is floodproofed.

2. Zone A shall have the lowest floor (including basement) elevated:

a. to at least one foot above the base flood elevation utilizing information obtained pursuant to Article III.H.1.b.(1); Article V.B.; or Article IX.D., or;

b. in the absence of all data described in Article VI.I.2.a., to at least two feet above the highest adjacent grade to the structure; or,

c. together with attendant utility and sanitary facilities, be floodproofed to one foot above the elevation established in Article VI.I.2.a. or b. and meet the floodproofing standards of Article VI.I.1.a., b., and c.

5. Zone VE and Coastal AE Zone (as defined) shall meet the requirements of Article VI.R.

J. **Manufactured Homes** - New or substantially improved manufactured homes located within:

1. Zone AE shall:

a. be elevated such that the lowest floor (including basement) of the manufactured home is at least one foot above the base flood elevation;

b. be on a permanent foundation, which may be poured masonry slab or foundation walls, with hydraulic openings, or may be reinforced piers or block supports, any of which support the manufactured home so that no weight is supported by its wheels and axles; and,

c. be securely anchored to an adequately anchored foundation system to resist flotation, collapse, or lateral movement. Methods of anchoring may include, but are not limited to:

(1) over-the-top ties anchored to the ground at the four corners of the manufactured home, plus two additional ties per side at intermediate points (manufactured homes less than 50 feet long require one additional tie per side); or by,

(2) frame ties at each corner of the home, plus five additional ties along each side at intermediate points (manufactured homes less than 50 feet long require four additional ties per side).

(3) All components of the anchoring system described in Article VI.J.1.c.(1) & (2) shall be capable of carrying a force of 4800 pounds.

2. Zone A shall:

a. be elevated on a permanent foundation, as described in Article VI.J.1.b., such that the lowest floor (including basement) of the manufactured home is at least one foot above the base flood elevation utilizing information obtained pursuant to Article III.H.1.b.(1); Article V.B.; or Article IX.D.; or,

b. in the absence of all data described in Article VI.J.2.a., to at least two feet above the highest adjacent grade to the structure; and,

c. meet the anchoring requirements of VI.J.1.c.

5. Zone VE and Coastal AE Zone (as defined) shall meet the requirements of Article VI.R.

K. **Recreational Vehicles** - Recreational Vehicles located within:

1. Zones A and AE shall either:

a. be on the site for fewer than 180 consecutive days; and,

b. be fully licensed and ready for highway use. A recreational vehicle is ready for highway use if it is on its wheels or jacking system, is attached to the site only by quick disconnect type utilities and security devices, and has no permanently attached additions; or,

c. be permitted in accordance with the elevation and anchoring requirements for "manufactured homes" in Article VI.J.1.

2. Zone VE and Coastal AE Zone (as defined) shall meet the requirements of either Article VI.K.1.a. and b., or Article VI.R.

L. **Accessory Structures** - New construction or substantial improvement of Accessory Structures, as defined in Article XIV, shall be exempt from the elevation criteria required in Article VI.H. & I. above, if all other requirements of Article VI and all the following requirements are met.

1. Accessory Structures located in Zones A and AE shall:

a. meet the requirements of Article VI.A.1. through 4., as applicable;

b. be limited in size to a one-story two car garage;

c. have unfinished interiors and not be used for human habitation;

d. have only ground fault interrupt electrical outlets. The electric service disconnect shall be located above the base flood elevation and, when possible, outside the Special Flood Hazard Area;

e. be located outside the floodway;

f. when possible be constructed and placed on the building site so as to offer the minimum resistance to the flow of floodwaters and be placed further from the source of flooding than is the primary structure;

g. have hydraulic openings, as specified in Article VI.N.2., in at least two different walls of the accessory structure; and

h. be located outside the Coastal AE Zone.

2. Accessory Structures in Zone VE and Coastal A Zones shall meet the requirements of Article VI.R.

M. **Floodways** -

1. In Zone AE riverine areas, encroachments, including fill, new construction, substantial improvement, and other development shall not be permitted within a regulatory floodway which is designated on the community's Flood Insurance Rate Map unless a technical evaluation certified by a registered professional engineer is provided demonstrating that such

encroachments will not result in any increase in flood levels within the community during the occurrence of the base flood discharge.

2. In Zones A and AE riverine areas, for which no regulatory floodway is designated, encroachments, including fill, new construction, substantial improvement, and other development shall not be permitted in the floodway as determined in Article VI.M.3. unless a technical evaluation certified by a registered professional engineer is provided demonstrating that the cumulative effect of the proposed development, when combined with all other existing development and anticipated development:

a. will not increase the water surface elevation of the base flood more than one foot at any point within the community; and,

b. is consistent with the technical criteria contained in FEMA's guidelines and standards for flood risk analysis and mapping.

3. In Zones A and AE riverine areas, for which no regulatory floodway is designated, the regulatory floodway is determined to be the channel of the river or other water course and the adjacent land areas to a distance of one-half the width of the floodplain as measured from the normal high water mark to the upland limit of the floodplain.

N. **Hydraulic Openings/Flood Vents -** New construction or substantial improvement of any structure in Zones A and AE that meets the development standards of Article VI, including the elevation requirements of Article VI, paragraphs H., I., or J. and is elevated on posts, columns, piers, piles, or crawl spaces may be enclosed below the base flood elevation requirements provided all the following criteria are met or exceeded:

1. Enclosed areas are not "basements" as defined in Article XIV;

2. Enclosed areas shall be designed to automatically equalize hydrostatic flood forces on exterior walls by allowing for the entry and exit of flood water. Designs for meeting this requirement must either:

a. be engineered and certified by a registered professional engineer or architect; or,

b. meet or exceed the following minimum criteria:

(1) a minimum of two openings having a total net area of not less than one square inch for every square foot of the enclosed area;

(2) the bottom of all openings shall be below the base flood elevation and no higher than one foot above the lowest grade; and,

(3) openings may be equipped with screens, louvers, valves, or other coverings or devices provided that they permit the entry and exit of flood waters automatically without any external influence or control such as human intervention, including the use of electrical and other non-automatic mechanical means;

3. The enclosed area shall not be used for human habitation; and,

4. The enclosed areas are usable solely for building access, parking of vehicles, or storage.

O. **Bridges** - New construction or substantial improvement of any bridge in Zones A, AE, and VE shall be designed such that:

1. when possible, the lowest horizontal member (excluding the pilings or columns) is elevated to at least one foot above the base flood elevation; and,

2. a registered professional engineer shall certify that:

a. the structural design and methods of construction shall meet the elevation requirements of this section and the floodway standards of Article VI.M.; and,

b. the foundation and superstructure attached thereto are designed to resist flotation, collapse, and lateral movement due to the effects of wind and water loads acting simultaneously on all structural components. Water loading values used shall be those associated with the base flood.

P. **Containment Walls -** New construction or substantial improvement of any containment wall located within:

1. Zones A, AE, and VE shall:

a. have the containment wall elevated to at least one foot above the base flood elevation;

b. have structural components capable of resisting hydrostatic and hydrodynamic loads and the effects of buoyancy; and,

c. be certified by a registered professional engineer or architect that the design and methods of construction are in accordance with accepted standards of practice for meeting the provisions of this section. Such certification shall be provided with the application for a Flood Hazard Development Permit, as required by Article III.K.

Q. **Wharves, Piers, and Docks** - New construction or substantial improvement of wharves, piers, and docks are permitted in and over water and seaward of the mean high tide if the following requirements are met:

1. in Zones A and AE, wharves, piers, and docks shall comply with all applicable local, state, and federal regulations; or,

2. in Zone VE, wharves, piers, and docks shall have a registered professional engineer develop or review the structural design, specifications, and plans for the construction.

R. **Coastal Floodplains** -

1. New construction located within Zones AE and VE shall be located landward of the reach of mean high tide except as provided in Article VI.R.7.

2. New construction or substantial improvement of any structure located within Zone VE or Coastal AE Zone shall have the bottom of all electrical, heating, plumbing, ventilation and air conditioning equipment, permanent fixtures and components, HVAC ductwork and duct systems, and any other utility service equipment, facilities, machinery, or connections servicing a structure, elevated to at least one foot above the base flood elevation. Systems, fixtures, equipment, and components shall not be mounted on or penetrate through walls intended to break away under flood loads.

3. New construction or substantial improvement of any structure located within Zone VE and Coastal AE Zones (as defined) shall:

   a. be elevated on posts or columns such that:

      (1) the bottom of the lowest horizontal structural member of the lowest floor (excluding the pilings or columns) is elevated to at least one foot above the base flood elevation;

      (2) the pile or column foundation and the elevated portion of the structure attached thereto is anchored to resist flotation, collapse, and lateral movement due to the effects of wind and water loads acting simultaneously on all building components; and,

      (3) water loading values used shall be those associated with the base flood. Wind loading values used shall be those required by applicable state and local building standards.

   b. have the space below the lowest floor:

      (1) free of obstructions; or,

      (2) constructed with open wood lattice-work, or insect screening intended to collapse under wind and water without causing collapse, displacement, or other structural damage to the elevated portion of the building or supporting piles or columns; or,

      (3) constructed with non-supporting breakaway walls that have a design safe loading resistance of not less than 10 or more than 20 pounds per square foot.

   c. require a registered professional engineer or architect to:

      (1) develop or review the structural design, specifications, and plans for the construction, which must meet or exceed the technical criteria contained in the *Coastal Construction Manual*, (FEMA-55); and,

      (2) certify that the design and methods of construction to be used are in accordance with accepted standards of practice for meeting the criteria of Article VI.R.3.

4. The use of fill for structural support in Zone VE and Coastal AE Zones is prohibited.

5. Human alteration of sand dunes within Zone VE and Coastal AE Zones is prohibited unless it can be demonstrated that such alterations will not increase potential flood damage.

6. The area below the lowest floor shall be used solely for parking vehicles, building access, and storage.

7. Conditional Use - Lobster sheds and fishing sheds may be located seaward of mean high tide and shall be exempt from the elevation requirement in Article VI.I. only if permitted as a Conditional Use following review and approval by the Planning Board, as provided in Article VII, and if all the following requirements and those of Article VI.A., VI.M., and VI.N. are met:

   a. The conditional use shall be limited to low value structures such as metal or wood sheds 200 square feet or less and shall not exceed more than one story.

   b. The structure shall be securely anchored to the wharf or pier to resist flotation, collapse, and lateral movement due to the effect of wind and water loads acting simultaneously on all building components.

   c. The structure will not adversely increase wave or debris impact forces affecting nearby buildings.

   d. The structure shall have unfinished interiors and shall not be used for human habitation.

   e. Any mechanical, utility equipment, and fuel storage tanks must be anchored and either elevated or floodproofed to at least one foot above the base flood elevation.

   f. All electrical outlets shall be ground fault interrupt type. The electrical service disconnect shall be located on shore above the base flood elevation and, when possible, outside the Special Flood Hazard Area.

ARTICLE VII - CONDITIONAL USE REVIEW

The Planning Board shall hear and decide upon applications for conditional uses provided for in this Ordinance. The Planning Board shall hear and approve, approve with conditions, or disapprove all applications for conditional uses. An applicant informed by the Code Enforcement Officer that a Conditional Use Permit is required shall file an application for the permit with the Planning Board.

A. Review Procedure for a Conditional Use Flood Hazard Development Permit

1. The Flood Hazard Development Permit Application with additional information attached addressing how each of the conditional use criteria specified in the Ordinance will be satisfied may serve as the permit application for the Conditional Use Permit.

2. Before deciding any application, the Planning Board shall hold a public hearing on the application within thirty days of their receipt of the application.

3. If the Planning Board finds that the application satisfies all relevant requirements of the ordinance, the Planning Board must approve the application or approve with conditions within 45 days of the date of the public hearing.

4. A Conditional Use Permit issued under the provisions of this Ordinance shall expire if the work or change involved is not commenced within 180 days of the issuance of the permit by the Planning Board.

5. The applicant shall be notified by the Planning Board in writing over the signature of the Chairman of the Planning Board that flood insurance is not available for structures located entirely over water or seaward of mean high tide.

B. Expansion of Conditional Uses

1. No existing building or use of premises may be expanded or enlarged without a permit issued under this section if that building or use was established or constructed under a previously issued Conditional Use Permit or if it is a building or use which would require a Conditional Use Permit if being newly-established or constructed under this Ordinance.

ARTICLE VIII - CERTIFICATE OF COMPLIANCE

No land in a special flood hazard area shall be occupied or used and no structure which is constructed or substantially improved shall be occupied until a Certificate of Compliance is issued by the Code Enforcement Officer subject to the following provisions:

A. For New Construction or Substantial Improvement of any elevated structure the applicant shall submit to the Code Enforcement Officer:

1. an Elevation Certificate completed by a Professional Land Surveyor for compliance with Article VI, paragraphs H., I., J., or R.; and,

2. for structures in Zone VE and Coastal AE Zone (as defined), certification by a registered professional engineer or architect that the design and methods of construction used are in compliance with Article VI.R.3.

B. The applicant shall submit written notification to the Code Enforcement Officer that the development is complete and complies with the provisions of this ordinance.

C. Within 10 working days, the Code Enforcement Officer shall:

1. review the required certificate(s) and the applicant's written notification; and,

2. upon determination that the development conforms to the provisions of this ordinance, shall issue a Certificate of Compliance.

ARTICLE IX - REVIEW OF SUBDIVISION AND DEVELOPMENT PROPOSALS

The Planning Board shall, when reviewing subdivisions and other proposed developments that require review under other federal law, state law, local ordinances or regulations, and all projects on 5 or more disturbed acres, or in the case of manufactured home parks divided into two or more lots, assure that:

A. All such proposals are consistent with the need to minimize flood damage.

B. All public utilities and facilities, such as sewer, gas, electrical, and water systems are located and constructed to minimize or eliminate flood damages.

C. Adequate drainage is provided so as to reduce exposure to flood hazards.

D. All proposals include base flood elevations, flood boundaries, and, in a riverine floodplain, floodway data. These determinations shall be based on engineering practices recognized by the Federal Emergency Management Agency.

E. Any proposed development plan must include a condition of plan approval requiring that structures on any lot in the development having any portion of its land within a Special Flood Hazard Area are to be constructed in accordance with Article VI of this ordinance. Such requirement will be included in any deed, lease, purchase and sale agreement, or document transferring or expressing an intent to transfer any interest in real estate or structure, including but not limited to a time-share interest. The condition shall clearly articulate that the municipality may enforce any violation of the construction requirement and that fact shall also be included in the deed or any other document previously described. The construction requirement shall also be clearly stated on any map, plat, or plan to be signed by the Planning Board or local reviewing authority as part of the approval process.

ARTICLE X - APPEALS AND VARIANCES

The Board of Appeals of the City of Biddeford may, upon written application of an aggrieved party, hear and decide appeals where it is alleged that there is an error in any order, requirement, decision, or determination made by, or failure to act by, the Code Enforcement Officer or Planning Board in the administration or enforcement of the provisions of this Ordinance.

The Board of Appeals may grant a variance from the requirements of this Ordinance consistent with state law and the following criteria:

A. Variances shall not be granted within any designated regulatory floodway if any increase in flood levels during the base flood discharge would result.

B. Variances shall be granted only upon:

1. a showing of good and sufficient cause; and,

2. a determination that should a flood comparable to the base flood occur, the granting of a variance will not result in increased flood heights, additional threats to public safety, public expense, or create nuisances, cause fraud or victimization of the public, or conflict with existing local laws or ordinances; and,

3. a showing that the issuance of the variance will not conflict with other state, federal, or local laws or ordinances; and,

4. a determination that failure to grant the variance would result in "undue hardship," which in this sub-section means:

   a. that the land in question cannot yield a reasonable return unless a variance is granted; and,

   b. that the need for a variance is due to the unique circumstances of the property and not to the general conditions in the neighborhood; and,

   c. that the granting of a variance will not alter the essential character of the locality; and,

   d. that the hardship is not the result of action taken by the applicant or a prior owner.

C. Variances shall only be issued upon a determination that the variance is the minimum necessary, considering the flood hazard, to afford relief, and the Board of Appeals may impose such conditions to a variance as is deemed necessary.

D. Variances may be issued for new construction, substantial improvements, or other development for the conduct of a functionally dependent use provided that:

1. the criteria of Article X.A. through C. and Article VI.M. are met; and,

2. the structure or other development is protected by methods that minimize flood damages during the base flood and create no additional threats to public safety.

E. Variances may be issued for the repair, reconstruction, rehabilitation, or restoration of Historic Structures upon the determination that:

1. the development meets the criteria of Article X.A. through C.; and,

2. the proposed repair, reconstruction, rehabilitation, or restoration will not preclude the structure's continued designation as a Historic Structure and the variance is the minimum necessary to preserve the historic character and design of the structure.

F. Variances may be issued for new construction and substantial improvement of Agricultural Structures being used for the conduct of agricultural uses provided that:

1. the development meets the criteria of Article X.A. through C.; and,

2. the development meets the criteria of Article VI.M. and Article VI.N.

G. Any applicant who meets the criteria of Article X.A. through C. and Article X.D., E., or F. shall be notified by the Board of Appeals in writing over the signature of the Chairman of the Board of Appeals that:

1. the issuance of a variance to construct a structure below the base flood level will result in greatly increased premium rates for flood insurance up to amounts as high as $25 per $100 of insurance coverage; and,

2. such construction below the base flood level increases risks to life and property; and,

3. the applicant agrees in writing that the applicant is fully aware of all the risks inherent in the use of land subject to flooding, assumes those risks, and agrees to indemnify and defend the municipality against any claims filed against it that are related to the applicant's decision to use land located in a floodplain and that the applicant individually releases the municipality from any claims the applicant may have against the municipality that are related to the use of land located in a floodplain.

H. Appeal Procedure for Administrative and Variance Appeals

1. An administrative or variance appeal may be taken to the Board of Appeals by an aggrieved party within thirty days after receipt of a written decision of the Code Enforcement Officer or Planning Board.

2. Upon being notified of an appeal, the Code Enforcement Officer or Planning Board, as appropriate, shall transmit to the Board of Appeals all of the documents constituting the record of the decision appealed from.

3. The Board of Appeals shall hold a public hearing on the appeal within thirty-five days of its receipt of an appeal request.

4. The person filing the appeal shall have the burden of proof.

5. The Board of Appeals shall decide all appeals within thirty-five days after the close of the hearing and shall issue a written decision on all appeals.

6. The Board of Appeals shall submit to the Code Enforcement Officer a report of all variance actions, including justification for the granting of the variance and an authorization for the Code Enforcement Officer to issue a Flood Hazard Development Permit, which includes any conditions to be attached to said permit.

7. Any aggrieved party who participated as a party during the proceedings before the Board of Appeals may take an appeal to Superior Court in accordance with State laws within forty-five days from the date of any decision of the Board of Appeals.

ARTICLE XI - ENFORCEMENT AND PENALTIES

A. It shall be the duty of the Code Enforcement Officer to enforce the provisions of this Ordinance pursuant to Title 30-A MRSA § 4452.

B. The penalties contained in Title 30-A MRSA § 4452 shall apply to any violation of this Ordinance.

C. In addition to other actions, the Code Enforcement Officer, upon identifying a violation, may submit a declaration to the Administrator of the Federal Insurance Administration requesting a flood insurance denial. The valid declaration shall consist of:

1. the name of the property owner and address or legal description of the property sufficient to confirm its identity or location;

2. a clear and unequivocal declaration that the property is in violation of a cited State or local law, regulation, or ordinance;

3. a clear statement that the public body making the declaration has authority to do so and a citation to that authority;

4. evidence that the property owner has been provided notice of the violation and the prospective denial of insurance; and,

5. a clear statement that the declaration is being submitted pursuant to Section 1316 of the National Flood Insurance Act of 1968, as amended.

ARTICLE XII - VALIDITY AND SEVERABILITY

If any section or provision of this Ordinance is declared by the courts to be invalid, such decision shall not invalidate any other section or provision of this Ordinance.

ARTICLE XIII - CONFLICT WITH OTHER ORDINANCES

This Ordinance shall not in any way impair or remove the necessity of compliance with any other applicable rule, ordinance, regulation, bylaw, permit, or provision of law. Where this Ordinance imposes a greater restriction upon the use of land, buildings, or structures, the provisions of this Ordinance shall control.

ARTICLE XIV - DEFINITIONS

Unless specifically defined below, words and phrases used in this Ordinance shall have the same meaning as they have at common law, and to give this Ordinance its most reasonable application. Words used in the present tense include the future, the singular number includes the plural, and the plural number includes the singular. The word "may" is permissive; "shall" is mandatory and not discretionary.

Accessory Structure - a structure which is on the same parcel of property as a principal structure and the use of which is incidental to the use of the principal structure.

Adjacent Grade - the natural elevation of the ground surface prior to construction next to the proposed walls of a structure.

Agricultural Structure - structures that are used exclusively for agricultural purposes or uses in connection with the production, harvesting, storage, raising, or drying of agricultural commodities and livestock. Structures that house tools or equipment used in connection with these purposes or uses are also considered to have agricultural purposes or uses.

Area of Special Flood Hazard - land in the floodplain having a one percent or greater chance of flooding in any given year, as specifically identified in the Flood Insurance Study cited in Article I of this Ordinance.

Base Flood - a flood having a one percent chance of being equaled or exceeded in any given year, commonly called the 100-year flood.

Basement - any area of a building that includes a floor that is subgrade (below ground level) on all sides.

Breakaway Wall - a wall that is not part of the structural support of the building and is intended through its design and construction to collapse under specific lateral loading forces, without causing damage to the elevated portion of the building or supporting foundation system.

Building - see **Structure**.

Certificate of Compliance - a document signed by the Code Enforcement Officer stating that a structure is in compliance with all of the provisions of this Ordinance.

Coastal AE Zone - The portion of the Coastal High Hazard Area with wave heights between 1.5 feet and 3.0 feet and bounded by a line labeled the "Limit of Moderate Wave Action" (LiMWA) on a Flood Insurance Rate Map (FIRM). VE Zone floodplain construction standards are applied to development, new construction, and substantial improvements in the Coastal AE Zone.

Coastal High Hazard Area - An area of special flood hazard extending from offshore to the inland limit of a primary frontal dune along an open coast and any other area subject to high velocity wave action from storms or seismic sources. Coastal High Hazard Areas are designated as Zone VE and Zone AE bounded by a line labeled "Limit of Moderate Wave Action" (LiMWA) on a Flood Insurance Rate Map (FIRM).

Code Enforcement Officer - a person certified under Title 30-A MRSA, Section 4451 (including exceptions in Section 4451, paragraph 1) and employed by a municipality to enforce all applicable comprehensive planning and land use laws.

Conditional Use - a use that, because of its potential impact on surrounding areas and structures, is permitted only upon review and approval by the Planning Board pursuant to Article VII.

Containment Wall - a wall surrounding all sides of an above ground tank to contain any spills or leaks.

Development - any manmade change to improved or unimproved real estate. This includes, but is not limited to, buildings or other structures; mining, dredging, filling, grading, paving, excavation, drilling operations or storage of equipment or materials; and the storage, deposition, or extraction of materials.

Elevated Building - a non-basement building that is:

a. built, in the case of a building in Zones A or AE, so that the top of the elevated floor, or in the case of a building in Zone VE or Coastal AE Zone, to have the bottom of the lowest horizontal structural member of the elevated floor, elevated above the ground level by means of pilings, columns, posts, or piers; and,

b. adequately anchored to not impair the structural integrity of the building during a flood of up to one foot above the magnitude of the base flood.

In the case of Zones A or AE, **Elevated Building** also includes a building elevated by means of fill or solid foundation perimeter walls with hydraulic openings sufficient to facilitate the unimpeded movement of flood waters, as required in Article VI.N. In the case of Zone VE and Coastal AE Zone, **Elevated Building** also includes a building otherwise meeting the definition of elevated building, even though the lower area is enclosed by means of breakaway walls, if the breakaway walls meet the standards of Article VI.R.3.b.(3).

Elevation Certificate - an official form (FEMA Form FF-206-FY-22-152, as amended) that is used to verify compliance with the floodplain management regulations of the National Flood Insurance Program.

Existing Manufactured Home Park or Subdivision - a manufactured home park or subdivision that was recorded in the deed registry prior to the adoption date of the community's first floodplain management regulations.

Flood or Flooding -

a. A general and temporary condition of partial or complete inundation of normally dry land areas from:

1. The overflow of inland or tidal waters.

2. The unusual and rapid accumulation or runoff of surface waters from any source.

b. The collapse or subsidence of land along the shore of a lake or other body of water as a result of erosion or undermining caused by waves or currents of water exceeding anticipated cyclical levels or suddenly caused by an unusually high water level in a natural body of water, accompanied by a severe storm, or by an unanticipated force of nature, such as flash flood or an abnormal tidal surge, or by some similarly unusual and unforeseeable event which results in flooding as defined in paragraph a.1. of this definition.

Flood Elevation Study - an examination, evaluation, and determination of flood hazards and, if appropriate, corresponding water surface elevations.

Flood Insurance Rate Map (FIRM) - an official map of a community, on which the Federal Insurance Administrator has delineated both the special hazard areas and the risk premium zones applicable to the community.

Flood Insurance Study - see **Flood Elevation Study**.

Floodplain or Floodprone Area - any land area susceptible to being inundated by water from any source (see **Flood or Flooding**).

Floodplain Management - the operation of an overall program of corrective and preventive measures for reducing flood damage, including but not limited to emergency preparedness plans, flood control works, and floodplain management regulations.

Floodplain Management Regulations - zoning ordinances, subdivision regulations, building codes, health regulations, special purpose ordinances (such as a floodplain ordinance, grading ordinance, and erosion control ordinance), and other applications of police power. The term describes such state or local regulations, in any combination thereof, which provide standards for the purpose of flood damage prevention and reduction.

Floodproofing - any combination of structural and non-structural additions, changes, or adjustments to structures which reduce or eliminate flood damage to real estate or improved real property, water and sanitary facilities, structures, and contents.

Floodway - see **Regulatory Floodway**.

Floodway Encroachment Lines - the lines marking the limits of floodways on federal, state, and local floodplain maps.

Freeboard - a factor of safety usually expressed in feet above a flood level for purposes of floodplain management. Freeboard tends to compensate for the many unknown factors, such as wave action, bridge openings, and the hydrological effect of urbanization of the watershed, which could contribute to flood heights greater than the height calculated for a selected size flood and floodway conditions.

Functionally Dependent Use - a use which cannot perform its intended purpose unless it is located or carried out in close proximity to water. The term includes only docking facilities, port facilities that are necessary for the loading and unloading of cargo or passengers, and ship building and ship repair facilities, but does not include long-term storage or related manufacturing facilities.

Historic Structure - any structure that is:

a. Listed individually in the National Register of Historic Places (a listing maintained by the Department of Interior) or preliminarily determined by the Secretary of the Interior as meeting the requirements for individual listing on the National Register;

b. Certified or preliminarily determined by the Secretary of the Interior as contributing to the historical significance of a registered historic district or a district preliminarily determined by the Secretary of the Interior to qualify as a registered historic district;

c. Individually listed on a state inventory of historic places in states with historic preservation programs which have been approved by the Secretary of the Interior; or,

d. Individually listed on a local inventory of historic places in communities with historic preservation programs that have been certified either:

1. By an approved state program as determined by the Secretary of the Interior, or,

2. Directly by the Secretary of the Interior in states without approved programs.

Limit of Moderate Wave Action (LiMWA) - The landward limit of the 1.5 foot breaking wave within a Coastal AE Zone. These areas are bounded by a line labeled "Limit of Moderate Wave Action" (LiMWA) on a Flood Insurance Rate Map (FIRM). The LiMWA line delineates that portion of the Special Flood Hazard Area (SFHA) landward of a VE zone in which the principal sources of flooding are astronomical high tides, storm surges, or tsunamis, not riverine sources. These areas may be subject to wave effects, velocity flows, erosion, scour, or combinations of these forces. The floodplain development and construction standards for VE Zones will be applied in the Coastal AE Zone.

Locally Established Datum - for purposes of this ordinance, an elevation established for a specific site to which all other elevations at the site are referenced. This elevation is generally not referenced to the National Geodetic Vertical Datum (NGVD), North American Vertical Datum (NAVD), or any other established datum and is used in areas where Mean Sea Level data is too far from a specific site to be practically used.

Lowest Floor - the lowest floor of the lowest enclosed area (including basement). An unfinished or flood resistant enclosure, usable solely for parking of vehicles, building access, or storage in an area other than a basement area is not considered a building's lowest floor, provided that such enclosure is not built so as to render the structure in violation of the applicable non-elevation design requirements described in Article VI.N. of this Ordinance.

Manufactured Home - a structure, transportable in one or more sections, which is built on a permanent chassis and is designed for use with or without a permanent foundation when connected to the required utilities. For floodplain management purposes the term manufactured home also includes park trailers, travel trailers, and other similar vehicles placed on a site for greater than 180 consecutive days.

Manufactured Home Park or Subdivision - a parcel (or contiguous parcels) of land divided into two or more manufactured home lots for rent or sale.

Mean Sea Level - for the purposes of the National Flood Insurance Program, the National Geodetic Vertical Datum (NGVD) of 1929, North American Vertical Datum (NAVD), or other datum, to which base flood elevations shown on a community's Flood Insurance Rate Map are referenced.

Minor Development - all development that is not new construction or a substantial improvement, such as repairs, maintenance, renovations, or additions, whose value is less than 50% of the market value of the structure. It also includes but is not limited to: accessory structures as provided for in Article VI.L., mining, dredging, filling, grading, paving, excavation, drilling operations, storage of equipment or materials, deposition or extraction of materials, public or private sewage disposal systems or water supply facilities that do not involve structures; and non-structural projects such as bridges, dams, towers, fencing, pipelines, wharves, and piers.

National Geodetic Vertical Datum (NGVD) - the national vertical datum, a standard established in 1929, which is used by the National Flood Insurance Program (NFIP). NGVD is based upon mean sea level in 1929 and has been called "1929 Mean Sea Level" (MSL).

New Construction - structures for which the "start of construction" commenced on or after the effective date of the initial floodplain management regulations adopted by a community and includes any subsequent improvements to such structures.

North American Vertical Datum (NAVD) - the national datum whose standard was established in 1988, which is the new vertical datum used by the National Flood Insurance Program (NFIP) for all new Flood Insurance Rate Maps. NAVD is based upon the vertical data used by other North American countries such as Canada and Mexico and was established to replace NGVD because of constant movement of the earth's crust, glacial rebound and subsidence, and the increasing use of satellite technology.

100-year flood - see **Base Flood**.

Recreational Vehicle - a vehicle that is:

a. built on a single chassis;

b. 400 square feet or less when measured at the largest horizontal projection, not including slideouts;

c. designed to be self-propelled or permanently towable by a motor vehicle; and,

d. designed primarily not for use as a permanent dwelling but as temporary living quarters for recreational, camping, travel, or seasonal use.

Regulatory Floodway -

a. the channel of a river or other water course and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height, and,

b. when not designated on the community's Flood Insurance Rate Map, it is considered to be the channel of a river or other water course and the adjacent land areas to a distance of one-half the width of the floodplain, as measured from the normal high water mark to the upland limit of the floodplain.

Riverine - relating to, formed by, or resembling a river (including tributaries), stream, brook, etc.

Special Flood Hazard Area - see **Area of Special Flood Hazard.**

Start of Construction - the date the building permit was issued, provided the actual start of construction, repair, reconstruction, rehabilitation, addition, placement, substantial improvement, or other improvement was within 180 days of the permit date. The actual start means either the first placement of permanent construction of a structure on a site, such as the pouring of slab or footings, the installation of piles, the construction of columns, or any work beyond the stage of excavation; or the placement of a

manufactured home on a foundation. Permanent construction does not include land preparation, such as clearing, grading, and filling; nor does it include the installation of streets and/or walkways; nor does it include excavation for basement, footings, piers, or foundations or the erection of temporary forms; nor does it include the installation on the property of accessory buildings, such as garages or sheds not occupied as dwelling units or not part of the main structure. For a substantial improvement, the actual start of construction means the first alteration of any wall, ceiling, floor, or other structural part of a building, or modification of any construction element, whether or not that alteration affects the external dimensions of the building.

Structure - for floodplain management purposes, a walled and roofed building. A gas or liquid storage tank that is principally above ground is also a structure.

Substantial Damage - damage of any origin sustained by a structure whereby the cost of restoring the structure to its before damage condition would equal or exceed 50 percent of the market value of the structure before the damage occurred.

Substantial Improvement - any reconstruction, rehabilitation, addition, or other improvement of a structure, the cost of which equals or exceeds 50 percent of the market value of the structure before the start of construction of the improvement. This term includes structures which have incurred substantial damage, regardless of the actual repair work performed. The term does not, however, include either:

a. Any project for improvement of a structure to correct existing violations of state or local health, sanitary, or safety code specifications which have been identified by the local code enforcement official and which are the minimum necessary to assure safe living conditions; or,

b. Any alteration of a Historic Structure, provided that the alteration will not preclude the structure's continued designation as a historic structure, and a variance is obtained from the Board of Appeals.

Variance - a grant of relief by a community from the terms of a floodplain management regulation.

Violation - the failure of a structure or development to comply with a community's floodplain management regulations.

ARTICLE XV - ABROGATION

This ordinance repeals and replaces any municipal ordinance previously enacted to comply with the National Flood Insurance Act of 1968 (P.L. 90-488, as amended).

ARTICLE XVI - DISCLAIMER OF LIABILITY

The degree of flood protection required by the ordinance is considered reasonable but does not imply total flood protection.

~~Section 1 **Purpose and establishment.**~~
~~[Ord. No. 2006.26,[1] 5-2-2006]~~

~~Certain areas of the City of Biddeford, Maine are subject to periodic flooding, causing serious damages to properties within these areas. Relief is available in the form of flood insurance as authorized by the National Flood Insurance Act of 1968.~~

~~Therefore, the City of Biddeford, Maine has chosen to become a participating community in the National Flood Insurance Program, and agrees to comply with the requirements of the National Flood Insurance Act of 1968 (P.L. 90-488, as amended) as delineated in this Floodplain Management Ordinance.~~

~~It is the intent of the City of Biddeford, Maine to require the recognition and evaluation of flood hazards in all official actions relating to land use in the floodplain areas having special flood hazards.~~
~~The City of Biddeford has the legal authority to adopt land use and control measures to reduce future flood losses pursuant to Title 30-A M.R.S.A. §§ 3001 through 3007, 4352 and 4401 through 4407, and Title 38 M.R.S.A. § 440.~~

~~The National Flood Insurance Program, established in the aforesaid Act, provides that areas of the City of Biddeford having a special flood hazard be identified by the Federal Emergency Management Agency and that floodplain management measures be applied in such flood hazard areas. This ordinance establishes a flood hazard development permit system and review procedure for development activities in the designated flood hazard areas of the City of Biddeford, Maine.~~

~~The areas of special flood hazard, Zones A, A1 — 30, AO, and V1 — 30, are identified by the Federal Emergency Management Agency in a report entitled "Flood Insurance Study-City of Biddeford, Maine, York County," dated November 15, 1983 with accompanying "Flood Insurance Rate Map" dated May 15, 1984, and "Flood Boundary and Floodway Map" dated May 15, 1984, which are hereby adopted by reference and declared to be a part of this ordinance.~~

~~[1] *Editor's Note: This ordinance amended former Art. XII, Floodplain Management Ordinance, in its entirety. Said Art. XII was originally adopted as Ord. of 6-2-198(3), Arts. I through XIV.*~~

~~Section 2 **Permit required.**~~
~~[Ord. No. 2006.26, 5-2-2006]~~
~~Before any construction or other development (as defined in Section 14), including the placement of manufactured homes, begins within any areas of special flood hazard established in Section **1**, a flood hazard development permit shall be obtained from the Code Enforcement~~

~~Officer except as provided in Section **7**. This permit shall be in addition to any other building permits which may be required pursuant to the codes and ordinances of the City of Biddeford, Maine.~~

~~Section 3 **Application for permit.**~~
~~[Ord. No. 2006.26, 5-2-2006]~~
~~The application for a flood hazard development permit shall be submitted to the Code Enforcement Officer and shall include:~~

~~**A.** The name, address and phone number of the applicant, owner, and contractor;~~

~~**B.** An address and a map indicating the location of the construction site;~~

~~**C.** A site plan showing location of existing and/or proposed development, including but not limited to structures, sewage disposal facilities, water supply facilities, areas to be cut and filled, and lot dimensions;~~

~~**D.** A statement of the intended use of the structure and/or development;~~

~~**E.** A statement of the cost of the development including all materials and labor;~~

~~**F.** A statement as to the type of sewage system proposed;~~

~~**G.** Specification of dimensions of the proposed structure and/or development;~~
~~[Items H—K3 apply only to new construction and substantial improvements.]~~

~~**H.** The elevation in relation to the National Geodetic Vertical Datum (NGVD), or to a locally established datum in Zone A only, of the:~~

~~**1.** Base flood at the proposed site of all new or substantially improved structures, which is determined:~~

~~**a.** In Zones A1—30, AO, and V1—30, from data contained in the "Flood Insurance Study-City of Biddeford, Maine," as described in Section **1**; or~~

~~**b.** In Zone A:~~

~~**(1)** From any base flood elevation data from federal, state, or other technical sources (such as FEMA's Quick-2 model, FEMA 265/July 1995), including information obtained pursuant to Section 6K and 9D;~~

(2) From the contour elevation extrapolated from a best fit analysis of the floodplain boundary when overlaid onto a USGS Quadrangle Map or other topographic map prepared by a professional land surveyor or registered professional engineer, if the floodplain boundary has a significant correlation to the elevation contour line(s); or, in the absence of all other data;

(3) To be the elevation of the ground at the intersection of the floodplain boundary and a line perpendicular to the shoreline which passes along the ground through the site of the proposed building.

2. Highest and lowest grades at the site adjacent to the walls of the proposed building;

3. Lowest floor, including basement; and whether or not such structures contain a basement; and,

4. Level, in the case of nonresidential structures only, to which the structure will be floodproofed;

I. A description of an elevation reference point established on the site of all developments for which elevation standards apply as required in Section **6**;

J. A written certification by a professional land surveyor, registered professional engineer or architect, that the base flood elevations and grade elevations shown on the application are accurate;

K. The following certifications as required in Section **6** by a registered professional engineer or architect:

1. A floodproofing certificate (FEMA Form 81-65, 01/03, as amended), to verify that the floodproofing methods for any nonresidential structures will meet the floodproofing criteria of Section 3H4; Section 6G; and other applicable standards in Section **6**;

2. A V-Zone certificate to verify that the construction in coastal high hazard areas, Zones V1—30, will meet the criteria of Section 6P; and other applicable standards in Section **6**;

3. A hydraulic openings certificate to verify that engineered hydraulic openings in foundation walls will meet the standards of Section 6L2a;

~~**4.** A certified statement that bridges will meet the standards of Section 6M;~~

~~**5.** A certified statement that containment walls will meet the standards of Section 6N;~~

~~**L.** A description of the extent to which any watercourse will be altered or relocated as a result of the proposed development; and~~

~~**M.** A statement of construction plans describing in detail how each applicable development standard in Section **6** will be met.~~

~~Section 4 **Application fee and expert's fee.**~~
~~[Ord. No. 2006.26, 5-2-2006]~~
~~A nonrefundable application fee shall be paid to the City through the Code Enforcement Office. This fee is separate from other required permit and review fees.~~

~~**a.** The fee for development projects will be $100.~~

~~**b.** In cases where projects meet the definition for minor development the fee shall be $50.~~

~~An additional fee may be charged if the Code Enforcement Officer and/or Board of Appeals needs the assistance of a professional engineer or other expert. The expert's fee shall be paid in full by the applicant within 10 days after the town submits a bill to the applicant. Failure to pay the bill shall constitute a violation of the ordinance and be grounds for the issuance of a stop work order. An expert shall not be hired by the municipality at the expense of an applicant until the applicant has either consented to such hiring in writing or been given an opportunity to be heard on the subject. An applicant who is dissatisfied with a decision to hire an expert may appeal that decision to the Board of Appeals.~~

~~Section 5 **Review standards for flood hazard development permit applications.**~~
~~[Ord. No. 2006.26, 5-2-2006]~~
~~The Code Enforcement Officer shall:~~
~~**A.** Review all applications for the flood hazard development permit to assure that proposed building sites are reasonably safe from flooding and to determine that all pertinent requirements of Section **6** (development standards) have, or will be met;~~

~~**B.** Utilize, in the review of all flood hazard development permit applications:~~

~~**1.** The base flood data and floodway data contained in the "Flood Insurance Study – City of Biddeford, Maine," as described in Section **1**.~~

~~**2.** In special flood hazard areas where base flood elevation and floodway data are not provided, the Code Enforcement Officer shall obtain, review and reasonably utilize any base flood elevation and floodway data from federal, state, or other technical sources, including information obtained pursuant to Section **3** H1b; Section 6K and Section 9D, in order to administer Section **6** of this ordinance.~~

~~**C.** Make interpretations of the location of boundaries of special flood hazard areas shown on the maps described in Section **1** of this ordinance;~~

~~**D.** In the review of flood hazard development permit applications, determine that all necessary permits have been obtained from those federal, state, and local government agencies from which prior approval is required by federal or state law, including but not limited to Section 404 of the Federal Water Pollution Control Act Amendments of 1972, 33 U.S.C. 1344;~~

~~**E.** Notify adjacent municipalities, the Department of Environmental Protection, and the Maine Floodplain Management Program in the State Planning Office prior to any alteration or relocation of a watercourse and submit copies of such notifications to the Federal Emergency Management Agency;~~

~~**F.** If the application satisfies the requirements of this ordinance, approve the issuance of one of the following flood hazard development permits based on the type of development:~~

~~**1.** A two-part flood hazard development permit for elevated structures. Part I shall authorize the applicant to build a structure to and including the first horizontal floor only above the base flood level. At that time the applicant shall provide the Code Enforcement Officer with an elevation certificate completed by a professional land surveyor, registered professional engineer or architect, based on the Part I permit construction, "as built," for verifying compliance with the elevation requirements of Section **6**, Paragraphs F, G, H, or P. Following review of the elevation certificate data, which shall take place within 72 hours of receipt of the application, the Code Enforcement Officer shall issue Part II of the flood hazard development permit. Part II shall authorize the applicant to complete the construction project; or~~

~~**2.** Issue a flood hazard development permit for flood proofing of nonresidential structures that are new construction or substantially improved nonresidential structures that are not being elevated but that meet the floodproofing standards of Section 6G1a, b, and c. The application for this permit shall include a floodproofing certificate signed by a registered professional engineer or architect; or~~

~~**3.** A flood hazard development permit for minor development for all development that is not new construction or a substantial improvement, such as repairs, maintenance, or renovations, whose value is less than 50% of the assessed value of the structure. Minor development also includes, but is not limited to: accessory structures as provided for in Section 6J, mining, dredging, filling, grading, paving, excavation, drilling operations, storage of equipment or materials, deposition or extraction of materials, public or private sewage disposal systems or water supply facilities that do not involve structures; and nonstructural projects such as bridges, dams, towers, fencing, pipelines, wharves, and piers.~~

~~**G.** Maintain, as a permanent record, copies of all flood hazard development permit applications, corresponding permits issued, and data relevant thereto, including reports of the Board of Appeals on variances granted under the provisions of Section **10** of this ordinance, and copies of elevation certificates, floodproofing certificates, certificates of compliance and certifications of design standards required under the provisions of Sections **3**, **6**, and **8** of this ordinance.~~

~~Section 6 **Development standards.**~~
~~[Ord. No. 2006.26, 5-2-2006]~~
~~All development in areas of special flood hazard shall meet the following applicable standards:~~
~~**A.** All development. All development shall:~~

~~**1.** Be designed or modified and adequately anchored to prevent flotation (excluding piers and docks), collapse or lateral movement of the development resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy;~~

~~**2.** Use construction materials that are resistant to flood damage;~~

~~**3.** Use construction methods and practices that will minimize flood damage; and,~~

4. Use electrical, heating, ventilation, plumbing, and air conditioning equipment, and other service facilities that are designed and/or located so as to prevent water from entering or accumulating within the components during flooding conditions.

B. Water supply. All new and replacement water supply systems shall be designed to minimize or eliminate infiltration of floodwaters into the systems.

C. Sanitary sewage systems. All new and replacement sanitary sewage systems shall be designed and located to minimize or eliminate infiltration of floodwaters into the system and discharges from the system into floodwaters.

D. On-site waste disposal systems. On-site waste disposal systems shall be located and constructed to avoid impairment to them or contamination from them during floods.

E. Watercourse carrying capacity. All development associated with altered or relocated portions of a watercourse shall be constructed and maintained in such a manner that no reduction occurs in the flood-carrying capacity of any watercourse.

F. Residential. New construction or substantial improvement of any residential structure located within:

1. Zones A1—30 shall have the lowest floor (including basement) elevated to at least one foot above the base flood elevation.

2. Zone AO shall have adequate drainage paths around structures on slopes, to guide floodwater away from the proposed structures.

3. Zone AO shall have the lowest floor (including basement) elevated above the highest adjacent grade:

a. At least one foot higher than the depth specified in feet on the community's flood insurance rate map; or,

b. At least three feet if no depth number is specified.

~~**4.** Zone A shall have the lowest floor (including basement) elevated to at least one foot above the base flood elevation utilizing information obtained pursuant to Section 3H1b; Section 5B; or Section 9D.~~

~~**5.** Zones V1—30 shall meet the requirements of Section 6D.~~

~~**G.** Nonresidential. New construction or substantial improvement of any nonresidential structure located within:~~

~~**1.** Zones A1—30 shall have the lowest floor (including basement) elevated to at least one foot above the base flood elevation, or together with attendant utility and sanitary facilities shall:~~

~~**a.** Be floodproofed to at least one foot above the base flood elevation so that below that elevation the structure is watertight with walls substantially impermeable to the passage of water;~~

~~**b.** Have structural components capable of resisting hydrostatic and hydrodynamic loads and the effects of buoyancy; and~~

~~**c.** Be certified by a registered professional engineer or architect that the floodproofing design and methods of construction are in accordance with accepted standards of practice for meeting the provisions of this section. Such certification shall be provided with the application for a flood hazard development permit, as required by Section 3K and shall include a record of the elevation above mean sea level to which the structure is floodproofed.~~

~~**2.** Zone AO shall have adequate drainage paths around structures on slopes, to guide floodwater away from the proposed structures.~~

~~**3.** Zone AO shall have the lowest floor (including basement) elevated above the highest adjacent grade:~~

~~**a.** At least one foot higher than the depth specified in feet on the community's flood insurance rate map; or~~

~~**b.** At least three feet if no depth number is specified; or~~

~~**c.** Together with attendant utility and sanitary facilities be floodproofed to meet the elevation requirements of this section and floodproofing standards of Section 6G1.~~

~~**4.** Zone A shall have the lowest floor (including basement) elevated to at least one foot above the base flood elevation utilizing information obtained pursuant to Section 3H1b; Section 5B; or Section 9D; or~~

~~**a.** Together with attendant utility and sanitary facilities meet the floodproofing standards of Section 6G1.~~

~~**5.** Zones V1—30 shall meet the requirements of Section 6P.~~

~~**H.** Manufactured homes. New or substantially improved manufactured homes located within:~~

~~**1.** Zone A1—30 shall:~~

~~**a.** Be elevated on a permanent foundation such that the lowest floor (including basement) of the manufactured home is at least one foot above the base flood elevation; and~~

~~**b.** Be on a permanent foundation, which may be poured masonry slab or foundation walls, with hydraulic openings, or may be reinforced piers or block supports, any of which support the manufactured home so that no weight is supported by its wheels and axles; and~~

~~**c.** Be securely anchored to an adequately anchored foundation system to resist flotation, collapse, or lateral movement. Methods of anchoring may include, but are not limited to:~~

~~**(1)** Over-the-top ties anchored to the ground at the four corners of the manufactured home, plus two additional ties per side at intermediate points (manufactured homes less than 50 feet long require one additional tie per side); or by~~

~~**(2)** Frame ties at each corner of the home, plus five additional ties along each side at intermediate points (manufactured homes less than 50 feet long require four additional ties per side).~~

(3) All components of the anchoring system described in Section **6**, Paragraph H1c(1) and (2) shall be capable of carrying a force of 4,800 pounds.

2. Zone AO shall have adequate drainage paths around structures on slopes, to guide floodwater away from the proposed structures.

3. Zone AO shall have the lowest floor (including basement) elevated above the highest adjacent grade:

a. At least one foot higher than the depth specified in feet on the community's flood insurance rate map; or

b. At least three feet if no depth number is specified; and

c. Meet the anchoring requirements of Section 6H1c.

4. Zone A shall:

a. Be elevated on a permanent foundation as described in Section 6H1b, such that the lowest floor (including basement) of the manufactured home is at least one foot above the base flood elevation utilizing information obtained pursuant to Section 3H1b; Section 5B; or Section 9D; and

b. Meet the anchoring requirements of Section 6H1b.

5. Zones V1—30 shall meet the requirements of Section 6P.

I. Recreational vehicles. Recreational vehicles located within:

1. Zones A1—30 shall either:

a. Be on the site for fewer than 180 consecutive days;

b. Be fully licensed and ready for highway use. A recreational vehicle is ready for highway use if it is on its wheels or jacking system, is attached to the site only by quick

~~disconnect type utilities and security devices, and has no permanently attached additions; or~~

~~**c.** Be permitted in accordance with the elevation and anchoring requirements for manufactured homes in Section 6H1.~~

~~**2.** Zones V1—30 shall meet the requirements of either Section 6I1a or b, or Section 6P.~~

~~**J.** Accessory structures. Accessory structures, as defined in Section 14, located within Zones A1—30, AO, and A, shall be exempt from the elevation criteria required in Section 6F and G above, if all other requirements of Section **6** and all the following requirements are met. Accessory structures shall:~~

~~**1.** Be 500 square feet or less and have a value less than $3,000;~~

~~**2.** Have unfinished interiors and not be used for human habitation;~~

~~**3.** Have hydraulic openings, as specified in Section 6L2, in at least two different walls of the accessory structure;~~

~~**4.** Be located outside the floodway;~~

~~**5.** When possible be constructed and placed on the building site so as to offer the minimum resistance to the flow of floodwaters and be placed further from the source of flooding than is the primary structure; and~~

~~**6.** Have only ground fault interrupt electrical outlets. The electric service disconnect shall be located above the base flood elevation and when possible outside the special flood hazard area.~~

~~**K.** Floodways.~~

~~**1.** In Zones A1—30 riverine areas, encroachments, including fill, new construction, substantial improvement, and other development shall not be permitted within a regulatory floodway which is designated on the community's "flood boundary and floodway map," unless a technical evaluation certified by a registered professional engineer is provided demonstrating~~

that such encroachments will not result in any increase in flood levels within the community during the occurrence of the base flood discharge.

2. In Zones A1—30 and A riverine areas for which no regulatory floodway is designated, encroachments, including fill, new construction, substantial improvement, and other development shall not be permitted in the floodway as determined in Section 6K3 unless a technical evaluation certified by a registered professional engineer is provided demonstrating that the cumulative effect of the proposed development, when combined with all other existing development and anticipated development:

a. Will not increase the water surface elevation of the base flood more than one foot at any point within the community; and

b. Is consistent with the technical criteria contained in Chapter 5 entitled "Hydraulic Analyses," Flood Insurance Study Guidelines and Specifications for Study Contractors, (FEMA 37/January 1995, as amended).

3. In Zones Al—30 and A riverine areas for which no regulatory floodway is designated, the regulatory floodway is determined to be the channel of the river or other watercourse and the adjacent land areas to a distance of one-half the width of the floodplain as measured from the normal high-water mark to the upland limit of the floodplain.

L. Enclosed areas below the lowest floor. New construction or substantial improvement of any structure in Zones A1—30, AO, and A that meets the development standards of Section **6**, including the elevation requirements of Section **6**, Paragraphs F, G, or H and is elevated on posts, columns, piers, piles, stilts, or crawl spaces may be enclosed below the base flood elevation requirements, provided all the following criteria are met or exceeded:

1. Enclosed areas are not "basements" as defined in Section 14; and,

2. Enclosed areas shall be designed to automatically equalize hydrostatic flood forces on exterior walls by allowing for the entry and exit of floodwater. Designs for meeting this requirement must either:

a. Be certified by a registered professional engineer or architect; or

~~**b.** Meet or exceed the following minimum criteria:~~

~~**(1)** A minimum of two openings having a total net area of not less than one square inch for every square foot of the enclosed area;~~

~~**(2)** The bottom of all openings shall be below the base flood elevation and no higher than one foot above the lowest grade; and~~

~~**(3)** Openings may be equipped with screens, louvers, valves, or other coverings or devices, provided that they permit the entry and exit of floodwaters automatically without any external influence or control such as human intervention, including the use of electrical and other nonautomatic mechanical means;~~

~~**3.** The enclosed area shall not be used for human habitation; and~~

~~**4.** The enclosed areas are usable solely for building access, parking of vehicles, or storage.~~

~~**M.** Bridges. New construction or substantial improvement of any bridge in Zones A1—30, AO, A, and V1—30 shall be designed such that:~~

~~**1.** When possible, the lowest horizontal member (excluding the pilings, or columns) is elevated to at least one foot above the base flood elevation; and~~

~~**2.** A registered professional engineer shall certify that:~~

~~**a.** The structural design and methods of construction shall meet the elevation requirements of this section and the floodway standards of Section 6K; and~~

~~**b.** The foundation and superstructure attached thereto are designed to resist flotation, collapse and lateral movement due to the effects of wind and water loads acting simultaneously on all structural components. Water loading values used shall be those associated with the base flood.~~

~~**N.** Containment walls. New construction or substantial improvement of any containment wall located within:~~

~~**1.** Zones A1—30, A, and V1—30 shall:~~

~~**a.** Have the containment wall elevated to at least one foot above the base flood elevation;~~

~~**b.** Have structural components capable of resisting hydrostatic and hydrodynamic loads and the effects of buoyancy; and~~

~~**c.** Be certified by a registered professional engineer or architect that the design and methods of construction are in accordance with accepted standards of practice for meeting the provisions of this section. Such certification shall be provided with the application for a flood hazard development permit, as required by Section 3K.~~

~~**2.** Zone AO shall have adequate drainage paths around containment walls on slopes, to guide floodwater away from the proposed walls.~~

~~**3.** Zone AO shall have the top of the containment wall elevated above the highest adjacent grade:~~

~~**a.** At least one foot higher than the depth specified in feet on the community's flood insurance rate map; or~~

~~**b.** At least three feet if no depth number is specified; and~~

~~**c.** Shall meet the requirements of Section 6N1b and c.~~

~~**O.** Wharves, piers and docks. New construction or substantial improvement of wharves, piers, and docks are permitted in Zones A1—30, AO, A, and V1—30, in and over water and seaward of the mean high tide if the following requirements are met:~~

~~**1.** Wharves, piers, and docks shall comply with all applicable local, state, and federal regulations; and~~

~~**2.** For commercial wharves, piers, and docks, a registered professional engineer shall develop or review the structural design, specifications, and plans for the construction.~~

~~**P.** Coastal floodplains.~~

~~**1.** All new construction located within Zones A1—30, A, and V1—30 shall be located landward of the reach of mean high tide, except as provided in Section 6PG.~~

~~**2.** New construction or substantial improvement of any structure located within Zones V1—30 shall:~~

~~**a.** Be elevated on posts or columns such that:~~

~~**(1)** The bottom of the lowest horizontal structural member of the lowest floor (excluding the pilings or columns) is elevated to one foot above the base flood level;~~

~~**(2)** The pile or column foundation and the elevated portion of the structure attached thereto is anchored to resist flotation, collapse, and lateral movement due to the effects of wind and water loads acting simultaneously on all building components; and~~

~~**(3)** Water loading values used shall be those associated with the base flood. Wind loading values used shall be those required by applicable state and local building standards.~~

~~**b.** Have the space below the lowest floor:~~

~~**(1)** Free of obstructions; or~~

~~**(2)** Constructed with open wood lattice-work, or insect screening intended to collapse under wind and water without causing collapse, displacement, or other structural damage to the elevated portion of the building or supporting piles or columns; or~~

~~**(3)** Constructed with nonsupporting breakaway walls which have a design safe loading resistance of not less than 10 or more than 20 pounds per square foot.~~

~~**c.** Require a registered professional engineer or architect to:~~

~~**a.** Develop or review the structural design, specifications, and plans for the construction, which must meet or exceed the technical criteria contained in the Coastal Construction Manual, (FEMA-55/June, 2000); and~~

~~**b.** Certify that the design and methods of construction to be used are in accordance with accepted standards of practice for meeting the criteria of Section 6L2.~~

~~**3.** The use of fill for structural support in Zones V1—30 is prohibited.~~

~~**4.** Human alteration of sand dunes within Zones V1—30 is prohibited unless it can be demonstrated that such alterations will not increase potential flood damage.~~

~~**5.** The area below the lowest floor, shall be used solely for parking vehicles, building access, and storage.~~

~~**6.** Conditional use. Lobster sheds and fishing sheds may be located seaward of mean high tide and shall be exempt from the elevation requirement in Section 6G, only if permitted as a conditional use following review and approval by the Planning Board, as provided in Section **7**, and if all the following requirements and those of Section 6A, 6K, and 6L are met:~~

~~**a.** The conditional use shall be limited to low-value structures such as metal or wood sheds 200 square feet or less and shall not exceed more than one story.~~

~~**b.** The structure shall be securely anchored to the wharf or pier to resist flotation, collapse, and lateral movement due to the effect of wind and water loads acting simultaneously on all building components.~~

~~**c.** The structure will not adversely increase wave or debris impact forces affecting nearby buildings.~~

~~**d.** The structure shall have unfinished interiors and shall not be used for human habitation.~~

~~**e.** Any mechanical, utility equipment and fuel storage tanks must be anchored and either elevated or floodproofed to one foot above the base flood elevation.~~

~~**f.** All electrical outlets shall be ground fault interrupt type. The electrical service disconnect shall be located on shore above the base flood elevation and when possible outside the special flood hazard area.~~

~~Section 7 **Conditional use review.**~~
~~[Ord. No. 2006.26, 5-2-2006]~~

~~The Planning Board shall hear and decide upon applications for conditional uses provided for in this ordinance. The Planning Board shall hear and approve, approve with conditions, or disapprove all applications for conditional uses. An applicant informed by the Code Enforcement Officer that a conditional use permit is required shall file an application for the permit with the Planning Board.~~

~~**A.** Review procedure for a conditional use flood hazard development permit.~~

~~**1.** The flood hazard development permit application with additional information attached addressing how each of the conditional use criteria specified in the ordinance will be satisfied, may serve as the permit application for the conditional use permit.~~

~~**2.** Before deciding any application, the Planning Board shall hold a public hearing on the application within 30 days of their receipt of the application.~~

~~**3.** If the Planning Board finds that the application satisfies all relevant requirements of the ordinance, the Planning Board must approve the application or approve with conditions within 45 days of the date of the public hearing.~~

~~**4.** A conditional use permit issued under the provisions of this ordinance shall expire if the work or change involved is not commenced within 180 days of the issuance of the permit by the Planning Board.~~

~~**5.** The applicant shall be notified by the Planning Board in writing over the signature of the Chairman of the Planning Board that flood insurance is not available for structures located entirely over water or seaward of mean high tide.~~

~~**B.** Expansion of conditional uses.~~

~~**1.** No existing building or use of premises may be expanded or enlarged without a permit issued under this section if that building or use was established or constructed under a previously issued conditional use permit or if it is a building or use which would require a conditional use permit if being newly established or constructed under this ordinance.~~

~~Section 8 **Certificate of compliance.**~~

~~[Ord. No. 2006.26, 5-2-2006]~~

~~No land in a special flood hazard area shall be occupied or used and no structure which is constructed or substantially improved shall be occupied until a certificate of compliance is issued by the Code Enforcement Officer subject to the following provisions:~~

~~**A.** For new construction or substantial improvement of any elevated structure the applicant shall submit to the Code Enforcement Officer:~~

~~**1.** An elevation certificate completed by a professional land surveyor, registered professional engineer, or architect, for compliance with Section **6**, paragraphs F, G, H, or P; and~~

~~**2.** For structures in Zones V1—30, certification by a registered professional engineer or architect that the design and methods of construction used are in compliance with Section 6P2.~~

~~**B.** The applicant shall submit written notification to the Code Enforcement Officer that the development is complete and complies with the provisions of this ordinance.~~

~~**C.** Within 10 working days, the Code Enforcement Officer shall:~~

~~**1.** Review the required certificate(s) and the applicant's written notification; and~~

~~**2.** Upon determination that the development conforms with the provisions of this ordinance, shall issue a certificate of compliance.~~

~~Section 9 **Review of subdivision and development proposals.**~~
~~[Ord. No. 2006.26, 5-2-2006]~~

~~The Planning Board shall, when reviewing subdivisions and other proposed developments that require review under other federal law, state law or local ordinances or regulations and all projects on five or more disturbed acres, or in the case of manufactured home parks divided into two or more lots, assure that:~~

~~**A.** All such proposals are consistent with the need to minimize flood damage.~~

~~**B.** All public utilities and facilities, such as sewer, gas, electrical and water systems are located and constructed to minimize or eliminate flood damages.~~

~~**C.** Adequate drainage is provided so as to reduce exposure to flood hazards.~~

~~**D.** All proposals include base flood elevations, flood boundaries, and, in a riverine floodplain, floodway data. These determinations shall be based on engineering practices recognized by the Federal Emergency Management Agency.~~

~~**E.** Any proposed development plan must include a condition of plan approval requiring that structures on any lot in the development having any portion of its land within a special flood hazard area, are to be constructed in accordance with Section **6** of this ordinance. Such requirement will be included in any deed, lease, purchase and sale agreement, or document transferring or expressing an intent to transfer any interest in real estate or structure, including but not limited to a time-share interest. The condition shall clearly articulate that the municipality may enforce any violation of the construction requirement and that fact shall also be included in the deed or any other document previously described. The construction requirement shall also be clearly stated on any map, plat, or plan to be signed by the Planning Board or local reviewing authority as part of the approval process.~~

~~Section 10**Appeals and variances.**~~
~~[Ord. No. 2006.26, 5-2-2006]~~

~~The Board of Appeals of the City of Biddeford may, upon written application of an aggrieved party, hear and decide appeals where it is alleged that there is an error in any order, requirement, decision, or determination made of the Code Enforcement Officer or Planning Board in the administration or enforcement of the provisions of this ordinance. The Board of Appeals may grant a variance from the requirements of this ordinance consistent with state law and the following criteria:~~

~~**A.** Variances shall not be granted within any designated regulatory floodway if any increase in flood levels during the base flood discharge would result.~~

~~**B.** Variances shall be granted only upon:~~

~~**1.** A showing of good and sufficient cause; and,~~

~~**2.** A determination that should a flood comparable to the base flood occur, the granting of a variance will not result in increased flood heights, additional threats to public safety, public expense, or create nuisances, cause fraud or victimization of the public or conflict with existing local laws or ordinances; and,~~

~~**3.** A showing that the issuance of the variance will not conflict with other state, federal or local laws or ordinances; and,~~

4. A determination that failure to grant the variance would result in "undue hardship," which in this subsection means:

a. That the land in question cannot yield a reasonable return unless a variance is granted; and

b. That the need for a variance is due to the unique circumstances of the property and not to the general conditions in the neighborhood; and

c. That the granting of a variance will not alter the essential character of the locality; and

d. That the hardship is not the result of action taken by the applicant or a prior owner.

C. Variances shall only be issued upon a determination that the variance is the minimum necessary, considering the flood hazard, to afford relief, and the Board of Appeals may impose such conditions to a variance as it deems necessary.

D. Variances may be issued for new construction, substantial improvements, or other development for the conduct of a functionally dependent use provided that:

1. Other criteria of Section **10** and Section 6K are met; and

2. The structure or other development is protected by methods that minimize flood damages during the base flood and create no additional threats to public safety.

E. Variances may be issued by a community for the repair, reconstruction, rehabilitation, or restoration of historic structures upon the determination that:

1. The development meets the criteria of Section **10**, Paragraphs A through D above; and

2. The proposed repair, reconstruction, rehabilitation, or restoration will not preclude the structure's continued designation as a historic structure and the variance is the minimum necessary to preserve the historic character and design of the structure.

~~**F.** Any applicant who meets the criteria of Section **10**, Paragraphs A through E shall be notified by the Board of Appeals in writing over the signature of the Chairman of the Board of Appeals that:~~

~~**1.** The issuance of a variance to construct a structure below the base flood level will result in greatly increased premium rates for flood insurance up to amounts as high as $25 per 100 of insurance coverage;~~

~~**2.** Such construction below the base flood level increases risks to life and property; and,~~

~~**3.** The applicant agrees in writing that the applicant is fully aware of all the risks inherent in the use of land subject to flooding, assumes those risks and agrees to indemnify and defend the municipality against any claims filed against it that are related to the applicant's decision to use land located in a floodplain and that the applicant individually releases the municipality from any claims the applicant may have against the municipality that are related to the use of land located in a floodplain.~~

~~**G.** Appeal procedure for administrative and variance appeals.~~

~~**1.** An administrative or variance appeal may be taken to the Board of Appeals by an aggrieved party within 30 days after receipt of a written decision of the Code Enforcement Officer or Planning Board.~~

~~**2.** Upon being notified of an appeal, the Code Enforcement Officer or Planning Board, as appropriate, shall transmit to the Board of Appeals all of the papers constituting the record of the decision appealed from.~~

~~**3.** The Board of Appeals shall hold a public hearing on the appeal within 35 days of its receipt of an appeal request.~~

~~**4.** The person filing the appeal shall have the burden of proof.~~

~~**5.** The Board of Appeals shall decide all appeals within 35 days after the close of the hearing, and shall issue a written decision on all appeals.~~

~~**6.** The Board of Appeals shall submit to the Code Enforcement Officer a report of all variance actions, including justification for the granting of the variance and an authorization for the Code Enforcement Officer to issue a flood hazard development permit, which includes any conditions to be attached to said permit.~~

~~**7.** Any aggrieved party who participated as a party during the proceedings before the Board of Appeals may take an appeal to Superior Court in accordance with state laws within 45 days from the date of any decision of the Board of Appeals.~~

~~Section 11 **Enforcement and penalties.**~~
~~[Ord. No. 2006.26, 5-2-2006]~~

~~**A.** It shall be the duty of the Code Enforcement Officer to enforce the provisions of this ordinance pursuant to 30-A M.R.S.A. § 4452.~~

~~**B.** The penalties contained in 30-A M.R.S.A. § 4452 shall apply to any violation of this ordinance.~~

~~**C.** In addition to any other actions, the Code Enforcement Officer, upon determination that a violation exists, shall submit a declaration to the Administrator of the Federal Insurance Administration requesting a denial of flood insurance. The valid declaration shall consist of:~~

~~**1.** The name of the property owner and address or legal description of the property sufficient to confirm its identity or location;~~

~~**2.** A clear and unequivocal declaration that the property is in violation of a cited state or local law, regulation, or ordinance;~~

~~**3.** A clear statement that the public body making the declaration has authority to do so and a citation to that authority;~~

~~**4.** Evidence that the property owner has been provided notice of the violation and the prospective denial of insurance; and,~~

~~**5.** A clear statement that the declaration is being submitted pursuant to Section 1316 of the National Flood Insurance Act of 1968, as amended.~~

~~Section 12 **Validity and severability.**~~
~~[Ord. No. 2006.26, 5-2-2006]~~

~~If any section or provision of this ordinance is declared by the courts to be invalid, such decision shall not invalidate any other section or provision of this ordinance.~~

~~Section 13 **Conflict with other ordinances.**~~
~~[Ord. No. 2006.26, 5-2-2006]~~

~~This ordinance shall not in any way impair or remove the necessity of compliance with any other applicable rule, ordinance, regulation, by law, permit, or provision of law. Where this ordinance imposes a greater restriction upon the use of land, buildings, or structures, the provisions of this ordinance shall control.~~

~~Section 14 **Definitions.**~~
~~[Ord. No. 2006.26, 5-2-2006]~~

~~Unless specifically defined below, words and phrases used in this ordinance shall have the same meaning as they have at common law and to give is ordinance its most reasonable application. Words used in the present tense include the future, the singular number includes the plural, and the plural number includes the singular. The word "may" is permissive; "shall" is mandatory and not discretionary.~~

~~**ACCESSORY STRUCTURE**~~
~~A small detached structure that is incidental and subordinate to the principal structure.~~

~~**ADJACENT GRADE**~~
~~The natural elevation of the ground surface prior to construction next to the proposed walls of a structure.~~

~~**AREA OF SHALLOW FLOODING**~~
~~A designated AO and AH Zone on a community's flood insurance rate map (FIRM) with a one-percent or greater annual chance of flooding to an average depth of one to three feet where a clearly defined channel does not exist, where the path of flooding is unpredictable, and where velocity flow may be evident. Such flooding is characterized by ponding or sheet flow.~~

~~**AREA OF SPECIAL FLOOD HAZARD**~~

~~The land in the floodplain having a one-percent or greater chance of flooding in any given year, as specifically identified in the flood insurance study cited in Section **1** of this ordinance.~~

~~**BASE FLOOD**~~
~~The flood having a one-percent chance of being equaled or exceeded in any given year; commonly called the "one-hundred-year flood."~~

~~**BASEMENT**~~
~~Any area of the building having its floor subgrade (below ground level) on all sides.~~

~~**BREAKAWAY WALL**~~
~~A wall that is not part of the structural support of the building and is intended through its design and construction to collapse under specific lateral loading forces, without causing damage to the elevated portion of the building or supporting foundation system.~~

~~**BUILDING**~~
~~See "structure."~~

~~**CERTIFICATE OF COMPLIANCE**~~
~~A document signed by the Code Enforcement Officer stating that a structure is in compliance with all of the provisions of this ordinance.~~

~~**CODE ENFORCEMENT OFFICER**~~
~~A person certified under 30-A M.R.S.A., § 4451 (including exceptions in Subsection 4451, Paragraph 1) and employed by a municipality to enforce all applicable comprehensive planning and land use laws and ordinances.~~

~~**CONDITIONAL USE**~~
~~A use that because of its potential impact on surrounding areas and structures, is permitted only upon review and approval by the Planning Board pursuant to Section **7**.~~

~~**DEVELOPMENT**~~
~~Any man-made change to improved or unimproved real estate, including but not limited to the construction of buildings or other structures; the construction of additions or substantial improvements to buildings or other structures; mining, dredging, filling, grading, paving,~~

~~excavation, drilling operations or storage of equipment or materials; and the storage, deposition, or extraction of materials, public or private sewage disposal systems or water supply facilities.~~

~~**ELEVATED BUILDING**~~

~~A nonbasement building:~~

~~**a.** Built, in the case of a building in Zones A1—30, A, or AO to have the top of the elevated floor, or in the case of a building in Zones V1—30, to have the bottom of the lowest horizontal structural member of the elevated floor, elevated above the ground level by means of pilings, columns, post, piers, or stilts; and~~

~~**b.** Adequately anchored so as not to impair the structural integrity of the building during a flood of up to one foot above the magnitude of the base flood.~~

~~In the case of Zones A1—30, A, or AO, "elevated building" also includes a building elevated by means of fill or solid foundation perimeter walls with hydraulic openings sufficient to facilitate the unimpeded movement of flood waters, as required in Section 6L. In the case of Zones V1—30, "elevated building" also includes a building otherwise meeting the definition of "elevated building," even though the lower area is enclosed by means of breakaway walls, if the breakaway walls meet the standards of Section 6P2b(3).~~

~~**ELEVATION CERTIFICATE**~~

~~An official form (FEMA Form 81-31, 01/03, as amended) that:~~

~~**a.** Is used to verify compliance with the floodplain management regulations of the National Flood Insurance Program; and~~

~~**b.** Is required for purchasing flood insurance.~~

~~**FLOOD or FLOODING**~~

~~**a.** A general and temporary condition of partial or complete inundation of normally dry land areas from:~~

~~**1.** The overflow of inland or tidal waters.~~

~~**2.** The unusual and rapid accumulation or runoff of surface waters from any source.~~

~~**b.** The collapse or subsidence of land along the shore of a lake or other body of water as a result of erosion or undermining caused by waves or currents of water exceeding anticipated cyclical levels or suddenly caused by an unusually high water level in a natural body of water, accompanied by a severe storm, or by an unanticipated force of nature,~~

~~such as flash flood or an abnormal tidal surge, or by some similarly unusual and unforeseeable event which results in flooding as defined in Paragraph a1 of this definition.~~

~~**FLOOD ELEVATION STUDY**~~

~~An examination, evaluation and determination of flood hazards and, if appropriate, corresponding water surface elevations.~~

~~**FLOOD INSURANCE RATE MAP (FIRM)**~~

~~An official map of a community, on which the administrator of the federal insurance administration has delineated both the special hazard areas and the risk premium zones applicable to the community.~~

~~**FLOOD INSURANCE STUDY**~~

~~See "flood elevation study."~~

~~**FLOODPLAIN or FLOOD-PRONE AREA**~~

~~Any land area susceptible to being inundated by water from any source. (See "flooding")~~

~~**FLOODPLAIN MANAGEMENT**~~

~~The operation of an overall program of corrective and preventive measures for reducing flood damage, including but not limited to emergency preparedness plans, flood control works, and floodplain management regulations.~~

~~**FLOODPLAIN MANAGEMENT REGULATIONS**~~

~~Zoning ordinances, subdivision regulations, building codes, health regulations, special purpose ordinances (such as a floodplain ordinance, grading ordinance, and erosion control ordinance) and other applications of police power. The term describes such state or local regulations, in any combination thereof, which provide standards for the purpose of flood damage prevention and reduction.~~

~~**FLOODPROOFING**~~

~~Any combination of structural and non-structural additions, changes, or adjustments to structures which reduce or eliminate flood damage to real estate or improved real property, water and sanitary facilities, structures and contents.~~

~~**FLOODWAY**~~

~~See "regulatory floodway."~~

~~**FLOODWAY ENCROACHMENT LINES**~~
~~The lines marking the limits of floodways on federal, state, and local floodplain maps.~~

~~**FREEBOARD**~~
~~A factor of safety usually expressed in feet above a flood level for purposes of floodplain management. Freeboard tends to compensate for the many unknown factors, such as wave action, bridge openings, and the hydrological effect of urbanization of the watershed, that could contribute to flood heights greater than the height calculated for a selected size flood and floodway conditions.~~

~~**FUNCTIONALLY DEPENDENT USE**~~
~~A use which cannot perform its intended purpose unless it is located or carried out in close proximity to water. The term includes only docking facilities, port facilities that are necessary for the loading and unloading of cargo or passengers, and ship building and ship repair facilities, but does not include long-term storage or related manufacturing facilities.~~

~~**HISTORIC STRUCTURE**~~
~~Any structure that is:~~
~~**a.** Listed individually in the National Register of Historic Places (a listing maintained by the Department of Interior) or preliminarily determined by the Secretary of the Interior as meeting the requirements for individual listing on the National Register;~~

~~**b.** Certified or preliminarily determined by the Secretary of the Interior as contributing to the historical significance of a registered historic district or a district preliminarily determined by the Secretary of the Interior to qualify as a registered historic district;~~

~~**c.** Individually listed on a state inventory of historic places in states with historic preservation programs which have been approved by the Secretary of the Interior; or~~

~~**d.** Individually listed on a local inventory of historic places in communities with historic preservation programs that have been certified either:~~
~~**1.** By an approved state program as determined by the Secretary of the Interior; or~~

2. Directly by the Secretary of the Interior in states without approved programs.

LOCALLY ESTABLISHED DATUM

For purposes of this ordinance, an elevation established for a specific site to which all other elevations at the site are referenced. This elevation is generally not referenced to the National Geodetic Vertical Datum (NGVD) or any other established datum and is used in areas where mean sea level data is too far from a specific site to be practically used.

LOWEST FLOOR

The lowest floor of the lowest enclosed area (including basement). An unfinished or flood-resistant enclosure, usable solely for parking of vehicles, building access or storage in an area other than a basement area is not considered a building's lowest floor, provided that such enclosure is not built so as to render the structure in violation of the applicable non-elevation design requirements described in Section **6** of this ordinance.

MANUFACTURED HOME

A structure, transportable in one or more sections, which is built on a permanent chassis and is designed for use with or without a permanent foundation when connected to the required utilities. For floodplain management purposes the term "manufactured home" also includes park trailers, travel trailers, and other similar vehicles placed on a site for greater than 180 consecutive days.

MANUFACTURED HOME PARK OR SUBDIVISION

A parcel (or contiguous parcels) of land divided into two or more manufactured home lots for rent or sale.

MEAN SEA LEVEL

For purposes of the National Flood Insurance Program, the National Geodetic Vertical Datum (NGVD) of 1929, or other datum, to which base flood elevations shown on a community's flood insurance rate map are referenced.

MINOR DEVELOPMENT

All development that is not new construction or a substantial improvement, such as repairs, maintenance, renovations, or additions, whose value is less that 50% of the market value of the structure. It includes, but is not limited to: accessory structures as provided for in Section 6J, mining, dredging, filling, grading, paving, excavation, drilling operations, storage of equipment or materials, deposition or extraction of materials, public or private sewage

~~disposal systems or water supply facilities that do not involve structures; and nonstructural projects such as bridges, dams, towers, fencing, pipelines, wharves, and piers.~~

~~**NATIONAL GEODETIC VERTICAL DATUM (NGVD)**~~
~~The national vertical datum, whose standard was established in 1929, which is used by the National Flood Insurance Program (NFIP). NGVD was based upon mean sea level in 1929 and also has been called "1929 Mean Sea Level (MSL)".~~

~~**NEW CONSTRUCTION**~~
~~Structures for which the start of construction commenced on or after the effective date of floodplain management regulations adopted by a community and includes any subsequent improvements to such structures.~~

~~**ONE-HUNDRED-YEAR FLOOD**~~
~~See "base flood."~~

~~**RECREATIONAL VEHICLE**~~
~~A vehicle which is:~~
~~**a.** Built on a single chassis;~~
~~**b.** Four hundred square feet or less when measured at the largest horizontal projection, not including slideouts;~~
~~**c.** Designed to be self-propelled or permanently towable by a motor vehicle; and~~
~~**d.** Designed primarily not for use as a permanent dwelling but as temporary living quarters for recreational, camping, travel, or seasonal use.~~

~~**REGULATORY FLOODWAY**~~
~~**a.** The channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than one foot; and~~

~~**b.** When not designated on the community's flood boundary and floodway map, it is considered to be the channel of a river or other watercourse and the adjacent land areas to a distance of 1/2 the width of the floodplain, as measured from the normal high-water mark to the upland limit of the floodplain.~~

~~**RIVERINE**~~

~~Relating to, formed by, or resembling a river (including tributaries), stream, brook, etc.~~

~~**SPECIAL FLOOD HAZARD AREA**~~
~~See "area of special flood hazard."~~

~~**START OF CONSTRUCTION**~~
~~The date the building permit was issued, provided the actual start of construction, repair, reconstruction, rehabilitation, addition, placement, substantial improvement or other improvement was within 180 days of the permit date. The actual start means either the first placement of permanent construction of a structure on a site, such as the pouring of slab or footings, the installation of pipes, the construction of columns, or any work beyond the stage of excavation; or the placement of a manufactured home on a foundation. Permanent construction does not include land preparation, such as clearing, grading and filling; nor does it include the installation of streets and/or walkways; nor does it include excavation for basement, footings, piers, or foundations or the erection of temporary forms; nor does it include the installation on the property of accessory buildings, such as garages or sheds not occupied as dwelling units or not part of the main structure. For a substantial improvement, the actual start of construction means the first alteration of any wall, ceiling, floor, or other structural part of a building, or modification of any construction element, whether or not that alteration affects the external dimensions of the building.~~

~~**STRUCTURE**~~
~~For floodplain management purposes, a walled and roofed building. A gas or liquid storage tank that is principally above ground is also a structure.~~

~~**SUBSTANTIAL DAMAGE**~~
~~Damage of any origin sustained by a structure whereby the cost of restoring the structure to its before damage condition would equal or exceed 50% of the assessed value of the structure before the damage occurred.~~

~~**SUBSTANTIAL IMPROVEMENT**~~
~~Any reconstruction, rehabilitation, addition, or other improvement of a structure, the cost of which equals or exceeds 50% of the assessed value of the structure before the start of construction of the improvement. This term includes structures which have incurred substantial damage, regardless of the actual repair work performed. The term does not, however, include either:~~

~~**a.** Any project for improvement of a structure to correct existing violations of state or local health, sanitary, or safety code specifications which have been identified by the local code enforcement official and which are the minimum necessary to assure safe living conditions; or~~

~~**b.** Any alteration of a historic structure, provided that the alteration will not preclude the structure's continued designation as a historic structure, and a variance is obtained from the Board of Appeals.~~

~~**VARIANCE**~~
~~A grant of relief by a community from the terms of a floodplain management regulation.~~

~~**VIOLATION**~~
~~The failure of a structure or development to comply with a community's floodplain management regulations.~~

~~Section 15 **Abrogation.**~~
~~[Ord. No. 2006.26, 5-2-2006]~~
~~This ordinance repeals and replaces any municipal ordinance previously enacted to comply with the National Flood Insurance Act of 1968 (P.L. 90-488, as amended).~~

CITY OF BIDDEFORD

Planning and Development Department

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FINDINGS OF FACT AND CONCLUSIONS OF LAW
University of New England
16 Old Pool Road Site Plan Approval
June 5, 2024

RE: 2024.10 Final Site Plan Review for University of New England to expand the tennis courts at 16 Old Pool Road (Tax Map 9, Lot 13) in the Institutional Zone.

MEETING DATE: June 5, 2024 at 6:00 PM

Pursuant to the provisions of the City of Biddeford Code of Ordinances Land Development Regulations, Article XI (Site Plan Review), and Article VI (Performance Standards), the Biddeford Planning Board has considered the application of Based on its review, including supportive data, public hearing testimony and related materials contained in the record, the Planning Board makes the following Findings of Fact and Conclusions of Law:

FINDINGS OF FACT:

1.	Applicant:	University of New England 11 Hills Beach Road Biddeford, ME 04005
2.	Owner of Property:	Same as applicant
3.	Agent:	Tom Saucier of Site Design Associates 23 Whitney Way Topsham, ME 04086
4.	Engineer:	Same as Agent
5.	Project Location:	16 Old Pool Road
6.	Project Tax Map #/Lot #:	Tax Map 9, Lot 13
7.	Lot Size:	30.12 Acres
8.	Base Zoning:	IN
9.	Overlay Zoning:	N/A
10.	Existing Use:	Tennis Courts
11.	Proposed Use:	Expand Tennis Courts
12.	Approvals Required:	Final Plan Review Final Plan Review
13.	Uses in the Vicinity:	Institution & Residential
14.	Waivers Needed:	a. None
18.	Waivers Granted:	a. None
22.	Other Non-City Permits Required:	
23.	Fees Paid:	Yes
25.	Planning Board Review History: May 15, 2024-Preliminary; June 5, 2024-Final	

FINDINGS OF FACT AND CONCLUSIONS OF LAW
University of New England
16 Old Pool Road Site Plan Approval
June 5, 2024

CONCLUSIONS OF LAW:

1. The proposed use meets specific requirements set forth in this ordinance and would be in compliance with applicable state or federal laws;

2. The proposed use would not create fire safety hazards by providing adequate access to the site, or to the buildings on the site, for emergency vehicles and would not create hazards through the storage of chemicals and wastes;

3. The proposed exterior lighting, where allowed, would not create hazards to motorists traveling on adjacent public streets or is adequate for the safety of occupants or users of the site or would not damage the value and diminish the usability of adjacent properties;

4. The provisions for buffers and on-site landscaping provide adequate protection to neighboring properties from detrimental or unsightly features of the development;

5. The proposed use would not have a significant, detrimental effect on the use and peaceful enjoyment of abutting property as the result of noise, vibrations, fumes, odor, dust, glare, hours of operation, or other causes;

6. The provisions for vehicular loading and unloading and parking and for vehicular and pedestrian circulation on the site and onto adjacent public streets would not create hazards to public safety or traffic congestion;

7. The proposed use would generate a volume of traffic that can reasonably be accommodated by the existing road network, or would not create unreasonable traffic hazards or would not exacerbate an existing traffic hazard, or would not create unreasonable traffic congestion;

8. The proposed use would not have a significant, detrimental effect on the value of adjacent properties which could be avoided by reasonable modification of the proposal;

9. The proposed use would not have an adverse impact on the privacy of the residents of the immediate area (within 500 feet) which could be avoided by reasonable modification of the proposal;

10. The proposed use would be in compliance with Biddeford's Comprehensive Plan;

11. The proposed use would not have an adverse impact on the immediate neighborhood or the community relative to architectural design, scale, bulk and building height, identity and historical character, or visual integrity, which could be avoided by reasonable modification of the proposal;

12. The design of the site would not result in significant flood hazards or flood damage or would be in conformance with applicable flood hazard protection requirements;

13. Adequate provision has been made for disposal of wastewater or solid waste or for the prevention of ground or surface water contamination;

14. Adequate provision has been made to control erosion or sedimentation;

15. Adequate provision has been made to handle stormwater runoff or other drainage problems on the site; and the proposed development will not unduly burden off-site surface water systems;

16. The proposed water supply would meet the demands of the proposed use for fire protection purposes;

17. Adequate provision has been made for the transportation, storage, and disposal of hazardous substances and materials as defined by state law;

18. The proposed use would not have an adverse impact on scenic vistas or on significant wildlife habitat or wetland areas and water bodies which could be avoided by reasonable modification of the proposal;

19. When located in the Shoreland Zone, the proposed use would meet the purposes of Shoreland Zoning as identified in Article XIV, Section 1 (Purposes) of this ordinance.

APPROVAL GRANTED:

Based on the evidence available and the conclusions above, the Biddeford Planning Board approves the proposed project summarized within the attached Staff report and pursuant to the provisions of the City of Biddeford Code of Ordinances Land Development Regulations, Article XI (Site Plan Review), and Article VI (Performance Standards), the Biddeford Planning Board has approved the application of Case # 2024.10 Final Site Plan Review for University of New England to expand the tennis courts at 16 Old Pool Road (Tax Map 9, Lot 13) in the Institutional Zone including this Findings of Fact (FOF) with the following Conditions of Approval (COA):

1. Standard Conditions of Approval apply, as listed below.

   A. The material provided for the proposed project has been reviewed only for general conformance to the City technical requirements. The applicant(s) and/or their technical consultant shall be responsible for the actual design details and completeness of their work. It is incumbent upon the applicant(s) to ensure that the project is in conformance and complies with all City Codes, ordinances and regulations as well as with all state regulations, including, but not limited to, space and bulk standards, performance standards, use standards and other zoning type requirements.

B. All work shall be in conformance with the approved plans and submission documents. No deviations from the approved plans are permitted without prior approval from the Planning Board for major changes, and from the City Planner and City Engineer for minor changes. The City Planner shall make the determination of major or minor.

C. A Letter of Credit or other surety acceptable to the City of Biddeford shall be submitted prior to the issuance of permits or site work being initiated. The financial guarantee shall be established for 150% of the cost of the following improvements:
   1) Landscaping
   2) Paving
   3) Work within ROW (existing or proposed),
   4) Drainage
   5) Loam & seed
   6) Sediment & erosion control
   7) As-Built Plans
   8) Monuments

D. Prior to any ground disturbance, the applicant shall establish a construction inspection account equal to: $2,500.00.

E. Prior to any ground disturbance, a pre-construction meeting with the owner/applicant, contractor, and City is required. Contact the Engineering Department to schedule this meeting.

F. Contact the Department of Public Works for driveway location permits, curb cut permits and/or street opening permits prior to the start of construction.

G. An as-built plan must be provided to the City of Biddeford Engineering Office at the end of the project electronically, which can be read by the City of Biddeford's Geographic Information System software. **Note: Any modifications to the Planning Board approved development plans shall be reviewed and approved by the City Planner prior to being made, including any "field changes".**

H. The applicant shall incorporate appropriate erosion control measures into this project to reduce erosion affects from the work. All disturbed areas must be re-vegetated and/or otherwise stabilized at the appropriate stage of the work per Maine DEP standards in the Best Management Practice (BMP) manual.
I. That the Article VI Performance Standards requirements regarding Dust, Fumes, Vapors & Gases (sect 25), Explosive Materials (sect 28), Glare (sect 37), Noise (sect 48) be followed.
J. The applicant shall obtain all other pertinent local, state and federal permits, licenses, and insurance such as blasting, building, electrical, plumbing, etc. prior to commencing business.
K. At the completion of the project the owner/applicant shall request a final inspection. This request shall be directed to the Planning Office. Performance guarantees and remaining escrow accounts shall not be released until the Planning Office certifies that the project has been completed and is in compliance with the approval and all applicable City Ordinances.
L. The applicant shall submit approved plans for signature of the City's Planning Board, which shall be recorded in the York County Registry of Deeds. An electronic copy of the recorded plan shall be sent to the Planning Office.

2. All conditions of approval previously adopted for the property are hereby reaffirmed.

3. Prior to the scheduling of the required Pre-construction meeting the Applicant shall make any required changes to the project Civil Plans for the review and approval of the City Engineer.

_____
Larry Patoine Planning Board Chair

_____
Date

CITY OF BIDDEFORD

Planning and Development Department

David C.M. Galbraith
Deputy Director/City Planner
205 Main Street
P.O. Box 586
Biddeford, ME 04005
(207) 284-9115
David.Galbraith@biddefordmaine.org

PLANNING BOARD STAFF REPORT

TO: Chair Patoine and Members of the Biddeford Planning Board

FROM: David C.M. Galbraith, Deputy Director/City Planner

DATE: May 22, 2024

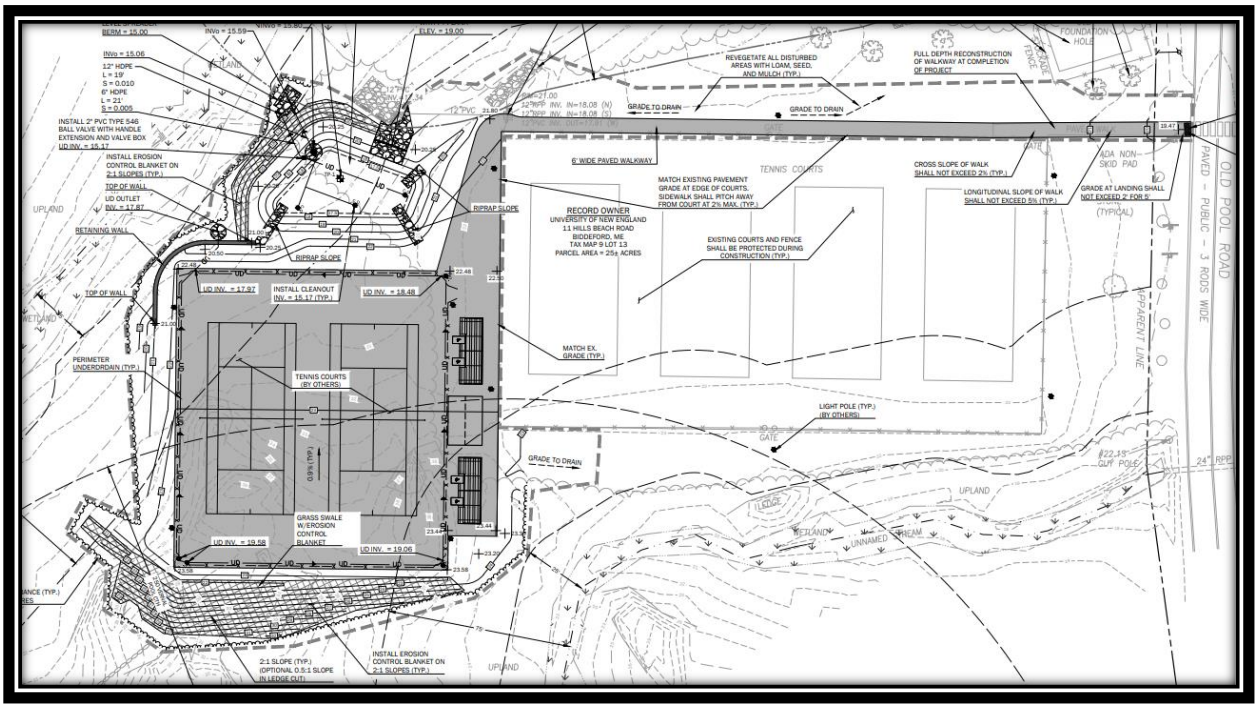
RE: 2024.10 Final Site Plan Review for University of New England to expand the tennis courts at 16 Old Pool Road (Tax Map 9, Lot 13) in the Institutional Zone.

MEETING DATE: June 5, 2024 at 6:00 PM

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1. INTRODUCTION

The University of New England (UNE) would like to expand the tennis courts with the construction of a 122 ft. x 110 ft. bituminous paved surface, for the installation of two tennis courts. The courts will be located westerly of the four existing courts on Old Pool Road in a currently undeveloped portion of the campus. The existing site is wooded and lawn area, with wetlands to the north and south, and a city SP zone to the northeast. No wetlands will be impacted by the project. The construction will also take place within 250 ft. of a significant vernal pool. A NRPA permit by rule notification was submitted to DEP.



Additionally, a new sidewalk will be constructed from Old Pool Road to the tennis courts. The courts will be used for varsity level play and recreational use. The primary reason for a new / widened sidewalk was to provide emergency responders a clean, hard surface to safely maneuver a stretcher in the event players or spectators are in need of our emergency responders. This project involves the construction of two paved tennis courts adjacent to the existing courts on the UNE Campus. UNE is preparing to add tennis as a varsity sport to its athletic programs. The NCAA requires a minimum of 6 courts to compete at a varsity level. Like other athletic venues on campus, all six courts would be illuminated. Practices, meets, and tournaments would be played in the off academic hours which would require illumination for completion of those events. In addition to the new courts and lighting, the project includes a storm water management system, a small storage and observation structure, and common site amenities such as a bike rack, benches, and trash receptacles.

The project is located in the Institutional zone where University uses are permitted. The site layout and design are in conformance with the applicable Site Plan Review criteria outlined in Part III, Article XI of the Biddeford Zoning Ordinance. The location, size, and activity of the proposed tennis courts are consistent with the previously approved UNE Institutional Zone Master Plan submission.

This is the first time this application is being reviewed by the Planning Board. Final Plan approval is required.

PROJECT DATA/INFORMATION

1.	Applicant:	University of New England 11 Hills Beach Road Biddeford, ME 04005
2.	Owner of Property:	Same as applicant
3.	Agent:	Tom Saucier of Site Design Associates 23 Whitney Way Topsham, ME 04086
4.	Engineer:	Same as Agent
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12.	Approvals Required:	Final Plan Review Final Plan Review
13.	Uses in the Vicinity:	Institution & Residential
14.	Waivers Needed:	a. None
18.	Waivers Granted:	a. None
22.	Other Non-City Permits Required:	
23.	Fees Paid:	Yes
25.	Planning Board Review History: May 15, 2024-Preliminary; June 5, 2024-Final	

2. REVIEW PROCESS

Per City ordinance, this application is subject to Site Plan (Land Development Regulations, Article XI) review and approval by the Planning Board.

3. DEPARTMENTAL REVIEW COMMENTS:

Staff has reviewed the submitted plans and is supportive of the proposed tennis courts.

STAFF RECOMMENDATION

Staff is supportive of the project and is requesting that the Planning Board approve the Final site plan review, with the following Conditions of Approval:

1. Standard Conditions of Approval.

2. All conditions previously approved for the University of New England (UNE), by the Planning Board, are hereby reaffirmed.

4. SAMPLE MOTIONS:

A. Motion to approve Case # 2024.10 Final Plan Review for UNE to expand their tennis courts located at 16 Old Pool Road (Tax Map 9, Lot 13), with the recommended Conditions of Approval.

B. Motion to Table Case # 2024.10 Final Plan Review for UNE to expand their tennis courts located at 16 Old Pool Road (Tax Map 9, Lot 13), based upon the following reasons:

a)_____

b)_____

c)_____

C. Motion to Deny Case # 2024.10 Final Plan Review for UNE to expand their tennis courts located at 16 Old Pool Road (Tax Map 9, Lot 13), based upon the following reasons:

a)_____

b)_____

c)_____

UNIVERSITY OF NEW ENGLAND

SITE PLAN REVIEW APPLICATION

Project:

PROPOSED TENNIS COURT EXPANSION
16 OLD POOL ROAD
BIDDEFORD, MAINE

Applicant:

UNIVERSITY OF NEW ENGLAND

February 14, 2024

Prepared by:

Site Design Associates
23 Whitney Way
Topsham, Maine 04086
Ph: 207-449-4275
Email: info@sitedesignassociates.biz

Site Design Associates
Consulting Engineering and Land Planning

February 14, 2024

David Galbraith, City Planner
City of Biddeford
P.O. Box 586
205 Main Street
Biddeford, ME 04005

RE: Proposed Tennis Court Expansion
University of New England

Dear David and Planning Board Members:

On behalf of University of New England (UNE), Site Design Associates is pleased to submit the enclosed plans and documentation in support of an application for Site Plan Approval for the construction of two new tennis courts. The project site is located in the Institutional Zone (IN) zone. The project is shown on the most recent city approved master plan.

We have included the following information in support of this application:

- Formal Site Plan Review Application
- Letter of Agent Authorization
- City Drawing Checklist
- Site Location Map
- Stormwater Management Report
- Drawings (seven full size copies)
  - C-100 Existing Conditions Plan
  - C-101 Site Demolition and Erosion Control Plan
  - C-200 Site Plan
  - C-201 Grading, Drainage, and Erosion Control Plan
  - E-100 Vernal Pool critical Terrestrial Habitat Plan
  - C-300 Erosion & Sedimentation Control Notes and Details
  - C-301 Civil Details
  - C-302 Civil Details
  - L-100 Tennis Court Details
  - L-101 Tennis Court Details
  - L-102 Lighting Details

This project involves the construction of two paved tennis courts adjacent to the existing courts on the UNE Campus. UNE is preparing to add tennis as a varsity sport to its athletic programs. The NCAA requires a minimum of 6 courts to compete at a varsity level. Like other athletic venues on campus, all six courts would be illuminated.

Practices, meets, and tournaments would be played in the off academic hours which would require illumination for completion of those events. In addition to the new courts and lighting, the project includes a storm water management system, a small storage and observation structure, and common site amenities such as a bike rack, benches, and trash receptacles.

The following addresses Site Plan Approval/ Site Design Criteria in separate sections.

I. General

The plans for the project detail the construction of a 122 ft x 110 ft bituminous paved surface, for the installation of two tennis courts. The courts will be located westerly of the four existing courts on Old Pool Road in a currently undeveloped portion of the campus. The existing site is wooded and lawn area, with wetlands to the north and south, and a city SP zone to the northeast. No wetlands will be impacted by the project. The construction will also take place within 250 ft of a significant vernal pool. A NRPA permit by rule notification will be submitted to DEP.

Additionally, a new sidewalk will be constructed from Old Pool Road to the tennis courts.

The courts will be used for varsity level play and recreational use.

The project is located in the Institutional zone where University uses are permitted. The site layout and design are in conformance with the applicable Site Plan Review criteria outlined in Part III, Article XI of the Biddeford Zoning Ordinance. The location, size, and activity of the proposed tennis courts are consistent with the previously approved UNE Institutional Zone Master Plan submission.

II. <u>Site Plan Approval/Site Design Criteria</u>

1. Drainage

The report demonstrates compliance with Maine Department of Environmental Protection (DEP) Basic and General standards, and city requirements. A Stormwater Management Report is attached. The project will include an underdrained soil filter designed to DEP BMP standards for enhancement of stormwater runoff quality.

In 2006 UNE installed four new 24” diameter culverts under Old Pool Road. During the approval process for the existing tennis courts, both the DEP and City agreed that the flooding standard did not apply, due to the downstream improvements made by UNE and the fact that the drainage below the culverts

is tidal. The Stormwater Management Report includes an analysis of the culverts which demonstrates that there will be no impact on the capacity of the culverts.

2. Utilities

No sanitary sewers are proposed.

3. Parking

Not applicable.

4. Structural Layout and Design

a) Design of Buildings

The only structures proposed are a press box and portable bleachers. A preliminary rendering of the press box is attached.

b) Setbacks

The tennis courts are sited in conformance with all setback requirements.

c) Fire Protection & Safety

The fire department requested that we provide a radius in the new sidewalk pavement to accommodate gator access to the courts. This has been incorporated into the site drawings.

d) Landscaping

Native vegetation will remain as a buffer around the site.

e) Service, Storage, and Utility Areas

Not applicable

f) Paving, Parking, and Storage Areas

Not applicable.

g) Handicapped Accessibility

The walkway to the tennis courts will be ADA compliant.

h) Loading Facilities

No buildings are proposed.

i) Parking, Loading, and Protective Buffers

Not applicable.

j) Open Space

Existing vegetation will be preserved to the extent practical.

k) External Lighting

New lighting is proposed for the tennis courts. Ten 40 ft to 50 ft poles with fixtures are proposed; six for the existing courts and four for the proposed courts. A photometric plan and lighting details are included in the plan set. Note that the fixtures are fully cut off and there will be minimal illumination beyond the tennis courts with no light trespass off the property.

l) Signs

Not applicable.

m) Historic and Archeological Resources.

No part of the site has been identified as containing historic or archaeological resources.

We are currently soliciting a general contractor and a tennis court specialist to undertake the work and would prefer to provide the performance guarantee cost estimate when the contractors are on board and have priced it. We are in hopes that the planning board could consider this as a condition of approval.

Please let me know if staff has any questions, comments, or suggestions relative to this proposal. We look forward to meeting with the Planning Board at the next available meeting to discuss this project. to discuss this project.

Sincerely,
Site Design Associates



Tom Saucier, P.E.
President

cc: Andrew Philippe, RA, NCARB, Director for Campus Planning

Attachment 1
Formal Site Plan Review Application

City of Biddeford – Planning Department
Planning Board Application
P.O. Box 586, 205 Main Street Biddeford, Maine 04005
207-284-9115

Type of Application:

x Shoreland Zoning Permit x Site Plan Review __ Extraction
__ Conditional Use Permit __ Subdivision __ Private Way
__ Other: _____

Applicant Information:

Name: University of New England
Mailing Address: 11 Hills Beach Road Biddeford, ME 04005
Telephone: 207-602-2365
Email: aphilippe@une.edu

What is your legal interest in the property?

x Owner __ Potential Buyer with Contract __ Lease/Rental Agreement

Owner's Information:

Name: Same as applicant
Mailing Address: _____
Telephone: _____
Email: _____

Agent's Information:

Name: Tom Saucier, Site Design Associates
Mailing Address: 23 Whitney Way Topsham, ME 04086
Telephone: 207-449-4275
Email: tsaucier@sitedesignassocites.biz

Engineer/Surveyor's Information:

Name: Agent
Mailing Address: _____
Telephone: _____
Email: _____

Project Location and Lot Information:

Street Address: 16 Old Pool Road Drainage Watershed: unamed tributary to Biddeford Pool
Tax Map: 9 Lot: 13
Current Zoning: IN Shoreland Zoning: SP
Size of Lot: 25 +/- (x)acres ( )s.f. Lot Frontage: 950 ft +/-
Existing Use of Property: Tennis courts/open space

Property currently serviced by:

__ City Road __ Public Sewer __ Public Water __ Public Trash
__ Private Road __ Septic System __ Private Well __ Private Hauler

Slope Conditions in Area of Construction (if applicable):

x Flat (0-3% slope) x Rolling (3-8% slope) __Hilly (8-15% slope) __Steep (15%+ Slope)

Are there any wetlands or waterbodies on the site? x (Yes)__(No) if yes attach information
Is the project within the 100-year floodplain? __ (Yes)x (No) if yes attach information
Do you plan to bring fill onto the lot? x (Yes) __(No) If yes attach information See plans.

Description of proposed use of property:

Project/Proposed Use:

Two new tennis courts and associated stormwater management facilities.

Property to be Serviced by:

x City Road __ Public Sewer __ Public Water __ Public Trash

__ Private Road __ Septic System __ Private Well __ Private Hauler

Limits of Disturbance: 23,000 sf ( )acres (x)s.f.

Net change in impervious cover: 18,200 ( )acres (x)s.f.

Is this project part of a larger project? __(Yes) x (No)

Is the project proposing a new Private or Public Road? __(Yes, Private) __(Yes, Public) x (No)

Is this project within the Urbanized Area/MS4 (*see City Drainage Map*) __(Yes) x (No)

Is the project proposing any Stormwater facilities/BMPs? x (Yes) __(No)

Will a Traffic Movement Permit (TMP) be required?: __(Yes) x (No)

__ **If in a Shoreland Zone:**

Percent of residential lot coverage (Max 20%): _____

Percent of structure expansion (Max 30%): _____

__ **If Subdivision Review, number of lots proposed:** _____

__ **If a Private Way is proposed, number of lots served:** _____

If Site Plan Review, you must provide the following information:

Total new square feet footprint of structure: _____

Total new square feet paving/parking: 18,200 sf

Waiver Requests (attach details):

1. Article XI.5.B.1.e.3. - Slopes steeper than 2: 1 in ledge.
2. _____
3. _____
4. _____
5. _____

Required Submittal Attachments:

A. Letters of Approval
   - __ Fire Department – Contact Chief or Deputy Chief – 282-9986
   - __ Ability to Serve for Water Service – Maine Water – 282-1543
   - __ Ability to Serve for Sewer Service – Engineering Department – Tom Milligan 284-9118
   - __ Police Department – e-911 Road Name Designation – Contact Joanne Fisk 282-5127

B. Letter to Planning Board describing project, Waiver requests, proposed improvements, addressing permit requirements, etc.

C. Photographs of Site.

D. Architectural renderings/drawings of proposed buildings, as required.

E. Engineering Plans, as required.

F. Stormwater Management Report, as required.

Fees (Due at time of Submission):

- $75 Nonrefundable Administration Fee is required for every application.
- Refer to "Attachment A Fees and Charges" of the Land Development Regulations for more information. Consult with Planning Staff if you have questions.

Required Signatures:

By signing this application, as the foresaid applicant or authorized agent:

- I certify that I have read and completely understand the application;
- I certify that the information contained in this application and its attachments are true and correct;
- I understand that all information provided on this form and all other documents submitted as part of my proposal is a matter of public record;
- I understand that copies of this information may be supplied upon request to an interested party.
- I understand that additional funds may be required through the course of the review for special studies, legal review costs, and/or engineering review.
- I understand that by submitting an application I am not guaranteed a place on any particular agenda. I further understand that the City Planner will place me on an agenda for review when the application is deemed substantially complete.

Will the proposed project cause 1 acre or more of site disturbance?: __(Yes) X (No)

- **If Yes, applicant is responsible for any required Maine Construction General Permits and shall comply with the requirements of DEP Chapter 500 Stormwater Regulations, as they apply.**

Signature of Applicant: _____ **Date** 2/13/24

Signature of Property Owner: _____ **Date** 2/13/24

DIGITAL SUBMITTAL REQUIREMENTS FOR ALL SUBMITTALS:

A) PDF OF SIGNED APPLICATION

B) PDFs OF ALL DRAWING SETS AND OTHER REQUIRED SUBMITTAL ATTACHMENTS NOTED ABOVE

HARD-COPY SUBMITTAL REQUIREMENTS FOR PLANNING BOARD APPLICATIONS:

A) SEVEN (7) FULL-SIZE PAPER COPIES OF DRAWING SETS

DIGITAL SUBMITTAL REQUIREMENTS FOR FINAL APPROVAL:

A) INDIVIDUALLY NAMED PDFs OF EACH DRAWING (NOT A COMBINED PDF SET)

- Individual Drawing PDF Naming Format: 'PROJECT/SHEETSET NAME_INDIVDUAL DRAWING NAME.pdf'

B) PDF COPIES OF ALL PERMIT APPROVALS, APPLICATIONS, REPORTS, NARRATIVES, LETTERS, ETC.

C) FINAL CAD REFERENCE FILES IN DWG FORMAT (SURVEY & PROPOSED DESIGN LINEWORK)

- All drawings & CAD reference files must be to-scale and within the following coordinate systems:

- MAINE STATE PLANE WEST NAD83 (Horizontal Datum) & NAVD88 (Vertical Datum)

HARD-COPY SUBMITTAL REQUIREMENTS FOR FINAL APPROVAL:

A) THREE (3) FULL-SIZE PAPER COPIES OF INDIVIUDAL DRAWINGS REQUIRING BOARD SIGNATURE

B) ONE (1) FULL-SIZE PAPER COPY OF ENTIRE DRAWING SET FOR ENGINEERING RECORDS

PLEASE CONFIRM WITH PLANNING STAFF FOR CLARIFICATION

UNIVERSITY OF NEW ENGLAND

Biddeford Campus
11 Hills Beach Road
Biddeford, ME 04005
(207) 283-0171 T

Portland Campus
716 Stevens Avenue
Portland, ME 04103
(207) 797-7261 T

February 13, 2024

Mr. Tom Saucier
Site Design Associates
23 Whitney Way
Topsham, Maine 04086

TO WHOM IT MAY CONCERN:

This letter authorizes Tom Saucier, Site Design Associates, to serve as an agent for University of New England for the purpose of permitting proposed tennis courts on its Biddeford campus.

Sincerely,



Alan Thibeault
Vice President for University Operations

CITY OF BIDDEFORD - SITE PLAN APPLICATION DRAWING CHECKLIST *LAST REVISED: 05/17/23*

CHECKLIST DIRECTIONS:

1. The following checklist must be completely filled out by the applicant for any Site Plan submittal to the Planning Department.
2. Applicant to confirm all of the items listed are included within the submittal. Any missing items must have adequate reasoning to justify their absence.
3. City to review applicant's submittal and checklist responses. Projects missing submittal information with non-acceptable reasoning will be rejected.
4. Items in **BLACK** are required for 'Preliminary Site Plan' approval & 'Final Site Plan' approval.
5. Items in **BLUE** are only required for 'Final Site Plan' approval.

SUBMITTAL INFORMATION - TO BE FILLED OUT BY APPLICANT	
Project Name:	Tennis Court Expansion
Planning Board # (if available):	
Applicant Name/Info:	University of New England, 11 Hills Beach Road, Biddeford, ME 04005
Submittal #/Type (Prelim/Final):	Preliminary
Submittal Date:	

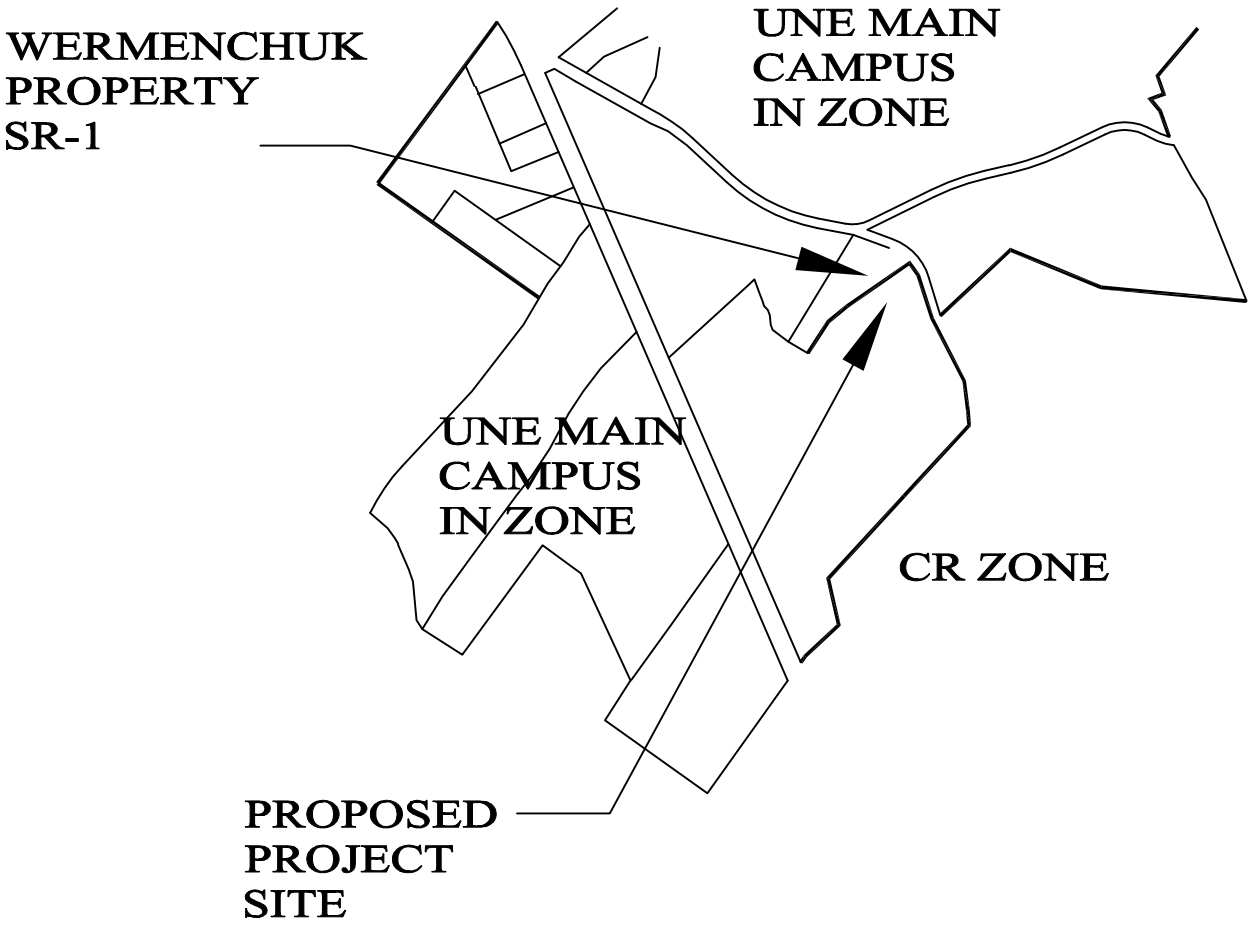
SUBMITTAL REQUIREMENT		APPLICANT RESPONSE		CITY REVIEW RESPONSE	
ITEM NUMBER	DESCRIPTION	INFORMATION PROVIDED (YES/NO)	REASON NOT PROVIDED/COMMENT	ACCEPTABLE (YES/NO-REVISE & RESUBMIT)	COMMENT
1	**GENERAL PLAN REQUIREMENTS**	YES			
A	Drawing specific legends (linetypes, hatches, etc.)	YES			
B	Individual drawing layer control should be utilized: freeze/thawing, changing lineweights, and screening (i.e. screen existing layers on a proposed plan, freeze topography and underground utilities on a proposed site plan)	YES			
C	North arrows, standard engineering scale viewports, dated revision blocks	YES			
D	All drawings and surveys must be in the following coordinate systems: NAD83 Maine State Plane West (Horizontal) and NAVD88 (Vertical)	YES			
E	Drawings need to be designed, signed & sealed by a Maine licensed professional engineer (PE); all boundary survey data needs to be performed by a licensed professional land surveyor (PLS)	YES			
2	**COVER SHEET**				
A	Project Name & Property Address	YES			
B	Project Team Contact Information (Owner, Engineer, Contractor, etc.)	YES			
C	Site Location Map	YES			
D	Sheet Set List of Drawings	YES			
E	Tax Map and Lot ID	YES			
F	Zoning & Shoreland Zone Information	YES			
G	Existing Use Description	YES			
H	Proposed Use Description	YES			
I	Required Waiver/Variances (Yes/No); if yes, plan must clearly list waivers/variances requesting	YES			
J	Name of Drainage Watershed	YES			
K	Within the MS4 Urbanized Area (Yes/No)	NO			
L	Natural resources (streams, wetlands, etc.) located on-site or adjacent to the property (Yes/No)	YES			
M	Within the 100-year Flood Zone (Yes/No)	NO			
N	Public Road Proposed (Yes/No)	NO			
O	Private Road Proposed (Yes/No)	NO			
P	Public Sewer Connection (Yes/No); if yes, need to include a proposed sewer flow calculation per Maine's Subsurface Wastewater Disposal Rules, Chapter 241, Section 4 (Tables 4A & 4C)	NA			
Q	Public Storm Drain Connection (Yes/No)	NO			
R	Limits of Disturbance in acres	YES			
S	Pervious Land Cover square footage, existing and proposed	YES			
T	Impervious Land Cover square footage (Pavement/Gravel), existing and proposed	YES			
U	Building Roof square footage, existing and proposed	YES			
V	Assigned Planning Board Number				
W	Estimated cut/fill earthwork volumes; if disturbing within Flood Zone, separate set of earthwork volumes required (site vs. within flood zone)				
3	**EXISTING CONDITIONS PLAN**				
A	Horizontal & Vertical Datums annotated (NAD83 & NAVD88)	YES			
B	Survey Benchmark Locations (with XYZ Coordinates annotated)	YES			
C	Property & Right-of-Way Lines	YES			
D	Boundary line information (bearings, distances, etc.)	YES			
E	Property pin and monumentation locations	YES			
F	Existing easements with proper ownership identified	NO	NOT APPLICABLE		
G	Road Names & Individual Lot Labels (Map, Lot, Owner, Acreage)	YES			
H	Location of any Natural Resources and their respective buffers (wetlands, streams, etc.)	YES			
I	100-year Flood Zone Limits & Elevation	NO	NOT APPLICABLE		
J	USDA-NRCS Soil Boundaries and Labels	YES			
K	Existing contours with adequate contour labelling; minimum 1' contour interval	YES			
L	Existing building FFEs annotated	NO	NOT APPLICABLE		
M	Spot elevations for existing building corners, door entrances, accessible parking/walkways, road centerlines, and bottom/top of curbs	NO	NOT APPLICABLE		
N	Existing buildings & structures	NO	NOT APPLICABLE		
O	Existing pavement areas & number of parking spaces	YES	NO PARKING ONSITE		
P	Existing ADA ramp geometry, detectable warning plates, and ADA parking spaces	YES			
Q	Existing site features (sidewalks, retaining walls, curbing, lightpoles, guide rails, dumpsters, fencing)	YES			
R	Existing signage and striping	NO	NOT APPLICABLE		
S	Existing underground utility locations (storm, sewer, force main, water, gas, elec, tele)	YES			
T	Existing above-ground utility locations (manholes, catch basins, utility poles, hydrants, transformers, riprap)	YES			
U	Rim, invert in, invert out, pipe size, cardinal direction (N, E, S, W) information for any existing utility infrastructure being tied into (upstream/downstream/outfalls)	YES			
V	Existing tree lines, street trees, free-standing trees (12" or larger diameter at breast height), and vegetation	YES	TREES> 12"DBH NOT PROVIDED		

W	Location of any borings, drinking wells, and monitoring wells	NO	NOT APPLICABLE		
4	**SITE DEMOLITION & EROSION CONTROL (E&SC) PLAN**				
A	Limits-of-disturbance outlined and acreage annotated	YES			
B	Location of any Natural Resources and their respective buffers (wetlands, streams, etc.)	YES			
C	100-year Flood Zone Limits	NO	NOT APPLICABLE		
D	Callout existing site features to be demolished/removed/replaced	YES			
E	Callout existing utilities to be demolished/removed/abandoned-in-place	NO	NOT APPLICABLE		
F	Hatch existing buildings and pavement to be removed	YES			
G	Construction Entrance location(s)	YES			
H	Perimeter E&SC control location(s) (i.e. silt fence, erosion berm mix)	YES			
I	Stockpile and staging area(s) identified (with proper perimeter control)	YES			
J	Inlet protection location(s)	NO	NOT APPLICABLE		
K	Note requiring contractor to implement dust control measures throughout construction	YES			
L	Note requiring contractor to pave utility trenches within right-of-way within 3 days of excavation or prior to any rain event	NO	NOT APPLICABLE		
M	If groundwater expected, show dewatering/silt bag location(s); show temporary pumping routing				
N	If large development is proposed with an extensive underground stormwater conveyance network, show sediment trap/basin location(s) needed for constructability/phasing; provide sizing calculations				
5	**SITE PLAN/SUBDIVISION PLAN**				
A	Partial Site Plans needed for any viewport scale greater than 1"=20'				
B	Existing property and right-of-way lines	YES			
C	Proposed subdivision lot lines and labels	NO	NOT APPLICABLE		
D	Required Zoning Setbacks shown with dimensions and annotation	YES			
E	Bulk requirement summary table (zoning/parking calculations)	NO	NOT APPLICABLE		
F	Location of any Natural Resources and their respective buffers (wetlands, streams, etc.)	YES			
G	100-year Flood Zone Limits	NO	NOT APPLICABLE		
H	Proposed building outlines, door entrances and loading docks	YES			
I	Proposed building labels	YES			
J	Proposed road extents; provide clear annotation if roads will be public or private	NO	NOT APPLICABLE		
K	Proposed parking and accessible parking locations; annotate parking space counts	NO	NOT APPLICABLE		
L	Proposed signage, parking striping, and traffic striping	NO	NOT APPLICABLE		
M	Detailed ADA ramp geometry, detectable warning surfaces, and ADA parking striping/signage; existing & proposed	NO	NOT APPLICABLE		
N	Proposed site features (i.e. curbing, walls, fencing, guiderail, fire hydrant, transformers, light pole locations)	YES			
O	Separate hatching for buildings, sidewalks, pavement, landscaping	YES			
P	Proposed landscaping; detailed landscaping design should be on separate plans	NO	NOT APPLICABLE		
Q	Designated snow storage areas	NO	SEASONAL USE DOES NOT REQUIRE SNOW REMOVAL		
R	Proposed dumpster locations and trash removal access	NO	NOT APPLICABLE		
S	Linear dimensions of all drive aisles, sidewalk widths, parking spaces, loading docks	YES			
T	Radial dimensions for all curbs, landscaped islands, sidewalks	YES			
U	Road centerline stationing shown, labelled every 0+50' with curve data	NO	NOT APPLICABLE		
V	If Private Road is proposed, final recorded plans must clearly note that proposed private roads will not be submitted in the future for public acceptance	NO	NOT APPLICABLE		
W	If Private Road is proposed, final recorded plans must clearly note that the City is not responsible for any maintenance, repair, plowing, or trash removal of proposed private roads	NO	NOT APPLICABLE		
X	Planning Board signature block for final recording				
6	**GRADING PLAN**				
A	Partial Grading Plans needed for any viewport greater than 1"=20'				
B	Limits-of-disturbance outlined and acreage annotated	YES			
C	Proposed Building Labels with Individual Finished Floor Elevations (FFEs)	NO	NOT APPLICABLE		
D	Existing contours with adequate contour labelling, screened; minimum 1' contour interval	YES			
E	Proposed contours with adequate contour labelling; minimum 1' contour interval	YES			
F	Detailed grading for all ditches, swales, outfalls, and riprap	YES			
G	All proposed contours tie-into existing contours at limits-of-disturbance outline	YES			
H	Existing spot elevations for all asphalt and curb tie-in locations	NO	NOT APPLICABLE		
I	Location of any Natural Resources and their respective buffers (wetlands, streams, etc.)	YES			
J	100-year Flood Zone Limits	NO	NOT APPLICABLE		
K	Proposed spot elevations for all important roadway geometric points and/or on a 50' maximum interval: low/high points, PC/PT, road centerline, edge-of-asphalt				
L	Proposed spot elevations for all curblines (bottom/top-of-curb) and sidewalks				
M	Proposed spot elevations for all parking and drive aisle geometry points				
N	Proposed spot elevations for all building corners and door-entry locations				
O	Proposed retaining wall/loading dock elevations (bottom/top of wall)				
P	Proposed spot elevations for all ADA ramp/landing/parking stall geometry points				
Q	Proposed % slope arrows for all ADA parking spaces and sidewalks				
R	Proposed longitudinal % slope arrows for drainage ditch centerlines				
S	Proposed % slope arrows for roads, parking areas, and landscape tie-in areas				
T	Estimated cut/fill earthwork volumes; if disturbing within Flood Zone, separate set of earthwork volumes required (site vs. within flood zone)				
7	**ROAD PROFILES (if public/private road proposed)**	NO	NOT APPLICABLE		
A	Existing surface; dashed and screened				
B	Proposed surface; continuous and bold				
C	Corresponding centerline stationing and curve data annotation				
D	Road cross-section including proposed surface cross slopes; include multiple sections for various road cross slope conditions proposed (crowned, superelevated)				
E	Horizontal and vertical scale bars				

F	Clear annotation if proposed road will be public or private				
G	If Private Road is proposed, plans must clearly note that proposed private roads will not be submitted in the future for public acceptance				
H	If Private Road is proposed, plans must clearly note that the City is not responsible for any maintenance, repair, plowing, or trash removal of proposed private roads				
8	**UTILITY PLAN**				
A	Existing underground utility locations; screened (storm, sewer, force main, water, gas, electric, telecom)	YES			
B	Existing above-ground utility locations; screened (manholes, catch basins, utility poles, hydrants, riprap)	YES			
C	Rim, invert in, invert out, pipe size, cardinal direction (N, E, S, W) information for any existing utility infrastructure being tied into (upstream/downstream/outfalls)	YES			
D	Proposed underground utility locations; bold (storm, sewer, force main, water, gas, electric, telecom, lighting)	YES			
E	Proposed above-ground utility locations; bold (manholes, catch basins, utility poles, hydrants, transformers, riprap)	YES			
F	Proposed storm culverts, outfalls, and riprap locations and sizes	YES			
G	Storm/sewer structure labels must include: rim, inverts in, inverts out, pipe sizes, cardinal directions (N, E, S, W)	YES			
H	Storm/sewer pipe labels must include: linear footage, pipe size, material, slope	YES			
I	Flow directional arrows for storm & sewer pipes	NA			
J	Proposed & existing site features shown that could conflict with proposed utilities (trees, signs, lightpoles, bollards, foundations, guiderails)	YES			
K	All storm drains must be sized to convey the 25-year storm	YES			
L	Sewer force main sizes and invert elevations	NA			
M	Sewer pump station locations, model, rim, inverts, pipe sizes, cardinal directions (N,E,S,W)	NA			
N	Grease trap & oil-water separator locations, sizes, elevations	NA			
O	Water, gas, electric, and telecom sizes labelled	NA			
9	**UTILITY PROFILES**	NA			
A	Utility profiles for **all** gravity storm drains and sewer pipes, including all laterals, catch basins, culverts, and outfalls; profiles preferred to be aligned on the pipe centerline (not superimposed on the road centerline)				
B	Existing surface; dashed and screened				
C	Proposed surface; continuous and bold				
D	Storm/sewer structure labels must include: rim, inverts in, inverts out, pipe sizes, cardinal directions (N, E, S, W)				
E	Storm/sewer pipe labels must include: linear footage, pipe size, material, slope				
F	Existing and proposed gravity pipe crossings shown; sizes labelled and depths/clearance annotated				
G	Existing and proposed electric/water/telecom/gas crossings shown at approximate depths; sizes labelled and depths/clearance annotated				
H	Known ledge or groundwater elevations				
I	For all storm drains, 25-year HGL must be shown on profiles with starting tailwater condition identified				
J	For storm outfalls, include riprap sizing and grading extents				
K	Horizontal and vertical scale bars				
10	**DETAILS**				
A	Road section detail, including pavement & gravel depths	NO	NOT APPLICABLE		
B	Sidewalk, paver, crosswalk, and any other pavement section details	YES			
C	Pavement sawcut detail	YES			
D	Utility trench/backfill detail	YES			
E	All site feature details; curbing, retaining walls, fencing, guiderails, dumpsters, etc.	YES			
F	Signage, striping, and ADA details	NO	NOT APPLICABLE		
G	E&S notes and details; only show applicable/proposed measures	YES			
H	Utility structure details (manholes, cleanouts, fittings, handholes, transformer pads, hydrants)	YES			
I	Storm outfall & riprap details	YES			
J	Drainage ditch cross section identifying minimum depth, minimum bed width, and maximum side slopes	YES			
K	Pump station, grease trap, and oil-water separator details	NA			
L	Conduit section details	NA			
M	Miscellaneous details (as needed)	YES			
11	**LANDSCAPING, LIGHTING & PHOTOMETRIC PLANS**				
A	As required by ordinance; at a minimum: locations, counts, and species/models must be identified				
B	Landscaping & lighting details	YES			
12	**DOCUMENTS/REPORTS/CALCULATIONS**				
A	On initial preliminary submittal applications, applicant must submit a development review and inspection fee. Applicant to coordinate fee amount with City Planner prior to submittal. This fee will be drawn against to cover the following type of services throughout the project life cycle (and may require replenishing): i. 3rd Party City Peer-Review ii. Site Inspections during the permitting process iii. Erosion & Sediment Control Inspections during construction iv. Right-of-Way Inspections during construction v. Site Punchlist/As-Built Inspections post-construction	YES			

B	Predevelopment & Post-development Drainage Area Maps, including: i. Subdrainage areas delineated and labeled ii. Points of Interest/Analysis shown and labeled iii. Hatching for different land cover areas (impervious, pervious, gravel) iv. Time of concentration (Tc) paths & durations v. Four City-standardized stormwater summary tables	YES			
C	An approved 'Sewer Ability-to-Serve Letter' from the Engineering Department: i. Applicant to submit proposed sewer flow calculations per Maine's Subsurface Wastewater Disposal Rules, Chapter 241, Section 4 (Tables 4A & 4C)	NA			
D	A Performance Guarantee Cost Estimate utilizing Planning's template	NO	HOPING A CONDITION OF APPROVAL UNTIL CONTRACTOR IS ON BOARD		
E	For any Site Location of Development (SLODA) project, the applicant's submittal must mimic a formal submittal to DEP. Submit must abide to DEP's SLODA application and include DEP's SLODA Submittal Checklist (Form D)	NO	Project will proceed under exemption for educational institutionsTitle 38.Chapter 3: Subchapter 1: Article 6. 27.		
F	25-year hydraulic calculations for all storm conveyance infrastructure (pipes, culverts, drainage ditches) via the rational method; starting tailwater conditions/documentation must be clearly identified				
G	If any SWM water quality BMP or detention facility is proposed, hydrologic model exports/hydrographs must be submitted for the for the 2, 10, 25, & 100-year storm frequencies				
H	Sizing calculations for any SWM water quality BMP or detention facility	YES			
I	A stormwater maintenance manual for any proposed SWM water quality BMP or detention facility, including: i. Annual maintenance requirements ii. Annual inspection requirements by a licensed PE; noting that all inspection reports/logs need to be submitted to the Engineering Department by March 1st each following year, identifying what on-going maintenance has occurred and what remedial repairs are needed iii. Signed Property Owner Agreement: including the current property owner's contact information and signature; it must be noted that all stormwater BMP maintenance requirements are linked to the property for perpetuity and transfer to any new ownership				
J	Salt Management Plan				
K	Sewer pump station sizing calculations				
L	Sewer pump station maintenance plan				
M	Grease trap sizing calculations				
N	Homeowner Association (HOA) agreement for any private road serving two (2) lots or more				
O	Summary list & copy of any required DOT/DEP/USACE permits & approvals				

Attachment 2
Site Location Map



THIS PLAN SHALL NOT BE MODIFIED WITHOUT WRITTEN PERMISSION FROM SYTDesign CONSULTANTS, ANY ALTERATIONS, OTHERWISE, SHALL BE AT THE USER'S SOLE RISK AND WITHOUT LIABILITY TO SYTDesign CONSULTANTS.

Site Design Associates
Consulting Engineering & Land Planning
23 Whitney Way Topsham, Maine 04086 Tel: (207) 449-4275

DESIGN	TWS
DRAWN	DEPT
CHKD	TWS
DATE	JULY 2015
SCALE	1" = 1000'

PROPOSED TENNIS COURTS
OLD POOL ROAD, BIDDEFORD, ME

SITE LOCATION MAP

UNIVERSITY OF NEW ENGLAND
11 HILLS BEACH ROAD, BIDDEFORD, ME

PROJ. NO.

REV.

DWG. NO. **FIGURE 1**

Drawing Name: N:\2015 Projects\15-216-00\tennis Courts\dwg\site Plan 08-12-15 | Plot Date / Time: Feb. 13, 24 / 5:47 PM

Attachment 3
Stormwater Management Report

STORMWATER MANAGEMENT REPORT

TENNIS COURT EXPANSION
UNIVERSITY OF NEW ENGLAND
16 OLD POOL ROAD
BIDDEFORD, MAINE

February 14, 2024

Introduction

Site Design Associates (SDA) was retained to assist the University of New England (UNE) (Applicant) in the design and permitting for the expansion of the existing outdoor tennis court facility at16 Old Pool Road in Biddeford, Maine. The four existing tennis courts were constructed in 2017. The proposed project includes the construction of two additional tennis courts with bleachers and a press box and associated stormwater amenities. The project will result in an increase of 18,207 square feet of new impervious area and 22,979 square feet of new developed area.

This Stormwater Management Report assesses both pre-development and post-development peak runoff rates and stormwater treatment practices for the development area in accordance with the Maine DEP and City of Biddeford ordinance.

Methodology

The stormwater runoff analysis has been undertaken utilizing the HydroCAD Stormwater Modeling System software (Version 10.0) developed by the Applied Microcomputer Systems of Chocorua, New Hampshire. The program is based upon the TR-20 computer program and the TR-55 tabular method, both of which are based upon techniques developed by the USDA Soil Conservation Service. The analysis was undertaken for the 2, 10, 25, and 50-year frequencies (3.3, 4.9, 6.2, and 7.3 inches). Twenty-four hour storms with a Type III distribution were the basis for the analysis.

All storm drainage piping and stormwater treatment BMPs have been sized for the 25-year, 24-hour storm utilizing the HydroCAD program. Copies of the pre and post development HydroCAD output are included in Appendix A and Appendix B of this report, respectively.

Pre-Development Conditions

The site of the proposed project is located on a 25±-acre portion of the UNE campus at 16 Old Pool Road in Biddeford, Maine. The site is largely undeveloped, except for the four adjacent tennis courts constructed in 2017 and lawn areas. As taken from the website of the *"Natural Resources Conservation Service, United States Department of Agriculture, Web Soil Survey,"* the predominant soil types in the development area are Naumburg sand (Na) (HSG A), Lyman loam (Ly) (HSG D), and Lyman rock outcrop (Ln) (HSG D). Due to the prevalence of wetlands and exposed and shallow ledge conditions in the Naumburg areas, HSG C was used for those soils. The USDA soil map

is included in Appendix D of this report. The soil boundaries are shown on drawings D-100, D-101, and D-200 in Appendix F of this report.

Stormwater runoff from the development area generally flows overland to the north into an unnamed tributary stream which flows to four existing 24-inch CMP culverts under Old Pool Road and ultimately flows to the tidal marsh adjacent to Biddeford Pool.

A city site plan application was submitted for the existing tennis courts in 2015. Based on the modeling and plans, both the DEP and city staff agreed that the flooding standard did not apply, due to the downstream improvements made by UNE and the fact that the drainage below the culverts is tidal.

Stormwater runoff from the existing tennis courts is treated in two 25-foot long stone berm level spreaders with wooded buffers on the north side of the courts.

Post-Development Conditions

The proposed project includes the construction of two additional tennis courts with bleachers and a press box and associated stormwater amenities. The project will result in an increase of 18,207 square feet of new impervious area and 22,979 square feet of new developed area.

Stormwater runoff from the new courts will be collected and treated in a grassed underdrained soil filter on the north side of the site. The new 6-foot wide paved walkway that will provide access to the new courts will drain to the existing stone berm level spreaders and buffers.

Stormwater Quantity

The project area is located within a partially developed 23± acre watershed (S4) draining to an unnamed stream which flows to four existing 24-inch CMP culverts under Old Pool Road just north of the project area. The Old Pool Road culverts were installed by UNE in 2006. In 2005 the abutter, Mr. Wermenchuk, was concerned that water was backing up behind the one 24" culvert that existed at the time. He indicated that when the Old Pool Road was paved at that time, he was of the understanding that a new, larger capacity culvert would be installed to prevent the water from backing up onto his property. His understanding was the city was going undertake this work in conjunction with the repaving project at the time. UNE was in the process of designing and permitting two parking lots in the watershed. Even though the designs met the stormwater runoff rate standards for those projects, UNE agreed to install improvements (with the city's blessing) to address Mr. Wermenchuk's perceived issue, to be a good neighbor and to put the issue rest. Because of limited head room, the decision was made to install three 24" diameter culverts adjacent to the existing 24" diameter culvert, rather than one large culvert.

The outlets of these culverts were used as the analysis point for the project (AP2). The analysis was undertaken utilizing the previous Maine DEP-approved 2006 drainage model for the installation of the new CMP culverts. Although there has been development within the campus since 2006, all projects have been required to meet the

Flooding Standard, so existing runoff values have remained the same. The additional impervious area associated the currently proposed tennis courts was added to the model to verify that existing peak flow rates were not exceeded. Due to the minimal size of the project in relation to the large S4 watershed, the minimal increase of impervious area associated with the two new tennis courts does not change the curve number for subcatchment S4. Therefore, peak flow rates remain the same at analysis point AP2.

TABLE 1
UNE TENNIS COURT EXPANSION - STORMWATER RUNOFF DISCHARGE SUMMARY

ANALYSIS POINT	STORM FREQUENCY	EXISTING DISCHARGE (CFS)	PROPOSED DISCHARGE (CFS)	NOTES
AP3	Q_2	41.1	41.1	No Increase
	Q_{10}	80.7	80.7	No Increase
	Q_{25}	99.8	99.8	No Increase
	Q_{50}	155.9	155.9	No Increase

Stormwater Quality

The proposed project includes the construction of two additional tennis courts with bleachers and a press box and associated stormwater amenities. The project will result in an increase of 18,207 square feet of new impervious area and 22,979 square feet of new developed area.

Stormwater runoff from the new courts will be collected and treated in a grassed underdrained soil filter on the north side of the site. The new 6-foot wide paved walkway that will provide access to the new courts will drain to the existing stone berm level spreaders and buffers. Graded areas on the south and west sides of the courts and on the north side of the soil filter berm will be returned to a meadow condition and mowed no more than twice per year, thereby returning them to and undeveloped condition, per Maine DEP Chapter 500.

The project is designed based on the Maine DEP Chapter 500 General Standards requiring treatment of 95% of the new impervious area and 80% of the new developed area. The project will result in the treatment of 99.7% of the new impervious area and 93.2% of the new developed area.

BMP sizing for the soil filter and level spreaders are provided in Appendix C of this report.

Table 1 Water Quality Treatment Calculations				
Subcatchment Area	**New Impervious**	**New Landscaped**	**New Developed**	**Treament BMP**
1	543	0	543	Level Spreader 1
2	687	0	687	Level Spreader 2
3	16,914	4,653	21,567	Soil Filter SF1
4	63	820	883	None
5	0	785	785	None
Subtotal Areas	18,207	6,258	24,465	
TOTAL TREATED AREAS	**18,144**	**4,653**	**22,797**	
PERCENT IMPERVIOUS & DEVELOPED AREA TREATED	**99.7%**		**93.2%**	
Notes:				
Treated Impervious Area				
Treated Developed Area				
Chapter 500 Requires treatment of 95% of impervious area and 80% of developed area.				
All areas presented in square feet.				

Erosion Control

BMPs such as a stabilized construction entrance, silt fence and/or filter berms of erosion control mix, riprap pipe inlet and outlet protection, mulch, and permanent seeding will be used to prevent erosion and downstream migration of sediment during construction. The locations of temporary and permanent erosion control measures and erosion and sedimentation control notes and details are shown on the design drawing set.

Inspection & Maintenance

The University of New England will be responsible for maintaining the stormwater facilities for the project. An Inspection and Maintenance Plan is included as Appendix D.

Conclusions

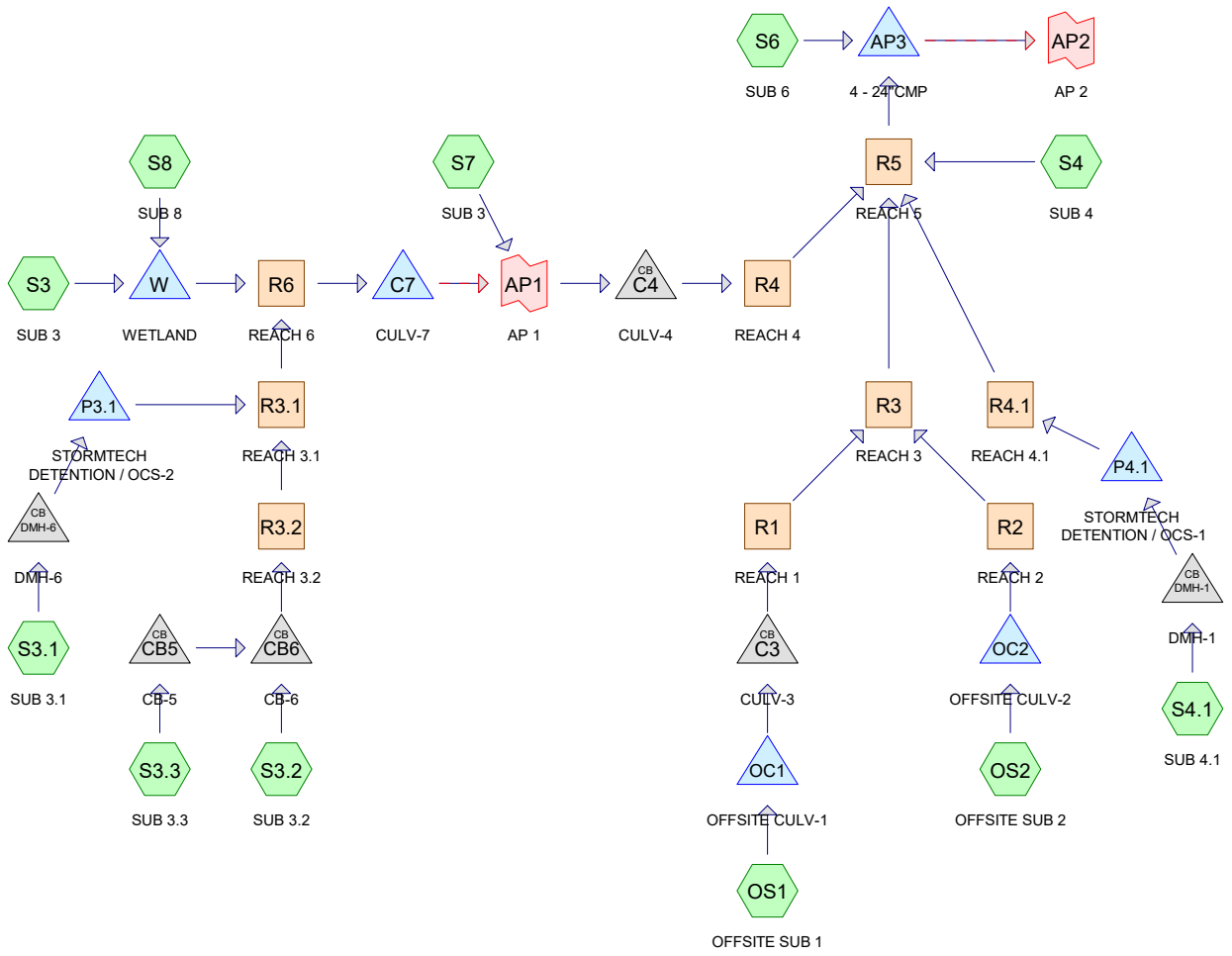
The stormwater management for this project includes a variety of BMPs to control both the quantity and quality of stormwater runoff. The HydroCAD calculations show that the project will maintain pre-development peak flows rates. Stormwater treatment BMPs have been designed to treat stormwater runoff from 99.7% of the new impervious area and 93.2% of the new developed area, which exceeds the standards of both the Maine DEP and the City of Biddeford. Based on the information provided, no adverse impacts to downstream receiving bodies are anticipated.

SUPPORTING DATA AND CALCULATIONS

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

- Appendix A: Pre-Development HydroCAD Calculations
- Appendix B: Post-Development HydroCAD Calculations
- Appendix C: Stormwater BMP Calculations & Biddeford Stormwater Tables
- Appendix D: Inspection and Maintenance Plan
- Appendix E: USDA NRCS Soil Map
- Appendix F: Drainage Plans
    - D-100 – Campus Drainage Plan – Offsite Areas
    - D-101 – Campus Drainage Plan – Pre-Development
    - D-200 – Campus Drainage Plan – Post Development
    - D-300 – Stormwater Treatment Plan

Appendix A:
Pre Development Campus Drainage HydroCAD Caluclations



Subcat Reach Pond Link

Routing Diagram for Campus - Pre Development
Prepared by Site Design Associates, Printed 2/12/2024
HydroCAD® 10.00-26 s/n 08018 © 2020 HydroCAD Software Solutions LLC

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment OS1: OFFSITE SUB 1 Runoff Area=1,467,784 sf 3.67% Impervious Runoff Depth=0.89"
Flow Length=1,645' Tc=29.1 min CN=70 Runoff=18.18 cfs 108,481 cf

Subcatchment OS2: OFFSITE SUB 2 Runoff Area=913,125 sf 2.70% Impervious Runoff Depth=1.28"
Flow Length=1,654' Tc=58.8 min CN=77 Runoff=12.15 cfs 97,685 cf

Subcatchment S3: SUB 3 Runoff Area=836,116 sf 36.42% Impervious Runoff Depth=1.16"
Flow Length=828' Tc=39.2 min CN=75 Runoff=12.49 cfs 80,978 cf

Subcatchment S3.1: SUB 3.1 Runoff Area=41,451 sf 89.14% Impervious Runoff Depth=2.85"
Flow Length=160' Slope=0.0100 '/' Tc=5.0 min CN=96 Runoff=3.06 cfs 9,837 cf

Subcatchment S3.2: SUB 3.2 Runoff Area=8,722 sf 9.15% Impervious Runoff Depth=1.55"
Flow Length=163' Slope=0.0220 '/' Tc=5.0 min CN=81 Runoff=0.37 cfs 1,125 cf

Subcatchment S3.3: SUB 3.3 Runoff Area=1,672 sf 27.51% Impervious Runoff Depth=1.35"
Tc=5.0 min CN=78 Runoff=0.06 cfs 188 cf

Subcatchment S4: SUB 4 Runoff Area=1,012,128 sf 16.94% Impervious Runoff Depth=1.48"
Flow Length=1,599' Tc=46.2 min CN=80 Runoff=18.17 cfs 124,765 cf

Subcatchment S4.1: SUB 4.1 Runoff Area=36,714 sf 95.49% Impervious Runoff Depth=2.96"
Flow Length=281' Slope=0.0100 '/' Tc=5.0 min CN=97 Runoff=2.76 cfs 9,043 cf

Subcatchment S6: SUB 6 Runoff Area=132,680 sf 8.16% Impervious Runoff Depth=1.55"
Flow Length=616' Tc=13.5 min CN=81 Runoff=4.32 cfs 17,117 cf

Subcatchment S7: SUB 3 Runoff Area=167,053 sf 43.24% Impervious Runoff Depth=2.17"
Flow Length=1,081' Tc=10.0 min CN=89 Runoff=8.48 cfs 30,251 cf

Subcatchment S8: SUB 8 Runoff Area=81,849 sf 5.04% Impervious Runoff Depth=1.35"
Flow Length=399' Tc=21.1 min CN=78 Runoff=1.92 cfs 9,188 cf

Reach R1: REACH 1 Avg. Flow Depth=0.19' Max Vel=1.26 fps Inflow=6.83 cfs 108,474 cf
n=0.030 L=386.0' S=0.0104 '/' Capacity=256.49 cfs Outflow=6.82 cfs 108,472 cf

Reach R2: REACH 2 Avg. Flow Depth=0.23' Max Vel=1.40 fps Inflow=10.07 cfs 97,680 cf
n=0.030 L=527.0' S=0.0100 '/' Capacity=252.44 cfs Outflow=10.00 cfs 97,679 cf

Reach R3: REACH 3 Avg. Flow Depth=0.62' Max Vel=3.73 fps Inflow=16.80 cfs 206,151 cf
n=0.030 L=874.0' S=0.0138 '/' Capacity=141.56 cfs Outflow=16.76 cfs 206,149 cf

Reach R3.1: REACH 3.1 Avg. Flow Depth=0.03' Max Vel=0.41 fps Inflow=0.60 cfs 11,150 cf
n=0.025 L=179.0' S=0.0056 '/' Capacity=833.80 cfs Outflow=0.53 cfs 11,150 cf

Reach R3.2: REACH 3.2 Avg. Flow Depth=0.01' Max Vel=0.65 fps Inflow=0.44 cfs 1,313 cf
n=0.025 L=91.3' S=0.0219 '/' Capacity=1,651.08 cfs Outflow=0.40 cfs 1,313 cf

Reach R4: REACH 4 Avg. Flow Depth=0.57' Max Vel=3.95 fps Inflow=16.14 cfs 131,567 cf
n=0.030 L=144.0' S=0.0171 '/' Capacity=157.25 cfs Outflow=16.14 cfs 131,567 cf

Reach R4.1: REACH 4.1 Avg. Flow Depth=0.07' Max Vel=0.99 fps Inflow=0.89 cfs 9,043 cf
n=0.030 L=552.0' S=0.0145 '/' Capacity=390.71 cfs Outflow=0.87 cfs 9,043 cf

Reach R5: REACH 5 Avg. Flow Depth=1.01' Max Vel=5.67 fps Inflow=40.35 cfs 471,523 cf
n=0.025 L=317.0' S=0.0134 '/' Capacity=147.04 cfs Outflow=40.33 cfs 471,523 cf

Reach R6: REACH 6 Avg. Flow Depth=0.21' Max Vel=3.78 fps Inflow=14.12 cfs 101,316 cf
n=0.025 L=133.0' S=0.0328 '/' Capacity=623.19 cfs Outflow=14.12 cfs 101,316 cf

Pond AP3: 4 - 24"CMP Peak Elev=11.78' Storage=4,214 cf Inflow=41.18 cfs 488,639 cf
Primary=41.09 cfs 488,616 cf Secondary=0.00 cfs 0 cf Outflow=41.09 cfs 488,616 cf

Pond C3: CULV-3 Peak Elev=32.83' Inflow=6.83 cfs 108,474 cf
24.0" Round Culvert n=0.013 L=169.0' S=0.0095 '/' Outflow=6.83 cfs 108,474 cf

Pond C4: CULV-4 Peak Elev=18.95' Inflow=16.14 cfs 131,567 cf
24.0" Round Culvert n=0.011 L=86.0' S=0.0050 '/' Outflow=16.14 cfs 131,567 cf

Pond C7: CULV-7 Peak Elev=21.02' Storage=569 cf Inflow=14.12 cfs 101,316 cf
Primary=14.10 cfs 101,316 cf Secondary=0.00 cfs 0 cf Outflow=14.10 cfs 101,316 cf

Pond CB5: CB-5 Peak Elev=104.12' Inflow=0.06 cfs 188 cf
1.0" Round Culvert n=0.010 L=70.0' S=0.0050 '/' Outflow=0.06 cfs 188 cf

Pond CB6: CB-6 Peak Elev=28.20' Inflow=0.44 cfs 1,313 cf
12.0" Round Culvert n=0.013 L=184.0' S=0.0050 '/' Outflow=0.44 cfs 1,313 cf

Pond DMH-1: DMH-1 Peak Elev=33.33' Inflow=2.76 cfs 9,043 cf
24.0" Round Culvert n=0.010 L=30.0' S=0.0077 '/' Outflow=2.76 cfs 9,043 cf

Pond DMH-6: DMH-6 Peak Elev=30.87' Inflow=3.06 cfs 9,837 cf
24.0" Round Culvert n=0.010 L=6.0' S=0.2050 '/' Outflow=3.06 cfs 9,837 cf

Pond OC1: OFFSITE CULV-1 Peak Elev=35.42' Storage=30,746 cf Inflow=18.18 cfs 108,481 cf
18.0" Round Culvert n=0.013 L=97.6' S=0.0201 '/' Outflow=6.83 cfs 108,474 cf

Pond OC2: OFFSITE CULV-2 Peak Elev=34.53' Storage=12,480 cf Inflow=12.15 cfs 97,685 cf
18.0" Round Culvert n=0.013 L=93.6' S=0.0170 '/' Outflow=10.07 cfs 97,680 cf

Pond P3.1: STORMTECH DETENTION / OCS-2 Peak Elev=29.36' Storage=3,885 cf Inflow=3.06 cfs 9,837 cf
Outflow=0.32 cfs 9,837 cf

Pond P4.1: STORMTECH DETENTION / OCS-1 Peak Elev=33.01' Storage=1,451 cf Inflow=2.76 cfs 9,043 cf
Outflow=0.89 cfs 9,043 cf

Pond W: WETLAND Peak Elev=24.29' Storage=1,005 cf Inflow=13.72 cfs 90,166 cf
Outflow=13.67 cfs 90,166 cf

Link AP1: AP 1 Inflow=16.14 cfs 131,567 cf
Primary=16.14 cfs 131,567 cf

Link AP2: AP 2 Inflow=41.09 cfs 488,616 cf
Primary=41.09 cfs 488,616 cf

Total Runoff Area = 4,699,294 sf Runoff Volume = 488,659 cf Average Runoff Depth = 1.25"
84.79% Pervious = 3,984,423 sf 15.21% Impervious = 714,871 sf

Summary for Subcatchment OS1: OFFSITE SUB 1

Runoff = 18.18 cfs @ 12.45 hrs, Volume= 108,481 cf, Depth= 0.89"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Yr Rainfall=3.30"

Area (sf)	CN	Description
53,844	98	Paved parking & roofs
32,748	49	50-75% Grass cover, Fair, HSG A
12,803	79	50-75% Grass cover, Fair, HSG C
12,554	84	50-75% Grass cover, Fair, HSG D
205,440	30	Woods, Good, HSG A
228,765	70	Woods, Good, HSG C
921,630	77	Woods, Good, HSG D
1,467,784	70	Weighted Average
1,413,940		96.33% Pervious Area
53,844		3.67% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.6	100	0.0430	0.25		**Sheet Flow, A - B** Range n= 0.130 P2= 3.00"
0.8	75	0.0510	1.58		**Shallow Concentrated Flow, B -C** Short Grass Pasture Kv= 7.0 fps
20.3	923	0.0230	0.76		**Shallow Concentrated Flow, C - D** Woodland Kv= 5.0 fps
1.4	547	0.0180	6.31	157.83	**Channel Flow, D - E** Area= 25.0 sf Perim= 27.0' r= 0.93' n= 0.030 Earth, grassed & winding
29.1	1,645	Total			

Summary for Subcatchment OS2: OFFSITE SUB 2

Runoff = 12.15 cfs @ 12.86 hrs, Volume= 97,685 cf, Depth= 1.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Yr Rainfall=3.30"

Area (sf)	CN	Description
24,623	98	Paved parking & roofs
8,226	79	50-75% Grass cover, Fair, HSG C
13,667	84	50-75% Grass cover, Fair, HSG D
151,095	70	Woods, Good, HSG C
715,514	77	Woods, Good, HSG D
913,125	77	Weighted Average
888,502		97.30% Pervious Area
24,623		2.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.0	100	0.0530	0.11		**Sheet Flow, A - B** Woods: Light underbrush n= 0.400 P2= 3.00"
43.8	1,554	0.0140	0.59		**Shallow Concentrated Flow, B - C** Woodland Kv= 5.0 fps
58.8	1,654	Total			

Summary for Subcatchment S3: SUB 3

Runoff = 12.49 cfs @ 12.59 hrs, Volume= 80,978 cf, Depth= 1.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Yr Rainfall=3.30"

Area (sf)	CN	Description
304,505	98	Paved parking & roofs
45,477	49	50-75% Grass cover, Fair, HSG A
10,125	79	50-75% Grass cover, Fair, HSG C
78,239	84	50-75% Grass cover, Fair, HSG D
142,893	30	Woods, Good, HSG A
81,209	70	Woods, Good, HSG C
173,668	77	Woods, Good, HSG D
836,116	75	Weighted Average
531,611		63.58% Pervious Area
304,505		36.42% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.4	150	0.0950	0.15		**Sheet Flow, A - B** Woods: Light underbrush n= 0.400 P2= 3.00"
1.5	143	0.1000	1.58		**Shallow Concentrated Flow, B - C** Woodland Kv= 5.0 fps
21.3	535	0.0070	0.42		**Shallow Concentrated Flow, C -D** Woodland Kv= 5.0 fps
39.2	828	Total			

Summary for Subcatchment S3.1: SUB 3.1

Runoff = 3.06 cfs @ 12.07 hrs, Volume= 9,837 cf, Depth= 2.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Yr Rainfall=3.30"

Area (sf)	CN	Description
36,951	98	Paved parking & roofs
3,700	79	50-75% Grass cover, Fair, HSG C
800	84	50-75% Grass cover, Fair, HSG D
41,451	96	Weighted Average
4,500		10.86% Pervious Area
36,951		89.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.4	160	0.0100	1.11		**Sheet Flow, A - B**
					Smooth surfaces n= 0.011 P2= 3.00"
2.6					**Direct Entry, Min Tc**
5.0	160	Total			

Summary for Subcatchment S3.2: SUB 3.2

Runoff = 0.37 cfs @ 12.08 hrs, Volume= 1,125 cf, Depth= 1.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Yr Rainfall=3.30"

Area (sf)	CN	Description
798	98	Paved parking & roofs
7,924	79	50-75% Grass cover, Fair, HSG C
8,722	81	Weighted Average
7,924		90.85% Pervious Area
798		9.15% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.6	163	0.0220	1.04		**Shallow Concentrated Flow, A - B**
					Short Grass Pasture Kv= 7.0 fps
2.4					**Direct Entry,**
5.0	163	Total			

Summary for Subcatchment S3.3: SUB 3.3

Runoff = 0.06 cfs @ 12.08 hrs, Volume= 188 cf, Depth= 1.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Yr Rainfall=3.30"

Area (sf)	CN	Description
460	98	Paved parking & roofs
1,212	70	Woods, Good, HSG C
1,672	78	Weighted Average
1,212		72.49% Pervious Area
460		27.51% Impervious Area

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

Summary for Subcatchment S4: SUB 4

Runoff = 18.17 cfs @ 12.67 hrs, Volume= 124,765 cf, Depth= 1.48"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Yr Rainfall=3.30"

Area (sf)	CN	Description
171,450	98	Paved parking & roofs
20,781	79	50-75% Grass cover, Fair, HSG C
7,642	84	50-75% Grass cover, Fair, HSG D
419,188	73	Woods, Fair, HSG C
393,067	79	Woods, Fair, HSG D
1,012,128	80	Weighted Average
840,678		83.06% Pervious Area
171,450		16.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
29.3	100	0.0100	0.06		**Sheet Flow, A - B** Woods: Light underbrush n= 0.400 P2= 3.00"
3.9	284	0.0600	1.22		**Shallow Concentrated Flow, B - C** Woodland Kv= 5.0 fps
10.4	341	0.0120	0.55		**Shallow Concentrated Flow, C - D** Woodland Kv= 5.0 fps
2.6	874	0.0140	5.64	281.88	**Channel Flow, D - E** Area= 50.0 sf Perim= 53.0' r= 0.94' n= 0.030 Earth, grassed & winding
46.2	1,599	Total			

Summary for Subcatchment S4.1: SUB 4.1

Runoff = 2.76 cfs @ 12.07 hrs, Volume= 9,043 cf, Depth= 2.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Yr Rainfall=3.30"

Area (sf)	CN	Description
35,058	98	Paved parking & roofs
1,656	74	>75% Grass cover, Good, HSG C
36,714	97	Weighted Average
1,656		4.51% Pervious Area
35,058		95.49% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.9	200	0.0100	1.16		**Sheet Flow, A - B**
					Smooth surfaces n= 0.011 P2= 3.00"
0.7	81	0.0100	2.03		**Shallow Concentrated Flow, B - C**
					Paved Kv= 20.3 fps
1.4					**Direct Entry, Min Tc**
5.0	281	Total			

Summary for Subcatchment S6: SUB 6

Runoff = 4.32 cfs @ 12.19 hrs, Volume= 17,117 cf, Depth= 1.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Yr Rainfall=3.30"

Area (sf)	CN	Description
10,824	98	Paved parking & roofs
19,401	79	50-75% Grass cover, Fair, HSG C
64,092	84	50-75% Grass cover, Fair, HSG D
32,603	70	Woods, Good, HSG C
5,760	77	Woods, Good, HSG D
132,680	81	Weighted Average
121,856		91.84% Pervious Area
10,824		8.16% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.0	40	0.0410	0.08		**Sheet Flow, A - B**
					Woods: Light underbrush n= 0.400 P2= 3.00"
0.7	71	0.1120	1.67		**Shallow Concentrated Flow, B - C**
					Woodland Kv= 5.0 fps
4.5	265	0.0380	0.97		**Shallow Concentrated Flow, B - C**
					Woodland Kv= 5.0 fps
0.3	240	0.0250	11.44	686.23	**Channel Flow, C - D**
					Area= 60.0 sf Perim= 34.0' r= 1.76'
					n= 0.030 Earth, grassed & winding
13.5	616	Total			

Summary for Subcatchment S7: SUB 3

Runoff = 8.48 cfs @ 12.14 hrs, Volume= 30,251 cf, Depth= 2.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Yr Rainfall=3.30"

Area (sf)	CN	Description
72,236	98	Paved parking & roofs
66,092	84	50-75% Grass cover, Fair, HSG D
5,176	73	Woods, Fair, HSG C
23,549	79	Woods, Fair, HSG D
167,053	89	Weighted Average
94,817		56.76% Pervious Area
72,236		43.24% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.8	58	0.0430	0.20		**Sheet Flow, A - B** Grass: Short n= 0.150 P2= 3.00"
1.1	136	0.0840	2.03		**Shallow Concentrated Flow, B - C** Short Grass Pasture Kv= 7.0 fps
2.8	424	0.0150	2.49		**Shallow Concentrated Flow, C - D** Paved Kv= 20.3 fps
0.1	39	0.0450	9.55	3.33	**Pipe Channel, D - E** 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.010 PVC, smooth interior
0.3	185	0.0380	11.66	116.60	**Channel Flow, E - F** Area= 10.0 sf Perim= 12.0' r= 0.83' n= 0.022 Earth, clean & straight
0.5	137	0.0168	4.82	0.95	**Pipe Channel, F - G** 6.0" Round Area= 0.2 sf Perim= 1.6' r= 0.13' n= 0.010 PVC, smooth interior
0.4	102	0.0042	4.67	14.66	**Pipe Channel, G - H** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.013 Concrete pipe, bends & connections
10.0	1,081	Total			

Summary for Subcatchment S8: SUB 8

Runoff = 1.92 cfs @ 12.31 hrs, Volume= 9,188 cf, Depth= 1.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Yr Rainfall=3.30"

Area (sf)	CN	Description
4,122	98	Paved parking & roofs
439	79	50-75% Grass cover, Fair, HSG C
34,658	74	>75% Grass cover, Good, HSG C
4,166	73	Woods, Fair, HSG C
38,464	79	Woods, Fair, HSG D
81,849	78	Weighted Average
77,727		94.96% Pervious Area
4,122		5.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.8	120	0.0500	0.11		**Sheet Flow, A - B** Woods: Light underbrush n= 0.400 P2= 3.00"
1.4	138	0.1100	1.66		**Shallow Concentrated Flow, B - C** Woodland Kv= 5.0 fps
1.9	141	0.0320	1.25		**Shallow Concentrated Flow, C - D** Short Grass Pasture Kv= 7.0 fps
21.1	399	Total			

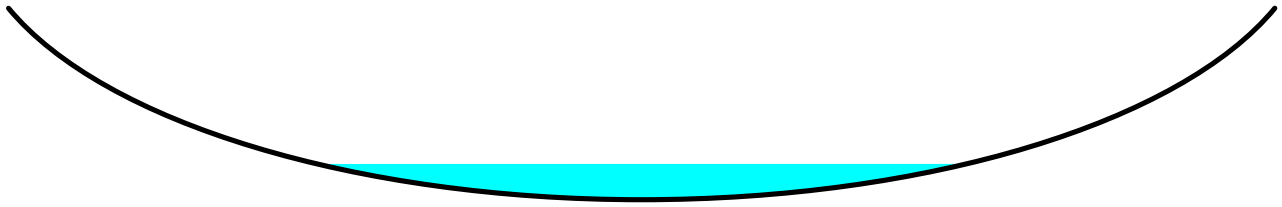
Summary for Reach R1: REACH 1

Inflow Area = 1,467,784 sf, 3.67% Impervious, Inflow Depth = 0.89" for 2-Yr event
Inflow = 6.83 cfs @ 13.06 hrs, Volume= 108,474 cf
Outflow = 6.82 cfs @ 13.21 hrs, Volume= 108,472 cf, Atten= 0%, Lag= 9.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.26 fps, Min. Travel Time= 5.1 min
Avg. Velocity = 0.44 fps, Avg. Travel Time= 14.7 min

Peak Storage= 2,088 cf @ 13.13 hrs
Average Depth at Peak Storage= 0.19'
Bank-Full Depth= 1.00' Flow Area= 66.7 sf, Capacity= 256.49 cfs

100.00' x 1.00' deep Parabolic Channel, n= 0.030 Earth, grassed & winding
Length= 386.0' Slope= 0.0104 '/'
Inlet Invert= 30.00', Outlet Invert= 26.00'



‡

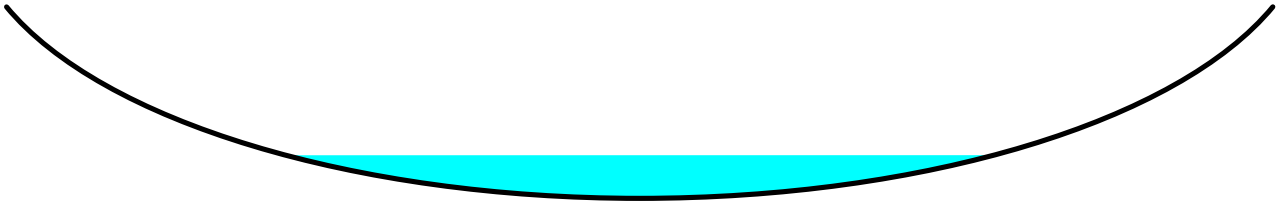
Summary for Reach R2: REACH 2

Inflow Area = 913,125 sf, 2.70% Impervious, Inflow Depth = 1.28" for 2-Yr event
Inflow = 10.07 cfs @ 13.13 hrs, Volume= 97,680 cf
Outflow = 10.00 cfs @ 13.31 hrs, Volume= 97,679 cf, Atten= 1%, Lag= 10.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.40 fps, Min. Travel Time= 6.3 min
Avg. Velocity = 0.40 fps, Avg. Travel Time= 21.9 min

Peak Storage= 3,757 cf @ 13.21 hrs
Average Depth at Peak Storage= 0.23'
Bank-Full Depth= 1.00' Flow Area= 66.7 sf, Capacity= 252.44 cfs

100.00' x 1.00' deep Parabolic Channel, n= 0.030 Earth, grassed & winding
Length= 527.0' Slope= 0.0100 '/'
Inlet Invert= 31.29', Outlet Invert= 26.00'



‡

Summary for Reach R3: REACH 3

Inflow Area = 2,380,909 sf, 3.30% Impervious, Inflow Depth = 1.04" for 2-Yr event
Inflow = 16.80 cfs @ 13.29 hrs, Volume= 206,151 cf
Outflow = 16.76 cfs @ 13.40 hrs, Volume= 206,149 cf, Atten= 0%, Lag= 6.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.73 fps, Min. Travel Time= 3.9 min
Avg. Velocity = 1.06 fps, Avg. Travel Time= 13.8 min

Peak Storage= 3,928 cf @ 13.34 hrs
Average Depth at Peak Storage= 0.62'
Bank-Full Depth= 2.00' Flow Area= 20.0 sf, Capacity= 141.56 cfs

6.00' x 2.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 2.0 '/' Top Width= 14.00'
Length= 874.0' Slope= 0.0138 '/'
Inlet Invert= 26.00', Outlet Invert= 13.90'



Summary for Reach R3.1: REACH 3.1

Inflow Area = 51,845 sf, 73.70% Impervious, Inflow Depth = 2.58" for 2-Yr event
Inflow = 0.60 cfs @ 12.15 hrs, Volume= 11,150 cf
Outflow = 0.53 cfs @ 12.34 hrs, Volume= 11,150 cf, Atten= 11%, Lag= 11.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.41 fps, Min. Travel Time= 7.2 min
Avg. Velocity = 0.33 fps, Avg. Travel Time= 9.1 min

Peak Storage= 232 cf @ 12.21 hrs
Average Depth at Peak Storage= 0.03'
Bank-Full Depth= 2.00' Flow Area= 140.0 sf, Capacity= 833.80 cfs

50.00' x 2.00' deep channel, n= 0.025 Earth, clean & winding
Side Slope Z-value= 10.0 '/' Top Width= 90.00'
Length= 179.0' Slope= 0.0056 '/'
Inlet Invert= 24.90', Outlet Invert= 23.90'



‡

Summary for Reach R3.2: REACH 3.2

Inflow Area = 10,394 sf, 12.10% Impervious, Inflow Depth = 1.52" for 2-Yr event
Inflow = 0.44 cfs @ 12.08 hrs, Volume= 1,313 cf
Outflow = 0.40 cfs @ 12.15 hrs, Volume= 1,313 cf, Atten= 9%, Lag= 4.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.65 fps, Min. Travel Time= 2.4 min
Avg. Velocity = 0.65 fps, Avg. Travel Time= 2.4 min

Peak Storage= 56 cf @ 12.11 hrs
Average Depth at Peak Storage= 0.01'
Bank-Full Depth= 2.00' Flow Area= 140.0 sf, Capacity= 1,651.08 cfs

50.00' x 2.00' deep channel, n= 0.025 Earth, clean & winding
Side Slope Z-value= 10.0 '/' Top Width= 90.00'
Length= 91.3' Slope= 0.0219 '/'
Inlet Invert= 26.90', Outlet Invert= 24.90'



‡

Summary for Reach R4: REACH 4

Inflow Area = 1,136,863 sf, 36.86% Impervious, Inflow Depth = 1.39" for 2-Yr event
Inflow = 16.14 cfs @ 12.54 hrs, Volume= 131,567 cf
Outflow = 16.14 cfs @ 12.55 hrs, Volume= 131,567 cf, Atten= 0%, Lag= 1.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.95 fps, Min. Travel Time= 0.6 min
Avg. Velocity = 1.32 fps, Avg. Travel Time= 1.8 min

Peak Storage= 588 cf @ 12.54 hrs
Average Depth at Peak Storage= 0.57'
Bank-Full Depth= 2.00' Flow Area= 20.0 sf, Capacity= 157.25 cfs

6.00' x 2.00' deep channel, n= 0.030 Stream, clean & straight
Side Slope Z-value= 2.0 '/' Top Width= 14.00'
Length= 144.0' Slope= 0.0171 '/'
Inlet Invert= 16.36', Outlet Invert= 13.90'



Summary for Reach R4.1: REACH 4.1

Inflow Area = 36,714 sf, 95.49% Impervious, Inflow Depth = 2.96" for 2-Yr event
Inflow = 0.89 cfs @ 12.35 hrs, Volume= 9,043 cf
Outflow = 0.87 cfs @ 12.59 hrs, Volume= 9,043 cf, Atten= 2%, Lag= 14.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.99 fps, Min. Travel Time= 9.3 min
Avg. Velocity = 0.48 fps, Avg. Travel Time= 19.1 min

Peak Storage= 485 cf @ 12.43 hrs
Average Depth at Peak Storage= 0.07'
Bank-Full Depth= 2.00' Flow Area= 56.0 sf, Capacity= 390.71 cfs

12.00' x 2.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 8.0 '/' Top Width= 44.00'
Length= 552.0' Slope= 0.0145 '/'
Inlet Invert= 22.00', Outlet Invert= 14.00'



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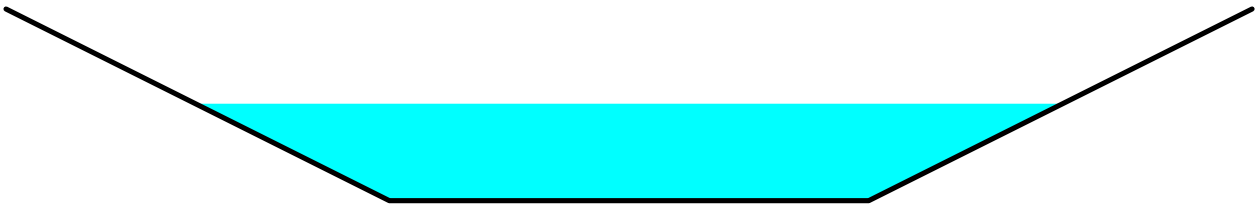
Summary for Reach R5: REACH 5

Inflow Area = 4,566,614 sf, 15.42% Impervious, Inflow Depth = 1.24" for 2-Yr event
Inflow = 40.35 cfs @ 12.78 hrs, Volume= 471,523 cf
Outflow = 40.33 cfs @ 12.80 hrs, Volume= 471,523 cf, Atten= 0%, Lag= 1.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 5.67 fps, Min. Travel Time= 0.9 min
Avg. Velocity = 1.42 fps, Avg. Travel Time= 3.7 min

Peak Storage= 2,255 cf @ 12.78 hrs
Average Depth at Peak Storage= 1.01'
Bank-Full Depth= 2.00' Flow Area= 18.0 sf, Capacity= 147.04 cfs

5.00' x 2.00' deep channel, n= 0.025 Earth, clean & straight
Side Slope Z-value= 2.0 '/' Top Width= 13.00'
Length= 317.0' Slope= 0.0134 '/'
Inlet Invert= 13.90', Outlet Invert= 9.64'



Summary for Reach R6: REACH 6

Inflow Area = 969,810 sf, 35.76% Impervious, Inflow Depth = 1.25" for 2-Yr event
Inflow = 14.12 cfs @ 12.59 hrs, Volume= 101,316 cf
Outflow = 14.12 cfs @ 12.61 hrs, Volume= 101,316 cf, Atten= 0%, Lag= 0.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.78 fps, Min. Travel Time= 0.6 min
Avg. Velocity = 1.25 fps, Avg. Travel Time= 1.8 min

Peak Storage= 497 cf @ 12.60 hrs
Average Depth at Peak Storage= 0.21'
Bank-Full Depth= 2.00' Flow Area= 42.0 sf, Capacity= 623.19 cfs

17.00' x 2.00' deep channel, n= 0.025 Earth, clean & winding
Side Slope Z-value= 2.0 '/' Top Width= 25.00'
Length= 133.0' Slope= 0.0328 '/'
Inlet Invert= 23.90', Outlet Invert= 19.54'



‡

Summary for Pond AP3: 4 - 24"CMP

Inflow Area = 4,699,294 sf, 15.21% Impervious, Inflow Depth = 1.25" for 2-Yr event
Inflow = 41.18 cfs @ 12.79 hrs, Volume= 488,639 cf
Outflow = 41.09 cfs @ 12.82 hrs, Volume= 488,616 cf, Atten= 0%, Lag= 1.8 min
Primary = 41.09 cfs @ 12.82 hrs, Volume= 488,616 cf
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 6

Peak Elev= 11.78' @ 12.82 hrs Surf.Area= 3,694 sf Storage= 4,214 cf

Plug-Flow detention time= 2.0 min calculated for 488,616 cf (100% of inflow)
Center-of-Mass det. time= 1.9 min (919.9 - 918.1)

Volume	Invert	Avail.Storage	Storage Description
#1	9.64'	96,037 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
9.64	0	0	0
10.00	856	154	154
12.00	4,037	4,893	5,047
14.00	13,588	17,625	22,672
16.00	39,016	52,604	75,276
16.50	44,026	20,761	96,037

Device	Routing	Invert	Outlet Devices
#1	Primary	9.77'	**24.0" Round Proposed 3 - 24" CMP X 3.00** L= 65.0' CMP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 9.77' / 9.12' S= 0.0100 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 3.14 sf
#2	Primary	9.83'	**24.0" Round Existing 24"CMP** L= 64.0' CMP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 9.77' / 9.83' S= -0.0009 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 3.14 sf
#3	Secondary	16.50'	**20.0' long x 25.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=41.09 cfs @ 12.82 hrs HW=11.78' (Free Discharge)
└**1=Proposed 3 - 24" CMP** (Barrel Controls 33.65 cfs @ 4.41 fps)
└**2=Existing 24"CMP** (Barrel Controls 7.45 cfs @ 2.92 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=9.64' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond C3: CULV-3

Inflow Area = 1,467,784 sf, 3.67% Impervious, Inflow Depth = 0.89" for 2-Yr event
Inflow = 6.83 cfs @ 13.06 hrs, Volume= 108,474 cf
Outflow = 6.83 cfs @ 13.06 hrs, Volume= 108,474 cf, Atten= 0%, Lag= 0.0 min
Primary = 6.83 cfs @ 13.06 hrs, Volume= 108,474 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 32.83' @ 13.06 hrs
Flood Elev= 39.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	31.60'	**24.0" Round Culvert** L= 169.0' RCP, groove end projecting, Ke= 0.200

Inlet / Outlet Invert= 31.60' / 30.00' S= 0.0095 '/' Cc= 0.900
n= 0.013 Concrete, trowel finish, Flow Area= 3.14 sf

Primary OutFlow Max=6.83 cfs @ 13.06 hrs HW=32.83' TW=31.60' (Fixed TW Elev= 31.60')
1=Culvert (Outlet Controls 6.83 cfs @ 4.80 fps)

Summary for Pond C4: CULV-4

Inflow Area = 1,136,863 sf, 36.86% Impervious, Inflow Depth = 1.39" for 2-Yr event
Inflow = 16.14 cfs @ 12.54 hrs, Volume= 131,567 cf
Outflow = 16.14 cfs @ 12.54 hrs, Volume= 131,567 cf, Atten= 0%, Lag= 0.0 min
Primary = 16.14 cfs @ 12.54 hrs, Volume= 131,567 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 18.95' @ 12.54 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	16.79'	**24.0" Round Culvert**
			L= 86.0' RCP, groove end projecting, Ke= 0.200
			Inlet / Outlet Invert= 16.79' / 16.36' S= 0.0050 '/' Cc= 0.900
			n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf

Primary OutFlow Max=16.14 cfs @ 12.54 hrs HW=18.95' (Free Discharge)
1=Culvert (Barrel Controls 16.14 cfs @ 5.91 fps)

Summary for Pond C7: CULV-7

Inflow Area = 969,810 sf, 35.76% Impervious, Inflow Depth = 1.25" for 2-Yr event
Inflow = 14.12 cfs @ 12.61 hrs, Volume= 101,316 cf
Outflow = 14.10 cfs @ 12.62 hrs, Volume= 101,316 cf, Atten= 0%, Lag= 0.9 min
Primary = 14.10 cfs @ 12.62 hrs, Volume= 101,316 cf
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 8
Peak Elev= 21.02' @ 12.62 hrs Surf.Area= 914 sf Storage= 569 cf

Plug-Flow detention time= 0.5 min calculated for 101,316 cf (100% of inflow)
Center-of-Mass det. time= 0.4 min (891.5 - 891.1)

Volume	Invert	Avail.Storage	Storage Description
#1	19.54'	9,728 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
19.54	0	0	0
20.00	144	33	33
21.00	890	517	550
22.00	2,015	1,453	2,003
23.00	6,588	4,302	6,304
23.50	7,106	3,424	9,728

Device	Routing	Invert	Outlet Devices
#1	Primary	19.54'	**24.0" Round 24" RCP** L= 184.0' RCP, rounded edge headwall, Ke= 0.100 Inlet / Outlet Invert= 19.54' / 16.79' S= 0.0149 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf
#2	Secondary	23.40'	**250.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=14.10 cfs @ 12.62 hrs HW=21.02' (Free Discharge)
1=24" RCP (Inlet Controls 14.10 cfs @ 5.65 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=19.54' (Free Discharge)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond CB5: CB-5

Inflow Area = 1,672 sf, 27.51% Impervious, Inflow Depth = 1.35" for 2-Yr event
Inflow = 0.06 cfs @ 12.08 hrs, Volume= 188 cf
Outflow = 0.06 cfs @ 12.08 hrs, Volume= 188 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.06 cfs @ 12.08 hrs, Volume= 188 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 104.12' @ 12.08 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	29.50'	**1.0" Round 12" CULV** L= 70.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 29.50' / 29.15' S= 0.0050 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.01 sf

Primary OutFlow Max=0.06 cfs @ 12.08 hrs HW=103.97' (Free Discharge)
1=12" CULV (Barrel Controls 0.06 cfs @ 11.31 fps)

Summary for Pond CB6: CB-6

Inflow Area = 10,394 sf, 12.10% Impervious, Inflow Depth = 1.52" for 2-Yr event
Inflow = 0.44 cfs @ 12.08 hrs, Volume= 1,313 cf
Outflow = 0.44 cfs @ 12.08 hrs, Volume= 1,313 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.44 cfs @ 12.08 hrs, Volume= 1,313 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 28.20' @ 12.08 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	27.82'	**12.0" Round 12"SD** L= 184.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 27.82' / 26.90' S= 0.0050 '/' Cc= 0.900 n= 0.013 Concrete, trowel finish, Flow Area= 0.79 sf

Primary OutFlow Max=0.44 cfs @ 12.08 hrs HW=28.20' (Free Discharge)
1=12"SD (Barrel Controls 0.44 cfs @ 2.39 fps)

Summary for Pond DMH-1: DMH-1

Inflow Area = 36,714 sf, 95.49% Impervious, Inflow Depth = 2.96" for 2-Yr event
Inflow = 2.76 cfs @ 12.07 hrs, Volume= 9,043 cf
Outflow = 2.76 cfs @ 12.07 hrs, Volume= 9,043 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.76 cfs @ 12.07 hrs, Volume= 9,043 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 33.33' @ 12.07 hrs
Flood Elev= 36.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	32.58'	**24.0" Round 24" SD to Detention Bed** L= 30.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 32.58' / 32.35' S= 0.0077 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=2.76 cfs @ 12.07 hrs HW=33.33' (Free Discharge)
1=24" SD to Detention Bed (Barrel Controls 2.76 cfs @ 3.77 fps)

Summary for Pond DMH-6: DMH-6

Inflow Area = 41,451 sf, 89.14% Impervious, Inflow Depth = 2.85" for 2-Yr event
Inflow = 3.06 cfs @ 12.07 hrs, Volume= 9,837 cf
Outflow = 3.06 cfs @ 12.07 hrs, Volume= 9,837 cf, Atten= 0%, Lag= 0.0 min
Primary = 3.06 cfs @ 12.07 hrs, Volume= 9,837 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 30.87' @ 12.07 hrs
Flood Elev= 32.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	30.13'	**24.0" Round 24" SD to Detention Bed** L= 6.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 30.13' / 28.90' S= 0.2050 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=3.06 cfs @ 12.07 hrs HW=30.86' (Free Discharge)
1=24" SD to Detention Bed (Inlet Controls 3.06 cfs @ 2.92 fps)

Summary for Pond OC1: OFFSITE CULV-1

Inflow Area = 1,467,784 sf, 3.67% Impervious, Inflow Depth = 0.89" for 2-Yr event
Inflow = 18.18 cfs @ 12.45 hrs, Volume= 108,481 cf
Outflow = 6.83 cfs @ 13.06 hrs, Volume= 108,474 cf, Atten= 62%, Lag= 36.5 min
Primary = 6.83 cfs @ 13.06 hrs, Volume= 108,474 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 35.42' @ 13.06 hrs Surf.Area= 47,126 sf Storage= 30,746 cf

Plug-Flow detention time= 76.7 min calculated for 108,451 cf (100% of inflow)
Center-of-Mass det. time= 76.9 min (971.8 - 894.9)

Volume	Invert	Avail.Storage	Storage Description
#1	34.25'	602,689 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
34.25	5,289	0	0
36.00	67,698	63,864	63,864
38.00	137,090	204,788	268,652
40.00	196,947	334,037	602,689

Device	Routing	Invert	Outlet Devices
#1	Primary	34.25'	**18.0" Round 18" RCP** L= 97.6' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 34.25' / 32.29' S= 0.0201 '/' Cc= 0.900 n= 0.013 Concrete, trowel finish, Flow Area= 1.77 sf

Primary OutFlow Max=6.84 cfs @ 13.06 hrs HW=35.42' (Free Discharge)
↑—**1=18" RCP** (Inlet Controls 6.84 cfs @ 4.61 fps)

Summary for Pond OC2: OFFSITE CULV-2

Inflow Area = 913,125 sf, 2.70% Impervious, Inflow Depth = 1.28" for 2-Yr event
Inflow = 12.15 cfs @ 12.86 hrs, Volume= 97,685 cf
Outflow = 10.07 cfs @ 13.13 hrs, Volume= 97,680 cf, Atten= 17%, Lag= 16.1 min
Primary = 10.07 cfs @ 13.13 hrs, Volume= 97,680 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 34.53' @ 13.13 hrs Surf.Area= 9,538 sf Storage= 12,480 cf

Plug-Flow detention time= 29.4 min calculated for 97,680 cf (100% of inflow)
Center-of-Mass det. time= 29.4 min (929.0 - 899.6)

Volume	Invert	Avail.Storage	Storage Description
#1	32.88'	71,548 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
32.88	5,285	0	0
34.00	8,520	7,731	7,731
36.00	12,392	20,912	28,643
38.00	30,513	42,905	71,548

Device	Routing	Invert	Outlet Devices
#1	Primary	32.88'	**18.0" Round 18" RCP** L= 93.6' RCP, groove end projecting, Ke= 0.200

Inlet / Outlet Invert= 32.88' / 31.29' S= 0.0170 '/' Cc= 0.900
n= 0.013 Concrete, trowel finish, Flow Area= 1.77 sf

Primary OutFlow Max=10.07 cfs @ 13.13 hrs HW=34.53' (Free Discharge)
└**1=18" RCP** (Inlet Controls 10.07 cfs @ 5.70 fps)

Summary for Pond P3.1: STORMTECH DETENTION / OCS-2

Inflow Area = 41,451 sf, 89.14% Impervious, Inflow Depth = 2.85" for 2-Yr event
Inflow = 3.06 cfs @ 12.07 hrs, Volume= 9,837 cf
Outflow = 0.32 cfs @ 12.73 hrs, Volume= 9,837 cf, Atten= 89%, Lag= 39.8 min
Primary = 0.32 cfs @ 12.73 hrs, Volume= 9,837 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 29.36' @ 12.73 hrs Surf.Area= 3,328 sf Storage= 3,885 cf
Flood Elev= 31.21' Surf.Area= 3,328 sf Storage= 7,258 cf

Plug-Flow detention time= 139.0 min calculated for 9,835 cf (100% of inflow)
Center-of-Mass det. time= 138.9 min (911.2 - 772.2)

Volume	Invert	Avail.Storage	Storage Description
#1	27.67'	2,926 cf	**34.70'W x 95.90'L x 3.50'H Prismatoid** 11,647 cf Overall - 4,331 cf Embedded = 7,316 cf x 40.0% Voids
#2	28.17'	4,331 cf	**ADS_StormTech SC-740 @ 95.90' L** x 7 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 95.90'L = 618.8 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
		7,258 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	25.15'	**24.0" Round 24" SD** L= 15.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 25.15' / 25.00' S= 0.0100 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 3.14 sf
#2	Device 1	25.15'	**2.0" Vert. 2" Orifice** C= 0.600
#3	Device 1	29.12'	**4.0" Vert. 4" Orifice** C= 0.600
#4	Device 1	30.90'	**6.0' long Sharp-Crested Vee/Trap Weir** Cv= 2.62 (C= 3.28)

Primary OutFlow Max=0.32 cfs @ 12.73 hrs HW=29.36' (Free Discharge)
└**1=24" SD** (Passes 0.32 cfs of 21.39 cfs potential flow)
├**2=2" Orifice** (Orifice Controls 0.21 cfs @ 9.78 fps)
├**3=4" Orifice** (Orifice Controls 0.11 cfs @ 1.66 fps)
└**4=Sharp-Crested Vee/Trap Weir** (Controls 0.00 cfs)

Summary for Pond P4.1: STORMTECH DETENTION / OCS-1

Inflow Area = 36,714 sf, 95.49% Impervious, Inflow Depth = 2.96" for 2-Yr event
Inflow = 2.76 cfs @ 12.07 hrs, Volume= 9,043 cf
Outflow = 0.89 cfs @ 12.35 hrs, Volume= 9,043 cf, Atten= 68%, Lag= 16.6 min
Primary = 0.89 cfs @ 12.35 hrs, Volume= 9,043 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 4

Peak Elev= 33.01' @ 12.35 hrs Surf.Area= 1,702 sf Storage= 1,451 cf
Flood Elev= 34.78' Surf.Area= 1,702 sf Storage= 3,388 cf

Plug-Flow detention time= 8.0 min calculated for 9,043 cf (100% of inflow)
Center-of-Mass det. time= 7.9 min (772.3 - 764.3)

Volume	Invert	Avail.Storage	Storage Description
#1	31.72'	1,513 cf	**25.25'W x 67.40'L x 3.50'H Prismatoid** 5,956 cf Overall - 2,174 cf Embedded = 3,782 cf x 40.0% Voids
#2	32.22'	2,174 cf	**ADS_StormTech SC-740 @ 67.40' L** x 5 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 67.40'L = 434.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
		3,687 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	28.76'	**24.0" Round 24" SD** L= 268.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 28.76' / 22.00' S= 0.0252 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 3.14 sf
#2	Device 1	28.76'	**4.0" Vert. 4" Orifice** C= 0.600
#3	Device 1	32.90'	**6.0" Vert. 6" Orifice** C= 0.600
#4	Device 1	33.65'	**4.0' long x 2.00' rise Sharp-Crested Vee/Trap Weir** Cv= 2.62 (C= 3.28)

Primary OutFlow Max=0.89 cfs @ 12.35 hrs HW=33.01' (Free Discharge)
└**1=24" SD** (Passes 0.89 cfs of 21.54 cfs potential flow)
  ├**2=4" Orifice** (Orifice Controls 0.85 cfs @ 9.73 fps)
  ├**3=6" Orifice** (Orifice Controls 0.04 cfs @ 1.14 fps)
  └**4=Sharp-Crested Vee/Trap Weir** (Controls 0.00 cfs)

Summary for Pond W: WETLAND

Inflow Area = 917,965 sf, 33.62% Impervious, Inflow Depth = 1.18" for 2-Yr event
Inflow = 13.72 cfs @ 12.55 hrs, Volume= 90,166 cf
Outflow = 13.67 cfs @ 12.59 hrs, Volume= 90,166 cf, Atten= 0%, Lag= 2.4 min
Primary = 13.67 cfs @ 12.59 hrs, Volume= 90,166 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 8
Peak Elev= 24.29' @ 12.59 hrs Surf.Area= 6,397 sf Storage= 1,005 cf

Plug-Flow detention time= 0.6 min calculated for 90,147 cf (100% of inflow)
Center-of-Mass det. time= 0.6 min (885.7 - 885.1)

Volume	Invert	Avail.Storage	Storage Description
#1	23.90'	42,267 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
23.90	0	0	0
24.00	412	21	21
26.00	41,834	42,246	42,267

Device	Routing	Invert	Outlet Devices
#1	Primary	23.90'	**152.0 deg x 17.0' long Sharp-Crested Vee/Trap Weir** Cv= 2.47 (C= 3.09)

Primary OutFlow Max=13.67 cfs @ 12.59 hrs HW=24.29' (Free Discharge)
1=Sharp-Crested Vee/Trap Weir (Weir Controls 13.67 cfs @ 1.89 fps)

Summary for Link AP1: AP 1

Inflow Area = 1,136,863 sf, 36.86% Impervious, Inflow Depth = 1.39" for 2-Yr event
Inflow = 16.14 cfs @ 12.54 hrs, Volume= 131,567 cf
Primary = 16.14 cfs @ 12.54 hrs, Volume= 131,567 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Summary for Link AP2: AP 2

Inflow Area = 4,699,294 sf, 15.21% Impervious, Inflow Depth = 1.25" for 2-Yr event
Inflow = 41.09 cfs @ 12.82 hrs, Volume= 488,616 cf
Primary = 41.09 cfs @ 12.82 hrs, Volume= 488,616 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment OS1: OFFSITE SUB 1 Runoff Area=1,467,784 sf 3.67% Impervious Runoff Depth=1.96"
Flow Length=1,645' Tc=29.1 min CN=70 Runoff=43.39 cfs 240,042 cf

Subcatchment OS2: OFFSITE SUB 2 Runoff Area=913,125 sf 2.70% Impervious Runoff Depth=2.54"
Flow Length=1,654' Tc=58.8 min CN=77 Runoff=24.74 cfs 193,244 cf

Subcatchment S3: SUB 3 Runoff Area=836,116 sf 36.42% Impervious Runoff Depth=2.37"
Flow Length=828' Tc=39.2 min CN=75 Runoff=26.34 cfs 165,023 cf

Subcatchment S3.1: SUB 3.1 Runoff Area=41,451 sf 89.14% Impervious Runoff Depth=4.43"
Flow Length=160' Slope=0.0100 '/' Tc=5.0 min CN=96 Runoff=4.65 cfs 15,313 cf

Subcatchment S3.2: SUB 3.2 Runoff Area=8,722 sf 9.15% Impervious Runoff Depth=2.90"
Flow Length=163' Slope=0.0220 '/' Tc=5.0 min CN=81 Runoff=0.70 cfs 2,106 cf

Subcatchment S3.3: SUB 3.3 Runoff Area=1,672 sf 27.51% Impervious Runoff Depth=2.63"
Tc=5.0 min CN=78 Runoff=0.12 cfs 366 cf

Subcatchment S4: SUB 4 Runoff Area=1,012,128 sf 16.94% Impervious Runoff Depth=2.81"
Flow Length=1,599' Tc=46.2 min CN=80 Runoff=34.87 cfs 236,652 cf

Subcatchment S4.1: SUB 4.1 Runoff Area=36,714 sf 95.49% Impervious Runoff Depth=4.55"
Flow Length=281' Slope=0.0100 '/' Tc=5.0 min CN=97 Runoff=4.15 cfs 13,913 cf

Subcatchment S6: SUB 6 Runoff Area=132,680 sf 8.16% Impervious Runoff Depth=2.90"
Flow Length=616' Tc=13.5 min CN=81 Runoff=8.15 cfs 32,033 cf

Subcatchment S7: SUB 3 Runoff Area=167,053 sf 43.24% Impervious Runoff Depth=3.68"
Flow Length=1,081' Tc=10.0 min CN=89 Runoff=14.08 cfs 51,178 cf

Subcatchment S8: SUB 8 Runoff Area=81,849 sf 5.04% Impervious Runoff Depth=2.63"
Flow Length=399' Tc=21.1 min CN=78 Runoff=3.81 cfs 17,918 cf

Reach R1: REACH 1 Avg. Flow Depth=0.24' Max Vel=1.50 fps Inflow=12.07 cfs 240,033 cf
n=0.030 L=386.0' S=0.0104 '/' Capacity=256.49 cfs Outflow=12.06 cfs 240,032 cf

Reach R2: REACH 2 Avg. Flow Depth=0.28' Max Vel=1.61 fps Inflow=15.77 cfs 193,238 cf
n=0.030 L=527.0' S=0.0100 '/' Capacity=252.44 cfs Outflow=15.75 cfs 193,237 cf

Reach R3: REACH 3 Avg. Flow Depth=0.83' Max Vel=4.39 fps Inflow=27.77 cfs 433,269 cf
n=0.030 L=874.0' S=0.0138 '/' Capacity=141.56 cfs Outflow=27.76 cfs 433,266 cf

Reach R3.1: REACH 3.1 Avg. Flow Depth=0.04' Max Vel=0.54 fps Inflow=1.27 cfs 17,785 cf
n=0.025 L=179.0' S=0.0056 '/' Capacity=833.80 cfs Outflow=1.12 cfs 17,785 cf

Reach R3.2: REACH 3.2 Avg. Flow Depth=0.02' Max Vel=0.72 fps Inflow=0.83 cfs 2,472 cf
n=0.025 L=91.3' S=0.0219 '/' Capacity=1,651.08 cfs Outflow=0.79 cfs 2,472 cf

Reach R4: REACH 4 Avg. Flow Depth=0.83' Max Vel=4.89 fps Inflow=31.17 cfs 251,905 cf
n=0.030 L=144.0' S=0.0171 '/' Capacity=157.25 cfs Outflow=31.17 cfs 251,905 cf

Reach R4.1: REACH 4.1 Avg. Flow Depth=0.10' Max Vel=1.27 fps Inflow=1.86 cfs 13,912 cf
n=0.030 L=552.0' S=0.0145 '/' Capacity=390.71 cfs Outflow=1.69 cfs 13,912 cf

Reach R5: REACH 5 Avg. Flow Depth=1.50' Max Vel=7.01 fps Inflow=84.51 cfs 935,735 cf
n=0.025 L=317.0' S=0.0134 '/' Capacity=147.04 cfs Outflow=84.48 cfs 935,735 cf

Reach R6: REACH 6 Avg. Flow Depth=0.33' Max Vel=5.02 fps Inflow=29.61 cfs 200,727 cf
n=0.025 L=133.0' S=0.0328 '/' Capacity=623.19 cfs Outflow=29.61 cfs 200,727 cf

Pond AP3: 4 - 24"CMP Peak Elev=14.16' Storage=25,077 cf Inflow=86.13 cfs 967,767 cf
Primary=80.73 cfs 967,742 cf Secondary=0.00 cfs 0 cf Outflow=80.73 cfs 967,742 cf

Pond C3: CULV-3 Peak Elev=33.24' Inflow=12.07 cfs 240,033 cf
24.0" Round Culvert n=0.013 L=169.0' S=0.0095 '/' Outflow=12.07 cfs 240,033 cf

Pond C4: CULV-4 Peak Elev=21.37' Inflow=31.17 cfs 251,905 cf
24.0" Round Culvert n=0.011 L=86.0' S=0.0050 '/' Outflow=31.17 cfs 251,905 cf

Pond C7: CULV-7 Peak Elev=22.46' Storage=3,393 cf Inflow=29.61 cfs 200,727 cf
Primary=28.55 cfs 200,727 cf Secondary=0.00 cfs 0 cf Outflow=28.55 cfs 200,727 cf

Pond CB5: CB-5 Peak Elev=324.14' Inflow=0.12 cfs 366 cf
1.0" Round Culvert n=0.010 L=70.0' S=0.0050 '/' Outflow=0.12 cfs 366 cf

Pond CB6: CB-6 Peak Elev=28.35' Inflow=0.83 cfs 2,472 cf
12.0" Round Culvert n=0.013 L=184.0' S=0.0050 '/' Outflow=0.83 cfs 2,472 cf

Pond DMH-1: DMH-1 Peak Elev=33.54' Inflow=4.15 cfs 13,913 cf
24.0" Round Culvert n=0.010 L=30.0' S=0.0077 '/' Outflow=4.15 cfs 13,913 cf

Pond DMH-6: DMH-6 Peak Elev=31.05' Inflow=4.65 cfs 15,313 cf
24.0" Round Culvert n=0.010 L=6.0' S=0.2050 '/' Outflow=4.65 cfs 15,313 cf

Pond OC1: OFFSITE CULV-1 Peak Elev=36.29' Storage=84,783 cf Inflow=43.39 cfs 240,042 cf
18.0" Round Culvert n=0.013 L=97.6' S=0.0201 '/' Outflow=12.07 cfs 240,033 cf

Pond OC2: OFFSITE CULV-2 Peak Elev=36.39' Storage=34,167 cf Inflow=24.74 cfs 193,244 cf
18.0" Round Culvert n=0.013 L=93.6' S=0.0170 '/' Outflow=15.77 cfs 193,238 cf

Pond P3.1: STORMTECH DETENTION / Peak Elev=30.35' Storage=6,107 cf Inflow=4.65 cfs 15,313 cf
Outflow=0.67 cfs 15,313 cf

Pond P4.1: STORMTECH DETENTION / Peak Elev=33.72' Storage=2,359 cf Inflow=4.15 cfs 13,913 cf
Outflow=1.86 cfs 13,912 cf

Pond W: WETLAND Peak Elev=24.52' Storage=3,039 cf Inflow=28.86 cfs 182,942 cf
Outflow=28.65 cfs 182,942 cf

Link AP1: AP 1 Inflow=31.17 cfs 251,905 cf
Primary=31.17 cfs 251,905 cf

Link AP2: AP 2 Inflow=80.73 cfs 967,742 cf
Primary=80.73 cfs 967,742 cf

Total Runoff Area = 4,699,294 sf Runoff Volume = 967,788 cf Average Runoff Depth = 2.47"
84.79% Pervious = 3,984,423 sf 15.21% Impervious = 714,871 sf

Summary for Subcatchment OS1: OFFSITE SUB 1

Runoff = 43.39 cfs @ 12.42 hrs, Volume= 240,042 cf, Depth= 1.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Yr Rainfall=4.90"

Area (sf)	CN	Description
53,844	98	Paved parking & roofs
32,748	49	50-75% Grass cover, Fair, HSG A
12,803	79	50-75% Grass cover, Fair, HSG C
12,554	84	50-75% Grass cover, Fair, HSG D
205,440	30	Woods, Good, HSG A
228,765	70	Woods, Good, HSG C
921,630	77	Woods, Good, HSG D
1,467,784	70	Weighted Average
1,413,940		96.33% Pervious Area
53,844		3.67% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.6	100	0.0430	0.25		**Sheet Flow, A - B** Range n= 0.130 P2= 3.00"
0.8	75	0.0510	1.58		**Shallow Concentrated Flow, B -C** Short Grass Pasture Kv= 7.0 fps
20.3	923	0.0230	0.76		**Shallow Concentrated Flow, C - D** Woodland Kv= 5.0 fps
1.4	547	0.0180	6.31	157.83	**Channel Flow, D - E** Area= 25.0 sf Perim= 27.0' r= 0.93' n= 0.030 Earth, grassed & winding
29.1	1,645	Total			

Summary for Subcatchment OS2: OFFSITE SUB 2

Runoff = 24.74 cfs @ 12.81 hrs, Volume= 193,244 cf, Depth= 2.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Yr Rainfall=4.90"

Area (sf)	CN	Description
24,623	98	Paved parking & roofs
8,226	79	50-75% Grass cover, Fair, HSG C
13,667	84	50-75% Grass cover, Fair, HSG D
151,095	70	Woods, Good, HSG C
715,514	77	Woods, Good, HSG D
913,125	77	Weighted Average
888,502		97.30% Pervious Area
24,623		2.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.0	100	0.0530	0.11		**Sheet Flow, A - B** Woods: Light underbrush n= 0.400 P2= 3.00"
43.8	1,554	0.0140	0.59		**Shallow Concentrated Flow, B - C** Woodland Kv= 5.0 fps
58.8	1,654	Total			

Summary for Subcatchment S3: SUB 3

Runoff = 26.34 cfs @ 12.55 hrs, Volume= 165,023 cf, Depth= 2.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Yr Rainfall=4.90"

Area (sf)	CN	Description
304,505	98	Paved parking & roofs
45,477	49	50-75% Grass cover, Fair, HSG A
10,125	79	50-75% Grass cover, Fair, HSG C
78,239	84	50-75% Grass cover, Fair, HSG D
142,893	30	Woods, Good, HSG A
81,209	70	Woods, Good, HSG C
173,668	77	Woods, Good, HSG D
836,116	75	Weighted Average
531,611		63.58% Pervious Area
304,505		36.42% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.4	150	0.0950	0.15		**Sheet Flow, A - B** Woods: Light underbrush n= 0.400 P2= 3.00"
1.5	143	0.1000	1.58		**Shallow Concentrated Flow, B - C** Woodland Kv= 5.0 fps
21.3	535	0.0070	0.42		**Shallow Concentrated Flow, C -D** Woodland Kv= 5.0 fps
39.2	828	Total			

Summary for Subcatchment S3.1: SUB 3.1

Runoff = 4.65 cfs @ 12.07 hrs, Volume= 15,313 cf, Depth= 4.43"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Yr Rainfall=4.90"

Area (sf)	CN	Description
36,951	98	Paved parking & roofs
3,700	79	50-75% Grass cover, Fair, HSG C
800	84	50-75% Grass cover, Fair, HSG D
41,451	96	Weighted Average
4,500		10.86% Pervious Area
36,951		89.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.4	160	0.0100	1.11		**Sheet Flow, A - B**
					Smooth surfaces n= 0.011 P2= 3.00"
2.6					**Direct Entry, Min Tc**
5.0	160	Total			

Summary for Subcatchment S3.2: SUB 3.2

Runoff = 0.70 cfs @ 12.07 hrs, Volume= 2,106 cf, Depth= 2.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Yr Rainfall=4.90"

Area (sf)	CN	Description
798	98	Paved parking & roofs
7,924	79	50-75% Grass cover, Fair, HSG C
8,722	81	Weighted Average
7,924		90.85% Pervious Area
798		9.15% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.6	163	0.0220	1.04		**Shallow Concentrated Flow, A - B**
					Short Grass Pasture Kv= 7.0 fps
2.4					**Direct Entry,**
5.0	163	Total			

Summary for Subcatchment S3.3: SUB 3.3

Runoff = 0.12 cfs @ 12.08 hrs, Volume= 366 cf, Depth= 2.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Yr Rainfall=4.90"

Area (sf)	CN	Description
460	98	Paved parking & roofs
1,212	70	Woods, Good, HSG C
1,672	78	Weighted Average
1,212		72.49% Pervious Area
460		27.51% Impervious Area

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

Summary for Subcatchment S4: SUB 4

Runoff = 34.87 cfs @ 12.63 hrs, Volume= 236,652 cf, Depth= 2.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Yr Rainfall=4.90"

Area (sf)	CN	Description
171,450	98	Paved parking & roofs
20,781	79	50-75% Grass cover, Fair, HSG C
7,642	84	50-75% Grass cover, Fair, HSG D
419,188	73	Woods, Fair, HSG C
393,067	79	Woods, Fair, HSG D
1,012,128	80	Weighted Average
840,678		83.06% Pervious Area
171,450		16.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
29.3	100	0.0100	0.06		**Sheet Flow, A - B** Woods: Light underbrush n= 0.400 P2= 3.00"
3.9	284	0.0600	1.22		**Shallow Concentrated Flow, B - C** Woodland Kv= 5.0 fps
10.4	341	0.0120	0.55		**Shallow Concentrated Flow, C - D** Woodland Kv= 5.0 fps
2.6	874	0.0140	5.64	281.88	**Channel Flow, D - E** Area= 50.0 sf Perim= 53.0' r= 0.94' n= 0.030 Earth, grassed & winding
46.2	1,599	Total			

Summary for Subcatchment S4.1: SUB 4.1

Runoff = 4.15 cfs @ 12.07 hrs, Volume= 13,913 cf, Depth= 4.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Yr Rainfall=4.90"

Area (sf)	CN	Description
35,058	98	Paved parking & roofs
1,656	74	>75% Grass cover, Good, HSG C
36,714	97	Weighted Average
1,656		4.51% Pervious Area
35,058		95.49% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.9	200	0.0100	1.16		**Sheet Flow, A - B**
					Smooth surfaces n= 0.011 P2= 3.00"
0.7	81	0.0100	2.03		**Shallow Concentrated Flow, B - C**
					Paved Kv= 20.3 fps
1.4					**Direct Entry, Min Tc**
5.0	281	Total			

Summary for Subcatchment S6: SUB 6

Runoff = 8.15 cfs @ 12.19 hrs, Volume= 32,033 cf, Depth= 2.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Yr Rainfall=4.90"

Area (sf)	CN	Description
10,824	98	Paved parking & roofs
19,401	79	50-75% Grass cover, Fair, HSG C
64,092	84	50-75% Grass cover, Fair, HSG D
32,603	70	Woods, Good, HSG C
5,760	77	Woods, Good, HSG D
132,680	81	Weighted Average
121,856		91.84% Pervious Area
10,824		8.16% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.0	40	0.0410	0.08		**Sheet Flow, A - B**
					Woods: Light underbrush n= 0.400 P2= 3.00"
0.7	71	0.1120	1.67		**Shallow Concentrated Flow, B - C**
					Woodland Kv= 5.0 fps
4.5	265	0.0380	0.97		**Shallow Concentrated Flow, B - C**
					Woodland Kv= 5.0 fps
0.3	240	0.0250	11.44	686.23	**Channel Flow, C - D**
					Area= 60.0 sf Perim= 34.0' r= 1.76'
					n= 0.030 Earth, grassed & winding
13.5	616	Total			

Summary for Subcatchment S7: SUB 3

Runoff = 14.08 cfs @ 12.14 hrs, Volume= 51,178 cf, Depth= 3.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Yr Rainfall=4.90"

Area (sf)	CN	Description
72,236	98	Paved parking & roofs
66,092	84	50-75% Grass cover, Fair, HSG D
5,176	73	Woods, Fair, HSG C
23,549	79	Woods, Fair, HSG D
167,053	89	Weighted Average
94,817		56.76% Pervious Area
72,236		43.24% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.8	58	0.0430	0.20		**Sheet Flow, A - B** Grass: Short n= 0.150 P2= 3.00"
1.1	136	0.0840	2.03		**Shallow Concentrated Flow, B - C** Short Grass Pasture Kv= 7.0 fps
2.8	424	0.0150	2.49		**Shallow Concentrated Flow, C - D** Paved Kv= 20.3 fps
0.1	39	0.0450	9.55	3.33	**Pipe Channel, D - E** 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.010 PVC, smooth interior
0.3	185	0.0380	11.66	116.60	**Channel Flow, E - F** Area= 10.0 sf Perim= 12.0' r= 0.83' n= 0.022 Earth, clean & straight
0.5	137	0.0168	4.82	0.95	**Pipe Channel, F - G** 6.0" Round Area= 0.2 sf Perim= 1.6' r= 0.13' n= 0.010 PVC, smooth interior
0.4	102	0.0042	4.67	14.66	**Pipe Channel, G - H** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.013 Concrete pipe, bends & connections
10.0	1,081	Total			

Summary for Subcatchment S8: SUB 8

Runoff = 3.81 cfs @ 12.30 hrs, Volume= 17,918 cf, Depth= 2.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Yr Rainfall=4.90"

Area (sf)	CN	Description
4,122	98	Paved parking & roofs
439	79	50-75% Grass cover, Fair, HSG C
34,658	74	>75% Grass cover, Good, HSG C
4,166	73	Woods, Fair, HSG C
38,464	79	Woods, Fair, HSG D
81,849	78	Weighted Average
77,727		94.96% Pervious Area
4,122		5.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.8	120	0.0500	0.11		**Sheet Flow, A - B** Woods: Light underbrush n= 0.400 P2= 3.00"
1.4	138	0.1100	1.66		**Shallow Concentrated Flow, B - C** Woodland Kv= 5.0 fps
1.9	141	0.0320	1.25		**Shallow Concentrated Flow, C - D** Short Grass Pasture Kv= 7.0 fps
21.1	399	Total			

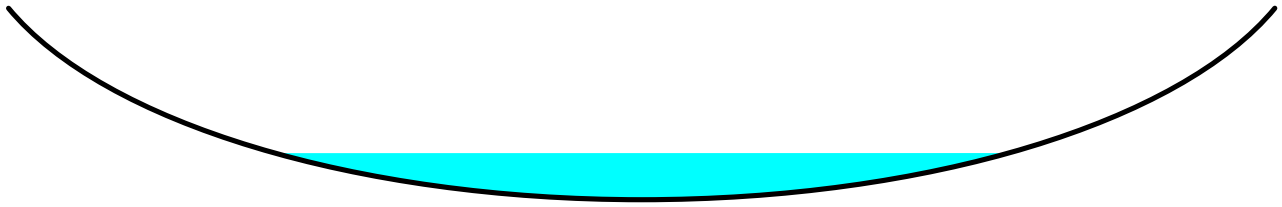
Summary for Reach R1: REACH 1

Inflow Area = 1,467,784 sf, 3.67% Impervious, Inflow Depth = 1.96" for 10-Yr event
Inflow = 12.07 cfs @ 13.17 hrs, Volume= 240,033 cf
Outflow = 12.06 cfs @ 13.29 hrs, Volume= 240,032 cf, Atten= 0%, Lag= 7.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.50 fps, Min. Travel Time= 4.3 min
Avg. Velocity = 0.53 fps, Avg. Travel Time= 12.2 min

Peak Storage= 3,099 cf @ 13.22 hrs
Average Depth at Peak Storage= 0.24'
Bank-Full Depth= 1.00' Flow Area= 66.7 sf, Capacity= 256.49 cfs

100.00' x 1.00' deep Parabolic Channel, n= 0.030 Earth, grassed & winding
Length= 386.0' Slope= 0.0104 '/'
Inlet Invert= 30.00', Outlet Invert= 26.00'



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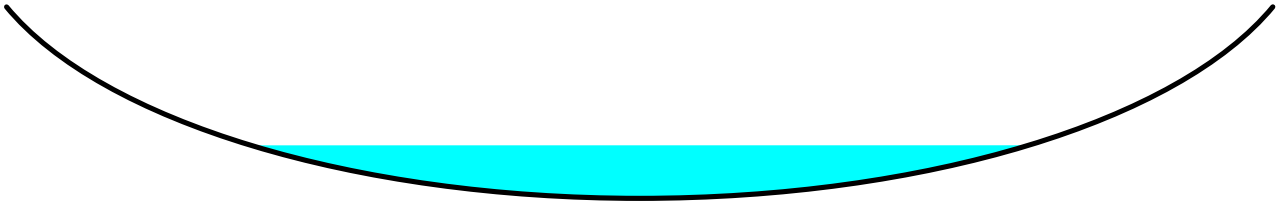
Summary for Reach R2: REACH 2

Inflow Area = 913,125 sf, 2.70% Impervious, Inflow Depth = 2.54" for 10-Yr event
Inflow = 15.77 cfs @ 13.31 hrs, Volume= 193,238 cf
Outflow = 15.75 cfs @ 13.46 hrs, Volume= 193,237 cf, Atten= 0%, Lag= 9.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.61 fps, Min. Travel Time= 5.4 min
Avg. Velocity = 0.47 fps, Avg. Travel Time= 18.7 min

Peak Storage= 5,145 cf @ 13.37 hrs
Average Depth at Peak Storage= 0.28'
Bank-Full Depth= 1.00' Flow Area= 66.7 sf, Capacity= 252.44 cfs

100.00' x 1.00' deep Parabolic Channel, n= 0.030 Earth, grassed & winding
Length= 527.0' Slope= 0.0100 '/'
Inlet Invert= 31.29', Outlet Invert= 26.00'



‡

Summary for Reach R3: REACH 3

Inflow Area = 2,380,909 sf, 3.30% Impervious, Inflow Depth = 2.18" for 10-Yr event
Inflow = 27.77 cfs @ 13.43 hrs, Volume= 433,269 cf
Outflow = 27.76 cfs @ 13.52 hrs, Volume= 433,266 cf, Atten= 0%, Lag= 5.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 4.39 fps, Min. Travel Time= 3.3 min
Avg. Velocity = 1.29 fps, Avg. Travel Time= 11.3 min

Peak Storage= 5,533 cf @ 13.47 hrs
Average Depth at Peak Storage= 0.83'
Bank-Full Depth= 2.00' Flow Area= 20.0 sf, Capacity= 141.56 cfs

6.00' x 2.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 2.0 '/' Top Width= 14.00'
Length= 874.0' Slope= 0.0138 '/'
Inlet Invert= 26.00', Outlet Invert= 13.90'



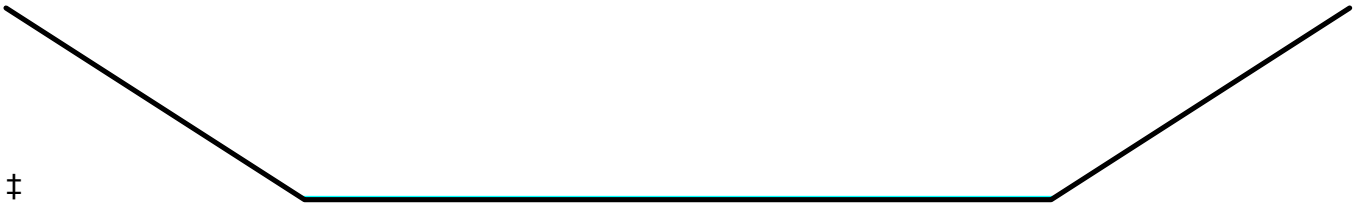
Summary for Reach R3.1: REACH 3.1

Inflow Area = 51,845 sf, 73.70% Impervious, Inflow Depth = 4.12" for 10-Yr event
Inflow = 1.27 cfs @ 12.14 hrs, Volume= 17,785 cf
Outflow = 1.12 cfs @ 12.32 hrs, Volume= 17,785 cf, Atten= 12%, Lag= 10.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.54 fps, Min. Travel Time= 5.6 min
Avg. Velocity = 0.34 fps, Avg. Travel Time= 8.7 min

Peak Storage= 375 cf @ 12.23 hrs
Average Depth at Peak Storage= 0.04'
Bank-Full Depth= 2.00' Flow Area= 140.0 sf, Capacity= 833.80 cfs

50.00' x 2.00' deep channel, n= 0.025 Earth, clean & winding
Side Slope Z-value= 10.0 '/' Top Width= 90.00'
Length= 179.0' Slope= 0.0056 '/'
Inlet Invert= 24.90', Outlet Invert= 23.90'



‡

Summary for Reach R3.2: REACH 3.2

Inflow Area = 10,394 sf, 12.10% Impervious, Inflow Depth = 2.85" for 10-Yr event
Inflow = 0.83 cfs @ 12.07 hrs, Volume= 2,472 cf
Outflow = 0.79 cfs @ 12.13 hrs, Volume= 2,472 cf, Atten= 4%, Lag= 3.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.72 fps, Min. Travel Time= 2.1 min
Avg. Velocity = 0.65 fps, Avg. Travel Time= 2.4 min

Peak Storage= 101 cf @ 12.10 hrs
Average Depth at Peak Storage= 0.02'
Bank-Full Depth= 2.00' Flow Area= 140.0 sf, Capacity= 1,651.08 cfs

50.00' x 2.00' deep channel, n= 0.025 Earth, clean & winding
Side Slope Z-value= 10.0 '/' Top Width= 90.00'
Length= 91.3' Slope= 0.0219 '/'
Inlet Invert= 26.90', Outlet Invert= 24.90'



‡

Summary for Reach R4: REACH 4

Inflow Area = 1,136,863 sf, 36.86% Impervious, Inflow Depth = 2.66" for 10-Yr event
Inflow = 31.17 cfs @ 12.57 hrs, Volume= 251,905 cf
Outflow = 31.17 cfs @ 12.58 hrs, Volume= 251,905 cf, Atten= 0%, Lag= 0.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 4.89 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 1.60 fps, Avg. Travel Time= 1.5 min

Peak Storage= 918 cf @ 12.57 hrs
Average Depth at Peak Storage= 0.83'
Bank-Full Depth= 2.00' Flow Area= 20.0 sf, Capacity= 157.25 cfs

6.00' x 2.00' deep channel, n= 0.030 Stream, clean & straight
Side Slope Z-value= 2.0 '/' Top Width= 14.00'
Length= 144.0' Slope= 0.0171 '/'
Inlet Invert= 16.36', Outlet Invert= 13.90'



Summary for Reach R4.1: REACH 4.1

Inflow Area = 36,714 sf, 95.49% Impervious, Inflow Depth = 4.55" for 10-Yr event
Inflow = 1.86 cfs @ 12.22 hrs, Volume= 13,912 cf
Outflow = 1.69 cfs @ 12.43 hrs, Volume= 13,912 cf, Atten= 10%, Lag= 12.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.27 fps, Min. Travel Time= 7.3 min
Avg. Velocity = 0.51 fps, Avg. Travel Time= 18.0 min

Peak Storage= 735 cf @ 12.31 hrs
Average Depth at Peak Storage= 0.10'
Bank-Full Depth= 2.00' Flow Area= 56.0 sf, Capacity= 390.71 cfs

12.00' x 2.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 8.0 '/' Top Width= 44.00'
Length= 552.0' Slope= 0.0145 '/'
Inlet Invert= 22.00', Outlet Invert= 14.00'



‡

Summary for Reach R5: REACH 5

Inflow Area = 4,566,614 sf, 15.42% Impervious, Inflow Depth = 2.46" for 10-Yr event
Inflow = 84.51 cfs @ 12.73 hrs, Volume= 935,735 cf
Outflow = 84.48 cfs @ 12.75 hrs, Volume= 935,735 cf, Atten= 0%, Lag= 1.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 7.01 fps, Min. Travel Time= 0.8 min
Avg. Velocity = 1.71 fps, Avg. Travel Time= 3.1 min

Peak Storage= 3,818 cf @ 12.74 hrs
Average Depth at Peak Storage= 1.50'
Bank-Full Depth= 2.00' Flow Area= 18.0 sf, Capacity= 147.04 cfs

5.00' x 2.00' deep channel, n= 0.025 Earth, clean & straight
Side Slope Z-value= 2.0 '/' Top Width= 13.00'
Length= 317.0' Slope= 0.0134 '/'
Inlet Invert= 13.90', Outlet Invert= 9.64'



Summary for Reach R6: REACH 6

Inflow Area = 969,810 sf, 35.76% Impervious, Inflow Depth = 2.48" for 10-Yr event
Inflow = 29.61 cfs @ 12.57 hrs, Volume= 200,727 cf
Outflow = 29.61 cfs @ 12.58 hrs, Volume= 200,727 cf, Atten= 0%, Lag= 0.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 5.02 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 1.50 fps, Avg. Travel Time= 1.5 min

Peak Storage= 784 cf @ 12.58 hrs
Average Depth at Peak Storage= 0.33'
Bank-Full Depth= 2.00' Flow Area= 42.0 sf, Capacity= 623.19 cfs

17.00' x 2.00' deep channel, n= 0.025 Earth, clean & winding
Side Slope Z-value= 2.0 '/' Top Width= 25.00'
Length= 133.0' Slope= 0.0328 '/'
Inlet Invert= 23.90', Outlet Invert= 19.54'



‡

Summary for Pond AP3: 4 - 24"CMP

Inflow Area = 4,699,294 sf, 15.21% Impervious, Inflow Depth = 2.47" for 10-Yr event
Inflow = 86.13 cfs @ 12.74 hrs, Volume= 967,767 cf
Outflow = 80.73 cfs @ 12.91 hrs, Volume= 967,742 cf, Atten= 6%, Lag= 10.0 min
Primary = 80.73 cfs @ 12.91 hrs, Volume= 967,742 cf
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 6

Peak Elev= 14.16' @ 12.91 hrs Surf.Area= 15,678 sf Storage= 25,077 cf

Plug-Flow detention time= 2.6 min calculated for 967,742 cf (100% of inflow)
Center-of-Mass det. time= 2.6 min (905.3 - 902.8)

Volume	Invert	Avail.Storage	Storage Description
#1	9.64'	96,037 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
9.64	0	0	0
10.00	856	154	154
12.00	4,037	4,893	5,047
14.00	13,588	17,625	22,672
16.00	39,016	52,604	75,276
16.50	44,026	20,761	96,037

Device	Routing	Invert	Outlet Devices
#1	Primary	9.77'	**24.0" Round Proposed 3 - 24" CMP X 3.00** L= 65.0' CMP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 9.77' / 9.12' S= 0.0100 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 3.14 sf
#2	Primary	9.83'	**24.0" Round Existing 24"CMP** L= 64.0' CMP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 9.77' / 9.83' S= -0.0009 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 3.14 sf
#3	Secondary	16.50'	**20.0' long x 25.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=80.73 cfs @ 12.91 hrs HW=14.16' (Free Discharge)
↑—**1=Proposed 3 - 24" CMP** (Barrel Controls 62.24 cfs @ 6.60 fps)
└—**2=Existing 24"CMP** (Barrel Controls 18.49 cfs @ 5.89 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=9.64' (Free Discharge)
↑—**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond C3: CULV-3

Inflow Area = 1,467,784 sf, 3.67% Impervious, Inflow Depth = 1.96" for 10-Yr event
Inflow = 12.07 cfs @ 13.17 hrs, Volume= 240,033 cf
Outflow = 12.07 cfs @ 13.17 hrs, Volume= 240,033 cf, Atten= 0%, Lag= 0.0 min
Primary = 12.07 cfs @ 13.17 hrs, Volume= 240,033 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 33.24' @ 13.17 hrs
Flood Elev= 39.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	31.60'	**24.0" Round Culvert** L= 169.0' RCP, groove end projecting, Ke= 0.200

Inlet / Outlet Invert= 31.60' / 30.00' S= 0.0095 '/' Cc= 0.900
n= 0.013 Concrete, trowel finish, Flow Area= 3.14 sf

Primary OutFlow Max=12.07 cfs @ 13.17 hrs HW=33.24' TW=31.60' (Fixed TW Elev= 31.60')
└**1=Culvert** (Outlet Controls 12.07 cfs @ 5.94 fps)

Summary for Pond C4: CULV-4

Inflow Area = 1,136,863 sf, 36.86% Impervious, Inflow Depth = 2.66" for 10-Yr event
Inflow = 31.17 cfs @ 12.57 hrs, Volume= 251,905 cf
Outflow = 31.17 cfs @ 12.57 hrs, Volume= 251,905 cf, Atten= 0%, Lag= 0.0 min
Primary = 31.17 cfs @ 12.57 hrs, Volume= 251,905 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 21.37' @ 12.57 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	16.79'	**24.0" Round Culvert**
			L= 86.0' RCP, groove end projecting, Ke= 0.200
			Inlet / Outlet Invert= 16.79' / 16.36' S= 0.0050 '/' Cc= 0.900
			n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf

Primary OutFlow Max=31.17 cfs @ 12.57 hrs HW=21.37' (Free Discharge)
└**1=Culvert** (Barrel Controls 31.17 cfs @ 9.92 fps)

Summary for Pond C7: CULV-7

Inflow Area = 969,810 sf, 35.76% Impervious, Inflow Depth = 2.48" for 10-Yr event
Inflow = 29.61 cfs @ 12.58 hrs, Volume= 200,727 cf
Outflow = 28.55 cfs @ 12.68 hrs, Volume= 200,727 cf, Atten= 4%, Lag= 5.8 min
Primary = 28.55 cfs @ 12.68 hrs, Volume= 200,727 cf
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 8
Peak Elev= 22.46' @ 12.68 hrs Surf.Area= 4,096 sf Storage= 3,393 cf

Plug-Flow detention time= 0.8 min calculated for 200,685 cf (100% of inflow)
Center-of-Mass det. time= 0.8 min (870.5 - 869.7)

Volume	Invert	Avail.Storage	Storage Description
#1	19.54'	9,728 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
19.54	0	0	0
20.00	144	33	33
21.00	890	517	550
22.00	2,015	1,453	2,003
23.00	6,588	4,302	6,304
23.50	7,106	3,424	9,728

Device	Routing	Invert	Outlet Devices
#1	Primary	19.54'	**24.0" Round 24" RCP** L= 184.0' RCP, rounded edge headwall, Ke= 0.100 Inlet / Outlet Invert= 19.54' / 16.79' S= 0.0149 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf
#2	Secondary	23.40'	**250.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=28.54 cfs @ 12.68 hrs HW=22.46' (Free Discharge)
1=24" RCP (Inlet Controls 28.54 cfs @ 9.09 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=19.54' (Free Discharge)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond CB5: CB-5

Inflow Area = 1,672 sf, 27.51% Impervious, Inflow Depth = 2.63" for 10-Yr event
Inflow = 0.12 cfs @ 12.08 hrs, Volume= 366 cf
Outflow = 0.12 cfs @ 12.08 hrs, Volume= 366 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.12 cfs @ 12.08 hrs, Volume= 366 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 324.14' @ 12.08 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	29.50'	**1.0" Round 12" CULV** L= 70.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 29.50' / 29.15' S= 0.0050 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.01 sf

Primary OutFlow Max=0.12 cfs @ 12.08 hrs HW=322.93' (Free Discharge)
1=12" CULV (Barrel Controls 0.12 cfs @ 22.43 fps)

Summary for Pond CB6: CB-6

Inflow Area = 10,394 sf, 12.10% Impervious, Inflow Depth = 2.85" for 10-Yr event
Inflow = 0.83 cfs @ 12.07 hrs, Volume= 2,472 cf
Outflow = 0.83 cfs @ 12.07 hrs, Volume= 2,472 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.83 cfs @ 12.07 hrs, Volume= 2,472 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 28.35' @ 12.07 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	27.82'	**12.0" Round 12"SD** L= 184.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 27.82' / 26.90' S= 0.0050 '/' Cc= 0.900 n= 0.013 Concrete, trowel finish, Flow Area= 0.79 sf

Primary OutFlow Max=0.83 cfs @ 12.07 hrs HW=28.35' (Free Discharge)
1=12"SD (Barrel Controls 0.83 cfs @ 2.85 fps)

Summary for Pond DMH-1: DMH-1

Inflow Area = 36,714 sf, 95.49% Impervious, Inflow Depth = 4.55" for 10-Yr event
Inflow = 4.15 cfs @ 12.07 hrs, Volume= 13,913 cf
Outflow = 4.15 cfs @ 12.07 hrs, Volume= 13,913 cf, Atten= 0%, Lag= 0.0 min
Primary = 4.15 cfs @ 12.07 hrs, Volume= 13,913 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 33.54' @ 12.07 hrs
Flood Elev= 36.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	32.58'	**24.0" Round 24" SD to Detention Bed** L= 30.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 32.58' / 32.35' S= 0.0077 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=4.15 cfs @ 12.07 hrs HW=33.54' (Free Discharge)
1=24" SD to Detention Bed (Barrel Controls 4.15 cfs @ 4.09 fps)

Summary for Pond DMH-6: DMH-6

Inflow Area = 41,451 sf, 89.14% Impervious, Inflow Depth = 4.43" for 10-Yr event
Inflow = 4.65 cfs @ 12.07 hrs, Volume= 15,313 cf
Outflow = 4.65 cfs @ 12.07 hrs, Volume= 15,313 cf, Atten= 0%, Lag= 0.0 min
Primary = 4.65 cfs @ 12.07 hrs, Volume= 15,313 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 31.05' @ 12.07 hrs
Flood Elev= 32.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	30.13'	**24.0" Round 24" SD to Detention Bed** L= 6.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 30.13' / 28.90' S= 0.2050 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=4.64 cfs @ 12.07 hrs HW=31.05' (Free Discharge)
1=24" SD to Detention Bed (Inlet Controls 4.64 cfs @ 3.27 fps)

Summary for Pond OC1: OFFSITE CULV-1

Inflow Area = 1,467,784 sf, 3.67% Impervious, Inflow Depth = 1.96" for 10-Yr event
Inflow = 43.39 cfs @ 12.42 hrs, Volume= 240,042 cf
Outflow = 12.07 cfs @ 13.17 hrs, Volume= 240,033 cf, Atten= 72%, Lag= 44.6 min
Primary = 12.07 cfs @ 13.17 hrs, Volume= 240,033 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 36.29' @ 13.17 hrs Surf.Area= 77,683 sf Storage= 84,783 cf

Plug-Flow detention time= 91.3 min calculated for 239,983 cf (100% of inflow)
Center-of-Mass det. time= 91.4 min (961.6 - 870.2)

Volume	Invert	Avail.Storage	Storage Description
#1	34.25'	602,689 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
34.25	5,289	0	0
36.00	67,698	63,864	63,864
38.00	137,090	204,788	268,652
40.00	196,947	334,037	602,689

Device	Routing	Invert	Outlet Devices
#1	Primary	34.25'	**18.0" Round 18" RCP** L= 97.6' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 34.25' / 32.29' S= 0.0201 '/' Cc= 0.900 n= 0.013 Concrete, trowel finish, Flow Area= 1.77 sf

Primary OutFlow Max=12.07 cfs @ 13.17 hrs HW=36.29' (Free Discharge)
↑—**1=18" RCP** (Inlet Controls 12.07 cfs @ 6.83 fps)

Summary for Pond OC2: OFFSITE CULV-2

Inflow Area = 913,125 sf, 2.70% Impervious, Inflow Depth = 2.54" for 10-Yr event
Inflow = 24.74 cfs @ 12.81 hrs, Volume= 193,244 cf
Outflow = 15.77 cfs @ 13.31 hrs, Volume= 193,238 cf, Atten= 36%, Lag= 30.0 min
Primary = 15.77 cfs @ 13.31 hrs, Volume= 193,238 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 36.39' @ 13.31 hrs Surf.Area= 15,927 sf Storage= 34,167 cf

Plug-Flow detention time= 30.2 min calculated for 193,238 cf (100% of inflow)
Center-of-Mass det. time= 30.1 min (909.7 - 879.6)

Volume	Invert	Avail.Storage	Storage Description
#1	32.88'	71,548 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
32.88	5,285	0	0
34.00	8,520	7,731	7,731
36.00	12,392	20,912	28,643
38.00	30,513	42,905	71,548

Device	Routing	Invert	Outlet Devices
#1	Primary	32.88'	**18.0" Round 18" RCP** L= 93.6' RCP, groove end projecting, Ke= 0.200

Inlet / Outlet Invert= 32.88' / 31.29' S= 0.0170 '/' Cc= 0.900
n= 0.013 Concrete, trowel finish, Flow Area= 1.77 sf

Primary OutFlow Max=15.77 cfs @ 13.31 hrs HW=36.39' (Free Discharge)
└**1=18" RCP** (Barrel Controls 15.77 cfs @ 8.92 fps)

Summary for Pond P3.1: STORMTECH DETENTION / OCS-2

Inflow Area = 41,451 sf, 89.14% Impervious, Inflow Depth = 4.43" for 10-Yr event
Inflow = 4.65 cfs @ 12.07 hrs, Volume= 15,313 cf
Outflow = 0.67 cfs @ 12.55 hrs, Volume= 15,313 cf, Atten= 86%, Lag= 28.9 min
Primary = 0.67 cfs @ 12.55 hrs, Volume= 15,313 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 30.35' @ 12.55 hrs Surf.Area= 3,328 sf Storage= 6,107 cf
Flood Elev= 31.21' Surf.Area= 3,328 sf Storage= 7,258 cf

Plug-Flow detention time= 135.9 min calculated for 15,313 cf (100% of inflow)
Center-of-Mass det. time= 135.9 min (897.9 - 761.9)

Volume	Invert	Avail.Storage	Storage Description
#1	27.67'	2,926 cf	**34.70'W x 95.90'L x 3.50'H Prismatoid** 11,647 cf Overall - 4,331 cf Embedded = 7,316 cf x 40.0% Voids
#2	28.17'	4,331 cf	**ADS_StormTech SC-740 @ 95.90' L** x 7 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 95.90'L = 618.8 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
		7,258 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	25.15'	**24.0" Round 24" SD** L= 15.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 25.15' / 25.00' S= 0.0100 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 3.14 sf
#2	Device 1	25.15'	**2.0" Vert. 2" Orifice** C= 0.600
#3	Device 1	29.12'	**4.0" Vert. 4" Orifice** C= 0.600
#4	Device 1	30.90'	**6.0' long Sharp-Crested Vee/Trap Weir** Cv= 2.62 (C= 3.28)

Primary OutFlow Max=0.67 cfs @ 12.55 hrs HW=30.35' (Free Discharge)
└**1=24" SD** (Passes 0.67 cfs of 24.47 cfs potential flow)
├**2=2" Orifice** (Orifice Controls 0.24 cfs @ 10.89 fps)
├**3=4" Orifice** (Orifice Controls 0.43 cfs @ 4.96 fps)
└**4=Sharp-Crested Vee/Trap Weir** (Controls 0.00 cfs)

Summary for Pond P4.1: STORMTECH DETENTION / OCS-1

Inflow Area = 36,714 sf, 95.49% Impervious, Inflow Depth = 4.55" for 10-Yr event
Inflow = 4.15 cfs @ 12.07 hrs, Volume= 13,913 cf
Outflow = 1.86 cfs @ 12.22 hrs, Volume= 13,912 cf, Atten= 55%, Lag= 9.2 min
Primary = 1.86 cfs @ 12.22 hrs, Volume= 13,912 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 4

Peak Elev= 33.72' @ 12.22 hrs Surf.Area= 1,702 sf Storage= 2,359 cf
Flood Elev= 34.78' Surf.Area= 1,702 sf Storage= 3,388 cf

Plug-Flow detention time= 9.8 min calculated for 13,910 cf (100% of inflow)
Center-of-Mass det. time= 9.8 min (765.1 - 755.3)

Volume	Invert	Avail.Storage	Storage Description
#1	31.72'	1,513 cf	**25.25'W x 67.40'L x 3.50'H Prismatoid** 5,956 cf Overall - 2,174 cf Embedded = 3,782 cf x 40.0% Voids
#2	32.22'	2,174 cf	**ADS_StormTech SC-740 @ 67.40' L** x 5 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 67.40'L = 434.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
		3,687 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	28.76'	**24.0" Round 24" SD** L= 268.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 28.76' / 22.00' S= 0.0252 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 3.14 sf
#2	Device 1	28.76'	**4.0" Vert. 4" Orifice** C= 0.600
#3	Device 1	32.90'	**6.0" Vert. 6" Orifice** C= 0.600
#4	Device 1	33.65'	**4.0' long x 2.00' rise Sharp-Crested Vee/Trap Weir** Cv= 2.62 (C= 3.28)

Primary OutFlow Max=1.86 cfs @ 12.22 hrs HW=33.72' (Free Discharge)
↑—**1=24" SD** (Passes 1.86 cfs of 23.76 cfs potential flow)
↑—**2=4" Orifice** (Orifice Controls 0.92 cfs @ 10.54 fps)
—**3=6" Orifice** (Orifice Controls 0.71 cfs @ 3.63 fps)
—**4=Sharp-Crested Vee/Trap Weir** (Weir Controls 0.23 cfs @ 0.85 fps)

Summary for Pond W: WETLAND

Inflow Area = 917,965 sf, 33.62% Impervious, Inflow Depth = 2.39" for 10-Yr event
Inflow = 28.86 cfs @ 12.54 hrs, Volume= 182,942 cf
Outflow = 28.65 cfs @ 12.57 hrs, Volume= 182,942 cf, Atten= 1%, Lag= 2.0 min
Primary = 28.65 cfs @ 12.57 hrs, Volume= 182,942 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 8
Peak Elev= 24.52' @ 12.57 hrs Surf.Area= 11,189 sf Storage= 3,039 cf

Plug-Flow detention time= 0.9 min calculated for 182,904 cf (100% of inflow)
Center-of-Mass det. time= 0.9 min (865.2 - 864.2)

Volume	Invert	Avail.Storage	Storage Description
#1	23.90'	42,267 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
23.90	0	0	0
24.00	412	21	21
26.00	41,834	42,246	42,267

Device	Routing	Invert	Outlet Devices
#1	Primary	23.90'	**152.0 deg x 17.0' long Sharp-Crested Vee/Trap Weir** Cv= 2.47 (C= 3.09)

Primary OutFlow Max=28.65 cfs @ 12.57 hrs HW=24.52' (Free Discharge)
1=Sharp-Crested Vee/Trap Weir (Weir Controls 28.65 cfs @ 2.37 fps)

Summary for Link AP1: AP 1

Inflow Area = 1,136,863 sf, 36.86% Impervious, Inflow Depth = 2.66" for 10-Yr event
Inflow = 31.17 cfs @ 12.57 hrs, Volume= 251,905 cf
Primary = 31.17 cfs @ 12.57 hrs, Volume= 251,905 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Summary for Link AP2: AP 2

Inflow Area = 4,699,294 sf, 15.21% Impervious, Inflow Depth = 2.47" for 10-Yr event
Inflow = 80.73 cfs @ 12.91 hrs, Volume= 967,742 cf
Primary = 80.73 cfs @ 12.91 hrs, Volume= 967,742 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment OS1: OFFSITE SUB 1 Runoff Area=1,467,784 sf 3.67% Impervious Runoff Depth=2.96"
Flow Length=1,645' Tc=29.1 min CN=70 Runoff=66.68 cfs 362,632 cf

Subcatchment OS2: OFFSITE SUB 2 Runoff Area=913,125 sf 2.70% Impervious Runoff Depth=3.65"
Flow Length=1,654' Tc=58.8 min CN=77 Runoff=35.70 cfs 278,070 cf

Subcatchment S3: SUB 3 Runoff Area=836,116 sf 36.42% Impervious Runoff Depth=3.45"
Flow Length=828' Tc=39.2 min CN=75 Runoff=38.62 cfs 240,602 cf

Subcatchment S3.1: SUB 3.1 Runoff Area=41,451 sf 89.14% Impervious Runoff Depth=5.73"
Flow Length=160' Slope=0.0100 '/' Tc=5.0 min CN=96 Runoff=5.92 cfs 19,781 cf

Subcatchment S3.2: SUB 3.2 Runoff Area=8,722 sf 9.15% Impervious Runoff Depth=4.07"
Flow Length=163' Slope=0.0220 '/' Tc=5.0 min CN=81 Runoff=0.98 cfs 2,956 cf

Subcatchment S3.3: SUB 3.3 Runoff Area=1,672 sf 27.51% Impervious Runoff Depth=3.76"
Tc=5.0 min CN=78 Runoff=0.17 cfs 523 cf

Subcatchment S4: SUB 4 Runoff Area=1,012,128 sf 16.94% Impervious Runoff Depth=3.96"
Flow Length=1,599' Tc=46.2 min CN=80 Runoff=49.13 cfs 334,187 cf

Subcatchment S4.1: SUB 4.1 Runoff Area=36,714 sf 95.49% Impervious Runoff Depth=5.84"
Flow Length=281' Slope=0.0100 '/' Tc=5.0 min CN=97 Runoff=5.28 cfs 17,879 cf

Subcatchment S6: SUB 6 Runoff Area=132,680 sf 8.16% Impervious Runoff Depth=4.07"
Flow Length=616' Tc=13.5 min CN=81 Runoff=11.37 cfs 44,961 cf

Subcatchment S7: SUB 3 Runoff Area=167,053 sf 43.24% Impervious Runoff Depth=4.93"
Flow Length=1,081' Tc=10.0 min CN=89 Runoff=18.60 cfs 68,622 cf

Subcatchment S8: SUB 8 Runoff Area=81,849 sf 5.04% Impervious Runoff Depth=3.76"
Flow Length=399' Tc=21.1 min CN=78 Runoff=5.45 cfs 25,620 cf

Reach R1: REACH 1 Avg. Flow Depth=0.27' Max Vel=1.59 fps Inflow=14.59 cfs 362,623 cf
n=0.030 L=386.0' S=0.0104 '/' Capacity=256.49 cfs Outflow=14.59 cfs 362,621 cf

Reach R2: REACH 2 Avg. Flow Depth=0.30' Max Vel=1.69 fps Inflow=18.37 cfs 278,064 cf
n=0.030 L=527.0' S=0.0100 '/' Capacity=252.44 cfs Outflow=18.35 cfs 278,063 cf

Reach R3: REACH 3 Avg. Flow Depth=0.91' Max Vel=4.63 fps Inflow=32.93 cfs 640,684 cf
n=0.030 L=874.0' S=0.0138 '/' Capacity=141.56 cfs Outflow=32.92 cfs 640,681 cf

Reach R3.1: REACH 3.1 Avg. Flow Depth=0.07' Max Vel=0.76 fps Inflow=2.89 cfs 23,260 cf
n=0.025 L=179.0' S=0.0056 '/' Capacity=833.80 cfs Outflow=2.70 cfs 23,260 cf

Reach R3.2: REACH 3.2 Avg. Flow Depth=0.03' Max Vel=0.84 fps Inflow=1.16 cfs 3,479 cf
n=0.025 L=91.3' S=0.0219 '/' Capacity=1,651.08 cfs Outflow=1.13 cfs 3,479 cf

Reach R4: REACH 4 Avg. Flow Depth=1.06' Max Vel=5.59 fps Inflow=48.21 cfs 358,096 cf
n=0.030 L=144.0' S=0.0171 '/' Capacity=157.25 cfs Outflow=48.14 cfs 358,096 cf

Reach R4.1: REACH 4.1 Avg. Flow Depth=0.15' Max Vel=1.57 fps Inflow=3.99 cfs 17,880 cf
n=0.030 L=552.0' S=0.0145 '/' Capacity=390.71 cfs Outflow=3.05 cfs 17,880 cf

Reach R5: REACH 5 Avg. Flow Depth=1.80' Max Vel=7.72 fps Inflow=119.32 cfs 1,350,844 cf
n=0.025 L=317.0' S=0.0134 '/' Capacity=147.04 cfs Outflow=119.28 cfs 1,350,843 cf

Reach R6: REACH 6 Avg. Flow Depth=0.42' Max Vel=5.82 fps Inflow=43.76 cfs 289,481 cf
n=0.025 L=133.0' S=0.0328 '/' Capacity=623.19 cfs Outflow=43.76 cfs 289,481 cf

Pond AP3: 4 - 24"CMP Peak Elev=15.68' Storage=63,392 cf Inflow=122.30 cfs 1,395,804 cf
Primary=99.79 cfs 1,395,789 cf Secondary=0.00 cfs 0 cf Outflow=99.79 cfs 1,395,789 cf

Pond C3: CULV-3 Peak Elev=33.42' Inflow=14.59 cfs 362,623 cf
24.0" Round Culvert n=0.013 L=169.0' S=0.0095 '/' Outflow=14.59 cfs 362,623 cf

Pond C4: CULV-4 Peak Elev=25.56' Inflow=48.21 cfs 358,096 cf
24.0" Round Culvert n=0.011 L=86.0' S=0.0050 '/' Outflow=48.21 cfs 358,096 cf

Pond C7: CULV-7 Peak Elev=23.47' Storage=9,483 cf Inflow=43.76 cfs 289,481 cf
Primary=32.92 cfs 280,765 cf Secondary=10.80 cfs 8,708 cf Outflow=43.72 cfs 289,474 cf

Pond CB5: CB-5 Peak Elev=629.89' Inflow=0.17 cfs 523 cf
1.0" Round Culvert n=0.010 L=70.0' S=0.0050 '/' Outflow=0.17 cfs 523 cf

Pond CB6: CB-6 Peak Elev=28.46' Inflow=1.16 cfs 3,479 cf
12.0" Round Culvert n=0.013 L=184.0' S=0.0050 '/' Outflow=1.16 cfs 3,479 cf

Pond DMH-1: DMH-1 Peak Elev=33.68' Inflow=5.28 cfs 17,879 cf
24.0" Round Culvert n=0.010 L=30.0' S=0.0077 '/' Outflow=5.28 cfs 17,879 cf

Pond DMH-6: DMH-6 Peak Elev=31.19' Inflow=5.92 cfs 19,781 cf
24.0" Round Culvert n=0.010 L=6.0' S=0.2050 '/' Outflow=5.92 cfs 19,781 cf

Pond OC1: OFFSITE CULV-1 Peak Elev=36.95' Storage=143,927 cf Inflow=66.68 cfs 362,632 cf
18.0" Round Culvert n=0.013 L=97.6' S=0.0201 '/' Outflow=14.59 cfs 362,623 cf

Pond OC2: OFFSITE CULV-2 Peak Elev=37.67' Storage=62,087 cf Inflow=35.70 cfs 278,070 cf
18.0" Round Culvert n=0.013 L=93.6' S=0.0170 '/' Outflow=18.37 cfs 278,064 cf

Pond P3.1: STORMTECH DETENTION / Peak Elev=31.08' Storage=7,136 cf Inflow=5.92 cfs 19,781 cf
Outflow=2.30 cfs 19,781 cf

Pond P4.1: STORMTECH DETENTION / Peak Elev=33.95' Storage=2,637 cf Inflow=5.28 cfs 17,879 cf
Outflow=3.99 cfs 17,880 cf

Pond W: WETLAND Peak Elev=24.68' Storage=5,150 cf Inflow=42.30 cfs 266,221 cf
Outflow=41.85 cfs 266,221 cf

Link AP1: AP 1 Inflow=48.21 cfs 358,096 cf
Primary=48.21 cfs 358,096 cf

Link AP2: AP 2 Inflow=99.79 cfs 1,395,789 cf
Primary=99.79 cfs 1,395,789 cf

Total Runoff Area = 4,699,294 sf Runoff Volume = 1,395,833 cf Average Runoff Depth = 3.56"
84.79% Pervious = 3,984,423 sf 15.21% Impervious = 714,871 sf

Summary for Subcatchment OS1: OFFSITE SUB 1

Runoff = 66.68 cfs @ 12.41 hrs, Volume= 362,632 cf, Depth= 2.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Yr Rainfall=6.20"

Area (sf)	CN	Description
53,844	98	Paved parking & roofs
32,748	49	50-75% Grass cover, Fair, HSG A
12,803	79	50-75% Grass cover, Fair, HSG C
12,554	84	50-75% Grass cover, Fair, HSG D
205,440	30	Woods, Good, HSG A
228,765	70	Woods, Good, HSG C
921,630	77	Woods, Good, HSG D
1,467,784	70	Weighted Average
1,413,940		96.33% Pervious Area
53,844		3.67% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.6	100	0.0430	0.25		**Sheet Flow, A - B** Range n= 0.130 P2= 3.00"
0.8	75	0.0510	1.58		**Shallow Concentrated Flow, B -C** Short Grass Pasture Kv= 7.0 fps
20.3	923	0.0230	0.76		**Shallow Concentrated Flow, C - D** Woodland Kv= 5.0 fps
1.4	547	0.0180	6.31	157.83	**Channel Flow, D - E** Area= 25.0 sf Perim= 27.0' r= 0.93' n= 0.030 Earth, grassed & winding
29.1	1,645	Total			

Summary for Subcatchment OS2: OFFSITE SUB 2

Runoff = 35.70 cfs @ 12.80 hrs, Volume= 278,070 cf, Depth= 3.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Yr Rainfall=6.20"

Area (sf)	CN	Description
24,623	98	Paved parking & roofs
8,226	79	50-75% Grass cover, Fair, HSG C
13,667	84	50-75% Grass cover, Fair, HSG D
151,095	70	Woods, Good, HSG C
715,514	77	Woods, Good, HSG D
913,125	77	Weighted Average
888,502		97.30% Pervious Area
24,623		2.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.0	100	0.0530	0.11		**Sheet Flow, A - B** Woods: Light underbrush n= 0.400 P2= 3.00"
43.8	1,554	0.0140	0.59		**Shallow Concentrated Flow, B - C** Woodland Kv= 5.0 fps
58.8	1,654	Total			

Summary for Subcatchment S3: SUB 3

Runoff = 38.62 cfs @ 12.54 hrs, Volume= 240,602 cf, Depth= 3.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Yr Rainfall=6.20"

Area (sf)	CN	Description
304,505	98	Paved parking & roofs
45,477	49	50-75% Grass cover, Fair, HSG A
10,125	79	50-75% Grass cover, Fair, HSG C
78,239	84	50-75% Grass cover, Fair, HSG D
142,893	30	Woods, Good, HSG A
81,209	70	Woods, Good, HSG C
173,668	77	Woods, Good, HSG D
836,116	75	Weighted Average
531,611		63.58% Pervious Area
304,505		36.42% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.4	150	0.0950	0.15		**Sheet Flow, A - B** Woods: Light underbrush n= 0.400 P2= 3.00"
1.5	143	0.1000	1.58		**Shallow Concentrated Flow, B - C** Woodland Kv= 5.0 fps
21.3	535	0.0070	0.42		**Shallow Concentrated Flow, C -D** Woodland Kv= 5.0 fps
39.2	828	Total			

Summary for Subcatchment S3.1: SUB 3.1

Runoff = 5.92 cfs @ 12.07 hrs, Volume= 19,781 cf, Depth= 5.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Yr Rainfall=6.20"

Area (sf)	CN	Description
36,951	98	Paved parking & roofs
3,700	79	50-75% Grass cover, Fair, HSG C
800	84	50-75% Grass cover, Fair, HSG D
41,451	96	Weighted Average
4,500		10.86% Pervious Area
36,951		89.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.4	160	0.0100	1.11		**Sheet Flow, A - B**
					Smooth surfaces n= 0.011 P2= 3.00"
2.6					**Direct Entry, Min Tc**
5.0	160	Total			

Summary for Subcatchment S3.2: SUB 3.2

Runoff = 0.98 cfs @ 12.07 hrs, Volume= 2,956 cf, Depth= 4.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Yr Rainfall=6.20"

Area (sf)	CN	Description
798	98	Paved parking & roofs
7,924	79	50-75% Grass cover, Fair, HSG C
8,722	81	Weighted Average
7,924		90.85% Pervious Area
798		9.15% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.6	163	0.0220	1.04		**Shallow Concentrated Flow, A - B**
					Short Grass Pasture Kv= 7.0 fps
2.4					**Direct Entry,**
5.0	163	Total			

Summary for Subcatchment S3.3: SUB 3.3

Runoff = 0.17 cfs @ 12.07 hrs, Volume= 523 cf, Depth= 3.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Yr Rainfall=6.20"

Area (sf)	CN	Description
460	98	Paved parking & roofs
1,212	70	Woods, Good, HSG C
1,672	78	Weighted Average
1,212		72.49% Pervious Area
460		27.51% Impervious Area

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

Summary for Subcatchment S4: SUB 4

Runoff = 49.13 cfs @ 12.63 hrs, Volume= 334,187 cf, Depth= 3.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Yr Rainfall=6.20"

Area (sf)	CN	Description
171,450	98	Paved parking & roofs
20,781	79	50-75% Grass cover, Fair, HSG C
7,642	84	50-75% Grass cover, Fair, HSG D
419,188	73	Woods, Fair, HSG C
393,067	79	Woods, Fair, HSG D
1,012,128	80	Weighted Average
840,678		83.06% Pervious Area
171,450		16.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
29.3	100	0.0100	0.06		**Sheet Flow, A - B** Woods: Light underbrush n= 0.400 P2= 3.00"
3.9	284	0.0600	1.22		**Shallow Concentrated Flow, B - C** Woodland Kv= 5.0 fps
10.4	341	0.0120	0.55		**Shallow Concentrated Flow, C - D** Woodland Kv= 5.0 fps
2.6	874	0.0140	5.64	281.88	**Channel Flow, D - E** Area= 50.0 sf Perim= 53.0' r= 0.94' n= 0.030 Earth, grassed & winding
46.2	1,599	Total			

Summary for Subcatchment S4.1: SUB 4.1

Runoff = 5.28 cfs @ 12.07 hrs, Volume= 17,879 cf, Depth= 5.84"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Yr Rainfall=6.20"

Area (sf)	CN	Description
35,058	98	Paved parking & roofs
1,656	74	>75% Grass cover, Good, HSG C
36,714	97	Weighted Average
1,656		4.51% Pervious Area
35,058		95.49% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.9	200	0.0100	1.16		**Sheet Flow, A - B** Smooth surfaces n= 0.011 P2= 3.00"
0.7	81	0.0100	2.03		**Shallow Concentrated Flow, B - C** Paved Kv= 20.3 fps
1.4					**Direct Entry, Min Tc**
5.0	281	Total			

Summary for Subcatchment S6: SUB 6

Runoff = 11.37 cfs @ 12.18 hrs, Volume= 44,961 cf, Depth= 4.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Yr Rainfall=6.20"

Area (sf)	CN	Description
10,824	98	Paved parking & roofs
19,401	79	50-75% Grass cover, Fair, HSG C
64,092	84	50-75% Grass cover, Fair, HSG D
32,603	70	Woods, Good, HSG C
5,760	77	Woods, Good, HSG D
132,680	81	Weighted Average
121,856		91.84% Pervious Area
10,824		8.16% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.0	40	0.0410	0.08		**Sheet Flow, A - B** Woods: Light underbrush n= 0.400 P2= 3.00"
0.7	71	0.1120	1.67		**Shallow Concentrated Flow, B - C** Woodland Kv= 5.0 fps
4.5	265	0.0380	0.97		**Shallow Concentrated Flow, B - C** Woodland Kv= 5.0 fps
0.3	240	0.0250	11.44	686.23	**Channel Flow, C - D** Area= 60.0 sf Perim= 34.0' r= 1.76' n= 0.030 Earth, grassed & winding
13.5	616	Total			

Summary for Subcatchment S7: SUB 3

Runoff = 18.60 cfs @ 12.14 hrs, Volume= 68,622 cf, Depth= 4.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Yr Rainfall=6.20"

Area (sf)	CN	Description
72,236	98	Paved parking & roofs
66,092	84	50-75% Grass cover, Fair, HSG D
5,176	73	Woods, Fair, HSG C
23,549	79	Woods, Fair, HSG D
167,053	89	Weighted Average
94,817		56.76% Pervious Area
72,236		43.24% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.8	58	0.0430	0.20		**Sheet Flow, A - B** Grass: Short n= 0.150 P2= 3.00"
1.1	136	0.0840	2.03		**Shallow Concentrated Flow, B - C** Short Grass Pasture Kv= 7.0 fps
2.8	424	0.0150	2.49		**Shallow Concentrated Flow, C - D** Paved Kv= 20.3 fps
0.1	39	0.0450	9.55	3.33	**Pipe Channel, D - E** 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.010 PVC, smooth interior
0.3	185	0.0380	11.66	116.60	**Channel Flow, E - F** Area= 10.0 sf Perim= 12.0' r= 0.83' n= 0.022 Earth, clean & straight
0.5	137	0.0168	4.82	0.95	**Pipe Channel, F - G** 6.0" Round Area= 0.2 sf Perim= 1.6' r= 0.13' n= 0.010 PVC, smooth interior
0.4	102	0.0042	4.67	14.66	**Pipe Channel, G - H** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.013 Concrete pipe, bends & connections
10.0	1,081	Total			

Summary for Subcatchment S8: SUB 8

Runoff = 5.45 cfs @ 12.29 hrs, Volume= 25,620 cf, Depth= 3.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Yr Rainfall=6.20"

Area (sf)	CN	Description
4,122	98	Paved parking & roofs
439	79	50-75% Grass cover, Fair, HSG C
34,658	74	>75% Grass cover, Good, HSG C
4,166	73	Woods, Fair, HSG C
38,464	79	Woods, Fair, HSG D
81,849	78	Weighted Average
77,727		94.96% Pervious Area
4,122		5.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.8	120	0.0500	0.11		**Sheet Flow, A - B** Woods: Light underbrush n= 0.400 P2= 3.00"
1.4	138	0.1100	1.66		**Shallow Concentrated Flow, B - C** Woodland Kv= 5.0 fps
1.9	141	0.0320	1.25		**Shallow Concentrated Flow, C - D** Short Grass Pasture Kv= 7.0 fps
21.1	399	Total			

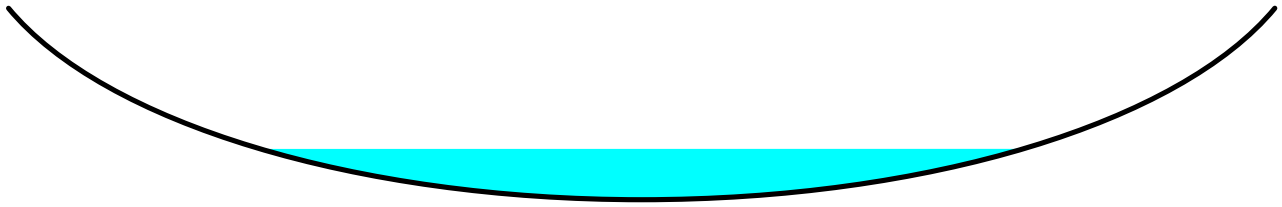
Summary for Reach R1: REACH 1

Inflow Area = 1,467,784 sf, 3.67% Impervious, Inflow Depth = 2.96" for 25-Yr event
Inflow = 14.59 cfs @ 13.30 hrs, Volume= 362,623 cf
Outflow = 14.59 cfs @ 13.42 hrs, Volume= 362,621 cf, Atten= 0%, Lag= 7.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.59 fps, Min. Travel Time= 4.0 min
Avg. Velocity = 0.59 fps, Avg. Travel Time= 10.9 min

Peak Storage= 3,536 cf @ 13.35 hrs
Average Depth at Peak Storage= 0.27'
Bank-Full Depth= 1.00' Flow Area= 66.7 sf, Capacity= 256.49 cfs

100.00' x 1.00' deep Parabolic Channel, n= 0.030 Earth, grassed & winding
Length= 386.0' Slope= 0.0104 '/'
Inlet Invert= 30.00', Outlet Invert= 26.00'



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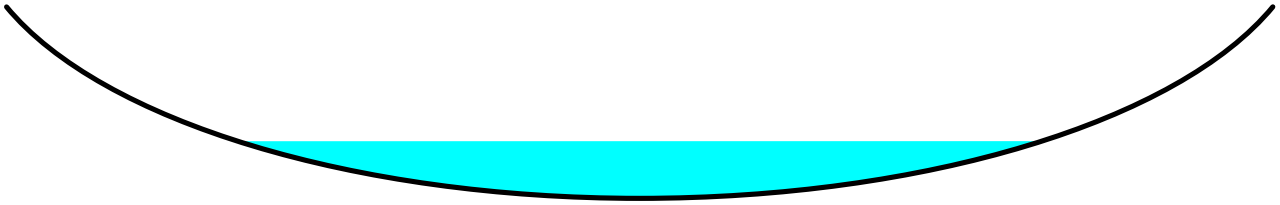
Summary for Reach R2: REACH 2

Inflow Area = 913,125 sf, 2.70% Impervious, Inflow Depth = 3.65" for 25-Yr event
Inflow = 18.37 cfs @ 13.45 hrs, Volume= 278,064 cf
Outflow = 18.35 cfs @ 13.60 hrs, Volume= 278,063 cf, Atten= 0%, Lag= 9.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.69 fps, Min. Travel Time= 5.2 min
Avg. Velocity = 0.51 fps, Avg. Travel Time= 17.1 min

Peak Storage= 5,722 cf @ 13.51 hrs
Average Depth at Peak Storage= 0.30'
Bank-Full Depth= 1.00' Flow Area= 66.7 sf, Capacity= 252.44 cfs

100.00' x 1.00' deep Parabolic Channel, n= 0.030 Earth, grassed & winding
Length= 527.0' Slope= 0.0100 '/'
Inlet Invert= 31.29', Outlet Invert= 26.00'



‡

Summary for Reach R3: REACH 3

Inflow Area = 2,380,909 sf, 3.30% Impervious, Inflow Depth = 3.23" for 25-Yr event
Inflow = 32.93 cfs @ 13.57 hrs, Volume= 640,684 cf
Outflow = 32.92 cfs @ 13.66 hrs, Volume= 640,681 cf, Atten= 0%, Lag= 5.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 4.63 fps, Min. Travel Time= 3.1 min
Avg. Velocity = 1.45 fps, Avg. Travel Time= 10.0 min

Peak Storage= 6,222 cf @ 13.61 hrs
Average Depth at Peak Storage= 0.91'
Bank-Full Depth= 2.00' Flow Area= 20.0 sf, Capacity= 141.56 cfs

6.00' x 2.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 2.0 '/' Top Width= 14.00'
Length= 874.0' Slope= 0.0138 '/'
Inlet Invert= 26.00', Outlet Invert= 13.90'



Summary for Reach R3.1: REACH 3.1

Inflow Area = 51,845 sf, 73.70% Impervious, Inflow Depth = 5.38" for 25-Yr event
Inflow = 2.89 cfs @ 12.27 hrs, Volume= 23,260 cf
Outflow = 2.70 cfs @ 12.38 hrs, Volume= 23,260 cf, Atten= 7%, Lag= 7.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.76 fps, Min. Travel Time= 3.9 min
Avg. Velocity = 0.35 fps, Avg. Travel Time= 8.5 min

Peak Storage= 638 cf @ 12.32 hrs
Average Depth at Peak Storage= 0.07'
Bank-Full Depth= 2.00' Flow Area= 140.0 sf, Capacity= 833.80 cfs

50.00' x 2.00' deep channel, n= 0.025 Earth, clean & winding
Side Slope Z-value= 10.0 '/' Top Width= 90.00'
Length= 179.0' Slope= 0.0056 '/'
Inlet Invert= 24.90', Outlet Invert= 23.90'



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Summary for Reach R3.2: REACH 3.2

Inflow Area = 10,394 sf, 12.10% Impervious, Inflow Depth = 4.02" for 25-Yr event
Inflow = 1.16 cfs @ 12.07 hrs, Volume= 3,479 cf
Outflow = 1.13 cfs @ 12.12 hrs, Volume= 3,479 cf, Atten= 3%, Lag= 2.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.84 fps, Min. Travel Time= 1.8 min
Avg. Velocity = 0.65 fps, Avg. Travel Time= 2.3 min

Peak Storage= 123 cf @ 12.09 hrs
Average Depth at Peak Storage= 0.03'
Bank-Full Depth= 2.00' Flow Area= 140.0 sf, Capacity= 1,651.08 cfs

50.00' x 2.00' deep channel, n= 0.025 Earth, clean & winding
Side Slope Z-value= 10.0 '/' Top Width= 90.00'
Length= 91.3' Slope= 0.0219 '/'
Inlet Invert= 26.90', Outlet Invert= 24.90'



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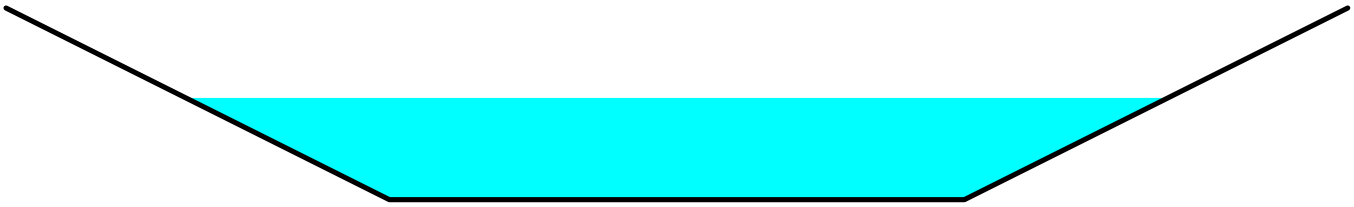
Summary for Reach R4: REACH 4

Inflow Area = 1,136,863 sf, 36.86% Impervious, Inflow Depth = 3.78" for 25-Yr event
Inflow = 48.21 cfs @ 12.56 hrs, Volume= 358,096 cf
Outflow = 48.14 cfs @ 12.58 hrs, Volume= 358,096 cf, Atten= 0%, Lag= 0.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 5.59 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 1.79 fps, Avg. Travel Time= 1.3 min

Peak Storage= 1,241 cf @ 12.57 hrs
Average Depth at Peak Storage= 1.06'
Bank-Full Depth= 2.00' Flow Area= 20.0 sf, Capacity= 157.25 cfs

6.00' x 2.00' deep channel, n= 0.030 Stream, clean & straight
Side Slope Z-value= 2.0 '/' Top Width= 14.00'
Length= 144.0' Slope= 0.0171 '/'
Inlet Invert= 16.36', Outlet Invert= 13.90'



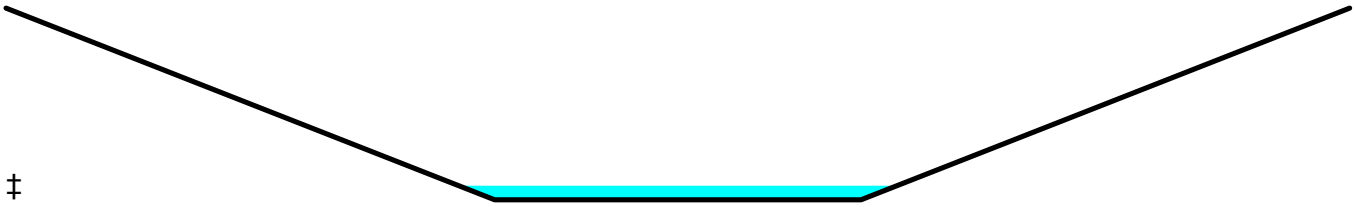
Summary for Reach R4.1: REACH 4.1

Inflow Area = 36,714 sf, 95.49% Impervious, Inflow Depth = 5.84" for 25-Yr event
Inflow = 3.99 cfs @ 12.13 hrs, Volume= 17,880 cf
Outflow = 3.05 cfs @ 12.30 hrs, Volume= 17,880 cf, Atten= 24%, Lag= 9.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.57 fps, Min. Travel Time= 5.8 min
Avg. Velocity = 0.53 fps, Avg. Travel Time= 17.3 min

Peak Storage= 1,072 cf @ 12.20 hrs
Average Depth at Peak Storage= 0.15'
Bank-Full Depth= 2.00' Flow Area= 56.0 sf, Capacity= 390.71 cfs

12.00' x 2.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 8.0 '/' Top Width= 44.00'
Length= 552.0' Slope= 0.0145 '/'
Inlet Invert= 22.00', Outlet Invert= 14.00'



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Summary for Reach R5: REACH 5

Inflow Area = 4,566,614 sf, 15.42% Impervious, Inflow Depth = 3.55" for 25-Yr event
Inflow = 119.32 cfs @ 12.63 hrs, Volume= 1,350,844 cf
Outflow = 119.28 cfs @ 12.65 hrs, Volume= 1,350,843 cf, Atten= 0%, Lag= 1.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 7.72 fps, Min. Travel Time= 0.7 min
Avg. Velocity = 1.92 fps, Avg. Travel Time= 2.8 min

Peak Storage= 4,900 cf @ 12.64 hrs
Average Depth at Peak Storage= 1.80'
Bank-Full Depth= 2.00' Flow Area= 18.0 sf, Capacity= 147.04 cfs

5.00' x 2.00' deep channel, n= 0.025 Earth, clean & straight
Side Slope Z-value= 2.0 '/' Top Width= 13.00'
Length= 317.0' Slope= 0.0134 '/'
Inlet Invert= 13.90', Outlet Invert= 9.64'



Summary for Reach R6: REACH 6

Inflow Area = 969,810 sf, 35.76% Impervious, Inflow Depth = 3.58" for 25-Yr event
Inflow = 43.76 cfs @ 12.55 hrs, Volume= 289,481 cf
Outflow = 43.76 cfs @ 12.56 hrs, Volume= 289,481 cf, Atten= 0%, Lag= 0.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 5.82 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 1.67 fps, Avg. Travel Time= 1.3 min

Peak Storage= 999 cf @ 12.56 hrs
Average Depth at Peak Storage= 0.42'
Bank-Full Depth= 2.00' Flow Area= 42.0 sf, Capacity= 623.19 cfs

17.00' x 2.00' deep channel, n= 0.025 Earth, clean & winding
Side Slope Z-value= 2.0 '/' Top Width= 25.00'
Length= 133.0' Slope= 0.0328 '/'
Inlet Invert= 23.90', Outlet Invert= 19.54'



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Summary for Pond AP3: 4 - 24"CMP

Inflow Area = 4,699,294 sf, 15.21% Impervious, Inflow Depth = 3.56" for 25-Yr event
Inflow = 122.30 cfs @ 12.64 hrs, Volume= 1,395,804 cf
Outflow = 99.79 cfs @ 13.01 hrs, Volume= 1,395,789 cf, Atten= 18%, Lag= 22.7 min
Primary = 99.79 cfs @ 13.01 hrs, Volume= 1,395,789 cf
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 6

Peak Elev= 15.68' @ 13.01 hrs Surf.Area= 34,929 sf Storage= 63,392 cf

Plug-Flow detention time= 4.1 min calculated for 1,395,789 cf (100% of inflow)
Center-of-Mass det. time= 4.0 min (904.9 - 900.8)

Volume	Invert	Avail.Storage	Storage Description
#1	9.64'	96,037 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
9.64	0	0	0
10.00	856	154	154
12.00	4,037	4,893	5,047
14.00	13,588	17,625	22,672
16.00	39,016	52,604	75,276
16.50	44,026	20,761	96,037

Device	Routing	Invert	Outlet Devices
#1	Primary	9.77'	**24.0" Round Proposed 3 - 24" CMP X 3.00** L= 65.0' CMP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 9.77' / 9.12' S= 0.0100 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 3.14 sf
#2	Primary	9.83'	**24.0" Round Existing 24"CMP** L= 64.0' CMP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 9.77' / 9.83' S= -0.0009 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 3.14 sf
#3	Secondary	16.50'	**20.0' long x 25.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=99.79 cfs @ 13.01 hrs HW=15.68' (Free Discharge)
└─**1=Proposed 3 - 24" CMP** (Barrel Controls 76.16 cfs @ 8.08 fps)
└─**2=Existing 24"CMP** (Barrel Controls 23.63 cfs @ 7.52 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=9.64' (Free Discharge)
└─**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond C3: CULV-3

Inflow Area = 1,467,784 sf, 3.67% Impervious, Inflow Depth = 2.96" for 25-Yr event
Inflow = 14.59 cfs @ 13.30 hrs, Volume= 362,623 cf
Outflow = 14.59 cfs @ 13.30 hrs, Volume= 362,623 cf, Atten= 0%, Lag= 0.0 min
Primary = 14.59 cfs @ 13.30 hrs, Volume= 362,623 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 33.42' @ 13.30 hrs
Flood Elev= 39.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	31.60'	**24.0" Round Culvert** L= 169.0' RCP, groove end projecting, Ke= 0.200

Inlet / Outlet Invert= 31.60' / 30.00' S= 0.0095 '/' Cc= 0.900
n= 0.013 Concrete, trowel finish, Flow Area= 3.14 sf

Primary OutFlow Max=14.59 cfs @ 13.30 hrs HW=33.42' TW=31.60' (Fixed TW Elev= 31.60')
└**1=Culvert** (Outlet Controls 14.59 cfs @ 6.37 fps)

Summary for Pond C4: CULV-4

Inflow Area = 1,136,863 sf, 36.86% Impervious, Inflow Depth = 3.78" for 25-Yr event
Inflow = 48.21 cfs @ 12.56 hrs, Volume= 358,096 cf
Outflow = 48.21 cfs @ 12.56 hrs, Volume= 358,096 cf, Atten= 0%, Lag= 0.0 min
Primary = 48.21 cfs @ 12.56 hrs, Volume= 358,096 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 25.56' @ 12.56 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	16.79'	**24.0" Round Culvert**
			L= 86.0' RCP, groove end projecting, Ke= 0.200
			Inlet / Outlet Invert= 16.79' / 16.36' S= 0.0050 '/' Cc= 0.900
			n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf

Primary OutFlow Max=48.19 cfs @ 12.56 hrs HW=25.55' (Free Discharge)
└**1=Culvert** (Barrel Controls 48.19 cfs @ 15.34 fps)

Summary for Pond C7: CULV-7

Inflow Area = 969,810 sf, 35.76% Impervious, Inflow Depth = 3.58" for 25-Yr event
Inflow = 43.76 cfs @ 12.56 hrs, Volume= 289,481 cf
Outflow = 43.72 cfs @ 12.58 hrs, Volume= 289,474 cf, Atten= 0%, Lag= 0.8 min
Primary = 32.92 cfs @ 12.58 hrs, Volume= 280,765 cf
Secondary = 10.80 cfs @ 12.58 hrs, Volume= 8,708 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 8
Peak Elev= 23.47' @ 12.58 hrs Surf.Area= 7,070 sf Storage= 9,483 cf

Plug-Flow detention time= 1.7 min calculated for 289,474 cf (100% of inflow)
Center-of-Mass det. time= 1.6 min (859.9 - 858.3)

Volume	Invert	Avail.Storage	Storage Description
#1	19.54'	9,728 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
19.54	0	0	0
20.00	144	33	33
21.00	890	517	550
22.00	2,015	1,453	2,003
23.00	6,588	4,302	6,304
23.50	7,106	3,424	9,728

Device	Routing	Invert	Outlet Devices
#1	Primary	19.54'	**24.0" Round 24" RCP** L= 184.0' RCP, rounded edge headwall, Ke= 0.100 Inlet / Outlet Invert= 19.54' / 16.79' S= 0.0149 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf
#2	Secondary	23.40'	**250.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=32.92 cfs @ 12.58 hrs HW=23.47' (Free Discharge)
1=24" RCP (Barrel Controls 32.92 cfs @ 10.48 fps)

Secondary OutFlow Max=10.64 cfs @ 12.58 hrs HW=23.47' (Free Discharge)
2=Broad-Crested Rectangular Weir (Weir Controls 10.64 cfs @ 0.65 fps)

Summary for Pond CB5: CB-5

Inflow Area = 1,672 sf, 27.51% Impervious, Inflow Depth = 3.76" for 25-Yr event
Inflow = 0.17 cfs @ 12.07 hrs, Volume= 523 cf
Outflow = 0.17 cfs @ 12.07 hrs, Volume= 523 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.17 cfs @ 12.07 hrs, Volume= 523 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 629.89' @ 12.07 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	29.50'	**1.0" Round 12" CULV** L= 70.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 29.50' / 29.15' S= 0.0050 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.01 sf

Primary OutFlow Max=0.17 cfs @ 12.07 hrs HW=627.27' (Free Discharge)
1=12" CULV (Barrel Controls 0.17 cfs @ 32.00 fps)

Summary for Pond CB6: CB-6

Inflow Area = 10,394 sf, 12.10% Impervious, Inflow Depth = 4.02" for 25-Yr event
Inflow = 1.16 cfs @ 12.07 hrs, Volume= 3,479 cf
Outflow = 1.16 cfs @ 12.07 hrs, Volume= 3,479 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.16 cfs @ 12.07 hrs, Volume= 3,479 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 28.46' @ 12.07 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	27.82'	**12.0" Round 12"SD** L= 184.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 27.82' / 26.90' S= 0.0050 '/' Cc= 0.900 n= 0.013 Concrete, trowel finish, Flow Area= 0.79 sf

Primary OutFlow Max=1.15 cfs @ 12.07 hrs HW=28.46' (Free Discharge)
1=12"SD (Barrel Controls 1.15 cfs @ 3.11 fps)

Summary for Pond DMH-1: DMH-1

Inflow Area = 36,714 sf, 95.49% Impervious, Inflow Depth = 5.84" for 25-Yr event
Inflow = 5.28 cfs @ 12.07 hrs, Volume= 17,879 cf
Outflow = 5.28 cfs @ 12.07 hrs, Volume= 17,879 cf, Atten= 0%, Lag= 0.0 min
Primary = 5.28 cfs @ 12.07 hrs, Volume= 17,879 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 33.68' @ 12.07 hrs
Flood Elev= 36.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	32.58'	**24.0" Round 24" SD to Detention Bed** L= 30.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 32.58' / 32.35' S= 0.0077 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=5.28 cfs @ 12.07 hrs HW=33.68' (Free Discharge)
1=24" SD to Detention Bed (Barrel Controls 5.28 cfs @ 4.30 fps)

Summary for Pond DMH-6: DMH-6

Inflow Area = 41,451 sf, 89.14% Impervious, Inflow Depth = 5.73" for 25-Yr event
Inflow = 5.92 cfs @ 12.07 hrs, Volume= 19,781 cf
Outflow = 5.92 cfs @ 12.07 hrs, Volume= 19,781 cf, Atten= 0%, Lag= 0.0 min
Primary = 5.92 cfs @ 12.07 hrs, Volume= 19,781 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 31.19' @ 12.07 hrs
Flood Elev= 32.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	30.13'	**24.0" Round 24" SD to Detention Bed** L= 6.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 30.13' / 28.90' S= 0.2050 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=5.92 cfs @ 12.07 hrs HW=31.19' (Free Discharge)
1=24" SD to Detention Bed (Inlet Controls 5.92 cfs @ 3.50 fps)

Summary for Pond OC1: OFFSITE CULV-1

Inflow Area = 1,467,784 sf, 3.67% Impervious, Inflow Depth = 2.96" for 25-Yr event
Inflow = 66.68 cfs @ 12.41 hrs, Volume= 362,632 cf
Outflow = 14.59 cfs @ 13.30 hrs, Volume= 362,623 cf, Atten= 78%, Lag= 53.2 min
Primary = 14.59 cfs @ 13.30 hrs, Volume= 362,623 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 36.95' @ 13.30 hrs Surf.Area= 100,691 sf Storage= 143,927 cf

Plug-Flow detention time= 116.1 min calculated for 362,623 cf (100% of inflow)
Center-of-Mass det. time= 116.1 min (974.1 - 858.0)

Volume	Invert	Avail.Storage	Storage Description
#1	34.25'	602,689 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
34.25	5,289	0	0
36.00	67,698	63,864	63,864
38.00	137,090	204,788	268,652
40.00	196,947	334,037	602,689

Device	Routing	Invert	Outlet Devices
#1	Primary	34.25'	**18.0" Round 18" RCP** L= 97.6' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 34.25' / 32.29' S= 0.0201 '/' Cc= 0.900 n= 0.013 Concrete, trowel finish, Flow Area= 1.77 sf

Primary OutFlow Max=14.59 cfs @ 13.30 hrs HW=36.95' (Free Discharge)
↑—**1=18" RCP** (Barrel Controls 14.59 cfs @ 8.26 fps)

Summary for Pond OC2: OFFSITE CULV-2

Inflow Area = 913,125 sf, 2.70% Impervious, Inflow Depth = 3.65" for 25-Yr event
Inflow = 35.70 cfs @ 12.80 hrs, Volume= 278,070 cf
Outflow = 18.37 cfs @ 13.45 hrs, Volume= 278,064 cf, Atten= 49%, Lag= 39.0 min
Primary = 18.37 cfs @ 13.45 hrs, Volume= 278,064 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 37.67' @ 13.45 hrs Surf.Area= 27,561 sf Storage= 62,087 cf

Plug-Flow detention time= 37.3 min calculated for 278,064 cf (100% of inflow)
Center-of-Mass det. time= 37.3 min (906.4 - 869.1)

Volume	Invert	Avail.Storage	Storage Description
#1	32.88'	71,548 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
32.88	5,285	0	0
34.00	8,520	7,731	7,731
36.00	12,392	20,912	28,643
38.00	30,513	42,905	71,548

Device	Routing	Invert	Outlet Devices
#1	Primary	32.88'	**18.0" Round 18" RCP** L= 93.6' RCP, groove end projecting, Ke= 0.200

Inlet / Outlet Invert= 32.88' / 31.29' S= 0.0170 '/' Cc= 0.900
n= 0.013 Concrete, trowel finish, Flow Area= 1.77 sf

Primary OutFlow Max=18.37 cfs @ 13.45 hrs HW=37.67' (Free Discharge)
└**1=18" RCP** (Barrel Controls 18.37 cfs @ 10.39 fps)

Summary for Pond P3.1: STORMTECH DETENTION / OCS-2

Inflow Area = 41,451 sf, 89.14% Impervious, Inflow Depth = 5.73" for 25-Yr event
Inflow = 5.92 cfs @ 12.07 hrs, Volume= 19,781 cf
Outflow = 2.30 cfs @ 12.27 hrs, Volume= 19,781 cf, Atten= 61%, Lag= 12.2 min
Primary = 2.30 cfs @ 12.27 hrs, Volume= 19,781 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 31.08' @ 12.27 hrs Surf.Area= 3,328 sf Storage= 7,136 cf
Flood Elev= 31.21' Surf.Area= 3,328 sf Storage= 7,258 cf

Plug-Flow detention time= 129.2 min calculated for 19,781 cf (100% of inflow)
Center-of-Mass det. time= 129.2 min (885.7 - 756.6)

Volume	Invert	Avail.Storage	Storage Description
#1	27.67'	2,926 cf	**34.70'W x 95.90'L x 3.50'H Prismatoid** 11,647 cf Overall - 4,331 cf Embedded = 7,316 cf x 40.0% Voids
#2	28.17'	4,331 cf	**ADS_StormTech SC-740 @ 95.90' L** x 7 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 95.90'L = 618.8 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
		7,258 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	25.15'	**24.0" Round 24" SD** L= 15.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 25.15' / 25.00' S= 0.0100 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 3.14 sf
#2	Device 1	25.15'	**2.0" Vert. 2" Orifice** C= 0.600
#3	Device 1	29.12'	**4.0" Vert. 4" Orifice** C= 0.600
#4	Device 1	30.90'	**6.0' long Sharp-Crested Vee/Trap Weir** Cv= 2.62 (C= 3.28)

Primary OutFlow Max=2.30 cfs @ 12.27 hrs HW=31.08' (Free Discharge)
└**1=24" SD** (Passes 2.30 cfs of 26.51 cfs potential flow)
├**2=2" Orifice** (Orifice Controls 0.25 cfs @ 11.64 fps)
├**3=4" Orifice** (Orifice Controls 0.56 cfs @ 6.44 fps)
└**4=Sharp-Crested Vee/Trap Weir** (Weir Controls 1.48 cfs @ 1.38 fps)

Summary for Pond P4.1: STORMTECH DETENTION / OCS-1

Inflow Area = 36,714 sf, 95.49% Impervious, Inflow Depth = 5.84" for 25-Yr event
Inflow = 5.28 cfs @ 12.07 hrs, Volume= 17,879 cf
Outflow = 3.99 cfs @ 12.13 hrs, Volume= 17,880 cf, Atten= 24%, Lag= 3.8 min
Primary = 3.99 cfs @ 12.13 hrs, Volume= 17,880 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 4

Peak Elev= 33.95' @ 12.13 hrs Surf.Area= 1,702 sf Storage= 2,637 cf
Flood Elev= 34.78' Surf.Area= 1,702 sf Storage= 3,388 cf

Plug-Flow detention time= 9.3 min calculated for 17,876 cf (100% of inflow)
Center-of-Mass det. time= 9.3 min (759.9 - 750.6)

Volume	Invert	Avail.Storage	Storage Description
#1	31.72'	1,513 cf	**25.25'W x 67.40'L x 3.50'H Prismatoid** 5,956 cf Overall - 2,174 cf Embedded = 3,782 cf x 40.0% Voids
#2	32.22'	2,174 cf	**ADS_StormTech SC-740 @ 67.40' L** x 5 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 67.40'L = 434.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
		3,687 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	28.76'	**24.0" Round 24" SD** L= 268.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 28.76' / 22.00' S= 0.0252 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 3.14 sf
#2	Device 1	28.76'	**4.0" Vert. 4" Orifice** C= 0.600
#3	Device 1	32.90'	**6.0" Vert. 6" Orifice** C= 0.600
#4	Device 1	33.65'	**4.0' long x 2.00' rise Sharp-Crested Vee/Trap Weir** Cv= 2.62 (C= 3.28)

Primary OutFlow Max=3.98 cfs @ 12.13 hrs HW=33.95' (Free Discharge)
↑**1=24" SD** (Passes 3.98 cfs of 24.45 cfs potential flow)
↑**2=4" Orifice** (Orifice Controls 0.94 cfs @ 10.80 fps)
3=6" Orifice (Orifice Controls 0.85 cfs @ 4.32 fps)
4=Sharp-Crested Vee/Trap Weir (Weir Controls 2.19 cfs @ 1.80 fps)

Summary for Pond W: WETLAND

Inflow Area = 917,965 sf, 33.62% Impervious, Inflow Depth = 3.48" for 25-Yr event
Inflow = 42.30 cfs @ 12.50 hrs, Volume= 266,221 cf
Outflow = 41.85 cfs @ 12.57 hrs, Volume= 266,221 cf, Atten= 1%, Lag= 3.7 min
Primary = 41.85 cfs @ 12.57 hrs, Volume= 266,221 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 8
Peak Elev= 24.68' @ 12.57 hrs Surf.Area= 14,582 sf Storage= 5,150 cf

Plug-Flow detention time= 1.1 min calculated for 266,166 cf (100% of inflow)
Center-of-Mass det. time= 1.1 min (854.6 - 853.4)

Volume	Invert	Avail.Storage	Storage Description
#1	23.90'	42,267 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
23.90	0	0	0
24.00	412	21	21
26.00	41,834	42,246	42,267

Device	Routing	Invert	Outlet Devices
#1	Primary	23.90'	**152.0 deg x 17.0' long Sharp-Crested Vee/Trap Weir** Cv= 2.47 (C= 3.09)

Primary OutFlow Max=41.84 cfs @ 12.57 hrs HW=24.68' (Free Discharge)
1=Sharp-Crested Vee/Trap Weir (Weir Controls 41.84 cfs @ 2.65 fps)

Summary for Link AP1: AP 1

Inflow Area = 1,136,863 sf, 36.86% Impervious, Inflow Depth = 3.78" for 25-Yr event
Inflow = 48.21 cfs @ 12.56 hrs, Volume= 358,096 cf
Primary = 48.21 cfs @ 12.56 hrs, Volume= 358,096 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Summary for Link AP2: AP 2

Inflow Area = 4,699,294 sf, 15.21% Impervious, Inflow Depth = 3.56" for 25-Yr event
Inflow = 99.79 cfs @ 13.01 hrs, Volume= 1,395,789 cf
Primary = 99.79 cfs @ 13.01 hrs, Volume= 1,395,789 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment OS1: OFFSITE SUB 1 Runoff Area=1,467,784 sf 3.67% Impervious Runoff Depth=3.87"
Flow Length=1,645' Tc=29.1 min CN=70 Runoff=87.48 cfs 473,256 cf

Subcatchment OS2: OFFSITE SUB 2 Runoff Area=913,125 sf 2.70% Impervious Runoff Depth=4.64"
Flow Length=1,654' Tc=58.8 min CN=77 Runoff=45.22 cfs 352,800 cf

Subcatchment S3: SUB 3 Runoff Area=836,116 sf 36.42% Impervious Runoff Depth=4.41"
Flow Length=828' Tc=39.2 min CN=75 Runoff=49.36 cfs 307,609 cf

Subcatchment S3.1: SUB 3.1 Runoff Area=41,451 sf 89.14% Impervious Runoff Depth=6.82"
Flow Length=160' Slope=0.0100 '/' Tc=5.0 min CN=96 Runoff=7.00 cfs 23,567 cf

Subcatchment S3.2: SUB 3.2 Runoff Area=8,722 sf 9.15% Impervious Runoff Depth=5.08"
Flow Length=163' Slope=0.0220 '/' Tc=5.0 min CN=81 Runoff=1.22 cfs 3,696 cf

Subcatchment S3.3: SUB 3.3 Runoff Area=1,672 sf 27.51% Impervious Runoff Depth=4.75"
Tc=5.0 min CN=78 Runoff=0.22 cfs 662 cf

Subcatchment S4: SUB 4 Runoff Area=1,012,128 sf 16.94% Impervious Runoff Depth=4.97"
Flow Length=1,599' Tc=46.2 min CN=80 Runoff=61.36 cfs 419,362 cf

Subcatchment S4.1: SUB 4.1 Runoff Area=36,714 sf 95.49% Impervious Runoff Depth=6.94"
Flow Length=281' Slope=0.0100 '/' Tc=5.0 min CN=97 Runoff=6.23 cfs 21,238 cf

Subcatchment S6: SUB 6 Runoff Area=132,680 sf 8.16% Impervious Runoff Depth=5.08"
Flow Length=616' Tc=13.5 min CN=81 Runoff=14.13 cfs 56,221 cf

Subcatchment S7: SUB 3 Runoff Area=167,053 sf 43.24% Impervious Runoff Depth=6.00"
Flow Length=1,081' Tc=10.0 min CN=89 Runoff=22.41 cfs 83,543 cf

Subcatchment S8: SUB 8 Runoff Area=81,849 sf 5.04% Impervious Runoff Depth=4.75"
Flow Length=399' Tc=21.1 min CN=78 Runoff=6.87 cfs 32,384 cf

Reach R1: REACH 1 Avg. Flow Depth=0.28' Max Vel=1.63 fps Inflow=15.78 cfs 473,246 cf
n=0.030 L=386.0' S=0.0104 '/' Capacity=256.49 cfs Outflow=15.78 cfs 473,244 cf

Reach R2: REACH 2 Avg. Flow Depth=0.40' Max Vel=2.07 fps Inflow=45.49 cfs 352,800 cf
n=0.030 L=527.0' S=0.0100 '/' Capacity=252.44 cfs Outflow=35.27 cfs 352,800 cf

Reach R3: REACH 3 Avg. Flow Depth=1.15' Max Vel=5.26 fps Inflow=50.95 cfs 826,044 cf
n=0.030 L=874.0' S=0.0138 '/' Capacity=141.56 cfs Outflow=50.29 cfs 826,043 cf

Reach R3.1: REACH 3.1 Avg. Flow Depth=0.10' Max Vel=0.94 fps Inflow=6.73 cfs 27,763 cf
n=0.025 L=179.0' S=0.0056 '/' Capacity=833.80 cfs Outflow=4.81 cfs 27,763 cf

Reach R3.2: REACH 3.2 Avg. Flow Depth=0.03' Max Vel=0.91 fps Inflow=1.44 cfs 4,357 cf
n=0.025 L=91.3' S=0.0219 '/' Capacity=1,651.08 cfs Outflow=1.40 cfs 4,357 cf

Reach R4: REACH 4 Avg. Flow Depth=1.22' Max Vel=6.02 fps Inflow=61.80 cfs 451,402 cf
n=0.030 L=144.0' S=0.0171 '/' Capacity=157.25 cfs Outflow=61.80 cfs 451,402 cf

Reach R4.1: REACH 4.1 Avg. Flow Depth=0.18' Max Vel=1.77 fps Inflow=5.53 cfs 21,238 cf
n=0.030 L=552.0' S=0.0145 '/' Capacity=390.71 cfs Outflow=4.29 cfs 21,238 cf

Reach R5: REACH 5 Avg. Flow Depth=2.01' Max Vel=8.19 fps Inflow=148.19 cfs 1,718,045 cf
n=0.025 L=317.0' S=0.0134 '/' Capacity=147.04 cfs Outflow=148.18 cfs 1,718,045 cf

Reach R6: REACH 6 Avg. Flow Depth=0.49' Max Vel=6.37 fps Inflow=55.52 cfs 367,756 cf
n=0.025 L=133.0' S=0.0328 '/' Capacity=623.19 cfs Outflow=55.51 cfs 367,756 cf

Pond AP3: 4 - 24"CMP Peak Elev=17.32' Storage=96,037 cf Inflow=152.41 cfs 1,774,265 cf
Primary=116.94 cfs 1,760,487 cf Secondary=38.95 cfs 23,892 cf Outflow=155.89 cfs 1,784,380 cf

Pond C3: CULV-3 Peak Elev=33.51' Inflow=15.78 cfs 473,246 cf
24.0" Round Culvert n=0.013 L=169.0' S=0.0095 '/' Outflow=15.78 cfs 473,246 cf

Pond C4: CULV-4 Peak Elev=30.18' Inflow=61.80 cfs 451,402 cf
24.0" Round Culvert n=0.011 L=86.0' S=0.0050 '/' Outflow=61.80 cfs 451,402 cf

Pond C7: CULV-7 Peak Elev=23.51' Storage=9,728 cf Inflow=55.51 cfs 367,756 cf
Primary=33.07 cfs 335,031 cf Secondary=22.56 cfs 32,828 cf Outflow=55.63 cfs 367,860 cf

Pond CB5: CB-5 Peak Elev=979.45' Inflow=0.22 cfs 662 cf
1.0" Round Culvert n=0.010 L=70.0' S=0.0050 '/' Outflow=0.22 cfs 662 cf

Pond CB6: CB-6 Peak Elev=28.55' Inflow=1.44 cfs 4,357 cf
12.0" Round Culvert n=0.013 L=184.0' S=0.0050 '/' Outflow=1.44 cfs 4,357 cf

Pond DMH-1: DMH-1 Peak Elev=33.80' Inflow=6.23 cfs 21,238 cf
24.0" Round Culvert n=0.010 L=30.0' S=0.0077 '/' Outflow=6.23 cfs 21,238 cf

Pond DMH-6: DMH-6 Peak Elev=31.30' Inflow=7.00 cfs 23,567 cf
24.0" Round Culvert n=0.010 L=6.0' S=0.2050 '/' Outflow=7.00 cfs 23,567 cf

Pond OC1: OFFSITE CULV-1 Peak Elev=37.48' Storage=202,628 cf Inflow=87.48 cfs 473,256 cf
18.0" Round Culvert n=0.013 L=97.6' S=0.0201 '/' Outflow=15.78 cfs 473,246 cf

Pond OC2: OFFSITE CULV-2 Peak Elev=62.75' Storage=71,548 cf Inflow=45.22 cfs 352,800 cf
18.0" Round Culvert n=0.013 L=93.6' S=0.0170 '/' Outflow=45.49 cfs 352,800 cf

Pond P3.1: STORMTECH DETENTION / Peak Elev=31.27' Storage=7,258 cf Inflow=7.00 cfs 23,567 cf
Outflow=5.33 cfs 23,406 cf

Pond P4.1: STORMTECH DETENTION / Peak Elev=34.08' Storage=2,775 cf Inflow=6.23 cfs 21,238 cf
Outflow=5.53 cfs 21,238 cf

Pond W: WETLAND Peak Elev=24.81' Storage=7,143 cf Inflow=54.03 cfs 339,993 cf
Outflow=53.36 cfs 339,993 cf

Link AP1: AP 1 Inflow=61.80 cfs 451,402 cf
Primary=61.80 cfs 451,402 cf

Link AP2: AP 2 Inflow=155.89 cfs 1,784,380 cf
Primary=155.89 cfs 1,784,380 cf

Total Runoff Area = 4,699,294 sf Runoff Volume = 1,774,337 cf Average Runoff Depth = 4.53"
84.79% Pervious = 3,984,423 sf 15.21% Impervious = 714,871 sf

Summary for Subcatchment OS1: OFFSITE SUB 1

Runoff = 87.48 cfs @ 12.41 hrs, Volume= 473,256 cf, Depth= 3.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-Yr Rainfall=7.30"

Area (sf)	CN	Description
53,844	98	Paved parking & roofs
32,748	49	50-75% Grass cover, Fair, HSG A
12,803	79	50-75% Grass cover, Fair, HSG C
12,554	84	50-75% Grass cover, Fair, HSG D
205,440	30	Woods, Good, HSG A
228,765	70	Woods, Good, HSG C
921,630	77	Woods, Good, HSG D
1,467,784	70	Weighted Average
1,413,940		96.33% Pervious Area
53,844		3.67% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.6	100	0.0430	0.25		**Sheet Flow, A - B** Range n= 0.130 P2= 3.00"
0.8	75	0.0510	1.58		**Shallow Concentrated Flow, B -C** Short Grass Pasture Kv= 7.0 fps
20.3	923	0.0230	0.76		**Shallow Concentrated Flow, C - D** Woodland Kv= 5.0 fps
1.4	547	0.0180	6.31	157.83	**Channel Flow, D - E** Area= 25.0 sf Perim= 27.0' r= 0.93' n= 0.030 Earth, grassed & winding
29.1	1,645	Total			

Summary for Subcatchment OS2: OFFSITE SUB 2

Runoff = 45.22 cfs @ 12.80 hrs, Volume= 352,800 cf, Depth= 4.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-Yr Rainfall=7.30"

Area (sf)	CN	Description
24,623	98	Paved parking & roofs
8,226	79	50-75% Grass cover, Fair, HSG C
13,667	84	50-75% Grass cover, Fair, HSG D
151,095	70	Woods, Good, HSG C
715,514	77	Woods, Good, HSG D
913,125	77	Weighted Average
888,502		97.30% Pervious Area
24,623		2.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.0	100	0.0530	0.11		**Sheet Flow, A - B** Woods: Light underbrush n= 0.400 P2= 3.00"
43.8	1,554	0.0140	0.59		**Shallow Concentrated Flow, B - C** Woodland Kv= 5.0 fps
58.8	1,654	Total			

Summary for Subcatchment S3: SUB 3

Runoff = 49.36 cfs @ 12.54 hrs, Volume= 307,609 cf, Depth= 4.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-Yr Rainfall=7.30"

Area (sf)	CN	Description
304,505	98	Paved parking & roofs
45,477	49	50-75% Grass cover, Fair, HSG A
10,125	79	50-75% Grass cover, Fair, HSG C
78,239	84	50-75% Grass cover, Fair, HSG D
142,893	30	Woods, Good, HSG A
81,209	70	Woods, Good, HSG C
173,668	77	Woods, Good, HSG D
836,116	75	Weighted Average
531,611		63.58% Pervious Area
304,505		36.42% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.4	150	0.0950	0.15		**Sheet Flow, A - B** Woods: Light underbrush n= 0.400 P2= 3.00"
1.5	143	0.1000	1.58		**Shallow Concentrated Flow, B - C** Woodland Kv= 5.0 fps
21.3	535	0.0070	0.42		**Shallow Concentrated Flow, C -D** Woodland Kv= 5.0 fps
39.2	828	Total			

Summary for Subcatchment S3.1: SUB 3.1

Runoff = 7.00 cfs @ 12.07 hrs, Volume= 23,567 cf, Depth= 6.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-Yr Rainfall=7.30"

Area (sf)	CN	Description
36,951	98	Paved parking & roofs
3,700	79	50-75% Grass cover, Fair, HSG C
800	84	50-75% Grass cover, Fair, HSG D
41,451	96	Weighted Average
4,500		10.86% Pervious Area
36,951		89.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.4	160	0.0100	1.11		**Sheet Flow, A - B**
					Smooth surfaces n= 0.011 P2= 3.00"
2.6					**Direct Entry, Min Tc**
5.0	160	Total			

Summary for Subcatchment S3.2: SUB 3.2

Runoff = 1.22 cfs @ 12.07 hrs, Volume= 3,696 cf, Depth= 5.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-Yr Rainfall=7.30"

Area (sf)	CN	Description
798	98	Paved parking & roofs
7,924	79	50-75% Grass cover, Fair, HSG C
8,722	81	Weighted Average
7,924		90.85% Pervious Area
798		9.15% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.6	163	0.0220	1.04		**Shallow Concentrated Flow, A - B**
					Short Grass Pasture Kv= 7.0 fps
2.4					**Direct Entry,**
5.0	163	Total			

Summary for Subcatchment S3.3: SUB 3.3

Runoff = 0.22 cfs @ 12.07 hrs, Volume= 662 cf, Depth= 4.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-Yr Rainfall=7.30"

Area (sf)	CN	Description
460	98	Paved parking & roofs
1,212	70	Woods, Good, HSG C
1,672	78	Weighted Average
1,212		72.49% Pervious Area
460		27.51% Impervious Area

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

Summary for Subcatchment S4: SUB 4

Runoff = 61.36 cfs @ 12.63 hrs, Volume= 419,362 cf, Depth= 4.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-Yr Rainfall=7.30"

Area (sf)	CN	Description
171,450	98	Paved parking & roofs
20,781	79	50-75% Grass cover, Fair, HSG C
7,642	84	50-75% Grass cover, Fair, HSG D
419,188	73	Woods, Fair, HSG C
393,067	79	Woods, Fair, HSG D
1,012,128	80	Weighted Average
840,678		83.06% Pervious Area
171,450		16.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
29.3	100	0.0100	0.06		**Sheet Flow, A - B** Woods: Light underbrush n= 0.400 P2= 3.00"
3.9	284	0.0600	1.22		**Shallow Concentrated Flow, B - C** Woodland Kv= 5.0 fps
10.4	341	0.0120	0.55		**Shallow Concentrated Flow, C - D** Woodland Kv= 5.0 fps
2.6	874	0.0140	5.64	281.88	**Channel Flow, D - E** Area= 50.0 sf Perim= 53.0' r= 0.94' n= 0.030 Earth, grassed & winding
46.2	1,599	Total			

Summary for Subcatchment S4.1: SUB 4.1

Runoff = 6.23 cfs @ 12.07 hrs, Volume= 21,238 cf, Depth= 6.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-Yr Rainfall=7.30"

Area (sf)	CN	Description
35,058	98	Paved parking & roofs
1,656	74	>75% Grass cover, Good, HSG C
36,714	97	Weighted Average
1,656		4.51% Pervious Area
35,058		95.49% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.9	200	0.0100	1.16		**Sheet Flow, A - B** Smooth surfaces n= 0.011 P2= 3.00"
0.7	81	0.0100	2.03		**Shallow Concentrated Flow, B - C** Paved Kv= 20.3 fps
1.4					**Direct Entry, Min Tc**
5.0	281	Total			

Summary for Subcatchment S6: SUB 6

Runoff = 14.13 cfs @ 12.18 hrs, Volume= 56,221 cf, Depth= 5.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-Yr Rainfall=7.30"

Area (sf)	CN	Description
10,824	98	Paved parking & roofs
19,401	79	50-75% Grass cover, Fair, HSG C
64,092	84	50-75% Grass cover, Fair, HSG D
32,603	70	Woods, Good, HSG C
5,760	77	Woods, Good, HSG D
132,680	81	Weighted Average
121,856		91.84% Pervious Area
10,824		8.16% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.0	40	0.0410	0.08		**Sheet Flow, A - B** Woods: Light underbrush n= 0.400 P2= 3.00"
0.7	71	0.1120	1.67		**Shallow Concentrated Flow, B - C** Woodland Kv= 5.0 fps
4.5	265	0.0380	0.97		**Shallow Concentrated Flow, B - C** Woodland Kv= 5.0 fps
0.3	240	0.0250	11.44	686.23	**Channel Flow, C - D** Area= 60.0 sf Perim= 34.0' r= 1.76' n= 0.030 Earth, grassed & winding
13.5	616	Total			

Summary for Subcatchment S7: SUB 3

Runoff = 22.41 cfs @ 12.14 hrs, Volume= 83,543 cf, Depth= 6.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-Yr Rainfall=7.30"

Area (sf)	CN	Description
72,236	98	Paved parking & roofs
66,092	84	50-75% Grass cover, Fair, HSG D
5,176	73	Woods, Fair, HSG C
23,549	79	Woods, Fair, HSG D
167,053	89	Weighted Average
94,817		56.76% Pervious Area
72,236		43.24% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.8	58	0.0430	0.20		**Sheet Flow, A - B** Grass: Short n= 0.150 P2= 3.00"
1.1	136	0.0840	2.03		**Shallow Concentrated Flow, B - C** Short Grass Pasture Kv= 7.0 fps
2.8	424	0.0150	2.49		**Shallow Concentrated Flow, C - D** Paved Kv= 20.3 fps
0.1	39	0.0450	9.55	3.33	**Pipe Channel, D - E** 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.010 PVC, smooth interior
0.3	185	0.0380	11.66	116.60	**Channel Flow, E - F** Area= 10.0 sf Perim= 12.0' r= 0.83' n= 0.022 Earth, clean & straight
0.5	137	0.0168	4.82	0.95	**Pipe Channel, F - G** 6.0" Round Area= 0.2 sf Perim= 1.6' r= 0.13' n= 0.010 PVC, smooth interior
0.4	102	0.0042	4.67	14.66	**Pipe Channel, G - H** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.013 Concrete pipe, bends & connections
10.0	1,081	Total			

Summary for Subcatchment S8: SUB 8

Runoff = 6.87 cfs @ 12.29 hrs, Volume= 32,384 cf, Depth= 4.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-Yr Rainfall=7.30"

Area (sf)	CN	Description
4,122	98	Paved parking & roofs
439	79	50-75% Grass cover, Fair, HSG C
34,658	74	>75% Grass cover, Good, HSG C
4,166	73	Woods, Fair, HSG C
38,464	79	Woods, Fair, HSG D
81,849	78	Weighted Average
77,727		94.96% Pervious Area
4,122		5.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.8	120	0.0500	0.11		**Sheet Flow, A - B** Woods: Light underbrush n= 0.400 P2= 3.00"
1.4	138	0.1100	1.66		**Shallow Concentrated Flow, B - C** Woodland Kv= 5.0 fps
1.9	141	0.0320	1.25		**Shallow Concentrated Flow, C - D** Short Grass Pasture Kv= 7.0 fps
21.1	399	Total			

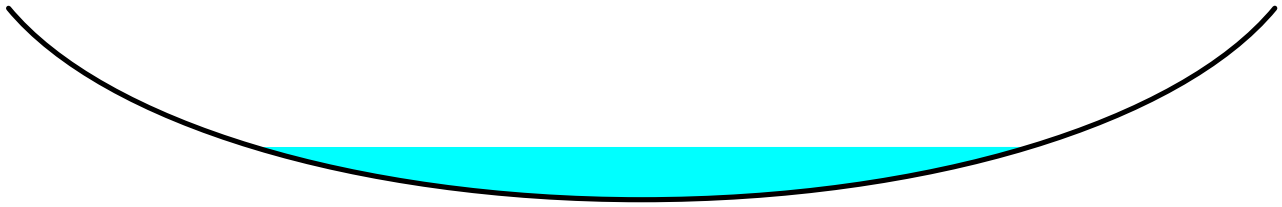
Summary for Reach R1: REACH 1

Inflow Area = 1,467,784 sf, 3.67% Impervious, Inflow Depth = 3.87" for 50-Yr event
Inflow = 15.78 cfs @ 13.45 hrs, Volume= 473,246 cf
Outflow = 15.78 cfs @ 13.57 hrs, Volume= 473,244 cf, Atten= 0%, Lag= 7.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.63 fps, Min. Travel Time= 3.9 min
Avg. Velocity = 0.64 fps, Avg. Travel Time= 10.1 min

Peak Storage= 3,732 cf @ 13.50 hrs
Average Depth at Peak Storage= 0.28'
Bank-Full Depth= 1.00' Flow Area= 66.7 sf, Capacity= 256.49 cfs

100.00' x 1.00' deep Parabolic Channel, n= 0.030 Earth, grassed & winding
Length= 386.0' Slope= 0.0104 '/'
Inlet Invert= 30.00', Outlet Invert= 26.00'



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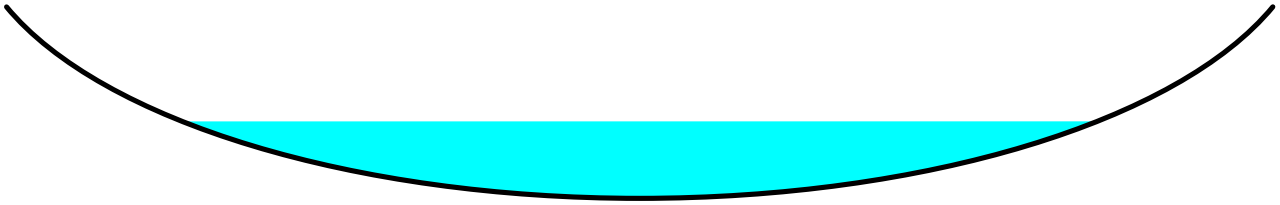
Summary for Reach R2: REACH 2

Inflow Area = 913,125 sf, 2.70% Impervious, Inflow Depth = 4.64" for 50-Yr event
Inflow = 45.49 cfs @ 13.02 hrs, Volume= 352,800 cf
Outflow = 35.27 cfs @ 13.20 hrs, Volume= 352,800 cf, Atten= 22%, Lag= 10.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.07 fps, Min. Travel Time= 4.2 min
Avg. Velocity = 0.66 fps, Avg. Travel Time= 13.3 min

Peak Storage= 8,993 cf @ 13.13 hrs
Average Depth at Peak Storage= 0.40'
Bank-Full Depth= 1.00' Flow Area= 66.7 sf, Capacity= 252.44 cfs

100.00' x 1.00' deep Parabolic Channel, n= 0.030 Earth, grassed & winding
Length= 527.0' Slope= 0.0100 '/'
Inlet Invert= 31.29', Outlet Invert= 26.00'



‡

Summary for Reach R3: REACH 3

Inflow Area = 2,380,909 sf, 3.30% Impervious, Inflow Depth = 4.16" for 50-Yr event
Inflow = 50.95 cfs @ 13.20 hrs, Volume= 826,044 cf
Outflow = 50.29 cfs @ 13.29 hrs, Volume= 826,043 cf, Atten= 1%, Lag= 5.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 5.26 fps, Min. Travel Time= 2.8 min
Avg. Velocity = 1.58 fps, Avg. Travel Time= 9.2 min

Peak Storage= 8,357 cf @ 13.24 hrs
Average Depth at Peak Storage= 1.15'
Bank-Full Depth= 2.00' Flow Area= 20.0 sf, Capacity= 141.56 cfs

6.00' x 2.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 2.0 '/' Top Width= 14.00'
Length= 874.0' Slope= 0.0138 '/'
Inlet Invert= 26.00', Outlet Invert= 13.90'



Summary for Reach R3.1: REACH 3.1

Inflow Area = 51,845 sf, 73.70% Impervious, Inflow Depth = 6.43" for 50-Yr event
Inflow = 6.73 cfs @ 12.12 hrs, Volume= 27,763 cf
Outflow = 4.81 cfs @ 12.22 hrs, Volume= 27,763 cf, Atten= 29%, Lag= 6.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.94 fps, Min. Travel Time= 3.2 min
Avg. Velocity = 0.36 fps, Avg. Travel Time= 8.4 min

Peak Storage= 912 cf @ 12.17 hrs
Average Depth at Peak Storage= 0.10'
Bank-Full Depth= 2.00' Flow Area= 140.0 sf, Capacity= 833.80 cfs

50.00' x 2.00' deep channel, n= 0.025 Earth, clean & winding
Side Slope Z-value= 10.0 '/' Top Width= 90.00'
Length= 179.0' Slope= 0.0056 '/'
Inlet Invert= 24.90', Outlet Invert= 23.90'



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Summary for Reach R3.2: REACH 3.2

Inflow Area = 10,394 sf, 12.10% Impervious, Inflow Depth = 5.03" for 50-Yr event
Inflow = 1.44 cfs @ 12.07 hrs, Volume= 4,357 cf
Outflow = 1.40 cfs @ 12.12 hrs, Volume= 4,357 cf, Atten= 3%, Lag= 2.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.91 fps, Min. Travel Time= 1.7 min
Avg. Velocity = 0.65 fps, Avg. Travel Time= 2.3 min

Peak Storage= 141 cf @ 12.09 hrs
Average Depth at Peak Storage= 0.03'
Bank-Full Depth= 2.00' Flow Area= 140.0 sf, Capacity= 1,651.08 cfs

50.00' x 2.00' deep channel, n= 0.025 Earth, clean & winding
Side Slope Z-value= 10.0 '/' Top Width= 90.00'
Length= 91.3' Slope= 0.0219 '/'
Inlet Invert= 26.90', Outlet Invert= 24.90'



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Summary for Reach R4: REACH 4

Inflow Area = 1,136,863 sf, 36.86% Impervious, Inflow Depth = 4.76" for 50-Yr event
Inflow = 61.80 cfs @ 12.51 hrs, Volume= 451,402 cf
Outflow = 61.80 cfs @ 12.52 hrs, Volume= 451,402 cf, Atten= 0%, Lag= 0.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 6.02 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 1.92 fps, Avg. Travel Time= 1.3 min

Peak Storage= 1,478 cf @ 12.51 hrs
Average Depth at Peak Storage= 1.22'
Bank-Full Depth= 2.00' Flow Area= 20.0 sf, Capacity= 157.25 cfs

6.00' x 2.00' deep channel, n= 0.030 Stream, clean & straight
Side Slope Z-value= 2.0 '/' Top Width= 14.00'
Length= 144.0' Slope= 0.0171 '/'
Inlet Invert= 16.36', Outlet Invert= 13.90'



Summary for Reach R4.1: REACH 4.1

Inflow Area = 36,714 sf, 95.49% Impervious, Inflow Depth = 6.94" for 50-Yr event
Inflow = 5.53 cfs @ 12.11 hrs, Volume= 21,238 cf
Outflow = 4.29 cfs @ 12.26 hrs, Volume= 21,238 cf, Atten= 23%, Lag= 8.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.77 fps, Min. Travel Time= 5.2 min
Avg. Velocity = 0.55 fps, Avg. Travel Time= 16.7 min

Peak Storage= 1,335 cf @ 12.17 hrs
Average Depth at Peak Storage= 0.18'
Bank-Full Depth= 2.00' Flow Area= 56.0 sf, Capacity= 390.71 cfs

12.00' x 2.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 8.0 '/' Top Width= 44.00'
Length= 552.0' Slope= 0.0145 '/'
Inlet Invert= 22.00', Outlet Invert= 14.00'



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Summary for Reach R5: REACH 5

Inflow Area = 4,566,614 sf, 15.42% Impervious, Inflow Depth = 4.51" for 50-Yr event
Inflow = 148.19 cfs @ 12.60 hrs, Volume= 1,718,045 cf
Outflow = 148.18 cfs @ 12.62 hrs, Volume= 1,718,045 cf, Atten= 0%, Lag= 1.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 8.19 fps, Min. Travel Time= 0.6 min
Avg. Velocity = 2.08 fps, Avg. Travel Time= 2.5 min

Peak Storage= 5,738 cf @ 12.61 hrs
Average Depth at Peak Storage= 2.01'
Bank-Full Depth= 2.00' Flow Area= 18.0 sf, Capacity= 147.04 cfs

5.00' x 2.00' deep channel, n= 0.025 Earth, clean & straight
Side Slope Z-value= 2.0 '/' Top Width= 13.00'
Length= 317.0' Slope= 0.0134 '/'
Inlet Invert= 13.90', Outlet Invert= 9.64'



Summary for Reach R6: REACH 6

Inflow Area = 969,810 sf, 35.76% Impervious, Inflow Depth = 4.55" for 50-Yr event
Inflow = 55.52 cfs @ 12.55 hrs, Volume= 367,756 cf
Outflow = 55.51 cfs @ 12.56 hrs, Volume= 367,756 cf, Atten= 0%, Lag= 0.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 6.37 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 1.78 fps, Avg. Travel Time= 1.2 min

Peak Storage= 1,160 cf @ 12.55 hrs
Average Depth at Peak Storage= 0.49'
Bank-Full Depth= 2.00' Flow Area= 42.0 sf, Capacity= 623.19 cfs

17.00' x 2.00' deep channel, n= 0.025 Earth, clean & winding
Side Slope Z-value= 2.0 '/' Top Width= 25.00'
Length= 133.0' Slope= 0.0328 '/'
Inlet Invert= 23.90', Outlet Invert= 19.54'



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Summary for Pond AP3: 4 - 24"CMP

Inflow Area = 4,699,294 sf, 15.21% Impervious, Inflow Depth = 4.53" for 50-Yr event
Inflow = 152.41 cfs @ 12.60 hrs, Volume= 1,774,265 cf
Outflow = 155.89 cfs @ 12.76 hrs, Volume= 1,784,380 cf, Atten= 0%, Lag= 9.6 min
Primary = 116.94 cfs @ 12.76 hrs, Volume= 1,760,487 cf
Secondary = 38.95 cfs @ 12.76 hrs, Volume= 23,892 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 6

Peak Elev= 17.32' @ 12.76 hrs Surf.Area= 44,026 sf Storage= 96,037 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 4.9 min (906.7 - 901.8)

Volume	Invert	Avail.Storage	Storage Description
#1	9.64'	96,037 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
9.64	0	0	0
10.00	856	154	154
12.00	4,037	4,893	5,047
14.00	13,588	17,625	22,672
16.00	39,016	52,604	75,276
16.50	44,026	20,761	96,037

Device	Routing	Invert	Outlet Devices
#1	Primary	9.77'	**24.0" Round Proposed 3 - 24" CMP X 3.00** L= 65.0' CMP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 9.77' / 9.12' S= 0.0100 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 3.14 sf
#2	Primary	9.83'	**24.0" Round Existing 24"CMP** L= 64.0' CMP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 9.77' / 9.83' S= -0.0009 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 3.14 sf
#3	Secondary	16.50'	**20.0' long x 25.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=116.94 cfs @ 12.76 hrs HW=17.32' (Free Discharge)
└**1=Proposed 3 - 24" CMP** (Barrel Controls 88.79 cfs @ 9.42 fps)
└**2=Existing 24"CMP** (Barrel Controls 28.15 cfs @ 8.96 fps)

Secondary OutFlow Max=38.92 cfs @ 12.76 hrs HW=17.32' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Weir Controls 38.92 cfs @ 2.38 fps)

Summary for Pond C3: CULV-3

Inflow Area = 1,467,784 sf, 3.67% Impervious, Inflow Depth = 3.87" for 50-Yr event
Inflow = 15.78 cfs @ 13.45 hrs, Volume= 473,246 cf
Outflow = 15.78 cfs @ 13.45 hrs, Volume= 473,246 cf, Atten= 0%, Lag= 0.0 min
Primary = 15.78 cfs @ 13.45 hrs, Volume= 473,246 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 33.51' @ 13.45 hrs
Flood Elev= 39.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	31.60'	**24.0" Round Culvert** L= 169.0' RCP, groove end projecting, Ke= 0.200

Inlet / Outlet Invert= 31.60' / 30.00' S= 0.0095 '/' Cc= 0.900
n= 0.013 Concrete, trowel finish, Flow Area= 3.14 sf

Primary OutFlow Max=15.78 cfs @ 13.45 hrs HW=33.51' TW=31.60' (Fixed TW Elev= 31.60')
↑—**1=Culvert** (Outlet Controls 15.78 cfs @ 6.55 fps)

Summary for Pond C4: CULV-4

Inflow Area = 1,136,863 sf, 36.86% Impervious, Inflow Depth = 4.76" for 50-Yr event
Inflow = 61.80 cfs @ 12.51 hrs, Volume= 451,402 cf
Outflow = 61.80 cfs @ 12.51 hrs, Volume= 451,402 cf, Atten= 0%, Lag= 0.0 min
Primary = 61.80 cfs @ 12.51 hrs, Volume= 451,402 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 30.18' @ 12.51 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	16.79'	**24.0" Round Culvert**
			L= 86.0' RCP, groove end projecting, Ke= 0.200
			Inlet / Outlet Invert= 16.79' / 16.36' S= 0.0050 '/' Cc= 0.900
			n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf

Primary OutFlow Max=61.80 cfs @ 12.51 hrs HW=30.18' (Free Discharge)
↑—**1=Culvert** (Barrel Controls 61.80 cfs @ 19.67 fps)

Summary for Pond C7: CULV-7

Inflow Area = 969,810 sf, 35.76% Impervious, Inflow Depth = 4.55" for 50-Yr event
Inflow = 55.51 cfs @ 12.56 hrs, Volume= 367,756 cf
Outflow = 55.63 cfs @ 12.56 hrs, Volume= 367,860 cf, Atten= 0%, Lag= 0.0 min
Primary = 33.07 cfs @ 12.56 hrs, Volume= 335,031 cf
Secondary = 22.56 cfs @ 12.56 hrs, Volume= 32,828 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 8
Peak Elev= 23.51' @ 12.56 hrs Surf.Area= 7,106 sf Storage= 9,728 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 1.7 min (852.5 - 850.8)

Volume	Invert	Avail.Storage	Storage Description
#1	19.54'	9,728 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
19.54	0	0	0
20.00	144	33	33
21.00	890	517	550
22.00	2,015	1,453	2,003
23.00	6,588	4,302	6,304
23.50	7,106	3,424	9,728

Device	Routing	Invert	Outlet Devices
#1	Primary	19.54'	**24.0" Round 24" RCP** L= 184.0' RCP, rounded edge headwall, Ke= 0.100 Inlet / Outlet Invert= 19.54' / 16.79' S= 0.0149 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf
#2	Secondary	23.40'	**250.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=33.07 cfs @ 12.56 hrs HW=23.51' (Free Discharge)
↑—**1=24" RCP** (Barrel Controls 33.07 cfs @ 10.53 fps)

Secondary OutFlow Max=22.38 cfs @ 12.56 hrs HW=23.51' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 22.38 cfs @ 0.83 fps)

Summary for Pond CB5: CB-5

Inflow Area = 1,672 sf, 27.51% Impervious, Inflow Depth = 4.75" for 50-Yr event
Inflow = 0.22 cfs @ 12.07 hrs, Volume= 662 cf
Outflow = 0.22 cfs @ 12.07 hrs, Volume= 662 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.22 cfs @ 12.07 hrs, Volume= 662 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 979.45' @ 12.07 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	29.50'	**1.0" Round 12" CULV** L= 70.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 29.50' / 29.15' S= 0.0050 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.01 sf

Primary OutFlow Max=0.22 cfs @ 12.07 hrs HW=975.65' (Free Discharge)
↑—**1=12" CULV** (Barrel Controls 0.22 cfs @ 40.26 fps)

Summary for Pond CB6: CB-6

Inflow Area = 10,394 sf, 12.10% Impervious, Inflow Depth = 5.03" for 50-Yr event
Inflow = 1.44 cfs @ 12.07 hrs, Volume= 4,357 cf
Outflow = 1.44 cfs @ 12.07 hrs, Volume= 4,357 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.44 cfs @ 12.07 hrs, Volume= 4,357 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 28.55' @ 12.07 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	27.82'	**12.0" Round 12"SD** L= 184.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 27.82' / 26.90' S= 0.0050 '/' Cc= 0.900 n= 0.013 Concrete, trowel finish, Flow Area= 0.79 sf

Primary OutFlow Max=1.44 cfs @ 12.07 hrs HW=28.55' (Free Discharge)
1=12"SD (Barrel Controls 1.44 cfs @ 3.28 fps)

Summary for Pond DMH-1: DMH-1

Inflow Area = 36,714 sf, 95.49% Impervious, Inflow Depth = 6.94" for 50-Yr event
Inflow = 6.23 cfs @ 12.07 hrs, Volume= 21,238 cf
Outflow = 6.23 cfs @ 12.07 hrs, Volume= 21,238 cf, Atten= 0%, Lag= 0.0 min
Primary = 6.23 cfs @ 12.07 hrs, Volume= 21,238 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 33.80' @ 12.07 hrs
Flood Elev= 36.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	32.58'	**24.0" Round 24" SD to Detention Bed** L= 30.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 32.58' / 32.35' S= 0.0077 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=6.23 cfs @ 12.07 hrs HW=33.80' (Free Discharge)
1=24" SD to Detention Bed (Barrel Controls 6.23 cfs @ 4.45 fps)

Summary for Pond DMH-6: DMH-6

Inflow Area = 41,451 sf, 89.14% Impervious, Inflow Depth = 6.82" for 50-Yr event
Inflow = 7.00 cfs @ 12.07 hrs, Volume= 23,567 cf
Outflow = 7.00 cfs @ 12.07 hrs, Volume= 23,567 cf, Atten= 0%, Lag= 0.0 min
Primary = 7.00 cfs @ 12.07 hrs, Volume= 23,567 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 31.30' @ 12.07 hrs
Flood Elev= 32.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	30.13'	**24.0" Round 24" SD to Detention Bed** L= 6.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 30.13' / 28.90' S= 0.2050 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=7.00 cfs @ 12.07 hrs HW=31.30' (Free Discharge)
1=24" SD to Detention Bed (Inlet Controls 7.00 cfs @ 3.68 fps)

Summary for Pond OC1: OFFSITE CULV-1

Inflow Area = 1,467,784 sf, 3.67% Impervious, Inflow Depth = 3.87" for 50-Yr event
Inflow = 87.48 cfs @ 12.41 hrs, Volume= 473,256 cf
Outflow = 15.78 cfs @ 13.45 hrs, Volume= 473,246 cf, Atten= 82%, Lag= 62.6 min
Primary = 15.78 cfs @ 13.45 hrs, Volume= 473,246 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 37.48' @ 13.45 hrs Surf.Area= 119,215 sf Storage= 202,628 cf

Plug-Flow detention time= 144.2 min calculated for 473,246 cf (100% of inflow)
Center-of-Mass det. time= 144.1 min (994.5 - 850.3)

Volume	Invert	Avail.Storage	Storage Description
#1	34.25'	602,689 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
34.25	5,289	0	0
36.00	67,698	63,864	63,864
38.00	137,090	204,788	268,652
40.00	196,947	334,037	602,689

Device	Routing	Invert	Outlet Devices
#1	Primary	34.25'	**18.0" Round 18" RCP** L= 97.6' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 34.25' / 32.29' S= 0.0201 '/' Cc= 0.900 n= 0.013 Concrete, trowel finish, Flow Area= 1.77 sf

Primary OutFlow Max=15.78 cfs @ 13.45 hrs HW=37.48' (Free Discharge)
↑—**1=18" RCP** (Barrel Controls 15.78 cfs @ 8.93 fps)

Summary for Pond OC2: OFFSITE CULV-2

Inflow Area = 913,125 sf, 2.70% Impervious, Inflow Depth = 4.64" for 50-Yr event
Inflow = 45.22 cfs @ 12.80 hrs, Volume= 352,800 cf
Outflow = 45.49 cfs @ 13.02 hrs, Volume= 352,800 cf, Atten= 0%, Lag= 13.4 min
Primary = 45.49 cfs @ 13.02 hrs, Volume= 352,800 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 62.75' @ 13.02 hrs Surf.Area= 30,513 sf Storage= 71,548 cf

Plug-Flow detention time= 38.2 min calculated for 352,800 cf (100% of inflow)
Center-of-Mass det. time= 38.1 min (900.4 - 862.3)

Volume	Invert	Avail.Storage	Storage Description
#1	32.88'	71,548 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
32.88	5,285	0	0
34.00	8,520	7,731	7,731
36.00	12,392	20,912	28,643
38.00	30,513	42,905	71,548

Device	Routing	Invert	Outlet Devices
#1	Primary	32.88'	**18.0" Round 18" RCP** L= 93.6' RCP, groove end projecting, Ke= 0.200

Inlet / Outlet Invert= 32.88' / 31.29' S= 0.0170 '/' Cc= 0.900
n= 0.013 Concrete, trowel finish, Flow Area= 1.77 sf

Primary OutFlow Max=45.49 cfs @ 13.02 hrs HW=62.75' (Free Discharge)
└**1=18" RCP** (Barrel Controls 45.49 cfs @ 25.74 fps)

Summary for Pond P3.1: STORMTECH DETENTION / OCS-2

Inflow Area = 41,451 sf, 89.14% Impervious, Inflow Depth = 6.82" for 50-Yr event
Inflow = 7.00 cfs @ 12.07 hrs, Volume= 23,567 cf
Outflow = 5.33 cfs @ 12.12 hrs, Volume= 23,406 cf, Atten= 24%, Lag= 3.2 min
Primary = 5.33 cfs @ 12.12 hrs, Volume= 23,406 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 31.27' @ 12.12 hrs Surf.Area= 3,328 sf Storage= 7,258 cf
Flood Elev= 31.21' Surf.Area= 3,328 sf Storage= 7,258 cf

Plug-Flow detention time= 126.3 min calculated for 23,401 cf (99% of inflow)
Center-of-Mass det. time= 121.7 min (874.9 - 753.2)

Volume	Invert	Avail.Storage	Storage Description
#1	27.67'	2,926 cf	**34.70'W x 95.90'L x 3.50'H Prismatoid** 11,647 cf Overall - 4,331 cf Embedded = 7,316 cf x 40.0% Voids
#2	28.17'	4,331 cf	**ADS_StormTech SC-740 @ 95.90' L** x 7 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 95.90'L = 618.8 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
		7,258 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	25.15'	**24.0" Round 24" SD** L= 15.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 25.15' / 25.00' S= 0.0100 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 3.14 sf
#2	Device 1	25.15'	**2.0" Vert. 2" Orifice** C= 0.600
#3	Device 1	29.12'	**4.0" Vert. 4" Orifice** C= 0.600
#4	Device 1	30.90'	**6.0' long Sharp-Crested Vee/Trap Weir** Cv= 2.62 (C= 3.28)

Primary OutFlow Max=5.08 cfs @ 12.12 hrs HW=31.26' (Free Discharge)
└**1=24" SD** (Passes 5.08 cfs of 26.99 cfs potential flow)
├**2=2" Orifice** (Orifice Controls 0.26 cfs @ 11.82 fps)
├**3=4" Orifice** (Orifice Controls 0.59 cfs @ 6.76 fps)
└**4=Sharp-Crested Vee/Trap Weir** (Weir Controls 4.23 cfs @ 1.96 fps)

Summary for Pond P4.1: STORMTECH DETENTION / OCS-1

Inflow Area = 36,714 sf, 95.49% Impervious, Inflow Depth = 6.94" for 50-Yr event
Inflow = 6.23 cfs @ 12.07 hrs, Volume= 21,238 cf
Outflow = 5.53 cfs @ 12.11 hrs, Volume= 21,238 cf, Atten= 11%, Lag= 2.4 min
Primary = 5.53 cfs @ 12.11 hrs, Volume= 21,238 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 4

Peak Elev= 34.08' @ 12.11 hrs Surf.Area= 1,702 sf Storage= 2,775 cf
Flood Elev= 34.78' Surf.Area= 1,702 sf Storage= 3,388 cf

Plug-Flow detention time= 8.9 min calculated for 21,234 cf (100% of inflow)
Center-of-Mass det. time= 8.9 min (756.6 - 747.7)

Volume	Invert	Avail.Storage	Storage Description
#1	31.72'	1,513 cf	**25.25'W x 67.40'L x 3.50'H Prismatoid** 5,956 cf Overall - 2,174 cf Embedded = 3,782 cf x 40.0% Voids
#2	32.22'	2,174 cf	**ADS_StormTech SC-740 @ 67.40' L** x 5 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 67.40'L = 434.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
		3,687 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	28.76'	**24.0" Round 24" SD** L= 268.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 28.76' / 22.00' S= 0.0252 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 3.14 sf
#2	Device 1	28.76'	**4.0" Vert. 4" Orifice** C= 0.600
#3	Device 1	32.90'	**6.0" Vert. 6" Orifice** C= 0.600
#4	Device 1	33.65'	**4.0' long x 2.00' rise Sharp-Crested Vee/Trap Weir** Cv= 2.62 (C= 3.28)

Primary OutFlow Max=5.53 cfs @ 12.11 hrs HW=34.08' (Free Discharge)
↑**1=24" SD** (Passes 5.53 cfs of 24.81 cfs potential flow)
↑**2=4" Orifice** (Orifice Controls 0.95 cfs @ 10.93 fps)
3=6" Orifice (Orifice Controls 0.91 cfs @ 4.64 fps)
↑**4=Sharp-Crested Vee/Trap Weir** (Weir Controls 3.67 cfs @ 2.14 fps)

Summary for Pond W: WETLAND

Inflow Area = 917,965 sf, 33.62% Impervious, Inflow Depth = 4.44" for 50-Yr event
Inflow = 54.03 cfs @ 12.50 hrs, Volume= 339,993 cf
Outflow = 53.36 cfs @ 12.56 hrs, Volume= 339,993 cf, Atten= 1%, Lag= 3.6 min
Primary = 53.36 cfs @ 12.56 hrs, Volume= 339,993 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 8
Peak Elev= 24.81' @ 12.56 hrs Surf.Area= 17,181 sf Storage= 7,143 cf

Plug-Flow detention time= 1.3 min calculated for 339,922 cf (100% of inflow)
Center-of-Mass det. time= 1.3 min (847.7 - 846.5)

Volume	Invert	Avail.Storage	Storage Description
#1	23.90'	42,267 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
23.90	0	0	0
24.00	412	21	21
26.00	41,834	42,246	42,267

Device	Routing	Invert	Outlet Devices
#1	Primary	23.90'	**152.0 deg x 17.0' long Sharp-Crested Vee/Trap Weir** Cv= 2.47 (C= 3.09)

Primary OutFlow Max=53.35 cfs @ 12.56 hrs HW=24.81' (Free Discharge)
1=Sharp-Crested Vee/Trap Weir (Weir Controls 53.35 cfs @ 2.84 fps)

Summary for Link AP1: AP 1

Inflow Area = 1,136,863 sf, 36.86% Impervious, Inflow Depth = 4.76" for 50-Yr event
Inflow = 61.80 cfs @ 12.51 hrs, Volume= 451,402 cf
Primary = 61.80 cfs @ 12.51 hrs, Volume= 451,402 cf, Atten= 0%, Lag= 0.0 min

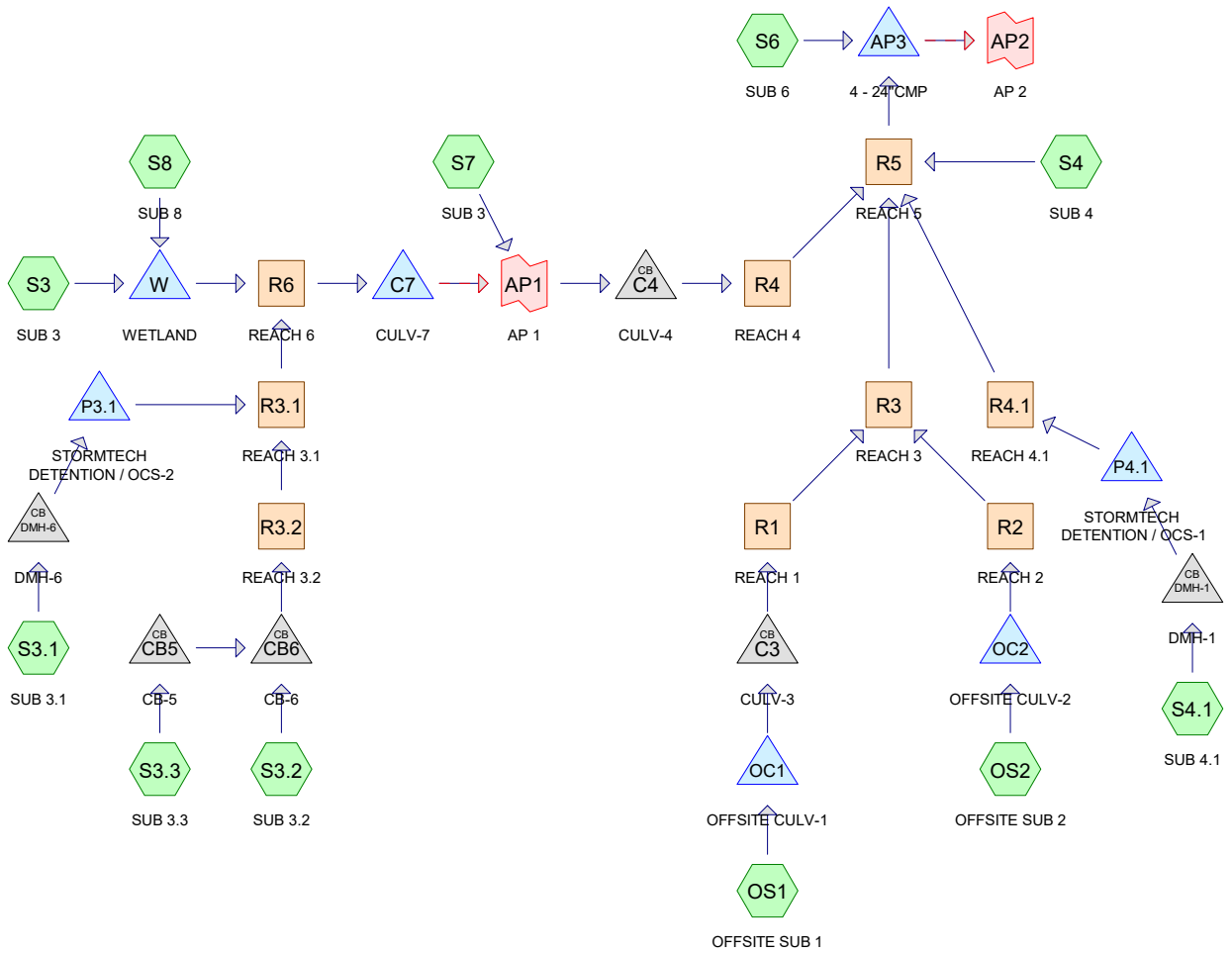
Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Summary for Link AP2: AP 2

Inflow Area = 4,699,294 sf, 15.21% Impervious, Inflow Depth = 4.56" for 50-Yr event
Inflow = 155.89 cfs @ 12.76 hrs, Volume= 1,784,380 cf
Primary = 155.89 cfs @ 12.76 hrs, Volume= 1,784,380 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Appendix B:
Post Development Campus Drainage HydroCAD Caluclations



Subcat Reach Pond Link

Routing Diagram for Campus - Post Development
Prepared by Site Design Associates, Printed 2/12/2024
HydroCAD® 10.00-26 s/n 08018 © 2020 HydroCAD Software Solutions LLC

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment OS1: OFFSITE SUB 1 Runoff Area=1,467,784 sf 3.67% Impervious Runoff Depth=0.89"
Flow Length=1,645' Tc=29.1 min CN=70 Runoff=18.18 cfs 108,481 cf

Subcatchment OS2: OFFSITE SUB 2 Runoff Area=913,125 sf 2.70% Impervious Runoff Depth=1.28"
Flow Length=1,654' Tc=58.8 min CN=77 Runoff=12.15 cfs 97,685 cf

Subcatchment S3: SUB 3 Runoff Area=836,116 sf 36.42% Impervious Runoff Depth=1.16"
Flow Length=828' Tc=39.2 min CN=75 Runoff=12.49 cfs 80,978 cf

Subcatchment S3.1: SUB 3.1 Runoff Area=41,451 sf 89.14% Impervious Runoff Depth=2.85"
Flow Length=160' Slope=0.0100 '/' Tc=5.0 min CN=96 Runoff=3.06 cfs 9,837 cf

Subcatchment S3.2: SUB 3.2 Runoff Area=8,722 sf 9.15% Impervious Runoff Depth=1.55"
Flow Length=163' Slope=0.0220 '/' Tc=5.0 min CN=81 Runoff=0.37 cfs 1,125 cf

Subcatchment S3.3: SUB 3.3 Runoff Area=1,672 sf 27.51% Impervious Runoff Depth=1.35"
Tc=5.0 min CN=78 Runoff=0.06 cfs 188 cf

Subcatchment S4: SUB 4 Runoff Area=1,011,187 sf 18.65% Impervious Runoff Depth=1.48"
Flow Length=1,599' Tc=46.2 min CN=80 Runoff=18.16 cfs 124,649 cf

Subcatchment S4.1: SUB 4.1 Runoff Area=36,714 sf 95.49% Impervious Runoff Depth=2.96"
Flow Length=281' Slope=0.0100 '/' Tc=5.0 min CN=97 Runoff=2.76 cfs 9,043 cf

Subcatchment S6: SUB 6 Runoff Area=132,680 sf 8.16% Impervious Runoff Depth=1.55"
Flow Length=616' Tc=13.5 min CN=81 Runoff=4.32 cfs 17,117 cf

Subcatchment S7: SUB 3 Runoff Area=167,053 sf 43.24% Impervious Runoff Depth=2.17"
Flow Length=1,081' Tc=10.0 min CN=89 Runoff=8.48 cfs 30,251 cf

Subcatchment S8: SUB 8 Runoff Area=81,849 sf 5.04% Impervious Runoff Depth=1.35"
Flow Length=399' Tc=21.1 min CN=78 Runoff=1.92 cfs 9,188 cf

Reach R1: REACH 1 Avg. Flow Depth=0.19' Max Vel=1.26 fps Inflow=6.83 cfs 108,474 cf
n=0.030 L=386.0' S=0.0104 '/' Capacity=256.49 cfs Outflow=6.82 cfs 108,472 cf

Reach R2: REACH 2 Avg. Flow Depth=0.23' Max Vel=1.40 fps Inflow=10.07 cfs 97,680 cf
n=0.030 L=527.0' S=0.0100 '/' Capacity=252.44 cfs Outflow=10.00 cfs 97,679 cf

Reach R3: REACH 3 Avg. Flow Depth=0.62' Max Vel=3.73 fps Inflow=16.80 cfs 206,151 cf
n=0.030 L=874.0' S=0.0138 '/' Capacity=141.56 cfs Outflow=16.76 cfs 206,149 cf

Reach R3.1: REACH 3.1 Avg. Flow Depth=0.03' Max Vel=0.41 fps Inflow=0.60 cfs 11,150 cf
n=0.025 L=179.0' S=0.0056 '/' Capacity=833.80 cfs Outflow=0.53 cfs 11,150 cf

Reach R3.2: REACH 3.2 Avg. Flow Depth=0.01' Max Vel=0.65 fps Inflow=0.44 cfs 1,313 cf
n=0.025 L=91.3' S=0.0219 '/' Capacity=1,651.08 cfs Outflow=0.40 cfs 1,313 cf

Reach R4: REACH 4 Avg. Flow Depth=0.57' Max Vel=3.95 fps Inflow=16.14 cfs 131,567 cf
n=0.030 L=144.0' S=0.0171 '/' Capacity=157.25 cfs Outflow=16.14 cfs 131,567 cf

Reach R4.1: REACH 4.1 Avg. Flow Depth=0.07' Max Vel=0.99 fps Inflow=0.89 cfs 9,043 cf
n=0.030 L=552.0' S=0.0145 '/' Capacity=390.71 cfs Outflow=0.87 cfs 9,043 cf

Reach R5: REACH 5 Avg. Flow Depth=1.01' Max Vel=5.67 fps Inflow=40.33 cfs 471,407 cf
n=0.025 L=317.0' S=0.0134 '/' Capacity=147.04 cfs Outflow=40.31 cfs 471,407 cf

Reach R6: REACH 6 Avg. Flow Depth=0.21' Max Vel=3.78 fps Inflow=14.12 cfs 101,316 cf
n=0.025 L=133.0' S=0.0328 '/' Capacity=623.19 cfs Outflow=14.12 cfs 101,316 cf

Pond AP3: 4 - 24"CMP Peak Elev=11.78' Storage=4,211 cf Inflow=41.17 cfs 488,523 cf
Primary=41.07 cfs 488,500 cf Secondary=0.00 cfs 0 cf Outflow=41.07 cfs 488,500 cf

Pond C3: CULV-3 Peak Elev=32.83' Inflow=6.83 cfs 108,474 cf
24.0" Round Culvert n=0.013 L=169.0' S=0.0095 '/' Outflow=6.83 cfs 108,474 cf

Pond C4: CULV-4 Peak Elev=18.95' Inflow=16.14 cfs 131,567 cf
24.0" Round Culvert n=0.011 L=86.0' S=0.0050 '/' Outflow=16.14 cfs 131,567 cf

Pond C7: CULV-7 Peak Elev=21.02' Storage=569 cf Inflow=14.12 cfs 101,316 cf
Primary=14.10 cfs 101,316 cf Secondary=0.00 cfs 0 cf Outflow=14.10 cfs 101,316 cf

Pond CB5: CB-5 Peak Elev=104.12' Inflow=0.06 cfs 188 cf
1.0" Round Culvert n=0.010 L=70.0' S=0.0050 '/' Outflow=0.06 cfs 188 cf

Pond CB6: CB-6 Peak Elev=28.20' Inflow=0.44 cfs 1,313 cf
12.0" Round Culvert n=0.013 L=184.0' S=0.0050 '/' Outflow=0.44 cfs 1,313 cf

Pond DMH-1: DMH-1 Peak Elev=33.33' Inflow=2.76 cfs 9,043 cf
24.0" Round Culvert n=0.010 L=30.0' S=0.0077 '/' Outflow=2.76 cfs 9,043 cf

Pond DMH-6: DMH-6 Peak Elev=30.87' Inflow=3.06 cfs 9,837 cf
24.0" Round Culvert n=0.010 L=6.0' S=0.2050 '/' Outflow=3.06 cfs 9,837 cf

Pond OC1: OFFSITE CULV-1 Peak Elev=35.42' Storage=30,746 cf Inflow=18.18 cfs 108,481 cf
18.0" Round Culvert n=0.013 L=97.6' S=0.0201 '/' Outflow=6.83 cfs 108,474 cf

Pond OC2: OFFSITE CULV-2 Peak Elev=34.53' Storage=12,480 cf Inflow=12.15 cfs 97,685 cf
18.0" Round Culvert n=0.013 L=93.6' S=0.0170 '/' Outflow=10.07 cfs 97,680 cf

Pond P3.1: STORMTECH DETENTION / OCS-2 Peak Elev=29.36' Storage=3,885 cf Inflow=3.06 cfs 9,837 cf
Outflow=0.32 cfs 9,837 cf

Pond P4.1: STORMTECH DETENTION / OCS-1 Peak Elev=33.01' Storage=1,451 cf Inflow=2.76 cfs 9,043 cf
Outflow=0.89 cfs 9,043 cf

Pond W: WETLAND Peak Elev=24.29' Storage=1,005 cf Inflow=13.72 cfs 90,166 cf
Outflow=13.67 cfs 90,166 cf

Link AP1: AP 1 Inflow=16.14 cfs 131,567 cf
Primary=16.14 cfs 131,567 cf

Link AP2: AP 2 Inflow=41.07 cfs 488,500 cf
Primary=41.07 cfs 488,500 cf

Total Runoff Area = 4,698,353 sf Runoff Volume = 488,543 cf Average Runoff Depth = 1.25"
84.42% Pervious = 3,966,350 sf 15.58% Impervious = 732,003 sf

Summary for Subcatchment OS1: OFFSITE SUB 1

Runoff = 18.18 cfs @ 12.45 hrs, Volume= 108,481 cf, Depth= 0.89"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Yr Rainfall=3.30"

Area (sf)	CN	Description
53,844	98	Paved parking & roofs
32,748	49	50-75% Grass cover, Fair, HSG A
12,803	79	50-75% Grass cover, Fair, HSG C
12,554	84	50-75% Grass cover, Fair, HSG D
205,440	30	Woods, Good, HSG A
228,765	70	Woods, Good, HSG C
921,630	77	Woods, Good, HSG D
1,467,784	70	Weighted Average
1,413,940		96.33% Pervious Area
53,844		3.67% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.6	100	0.0430	0.25		**Sheet Flow, A - B** Range n= 0.130 P2= 3.00"
0.8	75	0.0510	1.58		**Shallow Concentrated Flow, B -C** Short Grass Pasture Kv= 7.0 fps
20.3	923	0.0230	0.76		**Shallow Concentrated Flow, C - D** Woodland Kv= 5.0 fps
1.4	547	0.0180	6.31	157.83	**Channel Flow, D - E** Area= 25.0 sf Perim= 27.0' r= 0.93' n= 0.030 Earth, grassed & winding
29.1	1,645	Total			

Summary for Subcatchment OS2: OFFSITE SUB 2

Runoff = 12.15 cfs @ 12.86 hrs, Volume= 97,685 cf, Depth= 1.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Yr Rainfall=3.30"

Area (sf)	CN	Description
24,623	98	Paved parking & roofs
8,226	79	50-75% Grass cover, Fair, HSG C
13,667	84	50-75% Grass cover, Fair, HSG D
151,095	70	Woods, Good, HSG C
715,514	77	Woods, Good, HSG D
913,125	77	Weighted Average
888,502		97.30% Pervious Area
24,623		2.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.0	100	0.0530	0.11		**Sheet Flow, A - B** Woods: Light underbrush n= 0.400 P2= 3.00"
43.8	1,554	0.0140	0.59		**Shallow Concentrated Flow, B - C** Woodland Kv= 5.0 fps
58.8	1,654	Total			

Summary for Subcatchment S3: SUB 3

Runoff = 12.49 cfs @ 12.59 hrs, Volume= 80,978 cf, Depth= 1.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Yr Rainfall=3.30"

Area (sf)	CN	Description
304,505	98	Paved parking & roofs
45,477	49	50-75% Grass cover, Fair, HSG A
10,125	79	50-75% Grass cover, Fair, HSG C
78,239	84	50-75% Grass cover, Fair, HSG D
142,893	30	Woods, Good, HSG A
81,209	70	Woods, Good, HSG C
173,668	77	Woods, Good, HSG D
836,116	75	Weighted Average
531,611		63.58% Pervious Area
304,505		36.42% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.4	150	0.0950	0.15		**Sheet Flow, A - B** Woods: Light underbrush n= 0.400 P2= 3.00"
1.5	143	0.1000	1.58		**Shallow Concentrated Flow, B - C** Woodland Kv= 5.0 fps
21.3	535	0.0070	0.42		**Shallow Concentrated Flow, C -D** Woodland Kv= 5.0 fps
39.2	828	Total			

Summary for Subcatchment S3.1: SUB 3.1

Runoff = 3.06 cfs @ 12.07 hrs, Volume= 9,837 cf, Depth= 2.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Yr Rainfall=3.30"

Area (sf)	CN	Description
36,951	98	Paved parking & roofs
3,700	79	50-75% Grass cover, Fair, HSG C
800	84	50-75% Grass cover, Fair, HSG D
41,451	96	Weighted Average
4,500		10.86% Pervious Area
36,951		89.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.4	160	0.0100	1.11		**Sheet Flow, A - B**
					Smooth surfaces n= 0.011 P2= 3.00"
2.6					**Direct Entry, Min Tc**
5.0	160	Total			

Summary for Subcatchment S3.2: SUB 3.2

Runoff = 0.37 cfs @ 12.08 hrs, Volume= 1,125 cf, Depth= 1.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Yr Rainfall=3.30"

Area (sf)	CN	Description
798	98	Paved parking & roofs
7,924	79	50-75% Grass cover, Fair, HSG C
8,722	81	Weighted Average
7,924		90.85% Pervious Area
798		9.15% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.6	163	0.0220	1.04		**Shallow Concentrated Flow, A - B**
					Short Grass Pasture Kv= 7.0 fps
2.4					**Direct Entry,**
5.0	163	Total			

Summary for Subcatchment S3.3: SUB 3.3

Runoff = 0.06 cfs @ 12.08 hrs, Volume= 188 cf, Depth= 1.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Yr Rainfall=3.30"

Area (sf)	CN	Description
460	98	Paved parking & roofs
1,212	70	Woods, Good, HSG C
1,672	78	Weighted Average
1,212		72.49% Pervious Area
460		27.51% Impervious Area

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

Summary for Subcatchment S4: SUB 4

Runoff = 18.16 cfs @ 12.67 hrs, Volume= 124,649 cf, Depth= 1.48"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Yr Rainfall=3.30"

Area (sf)	CN	Description
188,582	98	Paved parking & roofs
20,781	79	50-75% Grass cover, Fair, HSG C
11,998	84	50-75% Grass cover, Fair, HSG D
419,188	73	Woods, Fair, HSG C
370,638	79	Woods, Fair, HSG D
1,011,187	80	Weighted Average
822,605		81.35% Pervious Area
188,582		18.65% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
29.3	100	0.0100	0.06		**Sheet Flow, A - B** Woods: Light underbrush n= 0.400 P2= 3.00"
3.9	284	0.0600	1.22		**Shallow Concentrated Flow, B - C** Woodland Kv= 5.0 fps
10.4	341	0.0120	0.55		**Shallow Concentrated Flow, C - D** Woodland Kv= 5.0 fps
2.6	874	0.0140	5.64	281.88	**Channel Flow, D - E** Area= 50.0 sf Perim= 53.0' r= 0.94' n= 0.030 Earth, grassed & winding
46.2	1,599	Total			

Summary for Subcatchment S4.1: SUB 4.1

Runoff = 2.76 cfs @ 12.07 hrs, Volume= 9,043 cf, Depth= 2.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Yr Rainfall=3.30"

Area (sf)	CN	Description
35,058	98	Paved parking & roofs
1,656	74	>75% Grass cover, Good, HSG C
36,714	97	Weighted Average
1,656		4.51% Pervious Area
35,058		95.49% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.9	200	0.0100	1.16		**Sheet Flow, A - B**
					Smooth surfaces n= 0.011 P2= 3.00"
0.7	81	0.0100	2.03		**Shallow Concentrated Flow, B - C**
					Paved Kv= 20.3 fps
1.4					**Direct Entry, Min Tc**
5.0	281	Total			

Summary for Subcatchment S6: SUB 6

Runoff = 4.32 cfs @ 12.19 hrs, Volume= 17,117 cf, Depth= 1.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Yr Rainfall=3.30"

Area (sf)	CN	Description
10,824	98	Paved parking & roofs
19,401	79	50-75% Grass cover, Fair, HSG C
64,092	84	50-75% Grass cover, Fair, HSG D
32,603	70	Woods, Good, HSG C
5,760	77	Woods, Good, HSG D
132,680	81	Weighted Average
121,856		91.84% Pervious Area
10,824		8.16% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.0	40	0.0410	0.08		**Sheet Flow, A - B**
					Woods: Light underbrush n= 0.400 P2= 3.00"
0.7	71	0.1120	1.67		**Shallow Concentrated Flow, B - C**
					Woodland Kv= 5.0 fps
4.5	265	0.0380	0.97		**Shallow Concentrated Flow, B - C**
					Woodland Kv= 5.0 fps
0.3	240	0.0250	11.44	686.23	**Channel Flow, C - D**
					Area= 60.0 sf Perim= 34.0' r= 1.76'
					n= 0.030 Earth, grassed & winding
13.5	616	Total			

Summary for Subcatchment S7: SUB 3

Runoff = 8.48 cfs @ 12.14 hrs, Volume= 30,251 cf, Depth= 2.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Yr Rainfall=3.30"

Area (sf)	CN	Description
72,236	98	Paved parking & roofs
66,092	84	50-75% Grass cover, Fair, HSG D
5,176	73	Woods, Fair, HSG C
23,549	79	Woods, Fair, HSG D
167,053	89	Weighted Average
94,817		56.76% Pervious Area
72,236		43.24% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.8	58	0.0430	0.20		**Sheet Flow, A - B** Grass: Short n= 0.150 P2= 3.00"
1.1	136	0.0840	2.03		**Shallow Concentrated Flow, B - C** Short Grass Pasture Kv= 7.0 fps
2.8	424	0.0150	2.49		**Shallow Concentrated Flow, C - D** Paved Kv= 20.3 fps
0.1	39	0.0450	9.55	3.33	**Pipe Channel, D - E** 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.010 PVC, smooth interior
0.3	185	0.0380	11.66	116.60	**Channel Flow, E - F** Area= 10.0 sf Perim= 12.0' r= 0.83' n= 0.022 Earth, clean & straight
0.5	137	0.0168	4.82	0.95	**Pipe Channel, F - G** 6.0" Round Area= 0.2 sf Perim= 1.6' r= 0.13' n= 0.010 PVC, smooth interior
0.4	102	0.0042	4.67	14.66	**Pipe Channel, G - H** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.013 Concrete pipe, bends & connections
10.0	1,081	Total			

Summary for Subcatchment S8: SUB 8

Runoff = 1.92 cfs @ 12.31 hrs, Volume= 9,188 cf, Depth= 1.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Yr Rainfall=3.30"

Area (sf)	CN	Description
4,122	98	Paved parking & roofs
439	79	50-75% Grass cover, Fair, HSG C
34,658	74	>75% Grass cover, Good, HSG C
4,166	73	Woods, Fair, HSG C
38,464	79	Woods, Fair, HSG D
81,849	78	Weighted Average
77,727		94.96% Pervious Area
4,122		5.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.8	120	0.0500	0.11		**Sheet Flow, A - B** Woods: Light underbrush n= 0.400 P2= 3.00"
1.4	138	0.1100	1.66		**Shallow Concentrated Flow, B - C** Woodland Kv= 5.0 fps
1.9	141	0.0320	1.25		**Shallow Concentrated Flow, C - D** Short Grass Pasture Kv= 7.0 fps
21.1	399	Total			

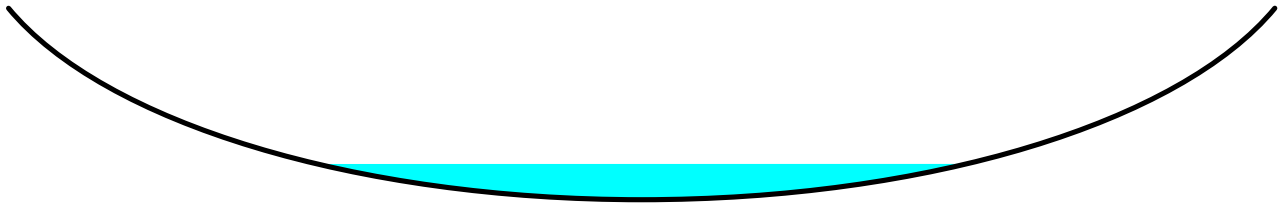
Summary for Reach R1: REACH 1

Inflow Area = 1,467,784 sf, 3.67% Impervious, Inflow Depth = 0.89" for 2-Yr event
Inflow = 6.83 cfs @ 13.06 hrs, Volume= 108,474 cf
Outflow = 6.82 cfs @ 13.21 hrs, Volume= 108,472 cf, Atten= 0%, Lag= 9.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.26 fps, Min. Travel Time= 5.1 min
Avg. Velocity = 0.44 fps, Avg. Travel Time= 14.7 min

Peak Storage= 2,088 cf @ 13.13 hrs
Average Depth at Peak Storage= 0.19'
Bank-Full Depth= 1.00' Flow Area= 66.7 sf, Capacity= 256.49 cfs

100.00' x 1.00' deep Parabolic Channel, n= 0.030 Earth, grassed & winding
Length= 386.0' Slope= 0.0104 '/'
Inlet Invert= 30.00', Outlet Invert= 26.00'



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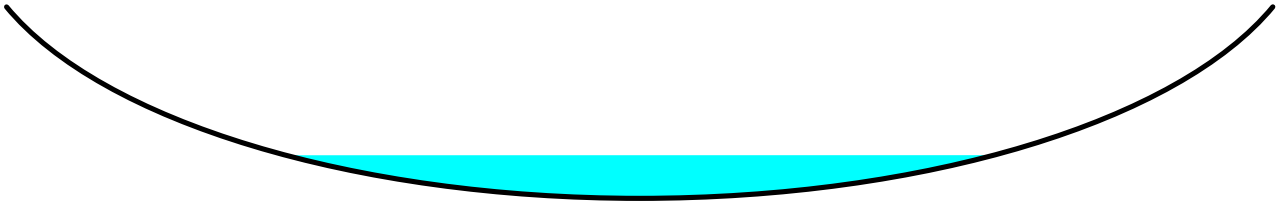
Summary for Reach R2: REACH 2

Inflow Area = 913,125 sf, 2.70% Impervious, Inflow Depth = 1.28" for 2-Yr event
Inflow = 10.07 cfs @ 13.13 hrs, Volume= 97,680 cf
Outflow = 10.00 cfs @ 13.31 hrs, Volume= 97,679 cf, Atten= 1%, Lag= 10.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.40 fps, Min. Travel Time= 6.3 min
Avg. Velocity = 0.40 fps, Avg. Travel Time= 21.9 min

Peak Storage= 3,757 cf @ 13.21 hrs
Average Depth at Peak Storage= 0.23'
Bank-Full Depth= 1.00' Flow Area= 66.7 sf, Capacity= 252.44 cfs

100.00' x 1.00' deep Parabolic Channel, n= 0.030 Earth, grassed & winding
Length= 527.0' Slope= 0.0100 '/'
Inlet Invert= 31.29', Outlet Invert= 26.00'



‡

Summary for Reach R3: REACH 3

Inflow Area = 2,380,909 sf, 3.30% Impervious, Inflow Depth = 1.04" for 2-Yr event
Inflow = 16.80 cfs @ 13.29 hrs, Volume= 206,151 cf
Outflow = 16.76 cfs @ 13.40 hrs, Volume= 206,149 cf, Atten= 0%, Lag= 6.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.73 fps, Min. Travel Time= 3.9 min
Avg. Velocity = 1.06 fps, Avg. Travel Time= 13.8 min

Peak Storage= 3,928 cf @ 13.34 hrs
Average Depth at Peak Storage= 0.62'
Bank-Full Depth= 2.00' Flow Area= 20.0 sf, Capacity= 141.56 cfs

6.00' x 2.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 2.0 '/' Top Width= 14.00'
Length= 874.0' Slope= 0.0138 '/'
Inlet Invert= 26.00', Outlet Invert= 13.90'



Summary for Reach R3.1: REACH 3.1

Inflow Area = 51,845 sf, 73.70% Impervious, Inflow Depth = 2.58" for 2-Yr event
Inflow = 0.60 cfs @ 12.15 hrs, Volume= 11,150 cf
Outflow = 0.53 cfs @ 12.34 hrs, Volume= 11,150 cf, Atten= 11%, Lag= 11.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.41 fps, Min. Travel Time= 7.2 min
Avg. Velocity = 0.33 fps, Avg. Travel Time= 9.1 min

Peak Storage= 232 cf @ 12.21 hrs
Average Depth at Peak Storage= 0.03'
Bank-Full Depth= 2.00' Flow Area= 140.0 sf, Capacity= 833.80 cfs

50.00' x 2.00' deep channel, n= 0.025 Earth, clean & winding
Side Slope Z-value= 10.0 '/' Top Width= 90.00'
Length= 179.0' Slope= 0.0056 '/'
Inlet Invert= 24.90', Outlet Invert= 23.90'



‡

Summary for Reach R3.2: REACH 3.2

Inflow Area = 10,394 sf, 12.10% Impervious, Inflow Depth = 1.52" for 2-Yr event
Inflow = 0.44 cfs @ 12.08 hrs, Volume= 1,313 cf
Outflow = 0.40 cfs @ 12.15 hrs, Volume= 1,313 cf, Atten= 9%, Lag= 4.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.65 fps, Min. Travel Time= 2.4 min
Avg. Velocity = 0.65 fps, Avg. Travel Time= 2.4 min

Peak Storage= 56 cf @ 12.11 hrs
Average Depth at Peak Storage= 0.01'
Bank-Full Depth= 2.00' Flow Area= 140.0 sf, Capacity= 1,651.08 cfs

50.00' x 2.00' deep channel, n= 0.025 Earth, clean & winding
Side Slope Z-value= 10.0 '/' Top Width= 90.00'
Length= 91.3' Slope= 0.0219 '/'
Inlet Invert= 26.90', Outlet Invert= 24.90'



‡

Summary for Reach R4: REACH 4

Inflow Area = 1,136,863 sf, 36.86% Impervious, Inflow Depth = 1.39" for 2-Yr event
Inflow = 16.14 cfs @ 12.54 hrs, Volume= 131,567 cf
Outflow = 16.14 cfs @ 12.55 hrs, Volume= 131,567 cf, Atten= 0%, Lag= 1.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.95 fps, Min. Travel Time= 0.6 min
Avg. Velocity = 1.32 fps, Avg. Travel Time= 1.8 min

Peak Storage= 588 cf @ 12.54 hrs
Average Depth at Peak Storage= 0.57'
Bank-Full Depth= 2.00' Flow Area= 20.0 sf, Capacity= 157.25 cfs

6.00' x 2.00' deep channel, n= 0.030 Stream, clean & straight
Side Slope Z-value= 2.0 '/' Top Width= 14.00'
Length= 144.0' Slope= 0.0171 '/'
Inlet Invert= 16.36', Outlet Invert= 13.90'



Summary for Reach R4.1: REACH 4.1

Inflow Area = 36,714 sf, 95.49% Impervious, Inflow Depth = 2.96" for 2-Yr event
Inflow = 0.89 cfs @ 12.35 hrs, Volume= 9,043 cf
Outflow = 0.87 cfs @ 12.59 hrs, Volume= 9,043 cf, Atten= 2%, Lag= 14.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.99 fps, Min. Travel Time= 9.3 min
Avg. Velocity = 0.48 fps, Avg. Travel Time= 19.1 min

Peak Storage= 485 cf @ 12.43 hrs
Average Depth at Peak Storage= 0.07'
Bank-Full Depth= 2.00' Flow Area= 56.0 sf, Capacity= 390.71 cfs

12.00' x 2.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 8.0 '/' Top Width= 44.00'
Length= 552.0' Slope= 0.0145 '/'
Inlet Invert= 22.00', Outlet Invert= 14.00'



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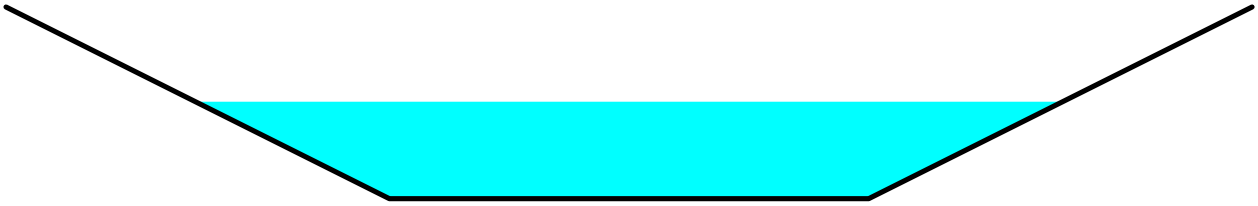
Summary for Reach R5: REACH 5

Inflow Area = 4,565,673 sf, 15.80% Impervious, Inflow Depth = 1.24" for 2-Yr event
Inflow = 40.33 cfs @ 12.78 hrs, Volume= 471,407 cf
Outflow = 40.31 cfs @ 12.80 hrs, Volume= 471,407 cf, Atten= 0%, Lag= 1.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 5.67 fps, Min. Travel Time= 0.9 min
Avg. Velocity = 1.42 fps, Avg. Travel Time= 3.7 min

Peak Storage= 2,254 cf @ 12.78 hrs
Average Depth at Peak Storage= 1.01'
Bank-Full Depth= 2.00' Flow Area= 18.0 sf, Capacity= 147.04 cfs

5.00' x 2.00' deep channel, n= 0.025 Earth, clean & straight
Side Slope Z-value= 2.0 '/' Top Width= 13.00'
Length= 317.0' Slope= 0.0134 '/'
Inlet Invert= 13.90', Outlet Invert= 9.64'



Summary for Reach R6: REACH 6

Inflow Area = 969,810 sf, 35.76% Impervious, Inflow Depth = 1.25" for 2-Yr event
Inflow = 14.12 cfs @ 12.59 hrs, Volume= 101,316 cf
Outflow = 14.12 cfs @ 12.61 hrs, Volume= 101,316 cf, Atten= 0%, Lag= 0.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.78 fps, Min. Travel Time= 0.6 min
Avg. Velocity = 1.25 fps, Avg. Travel Time= 1.8 min

Peak Storage= 497 cf @ 12.60 hrs
Average Depth at Peak Storage= 0.21'
Bank-Full Depth= 2.00' Flow Area= 42.0 sf, Capacity= 623.19 cfs

17.00' x 2.00' deep channel, n= 0.025 Earth, clean & winding
Side Slope Z-value= 2.0 '/' Top Width= 25.00'
Length= 133.0' Slope= 0.0328 '/'
Inlet Invert= 23.90', Outlet Invert= 19.54'

‡



Summary for Pond AP3: 4 - 24"CMP

Inflow Area = 4,698,353 sf, 15.58% Impervious, Inflow Depth = 1.25" for 2-Yr event
Inflow = 41.17 cfs @ 12.79 hrs, Volume= 488,523 cf
Outflow = 41.07 cfs @ 12.82 hrs, Volume= 488,500 cf, Atten= 0%, Lag= 1.8 min
Primary = 41.07 cfs @ 12.82 hrs, Volume= 488,500 cf
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 6

Peak Elev= 11.78' @ 12.82 hrs Surf.Area= 3,693 sf Storage= 4,211 cf

Plug-Flow detention time= 2.0 min calculated for 488,500 cf (100% of inflow)
Center-of-Mass det. time= 1.9 min (920.0 - 918.1)

Volume	Invert	Avail.Storage	Storage Description
#1	9.64'	96,037 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
9.64	0	0	0
10.00	856	154	154
12.00	4,037	4,893	5,047
14.00	13,588	17,625	22,672
16.00	39,016	52,604	75,276
16.50	44,026	20,761	96,037

Device	Routing	Invert	Outlet Devices
#1	Primary	9.77'	**24.0" Round Proposed 3 - 24" CMP X 3.00** L= 65.0' CMP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 9.77' / 9.12' S= 0.0100 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 3.14 sf
#2	Primary	9.83'	**24.0" Round Existing 24"CMP** L= 64.0' CMP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 9.77' / 9.83' S= -0.0009 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 3.14 sf
#3	Secondary	16.50'	**20.0' long x 25.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=41.08 cfs @ 12.82 hrs HW=11.78' (Free Discharge)
└**1=Proposed 3 - 24" CMP** (Barrel Controls 33.64 cfs @ 4.41 fps)
└**2=Existing 24"CMP** (Barrel Controls 7.44 cfs @ 2.92 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=9.64' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond C3: CULV-3

Inflow Area = 1,467,784 sf, 3.67% Impervious, Inflow Depth = 0.89" for 2-Yr event
Inflow = 6.83 cfs @ 13.06 hrs, Volume= 108,474 cf
Outflow = 6.83 cfs @ 13.06 hrs, Volume= 108,474 cf, Atten= 0%, Lag= 0.0 min
Primary = 6.83 cfs @ 13.06 hrs, Volume= 108,474 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 32.83' @ 13.06 hrs
Flood Elev= 39.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	31.60'	**24.0" Round Culvert** L= 169.0' RCP, groove end projecting, Ke= 0.200

Inlet / Outlet Invert= 31.60' / 30.00' S= 0.0095 '/' Cc= 0.900
n= 0.013 Concrete, trowel finish, Flow Area= 3.14 sf

Primary OutFlow Max=6.83 cfs @ 13.06 hrs HW=32.83' TW=31.60' (Fixed TW Elev= 31.60')
1=Culvert (Outlet Controls 6.83 cfs @ 4.80 fps)

Summary for Pond C4: CULV-4

Inflow Area = 1,136,863 sf, 36.86% Impervious, Inflow Depth = 1.39" for 2-Yr event
Inflow = 16.14 cfs @ 12.54 hrs, Volume= 131,567 cf
Outflow = 16.14 cfs @ 12.54 hrs, Volume= 131,567 cf, Atten= 0%, Lag= 0.0 min
Primary = 16.14 cfs @ 12.54 hrs, Volume= 131,567 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 18.95' @ 12.54 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	16.79'	**24.0" Round Culvert**
			L= 86.0' RCP, groove end projecting, Ke= 0.200
			Inlet / Outlet Invert= 16.79' / 16.36' S= 0.0050 '/' Cc= 0.900
			n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf

Primary OutFlow Max=16.14 cfs @ 12.54 hrs HW=18.95' (Free Discharge)
1=Culvert (Barrel Controls 16.14 cfs @ 5.91 fps)

Summary for Pond C7: CULV-7

Inflow Area = 969,810 sf, 35.76% Impervious, Inflow Depth = 1.25" for 2-Yr event
Inflow = 14.12 cfs @ 12.61 hrs, Volume= 101,316 cf
Outflow = 14.10 cfs @ 12.62 hrs, Volume= 101,316 cf, Atten= 0%, Lag= 0.9 min
Primary = 14.10 cfs @ 12.62 hrs, Volume= 101,316 cf
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 8
Peak Elev= 21.02' @ 12.62 hrs Surf.Area= 914 sf Storage= 569 cf

Plug-Flow detention time= 0.5 min calculated for 101,316 cf (100% of inflow)
Center-of-Mass det. time= 0.4 min (891.5 - 891.1)

Volume	Invert	Avail.Storage	Storage Description
#1	19.54'	9,728 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
19.54	0	0	0
20.00	144	33	33
21.00	890	517	550
22.00	2,015	1,453	2,003
23.00	6,588	4,302	6,304
23.50	7,106	3,424	9,728

Device	Routing	Invert	Outlet Devices
#1	Primary	19.54'	**24.0" Round 24" RCP** L= 184.0' RCP, rounded edge headwall, Ke= 0.100 Inlet / Outlet Invert= 19.54' / 16.79' S= 0.0149 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf
#2	Secondary	23.40'	**250.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=14.10 cfs @ 12.62 hrs HW=21.02' (Free Discharge)
↑—**1=24" RCP** (Inlet Controls 14.10 cfs @ 5.65 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=19.54' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond CB5: CB-5

Inflow Area = 1,672 sf, 27.51% Impervious, Inflow Depth = 1.35" for 2-Yr event
Inflow = 0.06 cfs @ 12.08 hrs, Volume= 188 cf
Outflow = 0.06 cfs @ 12.08 hrs, Volume= 188 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.06 cfs @ 12.08 hrs, Volume= 188 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 104.12' @ 12.08 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	29.50'	**1.0" Round 12" CULV** L= 70.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 29.50' / 29.15' S= 0.0050 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.01 sf

Primary OutFlow Max=0.06 cfs @ 12.08 hrs HW=103.97' (Free Discharge)
↑—**1=12" CULV** (Barrel Controls 0.06 cfs @ 11.31 fps)

Summary for Pond CB6: CB-6

Inflow Area = 10,394 sf, 12.10% Impervious, Inflow Depth = 1.52" for 2-Yr event
Inflow = 0.44 cfs @ 12.08 hrs, Volume= 1,313 cf
Outflow = 0.44 cfs @ 12.08 hrs, Volume= 1,313 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.44 cfs @ 12.08 hrs, Volume= 1,313 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 28.20' @ 12.08 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	27.82'	**12.0" Round 12"SD** L= 184.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 27.82' / 26.90' S= 0.0050 '/' Cc= 0.900 n= 0.013 Concrete, trowel finish, Flow Area= 0.79 sf

Primary OutFlow Max=0.44 cfs @ 12.08 hrs HW=28.20' (Free Discharge)
1=12"SD (Barrel Controls 0.44 cfs @ 2.39 fps)

Summary for Pond DMH-1: DMH-1

Inflow Area = 36,714 sf, 95.49% Impervious, Inflow Depth = 2.96" for 2-Yr event
Inflow = 2.76 cfs @ 12.07 hrs, Volume= 9,043 cf
Outflow = 2.76 cfs @ 12.07 hrs, Volume= 9,043 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.76 cfs @ 12.07 hrs, Volume= 9,043 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 33.33' @ 12.07 hrs
Flood Elev= 36.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	32.58'	**24.0" Round 24" SD to Detention Bed** L= 30.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 32.58' / 32.35' S= 0.0077 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=2.76 cfs @ 12.07 hrs HW=33.33' (Free Discharge)
1=24" SD to Detention Bed (Barrel Controls 2.76 cfs @ 3.77 fps)

Summary for Pond DMH-6: DMH-6

Inflow Area = 41,451 sf, 89.14% Impervious, Inflow Depth = 2.85" for 2-Yr event
Inflow = 3.06 cfs @ 12.07 hrs, Volume= 9,837 cf
Outflow = 3.06 cfs @ 12.07 hrs, Volume= 9,837 cf, Atten= 0%, Lag= 0.0 min
Primary = 3.06 cfs @ 12.07 hrs, Volume= 9,837 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 30.87' @ 12.07 hrs
Flood Elev= 32.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	30.13'	**24.0" Round 24" SD to Detention Bed** L= 6.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 30.13' / 28.90' S= 0.2050 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=3.06 cfs @ 12.07 hrs HW=30.86' (Free Discharge)
1=24" SD to Detention Bed (Inlet Controls 3.06 cfs @ 2.92 fps)

Summary for Pond OC1: OFFSITE CULV-1

Inflow Area = 1,467,784 sf, 3.67% Impervious, Inflow Depth = 0.89" for 2-Yr event
Inflow = 18.18 cfs @ 12.45 hrs, Volume= 108,481 cf
Outflow = 6.83 cfs @ 13.06 hrs, Volume= 108,474 cf, Atten= 62%, Lag= 36.5 min
Primary = 6.83 cfs @ 13.06 hrs, Volume= 108,474 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 35.42' @ 13.06 hrs Surf.Area= 47,126 sf Storage= 30,746 cf

Plug-Flow detention time= 76.7 min calculated for 108,451 cf (100% of inflow)
Center-of-Mass det. time= 76.9 min (971.8 - 894.9)

Volume	Invert	Avail.Storage	Storage Description
#1	34.25'	602,689 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
34.25	5,289	0	0
36.00	67,698	63,864	63,864
38.00	137,090	204,788	268,652
40.00	196,947	334,037	602,689

Device	Routing	Invert	Outlet Devices
#1	Primary	34.25'	**18.0" Round 18" RCP** L= 97.6' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 34.25' / 32.29' S= 0.0201 '/' Cc= 0.900 n= 0.013 Concrete, trowel finish, Flow Area= 1.77 sf

Primary OutFlow Max=6.84 cfs @ 13.06 hrs HW=35.42' (Free Discharge)
↑—**1=18" RCP** (Inlet Controls 6.84 cfs @ 4.61 fps)

Summary for Pond OC2: OFFSITE CULV-2

Inflow Area = 913,125 sf, 2.70% Impervious, Inflow Depth = 1.28" for 2-Yr event
Inflow = 12.15 cfs @ 12.86 hrs, Volume= 97,685 cf
Outflow = 10.07 cfs @ 13.13 hrs, Volume= 97,680 cf, Atten= 17%, Lag= 16.1 min
Primary = 10.07 cfs @ 13.13 hrs, Volume= 97,680 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 34.53' @ 13.13 hrs Surf.Area= 9,538 sf Storage= 12,480 cf

Plug-Flow detention time= 29.4 min calculated for 97,680 cf (100% of inflow)
Center-of-Mass det. time= 29.4 min (929.0 - 899.6)

Volume	Invert	Avail.Storage	Storage Description
#1	32.88'	71,548 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
32.88	5,285	0	0
34.00	8,520	7,731	7,731
36.00	12,392	20,912	28,643
38.00	30,513	42,905	71,548

Device	Routing	Invert	Outlet Devices
#1	Primary	32.88'	**18.0" Round 18" RCP** L= 93.6' RCP, groove end projecting, Ke= 0.200

Inlet / Outlet Invert= 32.88' / 31.29' S= 0.0170 '/' Cc= 0.900
n= 0.013 Concrete, trowel finish, Flow Area= 1.77 sf

Primary OutFlow Max=10.07 cfs @ 13.13 hrs HW=34.53' (Free Discharge)
└**1=18" RCP** (Inlet Controls 10.07 cfs @ 5.70 fps)

Summary for Pond P3.1: STORMTECH DETENTION / OCS-2

Inflow Area = 41,451 sf, 89.14% Impervious, Inflow Depth = 2.85" for 2-Yr event
Inflow = 3.06 cfs @ 12.07 hrs, Volume= 9,837 cf
Outflow = 0.32 cfs @ 12.73 hrs, Volume= 9,837 cf, Atten= 89%, Lag= 39.8 min
Primary = 0.32 cfs @ 12.73 hrs, Volume= 9,837 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 29.36' @ 12.73 hrs Surf.Area= 3,328 sf Storage= 3,885 cf
Flood Elev= 31.21' Surf.Area= 3,328 sf Storage= 7,258 cf

Plug-Flow detention time= 139.0 min calculated for 9,835 cf (100% of inflow)
Center-of-Mass det. time= 138.9 min (911.2 - 772.2)

Volume	Invert	Avail.Storage	Storage Description
#1	27.67'	2,926 cf	**34.70'W x 95.90'L x 3.50'H Prismatoid** 11,647 cf Overall - 4,331 cf Embedded = 7,316 cf x 40.0% Voids
#2	28.17'	4,331 cf	**ADS_StormTech SC-740 @ 95.90' L** x 7 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 95.90'L = 618.8 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
		7,258 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	25.15'	**24.0" Round 24" SD** L= 15.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 25.15' / 25.00' S= 0.0100 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 3.14 sf
#2	Device 1	25.15'	**2.0" Vert. 2" Orifice** C= 0.600
#3	Device 1	29.12'	**4.0" Vert. 4" Orifice** C= 0.600
#4	Device 1	30.90'	**6.0' long Sharp-Crested Vee/Trap Weir** Cv= 2.62 (C= 3.28)

Primary OutFlow Max=0.32 cfs @ 12.73 hrs HW=29.36' (Free Discharge)
└**1=24" SD** (Passes 0.32 cfs of 21.39 cfs potential flow)
├**2=2" Orifice** (Orifice Controls 0.21 cfs @ 9.78 fps)
├**3=4" Orifice** (Orifice Controls 0.11 cfs @ 1.66 fps)
└**4=Sharp-Crested Vee/Trap Weir** (Controls 0.00 cfs)

Summary for Pond P4.1: STORMTECH DETENTION / OCS-1

Inflow Area = 36,714 sf, 95.49% Impervious, Inflow Depth = 2.96" for 2-Yr event
Inflow = 2.76 cfs @ 12.07 hrs, Volume= 9,043 cf
Outflow = 0.89 cfs @ 12.35 hrs, Volume= 9,043 cf, Atten= 68%, Lag= 16.6 min
Primary = 0.89 cfs @ 12.35 hrs, Volume= 9,043 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 4

Peak Elev= 33.01' @ 12.35 hrs Surf.Area= 1,702 sf Storage= 1,451 cf
Flood Elev= 34.78' Surf.Area= 1,702 sf Storage= 3,388 cf

Plug-Flow detention time= 8.0 min calculated for 9,043 cf (100% of inflow)
Center-of-Mass det. time= 7.9 min (772.3 - 764.3)

Volume	Invert	Avail.Storage	Storage Description
#1	31.72'	1,513 cf	**25.25'W x 67.40'L x 3.50'H Prismatoid** 5,956 cf Overall - 2,174 cf Embedded = 3,782 cf x 40.0% Voids
#2	32.22'	2,174 cf	**ADS_StormTech SC-740 @ 67.40' L** x 5 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 67.40'L = 434.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
		3,687 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	28.76'	**24.0" Round 24" SD** L= 268.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 28.76' / 22.00' S= 0.0252 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 3.14 sf
#2	Device 1	28.76'	**4.0" Vert. 4" Orifice** C= 0.600
#3	Device 1	32.90'	**6.0" Vert. 6" Orifice** C= 0.600
#4	Device 1	33.65'	**4.0' long x 2.00' rise Sharp-Crested Vee/Trap Weir** Cv= 2.62 (C= 3.28)

Primary OutFlow Max=0.89 cfs @ 12.35 hrs HW=33.01' (Free Discharge)
↑**1=24" SD** (Passes 0.89 cfs of 21.54 cfs potential flow)
↑**2=4" Orifice** (Orifice Controls 0.85 cfs @ 9.73 fps)
3=6" Orifice (Orifice Controls 0.04 cfs @ 1.14 fps)
4=Sharp-Crested Vee/Trap Weir (Controls 0.00 cfs)

Summary for Pond W: WETLAND

Inflow Area = 917,965 sf, 33.62% Impervious, Inflow Depth = 1.18" for 2-Yr event
Inflow = 13.72 cfs @ 12.55 hrs, Volume= 90,166 cf
Outflow = 13.67 cfs @ 12.59 hrs, Volume= 90,166 cf, Atten= 0%, Lag= 2.4 min
Primary = 13.67 cfs @ 12.59 hrs, Volume= 90,166 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 8
Peak Elev= 24.29' @ 12.59 hrs Surf.Area= 6,397 sf Storage= 1,005 cf

Plug-Flow detention time= 0.6 min calculated for 90,147 cf (100% of inflow)
Center-of-Mass det. time= 0.6 min (885.7 - 885.1)

Volume	Invert	Avail.Storage	Storage Description
#1	23.90'	42,267 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
23.90	0	0	0
24.00	412	21	21
26.00	41,834	42,246	42,267

Device	Routing	Invert	Outlet Devices
#1	Primary	23.90'	**152.0 deg x 17.0' long Sharp-Crested Vee/Trap Weir** Cv= 2.47 (C= 3.09)

Primary OutFlow Max=13.67 cfs @ 12.59 hrs HW=24.29' (Free Discharge)
1=Sharp-Crested Vee/Trap Weir (Weir Controls 13.67 cfs @ 1.89 fps)

Summary for Link AP1: AP 1

Inflow Area = 1,136,863 sf, 36.86% Impervious, Inflow Depth = 1.39" for 2-Yr event
Inflow = 16.14 cfs @ 12.54 hrs, Volume= 131,567 cf
Primary = 16.14 cfs @ 12.54 hrs, Volume= 131,567 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Summary for Link AP2: AP 2

Inflow Area = 4,698,353 sf, 15.58% Impervious, Inflow Depth = 1.25" for 2-Yr event
Inflow = 41.07 cfs @ 12.82 hrs, Volume= 488,500 cf
Primary = 41.07 cfs @ 12.82 hrs, Volume= 488,500 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment OS1: OFFSITE SUB 1 Runoff Area=1,467,784 sf 3.67% Impervious Runoff Depth=1.96"
Flow Length=1,645' Tc=29.1 min CN=70 Runoff=43.39 cfs 240,042 cf

Subcatchment OS2: OFFSITE SUB 2 Runoff Area=913,125 sf 2.70% Impervious Runoff Depth=2.54"
Flow Length=1,654' Tc=58.8 min CN=77 Runoff=24.74 cfs 193,244 cf

Subcatchment S3: SUB 3 Runoff Area=836,116 sf 36.42% Impervious Runoff Depth=2.37"
Flow Length=828' Tc=39.2 min CN=75 Runoff=26.34 cfs 165,023 cf

Subcatchment S3.1: SUB 3.1 Runoff Area=41,451 sf 89.14% Impervious Runoff Depth=4.43"
Flow Length=160' Slope=0.0100 '/' Tc=5.0 min CN=96 Runoff=4.65 cfs 15,313 cf

Subcatchment S3.2: SUB 3.2 Runoff Area=8,722 sf 9.15% Impervious Runoff Depth=2.90"
Flow Length=163' Slope=0.0220 '/' Tc=5.0 min CN=81 Runoff=0.70 cfs 2,106 cf

Subcatchment S3.3: SUB 3.3 Runoff Area=1,672 sf 27.51% Impervious Runoff Depth=2.63"
Tc=5.0 min CN=78 Runoff=0.12 cfs 366 cf

Subcatchment S4: SUB 4 Runoff Area=1,011,187 sf 18.65% Impervious Runoff Depth=2.81"
Flow Length=1,599' Tc=46.2 min CN=80 Runoff=34.84 cfs 236,432 cf

Subcatchment S4.1: SUB 4.1 Runoff Area=36,714 sf 95.49% Impervious Runoff Depth=4.55"
Flow Length=281' Slope=0.0100 '/' Tc=5.0 min CN=97 Runoff=4.15 cfs 13,913 cf

Subcatchment S6: SUB 6 Runoff Area=132,680 sf 8.16% Impervious Runoff Depth=2.90"
Flow Length=616' Tc=13.5 min CN=81 Runoff=8.15 cfs 32,033 cf

Subcatchment S7: SUB 3 Runoff Area=167,053 sf 43.24% Impervious Runoff Depth=3.68"
Flow Length=1,081' Tc=10.0 min CN=89 Runoff=14.08 cfs 51,178 cf

Subcatchment S8: SUB 8 Runoff Area=81,849 sf 5.04% Impervious Runoff Depth=2.63"
Flow Length=399' Tc=21.1 min CN=78 Runoff=3.81 cfs 17,918 cf

Reach R1: REACH 1 Avg. Flow Depth=0.24' Max Vel=1.50 fps Inflow=12.07 cfs 240,033 cf
n=0.030 L=386.0' S=0.0104 '/' Capacity=256.49 cfs Outflow=12.06 cfs 240,032 cf

Reach R2: REACH 2 Avg. Flow Depth=0.28' Max Vel=1.61 fps Inflow=15.77 cfs 193,238 cf
n=0.030 L=527.0' S=0.0100 '/' Capacity=252.44 cfs Outflow=15.75 cfs 193,237 cf

Reach R3: REACH 3 Avg. Flow Depth=0.83' Max Vel=4.39 fps Inflow=27.77 cfs 433,269 cf
n=0.030 L=874.0' S=0.0138 '/' Capacity=141.56 cfs Outflow=27.76 cfs 433,266 cf

Reach R3.1: REACH 3.1 Avg. Flow Depth=0.04' Max Vel=0.54 fps Inflow=1.27 cfs 17,785 cf
n=0.025 L=179.0' S=0.0056 '/' Capacity=833.80 cfs Outflow=1.12 cfs 17,785 cf

Reach R3.2: REACH 3.2 Avg. Flow Depth=0.02' Max Vel=0.72 fps Inflow=0.83 cfs 2,472 cf
n=0.025 L=91.3' S=0.0219 '/' Capacity=1,651.08 cfs Outflow=0.79 cfs 2,472 cf

Reach R4: REACH 4 Avg. Flow Depth=0.83' Max Vel=4.89 fps Inflow=31.17 cfs 251,905 cf
n=0.030 L=144.0' S=0.0171 '/' Capacity=157.25 cfs Outflow=31.17 cfs 251,905 cf

Reach R4.1: REACH 4.1 Avg. Flow Depth=0.10' Max Vel=1.27 fps Inflow=1.86 cfs 13,912 cf
n=0.030 L=552.0' S=0.0145 '/' Capacity=390.71 cfs Outflow=1.69 cfs 13,912 cf

Reach R5: REACH 5 Avg. Flow Depth=1.50' Max Vel=7.01 fps Inflow=84.48 cfs 935,515 cf
n=0.025 L=317.0' S=0.0134 '/' Capacity=147.04 cfs Outflow=84.45 cfs 935,515 cf

Reach R6: REACH 6 Avg. Flow Depth=0.33' Max Vel=5.02 fps Inflow=29.61 cfs 200,727 cf
n=0.025 L=133.0' S=0.0328 '/' Capacity=623.19 cfs Outflow=29.61 cfs 200,727 cf

Pond AP3: 4 - 24"CMP Peak Elev=14.16' Storage=25,052 cf Inflow=86.10 cfs 967,547 cf
Primary=80.71 cfs 967,522 cf Secondary=0.00 cfs 0 cf Outflow=80.71 cfs 967,522 cf

Pond C3: CULV-3 Peak Elev=33.24' Inflow=12.07 cfs 240,033 cf
24.0" Round Culvert n=0.013 L=169.0' S=0.0095 '/' Outflow=12.07 cfs 240,033 cf

Pond C4: CULV-4 Peak Elev=21.37' Inflow=31.17 cfs 251,905 cf
24.0" Round Culvert n=0.011 L=86.0' S=0.0050 '/' Outflow=31.17 cfs 251,905 cf

Pond C7: CULV-7 Peak Elev=22.46' Storage=3,393 cf Inflow=29.61 cfs 200,727 cf
Primary=28.55 cfs 200,727 cf Secondary=0.00 cfs 0 cf Outflow=28.55 cfs 200,727 cf

Pond CB5: CB-5 Peak Elev=324.14' Inflow=0.12 cfs 366 cf
1.0" Round Culvert n=0.010 L=70.0' S=0.0050 '/' Outflow=0.12 cfs 366 cf

Pond CB6: CB-6 Peak Elev=28.35' Inflow=0.83 cfs 2,472 cf
12.0" Round Culvert n=0.013 L=184.0' S=0.0050 '/' Outflow=0.83 cfs 2,472 cf

Pond DMH-1: DMH-1 Peak Elev=33.54' Inflow=4.15 cfs 13,913 cf
24.0" Round Culvert n=0.010 L=30.0' S=0.0077 '/' Outflow=4.15 cfs 13,913 cf

Pond DMH-6: DMH-6 Peak Elev=31.05' Inflow=4.65 cfs 15,313 cf
24.0" Round Culvert n=0.010 L=6.0' S=0.2050 '/' Outflow=4.65 cfs 15,313 cf

Pond OC1: OFFSITE CULV-1 Peak Elev=36.29' Storage=84,783 cf Inflow=43.39 cfs 240,042 cf
18.0" Round Culvert n=0.013 L=97.6' S=0.0201 '/' Outflow=12.07 cfs 240,033 cf

Pond OC2: OFFSITE CULV-2 Peak Elev=36.39' Storage=34,167 cf Inflow=24.74 cfs 193,244 cf
18.0" Round Culvert n=0.013 L=93.6' S=0.0170 '/' Outflow=15.77 cfs 193,238 cf

Pond P3.1: STORMTECH DETENTION / Peak Elev=30.35' Storage=6,107 cf Inflow=4.65 cfs 15,313 cf
Outflow=0.67 cfs 15,313 cf

Pond P4.1: STORMTECH DETENTION / Peak Elev=33.72' Storage=2,359 cf Inflow=4.15 cfs 13,913 cf
Outflow=1.86 cfs 13,912 cf

Pond W: WETLAND Peak Elev=24.52' Storage=3,039 cf Inflow=28.86 cfs 182,942 cf
Outflow=28.65 cfs 182,942 cf

Link AP1: AP 1 Inflow=31.17 cfs 251,905 cf
Primary=31.17 cfs 251,905 cf

Link AP2: AP 2 Inflow=80.71 cfs 967,522 cf
Primary=80.71 cfs 967,522 cf

Total Runoff Area = 4,698,353 sf Runoff Volume = 967,568 cf Average Runoff Depth = 2.47"
84.42% Pervious = 3,966,350 sf 15.58% Impervious = 732,003 sf

Summary for Subcatchment OS1: OFFSITE SUB 1

Runoff = 43.39 cfs @ 12.42 hrs, Volume= 240,042 cf, Depth= 1.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Yr Rainfall=4.90"

Area (sf)	CN	Description
53,844	98	Paved parking & roofs
32,748	49	50-75% Grass cover, Fair, HSG A
12,803	79	50-75% Grass cover, Fair, HSG C
12,554	84	50-75% Grass cover, Fair, HSG D
205,440	30	Woods, Good, HSG A
228,765	70	Woods, Good, HSG C
921,630	77	Woods, Good, HSG D
1,467,784	70	Weighted Average
1,413,940		96.33% Pervious Area
53,844		3.67% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.6	100	0.0430	0.25		**Sheet Flow, A - B** Range n= 0.130 P2= 3.00"
0.8	75	0.0510	1.58		**Shallow Concentrated Flow, B -C** Short Grass Pasture Kv= 7.0 fps
20.3	923	0.0230	0.76		**Shallow Concentrated Flow, C - D** Woodland Kv= 5.0 fps
1.4	547	0.0180	6.31	157.83	**Channel Flow, D - E** Area= 25.0 sf Perim= 27.0' r= 0.93' n= 0.030 Earth, grassed & winding
29.1	1,645	Total			

Summary for Subcatchment OS2: OFFSITE SUB 2

Runoff = 24.74 cfs @ 12.81 hrs, Volume= 193,244 cf, Depth= 2.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Yr Rainfall=4.90"

Area (sf)	CN	Description
24,623	98	Paved parking & roofs
8,226	79	50-75% Grass cover, Fair, HSG C
13,667	84	50-75% Grass cover, Fair, HSG D
151,095	70	Woods, Good, HSG C
715,514	77	Woods, Good, HSG D
913,125	77	Weighted Average
888,502		97.30% Pervious Area
24,623		2.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.0	100	0.0530	0.11		**Sheet Flow, A - B** Woods: Light underbrush n= 0.400 P2= 3.00"
43.8	1,554	0.0140	0.59		**Shallow Concentrated Flow, B - C** Woodland Kv= 5.0 fps
58.8	1,654	Total			

Summary for Subcatchment S3: SUB 3

Runoff = 26.34 cfs @ 12.55 hrs, Volume= 165,023 cf, Depth= 2.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Yr Rainfall=4.90"

Area (sf)	CN	Description
304,505	98	Paved parking & roofs
45,477	49	50-75% Grass cover, Fair, HSG A
10,125	79	50-75% Grass cover, Fair, HSG C
78,239	84	50-75% Grass cover, Fair, HSG D
142,893	30	Woods, Good, HSG A
81,209	70	Woods, Good, HSG C
173,668	77	Woods, Good, HSG D
836,116	75	Weighted Average
531,611		63.58% Pervious Area
304,505		36.42% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.4	150	0.0950	0.15		**Sheet Flow, A - B** Woods: Light underbrush n= 0.400 P2= 3.00"
1.5	143	0.1000	1.58		**Shallow Concentrated Flow, B - C** Woodland Kv= 5.0 fps
21.3	535	0.0070	0.42		**Shallow Concentrated Flow, C -D** Woodland Kv= 5.0 fps
39.2	828	Total			

Summary for Subcatchment S3.1: SUB 3.1

Runoff = 4.65 cfs @ 12.07 hrs, Volume= 15,313 cf, Depth= 4.43"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Yr Rainfall=4.90"

Area (sf)	CN	Description
36,951	98	Paved parking & roofs
3,700	79	50-75% Grass cover, Fair, HSG C
800	84	50-75% Grass cover, Fair, HSG D
41,451	96	Weighted Average
4,500		10.86% Pervious Area
36,951		89.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.4	160	0.0100	1.11		**Sheet Flow, A - B**
					Smooth surfaces n= 0.011 P2= 3.00"
2.6					**Direct Entry, Min Tc**
5.0	160	Total			

Summary for Subcatchment S3.2: SUB 3.2

Runoff = 0.70 cfs @ 12.07 hrs, Volume= 2,106 cf, Depth= 2.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Yr Rainfall=4.90"

Area (sf)	CN	Description
798	98	Paved parking & roofs
7,924	79	50-75% Grass cover, Fair, HSG C
8,722	81	Weighted Average
7,924		90.85% Pervious Area
798		9.15% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.6	163	0.0220	1.04		**Shallow Concentrated Flow, A - B**
					Short Grass Pasture Kv= 7.0 fps
2.4					**Direct Entry,**
5.0	163	Total			

Summary for Subcatchment S3.3: SUB 3.3

Runoff = 0.12 cfs @ 12.08 hrs, Volume= 366 cf, Depth= 2.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Yr Rainfall=4.90"

Area (sf)	CN	Description
460	98	Paved parking & roofs
1,212	70	Woods, Good, HSG C
1,672	78	Weighted Average
1,212		72.49% Pervious Area
460		27.51% Impervious Area

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

Summary for Subcatchment S4: SUB 4

Runoff = 34.84 cfs @ 12.63 hrs, Volume= 236,432 cf, Depth= 2.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Yr Rainfall=4.90"

Area (sf)	CN	Description
188,582	98	Paved parking & roofs
20,781	79	50-75% Grass cover, Fair, HSG C
11,998	84	50-75% Grass cover, Fair, HSG D
419,188	73	Woods, Fair, HSG C
370,638	79	Woods, Fair, HSG D
1,011,187	80	Weighted Average
822,605		81.35% Pervious Area
188,582		18.65% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
29.3	100	0.0100	0.06		**Sheet Flow, A - B** Woods: Light underbrush n= 0.400 P2= 3.00"
3.9	284	0.0600	1.22		**Shallow Concentrated Flow, B - C** Woodland Kv= 5.0 fps
10.4	341	0.0120	0.55		**Shallow Concentrated Flow, C - D** Woodland Kv= 5.0 fps
2.6	874	0.0140	5.64	281.88	**Channel Flow, D - E** Area= 50.0 sf Perim= 53.0' r= 0.94' n= 0.030 Earth, grassed & winding
46.2	1,599	Total			

Summary for Subcatchment S4.1: SUB 4.1

Runoff = 4.15 cfs @ 12.07 hrs, Volume= 13,913 cf, Depth= 4.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Yr Rainfall=4.90"

Area (sf)	CN	Description
35,058	98	Paved parking & roofs
1,656	74	>75% Grass cover, Good, HSG C
36,714	97	Weighted Average
1,656		4.51% Pervious Area
35,058		95.49% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.9	200	0.0100	1.16		**Sheet Flow, A - B**
					Smooth surfaces n= 0.011 P2= 3.00"
0.7	81	0.0100	2.03		**Shallow Concentrated Flow, B - C**
					Paved Kv= 20.3 fps
1.4					**Direct Entry, Min Tc**
5.0	281	Total			

Summary for Subcatchment S6: SUB 6

Runoff = 8.15 cfs @ 12.19 hrs, Volume= 32,033 cf, Depth= 2.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Yr Rainfall=4.90"

Area (sf)	CN	Description
10,824	98	Paved parking & roofs
19,401	79	50-75% Grass cover, Fair, HSG C
64,092	84	50-75% Grass cover, Fair, HSG D
32,603	70	Woods, Good, HSG C
5,760	77	Woods, Good, HSG D
132,680	81	Weighted Average
121,856		91.84% Pervious Area
10,824		8.16% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.0	40	0.0410	0.08		**Sheet Flow, A - B**
					Woods: Light underbrush n= 0.400 P2= 3.00"
0.7	71	0.1120	1.67		**Shallow Concentrated Flow, B - C**
					Woodland Kv= 5.0 fps
4.5	265	0.0380	0.97		**Shallow Concentrated Flow, B - C**
					Woodland Kv= 5.0 fps
0.3	240	0.0250	11.44	686.23	**Channel Flow, C - D**
					Area= 60.0 sf Perim= 34.0' r= 1.76'
					n= 0.030 Earth, grassed & winding
13.5	616	Total			

Summary for Subcatchment S7: SUB 3

Runoff = 14.08 cfs @ 12.14 hrs, Volume= 51,178 cf, Depth= 3.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Yr Rainfall=4.90"

Area (sf)	CN	Description
72,236	98	Paved parking & roofs
66,092	84	50-75% Grass cover, Fair, HSG D
5,176	73	Woods, Fair, HSG C
23,549	79	Woods, Fair, HSG D
167,053	89	Weighted Average
94,817		56.76% Pervious Area
72,236		43.24% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.8	58	0.0430	0.20		**Sheet Flow, A - B** Grass: Short n= 0.150 P2= 3.00"
1.1	136	0.0840	2.03		**Shallow Concentrated Flow, B - C** Short Grass Pasture Kv= 7.0 fps
2.8	424	0.0150	2.49		**Shallow Concentrated Flow, C - D** Paved Kv= 20.3 fps
0.1	39	0.0450	9.55	3.33	**Pipe Channel, D - E** 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.010 PVC, smooth interior
0.3	185	0.0380	11.66	116.60	**Channel Flow, E - F** Area= 10.0 sf Perim= 12.0' r= 0.83' n= 0.022 Earth, clean & straight
0.5	137	0.0168	4.82	0.95	**Pipe Channel, F - G** 6.0" Round Area= 0.2 sf Perim= 1.6' r= 0.13' n= 0.010 PVC, smooth interior
0.4	102	0.0042	4.67	14.66	**Pipe Channel, G - H** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.013 Concrete pipe, bends & connections
10.0	1,081	Total			

Summary for Subcatchment S8: SUB 8

Runoff = 3.81 cfs @ 12.30 hrs, Volume= 17,918 cf, Depth= 2.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Yr Rainfall=4.90"

Area (sf)	CN	Description
4,122	98	Paved parking & roofs
439	79	50-75% Grass cover, Fair, HSG C
34,658	74	>75% Grass cover, Good, HSG C
4,166	73	Woods, Fair, HSG C
38,464	79	Woods, Fair, HSG D
81,849	78	Weighted Average
77,727		94.96% Pervious Area
4,122		5.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.8	120	0.0500	0.11		**Sheet Flow, A - B** Woods: Light underbrush n= 0.400 P2= 3.00"
1.4	138	0.1100	1.66		**Shallow Concentrated Flow, B - C** Woodland Kv= 5.0 fps
1.9	141	0.0320	1.25		**Shallow Concentrated Flow, C - D** Short Grass Pasture Kv= 7.0 fps
21.1	399	Total			

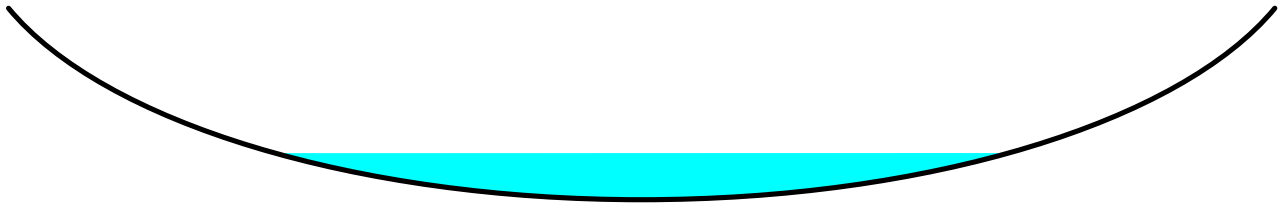
Summary for Reach R1: REACH 1

Inflow Area = 1,467,784 sf, 3.67% Impervious, Inflow Depth = 1.96" for 10-Yr event
Inflow = 12.07 cfs @ 13.17 hrs, Volume= 240,033 cf
Outflow = 12.06 cfs @ 13.29 hrs, Volume= 240,032 cf, Atten= 0%, Lag= 7.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.50 fps, Min. Travel Time= 4.3 min
Avg. Velocity = 0.53 fps, Avg. Travel Time= 12.2 min

Peak Storage= 3,099 cf @ 13.22 hrs
Average Depth at Peak Storage= 0.24'
Bank-Full Depth= 1.00' Flow Area= 66.7 sf, Capacity= 256.49 cfs

100.00' x 1.00' deep Parabolic Channel, n= 0.030 Earth, grassed & winding
Length= 386.0' Slope= 0.0104 '/'
Inlet Invert= 30.00', Outlet Invert= 26.00'



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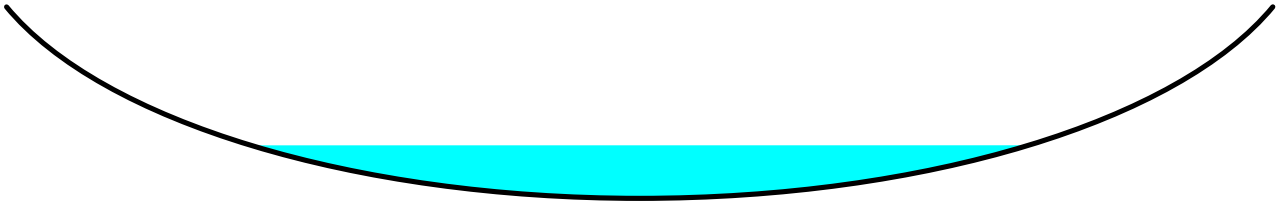
Summary for Reach R2: REACH 2

Inflow Area = 913,125 sf, 2.70% Impervious, Inflow Depth = 2.54" for 10-Yr event
Inflow = 15.77 cfs @ 13.31 hrs, Volume= 193,238 cf
Outflow = 15.75 cfs @ 13.46 hrs, Volume= 193,237 cf, Atten= 0%, Lag= 9.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.61 fps, Min. Travel Time= 5.4 min
Avg. Velocity = 0.47 fps, Avg. Travel Time= 18.7 min

Peak Storage= 5,145 cf @ 13.37 hrs
Average Depth at Peak Storage= 0.28'
Bank-Full Depth= 1.00' Flow Area= 66.7 sf, Capacity= 252.44 cfs

100.00' x 1.00' deep Parabolic Channel, n= 0.030 Earth, grassed & winding
Length= 527.0' Slope= 0.0100 '/'
Inlet Invert= 31.29', Outlet Invert= 26.00'



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Summary for Reach R3: REACH 3

Inflow Area = 2,380,909 sf, 3.30% Impervious, Inflow Depth = 2.18" for 10-Yr event
Inflow = 27.77 cfs @ 13.43 hrs, Volume= 433,269 cf
Outflow = 27.76 cfs @ 13.52 hrs, Volume= 433,266 cf, Atten= 0%, Lag= 5.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 4.39 fps, Min. Travel Time= 3.3 min
Avg. Velocity = 1.29 fps, Avg. Travel Time= 11.3 min

Peak Storage= 5,533 cf @ 13.47 hrs
Average Depth at Peak Storage= 0.83'
Bank-Full Depth= 2.00' Flow Area= 20.0 sf, Capacity= 141.56 cfs

6.00' x 2.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 2.0 '/' Top Width= 14.00'
Length= 874.0' Slope= 0.0138 '/'
Inlet Invert= 26.00', Outlet Invert= 13.90'



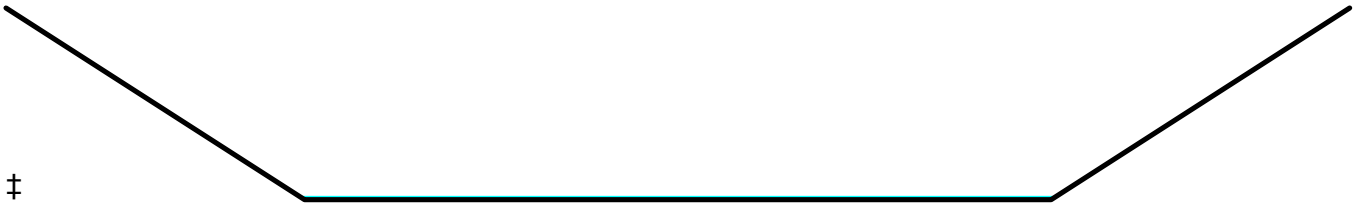
Summary for Reach R3.1: REACH 3.1

Inflow Area = 51,845 sf, 73.70% Impervious, Inflow Depth = 4.12" for 10-Yr event
Inflow = 1.27 cfs @ 12.14 hrs, Volume= 17,785 cf
Outflow = 1.12 cfs @ 12.32 hrs, Volume= 17,785 cf, Atten= 12%, Lag= 10.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.54 fps, Min. Travel Time= 5.6 min
Avg. Velocity = 0.34 fps, Avg. Travel Time= 8.7 min

Peak Storage= 375 cf @ 12.23 hrs
Average Depth at Peak Storage= 0.04'
Bank-Full Depth= 2.00' Flow Area= 140.0 sf, Capacity= 833.80 cfs

50.00' x 2.00' deep channel, n= 0.025 Earth, clean & winding
Side Slope Z-value= 10.0 '/' Top Width= 90.00'
Length= 179.0' Slope= 0.0056 '/'
Inlet Invert= 24.90', Outlet Invert= 23.90'



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Summary for Reach R3.2: REACH 3.2

Inflow Area = 10,394 sf, 12.10% Impervious, Inflow Depth = 2.85" for 10-Yr event
Inflow = 0.83 cfs @ 12.07 hrs, Volume= 2,472 cf
Outflow = 0.79 cfs @ 12.13 hrs, Volume= 2,472 cf, Atten= 4%, Lag= 3.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.72 fps, Min. Travel Time= 2.1 min
Avg. Velocity = 0.65 fps, Avg. Travel Time= 2.4 min

Peak Storage= 101 cf @ 12.10 hrs
Average Depth at Peak Storage= 0.02'
Bank-Full Depth= 2.00' Flow Area= 140.0 sf, Capacity= 1,651.08 cfs

50.00' x 2.00' deep channel, n= 0.025 Earth, clean & winding
Side Slope Z-value= 10.0 '/' Top Width= 90.00'
Length= 91.3' Slope= 0.0219 '/'
Inlet Invert= 26.90', Outlet Invert= 24.90'



‡

Summary for Reach R4: REACH 4

Inflow Area = 1,136,863 sf, 36.86% Impervious, Inflow Depth = 2.66" for 10-Yr event
Inflow = 31.17 cfs @ 12.57 hrs, Volume= 251,905 cf
Outflow = 31.17 cfs @ 12.58 hrs, Volume= 251,905 cf, Atten= 0%, Lag= 0.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 4.89 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 1.60 fps, Avg. Travel Time= 1.5 min

Peak Storage= 918 cf @ 12.57 hrs
Average Depth at Peak Storage= 0.83'
Bank-Full Depth= 2.00' Flow Area= 20.0 sf, Capacity= 157.25 cfs

6.00' x 2.00' deep channel, n= 0.030 Stream, clean & straight
Side Slope Z-value= 2.0 '/' Top Width= 14.00'
Length= 144.0' Slope= 0.0171 '/'
Inlet Invert= 16.36', Outlet Invert= 13.90'



Summary for Reach R4.1: REACH 4.1

Inflow Area = 36,714 sf, 95.49% Impervious, Inflow Depth = 4.55" for 10-Yr event
Inflow = 1.86 cfs @ 12.22 hrs, Volume= 13,912 cf
Outflow = 1.69 cfs @ 12.43 hrs, Volume= 13,912 cf, Atten= 10%, Lag= 12.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.27 fps, Min. Travel Time= 7.3 min
Avg. Velocity = 0.51 fps, Avg. Travel Time= 18.0 min

Peak Storage= 735 cf @ 12.31 hrs
Average Depth at Peak Storage= 0.10'
Bank-Full Depth= 2.00' Flow Area= 56.0 sf, Capacity= 390.71 cfs

12.00' x 2.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 8.0 '/' Top Width= 44.00'
Length= 552.0' Slope= 0.0145 '/'
Inlet Invert= 22.00', Outlet Invert= 14.00'



‡

Summary for Reach R5: REACH 5

Inflow Area = 4,565,673 sf, 15.80% Impervious, Inflow Depth = 2.46" for 10-Yr event
Inflow = 84.48 cfs @ 12.73 hrs, Volume= 935,515 cf
Outflow = 84.45 cfs @ 12.75 hrs, Volume= 935,515 cf, Atten= 0%, Lag= 1.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 7.01 fps, Min. Travel Time= 0.8 min
Avg. Velocity = 1.71 fps, Avg. Travel Time= 3.1 min

Peak Storage= 3,817 cf @ 12.74 hrs
Average Depth at Peak Storage= 1.50'
Bank-Full Depth= 2.00' Flow Area= 18.0 sf, Capacity= 147.04 cfs

5.00' x 2.00' deep channel, n= 0.025 Earth, clean & straight
Side Slope Z-value= 2.0 '/' Top Width= 13.00'
Length= 317.0' Slope= 0.0134 '/'
Inlet Invert= 13.90', Outlet Invert= 9.64'



Summary for Reach R6: REACH 6

Inflow Area = 969,810 sf, 35.76% Impervious, Inflow Depth = 2.48" for 10-Yr event
Inflow = 29.61 cfs @ 12.57 hrs, Volume= 200,727 cf
Outflow = 29.61 cfs @ 12.58 hrs, Volume= 200,727 cf, Atten= 0%, Lag= 0.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 5.02 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 1.50 fps, Avg. Travel Time= 1.5 min

Peak Storage= 784 cf @ 12.58 hrs
Average Depth at Peak Storage= 0.33'
Bank-Full Depth= 2.00' Flow Area= 42.0 sf, Capacity= 623.19 cfs

17.00' x 2.00' deep channel, n= 0.025 Earth, clean & winding
Side Slope Z-value= 2.0 '/' Top Width= 25.00'
Length= 133.0' Slope= 0.0328 '/'
Inlet Invert= 23.90', Outlet Invert= 19.54'



‡

Summary for Pond AP3: 4 - 24"CMP

Inflow Area = 4,698,353 sf, 15.58% Impervious, Inflow Depth = 2.47" for 10-Yr event
Inflow = 86.10 cfs @ 12.74 hrs, Volume= 967,547 cf
Outflow = 80.71 cfs @ 12.91 hrs, Volume= 967,522 cf, Atten= 6%, Lag= 10.0 min
Primary = 80.71 cfs @ 12.91 hrs, Volume= 967,522 cf
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 6

Peak Elev= 14.16' @ 12.91 hrs Surf.Area= 15,657 sf Storage= 25,052 cf

Plug-Flow detention time= 2.6 min calculated for 967,522 cf (100% of inflow)
Center-of-Mass det. time= 2.6 min (905.3 - 902.8)

Volume	Invert	Avail.Storage	Storage Description
#1	9.64'	96,037 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
9.64	0	0	0
10.00	856	154	154
12.00	4,037	4,893	5,047
14.00	13,588	17,625	22,672
16.00	39,016	52,604	75,276
16.50	44,026	20,761	96,037

Device	Routing	Invert	Outlet Devices
#1	Primary	9.77'	**24.0" Round Proposed 3 - 24" CMP X 3.00** L= 65.0' CMP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 9.77' / 9.12' S= 0.0100 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 3.14 sf
#2	Primary	9.83'	**24.0" Round Existing 24"CMP** L= 64.0' CMP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 9.77' / 9.83' S= -0.0009 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 3.14 sf
#3	Secondary	16.50'	**20.0' long x 25.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=80.71 cfs @ 12.91 hrs HW=14.16' (Free Discharge)
└**1=Proposed 3 - 24" CMP** (Barrel Controls 62.22 cfs @ 6.60 fps)
└**2=Existing 24"CMP** (Barrel Controls 18.49 cfs @ 5.88 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=9.64' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond C3: CULV-3

Inflow Area = 1,467,784 sf, 3.67% Impervious, Inflow Depth = 1.96" for 10-Yr event
Inflow = 12.07 cfs @ 13.17 hrs, Volume= 240,033 cf
Outflow = 12.07 cfs @ 13.17 hrs, Volume= 240,033 cf, Atten= 0%, Lag= 0.0 min
Primary = 12.07 cfs @ 13.17 hrs, Volume= 240,033 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 33.24' @ 13.17 hrs
Flood Elev= 39.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	31.60'	**24.0" Round Culvert** L= 169.0' RCP, groove end projecting, Ke= 0.200

Inlet / Outlet Invert= 31.60' / 30.00' S= 0.0095 '/' Cc= 0.900
n= 0.013 Concrete, trowel finish, Flow Area= 3.14 sf

Primary OutFlow Max=12.07 cfs @ 13.17 hrs HW=33.24' TW=31.60' (Fixed TW Elev= 31.60')
↑—**1=Culvert** (Outlet Controls 12.07 cfs @ 5.94 fps)

Summary for Pond C4: CULV-4

Inflow Area = 1,136,863 sf, 36.86% Impervious, Inflow Depth = 2.66" for 10-Yr event
Inflow = 31.17 cfs @ 12.57 hrs, Volume= 251,905 cf
Outflow = 31.17 cfs @ 12.57 hrs, Volume= 251,905 cf, Atten= 0%, Lag= 0.0 min
Primary = 31.17 cfs @ 12.57 hrs, Volume= 251,905 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 21.37' @ 12.57 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	16.79'	**24.0" Round Culvert**
			L= 86.0' RCP, groove end projecting, Ke= 0.200
			Inlet / Outlet Invert= 16.79' / 16.36' S= 0.0050 '/' Cc= 0.900
			n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf

Primary OutFlow Max=31.17 cfs @ 12.57 hrs HW=21.37' (Free Discharge)
↑—**1=Culvert** (Barrel Controls 31.17 cfs @ 9.92 fps)

Summary for Pond C7: CULV-7

Inflow Area = 969,810 sf, 35.76% Impervious, Inflow Depth = 2.48" for 10-Yr event
Inflow = 29.61 cfs @ 12.58 hrs, Volume= 200,727 cf
Outflow = 28.55 cfs @ 12.68 hrs, Volume= 200,727 cf, Atten= 4%, Lag= 5.8 min
Primary = 28.55 cfs @ 12.68 hrs, Volume= 200,727 cf
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 8
Peak Elev= 22.46' @ 12.68 hrs Surf.Area= 4,096 sf Storage= 3,393 cf

Plug-Flow detention time= 0.8 min calculated for 200,685 cf (100% of inflow)
Center-of-Mass det. time= 0.8 min (870.5 - 869.7)

Volume	Invert	Avail.Storage	Storage Description
#1	19.54'	9,728 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
19.54	0	0	0
20.00	144	33	33
21.00	890	517	550
22.00	2,015	1,453	2,003
23.00	6,588	4,302	6,304
23.50	7,106	3,424	9,728

Device	Routing	Invert	Outlet Devices
#1	Primary	19.54'	**24.0" Round 24" RCP** L= 184.0' RCP, rounded edge headwall, Ke= 0.100 Inlet / Outlet Invert= 19.54' / 16.79' S= 0.0149 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf
#2	Secondary	23.40'	**250.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=28.54 cfs @ 12.68 hrs HW=22.46' (Free Discharge)
1=24" RCP (Inlet Controls 28.54 cfs @ 9.09 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=19.54' (Free Discharge)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond CB5: CB-5

Inflow Area = 1,672 sf, 27.51% Impervious, Inflow Depth = 2.63" for 10-Yr event
Inflow = 0.12 cfs @ 12.08 hrs, Volume= 366 cf
Outflow = 0.12 cfs @ 12.08 hrs, Volume= 366 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.12 cfs @ 12.08 hrs, Volume= 366 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 324.14' @ 12.08 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	29.50'	**1.0" Round 12" CULV** L= 70.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 29.50' / 29.15' S= 0.0050 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.01 sf

Primary OutFlow Max=0.12 cfs @ 12.08 hrs HW=322.93' (Free Discharge)
1=12" CULV (Barrel Controls 0.12 cfs @ 22.43 fps)

Summary for Pond CB6: CB-6

Inflow Area = 10,394 sf, 12.10% Impervious, Inflow Depth = 2.85" for 10-Yr event
Inflow = 0.83 cfs @ 12.07 hrs, Volume= 2,472 cf
Outflow = 0.83 cfs @ 12.07 hrs, Volume= 2,472 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.83 cfs @ 12.07 hrs, Volume= 2,472 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 28.35' @ 12.07 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	27.82'	**12.0" Round 12"SD** L= 184.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 27.82' / 26.90' S= 0.0050 '/' Cc= 0.900 n= 0.013 Concrete, trowel finish, Flow Area= 0.79 sf

Primary OutFlow Max=0.83 cfs @ 12.07 hrs HW=28.35' (Free Discharge)
1=12"SD (Barrel Controls 0.83 cfs @ 2.85 fps)

Summary for Pond DMH-1: DMH-1

Inflow Area = 36,714 sf, 95.49% Impervious, Inflow Depth = 4.55" for 10-Yr event
Inflow = 4.15 cfs @ 12.07 hrs, Volume= 13,913 cf
Outflow = 4.15 cfs @ 12.07 hrs, Volume= 13,913 cf, Atten= 0%, Lag= 0.0 min
Primary = 4.15 cfs @ 12.07 hrs, Volume= 13,913 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 33.54' @ 12.07 hrs
Flood Elev= 36.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	32.58'	**24.0" Round 24" SD to Detention Bed** L= 30.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 32.58' / 32.35' S= 0.0077 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=4.15 cfs @ 12.07 hrs HW=33.54' (Free Discharge)
1=24" SD to Detention Bed (Barrel Controls 4.15 cfs @ 4.09 fps)

Summary for Pond DMH-6: DMH-6

Inflow Area = 41,451 sf, 89.14% Impervious, Inflow Depth = 4.43" for 10-Yr event
Inflow = 4.65 cfs @ 12.07 hrs, Volume= 15,313 cf
Outflow = 4.65 cfs @ 12.07 hrs, Volume= 15,313 cf, Atten= 0%, Lag= 0.0 min
Primary = 4.65 cfs @ 12.07 hrs, Volume= 15,313 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 31.05' @ 12.07 hrs
Flood Elev= 32.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	30.13'	**24.0" Round 24" SD to Detention Bed** L= 6.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 30.13' / 28.90' S= 0.2050 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=4.64 cfs @ 12.07 hrs HW=31.05' (Free Discharge)
1=24" SD to Detention Bed (Inlet Controls 4.64 cfs @ 3.27 fps)

Summary for Pond OC1: OFFSITE CULV-1

Inflow Area = 1,467,784 sf, 3.67% Impervious, Inflow Depth = 1.96" for 10-Yr event
Inflow = 43.39 cfs @ 12.42 hrs, Volume= 240,042 cf
Outflow = 12.07 cfs @ 13.17 hrs, Volume= 240,033 cf, Atten= 72%, Lag= 44.6 min
Primary = 12.07 cfs @ 13.17 hrs, Volume= 240,033 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 36.29' @ 13.17 hrs Surf.Area= 77,683 sf Storage= 84,783 cf

Plug-Flow detention time= 91.3 min calculated for 239,983 cf (100% of inflow)
Center-of-Mass det. time= 91.4 min (961.6 - 870.2)

Volume	Invert	Avail.Storage	Storage Description
#1	34.25'	602,689 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
34.25	5,289	0	0
36.00	67,698	63,864	63,864
38.00	137,090	204,788	268,652
40.00	196,947	334,037	602,689

Device	Routing	Invert	Outlet Devices
#1	Primary	34.25'	**18.0" Round 18" RCP** L= 97.6' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 34.25' / 32.29' S= 0.0201 '/' Cc= 0.900 n= 0.013 Concrete, trowel finish, Flow Area= 1.77 sf

Primary OutFlow Max=12.07 cfs @ 13.17 hrs HW=36.29' (Free Discharge)
↑—**1=18" RCP** (Inlet Controls 12.07 cfs @ 6.83 fps)

Summary for Pond OC2: OFFSITE CULV-2

Inflow Area = 913,125 sf, 2.70% Impervious, Inflow Depth = 2.54" for 10-Yr event
Inflow = 24.74 cfs @ 12.81 hrs, Volume= 193,244 cf
Outflow = 15.77 cfs @ 13.31 hrs, Volume= 193,238 cf, Atten= 36%, Lag= 30.0 min
Primary = 15.77 cfs @ 13.31 hrs, Volume= 193,238 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 36.39' @ 13.31 hrs Surf.Area= 15,927 sf Storage= 34,167 cf

Plug-Flow detention time= 30.2 min calculated for 193,238 cf (100% of inflow)
Center-of-Mass det. time= 30.1 min (909.7 - 879.6)

Volume	Invert	Avail.Storage	Storage Description
#1	32.88'	71,548 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
32.88	5,285	0	0
34.00	8,520	7,731	7,731
36.00	12,392	20,912	28,643
38.00	30,513	42,905	71,548

Device	Routing	Invert	Outlet Devices
#1	Primary	32.88'	**18.0" Round 18" RCP** L= 93.6' RCP, groove end projecting, Ke= 0.200

Inlet / Outlet Invert= 32.88' / 31.29' S= 0.0170 '/' Cc= 0.900
n= 0.013 Concrete, trowel finish, Flow Area= 1.77 sf

Primary OutFlow Max=15.77 cfs @ 13.31 hrs HW=36.39' (Free Discharge)
└**1=18" RCP** (Barrel Controls 15.77 cfs @ 8.92 fps)

Summary for Pond P3.1: STORMTECH DETENTION / OCS-2

Inflow Area = 41,451 sf, 89.14% Impervious, Inflow Depth = 4.43" for 10-Yr event
Inflow = 4.65 cfs @ 12.07 hrs, Volume= 15,313 cf
Outflow = 0.67 cfs @ 12.55 hrs, Volume= 15,313 cf, Atten= 86%, Lag= 28.9 min
Primary = 0.67 cfs @ 12.55 hrs, Volume= 15,313 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 30.35' @ 12.55 hrs Surf.Area= 3,328 sf Storage= 6,107 cf
Flood Elev= 31.21' Surf.Area= 3,328 sf Storage= 7,258 cf

Plug-Flow detention time= 135.9 min calculated for 15,313 cf (100% of inflow)
Center-of-Mass det. time= 135.9 min (897.9 - 761.9)

Volume	Invert	Avail.Storage	Storage Description
#1	27.67'	2,926 cf	**34.70'W x 95.90'L x 3.50'H Prismatoid** 11,647 cf Overall - 4,331 cf Embedded = 7,316 cf x 40.0% Voids
#2	28.17'	4,331 cf	**ADS_StormTech SC-740 @ 95.90' L** x 7 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 95.90'L = 618.8 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
		7,258 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	25.15'	**24.0" Round 24" SD** L= 15.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 25.15' / 25.00' S= 0.0100 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 3.14 sf
#2	Device 1	25.15'	**2.0" Vert. 2" Orifice** C= 0.600
#3	Device 1	29.12'	**4.0" Vert. 4" Orifice** C= 0.600
#4	Device 1	30.90'	**6.0' long Sharp-Crested Vee/Trap Weir** Cv= 2.62 (C= 3.28)

Primary OutFlow Max=0.67 cfs @ 12.55 hrs HW=30.35' (Free Discharge)
└**1=24" SD** (Passes 0.67 cfs of 24.47 cfs potential flow)
  ├**2=2" Orifice** (Orifice Controls 0.24 cfs @ 10.89 fps)
  ├**3=4" Orifice** (Orifice Controls 0.43 cfs @ 4.96 fps)
  └**4=Sharp-Crested Vee/Trap Weir** (Controls 0.00 cfs)

Summary for Pond P4.1: STORMTECH DETENTION / OCS-1

Inflow Area = 36,714 sf, 95.49% Impervious, Inflow Depth = 4.55" for 10-Yr event
Inflow = 4.15 cfs @ 12.07 hrs, Volume= 13,913 cf
Outflow = 1.86 cfs @ 12.22 hrs, Volume= 13,912 cf, Atten= 55%, Lag= 9.2 min
Primary = 1.86 cfs @ 12.22 hrs, Volume= 13,912 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 4

Peak Elev= 33.72' @ 12.22 hrs Surf.Area= 1,702 sf Storage= 2,359 cf
Flood Elev= 34.78' Surf.Area= 1,702 sf Storage= 3,388 cf

Plug-Flow detention time= 9.8 min calculated for 13,910 cf (100% of inflow)
Center-of-Mass det. time= 9.8 min (765.1 - 755.3)

Volume	Invert	Avail.Storage	Storage Description
#1	31.72'	1,513 cf	**25.25'W x 67.40'L x 3.50'H Prismatoid** 5,956 cf Overall - 2,174 cf Embedded = 3,782 cf x 40.0% Voids
#2	32.22'	2,174 cf	**ADS_StormTech SC-740 @ 67.40' L** x 5 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 67.40'L = 434.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
		3,687 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	28.76'	**24.0" Round 24" SD** L= 268.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 28.76' / 22.00' S= 0.0252 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 3.14 sf
#2	Device 1	28.76'	**4.0" Vert. 4" Orifice** C= 0.600
#3	Device 1	32.90'	**6.0" Vert. 6" Orifice** C= 0.600
#4	Device 1	33.65'	**4.0' long x 2.00' rise Sharp-Crested Vee/Trap Weir** Cv= 2.62 (C= 3.28)

Primary OutFlow Max=1.86 cfs @ 12.22 hrs HW=33.72' (Free Discharge)
↑—**1=24" SD** (Passes 1.86 cfs of 23.76 cfs potential flow)
↑—**2=4" Orifice** (Orifice Controls 0.92 cfs @ 10.54 fps)
—**3=6" Orifice** (Orifice Controls 0.71 cfs @ 3.63 fps)
—**4=Sharp-Crested Vee/Trap Weir** (Weir Controls 0.23 cfs @ 0.85 fps)

Summary for Pond W: WETLAND

Inflow Area = 917,965 sf, 33.62% Impervious, Inflow Depth = 2.39" for 10-Yr event
Inflow = 28.86 cfs @ 12.54 hrs, Volume= 182,942 cf
Outflow = 28.65 cfs @ 12.57 hrs, Volume= 182,942 cf, Atten= 1%, Lag= 2.0 min
Primary = 28.65 cfs @ 12.57 hrs, Volume= 182,942 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 8
Peak Elev= 24.52' @ 12.57 hrs Surf.Area= 11,189 sf Storage= 3,039 cf

Plug-Flow detention time= 0.9 min calculated for 182,904 cf (100% of inflow)
Center-of-Mass det. time= 0.9 min (865.2 - 864.2)

Volume	Invert	Avail.Storage	Storage Description
#1	23.90'	42,267 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
23.90	0	0	0
24.00	412	21	21
26.00	41,834	42,246	42,267

Device	Routing	Invert	Outlet Devices
#1	Primary	23.90'	**152.0 deg x 17.0' long Sharp-Crested Vee/Trap Weir** Cv= 2.47 (C= 3.09)

Primary OutFlow Max=28.65 cfs @ 12.57 hrs HW=24.52' (Free Discharge)
1=Sharp-Crested Vee/Trap Weir (Weir Controls 28.65 cfs @ 2.37 fps)

Summary for Link AP1: AP 1

Inflow Area = 1,136,863 sf, 36.86% Impervious, Inflow Depth = 2.66" for 10-Yr event
Inflow = 31.17 cfs @ 12.57 hrs, Volume= 251,905 cf
Primary = 31.17 cfs @ 12.57 hrs, Volume= 251,905 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Summary for Link AP2: AP 2

Inflow Area = 4,698,353 sf, 15.58% Impervious, Inflow Depth = 2.47" for 10-Yr event
Inflow = 80.71 cfs @ 12.91 hrs, Volume= 967,522 cf
Primary = 80.71 cfs @ 12.91 hrs, Volume= 967,522 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment OS1: OFFSITE SUB 1 Runoff Area=1,467,784 sf 3.67% Impervious Runoff Depth=2.96"
Flow Length=1,645' Tc=29.1 min CN=70 Runoff=66.68 cfs 362,632 cf

Subcatchment OS2: OFFSITE SUB 2 Runoff Area=913,125 sf 2.70% Impervious Runoff Depth=3.65"
Flow Length=1,654' Tc=58.8 min CN=77 Runoff=35.70 cfs 278,070 cf

Subcatchment S3: SUB 3 Runoff Area=836,116 sf 36.42% Impervious Runoff Depth=3.45"
Flow Length=828' Tc=39.2 min CN=75 Runoff=38.62 cfs 240,602 cf

Subcatchment S3.1: SUB 3.1 Runoff Area=41,451 sf 89.14% Impervious Runoff Depth=5.73"
Flow Length=160' Slope=0.0100 '/' Tc=5.0 min CN=96 Runoff=5.92 cfs 19,781 cf

Subcatchment S3.2: SUB 3.2 Runoff Area=8,722 sf 9.15% Impervious Runoff Depth=4.07"
Flow Length=163' Slope=0.0220 '/' Tc=5.0 min CN=81 Runoff=0.98 cfs 2,956 cf

Subcatchment S3.3: SUB 3.3 Runoff Area=1,672 sf 27.51% Impervious Runoff Depth=3.76"
Tc=5.0 min CN=78 Runoff=0.17 cfs 523 cf

Subcatchment S4: SUB 4 Runoff Area=1,011,187 sf 18.65% Impervious Runoff Depth=3.96"
Flow Length=1,599' Tc=46.2 min CN=80 Runoff=49.08 cfs 333,877 cf

Subcatchment S4.1: SUB 4.1 Runoff Area=36,714 sf 95.49% Impervious Runoff Depth=5.84"
Flow Length=281' Slope=0.0100 '/' Tc=5.0 min CN=97 Runoff=5.28 cfs 17,879 cf

Subcatchment S6: SUB 6 Runoff Area=132,680 sf 8.16% Impervious Runoff Depth=4.07"
Flow Length=616' Tc=13.5 min CN=81 Runoff=11.37 cfs 44,961 cf

Subcatchment S7: SUB 3 Runoff Area=167,053 sf 43.24% Impervious Runoff Depth=4.93"
Flow Length=1,081' Tc=10.0 min CN=89 Runoff=18.60 cfs 68,622 cf

Subcatchment S8: SUB 8 Runoff Area=81,849 sf 5.04% Impervious Runoff Depth=3.76"
Flow Length=399' Tc=21.1 min CN=78 Runoff=5.45 cfs 25,620 cf

Reach R1: REACH 1 Avg. Flow Depth=0.27' Max Vel=1.59 fps Inflow=14.59 cfs 362,623 cf
n=0.030 L=386.0' S=0.0104 '/' Capacity=256.49 cfs Outflow=14.59 cfs 362,621 cf

Reach R2: REACH 2 Avg. Flow Depth=0.30' Max Vel=1.69 fps Inflow=18.37 cfs 278,064 cf
n=0.030 L=527.0' S=0.0100 '/' Capacity=252.44 cfs Outflow=18.35 cfs 278,063 cf

Reach R3: REACH 3 Avg. Flow Depth=0.91' Max Vel=4.63 fps Inflow=32.93 cfs 640,684 cf
n=0.030 L=874.0' S=0.0138 '/' Capacity=141.56 cfs Outflow=32.92 cfs 640,681 cf

Reach R3.1: REACH 3.1 Avg. Flow Depth=0.07' Max Vel=0.76 fps Inflow=2.89 cfs 23,260 cf
n=0.025 L=179.0' S=0.0056 '/' Capacity=833.80 cfs Outflow=2.70 cfs 23,260 cf

Reach R3.2: REACH 3.2 Avg. Flow Depth=0.03' Max Vel=0.84 fps Inflow=1.16 cfs 3,479 cf
n=0.025 L=91.3' S=0.0219 '/' Capacity=1,651.08 cfs Outflow=1.13 cfs 3,479 cf

Reach R4: REACH 4 Avg. Flow Depth=1.06' Max Vel=5.59 fps Inflow=48.21 cfs 358,096 cf
n=0.030 L=144.0' S=0.0171 '/' Capacity=157.25 cfs Outflow=48.14 cfs 358,096 cf

Reach R4.1: REACH 4.1 Avg. Flow Depth=0.15' Max Vel=1.57 fps Inflow=3.99 cfs 17,880 cf
n=0.030 L=552.0' S=0.0145 '/' Capacity=390.71 cfs Outflow=3.05 cfs 17,880 cf

Reach R5: REACH 5 Avg. Flow Depth=1.80' Max Vel=7.72 fps Inflow=119.28 cfs 1,350,533 cf
n=0.025 L=317.0' S=0.0134 '/' Capacity=147.04 cfs Outflow=119.24 cfs 1,350,532 cf

Reach R6: REACH 6 Avg. Flow Depth=0.42' Max Vel=5.82 fps Inflow=43.76 cfs 289,481 cf
n=0.025 L=133.0' S=0.0328 '/' Capacity=623.19 cfs Outflow=43.76 cfs 289,481 cf

Pond AP3: 4 - 24"CMP Peak Elev=15.68' Storage=63,328 cf Inflow=122.25 cfs 1,395,494 cf
Primary=99.77 cfs 1,395,479 cf Secondary=0.00 cfs 0 cf Outflow=99.77 cfs 1,395,479 cf

Pond C3: CULV-3 Peak Elev=33.42' Inflow=14.59 cfs 362,623 cf
24.0" Round Culvert n=0.013 L=169.0' S=0.0095 '/' Outflow=14.59 cfs 362,623 cf

Pond C4: CULV-4 Peak Elev=25.56' Inflow=48.21 cfs 358,096 cf
24.0" Round Culvert n=0.011 L=86.0' S=0.0050 '/' Outflow=48.21 cfs 358,096 cf

Pond C7: CULV-7 Peak Elev=23.47' Storage=9,483 cf Inflow=43.76 cfs 289,481 cf
Primary=32.92 cfs 280,765 cf Secondary=10.80 cfs 8,708 cf Outflow=43.72 cfs 289,474 cf

Pond CB5: CB-5 Peak Elev=629.89' Inflow=0.17 cfs 523 cf
1.0" Round Culvert n=0.010 L=70.0' S=0.0050 '/' Outflow=0.17 cfs 523 cf

Pond CB6: CB-6 Peak Elev=28.46' Inflow=1.16 cfs 3,479 cf
12.0" Round Culvert n=0.013 L=184.0' S=0.0050 '/' Outflow=1.16 cfs 3,479 cf

Pond DMH-1: DMH-1 Peak Elev=33.68' Inflow=5.28 cfs 17,879 cf
24.0" Round Culvert n=0.010 L=30.0' S=0.0077 '/' Outflow=5.28 cfs 17,879 cf

Pond DMH-6: DMH-6 Peak Elev=31.19' Inflow=5.92 cfs 19,781 cf
24.0" Round Culvert n=0.010 L=6.0' S=0.2050 '/' Outflow=5.92 cfs 19,781 cf

Pond OC1: OFFSITE CULV-1 Peak Elev=36.95' Storage=143,927 cf Inflow=66.68 cfs 362,632 cf
18.0" Round Culvert n=0.013 L=97.6' S=0.0201 '/' Outflow=14.59 cfs 362,623 cf

Pond OC2: OFFSITE CULV-2 Peak Elev=37.67' Storage=62,087 cf Inflow=35.70 cfs 278,070 cf
18.0" Round Culvert n=0.013 L=93.6' S=0.0170 '/' Outflow=18.37 cfs 278,064 cf

Pond P3.1: STORMTECH DETENTION / Peak Elev=31.08' Storage=7,136 cf Inflow=5.92 cfs 19,781 cf
Outflow=2.30 cfs 19,781 cf

Pond P4.1: STORMTECH DETENTION / Peak Elev=33.95' Storage=2,637 cf Inflow=5.28 cfs 17,879 cf
Outflow=3.99 cfs 17,880 cf

Pond W: WETLAND Peak Elev=24.68' Storage=5,150 cf Inflow=42.30 cfs 266,221 cf
Outflow=41.85 cfs 266,221 cf

Link AP1: AP 1 Inflow=48.21 cfs 358,096 cf
Primary=48.21 cfs 358,096 cf

Link AP2: AP 2 Inflow=99.77 cfs 1,395,479 cf
Primary=99.77 cfs 1,395,479 cf

Total Runoff Area = 4,698,353 sf Runoff Volume = 1,395,522 cf Average Runoff Depth = 3.56"
84.42% Pervious = 3,966,350 sf 15.58% Impervious = 732,003 sf

Summary for Subcatchment OS1: OFFSITE SUB 1

Runoff = 66.68 cfs @ 12.41 hrs, Volume= 362,632 cf, Depth= 2.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Yr Rainfall=6.20"

Area (sf)	CN	Description
53,844	98	Paved parking & roofs
32,748	49	50-75% Grass cover, Fair, HSG A
12,803	79	50-75% Grass cover, Fair, HSG C
12,554	84	50-75% Grass cover, Fair, HSG D
205,440	30	Woods, Good, HSG A
228,765	70	Woods, Good, HSG C
921,630	77	Woods, Good, HSG D
1,467,784	70	Weighted Average
1,413,940		96.33% Pervious Area
53,844		3.67% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.6	100	0.0430	0.25		**Sheet Flow, A - B** Range n= 0.130 P2= 3.00"
0.8	75	0.0510	1.58		**Shallow Concentrated Flow, B -C** Short Grass Pasture Kv= 7.0 fps
20.3	923	0.0230	0.76		**Shallow Concentrated Flow, C - D** Woodland Kv= 5.0 fps
1.4	547	0.0180	6.31	157.83	**Channel Flow, D - E** Area= 25.0 sf Perim= 27.0' r= 0.93' n= 0.030 Earth, grassed & winding
29.1	1,645	Total			

Summary for Subcatchment OS2: OFFSITE SUB 2

Runoff = 35.70 cfs @ 12.80 hrs, Volume= 278,070 cf, Depth= 3.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Yr Rainfall=6.20"

Area (sf)	CN	Description
24,623	98	Paved parking & roofs
8,226	79	50-75% Grass cover, Fair, HSG C
13,667	84	50-75% Grass cover, Fair, HSG D
151,095	70	Woods, Good, HSG C
715,514	77	Woods, Good, HSG D
913,125	77	Weighted Average
888,502		97.30% Pervious Area
24,623		2.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.0	100	0.0530	0.11		**Sheet Flow, A - B** Woods: Light underbrush n= 0.400 P2= 3.00"
43.8	1,554	0.0140	0.59		**Shallow Concentrated Flow, B - C** Woodland Kv= 5.0 fps
58.8	1,654	Total			

Summary for Subcatchment S3: SUB 3

Runoff = 38.62 cfs @ 12.54 hrs, Volume= 240,602 cf, Depth= 3.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Yr Rainfall=6.20"

Area (sf)	CN	Description
304,505	98	Paved parking & roofs
45,477	49	50-75% Grass cover, Fair, HSG A
10,125	79	50-75% Grass cover, Fair, HSG C
78,239	84	50-75% Grass cover, Fair, HSG D
142,893	30	Woods, Good, HSG A
81,209	70	Woods, Good, HSG C
173,668	77	Woods, Good, HSG D
836,116	75	Weighted Average
531,611		63.58% Pervious Area
304,505		36.42% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.4	150	0.0950	0.15		**Sheet Flow, A - B** Woods: Light underbrush n= 0.400 P2= 3.00"
1.5	143	0.1000	1.58		**Shallow Concentrated Flow, B - C** Woodland Kv= 5.0 fps
21.3	535	0.0070	0.42		**Shallow Concentrated Flow, C -D** Woodland Kv= 5.0 fps
39.2	828	Total			

Summary for Subcatchment S3.1: SUB 3.1

Runoff = 5.92 cfs @ 12.07 hrs, Volume= 19,781 cf, Depth= 5.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Yr Rainfall=6.20"

Area (sf)	CN	Description
36,951	98	Paved parking & roofs
3,700	79	50-75% Grass cover, Fair, HSG C
800	84	50-75% Grass cover, Fair, HSG D
41,451	96	Weighted Average
4,500		10.86% Pervious Area
36,951		89.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.4	160	0.0100	1.11		**Sheet Flow, A - B**
					Smooth surfaces n= 0.011 P2= 3.00"
2.6					**Direct Entry, Min Tc**
5.0	160	Total			

Summary for Subcatchment S3.2: SUB 3.2

Runoff = 0.98 cfs @ 12.07 hrs, Volume= 2,956 cf, Depth= 4.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Yr Rainfall=6.20"

Area (sf)	CN	Description
798	98	Paved parking & roofs
7,924	79	50-75% Grass cover, Fair, HSG C
8,722	81	Weighted Average
7,924		90.85% Pervious Area
798		9.15% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.6	163	0.0220	1.04		**Shallow Concentrated Flow, A - B**
					Short Grass Pasture Kv= 7.0 fps
2.4					**Direct Entry,**
5.0	163	Total			

Summary for Subcatchment S3.3: SUB 3.3

Runoff = 0.17 cfs @ 12.07 hrs, Volume= 523 cf, Depth= 3.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Yr Rainfall=6.20"

Area (sf)	CN	Description
460	98	Paved parking & roofs
1,212	70	Woods, Good, HSG C
1,672	78	Weighted Average
1,212		72.49% Pervious Area
460		27.51% Impervious Area

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

Summary for Subcatchment S4: SUB 4

Runoff = 49.08 cfs @ 12.63 hrs, Volume= 333,877 cf, Depth= 3.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Yr Rainfall=6.20"

Area (sf)	CN	Description
188,582	98	Paved parking & roofs
20,781	79	50-75% Grass cover, Fair, HSG C
11,998	84	50-75% Grass cover, Fair, HSG D
419,188	73	Woods, Fair, HSG C
370,638	79	Woods, Fair, HSG D
1,011,187	80	Weighted Average
822,605		81.35% Pervious Area
188,582		18.65% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
29.3	100	0.0100	0.06		**Sheet Flow, A - B** Woods: Light underbrush n= 0.400 P2= 3.00"
3.9	284	0.0600	1.22		**Shallow Concentrated Flow, B - C** Woodland Kv= 5.0 fps
10.4	341	0.0120	0.55		**Shallow Concentrated Flow, C - D** Woodland Kv= 5.0 fps
2.6	874	0.0140	5.64	281.88	**Channel Flow, D - E** Area= 50.0 sf Perim= 53.0' r= 0.94' n= 0.030 Earth, grassed & winding
46.2	1,599	Total			

Summary for Subcatchment S4.1: SUB 4.1

Runoff = 5.28 cfs @ 12.07 hrs, Volume= 17,879 cf, Depth= 5.84"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Yr Rainfall=6.20"

Area (sf)	CN	Description
35,058	98	Paved parking & roofs
1,656	74	>75% Grass cover, Good, HSG C
36,714	97	Weighted Average
1,656		4.51% Pervious Area
35,058		95.49% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.9	200	0.0100	1.16		**Sheet Flow, A - B**
					Smooth surfaces n= 0.011 P2= 3.00"
0.7	81	0.0100	2.03		**Shallow Concentrated Flow, B - C**
					Paved Kv= 20.3 fps
1.4					**Direct Entry, Min Tc**
5.0	281	Total			

Summary for Subcatchment S6: SUB 6

Runoff = 11.37 cfs @ 12.18 hrs, Volume= 44,961 cf, Depth= 4.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Yr Rainfall=6.20"

Area (sf)	CN	Description
10,824	98	Paved parking & roofs
19,401	79	50-75% Grass cover, Fair, HSG C
64,092	84	50-75% Grass cover, Fair, HSG D
32,603	70	Woods, Good, HSG C
5,760	77	Woods, Good, HSG D
132,680	81	Weighted Average
121,856		91.84% Pervious Area
10,824		8.16% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.0	40	0.0410	0.08		**Sheet Flow, A - B**
					Woods: Light underbrush n= 0.400 P2= 3.00"
0.7	71	0.1120	1.67		**Shallow Concentrated Flow, B - C**
					Woodland Kv= 5.0 fps
4.5	265	0.0380	0.97		**Shallow Concentrated Flow, B - C**
					Woodland Kv= 5.0 fps
0.3	240	0.0250	11.44	686.23	**Channel Flow, C - D**
					Area= 60.0 sf Perim= 34.0' r= 1.76'
					n= 0.030 Earth, grassed & winding
13.5	616	Total			

Summary for Subcatchment S7: SUB 3

Runoff = 18.60 cfs @ 12.14 hrs, Volume= 68,622 cf, Depth= 4.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Yr Rainfall=6.20"

Area (sf)	CN	Description
72,236	98	Paved parking & roofs
66,092	84	50-75% Grass cover, Fair, HSG D
5,176	73	Woods, Fair, HSG C
23,549	79	Woods, Fair, HSG D
167,053	89	Weighted Average
94,817		56.76% Pervious Area
72,236		43.24% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.8	58	0.0430	0.20		**Sheet Flow, A - B** Grass: Short n= 0.150 P2= 3.00"
1.1	136	0.0840	2.03		**Shallow Concentrated Flow, B - C** Short Grass Pasture Kv= 7.0 fps
2.8	424	0.0150	2.49		**Shallow Concentrated Flow, C - D** Paved Kv= 20.3 fps
0.1	39	0.0450	9.55	3.33	**Pipe Channel, D - E** 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.010 PVC, smooth interior
0.3	185	0.0380	11.66	116.60	**Channel Flow, E - F** Area= 10.0 sf Perim= 12.0' r= 0.83' n= 0.022 Earth, clean & straight
0.5	137	0.0168	4.82	0.95	**Pipe Channel, F - G** 6.0" Round Area= 0.2 sf Perim= 1.6' r= 0.13' n= 0.010 PVC, smooth interior
0.4	102	0.0042	4.67	14.66	**Pipe Channel, G - H** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.013 Concrete pipe, bends & connections
10.0	1,081	Total			

Summary for Subcatchment S8: SUB 8

Runoff = 5.45 cfs @ 12.29 hrs, Volume= 25,620 cf, Depth= 3.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Yr Rainfall=6.20"

Area (sf)	CN	Description
4,122	98	Paved parking & roofs
439	79	50-75% Grass cover, Fair, HSG C
34,658	74	>75% Grass cover, Good, HSG C
4,166	73	Woods, Fair, HSG C
38,464	79	Woods, Fair, HSG D
81,849	78	Weighted Average
77,727		94.96% Pervious Area
4,122		5.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.8	120	0.0500	0.11		**Sheet Flow, A - B** Woods: Light underbrush n= 0.400 P2= 3.00"
1.4	138	0.1100	1.66		**Shallow Concentrated Flow, B - C** Woodland Kv= 5.0 fps
1.9	141	0.0320	1.25		**Shallow Concentrated Flow, C - D** Short Grass Pasture Kv= 7.0 fps
21.1	399	Total			

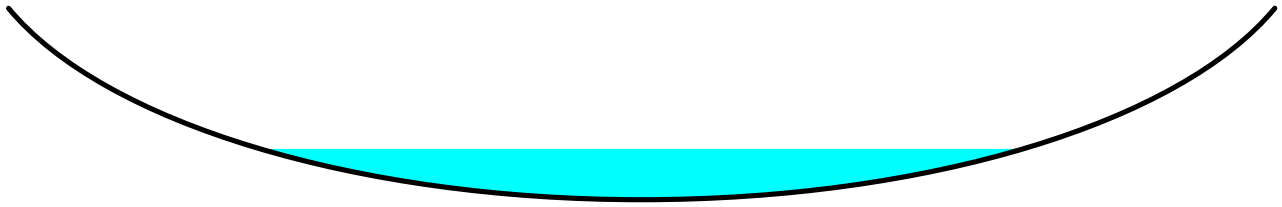
Summary for Reach R1: REACH 1

Inflow Area = 1,467,784 sf, 3.67% Impervious, Inflow Depth = 2.96" for 25-Yr event
Inflow = 14.59 cfs @ 13.30 hrs, Volume= 362,623 cf
Outflow = 14.59 cfs @ 13.42 hrs, Volume= 362,621 cf, Atten= 0%, Lag= 7.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.59 fps, Min. Travel Time= 4.0 min
Avg. Velocity = 0.59 fps, Avg. Travel Time= 10.9 min

Peak Storage= 3,536 cf @ 13.35 hrs
Average Depth at Peak Storage= 0.27'
Bank-Full Depth= 1.00' Flow Area= 66.7 sf, Capacity= 256.49 cfs

100.00' x 1.00' deep Parabolic Channel, n= 0.030 Earth, grassed & winding
Length= 386.0' Slope= 0.0104 '/'
Inlet Invert= 30.00', Outlet Invert= 26.00'



‡

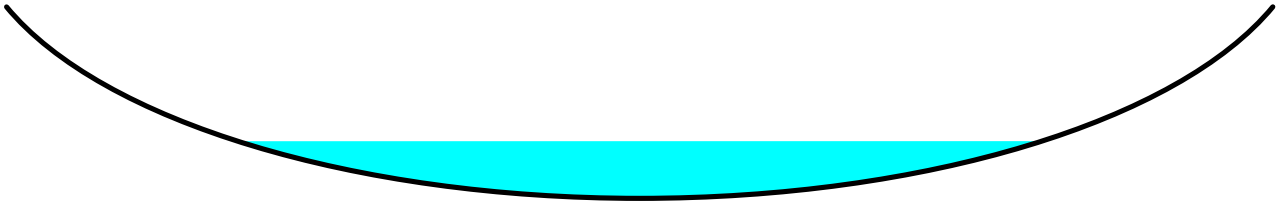
Summary for Reach R2: REACH 2

Inflow Area = 913,125 sf, 2.70% Impervious, Inflow Depth = 3.65" for 25-Yr event
Inflow = 18.37 cfs @ 13.45 hrs, Volume= 278,064 cf
Outflow = 18.35 cfs @ 13.60 hrs, Volume= 278,063 cf, Atten= 0%, Lag= 9.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.69 fps, Min. Travel Time= 5.2 min
Avg. Velocity = 0.51 fps, Avg. Travel Time= 17.1 min

Peak Storage= 5,722 cf @ 13.51 hrs
Average Depth at Peak Storage= 0.30'
Bank-Full Depth= 1.00' Flow Area= 66.7 sf, Capacity= 252.44 cfs

100.00' x 1.00' deep Parabolic Channel, n= 0.030 Earth, grassed & winding
Length= 527.0' Slope= 0.0100 '/'
Inlet Invert= 31.29', Outlet Invert= 26.00'



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Summary for Reach R3: REACH 3

Inflow Area = 2,380,909 sf, 3.30% Impervious, Inflow Depth = 3.23" for 25-Yr event
Inflow = 32.93 cfs @ 13.57 hrs, Volume= 640,684 cf
Outflow = 32.92 cfs @ 13.66 hrs, Volume= 640,681 cf, Atten= 0%, Lag= 5.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 4.63 fps, Min. Travel Time= 3.1 min
Avg. Velocity = 1.45 fps, Avg. Travel Time= 10.0 min

Peak Storage= 6,222 cf @ 13.61 hrs
Average Depth at Peak Storage= 0.91'
Bank-Full Depth= 2.00' Flow Area= 20.0 sf, Capacity= 141.56 cfs

6.00' x 2.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 2.0 '/' Top Width= 14.00'
Length= 874.0' Slope= 0.0138 '/'
Inlet Invert= 26.00', Outlet Invert= 13.90'



Summary for Reach R3.1: REACH 3.1

Inflow Area = 51,845 sf, 73.70% Impervious, Inflow Depth = 5.38" for 25-Yr event
Inflow = 2.89 cfs @ 12.27 hrs, Volume= 23,260 cf
Outflow = 2.70 cfs @ 12.38 hrs, Volume= 23,260 cf, Atten= 7%, Lag= 7.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.76 fps, Min. Travel Time= 3.9 min
Avg. Velocity = 0.35 fps, Avg. Travel Time= 8.5 min

Peak Storage= 638 cf @ 12.32 hrs
Average Depth at Peak Storage= 0.07'
Bank-Full Depth= 2.00' Flow Area= 140.0 sf, Capacity= 833.80 cfs

50.00' x 2.00' deep channel, n= 0.025 Earth, clean & winding
Side Slope Z-value= 10.0 '/' Top Width= 90.00'
Length= 179.0' Slope= 0.0056 '/'
Inlet Invert= 24.90', Outlet Invert= 23.90'



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Summary for Reach R3.2: REACH 3.2

Inflow Area = 10,394 sf, 12.10% Impervious, Inflow Depth = 4.02" for 25-Yr event
Inflow = 1.16 cfs @ 12.07 hrs, Volume= 3,479 cf
Outflow = 1.13 cfs @ 12.12 hrs, Volume= 3,479 cf, Atten= 3%, Lag= 2.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.84 fps, Min. Travel Time= 1.8 min
Avg. Velocity = 0.65 fps, Avg. Travel Time= 2.3 min

Peak Storage= 123 cf @ 12.09 hrs
Average Depth at Peak Storage= 0.03'
Bank-Full Depth= 2.00' Flow Area= 140.0 sf, Capacity= 1,651.08 cfs

50.00' x 2.00' deep channel, n= 0.025 Earth, clean & winding
Side Slope Z-value= 10.0 '/' Top Width= 90.00'
Length= 91.3' Slope= 0.0219 '/'
Inlet Invert= 26.90', Outlet Invert= 24.90'



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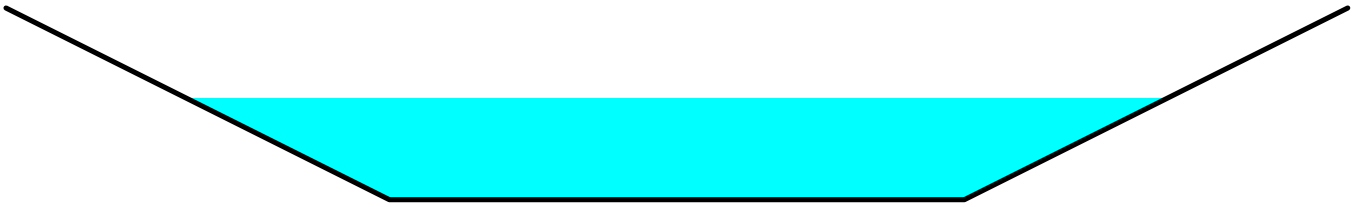
Summary for Reach R4: REACH 4

Inflow Area = 1,136,863 sf, 36.86% Impervious, Inflow Depth = 3.78" for 25-Yr event
Inflow = 48.21 cfs @ 12.56 hrs, Volume= 358,096 cf
Outflow = 48.14 cfs @ 12.58 hrs, Volume= 358,096 cf, Atten= 0%, Lag= 0.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 5.59 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 1.79 fps, Avg. Travel Time= 1.3 min

Peak Storage= 1,241 cf @ 12.57 hrs
Average Depth at Peak Storage= 1.06'
Bank-Full Depth= 2.00' Flow Area= 20.0 sf, Capacity= 157.25 cfs

6.00' x 2.00' deep channel, n= 0.030 Stream, clean & straight
Side Slope Z-value= 2.0 '/' Top Width= 14.00'
Length= 144.0' Slope= 0.0171 '/'
Inlet Invert= 16.36', Outlet Invert= 13.90'



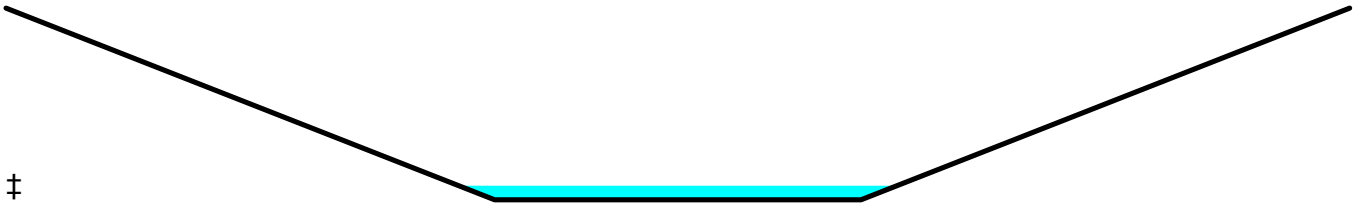
Summary for Reach R4.1: REACH 4.1

Inflow Area = 36,714 sf, 95.49% Impervious, Inflow Depth = 5.84" for 25-Yr event
Inflow = 3.99 cfs @ 12.13 hrs, Volume= 17,880 cf
Outflow = 3.05 cfs @ 12.30 hrs, Volume= 17,880 cf, Atten= 24%, Lag= 9.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.57 fps, Min. Travel Time= 5.8 min
Avg. Velocity = 0.53 fps, Avg. Travel Time= 17.3 min

Peak Storage= 1,072 cf @ 12.20 hrs
Average Depth at Peak Storage= 0.15'
Bank-Full Depth= 2.00' Flow Area= 56.0 sf, Capacity= 390.71 cfs

12.00' x 2.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 8.0 '/' Top Width= 44.00'
Length= 552.0' Slope= 0.0145 '/'
Inlet Invert= 22.00', Outlet Invert= 14.00'



‡

Summary for Reach R5: REACH 5

Inflow Area = 4,565,673 sf, 15.80% Impervious, Inflow Depth = 3.55" for 25-Yr event
Inflow = 119.28 cfs @ 12.63 hrs, Volume= 1,350,533 cf
Outflow = 119.24 cfs @ 12.65 hrs, Volume= 1,350,532 cf, Atten= 0%, Lag= 1.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 7.72 fps, Min. Travel Time= 0.7 min
Avg. Velocity = 1.92 fps, Avg. Travel Time= 2.8 min

Peak Storage= 4,899 cf @ 12.64 hrs
Average Depth at Peak Storage= 1.80'
Bank-Full Depth= 2.00' Flow Area= 18.0 sf, Capacity= 147.04 cfs

5.00' x 2.00' deep channel, n= 0.025 Earth, clean & straight
Side Slope Z-value= 2.0 '/' Top Width= 13.00'
Length= 317.0' Slope= 0.0134 '/'
Inlet Invert= 13.90', Outlet Invert= 9.64'



Summary for Reach R6: REACH 6

Inflow Area = 969,810 sf, 35.76% Impervious, Inflow Depth = 3.58" for 25-Yr event
Inflow = 43.76 cfs @ 12.55 hrs, Volume= 289,481 cf
Outflow = 43.76 cfs @ 12.56 hrs, Volume= 289,481 cf, Atten= 0%, Lag= 0.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 5.82 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 1.67 fps, Avg. Travel Time= 1.3 min

Peak Storage= 999 cf @ 12.56 hrs
Average Depth at Peak Storage= 0.42'
Bank-Full Depth= 2.00' Flow Area= 42.0 sf, Capacity= 623.19 cfs

17.00' x 2.00' deep channel, n= 0.025 Earth, clean & winding
Side Slope Z-value= 2.0 '/' Top Width= 25.00'
Length= 133.0' Slope= 0.0328 '/'
Inlet Invert= 23.90', Outlet Invert= 19.54'



‡

Summary for Pond AP3: 4 - 24"CMP

Inflow Area = 4,698,353 sf, 15.58% Impervious, Inflow Depth = 3.56" for 25-Yr event
Inflow = 122.25 cfs @ 12.64 hrs, Volume= 1,395,494 cf
Outflow = 99.77 cfs @ 13.01 hrs, Volume= 1,395,479 cf, Atten= 18%, Lag= 22.7 min
Primary = 99.77 cfs @ 13.01 hrs, Volume= 1,395,479 cf
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 6

Peak Elev= 15.68' @ 13.01 hrs Surf.Area= 34,906 sf Storage= 63,328 cf

Plug-Flow detention time= 4.1 min calculated for 1,395,479 cf (100% of inflow)
Center-of-Mass det. time= 4.0 min (904.9 - 900.8)

Volume	Invert	Avail.Storage	Storage Description
#1	9.64'	96,037 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
9.64	0	0	0
10.00	856	154	154
12.00	4,037	4,893	5,047
14.00	13,588	17,625	22,672
16.00	39,016	52,604	75,276
16.50	44,026	20,761	96,037

Device	Routing	Invert	Outlet Devices
#1	Primary	9.77'	**24.0" Round Proposed 3 - 24" CMP X 3.00** L= 65.0' CMP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 9.77' / 9.12' S= 0.0100 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 3.14 sf
#2	Primary	9.83'	**24.0" Round Existing 24"CMP** L= 64.0' CMP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 9.77' / 9.83' S= -0.0009 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 3.14 sf
#3	Secondary	16.50'	**20.0' long x 25.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=99.77 cfs @ 13.01 hrs HW=15.68' (Free Discharge)
└─**1=Proposed 3 - 24" CMP** (Barrel Controls 76.14 cfs @ 8.08 fps)
└─**2=Existing 24"CMP** (Barrel Controls 23.62 cfs @ 7.52 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=9.64' (Free Discharge)
└─**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond C3: CULV-3

Inflow Area = 1,467,784 sf, 3.67% Impervious, Inflow Depth = 2.96" for 25-Yr event
Inflow = 14.59 cfs @ 13.30 hrs, Volume= 362,623 cf
Outflow = 14.59 cfs @ 13.30 hrs, Volume= 362,623 cf, Atten= 0%, Lag= 0.0 min
Primary = 14.59 cfs @ 13.30 hrs, Volume= 362,623 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 33.42' @ 13.30 hrs
Flood Elev= 39.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	31.60'	**24.0" Round Culvert** L= 169.0' RCP, groove end projecting, Ke= 0.200

Inlet / Outlet Invert= 31.60' / 30.00' S= 0.0095 '/' Cc= 0.900
n= 0.013 Concrete, trowel finish, Flow Area= 3.14 sf

Primary OutFlow Max=14.59 cfs @ 13.30 hrs HW=33.42' TW=31.60' (Fixed TW Elev= 31.60')
└**1=Culvert** (Outlet Controls 14.59 cfs @ 6.37 fps)

Summary for Pond C4: CULV-4

Inflow Area = 1,136,863 sf, 36.86% Impervious, Inflow Depth = 3.78" for 25-Yr event
Inflow = 48.21 cfs @ 12.56 hrs, Volume= 358,096 cf
Outflow = 48.21 cfs @ 12.56 hrs, Volume= 358,096 cf, Atten= 0%, Lag= 0.0 min
Primary = 48.21 cfs @ 12.56 hrs, Volume= 358,096 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 25.56' @ 12.56 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	16.79'	**24.0" Round Culvert**
			L= 86.0' RCP, groove end projecting, Ke= 0.200
			Inlet / Outlet Invert= 16.79' / 16.36' S= 0.0050 '/' Cc= 0.900
			n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf

Primary OutFlow Max=48.19 cfs @ 12.56 hrs HW=25.55' (Free Discharge)
└**1=Culvert** (Barrel Controls 48.19 cfs @ 15.34 fps)

Summary for Pond C7: CULV-7

Inflow Area = 969,810 sf, 35.76% Impervious, Inflow Depth = 3.58" for 25-Yr event
Inflow = 43.76 cfs @ 12.56 hrs, Volume= 289,481 cf
Outflow = 43.72 cfs @ 12.58 hrs, Volume= 289,474 cf, Atten= 0%, Lag= 0.8 min
Primary = 32.92 cfs @ 12.58 hrs, Volume= 280,765 cf
Secondary = 10.80 cfs @ 12.58 hrs, Volume= 8,708 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 8
Peak Elev= 23.47' @ 12.58 hrs Surf.Area= 7,070 sf Storage= 9,483 cf

Plug-Flow detention time= 1.7 min calculated for 289,474 cf (100% of inflow)
Center-of-Mass det. time= 1.6 min (859.9 - 858.3)

Volume	Invert	Avail.Storage	Storage Description
#1	19.54'	9,728 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
19.54	0	0	0
20.00	144	33	33
21.00	890	517	550
22.00	2,015	1,453	2,003
23.00	6,588	4,302	6,304
23.50	7,106	3,424	9,728

Device	Routing	Invert	Outlet Devices
#1	Primary	19.54'	**24.0" Round 24" RCP** L= 184.0' RCP, rounded edge headwall, Ke= 0.100 Inlet / Outlet Invert= 19.54' / 16.79' S= 0.0149 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf
#2	Secondary	23.40'	**250.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=32.92 cfs @ 12.58 hrs HW=23.47' (Free Discharge)
↑—**1=24" RCP** (Barrel Controls 32.92 cfs @ 10.48 fps)

Secondary OutFlow Max=10.64 cfs @ 12.58 hrs HW=23.47' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 10.64 cfs @ 0.65 fps)

Summary for Pond CB5: CB-5

Inflow Area = 1,672 sf, 27.51% Impervious, Inflow Depth = 3.76" for 25-Yr event
Inflow = 0.17 cfs @ 12.07 hrs, Volume= 523 cf
Outflow = 0.17 cfs @ 12.07 hrs, Volume= 523 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.17 cfs @ 12.07 hrs, Volume= 523 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 629.89' @ 12.07 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	29.50'	**1.0" Round 12" CULV** L= 70.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 29.50' / 29.15' S= 0.0050 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.01 sf

Primary OutFlow Max=0.17 cfs @ 12.07 hrs HW=627.27' (Free Discharge)
↑—**1=12" CULV** (Barrel Controls 0.17 cfs @ 32.00 fps)

Summary for Pond CB6: CB-6

Inflow Area = 10,394 sf, 12.10% Impervious, Inflow Depth = 4.02" for 25-Yr event
Inflow = 1.16 cfs @ 12.07 hrs, Volume= 3,479 cf
Outflow = 1.16 cfs @ 12.07 hrs, Volume= 3,479 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.16 cfs @ 12.07 hrs, Volume= 3,479 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 28.46' @ 12.07 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	27.82'	**12.0" Round 12"SD** L= 184.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 27.82' / 26.90' S= 0.0050 '/' Cc= 0.900 n= 0.013 Concrete, trowel finish, Flow Area= 0.79 sf

Primary OutFlow Max=1.15 cfs @ 12.07 hrs HW=28.46' (Free Discharge)
1=12"SD (Barrel Controls 1.15 cfs @ 3.11 fps)

Summary for Pond DMH-1: DMH-1

Inflow Area = 36,714 sf, 95.49% Impervious, Inflow Depth = 5.84" for 25-Yr event
Inflow = 5.28 cfs @ 12.07 hrs, Volume= 17,879 cf
Outflow = 5.28 cfs @ 12.07 hrs, Volume= 17,879 cf, Atten= 0%, Lag= 0.0 min
Primary = 5.28 cfs @ 12.07 hrs, Volume= 17,879 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 33.68' @ 12.07 hrs
Flood Elev= 36.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	32.58'	**24.0" Round 24" SD to Detention Bed** L= 30.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 32.58' / 32.35' S= 0.0077 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=5.28 cfs @ 12.07 hrs HW=33.68' (Free Discharge)
1=24" SD to Detention Bed (Barrel Controls 5.28 cfs @ 4.30 fps)

Summary for Pond DMH-6: DMH-6

Inflow Area = 41,451 sf, 89.14% Impervious, Inflow Depth = 5.73" for 25-Yr event
Inflow = 5.92 cfs @ 12.07 hrs, Volume= 19,781 cf
Outflow = 5.92 cfs @ 12.07 hrs, Volume= 19,781 cf, Atten= 0%, Lag= 0.0 min
Primary = 5.92 cfs @ 12.07 hrs, Volume= 19,781 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 31.19' @ 12.07 hrs
Flood Elev= 32.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	30.13'	**24.0" Round 24" SD to Detention Bed** L= 6.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 30.13' / 28.90' S= 0.2050 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=5.92 cfs @ 12.07 hrs HW=31.19' (Free Discharge)
1=24" SD to Detention Bed (Inlet Controls 5.92 cfs @ 3.50 fps)

Summary for Pond OC1: OFFSITE CULV-1

Inflow Area = 1,467,784 sf, 3.67% Impervious, Inflow Depth = 2.96" for 25-Yr event
Inflow = 66.68 cfs @ 12.41 hrs, Volume= 362,632 cf
Outflow = 14.59 cfs @ 13.30 hrs, Volume= 362,623 cf, Atten= 78%, Lag= 53.2 min
Primary = 14.59 cfs @ 13.30 hrs, Volume= 362,623 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 36.95' @ 13.30 hrs Surf.Area= 100,691 sf Storage= 143,927 cf

Plug-Flow detention time= 116.1 min calculated for 362,623 cf (100% of inflow)
Center-of-Mass det. time= 116.1 min (974.1 - 858.0)

Volume	Invert	Avail.Storage	Storage Description
#1	34.25'	602,689 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
34.25	5,289	0	0
36.00	67,698	63,864	63,864
38.00	137,090	204,788	268,652
40.00	196,947	334,037	602,689

Device	Routing	Invert	Outlet Devices
#1	Primary	34.25'	**18.0" Round 18" RCP** L= 97.6' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 34.25' / 32.29' S= 0.0201 '/' Cc= 0.900 n= 0.013 Concrete, trowel finish, Flow Area= 1.77 sf

Primary OutFlow Max=14.59 cfs @ 13.30 hrs HW=36.95' (Free Discharge)
↑—**1=18" RCP** (Barrel Controls 14.59 cfs @ 8.26 fps)

Summary for Pond OC2: OFFSITE CULV-2

Inflow Area = 913,125 sf, 2.70% Impervious, Inflow Depth = 3.65" for 25-Yr event
Inflow = 35.70 cfs @ 12.80 hrs, Volume= 278,070 cf
Outflow = 18.37 cfs @ 13.45 hrs, Volume= 278,064 cf, Atten= 49%, Lag= 39.0 min
Primary = 18.37 cfs @ 13.45 hrs, Volume= 278,064 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 37.67' @ 13.45 hrs Surf.Area= 27,561 sf Storage= 62,087 cf

Plug-Flow detention time= 37.3 min calculated for 278,064 cf (100% of inflow)
Center-of-Mass det. time= 37.3 min (906.4 - 869.1)

Volume	Invert	Avail.Storage	Storage Description
#1	32.88'	71,548 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
32.88	5,285	0	0
34.00	8,520	7,731	7,731
36.00	12,392	20,912	28,643
38.00	30,513	42,905	71,548

Device	Routing	Invert	Outlet Devices
#1	Primary	32.88'	**18.0" Round 18" RCP** L= 93.6' RCP, groove end projecting, Ke= 0.200

Inlet / Outlet Invert= 32.88' / 31.29' S= 0.0170 '/' Cc= 0.900
n= 0.013 Concrete, trowel finish, Flow Area= 1.77 sf

Primary OutFlow Max=18.37 cfs @ 13.45 hrs HW=37.67' (Free Discharge)
└**1=18" RCP** (Barrel Controls 18.37 cfs @ 10.39 fps)

Summary for Pond P3.1: STORMTECH DETENTION / OCS-2

Inflow Area = 41,451 sf, 89.14% Impervious, Inflow Depth = 5.73" for 25-Yr event
Inflow = 5.92 cfs @ 12.07 hrs, Volume= 19,781 cf
Outflow = 2.30 cfs @ 12.27 hrs, Volume= 19,781 cf, Atten= 61%, Lag= 12.2 min
Primary = 2.30 cfs @ 12.27 hrs, Volume= 19,781 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 31.08' @ 12.27 hrs Surf.Area= 3,328 sf Storage= 7,136 cf
Flood Elev= 31.21' Surf.Area= 3,328 sf Storage= 7,258 cf

Plug-Flow detention time= 129.2 min calculated for 19,781 cf (100% of inflow)
Center-of-Mass det. time= 129.2 min (885.7 - 756.6)

Volume	Invert	Avail.Storage	Storage Description
#1	27.67'	2,926 cf	**34.70'W x 95.90'L x 3.50'H Prismatoid** 11,647 cf Overall - 4,331 cf Embedded = 7,316 cf x 40.0% Voids
#2	28.17'	4,331 cf	**ADS_StormTech SC-740 @ 95.90' L** x 7 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 95.90'L = 618.8 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
		7,258 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	25.15'	**24.0" Round 24" SD** L= 15.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 25.15' / 25.00' S= 0.0100 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 3.14 sf
#2	Device 1	25.15'	**2.0" Vert. 2" Orifice** C= 0.600
#3	Device 1	29.12'	**4.0" Vert. 4" Orifice** C= 0.600
#4	Device 1	30.90'	**6.0' long Sharp-Crested Vee/Trap Weir** Cv= 2.62 (C= 3.28)

Primary OutFlow Max=2.30 cfs @ 12.27 hrs HW=31.08' (Free Discharge)
└**1=24" SD** (Passes 2.30 cfs of 26.51 cfs potential flow)
├**2=2" Orifice** (Orifice Controls 0.25 cfs @ 11.64 fps)
├**3=4" Orifice** (Orifice Controls 0.56 cfs @ 6.44 fps)
└**4=Sharp-Crested Vee/Trap Weir** (Weir Controls 1.48 cfs @ 1.38 fps)

Summary for Pond P4.1: STORMTECH DETENTION / OCS-1

Inflow Area = 36,714 sf, 95.49% Impervious, Inflow Depth = 5.84" for 25-Yr event
Inflow = 5.28 cfs @ 12.07 hrs, Volume= 17,879 cf
Outflow = 3.99 cfs @ 12.13 hrs, Volume= 17,880 cf, Atten= 24%, Lag= 3.8 min
Primary = 3.99 cfs @ 12.13 hrs, Volume= 17,880 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 4

Peak Elev= 33.95' @ 12.13 hrs Surf.Area= 1,702 sf Storage= 2,637 cf
Flood Elev= 34.78' Surf.Area= 1,702 sf Storage= 3,388 cf

Plug-Flow detention time= 9.3 min calculated for 17,876 cf (100% of inflow)
Center-of-Mass det. time= 9.3 min (759.9 - 750.6)

Volume	Invert	Avail.Storage	Storage Description
#1	31.72'	1,513 cf	**25.25'W x 67.40'L x 3.50'H Prismatoid** 5,956 cf Overall - 2,174 cf Embedded = 3,782 cf x 40.0% Voids
#2	32.22'	2,174 cf	**ADS_StormTech SC-740 @ 67.40' L** x 5 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 67.40'L = 434.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
		3,687 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	28.76'	**24.0" Round 24" SD** L= 268.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 28.76' / 22.00' S= 0.0252 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 3.14 sf
#2	Device 1	28.76'	**4.0" Vert. 4" Orifice** C= 0.600
#3	Device 1	32.90'	**6.0" Vert. 6" Orifice** C= 0.600
#4	Device 1	33.65'	**4.0' long x 2.00' rise Sharp-Crested Vee/Trap Weir** Cv= 2.62 (C= 3.28)

Primary OutFlow Max=3.98 cfs @ 12.13 hrs HW=33.95' (Free Discharge)
↑**1=24" SD** (Passes 3.98 cfs of 24.45 cfs potential flow)
↑**2=4" Orifice** (Orifice Controls 0.94 cfs @ 10.80 fps)
3=6" Orifice (Orifice Controls 0.85 cfs @ 4.32 fps)
4=Sharp-Crested Vee/Trap Weir (Weir Controls 2.19 cfs @ 1.80 fps)

Summary for Pond W: WETLAND

Inflow Area = 917,965 sf, 33.62% Impervious, Inflow Depth = 3.48" for 25-Yr event
Inflow = 42.30 cfs @ 12.50 hrs, Volume= 266,221 cf
Outflow = 41.85 cfs @ 12.57 hrs, Volume= 266,221 cf, Atten= 1%, Lag= 3.7 min
Primary = 41.85 cfs @ 12.57 hrs, Volume= 266,221 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 8
Peak Elev= 24.68' @ 12.57 hrs Surf.Area= 14,582 sf Storage= 5,150 cf

Plug-Flow detention time= 1.1 min calculated for 266,166 cf (100% of inflow)
Center-of-Mass det. time= 1.1 min (854.6 - 853.4)

Volume	Invert	Avail.Storage	Storage Description
#1	23.90'	42,267 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
23.90	0	0	0
24.00	412	21	21
26.00	41,834	42,246	42,267

Device	Routing	Invert	Outlet Devices
#1	Primary	23.90'	**152.0 deg x 17.0' long Sharp-Crested Vee/Trap Weir** Cv= 2.47 (C= 3.09)

Primary OutFlow Max=41.84 cfs @ 12.57 hrs HW=24.68' (Free Discharge)
1=Sharp-Crested Vee/Trap Weir (Weir Controls 41.84 cfs @ 2.65 fps)

Summary for Link AP1: AP 1

Inflow Area = 1,136,863 sf, 36.86% Impervious, Inflow Depth = 3.78" for 25-Yr event
Inflow = 48.21 cfs @ 12.56 hrs, Volume= 358,096 cf
Primary = 48.21 cfs @ 12.56 hrs, Volume= 358,096 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Summary for Link AP2: AP 2

Inflow Area = 4,698,353 sf, 15.58% Impervious, Inflow Depth = 3.56" for 25-Yr event
Inflow = 99.77 cfs @ 13.01 hrs, Volume= 1,395,479 cf
Primary = 99.77 cfs @ 13.01 hrs, Volume= 1,395,479 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment OS1: OFFSITE SUB 1 Runoff Area=1,467,784 sf 3.67% Impervious Runoff Depth=3.87"
Flow Length=1,645' Tc=29.1 min CN=70 Runoff=87.48 cfs 473,256 cf

Subcatchment OS2: OFFSITE SUB 2 Runoff Area=913,125 sf 2.70% Impervious Runoff Depth=4.64"
Flow Length=1,654' Tc=58.8 min CN=77 Runoff=45.22 cfs 352,800 cf

Subcatchment S3: SUB 3 Runoff Area=836,116 sf 36.42% Impervious Runoff Depth=4.41"
Flow Length=828' Tc=39.2 min CN=75 Runoff=49.36 cfs 307,609 cf

Subcatchment S3.1: SUB 3.1 Runoff Area=41,451 sf 89.14% Impervious Runoff Depth=6.82"
Flow Length=160' Slope=0.0100 '/' Tc=5.0 min CN=96 Runoff=7.00 cfs 23,567 cf

Subcatchment S3.2: SUB 3.2 Runoff Area=8,722 sf 9.15% Impervious Runoff Depth=5.08"
Flow Length=163' Slope=0.0220 '/' Tc=5.0 min CN=81 Runoff=1.22 cfs 3,696 cf

Subcatchment S3.3: SUB 3.3 Runoff Area=1,672 sf 27.51% Impervious Runoff Depth=4.75"
Tc=5.0 min CN=78 Runoff=0.22 cfs 662 cf

Subcatchment S4: SUB 4 Runoff Area=1,011,187 sf 18.65% Impervious Runoff Depth=4.97"
Flow Length=1,599' Tc=46.2 min CN=80 Runoff=61.31 cfs 418,972 cf

Subcatchment S4.1: SUB 4.1 Runoff Area=36,714 sf 95.49% Impervious Runoff Depth=6.94"
Flow Length=281' Slope=0.0100 '/' Tc=5.0 min CN=97 Runoff=6.23 cfs 21,238 cf

Subcatchment S6: SUB 6 Runoff Area=132,680 sf 8.16% Impervious Runoff Depth=5.08"
Flow Length=616' Tc=13.5 min CN=81 Runoff=14.13 cfs 56,221 cf

Subcatchment S7: SUB 3 Runoff Area=167,053 sf 43.24% Impervious Runoff Depth=6.00"
Flow Length=1,081' Tc=10.0 min CN=89 Runoff=22.41 cfs 83,543 cf

Subcatchment S8: SUB 8 Runoff Area=81,849 sf 5.04% Impervious Runoff Depth=4.75"
Flow Length=399' Tc=21.1 min CN=78 Runoff=6.87 cfs 32,384 cf

Reach R1: REACH 1 Avg. Flow Depth=0.28' Max Vel=1.63 fps Inflow=15.78 cfs 473,246 cf
n=0.030 L=386.0' S=0.0104 '/' Capacity=256.49 cfs Outflow=15.78 cfs 473,244 cf

Reach R2: REACH 2 Avg. Flow Depth=0.40' Max Vel=2.07 fps Inflow=45.49 cfs 352,800 cf
n=0.030 L=527.0' S=0.0100 '/' Capacity=252.44 cfs Outflow=35.27 cfs 352,800 cf

Reach R3: REACH 3 Avg. Flow Depth=1.15' Max Vel=5.26 fps Inflow=50.95 cfs 826,044 cf
n=0.030 L=874.0' S=0.0138 '/' Capacity=141.56 cfs Outflow=50.29 cfs 826,043 cf

Reach R3.1: REACH 3.1 Avg. Flow Depth=0.10' Max Vel=0.94 fps Inflow=6.73 cfs 27,763 cf
n=0.025 L=179.0' S=0.0056 '/' Capacity=833.80 cfs Outflow=4.81 cfs 27,763 cf

Reach R3.2: REACH 3.2 Avg. Flow Depth=0.03' Max Vel=0.91 fps Inflow=1.44 cfs 4,357 cf
n=0.025 L=91.3' S=0.0219 '/' Capacity=1,651.08 cfs Outflow=1.40 cfs 4,357 cf

Reach R4: REACH 4 Avg. Flow Depth=1.22' Max Vel=6.02 fps Inflow=61.80 cfs 451,402 cf
n=0.030 L=144.0' S=0.0171 '/' Capacity=157.25 cfs Outflow=61.80 cfs 451,402 cf

Reach R4.1: REACH 4.1 Avg. Flow Depth=0.18' Max Vel=1.77 fps Inflow=5.53 cfs 21,238 cf
n=0.030 L=552.0' S=0.0145 '/' Capacity=390.71 cfs Outflow=4.29 cfs 21,238 cf

Reach R5: REACH 5 Avg. Flow Depth=2.01' Max Vel=8.19 fps Inflow=148.14 cfs 1,717,655 cf
n=0.025 L=317.0' S=0.0134 '/' Capacity=147.04 cfs Outflow=148.12 cfs 1,717,655 cf

Reach R6: REACH 6 Avg. Flow Depth=0.49' Max Vel=6.37 fps Inflow=55.52 cfs 367,756 cf
n=0.025 L=133.0' S=0.0328 '/' Capacity=623.19 cfs Outflow=55.51 cfs 367,756 cf

Pond AP3: 4 - 24"CMP Peak Elev=17.03' Storage=96,037 cf Inflow=152.35 cfs 1,773,875 cf
Primary=114.14 cfs 1,756,365 cf Secondary=19.53 cfs 6,068 cf Outflow=133.67 cfs 1,762,434 cf

Pond C3: CULV-3 Peak Elev=33.51' Inflow=15.78 cfs 473,246 cf
24.0" Round Culvert n=0.013 L=169.0' S=0.0095 '/' Outflow=15.78 cfs 473,246 cf

Pond C4: CULV-4 Peak Elev=30.18' Inflow=61.80 cfs 451,402 cf
24.0" Round Culvert n=0.011 L=86.0' S=0.0050 '/' Outflow=61.80 cfs 451,402 cf

Pond C7: CULV-7 Peak Elev=23.51' Storage=9,728 cf Inflow=55.51 cfs 367,756 cf
Primary=33.07 cfs 335,031 cf Secondary=22.56 cfs 32,828 cf Outflow=55.63 cfs 367,860 cf

Pond CB5: CB-5 Peak Elev=979.45' Inflow=0.22 cfs 662 cf
1.0" Round Culvert n=0.010 L=70.0' S=0.0050 '/' Outflow=0.22 cfs 662 cf

Pond CB6: CB-6 Peak Elev=28.55' Inflow=1.44 cfs 4,357 cf
12.0" Round Culvert n=0.013 L=184.0' S=0.0050 '/' Outflow=1.44 cfs 4,357 cf

Pond DMH-1: DMH-1 Peak Elev=33.80' Inflow=6.23 cfs 21,238 cf
24.0" Round Culvert n=0.010 L=30.0' S=0.0077 '/' Outflow=6.23 cfs 21,238 cf

Pond DMH-6: DMH-6 Peak Elev=31.30' Inflow=7.00 cfs 23,567 cf
24.0" Round Culvert n=0.010 L=6.0' S=0.2050 '/' Outflow=7.00 cfs 23,567 cf

Pond OC1: OFFSITE CULV-1 Peak Elev=37.48' Storage=202,628 cf Inflow=87.48 cfs 473,256 cf
18.0" Round Culvert n=0.013 L=97.6' S=0.0201 '/' Outflow=15.78 cfs 473,246 cf

Pond OC2: OFFSITE CULV-2 Peak Elev=62.75' Storage=71,548 cf Inflow=45.22 cfs 352,800 cf
18.0" Round Culvert n=0.013 L=93.6' S=0.0170 '/' Outflow=45.49 cfs 352,800 cf

Pond P3.1: STORMTECH DETENTION / Peak Elev=31.27' Storage=7,258 cf Inflow=7.00 cfs 23,567 cf
Outflow=5.33 cfs 23,406 cf

Pond P4.1: STORMTECH DETENTION / Peak Elev=34.08' Storage=2,775 cf Inflow=6.23 cfs 21,238 cf
Outflow=5.53 cfs 21,238 cf

Pond W: WETLAND Peak Elev=24.81' Storage=7,143 cf Inflow=54.03 cfs 339,993 cf
Outflow=53.36 cfs 339,993 cf

Link AP1: AP 1 Inflow=61.80 cfs 451,402 cf
Primary=61.80 cfs 451,402 cf

Link AP2: AP 2 Inflow=133.67 cfs 1,762,434 cf
Primary=133.67 cfs 1,762,434 cf

Total Runoff Area = 4,698,353 sf Runoff Volume = 1,773,947 cf Average Runoff Depth = 4.53"
84.42% Pervious = 3,966,350 sf 15.58% Impervious = 732,003 sf

Summary for Subcatchment OS1: OFFSITE SUB 1

Runoff = 87.48 cfs @ 12.41 hrs, Volume= 473,256 cf, Depth= 3.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-Yr Rainfall=7.30"

Area (sf)	CN	Description
53,844	98	Paved parking & roofs
32,748	49	50-75% Grass cover, Fair, HSG A
12,803	79	50-75% Grass cover, Fair, HSG C
12,554	84	50-75% Grass cover, Fair, HSG D
205,440	30	Woods, Good, HSG A
228,765	70	Woods, Good, HSG C
921,630	77	Woods, Good, HSG D
1,467,784	70	Weighted Average
1,413,940		96.33% Pervious Area
53,844		3.67% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.6	100	0.0430	0.25		**Sheet Flow, A - B** Range n= 0.130 P2= 3.00"
0.8	75	0.0510	1.58		**Shallow Concentrated Flow, B -C** Short Grass Pasture Kv= 7.0 fps
20.3	923	0.0230	0.76		**Shallow Concentrated Flow, C - D** Woodland Kv= 5.0 fps
1.4	547	0.0180	6.31	157.83	**Channel Flow, D - E** Area= 25.0 sf Perim= 27.0' r= 0.93' n= 0.030 Earth, grassed & winding
29.1	1,645	Total			

Summary for Subcatchment OS2: OFFSITE SUB 2

Runoff = 45.22 cfs @ 12.80 hrs, Volume= 352,800 cf, Depth= 4.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-Yr Rainfall=7.30"

Area (sf)	CN	Description
24,623	98	Paved parking & roofs
8,226	79	50-75% Grass cover, Fair, HSG C
13,667	84	50-75% Grass cover, Fair, HSG D
151,095	70	Woods, Good, HSG C
715,514	77	Woods, Good, HSG D
913,125	77	Weighted Average
888,502		97.30% Pervious Area
24,623		2.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.0	100	0.0530	0.11		**Sheet Flow, A - B** Woods: Light underbrush n= 0.400 P2= 3.00"
43.8	1,554	0.0140	0.59		**Shallow Concentrated Flow, B - C** Woodland Kv= 5.0 fps
58.8	1,654	Total			

Summary for Subcatchment S3: SUB 3

Runoff = 49.36 cfs @ 12.54 hrs, Volume= 307,609 cf, Depth= 4.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-Yr Rainfall=7.30"

Area (sf)	CN	Description
304,505	98	Paved parking & roofs
45,477	49	50-75% Grass cover, Fair, HSG A
10,125	79	50-75% Grass cover, Fair, HSG C
78,239	84	50-75% Grass cover, Fair, HSG D
142,893	30	Woods, Good, HSG A
81,209	70	Woods, Good, HSG C
173,668	77	Woods, Good, HSG D
836,116	75	Weighted Average
531,611		63.58% Pervious Area
304,505		36.42% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.4	150	0.0950	0.15		**Sheet Flow, A - B** Woods: Light underbrush n= 0.400 P2= 3.00"
1.5	143	0.1000	1.58		**Shallow Concentrated Flow, B - C** Woodland Kv= 5.0 fps
21.3	535	0.0070	0.42		**Shallow Concentrated Flow, C -D** Woodland Kv= 5.0 fps
39.2	828	Total			

Summary for Subcatchment S3.1: SUB 3.1

Runoff = 7.00 cfs @ 12.07 hrs, Volume= 23,567 cf, Depth= 6.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-Yr Rainfall=7.30"

Area (sf)	CN	Description
36,951	98	Paved parking & roofs
3,700	79	50-75% Grass cover, Fair, HSG C
800	84	50-75% Grass cover, Fair, HSG D
41,451	96	Weighted Average
4,500		10.86% Pervious Area
36,951		89.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.4	160	0.0100	1.11		**Sheet Flow, A - B**
					Smooth surfaces n= 0.011 P2= 3.00"
2.6					**Direct Entry, Min Tc**
5.0	160	Total			

Summary for Subcatchment S3.2: SUB 3.2

Runoff = 1.22 cfs @ 12.07 hrs, Volume= 3,696 cf, Depth= 5.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-Yr Rainfall=7.30"

Area (sf)	CN	Description
798	98	Paved parking & roofs
7,924	79	50-75% Grass cover, Fair, HSG C
8,722	81	Weighted Average
7,924		90.85% Pervious Area
798		9.15% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.6	163	0.0220	1.04		**Shallow Concentrated Flow, A - B**
					Short Grass Pasture Kv= 7.0 fps
2.4					**Direct Entry,**
5.0	163	Total			

Summary for Subcatchment S3.3: SUB 3.3

Runoff = 0.22 cfs @ 12.07 hrs, Volume= 662 cf, Depth= 4.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-Yr Rainfall=7.30"

Area (sf)	CN	Description
460	98	Paved parking & roofs
1,212	70	Woods, Good, HSG C
1,672	78	Weighted Average
1,212		72.49% Pervious Area
460		27.51% Impervious Area

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

Summary for Subcatchment S4: SUB 4

Runoff = 61.31 cfs @ 12.63 hrs, Volume= 418,972 cf, Depth= 4.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-Yr Rainfall=7.30"

Area (sf)	CN	Description
188,582	98	Paved parking & roofs
20,781	79	50-75% Grass cover, Fair, HSG C
11,998	84	50-75% Grass cover, Fair, HSG D
419,188	73	Woods, Fair, HSG C
370,638	79	Woods, Fair, HSG D
1,011,187	80	Weighted Average
822,605		81.35% Pervious Area
188,582		18.65% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
29.3	100	0.0100	0.06		**Sheet Flow, A - B** Woods: Light underbrush n= 0.400 P2= 3.00"
3.9	284	0.0600	1.22		**Shallow Concentrated Flow, B - C** Woodland Kv= 5.0 fps
10.4	341	0.0120	0.55		**Shallow Concentrated Flow, C - D** Woodland Kv= 5.0 fps
2.6	874	0.0140	5.64	281.88	**Channel Flow, D - E** Area= 50.0 sf Perim= 53.0' r= 0.94' n= 0.030 Earth, grassed & winding
46.2	1,599	Total			

Summary for Subcatchment S4.1: SUB 4.1

Runoff = 6.23 cfs @ 12.07 hrs, Volume= 21,238 cf, Depth= 6.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-Yr Rainfall=7.30"

Area (sf)	CN	Description
35,058	98	Paved parking & roofs
1,656	74	>75% Grass cover, Good, HSG C
36,714	97	Weighted Average
1,656		4.51% Pervious Area
35,058		95.49% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.9	200	0.0100	1.16		**Sheet Flow, A - B** Smooth surfaces n= 0.011 P2= 3.00"
0.7	81	0.0100	2.03		**Shallow Concentrated Flow, B - C** Paved Kv= 20.3 fps
1.4					**Direct Entry, Min Tc**
5.0	281	Total			

Summary for Subcatchment S6: SUB 6

Runoff = 14.13 cfs @ 12.18 hrs, Volume= 56,221 cf, Depth= 5.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-Yr Rainfall=7.30"

Area (sf)	CN	Description
10,824	98	Paved parking & roofs
19,401	79	50-75% Grass cover, Fair, HSG C
64,092	84	50-75% Grass cover, Fair, HSG D
32,603	70	Woods, Good, HSG C
5,760	77	Woods, Good, HSG D
132,680	81	Weighted Average
121,856		91.84% Pervious Area
10,824		8.16% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.0	40	0.0410	0.08		**Sheet Flow, A - B** Woods: Light underbrush n= 0.400 P2= 3.00"
0.7	71	0.1120	1.67		**Shallow Concentrated Flow, B - C** Woodland Kv= 5.0 fps
4.5	265	0.0380	0.97		**Shallow Concentrated Flow, B - C** Woodland Kv= 5.0 fps
0.3	240	0.0250	11.44	686.23	**Channel Flow, C - D** Area= 60.0 sf Perim= 34.0' r= 1.76' n= 0.030 Earth, grassed & winding
13.5	616	Total			

Summary for Subcatchment S7: SUB 3

Runoff = 22.41 cfs @ 12.14 hrs, Volume= 83,543 cf, Depth= 6.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-Yr Rainfall=7.30"

Area (sf)	CN	Description
72,236	98	Paved parking & roofs
66,092	84	50-75% Grass cover, Fair, HSG D
5,176	73	Woods, Fair, HSG C
23,549	79	Woods, Fair, HSG D
167,053	89	Weighted Average
94,817		56.76% Pervious Area
72,236		43.24% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.8	58	0.0430	0.20		**Sheet Flow, A - B** Grass: Short n= 0.150 P2= 3.00"
1.1	136	0.0840	2.03		**Shallow Concentrated Flow, B - C** Short Grass Pasture Kv= 7.0 fps
2.8	424	0.0150	2.49		**Shallow Concentrated Flow, C - D** Paved Kv= 20.3 fps
0.1	39	0.0450	9.55	3.33	**Pipe Channel, D - E** 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.010 PVC, smooth interior
0.3	185	0.0380	11.66	116.60	**Channel Flow, E - F** Area= 10.0 sf Perim= 12.0' r= 0.83' n= 0.022 Earth, clean & straight
0.5	137	0.0168	4.82	0.95	**Pipe Channel, F - G** 6.0" Round Area= 0.2 sf Perim= 1.6' r= 0.13' n= 0.010 PVC, smooth interior
0.4	102	0.0042	4.67	14.66	**Pipe Channel, G - H** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.013 Concrete pipe, bends & connections
10.0	1,081	Total			

Summary for Subcatchment S8: SUB 8

Runoff = 6.87 cfs @ 12.29 hrs, Volume= 32,384 cf, Depth= 4.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-Yr Rainfall=7.30"

Area (sf)	CN	Description
4,122	98	Paved parking & roofs
439	79	50-75% Grass cover, Fair, HSG C
34,658	74	>75% Grass cover, Good, HSG C
4,166	73	Woods, Fair, HSG C
38,464	79	Woods, Fair, HSG D
81,849	78	Weighted Average
77,727		94.96% Pervious Area
4,122		5.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.8	120	0.0500	0.11		**Sheet Flow, A - B** Woods: Light underbrush n= 0.400 P2= 3.00"
1.4	138	0.1100	1.66		**Shallow Concentrated Flow, B - C** Woodland Kv= 5.0 fps
1.9	141	0.0320	1.25		**Shallow Concentrated Flow, C - D** Short Grass Pasture Kv= 7.0 fps
21.1	399	Total			

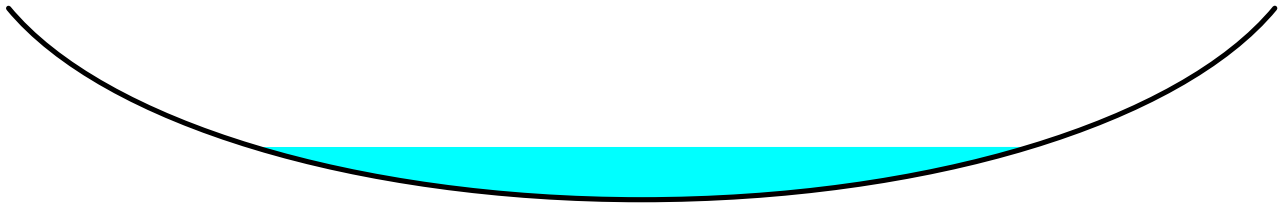
Summary for Reach R1: REACH 1

Inflow Area = 1,467,784 sf, 3.67% Impervious, Inflow Depth = 3.87" for 50-Yr event
Inflow = 15.78 cfs @ 13.45 hrs, Volume= 473,246 cf
Outflow = 15.78 cfs @ 13.57 hrs, Volume= 473,244 cf, Atten= 0%, Lag= 7.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.63 fps, Min. Travel Time= 3.9 min
Avg. Velocity = 0.64 fps, Avg. Travel Time= 10.1 min

Peak Storage= 3,732 cf @ 13.50 hrs
Average Depth at Peak Storage= 0.28'
Bank-Full Depth= 1.00' Flow Area= 66.7 sf, Capacity= 256.49 cfs

100.00' x 1.00' deep Parabolic Channel, n= 0.030 Earth, grassed & winding
Length= 386.0' Slope= 0.0104 '/'
Inlet Invert= 30.00', Outlet Invert= 26.00'



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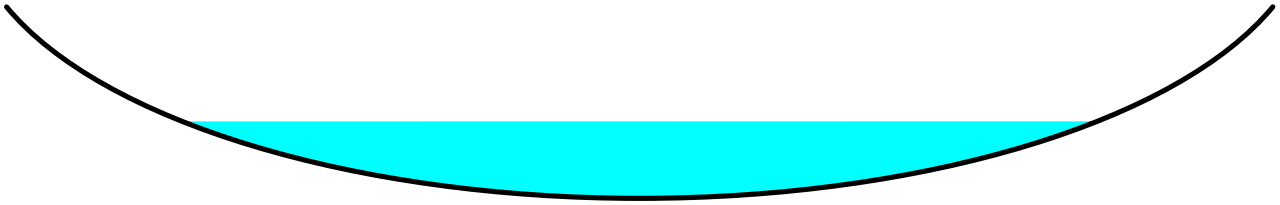
Summary for Reach R2: REACH 2

Inflow Area = 913,125 sf, 2.70% Impervious, Inflow Depth = 4.64" for 50-Yr event
Inflow = 45.49 cfs @ 13.02 hrs, Volume= 352,800 cf
Outflow = 35.27 cfs @ 13.20 hrs, Volume= 352,800 cf, Atten= 22%, Lag= 10.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.07 fps, Min. Travel Time= 4.2 min
Avg. Velocity = 0.66 fps, Avg. Travel Time= 13.3 min

Peak Storage= 8,993 cf @ 13.13 hrs
Average Depth at Peak Storage= 0.40'
Bank-Full Depth= 1.00' Flow Area= 66.7 sf, Capacity= 252.44 cfs

100.00' x 1.00' deep Parabolic Channel, n= 0.030 Earth, grassed & winding
Length= 527.0' Slope= 0.0100 '/'
Inlet Invert= 31.29', Outlet Invert= 26.00'



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Summary for Reach R3: REACH 3

Inflow Area = 2,380,909 sf, 3.30% Impervious, Inflow Depth = 4.16" for 50-Yr event
Inflow = 50.95 cfs @ 13.20 hrs, Volume= 826,044 cf
Outflow = 50.29 cfs @ 13.29 hrs, Volume= 826,043 cf, Atten= 1%, Lag= 5.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 5.26 fps, Min. Travel Time= 2.8 min
Avg. Velocity = 1.58 fps, Avg. Travel Time= 9.2 min

Peak Storage= 8,357 cf @ 13.24 hrs
Average Depth at Peak Storage= 1.15'
Bank-Full Depth= 2.00' Flow Area= 20.0 sf, Capacity= 141.56 cfs

6.00' x 2.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 2.0 '/' Top Width= 14.00'
Length= 874.0' Slope= 0.0138 '/'
Inlet Invert= 26.00', Outlet Invert= 13.90'



Summary for Reach R3.1: REACH 3.1

Inflow Area = 51,845 sf, 73.70% Impervious, Inflow Depth = 6.43" for 50-Yr event
Inflow = 6.73 cfs @ 12.12 hrs, Volume= 27,763 cf
Outflow = 4.81 cfs @ 12.22 hrs, Volume= 27,763 cf, Atten= 29%, Lag= 6.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.94 fps, Min. Travel Time= 3.2 min
Avg. Velocity = 0.36 fps, Avg. Travel Time= 8.4 min

Peak Storage= 912 cf @ 12.17 hrs
Average Depth at Peak Storage= 0.10'
Bank-Full Depth= 2.00' Flow Area= 140.0 sf, Capacity= 833.80 cfs

50.00' x 2.00' deep channel, n= 0.025 Earth, clean & winding
Side Slope Z-value= 10.0 '/' Top Width= 90.00'
Length= 179.0' Slope= 0.0056 '/'
Inlet Invert= 24.90', Outlet Invert= 23.90'



‡

Summary for Reach R3.2: REACH 3.2

Inflow Area = 10,394 sf, 12.10% Impervious, Inflow Depth = 5.03" for 50-Yr event
Inflow = 1.44 cfs @ 12.07 hrs, Volume= 4,357 cf
Outflow = 1.40 cfs @ 12.12 hrs, Volume= 4,357 cf, Atten= 3%, Lag= 2.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.91 fps, Min. Travel Time= 1.7 min
Avg. Velocity = 0.65 fps, Avg. Travel Time= 2.3 min

Peak Storage= 141 cf @ 12.09 hrs
Average Depth at Peak Storage= 0.03'
Bank-Full Depth= 2.00' Flow Area= 140.0 sf, Capacity= 1,651.08 cfs

50.00' x 2.00' deep channel, n= 0.025 Earth, clean & winding
Side Slope Z-value= 10.0 '/' Top Width= 90.00'
Length= 91.3' Slope= 0.0219 '/'
Inlet Invert= 26.90', Outlet Invert= 24.90'



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Summary for Reach R4: REACH 4

Inflow Area = 1,136,863 sf, 36.86% Impervious, Inflow Depth = 4.76" for 50-Yr event
Inflow = 61.80 cfs @ 12.51 hrs, Volume= 451,402 cf
Outflow = 61.80 cfs @ 12.52 hrs, Volume= 451,402 cf, Atten= 0%, Lag= 0.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 6.02 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 1.92 fps, Avg. Travel Time= 1.3 min

Peak Storage= 1,478 cf @ 12.51 hrs
Average Depth at Peak Storage= 1.22'
Bank-Full Depth= 2.00' Flow Area= 20.0 sf, Capacity= 157.25 cfs

6.00' x 2.00' deep channel, n= 0.030 Stream, clean & straight
Side Slope Z-value= 2.0 '/' Top Width= 14.00'
Length= 144.0' Slope= 0.0171 '/'
Inlet Invert= 16.36', Outlet Invert= 13.90'



Summary for Reach R4.1: REACH 4.1

Inflow Area = 36,714 sf, 95.49% Impervious, Inflow Depth = 6.94" for 50-Yr event
Inflow = 5.53 cfs @ 12.11 hrs, Volume= 21,238 cf
Outflow = 4.29 cfs @ 12.26 hrs, Volume= 21,238 cf, Atten= 23%, Lag= 8.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.77 fps, Min. Travel Time= 5.2 min
Avg. Velocity = 0.55 fps, Avg. Travel Time= 16.7 min

Peak Storage= 1,335 cf @ 12.17 hrs
Average Depth at Peak Storage= 0.18'
Bank-Full Depth= 2.00' Flow Area= 56.0 sf, Capacity= 390.71 cfs

12.00' x 2.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 8.0 '/' Top Width= 44.00'
Length= 552.0' Slope= 0.0145 '/'
Inlet Invert= 22.00', Outlet Invert= 14.00'



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Summary for Reach R5: REACH 5

Inflow Area = 4,565,673 sf, 15.80% Impervious, Inflow Depth = 4.51" for 50-Yr event
Inflow = 148.14 cfs @ 12.60 hrs, Volume= 1,717,655 cf
Outflow = 148.12 cfs @ 12.62 hrs, Volume= 1,717,655 cf, Atten= 0%, Lag= 1.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 8.19 fps, Min. Travel Time= 0.6 min
Avg. Velocity = 2.08 fps, Avg. Travel Time= 2.5 min

Peak Storage= 5,737 cf @ 12.61 hrs
Average Depth at Peak Storage= 2.01'
Bank-Full Depth= 2.00' Flow Area= 18.0 sf, Capacity= 147.04 cfs

5.00' x 2.00' deep channel, n= 0.025 Earth, clean & straight
Side Slope Z-value= 2.0 '/' Top Width= 13.00'
Length= 317.0' Slope= 0.0134 '/'
Inlet Invert= 13.90', Outlet Invert= 9.64'



Summary for Reach R6: REACH 6

Inflow Area = 969,810 sf, 35.76% Impervious, Inflow Depth = 4.55" for 50-Yr event
Inflow = 55.52 cfs @ 12.55 hrs, Volume= 367,756 cf
Outflow = 55.51 cfs @ 12.56 hrs, Volume= 367,756 cf, Atten= 0%, Lag= 0.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 6.37 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 1.78 fps, Avg. Travel Time= 1.2 min

Peak Storage= 1,160 cf @ 12.55 hrs
Average Depth at Peak Storage= 0.49'
Bank-Full Depth= 2.00' Flow Area= 42.0 sf, Capacity= 623.19 cfs

17.00' x 2.00' deep channel, n= 0.025 Earth, clean & winding
Side Slope Z-value= 2.0 '/' Top Width= 25.00'
Length= 133.0' Slope= 0.0328 '/'
Inlet Invert= 23.90', Outlet Invert= 19.54'



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Summary for Pond AP3: 4 - 24"CMP

Inflow Area = 4,698,353 sf, 15.58% Impervious, Inflow Depth = 4.53" for 50-Yr event
Inflow = 152.35 cfs @ 12.60 hrs, Volume= 1,773,875 cf
Outflow = 133.67 cfs @ 12.76 hrs, Volume= 1,762,434 cf, Atten= 12%, Lag= 9.9 min
Primary = 114.14 cfs @ 12.76 hrs, Volume= 1,756,365 cf
Secondary = 19.53 cfs @ 12.76 hrs, Volume= 6,068 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 6

Peak Elev= 17.03' @ 12.76 hrs Surf.Area= 44,026 sf Storage= 96,037 cf

Plug-Flow detention time= 11.0 min calculated for 1,762,067 cf (99% of inflow)
Center-of-Mass det. time= 6.5 min (908.4 - 901.8)

Volume	Invert	Avail.Storage	Storage Description
#1	9.64'	96,037 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
9.64	0	0	0
10.00	856	154	154
12.00	4,037	4,893	5,047
14.00	13,588	17,625	22,672
16.00	39,016	52,604	75,276
16.50	44,026	20,761	96,037

Device	Routing	Invert	Outlet Devices
#1	Primary	9.77'	**24.0" Round Proposed 3 - 24" CMP X 3.00** L= 65.0' CMP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 9.77' / 9.12' S= 0.0100 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 3.14 sf
#2	Primary	9.83'	**24.0" Round Existing 24"CMP** L= 64.0' CMP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 9.77' / 9.83' S= -0.0009 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 3.14 sf
#3	Secondary	16.50'	**20.0' long x 25.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=113.49 cfs @ 12.76 hrs HW=16.97' (Free Discharge)
└**1=Proposed 3 - 24" CMP** (Barrel Controls 86.25 cfs @ 9.15 fps)
└**2=Existing 24"CMP** (Barrel Controls 27.24 cfs @ 8.67 fps)

Secondary OutFlow Max=17.22 cfs @ 12.76 hrs HW=16.97' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Weir Controls 17.22 cfs @ 1.84 fps)

Summary for Pond C3: CULV-3

Inflow Area = 1,467,784 sf, 3.67% Impervious, Inflow Depth = 3.87" for 50-Yr event
Inflow = 15.78 cfs @ 13.45 hrs, Volume= 473,246 cf
Outflow = 15.78 cfs @ 13.45 hrs, Volume= 473,246 cf, Atten= 0%, Lag= 0.0 min
Primary = 15.78 cfs @ 13.45 hrs, Volume= 473,246 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 33.51' @ 13.45 hrs
Flood Elev= 39.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	31.60'	**24.0" Round Culvert** L= 169.0' RCP, groove end projecting, Ke= 0.200

Inlet / Outlet Invert= 31.60' / 30.00' S= 0.0095 '/' Cc= 0.900
n= 0.013 Concrete, trowel finish, Flow Area= 3.14 sf

Primary OutFlow Max=15.78 cfs @ 13.45 hrs HW=33.51' TW=31.60' (Fixed TW Elev= 31.60')
└**1=Culvert** (Outlet Controls 15.78 cfs @ 6.55 fps)

Summary for Pond C4: CULV-4

Inflow Area = 1,136,863 sf, 36.86% Impervious, Inflow Depth = 4.76" for 50-Yr event
Inflow = 61.80 cfs @ 12.51 hrs, Volume= 451,402 cf
Outflow = 61.80 cfs @ 12.51 hrs, Volume= 451,402 cf, Atten= 0%, Lag= 0.0 min
Primary = 61.80 cfs @ 12.51 hrs, Volume= 451,402 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 30.18' @ 12.51 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	16.79'	**24.0" Round Culvert**
			L= 86.0' RCP, groove end projecting, Ke= 0.200
			Inlet / Outlet Invert= 16.79' / 16.36' S= 0.0050 '/' Cc= 0.900
			n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf

Primary OutFlow Max=61.80 cfs @ 12.51 hrs HW=30.18' (Free Discharge)
└**1=Culvert** (Barrel Controls 61.80 cfs @ 19.67 fps)

Summary for Pond C7: CULV-7

Inflow Area = 969,810 sf, 35.76% Impervious, Inflow Depth = 4.55" for 50-Yr event
Inflow = 55.51 cfs @ 12.56 hrs, Volume= 367,756 cf
Outflow = 55.63 cfs @ 12.56 hrs, Volume= 367,860 cf, Atten= 0%, Lag= 0.0 min
Primary = 33.07 cfs @ 12.56 hrs, Volume= 335,031 cf
Secondary = 22.56 cfs @ 12.56 hrs, Volume= 32,828 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 8
Peak Elev= 23.51' @ 12.56 hrs Surf.Area= 7,106 sf Storage= 9,728 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 1.7 min (852.5 - 850.8)

Volume	Invert	Avail.Storage	Storage Description
#1	19.54'	9,728 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
19.54	0	0	0
20.00	144	33	33
21.00	890	517	550
22.00	2,015	1,453	2,003
23.00	6,588	4,302	6,304
23.50	7,106	3,424	9,728

Device	Routing	Invert	Outlet Devices
#1	Primary	19.54'	**24.0" Round 24" RCP** L= 184.0' RCP, rounded edge headwall, Ke= 0.100 Inlet / Outlet Invert= 19.54' / 16.79' S= 0.0149 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf
#2	Secondary	23.40'	**250.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=33.07 cfs @ 12.56 hrs HW=23.51' (Free Discharge)
↑—**1=24" RCP** (Barrel Controls 33.07 cfs @ 10.53 fps)

Secondary OutFlow Max=22.38 cfs @ 12.56 hrs HW=23.51' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 22.38 cfs @ 0.83 fps)

Summary for Pond CB5: CB-5

Inflow Area = 1,672 sf, 27.51% Impervious, Inflow Depth = 4.75" for 50-Yr event
Inflow = 0.22 cfs @ 12.07 hrs, Volume= 662 cf
Outflow = 0.22 cfs @ 12.07 hrs, Volume= 662 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.22 cfs @ 12.07 hrs, Volume= 662 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 979.45' @ 12.07 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	29.50'	**1.0" Round 12" CULV** L= 70.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 29.50' / 29.15' S= 0.0050 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.01 sf

Primary OutFlow Max=0.22 cfs @ 12.07 hrs HW=975.65' (Free Discharge)
↑—**1=12" CULV** (Barrel Controls 0.22 cfs @ 40.26 fps)

Summary for Pond CB6: CB-6

Inflow Area = 10,394 sf, 12.10% Impervious, Inflow Depth = 5.03" for 50-Yr event
Inflow = 1.44 cfs @ 12.07 hrs, Volume= 4,357 cf
Outflow = 1.44 cfs @ 12.07 hrs, Volume= 4,357 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.44 cfs @ 12.07 hrs, Volume= 4,357 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 28.55' @ 12.07 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	27.82'	**12.0" Round 12"SD** L= 184.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 27.82' / 26.90' S= 0.0050 '/' Cc= 0.900 n= 0.013 Concrete, trowel finish, Flow Area= 0.79 sf

Primary OutFlow Max=1.44 cfs @ 12.07 hrs HW=28.55' (Free Discharge)
1=12"SD (Barrel Controls 1.44 cfs @ 3.28 fps)

Summary for Pond DMH-1: DMH-1

Inflow Area = 36,714 sf, 95.49% Impervious, Inflow Depth = 6.94" for 50-Yr event
Inflow = 6.23 cfs @ 12.07 hrs, Volume= 21,238 cf
Outflow = 6.23 cfs @ 12.07 hrs, Volume= 21,238 cf, Atten= 0%, Lag= 0.0 min
Primary = 6.23 cfs @ 12.07 hrs, Volume= 21,238 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 33.80' @ 12.07 hrs
Flood Elev= 36.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	32.58'	**24.0" Round 24" SD to Detention Bed** L= 30.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 32.58' / 32.35' S= 0.0077 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=6.23 cfs @ 12.07 hrs HW=33.80' (Free Discharge)
1=24" SD to Detention Bed (Barrel Controls 6.23 cfs @ 4.45 fps)

Summary for Pond DMH-6: DMH-6

Inflow Area = 41,451 sf, 89.14% Impervious, Inflow Depth = 6.82" for 50-Yr event
Inflow = 7.00 cfs @ 12.07 hrs, Volume= 23,567 cf
Outflow = 7.00 cfs @ 12.07 hrs, Volume= 23,567 cf, Atten= 0%, Lag= 0.0 min
Primary = 7.00 cfs @ 12.07 hrs, Volume= 23,567 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 31.30' @ 12.07 hrs
Flood Elev= 32.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	30.13'	**24.0" Round 24" SD to Detention Bed** L= 6.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 30.13' / 28.90' S= 0.2050 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=7.00 cfs @ 12.07 hrs HW=31.30' (Free Discharge)
1=24" SD to Detention Bed (Inlet Controls 7.00 cfs @ 3.68 fps)

Summary for Pond OC1: OFFSITE CULV-1

Inflow Area = 1,467,784 sf, 3.67% Impervious, Inflow Depth = 3.87" for 50-Yr event
Inflow = 87.48 cfs @ 12.41 hrs, Volume= 473,256 cf
Outflow = 15.78 cfs @ 13.45 hrs, Volume= 473,246 cf, Atten= 82%, Lag= 62.6 min
Primary = 15.78 cfs @ 13.45 hrs, Volume= 473,246 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 37.48' @ 13.45 hrs Surf.Area= 119,215 sf Storage= 202,628 cf

Plug-Flow detention time= 144.2 min calculated for 473,246 cf (100% of inflow)
Center-of-Mass det. time= 144.1 min (994.5 - 850.3)

Volume	Invert	Avail.Storage	Storage Description
#1	34.25'	602,689 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
34.25	5,289	0	0
36.00	67,698	63,864	63,864
38.00	137,090	204,788	268,652
40.00	196,947	334,037	602,689

Device	Routing	Invert	Outlet Devices
#1	Primary	34.25'	**18.0" Round 18" RCP** L= 97.6' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 34.25' / 32.29' S= 0.0201 '/' Cc= 0.900 n= 0.013 Concrete, trowel finish, Flow Area= 1.77 sf

Primary OutFlow Max=15.78 cfs @ 13.45 hrs HW=37.48' (Free Discharge)
↑—**1=18" RCP** (Barrel Controls 15.78 cfs @ 8.93 fps)

Summary for Pond OC2: OFFSITE CULV-2

Inflow Area = 913,125 sf, 2.70% Impervious, Inflow Depth = 4.64" for 50-Yr event
Inflow = 45.22 cfs @ 12.80 hrs, Volume= 352,800 cf
Outflow = 45.49 cfs @ 13.02 hrs, Volume= 352,800 cf, Atten= 0%, Lag= 13.4 min
Primary = 45.49 cfs @ 13.02 hrs, Volume= 352,800 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 62.75' @ 13.02 hrs Surf.Area= 30,513 sf Storage= 71,548 cf

Plug-Flow detention time= 38.2 min calculated for 352,800 cf (100% of inflow)
Center-of-Mass det. time= 38.1 min (900.4 - 862.3)

Volume	Invert	Avail.Storage	Storage Description
#1	32.88'	71,548 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
32.88	5,285	0	0
34.00	8,520	7,731	7,731
36.00	12,392	20,912	28,643
38.00	30,513	42,905	71,548

Device	Routing	Invert	Outlet Devices
#1	Primary	32.88'	**18.0" Round 18" RCP** L= 93.6' RCP, groove end projecting, Ke= 0.200

Inlet / Outlet Invert= 32.88' / 31.29' S= 0.0170 '/' Cc= 0.900
n= 0.013 Concrete, trowel finish, Flow Area= 1.77 sf

Primary OutFlow Max=45.49 cfs @ 13.02 hrs HW=62.75' (Free Discharge)
└**1=18" RCP** (Barrel Controls 45.49 cfs @ 25.74 fps)

Summary for Pond P3.1: STORMTECH DETENTION / OCS-2

Inflow Area = 41,451 sf, 89.14% Impervious, Inflow Depth = 6.82" for 50-Yr event
Inflow = 7.00 cfs @ 12.07 hrs, Volume= 23,567 cf
Outflow = 5.33 cfs @ 12.12 hrs, Volume= 23,406 cf, Atten= 24%, Lag= 3.2 min
Primary = 5.33 cfs @ 12.12 hrs, Volume= 23,406 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 31.27' @ 12.12 hrs Surf.Area= 3,328 sf Storage= 7,258 cf
Flood Elev= 31.21' Surf.Area= 3,328 sf Storage= 7,258 cf

Plug-Flow detention time= 126.3 min calculated for 23,401 cf (99% of inflow)
Center-of-Mass det. time= 121.7 min (874.9 - 753.2)

Volume	Invert	Avail.Storage	Storage Description
#1	27.67'	2,926 cf	**34.70'W x 95.90'L x 3.50'H Prismatoid** 11,647 cf Overall - 4,331 cf Embedded = 7,316 cf x 40.0% Voids
#2	28.17'	4,331 cf	**ADS_StormTech SC-740 @ 95.90' L** x 7 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 95.90'L = 618.8 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
		7,258 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	25.15'	**24.0" Round 24" SD** L= 15.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 25.15' / 25.00' S= 0.0100 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 3.14 sf
#2	Device 1	25.15'	**2.0" Vert. 2" Orifice** C= 0.600
#3	Device 1	29.12'	**4.0" Vert. 4" Orifice** C= 0.600
#4	Device 1	30.90'	**6.0' long Sharp-Crested Vee/Trap Weir** Cv= 2.62 (C= 3.28)

Primary OutFlow Max=5.08 cfs @ 12.12 hrs HW=31.26' (Free Discharge)
└**1=24" SD** (Passes 5.08 cfs of 26.99 cfs potential flow)
├**2=2" Orifice** (Orifice Controls 0.26 cfs @ 11.82 fps)
├**3=4" Orifice** (Orifice Controls 0.59 cfs @ 6.76 fps)
└**4=Sharp-Crested Vee/Trap Weir** (Weir Controls 4.23 cfs @ 1.96 fps)

Summary for Pond P4.1: STORMTECH DETENTION / OCS-1

Inflow Area = 36,714 sf, 95.49% Impervious, Inflow Depth = 6.94" for 50-Yr event
Inflow = 6.23 cfs @ 12.07 hrs, Volume= 21,238 cf
Outflow = 5.53 cfs @ 12.11 hrs, Volume= 21,238 cf, Atten= 11%, Lag= 2.4 min
Primary = 5.53 cfs @ 12.11 hrs, Volume= 21,238 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 4

Peak Elev= 34.08' @ 12.11 hrs Surf.Area= 1,702 sf Storage= 2,775 cf
Flood Elev= 34.78' Surf.Area= 1,702 sf Storage= 3,388 cf

Plug-Flow detention time= 8.9 min calculated for 21,234 cf (100% of inflow)
Center-of-Mass det. time= 8.9 min (756.6 - 747.7)

Volume	Invert	Avail.Storage	Storage Description
#1	31.72'	1,513 cf	**25.25'W x 67.40'L x 3.50'H Prismatoid** 5,956 cf Overall - 2,174 cf Embedded = 3,782 cf x 40.0% Voids
#2	32.22'	2,174 cf	**ADS_StormTech SC-740 @ 67.40' L** x 5 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 67.40'L = 434.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
		3,687 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	28.76'	**24.0" Round 24" SD** L= 268.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 28.76' / 22.00' S= 0.0252 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 3.14 sf
#2	Device 1	28.76'	**4.0" Vert. 4" Orifice** C= 0.600
#3	Device 1	32.90'	**6.0" Vert. 6" Orifice** C= 0.600
#4	Device 1	33.65'	**4.0' long x 2.00' rise Sharp-Crested Vee/Trap Weir** Cv= 2.62 (C= 3.28)

Primary OutFlow Max=5.53 cfs @ 12.11 hrs HW=34.08' (Free Discharge)
↑—**1=24" SD** (Passes 5.53 cfs of 24.81 cfs potential flow)
—**2=4" Orifice** (Orifice Controls 0.95 cfs @ 10.93 fps)
—**3=6" Orifice** (Orifice Controls 0.91 cfs @ 4.64 fps)
—**4=Sharp-Crested Vee/Trap Weir** (Weir Controls 3.67 cfs @ 2.14 fps)

Summary for Pond W: WETLAND

Inflow Area = 917,965 sf, 33.62% Impervious, Inflow Depth = 4.44" for 50-Yr event
Inflow = 54.03 cfs @ 12.50 hrs, Volume= 339,993 cf
Outflow = 53.36 cfs @ 12.56 hrs, Volume= 339,993 cf, Atten= 1%, Lag= 3.6 min
Primary = 53.36 cfs @ 12.56 hrs, Volume= 339,993 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 8
Peak Elev= 24.81' @ 12.56 hrs Surf.Area= 17,181 sf Storage= 7,143 cf

Plug-Flow detention time= 1.3 min calculated for 339,922 cf (100% of inflow)
Center-of-Mass det. time= 1.3 min (847.7 - 846.5)

Volume	Invert	Avail.Storage	Storage Description
#1	23.90'	42,267 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
23.90	0	0	0
24.00	412	21	21
26.00	41,834	42,246	42,267

Device	Routing	Invert	Outlet Devices
#1	Primary	23.90'	**152.0 deg x 17.0' long Sharp-Crested Vee/Trap Weir** Cv= 2.47 (C= 3.09)

Primary OutFlow Max=53.35 cfs @ 12.56 hrs HW=24.81' (Free Discharge)
1=Sharp-Crested Vee/Trap Weir (Weir Controls 53.35 cfs @ 2.84 fps)

Summary for Link AP1: AP 1

Inflow Area = 1,136,863 sf, 36.86% Impervious, Inflow Depth = 4.76" for 50-Yr event
Inflow = 61.80 cfs @ 12.51 hrs, Volume= 451,402 cf
Primary = 61.80 cfs @ 12.51 hrs, Volume= 451,402 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Summary for Link AP2: AP 2

Inflow Area = 4,698,353 sf, 15.58% Impervious, Inflow Depth = 4.50" for 50-Yr event
Inflow = 133.67 cfs @ 12.76 hrs, Volume= 1,762,434 cf
Primary = 133.67 cfs @ 12.76 hrs, Volume= 1,762,434 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Appendix C:
Stormwater BMP Calculations and Biddeford Stormwater Tables

Buffer with Stone Berm Level Spreader Calculations

(refer to 2016 Tennis Courts stormwater report for existing calculations)

Level Spreader 1
Existing length required = 23’
Existing length provided = 25’
Additional length required (75’ buffer on HSG A soil)
New impervious area = (543 SF / 43560 SF/Ac)(75 ft) = 0.9 ft
Total length required = 23’ + 0.9’ = **24’ < 25’ provided => OK**

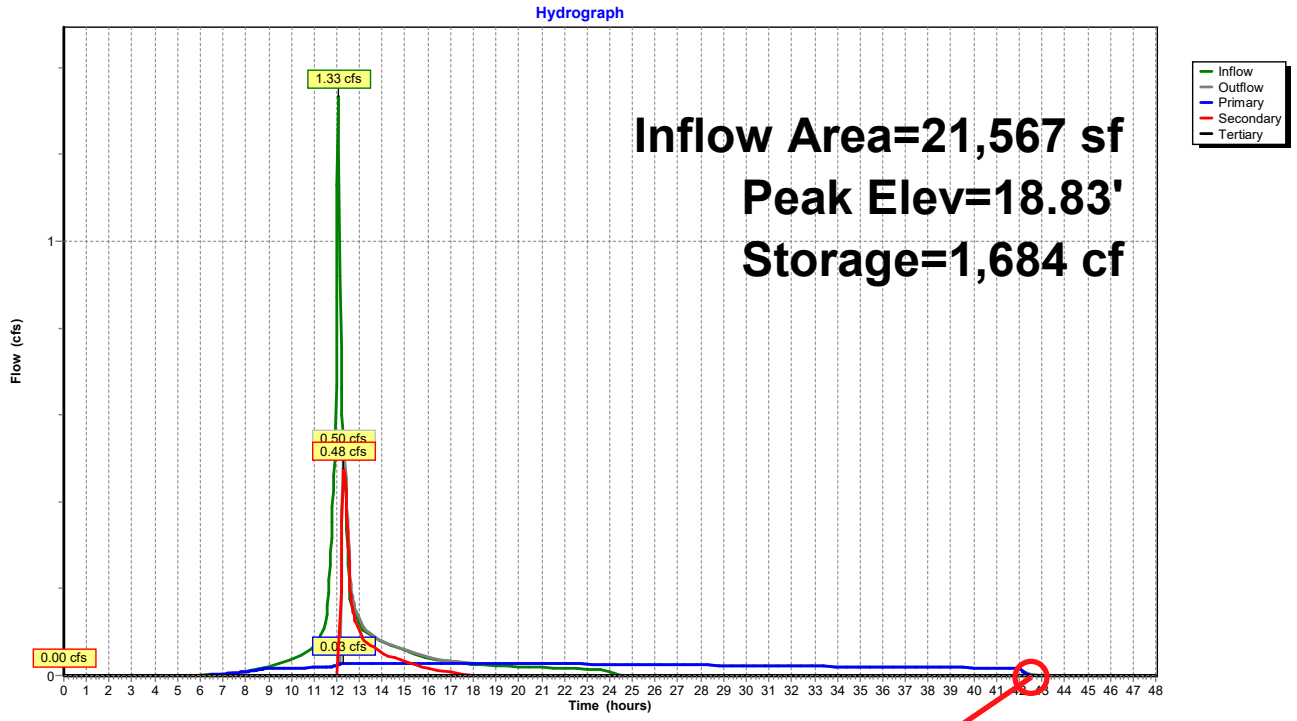
Level Spreader 2
Existing length required = 23’
Existing length provided = 25’
Additional length required (75’ buffer on HSG A soil)
New impervious area = (687 SF / 43560 SF/Ac)(75 ft) = 1.2 ft
Total length required = 23’ + 1.2’ = **24.2’ < 25’ provided => OK**

Soil Filter SF1 BMP Calculations							
Subcatchment Area	**New Impervious Area (SF)**	**New Landscaped Area (SF)**	**New Developed Area (SF)**	**CPV Required[1] (CF)**	**CPV Provided (CF)**	**Filter Area Required[2] (CF)**	**Filter Area Provided (CF)**
TREATED AREAS							
3	16,914	4,653	21,567	1,557	1,557	939	972

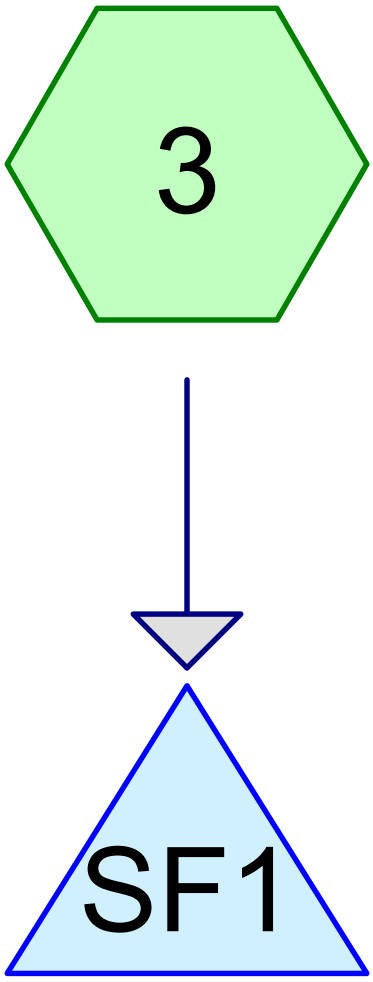
Notes:

1. Channel Protection Volume (CPV) required is calculated as 1" over the contributing impervious area plus 0.4" over the contributing landscaped area
2. Filter area required is calculated at 5% of contributing impervious area and 2% of contributing landscaped area.

Pond SF1: Soil Filter



soil filter drains in 42 hours



Soil Filter

Subcat Reach Pond Link

Routing Diagram for SOIL FILTER
Prepared by Site Design Associates, Printed 2/12/2024
HydroCAD® 10.00-26 s/n 08018 © 2020 HydroCAD Software Solutions LLC

Time span=0.00-48.00 hrs, dt=0.03 hrs, 1601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 3: Runoff Area=21,567 sf 78.43% Impervious Runoff Depth=2.64"
Tc=5.0 min CN=94 Runoff=1.51 cfs 4,746 cf

Pond SF1: Soil Filter Peak Elev=18.88' Storage=1,754 cf Inflow=1.51 cfs 4,746 cf
Primary=0.03 cfs 2,937 cf Secondary=0.91 cfs 1,809 cf Tertiary=0.00 cfs 0 cf Outflow=0.94 cfs 4,746 cf

Total Runoff Area = 21,567 sf Runoff Volume = 4,746 cf Average Runoff Depth = 2.64"
21.57% Pervious = 4,653 sf 78.43% Impervious = 16,914 sf

Summary for Subcatchment 3:

Runoff = 1.51 cfs @ 12.07 hrs, Volume= 4,746 cf, Depth= 2.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Type III 24-hr 2-Yr Storm Rainfall=3.30"

	Area (sf)	CN	Description
*	16,914	98	Impervious
	4,653	80	>75% Grass cover, Good, HSG D
	21,567	94	Weighted Average
	4,653		21.57% Pervious Area
	16,914		78.43% Impervious Area

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

Summary for Pond SF1: Soil Filter

Inflow Area = 21,567 sf, 78.43% Impervious, Inflow Depth = 2.64" for 2-Yr Storm event
Inflow = 1.51 cfs @ 12.07 hrs, Volume= 4,746 cf
Outflow = 0.94 cfs @ 12.17 hrs, Volume= 4,746 cf, Atten= 38%, Lag= 5.6 min
Primary = 0.03 cfs @ 12.17 hrs, Volume= 2,937 cf
Secondary = 0.91 cfs @ 12.17 hrs, Volume= 1,809 cf
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Peak Elev= 18.88' @ 12.17 hrs Surf.Area= 1,593 sf Storage= 1,754 cf

Plug-Flow detention time= 397.5 min calculated for 4,744 cf (100% of inflow)
Center-of-Mass det. time= 397.9 min (1,183.1 - 785.2)

Volume	Invert	Avail.Storage	Storage Description
#1	17.50'	3,842 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
17.50	972	134.0	0	0	972
18.00	1,179	143.0	537	537	1,182
18.75	1,550	165.0	1,020	1,557	1,734
19.00	1,636	162.0	398	1,955	1,822
20.00	2,150	181.0	1,887	3,842	2,368

Device	Routing	Invert	Outlet Devices
#1	Primary	17.50'	**0.750 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Secondary	18.75'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Tertiary	19.00'	**10.0' long x 15.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.03 cfs @ 12.17 hrs HW=18.87' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.03 cfs)

Secondary OutFlow Max=0.90 cfs @ 12.17 hrs HW=18.87' (Free Discharge)
2=Orifice/Grate (Weir Controls 0.90 cfs @ 1.15 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=17.50' (Free Discharge)
3=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Time span=0.00-48.00 hrs, dt=0.03 hrs, 1601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 3: Runoff Area=21,567 sf 78.43% Impervious Runoff Depth=4.21"
Tc=5.0 min CN=94 Runoff=2.34 cfs 7,565 cf

Pond SF1: Soil Filter Peak Elev=18.97' Storage=1,911 cf Inflow=2.34 cfs 7,565 cf
Primary=0.03 cfs 3,216 cf Secondary=2.16 cfs 4,349 cf Tertiary=0.00 cfs 0 cf Outflow=2.19 cfs 7,565 cf

Total Runoff Area = 21,567 sf Runoff Volume = 7,565 cf Average Runoff Depth = 4.21"
21.57% Pervious = 4,653 sf 78.43% Impervious = 16,914 sf

Summary for Subcatchment 3:

Runoff = 2.34 cfs @ 12.07 hrs, Volume= 7,565 cf, Depth= 4.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Type III 24-hr 10-Yr Storm Rainfall=4.90"

	Area (sf)	CN	Description
*	16,914	98	Impervious
	4,653	80	>75% Grass cover, Good, HSG D
	21,567	94	Weighted Average
	4,653		21.57% Pervious Area
	16,914		78.43% Impervious Area

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

Summary for Pond SF1: Soil Filter

Inflow Area = 21,567 sf, 78.43% Impervious, Inflow Depth = 4.21" for 10-Yr Storm event
Inflow = 2.34 cfs @ 12.07 hrs, Volume= 7,565 cf
Outflow = 2.19 cfs @ 12.10 hrs, Volume= 7,565 cf, Atten= 7%, Lag= 1.8 min
Primary = 0.03 cfs @ 12.10 hrs, Volume= 3,216 cf
Secondary = 2.16 cfs @ 12.10 hrs, Volume= 4,349 cf
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Peak Elev= 18.97' @ 12.10 hrs Surf.Area= 1,626 sf Storage= 1,911 cf

Plug-Flow detention time= 280.0 min calculated for 7,561 cf (100% of inflow)
Center-of-Mass det. time= 280.6 min (1,053.7 - 773.1)

Volume	Invert	Avail.Storage	Storage Description
#1	17.50'	3,842 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
17.50	972	134.0	0	0	972
18.00	1,179	143.0	537	537	1,182
18.75	1,550	165.0	1,020	1,557	1,734
19.00	1,636	162.0	398	1,955	1,822
20.00	2,150	181.0	1,887	3,842	2,368

Device	Routing	Invert	Outlet Devices
#1	Primary	17.50'	**0.750 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Secondary	18.75'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Tertiary	19.00'	**10.0' long x 15.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.03 cfs @ 12.10 hrs HW=18.97' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.03 cfs)

Secondary OutFlow Max=2.13 cfs @ 12.10 hrs HW=18.97' (Free Discharge)
2=Orifice/Grate (Weir Controls 2.13 cfs @ 1.54 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=17.50' (Free Discharge)
3=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Time span=0.00-48.00 hrs, dt=0.03 hrs, 1601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 3: Runoff Area=21,567 sf 78.43% Impervious Runoff Depth=5.49"
Tc=5.0 min CN=94 Runoff=3.01 cfs 9,875 cf

Pond SF1: Soil Filter Peak Elev=19.01' Storage=1,978 cf Inflow=3.01 cfs 9,875 cf
Primary=0.03 cfs 3,331 cf Secondary=2.79 cfs 6,538 cf Tertiary=0.04 cfs 7 cf Outflow=2.86 cfs 9,875 cf

Total Runoff Area = 21,567 sf Runoff Volume = 9,875 cf Average Runoff Depth = 5.49"
21.57% Pervious = 4,653 sf 78.43% Impervious = 16,914 sf

Summary for Subcatchment 3:

Runoff = 3.01 cfs @ 12.07 hrs, Volume= 9,875 cf, Depth= 5.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Type III 24-hr 25-Yr Storm Rainfall=6.20"

	Area (sf)	CN	Description
*	16,914	98	Impervious
	4,653	80	>75% Grass cover, Good, HSG D
	21,567	94	Weighted Average
	4,653		21.57% Pervious Area
	16,914		78.43% Impervious Area

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

Summary for Pond SF1: Soil Filter

Inflow Area = 21,567 sf, 78.43% Impervious, Inflow Depth = 5.49" for 25-Yr Storm event
Inflow = 3.01 cfs @ 12.07 hrs, Volume= 9,875 cf
Outflow = 2.86 cfs @ 12.10 hrs, Volume= 9,875 cf, Atten= 5%, Lag= 1.6 min
Primary = 0.03 cfs @ 12.10 hrs, Volume= 3,331 cf
Secondary = 2.79 cfs @ 12.10 hrs, Volume= 6,538 cf
Tertiary = 0.04 cfs @ 12.09 hrs, Volume= 7 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Peak Elev= 19.01' @ 12.10 hrs Surf.Area= 1,643 sf Storage= 1,978 cf

Plug-Flow detention time= 226.1 min calculated for 9,875 cf (100% of inflow)
Center-of-Mass det. time= 226.0 min (992.7 - 766.7)

Volume	Invert	Avail.Storage	Storage Description
#1	17.50'	3,842 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
17.50	972	134.0	0	0	972
18.00	1,179	143.0	537	537	1,182
18.75	1,550	165.0	1,020	1,557	1,734
19.00	1,636	162.0	398	1,955	1,822
20.00	2,150	181.0	1,887	3,842	2,368

Device	Routing	Invert	Outlet Devices
#1	Primary	17.50'	**0.750 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Secondary	18.75'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Tertiary	19.00'	**10.0' long x 15.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.03 cfs @ 12.10 hrs HW=19.01' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Secondary OutFlow Max=2.75 cfs @ 12.10 hrs HW=19.01' (Free Discharge)
↑—**2=Orifice/Grate** (Weir Controls 2.75 cfs @ 1.67 fps)

Tertiary OutFlow Max=0.04 cfs @ 12.09 hrs HW=19.01' (Free Discharge)
↑—**3=Broad-Crested Rectangular Weir** (Weir Controls 0.04 cfs @ 0.30 fps)

Time span=0.00-48.00 hrs, dt=0.03 hrs, 1601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 3: Runoff Area=21,567 sf 78.43% Impervious Runoff Depth=6.59"
Tc=5.0 min CN=94 Runoff=3.57 cfs 11,837 cf

Pond SF1: Soil Filter Peak Elev=19.04' Storage=2,022 cf Inflow=3.57 cfs 11,837 cf
Primary=0.03 cfs 3,394 cf Secondary=3.21 cfs 8,388 cf Tertiary=0.22 cfs 55 cf Outflow=3.46 cfs 11,837 cf

Total Runoff Area = 21,567 sf Runoff Volume = 11,837 cf Average Runoff Depth = 6.59"
21.57% Pervious = 4,653 sf 78.43% Impervious = 16,914 sf

Summary for Subcatchment 3:

Runoff = 3.57 cfs @ 12.07 hrs, Volume= 11,837 cf, Depth= 6.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Type III 24-hr 50-Yr Storm Rainfall=7.30"

	Area (sf)	CN	Description
*	16,914	98	Impervious
	4,653	80	>75% Grass cover, Good, HSG D
	21,567	94	Weighted Average
	4,653		21.57% Pervious Area
	16,914		78.43% Impervious Area

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

Summary for Pond SF1: Soil Filter

Inflow Area = 21,567 sf, 78.43% Impervious, Inflow Depth = 6.59" for 50-Yr Storm event
Inflow = 3.57 cfs @ 12.07 hrs, Volume= 11,837 cf
Outflow = 3.46 cfs @ 12.09 hrs, Volume= 11,837 cf, Atten= 3%, Lag= 1.4 min
Primary = 0.03 cfs @ 12.09 hrs, Volume= 3,394 cf
Secondary = 3.21 cfs @ 12.09 hrs, Volume= 8,388 cf
Tertiary = 0.22 cfs @ 12.09 hrs, Volume= 55 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Peak Elev= 19.04' @ 12.09 hrs Surf.Area= 1,655 sf Storage= 2,022 cf

Plug-Flow detention time= 194.0 min calculated for 11,830 cf (100% of inflow)
Center-of-Mass det. time= 194.6 min (957.3 - 762.6)

Volume	Invert	Avail.Storage	Storage Description
#1	17.50'	3,842 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
17.50	972	134.0	0	0	972
18.00	1,179	143.0	537	537	1,182
18.75	1,550	165.0	1,020	1,557	1,734
19.00	1,636	162.0	398	1,955	1,822
20.00	2,150	181.0	1,887	3,842	2,368

Device	Routing	Invert	Outlet Devices
#1	Primary	17.50'	**0.750 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Secondary	18.75'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Tertiary	19.00'	**10.0' long x 15.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.03 cfs @ 12.09 hrs HW=19.04' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Secondary OutFlow Max=3.19 cfs @ 12.09 hrs HW=19.04' (Free Discharge)
↑—**2=Orifice/Grate** (Weir Controls 3.19 cfs @ 1.76 fps)

Tertiary OutFlow Max=0.21 cfs @ 12.09 hrs HW=19.04' (Free Discharge)
↑—**3=Broad-Crested Rectangular Weir** (Weir Controls 0.21 cfs @ 0.53 fps)

UNE TENNIS COURT EXPANSION - PREDEVELOPMENT LAND COVER SUMMARY									
			Subdrainage Land Cover Areas						
Drainage Area	Area (SF)	Area (AC)	Impervious Area (SF)	Lawn Area HSG 'C' (SF)	Lawn Area HSG 'D' (SF)	Woods Area HSG 'C' (SF)	Woods Area HSG 'D' (SF)	Composite CN	Tc (hours)
			CN: 98	CN: 79	CN: 84	CN: 73	CN: 79		
S4	1,011,187	23.21	171,450	20,781	7,642	419,188	374,994	80	0.77
TOTAL	1,011,187	23.21	171,450	20,781	7,642	419,188	374,994	80	-

*If a drainage area contains multiple soil types with differing HSG classifcations (i.e. 'C' vs 'D'), additional columns should be added for each pervious & gravel hydrologic soil group types (HSG).

UNE TENNIS COURT EXPANSION - POSTDEVELOPMENT LAND COVER SUMMARY									
			Subdrainage Land Cover Areas						
Drainage Area	Area (SF)	Area (AC)	Impervious Area (SF)	Lawn Area HSG 'C' (SF)	Lawn Area HSG 'D' (SF)	Woods Area HSG 'C' (SF)	Woods Area HSG 'D' (SF)	Composite CN	Tc (hours)
			CN: 98	CN: 79	CN: 84	CN: 73	CN: 79		
S4	1,011,187	23.21	188,582	20,781	11,998	419,118	370,638	80	0.77
TOTAL	1,011,187	23.21	188,582	20,781	11,998	419,118	370,638	80	-

*If a drainage area contains multiple soil types with differing HSG classifcations (i.e. 'C' vs 'D'), additional columns should be added for each pervious & gravel hydrologic soil group types (HSG).

UNE TENNIS COURT EXPANSION - LAND COVER CURVE NUMBER SUMMARY TABLE				
USDA-NRCS SOIL CLASSIFICATION	**HYDROLOGIC SOIL GROUP (HSG)**	**LAND COVER TYPES - CURVE NUMBERS**		
		Impervious	**Grass, Fair**	**Woods, Fair**
Naumber (Na)	C	98	79	73
Lyman (Ly)	D	98	84	79
Lyman-Rock (Ln)	D	98	84	79

Source: Urban Hydrology for Small Watersheds - TR-55

BIDDEFORD - 24 HR RAINFALL DEPTHS	
2-YR	3.3 in
10-YR	4.9 in
25-YR	6.2 in
50-YR	7.3 in
100-YR	8.7 in

*Per Appendix H of DEP's Chapter 500; Type III Storm

TABLE 1 UNE TENNIS COURT EXPANSION - STORMWATER RUNOFF DISCHARGE SUMMARY				
ANALYSIS POINT	STORM FREQUENCY	EXISTING DISCHARGE (CFS)	PROPOSED DISCHARGE (CFS)	NOTES
AP3	Q_2	41.1	41.1	No Increase
	Q_{10}	80.7	80.7	No Increase
	Q_{25}	99.8	99.8	No Increase
	Q_{50}	155.9	155.9	No Increase

Appendix D:
Inspection & Maintenance Plan

Inspection and Maintenance Plan
For Stormwater Management Facilities

University of New England
Biddeford, Maine

February 2024

Stormwater management facilities include paved surfaces, ditches/swales, catch basins, culverts, storm drain pipe, detention ponds, wet pond, bioretention cells, grassed underdrain soil filters, and subsurface Stormtech detention chambers. During construction activities, the maintenance of all stormwater measures will be the direct responsibility of the Contractor. After acceptance by the Owner, the maintenance of all stormwater management facilities, the establishment of any contract services required to implement the program, and the keeping of records and maintenance log book will be the responsibility of the University of New England. At a minimum, the following maintenance activities for each stormwater management system shall be performed on a prescribed schedule.

Recertification Requirement

Within three months of the expiration of each five-year interval from the date of issuance of the permit, the permittee shall certify the following to the department.

(a) All areas of the project site have been inspected for areas of erosion, and appropriate steps have been taken to permanently stabilize these areas.
(b) All aspects of the stormwater control system have been inspected for damage, wear, and malfunction, and appropriate steps have been taken to repair or replace the facilities.
(c) The erosion and stormwater maintenance plan for the site is being implemented as written, or modifications to the plan have been submitted to and approved by the department and the maintenance log is being maintained.

Paved Surfaces

Accumulations of winter sand along paved surfaces shall be cleared at least once a year, preferably in the spring, and periodically during the year on an as-needed basis, to minimize transportation of sediment during rainfall events. Accumulations on pavement may be removed by pavement sweeping or vacuuming. 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. Grading of gravel roads, or grading of the gravel shoulders of gravel or paved roads, must be routinely performed to ensure that stormwater drains immediately off the road surface to adjacent buffer areas or stable ditches, and is not impeded by accumulations of graded material on the road shoulder or by excavation of false ditches in the shoulder.

Ditches and Swales

Open swales and ditches shall be inspected twice per year (in spring and fall) to assure that debris and/or sediments do not reduce the effectiveness of the system. Debris

and sediments shall be removed at that time. Any sign of erosion or blockage shall be immediately repaired to assure a vigorous growth of vegetation for the stability of the ditches and slopes proper function. Maintenance shall include, but not be limited to, mowing, trimming and removal vegetation in the ditches and slopes as required in order to prevent vegetation from blocking or diverting storm flows, replacement of riprap channel lining to prevent scour of the channel invert, removing vegetation and debris from the culverts.

Vegetated ditches should be mowed at least monthly during the growing season. Larger brush or trees must not be allowed to become established in the channel. Any areas where the vegetation fails will be subject to erosion and should be reseeded and mulched immediately.

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

Catch Basins

All catch basins, and any other field inlets throughout the collection system, shall be inspected twice per year (in spring and fall) to assure that the inlet entry and grates are clear of debris and will accept the intended flows. Any debris and sediments shall be cleared.

Sediment should be removed from these structures when it accumulates within 12 inches of the lowest pipe invert. If the basin outlet is designed with a hood to trap floatable materials (i.e. Snout or Casco Bay trap), check to ensure watertight seal is working. At a minimum, remove floating debris and hydrocarbons at the time of the inspection. The removed material must be disposed of in accordance with the Maine Solid Waste Disposal Rules. Confined space entry safety procedures shall be practiced should entry into these structures be required.

Culverts and Storm Drainage Pipes

Culverts and piped drainage systems shall be inspected on an annual basis to remove any obstructions to flow; remove accumulated sediments and debris at the inlet, at the outlet, and within the conduit; and to repair any erosion damage at the pipe inlet and outlet. Sediment should be removed when its level exceeds 20% of the pipe diameter. This may be accomplished by hydraulic flushing or any mechanical means; however, care should be taken to contain the sediment at the pipe outlet, and not flush the sediments into the detention/infiltration pond areas as this will reduce the ponds capacity and ability to infiltrate runoff, and will hasten the time when the pond must be cleaned or rehabilitated.

Detention Ponds

Inlets and outlets of ponds should be inspected monthly during wet weather conditions from March to November. Pipe ends and drain grates should be cleared of debris as necessary and inspected for damage.

Ponds should be inspected semi-annually for erosion, destabilization of side slopes, embankment settling and other signs of structural failure, and loss of storage volume due to sediment accumulation. Corrective action should be taken immediately upon identification of problems.

Embankments should be maintained to preserve their integrity as impoundment structures. Maintenance should include mowing and control of woody vegetation at least twice annually; and rodent control and erosion control and repair as needed.

Inspection and maintenance of the ponds is critical to their long term performance. Observations and volume of sediment removed should be recorded in the inspection/maintenance logs.

Wet Pond

The inlet and outlet of the wet pond should be inspected twice per year to ensure that flow structures are not blocked by debris, identify any erosion, destabilization of side slopes, embankment settling, and other signs of structural failure. Corrective action should be taken immediately upon identification of problems.

The gravel trench outlet should be inspected after every major storm in the first few months to ensure proper function. Thereafter, the gravel trench should be inspected at least once every six months. Inspection consists of verifying that the pond is slowly emptying through the gravel filter for a short time (12-24 hours) after a storm and that potentially clogging material such as accumulations of decaying leaves are not preventing discharge through the gravel. The top several inches of gravel in the trench must be replaced with fresh material when water ponds above the permanent pool elevation form more than 72 hours.

Wet ponds lose 0.5% to 1% of their volume annually due to sediment accumulation. Dredging is required when accumulated volume loss reaches 15%, or approximately every 15 to 20 years. Sediment and plant debris should be removed from any pretreatment structure(s) annually.

Grassed Underdrained Soil Filters

The soil filter should be inspected after every major storm in the first few months to ensure proper function. Thereafter, the filter should be inspected at least once every six months to ensure that it is draining within 24 hours.

The top several inches of the filter shall be replaced with fresh material when water ponds on the surface of the bed for more than 72 hours. The removed sediments should be disposed in an acceptable manner.

Sediment and plan debris should be removed from the pretreatment structure at least annually.

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

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

Harvesting and pruning of excessive growth will need to be done occasionally. Weeding to control unwanted or invasive plants may also be necessary.

Bioretention Cells

Mowing and removal of woody growth – Bio-retention areas are designed to grow water tolerant plantings and mowing is not required in the interior of the structure. However, the external and top slopes of earthen embankments will be mowed up to three times per growing season to control over growth.

Outlet inspection and cleaning – The Bio-retention outlet consists of a layer of planting loam and sand with a stone and perforated pipe underdrain. Influx of sediments will be limited by sumps on all upstream catch basin structures. Outlet inspections shall include flushing of the underdrain through the cleanout at the end of the pipe. Trash, sediment and debris shall be removed from the vicinity of the outlet and disposed of at a licensed off-site facility. The basin shall be inspected bi annually for evidence of excessive retention or rapid release of flow.

Sediment removal and soil replacement – Every five years the planting soil in the Bio-retention area shall be removed and replaced with clean material. Every effort should be made to retain and re-plant existing vegetation. The stone underdrain shall also be replaced at this time, along with the perforated pipe.

Bioretention cells shall not be used for snow storage area.

Vehicular equipment used to maintain or rehabilitate bioretention cells should work from the basin perimeter and not enter the basin area, as this will compact the soil surface and reduce the design infiltration rate.

Level Spreaders

Long term maintenance of the level spreader is essential to ensure its effectiveness.

- Inspections - At least once a year and following major storms, the level spreader pool should be inspected for sand accumulation and debris that may reduce its capacity.
- Sediment Removal - Sediment build-up within the swale should be removed when it has accumulated to approximately 25% of design volume or channel capacity. Dispose of the sediments appropriately.

- Debris - Remove debris such as leaf litter, branches and tree growth from the spreader.
- Mowing - Vegetated spreaders may require mowing.
- Snow Storage - Do not store snow within the area of the level spreader.
- Level Spreader Replacement - The reconstruction of the level spreader may be necessary when sheet flow from the spreader channelize into the buffer.

Disposal

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

Recordkeeping

UNE will keep a written maintenance log that summarizes inspections, maintenance, an any corrective actions taken. The log shall include the date on which each inspection or maintenance task was performed, a description of the inspection findings or maintenance completed, and the name of the inspector or maintenance personnel performing the task. If a maintenance task requires the clean-out of any sediment or debris, the location where the sediment or debris was disposed after removal will be indicated. This log shall be made available to the Maine Department of Environmental Protection upon request. A copy of this log will be provided to the City of Biddeford Planning Department no later than January 15th of each year.

UNE Tennis Courts
16 Old Pool Road, Biddeford, ME

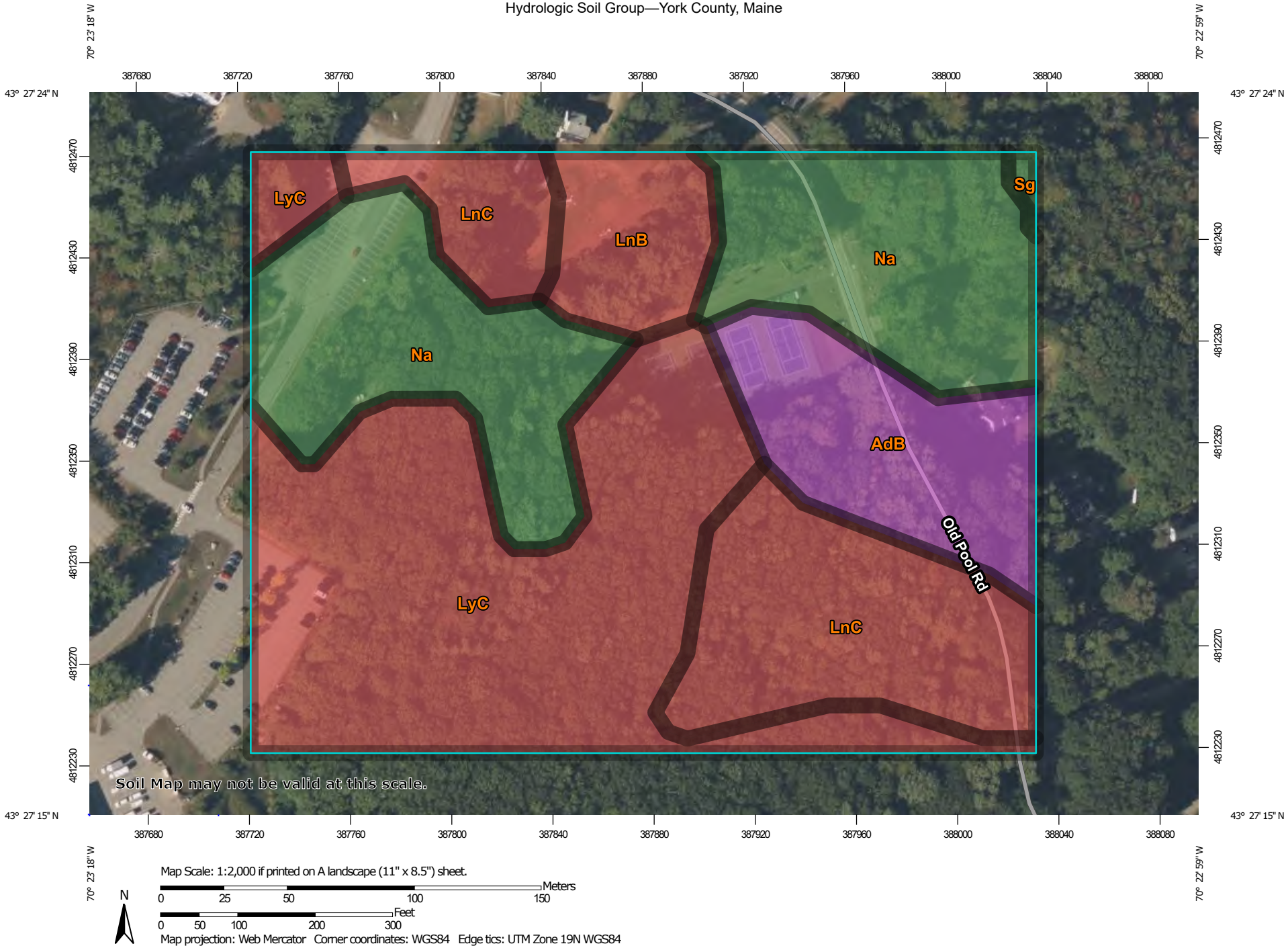
INSPECTION / MAINTENANCE LOG

UNDERDRAINED SOIL FILTERS

I: INSPECTED - C: CLEANED - S: SWEPT - R: REPAIRED

DATE	INITIALS	ACTION	COMMENT
3/28/22	RST	I	EXAMPLE: Cleared sediment and plant debris from inlet area, mowed filter area, crest, and sideslopes.

Appendix E
USDA NRCS Soil Map



Map Scale: 1:2,000 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 25 50 100 150

Feet: 0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Lines

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Points

A

A/D

B

B/D

C

C/D

D

Not rated or not available

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 1:20,000.

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

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: York County, Maine
Survey Area Data: Version 22, Sep 5, 2023

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

Date(s) aerial images were photographed: Jun 19, 2020—Sep 20, 2020

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.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
AdB	Adams loamy sand, 0 to 8 percent slopes	A	2.0	11.2%
LnB	Lyman loam, 3 to 8 percent slopes, rocky	D	1.1	5.9%
LnC	Lyman loam, 8 to 15 percent slopes, rocky	D	3.4	18.4%
LyC	Lyman-Rock outcrop complex, 8 to 15 percent slopes	D	6.6	36.0%
Na	Naumburg sand	A/D	5.1	28.2%
Sg	Sebago peat	A/D	0.1	0.3%
Totals for Area of Interest			**18.2**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

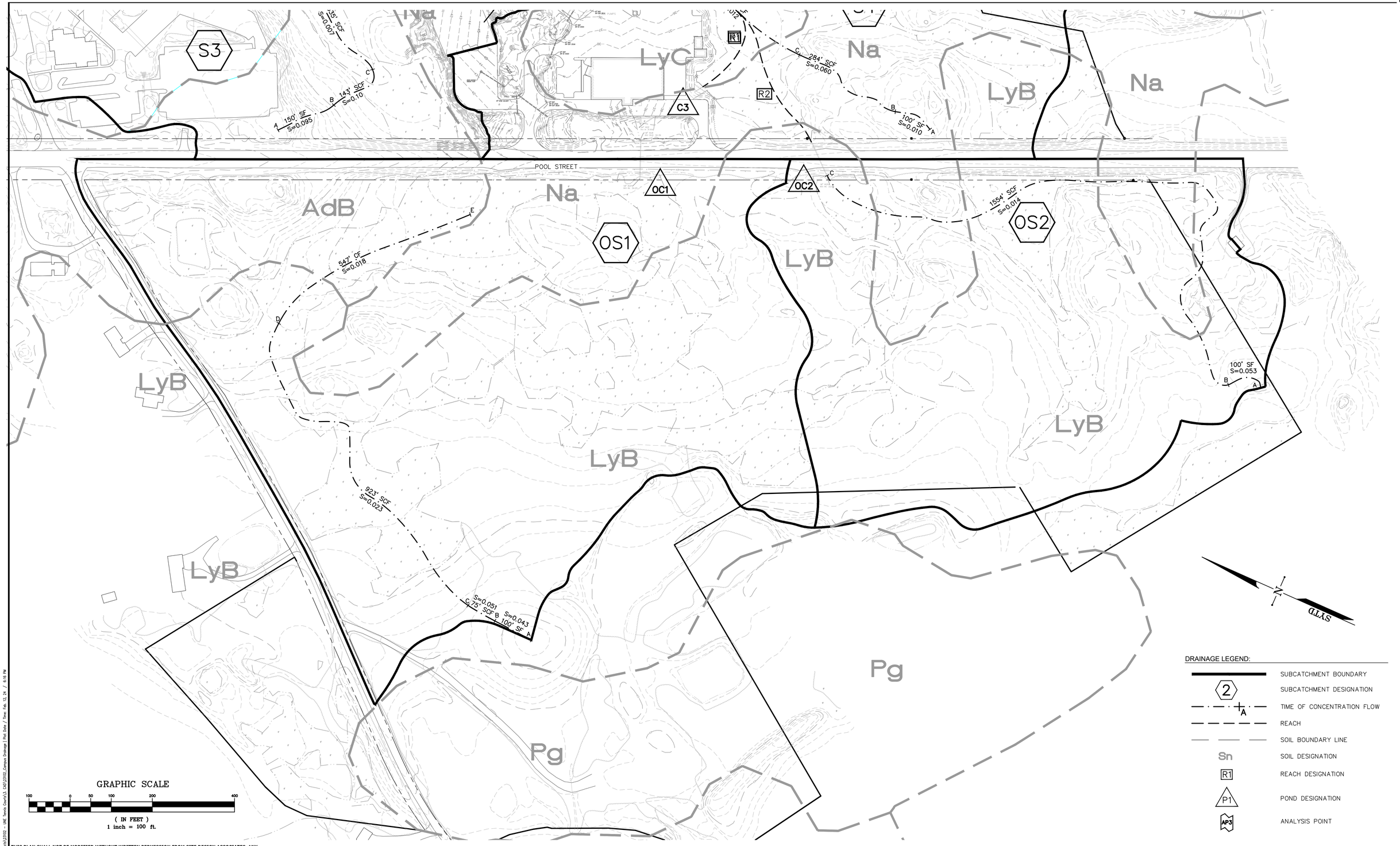
Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Appendix F
Drainage Plans

Drawing List

- D-100 – Campus Drainage Plan – Offsite Areas
- D-101 – Campus Drainage Plan – Pre-Development
- D-200 – Campus Drainage Plan – Post Development
- D-300 – Stormwater Treatment Plan



THIS PLAN SHALL NOT BE MODIFIED WITHOUT WRITTEN PERMISSION FROM SITE DESIGN ASSOCIATES, ANY ALTERATIONS, OTHERWISE, SHALL BE AT THE USER'S SOLE RISK AND WITHOUT LIABILITY TO SITE DESIGN ASSOCIATES.

REV.	DATE	STATUS	BY	CHKD.	APPD.	REV.	DATE	STATUS	BY	CHKD.	APPD.
D	2/14/2024	SUBMITTED FOR SITE PLAN REVIEW	DAM	TWS	TWS						
C	06/22/06	REVISED PER M.D.E.P. COMMENTS	DAM	TWS	TWS						
B	05/03/06	REVISED PER CITY COMMENTS / SUBMITTED FOR M.D.E.P. REVIEW	DAM	TWS	TWS						
A	04/12/06	SUBMITTED FOR SITE PLAN REVIEW	DAM	TWS	TWS						

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2/14/2024

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CLIENT:
UNIVERSITY OF NEW ENGLAND
11 HILLS BEACH ROAD BIDDEFORD, MAINE 04005

DESIGN: DEPT.
DRAWN: DEPT.
CHKD: TWS
DATE: FEB 2024
SCALE: 1" = 100'

PROJECT:
TENNIS COURT EXPANSION
16 OLD POOL ROAD, BIDDEFORD, ME
CAMPUS DRAINAGE PLAN
OFFSITE AREAS

PROJ. NO. 23-216-00
DWG. NO. D-100
REV. D

Drawing Name: C:\Users\Stan\Google Drive\Projects\SDA Projects\23XXX - UNE Tennis Courts\5 CAD\23X02_Campus Drainage | Plot Date / Time: Feb. 12, 24 / 6:16 PM

DRAINAGE LEGEND:

- SUBCATCHMENT BOUNDARY
- 2 — SUBCATCHMENT DESIGNATION
- T_A — TIME OF CONCENTRATION FLOW
- REACH
- SOIL BOUNDARY LINE
- Sn — SOIL DESIGNATION
- R1 — REACH DESIGNATION
- P1 — POND DESIGNATION
- AP3 — ANALYSIS POINT

GRAPHIC SCALE

(IN FEET)
1 inch = 100 ft.

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D	2/14/2024	SUBMITTED FOR SITE PLAN REVIEW	DAM	TWS	TWS						
C	06/22/06	REVISED PER M.D.E.P. COMMENTS	DAM	TWS	TWS						
B	05/03/06	REVISED PER CITY COMMENTS / SUBMITTED FOR M.D.E.P. REVIEW	DAM	TWS	TWS						
A	04/12/06	SUBMITTED FOR SITE PLAN REVIEW	DAM	TWS	TWS						

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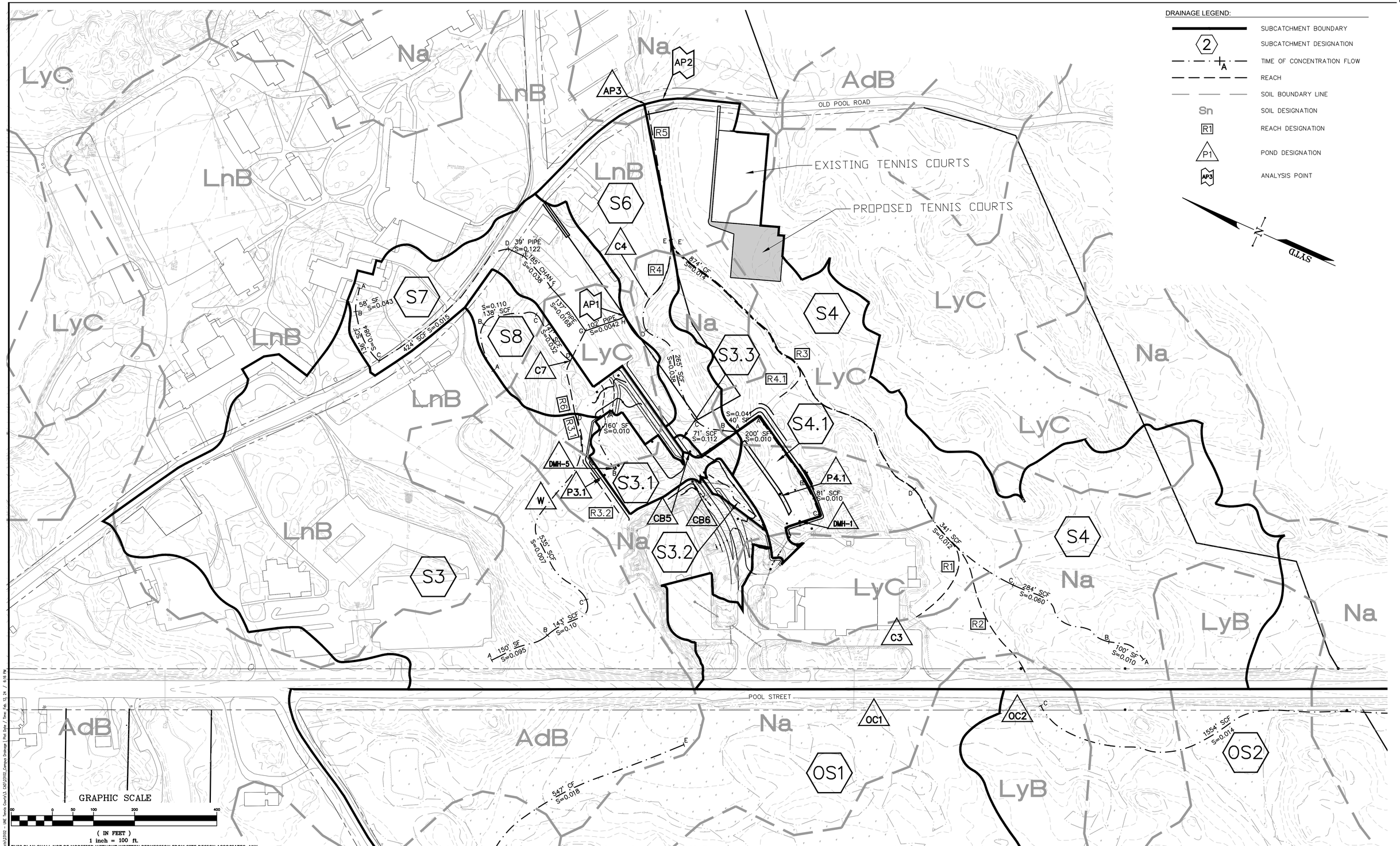
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DRAWN: DEPT.
CHKD: TWS
DATE: FEB 2024
SCALE: 1" = 100'

PROJECT: TENNIS COURT EXPANSION
16 OLD POOL ROAD, BIDDEFORD, ME

CAMPUS DRAINAGE PLAN
PRE DEVELOPMENT PLAN

PROJ. NO. 23-216-00
DWG. NO. D-101
REV. D

Drawing Name: C:\Users\Site\Google Drive\Projects\SDA Projects\23102 - UNE Tennis Courts\3. CAD\23102_Campus Drainage | Plot Date / Time: Feb. 12, 24 / 6:16 PM



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D	2/14/2024	SUBMITTED FOR SITE PLAN REVIEW	DAM	TWS	TWS						
C	06/22/06	REVISED PER M.D.E.P. COMMENTS	DAM	TWS	TWS						
B	05/03/06	REVISED PER CITY COMMENTS / SUBMITTED FOR M.D.E.P. REVIEW	DAM	TWS	TWS						
A	04/12/06	SUBMITTED FOR SITE PLAN REVIEW	DAM	TWS	TWS						

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DESIGN: DEPT.	PROJECT: TENNIS COURT EXPANSION
DRAWN: DEPT.	16 OLD POOL ROAD, BIDDEFORD, ME
CHKD: TWS	CAMPUS DRAINAGE PLAN POST DEVELOPMENT PLAN
DATE: FEB 2024	PROJ. NO. 23-216-00 REV. D
SCALE: 1" = 100'	DWG. NO. D-200

Drawing Name: C:\Users\Site\Google Drive\Projects\SDA Projects\23102 - UNE Tennis Courts\3. CAD\23102_Campus Drainage | Plot Date / Time: Feb. 12, 24 / 6:16 PM

Table 1
Water Quality Treatment Calculations

Subcatchment Area	New Impervious	New Landscaped	New Developed	Treament BMP
1	543	0	543	Level Spreader 1
2	687	0	687	Level Spreader 2
3	16,914	4,653	21,567	Soil Filter SF1
4	63	820	883	None
5	0	785	785	None
Subtotal Areas	18,207	6,258	24,465	
TOTAL TREATED AREAS	**18,144**	**4,653**	**22,797**	
PERCENT IMPERVIOUS & DEVELOPED AREA TREATED	**99.7%**		**93.2%**	

Notes:
Treated Impervious Area
Treated Developed Area
Chapter 500 Requires treatment of 95% of impervious area and 80% of developed area.
All areas presented in square feet.

PROPOSED SOIL FILTER SF1

EXISTING LEVEL SPREADER 2
(25' LONG)

EXISTING LEVEL SPREADER 1
(25' LONG)

APPARENT LINE

STORMWATER TREATMENT LEGEND
AREA TREATED IN LEVEL SPREADER 1
AREA TREATED IN LEVEL SPREADER 2
AREA TREATED IN SOIL FILTER SF1

DRAINAGE LEGEND
SUBCATCHMENT BOUNDARY
1 SUBCATCHMENT DESIGNATION

GRAPHIC SCALE
20 0 10 20 40 80
1 inch = 20 ft.

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REV.	DATE	STATUS	BY	CHKD.	APPD.
A	2/14/2024	ISSUED FOR SITE PLAN REVIEW	DEPT.	TWS	TWS

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DESIGN: DEPT.
DRAWN: DEPT.
CHKD: TWS
DATE: FEB 2024
SCALE: 1" = 20'

PROJECT: TENNIS COURT EXPANSION
16 OLD POOL ROAD, BIDDEFORD, ME
STORMWATER TREATMENT PLAN

PROJ. NO. 23-216-00 REV. A
DWG. NO. D-300

Drawing Name: C:\Users\tbas\Google Drive\Projects\SDA Projects\23202 - UNE Tennis Courts\3. CAD\23202 - Base | Plot Date / Time: Feb. 12, 24 / 6:17 PM

TENNIS COURT EXPANSION

UNIVERSITY OF NEW ENGLAND
16 OLD POOL ROAD
BIDDEFORD, ME

PREPARED FOR:
UNIVERSITY OF NEW ENGLAND
11 HILLS BEACH ROAD
BIDDEFORD, ME 04005

FEBRUARY 14, 2024

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WETLAND PROFESSIONAL
STATEWIDE SURVEYS, INC.
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CAPE ELIZABETH, ME 04107
207-767-4200

LANDSCAPE ARCHITECT
HUNTRESS SPORTS
LANDSCAPE ARCHITECTS & PLANNERS
17 TEWKSBURY STREET
ANDOVER, MA 01810
978-470-8882

SITE CONTRACTOR
TO BE DETERMINED

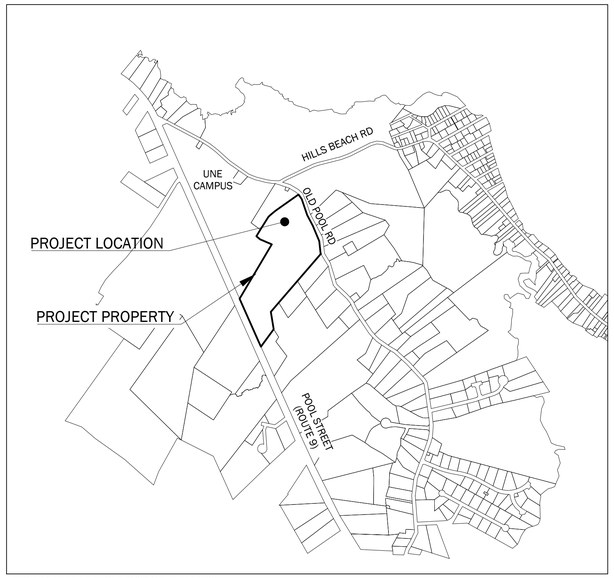
RECORD OWNER:

UNIVERSITY OF NEW ENGLAND
11 HILLs BEACH ROAD
BIDDEFORD, ME 04005

PARCEL ID:

TAX MAP 9
LOT 13

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USGS BIDDEFORD, MAINE 24K TOPOGRAPHIC MAP, 2021

N

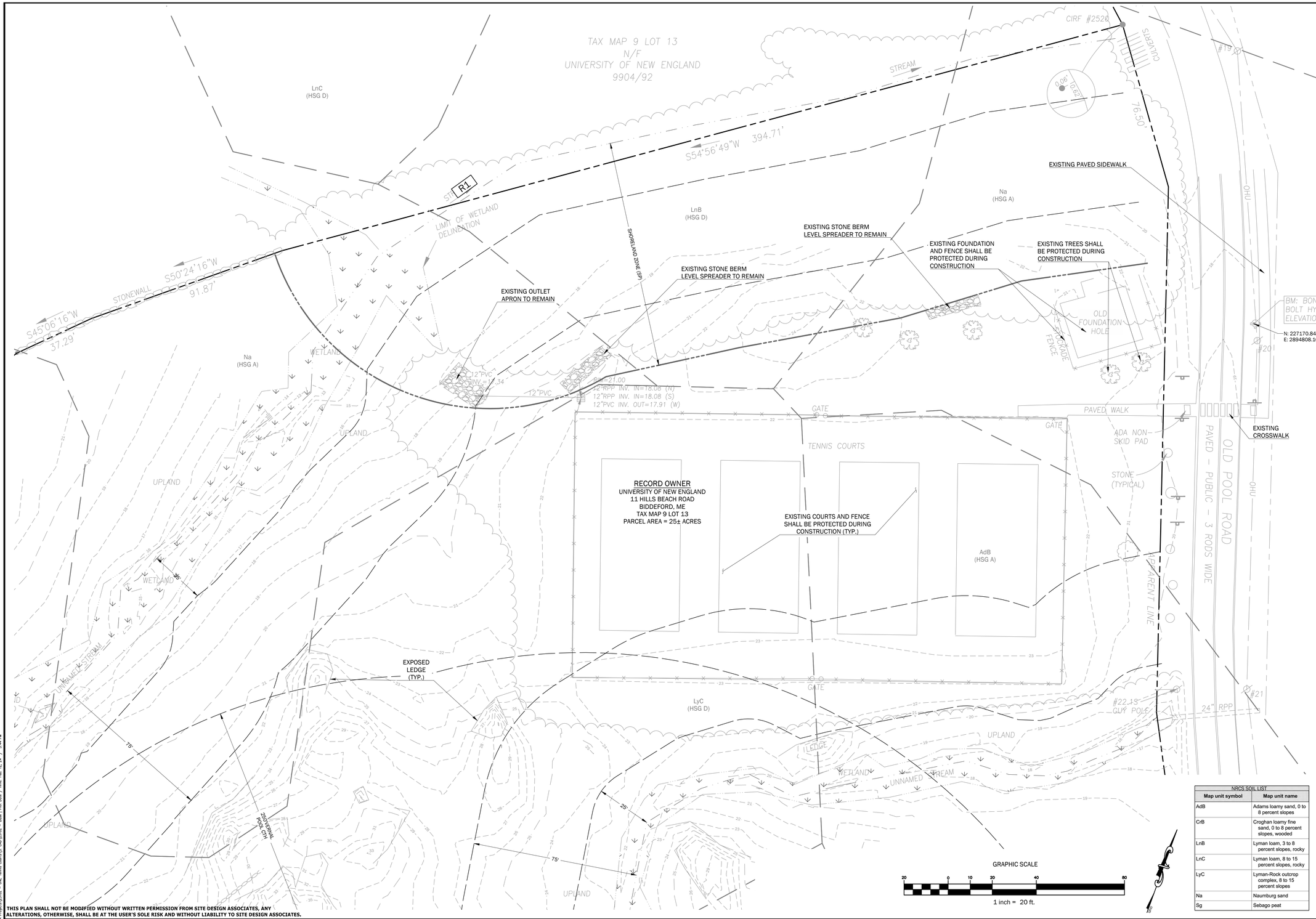
GRAPHIC SCALE
1000 0 500 1000
1 inch = 1000ft.

LIST OF DRAWINGS:

SHEET NO.	SHEET TITLE
	COVER SHEET
C-100	EXISTING CONDITIONS PLAN
C-101	SITE DEMOLITION AND EROSION CONTROL PLAN
C-200	SITE PLAN
C-201	GRADING, DRAINAGE, AND EROSION CONTROL PLAN
E-100	VERNAL POOL CRITICAL TERRESTRIAL HABITAT PLAN
C-301	EROSION & SEDIMENTATION CONTROL NOTES AND DETAILS
C-302	CIVIL DETAILS
C-303	CIVIL DETAILS
L-100	TENNIS COURT DETAILS
L-101	TENNIS COURT DETAILS
L-102	TENNIS COURT DETAILS

GENERAL PROJECT NOTES:

1. THE PROJECT SITE CONTAINS APPROXIMATELY 25± ACRES.
2. THE PROJECT SITE IS LOCATED IN THE INSTITUTIONAL (IN) ZONE.
3. A NON-STRUCTURAL PORTION OF THE PROJECT IS LOCATED IN THE STREAM PROTECTION (SP) ZONE.
4. THE SITE IS CURRENTLY PART OF THE UNIVERSITY OF NEW ENGLAND CAMPUS AND CONTAINS FOUR TENNIS COURTS. THE REMAINDER OF THE PARCEL IS UNDEVELOPED AND FORESTED.
5. THE PROPOSED PROJECT CONSISTS OF CONSTRUCTION OF TWO ADDITIONAL TENNIS COURTS AND ASSOCIATED AMENITIES.
6. THE PROJECT IS LOCATED IN THE WATERSHED OF AN UNNAMED TRIBUTARY TO BIDDEFORD POOL.
7. THE PROJECT SITE IS NOT LOCATED WITHIN THE BIDDEFORD MS4 URBANIZED AREA.
8. THE FOLLOWING NATURAL RESOURCES ARE LOCATED ONSITE:
   - 8.1. TWO UNNAMED TRIBUTARY STREAMS TO BIDDEFORD POOL (SEE SHEET C-100).
   - 8.2. MULTIPLE FRESHWATER WETLANDS ARE LOCATED WITHIN THE PROJECT AREA (SEE SHEET C-100).
   - 8.3. A SIGNIFICANT VERNAL POOL IS LOCATED IN THE APPROXIMATE CENTER OF THE PROPERTY (SEE SHEET E-100).
9. THE PROJECT IS NOT LOCATED WITHIN THE FEMA 100-YEAR FLOODPLAIN.
10. NO PUBLIC OR PRIVATE ROADS ARE PROPOSED FOR THIS PROJECT.
11. NO PUBLIC SEWER CONNECTIONS ARE PROPOSED FOR THIS PROJECT.
12. NO PUBLIC STORM DRAIN CONNECTIONS ARE PROPOSED FOR THIS PROJECT.
13. THE PROJECT LIMIT OF DISTURBANCE IS APPROXIMATELY 0.89± ACRES.
14. PERVIOUS LAND COVER ONSITE:
    EXISTING: 1,061,810 SF
    PROPOSED: 1,043,603 SF
14. IMPERVIOUS LAND COVER ONSITE:
    EXISTING: 27,190 SF
    PROPOSED: 45,397 SF
15. THE FOLLOWING WAIVERS ARE REQUESTED FOR THE PROJECT:
    - 15.1. WAIVER OF ARTICLE XI.5.B.1.e.3.: NO SLOPES STEEPER THAN 2H:1V. TO ALLOW FOR STEEPER SLOPES IN LEDGE CUT AREAS.



EXISTING CONDITIONS NOTES

1. THE CONTRACTOR SHALL NOTIFY DIGSAFE PRIOR TO ANY DEMOLITION AND CONSTRUCTION ACTIVITIES.
2. THE LOCATIONS OF UNDERGROUND UTILITIES ARE APPROXIMATE AND NOT GUARANTEED BY THE OWNER OR THE ENGINEER. IT IS THE CONTRACTORS RESPONSIBILITY TO LOCATE ALL UTILITIES, ANTICIPATE CONFLICTS, AND REPAIR EXISTING UTILITIES AS REQUIRED TO COMPLETE THE WORK.
3. ANY EXISTING PROPERTY DAMAGED BY THE CONTRACTOR SHALL BE REPAIRED OR REPLACED TO MATCH ITS ORIGINAL EXISTING CONDITIONS BY THE CONTRACTOR AT NO CHARGE TO THE OWNER OR ENGINEER.
4. ALL MATERIALS DESIGNATED FOR REMOVAL/DEMOLITION SHALL BECOME THE PROPERTY OF THE CONTRACTOR UNLESS OTHERWISE SPECIFIED. THE CONTRACTOR SHALL DISPOSE OF ALL MATERIALS OFF-SITE IN ACCORDANCE WITH ALL LOCAL, STATE AND FEDERAL REGULATIONS, ORDINANCES AND CODES.
5. SAWCUT, GRIND AND REMOVE PAVEMENT PER DETAIL SHOWN ON SITE DETAIL SHEETS. IN ALL AREAS WHERE PAVEMENT TO BE REMOVED ABUTS EXISTING PAVEMENT TO REMAIN.
6. SCREENED IMAGES REPRESENT EXISTING CONDITIONS.

GENERAL PROJECT NOTES

1. PRIOR TO THE START OF ANY EXCAVATION FOR THE PROJECT, BOTH ON-SITE AND OFF-SITE, THE CONTRACTOR SHALL NOTIFY DIGSAFE AND BE PROVIDED WITH A DIGSAFE NUMBER INDICATING THAT ALL EXISTING UTILITIES HAVE BEEN LOCATED AND CLEARLY MARKED.
2. CONTRACTOR SHALL THOROUGHLY FAMILIARIZE THEMSELVES WITH ALL DRAWINGS AND SITE CONDITIONS PRIOR TO BIDDING AND PRIOR TO CONSTRUCTION.
3. IT IS THE CONTRACTOR'S RESPONSIBILITY TO FAMILIARIZE THEMSELVES WITH AND COMPLY WITH THE CONDITIONS OF ALL REGULATIONS, PERMITS AND APPROVALS AND CONDUCT THE WORK IN ACCORDANCE WITH THESE PERMITS AND APPROVALS. THE CONTRACTOR SHALL OBTAIN AND PAY FOR ALL ADDITIONAL PERMITS, STREET OPENINGS, NOTICES AND FEES NECESSARY TO COMPLETE THE WORK.
4. ANY DISCREPANCIES BETWEEN DRAWINGS AND SITE CONDITIONS AS WELL AS MANUFACTURER'S RECOMMENDATIONS SHALL BE REPORTED IMMEDIATELY TO THE OWNER'S REPRESENTATIVE FOR CLARIFICATION AND RESOLUTION PRIOR TO BIDDING OR CONSTRUCTION.
5. CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR ALL MEANS, METHODS AND TECHNIQUES EMPLOYED TO PERFORM WORK SHOWN ON THESE PLANS.
6. THE CONTRACTOR SHALL LIMIT THE CONSTRUCTION ACTIVITY TO THE LIMITS SHOWN ON THE PLANS, UNLESS OTHERWISE AUTHORIZED BY THE OWNER'S REPRESENTATIVE.

PLAN REFERENCES

1. PARTIAL BOUNDARY AND TOPOGRAPHIC INFORMATION OBTAINED FROM A PLAN ENTITLED "TOPOGRAPHIC SURVEY AT 2 OLD POOL ROAD, BIDDEFORD, ME" PREPARED BY OWEN HASKELL, INC. OF FALMOUTH, MAINE, DATED MAY 24, 2023.
2. WETLANDS WERE DELINEATED IN MAY 2023 BY STATEWIDE SURVEYS, OF CAPE ELIZABETH, MAINE.

LEGEND

EXISTING

- PROPERTY LINE
- WETLANDS
- STREAM
- OHU — OVERHEAD UTILITIES
- UTILITY POLE
- HYDRANT
- BUILDING
- EDGE OF PAVEMENT
- CHAIN LINK FENCE
- 100 / 101 — INDEX CONTOUR / INTERMEDIATE CONTOUR
- RIPRAP
- TREELINE
- NRCS SOIL BOUNDARY
- Na (HSG A) — NRCS SOIL NAME (HYDROLOGIC SOIL GROUP)

GRAPHIC SCALE

20 0 10 20 40 80

1 inch = 20 ft.

NRCS SOIL LIST	
Map unit symbol	**Map unit name**
AdB	Adams loamy sand, 0 to 8 percent slopes
CrB	Croghan loamy fine sand, 0 to 8 percent slopes, wooded
LnB	Lyman loam, 3 to 8 percent slopes, rocky
LnC	Lyman loam, 8 to 15 percent slopes, rocky
LyC	Lyman-Rock outcrop complex, 8 to 15 percent slopes
Na	Naumburg sand
Sg	Sebago peat

THIS PLAN SHALL NOT BE MODIFIED WITHOUT WRITTEN PERMISSION FROM SITE DESIGN ASSOCIATES, ANY ALTERATIONS, OTHERWISE, SHALL BE AT THE USER'S SOLE RISK AND WITHOUT LIABILITY TO SITE DESIGN ASSOCIATES.

REV.	DATE	STATUS	BY	CHKD.	APPD.
A	2/14/2023	ISSUED FOR SITE PLAN REVIEW	DEPT.	TWS	TWS

STATE OF MAINE — THOMAS W. SAUCIER NO. 8026 — LICENSED PROFESSIONAL ENGINEER

2/14/2024

Site Design Associates
Consulting Engineering & Land Planning
23 Whitney Way Topsham, Maine 04086 Tel: (207) 449-4275

CLIENT:
UNIVERSITY OF NEW ENGLAND
11 HILLS BEACH ROAD BIDDEFORD, MAINE 04005

DESIGN: DEPT.
DRAWN: DEPT.
CHKD: TWS
DATE: FEB 2024
SCALE: 1" = 20'

PROJECT: TENNIS COURT EXPANSION
16 OLD POOL ROAD, BIDDEFORD, ME

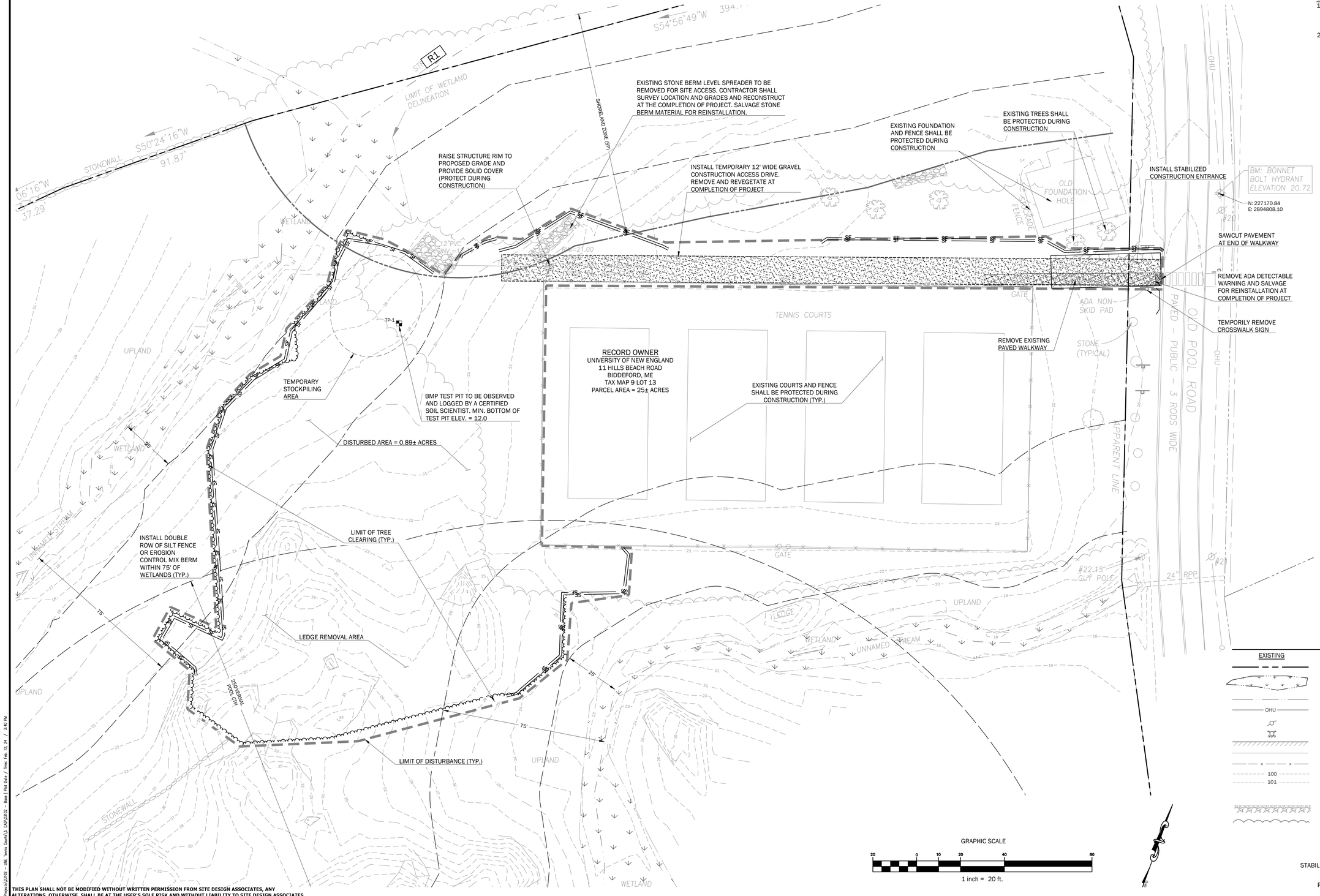
EXISTING CONDITIONS PLAN

PROJ. NO. 23-216-00
DWG. NO. C-100
REV. A

Drawing Name: C:\Users\Stan\Google Drive\Projects\SDA Projects\23102 - UNE Tennis Courts\13. CAD\23102 - Base | Plot Date / Time: Feb. 12, 24 / 3:44 PM

EROSION CONTROL NOTES

1. CONTRACTOR SHALL INSTALL EROSION AND SEDIMENTATION CONTROL BMPS PRIOR TO EXCAVATION AND/OR STOCKPILING ACTIVITIES ONSITE.
2. CONTRACTOR SHALL IMPLEMENT AND MAINTAIN DUST CONTROL MEASURES THROUGHOUT CONSTRUCTION.



LEGEND

EXISTING		PROPOSED
	PROPERTY LINE	
	WETLANDS	
	STREAM	
OHU	OVERHEAD UTILITIES	
	UTILITY POLE	
	HYDRANT	
	BUILDING	
	EDGE OF PAVEMENT	
x x	CHAIN LINK FENCE	
100	INDEX CONTOUR	
101	INTERMEDIATE CONTOUR	
	EDGE OF GRAVEL	
	RIPRAP	
	TREELINE	
	LIMIT OF DISTURBANCE	
SF	SILT FENCE OR EROSION CONTROL MIX BERM	
	STABILIZED CONSTRUCTION ENTRANCE	
	PAVEMENT REMOVAL AREA	

GRAPHIC SCALE

20 0 10 20 40 80

1 inch = 20 ft.

THIS PLAN SHALL NOT BE MODIFIED WITHOUT WRITTEN PERMISSION FROM SITE DESIGN ASSOCIATES, ANY ALTERATIONS, OTHERWISE, SHALL BE AT THE USER'S SOLE RISK AND WITHOUT LIABILITY TO SITE DESIGN ASSOCIATES.

REV.	DATE	STATUS	BY	CHKD.	APPD.
A	2/14/2023	ISSUED FOR SITE PLAN REVIEW	DEPT.	TWS	TWS

STATE OF MAINE
THOMAS W. SAUCIER
NO. 6085
REGISTERED PROFESSIONAL ENGINEER
2/14/2024

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CLIENT:
UNIVERSITY OF NEW ENGLAND
11 HILLS BEACH ROAD BIDDEFORD, MAINE 04005

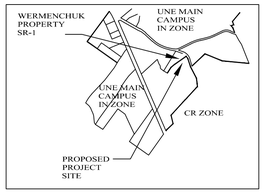
DESIGN: DEPT.
DRAWN: DEPT.
CHKD: TWS
DATE: FEB 2024
SCALE: 1" = 20'

PROJECT:
TENNIS COURT EXPANSION
16 OLD POOL ROAD, BIDDEFORD, ME

SITE DEMOLITION AND EROSION CONTROL PLAN

PROJ. NO. 23-216-00
DWG. NO. C-101
REV. A

Drawing Name: c:\Users\Staci\Google Drive\Projects\SDA Projects\23202 - UNE Tennis Courts\1_CAD\23202 - Base | Plot Date / Time: Fri, 12, 24 / 3:40 PM



LOCATION MAP
1" = 2,000 FT

SITE PLAN NOTES

1. ALL DIMENSIONS ARE PERPENDICULAR UNLESS OTHERWISE NOTED.
2. DO NOT SCALE DRAWINGS. ANY OMISSIONS IN DIMENSIONING SHALL BE REPORTED
3. IMMEDIATELY TO THE OWNER'S REPRESENTATIVE.
4. CONTRACTOR SHALL VERIFY ALL DIMENSIONS IN THE FIELD AND SHALL STAKE THE COURTS AND SIDEWALK FOR APPROVAL BY THE OWNER PRIOR TO CONSTRUCTION.
5. A DIGITAL AUTOCAD FILE WILL BE SUPPLIED TO THE CONTRACTOR FOR LAYOUT PURPOSES UPON REQUEST.
6. ALL SIGNAGE AND MARKINGS TO BE IN ACCORDANCE WITH MUTCD STANDARDS AND THE CITY OF BIDDEFORD ORDINANCES.
7. RELOCATE SIGNS WITHIN THE LIMITS OF WORK AS REQUIRED.
8. RETAINING WALL SHALL BE "STRONG STONE" OR APPROVED EQUAL. CONTRACTOR SHALL SUBMIT PLAN PREPARED BY A PROFESSIONAL ENGINEER TO BE REVIEWED AND APPROVED BY OWNER'S REPRESENTATIVE.

ZONING SUMMARY

ZONE - INSTITUTIONAL ZONE (IN)
STREAM PROTECTION ZONE (SP)

PLAN REFERENCES

1. BOUNDARY AND TOPOGRAPHIC INFORMATION OBTAINED FROM A PLAN ENTITLED "TOPOGRAPHIC SURVEY AT 2 OLD POOL ROAD, BIDDEFORD, ME" PREPARED BY OWEN HASKELL, INC. OF FALMOUTH, MAINE, DATED MAY 24, 2023.
2. WETLANDS WERE DELINEATED IN MAY 2023 BY STATEWIDE SURVEYS, OF CAPE ELIZABETH, MAINE.

RECORD OWNER
UNIVERSITY OF NEW ENGLAND
11 HILLS BEACH ROAD
BIDDEFORD, ME
TAX MAP 9 LOT 13
PARCEL AREA = 25± ACRES

APPROVAL
CITY OF BIDDEFORD PLANNING BOARD

APPROVED BY: DATE:

GRAPHIC SCALE
20 0 10 20 40 80
1 inch = 20 ft.

LEGEND

EXISTING		PROPOSED
	PROPERTY LINE	
	WETLANDS	
	STORM DRAIN STRUCTURE	●
	STORM DRAIN LINE	SD
	UNDERDRAIN	UD
	CLEANOUT	C.O.
	UNDERDRAIN	UD
OHU	OVERHEAD UTILITIES	OHU
	UNDERGROUND ELECTRIC	UGE
	BOLLARD LIGHT	✱
	UTILITY POLE	
	HYDRANT	
	BUILDING	
	EDGE OF PAVEMENT	
100	INDEX CONTOUR	100
101	INTERMEDIATE CONTOUR	101
	EDGE OF GRAVEL	
	RIPRAP	
	TREELINE	

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REV.	DATE	STATUS	BY	CHKD.	APPD.
A	2/14/2023	ISSUED FOR SITE PLAN REVIEW	DEPT.	TWS	TWS

THOMAS W. SAUCIER NO. 8078 LICENSED PROFESSIONAL ENGINEER
2/14/2024

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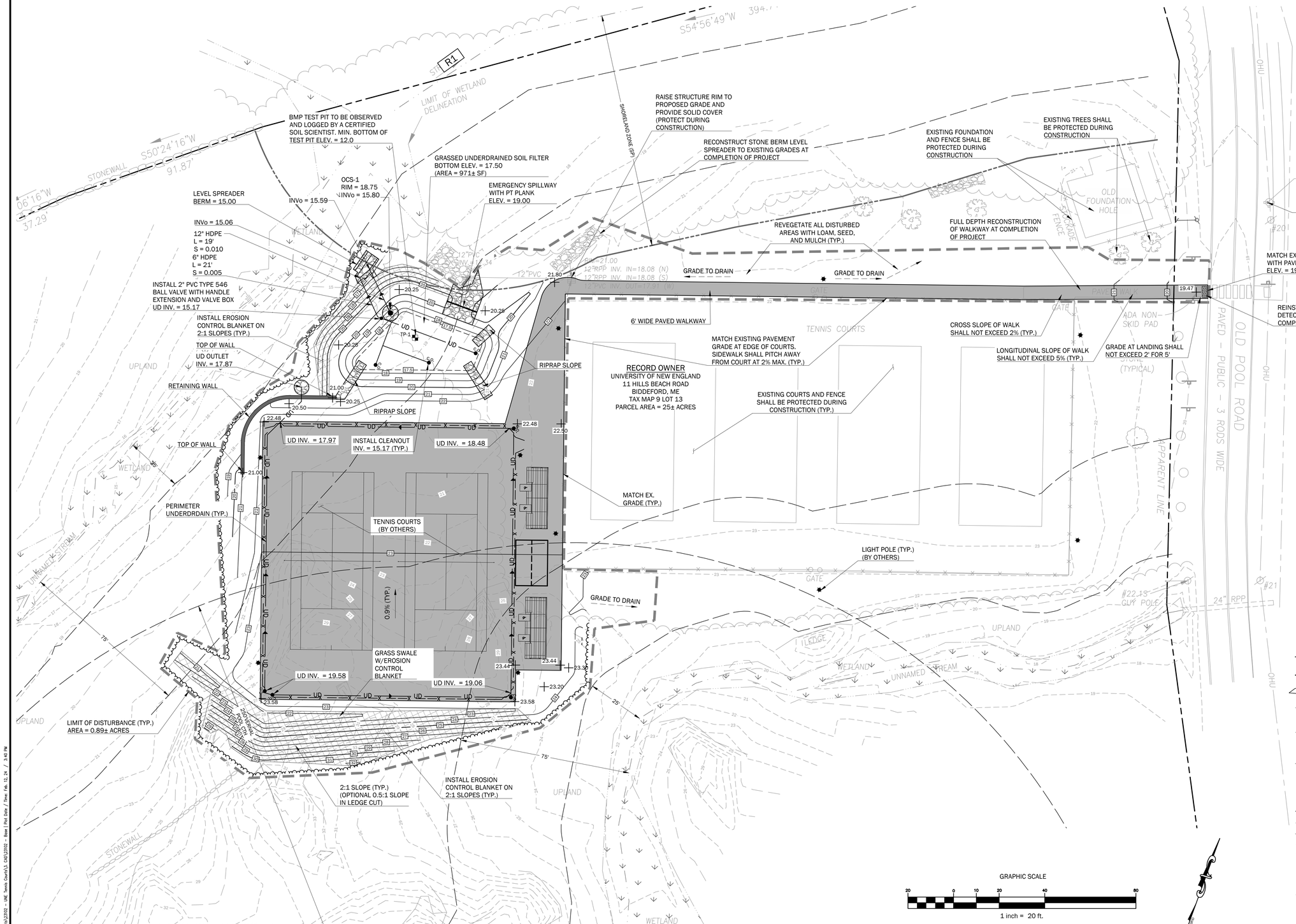
CLIENT:
UNIVERSITY OF NEW ENGLAND
11 HILLS BEACH ROAD BIDDEFORD, MAINE 04005

DESIGN: DEPT.
DRAWN: DEPT.
CHKD: TWS
DATE: FEB 2024
SCALE: 1" = 20'

PROJECT: TENNIS COURT EXPANSION
16 OLD POOL ROAD, BIDDEFORD, ME
SITE PLAN

PROJ. NO. 23-216-00
DWG. NO. C-200
REV. A

Drawing Name: C:\Users\Stan\Google Drive\Projects\SDA Projects\23102 - UNE Tennis Courts\13. CAD\23102 - Base | Plot Date / Time: Feb. 12, 24 / 2:40 PM



GRADING AND DRAINAGE NOTES

1. PRIOR TO THE START OF ANY EXCAVATION FOR THE PROJECT BOTH ON AND OFF THE SITE, THE CONTRACTOR SHALL NOTIFY DIGSAFE AND BE PROVIDED WITH A DIGSAFE NUMBER INDICATING THAT ALL EXISTING UTILITIES HAVE BEEN LOCATED AND MARKED.
2. CONTRACTOR SHALL VERIFY EXISTING GRADES AND NOTIFY THE OWNER'S REPRESENTATIVE OF ANY DISCREPANCIES.
3. CONTRACTOR SHALL MAINTAIN POSITIVE DRAINAGE AWAY FROM ALL STRUCTURES.
4. CONTRACTOR TO ADJUST EXISTING AND PROPOSED UTILITY ELEMENT MEANT TO BE FLUSH WITH GRADE (CLEAN-OUTS, UTILITY MANHOLES, CATCH BASINS, INLETS, ETC) THAT ARE AFFECTED BY SITE WORK OR GRADE CHANGES, WHETHER SPECIFICALLY NOTED ON PLANS OR NOT.
5. WHERE PROPOSED GRADES MEET EXISTING GRADES, CONTRACTOR SHALL BLEND GRADES TO PROVIDE A SMOOTH TRANSITION BETWEEN EXISTING AND NEW WORK. PONDING AT TRANSITION AREAS WILL NOT BE ALLOWED.
6. CONTRACTOR SHALL PROVIDE A FINISHED PAVEMENT SURFACE FREE OF LOW SPOTS AND PONDING AREAS. SEE TENNIS COURT SPECIFICATIONS.
7. ALL UNDERDRAIN PIPE SHALL BE PERFORATED PVC PIPE, BEDDED IN CRUSHED STONE WRAPPED IN MIRAFI 140N PER THE UNDERDRAIN DETAIL PROVIDED WITH HOLES DOWN.
8. THE CONTRACTOR SHALL INSTALL CATCH BASIN INLET PROTECTION AT ALL CATCH BASIN INLETS WITHIN THE DISTURBED AREA AND BE RESPONSIBLE FOR TAKING ALL NECESSARY EROSION CONTROL MEASURES. SEE SHEET C-300 FOR EROSION CONTROL NOTES, SEQUENCE AND DETAILS.
9. ALL UNSUITABLE AND UNUSED MATERIALS SHALL BE REMOVED AND DISPOSED OF OFF SITE BY THE CONTRACTOR IN ACCORDANCE WITH ALL STATE AND LOCAL LAWS.
10. ALL STORMDRAIN PIPING TO BE SMOOTH BORE HDPE, ADS N-12 OR EQUIVALENT.
11. FINAL UNDERDRAIN LAYOUT SHALL BE BASED ON GEOTECHNICAL REPORT RECOMMENDATIONS.

PLAN REFERENCES

1. BOUNDARY AND TOPOGRAPHIC INFORMATION OBTAINED FROM A PLAN ENTITLED "TOPOGRAPHIC SURVEY AT 2 OLD POOL ROAD, BIDDEFORD, ME" PREPARED BY OWEN HASKELL, INC. OF FALMOUTH, MAINE, DATED MAY 24, 2023.
2. WETLANDS WERE DELINEATED IN MAY 2023 BY STATEWIDE SURVEYS, OF CAPE ELIZABETH, MAINE.

LEGEND

EXISTING		PROPOSED
	PROPERTY LINE	
	WETLANDS	
	STREAM	
	STORM DRAIN STRUCTURE	
	STORM DRAIN LINE	SD
	UNDERDRAIN	UD
	CLEANOUT	C.O.
OHU	OVERHEAD UTILITIES	OHU
	UNDERGROUND ELECTRIC	UGE
	LIGHT POLE	
	UTILITY POLE	
	HYDRANT	
	BUILDING	
	EDGE OF PAVEMENT	
x x x	CHAIN LINK FENCE	x x x
100	INDEX CONTOUR	100
101	INTERMEDIATE CONTOUR	101
	EDGE OF GRAVEL	
	RIPRAP/STONE	
	TREELINE	
	LIMIT OF DISTURBANCE	

GRAPHIC SCALE
20 0 10 20 40 80
1 inch = 20 ft.

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REV.	DATE	STATUS	BY	CHKD.	APPD.
A	2/14/2023	ISSUED FOR SITE PLAN REVIEW	DEPT.	TWS	TWS

STATE OF MAINE — THOMAS W. SKLUCIER (NO. 9026) — LICENSED PROFESSIONAL ENGINEER
2/14/2024

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CLIENT:
UNIVERSITY OF NEW ENGLAND
11 HILLS BEACH ROAD BIDDEFORD, MAINE 04005

DESIGN: DEPT.
DRAWN: DEPT.
CHKD: TWS
DATE: FEB 2024
SCALE: 1" = 20'

PROJECT: TENNIS COURT EXPANSION
16 OLD POOL ROAD, BIDDEFORD, ME
GRADING, DRAINAGE, AND EROSION CONTROL PLAN
PROJ. NO. 23-216-00
REV. A
DWG. NO. C-201

Drawing Name: C:\Users\Sites\Google Drive\Projects\SDA Projects\23102 - UNE Tennis Courts\1. CAD\23102 - Base | Proj Data / Time: Feb. 12, 24 / 3:40 PM



VERNAL POOL CRITICAL TERRESTRIAL HABITAT (CTH) CALCULATIONS:

IMPACT AREA	=	16,501 SF
TOTAL CTH AREA	=	300,005 SF
PERCENT IMPACT	=	5.5%

GRAPHIC SCALE

40 0 20 40 80 160

1 inch = 40 ft.

PLAN REFERENCES

1. BOUNDARY AND TOPOGRAPHIC INFORMATION OBTAINED FROM A PLAN ENTITLED "TOPOGRAPHIC SURVEY AT 2 OLD POOL ROAD, BIDDEFORD, ME" PREPARED BY OWEN HASKELL, INC. OF FALMOUTH, MAINE, DATED MAY 24, 2023.
2. WETLANDS WERE DELINEATED IN MAY 2023 BY STATEWIDE SURVEYS, OF CAPE ELIZABETH, MAINE.

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REV.	DATE	STATUS	BY	CHKD.	APPD.
A	2/14/2023	ISSUED FOR SITE PLAN REVIEW	DEPT.	TWS	TWS

STATE OF MAINE — THOMAS W. SAUCIER — NO. 6026 — LICENSED PROFESSIONAL ENGINEER

2/14/2024

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CLIENT:
UNIVERSITY OF NEW ENGLAND
11 HILLS BEACH ROAD BIDDEFORD, MAINE 04005

DESIGN: DEPT.
DRAWN: DEPT.
CHKD: TWS
DATE: FEB 2024
SCALE: 1" = 40'

PROJECT: TENNIS COURT EXPANSION
16 OLD POOL ROAD, BIDDEFORD, ME

VERNAL POOL CRITICAL TERRESTRIAL HABITAT PLAN

PROJ. NO. 23-216-00 REV. A
DWG. NO. E-100

Drawing Name: C:\Users\Staci\Google Drive\Projects\SDA Projects\23202 - UNE Tennis Courts\3. CAD\23202 - Base | Plot Date / Time: Feb. 12, 24 / 6:27 PM

EROSION AND SEDIMENTATION CONTROL NOTES:

INTRODUCTION

THE FOLLOWING PLAN FOR CONTROLLING SEDIMENTATION AND EROSION IN THIS PROJECT IS BASED ON CONSERVATION PRACTICES FOUND IN THE MAINE EROSION & SEDIMENT CONTROL BMPS MANUAL, OCTOBER 2016, AND MAINE EROSION AND SEDIMENT CONTROL PRACTICE FIELD GUIDE FOR CONTRACTORS, REVISED 2014, MAINE DEPARTMENT OF ENVIRONMENTAL PROTECTION. THE CONTRACTOR WHO IMPLEMENTS THIS PLAN SHALL BE FAMILIAR WITH THESE PUBLICATIONS AND ADHERE TO THEM AND THE PRACTICES PRESENTED HEREIN

REFERENCE IS MADE TO THE GRADING AND DRAINAGE PLANS (C-301 AND C-302) WITHIN THE PLAN SET, SHOWING THE LOCATIONS AND TYPES OF PROPOSED MEASURES TO BE IMPLEMENTED.

GENERAL EROSION AND SEDIMENTATION CONTROL PRACTICES

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

SILT FENCE AND/OR EROSION CONTROL MIX SEDIMENT BARRIERS

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

CATCH BASIN PROTECTION

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

CONSTRUCTION PHASE

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

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

DEWATERING

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

POST CONSTRUCTION REVEGETATION

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

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

MONITORING SCHEDULE

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

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

STANDARDS FOR STABILIZING SITES FOR THE WINTER

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

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

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

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

EROSION CONTROL REMOVAL

AN AREA IS CONSIDERED STABLE IF IT IS PAVED OR IF 90% GROWTH OF PLANTED SEEDS IS ESTABLISHED. ONCE AN AREA IS CONSIDERED STABLE, THE EROSION CONTROL MEASURES CAN BE REMOVED AS FOLLOWS:

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

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

MAINE CONSTRUCTION GENERAL PERMIT REQUIRED

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

INSPECTION AND MAINTENANCE (APPENDIX B)

1. INSPECTION AND MAINTENANCE REQUIREMENTS: INSPECT DISTURBED AND IMPERVIOUS AREAS, EROSION AND STORMWATER CONTROL MEASURES, AREAS USED FOR STORAGE THAT ARE EXPOSED TO PRECIPITATION, AND LOCATIONS WHERE VEHICLES ENTER OR EXIT THE SITE. INSPECT THESE AREAS AT LEAST ONCE A WEEK AS WELL AS BEFORE AND AFTER A SIGNIFICANT STORM EVENT (0.5 INCHES OF RAINFALL IN A 24-HOUR PERIOD) AND PRIOR TO COMPLETION OF PERMANENT STABILIZATION MEASURES. A PERSON WITH KNOWLEDGE OF EROSION AND STORMWATER CONTROL, INCLUDING THE STANDARDS IN THE MCGP AND ANY DEPARTMENTAL COMPANION DOCUMENT TO THE MCGP, MUST CONDUCT THE INSPECTION. THIS PERSON MUST BE IDENTIFIED IN THE INSPECTION LOG. IF BEST MANAGEMENT PRACTICES (BMPS) NEED TO BE MODIFIED OR IF ADDITIONAL BMPS ARE NECESSARY, IMPLEMENTATION MUST BE STARTED BY THE END OF THE NEXT WORKIN DAY AND COMPLETED WITHIN 7 CALENDAR DAYS AND PRIOR TO ANY STORM EVENT (RAINFALL). ALL MEASURES MUST BE MAINTAINED IN EFFECTIVE OPERATING CONDITION UNTIL AREAS AREA PERMANENTLY STABILIZED. DOCUMENTATION OF CORRECTION ACTIONS SHALL BE MAINTAINED WITH THE INSPECTION FORMS.
2. INSPECTION LOG (REPORT): A LOG (REPORT) MUST BE KEPT SUMMARIZING THE SCOPE OF THE INSPECTION, NAME(S) AND QUALIFICATIONS OF THE PERSONNEL MAKING THE INSPECTION, THE DATE(S) OF THE INSPECTION, AND MAJOR OBSERVATIONS RELATING TO OPERATION OF EROSION AND SEDIMENTATION CONTROLS AND POLLUTION PREVENTION MEASURES. MAJOR OBSERVATIONS MUST INCLUDE BMPS THAT NEED MAINTENANCE, BMPS THAT FAILED TO OPERATE AS DESIGNED OR PROVED INADEQUATE FOR A PARTICULAR LOCATION, AND LOCATIONS(S) WHERE ADDITIONAL BMPS ARE NEEDED. FOR EACH BMP REQUIRING MAINTENANCE, BMP NEEDING REPLACEMENT, AND LOCATION NEEDING ADDITIONAL BMPS, NOTE IN THE INSPECTION LOG THE CORRECT ACTION TAKEN AND WHEN IT WAS TAKEN. THE LOG MUST BE MADE ACCESSIBLE TO THE DEPARTMENT STAFF AND A COPY MUST BE PROVIDED UPON REQUEST. THE PERMITTEE SHALL RETAIN A COPY OF THE LOG FOR A PERIOD OF AT LEAST THREE YEARS FROM THE COMPLETION OF THE PERMANENT STABILIZATION.

HOUSEKEEPING (APPENDIX C)

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

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

2. GROUNDWATER PROTECTION: DURING CONSTRUCTION, LIQUID PETROLEUM PRODUCTS AND OTHER HAZARDOUS MATERIALS WITH THE POTENTIAL TO CONTAMINATE GROUNDWATER MAY NOT BE STORED OR HANDLED IN AREAS OF THE SITE DRAINING TO AN INFILTRATION AREA. AN "INFILTRATION AREA" IS ANY AREA OF THE SITE THAT BY DESIGN OR AS A RESULT OF SOILS, TOPOGRAPHY AND OTHER RELEVANT FACTORS ACCUMULATES RUNOFF THAT INFILTRATES INTO THE SOIL. DIKES, BERMS, SUMPS, AND OTHER FORMS OF SECONDARY CONTAINMENT THAT PREVENT DISCHARGE TO GROUNDWATER MAY BE USED TO ISOLATE PORTIONS OF THE SITE FOR THE PURPOSES OF STORAGE AND HANDLING OF THESE MATERIALS. ANY PROJECT PROPOSING INFILTRATION OF STORMWATER MUST PROVIDE ADEQUATE PRE-TREATMENT OF STORMWATER PRIOR TO DISCHARGE OF STORMWATER TO THE INFILTRATION AREA, OR PROVIDE FOR TREATMENT WITHIN THE INFILTRATION AREA, IN ORDER TO PREVENT THE ACCUMULATION OF FINES, REDUCTION IN INFILTRATION RATE, AND CONSEQUENT FLOODING AND DESTABILIZATION.

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

3. FUGITIVE SEDIMENT AND DUST: ACTIONS MUST BE TAKEN TO ENSURE THAT ACTIVITIES DO NOT RESULT IN NOTICEABLE EROSION OF SOILS OR FUGITIVE DUST EMISSIONS DURING OR AFTER CONSTRUCTION. OIL MAY NOT BE USED FOR DUST CONTROL, BUT OTHER WATER ADDITIVES MAY BE CONSIDERED AS NEEDED. A STABILIZED CONSTRUCTION ENTRANCE (SCE) SHOULD BE INCLUDED TO MINIMIZE TRACKING OF MUD AND SEDIMENT. IF OFF-SITE TRACKING OCCURS, PUBLIC ROADS SHOULD BE SWEPT IMMEDIATELY AND NO LESS THAN ONCE A WEEK AND PRIOR TO SIGNIFICANT STORM EVENTS. OPERATIONS DURING DRY MONTHS, THAT EXPERIENCE FUGITIVE DUST PROBLEMS, SHOULD WET DOWN UNPAVED ACCESS ROADS ONCE A WEEK OR MORE FREQUENTLY AS NEEDED WITH A WATER ADDITIVE TO SUPPRESS FUGITIVE SEDIMENT AND DUST.

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

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

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

5. EXCAVATION DEWATERING: EXCAVATION DEWATERING IS THE REMOVAL OF WATER FROM TRENCHES, FOUNDATIONS, COFFER DAMS, PONDS, AND OTHER AREAS WITHIN THE CONSTRUCTION AREA THAT RETAIN WATER AFTER EXCAVATION. IN MOST CASES THE COLLECTED WATER IS HEAVILY SILTED AND HINDERS CORRECT AND SAFE CONSTRUCTION PRACTICES. THE COLLECTED WATER REMOVED FROM THE PONDED AREA, EITHER THROUGH GRAVITY OR PUMPING, MUST BE SPREAD THROUGH NATURAL WOODED BUFFERS OR REMOVED TO AREAS THAT ARE SPECIFICALLY DESIGNED TO COLLECT THE MAXIMUM AMOUNT OF SEDIMENT POSSIBLE, LIKE A COFFERDAM SEDIMENTATION BASIN. AVOID ALLOWING THE WATER TO FLOW OVER DISTURBED AREAS OF THE SITE. EQUIVALENT MEASURES MAY BE TAKEN IF APPROVED BY THE DEPARTMENT.

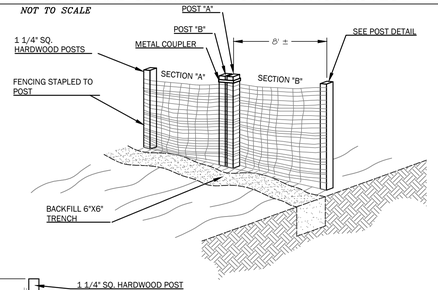
NOTE: DEWATERING CONTROLS ARE DISCUSSED IN THE "MAINE EROSION AND SEDIMENT CONTROL BMPS, MAINE DEPARTMENT OF ENVIRONMENTAL PROTECTION."

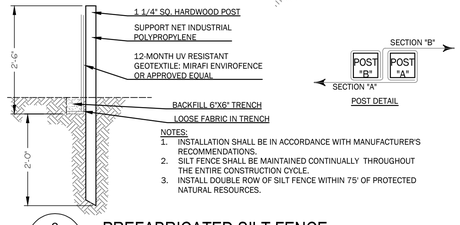
6. AUTHORIZED NON-STORMWATER DISCHARGES: IDENTIFY AND PREVENT CONTAMINATION BY NON-STORMWATER DISCHARGES. WHERE ALLOWED NON-STORMWATER DISCHARGES EXIST, THEY MUST BE IDENTIFIED AND STEPS SHOULD BE TAKEN TO ENSURE THE IMPLEMENTATION OF APPROPRIATE POLLUTION PREVENTION MEASURES FOR THE NON-STORMWATER COMPONENT(S) OF THE DISCHARGE. AUTHORIZED NON-STORMWATER DISCHARGES ARE:.
   - DISCHARGES FROM FIREFIGHTING ACTIVITY;
   - FIRE HYDRANT FLUSHINGS;
   - VEHICLE WASHWATER IF DETERGENTS ARE NOT USED AND WASHING IS LIMITED TO THE EXTERIOR OF VEHICLES (ENGINE, UNDERCARRIAGE, AND TRANSMISSION WASHING IS PROHIBITED);
   - DUST CONTROL RUNOFF IN ACCORDANCE WITH PERMIT CONDITIONS AND APPENDIX (C)(3);
   - ROUTINE EXTERNAL BUILDING WASHDOWN, NOT INCLUDING SURFACE PAINT REMOVAL, THAT DOES NOT INVOLVE DETERGENTS;
   - PAVEMENT WASHWATER WHERE SPILLS/LEAKS OF TOXIC OR HAZARDOUS MATERIALS HAVE NOT OCCURRED, UNLESS ALL SPILLED MATERIAL HAD BEEN REMOVED) IF DETERGENTS ARE NOT USED;
   - UNCONTAMINATED AIR CONDITIONING OR COMPRESSOR CONDENSATE;
   - UNCONTAMINATED GROUNDWATER OR SPRING WATER;
   - FOUNDATION OR FOOTER DRAIN-WATER WHERE FLOWS ARE NOT CONTAMINATED;
   - UNCONTAMINATED EXCAVATION DEWATERING (SEE REQUIREMENTS IN APPENDIX C(5));
   - POTABLE WATER SOURCES INCLUDING WATERLINE FLUSHINGS; AND
   - LANDSCAPE IRRIGATION

7. UNAUTHORIZED NON-STORMWATER DISCHARGES: THE DEPARTMENTS APPROVAL UNDER THIS CHAPTER DOES NOT AUTHORIZE A DISCHARGE THAT IS MIXED WITH A SOURCE OF NON-STORMWATER, OTHER THAN THOSE DISCHARGES IN COMPLIANCE WITH APPENDIX C (6). SPECIFICALLY, THE DEPARTMENT'S APPROVAL DOES NOT AUTHORIZE DISCHARGES OF THE FOLLOWING:
   - WASTEWATER FROM THE WASHOUT OR CLEANOUT OF CONCRETE, STUCCO, PAINT, FORM RELEASE OILS, CURING COMPOUNDS OR OTHER CONSTRUCTION MATERIALS;
   - FUELS, OILS OR OTHER POLLUTANTS USED IN VEHICLE AND EQUIPMENT OPERATION AND MAINTENANCE;
   - SOAPS, SOLVENTS, OR DETERGENTS USED IN VEHICLE AND EQUIPMENT WASHING; AND
   - TOXIC OR HAZARDOUS SUBSTANCES FROM A SPILL OR OTHER RELEASE.

8. ADDITIONAL REQUIREMENTS: ADDITIONAL REQUIREMENTS MAY BE APPLIED ON A SITE-SPECIFIC BASIS.

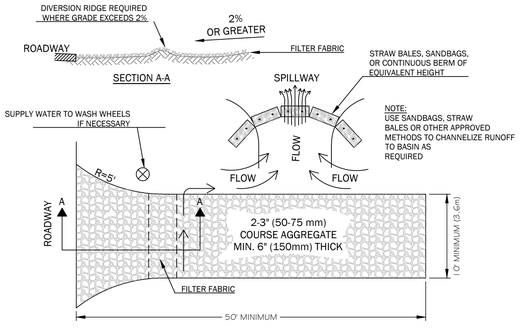
1 C-300 — EROSION AND SEDIMENTATION CONTROL NOTES

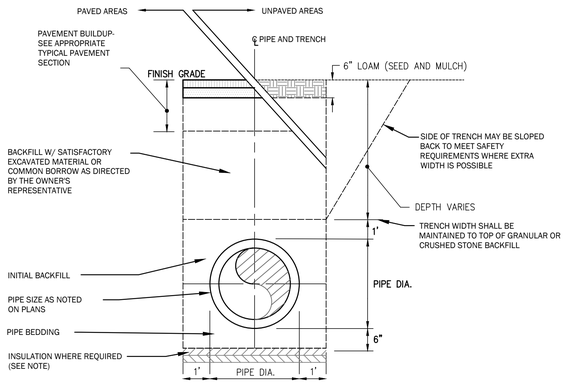




NOTES:
1. INSTALLATION SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
2. SILT FENCE SHALL BE MAINTAINED CONTINUALLY THROUGHOUT THE ENTIRE CONSTRUCTION CYCLE.
3. INSTALL DOUBLE ROW OF SILT FENCE WITHIN 75' OF PROTECTED NATURAL RESOURCES.

2 C-300 — PREFABRICATED SILT FENCE
NOT TO SCALE


DIVERSION RIDGE REQUIRED WHERE GRADE EXCEEDS 2%
2% OR GREATER
ROADWAY
FILTER FABRIC
SECTION A-A
STRAW BALES, SANDBAGS, OR CONTINUOUS BERM OF EQUIVALENT HEIGHT
SPILLWAY
SUPPLY WATER TO WASH WHEELS IF NECESSARY
NOTE: USE SANDBAGS, STRAW BALES OR OTHER APPROVED METHODS TO CHANNELIZE RUNOFF TO BASIN AS REQUIRED
FLOW
FLOW
FLOW
R=5'
A
A
ROADWAY
2-3" (50-75 mm) COURSE AGGREGATE MIN. 6" (150mm) THICK
1.0



TRENCH BACKFILL SCHEDULE

PIPE MATERIAL	BEDDING MATERIAL	INITIAL BACKFILL	BACKFILL MATERIAL
HDPE	3/4" CRUSHED STONE	***EXCAVATED MATERIAL OR GRANULAR BORROW	
PVC	SAND	3/4" CRUSHED STONE	***EXCAVATED MATERIAL OR GRANULAR BORROW
CMP	***EXCAVATED MATERIAL OR GRANULAR BORROW	***EXCAVATED MATERIAL OR GRANULAR BORROW	***EXCAVATED MATERIAL OR GRANULAR BORROW
DUCTILE IRON	GRANULAR MATERIAL	GRANULAR MATERIAL	***EXCAVATED MATERIAL OR GRANULAR BORROW

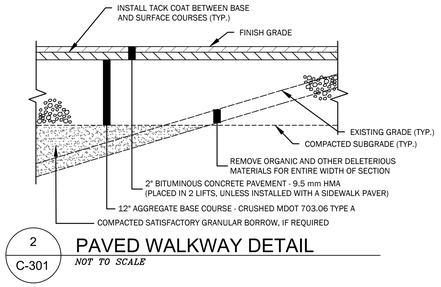
*** EXCAVATED MATERIAL MUST BE REVIEWED AND APPROVED BY THE OWNER'S REPRESENTATIVE PRIOR TO INSTALLATION.

GRANULAR MATERIAL TO BE SAND OR GRAVEL.

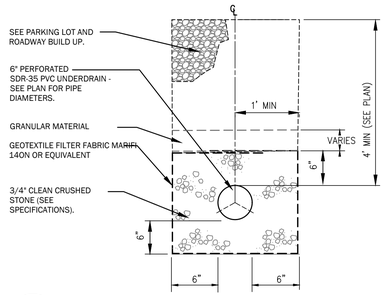
1 / C-301 — TYPICAL TRENCH SECTION
NOT TO SCALE

NOTES:

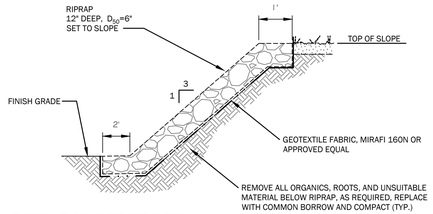
1. ADDITIONAL SUBBASE GRAVEL AND/OR GEOTEXTILES MAY BE REQUIRED DURING CONSTRUCTION IF SOIL CONDITIONS WARRANT.
2. BASE AND SUBBASE GRAVELS TO BE COMPACTED TO 95% MINIMUM OF THEIR MAXIMUM DRY DENSITY IN ACCORDANCE WITH ASTM D-1557.
3. APPLY TACK COAT BETWEEN LIFTS OF PAVEMENT.



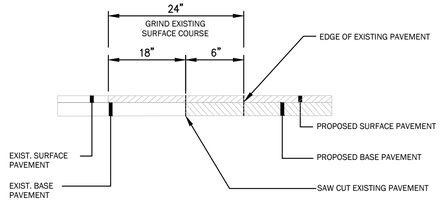
2 / C-301 — PAVED WALKWAY DETAIL
NOT TO SCALE



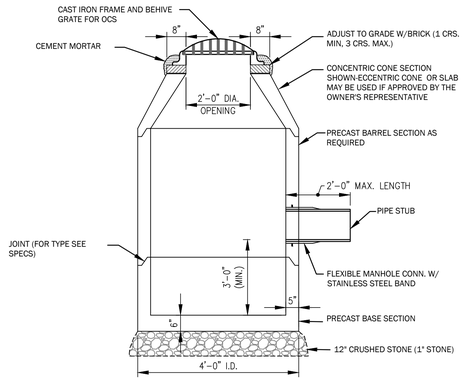
3 / C-301 — 6" DIA. UNDERDRAIN TRENCH (TYPE B)
NOT TO SCALE



4 / C-301 — RIPRAP SLOPE SECTION
NOT TO SCALE



5 / C-301 — HMA PAVEMENT BUTT JOINT
NOT TO SCALE

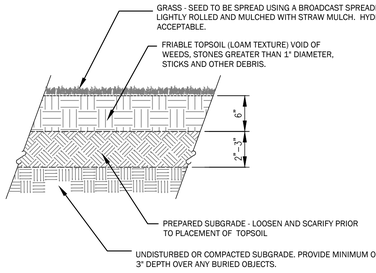


6 / C-301 — DRAINAGE STURCTURE DETAIL (OCS)
NOT TO SCALE

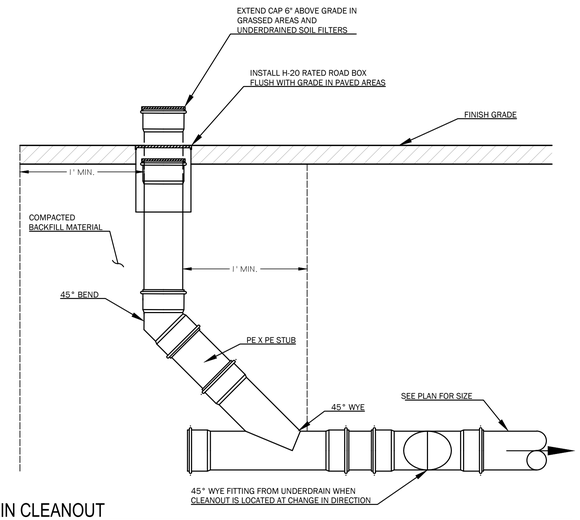
NOTES:

- NATURAL, FERTILE LOAM TYPICAL OF CULTIVATED TOPSOIL OF THE LOCALITY, CONTAINING NOT LESS THAN 3.5 PERCENT OR MORE THAN 8 PERCENT BY WEIGHT, OF DECAYED ORGANIC MATTER (HUMUS) AS DETERMINED BY ASTM F1647.
- OBTAIN FROM A WELL DRAINED ARABLE SITE, FREE OF SUBSOIL, EARTH CLODS, LARGE STONES, STICKS, STUMPS, CLAY LUMPS, ROOTS, OR OTHER OBJECTIONABLE, EXTRANEOUS MATTER OR DEBRIS. SCREEN TOPSOIL TO A MAXIMUM STONE SIZE OF ONE INCH.
- TOPSOIL SHALL BE FREE OF QUACK-GRASS RHIZOMES, AGROPYRON REPENS, AND THE NUT-LIKE TUBERS OF NUTGRASS, CYPERUS ESCULENTUS, AND ALL OTHER PRIMARY NOXIOUS WEEDS.
- TOPSOIL SHALL HAVE A PH OF NOT LESS THAN 6.0 OR GREATER THAN 6.8. AMEND WITH LIME AS REQUIRED.
- TOPSOIL SHALL HAVE A LOAM TEXTURE CLASSIFICATION. TOPSOIL (LOAM) SHALL CONFORM TO THE FOLLOWING PARTICLE SIZE DISTRIBUTION, AS DETERMINED BY PIPETTE METHOD IN COMPLIANCE WITH ASTM F1632.
  - a. SAND: 40-60 PERCENT.
  - b. SILT: 30-40 PERCENT.
  - c. CLAY: 5-20 PERCENT.
- DO NOT DELIVER OR USE TOPSOIL WHILE IN A FROZEN OR MUDDY CONDITION.

IN LIEU OF PROVIDING AND FOLLOWING THE SOIL ANALYSIS REQUIRED IN NOTE 1 ABOVE THE CONTRACTOR CAN INSTEAD ELECT TO INCORPORATE THE FOLLOWING INTO THE TOP 6 INCHES OF TOPSOIL: 20 LBS. OF 10-20-10 FERTILIZER PER 1,000 S.F., 70 LBS. OF MAGNESIUM LIME PER 1,000 S.F., AND 3 CUBIC YARDS OF COMPOST PER 1,000 S.F.



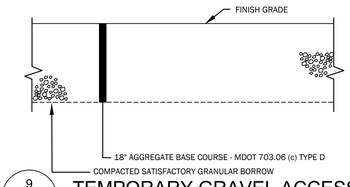
7 / C-301 — LAWN INSTALLATION DETAIL
NOT TO SCALE



8 / C-301 — UNDERDRAIN CLEANOUT
NOT TO SCALE

NOTES:

1. ADDITIONAL SUBBASE GRAVEL AND/OR GEOTEXTILES MAY BE REQUIRED DURING CONSTRUCTION IF SOIL CONDITIONS WARRANT.



9 / C-301 — TEMPORARY GRAVEL ACCESS DRIVE
NOT TO SCALE

THIS PLAN SHALL NOT BE MODIFIED WITHOUT WRITTEN PERMISSION FROM SITE DESIGN ASSOCIATES, ANY ALTERATIONS, OTHERWISE, SHALL BE AT THE USER'S SOLE RISK AND WITHOUT LIABILITY TO SITE DESIGN ASSOCIATES.

REV.	DATE	STATUS	BY	CHKD.	APPD.
A	2/14/2023	ISSUED FOR SITE PLAN REVIEW	DEPT.	TWS	TWS

STATE OF MAINE — THOMAS W. SAUCIER — NO. 6026 — LICENSED PROFESSIONAL ENGINEER
2/14/2024

Site Design Associates
Consulting Engineering & Land Planning
23 Whitney Way Topsham, Maine 04086 Tel: (207) 449-4275

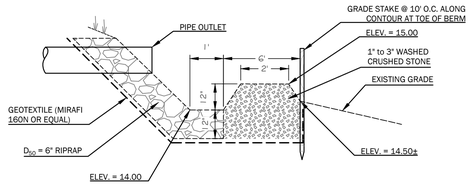
CLIENT:
UNIVERSITY OF NEW ENGLAND
11 HILLS BEACH ROAD BIDDEFORD, MAINE 04005

DESIGN: DEPT.
DRAWN: DEPT.
CHKD: TWS
DATE: FEB 2024
SCALE: AS NOTED

PROJECT:
TENNIS COURT EXPANSION
16 OLD POOL ROAD, BIDDEFORD, ME
CIVIL DETAILS

PROJ. NO. 23-216-00
DWG. NO. C-301
REV. A

Drawing Name: C:\Users\Sites\Google Drive\Projects\SDA Projects\23202 - UNE Tennis Courts\3. CAD\23202 - Details | Paul Duke / Time: Feb. 12, 24 / 3:39 PM



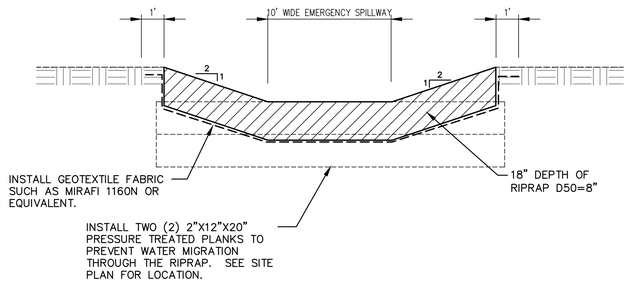
CROSS SECTION

NOTES

1. CONSTRUCT LEVEL LIP AND SPREADER ON ZERO PERCENT GRADE.
2. DO NOT CONSTRUCT LEVEL SPREADER ON FILL.
3. STORM RUNOFF CONVERTED TO SHEET FLOW SHALL OUTLET ONTO STABILIZED AREA. WATER SHALL NOT BE CHANNELIZED IMMEDIATELY BELOW POINT OF DISCHARGE.
4. THE LAYOUT AND CONSTRUCTION OF THE LEVEL SPREADER IS CRITICAL TO IT'S SUCCESS. CLEAR THE AREA AND STAKE OUT LEVEL LIP ELEVATION WITH STAKES EVERY 10'. WORK THE STONE BELOW THE STAKES AND THEN EXCAVATE AND GRADE THE UPHILL SECTION. REMOVE THE STAKES AFTER THE STONE IS INSTALLED.

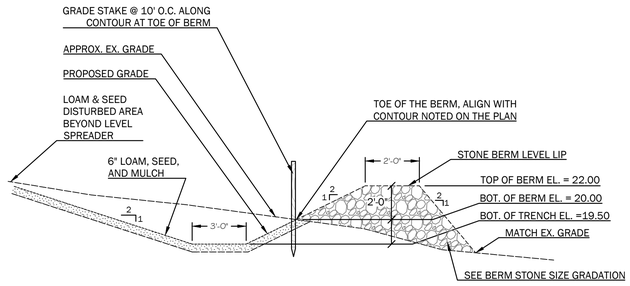
1 C-302 SOIL FILTER OUTLET LEVEL SPREADER

NOT TO SCALE



2 C-302 EMERGENCY SPILLWAY DETAIL

NOT TO SCALE



NOTES

1. CONSTRUCT LEVEL LIP AND SPREADER ON ZERO PERCENT GRADE.
2. DO NOT CONSTRUCT LEVEL SPREADER ON FILL.
3. STORM RUNOFF CONVERTED TO SHEET FLOW SHALL OUTLET ONTO STABILIZED AREA. WATER SHALL NOT BE CHANNELIZED IMMEDIATELY BELOW POINT OF DISCHARGE.
4. THE LAYOUT AND CONSTRUCTION OF THE STONE BERM LEVEL SPREADER IS CRITICAL TO IT'S SUCCESS. CLEAR THE AREA AND STAKE OUT LEVEL LIP ELEVATION WITH STAKES EVERY 10'. THE ENGINEER WILL INSPECT THE SURVEYED AND STAKED LOCATION OF EACH LEVEL SPREADER BEFORE PLACEMENT OF THE STONE BERM. WORK THE STONE BELOW THE STAKES AND THEN EXCAVATE AND GRADE THE UPHILL SECTION. REMOVE THE STAKES AFTER THE SEEDING IS COMPLETED.

BERM STONE SIZE	
SIEVE	% BY WEIGHT PASSING SIEVE
12 in	100
6 in	84-100
3 in	68-83
1 in	42-55
No. 4	8-12

3 C-302 STONE BERM LEVEL SPREADER RECONSTRUCTION

NOT TO SCALE

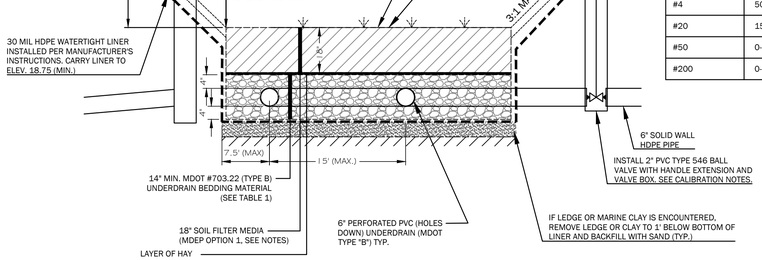


Table 1 MDOT Specifications for Underdrains (MDOT #703.22)	
Sieve Size	% by Weight
Underdrain Type B	
1"	90-100
1/2"	75-100
#4	50-100
#20	15-80
#50	0-15
#200	0-5

SOIL FILTER MEDIA NOTES:

SOIL FILTER MEDIA SHALL CONFORM TO MAINE DEP *SOIL FILTER MEDIA OPTION 1*, PER MAINE DEP STORMWATER BMP MANUAL CHAPTER 7.1. AS FOLLOWS:

1.1. SOIL FILTER MEDIA SHALL CONSIST OF A SILTY SAND SOIL OR SOIL MIXTURE COMBINED WITH A MATURE, MODERATELY FINE SHREDDED BARK OR WOOD FIBER MULCH.
1.2. THE RESULTING MIX SHALL CONTAIN NO LESS THAN 10% BY DRY WEIGHT ORGANIC MATERIAL.
1.3. THE RESULTING MIX SHALL CONTAIN 8% TO 12% PASSING THE NO. 200 SIEVE.
1.4. THE RESULTING MIX SHALL CONTAIN A MAXIMUM CLAY CONTENT OF 2%.

UNDERDRAIN OUTLET VALVE CALIBRATION NOTES:

AFTER THE COMPLETION OF INSTALLATION OF THE SOIL FILTER MEDIA, THE CONTRACTOR SHALL PERFORM THE FOLLOWING PROCEDURE TO CALIBRATE THE UNDERDRAIN OUTLET VALVE TO ACHIEVE THE 0.75"/HOUR DESIGN FLOW RATE.

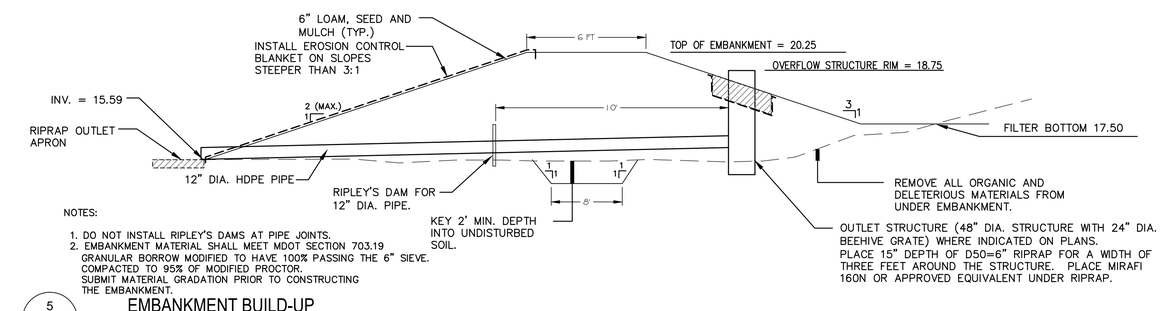
1. BEGIN WITH VALVE CLOSED.
2. CAREFULLY FLOOD THE BASIN UNTIL THERE IS 15" OF WATER STORED ABOVE THE SOIL FILTER MEDIA (UP TO THE HEIGHT OF OUTLET STRUCTURE RIM) WITHOUT CAUSING EROSION OF THE SOIL FILTER MEDIA.
3. OPEN THE VALVE HALF-WAY.
4. RECORD THE TIME IT TAKES FOR THE 15" OF WATER TO DRAIN TO THE TOP OF THE SOIL FILTER MEDIA. THE TARGET DRAINDOWN TIME IS 24 HOURS.
5. IF THE 15" OF WATER DRAINS IN LESS THAN 24 HOURS, CLOSE THE VALVE SLIGHTLY AND REPEAT STEPS 2 & 3 ABOVE.
6. IF THE 15" OF WATER DRAINS IN MORE THAN 24 HOURS, OPEN THE VALVE SLIGHTLY AND REPEAT STEPS 2 & 3 ABOVE.
7. REPEAT THIS PROCESS UNTIL THE 15" OF WATER DRAINS IN 24 HOURS.

GRASSED UNDERDRAINED SOIL FILTER SCHEDULE

GRASSED UNDERDRAINED SOIL FILTER FILTER #	EMBKMT. ELEV. (A)	SPILLWAY ELEV. (B)	TOP OF OUTLET STRUCT ELEV. (C)	BOTTOM OF STORAGE ELEV. (D)	INTERIOR UNDERDRAIN INVERT	UNDERDRAIN OUTLET INVERT	FILTER AREA (SQ. FT.)
SF1	20.25	19.00	18.75	17.50	15.17	15.06	971

4 C-302 GRASSED UNDERDRAIN SOIL FILTER TYPICAL CROSS SECTION

NOT TO SCALE



NOTES:

1. DO NOT INSTALL RIPLEY'S DAMS AT PIPE JOINTS.
2. EMBANKMENT MATERIAL SHALL MEET MDOT SECTION 703.19 GRANULAR BORROW MODIFIED TO HAVE 100% PASSING THE 6" SIEVE. COMPACTED TO 95% OF MODIFIED PROCTOR. SUBMIT MATERIAL GRADATION PRIOR TO CONSTRUCTING THE EMBANKMENT.

5 C-302 EMBANKMENT BUILD-UP

NOT TO SCALE

CONSTRUCTION OVERSIGHT

THE APPLICANT WILL RETAIN THE SERVICES OF A PROFESSIONAL ENGINEER TO INSPECT THE CONSTRUCTION AND STABILIZATION OF ALL STORMWATER MANAGEMENT STRUCTURES TO BE BUILT AS PART OF THE PROJECT. IF NECESSARY, THE INSPECTING ENGINEER WILL INTERPRET THE CONSTRUCTION PLANS FOR THE CONTRACTOR. ONCE ALL STORMWATER MANAGEMENT STRUCTURES ARE CONSTRUCTED AND STABILIZED, THE INSPECTING ENGINEER WILL NOTIFY THE DEPARTMENT IN WRITING WITHIN 30 DAYS TO STATE THAT THE STRUCTURES HAVE BEEN COMPLETED. ACCOMPANYING THE ENGINEER'S NOTIFICATION MUST BE A COPY OF THE TEST RESULTS FOR ANY SOIL FILL, AGGREGATE, OR MULCH MATERIALS USED IN THE CONSTRUCTION OF THE STORMWATER MANAGEMENT STRUCTURES AND A LOG OF THE ENGINEER'S INSPECTIONS GIVING THE DATE OF EACH INSPECTION, THE TIME OF EACH INSPECTION, AND THE ITEMS INSPECTED ON EACH VISIT.

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

COMPACTION OF SOIL FILTER: FILTER SOIL MEDIA AND UNDERDRAIN BEDDING MATERIAL MUST BE COMPACTED BY FLOODING EACH LIFT. THE BED SHOULD BE INSTALLED IN AT LEAST TWO LIFTS OF 9INCHES TO PREVENT POCKETS OF LOOSE MEDIA.

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

- AFTER FILTER HAS BEEN CONSTRUCTED TO SUBGRADE.
- AFTER INSTALLATION OF THE HDPE LINER
- AFTER THE UNDERDRAIN PIPES ARE INSTALLED BUT NOT BACKFILLED
- AFTER THE DRAINAGE LAYER IS CONSTRUCTED AND PRIOR TO INSTALLATION OF THE SOIL FILTER MEDIA.
- AFTER THE FILTER MEDIA HAS BEEN INSTALLED, SEEDED AND MULCHED.
- AFTER ONE YEAR TO INSPECT VEGETATION AND MAKE CORRECTIONS.
- ALL THE MATERIAL USED FOR THE CONSTRUCTION OF THE FILTER BASIN MUST BE CONFIRMED AS SUITABLE BY THE DESIGN ENGINEER. TESTING MUST BE DONE BY A CERTIFIED LABORATORY TO SHOW THEY ARE PASSING DEP SPECIFICATIONS.

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

- SUBMIT SAMPLES OF EACH TYPE OF MATERIAL TO BE BLENDED FOR THE MIXED FILTER MEDIA AND SAMPLES OF THE UNDERDRAIN BEDDING MATERIAL. SAMPLES MUST BE A COMPOSITE OF THREE DIFFERENT LOCATIONS (GRABS) FROM THE STOCKPILE OR PIT FACE. SAMPLE SIZE REQUIRED WILL BE DETERMINED BY THE TESTING LABORATORY.
- PERFORM A SIEVE ANALYSIS CONFORMING TO ASTM C136 (STANDARD TEST METHOD FOR SIEVE ANALYSIS OF FINE AND COARSE AGGREGATES; 1996A) ON EACH TYPE OF THE SAMPLE MATERIAL.
- PERFORM A PERMEABILITY TEST ON THE SOIL FILTER MEDIA MIXTURE CONFORMING TO ASTM D2434 WITH THE MIXTURE COMPACTED TO 90-92% OF MAXIMUM DRY DENSITY BASED ON ASTM D698.

THIS PLAN SHALL NOT BE MODIFIED WITHOUT WRITTEN PERMISSION FROM SITE DESIGN ASSOCIATES, ANY ALTERATIONS, OTHERWISE, SHALL BE AT THE USER'S SOLE RISK AND WITHOUT LIABILITY TO SITE DESIGN ASSOCIATES.

REV.	DATE	STATUS	BY	CHKD.	APPD.
A	2/14/2023	ISSUED FOR SITE PLAN REVIEW	DEPT.	TWS	TWS

THOMAS W. SAUCIER NO. 6018 LICENSED PROFESSIONAL ENGINEER STATE OF MAINE
2/14/2024

Site Design Associates
Consulting Engineering & Land Planning
23 Whitney Way Topsham, Maine 04086 Tel: (207) 449-4275

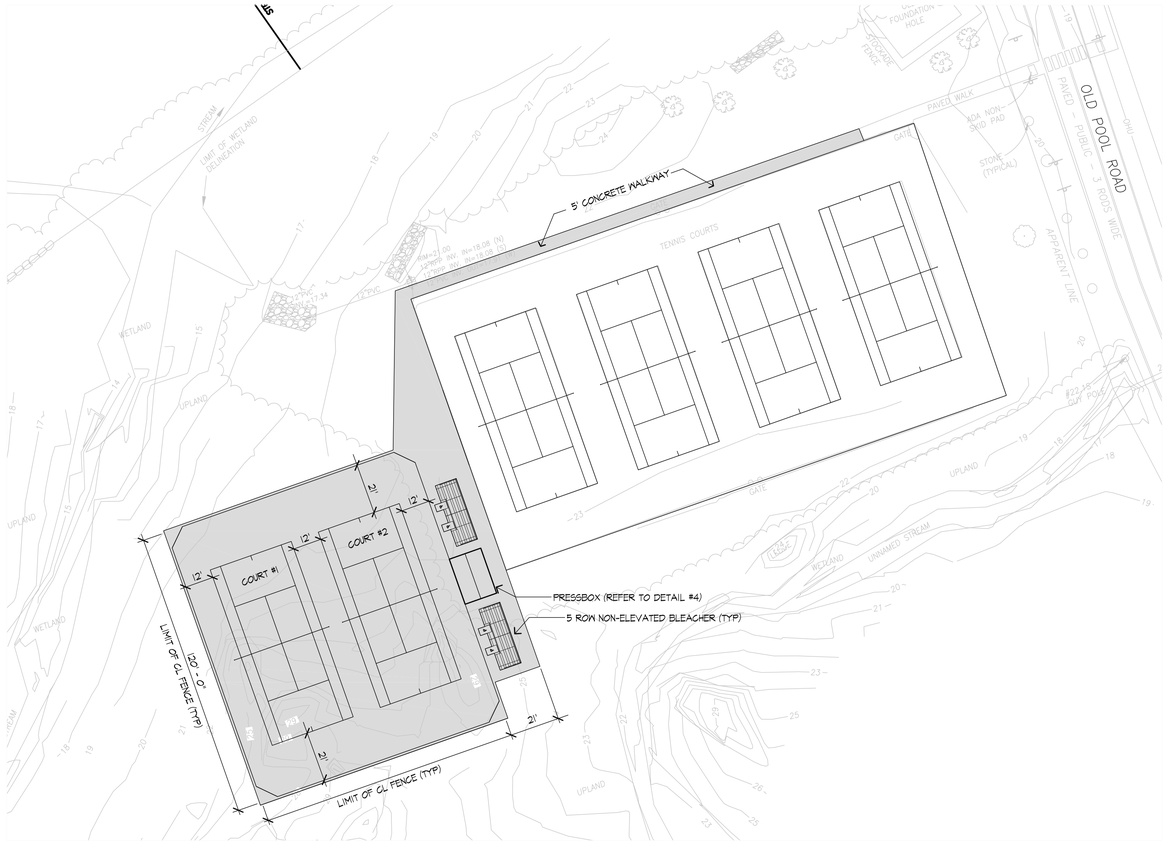
CLIENT:
UNIVERSITY OF NEW ENGLAND
11 HILLS BEACH ROAD BIDDEFORD, MAINE 04005

DESIGN: DEPT.
DRAWN: DEPT.
CHKD: TWS
DATE: FEB 2024
SCALE: AS NOTED

PROJECT: TENNIS COURT EXPANSION
16 OLD POOL ROAD, BIDDEFORD, ME
CIVIL DETAILS

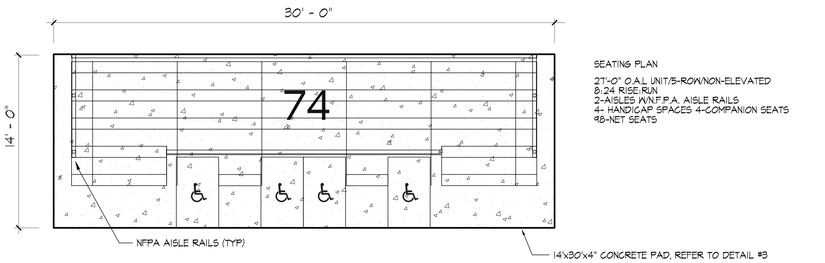
PROJ. NO. 23-216-00
DWG. NO. C-302
REV. A

Drawing Name: C:\Users\Stan\Google Drive\Projects\SDA Projects\23102 - UNE Tennis Courts\3_CAD\23102 - Details | Plot Date / Time: Feb. 12, 24 / 3:39 PM



1 TENNIS COURT LAYOUT PLAN

SCALE: 1" = 30'

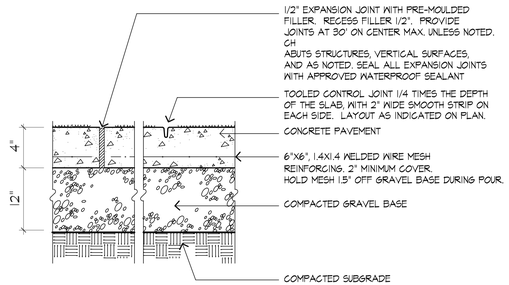


SEATING PLAN

27'-0" O.A.L UNIT/5-ROW/NON-ELEVATED
8:24 RISE:RUN
2-AISLES W/N.F.P.A. AISLE RAILS
4- HANDICAP SPACES 4-COMPANION SEATS
98-NET SEATS

2 TENNIS - 74 SEAT BLEACHER

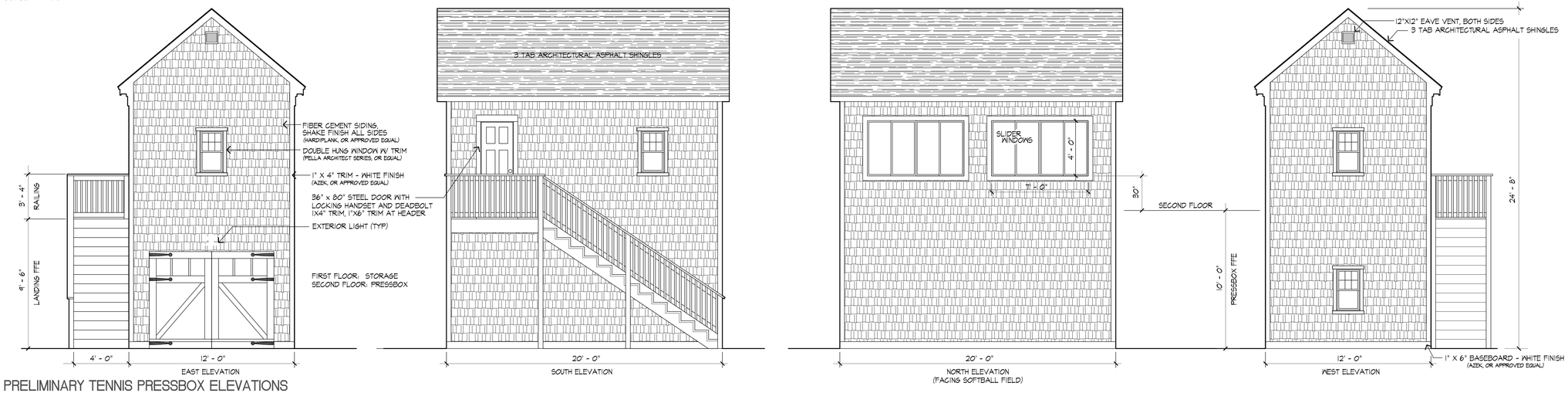
SCALE: 1" = 5'



PROVIDE LIGHT BROOM FINISH PERPENDICULAR TO THE TRAFFIC FLOW UNLESS OTHERWISE NOTED

3 CONCRETE PAVEMENT

SCALE: NTS



4 PRELIMINARY TENNIS PRESSBOX ELEVATIONS

SCALE: 1" = 4'

REV.	DATE	STATUS	BY	CHKD.	APPD.
1	2/14/24	SUBMITTED FOR SITE PLAN REVIEW	CCH		

LICENSED LANDSCAPE ARCHITECT — CHRISTIAN C. HUNTRESS — 3717 — STATE OF MAINE

HUNTRESS *Sports*

LANDSCAPE ARCHITECTS & PLANNERS

17 Tewksbury Street - Andover, MA 01810 p 978.470.8882 www.huntressassociates.com

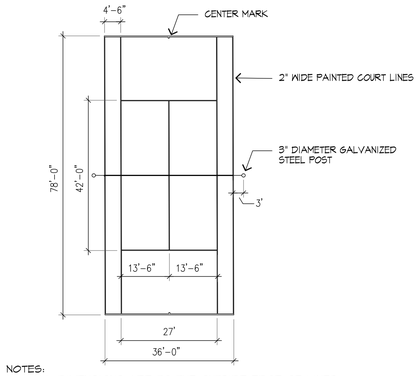
CLIENT:

UNIVERSITY OF NEW ENGLAND

11 HILLS BEACH ROAD BIDDEFORD, MAINE 04005

DESIGN: CCH	PROJECT: TENNIS COURT EXPANSION, 16 OLD POOL ROAD, BIDDEFORD, MAINE
DRAWN: CCH	
CHKD: DPH	TENNIS COURT DETAILS
DATE: 2/14/24	PROJ. NO. 23-216-00 — REV. A
SCALE: AS NOTED	DWG. NO. L-100

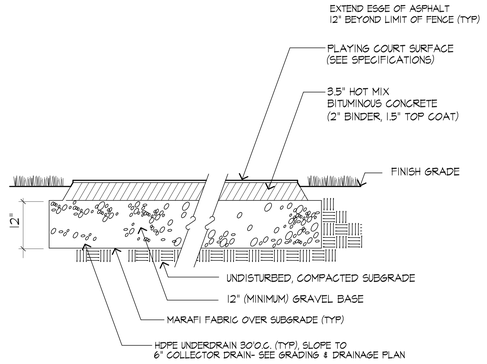
Drawing Name: \\Vhi-dsfs01\Users\Huntress Assoc\Jobs\University Of New England\Tennis\VHI-DSFS-Tennis 022324 Released | Plot Date / Time: Feb 13, 24 / 4:38 PM



NOTES:
1. ALL DIMENSIONS ARE TO THE OUTSIDE EDGE OF LINES.
2. ALL PLAYING LINES ARE 2" IN WIDTH.

1 TENNIS COURT LAYOUT

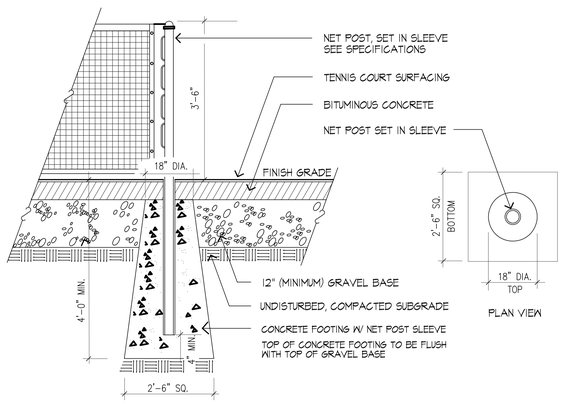
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2 PROPOSED ASPHALT SECTION

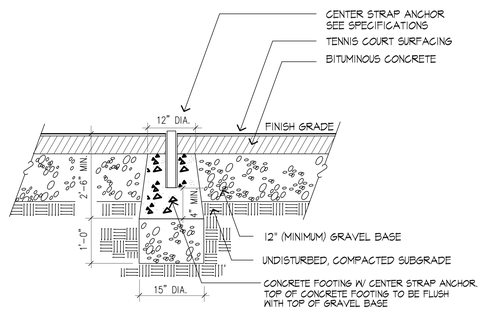
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93067



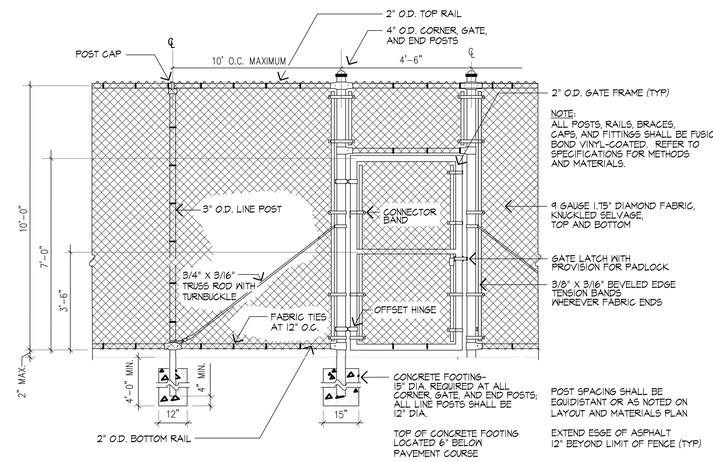
3 TENNIS NET POST FOOTING

SCALE: NTS



4 TENNIS NET CENTER STRAP ANCHOR

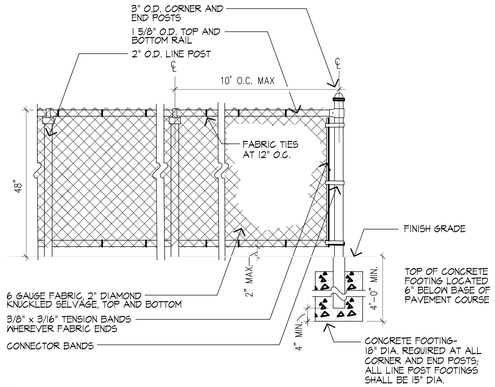
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5 10'-0" TALL FUSION BOND CHAIN LINK FENCE AND GATE

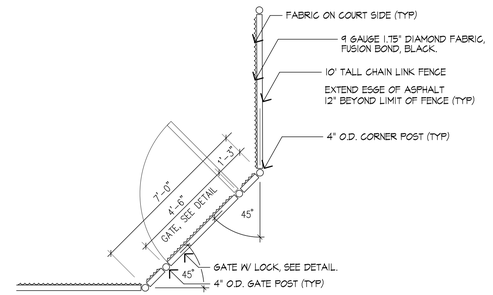
SCALE: NTS

NOTES: 1. ALL GATES TO MAINTAIN 4' MIN. CLEAR WIDTH FOR ADA COMPLIANCE.
2. ALL 10' CLF AT THE TENNIS COURTS SHALL BE INSTALLED WITH WINDSCREEN, AS PER SPEC.



6 4' FUSION BOND CHAIN LINK FENCE

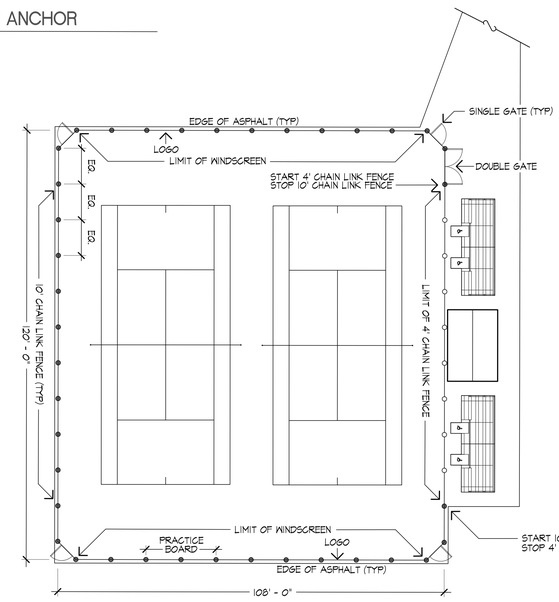
SCALE: NTS



NOTE: ALL GATES TO MAINTAIN 4' MIN. CLEAR WIDTH FOR ADA COMPLIANCE.

7 PLAN VIEW, CHAMFERED CORNER W/ SINGLE GATE

SCALE: NTS



8 TENNIS COURT FENCE LAYOUT

SCALE: 1" = 20'

REV.	DATE	STATUS	BY	CHKD.	APPD.
1	2/14/24	SUBMITTED FOR SITE PLAN REVIEW	CCH		

CHRISTIAN C. HUNTRESS 3717 LICENSED LANDSCAPE ARCHITECT STATE OF MAINE

HUNTRESS *Sports*
LANDSCAPE ARCHITECTS & PLANNERS
17 Tewksbury Street - Andover, MA 01810 p 978.470.8882 www.huntressassociates.com

CLIENT:
UNIVERSITY OF NEW ENGLAND
11 HILLS BEACH ROAD BIDDEFORD, MAINE 04005

DESIGN: CCH
DRAWN: CCH
CHKD: DPH
DATE: 2/14/24
SCALE: AS NOTED

PROJECT:
TENNIS COURT EXPANSION
16 OLD POOL ROAD, BIDDEFORD, MAINE

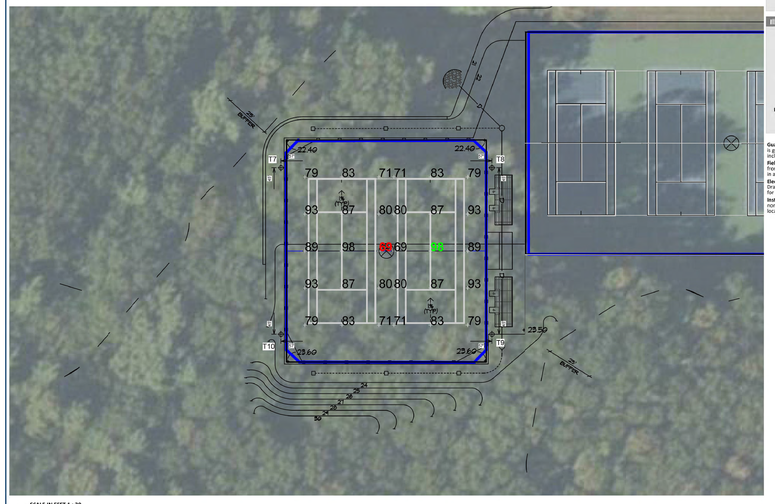
TENNIS COURT DETAILS

PROJ. NO. 23-216-00
DWG. NO. L-101
REV. A

Drawing Name: L:\All-JOBS\Active Workflow Server\Maine\University Of New England\Tennis\Work-ARC-Tennis 102324 Released | Plot Date / Time: Feb. 13, 24 / 4:37 PM

Equipment List For Areas Shown

Pole QTY	Pole LOCATION	Pole SIZE	Pole GRADE ELEVATION	Luminaires ABOVE GRADE (EVE)	Luminaires LUMINAIRE TYPE	Luminaires QTY/POLE	Luminaires THIS GRID	Luminaires OTHER GRIDS
4	T7-T10	40'	-	40.2'	TLC-LED-900	3	3	0
4				Totals		12	12	0



ENGINEERED DESIGN By: Tanner Lanphier • File #230992C • 21-Nov-23

Pole location(s): ⊙ dimensions are relative to (0,0) reference point(s)

UNE Tennis Courts

Biddeford, ME

Grid Summary

Name	Tennis 5-6
Size	2 Court - 12' Spacing
Spacing	20.0' x 20.0'
Height	3.0' above grade

Illumination Summary

MAINTAINED HORIZONTAL FOOTCANDLES

	Entire Grid
Guaranteed Average	**75**
Scan Average	82.89
Maximum	98
Minimum	69
Avg/Min	1.19
Guaranteed Max/Min	**1.7**
Max/Min	1.41
UG (adjacent pts)	0.00
CU	0.88
No. of Points	30

LUMINAIRE INFORMATION

Applied Circuits	B
No. of Luminaires	**12**
Total Load	10.56 kW

Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document and includes a 0.95 depreciation factor.

Field Measurements: Individual field measurements may vary from computer-calculated predictions and should be taken in accordance with IESNA RP-6-15.

Electrical System Requirements: Refer to Amperage Draw Chart and/or the **"Musco Control System Summary"** for electrical sizing.

Installation Requirements: Results assume ± 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.

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ILLUMINATION SUMMARY



ENGINEERED DESIGN By: Tanner Lanphier • File #230992C • 21-Nov-23

Pole location(s): ⊙ dimensions are relative to (0,0) reference point(s)

UNE Tennis Courts

Biddeford, ME

Grid Summary

Name	Zero Grid
Spacing	10.0' x 10.0'
Height	3.0' above grade

Illumination Summary

MAINTAINED HORIZONTAL FOOTCANDLES

	Entire Grid
Scan Average	**25.19**
Maximum	103
Minimum	0
Avg/Min	
Max/Min	
UG (adjacent pts)	648.09
CU	1.30
No. of Points	400

LUMINAIRE INFORMATION

Applied Circuits	A,B
No. of Luminaires	**36**
Total Load	31.68 kW

Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document and includes a 0.95 depreciation factor.

Field Measurements: Individual field measurements may vary from computer-calculated predictions and should be taken in accordance with IESNA RP-6-15.

Electrical System Requirements: Refer to Amperage Draw Chart and/or the **"Musco Control System Summary"** for electrical sizing.

Installation Requirements: Results assume ± 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.

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ILLUMINATION SUMMARY

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PROJECT SUMMARY

UNE Tennis Courts

Biddeford, ME

Lighting System

Pole/Fixture Summary

Pole ID	Pole Height	Mtg Height	Fixture Qty	Luminaire Type	Load	Circuit
T1	50'	50'	3	TLC-LED-900	2.64 kW	A
T2	50'	50'	6	TLC-LED-900	5.28 kW	A
T3-T4	50'	50'	3	TLC-LED-900	2.64 kW	A
T5	50'	50'	6	TLC-LED-900	5.28 kW	A
T6	50'	50'	6	TLC-LED-900	5.28 kW	A
T7-T10	40'	40'	3	TLC-LED-900	2.64 kW	B
10			**36**		**31.68 kW**	

Circuit Summary

Circuit	Description	Load	Fixture Qty
A	Tennis 1-4	21.12 kW	24
B	Tennis 5-6	10.56 kW	12

Fixture Type Summary

Type	Source	Wattage	Lumens	L90	L80	L70	Quantity
TLC-LED-900	LED 5700K - 75 CRI	860W	184,000	>120,000	>120,000	>120,000	36

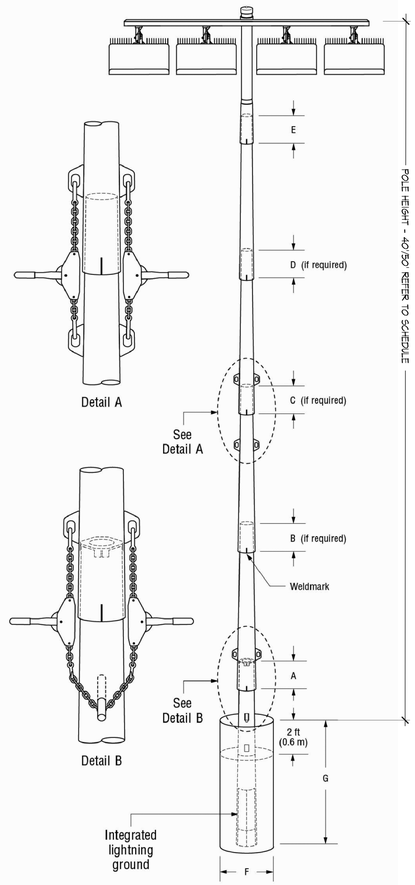
Single Luminaire Amperage Draw Chart

Driver Specifications (.90 min power factor)	Line Amperage Per Luminaire (max draw)						
Single Phase Voltage	208 (60)	220 (60)	240 (60)	277 (60)	347 (60)	380 (60)	480 (60)
TLC-LED-900	5.2	4.9	4.5	3.9	3.1	2.9	2.3

Light Level Summary

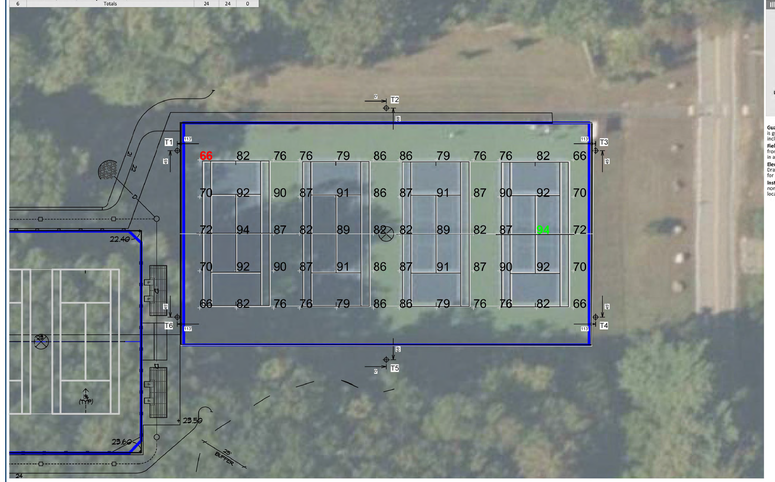
Calculation Grid Summary

Grid Name	Calculation Metric	Illumination Ave	Min	Max	Max/Min	Ave/Min	Circuits	Fixture Qty
Tennis 1-4	Horizontal Illuminance	82.2	66	94	1.44	1.25	A	24
Tennis 5-6	Horizontal Illuminance	82.9	69	98	1.41	1.20	B	12
Zero Grid	Horizontal Illuminance	25.2	0	103	0.00		A,B	36



Equipment List For Areas Shown

Pole QTY	Pole LOCATION	Pole SIZE	Pole GRADE ELEVATION	Luminaires ABOVE GRADE (EVE)	Luminaires LUMINAIRE TYPE	Luminaires QTY/POLE	Luminaires THIS GRID	Luminaires OTHER GRIDS
4	T1 T3-T4 T6	50'	-	49.5'	TLC-LED-900	3	3	0
2	T2 T5	50'	-	49.5'	TLC-LED-900	6	6	0
6				Totals		24	24	0



ENGINEERED DESIGN By: Tanner Lanphier • File #230992C • 21-Nov-23

Pole location(s): ⊙ dimensions are relative to (0,0) reference point(s)

UNE Tennis Courts

Biddeford, ME

Grid Summary

Name	Tennis 1-4
Size	4 Court - 18' Spacing
Spacing	20.0' x 20.0'
Height	3.0' above grade

Illumination Summary

MAINTAINED HORIZONTAL FOOTCANDLES

	Entire Grid
Guaranteed Average	**75**
Scan Average	82.24
Maximum	94
Minimum	66
Avg/Min	1.25
Guaranteed Max/Min	**1.7**
Max/Min	1.44
UG (adjacent pts)	0.00
CU	0.86
No. of Points	68

LUMINAIRE INFORMATION

Applied Circuits	A
No. of Luminaires	**24**
Total Load	21.12 kW

Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document and includes a 0.95 depreciation factor.

Field Measurements: Individual field measurements may vary from computer-calculated predictions and should be taken in accordance with IESNA RP-6-15.

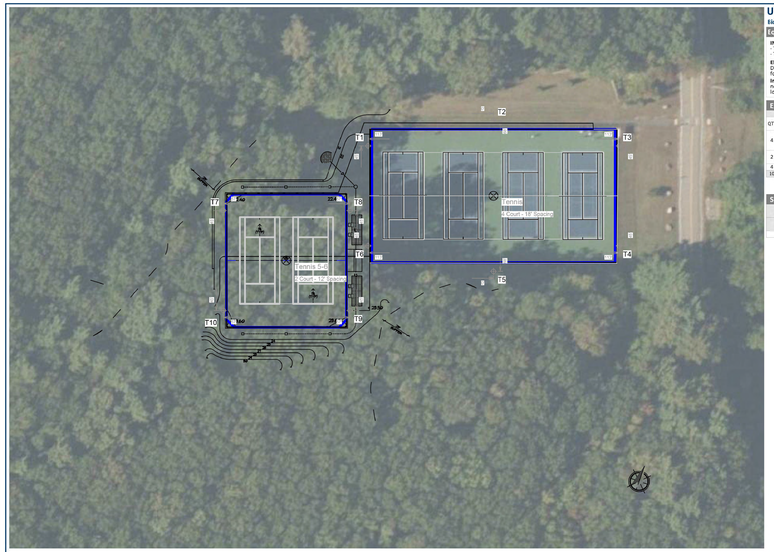
Electrical System Requirements: Refer to Amperage Draw Chart and/or the **"Musco Control System Summary"** for electrical sizing.

Installation Requirements: Results assume ± 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.

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ILLUMINATION SUMMARY



ENGINEERED DESIGN By: Tanner Lanphier • File #230992C • 21-Nov-23

Pole location(s): ⊙ dimensions are relative to (0,0) reference point(s)

UNE Tennis Courts

Biddeford, ME

Equipment Layout

INCLUDES:
- Tennis
- Tennis 5-6

Electrical System Requirements: Refer to Amperage Draw Chart and/or the **"Musco Control System Summary"** for electrical sizing.

Installation Requirements: Results assume ± 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.

Equipment List For Areas Shown

Pole QTY	Pole LOCATION	Pole SIZE	Pole GRADE ELEVATION	Luminaires ABOVE GRADE (EVE)	Luminaires LUMINAIRE TYPE	Luminaires QTY/POLE
4	T1 T3-T4 T6	50'	-	49.5'	TLC-LED-900	3
2	T2 T5	50'	-	49.5'	TLC-LED-900	6
4	T7-T10	40'	-	40.2'	TLC-LED-900	3
10				Totals		36

Single Luminaire Amperage Draw Chart

Driver Specifications (.90 min power factor)	Line Amperage Per Luminaire (max draw)						
Single Phase Voltage	208 (60)	220 (60)	240 (60)	277 (60)	347 (60)	380 (60)	480 (60)
TLC-LED-900	5.2	4.9	4.5	3.9	3.1	2.9	2.3

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EQUIPMENT LAYOUT

1 SPORTS LIGHTING PHOTOMETRIC DETAILS

SCALE: NTS

2 PRELIMINARY POLE ELEVATION

SCALE: NTS

REV.	DATE	STATUS	BY	CHKD.	APPD.
1	2/14/24	SUBMITTED FOR SITE PLAN REVIEW	CCH		

CHRISTIAN C. HUNTRESS — LICENSED LANDSCAPE ARCHITECT — 3717 — STATE OF MAINE

HUNTRESS Sports

LANDSCAPE ARCHITECTS & PLANNERS

17 Tewksbury Street - Andover, MA 01810 p 978.470.8882 www.huntressassociates.com

CLIENT: UNIVERSITY OF NEW ENGLAND

11 HILLS BEACH ROAD BIDDEFORD, MAINE 04005

DESIGN: CCH
DRAWN: CCH
CHKD: DPH
DATE: 2/14/24
SCALE: AS NOTED

PROJECT: TENNIS COURT EXPANSION
16 OLD POOL ROAD, BIDDEFORD, MAINE

TENNIS COURT LIGHTING DETAILS

PROJ. NO. 23-216-00 REV. A

DWG. NO. L-102

Drawing Name: L:\All-JOBS\Current Volumes Since Kate\University Of New England\Tennis\Vol-UNE-Tennis 023216 Relocate\ | Plot Date / Time: Feb. 13, 24 / 4:38 PM

Weston & Sampson

427 Main Street, Suite 400, Worcester, MA 01608
Tel: 508.762.1676

Mr. David Galbraith
City Planner
City of Biddeford
205 Main Street
Biddeford, ME 04005

June 4, 2024

Re: Engineering Peer Review
16 Old Pool Road: Site Plan Review Application
Proposed Tennis Court Expansion
City of Biddeford, Maine

Dear Members of the Planning Board:

Pursuant to the request received from the Biddeford Planning Department, Weston & Sampson is pleased to present our review of the above-referenced application, submitted by Site Design Associates (engineer) on behalf of the University of New England (applicant). The purpose of this letter report is to provide comments on the following subject matter areas:

1. MaineDEP Stormwater Management (Chapter 500) Compliance
    a. Basic Standards
    b. General Standards
    c. Phosphorus Standard
    d. Urban Impaired Stream Standard
    e. Flooding Standard
    f. Easements and Deed Restrictions Standard
    g. Redistribution of Stormwater Discharges Standard
    h. Discharge to Wetland Standard
    i. Discharges to Public Storm Sewer Systems Standard

2. City of Biddeford, Part III Land Development Regulations, Article VI Performance Standards, Section 61 Stormwater Management

3. City of Biddeford, Part III Land Development Regulations, Article XI Site Plan Review, Section 5(B)(1) Site Design and Development Criteria: Drainage

4. General Comments

Weston & Sampson reviewed the following documents that we received on May 9, 2024:

- Site Plan Review Application, Site Design Associates, dated February 14, 2024 (239 pages)
- Site Plan Set for Tennis Court Expansion – University of New England prepared by Site Design Associates, LLC, dated February 14, 2024 (12 sheets) (the "Site Plans")

The above referenced subject matters and their associated regulatory standards are reproduced in italicized text below, followed by our comments identified as "WSE COMMENT."

PART 1: MaineDEP Stormwater Management (Chapter 500) Compliance

a. Chapter 500, Section 4(B) – Basic Standards

The basic standards apply to all projects described above. The applicant must demonstrate that the erosion and sedimentation control, inspection and maintenance, and housekeeping standards specified in Appendices A, B, and C to this Chapter, respectively, are met, and that the grading or other construction activity will not impede or otherwise alter drainageways so as to have an unreasonable adverse impact on a wetland or waterbody, or an adjacent downslope parcel.

WSE Comment: The engineer has provided an erosion and sediment control plan which requires the installation of either a double row silt fence or filter berms around the perimeter of the disturbed area. A temporary construction access drive and stabilized construction entrance are also provided in the plan. The engineer appears to have made a reasonable effort to keep the disturbed area to a minimum. As designed, the project will not result in an impediment to or alteration of drainageways, nor does there appear to be a likelihood of adverse impact to wetlands, water bodies or adjacent downslope parcels. Information on construction period and long-term inspection and maintenance has been included in an inspection and maintenance plan accompanying the application. Based on the information included in these documents, we believe that this standard has been met.

b. Chapter 500, Section 4(C) – General Standards

The general standards shall apply in addition to the Basic Standards including treatment requirements (Section 4(C)(2) and types of treatment measures allowed (Section 4(C)(3)). Required treatment measures can be reduced through applicable low impact development credits (Section 4(C)(4)) and exceptions from the general standards (Section 4(C)(5)).

WSE Comment: The engineer has proposed an underdrained soil filter BMP to provide treatment for the majority of stormwater runoff coming from the project area. A smaller portion of the project area consisting of a new pedestrian walk will drain toward existing stone berm level spreaders and buffers. The engineer has evaluated the latter and has found that the existing BMPs are adequate to support the additional relatively small impervious area associated with the pedestrian walk. The soil filter BMP appears to have been generally designed to conform to Appendix E of Chapter 500, with only two issues noted:

- On the second page of Appendix C in the engineer's calculations, the required channel protection volume is stated as 1,557 cubic feet, whereas calculating this value based on the reported developed areas yields a result of 1,565 cubic feet, which appears to exceed the volume provided in the BMP. We recommend that the engineer address this apparent minor math error.
- Plans indicate that a proposed test pit will be performed within the footprint of the soil filter BMP. The board may wish to include this as a condition of approval.

c. Chapter 500, Section 4(D) - Phosphorus Standard

The phosphorus standards apply in addition to the basic standards described in Section 4(B). Phosphorus standards apply to projects meeting the criteria shown in Section 4(D)(1)(a-b). Applicants are required to show BMPs with subcatchments including time of concentration (Tc) lines, flow lengths and flow types on WQ treatment plans. In addition to WQ Treatment Plan content requirements, projects subject to Phosphorus Standard shall provide phosphorus export calculations.

WSE Comment: The project does not discharge to a lake watershed. This standard is not applicable.

d. Chapter 500, Section 4(E) - Urban Impaired Stream Standard

A project must meet the urban impaired stream standard if the project is located in the direct watershed of urban impaired stream and requires a Site Law permit or permit modification. To meet the urban impaired stream standard, the applicant must either pay a compensation fee or mitigate project impacts by reducing or eliminating an off-site or on-site pre-development impervious stormwater source as described in 06-096 CMR 501.

WSE Comment: The project is not located in the direct watershed of an urban impaired stream. This standard is not applicable.

e. Chapter 500, Section 4(F) - Flooding Standard

A project must meet the flooding standard if the project results in three acres or more of impervious area or 20 acres or more of developed area; or Requires a Site Law permit or permit modification. If the standard is applicable, the applicant shall demonstrate that a project's stormwater management systems will meet the criteria shown in Sections 4(F)(2)(a-e).

WSE Comment: The engineer's narrative indicates that the project is believed to be eligible for a waiver from this standard. The site's stormwater runoff travels a relatively short distance down a brook to four 24-inch roadway crossing culverts that discharge to a tidal water body. In our review of Chapter 500 we don't object to this assessment, provided that the engineer has demonstrated that the proposed development will not result in concerns related to flow capacity at the culverts. That being said, the engineer is not requesting a waiver and has claimed that the project will fully comply with the flooding standard. The engineer has modeled the culverts and the peak discharge from the site in a Hydrocad model included in Appendix A of the site plan application's stormwater management report. It was noted that Subcatchment S4 in the calculations reflected an increase of 17,132 square feet of impervious area whereas the plans and narrative both reflect that this number should be 18,207 square feet. The overall total drainage area in the post-development model is less than that which is in the pre-development model by an amount by this approximate difference. We recommend that the engineer correct this error to ensure that the culvert capacity and peak discharge are correctly reported.

f. Chapter 500, Section 4(G) - Easements and Deed Restrictions Standard

A project must meet the easements and deed restrictions standard if the project requires specific off-site areas for the control, disposal, or treatment of stormwater runoff. If the standard is applicable, the applicant shall demonstrate that a project will meet the criteria shown in Sections 4(G)(2).

WSE Comment: The project does not require off-site areas for the control, disposal or treatment of stormwater runoff. This standard is not applicable.

g. Chapter 500, Section 4(H) - Redistribution of Stormwater Discharges Standard

A project must meet the redistribution of stormwater discharges standard if the project discharges concentrated stormwater runoff through an open-channel or pipe to any point that is not an open channel, an inlet to a storm drain system, or a natural or man-made impoundment. If the standard is applicable, the applicant shall demonstrate that a project will meet the criteria shown in Sections 4(H)(2).

WSE Comment: The engineer has incorporated appropriately designed level spreaders into the plans for discharges from the soil filter. This standard has been met.

h. Chapter 500, Section 4(I) - Discharge to Wetlands Standard

A project must meet the discharge to wetlands standard if the project discharges stormwater a wetland, unless the affected area of wetland qualifies for an exemption pursuant to the Natural Resources Protection Act, 38 M.R.S. §480-Q(17), or unless the Department determines that the change in stormwater flow will not cause a loss of wetland functions and values.

To meet the discharge to wetlands standard, the applicant must demonstrate that the project's discharges into wetlands will not significantly alter the flow of stormwater to the wetland from that which occurred. In general, new or increased stormwater discharges into wetlands must be put into sheet flow using level spreaders designed to meet the requirements in Section 4(H), above. The Department may allow alternate stormwater treatment measures if those measures will not unreasonably adversely affect the wetland.

The discharge of runoff to a wetland due to a 2-year storm may not increase the mean storage depth within a wetland more than two inches above pre-development levels for more than 24 hours from the end of the storm event, unless otherwise approved by the Department. The Department may consider cumulative impacts due to runoff from other projects when applying this standard to any wetland.

WSE Comment: The engineer's approach to meeting the flooding standard by mitigating peak discharges and providing level spreaders would meet this standard. Provided that the comments above regarding the flooding standard are met, this comment will be addressed.

i. Chapter 500, Section 4(J) - Discharges to Public Storm Sewer Systems Standard

A project must meet the discharges to public storm sewer systems standard if runoff from the project site will flow to a publicly-owned storm sewer system. The applicant must obtain authorization from the system's owner to discharge into the system. At its discretion, the Department may require the applicant to demonstrate that the system has adequate capacity for any increases in peak flow rates and volumes to the system and to provide photo documentation that the outfall of the public storm sewer system is being properly maintained.

WSE Comment: The stormwater from this site will not discharge to a public sewer system. This standard is not applicable.

PART 2: City of Biddeford, Part III Land Development Regulations, Article VI Performance Standards, Section 61 Stormwater Management

A1. All new construction and development, whether or not served by a stormwater collection and transportation system, shall be designed to reflect or resemble, as nearly as possible, natural runoff conditions in terms of volume, velocity and location of runoff.

WSE Comment: The engineer has proposed level spreaders to make stormwater runoff flow in a drainage pattern that is more reflective of a natural condition in terms of volume, velocity and location. This standard has been met.

A2. If runoff, after development, would exceed predevelopment runoff conditions, the offsite impact must be evaluated in terms of potential soil erosion and sedimentation, drainage capacity, and the land use/land cover characteristics. Appropriate methods of reducing off-site impact shall be employed.

WSE Comment: The engineer has indicated that there will be no increase in peak discharge from the site after the proposed work is constructed. Provided that the comments under the flooding standard further above are addressed, this standard will also be addressed.

A3. Stormwater management evaluations and designs shall be based on a twenty-four-hour, twenty-five-year occurrence interval storm.

WSE Comment: The engineer has performed an analysis based on the 24-hour 25-year storm in addition to storms of other recurrence intervals. This standard has been met.

A4. The Planning Board may, when it deems it appropriate, require calculations that are based on a fifty-year storm.

WSE Comment: The engineer has performed an analysis based on the 24-hour 50-year storm in addition to storms of other recurrence intervals. This standard has been met.

B. All development plans shall define maintenance requirements and identify parties responsible for maintenance of the stormwater control system. Whenever practical, underground stormwater management systems shall be employed. When methods of reducing stormwater impact are necessary or desirable, stormwater runoff control plans shall include:

1. Control methods effective both during and after construction.

WSE Comment: The engineer has provided a comprehensive erosion and sediment control plan to address runoff concerns during construction, and has provided an inspection and maintenance plan to address long-term needs. This standard has been met.

2. Control methods compatible with upstream and downstream characteristics.

WSE Comment: Runoff control methods include level spreaders which appear to be compatible with the brook immediately downstream which has historically received runoff via overland sheet flow. This standard has been met.

3. Documentation by the designer that increasing the volume and rate of runoff from the proposed development will not aggravate conditions downstream or upstream.

WSE Comment: The engineer has claimed that the rate of runoff will not increase after development. Provided that the comments under the flooding standard further above are addressed, this standard will also be addressed.

4. Provisions for on-site storage and gradual discharge of excessive flows, or contribution toward increasing downstream capacity (e.g., by enlarging existing culverts), when the channel downstream is not able to accommodate the increased volume or rate of runoff created by the proposed development.

WSE Comment: The engineer has reported that the applicant undertook a project in recent years to increase the capacity of the culvert crossing at Old Pool Road, which receives runoff from a large area of the university campus to the west of the road. The engineer has provided an analysis showing that there is no increase in post-development peak discharge and has also analyzed the culvert to ensure that there are no capacity concerns. Provided that the comments under the flooding standard further above are addressed, this standard will also be addressed.

5. Consideration of the following factors:

(a) Impact: on-site, downstream, upstream, and basin-wide.

(b) Costs: initial, amortized, operation and maintenance (cost paid by person if not on-site).

(c) Intensity of rainfall.

(d) Timing of rainfall (e.g. falling of snow or during the spring snowmelt).

(e) Amount of precipitation in the basin during the five days preceding the storm in question.

(f) Hydrologic soil groups throughout the basin (i.e., the soil's rate of water infiltration and transmission).

(g) Hydrologic conditions throughout the basin (soil's moisture content, humus/organic content, temperature, and whether or not it is frozen).

(h) Vegetative cover throughout the basin (vegetation helps soil dry out after a rainfall, intercepts some precipitation during the rainfall and slows down the flow of water over the land).

(i) Area of land covered by impervious surfaces throughout the basin (roads, sidewalks, roofs, driveways, patios, etc.).

(j) Topography throughout the basin (slopes affect the rate of runoff, marshland reduces peak discharge rate by slowing down the rate of runoff).

(k) Size and shape of watershed (peak discharge rates are slower in long, narrow watersheds).

WSE Comment: With the exception of the cost factors described above, consideration of these parameters has been reflected in the stormwater modeling for the site. The board may wish to opine as to whether it wishes to see further consideration of cost factors.

C. Stormwater runoff systems should be designed to facilitate aquifer recharge when it is advantageous to compensate for groundwater withdrawals or reductions in infiltration. Conversely, designs should avoid recharge where groundwater effects might be harmful.

Design of permanent storage facilities should consider safety, appearance, recreational use, and cost and effectiveness of maintenance operations, in addition to the primary storage function.
Natural overland flows, and open drainage channel and swale locations should be the preferred alignments for major components of a residential drainage system.

The use of enclosed components (such as underground piping) should be minimized where the existing natural systems are able to accommodate storm runoff. Energy dissipators (to reduce high flow velocities) and other forms of outfall protection shall be employed where enclosed drains discharge onto erodible soils.

WSE Comment: The proposed soil filter BMP is designed with an impervious liner and is not designed to promote groundwater recharge. The proposed stormwater management system appears to minimize pipe conveyance, utilizing above-ground flowpaths that follow existing topography to a large degree. The board may wish to request clarification from the engineer as to the reasons for not proposing any recharge BMPs as part of the project.

PART 3: City of Biddeford, Part III Land Development Regulations, Article XI Site Plan Review, Section 5(B)(1) Site Design and Development Criteria: Drainage

a. The rate of post-development runoff shall not exceed that of predevelopment. Details of catch basins, drainage pipes and retention/detention ponds shall be provided as needed with the application. All detail sheets shall bear the seal and signature of a professional engineer, licensed in the State of Maine.

WSE Comment: The engineer has provided details for drainage related items as required and has sealed the detail sheets. The engineer has provided calculations to show that post-development peak discharges do not exceed pre-development rates. Provided that the comments under the flooding standard further above are addressed, this standard will also be addressed.

b. A written engineering report describing the impacted watershed area, projected runoff, and any projected downstream impact shall be required.

WSE Comment: The engineer has provided a written narrative as part of the stormwater management report. This comment has been addressed.

c. Drainage easements shall be established for any concentrated off-site drainage. Such easement shall state who has the responsibility to maintain the easement. Easement documents shall be reviewed, at applicant expense, by the Director of Public Works, City Engineer, and the City Solicitor, as to exactness of content. Plans shall include the location of easements.

WSE Comment: There is no offsite drainage being proposed as part of this project. This standard is not applicable.

d. Where it is determined by the City Engineer or consultant hired by the Board, that the additional runoff incident to the development of the projected site will overload an existing downstream drainage facility, the Board may require the provision of water-retarding facilities or other improvements to alleviate said problem.

WSE Comment: It is our understanding that there aren't presently any concerns about the ability of downstream infrastructure to handle runoff from the site. This standard is not applicable.

e. Development in specific areas of concern shall provide detailed information and address specific issues in relation to drainage:

1. Parcels situated within the federally designated flood hazard zone, as per Flood Hazard Boundary Map H01-18, dated May, 1984, as amended, shall comply with all applicable federal regulations relating thereto.

WSE Comment: The project is not located within a flood hazard zone. This standard is not applicable.

2. One-hundred-year flood elevation line shall be included where applicable.

WSE Comment: The project is not located within a flood hazard zone. This standard is not applicable.

3. No slope shall be created which results in a slope of more than two feet horizontal to one foot vertical unless proper retaining walls are proposed.

WSE Comment: The engineer has included a retaining wall in the project in the design, and in all other areas the slopes appear to meet this slope requirement. This standard has been met.

f. Drainage improvements shall be scheduled to be constructed as part of the first portion of any project where drainage improvements are proposed.

WSE Comment: The board may wish to include this as a condition of approval.

g. Special bonding of 1 1/2 times the anticipated cost of said improvements shall be incorporated by the developer to insure that improvements are placed and that they function as planned. No portion of this special bond may be released until the project, or that portion of the project for which the drainage improvement is proposed has been constructed, and until so released by the Planning Board, with the recommendation from the Director of Public Works and the City Engineer.

WSE Comment: The board may wish to include this as a condition of approval.

PART 4: General Comments

Based on project correspondence, it is our understanding that the applicant intends to forego a submission to Maine DEP based on a statutory exemption found in MRSA Title 38, Chapter 3, Subchapter 1, Article 6, §488, 27:

Exemption for educational institutions. New construction at or a modification of a campus of an educational institution permitted pursuant to this article is exempt from review under this article as provided in this subsection. For purposes of this subsection, "educational institution" means any private or public school or postsecondary institution.
A. New construction at or a modification of a campus of an educational institution permitted pursuant to this article is exempt from review under this article if the additional disturbed area not to be revegetated does not exceed 40,000 square feet ground area in any calendar year and does not exceed 80,000 square feet ground area in total. [PL 2021, c. 123, §2 (AMD).]

B. The permittee shall annually notify the department of any new construction or modifications conducted during the previous 12 months that fall under this exemption. The notice must identify the type, location and ground area of the new construction or modification. With the annual notification, the permittee shall provide to the department

development plans certified by a professional engineer for the new construction or modification undertaken pursuant to this subsection. [PL 2011, c. 551, §3 (NEW).]

C. When review under this article is required at an educational institution permitted pursuant to this article, the permittee shall provide plans for the new development, as well as for those activities that have been undertaken pursuant to this subsection. [PL 2011, c. 551, §3 (NEW).]

D. Nothing in this subsection authorizes a person to undertake an activity on a parcel of land affected by an order or permit issued by the department that is contrary to that order or permit. [PL 2011, c. 551, §3 (NEW).]

WSE COMMENT: The proposed project is part of an educational institution and the disturbed area not to be revegetated is below the 40,000 square foot threshold. We have no knowledge of other projects that may potentially count against the 40,000 or 80,000 square foot thresholds in the statute, but on the presumption that the applicant has accurately represented the matter in that regard it appear that the applicant would qualify for the exemption from submitting the project to Maine DEP for review.

Weston & Sampson appreciates the opportunity to present our findings. We are available at your earliest convenience to discuss our report. Please contact me if you have any questions. I may be reached at (978) 573-4077 or via electronic mail at pearsonj@wseinc.com.

Sincerely,

WESTON & SAMPSON ENGINEERS, INC.

James Pearson, PE
Technical Leader

Whitten, Nan

From: Bunny Wermenchuk <b_wermenchuk@yahoo.com>
Sent: Tuesday, May 14, 2024 10:27 PM
To: Whitten, Nan
Cc: 2 I. C. E Dale Wermenchuk; 1 I. C. E. Sam Ajanaku (Sister)
Subject: 16 Old Pool Road Site Plan Application

EXTERNAL: This email originated from outside of the City of Biddeford email system. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Dear Ms. Whitten,
I am writing you in response to the 16 Old Pool Road site plan application. Our property at 2 Old Pool Road abutts the existing tennis courts at the University of New England.
Currently the tennis courts are used for the University community only. Posted hours of usage are designated between 8 am to dusk.

There does not appear to be any regulating or monitoring of these hours. Pickleball and tennis season has begun already and most weather permitting days has folks at the courts before 7 am.
Based on the current expansion which includes 150 stadium seating, press box, and lights; I ask the following questions.
* What will be the hours of operation?
*Will the courts be opened to the general public?
* With the number of seats added, will there be porta potties installed?
*Who will, and how often will there be trash removal to prevent wildlife from getting into it trash cans? To preventing the scattering of loose trash from blowing on abutting properties.
*I am aware that a photometric study was conducted however was a noise assessment completed? Since the tennis courts are abutted by residential zoning.
*Who will be enforcing parking during events to avoid off road parking on Old Pool Road and ensuring safe passage across a very dangerous curve to get to the tennis court?
Thank you for your time and I look forward to hearing the answers to my questions.
Yahoo Mail: Search, Organize, Conquer
Yahoo Mail: Search, Organize, Conquer

Whitten, Nan

From: Jill Fink <jillcfink@gmail.com>
Sent: Tuesday, June 4, 2024 1:33 PM
To: Whitten, Nan
Subject: Planning Board / UNE tennis courts

EXTERNAL: This email originated from outside of the City of Biddeford email system. Do not click links or open attachments unless you recognize the sender and know the content is safe.
Good morning Ms. Whitten -

My name is Jill Fink and I live at 32 Old Pool Road. I share a property line with UNE, the property line immediately adjacent to the tennis courts. I participated in the May planning board meeting virtually, and (if I can get out of work on time) will attend the meeting in-person tomorrow. In the event I don't get there in-person, I wanted to mention a few concerns and questions:

- At the last meeting, the representative from UNE said that the tennis courts open at 830a. I've kept track of when I hear folks beginning to play for just the last few days. On Saturday, 6/1 it was 650a; Sunday 6/2 at 830a; Monday 6/4 at 730a; today, Tues 6/5 it was 510a. It's always been this way, so much so that I was shocked when I heard that 830a was the start time. (I'll also note that pickleball is much louder than tennis.) As we move deeper into summer the courts obviously get more use, but as the temperatures increase the courts are used earlier and earlier in the day. Again, it's not unusual for me to hear play start between 5-6a in July/August.
- The UNE representative at the last meeting said that if play is happening outside of sanctioned hours, an individual can call and report it. I don't believe that the responsibility for monitoring the usage of the courts should be on the residents and neighbors. It's the responsibility of UNE. It's disingenuous to say that hours are posted and leave it at that. UNE should lock the gates and unlock them at 830a. I don't want to have to make a call (nearly) every morning when I'm awoken by pickleball play.
- Will the competitive tennis matches (e.g. UNE team matches) be announced using an amplified system?
- Lighting:
    - I believe it was said that lighting would be installed. If court usage is supposed to end at dusk, why would lights be added?
    - If lights are added, will they be on a timer and how late will they be on?
- The stands that will be added for spectators? How many will be added and what is the capacity for the number of spectators?

I thank you so much for taking my questions and concerns. Again, I hope to be able to attend in person.

Warmly,
Jill

Whitten, Nan

From: Lisa smith <lasmith04103@yahoo.com>
Sent: Wednesday, June 5, 2024 1:09 PM
To: Whitten, Nan; Lisa Smith
Subject: Re Written Comment for 10 Final Site Plan Application for UNE tennis courts

EXTERNAL: This email originated from outside of the City of Biddeford email system. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Dear Nan:
My name is Lisa A. Smith and I live at 90 Old Pool Road, Biddeford. A neighbor told me about UNE's proposed plan to add 4 to 6 more tennis courts to the current tennis court location.
I am not opposed to the tennis courts going in as I am an avid tennis player and UNE alumni. However, I am very concerned that the plan has not addressed several items for the surrounding homes and neighborhood.

1. Increased Traffic
How are they going to control the increased traffic & speeding for residents? The students regularly speed at high rates on Old Pool Rd.. Old Pool Road is in terrible condition, more traffic is just going to deteriorate the road conditions(there have been several serious bike crashes due to pot holes).

2. Light Pollution
Are the tennis court lights... DARK SKY compliant? Are the lights going to be on a timer so they go out at 9pm?

3. Hours of Operation ?
Will the courts be locked so people can not play tennis or pickle ball and 5am or 9pm?

4. Landscaping
Will any large mature trees be left to buffer the tennis ball noise ?
5. Grandstands?
What side of the courts are Grandstand being installed?

What's really important for UNE to understand is that they need to be sensitive to the surrounding environment and neighborhood.
Smart, innovative environmental design is essential for the college to expand in a positive way within the Biddeford Community.

If you have any questions I am happy to be contacted.
Thank you
Lisa A. Smith
UNE Class of 91'
207-4000-7677

CITY OF BIDDEFORD

Planning and Development Department

David C.M. Galbraith
Deputy Director/City Planner
205 Main Street
P.O. Box 586
Biddeford, ME 04005
(207) 284-9115
David.Galbraith@biddefordmaine.org

PLANNING BOARD STAFF REPORT

TO: Chair Patoine and Members of the Biddeford Planning Board

FROM: David C.M. Galbraith, Deputy Director/City Planner

DATE: May 29, 2024

RE: 2022.11 Site Plan and Subdivision Amendment Review for Tom Watson & Co. at 10, 20, 26 and 30 Upper Falls Way (formerly Gooch Street) (Tax Map 40, Lots 55, 55-3, and 56-1) in the MSRD-3 zone and GD-1 Shoreland Overlay Zone / Amendment Request to the Approved Conditional of Approval (COA).

MEETING DATE: June 5, 2024 at 6:00 PM

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1. INTRODUCTION

On February 1, 2023 the Planning Board approved a development application from Tom Watson & Co., for the redevelopment of 10, 20, 26, and 30 Upper Falls Way (formally known as Gooch Street). The parcels are mapped as Map: 40, Block: 55, 55-3, 56-1 and located in the Main Street Revitalization District – High Density / Mixed-Use (MSRD-3), and the Waterfront Renaissance (WR) Shoreland Overlay Zoning Districts. The project includes the construction of a 6-story building containing 56 residential units with a restaurant space on 10 Upper Falls Way, a 5-story, 20-unit residential building on 20 Upper Falls Way (original unit count 16 but a modification was approved post approval, to 20 units), 11 townhome units on 26 Upper Falls Way, and a partial demolition and redevelopment of the existing building located at 30 Upper Falls Way to accommodate a commercial use (potentially a brewery / taproom / restaurant). The project will include associated parking and landscaped areas.

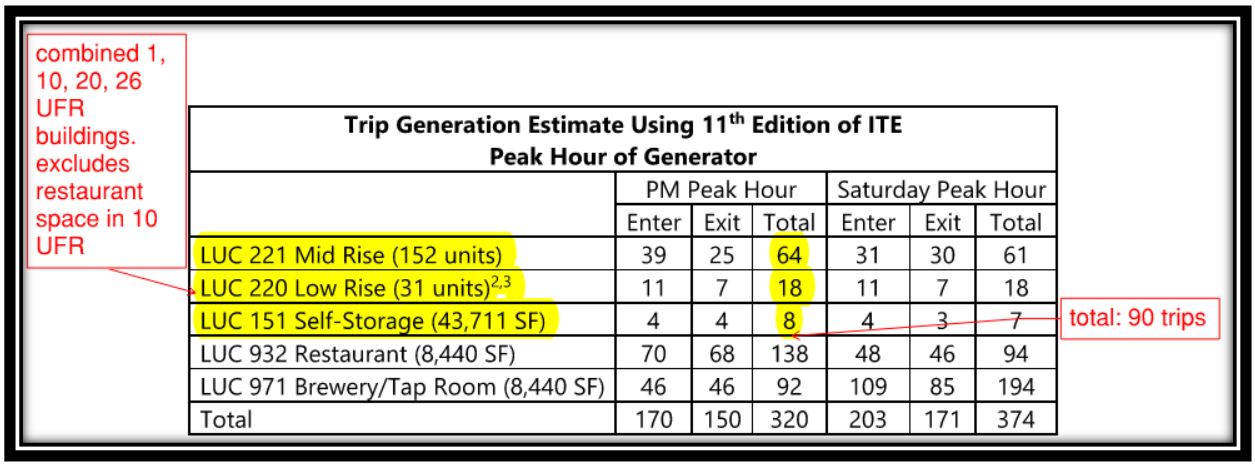
The approved project included Conditions of Approval (COA) which included the following:

1. **Prior to any ground disturbance/site work the following must be completed:**
   a. **The applicant must provide the City with a Maine DEP Permit.**
   b. **The applicant must provide a Maine DOT Traffic Movement Permit to the City.**

The Applicant is seeking an amendment to their approved Conditions of approval to be able to construct the approved buildings as approved AND get occupancy permits for the residential uses only, prior to the approval of the MDOT TMP. As outlined in the Applicant's correspondence with the City:

2022.11 Site Plan and Subdivision Amendment Review for Tom Watson & Co. at 10, 20, 26 and 30 Upper Falls Way (formerly Gooch Street) (Tax Map 40, Lots 55, 55-3, and 56-1) in the MSRD-3 zone and GD-1 Shoreland Overlay Zone / Amendment Request to the Approved Conditional of Approval (COA).
Planning Board Hearing date: June 5, 2024.

"We are following up on an item we wanted to discuss with you both specific to our existing NOD and COA associated with the project. The COA references in Amendment #2 that permits modification to this amendment if the TMP has not been issued by the Maine DOT. We have met with our traffic engineer and reviewed the current programing for the entire development and are looking at options on how to proceed with the MDOT TMP process. We would respectfully request that the City revise the conditions associated with the 10, 20, 26 UFR buildings to separate out conditions that tie issuance of a TMP to issuance of a Certificate of Occupancy (26 UFR is already excluded per current conditions), as the combined total trip generations for 1 UFR (including residential units and self-storage), 10 UFR (residential units only, not the commercial/restaurant space), 20 UFR, and 26 UFR would be less than the 100 peak hour trip threshold that would trigger the TMP requirement. See below for an excerpt from the TMP application for the trip generation breakdown of these buildings. Please let us know if you have any questions and once you have a chance to review, let us know what next steps look like from your perspective so we can initiate this revision".



Trip Generation Estimate Using 11th Edition of ITE
Peak Hour of Generator

	PM Peak Hour			Saturday Peak Hour		
	Enter	Exit	Total	Enter	Exit	Total
LUC 221 Mid Rise (152 units)	39	25	64	31	30	61
LUC 220 Low Rise (31 units)[2,3]	11	7	18	11	7	18
LUC 151 Self-Storage (43,711 SF)	4	4	8	4	3	7
LUC 932 Restaurant (8,440 SF)	70	68	138	48	46	94
LUC 971 Brewery/Tap Room (8,440 SF)	46	46	92	109	85	194
Total	170	150	320	203	171	374

Traffic Generation illustrating residential peak demand at full build-out.

As you can see but the traffic demand analysis above, the peak hour vehicle trips for all of the residential units approved for the project, are under the 100 peak hour trips which would require a Traffic Movement Permit (TMP) to be issued by the Maine Department of Transportation (MDOT). Construction of the proposed residential portions of the development are underway and the Applicant is seeking to amend the Conditions of Approval (COA) to allow the construction of the residential units and issue Occupancy Permits for the residential units prior to the issuance of the TMP. The commercial parts of the development, combined with the residential units would trigger the TMP issuance. The TMP has not been issued by MDOT for this project or the One Diamond Development project and Fathom Development (Lincoln / Pearl Streets) as MDOT has been reviewing the TMP's for all three projects at the same time. Due to the complexity of the combined projects, and the various "trigger points" for the three downtown project requiring the TMP issuance MDOT has not yet issued any of the TMP's as MDOT and the City continue to evaluate and determine the finantial contribution amounts for each of the developers. Due to the above, Staff has evaluated the applicants TMP numbers and agrees with the Applicant that at this juncture a TMP is not required for the Applicant to continue constructing the residential units and be issued Occupancy Permits for said units.

Therefore, Staff is supportive of the Applicant's request and recommends that the Planning Board modify COA # 1 B from:

1b. "Prior to the any ground disturbance / site work the following must be completed"… b. The Applicant must provide a Maine DOT Traffic Movement Permit to the City"

Being modified to:

1b. "Prior to the any ground disturbance / site work the following must be completed"… b. The Applicant must provide a Maine DOT Traffic Movement Permit to the City prior to the issuance of Occupancy Permits for the commercial portions of the development".



10 Upper Falls Way- 6-story building - 55 residential units with a restaurant space (Modifications Proposed)



20 Upper Falls Way - 5-story, 20-unit residential building
(No Modifications Proposed)



26 Upper Falls Way - 11 townhome units - Proposed Subdivision
(No Modifications Proposed)

2022.11 Site Plan and Subdivision Amendment Review for Tom Watson & Co. at 10, 20, 26 and 30 Upper Falls Way (formerly Gooch Street) (Tax Map 40, Lots 55, 55-3, and 56-1) in the MSRD-3 zone and GD-1 Shoreland Overlay Zone / Amendment Request to the Approved Conditional of Approval (COA).
Planning Board Hearing date: June 5, 2024.



30 Upper Falls Road- Partial demolition and redevelopment of existing building located at, to accommodate a commercial use (Photos: L to R: Historic, Existing & Proposed). (No Proposed Changes)

2. PROJECT DATA/INFORMATION

1.	Applicant:	Tom Watson & Co. 188 State Street Portland, ME 04101
2.	Owner of Property:	Same as Applicant
3.	Agent:	Peter Heil, P.E. Acorn Engineering 500 Washington Ave, Suite #202 Portland, ME 04103
4.	Surveyor:	Owen Haskell 390 US Route 1. Unit #10 Falmouth, ME 04105
5.	Project Location:	10, 20 & 30 Upper Falls Way
6.	Project Tax Map #/Lot #:	Tax Map 40, Lot 55, 55-3, 56-1
7.	Lot Size:	2.49 acres (All 3 properties)
8.	Base Zoning:	MSRD-3
9.	Overlay Zoning:	GD-1 Shoreland – Proposed Waterfront Renaissa
10.	Existing Use:	Parking Lots/Existing Commercial Buildings
11.	Proposed Use:	Mixed-use Residential and Commercial
12.	Approvals Required:	Site Plan Amendment. Subdivision Amendment
13.	Uses in the Vicinity:	City of Biddeford Downtown and Mill District, Mixe Use
14.	Waivers Needed:	a. Parking Waiver b. Openspace
18.	Waivers Granted:	a. Parking Waiver b. Openspace
22.	Other Non-City Permits Required:	Maine DEP Stormwater, Maine DOT Traffic Mover Permit (TMP)
23.	LDR Attachment A: Fees Paid:	Yes

25.	Planning Board Review History: Sketch Plan Review - February 2, 2022; Preliminary Review November 2, 2022; Final Plan Review January 18, 2023. Amendment June 7, 2023, Amendment # 2 5-17-2023.

3. REVIEW PROCESS

Per City ordinance, this application was subject to Subdivision review and approval (Code of Ordinances, Chapter 66). The project followed the normal Subdivision and Site Plan review process which culminated in the Planning Board granting final plan approval. The Planning Board is now considering an Amendment the approved Conditions of Approval (COA).

4. STAFF RECOMMENDATION:

Staff has reviewed the request with the City's Peer Traffic Review Consultant, MDOT and the Applicants Traffic Review Engineer and Staff is comfortable granting the Applicant's request as it will keep the developer's project progressing while not impacting the issuance of the TMP by MDOT with the COA amendment as proposed.

STAFF RECOMMENDED CONDITIONS OF APPROVAL:

A. All previously adopted Conditions of Approval (COA) for the 10, 20, 26 & 30 Upper Falls Road project, Case # 2022.11, are hereby reaffirmed and remain in effect unless specifically granted by the Planning Board with this approval.

B. *COA # 1b. is hereby modified* from "Prior to the any ground disturbance / site work the Applicant must provide a Maine DOT Traffic Movement Permit to the City" *being modified to* The Applicant must provide a Maine DOT Traffic Movement Permit to the City prior to the issuance of Occupancy Permits for the commercial portions of the development".

5. SAMPLE MOTIONS:

A. Motion to Approve:

I motion to APPROVE the proposed amendment to the projects Conditions of Approval Item 1b to read " The Applicant must provide a Maine DOT Traffic Movement Permit to the City prior to the issuance of Occupancy Permits for the commercial portions of the development"*, and the inclusion the Staff recommended Conditions of Approval (COA) listed above.*

B. Motion to Deny I motion to DENY the proposed amendment to the projects Conditions of Approval Item 1b to read " The Applicant must provide a Maine DOT Traffic Movement Permit to the City prior to the issuance of Occupancy Permits for the commercial portions of the development"*, and the inclusion of the Staff recommended Conditions of Approval (COA) listed above, for the following reasons:*

1) _____.
2) _____.
3) _____.

2022.11 Site Plan and Subdivision Amendment Review for Tom Watson & Co. at 10, 20, 26 and 30 Upper Falls Way (formerly Gooch Street) (Tax Map 40, Lots 55, 55-3, and 56-1) in the MSRD-3 zone and GD-1 Shoreland Overlay Zone / Amendment Request to the Approved Conditional of Approval (COA).
Planning Board Hearing date: June 5, 2024.

A. *Motion to Table: I motion to TABLE the proposed amendment to the projects Conditions of Approval Item 1b to read "* The Applicant must provide a Maine DOT Traffic Movement Permit to the City prior to the issuance of Occupancy Permits for the commercial portions of the development"*, and the inclusion of the Staff recommended Conditions of Approval (COA) listed above, for the following reasons:*

1) _____.
2) _____.
3) _____.

CITY OF BIDDEFORD

Planning and Development Department

David C.M. Galbraith
Deputy Director/City Planner
205 Main Street
P.O. Box 586
Biddeford, ME 04005
(207) 284-9115
David.Galbraith@biddefordmaine.org

PLANNING BOARD STAFF REPORT

TO: Chair Patoine and Members of the Biddeford Planning Board

FROM: David C.M. Galbraith, Deputy Director/City Planner

DATE: May 28, 2024

RE: 2024.27 Sketch Plan - Subdivision Review for Josh Cushman / Proposed Construction of a 64-unit residential structure on 6 & 32-40 Main Street (Tax Map 71, Lots 10-1 & 10-4), within the Buildings 19 & 20, Pepperell Mill located in the MSRD-3 Zone.

MEETING DATE: June 5, 2024 at 6:00 PM

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1. INTRODUCTION

Gorrill Palmer is representing Josh Cushman who is applying for Sketch Plan Review for the redevelopment of, the currently vacant 3-4 story structure, Buildings 19 & 20 within the Pepperell Mill Campus into 64-unit residential structures. The project site includes Buildings 19 and 20 of the Pepperrell Mill, at 6 Main Street and 32-40 Main Street, which are identified as Parcel IDs 71-10-1, 71-10-4, and 71-10-7 on the City of Biddeford's Assessor's Map. Buildings 19 and 20 are part of the Pepperell Mill campus located in the Main Street Revitalization District 3 (MSRD3). Both buildings have three levels (including the basement) with a combined gross floor area of 87,700 square feet. The applicant is proposing to convert the building into 64 residential dwelling units across the three stories. The application includes preliminary floor plans for the proposed residential units.



Buildings 19 & 20, Pepperell Mill – Proposed 64 Unit Buildings

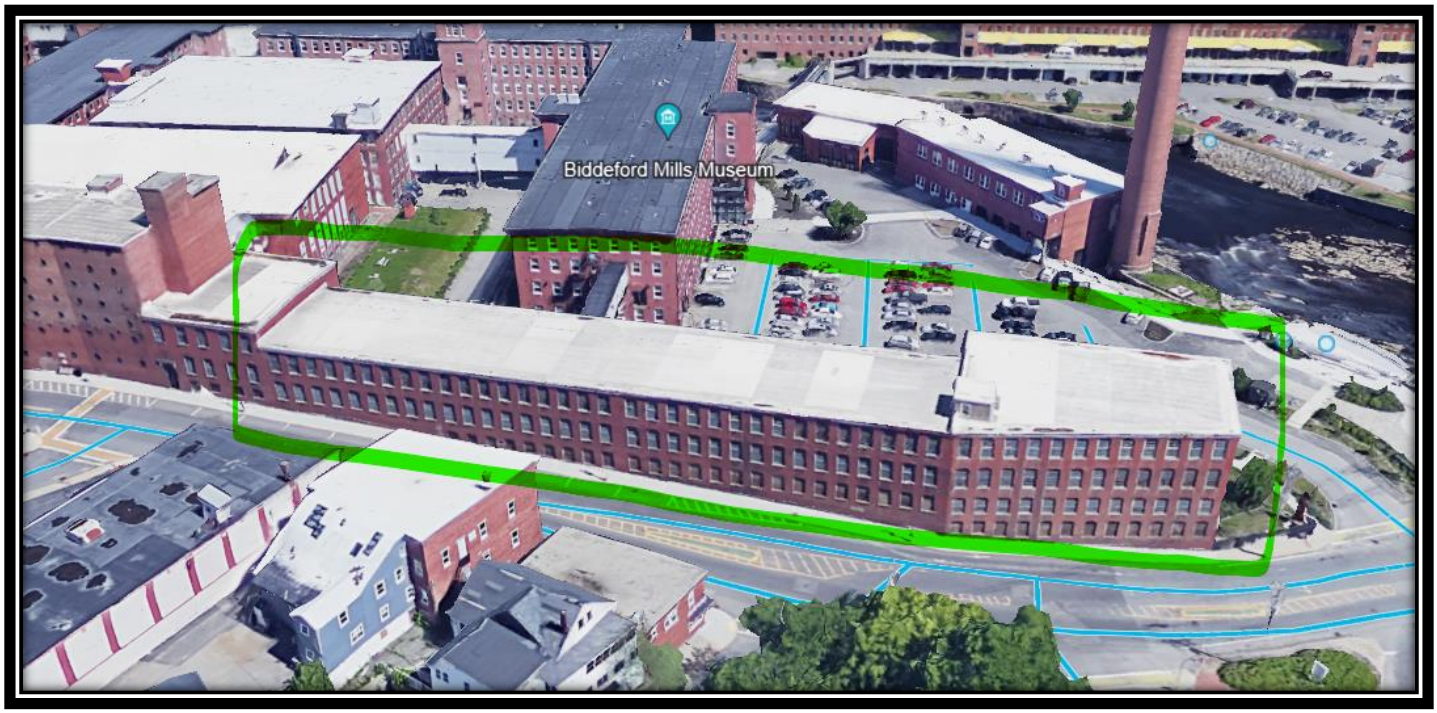
Case 2024.27: Sketch Plan Review and Subdivision Review for Josh Cushman / Proposed Construction of a 64-unit residential structures on 6 & 32-40 Main Street (Tax Map 71, Lots 10-1 & 10-4).

Planning Board Hearing date: June 6, 2024.

The existing structures are two empty buildings that are former mills. The sketch plan application includes a narrative which includes the following proposal overview:

> *The project site includes Buildings 19 and 20 of the Pepperrell Mill, identified as Parcel IDs 71-10-1, 71-10-4, and 71-10-7 on the City of Biddeford's Assessor's Map. Buildings 19 and 20 are part of the Pepperell Mill campus located in the Main Street Revitalization District 3 (MSRD3). Both buildings have three levels (including the basement) with a combined gross floor area of 87,700 square feet. The applicant is proposing to convert the building into 64 residential dwelling units across the three stories. An overall existing conditions plan with the site location highlighted has been provided with this letter.*
>
> *Overall, this project aims to provide housing to a much-needed housing stock throughout the Pepperell Mill Campus in order to support the vibrant community of people and businesses and further increase activity within the City's flourishing downtown. This project proposes to convert Buildings 19 and 20 into 64 residential apartments that will consist of the following mix:*
> *(15) Studios*
> *(19) 1 Bedroom/1 Bathroom*
> *(1) 1 Bedroom/2 Bathrooms*
> *(23) 2 Bedrooms/1 Bathroom*
> *(6) 2 Bedrooms/2 Bathrooms*

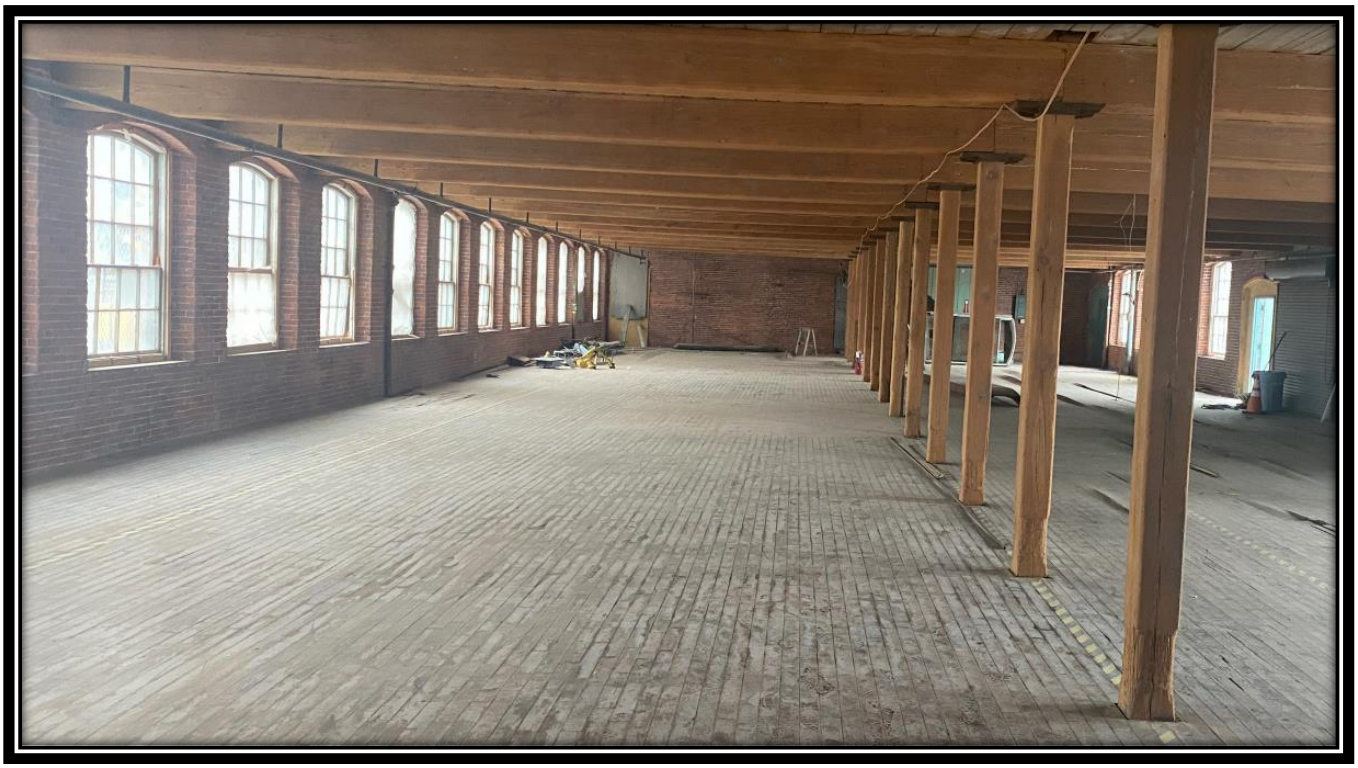
The property has existing parking and is currently serviced by a City Road and therefore minimal site work is anticipated.



Buildings 19 & 20, Pepperell Mill (highlighted in green) – Proposed 64 Unit Buildings

Case 2024.27: Sketch Plan Review and Subdivision Review for Josh Cushman / Proposed Construction of a 64-unit residential structures on 6 & 32-40 Main Street (Tax Map 71, Lots 10-1 & 10-4).

Planning Board Hearing date: June 6, 2024.



Building 19 – First Floor Interior Image

2. PROJECT DATA/INFORMATION

1.	Applicant:	Josh Cushman 16 Casco Street Portland, ME 04101
2.	Owner of Property:	Pepperell Mills Development LLC 3100 McKinnon St Ste. 250 Dallas, TX 75201
3.	Agent:	Marieke Thormann 80 Exchange Street, Suite 400 Portland, ME 04101
4.	Surveyor:	Matt Rabasco 300 Southborough Drive, Suite 200 South Portland, ME 04106
5.	Project Location:	6 & 32-40 Main Street
6.	Project Tax Map #/Lot #:	Tax Map 71, Lots 10-1 & 10-4
7.	Lot Size:	
8.	Base Zoning:	MSRD-3
9.	Overlay Zoning:	N/A
10.	Existing Use:	2 Vacant former Mill Buildings
11.	Proposed Use:	2 3-story residential structures 64-units
12.	Approvals Required:	Site Plan and Subdivision Review
13.	Uses in the Vicinity:	Residential

14.	Waivers Needed:	Part II-Article XI-Section 5.B.1 Drainage
18.	Waivers Granted:	
22.	Other Non-City Permits Required:	N/A
23.	LDR Attachment A: Fees Paid:	Yes
25.	Planning Board Review History: N/A	

3. REVIEW PROCESS

Per City ordinance, this application is subject to Site Plan (Land Development Regulations, Article XI) review and Subdivision Review (Chapter 66 – Subdivisions) approval by the Planning Board.

4. Departmental Review Comments:

A. Planning:

1. Building Elevations: The Preliminary Plan submittal shall include building elevations identifying all proposed exterior building modifications which will also need review and approval from the Historic Preservation Commission (HPC). These modifications shall specifically include proposed window and doorway modifications.

2. All refuse and recycling dumpsters shall be fully screened with a dumpster enclosure/s and the locations of said enclosures shall be shown on the redevelopment plans.

3. The Preliminary Plan Application shall include a detailed overview / narrative of all property improvements being proposed.

4. The rear / interior side of 6the property includes three loading docks. As this building is being converted to residential from a prior industrial use what is planned for the three existing loading docks?



5. Being a residential development, where is the main entrance going to be located and will this include any exterior building modifications?

6. Designated "temporary parking" / parking easement stalls shall be clearly identified on submitted site plans.

7. Discussions with the applicant to date, have included the Applicant's plan to provide required parking within the City's Pearl Street parking garage with a shuttle / valet service being provided to future residents. The Preliminary Application shall include a detailed overview of the proposed shuttle / valet service in addition to designated guest / visitor parking.

8. Prior to Final Planning Board review, the Applicant shall include a signed perpetual parking agreement with Premium Parking for all of the required parking for the development.

B. Code Enforcement:

1. No comments / concerns at this time.

C. Engineering / Public Works:

1. The Applicant shall provide interior storm and sanitary plumbing plans, confirming both gravity systems are separated and have separated downstream connections within the City's infrastructure. If the interior storm and sanitary piping are not separated or do not outfall into separated systems, the Applicant shall provide formal separation plans, including disconnection of roof drains / downspouts. The submitted plans shall be reviewed and approved by the City's Director of Engineering prior to the issuance of any building or plumbing permits.

2. All vehicle maneuvering must occur on-site and may not utilize Main Street for backing into / out of the property.

3. Delivery vehicles may not block the Main Street curb-cut or prevent other vehicles from entering / exiting the adjacent multi-tenant parking lot.

D. Police:

1. No comments / concerns at this time.

E. Fire:

1. No comments / concerns at this time.

F. Traffic Peer Review:

1. Not Applicable.

G. Engineering Peer Review:

1. No comments at this time.

2. STAFF REVIEW

Case 2024.27: Sketch Plan Review and Subdivision Review for Josh Cushman / Proposed Construction of a 64-unit residential structures on 6 & 32-40 Main Street (Tax Map 71, Lots 10-1 & 10-4).

Planning Board Hearing date: June 6, 2024.

- **APPLICATION COMPLETENESS:** This Application is for a "Sketch Plan" review and in addition to Planning Board review and approval of the project, it also requires approval from:

  A. Saco Rive Corridor Commission
  B. Historic Preservation Committee

- **ZONING:**

  The subject property is located within the City's MSRD-3 zoning district where multi-family dwellings are a permitted use. The proposed sixty four (64) unit buildings are situated in an existing multi-family development which is consistent with the surrounding duplexes within the Buildings 19 & 20, Pepperell Mill.

- **REVIEW STANDARDS:**

  In general, staff found the application to satisfy City subdivision and site plan requirements. The major site details being proposed, such as building, parking, landscaped areas, gang mailbox and playground location have been determined by the Applicant so the plan being reviewed the Board are what is proposed to be constructed on the property.

- **WAIVERS:**

  Part II Article X1-Section 5.B.1 Drainage

3. <u>SAMPLE MOTIONS:</u>

The Application before the Board is a "Sketch Plan" so no formal vote is required. However, the Board should provide the Applicant direction regarding any items that should be included in the formal Preliminary Application.

DocuSign Envelope ID: FD56DD65-F531-4438-A502-770DF9C008C9

Revised: May 17, 2022

City of Biddeford – Planning Department
Planning Board Application
P.O. Box 586, 205 Main Street Biddeford, Maine 04005
207-284-9115

Type of Application:

✓ Shoreland Zoning Permit ✓ Site Plan Review __ Extraction
__ Conditional Use Permit __ Subdivision __ Private Way
__ Other: _____

Applicant Information:

Name: Josh Cushman
Mailing Address: 16 Casco Street, Portland ME 04101
Telephone: (207) 744-3084
Email: Jcushman@corefirms.com

What is your legal interest in the property?

Co-Owner ✓ Owner __ Potential Buyer with Contract __ Lease/Rental Agreement

Owner's Information:

Name: Stephen Goodrich
Mailing Address: 72 Commercial Street, Box 2, Portland, ME 04101
Telephone: _____
Email: steve@steveg.biz

Agent's Information:

Name: Marieke Thormann
Mailing Address: 80 Exchange Street, Suite 400, Portland ME 04101
Telephone: (207) 317-2818
Email: mthormann@fathomcompanies.com

Engineer/Surveyor's Information:

Name: Matt Rabasco
Mailing Address: 300 Southborough Drive, Suite 200, South Portland, ME 04106
Telephone: (207) 772-3515
Email: mrabasco@gorrillpalmer.com

Project Location and Lot Information:

Street Address: Building 19 & 20, 2 Main Street, Biddeford Drainage Watershed: Saco River
Tax Map: 71 Lot: 10-7, 10-4, 10-1
Current Zoning: MSRD3 Shoreland Zoning: GD-1
Size of Lot: 23,512 ( )acres (✓)s.f. Lot Frontage: Approx. 422 ft
Existing Use of Property: Abandoned Mill Building

Property currently serviced by:

✓ City Road __ Public Sewer __ Public Water __ Public Trash
__ Private Road __ Septic System __ Private Well __ Private Hauler

Slope Conditions in Area of Construction (if applicable):

✓ Flat (0-3% slope) __Rolling (3-8% slope) __Hilly (8-15% slope) __Steep (15%+ Slope)

Are there any wetlands or waterbodies on the site? __ (Yes) ✓ (No) if yes attach information
Is the project within the 100-year floodplain? __ (Yes) ✓ (No) if yes attach information
Do you plan to bring fill onto the lot? __(Yes) ✓ (No) If yes attach information

DocuSign Envelope ID: FD56DD65-F531-4438-A502-770DF9C008C9

Description of proposed use of property:

Project/Proposed Use:

Residential units

Property to be Serviced by:

✓ City Road ✓ Public Sewer ✓ Public Water __ Public Trash
__ Private Road __ Septic System __ Private Well __ Private Hauler

Limits of Disturbance: 0 SF ( )acres ( )s.f.
Net change in impervious cover: 0 SF ( )acres ( )s.f.
Is this project part of a larger project? __(Yes) ✓(No)
Is the project proposing a new Private or Public Road? __(Yes, Private) __(Yes, Public) ✓(No)
Is this project within the Urbanized Area/MS4 (*see City Drainage Map*) ✓(Yes) __(No)
Is the project proposing any Stormwater facilities/BMPs? __(Yes) ✓(No)
Will a Traffic Movement Permit (TMP) be required?: __(Yes) ✓(No)

✓ **If in a Shoreland Zone:**
Percent of residential lot coverage (Max 20%): N/A - Existing Building
Percent of structure expansion (Max 30%): 0%
__ **If Subdivision Review, number of lots proposed:** N/A - Condominium
__ **If a Private Way is proposed, number of lots served:** N/A

If Site Plan Review, you must provide the following information:

Total new square feet footprint of structure: 0 SF
Total new square feet paving/parking: 0 SF

Waiver Requests (attach details):

1. Part III - Article XI - Section 5.B.1 Drainage
2.
3.
4.
5.

Required Submittal Attachments:

A. Letters of Approval
   - ✓ Fire Department – Contact Chief or Deputy Chief – 282-9986
   - ✓ Ability to Serve for Water Service – Maine Water – 282-1543
   - ✓ Ability to Serve for Sewer Service – Engineering Department – Tom Milligan 284-9118
   - ✓ Police Department – e-911 Road Name Designation – Contact Joanne Fisk 282-5127

B. Letter to Planning Board describing project, Waiver requests, proposed improvements, addressing permit requirements, etc.
C. Photographs of Site.
D. Architectural renderings/drawings of proposed buildings, as required.
E. Engineering Plans, as required.
F. Stormwater Management Report, as required.

Fees (Due at time of Submission):

- $75 Nonrefundable Administration Fee is required for every application.
- Refer to "Attachment A Fees and Charges" of the Land Development Regulations for more information. Consult with Planning Staff if you have questions.

DocuSign Envelope ID: FD56DD65-F531-4438-A502-770DF9C008C9

Required Signatures:

By signing this application, as the foresaid applicant or authorized agent:

- I certify that I have read and completely understand the application;
- I certify that the information contained in this application and its attachments are true and correct;
- I understand that all information provided on this form and all other documents submitted as part of my proposal is a matter of public record;
- I understand that copies of this information may be supplied upon request to an interested party.
- I understand that additional funds may be required through the course of the review for special studies, legal review costs, and/or engineering review.
- I understand that by submitting an application I am not guaranteed a place on any particular agenda. I further understand that the City Planner will place me on an agenda for review when the application is deemed substantially complete.

Will the proposed project cause 1 acre or more of site disturbance?: __(Yes) ✓(No)

- **If Yes, applicant is responsible for any required Maine Construction General Permits and shall comply with the requirements of DEP Chapter 500 Stormwater Regulations, as they apply.**

Signature of Applicant: DocuSigned by: 25FA091F5013400... **Date** 4/26/2024

Signature of Property Owner: **Date** 5/1/24

DIGITAL SUBMITTAL REQUIREMENTS FOR ALL SUBMITTALS:

A) PDF OF SIGNED APPLICATION

B) PDFs OF ALL DRAWING SETS AND OTHER REQUIRED SUBMITTAL ATTACHMENTS NOTED ABOVE

HARD-COPY SUBMITTAL REQUIREMENTS FOR PLANNING BOARD APPLICATIONS:

A) SEVEN (7) FULL-SIZE PAPER COPIES OF DRAWING SETS

DIGITAL SUBMITTAL REQUIREMENTS FOR FINAL APPROVAL:

A) INDIVIDUALLY NAMED PDFs OF EACH DRAWING (NOT A COMBINED PDF SET)

- Individual Drawing PDF Naming Format: 'PROJECT/SHEETSET NAME_INDIVDUAL DRAWING NAME.pdf'

B) PDF COPIES OF ALL PERMIT APPROVALS, APPLICATIONS, REPORTS, NARRATIVES, LETTERS, ETC.

C) FINAL CAD REFERENCE FILES IN DWG FORMAT (SURVEY & PROPOSED DESIGN LINEWORK)

- All drawings & CAD reference files must be to-scale and within the following coordinate systems:

- MAINE STATE PLANE WEST NAD83 (Horizontal Datum) & NAVD88 (Vertical Datum)

HARD-COPY SUBMITTAL REQUIREMENTS FOR FINAL APPROVAL:

A) THREE (3) FULL-SIZE PAPER COPIES OF INDIVIUDAL DRAWINGS REQUIRING BOARD SIGNATURE

B) ONE (1) FULL-SIZE PAPER COPY OF ENTIRE DRAWING SET FOR ENGINEERING RECORDS

PLEASE CONFIRM WITH PLANNING STAFF FOR CLARIFICATION

Required Submittal Attachment

Letters of Approval

GORRILL PALMER

300 Southborough Drive, Suite 200
South Portland, ME 04106
207.772.2515

April 11, 2024

Craig Chekan
City of Biddeford – Engineering Department
205 Main Street
Biddeford, Maine 04005

Subject: Proposed Residential Facility
Pepperell Mill - Buildings 19 & 20
6 & 32-40 Main Street, Biddeford, ME, 04005
Ability to Serve Request

Dear Mr. Chekan,

On behalf of **Maine Realty Advisors,** we would like to verify the City of Biddeford's ability to provide wastewater treatment capacity for a proposed residential facility located in Buildings 19 and 20 of the Pepperell Mill at 6 Main Street and 32-40 Main Street in Biddeford, ME.

The project site includes Buildings 19 and 20 of the Pepperrell Mill, identified as Parcel IDs 71-10-1, 71-10-4, and 71-10-7 on the City of Biddeford's Assessor's Map. Buildings 19 and 20 are part of the Pepperell Mill campus located in the Main Street Revitalization District 3 (MSRD3). Both buildings have three levels (including the basement) with a combined gross floor area of 87,700 square feet. The applicant is proposing to convert the building into 64 residential dwelling units across the three stories. An overall existing conditions plan with the site location highlighted has been provided with this letter.

EXISTING AND PROPOSED SERVICE

The presence or location of sanitary sewer service to Building 19 or 20 is currently unknown. Based on plans and other information provided to us by the City Engineering Department, there is an existing 72" RCP sewer main originating at the intersection of Main Street and Alfred Street that continues down to Water Street. A smaller branch of the main appears to serve a portion of the Pepperell Mill complex. There is an existing manhole on the eastern side of Building 20 next to the site driveway. We understand that Main St is currently under moratorium, and therefore would propose a connection to the specified manhole or its tributary pipes to avoid disturbance within the public R.O.W. Please refer to the Existing Conditions Plan and the Main St as-built plan attached to this letter for reference.

ANTICIPATED FLOWS

The anticipated water usage of the storage facility is 9,420 GPD, which is based on the 2023 Maine Subsurface Wastewater Disposal Rules. For multifamily residential, Section 5.E.2. of MSWDR specifies 120 GPD per dwelling unit for one-bedroom units and 90 GPD per bedroom for multiple bedrooms units. Of the 64 units, 15 are proposed as studio apartments. As MSWDR does not differentiate between studio and one-bedroom units, they are both assumed to generate 120 GPD. Based on the publication, *Water Supply and Pollution Control, Third Edition,* by Clark, Viessman and Hammer, Chapter 4, Section 5; the peak daily use can be

considered to be about 180% of the average daily use. Based on this information, the estimated project water usage is as follows:

Flow Type	Design Flow (GPD)	Peak Daily Design Flow (GPD)
Building 19		
Studio & 1-Bedroom Unit (19 units @ 120 gpd)	2,280	4,104
2-Bedroom Unit (23 units @ 180 gpd)	4,140	7,452
Subtotal	6,420	11,556
Building 20		
Studio & 1-Bedroom Unit (16 units @ 120 gpd)	1,920	3,456
2-Bedroom Unit (6 units @ 180 gpd)	1,080	1,944
Subtotal	3,000	5,400
TOTAL	**9,420**	**16,956**

CLOSURE

As required by the City of Biddeford Site Plan Review process, we are writing to request a letter indicating the City of Biddeford's ability to serve this project.

Specifically, our office is interested in a letter from you indicating the following:

- Confirmation of the City of Biddeford's facilities to serve the project.
- Any other factors which may affect the sewer service to this site.
- Any connection service or impact fees.

We are in the process of submitting a Site Plan Application to the City of Biddeford and would appreciate your confirmation of site conditions in a timely manner. If you have any questions on the information submitted, please contact our office.

GORRILL PALMER



Matt Rabasco, PE
Project Engineer
Phone: (207) 772-2515x296
mrabasco@gorrillpalmer.com

Attachments:

Existing Conditions Plan
Main Street As-Built Utility Plan

GORRILL PALMER

300 Southborough Drive, Suite 200
South Portland, ME 04106
207.772.2515

April 11, 2024

Marcus Knipp
Maine Water Company
93 Industrial Park Rd
Saco, Maine 04072

Subject: Proposed Residential Facility
Pepperell Mill – Buildings 19 & 20
6 & 32-40 Main Street, Biddeford, ME, 04005
Ability to Serve Request

Dear Marcus,

On behalf of **Maine Realty Advisors** we would like to verify Maine Water Company's ability to provide water service for a proposed residential facility located in Buildings 19 and 20 of the Pepperell Mill at 6 Main Street and 32-40 Main Street in Biddeford, ME.

The project site includes Buildings 19 and 20 of the Pepperrell Mill, identified as Parcel IDs 71-10-1, 71-10-4, and 71-10-7 on the City of Biddeford's Assessor's Map. Buildings 19 and 20 are part of the Pepperell Mill campus located in the Main Street Revitalization District 3 (MSRD3). Both buildings have three levels (including the basement) with a combined gross floor area of 87,700 square feet. The applicant is proposing to convert the building into 64 residential dwelling units across the three stories. An overall existing conditions plan with the site location highlighted has been provided with this letter.

EXISTING AND PROPOSED SERVICE

Based on archive as-built utility plans for Main Street, there appears to be a water service to Building 19 from the existing 12" main in Main St. The size of this service is currently unknown. If possible, the development would seek to utilize this service for domestic and/or fire suppression for both Building 19 and 20. A proposed fixture count has been provided with this letter. As part of this Ability to Serve, the applicant is also seeking information on any service upgrades that would be necessary to serve this project. The as-built plan has been attached to this letter for reference.

ANTICIPATED FLOWS

The anticipated water usage of the storage facility is 9,420 GPD, which is based on the 2023 Maine Subsurface Wastewater Disposal Rules. For multifamily residential, Section 5.E.2. of MSWDR specifies 120 GPD per dwelling unit for one-bedroom units and 90 GPD per bedroom for multiple bedrooms units. Of the 64 units, 15 are proposed as studio apartments. As MSWDR does not differentiate between studio and one-bedroom units, they are both assumed to generate 120 GPD. Based on the publication, *Water Supply and Pollution Control, Third Edition,* by Clark, Viessman and Hammer, Chapter 4, Section 5; the peak daily use can be considered to be about 180% of the average daily use. Based on this information, the estimated project water usage is as follows:

Flow Type	Design Flow (GPD)	Peak Daily Design Flow (GPD)
Building 19		
Studio & 1-Bedroom Unit (19 units @ 120 gpd)	2,280	4,104
2-Bedroom Unit (23 units @ 180 gpd)	4,140	7,452
Subtotal	*6,420*	*11,556*
Building 20		
Studio & 1-Bedroom Unit (16 units @ 120 gpd)	1,920	3,456
2-Bedroom Unit (6 units @ 180 gpd)	1,080	1,944
Subtotal	*3,000*	*5,400*
TOTAL	**9,420**	**16,956**

CLOSURE

As required by the City of Biddeford, we are writing to request a letter indicating the ability of the Maine Water Company's ability to serve this project. An overall existing conditions plan and a Main St as-built utility plan is attached for your reference.

Specifically, our office is interested in a letter from you indicating the following:

- The ability of Maine Water Company's facilities to serve the project.
- Any system maps available for the area.
- Any other factors which may affect the water service to this site.
- Any connection service or impact fees.

We are in the process of submitting a Site Plan Application to the City of Biddeford and would appreciate your confirmation of site conditions in a timely manner. If you have any questions on the information submitted, please contact our office.

Regards,

GORRILL PALMER

Matt Rabasco, PE
Project Engineer
Phone: (207) 772-2515x296
mrabasco@gorrillpalmer.com

Attachments:

Overall Existing Conditions Plan
Main Street As-Built Utility Plan
Fixture Count

U:\3842.52_Pepperell Mill_Buildings 19 & 20\H Utilities\Ability to Serve\abs_water_04-02-2024.docx

Subject: FW: notice to serve Fire Dept
Date: Thursday, March 28, 2024 at 12:09:47 PM Eastern Daylight Time
From: Marieke Thormann
To: Robyn Smith-Payne
Attachments: image001.png, image002.jpg, image001.png

FYI for site plan application for Pep Mill

Marieke Thormann, PE | *VP of Development*

Fathom Companies
C | 207-317-2818
O | 207-808-8787
mthormann@fathomcompanies.com
80 Exchange Street | Suite 400
Portland, ME 04101

On 3/28/24, 8:50 AM, "Josh Cushman" <jcushman@mainerealtyadvisors.com> wrote:

---------- Forwarded message ---------
From: **Dexter, Edward** <Edward.Dexter@biddefordmaine.org>
Date: Tue, Mar 5, 2024 at 10:30 AM
Subject: notice to serve
To: jcushman@mainerealtyadvisors.com <jcushman@mainerealtyadvisors.com>

Good Morning Mr. Cushman:

This email is to indicate that the Biddeford Fire Department can serve your property in the city. If you have any questions or need further information please feel free to reach out.

Sincerely,
Ed Dexter

Edward B. Dexter
Assistant Chief

Biddeford Fire Department
152 Alfred St.
Biddeford, ME. 04005

(207) 571-1686 Office
(207) 571-1687 Fax



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CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize

CITY OF BIDDEFORD
REGIONAL COMMUNICATIONS CENTER
Division of Biddeford Police Department

39 Alfred Street, Biddeford, ME 04005

March 07, 2024

Joshua Cushman
Maine Realty Advisors

Dear **Mr. Cushman**,

The address shown below is the physical E-911 emergency response address for your residence.

Property Address: Pepperell Mill Bldg. #19 **14 Main St. Biddeford, ME 04005**

Identifying Your Property / Building

For Police, Fire, and Medical purposes, it is very important that you place your street number on your house or building in a location visible from the street or driveway. The height of each number in your address should be a minimum of **4 inches.** The color of the numbers should contrast with the color of building. We strongly recommend the numbers be made of reflective materials to enhance nighttime viewing.

In addition, if your house or building is located further than 75 feet back from the road or otherwise not visible from the road, your street number(s) is required to be placed at the beginning of your driveway/private way. Acceptable methods for display include the use of your mailbox, placement of a plaque on a post, etc.

If you have any questions or concerns, I may be reached at (207) 282-5127 or dylan.martin@biddefordmaine.org. Thank you in advance for your cooperation.

Regards,

Dylan D. Martin
RCC Supervisor / E-911 Addressing Officer
Biddeford Regional Communications Center
Division of; Biddeford Police Department

CITY OF BIDDEFORD
REGIONAL COMMUNICATIONS CENTER
Division of Biddeford Police Department

39 Alfred Street, Biddeford, ME 04005

March 07, 2024

Joshua Cushman
Maine Realty Advisors

Dear **Mr. Cushman**,

The address shown below is the physical E-911 emergency response address for your residence.

Property Address: Pepperell Mill Bldg. #20 **6 Main St. Biddeford, ME 04005**

Identifying Your Property / Building

For Police, Fire, and Medical purposes, it is very important that you place your street number on your house or building in a location visible from the street or driveway. The height of each number in your address should be a minimum of **4 inches.** The color of the numbers should contrast with the color of building. We strongly recommend the numbers be made of reflective materials to enhance nighttime viewing.

In addition, if your house or building is located further than 75 feet back from the road or otherwise not visible from the road, your street number(s) is required to be placed at the beginning of your driveway/private way. Acceptable methods for display include the use of your mailbox, placement of a plaque on a post, etc.

If you have any questions or concerns, I may be reached at (207) 282-5127 or dylan.martin@biddefordmaine.org. Thank you in advance for your cooperation.

Regards,

Dylan D. Martin
RCC Supervisor / E-911 Addressing Officer
Biddeford Regional Communications Center
Division of; Biddeford Police Department

Required Submittal Attachment

Letter to Planning Board

Planning Board & Planning Department

May 3, 2024

City of Biddeford, Maine

205 Main Street

Biddeford, ME 04005

Subject: Site Plan Application Buildings 19 and 20 of the Pepperell Mill, Biddeford, Maine

Project Description:

The project site includes Buildings 19 and 20 of the Pepperrell Mill, at 6 Main Street and 32-40 Main Street in Biddeford, ME. Identified as Parcel IDs 71-10-1, 71-10-4, and 71-10-7 on the City of Biddeford's Assessor's Map. Buildings 19 and 20 are part of the Pepperell Mill campus located in the Main Street Revitalization District 3 (MSRD3). Both buildings have three levels (including the basement) with a combined gross floor area of 87,700 square feet. The applicant is proposing to convert the building into 64 residential dwelling units across the three stories.

Waiver Requests:

The applicant is requesting a waiver for the Engineering report on Stormwater, as no impervious area is being proposed. Part III - Article XI - Section 5.B.1. Drainage.

Proposed Improvements:

Overall, this project aims to provide housing to a much-needed housing stock throughout the Pepperell Mill Campus in order to support the vibrant community of people and businesses and further increase activity within the City's flourishing downtown. This project proposes to convert Buildings 19 and 20 into 64 residential apartments that will consist of the following mix:

(15) Studios

(19) 1 Bedroom/1 Bathroom

(1) 1 Bedroom/2 Bathrooms

(23) 2 Bedrooms/1 Bathroom

(6) 2 Bedrooms/2 Bathrooms

The property has existing parking and is currently serviced by a City Road and therefore minimal sitework is anticipated.

Required Submittal Attachment

Photographs of Site





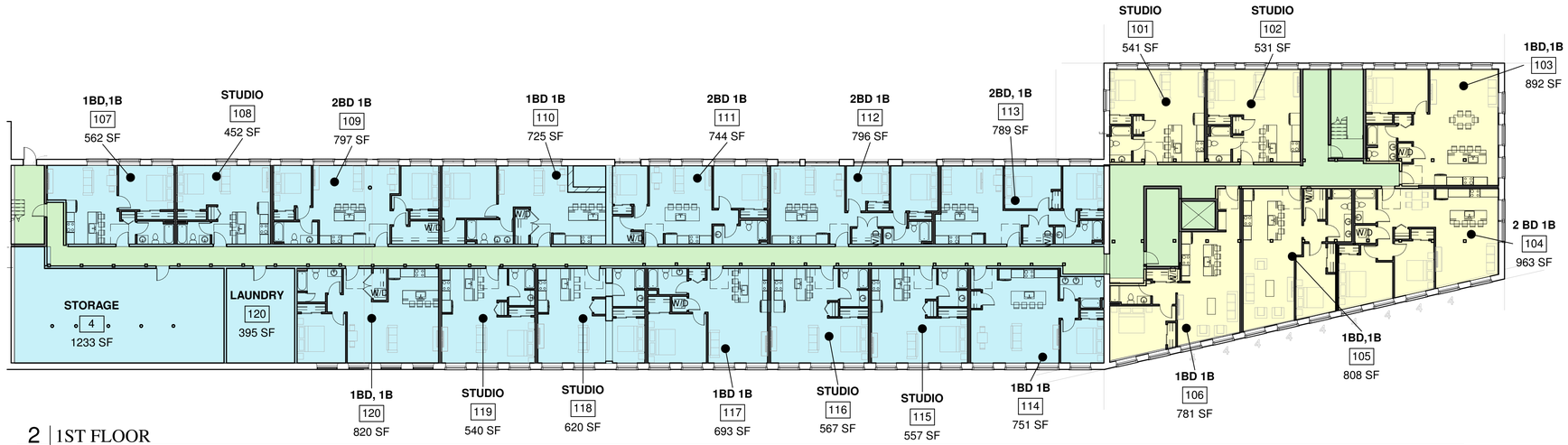




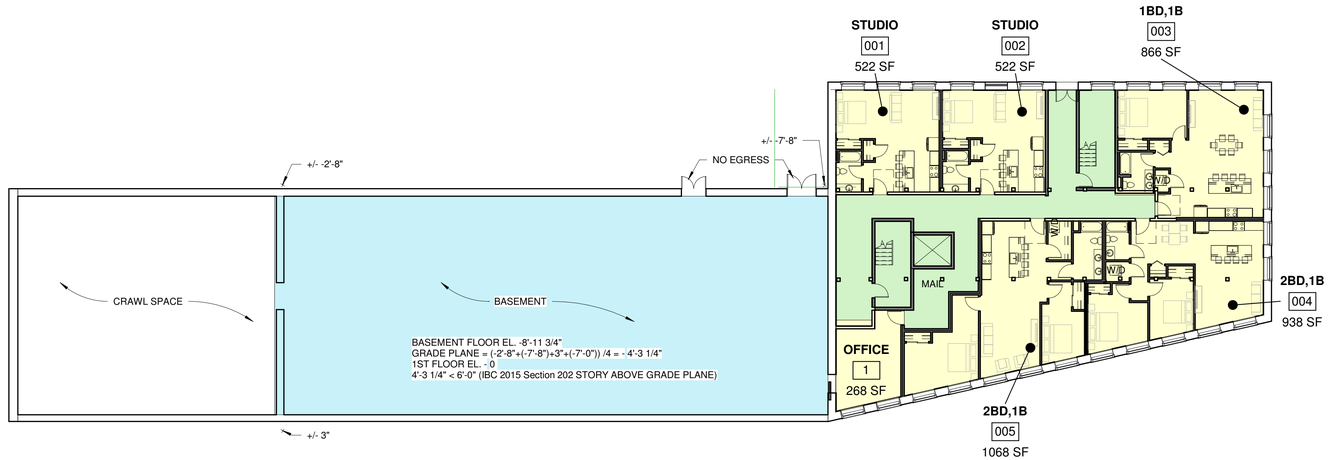


Required Submittal Attachment

Architectural Drawings



2 | 1ST FLOOR
1/16" = 1'-0"



1 | 1ST FLOOR BLDG 20
1/16" = 1'-0"

OPTION 1 (AS DRAWN)	STUDIO	1B,1B	1B,2B	2B,1B	2B,2B	TOTAL
- BUILDING 19	7	12	-	17	6	42
- BUILDING 20	8	7	1	6	-	22
						64

- COMMON

Prepared For:

Consultant:

Architect:
ARCHETYPE ARCHITECTS
48 Union Wharf Portland, Maine 04101
(207) 772-6022 Fax (207) 772-4056

Project:
PEPPERELL MILL, 19, 20
5 MAIN STREET
BIDDEFORD, ME 04005

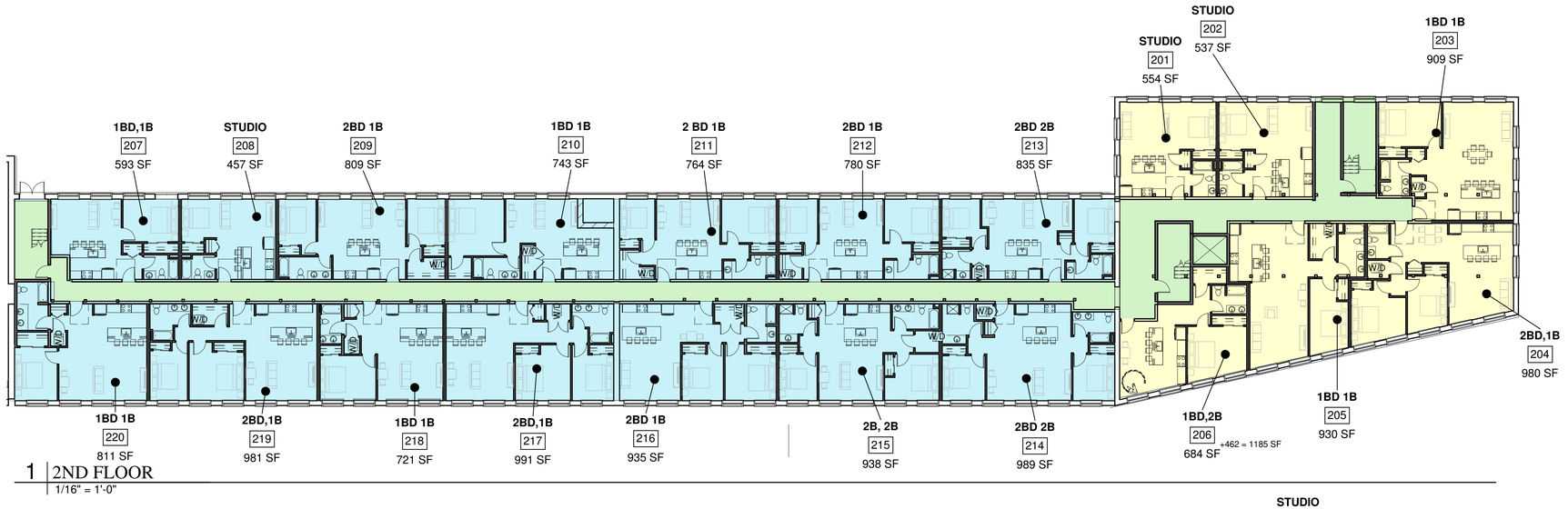
Revisions:

Scale: As indicated

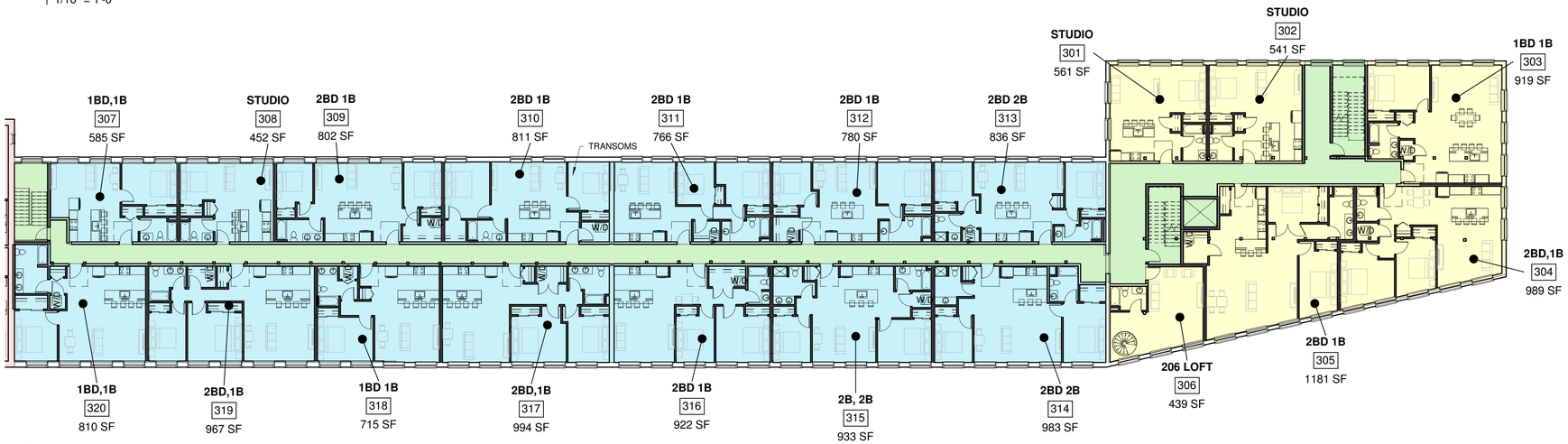
Date: 04-10-2024

FLOOR PLANS

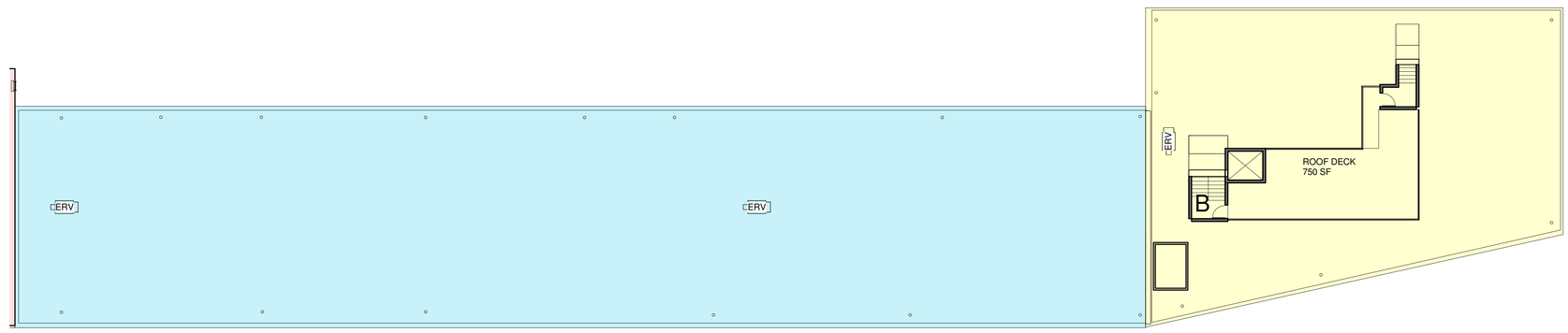
A1



1 | 2ND FLOOR
1/16" = 1'-0"



2 | 3RD FLOOR
1/16" = 1'-0"



3 | ROOF PLAN
1/16" = 1'-0"

Architect:
ARCHETYPE ARCHITECTS
48 Union Wharf Portland, Maine 04101
(207) 772-6022 Fax (207) 772-4056

Consultant:

Prepared For:

Project:
PEPPERELL MILL, 19, 20
5 MAIN STREET
BIDDEFORD, ME 04005

Revisions:

Scale: 1/16" = 1'-0"

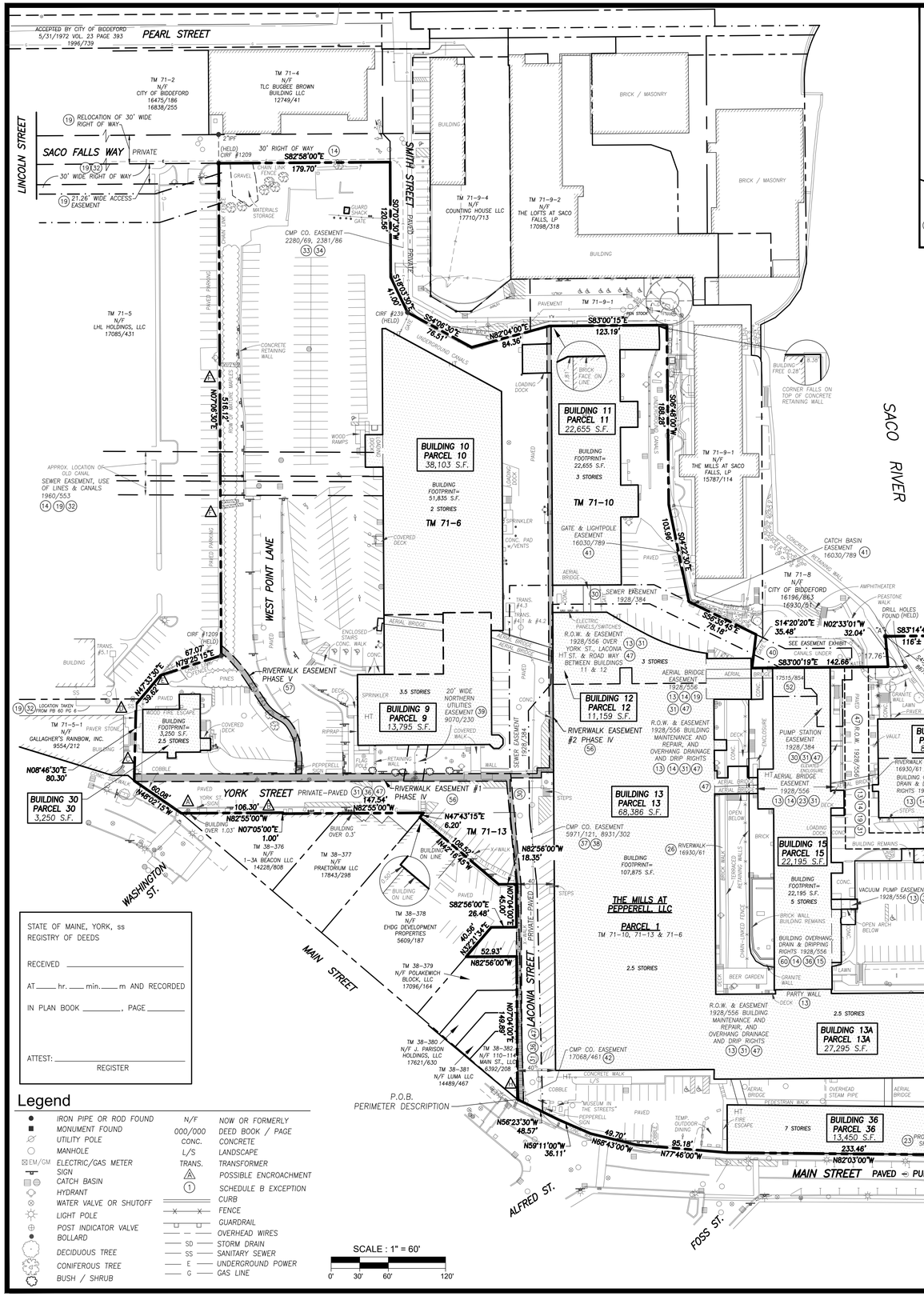
Date: 04-10-2024

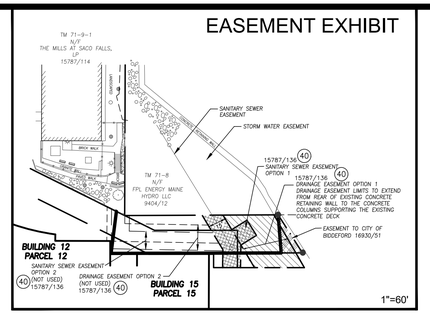
FLOOR PLANS

A2

Required Submittal Attachment

Site Plan/Survey





Possible Encroachments

- (A) ABUTTER'S BUILDING 1.03 FEET INTO SURVEYED PREMESIS KNOWN AS YORK STREET
- (B) HEAT PUMPS, WOOD STEPS, HVAC EQUIPMENT, GAS METERS, DUMPSTER UP TO 5.5 FEET INTO SURVEYED PREMESIS KNOWN AS YORK STREET
- (C) CONCRETE SIDEWALK (RECENT UPGRADE) AND LIGHTPOLE 7.7 FEET INTO SURVEYED PREMESIS
- (D) PAVERSTONE WALK 7.7 FEET INTO SURVEYED PREMESIS
- (E) RECENT PAVEMENT DISTURBANCE, RESURFACING, AND FENCE REMOVAL PURSUANT TO ABUTTING CONSTRUCTION
- (F) SURFACE WATER DRAINING FROM ABUTTER INTO RIP–RAP CHANNELS ON SURVEYED PREMESIS
- (G) PEASTONE WALK CROSSES PROPERTY LINE
- (H) BUILDING OVER 1.8 FEET INTO SURVEYED PREMESIS KNOWN AS LACONIA STREET

Plan References

1. *"PLAN SHOWING AN ALTA/ACSM LAND TITLE SURVEY MADE FOR WEST POINT PEPPERELL, INC., BIDDEFORD, MAINE" OCTOBER 27, 1989, REVISED DECEMBER 14, 1990 BY DOW & COULOMBE, INC.*
2. *"ALTA/ACSM LAND TITLE SURVEY (URBAN) MADE FOR SUNBEAM PRODUCTS, INC." DATED MARCH 4, 1999, REVISED MARCH 24, 1999, BY DOW & COULOMBE, INC.*
3. *"COMPISTE PLAN OF LAND MADE FOR NORTH DAM, LLC AND THE MILLS AT PEPPERELL, LLC" DATED MAY 23, 2011 REVISED FEBRUARY 12, 2014 BY DOW & COULOMBE, INC.*
4. *"FUNCTIONAL SUBDIVISION, THE MILLS AT PEPPERELL, MAINE STREET AND YORK STREET, BIDDEFORD, MAINE MADE FOR RECORD OWNER PRESIDIUM GROUP, LLC" DATED DEC. 2, 2021 BY OWEN HASKELL, INC.*

Zoning Information

PRELIMINARY ZONING REPORT PREPARED BY: ZONING–INFO, INC.
3555 N.W. 58TH STREET, SUITE 400, OKLAHOMA CITY, OK 73112
DECEMBER 13, 2021 SITE #77091
PEPPERELL MILLS CAMPUS, 2, 6, 32–40 MAIN STREET; 1–14 YORK STREET; 44–50 LACONIA STREET, BIDDEFORD, MAINE

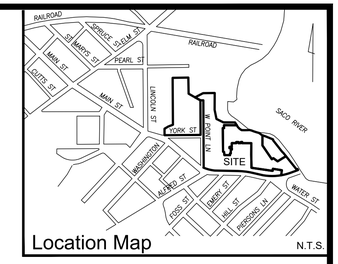
ZONING: "MSRD–3" MAIN STREET REVITALIZATION DISTRICT WITHIN THE "GD–1" GENERAL DEVELOPMENT 1 OVERLAY DISTRICT

MINIMUM BUILDING HEIGHT FEET/STORIES: 26 FEET, 2 STORIES

NO LOT REQUIREMENTS WITHIN THE MSRD–3 DISTRICT
NO SETBACK REQUIREMENTS WITHIN THE MSRD–3 DISTRICT

MINIMUM PARKING REQUIRED:
MULTI–FAMILY: 304 PARKING SPACES
ART STUDIO: 13 PARKING SPACES
MEDICAL OFFICE: 5 PARKING SPACES PER MEDICAL PRACTITIONER
OFFICE: 465 PARKING SPACES
RESTAURANT: 1 PARKING SPACE PER 3 SEATS
RETAIL: 55 PARKING SPACES
COMMERCIAL SCHOOL: 382 PARKING SPACES





General Notes

1. *OWNER OF RECORD: THE MILLS AT PEPPERELL, LLC*
   TM 71 LOT 6, TM 71 LOT 10, TM 71 LOT 12
   DEED BOOK 15880, PAGE 864
   DEED BOOK 18640, PAGE 480

   NORTH DAM, LLC
   TM 71 LOT 11 AND TM 71 LOT 10–1
   DEED BOOK 14072, PAGE 296
   DEED BOOK 16478, PAGE 953
2. *BEARINGS ARE MAGNETIC 1929 BASED ON MARKERS FOUND AS SHOWN ON PLAN REFERENCE 1.*
4. *THERE ARE 454 REGULAR SPACES AND 8 HANDICAP SPACES, FOR A TOTAL OF 462 DELINEATED PARKING SPACES.*
5. *UTILITIES SHOWN ARE SURVEYED FROM OBSERVED SURFACE EVIDENCE AND PLANS OF RECORD.*
6. *EVIDENCE OF RECENT EARTH MOVING WORK WAS OBSERVED IN THE COURTYARD AREA BETWEEN BUILDING 11 AND LAND NOW OR FORMERLY OF THE MILLS AT SACO FALLS, LP (TM 71–9–1). SEE POSSIBLE ENCROACHMENT "E" FOR OTHER EVIDENCE OF RECENT EARTH MOVING WORK. EVIDENCE OF RECENT SIDEWALK CONSTRUCTION OR REPAIRS WAS OBSERVED ALONG PORTIONS OF MAIN STREET AND IN THE VICINITY OF THE INTERSECTION OF MAIN STREET AND YORK STREET. ALL BOUNDARY MARKERS ALONG MAIN STREET HAVE BEEN DESTROYED POSSIBLY DUE TO THE SIDEWALK RECONSTRUCTION.*
7. *NO EVIDENCE OF RECENT BUILDING CONSTRUCTION OR ADDITIONS WERE OBSERVED.*
8. *NO PROPOSED CHANGES IN STREET LINES IS KNOWN BY THIS SURVEYOR.*
9. *THE PROPERTY IS BENEFITED BY AND SUBJECT TO THE EASEMENTS, COVENANTS AND RESTRICTIONS SET FORTH IN THE MASTER DECLARATION.*
10. *COMMON AREA TO BE OWNED BY PEPPERELL MILL PROGRESSION, LLC.*
11. *TOTAL AREA = 788,128 S.F. OR 18.09 ACRES, MORE OR LESS MEASURED TO THE THREAD OF THE SACO RIVER.*

Flood Zone Note

BY GRAPHIC PLOTTING ONLY, THE PORTIONS OF THE PROPERTY ABOVE THE GRANITE BLOCK AND CONCRETE RETAINING WALLS ALONG THE SACO RIVER ARE IN ZONE C OF THE FLOOD INSURANCE RATE MAP, COMMUNITY PANEL NO. 230145 0004B, WHICH BEARS AN EFFECTIVE DATE OF MAY 15, 1984 AND ARE NOT IN A SPECIAL FLOOD HAZARD AREA. THOSE PORTIONS OF THE PROPERTY BEYOND THE GRANITE BLOCK AND CONCRETE RETAINING WALLS, I.E., THE SACO RIVER, LIE IN ZONE A2, AREAS OF 100 YEAR FLOOD.

Utility Note

THE UNDERGROUND UTILITIES SHOWN HAVE BEEN LOCATED FROM FIELD SURVEY INFORMATION AND EXISTING DRAWINGS. THE SURVEYOR MAKES NO GUARANTEES THAT THE UNDERGROUND UTILITIES SHOWN COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN SERVICE OR ABANDONED. THE SURVEYOR FURTHER DOES NOT WARRANT THAT THE UNDERGROUND UTILITIES SHOWN ARE IN THE EXACT LOCATION INDICATED ALTHOUGH HE DOES CERTIFY THAT THEY ARE LOCATED AS ACCURATELY AS POSSIBLE FROM INFORMATION AVAILABLE. THE SURVEYOR HAS NOT PHYSICALLY LOCATED THE UNDERGROUND UTILITIES. CALL 1–888–DIGSAFE AT LEAST THREE BUSINESS DAYS BEFORE PERFORMING ANY CONSTRUCTION. DUE TO OSHA CONFINED SPACE REQUIREMENTS, ALL INVERTS AND PIPE SIZES MUST BE VERIFIED PRIOR TO ANY CONSTRUCTION.

ALTA / NSPS Land Title Survey

The Mills at Pepperell
2 & 6 Main Street, 32-40 Main Street &
44-50 Laconia Street, 12 York Street,
1-15 York Street and 10 West Point Lane
Biddeford, York County, Maine
Made for Record Owner
Pepperell Mill Progression, LLC &
Pepperell Mill Development, LLC
3100 McKinnon Street, Suite 250, Dallas, Texas

Surveyor's Certification

TO: OLD REPUBLIC NATIONAL TITLE INSURANCE COMPANY; LADDER CAPITAL FINANCE LLC, ITS SUCCESSORS AND/OR ASSIGNS; PEPPERELL MILL PROGRESSION, LLC; PEPPERELL MILL DEVELOPMENT, LLC; CLASSIC TITLE CO.

THIS IS TO CERTIFY THAT THIS MAP OR PLAT AND THE SURVEY ON WHICH IT IS BASED WERE MADE IN ACCORDANCE WITH THE 2021 MINIMUM STANDARD DETAIL REQUIREMENTS FOR ALTA/NSPS LAND TITLE SURVEYS, JOINTLY ESTABLISHED AND ADOPTED BY ALTA AND NSPS, AND INCLUDES ITEMS 1, 2, 3, 4, 6(A), 7(A), 7(B)(1), 7(C), 8, 9, 11, 13, 16, AND 17 OF TABLE A THEREOF. THE FIELD WORK WAS COMPLETED ON AUGUST 26, 2021.

RANDY R. LOUBIER
PROFESSIONAL LAND SURVEYOR NO. 2407

DATE OF PLAT OR MAP: SEPTEMBER 9, 2021
DATE OF LAST REVISION: DECEMBER 10, 2021

STATE OF MAINE · RANDY R. LOUBIER 2407 · PROFESSIONAL LAND SURVEYOR

OWEN HASKELL, INC.
PROFESSIONAL LAND SURVEYORS
390 U.S. ROUTE 1, UNIT 10, FALMOUTH, ME 04105 TEL. 207-774-0424

DRAWN BY: SDG / JLW	FIELD BOOK: FILE	JOB NO.	2021-201 B-Y
CHECKED BY: SDG	SCALE: 1" = 60'	DRWG. NO.	1 OF 2

STATE OF MAINE, YORK, ss
REGISTRY OF DEEDS

RECEIVED _____

AT ____ hr. ____ min. ____ m AND RECORDED

IN PLAN BOOK _____, PAGE _____

ATTEST: _____
REGISTER

Legend

●	IRON PIPE OR ROD FOUND	N/F	NOW OR FORMERLY
■	MONUMENT FOUND	000/000	DEED BOOK / PAGE
⌀	UTILITY POLE	CONC.	CONCRETE
○	MANHOLE	L/S	LANDSCAPE
⊠ EM/GM	ELECTRIC/GAS METER	TRANS.	TRANSFORMER
⊢	SIGN	△	POSSIBLE ENCROACHMENT
▤	CATCH BASIN	(1)	SCHEDULE B EXCEPTION
⊕	HYDRANT	═══	CURB
⊗	WATER VALVE OR SHUTOFF	×—×—×	FENCE
☼	LIGHT POLE	□—□—□	GUARDRAIL
⊕	POST INDICATOR VALVE	———	OVERHEAD WIRES
●	BOLLARD	——SD——	STORM DRAIN
	DECIDUOUS TREE	——SS——	SANITARY SEWER
	CONIFEROUS TREE	——E——	UNDERGROUND POWER
	BUSH / SHRUB	——G——	GAS LINE

Schedule B Section II Exceptions

OLD REPUBLIC NATIONAL TITLE INSURANCE COMPANY
COMMITMENT FILE NO. 9258–1112(OB & CA) / 27415–1 EFFECTIVE DATE: DECEMBER 3, 2021
COMMITMENT FILE NO. 9258–1112(UB) / 27415–1 EFFECTIVE DATE: DECEMBER 3, 2021

1 – 8. NON SURVEY ITEMS

9. RIGHTS RESERVED BY YORK MANUFACTURING COMPANY IN AGREEMENTS WITH SACO WATER POWER COMPANY, DATED OCTOBER 17, 1840 AND RECORDED IN BOOK 170, PAGE 65, AND IN BOOK 334, PAGES 77 AND 79, AS THE SAME MAY AFFECT RIGHTS TO DRAW WATER AND RELATED EASEMENTS, AS SHOWN ON THE SURVEY. –AS SHOWN

10. RIGHTS AND COVENANTS SET FORTH IN DEED FROM PEPPERELL MANUFACTURING COMPANY TO CUMBERLAND COUNTY POWER AND LIGHT DATED SEPTEMBER 22, 1930 AND RECORDED IN BOOK 795, PAGE 11. –AS SHOWN

11. RIGHTS AND EASEMENTS GRANTED TO CUMBERLAND COUNTY POWER AND LIGHT COMPANY FROM YORK MANUFACTURING COMPANY AS SET FORTH IN THE EASEMENT DEED DATED DECEMBER 15, 1931 AND RECORDED IN BOOK 935, PAGE 332; AS CONVEYED BY CENTRAL MAINE POWER COMPANY TO PEPPERELL MANUFACTURING COMPANY, DATED SEPTEMBER 15, 1964 AND RECORDED IN BOOK 1622, PAGE 217; AS AFFECTED BY THE RELEASE DEED FROM CENTRAL MAINE POWER COMPANY TO NORTH DAM, LLC DATED SEPTEMBER 16, 2010 AND RECORDED IN BOOK 15947, PAGE 614. –AS SHOWN

12. SUCH STATE OF FACTS AS SHOWN ON THE PLAN ENTITLED "PLAN SHOWING A PROPOSED SALE OF LAND, WEST POINT–PEPPERELL, INC., TO NECO ELECTRICAL PRODUCTS CORP.," DATED OCTOBER 29, 1971 AND RECORDED IN PLAN BOOK 53, PAGE 44, AS SHOWN ON SURVEY. – ALL PERTINENT INFORMATION ON REFERENCED PLAN AS SHOWN

13. RIGHTS, PRIVILEGES AND EASEMENTS AS SET FORTH IN DEED FROM WEST POINT –PEPPERELL, INC. TO BIDDEFORD TEXTILE COMPANY DATED NOVEMBER 17, 1971 AND RECORDED IN BOOK 1928, PAGE 556; INCLUDING BUT NOT LIMITED TO AN UNRECORDED AGREEMENT BY AND BETWEEN WEST POINT–PEPPERELL, INC. AND NECO ELECTRICAL PRODUCTS CORPORATION, AS REFERENCED IN THE DEED RECORDED IN BOOK 1928, PAGE 556; AS AFFECTED BY THE AGREEMENT BETWEEN BIDDEFORD TEXTILE CORPORATION, SUNBEAM PRODUCTS, INC., AND WEST POINT STEVENS, INC. DATED MAY 9, 1997 AND RECORDED IN BOOK 8257, PAGE 318, TO THE EXTENT STILL IN EFFECT. –AS SHOWN

14. EXCEPTIONS, RESERVATIONS, RESTRICTIONS, EASEMENTS AND CONDITIONS SET FORTH IN THE SPECIAL WARRANTY DEED FROM WESTPOINT STEVENS, INC. TO WP PROPERTY HOLDINGS I, LLC DATED AUGUST 8, 2005 AND RECORDED IN BOOK 14603, PAGE 592, AS SHOWN ON THE SURVEY. – AS SHOWN

15. TERMS, CONDITIONS, PROVISIONS, AGREEMENTS AND OBLIGATIONS SET FORTH IN THE UTILITY EASEMENT AGREEMENT BY AND BETWEEN WESTPOINT HOME, INC. AND NORTH DAM MILL, LLC, DATED NOVEMBER 18, 2008, AND RECORDED IN BOOK 15532, PAGE 471. – NOT PLOTTABLE

16. INTENTIONALLY DELETED.

17. RIGHTS, EASEMENTS, TERMS, CONDITIONS AND AGREEMENT SET FORTH IN THE PERMANENT RIVERWALK EASEMENT (PHASE I) FROM NORTH DAM, LLC AND THE MILLS AT PEPPERELL, LLC TO THE CITY OF BIDDEFORD DATED JANUARY 5, 2011, AND RECORDED IN BOOK 16028, PAGE 417, AS SHOWN ON THE SURVEY. –AS SHOWN

18. RIGHTS AND EASEMENTS SET FORTH IN THE PERMANENT RIVERWALK EASEMENT DEED (PHASE II) FROM NORTH DAM, LLC AND THE MILLS AT PEPPERELL, LLC TO THE CITY OF BIDDEFORD DATED JANUARY 9, 2014 AND RECORDED IN BOOK 16770, PAGE 872, AS SHOWN ON THE SURVEY. –AS SHOWN

19. EXCEPTIONS, RESERVATIONS, RESTRICTIONS, EASEMENTS AND CONDITIONS SET FORTH IN THE QUITCLAIM WITH COVENANT DEED FROM THE MILLS AT PEPPERELL, LLC TO NORTH DAM, LLC DATED DECEMBER 6, 2012 AND RECORDED IN BOOK 16478, PAGE 953, AS SHOWN ON THE SURVEY. –AS SHOWN

20. TITLE TO THAT PORTION OF THE INSURED PREMISES LOCATED WITHIN THE NORMAL BOUNDS OF THE SACO RIVER, IF ANY, AS SHOWN ON THE SURVEY. –AS SHOWN

21. RIGHTS OF OTHERS IN OR TO THE UNINTERRUPTED FLOW OF THE SACO RIVER, BUT THIS POLICY DOES NOT INSURE ANY RIPARIAN RIGHTS OR EASEMENTS IN FAVOR OF THE OWNER OF THE INSURED PREMISES HEREIN, IF ANY, AS SHOWN ON THE SURVEY. –NON SURVEY

22. RIPARIAN RIGHTS OF OTHERS IN AND TO THE SACO RIVER AS THE SAME PASSES BY OR THROUGH THE INSURED PREMISES, IF ANY, AS SHOWN ON THE SURVEY. –NON SURVEY

23. SUCH STATE OF FACTS AS IS SHOWN ON THE "PLAN SHOWING PROPOSED CONVEYANCES OF LAND MADE FOR THE MILLS AT PEPPERELL, LLC, BIDDEFORD, MAINE" DATED JULY 9, 2012; AS REVISED OCTOBER 15, 2012, PREPARED BY MICHAEL J. COULOMBE, PLS NO. 1293 OF DOW & COULOMBE, INC. AND RECORDED IN THE YORK COUNTY REGISTRY OF DEEDS IN PLAN BOOK 358, PAGES 15 AND 16, AS SHOWN ON SURVEY. –ALL PERTINENT INFORMATION ON REFERENCED PLAN AS SHOWN

24. INTENTIONALLY DELETED.

25. RIGHTS, EASEMENTS, TERMS, CONDITIONS AND AGREEMENT SET FORTH IN THE PERMANENT PEDESTRIAN BRIDGE EASEMENT DEED FROM NORTH DAM, LLC AND THE MILLS AT PEPPERELL, LLC TO THE CITY OF BIDDEFORD DATED OCTOBER 31, 2012, AND RECORDED IN BOOK 16770, PAGE 860, AS SHOWN ON THE SURVEY. –AS SHOWN

26. RIGHTS, EASEMENTS, TERMS, CONDITIONS AND AGREEMENTS SET FORTH IN RIVERWALK EASEMENT AGREEMENT (PHASE III) BETWEEN NORTH DAM, LLC AND THE CITY OF BIDDEFORD DATED APRIL 29, 2014 AND RECORDED IN BOOK 16930, PAGE 61, AS SHOWN ON THE SURVEY. –AS SHOWN

27. INTENTIONALLY DELETED

28. SUCH STATE OF FACTS AS SHOWN ON THE PLAN ENTITLED "PLAN SHOWING LAND AND BUILDINGS FOR SALE BY WEST POINT–PEPPERELL, INC., TO DANIEL TURKANIS" DATED AUGUST 2, 1972 AND RECORDED IN PLAN BOOK 60, PAGE 6, AS SHOWN ON SURVEY. –ALL PERTINENT INFORMATION ON REFERENCED PLAN AS SHOWN

29. RIGHTS AND EASEMENTS GRANTED TO CENTRAL MAINE POWER COMPANY BY SACO REALTY CORPORATION AS SET FORTH IN THE INDENTURE DATED NOVEMBER 28, 1958 AND RECORDED IN BOOK 1396, PAGE 280. –NO STEAM PIPES OBSERVED

30. RIGHTS, PRIVILEGES AND EASEMENTS AS SET FORTH IN DEED FROM WEST POINT–PEPPERELL, INC. TO THE CITY OF BIDDEFORD DATED NOVEMBER 11, 1971, AND RECORDED IN BOOK 1928, PAGE 384, AS SHOWN ON THE SURVEY. –AS SHOWN

31. RIGHTS, PRIVILEGES AND EASEMENTS AS SET FORTH IN DEED FROM WEST POINT –PEPPERELL, INC. TO BIDDEFORD TEXTILE COMPANY DATED NOVEMBER 17, 1971 AND RECORDED IN BOOK 1928, PAGE 556, AS SHOWN ON THE SURVEY. –AS SHOWN

32. TERMS, CONDITIONS, RIGHTS AND EASEMENTS SET FORTH IN DEED FROM WEST POINT–PEPPERELL TO DANIEL TURKANIS DATED AUGUST 16, 1972, AND RECORDED IN BOOK 1960, PAGE 553, AS SHOWN ON THE SURVEY.. –AS SHOWN

33. RIGHTS AND EASEMENTS GRANTED TO CENTRAL MAINE POWER COMPANY FROM WEST POINT PEPPERELL INC. TO CENTRAL MAINE POWER COMPANY RECORDED ON NOVEMBER 8, 1977 IN BOOK 2280, PAGE 69, AS SHOWNON THE SURVEY. – UNDERGROUND ELECTRIC IN SMITH STREET AS SHOWN, POLES REFERENCED NOT FOUND

34. CONTRACT FOR OUTDOOR LIGHTING BY AND BETWEEN CENTRAL MAINE POWER COMPANY AND WEST POINT PEPPERELL DATED AUGUST 25, 1977, AND RECORDED IN BOOK 2381, PAGE 86, AS SHOWN ON THE SURVEY. – UNDERGROUND ELECTRIC IN SMITH STREET AS SHOWN, POLES REFERENCED NOT FOUND

35. NOTICE OF ABANDONED UNDERGROUND OIL STORAGE FACILITY OR TANK FILED BY WEST POINT–PEPPERELL, INC. DATED DECEMBER 19, 1991 AND RECORDED IN BOOK 5925, PAGE 271, AS SHOWN ON THE SURVEY. –AS SHOWN

36. POSSIBLE RIGHTS OF OTHERS IN PRIVATE ROADS KNOWN AS YORK STREET AND LACONIA STREET AS AFFECTED BY AFFIDAVITS OF PHYSICAL OBSTRUCTION AND CLOSING OF PRIVATE WAYS BY WEST POINT–PEPPERELL DATED DECEMBER 7, 1990 AS RECORDED IN BOOK 5583, PAGE 177, AND DATED MARCH 6, 1992 AS RECORDED IN BOOK 5998, PAGE 51, AND DATED SEPTEMBER 7, 1995 AS RECORDED IN BOOK 7549, PAGE 25, AND DATED NOVEMBER 5, 1997 AS RECORDED IN BOOK 8511, PAGE 177, AS SHOWN ON THE SURVEY. –AS SHOWN

STATE OF MAINE, YORK, ss
REGISTRY OF DEEDS

RECEIVED _____

AT _____ hr. _____ min. _____ m AND RECORDED

IN PLAN BOOK _____, PAGE _____

ATTEST: _____
REGISTER

Schedule B Section II Exceptions - cont'd

37. RIGHTS AND EASEMENTS GRANTED TO CENTRAL MAINE POWER COMPANY FROM WEST POINT–PEPPERELL, INC. AS SET FORTH IN THE EASEMENT DEED DATED NOVEMBER 22, 1991, AND RECORDED IN BOOK 5971, PAGE 121, AS SHOWN ON THE SURVEY. –AS SHOWN

38. RIGHTS AND EASEMENTS GRANTED TO CENTRAL MAINE POWER COMPANY FROM WESTPOINT STEVENS INC. AS SET FORTH IN THE EASEMENT DEED DATED JUNE 10, 1998 AND RECORDED IN BOOK 8931, PAGE 302, AS SHOWN ON THE SURVEY. –AS SHOWN

39. RIGHTS AND EASEMENTS GRANTED TO NORTHERN UTILITIES, INC. FROM WESTPOINT STEVENS INC. AS SET FORTH IN THE EASEMENT DEED DATED JUNE 1, 1998 AND RECORDED IN BOOK 9070, PAGE 230, AS SHOWN ON THE SURVEY. –AS SHOWN

40. RIGHTS AND EASEMENTS SET FORTH IN THE EASEMENT DEED FROM WP PROPERTY HOLDINGS I, LLC TO THE MILL AT SACO FALLS, LP AND RIVERDAM MILL, LLC DATED NOVEMBER 6, 2009 AND RECORDED IN BOOK 15787, PAGE 136, AS SHOWN ON THE SURVEY. –AS SHOWN

41. RIGHTS AND EASEMENTS SET FORTH IN THE EASEMENT DEED FROM THE MILLS AT PEPPERELL, LLC TO THE MILL AT SACO FALLS, LP DATED JANUARY 14, 2011, AND RECORDED IN BOOK 16030, PAGE 789, AS SHOWN ON THE SURVEY. –AS SHOWN

42. RIGHTS AND EASEMENTS SET FORTH IN EASEMENT FROM THE MILLS AT PEPPERELL, LLC TO CENTRAL MAINE POWER COMPANY DATED MAY 8, 2015 AND RECORDED IN BOOK 17068, PAGE 461. –AS SHOWN

43. AFFIDAVIT OF PHYSICAL OBSTRUCTION AND CLOSING OF PRIVATE WAYS BY WILLIAM D. SANFORD, PROPERTY MANAGER FOR THE MILLS AT PEPPERELL, LLC DATED APRIL 12, 2017 AND RECORDED IN BOOK 17868, PAGE 876. –NON SURVEY

44. RIGHTS AND EASEMENTS GRANTED TO CENTRAL MAINE POWER COMPANY FROM BIDDEFORD TEXTILE COMPANY SET FORTH IN THE EASEMENT DEED DATED MARCH 30, 1972 AND RECORDED IN BOOK 2055, PAGE 84. –REFERENCED POLES NOT FOUND

45. INTENTIONALLY DELETED.

46. SUCH STATE OF FACTS AS IS SHOWN ON THE PLAN ENTITLED "STATE OF MAINE, DEPARTMENT OF TRANSPORTATION, RIGHT OF WAY MAP, STATE AID HIGHWAY NO. 3 AND 8 (RTE 9/MAIN STREET), BIDDEFORD–SACO, YORK COUNTY", DATED AUGUST 2001 AND RECORDED IN PLAN BOOK 322, PAGE 40, AS SHOWN ON SURVEY. – ALL PERTINENT INFORMATION ON REFERENCED PLAN AS SHOWN

47. EXCEPTIONS, RESERVATIONS, RESTRICTIONS, EASEMENTS AND CONDITIONS SET FORTH IN THE QUITCLAIM DEED FROM SUNBEAM PRODUCTS, INC. TO NORTH DAM, LLC DATED APRIL 30, 2004 AND RECORDED IN BOOK 14072, PAGE 296. –AS SHOWN

48. RIGHTS AND EASEMENTS GRANTED TO CENTRAL MAINE POWER COMPANY FROM NORTH DAM, LLC AS SET FORTH IN THE EASEMENT DEED (UNDERGROUND LINE) DATED AUGUST 6, 2008, AND RECORDED IN BOOK 15501, PAGE 812, AS SHOWN ON THE SURVEY. –AS SHOWN

49. RIGHTS AND EASEMENTS GRANTED TO CENTRAL MAINE POWER COMPANY BY EASEMENT DEED FROM NORTH DAM, LLC DATED AUGUST 19, 2008, AND RECORDED IN BOOK 15535, PAGE 609. –REFERENCED POLES NOT FOUND

50. RIGHTS AND EASEMENTS DESCRIBED IN THE EASEMENT DEED (UNDERGROUND LINE) FROM NORTH DAM, LLC TO CENTRAL MAINE POWER COMPANY DATED APRIL 3, 2012 AND RECORDED IN BOOK 16311, PAGE 226, AS SHOWN ON THE SURVEY. –AS SHOWN

51. NOTICE OF DECISION FROM THE BIDDEFORD PLANNING BOARD DATED JANUARY 16, 2014 AND RECORDED IN BOOK 16803, PAGE 815. NOTE: WITH RESPECT TO THE REQUIREMENTS OF THE NOTICE OF DECISION DATED JANUARY 16, 2014 RECORDED IN BOOK 16803, PAGE 815, SAID REQUIREMENTS WERE DEEMED SATISFIED AS EVIDENCED BY AN UNRECORDED CERTIFICATE OF OCCUPANCY DATED JUNE 30, 2015. –NON SURVEY

52. RIGHTS, EASEMENTS, TERMS AND CONDITIONS IN PERMANENT EASEMENT GRANTED TO CITY OF BIDDEFORD DATED APRIL 15, 2015 AND RECORDED IN BOOK 17005, PAGE 538; AS AFFECTED BY A CORRECTIVE PERMANENT EASEMENT DEED GRANTED TO CITY OF BIDDEFORD DATED JUNE 30, 2017 AND RECORDED IN BOOK 17515, PAGE 854, AS SHOWN ON THE SURVEY. –AS SHOWN

53. TERMS AND CONDITIONS IN AN AFFIDAVIT OF THE MAINE DEPARTMENT OF ENVIRONMENTAL PROTECTION AFFIDAVIT VOLUNTARY RESPONSE ACTION PROGRAM NORTH DAM MILL SITE DATED AUGUST 26, 2015 AND RECORDED IN BOOK 17092, PAGE 503. –NON SURVEY

54. RIGHTS AND EASEMENTS SET FORTH IN AN UNDERGROUND LINE EASEMENT FROM NORTH DAM LLC TO CENTRAL MAINE POWER COMPANY DATED OCTOBER 11, 2018 AND RECORDED IN BOOK 17889, PAGE 755, AS SHOWN ON THE SURVEY. –AS SHOWN

55. RIGHTS AND EASEMENTS SET FORTH IN A SIGNAL SYSTEM EASEMENT FROM NORTH DAM, LLC TO STATE OF MAINE, ACTING BY AND THROUGH ITS DEPARTMENT OF TRANSPORTATION DATED JUNE 11, 2021 AND RECORDED IN BOOK 18736, PAGE 668, AS SHOWN ON THE SURVEY. –AS SHOWN

56. RIGHTS AND EASEMENTS SET FORTH IN RIVERWALK EASEMENT DEED (PHASE IV) FROM THE MILLS AT PEPPERELL, LLC TO THE CITY OF BIDDEFORD, DATED DECEMBER ___, 2021 AND RECORDED IN BOOK _____, PAGE ____, AS SHOWN ON SURVEY. –AS SHOWN

57. RIGHTS AND EASEMENTS SET FORTH IN RIVERWALK EASEMENT DEED (PHASE V) FROM THE MILLS AT PEPPERELL, LLC TO THE CITY OF BIDDEFORD, DATED DECEMBER ___, 2021 AND RECORDED IN BOOK _____, PAGE ____, AS SHOWN ON SURVEY. –AS SHOWN

58. COVENANTS, CONDITIONS, EASEMENTS AND RESTRICTIONS SET FORTH IN DECLARATION OF COVENANTS, CONDITIONS, EASEMENTS AND RESTRICTIONS BY PEPPERELL MILL PROGRESSION, LLC DATED DECEMBER 15, 2021 AND RECORDED IN BOOK _____, PAGE ____, AS SHOWN ON SURVEY. –ALL PERTINENT INFORMATION AS SHOWN

59. SUCH STATE OF FACTS AS SET FORTH ON PLAN ENTITLED FUNCTIONAL SUBDIVISION – FOR PEPPERELL MILL PROGRESSION, LLC AND PEPPERELL MILL DEVELOPMENT, LLC, MAIN STREET AND YORK STREET, BIDDEFORD, MAINE, PREPARED BY OWEN HASKELL, INC. DATED NOVEMBER 19, 2021 AND REVISED THROUGH DECEMBER ___, 2021, AS RECORDED IN PLAN BOOK ____, PAGE ____, AS SHOWN ON SURVEY. –ALL PERTINENT INFORMATION ON REFERENCED PLAN AS SHOWN

60. THE FOLLOWING STATE FACTS AS SET FORTH ON PLAN ENTITLED ALTA/NSPS LAND TITLE SURVEY, THE MILLS AT PEPPERELL, MADE FOR RECORD OWNER PEPPERELL MILL PROGRESSION, LLC AND PEPPERELL MILL DEVELOPMENT, LLC, MAIN STREET AND YORK STREET, BIDDEFORD, MAINE PREPARED BY OWEN HASKELL, INC. DATED SEPTEMBER 9, 2021 AND REVISED THROUGH DECEMBER ___, 2021 ("THE SURVEY", AS USED HEREIN): POSSIBLE ENCROACHMENTS A THROUGH H AS LISTED THEREON. –SEE THIS PLAN

Legal Description

OLD REPUBLIC NATIONAL TITLE INSURANCE COMPANY
TITLE COMMITMENT FILE NO. 9258–1112(OB & CA) / 27415–1

OCCUPIED BUILDINGS AND COMMON AREAS:

A CERTAIN LOT OR PARCEL OF LAND, TOGETHER WITH THE BUILDINGS AND IMPROVEMENTS THEREON, SITUATED ON THE NORTHERLY SIDE OF MAIN STREET IN THE CITY OF SACO, COUNTY OF YORK AND STATE OF MAINE, AS SHOWN AND SET FORTH ON A PLAN ENTITLED FUNCTIONAL SUBDIVISION THE MILLS AT PEPPERELL, MAIN STREET, BIDDEFORD, YORK COUNTY, MAINE MADE FOR PEPPERELL MILL PROGRESSION, LLC AND PEPPERELL MILL DEVELOPMENT, LLC, PREPARED BY OWEN HASKELL, INC., PROFESSIONAL LAND SURVEYORS, DATED DECEMBER 10, 2021, AS RECORDED IN PLAN BOOK ____, PAGE ____ (THE "PLAN"), AND BEING BOUNDED AND DESCRIBED BY THE FOLLOWING METES AND BOUNDS, HOWEVER, SPECIFICALLY EXCEPTING THEREFROM THOSE CERTAIN BUILDINGS/PARCELS AS SHOWN ON SAID PLAN THAT ARE THEREON DESIGNATED AS BUILDING/PARCEL NO'S 11, 12, 19, 20, 30, 36, AND SMOKESTACK PARCEL 38:

BEGINNING ON THE NORTHERLY SIDELINE OF MAIN STREET AT THE SOUTHEASTERLY CORNER OF LAND NOW OR FORMERLY OF MAIN ST., LLC AS DESCRIBED IN DEED BOOK 6392, PAGE 208, THENCE N 07°04'00" E ALONG LAND OF SAID MAIN ST., LLC, LAND NOW OR FORMERLY OF LUMA LLC AS DESCRIBED IN DEED BOOK 14489, PAGE 467, LAND NOW OR FORMERLY OF J. PARISON HOLDINGS, LLC AS DESCRIBED IN DEED BOOK 17621, PAGE 630 AND LAND NOW OR FORMERLY OF POLAKEWICH BLOCK, LLC 149.89 FEET;

THENCE, N 82°56'00" W ALONG LAND OF SAID POLAKEWICH BLOCK, LLC 52.93 FEET TO LAND NOW OR FORMERLY OF EHDG DEVELOPMENT PROPERTIES AS DESCRIBED IN DEED BOOK 5609, PAGE 187;

THENCE THE FOLLOWING COURSES AND DISTANCES ALONG LAND OF SAID EHDG DEVELOPMENT PROPERTIES:
N 47°46'00" E A DISTANCE OF 40.56 FEET;
S 82°56'00" E A DISTANCE OF 26.48 FEET;
N 07°04'00" E A DISTANCE OF 45.00 FEET;
N 82°56'00" W A DISTANCE OF 18.35 FEET;
N 42°16'45" W A DISTANCE OF 108.52 FEET TO LAND NOW OR FORMERLY OF PRAETORIUM LLC AS DESCRIBED IN DEED BOOK 17843, PAGE 298;

Legal Description - cont'd

THENCE, N 47°43'15" E ALONG SAID PRAETORIUM LLC 6.20 FEET;

THENCE, N 82°55'00" W CONTINUING ALONG PREATORIUM LLC AND LAND NOW OR FORMERLY OF 1–3A BEACON LLC AS DESCRIBED IN DEED BOOK 1422, PAGE 808 A DISTANCE OF 147.54 FEET;

THENCE, N 07°05'00" E ALONG SAID 1–3A BEACON LLC 1.00 FEET;

THENCE, N 82°55'00" W CONTINUING ALONG 1–3A BEACON LLC 106.30 FEET TO THE NORTHERLY SIDELINE OF SAID MAIN STREET;

THENCE, N 48°02'15" W ALONG THE NORTHERLY SIDELINE OF MAIN STREET 60.08 FEET TO THE SOUTHEASTERLY CORNER OF LAND OF GALLAGHER'S RAINBOW, INC. AS DESCRIBED IN DEED BOOK 9554, PAGE 212;

THENCE, N 08°46'30" E ALONG LAND OF SAID GALLAGHER'S RAINBOW, INC. 80.30 FEET;

THENCE, N 47°33'30" E CONTINUING ALONG LAND OF GALLAGHER'S RAINBOW AND LAND NOW OR FORMERLY OF LHL HOLDING, LLC AS DESCRIBED IN DEED BOOK 17085, PAGE 431 A DISTANCE OF 39.62 FEET;

THENCE, N 79°25'15" E ALONG LAND OF SAID LHL HOLDINGS, LLC 67.07 FEET TO A CAPPED IRON ROD STAMPED #1209;

THENCE, N 07°06'30" E CONTINUING ALONG LHL HOLDINGS, LLC 516.12 FEET TO THE SOUTHERLY SIDELINE OF SACO FALLS WAY MARKED BY A CAPPED IRON ROD FOUND STAMPED #1209;

THENCE, S 82°58'00" E ALONG THE SOUTHERLY SIDELINE OF SAID SACO FALLS WAY 179.70 FEET TO THE MILLS AT SACO FALL, LP AS DESCRIBED IN DEED BOOK 15787, PAGE 114;

THENCE THE FOLLOWING COURSES AND DISTANCES ALONG SAID THE MILLS AT SACO FALLS, LP:
S 07°07'30" W A DISTANCE OF 120.56 FEET;
S 18°03'30" E A DISTANCE OF 41.00 FEET TO A CAPPED IRON ROD FOUND STAMPED #239;
S 54°06'30" E A DISTANCE OF 76.51 FEET;
N 82°04'00" E A DISTANCE OF 84.36 FEET;
S 83°00'15" E A DISTANCE OF 123.19 FEET;
S 06°48'00" W A DISTANCE OF 188.28 FEET;
S 04°22'30" E A DISTANCE OF 103.96 FEET;
S 56°35'45" E A DISTANCE OF 78.18 FEET TO LAND NOW OR FORMERLY OF CITY OF BIDDEFORD AS DESCRIBED IN DEED BOOK 16930, PAGE 51;

THENCE, S 14°20'20" E ALONG THE SAID CITY OF BIDDEFORD 35.48 FEET;

THENCE, S 83°00'19" E CONTINUING ALONG THE LAND OF THE CITY OF BIDDEFORD 142.66 FEET;

THENCE, N 02°33'01" W ALONG THE LAND OF THE CITY OF BIDDEFORD 32.04 FEET TO A DRILL HOLE FOUND;

THENCE, S 83°14'45" E A DISTANCE OF 116 FEET, MORE OR LESS TO THE THREAD OF THE SACO RIVER;

THENCE, SOUTHEASTERLY ALONG THE THREAD OF THE SACO RIVER 870 FEET, MORE OR LESS TO SAID MAIN STREET;

THENCE, SOUTHWESTERLY 121 FEET, MORE OR LESS TO A POINT BEING S 45°19'45" E FROM THE LAST–MENTIONED DRILL HOLE FOUND;

THENCE THE FOLLOWING COURSES AND DISTANCES ALONG THE NORTHERLY SIDELINE OF MAIN STREET:
S 84°43'00" W A DISTANCE OF 20.84 FEET;
S 76°56'30" W A DISTANCE OF 162.98 FEET;
N 87°16'00" W A DISTANCE OF 100.08 FEET;
N 74°21'27" W A DISTANCE OF 271.59 FEET;
N 73°35'33" W A DISTANCE OF 82.49 FEET;
N 82°03'00" W A DISTANCE OF 233.46 FEET;
N 77°46'00" W A DISTANCE OF 95.18 FEET;
N 68°43'00" W A DISTANCE OF 49.70 FEET;
N 59°11'00" W A DISTANCE OF 36.11 FEET;
N 56°23'30" W A DISTANCE OF 48.57 FEET TO THE POINT OF BEGINNING, CONTAINING 788,128 S.F. OR 18.09 ACRES, MORE OR LESS.

TOGETHER WITH RIGHTS AND EASEMENTS SET FORTH IN UTILITY EASEMENT BY AND BETWEEN WESTPOINT HOME, INC. AND NORTH DAM MILL, LLC DATED NOVEMBER 18, 2008 AND RECORDED IN BOOK 15532, PAGE 471.

TOGETHER WITH THE EASEMENTS AND RIGHTS, IF ANY, LOCATED IN THE CITY OF BIDDEFORD, YORK COUNTY, MAINE, AS MORE PARTICULARLY RESERVED BY THE MILLS AT PEPPERELL, LLC OR OTHERWISE HELD BY THE MILLS AT PEPPERELL, LLC PURSUANT TO THE FOLLOWING INSTRUMENTS: THE QUITCLAIM DEED WITH COVENANT FROM THE MILLS AT PEPPERELL, LLC TO CITY OF BIDDEFORD DATED AS OF APRIL 29, 2014 AND RECORDED IN THE YORK COUNTY REGISTRY OF DEEDS ON NOVEMBER 25, 2014 IN BOOK 16930, PAGE 51; THE RIVERWALK EASEMENT AGREEMENT (PHASE III) WITH THE CITY OF BIDDEFORD DATED AS OF APRIL 29, 2014 AND RECORDED IN SAID REGISTRY OF DEEDS ON NOVEMBER 29, 2014 IN BOOK 16930, PAGE 61.

TOGETHER WITH THE EXCEPTIONS, RESERVATIONS, RESTRICTIONS, EASEMENTS AND CONDITIONS SET FORTH IN THE QUITCLAIM DEED FROM SUNBEAM PRODUCTS, INC. TO NORTH DAM, LLC DATED APRIL 30, 2004 AND RECORDED IN THE YORK COUNTY REGISTRY OF DEEDS IN BOOK 14072, PAGE 296.
TOGETHER WITH THE EXCEPTIONS, RESERVATIONS, RESTRICTIONS, EASEMENTS AND CONDITIONS SET FORTH IN THE QUITCLAIM WITH COVENANT DEED FROM THE MILLS AT PEPPERELL, LLC TO NORTH DAM, LLC DATED DECEMBER 6, 2012 AND RECORDED IN THE YORK COUNTY REGISTRY OF DEEDS IN BOOK 16478, PAGE 953.

TOGETHER WITH COVENANTS, CONDITIONS, EASEMENTS AND RESTRICTIONS SET FORTH IN DECLARATION OF COVENANTS, CONDITIONS AND RESTRICTIONS BY PEPPERELL MILL PROGRESSION, LLC, DATED DECEMBER 15, 2021 TO BE RECORDED IN THE YORK COUNTY REGISTRY OF DEEDS.

TOGETHER WITH THE FOLLOWING HISTORICAL RIGHTS AND EASEMENTS:

EASEMENT ONE:
THOSE RIGHTS AND EASEMENTS CONVEYED BY YORK MANUFACTURING COMPANY TO CUMBERLAND COUNTY POWER AND LIGHT COMPANY BY INDENTURE DATED SEPTEMBER 22, 1938, RECORDED IN YORK COUNTY REGISTRY OF DEEDS, BOOK 935, PAGE 332 FOR THE BENEFIT OF PARCELS ONE AND TWO AS SET FORTH AND DEFINED IN THE DEED FROM CENTRAL MAINE POWER COMPANY TO PEPPERELL MANUFACTURING COMPANY DATED SEPTEMBER 15, 1964 AND RECORDED OCTOBER 12, 1964 IN BOOK 1622, PAGE 217, INCLUDING THE BRIDGE, PENSTOCK AND PIPELINES, THE INTAKE, SCREEN CHAMBER AND GATES TO THE CENTER OF THE SACO RIVER.

EASEMENT TWO:
RIGHT AND EASEMENT FOR THE PURPOSE OF OPERATING, REPLACING, REPAIRING AND MAINTAINING A STEAM PIPE LINE AND A RETURN CONDENSATE PIPE LINE, WITH VALVES, FITTINGS AND NECESSARY APPURTENANCES, TOGETHER WITH NECESSARY STEEL TRESTLES, BRIDGES AND WALL BRACKETS TO SUPPORT THE SAME AS FURTHER DESCRIBED BY THE DEED FROM SACO REALTY CORPORATION TO CENTRAL MAINE POWER COMPANY DATED NOVEMBER 28, 1958, RECORDED IN SAID REGISTRY, BOOK 1396, PAGE 280, FOR THE BENEFIT OF PARCELS ONE AND TWO AS SET FORTH AND DEFINED IN THE DEED FROM CENTRAL MAINE POWER COMPANY TO PEPPERELL MANUFACTURING COMPANY DATED SEPTEMBER 15, 1964 AND RECORDED OCTOBER 12, 1964 IN BOOK 1622, PAGE 217.

EASEMENT THREE:
THE RIGHT TO LAY A PIPELINE OR PIPELINES ALONG THE CANALS AND/OR PENSTOCKS OF PEPPERELL MANUFACTURING COMPANY FOR THE PURPOSE OF OBTAINING SUFFICIENT WATER FROM ABOVE THE UPPER YORK DAM FOR THE PROPER OPERATION OF A STEAM PLANT AS FURTHER DESCRIBED IN THE DEED FROM PEPPERELL MANUFACTURING COMPANY TO CUMBERLAND COUNTY POWER AND LIGHT COMPANY DATED SEPTEMBER 22, 1930 AND RECORDED IN BOOK 795, PAGE 11 TO INCLUDE ANY AND ALL OF THE FOLLOWING: THE RIGHT TO EXCAVATE THE BED OF THE WESTERLY BRANCH OF SAID SACO RIVER IN ANY PART THEREOF BETWEEN SAID NORTHWESTERLY BOUNDARY LINE OF THE POWER HOUSE PROPERTY AND SAID SOUTHERLY BOUNDARY LINE OF THE PROPERTY DESCRIBED IN SAID SECTION 15 THEREIN; THE RIGHT TO TAKE WATER FROM THE SAID WEST BRANCH OF THE SACO RIVER AT ANY POINT ABOVE UPPER YORK DAM FOR USE ON THE PREMISES OCCUPIED BY ITS MANUFACTURING PLANT IN SAID BIDDEFORD AS THE SAME NOW IS OR MAY HEREAFTER BE CONSTITUTED, THE SAID WATER TO BE USED FOR ANY PURPOSE ON SAID PREMISES EXCEPT FOR THE GENERATION OF WATER POWER; AND THE RIGHT TO LAY, CONSTRUCT AND MAINTAIN ON AND ACROSS THAT PART OF THE LAND THEREBY CONVEYED TO CUMBERLAND COUNTY POWER AND LIGHT COMPANY WHICH LIES NORTHERLY OF THE NORTHERLY BOUNDARY OF THE PARCEL DESCRIBED IN SECTION 13 THEREIN A SUITABLE PIPE LINE OR LINES AND A SUITABLE INTAKE TO ENABLE PEPPERELL MANUFACTURING COMPANY, ITS SUCCESSORS AND ASSIGNS, TO OBTAIN SAID WATER, SAID INTAKE TO BE LOCATED APPROXIMATELY ON A LINE RUNNING NORTHERLY FROM THE NORTHEASTERLY CORNER OF SAID PARCEL DESCRIBED IN SECTION 13 THEREIN, TOGETHER WITH THE RIGHT TO ENTER ON SAID LAND FOR THE PURPOSES OF LAYING, CONSTRUCTING, INSPECTING, REPAIRING AND/OR REPLACING SAID PIPE LINE OR LINES AND INTAKE FOR THE BENEFIT OF PARCELS ONE AND TWO AS SET FORTH AND DEFINED IN THE DEED FROM CENTRAL MAINE POWER COMPANY TO PEPPERELL MANUFACTURING COMPANY DATED SEPTEMBER 15, 1964 AND RECORDED OCTOBER 12, 1964 IN BOOK 1622, PAGE 217.

EASEMENT FOUR:
RIGHT OF WAY AND EASEMENT FOR THE PURPOSE OF INGRESS AND EGRESS ON FOOT AND BY VEHICLE FROM AND TO MAIN STREET AND BUILDINGS 13, 16, 19, 20, 37 AND 37B AND APPURTENANT LAND OVER THE ROADWAY AS SHOWN ON THE NECO PLAN FOR THE BENEFIT OF PARCELS ONE AND TWO AS SET FORTH AND DEFINED IN PARAGRAPH C, SECTION 1 OF DEED FROM WEST POINT –PEPPERELL, INC., TO BIDDEFORD TEXTILE COMPANY DATED NOVEMBER 17, 1971 AND RECORDED NOVEMBER 17, 1971 IN BOOK 1928 PAGE 556.

EASEMENT FIVE:
RIGHT OF WAY AND EASEMENT FOR THE PURPOSE OF RECEIVING, DELIVERING AND SHIPPING GOODS, MERCHANDISE, RAW MATERIALS AND OTHER PERSONAL PROPERTY BY VEHICLE FROM AND TO BUILDINGS 16, 19, 20, 37 A

June 4, 2024

City of Biddeford
Planning & Development
205 Main Street
Biddeford, ME 04005

Subject: 2024. 27 Sketch Plan Subdivision Review (Pepperell Mill Building 19 & 20) – Applicant Response to Staff Comments

In response to your comments from the Planning Board Staff Report for the above mentioned project, see below final responses from the applicant and accompanying attachments:

Planning:

1. Building Elevations: The Preliminary Plan submittal shall include building elevations identifying all proposed exterior building modifications which will also need review and approval from the Historic Preservation Commission (HPC). These modifications shall specifically include proposed window and doorway modifications.

Response: Noted, and building elevation plans were provided to staff on 6/3 by Archetype and are attached for reference.

2. All refuse and recycling dumpsters shall be fully screened with a dumpster enclosure/s and the locations of said enclosures shall be shown on the redevelopment plans.

Response: Two (2) trash bins are anticipated to support the development and will be fully screened as required and final locations will be shown on the Preliminary Plan Application.

3. The Preliminary Plan Application shall include a detailed overview / narrative of all property improvements being proposed.

Response: Noted, and there will be minimal property improvements given the footprint of the existing building and historic requirements.

4. The rear / interior side of 6the property includes three loading docks. As this building is being converted to residential from a prior industrial use what is planned for the three existing loading docks?

Response: Reference sheet A2.1 of building elevation, the loading dock doors will be converted to storefront windows with apartments in the adjacent space.

5. Being a residential development, where is the main entrance going to be located and will this include any exterior building modifications?

Response: The main entrance is in Mill 20 in the historic location, reference the building elevations for the door locations.

6. Designated "temporary parking" / parking easement stalls shall be clearly identified on submitted site plans.

Response: Noted, the Applicant is finalizing the agreements for adjacent parking spaces which will be shown on the site plan included in the Preliminary Plan Application.

7. Discussions with the applicant to date, have included the Applicant's plan to provide required parking within the City's Pearl Street parking garage with a shuttle / valet service being provided to future residents. The Preliminary Application shall include a detailed overview of the proposed shuttle / valet service in addition to designated guest / visitor parking.

Response: The Applicant has coordinated with Premium Parking for a minimum of 64 spaces to support the project and a shuttle/valet is no longer being considered.

8. Prior to Final Planning Board review, the Applicant shall include a signed perpetual parking agreement with Premium Parking for all of the required parking for the development.

Response: Acknowledged.

Engineering/Public Works:

1. The Applicant shall provide interior storm and sanitary plumbing plans, confirming both gravity systems are separated and have separated downstream connections within the City's infrastructure. If the interior storm and sanitary piping are not separated or do not outfall into separated systems, the Applicant shall provide formal separation plans, including disconnection of roof drains / downspouts. The submitted plans shall be reviewed and approved by the City's Director of Engineering prior to the issuance of any building or plumbing permits.

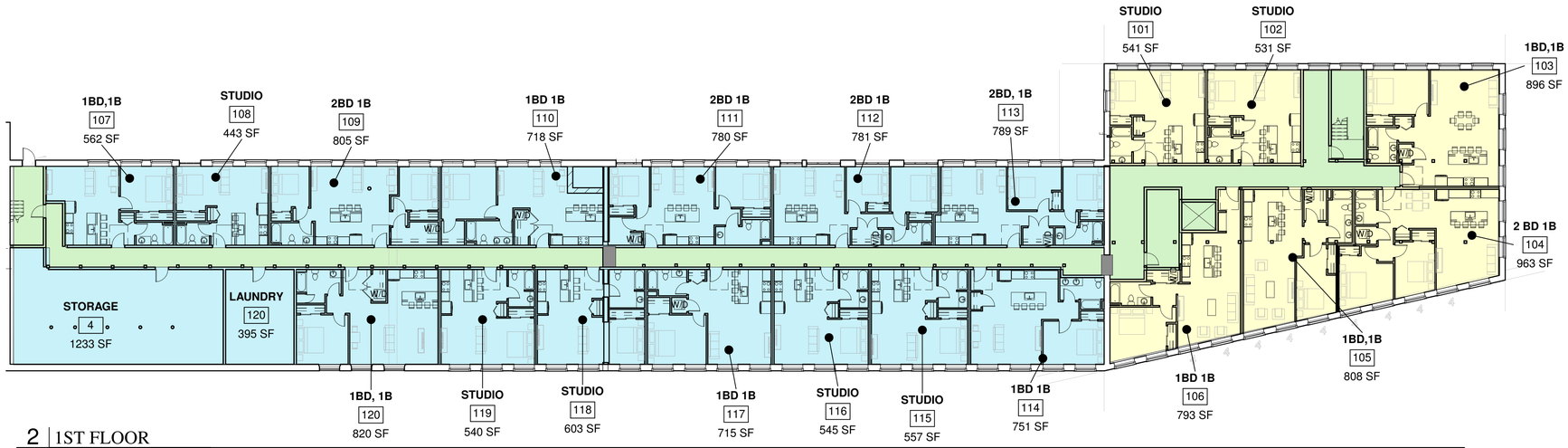
Response: Noted and all required civil and utility plans will be provided prior to the application for any building or plumbing permits.

2. All vehicle maneuvering must occur on-site and may not utilize Main Street for backing into / out of the property.

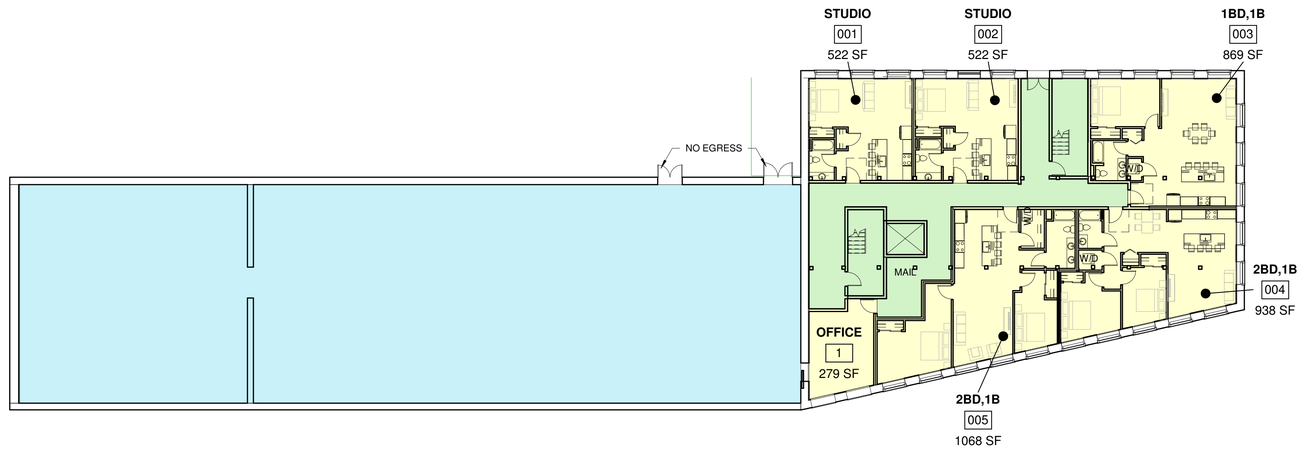
Response: Acknowledged.

3. Delivery vehicles may not block the Main Street curb-cut or prevent other vehicles from entering / exiting the adjacent multi-tenant parking lot.

Response: Acknowledged.



2 | 1ST FLOOR
1/16" = 1'-0"



1 | BASEMENT
1/16" = 1'-0"

OPTION 1 (AS DRAWN)	STUDIO	1B,1B	1B,2B	2B,1B	2B,2B	TOTAL
- BUILDING 19	7	12	-	17	6	42
- BUILDING 20	8	7	1	6	-	22
						64

- COMMON

Prepared For:

Consultant:

Architect:
ARCHETYPE ARCHITECTS
48 Union Wharf Portland, Maine 04101
(207) 772-6022 Fax (207) 772-4056

Project:
PEPPERELL MILL, 19, 20
5 MAIN STREET BIDDEFORD, ME 04005

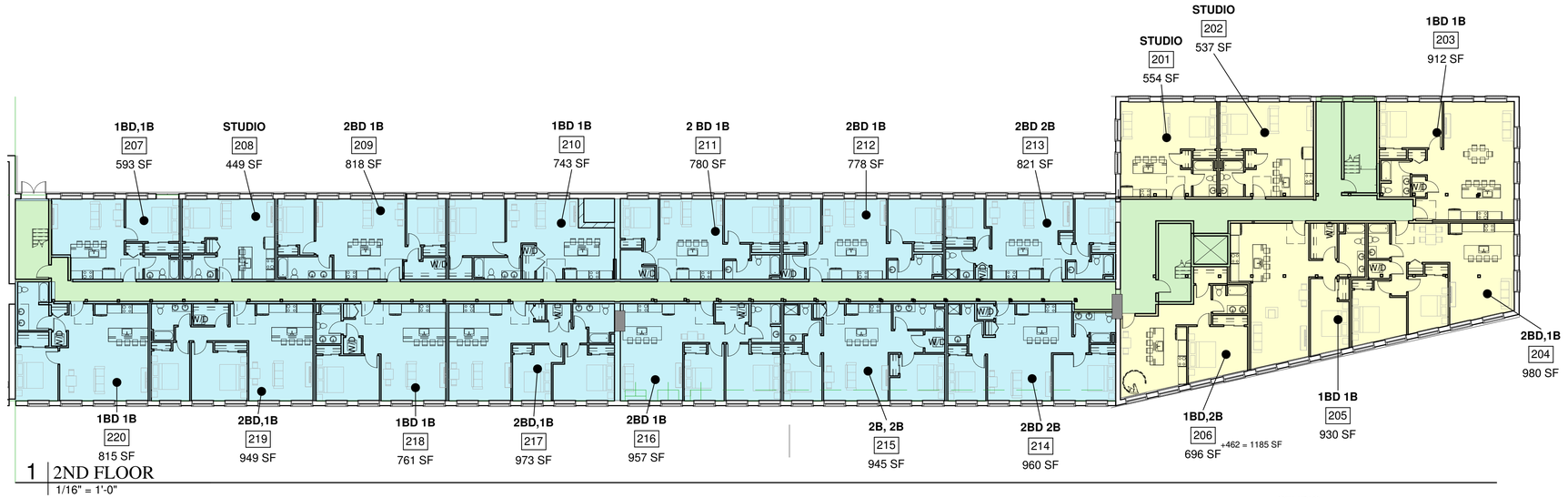
Revisions:

Scale: As indicated

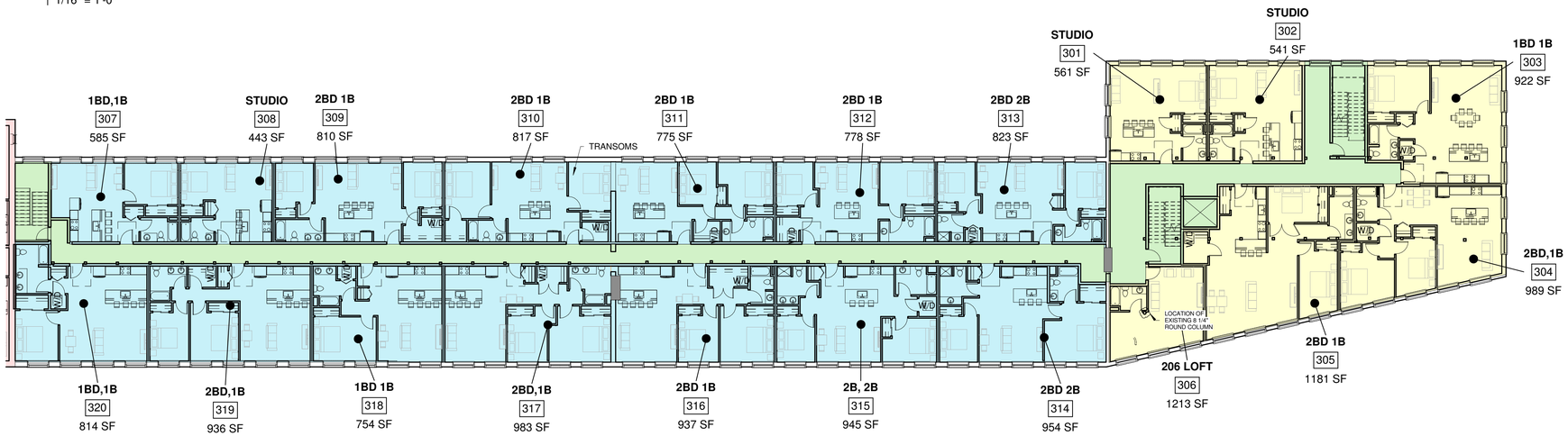
Date: 04-09-2024

FLOOR PLANS

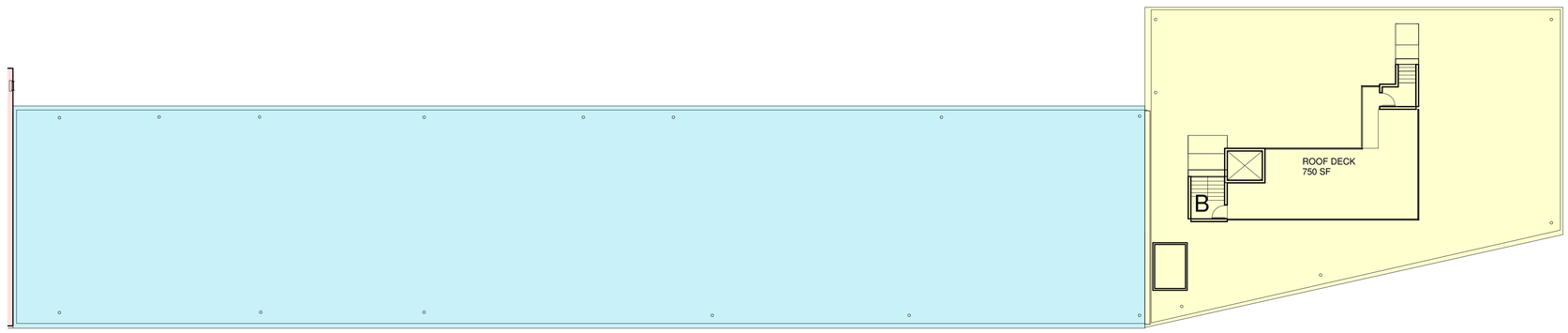
A1



1 2ND FLOOR
1/16" = 1'-0"



2 3RD FLOOR
1/16" = 1'-0"



3 ROOF PLAN
1/16" = 1'-0"

Architect:
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(207) 772-6022 Fax (207) 772-4056

Consultant:

Prepared For:

Project:
PEPPERELL MILL, 19, 20
5 MAIN STREET
BIDDEFORD, ME 04005

Revisions:
1 03/02/18 REVISIONS PER FIRE REVIEW

Scale: 1/16" = 1'-0"

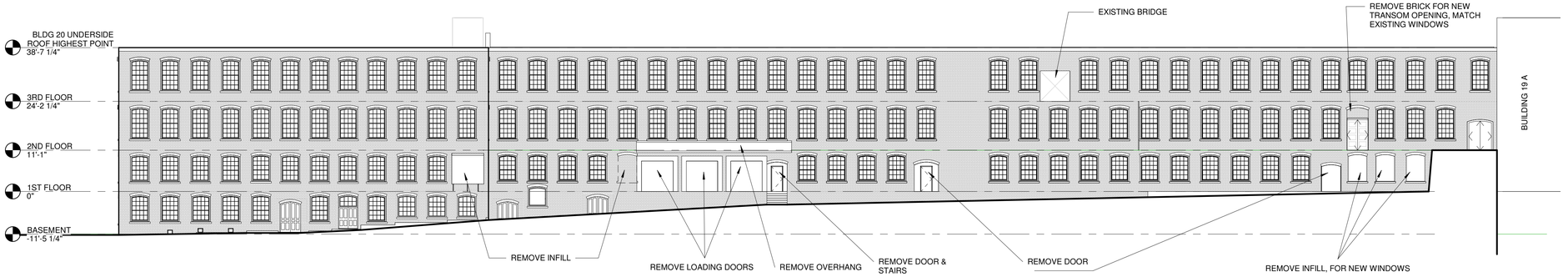
Date: 04-09-2024

FLOOR PLANS

A2



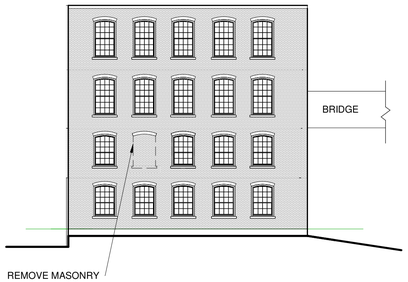
EAST ELEVATION



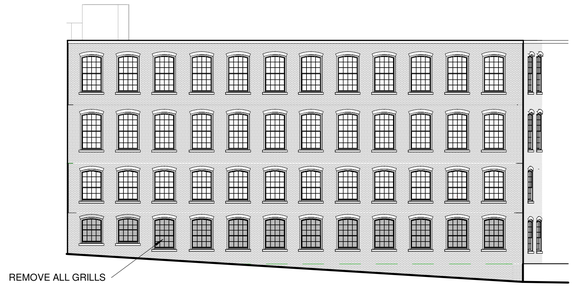
1 | BUILDINGS 19&20 NORTH ELEVATION
1/16" = 1'-0"



SOUTH ELEVATION



2 | BUILDING 20 EAST ELEVATION
1/16" = 1'-0"

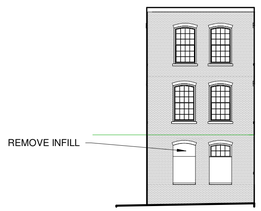


3 | BUILDING 20 SOUTH ELEVATION
1/16" = 1'-0"

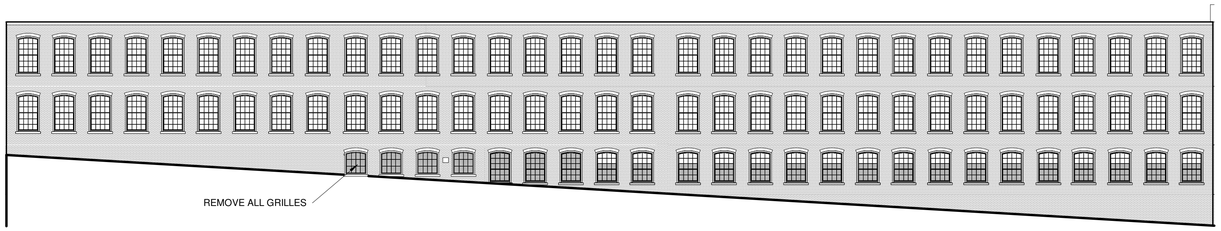


NORTH ELEVATION

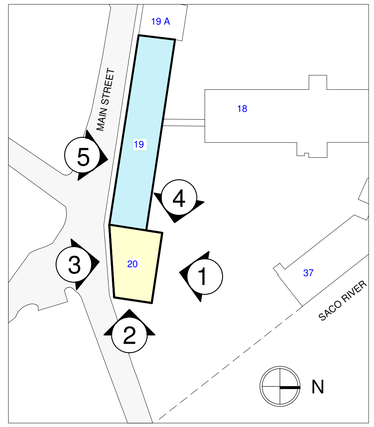
NOTE: REMOVE ALL WINDOWS & REPLACE



4 | BUILDING 20 WEST ELEVATION
1/16" = 1'-0"



5 | BULDING 19 SOUTH ELEVATION
1/16" = 1'-0"



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Project:
PEPPERELL MILL, 19, 20
5 MAIN STREET BIDDEFORD, ME 04005

Revisions:

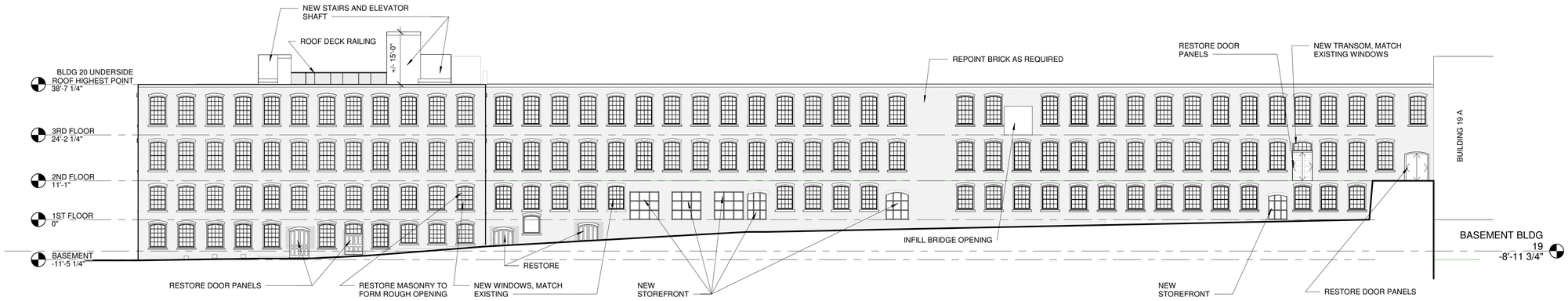
Scale: As indicated

Date: 04-09-2024

EXISTING BUILDING ELEVATIONS

A0.04

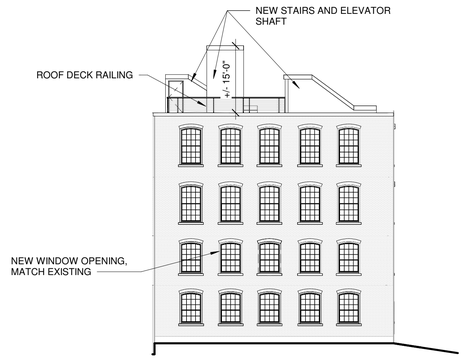
REPLACE ALL WINDOWS - MATCH EXISTING



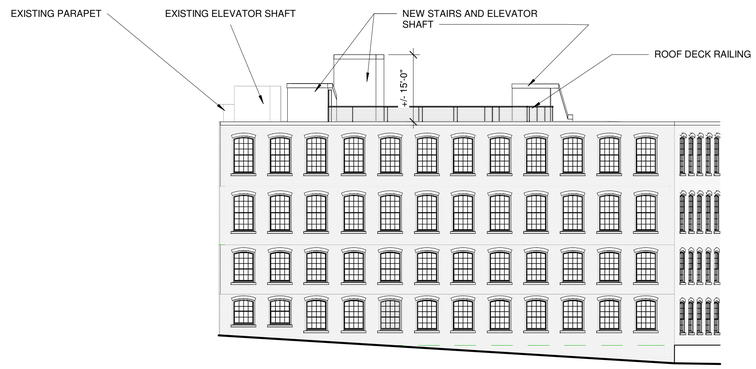
1 BUILDINGS 19&20 NORTH ELEVATION
1/16" = 1'-0"



OPENINGS GLASS INFILL EXAMPLES PREVIOUSLY APPROVED BY THE NATIONAL PARKS SERVICE

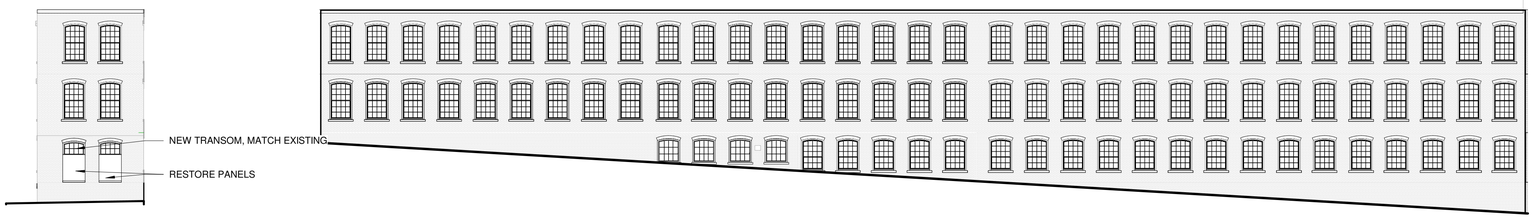


2 BUILDING 20 EAST ELEVATION
1/16" = 1'-0"



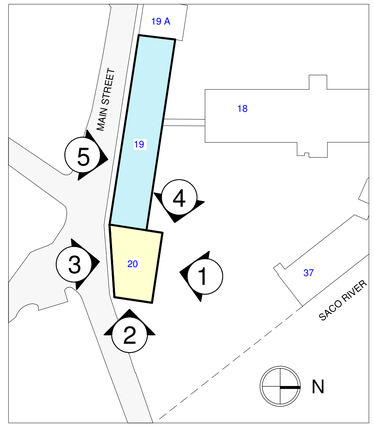
3 BUILDING 20 SOUTH ELEVATION
1/16" = 1'-0"

NOTE: ALL WINDOWS TO BE ALUMINUM CLAD, SASHES, AND FRAMES TO MATCH EXISTING



4 BUILDING 20 WEST ELEVATION
1/16" = 1'-0"

5 BULDING 19 SOUTH ELEVATION
1/16" = 1'-0"



Prepared For:

Consultant:

Architect:
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Project:
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5 MAIN STREET BIDDEFORD, ME 04005

Revisions:

Scale: As indicated

Date: 04-09-2024

NEW BUILDING ELEVATIONS

A2.1

FROM MAIN STREET



FROM EMERY STREET



FROM HILL STREET



FROM PARKING LOT



Whitten, Nan

From: Marieke Thormann <mthormann@fathomcompanies.com>
Sent: Tuesday, June 4, 2024 8:04 PM
To: Whitten, Nan; Robyn Smith-Payne; Josh Cushman
Cc: Galbraith, David; Gervais, George; Josh Soley
Subject: Re: Site Plan Application - Pepperell Mill Buildings 19 & 20
Attachments: 2024 0605 Pepperell Mill Building 19_20 - Planning Board Staff Comments - Responses.pdf; A1 - FLOOR PLANS.pdf; A2 - FLOOR PLANS.pdf; Pepperell Mill A0.04 - EXISTING BUILDING ELEVATIONS.pdf; Pepperell Mill A2.1 - NEW BUILDING ELEVATIONS.pdf; Renderings.pdf

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David,

See attached responses to comments for the Pepperell Mill 19 & 20 Sketch Plan for your review ahead of the Planning Board meeting tomorrow (6/5). I have also included the building elevation/plans that Archetype already shared earlier this week for reference.

Let me know if you have any questions ahead of the meeting or if there are any other items we should be prepared to discuss, hopefully it is a simple review given it is only Sketch Plan and the buildings are existing.

Thank you,

Marieke

Marieke Thormann, PE | *VP of Development*

Fathom COMPANIES

Fathom Companies
C | 207-317-2818
O | 207-808-8787
mthormann@fathomcompanies.com
80 Exchange Street | Suite 400
Portland, ME 04101

On 5/28/24, 12:34 PM, "Whitten, Nan" <Nan.Whitten@Biddefordmaine.org> wrote:

I certainly will, thank you

From: Marieke Thormann <mthormann@fathomcompanies.com>
Sent: Tuesday, May 28, 2024 12:33 PM
To: Whitten, Nan <Nan.Whitten@Biddefordmaine.org>; Robyn Smith-Payne <rpayne@fathomcompanies.com>; Josh Cushman <jcushman@corefirms.com>
Cc: Galbraith, David <David.Galbraith@biddefordmaine.org>; Gervais, George <George.Gervais@biddefordmaine.org>; Josh Soley <josh@corefirms.com>
Subject: Re: Site Plan Application - Pepperell Mill Buildings 19 & 20

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Nan,

Thank you, that is a great update, let us know if you need anything in the meantime.

Marieke

Marieke Thormann, PE | *VP of Development*

Fathom Companies
C | 207-317-2818
O | 207-808-8787
mthormann@fathomccompanies.com
80 Exchange Street | Suite 400
Portland, ME 04101

On 5/28/24, 11:58 AM, "Whitten, Nan" <Nan.Whitten@Biddefordmaine.org> wrote:

We have you on the agenda for June 5, we will be sending out documentation later

---

From: Marieke Thormann <mthormann@fathomcompanies.com>
Sent: Tuesday, May 28, 2024 10:25 AM
To: Whitten, Nan <Nan.Whitten@Biddefordmaine.org>; Robyn Smith-Payne <rpayne@fathomcompanies.com>; Josh Cushman <jcushman@corefirms.com>
Cc: Galbraith, David <David.Galbraith@biddefordmaine.org>; Gervais, George <George.Gervais@biddefordmaine.org>; Josh Soley <josh@corefirms.com>
Subject: Re: Site Plan Application - Pepperell Mill Buildings 19 & 20

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Nan,

We dropped off the check for the permit fee last week, please confirm receipt and let us know if the project can be included on a Planning Board agenda in June.

We appreciate the help and hope you enjoyed the long weekend,

Marieke

Marieke Thormann, PE | *VP of Development*

Fathom Companies
C | 207-317-2818
O | 207-808-8787
mthormann@fathomccompanies.com
80 Exchange Street | Suite 400
Portland, ME 04101

On 5/20/24, 10:32 AM, "Whitten, Nan" <Nan.Whitten@Biddefordmaine.org> wrote:

Hi Robyn:

Not yet but they are still processing the mail.

From: Robyn Smith-Payne <rpayne@fathomcompanies.com>
Sent: Monday, May 20, 2024 10:29 AM
To: Whitten, Nan <Nan.Whitten@Biddefordmaine.org>; Josh Cushman <jcushman@corefirms.com>
Cc: Galbraith, David <David.Galbraith@biddefordmaine.org>; Gervais, George <George.Gervais@biddefordmaine.org>; Josh Soley <josh@corefirms.com>; Marieke Thormann <mthormann@fathomcompanies.com>
Subject: Re: Site Plan Application - Pepperell Mill Buildings 19 & 20

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Hi Nan,

I hope you had a nice weekend. Just checking in to see if you received the check for the Pepperell Mill Bldg 19 & 20 Site Plan Application?

Thank you,

Robyn Smith-Payne, LEED AP BD+C | *Assistant Project Manager*

Fathom COMPANIES

Fathom Companies
C | 207-800-5495
O | 207-808-8787
rpayne@fathomcompanies.com
80 Exchange Street | Suite 400
Portland, ME 04101

From: Whitten, Nan <Nan.Whitten@Biddefordmaine.org>
Date: Wednesday, May 8, 2024 at 11:11 AM
To: Robyn Smith-Payne <rpayne@fathomcompanies.com>, Josh Cushman <jcushman@corefirms.com>
Cc: Galbraith, David <David.Galbraith@biddefordmaine.org>, Gervais, George <George.Gervais@biddefordmaine.org>, Josh Soley <josh@corefirms.com>, Marieke Thormann <mthormann@fathomcompanies.com>
Subject: RE: Site Plan Application - Pepperell Mill Buildings 19 & 20

Great to know, thank you

From: Robyn Smith-Payne <rpayne@fathomcompanies.com>
Sent: Wednesday, May 8, 2024 11:09 AM
To: Whitten, Nan <Nan.Whitten@Biddefordmaine.org>; Josh Cushman <jcushman@corefirms.com>
Cc: Galbraith, David <David.Galbraith@biddefordmaine.org>; Gervais, George <George.Gervais@biddefordmaine.org>; Josh Soley <josh@corefirms.com>; Marieke Thormann <mthormann@fathomcompanies.com>
Subject: Re: Site Plan Application - Pepperell Mill Buildings 19 & 20

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Hi Nan,

Lot 10-7 is not included in this application, please disregard that from the site plan application.

Apologies for the confusion,

Robyn Smith-Payne, LEED AP BD+C | *Assistant Project Manager*

Fathom Companies
C | 207-800-5495
O | 207-808-8787
rpayne@fathomcompanies.com
80 Exchange Street | Suite 400
Portland, ME 04101

From: Whitten, Nan <Nan.Whitten@Biddefordmaine.org>
Date: Wednesday, May 8, 2024 at 11:07 AM
To: Josh Cushman <jcushman@corefirms.com>, Robyn Smith-Payne <rpayne@fathomcompanies.com>
Cc: Galbraith, David <David.Galbraith@biddefordmaine.org>, Gervais, George <George.Gervais@biddefordmaine.org>, Josh Soley <josh@corefirms.com>, Marieke Thormann <mthormann@fathomcompanies.com>
Subject: RE: Site Plan Application - Pepperell Mill Buildings 19 & 20

The application lists all 3 maps and lots, should they all be included?

From: Josh Cushman <jcushman@corefirms.com>
Sent: Wednesday, May 8, 2024 11:01 AM
To: Robyn Smith-Payne <rpayne@fathomcompanies.com>
Cc: Galbraith, David <David.Galbraith@biddefordmaine.org>; Gervais, George <George.Gervais@biddefordmaine.org>; Josh Soley <josh@corefirms.com>; Marieke Thormann <mthormann@fathomcompanies.com>; Whitten, Nan <Nan.Whitten@Biddefordmaine.org>
Subject: Re: Site Plan Application - Pepperell Mill Buildings 19 & 20

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Nan
One quick point of clarification we are only working on buildings 19&20. The unit number does not change.
Thanks much,

Josh Cushman
Core Firms
Construction Analyst
207.838.0834

On Wed, May 8, 2024 at 10:57 AM Robyn Smith-Payne <rpayne@fathomcompanies.com> wrote:

> Great, thank you for confirming. We will coordinate payment ASAP.
>
> Enjoy the rest of your day,
>
> **Robyn Smith-Payne, LEED AP BD+C** | *Assistant Project Manager*



From: Whitten, Nan <Nan.Whitten@Biddefordmaine.org>
Date: Wednesday, May 8, 2024 at 10:56 AM
To: Robyn Smith-Payne <rpayne@fathomcompanies.com>
Cc: Josh Soley <josh@corefirms.com>, Josh Cushman <jcushman@corefirms.com>, Marieke Thormann <mthormann@fathomcompanies.com>, Galbraith, David <David.Galbraith@biddefordmaine.org>, Gervais, George <George.Gervais@biddefordmaine.org>
Subject: RE: Site Plan Application - Pepperell Mill Buildings 19 & 20

Hi Robyn:

Yes, those figures are correct

From: Robyn Smith-Payne <rpayne@fathomcompanies.com>
Sent: Wednesday, May 8, 2024 10:31 AM
To: Whitten, Nan <Nan.Whitten@Biddefordmaine.org>
Cc: Josh Soley <josh@corefirms.com>; Josh Cushman <jcushman@corefirms.com>; Marieke Thormann <mthormann@fathomcompanies.com>; Galbraith, David <David.Galbraith@biddefordmaine.org>; Gervais, George <George.Gervais@biddefordmaine.org>
Subject: Re: Site Plan Application - Pepperell Mill Buildings 19 & 20

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Hi Nan,

I really appreciate you detailing this out for me, thank you. Just to confirm, the total amount due with the initial application as part of the Sketch Plan Submission is $12,286? I assume this fee needs to be paid prior to the City of Biddeford reviewing the documents?

Thank you,

Robyn Smith-Payne, LEED AP BD+C | *Assistant Project Manager*

Fathom COMPANIES

Fathom Companies
C | 207-800-5495
O | 207-808-8787
rpayne@fathomcompanies.com
80 Exchange Street | Suite 400
Portland, ME 04101

From: Whitten, Nan <Nan.Whitten@Biddefordmaine.org>
Date: Tuesday, May 7, 2024 at 3:30 PM
To: Robyn Smith-Payne <rpayne@fathomcompanies.com>
Cc: Josh Soley <josh@corefirms.com>, Josh Cushman <jcushman@corefirms.com>, Marieke Thormann <mthormann@fathomcompanies.com>, Galbraith, David <David.Galbraith@biddefordmaine.org>, Gervais, George <George.Gervais@biddefordmaine.org>
Subject: RE: Site Plan Application - Pepperell Mill Buildings 19 & 20

Hi Robin:

Fees for a Site Plan/Subdivision Application (fees are due at time of submission) are paid in 3 increments according to the submission:

	Sketch Plan	Preliminary	Final
Administrative Fee	*$75.00*	*$75.00*	*$75.00*
*Engineer Review**	*$2,250.00*		
*Engineer Inspect**	*$2,250.00*		
Postage	*$31.00*		
*Application Fee***	*$7,680.00*	*$11,520.00*	*$750.00*
Totals	*$12,286.00*	*$11,595.00*	*$825.00*

Engineering Review & Inspection Fees are both entered into draw accounts. Once the project has been deemed complete, we will refund the amount of these accounts that are remaining.

Application Fee is based on how may units being built. In the case of Buildings 19, 19A & 20 it is 64 units multiplied by $300.00 which totals $19,200.00. This application fee is divided between Sketch Plan and Preliminary submittals 40% of the fee is due with the Sketch Plan submittal and the remaining 60% is due with the Preliminary submittal.

Fees can be paid with check made payable to the City of Biddeford or with credit card (there is a 2.5% fee for credit card payments).

Hopefully, this makes sense to you. Please let us know if you have any questions.

Thank you for your submission.

Nan Whitten
City of Biddeford
Office Manager
Planning & Development
207-284-9115

From: Robyn Smith-Payne <rpayne@fathomcompanies.com>
Sent: Tuesday, May 7, 2024 11:30 AM
To: Whitten, Nan <Nan.Whitten@Biddefordmaine.org>
Cc: Josh Soley <josh@corefirms.com>; Josh Cushman <jcushman@corefirms.com>; Marieke Thormann <mthormann@fathomcompanies.com>
Subject: FW: Site Plan Application - Pepperell Mill Buildings 19 & 20

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Hi Nan,

Thank you for the call earlier. As discussed, please see attached Site Plan Application for Pepperell Mill Buildings 19 & 20 – the required documents are included in the email below.

Please let me know if you need any additional information as well as how best to go about paying the necessary fees.

Thank you,

Robyn Smith-Payne, LEED AP BD+C | *Assistant Project Manager*



Fathom Companies
C | 207-800-5495
O | 207-808-8787
rpayne@fathomcompanies.com
80 Exchange Street | Suite 400
Portland, ME 04101

From: Robyn Smith-Payne <rpayne@fathomcompanies.com>
Date: Friday, May 3, 2024 at 12:22 PM
To: Galbraith, David <David.Galbraith@biddefordmaine.org>
Cc: Marieke Thormann <mthormann@fathomcompanies.com>, Josh Cushman <jcushman@corefirms.com>, Josh Soley <josh@corefirms.com>
Subject: Site Plan Application - Pepperell Mill Buildings 19 & 20

Good afternoon,

Please see attached Site Plan Application for Pepperell Mill Buildings 19 & 20 at 6 Main Street and 32-40 Main Street in Biddeford.

I have combined all the required submittal attachments into one PDF, please use this link to access. If you prefer that these documents are separated out, please use this link to access the individual files.

If you have any questions or need additional information, please don't hesitate to reach out.

Thank you,

Robyn Smith-Payne, LEED AP BD+C | *Assistant Project Manager*



Fathom Companies
C | 207-800-5495
O | 207-808-8787
rpayne@fathomcompanies.com
80 Exchange Street | Suite 400
Portland, ME 04101

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CITY OF BIDDEFORD

Planning and Development Department

David C.M. Galbraith
Deputy Director/City Planner
205 Main Street
P.O. Box 586
Biddeford, ME 04005
(207) 284-9115
David.Galbraith@biddefordmaine.org

PLANNING BOARD STAFF REPORT

TO: Chair Patoine and Members of the Biddeford Planning Board

FROM: David C.M. Galbraith, Deputy Director/City Planner

DATE: May 28, 2024

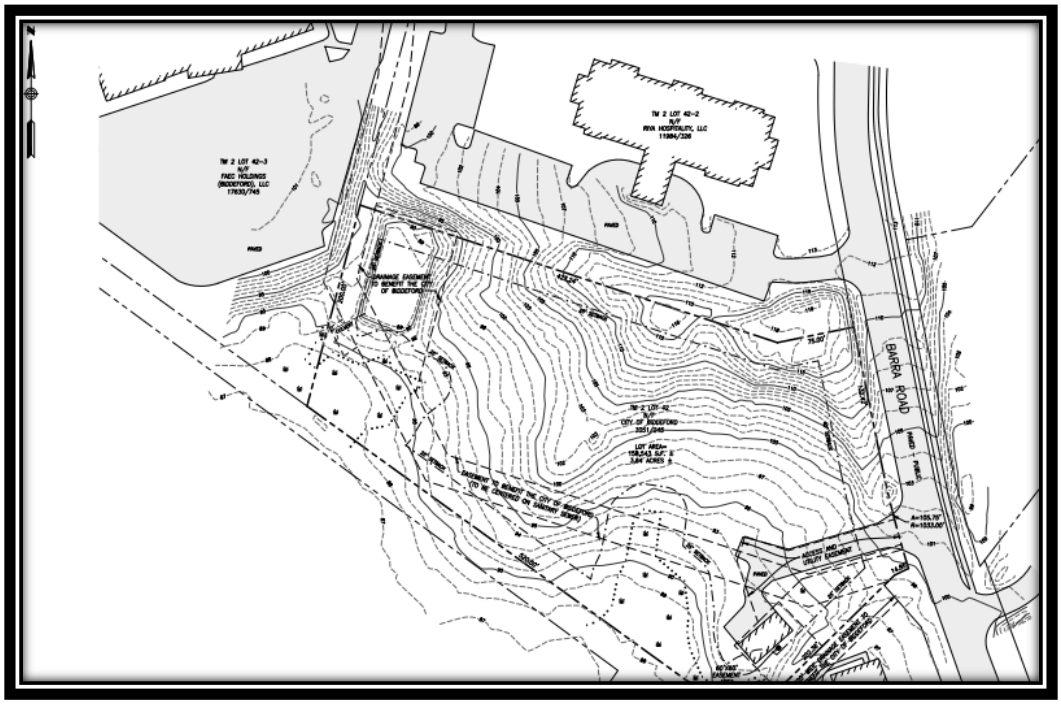
RE: 2024.29 Sketch Plan - Subdivision Review for Westbrook Development Corporation / Proposed Construction of affordable housing at 37 Barra Road (Tax Map 2, P/O Lot 42), in the I-3 Zone.

MEETING DATE: June 5, 2024 at 6:00 PM

---

1. INTRODUCTION

Westbrook Development Corporation (WDC) is applying for Sketch Plan Review for the construction of affordable housing development on the currently vacant land located at 37 Barra Road (Tax Map 2, P/O Lot 42) in the I-3 Zone.



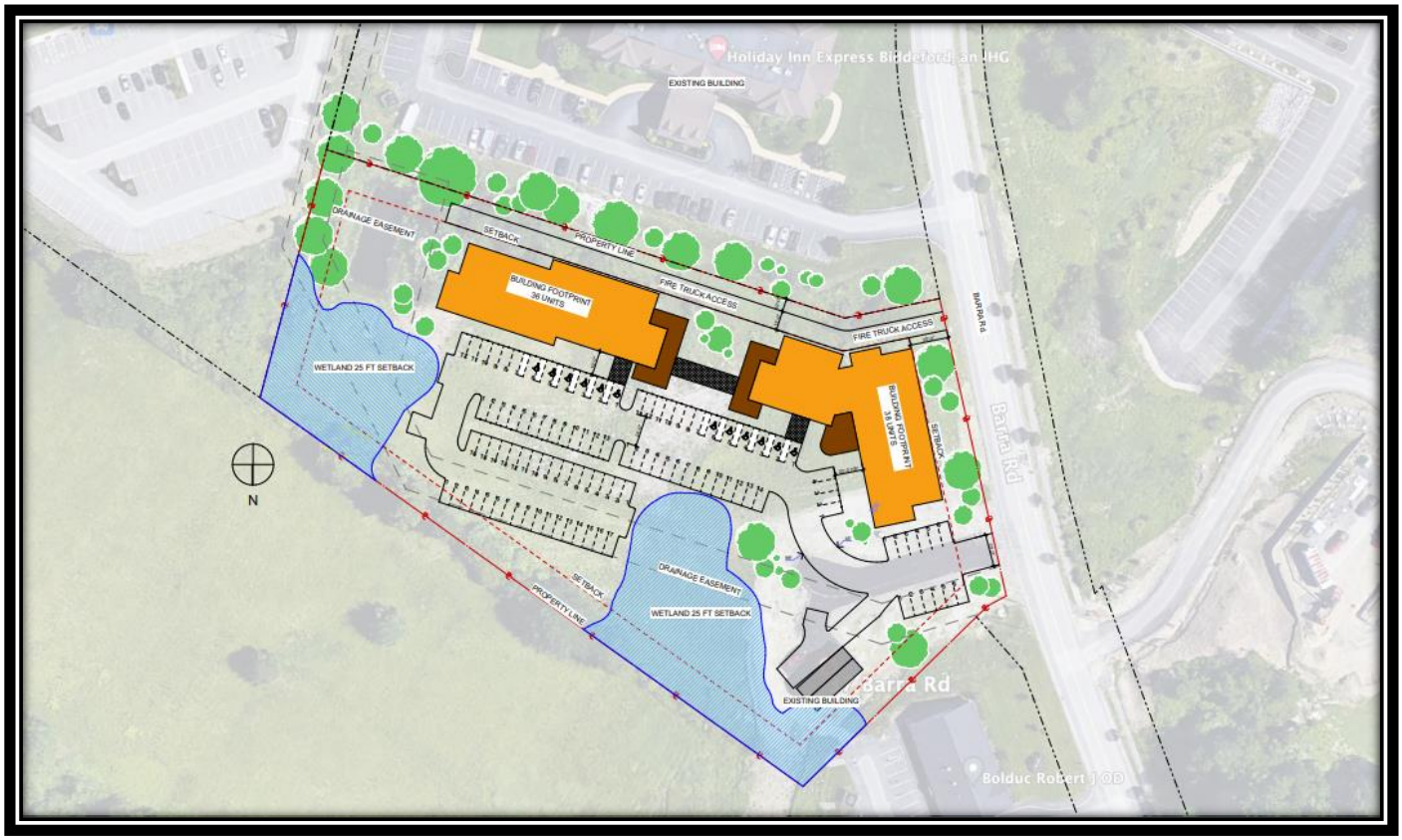
Existing Conditions Plan – 37 Barra Road

Case 2024.29: Sketch Plan Review and Subdivision Review for Westbrook Development Corporation / Proposed Construction of affordable housing at 37 Barra Road (Tax Map 2, p/o Lot 42) in the I-3 Zone.

Planning Board Hearing date: June 5, 2024.

The subject property is currently owned by the City of Biddeford and the development would require the purchase of the land. The property is 3.65-acres in area and is located within the City's I-3 Zoning District. The property currently vacant with the exception of a sewer pump station (building) with a small paved access drive / parking area. The lot includes an Access and utility easement for the pump station and associated parking in addition to an "easement to benefit the City of Biddeford (to be centered on sanitary sewer)" approximately 30' wide. The remainder of the land remains undeveloped.

The proposal includes the construction of two (2) multi-story buildings with a total of up to 80 units of affordable rental housing. As stated in their application narrative; *"Our team aims to develop two new multifamily apartment buildings consisting of up to 80 units of affordable rental housing. This site, currently owned by the City of Biddeford, is an excellent location for such a development due to its existing infrastructure, bus lines, and proximity to various amenities and employment opportunities".* The application also describes the population they serve, stating, *"Our concept envisions 100% of the proposed units to be reserved as affordable housing. The existing funding sources managed by Maine Housing typically require affordability to be set for households earning up to 50% and 60% of Area Median Income (AMI)".*



Westbrook Development Corporation (WDC) - 37 Barra Road – 80 +/- Affordable Housing Units.

The Application goes on to outline their proposal as:

Development Proposal *Our development plan includes two distinct buildings:*

1. Senior Housing Building: Reserved for residents aged 55 and older, this 36-unit building will consist entirely of one-bedroom apartments. This design is intended to cater to the needs of seniors, providing them with comfortable, manageable living spaces.

2. *Mixed-Use Family Building: This 38-unit building will not be age-restricted and will offer a mix of one-bedroom, two-bedroom, and three-bedroom units. Specifically, 50% of the units will be one-bedroom, while the remainder will be two-bedroom and three-bedroom units. This mix is designed to accommodate a variety of family sizes and living arrangements, ensuring broad community appeal.*

The buildings will have community spaces, air conditioning, outdoor seating areas, indoor trash rooms, laundry rooms, and free Wi-Fi for telemedicine services. The buildings will be designed with energy efficiency in mind utilizing efficient electric HVAC heating and cooling systems and will target other energy efficiency goals like high end insulation, roof top solar panels, and conduits for future EV charging stations. Utilities will be included in tenant's rent as a means to help keep all of their housing costs both predictable and affordable.

Accessibility and Infrastructure: *The site is exceptionally well-positioned to support affordable housing due to its accessibility to key infrastructure:*
• Public Transportation: The site is well served by existing bus routes along Barra Road, which is crucial for residents who rely on public transit.
• Utilities: The land is serviced by public water and sewer systems, and three-phase power is available, providing reliable and efficient utilities for the buildings.
• Proximity to Highway: The site's closeness to the highway enhances connectivity, making it easier for residents to travel to and from work and other destinations.
• Nearby Amenities: The area is surrounded by employment opportunities and amenities suitable for both families and seniors, such as shopping centers, healthcare facilities, and recreational areas.

Parking Anticipated Demand*: Based on our extensive experience in developing and managing similar properties on public transportation routes, we anticipate the demand for parking will be approximately 68 spaces including 5% set aside for visitors. We have found that the populations we serve often rely on public transportation, are single parent households with one car, or are seniors that no longer have the ability to drive independently.*

The anticipated actual demand is based on the following parking ratios:
• 0.75 parking space per one-bedroom unit.
• 1.25 parking spaces per two-bedroom and three-bedroom units.

Proposed Parking*: That said, we believe the site can accommodate closer to 88-100 spaces depending on how many ADA spaces are needed and the physical limitations of the site. The final number of parking spaces will be fine-tuned as the project makes its way through the Planning Board process. Based on initial due diligence and conceptual site plans we believe that we will be able to provide the parking ratios outlined below:*

• 1.0 parking space per one-bedroom unit.
• 1.5 parking spaces per two-bedroom and three-bedroom units.

This parking plan ensures that residents have adequate space for their vehicles based on our experience managing similar buildings in similar locations. Financials

The Applicant's goal is to receive all their municipal and state approvals by August 23rd in order to be eligible to apply for Maine Housing's annual funding round in September 2024. They note that funding is extremely competitive and there are always more deserving projects than there is funding available. As such, it is not uncommon for projects to need to reapply more than once for Maine Housing funding. The proposed development will require approval of a Contract Zone (#24) by the City Council who will be discussing this matter at their June 4, 2024 meeting.

It should be noted that this development proposal came together following a phone call from the City's Economic Development / Planning Director, to the Applicants following their denial of a similar project in another community whose residents voted against the low / moderate income housing project. Seeing the need for affordable housing, which has been a desire of the City Council and Staff, and a tried and true applicant it seemed like a natural fit to attract the Applicant to Biddeford. As such, the Applicants are seeking to get all municipal approvals by August 23, 2024 to enable the project to be granted funding for September 2024.

3. PROJECT DATA/INFORMATION

1.	Applicant:	Westbrook Development Corporation 30 Liza Harmon Drive Westbrook, ME 04092
2.	Owner of Property:	City of Biddeford
3.	Agent:	Owen Haskell, Inc.
4.	Surveyor:	Owen Haskell, Inc. – Professional Land Surveyors
5.	Project Location:	37 Barra Road
6.	Project Tax Map #/Lot #:	Tax Map 2, Lot P/O 42
7.	Lot Size:	3.65 Acres
8.	Base Zoning:	I-3
9.	Overlay Zoning:	N/A
10.	Existing Use:	Vacant Lot
11.	Proposed Use:	Affordable Housing
12.	Approvals Required:	Site Plan and Subdivision Review
13.	Uses in the Vicinity:	Mixed use, commercial, medical
14.	Waivers Needed:	TBD
18.	Waivers Granted:	None at this time
22.	Other Non-City Permits Required:	N/A
23.	LDR Attachment A: Fees Paid:	Yes
25.	Planning Board Review History: 6-5-24 Sketch Plan	

4. REVIEW PROCESS

Per City ordinance, this application is subject to Site Plan (Land Development Regulations, Article XI) review approval by the Planning Board. This requires 1) Sketch Plan Review; 2) Preliminary Review and; 3) Final Review. The project will also require a Contract Zone to ultimately be approved by the City Council following Planning Board review and recommendation.

5. MOTION:

The Application before the Board is a "Sketch Plan" so no formal vote is required. However, the Board should provide the Applicant direction regarding any items that should be included in the formal Preliminary Application.

City of Biddeford – Planning Department
Planning Board Application
P.O. Box 586, 205 Main Street Biddeford, Maine 04005
207-284-9115

Type of Application:

__ Shoreland Zoning Permit __ Site Plan Review __ Extraction
__ Conditional Use Permit __ Subdivision __ Private Way
_x_ Other: ____Sketch Plan_____

Applicant Information:

Name: ___Westbrook Development Corporation_____
Mailing Address: ___30 Liza Harmon Drive, Westbrook, ME 04092_____
Telephone: __(207) 956-1575_____
Email: __tnorod@westbrookdevelopmentcorp.org_____
What is your legal interest in the property?
__ Owner _X_ Potential Buyer with Contract __ Lease/Rental Agreement

Owner's Information:

Name: __Westbrook Development Corporation_____
Mailing Address: ___30 Liza Harmon Drive, Westbrook, ME 04092_____
Telephone: __(207) 956-1575_____
Email: __tnorod@westbrookdevelopmentcorp.org_____

Agent's Information:

Name: __Westbrook Development Corporation_____
Mailing Address: ___30 Liza Harmon Drive, Westbrook, ME 04092_____
Telephone: __(207) 956-1575_____
Email: __tnorod@westbrookdevelopmentcorp.org_____

Engineer/Surveyor's Information:

Name: __Gorrill Palmer_____
Mailing Address: __300 Southborough Drive, Suite 200, South Portland, ME 04106_____
Telephone: ___(207) 772-2515_____
Email: ___kbourassa@gorrillpalmer.com_____

Project Location and Lot Information:

Street Address: __37 Barra Road_____ Drainage Watershed:_ Thatcher Brook
Tax Map: _____2_____ Lot: _____42; 42/999; 42/A_____ Current Zoning: _____I3_____ Shoreland Zoning: _____
Size of Lot: ___3.64_____ (x)acres ( )s.f. Lot Frontage: _____132.42'_____
Existing Use of Property: ___Vacant lot with shed and utility/sewer easement _____
_____

_ **Property currently serviced by:**

_x_ City Road _x_ Public Sewer _x_ Public Water __ Public Trash
__ Private Road __ Septic System __ Private Well _x Private Hauler

Slope Conditions in Area of Construction (if applicable):

__ Flat (0-3% slope) _x Rolling (3-8% slope) _x Hilly (8-15% slope) __Steep (15%+ Slope)

Are there any wetlands or waterbodies on the site? _x_ (Yes)__(No) if yes attach information
Is the project within the 100-year floodplain? __ (Yes)_x_(No) if yes attach information
Do you plan to bring fill onto the lot? _x_(Yes) __(No) If yes attach information

Description of proposed use of property:
Project/Proposed Use: Two (2) new multifamily buildings containing up to 80 affordable apartments.

_____

Property to be Serviced by: Westbrook Housing Authority as its Property Manager

__ City Road _x_ Public Sewer _x_ Public Water __ Public Trash
__ Private Road __ Septic System __ Private Well _x_ Private Hauler

Limits of Disturbance: 2.25 acres ( )acres ( )s.f.
Net change in impervious cover: 64,000 sf ( )acres ( )s.f.
Is this project part of a larger project? __(Yes) _x_(No)
Is the project proposing a new Private or Public Road? __(Yes, Private) __(Yes, Public) _x_(No)
Is this project within the Urbanized Area/MS4 (*see City Drainage Map*) _x_(Yes) __(No)
Is the project proposing any Stormwater facilities/BMPs? __(Yes) _x_(No)
Will a Traffic Movement Permit (TMP) be required?: __(Yes) _x_(No)

__ **If in a Shoreland Zone:**
Percent of residential lot coverage (Max 20%): _____
Percent of structure expansion (Max 30%): _____
__ **If Subdivision Review, number of lots proposed:** _____
__ **If a Private Way is proposed, number of lots served:** _____

If Site Plan Review, you must provide the following information:
Total new square feet footprint of structure: 21,000sf
Total new square feet paving/parking: 43,000sf

Waiver Requests (attach details):

1. _____
2. _____
3. _____
4. _____
5. _____

Required Submittal Attachments:

A. Letters of Approval
   __ Fire Department – Contact Chief or Deputy Chief – 282-9986
   __ Ability to Serve for Water Service – Maine Water – 282-1543
   __ Ability to Serve for Sewer Service – Engineering Department – Tom Milligan 284-9118
   __ Police Department – e-911 Road Name Designation – Contact Joanne Fisk 282-5127
B. Letter to Planning Board describing project, Waiver requests, proposed improvements, addressing permit requirements, etc.
C. Photographs of Site.
D. Architectural renderings/drawings of proposed buildings, as required.
E. Engineering Plans, as required.
F. Stormwater Management Report, as required.

Fees (Due at time of Submission):

- $75 Nonrefundable Administration Fee is required for every application.
- Refer to "Attachment A Fees and Charges" of the Land Development Regulations for more information. Consult with Planning Staff if you have questions.

Required Signatures:

By signing this application, as the foresaid applicant or authorized agent:

- I certify that I have read and completely understand the application;
- I certify that the information contained in this application and its attachments are true and correct;
- I understand that all information provided on this form and all other documents submitted as part of my proposal is a matter of public record;
- I understand that copies of this information may be supplied upon request to an interested party.
- I understand that additional funds may be required through the course of the review for special studies, legal review costs, and/or engineering review.
- I understand that by submitting an application I am not guaranteed a place on any particular agenda. I further understand that the City Planner will place me on an agenda for review when the application is deemed substantially complete.

Will the proposed project cause 1 acre or more of site disturbance?: __(Yes) __(No)

- **If Yes, applicant is responsible for any required Maine Construction General Permits and shall comply with the requirements of DEP Chapter 500 Stormwater Regulations, as they apply.**

Signature of Applicant: Tyler Norod **Date** 05/29/2024

Signature of Property Owner: _____ **Date** _____

DIGITAL SUBMITTAL REQUIREMENTS FOR ALL SUBMITTALS:

A) PDF OF SIGNED APPLICATION

B) PDFs OF ALL DRAWING SETS AND OTHER REQUIRED SUBMITTAL ATTACHMENTS NOTED ABOVE

HARD-COPY SUBMITTAL REQUIREMENTS FOR PLANNING BOARD APPLICATIONS:

A) SEVEN (7) FULL-SIZE PAPER COPIES OF DRAWING SETS

DIGITAL SUBMITTAL REQUIREMENTS FOR FINAL APPROVAL:

A) INDIVIDUALLY NAMED PDFs OF EACH DRAWING (NOT A COMBINED PDF SET)

- Individual Drawing PDF Naming Format: 'PROJECT/SHEETSET NAME_INDIVDUAL DRAWING NAME.pdf'

B) PDF COPIES OF ALL PERMIT APPROVALS, APPLICATIONS, REPORTS, NARRATIVES, LETTERS, ETC.

C) FINAL CAD REFERENCE FILES IN DWG FORMAT (SURVEY & PROPOSED DESIGN LINEWORK)

- All drawings & CAD reference files must be to-scale and within the following coordinate systems:

- MAINE STATE PLANE WEST NAD83 (Horizontal Datum) & NAVD88 (Vertical Datum)

HARD-COPY SUBMITTAL REQUIREMENTS FOR FINAL APPROVAL:

A) THREE (3) FULL-SIZE PAPER COPIES OF INDIVIUDAL DRAWINGS REQUIRING BOARD SIGNATURE

B) ONE (1) FULL-SIZE PAPER COPY OF ENTIRE DRAWING SET FOR ENGINEERING RECORDS

PLEASE CONFIRM WITH PLANNING STAFF FOR CLARIFICATION

May 29, 2024

Biddeford Planning Board
City of Biddeford
205 Main Street
Biddeford, ME 04005

Re: Sketch Plan Review – 37 Barra Road

Dear Members of the Biddeford Planning Board,

I am writing on behalf of Westbrook Development Corporation (WDC) to provide a narrative outlining our proposed development project at 37 Barra Road, Biddeford, ME. We have partnered with Kaplan Thompson Architects and Gorrill Palmer as our civil engineer to develop much needed sustainable, affordable housing options for the City of Biddeford. Our team aims to develop two new multifamily apartment buildings consisting of up to 80 units of affordable rental housing. This site, currently owned by the City of Biddeford, is an excellent location for such a development due to its existing infrastructure, bus lines, and proximity to various amenities and employment opportunities.

Site Overview

The proposed site at 37 Barra Road is currently vacant, aside from a shed pump house owned by Maine Water Company. The land includes existing easements for site access, stormwater, and sewer. The presence of these easements will be taken into careful consideration during the planning and construction phases to ensure compliance and functionality.

Zoning

The site is currently located within the I3 Industrial Zone. In order to build the proposed plan for affordable housing WDC is requesting the City to adopt a contract zone.

Development Team

More than 30 years after our founding, WDC has grown from an extension of a government-funded local housing authority to a widely recognized leading non-profit developer of affordable and workforce housing. WDC is proud to lead a team of experts that includes Kaplan Thompson

Architects, Gorrill Palmer Engineering, Westbrook Housing Authority (WHA), and Drummond Woodsum LP. Each member of our team are proven leaders in their fields with a demonstrated history of orchestrating intricate, affordable, sustainable, and meticulously planned residential developments. Our confidence in the capability of our team stems from this robust collective experience and our ability to get great projects done.

Our diverse development portfolio showcases our versatility, including a 100-unit, multistory apartment building, a charming single-family townhouse community, luxurious market-rate condominiums fashioned from a historic schoolhouse, and contemporary industrial-style lofts converted from an abandoned riverside mill. From affordable rental communities catering to seniors and residents with disabilities to pioneering homeownership opportunities for first-time buyers, WDC takes pride in delivering distinctive housing initiatives. We currently manage and own a portfolio of approximately 650 affordable apartments with an additional 115 affordable apartments scheduled to finish construction in the fall of 2024.

At our core, WDC is deeply committed to fostering sustainable long-term growth of affordable housing across Greater Portland and Southern Maine. Rather than imposing developments on cities and towns, we prioritize collaboration. We work hand in hand with city officials, civic leaders, neighborhoods, and residents to understand their needs and aspirations, ensuring that the housing solutions we create reflect their desires.

Our message to all communities is simple yet powerful: "Tell us what you want. We listen." By embracing this ethos, we consistently empower communities with the housing options they seek, making a lasting positive impact on the lives of countless individuals and families. With each project we undertake, WDC reaffirms its position as a leader in affordable and workforce housing development, dedicated to shaping a better, more inclusive future for all.

Development Proposal

Our development plan includes two distinct buildings:

1. **Senior Housing Building**: Reserved for residents aged 55 and older, this 36-unit building will consist entirely of one-bedroom apartments. This design is intended to cater to the needs of seniors, providing them with comfortable, manageable living spaces.

2. **Mixed-Use Family Building**: This 38-unit building will not be age-restricted and will offer a mix of one-bedroom, two-bedroom, and three-bedroom units. Specifically, 50% of the units will be one-bedroom, while the remainder will be two-bedroom and three-bedroom units. This mix is designed to accommodate a variety of family sizes and living arrangements, ensuring broad community appeal.

The buildings will have community spaces, air conditioning, outdoor seating areas, indoor trash rooms, laundry rooms, and free wi-fi for telemedicine services. The buildings will be designed

with energy efficiency in mind utilizing efficient electric HVAC heating and cooling systems and will target other energy efficiency goals like high end insulation, roof top solar panels, and conduits for future EV charging stations. Utilities will be included in tenant's rent as a means to help keep all of their housing costs both predictable and affordable.

Senior Building - Unit Mix

	1BR	2BR	3BR	**Total**
Unit Mix	36	0	0	**36**

Non-Age Restricted Builing - Unit Mix

	1BR	2BR	3BR	**Total**
Unit Mix	19	11	8	**38**

Accessibility and Infrastructure

The site is exceptionally well-positioned to support affordable housing due to its accessibility to key infrastructure:

- **Public Transportation**: The site is well served by existing bus routes along Barra Road, which is crucial for residents who rely on public transit.
- **Utilities**: The land is serviced by public water and sewer systems, and three-phase power is available, providing reliable and efficient utilities for the buildings.
- **Proximity to Highway**: The site's closeness to the highway enhances connectivity, making it easier for residents to travel to and from work and other destinations.
- **Nearby Amenities**: The area is surrounded by employment opportunities and amenities suitable for both families and seniors, such as shopping centers, healthcare facilities, and recreational areas.

Parking

Anticipated Demand

Based on our extensive experience in developing and managing similar properties on public transportation routes, we anticipate the demand for parking will be approximately 68 spaces including 5% set aside for visitors. We have found that the populations we serve often rely on public transportation, are single parent households with one car, or are seniors that no longer have the ability to drive independently. The anticipated actual demand is based on the following parking ratios:

- 0.75 parking space per one-bedroom unit.
- 1.25 parking spaces per two-bedroom and three-bedroom units.

Proposed Parking

That said, we believe the site can accommodate closer to 88-100 spaces depending on how many ADA spaces are needed and the physical limitations of the site. The final number of parking spaces will be fine-tuned as the project makes its way through the Planning Board process. Based on initial due diligence and conceptual site plans we believe that we will be able to provide the parking ratios outlined below:

- 1.0 parking space per one-bedroom unit.
- 1.5 parking spaces per two-bedroom and three-bedroom units.

This parking plan ensures that residents have adequate space for their vehicles based on our experience managing similar buildings in similar locations.

Financials

Our project will be primarily funded through Low Income Housing Tax Credits (LIHTC), which are awarded annually by MaineHousing. This funding mechanism is crucial to making the development financially viable while keeping rental rates affordable long term for our target populations. In addition, it is typical for affordable housing to need other smaller funding layers to fill their capital stack including permanent loans, TIF's, HOME or CDBG funding, or AHP awards through the Federal Home Loan Bank of Boston.

We believe this development is well positioned to be competitive for available funding sources and will greatly benefit the Biddeford community by providing much-needed affordable housing options for both seniors and families. We are committed to working closely with the City of Biddeford and the Planning Board to ensure that this project meets all regulatory requirements and enhances the quality of life for future residents.

Populations Served

Our concept envisions 100% of the proposed units to be reserved as affordable housing. The existing funding sources managed by MaineHousing typically require affordability to be set for households earning up to 50% and 60% of Area Median Income (AMI). These income levels are published by the federal government based on census data for regional median household incomes and household size. Below is a chart outlining the current income levels published for 2024. The exact mix of AMI levels are determined by the funding sources available at the time of application. MaineHousing typically opens application rounds once a year in the fall.

% Median Income – Adjusted by Household Size - 2024				
	One	Two	Three	Four
50% AMI	$34,300	$39,200	$44,100	$48,950
60% AMI	$41,160	$47,040	$52,920	$58,740

These income levels are typical for many jobs in our community that are often described as essential and represent many of our current senior community members who are on fixed incomes. Some common job types that qualify include: EMT's, Daycare Workers, Ed Techs, School Bus Drivers, Teachers, Nursing Home Attendants, and many more.

Timeline

Our goal is to receive all our municipal and state approvals by August 23rd in order to be eligible to apply for MaineHousing's annual funding round in September 2024. It should be noted that funding is extremely competitive and there are always more deserving projects than there is funding available. As such, it is not uncommon for projects to need to reapply more than once for MaineHousing funding.

Typically, MaineHousing holds applications for its tax credit funds once a year. The three (3) timeline scenarios below are based on different potential timelines for successfully receiving a funding award from MaineHousing. Once under construction we anticipate construction of each building to last approximately 14-16 months. The two-month difference is largely to account for uncertainties related to removing granite ledge known to be on site. Our preference would be to apply for funding for both buildings at the same time, but there is always the possibility that one building receives an award before the other and they need to have offset construction starts.

Scenario 1

Major Milestones & Activities	Timeline
Site Control, Contract Zone, TIF, Municipal Approvals	Before August 23rd, 2024
Submit Tax Credit Application to MaineHousing	September 2024
Receive Funding Award	December 2024
Design Development Prior to Construction	Winter 2025
Construction Bid	Spring 2025
Construction Start	Summer 2025
Construction Completion & Lease Up	Fall 2026/Winter 2027

Scenario 2

Major Milestones & Activities	Timeline
Site Control, Contract Zone, TIF, Municipal Approvals	After August 23rd, 2024
Submit Tax Credit Application to MaineHousing	September 2025
Receive Funding Award	December 2025
Design Development Prior to Construction	Winter 2026
Construction Bid	Spring 2026
Construction Start	Summer 2026
Construction Completion & Lease Up	Fall 2027/Winter 2028

Scenario 3

Major Milestones & Activities	Timeline
Site Control, Contract Zone, TIF, Municipal Approvals	After August 23rd, 2024
Unsuccessful Tax Credit Application to MaineHousing	September 2025
Resubmit Tax Credit Application to MaineHousing	September 2026
Receive Funding Award	December 2026
Design Development Prior to Construction	Winter 2027
Construction Bid	Spring 2027
Construction Start	Summer 2027
Construction Completion & Lease Up	Fall 2028/Winter 2029

Conclusion

Thank you for your time and consideration in reviewing our proposal. We are excited about the opportunity to collaborate with the City of Biddeford and are confident that this project will bring significant benefits to the community. We look forward to working closely with City Staff, the Mayor, City Council, the Planning Board and local community to refine our plans and address any questions or concerns. Together, we can create a vibrant, inclusive, and sustainable housing development that meets the needs of Biddeford's residents.

Sincerely,

Tyler Norod

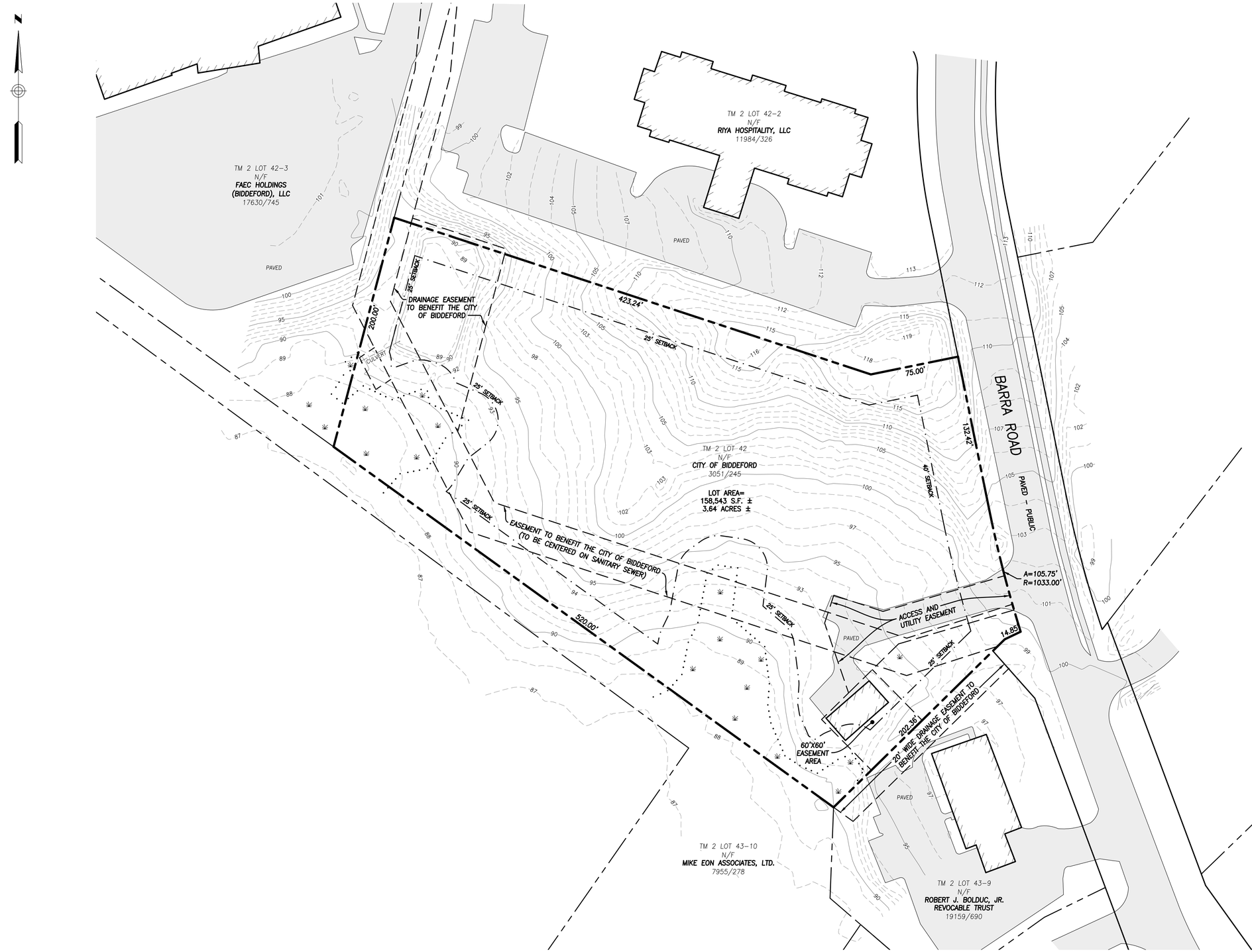
Tyler Norod
Development Director
Westbrook Development Corporation



Aerial Map – 37 Barra Road, Biddeford, ME

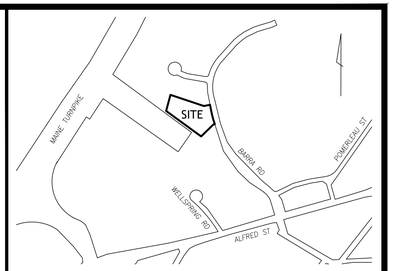

37 Barra Rd
Biddeford, Maine
Google Street View
Jul 2018
See more dates





SCALE : 1" = 40'

0' 20' 40' 80'



LOCATION MAP N.T.S.

LEGEND

- SETBACK LINE
- EASEMENT LINE
- EDGE OF WETLAND
- 100 1' CONTOUR

PLAN REFERENCES

1. *"CITY OF BIDDEFORD, 205 MAIN STREET, BIDDEFORD, MAINE – FIFTH AMENDED SUBDIVISION PLAN", SEPTEMBER 12, 2024, BY OWEN HASKELL, INC, RECORDED AT YORK COUNTY REGISTRY OF DEEDS (Y.C.R.D.) IN PLAN BOOK 371, PAGE 50.*
2. *"AMENDED SUBDIVISION PLAN OF: LOT 1 – EXIT 4 BUSINESS PARK, BARRA ROAD, BIDDEFORD, MAINE – FOR: VERIZON NEW ENGLAND, INC.", NOVEMBER 21, 2000, BY SEBAGO TECHNICS.*
3. *"RECORD PLAN OF THE: EXIT 4 BUSINESS PARK PCH, BARRA ROAD, BIDDEFORD, MAINE – FOR: VERIZON NEW ENGLAND, INC.", NOVEMBER 14, 2000, BY SEBAGO TECHNICS, RECORDED AT Y.C.R.D. IN PLAN BOOK 260, PAGE 11.*
4. *SITE PLAN, COMMERCIAL SITE, 35 BARRA ROAD, BIDDEFORD, MAINE", JUNE 2011, BY BH2M, RECORDED AT Y.C.R.D. IN PLAN BOOK 354, PAGE 25.*
5. *SUBDIVISION PLAN, 3 LOT SUBDIVISION, BARRA ROAD, BIDDEFORD, MAINE", JUNE 2013, BY BH2M, RECORDED AT Y.C.R.D. IN PLAN BOOK 362, PAGE 30.*

GENERAL NOTES

1. *OWNER OF RECORD: CITY OF BIDDEFORD*
   TAX MAP 2 LOT 42
   Y.C.R.D. BOOK 3051 PAGE 245
2. *BEARINGS ARE BASED ON STATE PLAN COORDINATE SYSTEM, MAINE WEST ZONE, NAD 83.*
3. *ELEVATIONS ARE BASED ON NAVD 88 DATUM, DERIVED FROM 2020 LiDAR DATA PROVIDED VIA HTTPS://COAST.NOAA.GOV/DATAVIEWER/.*
4. *THE PURPOSE OF THIS PLAN IS TO SHOW THE APPROXIMATE BOUNDARY OF THE LOCUS PARCEL AND ITS RELATION TO EXISTING FEATURES AND TOPOGRAPHIC DATA.*
5. *THE LOCUS PARCEL IS ENTIRELY WITHIN AN INDUSTRIAL 3 (I3) ZONE WITH THE FOLLOWING DIMENSIONAL REQUIREMENTS;*
   FRONT SETBACK: 40 FEET
   SIDE/REAR SETBACK: 25 FEET
   WETLAND SETBACK: 25 FEET
6. *ACCORDING TO FEMA'S FLOOD INSURANCE RATE MAP 2301450008B, w/ EFFECTIVE DATE MAY 15, 1984, THE LOCUS PARCEL IS ZONE C (AREA OF MINIMAL FLOODING)*
7. *THE BOUNDARY OF THE LOCUS PARCELS SOLELY BASED ON PLAN REFERENCE #1. THIS IS NOT A BOUNDARY SURVEY.*
8. *WETLAND'S WERE DELINEATED MAY 22, 2024 BY FLYCATCHER, LLC.*
9. *BUILDINGS AND PAVEMENT SHOWN ARE BASED ON AERIAL PHOTOGRAPHY.*
10. *THE LOCUS PARCEL IS SUBJECT TO AN ACCESS & UTILITY EASEMENT AND A 60'X60' EASEMENT AREA, SHOWN PER PLAN REFERENCE #1. THE STATUS OF SAID EASEMENTS ARE UNKNOWN.*
11. *THE EASEMENTS LABELED "TO BENEFIT THE CITY OF BIDDEFORD" ARE SHOWN PER PLAN REFERENCE #1. THE STATUS OF SAID EASEMENTS ARE UNKNOWN.*

Compiled Survey
At
37 Barra Road, Biddeford, Maine
Made for
Westbrook Development Corporation
& Westbrook Housing Authority
30 Liza Harmon Dr, Westbrook, ME

OWEN HASKELL, INC.
PROFESSIONAL LAND SURVEYORS
390 US ROUTE 1, UNIT 10, FALMOUTH, ME 04105 TEL. 207-774-0424

DRAWN BY:	JWS	DATE:	MAY 24, 2024	JOB NO.	2024-115
CHECKED BY:	RRL	SCALE:	1" = 40'	DRWG. NO.	1



Kaplan
Thompson
Architects

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

SITE PLAN

WDC_B

05/29/2024

CITY OF BIDDEFORD

Planning and Development Department

David C.M. Galbraith
Deputy Director/City Planner
205 Main Street
P.O. Box 586
Biddeford, ME 04005
(207) 284-9115
David.Galbraith@biddefordmaine.org

PLANNING BOARD STAFF REPORT

TO: Chair Patoine and Members of the Biddeford Planning Board

FROM: David C.M. Galbraith, City Planner & Deputy Director of the Planning & Development Dept.

DATE: May 28, 2024

RE: 2024.21 Preliminary Plan for Indian Cliff Development Corp for an 9-lot subdivision on Barra Road (Tax Map 7, Lot 15) in the R-3 & R-1 zones and Contract Zone (#23) Review.

MEETING DATE: June 5, 2024 at 6:00 PM

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1. INTRODUCTION

This application is being presented by Michael Eon, president of Indian Cliff Development Corporation. The subject property is approximately 55.94-acres in area, and the Applicant is seeking to subdivide approximately seven (7) acres into eight (9) lots. One of the proposed lots is currently being reviewed for a new Avesta Housing project which consists of a four story, 46 unit, low / moderate income (LMI), senior housing development. The subject property (Tax Map 7, Lot 15) is a proposed 2.2-acre property**,** located to the east of Barra Road, immediately north of the 60 Barra Road project (Reveler, formerly Saxon), and is located in the R-3 zoning district.

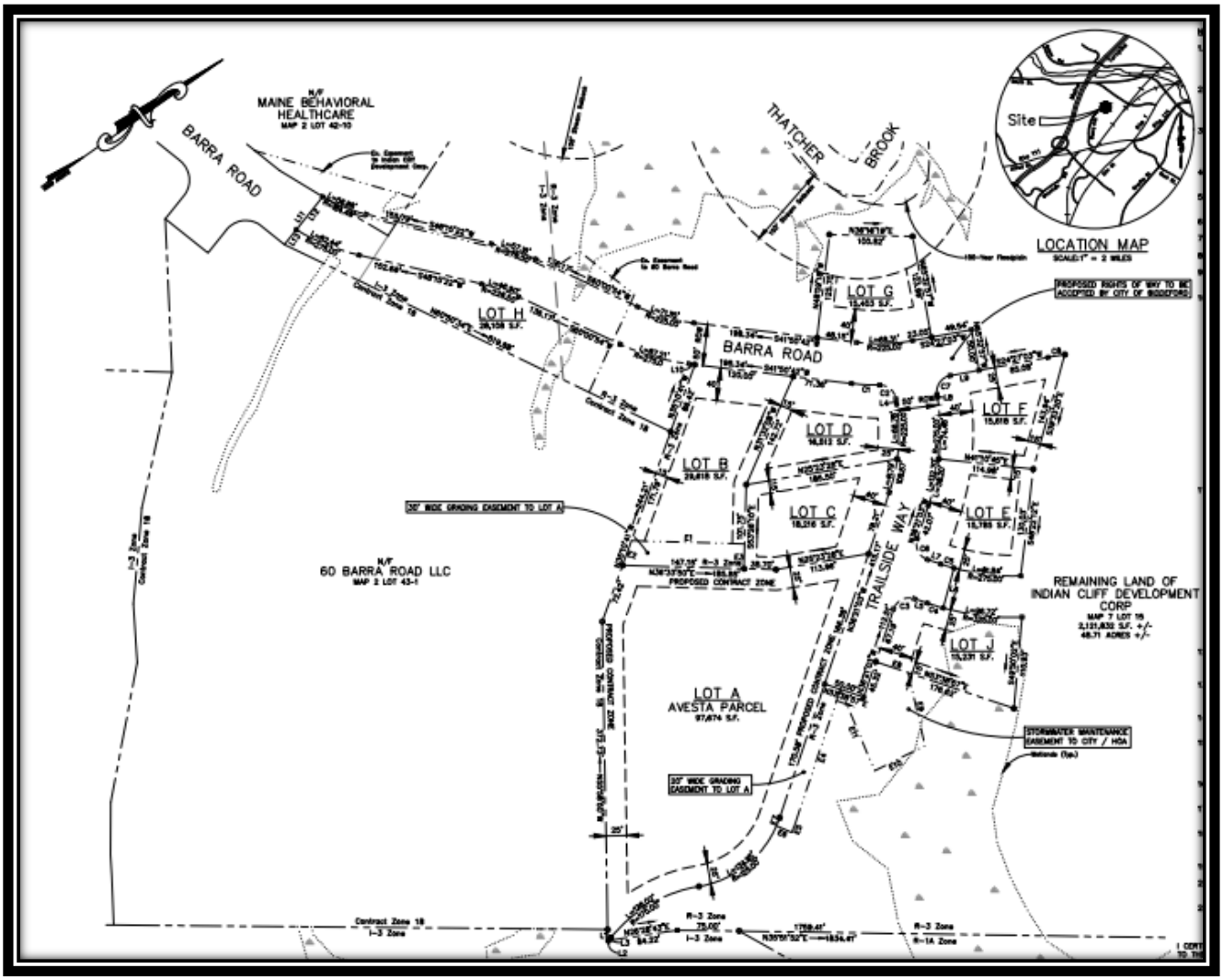
The Avesta project is interwoven with this application which is seeking Subdivision approval and Contract Zone review / amendment with a positive recommendation to the City Council for final approval of the proposed Contract Zone #23. The subdivision project proposes to subdivide approximately 7 acres of the existing parcel to provide 9 new lots, with Lot A being the parcel proposed for Avesta's development, Lots B through G being proposed as single family or duplex lots for Indian Cliff Development Corp, and Lot H being a remainder lot that is not proposed for housing development. Lot H currently features stormwater and access easements granted to Reveler for development of the 60 Barra Road project, which construction is currently ongoing, and will propose to provide stormwater management for the extension of Barra Road proposed by Indian Cliff Development.

Access to the proposed lots will be via a roadway extension off the end of Barra Road including a new proposed road, providing access to the Avesta development. The project will be accessed via an extension of Barra Road to a new connecting roadway tentatively named

2024.21 Preliminary Plan for Indian Cliff Development Corp for an 9-lot subdivision on Barra Road (Tax Map 7, Lot 15) in the R-3 & R-1 zones and Contract Zone (#23) Review. Planning Board

Meeting Date: June 5, 2024

Trailside Way. The proposed roadway name has been forwarded to the City's E-911 Addressing Officer who will determine if the roadway name conflicts with other street names in the City. In addition to Avesta's site plan review and approval, the combined projects will also require 1) A subdivision plan approval and 2) Contract Zone review and ultimately City Council review and approval. The proposed subdivision and Contract Zone are being requested by the Indian Cliff Development Corp. which is owned, in part, by Michael Eon.

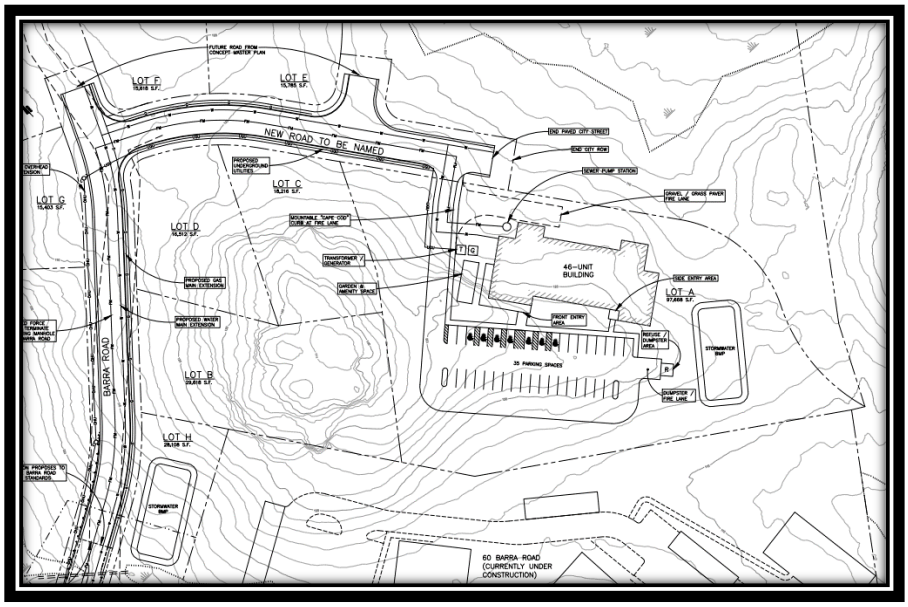


Proposed Eight Lot Subdivision

Indian Cliff Development – Contract Zone: The Contract Zone request was forwarded to the City Council to be discussed at their April 16, 2024 meeting. In turn the Council forwarded the proposed Contract Zone to the Planning Board for review and recommendation. The need for the Contract Zone is due to the proposed development of lot A by Avesta Housing for a low income houring project. The Contract Zone will require, at minimum, two (2) public hearings before the Planning Board followed by a

recommendation to the City Council which would be reviewed at two (2) separate Council hearings. The proposed Contract Zone is in keeping with the previously approved Contract Zone for the 60 Barra Road property in regards to height and bulk. In addition, the proposed Avesta Housing project is in keeping with the properties previously approved Joint Development Agreement (JDA) / Contract Zone which stipulated that Indian Cliff Development would provide a LMI senior housing develop in this general area which is required to have a *minimum* of 30 units.

The Avesta Housing project is currently before the Planning Board under a separate application for Site Plan Preliminary Plan review. Avesta is being represented by Ryan Fecteau, Senior Officer if Policy and Planning for Avesta Housing and Christopher MacDonald, PE Civil Engineer of BH2M Engineering Consultants, who is also the project engineer for the proposed subdivision.



Avesta Housing – 46 Unit, LMI senior housing project

The proposed Avesta Housing project is a four story, 46 unit, low / moderate income (LMI), senior housing development. The subject property (Tax Map 7, Lot 15) is a proposed 2.2-acre property lot located to the east of Barra Road, immediately north of the 60 Barra Road project (Reveler, formerly Saxon), and is located in the R-3 zoning district.

2. PROJECT DATA/INFORMATION

1.	Applicant:	Indian Cliff Development Corp PO Box 444 Biddeford, ME 04005-0444
2.	Owner of Property:	Indian Cliff Development Corp
3.	Agent:	Christopher MacDonald P.E. BH2M 380B Maine Street Gorham, ME 04038
4.	Surveyor:	Same as above
5.	Project Location:	Barra Road

6.	Project Tax Map #/Lot #:	Tax Map 7, Lot 15
7.	Lot Size:	55.94 acres
8.	Base Zoning:	R-3 & I-3
9.	Overlay Zoning:	N/A
10.	Existing Use:	Vacant Land
11.	Proposed Use:	9 Lot Subdivision
12.	Approvals Required:	Subdivision/Site Plan
13.	Uses in the Vicinity:	Commercial/Medical
14.	Waivers Needed:	a. None
18.	Waivers Granted:	a. None
22.	Other Non-City Permits Required:	
23.	LDR Attachment A: Fees Paid:	Preliminary Plan Fees Paid
25.	Planning Board Review History: April 17, 2024- Sketch Plan; June 5, 2024 Preliminary Plan	

3. REVIEW PROCESS

Per City ordinance, this application is subject to Subdivision Review (Chapter 66 – Subdivisions) and approval by the Planning Board and Contract Zone (#23) review and recommendation to the City Council.

4. STAFF REVIEW

- **APPLICATION COMPLETENESS:** This application is for subdivision preliminary plan review so the purpose of this memorandum is to identify items City Staff and the Board believes are important and necessary for the continued review of this plan / project.

- **ZONING:** The subject property is zoned R-3 & I-3 but this application includes a Contract Zone to allow the Avesta project to construct a four (4) story, senior housing development, which includes a building height and bolt as the adjacent Reveler development, located to the immediate south of the proposed Avesta development.

- **REVIEW STANDARDS:**

  Staff found the preliminary plan application to satisfy City subdivision requirements.

- **WAIVERS:** The applicant is not seeking any waivers at this time.

5. STAFF RECOMMENDATION

The Application is for Subdivision “preliminary plan review” and Staff is supportive of the proposed subdivision as designed and recommends that the Board grant the requested Preliminary Plan approval.

4. SAMPLE MOTIONS:

A. **Motion to approve** 2024.21 Preliminary Plan for Indian Cliff Development Corp for an 9-lot subdivision on Barra Road (Tax Map 7, Lot 15) in the R-3 & R-1 zones, with the recommended Conditions of Approval.

B. **Motion to Table** Case # 2024.21 Preliminary Plan for Indian Cliff Development Corp for an 9-lot subdivision on Barra Road (Tax Map 7, Lot 15) in the R-3 & R-1 zones), based upon the following reasons:

a)_____

b)_____

c)_____

C. **Motion to Deny:** 2024.21 Preliminary Plan for Indian Cliff Development Corp for an 9-lot subdivision on Barra Road (Tax Map 7, Lot 15) in the R-3 & R-1 zones, based upon the following reasons:

a)_____

b)_____

c)_____

CITY OF BIDDEFORD

Planning and Development Department

David C.M. Galbraith
Deputy Director/City Planner
205 Main Street
P.O. Box 586
Biddeford, ME 04005
(207) 284-9115
David.Galbraith@biddefordmaine.org

PLANNING BOARD STAFF REPORT

TO: Chair Patoine and Members of the Biddeford Planning Board

FROM: David C.M. Galbraith, City Planner & Deputy Director of the Planning & Development Dept.

DATE: May 28, 2024

RE: 2024.21 Preliminary Plan for Indian Cliff Development Corp for an 8-lot subdivision on Barra Road (Tax Map 7, Lot 15) in the R-3 & R-1 zones and Contract Zone (#23) Review.

MEETING DATE: June 5, 2024 at 6:00 PM

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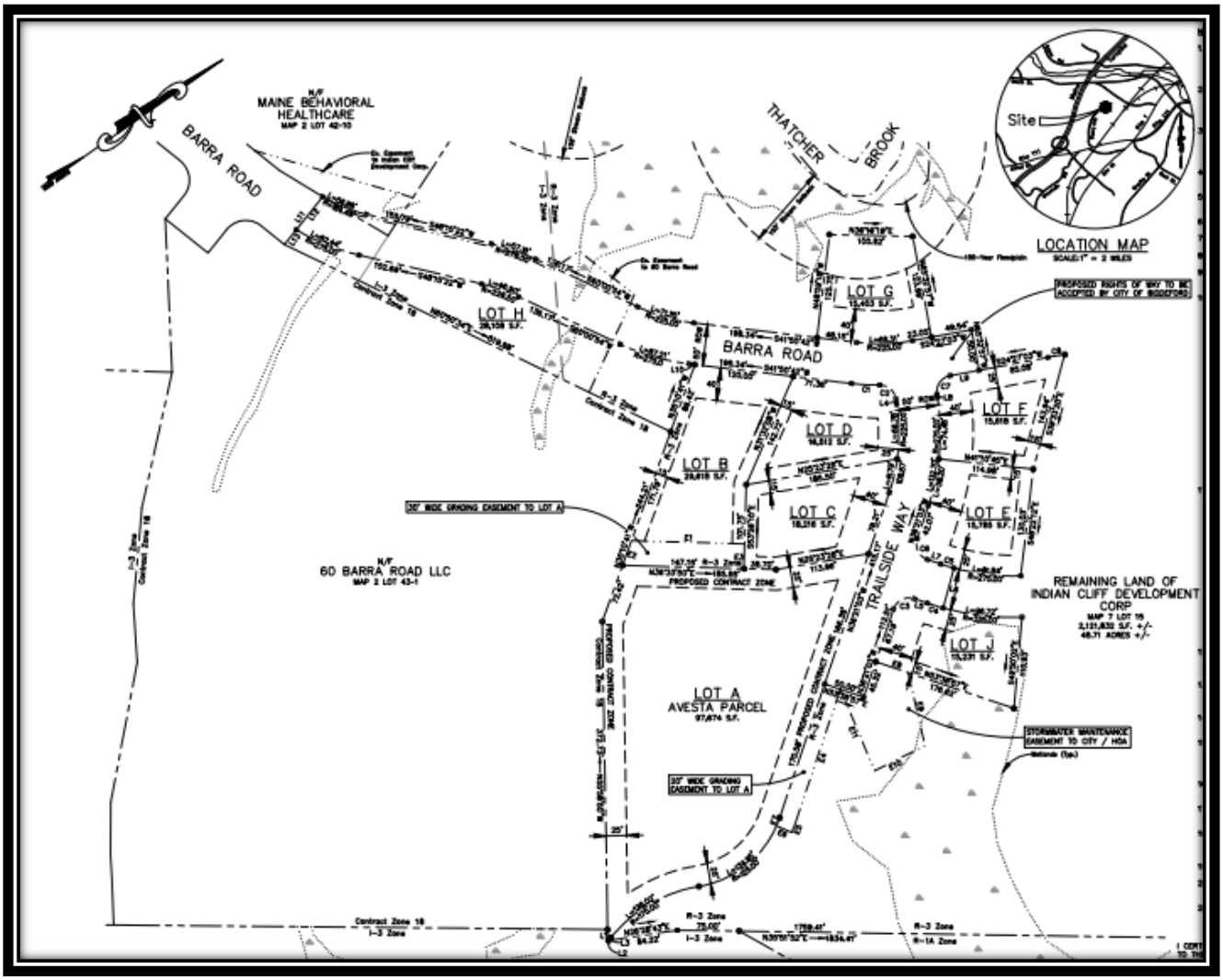
1. INTRODUCTION

This application is being presented by Michael Eon, president of Indian Cliff Development Corporation. The subject property is approximately 55.94-acres in area, and the Applicant is seeking to subdivide approximately seven (7) acres into eight (8) lots. One of the proposed lots is currently being reviewed for a new Avesta Housing project which consists of a four story, 46 unit, low / moderate income (LMI), senior housing development. The subject property (Tax Map 7, Lot 15) is a proposed 2.2-acre property**,** located to the east of Barra Road, immediately north of the 60 Barra Road project (Reveler, formerly Saxon), and is located in the R-3 zoning district.

The Avesta project is interwoven with this application which is seeking Subdivision approval and Contract Zone review / amendment with a positive recommendation to the City Council for final approval of the proposed Contract Zone #23. The subdivision project proposes to subdivide approximately 7 acres of the existing parcel to provide 8 new lots, with Lot A being the parcel proposed for Avesta's development, Lots B through G being proposed as single family or duplex lots for Indian Cliff Development Corp, and Lot H being a remainder lot that is not proposed for housing development. Lot H currently features stormwater and access easements granted to Reveler for development of the 60 Barra Road project, which construction is currently ongoing, and will propose to provide stormwater management for the extension of Barra Road proposed by Indian Cliff Development.

Access to the proposed lots will be via a roadway extension off the end of Barra Road including a new proposed road, providing access to the Avesta development. The project will be accessed via an extension of Barra Road to a new connecting roadway tentatively named

Trailside Way. The proposed roadway name has been forwarded to the City's E-911 Addressing Officer who will determine if the roadway name conflicts with other street names in the City. In addition to Avesta's site plan review and approval, the combined projects will also require 1) A subdivision plan approval and 2) Contract Zone review and ultimately City Council review and approval. The proposed subdivision and Contract Zone are being requested by the Indian Cliff Development Corp. which is owned, in part, by Michael Eon.

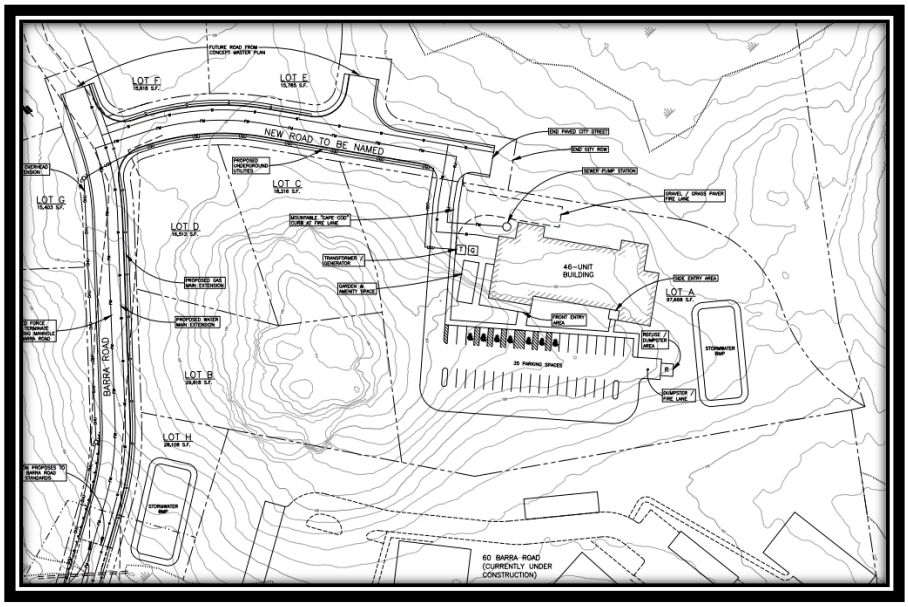


Proposed Eight Lot Subdivision

Indian Cliff Development – Contract Zone: The Contract Zone request was forwarded to the City Council to be discussed at their April 16, 2024 meeting. In turn the Council forwarded the proposed Contract Zone to the Planning Board for review and recommendation. The need for the Contract Zone is due to the proposed development of lot A by Avesta Housing for a low income houring project. The Contract Zone will require, at minimum, two (2) public hearings before the Planning Board followed by a

recommendation to the City Council which would be reviewed at two (2) separate Council hearings. The proposed Contract Zone is in keeping with the previously approved Contract Zone for the 60 Barra Road property in regards to height and bulk. In addition, the proposed Avesta Housing project is in keeping with the properties previously approved Joint Development Agreement (JDA) / Contract Zone which stipulated that Indian Cliff Development would provide a LMI senior housing develop in this general area which is required to have a *minimum* of 30 units.

The Avesta Housing project is currently before the Planning Board under a separate application for Site Plan Preliminary Plan review. Avesta is being represented by Ryan Fecteau, Senior Officer if Policy and Planning for Avesta Housing and Christopher MacDonald, PE Civil Engineer of BH2M Engineering Consultants, who is also the project engineer for the proposed subdivision.



The proposed Avesta Housing project is a four story, 46 unit, low / moderate income (LMI), senior housing development. The subject property (Tax Map 7, Lot 15) is a proposed 2.2-acre property lot located to the east of Barra Road, immediately north of the 60 Barra Road project (Reveler, formerly Saxon), and is located in the R-3 zoning district.

Avesta Housing – 46 Unit, LMI senior housing project

2. PROJECT DATA/INFORMATION

1.	Applicant:	Indian Cliff Development Corp PO Box 444 Biddeford, ME 04005-0444
2.	Owner of Property:	Indian Cliff Development Corp
3.	Agent:	Christopher MacDonald P.E. BH2M 380B Maine Street Gorham, ME 04038
4.	Surveyor:	Same as above
5.	Project Location:	Barra Road

6.	Project Tax Map #/Lot #:	Tax Map 7, Lot 15
7.	Lot Size:	55.94 acres
8.	Base Zoning:	R-3 & I-3
9.	Overlay Zoning:	N/A
10.	Existing Use:	Vacant Land
11.	Proposed Use:	8 Lot Subdivision
12.	Approvals Required:	Subdivision/Site Plan
13.	Uses in the Vicinity:	Commercial/Medical
14.	Waivers Needed:	a. None
18.	Waivers Granted:	a. None
22.	Other Non-City Permits Required:	
23.	LDR Attachment A: Fees Paid:	Preliminary Plan Fees Paid
25.	Planning Board Review History: April 17, 2024- Sketch Plan; June 5, 2024 Preliminary Plan	

3. REVIEW PROCESS

Per City ordinance, this application is subject to Subdivision Review (Chapter 66 – Subdivisions) and approval by the Planning Board and Contract Zone (#23) review and recommendation to the City Council.

4. STAFF REVIEW

- **APPLICATION COMPLETENESS:** This application is for subdivision preliminary plan review so the purpose of this memorandum is to identify items City Staff and the Board believes are important and necessary for the continued review of this plan / project.

- **ZONING:** The subject property is zoned R-3 & I-3 but this application includes a Contract Zone to allow the Avesta project to construct a four (4) story, senior housing development, which includes a building height and bolt as the adjacent Reveler development, located to the immediate south of the proposed Avesta development.

- **REVIEW STANDARDS:**

  Staff found the preliminary plan application to satisfy City subdivision requirements.

- **WAIVERS:** The applicant is not seeking any waivers at this time.

5. STAFF RECOMMENDATION

The Application is for Subdivision “preliminary plan review” and Staff is supportive of the proposed subdivision as designed and recommends that the Board grant the requested Preliminary Plan approval.

4. SAMPLE MOTIONS:

A. **Motion to approve** 2024.21 Preliminary Plan for Indian Cliff Development Corp for an 8-lot subdivision on Barra Road (Tax Map 7, Lot 15) in the R-3 & R-1 zones, with the recommended Conditions of Approval.

B. **Motion to Table** Case # 2024.21 Preliminary Plan for Indian Cliff Development Corp for an 8-lot subdivision on Barra Road (Tax Map 7, Lot 15) in the R-3 & R-1 zones), based upon the following reasons:

a)_____

b)_____

c)_____

C. **Motion to Deny:** 2024.21 Preliminary Plan for Indian Cliff Development Corp for an 8-lot subdivision on Barra Road (Tax Map 7, Lot 15) in the R-3 & R-1 zones, based upon the following reasons:

a)_____

b)_____

c)_____

Site Design Associates
Consulting Engineering and Land Planning

May 29, 2024

David Galbraith, City Planner
Via email

RE: Barra Road Subdivision

Dear David;

Per your request Site Design Associates has undertaken a review of the plans and documentation submitted in support of a preliminary site plan review and subdivision applications.

Our review was based on preliminary civil engineering plans dated 05-15-24, the application packet, the stormwater management report for the project, and a site visit. It is our understanding the project requires review and approval by the Maine Department of Environmental Protection under the under Chapter 500 Stormwater Law. Therefore, we did not review the stormwater quantity and quality analysis in great detail, as this will be performed by DEP staff. We did review this information and design in the context of the city land use code and standard engineering practice.

We are aware that the plans are preliminary, and may not contain the detail one would expect in the final documents. Our comments include some items that may be closer associated with final documents, in order for the applicant to consider them prior to the final plan submission.

Based on our review we offer the following comments for your, the planning board's, and the applicant's consideration:

A. Stormwater Management

1. The stormwater management report was developed to address local and state regulations. The report and drainage plans indicate that subsequent to development, the post development stormwater runoff rates for the 2, 10, and 25 year storms will be equal to or less than the existing rates of runoff at three analysis points around the site perimeter. This meets the requirements for stormwater runoff control under the city code. Additionally, two underdrained soil filters have been designed to enhance the stormwater runoff quality, in fulfillment of the DEP general standards. Lastly, because the project is located in the direct watershed of Thatcher Brook, an urban impaired stream, under the DEP Stormwater Law the applicant must mitigate impacts by reducing or eliminating an onsite or off site existing impervious area, or by paying a compensation fee. It is our understanding that the fee in Biddeford would be

23 Whitney Way Topsham, Maine 04086
Phone: (207) 449-4275 email: info@sitedesignassociates.biz

paid to a Compensation Fee Utilization Fund administered by the city for Thatcher Brook. The applicant intends to pay the fee for this project.

2. Soil filter 2 appears to be located in an easement shown on the subdivision plan along with the note "Stormwater maintenance easement to city/HOA." We assume the city will require that the maintenance be the responsibility of the HOA. If that is the case, the note should be revised, and the easement for soil filter 3 clarified as well. We recommend that the requirements of Chapter 34-481(c) be applied to both soil filters 2 and 3, assuming the HOA will be responsible for maintenance.

3. The plans appear to reflect a private force main in the future public right of way, with individual pump stations on each lot. Is this acceptable to the city? It seems an option would be to install gravity sewers to a central pump station located to accommodate the planned and future development.

B. Drainage Plans and Calculations

1. The stormwater model for soil filter 3 indicates that SC-1J will be 0% impervious, even though it is part of lot B. This should be clarified.
2. The treatment calculations indicate that there will be no treatment for the developed area in SC-1J. However, this area is tributary to SF 3. This should be clarified.
3. Although the entire area of SC-1J (19,433 s.f.) is included in the model for the peak rates of runoff, and will be routed to SF-3, only 4,961 s.f. is include in the soil filter sizing calculations.
4. Although the entire area of SC-2D (11,870 s.f.) is included in the model for the peak rates of runoff, and will be routed to SF-2, only 1,919 s.f. is include in the soil filter sizing calculations.
5. The soil filter storage calculations appear to indicate that the filter material will have a 40% void ratio. Given the specifications for this material, that will not be the case.
6. The post-construction I and M plan should include the requirements for inspecting the soil filter.

C. Drawings

1. Sheets 4 and 5 – Plan/Profile drawings

    a. Will the existing portion of Barra Road be paved at the same time the proposed portion is paved?
    b. What is the intent/purpose of note 3?
    c. The city checklist requires that a 25 year hydraulic grade line be shown for the storm drains. The plans for the soil filters indicate that stormwater will back up into the stormdrain line from the soil filters. This has the potential to cause issues during winter months, and reducing the storm drain capacity

during freeze thaw cycles, particularly with the slow drawdown of the soil filters.

d. Snow storage areas are shown behind the guardrail at the end of the roads. We suggest that the guardrail be located 20 ft off the edge of pavement to provide adequate space for snow storage.
e. Is wood guardrail acceptable to the city?
f. Given the slope below the outlet of the 18" stormdrain at sta 205+50 of Barra Road, we recommend that a properly sized level spreader be installed below the outlet.
g. Several catch basins are specified as Type F basins. Are these acceptable to the city? Is the city equipped to maintain the Type F basins?
h. Slopes steeper than 3H:1V require additional erosion protection. This should be specified on the drawings and the extent shown. A waiver of Article XI .Article II.5.B.1.e.3. is required for slopes steeper than 2H:1V and of Article VI, Section 26. F. for slopes steeper than 3:1.
i. A cross walk, tip downs, and ADA tactile warnings should be provided across Trailside Way at the intersection with Barra Road.
j. Utilities should be extend to points beyond the edge of the new pavement.
k. Why is the sewer not extended to the end of Barra Road?
l. Intersection radii (30 ft minimum) and centerline curve data should be shown.
m. Sizes of utility services should be shown.
n. Utility service valves should be shown on the right of way line.
o. It seems utilities should be extended beyond the end of the tee at sta 302+55 of Trailside Way.
p. Provisions should be made for erosion protection at the end of the side street referenced above, or the pavement graded back toward Trailside Way.
q. Spot grades should be provided at the end of all roads and turnouts.
r. Is the plan acceptable to the fire department.

2. Sheet 6 – Erosion Control Details

   a. The I and M plan for during construction should be included on this drawing.

3. Sheet 8 – Details A

   a. Minimum 2 ft deep sumps should be provided in the Type F basins. Two courses of brick or equivalent grade rings should also be noted.
   b. A force main cleanout manhole detail should be provided.
   c. Road Typical Section
      - Show sideslopes and erosion protection of the slopes.
      - We recommend 30" from the face of curb to the face of guardrail to allow for snow storage. Based on the detail provided there would be 4-5" available for snow storage.

- Does this typical section match the typical section approved for Barra Road?
- A waiver of the travel way width required under the land use code for a major urban road may be necessary.
- Tack coat should be shown between the base and surface paving.
- The typical section should be revised to conform with the grading plans; i.e. ditch on the sidewalk side and ditch on the opposite side.
- The typical section reflects subbase gravel extending to daylight to provide subgrade drainage. The city should be consulted to verify this is acceptable, in lieu of underdrains. If acceptable, an underdrain would still be required from the east side of the end of Barra Road to Sta 301+75 of Trailside Way.
- Specifications for fill material under the subbase gravel should be provided.

d. The pavement joint detail should include a shiplap joint.

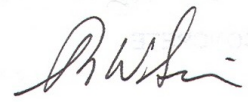
4. Sheets 9 and 10 – Grassed Underdrained Soil Filter Details

a. Provide embankment sections.
b. The inspection requirements for the soil filter construction should include inspections when the liner is in place and prior to the back fill of the underdrains.
c. What will prevent water from flowing through 20" of riprap in the emergency spillway? A better option for preventing erosion may be a Turf Reinforcement Mat.
d. The elevations for the various storms should be shown in the typical sections, along with the water quality volume.
e. Riprap aprons should be shown at the ends of the outlet control structure outlet pipes.
f. The rim elevation for OCS 2 conflicts with the model.
g. The OCS 3 water quality inlet dimensions conflict with the plan/profile drawing but are consistent with the model.

We do not believe that these comments will significantly impact the overall design concept, and that they could be satisfactorily addressed at the time of the final plan submission, if the planning board and you concur.

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

Sincerely,
Site Design Associates



Tom Saucier, P.E.
President

City of Biddeford

Subdivision Application

BARRA ROAD SUBDIVISION

Barra Road, Biddeford, Maine

May 2024

Applicant

Indian Cliff Development Corp.
260 Main Street
P.O, Box 444
Biddeford, ME 04005

Agent

BH2M
380B Main Street
Gorham, Maine 04038

BH2M

Civil Engineering | Surveying

David Galbraith
City Planner of Biddeford, Maine
205 Main Street
P.O. Box 586
Biddeford, ME 04005

May 15, 2024

Re: Barra Road Subdivision
Preliminary Subdivision Application

Dear David;

BH2M has been retained by Indian Cliff Development Corp. to provide Engineering, Surveying, and Permitting services for development of a 9-lot subdivision project proposed along the end of Barra Road in Biddeford. The project proposes a subdivision of an existing parcel on Map 7 lot 15 owned by Indian Cliff Development Corp, of which Mike Eon represents.

In general, the subdivision project proposes to subdivide approximately 7 acres of the existing parcel to provide 9 new lots, with Lot A being the parcel proposed for Avesta's development of a 46-unit affordable elderly housing project being applied for in parallel to this application, Lots B through G & J being proposed as single family or duplex residential house lots to be developed by others, and Lot H being a remainder lot that is not proposed as buildable for housing. Lot H currently features stormwater and access easements granted to Reveler for development of the 60 Barra Road project, which construction is currently ongoing, and is proposed to provide a location for stormwater management proposed under this subdivision application.

Reveler is currently constructing a section of Barra Road for use in emergency access to their development at 60 Barra Road. This section of Barra Road will be constructed to meet City Standards, and has been subject to previous review and approval by the City Planning Department, finding that these upgrades represented de minimis change to Reveler's Site Plan approval. With this new Subdivision Plan, Indian Cliff Development Corp proposes to create a new ROW across the section of road that Reveler is constructing to allow for public acceptance. The Subdivision project that Indian Cliff Development Corp proposes will then come off the end of Reveler's extension of Barra Road, and additionally extend Barra Road as shown on these Preliminary Plans, ultimately providing access to the subdivision via City Streets once accepted.

In support of this permit application, we are including the following attachments:

Attachment 1 - City of Biddeford Planning Department Forms and Checklists
Attachment 2 - Agent Authorization Letter
Attachment 3 - Property Deed
Attachment 4 - Financial Capacity
Attachment 5 – Certificate of Good Standing

Attachment 6 - Technical Capacity
Attachment 7 – Wildlife Assessment Barra Road Complex
Attachment 8 - Traffic Summary
Attachment 9 - Correspondence with Maine Water and the City for Sewer and Water capacity
Attachment 10 - Initial Sewer Design Report
Attachment 11 - Correspondence with City of Biddeford Fire and Police
Attachment 12 – Salt Management Plan
Attachment 13 – Draft Deed Restrictions
Attachment 14 - Stormwater Management Report

We trust that this Subdivision application provides you with the necessary information to bring this application to the Planning Board for review. If you need any additional information, feel free to contact me directly.

Sincerely,

Christopher MacDonald, P.E.
Civil Engineer

Cc Mike Eon – Indian Cliff Development Corp.
Ryan Fecteau – Avesta Housing
Todd Rothstein – Avesta Housing
Patraic Hodgson – Avesta Housing

ATTACHMENT 1
CITY OF BIDDEFORD PLANNING DEPARTMENT FORMS AND CHECKLISTS

City of Biddeford – Planning Department
Planning Board Application
P.O. Box 586, 205 Main Street Biddeford, Maine 04005
207-284-9115

Type of Application:

__ Shoreland Zoning Permit __ Site Plan Review __ Extraction
__ Conditional Use Permit X Subdivision Private Way
X Other: Contract Zone

Applicant information:

Name: Indian Cliff Development Corp., Mike Eon, President
Mailing Address: 260 Main Street. P.O. Box 444. Biddeford. Maine 04005
Telephone: (207)283-3000
Email: meon@mikeeonassoc.com
What is your legal interest in the property?
X Owner __ Potential Buyer with Contract __ Lease/Rental Agreement

Owner's Information:

Name: Indian Cliff Development Corp., Mike Eon, President
Mailing Address: 260 Main Street. P.O. Box 444. Biddeford. Maine 04005
Telephone: (207)283-3000
Email: meon@mikeeonassoc.com

Agent's Information:

Name: BH2M, Christopher MacDonald, PE, Civil Engineer
Mailing Address: 380B Main Street, Gorham, Maine 04038
Telephone: (207)839-2771
Email: cmacdonald@bh2m.com

Engineer/Surveyor's Information:

Name: BH2M, Christopher MacDonald, PE, Civil Engineer
Mailing Address: 380B Main Street, Gorham, Maine 04038
Telephone: (207)839-2771
Email: cmacdonald@bh2m.com

Project Location and Lot Information:

Street Address: Barra Road Drainage Watershed: Thatcher Brook
Tax Map: 7 Lot: 15
Current Zoning: R-3 & I-3 Shoreland Zoning: N/A
Size of Lot: 55.94 +/- (X) acres ( )s.f. Lot Frontage: 66'
Existing Use of Property: Undeveloped, Primarily wooded

Property currently serviced by:

X City Road __ Public Sewer __ Public Water __ Public Trash
__ Private Road __ Septic System __ Private Well __ Private Hauler

Slope Conditions in Area of Construction (if applicable):

__Flat (0-3% slope) X Rolling (3-8% slope) X Hilly (8-15% slope) __Steep (15%+ Slope)

Are there any wetlands or waterbodies on the site? __ (Yes) X (No) if yes attach information
Is the project within the 100-year floodplain? __ (Yes) X (No) if yes attach information
Do you plan to bring fill onto the lot? X (Yes) __ (No) If yes attach information

Description of proposed use of property:

Project/Proposed Use:

Indian Cliff Development Corp. proposes to subdivide approximately 7 acres of their property to provide 9 new lots, 1 lot for development of a 46-unit elderly affordable housing project, 7 new single family / duplex lots, and 1 non-buildable lot

Property to be Serviced by:

X City Road X Public Sewer X Public Water __ Public Trash
__ Private Road __ Septic System __ Private Well __ Private Hauler

Limits of Disturbance: 1 +/- (X)acres ( )s.f.
Net change in impervious cover: 0.7 +/- (X)acres ( )s.f.
Is this project part of a larger project? __(Yes) X(No)
Is the project proposing a new Private or Public Road? __(Yes, Private) X(Yes, Public) __(No)
Is this project within the Urbanized Area/MS4 (*see City Drainage Map*) X(Yes) __(No)
Is the project proposing any Stormwater facilities/BMPs? X(Yes) __(No)
Will a Traffic Movement Permit (TMP) be required?: __(Yes) X(No)

__ **If in a Shoreland Zone:**
Percent of residential lot coverage (Max 20%): _____
Percent of structure expansion (Max 30%): _____
X **If Subdivision Review, number of lots proposed:** 9
__ **If a Private Way is proposed, number of lots served:** _____

If Site Plan Review, you must provide the following information:

Total new square feet footprint of structure: None
Total new square feet paving/parking: 30,500 +/-

Waiver Requests (attach details):

1. To Be Determined
2. _____
3. _____
4. _____
5. _____

Required Submittal Attachments:

A. Letters of Approval
   __ Fire Department – Contact Chief or Deputy Chief – 282-9986
   __ Ability to Serve for Water Service – Maine Water – 282-1543
   __ Ability to Serve for Sewer Service – Engineering Department – Tom Milligan 284-9118
   __ Police Department – e-911 Road Name Designation – Contact Joanne Fisk 282-5127
B. Letter to Planning Board describing project, Waiver requests, proposed improvements, addressing permit requirements, etc. See Cover Letter
C. Photographs of Site.
D. Architectural renderings/drawings of proposed buildings, as required.
E. Engineering Plans, as required. See Submitted Plan Set
F. Stormwater Management Report, as required. See Submitted Stormwater Report

Fees (Due at time of Submission):

- $75 Nonrefundable Administration Fee is required for every application.
- Refer to "Attachment A Fees and Charges" of the Land Development Regulations for more information. Consult with Planning Staff if you have questions.

Required Signatures:

By signing this application, as the foresaid applicant or authorized agent:

- I certify that I have read and completely understand the application;
- I certify that the information contained in this application and its attachments are true and correct;
- I understand that all information provided on this form and all other documents submitted as part of my proposal is a matter of public record;
- I understand that copies of this information may be supplied upon request to an interested party.
- I understand that additional funds may be required through the course of the review for special studies, legal review costs, and/or engineering review.
- I understand that by submitting an application I am not guaranteed a place on any particular agenda. I further understand that the City Planner will place me on an agenda for review when the application is deemed substantially complete.

Will the proposed project cause 1 acre or more of site disturbance?: X(Yes) __(No)

- **If Yes, applicant is responsible for any required Maine Construction General Permits and shall comply with the requirements of DEP Chapter 500 Stormwater Regulations, as they apply.**

Signature of Applicant: _____ Pres **Date** 5/13/24

Signature of Property Owner: _____ Pres **Date** 5/13/24

DIGITAL SUBMITTAL REQUIREMENTS FOR ALL SUBMITTALS:

A) PDF OF SIGNED APPLICATION

B) PDFs OF ALL DRAWING SETS AND OTHER REQUIRED SUBMITTAL ATTACHMENTS NOTED ABOVE

HARD-COPY SUBMITTAL REQUIREMENTS FOR PLANNING BOARD APPLICATIONS:

A) SEVEN (7) FULL-SIZE PAPER COPIES OF DRAWING SETS

DIGITAL SUBMITTAL REQUIREMENTS FOR FINAL APPROVAL:

A) INDIVIDUALLY NAMED PDFs OF EACH DRAWING (NOT A COMBINED PDF SET)

- Individual Drawing PDF Naming Format: 'PROJECT/SHEETSET NAME_INDIVDUAL DRAWING NAME.pdf'

B) PDF COPIES OF ALL PERMIT APPROVALS, APPLICATIONS, REPORTS, NARRATIVES, LETTERS, ETC.

C) FINAL CAD REFERENCE FILES IN DWG FORMAT (SURVEY & PROPOSED DESIGN LINEWORK)

- All drawings & CAD reference files must be to-scale and within the following coordinate systems:

- MAINE STATE PLANE WEST NAD83 (Horizontal Datum) & NAVD88 (Vertical Datum)

HARD-COPY SUBMITTAL REQUIREMENTS FOR FINAL APPROVAL:

A) THREE (3) FULL-SIZE PAPER COPIES OF INDIVIUDAL DRAWINGS REQUIRING BOARD SIGNATURE

B) ONE (1) FULL-SIZE PAPER COPY OF ENTIRE DRAWING SET FOR ENGINEERING RECORDS

PLEASE CONFIRM WITH PLANNING STAFF FOR CLARIFICATION

CITY OF BIDDEFORD - SITE PLAN APPLICATION DRAWING CHECKLIST *LAST REVISED: 04/18/23*

CHECKLIST DIRECTIONS:

1. The following checklist must be completely filled out by the applicant for any Site Plan submittal to the Planning Department.
2. Applicant to confirm all of the items listed are included within the submittal. Any missing items must have adequate reasoning to justify their absence.
3. City to review applicant's submittal and checklist responses. Projects missing submittal information with non-acceptable reasoning will be rejected.
4. Items in **BLACK** are required for 'Preliminary Site Plan' approval & 'Final Site Plan' approval.
5. Items in **BLUE** are only required for 'Final Site Plan' approval.

SUBMITTAL INFORMATION - TO BE FILLED OUT BY APPLICANT	
Project Name:	Barra Road Subdivision
Planning Board # (if available):	2024.21
Applicant Name/Info:	Indian Cliff Development Corp
Submittal #/Type (Prelim/Final):	Preliminary Subdivision
Submittal Date:	15-May-24

SUBMITTAL REQUIREMENT		APPLICANT RESPONSE		CITY REVIEW RESPONSE	
ITEM NUMBER	**DESCRIPTION**	**INFORMATION PROVIDED (YES/NO)**	**REASON NOT PROVIDED/COMMENT**	**ACCEPTABLE (YES/NO-REVISE & RESUBMIT)**	**COMMENT**
1	**GENERAL PLAN REQUIREMENTS**				
A	Drawing specific legends (linetypes, hatches, etc.)	Yes			
B	Individual drawing layer control should be utilized: freeze/thawing, changing lineweights, and screening (i.e. screen existing layers on a proposed plan, freeze topography and underground utilities on a proposed site plan)	Yes			
C	North arrows, standard engineering scale viewports, dated revision blocks	Yes			
D	All drawings and surveys must be in the following coordinate systems: NAD83 Maine State Plane West (Horizontal) and NAVD88 (Vertical)	Yes			
E	Drawings need to be designed, signed & sealed by a Maine licensed professional engineer (PE); all boundary survey data needs to be performed by a licensed professional land surveyor (PLS)	Yes			
2	**COVER SHEET**				
A	Project Name & Property Address	Yes			
B	Project Team Contact Information (Owner, Engineer, Contractor, etc.)	Yes			
C	Site Location Map	Yes			
D	Sheet Set List of Drawings	Yes			
E	Tax Map and Lot ID	Yes			
F	Zoning & Shoreland Zone Information	Yes			
G	Existing Use Description	Yes			
H	Proposed Use Description	Yes			
I	Required Waiver/Variances (Yes/No); if yes, plan must clearly list waivers/variances requesting	No	No waivers proposed		
J	Name of Drainage Watershed	Yes			
K	Within the MS4 Urbanized Area (Yes/No)	No			
L	Natural resources (streams, wetlands, etc.) located on-site or adjacent to the property (Yes/No)	Yes			
M	Within the 100-year Flood Zone (Yes/No)	Yes			
N	Public Road Proposed (Yes/No)	Yes			
O	Private Road Proposed (Yes/No)	No			
P	Public Sewer Connection (Yes/No); if yes, need to include a proposed sewer flow calculation per Maine's Subsurface Wastewater Disposal Rules, Chapter 241, Section 4 (Tables 4A & 4C)	Yes	Proposed to be serviced by Low Pressure Sewer		
Q	Public Storm Drain Connection (Yes/No)	No	No public storm drain connections proposed		
R	Limits of Disturbance in acres	Yes	Provided in Stormwater Report		
S	Pervious Land Cover square footage, existing and proposed	Yes	Provided in Stormwater Report		
T	Impervious Land Cover square footage (Pavement/Gravel), existing and proposed	Yes	Provided in Stormwater Report		
U	Building Roof square footage, existing and proposed	No	No buildings proposed, see Avesta Site Plan Application		
V	Assigned Planning Board Number	Yes	2024.21 As assigned during sketch plan application		
W	Estimated cut/fill earthwork volumes; if disturbing within Flood Zone, separate set of earthwork volumes required (site vs. within flood zone)				
3	**EXISTING CONDITIONS PLAN**				
A	Horizontal & Vertical Datums annotated (NAD83 & NAVD88)	Yes			
B	Survey Benchmark Locations (with XYZ Coordinates annotated)	Yes	A benchmark is shown on the boundary survey, but a new benchmark will be established closer to the project and provided in subsequent revisions to the plans		
C	Property & Right-of-Way Lines	Yes			
D	Boundary line information (bearings, distances, etc.)	Yes			
E	Property pin and monumentation locations	Yes			
F	Existing easements with proper ownership identified	Yes			
G	Road Names & Individual Lot Labels (Map, Lot, Owner, Acreage)	Yes			
H	Location of any Natural Resources and their respective buffers (wetlands, streams, etc.)	Yes			
I	100-year Flood Zone Limits & Elevation	Yes			
J	USDA-NRCS Soil Boundaries and Labels	Yes			
K	Existing contours with adequate contour labelling; minimum 1' contour interval	Yes			
L	Existing building FFEs annotated	No	No existing buildings on proposed project area		
M	Spot elevations for existing building corners, door entrances, accessible parking/walkways, road centerlines, and bottom/top of curbs	No	No existing buildings on proposed project area		
N	Existing buildings & structures	No	No existing buildings on proposed project area		
O	Existing pavement areas & number of parking spaces	No	No existing buildings on proposed project area		
P	Existing ADA ramp geometry, detectable warning plates, and ADA parking spaces	No	No existing buildings on proposed project area		
Q	Existing site features (sidewalks, retaining walls, curbing, lightpoles, guide rails, dumpsters, fencing)	Yes	Abutting project under construction, completed conditions shown assumed as existing		
R	Existing signage and striping	Yes			
S	Existing underground utility locations (storm, sewer, force main, water, gas, elec, tele)	Yes			

	T	Existing above-ground utility locations (manholes, catch basins, utility poles, hydrants, transformers, riprap)	Yes			
	U	Rim, invert in, invert out, pipe size, cardinal direction (N, E, S, W) information for any existing utility infrastructure being tied into (upstream/downstream/outfalls)	Yes			
	V	Existing tree lines, street trees, free-standing trees (12" or larger diameter at breast height), and vegetation	Yes			
	W	Location of any borings, drinking wells, and monitoring wells	Yes			
4		**SITE DEMOLITION & EROSION CONTROL (E&SC) PLAN**				
	A	Limits-of-disturbance outlined and acreage annotated	Yes			
	B	Location of any Natural Resources and their respective buffers (wetlands, streams, etc.)	Yes			
	C	100-year Flood Zone Limits	Yes			
	D	Callout existing site features to be demolished/removed/replaced	Yes			
	E	Callout existing utilities to be demolished/removed/abandoned-in-place	Yes			
	F	Hatch existing buildings and pavement to be removed	Yes			
	G	Construction Entrance location(s)	Yes			
	H	Perimeter E&SC control location(s) (i.e. silt fence, erosion berm mix)	Yes			
	I	Stockpile and staging area(s) identified (with proper perimeter control)	Yes			
	J	Inlet protection location(s)	Yes			
	K	Note requiring contractor to implement dust control measures throughout construction	Yes			
	L	Note requiring contractor to pave utility trenches within right-of-way within 3 days of excavation or prior to any rain event	Yes			
	M	If groundwater expected, show dewatering/silt bag location(s); show temporary pumping routing				
	N	If large development is proposed with an extensive underground stormwater conveyance network, show sediment trap/basin location(s) needed for constructability/phasing; provide sizing calculations				
5		**SITE PLAN/SUBDIVISION PLAN**				
	A	Partial Site Plans needed for any viewport scale greater than 1"=20'	No	1" = 30' scale plans appropriate for project detail		
	B	Existing property and right-of-way lines	Yes			
	C	Proposed subdivision lot lines and labels	Yes			
	D	Required Zoning Setbacks shown with dimensions and annotation	Yes			
	E	Bulk requirement summary table (zoning/parking calculations)	Yes			
	F	Location of any Natural Resources and their respective buffers (wetlands, streams, etc.)	Yes			
	G	100-year Flood Zone Limits	Yes			
	H	Proposed building outlines, door entrances and loading docks	Yes	See Avesta Site Plans		
	I	Proposed building labels	Yes			
	J	Proposed road extents; provide clear annotation if roads will be public or private	Yes			
	K	Proposed parking and accessible parking locations; annotate parking space counts	Yes			
	L	Proposed signage, parking striping, and traffic striping	Yes			
	M	Detailed ADA ramp geometry, detectable warning surfaces, and ADA parking striping/signage; existing & proposed	Yes			
	N	Proposed site features (i.e. curbing, walls, fencing, guiderail, fire hydrant, transformers, light pole locations)	Yes			
	O	Separate hatching for buildings, sidewalks, pavement, landscaping	Yes			
	P	Proposed landscaping; detailed landscaping design should be on separate plans	No	Not Applicable		
	Q	Designated snow storage areas	Yes			
	R	Proposed dumpster locations and trash removal access	No	Not Applicable		
	S	Linear dimensions of all drive aisles, sidewalk widths, parking spaces, loading docks	No	Not Applicable		
	T	Radial dimensions for all curbs, landscaped islands, sidewalks	Yes			
	U	Road centerline stationing shown, labelled every 0+50' with curve data	Yes			
	V	If Private Road is proposed, final recorded plans must clearly note that proposed private roads will not be submitted in the future for public acceptance	No	Not Applicable		
	W	If Private Road is proposed, final recorded plans must clearly note that the City is not responsible for any maintenance, repair, plowing, or trash removal of proposed private roads	No	Not Applicable		
	X	Planning Board signature block for final recording	Yes			
6		**GRADING PLAN**				
	A	Partial Grading Plans needed for any viewport greater than 1"=20'	No	1" = 30' scale plans appropriate for project detail		
	B	Limits-of-disturbance outlined and acreage annotated	Yes			
	C	Proposed Building Labels with Individual Finished Floor Elevations (FFEs)	No	Not Applicable		
	D	Existing contours with adequate contour labelling, screened; minimum 1' contour interval	Yes			
	E	Proposed contours with adequate contour labelling; minimum 1' contour interval	Yes			
	F	Detailed grading for all ditches, swales, outfalls, and riprap	Yes			
	G	All proposed contours tie-into existing contours at limits-of-disturbance outline	Yes			
	H	Existing spot elevations for all asphalt and curb tie-in locations	Yes			
	I	Location of any Natural Resources and their respective buffers (wetlands, streams, etc.)	Yes			
	J	100-year Flood Zone Limits	Yes			
	K	Proposed spot elevations for all important roadway geometric points and/or on a 50' maximum interval: low/high points, PC/PT, road centerline, edge-of-asphalt	Yes			
	L	Proposed spot elevations for all curblines (bottom/top-of-curb) and sidewalks	Yes			
	M	Proposed spot elevations for all parking and drive aisle geometry points	Yes			
	N	Proposed spot elevations for all building corners and door-entry locations	No	Not Applicable		
	O	Proposed retaining wall/loading dock elevations (bottom/top of wall)	No	Not Applicable		
	P	Proposed spot elevations for all ADA ramp/landing/parking stall geometry points	No	Not Applicable		
	Q	Proposed % slope arrows for all ADA parking spaces and sidewalks	No	Not Applicable		

	R	Proposed longitudinal % slope arrows for drainage ditch centerlines	Yes			
	S	Proposed % slope arrows for roads, parking areas, and landscape tie-in areas	Yes			
	T	Estimated cut/fill earthwork volumes; if disturbing within Flood Zone, separate set of earthwork volumes required (site vs. within flood zone)				
7		**ROAD PROFILES (if public/private road proposed)**				
	A	Existing surface; dashed and screened	Yes			
	B	Proposed surface; continuous and bold	Yes			
	C	Corresponding centerline stationing and curve data annotation	Yes			
	D	Road cross-section including proposed surface cross slopes; include multiple sections for various road cross slope conditions proposed (crowned, superelevated)	Yes			
	E	Horizontal and vertical scale bars	Yes			
	F	Clear annotation if proposed road will be public or private	Yes			
	G	If Private Road is proposed, plans must clearly note that proposed private roads will not be submitted in the future for public acceptance	No	Not Applicable		
	H	If Private Road is proposed, plans must clearly note that the City is not responsible for any maintenance, repair, plowing, or trash removal of proposed private roads	No	Not Applicable		
8		**UTILITY PLAN**				
	A	Existing underground utility locations; screened (storm, sewer, force main, water, gas, electric, telecom)	Yes			
	B	Existing above-ground utility locations; screened (manholes, catch basins, utility poles, hydrants, riprap)	Yes			
	C	Rim, invert in, invert out, pipe size, cardinal direction (N, E, S, W) information for any existing utility infrastructure being tied into (upstream/downstream/outfalls)	Yes			
	D	Proposed underground utility locations; bold (storm, sewer, force main, water, gas, electric, telecom, lighting)	Yes			
	E	Proposed above-ground utility locations; bold (manholes, catch basins, utility poles, hydrants, transformers, riprap)	Yes			
	F	Proposed storm culverts, outfalls, and riprap locations and sizes	Yes			
	G	Storm/sewer structure labels must include: rim, inverts in, inverts out, pipe sizes, cardinal directions (N, E, S, W)	Yes			
	H	Storm/sewer pipe labels must include: linear footage, pipe size, material, slope	Yes			
	I	Flow directional arrows for storm & sewer pipes	Yes			
	J	Proposed & existing site features shown that could conflict with proposed utilities (trees, signs, lightpoles, bollards, foundations, guiderails)	Yes			
	K	All storm drains must be sized to convey the 25-year storm	Yes			
	L	Sewer force main sizes and invert elevations	Yes			
	M	Sewer pump station locations, model, rim, inverts, pipe sizes, cardinal directions (N,E,S,W)	Yes			
	N	Grease trap & oil-water separator locations, sizes, elevations	No	Not Applicable		
	O	Water, gas, electric, and telecom sizes labelled	Yes			
9		**UTILITY PROFILES**	No	All Gravity Information shown on plans		
	A	Utility profiles for **all** gravity storm drains and sewer pipes, including all laterals, catch basins, culverts, and outfalls; profiles preferred to be aligned on the pipe centerline (not superimposed on the road centerline)				
	B	Existing surface; dashed and screened				
	C	Proposed surface; continuous and bold				
	D	Storm/sewer structure labels must include: rim, inverts in, inverts out, pipe sizes, cardinal directions (N, E, S, W)				
	E	Storm/sewer pipe labels must include: linear footage, pipe size, material, slope				
	F	Existing and proposed gravity pipe crossings shown; sizes labelled and depths/clearance annotated				
	G	Existing and proposed electric/water/telecom/gas crossings shown at approximate depths; sizes labelled and depths/clearance annotated				
	H	Known ledge or groundwater elevations				
	I	For all storm drains, 25-year HGL must be shown on profiles with starting tailwater condition identified				
	J	For storm outfalls, include riprap sizing and grading extents				
	K	Horizontal and vertical scale bars				
10		**DETAILS**				
	A	Road section detail, including pavement & gravel depths	Yes			
	B	Sidewalk, paver, crosswalk, and any other pavement section details				
	C	Pavement sawcut detail	Yes			
	D	Utility trench/backfill detail	Yes			
	E	All site feature details; curbing, retaining walls, fencing, guiderails, dumpsters, etc.	Yes			
	F	Signage, striping, and ADA details	Yes			
	G	E&S notes and details; only show applicable/proposed measures	Yes			
	H	Utility structure details (manholes, cleanouts, fittings, handholes, transformer pads, hydrants)	Yes			
	I	Storm outfall & riprap details	Yes			
	J	Drainage ditch cross section identifying minimum depth, minimum bed width, and maximum side slopes	Yes			
	K	Pump station, grease trap, and oil-water separator details	Yes			
	L	Conduit section details	Yes			
	M	Miscellaneous details (as needed)	Yes			
11		**LANDSCAPING, LIGHTING & PHOTOMETRIC PLANS**				

	A	As required by ordinance; at a minimum: locations, counts, and species/models must be identified	No	Not Applicable		
	B	Landscaping & lighting details	No	Not Applicable		
12		**DOCUMENTS/REPORTS/CALCULATIONS**				
	A	On initial preliminary submittal applications, applicant must submit a development review and inspection fee. Applicant to coordinate fee amount with City Planner prior to submittal. This fee will be drawn against to cover the following type of services throughout the project life cycle (and may require replenishing): i. 3rd Party City Peer-Review ii. Site Inspections during the permitting process iii. Erosion & Sediment Control Inspections during construction iv. Right-of-Way Inspections during construction	Yes	Per Sketch plan application, Sketch Plan Application fees of $6,835 paid, Preliminary Application fees $1,515 paid with this application, Final Application fees of $825 will be paid		
	B	Predevelopment & Post-development Drainage Area Maps, including: i. Subdrainage areas delineated and labeled ii. Points of Interest/Analysis shown and labeled iii. Hatching for different land cover areas (impervious, pervious, gravel) iv. Time of concentration (Tc) paths & durations	Yes			
	C	An approved 'Sewer Ability-to-Serve Letter' from the Engineering Department: i. Applicant to submit proposed sewer flow calculations per Maine's Subsurface Wastewater Disposal Rules, Chapter 241, Section 4 (Tables 4A & 4C)	Yes	See Application		
	D	A Performance Guarantee Cost Estimate utilizing Planning's template				
	E	25-year hydraulic calculations for all storm conveyance piping (rational method), including starting tailwater conditions/documentation	Yes	See Stormwater Report		
	F	If any SWM water quality BMP or detention facility is proposed, hydrologic model exports/hydrographs must be submitted for the for the 2, 10, 25, & 100-year storm frequencies	Yes	See Stormwater Report		
	G	Sizing calculations for any SWM water quality BMP or detention facility	Yes	See Stormwater Report		
	H	A stormwater maintenance manual for any proposed SWM water quality BMP or detention facility, including: i. Annual maintenance requirements ii. Annual inspection requirements by a licensed PE; noting that all inspection reports/logs need to be submitted to the Engineering Department by March 1st each following year, identifying what on-going maintenance has occurred and what remedial repairs are needed iii. Signed Property Owner Agreement: including the current property owner's contact information and signature; it must be noted that all stormwater BMP maintenance requirements are linked to the property for perpetuity and transfer to any new ownership	Yes	See Stormwater Report		
	I	Salt Management Plan	Yes			
	J	Sewer pump station sizing calculations	Yes			
	K	Sewer pump station maintenance plan	No	To be provided for final application		
	L	Grease trap sizing calculations	No	Not Applicable		
	M	Homeowner Association (HOA) agreement for any private road serving two (2) lots or more	Yes	See Application		
	N	Summary list & copy of any required DOT/DEP/USACE permits & approvals	No	Project will apply for Maine DEP Stormwater Law Permit and provide copy when filed		

ATTACHMENT 2
AGENT AUTHORIZATION LETTER

To Whom It May Concern,

By this letter, the undersigned authorizes Berry Huff McDonald Milligan Inc. (BH2M) to act as the agent for the undersigned, Indian Cliff Development Corp. in the preparation and submission of all Federal, State, and Local permit applications and relevant documents and correspondence for all necessary permits for the construction of the Barra Road Subdivision project located on Barra Road in the City of Biddeford, to attend meetings and site visits; to appear before all boards, commissions, and committees, and to provide such other services as are necessary and appropriate in furtherance of the aforementioned project.

Sincerely,

Signature

MICHAEL R. FOX Pres.

Printed Name and Title

May 13, 2024

Date

ATTACHMENT 3
PROPERTY DEED

30359

CORRECTIVE QUITCLAIM DEED

KNOW ALL MEN BY THESE PRESENTS, THAT It, MERREAL CORP., formerly known as MM II REAL ESTATE CORPORATION, a Delaware corporation with a place of business at One Maine Savings Plaza, Portland, in the County of Cumberland and State of Maine, in consideration of One Dollar and other valuable considerations paid by INDIAN CLIFF DEVELOPMENT CORPORATION, a Maine Corporation with a place of business at Biddeford, in the County of York and State of Maine, whose mailing address is 260 Main Street, Biddeford, Maine 04005, the receipt whereof it does hereby acknowledge, does hereby REMISE, RELEASE, BARGAIN, SELL AND CONVEY, and forever QUITCLAIM unto the said INDIAN CLIFF DEVELOPMENT CORPORATION, its successors and assigns forever,

A certain lot or parcel of land together with any structures thereon situated southwesterly of but not adjacent to South Street so-called, in the City of Biddeford, County of York and State of Maine, being more particularly bounded and described as follows:

Beginning at a found iron situated South 46 degrees 41 minutes 25 seconds East two hundred one and seventy-three hundredths (201.73) feet from an iron on the southeasterly sideline of Village Lane, so-called, said iron at the point of beginning marking the most easterly corner of Lot Nine (9) as shown on a plan of land entitled, "Standard Boundary Survey of Village Lane Subdivision" dated July 18, 1986 prepared by Steven's Associates and recorded at the York County Registry of Deeds in Plan Book 150, Page 29; Thence South 41 degrees 29 minutes 16 seconds East one hundred one (101) feet, more or less, by lands now or formerly owned by R.E Brickates Agency by deed dated October 25, 1985 and recorded in Book 3676, Page 219, to the thread of Thatcher Brook formerly known as Cutts Brook opposite lands now or formerly owned by Mary K. Shaw by deed dated May 3, 1982 and recorded in Book 2919, Page 46; Thence generally in a southerly and southwesterly direction one thousand five hundred forty-one (1541) feet, more or less, by and along the thread of said Thatcher Brook to a point; Thence South 36 degrees 33 minutes 38 seconds East one hundred eighty-nine (189) feet, more or less, crossing said Thatcher Brook and running by and along said Shaw lands to a set iron rod situated South 12 degrees 08 minutes 59 seconds West one thousand three hundred and twenty-two hundredths (1300.22) feet from the point of beginning; Thence South 51 degrees 35 minutes 53 seconds West one thousand eight hundred thirty-three and eighty-three hundredths (1833.83) feet crossing a one hundred (100) foot wide electrical transmission line easement and by and along said Shaw lands to 10"x10" stone monument situated at the end of a stone wall; Thence South 42 degrees 56 minutes 17 seconds West eighty-four and sixty-five hundredths (84.65) feet by and along said Shaw lands to a set iron rod and lands now or formerly owned by the heirs of Abbie S. Murphy who received her interest in a deed dated October 14, 1890 and recorded in Book 442, Page 108; Thence North 43 degrees 52 minutes 18 seconds West six hundred eighty-one and twenty-five hundredths (681.25) feet by and along said Murphy heirs lands to a set iron rod situated South 47 degrees 33 minutes 28 seconds West twenty and eighty-six hundredths (20.86) feet from a found 3/4 inch iron

pipe; Thence South 51 degrees 35 minutes 53 seconds West three hundred twenty-two and thirty hundredths (322.30) feet by and along said Murphy heirs lands and following nearly along a wire fence to a set iron rod at or near an old stump at the intersection of three wire fences; Thence North 06 degrees 08 minutes 17 seconds West four hundred fifty-two and seventy-five hundredths (452.75) feet by and along lands now or formerly owned by the City of Biddeford as shown by deed dated March 2, 1983 and recorded in Book 3051, Page 245 following near a wire fence to a "20-inch diameter blazed white pine tree; Thence North 60 degrees 50 minutes 04 seconds West one hundred twenty-eight and thirty-three hundredths (128.33) feet by and along said City of Biddeford lands and following near a wire fence to a set iron rod; Thence North 70 degrees 04 minutes 54 seconds West one hundred ten and ninety-three hundredths (110.93) feet by and along said City of Biddeford lands and following near a wire fence to a set iron and lands now or formerly owned by Rochambeau Club by deed dated November 8, 1962 and recorded in Book 1490, Page 357; Thence North 53 degrees 19 minutes 17 seconds East two hundred three and one hundredths (203.01) feet by and along said Rochambeau Club lands and crossing said Thatcher Brook to a 10"x10"x10" three (3) sided stone monument; Thence North 51 degrees 35 minutes 53 seconds East two thousand two hundred sixty-three and fifty-two hundredths (2263.52) feet by and along said Rochambeau Club lands and an old wire fence through several one inch iron rods set in ledge to a found #5 rebar capped R.L.S. #1036 at the most westerly corner of Lot eleven (11) as shown on said plan of Village Lane Subdivision; Thence South 38 degrees 27 minutes 07 seconds East one hundred eighty (180.00) feet by and along said Lot eleven (11) to a set iron on the northwesterly sideline of said Village Lane; Thence South 51 degrees 32 minutes 53 seconds West seven and three hundredths (7.03) feet by and along said Village Lane to a set iron rod marking the point of curvature on the northwesterly sideline of said Village Lane; Thence southwesterly and southerly following a curve concave to the southeast with a radius of three hundred seventy-five (375.00) feet an arc distance of four hundred twenty-two and fifteen hundredths (422.15) feet by and along said Village Lane to a set iron rod at the point of tangency; Thence South 12 degrees 57 minutes 07 seconds East three hundred twenty-seven and ninety-two hundredths (327.92) feet by and along said Village Lane crossing into said one hundred (100) foot wide electrical transmission line easement area to a set iron rod at the southerly terminus of said Village Lane; Thence North 77 degrees 02 minutes 53 seconds East fifty (50.00) feet by and along said terminus of Village Lane to a found #5 rebar capped R.L.S. #1036 on the westerly sideline of Lot thirty-six (36) as shown on said plan; Thence South 12 degrees 57 minutes 07 seconds East fifty-nine and four hundredths (59.04) feet by and along said Lot thirty-six (36) to another found #5 rebar capped R.L.S. #1036 marking the southwesterly corner of said Lot thirty-six (36); Thence North 75 degrees 03 minutes 24 seconds East three hundred sixty-nine (369.00) feet by and along the southerly sideline of said Lot thirty-six (36) and Lots thirty-five (35) and thirty-four (34) as shown on said plan to another #5 rebar capped R.L.S. #1036 marking the most southerly corner of Lot thirty-three (33) as

shown on said plan; Thence North 45 degrees 15 minutes 51 seconds East three hundred fifty-nine and ninety-two hundredths (359.92) feet by and along said Lot thirty-three (33) and Lots thirty-two (32) and thirty-one (31) to a found iron marking the most southerly corner of Lot thirty (30) as shown on said Plan; Thence North 12 degrees 28 minutes 27 seconds East two hundred eighty-eight and sixty-six hundredths (288.66) feet by and along said Lot thirty (30) and Lot twenty-nine (29) to a found iron marking the most easterly corner of Lot twenty-eight (28) as shown on said plan; Thence North 23 degrees 58 minutes 54 seconds West two hundred sixty-nine and eight hundredths (269.08) feet by and along said Lot twenty-eight (28) and Lot twenty-seven (27) to a found iron on the southeasterly rear lot line of Lot eight (8) as shown on said plan; Thence North 51 degrees 32 minutes 53 seconds East one hundred eighty-seven (187.00) feet by and along said Lot eight (8) and Lot nine (9) as shown on said Plan to the point of beginning.

Also conveying herewith all of the Grantor's right, title and interest, if any, in and to those areas lying between the remains of an old barbed wire fence and scattered stone wall, and the Southeasterly and Southwesterly sidelines of the above described premises, all as more particularly depicted on the survey plan of Merreal Corp. to be recorded this day.

Meaning and intending to convey a certain lot or parcel of land containing 64.5 acres, more or less, as shown on a plan of land entitled, "Survey Plan of Land owned by Merreal Corporation formerly MM II, off South Street Biddeford, Maine for Maine Savings Bank" dated March 21, 1990, as revised through June 28, 1990 and prepared by Sebago Technics Inc., and recorded in York Registry of Deeds in Plan Book 192, Page 16.

Reference is made to a previous survey completed as shown on the "Plan of Land of Alma Corbin, Biddeford, Maine" dated May 16, 1972 prepared by DesRoberts and Henry Inc. and recorded in said Registry of Deeds in Plan Book 57, Pages 25 and 26. The above described premises being a portion of those lands shown on said plan.

The above described premises being a part of those lands described in a deed from Merrymeeting Developers, Inc. to MM II recorded in said Registry in Book 4916, Page 140.

Bearings herein are magnetic as of the year 1972.

The above described premises are conveyed subject to an easement given by the within Grantor to The Inhabitants of the City of Biddeford, dated June 22, 1990, and to be recorded in the York County Registry of Deeds, to which reference is made for a more particular description of the aforesaid easement.

The above described premises are conveyed subject to the right to enter for construction and erection of an electric power line as more particularly described in a deed from Francois

Pelletier to York County Power Co. dated February 15, 1921 and recorded in Book 712, Page 125. Rights are now owned by Central Maine Power Co. as described in a deed from Cumberland County Power & Light Co. dated December 3, 1942 and recorded in Book 985, Page 450.

The above described premises are conveyed subject to the reservation of rights, if any still exist, "to the heirs of Dominicus Cutts, through the gate and bars and in the road now used and the legal rights of all other persons to pass over said land." as described in a deed from John and Julia Scammon to Ralph Emery and Obed Hooper dated April 16, 1849 and recorded in Book 210, Page 504.

The above described premises are conveyed subject to the right to perpetually enter on a one hundred (100) foot wide strip of land for the construction and maintenance of a transmission line as described in a deed from Alcide and Alma H. Corbin to Central Maine Power Co. dated March 4, 1952 and recorded in Book 1214, Page 229.

Excepting from the above described premises "the family burying ground thereon, with the right to go to and from the same and make repairs thereon" all as more particularly described in a deed from Wilfrid and Blanche Labbe to Alcide and Alma Corbin dated April 7, 1943 and recorded in Book 987, Page 463.

The above described premises are benefited by and subject to "a right of way over and across said lot of land at any and all times with teams vehicles, animals and on foot for any and all purposes" as excepted and reserved unto the heirs of Obed Hooper and Oscar G. Bemis and their heirs and assigns forever in said deed from Labbe to Corbin in Book 987, Page 463.

The above described premises are benefited by a right of way fifty (50) feet wide as reserved for Alma Corbin, her heirs and assigns to her remaining land now or formerly owned by Merreal Corporation as described in her deed to John D. Downing dated May 6, 1964 and recorded in Book 1597, Page 355. Right of way to lie between Lot #1 to Lot #5 inclusive and between Lot #6 to Lot #9 inclusive as shown on a plan showing section #1 of "The Village Green" Biddeford, Maine owned by John Downing, dated March 3, 1964 and prepared by Libby & Dow Engineers, Saco, Maine, which plan is duly recorded in Plan Book 38, Page 26 of the York County Registry of Deeds. Said Right of Way then becomes seventy (70) feet wide running from Lots #1 and #9 to South Street, so-called.

The above described premises are conveyed subject to any and all setback lines, easements, notes, reservations, open spaces, conditions, widening strips, restrictions, and/or other matters affecting said parcel of land all as shown on a survey plan of land owned by Merreal Corporation, prepared for Maine Savings Bank by Sebago Technics, Inc., Charles Lowell Brown, Jr., Registered Land Surveyor #1205, which revised plan is dated March 21, 1990, as revised through June 28, 1990 and is recorded in York Registry

54

of Deeds, Plan Book 192, Page 16.

The above described premises are conveyed subject to rights, if any still exist, over roadways within the boundaries all as shown on said revised survey plan.

The description for the above described premises was furnished by Charles Lowell Brown, Jr., Registered Land Surveyor #1205, of Sebago Technics Inc. of 169 Park Row, Brunswick, Maine 04011.

THE PURPOSE OF THIS DEED IS TO CORRECT THE ORIGINAL DEED REFERENCE AS TO THE DATE OF FINAL REVISION OF THE "SURVEY PLAN OF LAND OWNED BY MERREAL CORPORATION FORMERLY MM II, OFF SOUTH STREET, BIDDEFORD, MAINE FOR MAINE SAVINGS BANK" PREPARED BY SEBAGO TECHNICS, INC. AND DULY RECORDED IN PLAN BOOK 192, PAGE 16. In Book 5442 Page 218, THE ORIGINAL DEED DESCRIBED SAID PLAN AS BEING DATED MARCH 21, 1990 AS REVISED THROUGH JUNE 13, 1990 AND THE SAID PLAN DULY RECORDED IN PLAN BOOK 192, PAGE 16, IS DATED MARCH 21, 1990 AS REVISED THROUGH JUNE 28, 1990.

TO HAVE AND TO HOLD the same, together with all the privileges and appurtenances thereunto belonging, to the said Indian Cliff Development Corporation, its successors and assigns forever.

AND it does COVENANT with the said Grantee, its successors and assigns, that it shall and will WARRANT AND DEFEND the premises to the said Grantee, its successors and assigns, forever, against thelawful claims and demands of all persons claiming by, through or under it.

IN WITNESS WHEREOF, It, the said Merreal Corp., has caused this instrument to be signed in its name and behalf, and its corporate seal to be hereunto affixed by Thomas D. Lewis, its President, thereunto duly authorized this 13th day of the month of July, A.D. 1990.

SIGNED, SEALED AND DELIVERED IN PRESENCE OF

MERREAL CORP.

By: Thomas D. Lewis
Its: President

STATE OF MAINE

COUNTY OF CUMBERLAND July 13, 1990.

Then personally appeared the above named Thomas D. Lewis, President of said Merreal Corp. and acknowledged the foregoing

GEORGE A. GIOVANIS - ATTORNEY AT LAW 200 MAIN ST BIDDEFORD, MAINE 04005

instrument to be his free act and deed in his said capacity, and the free act and deed of said Merreal Corp.

Before me,

Jeffrey A. Nathanson

~~Notary Public~~ Attorney at Law

Printed Name: Jeffrey A. Nathanson

Eon2.doc

RECEIVED YORK S.S.
90 JUL 25 PM 3:17
ATTEST: [illegible]
REGISTER OF DEEDS

ATTACHMENT 4
FINANCIAL CAPACITY

MAINE
COMMUNITY BANK

May 10, 2024

City of Biddeford
Planning Office
205 Main Street
Biddeford, ME 04005

RE: Indian Cliff Development Corp.
Barra Road Extension Project

To Whom It May Concern,

This letter is intended as support for Indian Cliff Development Corp.'s submission for approvals regarding the intended Barra Road, Biddeford, 8-buildable lot subdivision development. Maine Community Bank has worked with Mike Eon, President of Indian Cliff Development Corp., on subdivision projects like the project referenced herein. We have found that the projects the Bank has financed for Mr. Eon and/or his related entities have been completed on time, on budget, and with all financial obligations being met, complied with, and in an excellent manner.

Although we have not fully underwritten the loan for the proposed project, the Bank has done a preliminary review of the project and is in receipt of Mr. Eon's financial information. After our review, it is believed that the subdivision is viable, and that the entity and its principals have the ability to satisfactorily undertake and complete the proposed project. Based on our review to date, the Bank has interest in moving forward with Indian Cliff Development Corp. regarding funding completion of the project. Any formal commitment to lend from the Bank will be contingent upon full underwriting, due diligence and Bank approval, as well as receipt of final approvals for the project.

Should you need additional information, please do not hesitate to contact me directly.

Sincerely,

Jennifer Sirois

Jennifer Sirois
Regional Vice President, Commercial Banking
(207) 571-5614
jsirois@mainecb.com

ATTACHMENT 5
CERTIFICATE OF GOOD STANDING

State of Maine

Department of the Secretary of State

I, the Secretary of State of Maine, certify that according to the provisions of the Constitution and Laws of the State of Maine, the Department of the Secretary of State is the legal custodian of the Great Seal of the State of Maine which is hereunto affixed and of the records of organization, amendment, and dissolution of corporations and annual reports filed by the same.

I further certify that INDIAN CLIFF DEVELOPMENT CORPORATION is a duly organized business corporation under the laws of the State of Maine and that the date of incorporation is April 17, 1990.

I further certify that said business corporation has filed annual reports due to this Department, and that no action is now pending by or on behalf of the State of Maine to forfeit the articles of incorporation and that according to the records in the Department of the Secretary of State, said corporation is a legally existing business corporation in good standing under the laws of the State of Maine at the present time.

In testimony whereof, *I have caused the Great Seal of the State of Maine to be hereunto affixed, given under my hand at Augusta, Maine, this fourteenth day of May 2024.*

Shenna Bellows

Shenna Bellows
Secretary of State

Authentication: 8004121

ATTACHMENT 6
TECHNICAL CAPACITY

INTRODUCTION TO BH2M

Berry Huff McDonald Milligan Inc. (BH2M) is a locally owned civil engineering, planning and surveying firm, founded in 1978. BH2M is headquartered in Gorham, Maine. Our multifaceted staff of 16 includes engineers, planners, project managers, construction managers, and land surveyors. Over the past 44 years BH2M has provided a broad spectrum of services including:



Surveying

- Boundary Surveys
- Topographic Surveys
- Existing Condition Surveys
- Utility Surveys
- As-Built Surveys
- Construction Stakeout
- Elevation Certificates and Letters of Map Amendment
- ALTA/NSPS Surveys
- Mortgage Loan Inspections

Engineering and Planning

- Municipal Engineering
- Roadway Design
- Pedestrian and Bicycle Enhancement
- Shared Use Paths
- Athletic Facilities
- Vehicular Access and Parking
- Site Planning
- Comprehensive Land Planning
- Construction Cost Estimating
- Environmental and Local Permitting
- Stormwater Management
- Erosion Control
- Wastewater Collection and Pumping Systems
- ADA Accessibility



BH2M is a small firm mostly comprised of staff members that have been with the firm for 20 years or more. Our size, ability to offer a variety of services in-house, and experience working with one another enables us to provide efficient and cost-effective solutions to municipal infrastructure projects.

CAPABILITIES

Surveying

BH2M has the benefit of offering a full-service survey department. Our survey department provides the foundation for each project we undertake. Having the ability to self-perform survey services provides us with a cohesive transition from field reconnaissance to design and then to construction. Typically, our Project Managers will accompany the survey crew early in the process. We've found this be an effective approach that reduces the time needed for field survey and guarantees that designers will have the critical information needed for an accurate design. Our survey staff is highly trained in property line, existing conditions, utility and topographic surveys as well as construction layout.



Civil Engineering

BH2M has provided developers, contractors, and municipalities with civil engineering services since our inception in 1978. Our Staff includes four Maine licensed professional engineers. We have provided civil engineering services for residential, commercial, municipal, institutional, and utility projects. Our Staff is highly skilled in roadway design, utility design, stormwater management design, and erosion & sedimentation control design



BH2M routinely supports developers, contractors, institutions, and municipalities by providing construction documents, contract documents, technical specifications, bidding support, assistance with bid selection, RFI responses, shop drawing reviews, value engineering, construction inspections, and stormwater compliance inspections. Our ability to lead a project from conceptual planning through construction is highly valued by our clients.

Planning and Permitting

Most of our projects require some level of environmental permitting. BH2M has a long history of managing regulatory constraints for municipal projects. Our Staff has a constant dialogue with regulators at the State and Federal Levels. Our environmental and municipal permitting expertise includes:

- Stormwater Management Law
- Site Location of Development (Site Law)
- Maine Construction General Permits
- Natural Resource Protection Act (NRPA)
- Municipal Site Plan, Subdivision, and Conditional Use
- Traffic Movement, Driveway/Entrance, and Utility Location Permits

ATTACHMENT 7
WILDLIFE ASSESSMENT BARRA ROAD COMPLEX

BH2M

Known for excellence. Built on trust.



WILDLIFE ASSESSMENT REPORT
Barra Road Complex
Barra Road
Tax Map 7, Lot 17, Sublot 4 and portions of Tax Map 7, Lot 15, Tax Map 7, Lot 17, Sublot 12, & Tax Map 7, Lot 19
Biddeford, Maine

May 2022
File No. 04.0191316.00



PREPARED FOR:
Mike Eon Associates
Biddeford, Maine

GZA GeoEnvironmental, Inc.
5 Commerce Park North, Suite 201 | Bedford, NH 03110-6984
603-623-3600

Offices Nationwide
www.gza.com

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WATER
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Via Email

May 13, 2022
File No. 04.0191316.00

Mike Eon Associates
Attn: Michael R. Eon, President
P.O. Box 444
Biddeford, Maine 04005

Re: Wildlife Assessment Report
Barra Road Complex
Barra Road
Tax Map 7, Lot 17, Sublot 4, Tax Map 7, Lot 15 (portions) & Tax Map 7, Lot 17, Sublot 2 (portions)
Biddeford, Maine

Dear Mr. Eon:

GZA GeoEnvironmental, Inc. (GZA) is pleased to submit the attached Wildlife Assessment Report in support of local permitting for proposed construction of an affordable elderly housing project off of Barra Road (i.e., Tax Map 7, Lot 17, Sublot 4 and portions of Tax Map 7, Lot 15 and Tax Map 7, Lot 17, Sublot 12) in Biddeford, Maine (Site). This report summarizes the results of the field work completed on September 30, 2021, to document and assess the potential for threatened and endangered wildlife species on the Site.

Please contact Tracy Tarr at 603-235-6992 or *tracy.tarr@gza.com* if you have any questions or concerns.

Very truly yours,

GZA GEOENVIRONMENTAL, INC.

Logan Young
Senior Field Biologist

Deborah M. Zarta Gier, CNRP
Consultant/Reviewer

Tracy L. Tarr, CWS, CWB, CESSWI
Associate Principal

LTY/TLT/DMZ
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Attachment: Wildlife Assessment Report

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1.1 INTRODUCTION

This report presents the results of the wildlife assessment conducted by GZA GeoEnvironmental, Inc. (GZA) in support of local permitting for proposed construction off of Barra Road (i.e., Tax Map 7, Lot 17, Sublot 4 and portions of Tax Map 7, Lot 15 and Tax Map 7, Lot 17, Sublot 12), and approximately 81-acre area in Biddeford, Maine (i.e., Site, see **Figure 1** - *Locus Plan*; **Figure 2** - *Aerial Overview*; **Figure 3** - *Cover Type Overlay*).

Mike Eon Associates is proposing to construct a multi-unit, affordable elderly housing development and associated access at the Site. This wildlife study was completed to satisfy local permitting requirements and assess the potential for rare wildlife species to occur at the Site as a project design is developed. (**Figure 5** – *Existing Site Conditions*).

GZA was retained by Mike Eon Associates to prepare a wildlife assessment to address the City of Biddeford Zoning Ordinance Article VI, Section 70, which requires a wildlife study be conducted by a Certified Wildlife Biologist for projects involving parcels of land greater than five acres, and mitigation for projects involving significant fisheries or wildlife habitats. GZA understands requirement for mitigation may be waived if a review from the Maine Department of Inland Fisheries and Wildlife (MDIFW) confirms no significant habitat areas are involved in the project or adjacent land areas. This assessment included the following components:

- Review existing georeferenced wildlife habitat data available through the Maine Office of GIS to characterize the regional significance and landscape connectivity of the Site;
- Describe wildlife habitat types and observed wildlife species and utilize definitions of "significant wildlife habitat" as presented in Chapter 335 of Maine Department of Environmental Protection (MEDEP) rules to identify potential significant wildlife habitats on-site;
- Assess the potential for Blanding's turtle (*Emydoidea blandingii*) to occur at the Site; and
- Prepare a report summarizing methods, observations, and findings of the wildlife field assessment.

GZA completed wildlife assessment field work on September 30, 2021. It is our understanding that documentation from this effort will be used by Mike Eon Associates to fulfill local permitting requirements and initiate a review by MDIFW for significant wildlife habitats in the project area. This report is subject to the Limitations in **Appendix A**.

1.2 PROJECT DESCRIPTION

1.2.1 SCOPE OF WORK

Professional services provided by GZA within the work area described below included:

- *Review of existing georeferenced statewide data to assess landscape context of the Site.* GZA reviewed MDIFW habitat mapping and habitat ranking. In addition, GZA reviewed "Beginning with Habitat" data to assess whether rare species are known to occur on the Site.
- *Assessment and classification of habitat types.* GZA mapped habitat types to assess habitat rarity and predict wildlife usage on the Site. The habitat assessment was completed by Wildlife Biologist Logan Young

on September 30, 2021, under the direction of Wildlife Biologist Tracy Tarr. Mr. Young has a B.S. in Environmental Conservation, and Ms. Tarr has a B.S. in Wildlife Management and an M.S. in Wildlife Ecology: Natural Resources and is a Certified Wildlife Biologist.

- *Documentation of wildlife (observed and potential).* As part of documentation, GZA completed visual observations for wildlife and wildlife sign (i.e., tracks, scat, feathers) along random traverse routes across the Site on September 30, 2021. Wildlife tracking surveys, habitat survey, and visual and acoustic species survey were completed by Mr. Young, under the direction of Tracy Tarr.

1.2.2 DESCRIPTION OF WORK AREA AND SURROUNDING LAND USES

Based on materials provided by Mike Eon Associates and field review of current conditions, the Site contains primarily wooded land and forested, emergent, and riverine wetlands. Based on a review of historic aerial imagery available from Google Earth and Nationwide Environmental Title Research, LLC, the Site has been primarily forested land since at least 1956. The Site is bordered to the north and west by Thatcher Brook and private residences, to the east by an unnamed stream and commercial and residential development, and to the south by commercial development.

The Site is bordered to the northwest by Thatcher Brook and to the east by an unnamed tributary, which drain to the Saco River approximately 3,000 feet north of the Site. The majority of the Site contains "State Listed Animal Habitats" as mapped by MDIFW (see **Figure 4** – *Beginning with Habitat*) and GZA understands this is associated with a historical Blanding's turtle (*Emydoidea blandingii*) record. This landscape position is considered in the following narrative.

1.3 METHODOLOGY

1.3.1 WILDLIFE HABITAT MAPPING

GZA assessed habitat conditions on September 30, 2021, by conducting vegetation assessments along random traverse routes and in random plant plot locations throughout the property. GZA identified dominant plant species along random traverse routes and plots to describe the vegetation composition of individual areas. Habitat boundaries were determined by assessing major changes in vegetation through aerial photograph interpretation and field reconnaissance. Habitat classifications were based on habitat types described in "Natural Landscapes of Maine: A Guide to Natural Communities and Ecosystems". In addition, the presence of significant habitats was based on available "Beginning with Habitat" mapping data. Wetland delineation was completed by Mark Hampton Associates, Inc. in 2021 (see **Appendix B**).

GZA utilized "Beginning with Habitat" mapping and to determine if any rare species or exemplary natural communities are known to occur on the project Site (see **Figure 4** – *Beginning with Habitat*). Additionally, data from the town-based maps developed by MDIFW were reviewed to determine the presence of any regionally significant habitat areas (e.g., highest ranked habitats or supporting landscapes).

To assess the potential for rare species (i.e., Blanding's turtle), GZA created an overlay map of the property of existing wetland and upland habitats. Approximate habitat areas were mapped and calculated in a Geographic Information System (GIS) database.

1.3.2 DOCUMENTATION OF WILDLIFE

The presence of wildlife species on the Site was assessed by identifying species through song, track, and scat identification, as well as direct observations. Birds were assessed along random traverse route using binoculars and by call survey (identifying songs). Mammals were assessed by visual observation and track survey. Amphibians were assessed by call identification and visual identification. Because wildlife species can be cryptic and seasonally active, and in consideration of the timeframe of the assessment (autumn), GZA utilized known habitat preferences (see DeGraaf and Yamasaki 2001) to predict potential habitat utilization by rare wildlife species on the Site to supplement information gained from direct observations.

1.4 HABITAT MAPPING AND WILDLIFE DOCUMENTATION RESULTS

1.4.1 UPLAND WILDLIFE HABITATS

The Site contains approximately 75% forested upland habitat (see **Figure 3** - *Cover Type Overlay*), consisting of mixed deciduous-conifer species throughout the Site. GZA did not observe any threatened or endangered wildlife.

1.4.1.1 Oak-Pine Forest

Approximately 60 acres of the Site contains Oak-Pine Forest habitat. Dominant tree species in the canopy layer contains red maple (*Acer rubrum*), red oak (*Quercus rubra*), eastern white pine (*Pinus strobus*), and American beech (*Fagus grandifolia*), in association with sugar maple (*Acer saccharum*), eastern hemlock (*Tsuga canadensis*), shagbark hickory (*Carya ovata*), and bigtooth aspen (*Populus grandidentata*). The shrub stratum is interspersed with dominant species including red oak, red maple, eastern white pine, white oak (*Quercus alba*), balsam fir (*Abies balsamea*), hawthorn (*Crataegus* sp.), American witch-hazel (*Hamamelis virginiana*), mapleleaf viburnum (*Viburnum acerifolium*), and invasive species multiflora rose (*Rosa multiflora*) and glossy buckthorn (*Frangula alnus*). Dominant species in the herbaceous layer include red oak, red maple, sweet fern (*Comptonia peregrina*), wrinkleaf goldenrod (*Solidago rugosa*), wild sarsaparilla (*Aralia nudicaulis*), eastern teaberry (*Gaultheria procumbens*), lowbush blueberry (*Vaccinium angustifolium*), sheep laurel (*Kalmia angustifolia*), Christmas fern (*Polystichum acrostichoides*), and blue-bead lily (*Clintonia borealis*).

GZA observed resident and migratory songbird species including black-capped chickadee (*Poecile atricapillus*), black-and-white warbler (*Mniotilta varia*), blackpoll warbler (*Setophaga striata*), chestnut-sided warbler (*Setophaga pensylvanica*), blue-headed vireo (*Vireo solitarius*), white-breasted nuthatch (*Sitta carolinensis*), white-throated sparrow (*Zonotrichia albicollis*). GZA also observed track and scat evidence of eastern coyote (*Canis latrans var.*) and white-tailed deer (*Odocoileus virginianus*), eastern chipmunk (*Tamias striatus*) and woodchuck (*Marmota monax*) burrows.



Photo 1. View of Oak-Pine habitat.



Photo 2. View of partially open understory in Oak-Pine habitat.



Photo 3. Eastern coyote and white-tailed deer tracks.



Photo 4. Blue-headed vireo observed in Oak-Pine habitat.

1.4.2 WETLAND WILDLIFE HABITATS

The Site contains approximately 25% wetland habitats including Riverine, Red Maple Swamp, and Grassy Shrub Marsh natural communities (see **Figure 3** - *Cover Type Overlay*). The Site contains two primary wetland areas associated with Thatcher Brook, an unnamed tributary, and up-gradient drainages. GZA did not observe any threatened or endangered wildlife.

1.4.2.1 Riverine

The Site contains approximately 10 acres of Riverine habitat associated with Thatcher Brook, a perennial, riverine system, which flows along the northwestern Site boundary. An unnamed tributary also flows along the eastern Site boundary and converges in wetlands to the north.

This habitat type flows through neighboring Oak-Pine and Red Maple Swamp communities, with a canopy dominated by red oak, eastern hemlock, American elm (*Ulmus americana*), and eastern white pine. The shrub

layer is dominated by choke cherry (*Prunus virginiana*) and silky dogwood (*Cornus amomum*), and the herbaceous layer is dominated by sensitive fern (*Onoclea sensibilis*).

GZA observed common resident bird species blue jay (*Cyanocitta cristata*), belted kingfisher (*Megaceryle alcyon*), and mallard (*Anas platyrhynchos*), in addition to muskrat (*Ondrata zibethicus*) burrows and foraging evidence of American beaver (*Castor canadensis*). GZA also observed common creek chub (*Semotilus atromaculatus*) and a North American river otter (*Lontra canadensis*) latrine near the confluence of Thatcher Brook and its tributary to the north of the Site. GZA did not observe any threatened or endangered species.



Photo 5. View of Thatcher Brook at the western Site boundary.



Photo 6. View of Thatcher Brook at the northern Site boundary.



Photo 7. View of unnamed stream at the eastern Site boundary in Oak-Pine Forest.



Photo 8. River otter latrine site near Thatcher Brook.

1.4.2.2 Red Maple Swamp

Approximately nine acres of the Site contains Red Maple Swamp habitat, associated with forested wetlands and associated drainages at the southern and central portions of the Site.

The canopy is dominated by red maple, in association with red oak, eastern hemlock, black cherry (*Prunus serotina*), and white ash (*Fraxinus americana*). The shrub layer contains arrowwood viburnum (*Viburnum dentatum*), silky dogwood, and wild raisin (*Viburnum nudum*), in association with highbush blueberry (*Vaccinium corymbosum*), winterberry holly (*Ilex verticillata*), white meadowsweet (*Spiraea alba*), and red elderberry (*Sambucus racemosa*). The herbaceous layer is dominated by sensitive fern and sphagnum moss (*Sphagnum* spp.), in association with marsh fern, arrowwood viburnum, jewelweed (*Impatiens capensis*), poison ivy (*Toxicodendron radicans*), and nodding sedge (*Carex gynandra*).

GZA observed common resident bird species black-capped chickadee, gray catbird (*Dumetella carolinensis*), hairy woodpecker (*Leuconotopicus villosus*), northern flicker (*Colaptes auratus)*, and white-throated sparrow. GZA also observed green frog (*Lithobates clamitans*) and track evidence of white-tailed deer and gray squirrel (*Sciurus carolinensis*).



Photo 9. Red maple and sensitive fern wetlands.



Photo 10. View of dense shrub cover in forested uplands.

1.4.2.3 Grassy Shrub Marsh

Approximately two acres of the Site contains Grassy Shrub Marsh habitat, associated with wetlands at the northern Site boundary near the confluence of Thatcher Brook and an unnamed tributary.

The canopy layer is sparse and contains eastern hemlock, red maple, and yellow birch (*Betula alleghaniensis*). The shrub layer is dominated by gray dogwood and red-osier dogwood (*Cornus sericea*), in association with speckled alder (*Alnus incana*). The herbaceous layer is dominated by sensitive fern, cinnamon fern (*Osmundastrum cinnamomeum*), woolgrass (*Scirpus cyperinus*), swamp dewberry (*Rubus hispidus*), and sedges (*Carex* spp.).

GZA observed common resident songbird species belted kingfisher, blue jay, northern flicker, and song sparrow (*Melospiza georgiana*). GZA also observed scat from river otter and foraging evidence of beaver. GZA did not observe any threatened or endangered species.



Photo 11. View of Grassy Shrub Marsh habitat at the northern Site boundary.

1.4.3 CRITICAL HABITATS

The Site is located within an area of "Endangered, Threatened, and Special Concern (ETSC) Animal Habitat" buffer, as shown on MDIFW "Beginning with Habitat" mapping (see **Figure 4** – *Beginning with Habitat*). This buffer follows a portion of Thatcher Brook for approximately 1.3 miles to the Saco River, limited to areas of undeveloped forest and wetlands. Based on information provided by Mike Eon Associates from MDIFW, a historic report of Blanding's turtle was reported in the Site vicinity and ETSC habitat buffer designated at the Site may be in relation to this record. No additional records of this species have been reported in the vicinity and approximately 98% of habitat at the Site does not contain core features of Blanding's turtle feeding and breeding habitat anticipated to support this species. In addition, the Site does not contain Essential Wildlife Habitat, as depicted by MDIFW data, and a vernal pool assessment completed by Mark Hampton Associates in 2022 did not document egg masses of vernal pool indicator species at the Site (see **Appendix B**).

1.4.4 THREATENED AND ENDANGERED WILDLIFE SPECIES

1.4.4.1 Blanding's Turtle

The Blanding's turtle is listed as State Endangered. This species utilizes a variety of wetlands throughout the year including vernal pools, beaver flowages, marshes, scrub-shrub, and forested wetlands with standing water. Blanding's turtles are known to make routine seasonal movements to vernal pools for foraging and other activities in the spring, as well as for summer rest periods known as aestivation (Ernst et al. 1994, Fowle 2001). In Maine, Blanding's turtles generally emerge from permanently flooded overwintering habitats in April and then disperse to vernal pools and other wetlands to feed on amphibian eggs and larvae, and in Maine are known to travel to as many as six different wetlands in a season (Joyal 1996). Individual turtles then may travel to deep-water wetlands (e.g., permanently flooded marshes and beaver impoundments) in late summer and early fall (Beaudry et al. 2009). Mating generally occurs from May to July, after which Blanding's turtles will make

large overland movements to nest in anthropogenic habitats such as uplands with exposed, sandy soils, typically from mid to late June (Beaudry et al. 2010).

Based on information summarized by MDIFW, one Blanding's turtle was observed approximately 2,000 feet north of the Site in the vicinity of South Road during 1970. Approximately 98% of the Site lacks core Blanding's turtle feeding and breeding habitat, containing forested uplands and wetland types with low potential to support this species. The Site also lacks large areas of open, disturbed habitat with sandy soils conducive for digging, required for potential nesting sites. However, approximately two acres of the Site contain Grassy Shrub Wetland habitat, featuring an area of emergent and shrub-dominant wetlands at the northern boundary, which may support this species, if present. Additionally, Blanding's and spotted turtles (*Clemmys guttata*) share similar habitat requirements and can co-occur within each species range (Beaudry et al. 2009, Beaudry et al. 2010). As a result, emergent wetlands to the north of the Site may have potential to support spotted turtles as well.

1.5 FINDING AND CONCLUSIONS

GZA has completed a wildlife assessment, as required by Section 70 of the City of Biddeford Zoning Ordinance, to support the local permitting efforts by Mike Eon Associates for future construction of a housing development off of Barra Road. The assessment included a review of state-wide wildlife data, classification and mapping of habitat types, wildlife documentation, and reviewed potential for Blanding's turtle to occur at the Site. GZA understands the project design is still in development and additional review of with MDIFW may be required for further concurrence. The following is a summary of our findings and conclusions:

- GZA created a wildlife habitat database using GIS to create an aerial habitat overlay of the project, and to identify wildlife habitats of regional significance near or on the Site. In addition, GZA completed a survey for wildlife on September 30, 2021, to document mammals, birds, amphibians, and reptiles.

- Blanding's turtles are historically known to occur in the Site vicinity (MDIFW data).

- The Site contains Oak-Pine Forest, Red Maple Swamp, Grassy Shrub Marsh, and Riverine habitats. An approximately two-acre area of emergent and shrub wetland habitat at the northern boundary, approximately 2% of the Site, may provide supporting habitat for rare species (i.e., Blanding's turtle).

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Appendix A – Limitations

USE OF REPORT

1. GZA GeoEnvironmental, Inc. (GZA) has prepared this report on behalf of, and for the exclusive use of Mike Eon Associates ("Client") for the stated purpose(s) and location(s) identified in the report. Use of this report, in whole or in part, at other locations, or for other purposes, may lead to inappropriate conclusions; and we do not accept any responsibility for the consequences of such use(s). Further, reliance by any party not identified in the agreement, for any use, without our prior written permission, shall be at that party's risk, and without any liability to GZA.

STANDARD OF CARE

2. GZA's findings and conclusions are based on the work conducted as part of the Scope of Services set forth in the Report and/or proposal, and reflect our professional judgment. These findings and conclusions must be considered not as scientific or engineering certainties, but rather as our professional opinions concerning the data gathered and observations made during the course of our work. Conditions other than described in this report may be found at the subject location(s).

3. GZA's services were performed using the degree of skill and care ordinarily exercised by qualified professionals performing the same type of services, at the same time, under similar conditions, at the same or a similar property. No warranty, expressed or implied, is made.

LIMITS TO OBSERVATIONS

4. Natural resource characteristics are inherently variable. Biological community composition and diversity can be affected by seasonal, annual or anthropogenic influences. In addition, soil conditions are reflective of subsurface geologic materials, the composition and distribution of which vary spatially.

5. The observations described in this report were made on the dates referenced and under the conditions stated therein. Conditions observed and reported by GZA reflect the conditions that could be reasonably observed based upon the visual observations of surface conditions and/or a limited observation of subsurface conditions at the specific time of observation. Such conditions are subject to environmental and circumstantial alteration and may not reflect conditions observable at another time.

6. The conclusions and recommendations contained in this report are based upon the data obtained from a limited number of surveys performed during the course of our work on the site, as described in the Report. There may be variations between these surveys and other past or future surveys due to inherent environmental and circumstantial variability.

RELIANCE ON INFORMATION FROM OTHERS

7. Preparation of this Report may have relied upon information made available by Federal, state and local authorities; and/or work products prepared by other professionals as specified in the report. Unless specifically stated, GZA did not attempt to independently verify the accuracy or completeness of that information.

COMPLIANCE WITH REGULATIONS AND CODES

8. GZA's services were performed to render an opinion on the presence and/or condition of natural resources as described in the Report. Standards used to identify or assess these resources as well as regulatory jurisdiction, if any, are stated in the Report. Standards for identification of jurisdictional resources and regulatory control over them may vary between governmental agencies at Federal, state and local levels and are subject to change over time which may affect the conclusions and findings of this report.

NEW INFORMATION

9. In the event that the Client or others authorized to use this report obtain information on environmental regulatory compliance issues at the site not contained in this report, such information shall be brought to GZA's attention forthwith. GZA will evaluate such information and, on the basis of this work, may modify the conclusions stated in this report.

ADDITIONAL SERVICES

10. GZA recommends that we be retained to provide further investigation, if necessary, which would allow GZA to (1) observe compliance with the concepts and recommendations contained herein; (2) evaluate whether the manner of implementation creates a potential new finding; and (3) evaluate whether the manner of implementation affects or changes the conditions on which our opinions were made.

Appendix B – Mark Hampton Associates Letters

MARK HAMPTON ASSOCIATES, INC.

SOIL EVALUATION • WETLAND DELINEATIONS • SOIL SURVEYS • WETLAND PERMITTING

6950
December 14, 2021

Mr. Mike Eon
Mike Eon Associates
260 Main Street Suite C
Biddeford, ME 04005

Re: Wetland Delineation 75+ acre parcel Barra Road Biddeford, ME

Dear Mike,

I completed a wetland delineation on an 75+ acre parcel located off Barra Road Biddeford, ME. The wetland delineation was completed in accordance with the 1987 U.S. Army Corps of Engineers Wetland Delineation Manual and the Regional Supplement to the Corps of Engineers Wetland Delineation Manual for the Northcentral and Northeast Regions dated January 2012. These manuals require the presence of three parameters for a wetland to be present, wetland hydrology, hydrophytic vegetation, and hydric soils.

The wetlands I found on the parcel were flagged with yellow flagging. The wetland flags are labeled in an alpha-numeric sequence and were located with a handheld GPS unit with accuracy to less than 36 inches. This information has been forwarded to BH2M. The wetlands found onsite are forested wetlands. The wetlands on the property located adjacent to the streams meet the definition of wetlands of special significance as defined by Maine Department of Environmental Protection.

If you have any questions or require additional information, please contact me.

Sincerely,

Mark J. Hampton L.S.E., C.S.S.
Licensed Site Evaluator #263
Certified Soil Scientist #216

P.O. BOX 1931 • PORTLAND, ME 04104-1931 • 207-756-2900 • mhampto1@maine.rr.com

Quality services that meet your deadline

MARK HAMPTON ASSOCIATES, INC.

SOIL EVALUATION • WETLAND DELINEATIONS • SOIL SURVEYS • WETLAND PERMITTING

6950
May 3, 2022

Mr. Mike Eon
Mike Eon Associates
260 Main Street Suite C
Biddeford, ME 04005

Re: Vernal Pool Assessment, 75+ acre parcel Barra Road Biddeford, ME

Dear Mike,

I have completed a vernal pool assessment on a 75+ acre parcel located off Barra Road Biddeford, ME. The vernal pool assessment was conducted in accordance with Chapter 335 Significant Wildlife Habitat, Section 9 Significant Vernal Pools for the Maine Department of Environmental Protection. This section outlines the definition of a vernal pool as well as the requirements of a vernal pool to meet the definition of significance as related to the number of amphibian egg masses counted during the breeding season.

Two site visits were made to the property over the course of six weeks beginning the last week in March. I found no vernal pools on the property.

If you have any questions or require additional information, please contact me.
Sincerely,

Mark J. Hampton L.S.E., C.S.S.
Licensed Site Evaluator #263
Certified Soil Scientist #216

P.O. BOX 1931 • PORTLAND, ME 04104-1931 • 207-756-2900 • mhampto1@maine.rr.com

Quality services that meet your deadline

Appendix C – Qualified Wildlife Biologist Resume



Tracy L. Tarr, CWS, CWB, CESSWI

Associate Principal

Summary of Experience

Tracy is an environmental consultant that specializes in wildlife assessment, natural resource identification, and permitting. She manages field teams and oversees complex natural resource data collection and permitting efforts. She specializes in a variety of ecological assessment services including protected species surveys, wetland function-value assessment, vernal pool assessments, wetland delineation, natural community mapping, wildlife habitat assessments, watershed planning, mitigation design, and construction monitoring. She has permitted a diversity of projects at the local, state, and federal level including residential projects, commercial developments, municipal infrastructure projects, and utility corridors. Tracy also specializes in municipal projects that integrate natural resource assessment and planning. Tracy previously served as the Chair of the Gilmanton Conservation Commission and as the Secretary of the NH Association of Conservation Commissions. She is currently a member of the NH Association of Natural Resource Scientists Legislative Committee and serves as the northern New England technical practice lead for ecological services at GZA.

Education

B.S., Wildlife Management
University of New Hampshire, 1997
M.S., Natural Resources: Wildlife Ecology
University of New Hampshire, 2000

Licenses & Registrations

New Hampshire Certified Wetland Scientist, CWS #281
Certified Wildlife Biologist
Certified Erosion, Sediment and Stormwater Inspector, #388

Affiliations

- New Hampshire Association of Natural Resource Scientists
- Gilmanton Conservation Commission, Past Chair

Areas of Specialization

- Wildlife Habitat Evaluation
- Wetland Permitting
- Invasive Species Mapping
- Mitigation Design
- Rare Species Assessment
- Vernal Pool Identification & Evaluation
- Construction Monitoring
- G.I.S. Mapping

Relevant Project Experience

WILDLIFE AND RARE SPECIES ASSESSMENT

Wildlife Biologist, HSR, Illinois. Completed meander surveys for ornate box turtle and trapping surveys for Blanding's turtle. Led multi-state field team.

Wildlife Biologist/Wetland Scientist, Project Manager, Round Pond Dam Expansion Project, New Hampshire. Completed a multi-year trapping and radio-telemetry study of Blanding's turtle (*Emydoidea blandingii*), a State Endangered species, to model and predict impacts of a proposed reservoir expansion project. Ms. Tarr provided wildlife evaluations, rare species documentation, habitat mapping, wetland delineation, function-value assessments, and impact analysis for a proposed water reservoir expansion project at Round Pond. The project was specifically designed to assess the potential impacts of raising the outlet elevation of Round Pond by approximately 10 feet.

Wildlife Biologist, Mike Eon Associates, Biddeford, Maine. Completed wildlife habitat mapping field work and impact assessment evaluations for Blanding's turtle.

Wildlife Biologist, Groundwater Exploration, Bethel, Connecticut. Completed construction surveys for eastern box turtle (*Terrapene Carolina carolina*), bog turtle (*Glyptemys muhlenbergii*), spotted turtle (*Clemmys guttata*), and wood turtle (*Glyptemys insculpta*). Oversaw electrofishing effort to characterize fisheries on Site.

Wildlife Biologist, South Coast Rail, Berkeley, Massachusetts. Sub-permittee for construction surveys for eastern box turtle. Oversaw implementation of turtle monitoring.

Erosion Control Monitor for the P145 Transmission Line, Concord, New Hampshire. Provided construction monitoring services and assessed drill locations for the State Endangered Blanding's turtle.

Tracy L. Tarr, CWS, CESSWI

Associate Principal

Wildlife Biologist/Associate Principal, Winchester Economic Development Authority, Winchester, New Hampshire. Completed a multi-season survey for black racer (*Coluber constrictor*) as part of Alteration of Terrain permitting for the project. Responsible for developing methods and coordination with the New Hampshire Fish and Game Department.

Project Manager, Eastman Development, LLC, Brookline, New Hampshire. Completed a survey for eastern hognose snake (*Heterodon platirhinos*) and black racer on a 40-acre Site.

Wetland Scientist/Associate Principal, Town of Exeter, Exeter, New Hampshire. Completed a peer review of rare species, exemplary community and vernal pool surveys.

Wildlife Biologist, Battis Farm, Amesbury, Massachusetts. Completed a survey for bobolink (*Dolichonyx oryzivorus*) and prepared a grassland bird management plan for the Battis Barm Conservation Property.

Project Manager, Riverwoods at Durham, Durham, New Hampshire. Oversaw and completed a winter pellet survey for New England cottontail (*Sylvilagus transitionalis*).

Wildlife Biologist/Associate Principal, Waste Management of New Hampshire, Inc. Rochester, New Hampshire. Managed and oversaw the development of a wildlife habitat survey for rare species to address Alteration of Terrain permitting requirements.

Wildlife Biologist/Associate Principal, Commercial Development, Seabrook, New Hampshire. Responsible for the development of wetland mitigation enhancement plan and overseeing wildlife relocation measures during construction including relocation of turtles, amphibians and fish. Documented new location of a special concern fish species.

Wildlife Biologist, BlueWave, Naples, Maine. Completed a deer wintering habitat survey, amphibian egg mass counts, and talus rock survey for bats.

Wildlife Biologist/Project Manager, Substation, New Hampshire. Assessed common raven (*Corvus corax*) habitat use and behavior over approximately five square miles, and developed a management plan for reducing power outages caused by ravens.

Wildlife Biologist, Waste Management of New Hampshire, Inc., Rochester, New Hampshire. Completed a Phase 1 bat assessment on a 598 acre commercial property to evaluate habitat suitability for the northern log-eared bat (*Myotis septentrionalis*), a federally Threatened species. Ms. Tarr completed all field work, report preparation, and coordination with the U.S. Fish and Wildlife Service.

Wildlife Biologist, Thermogen Industries, Eastport, Maine. Completed wildlife habitat assessment, rare species documentation, natural community mapping, intertidal and subtidal field surveys, wetland delineation, shoreland/surface water delineation, wetland functions and values assessment, and preliminary natural resource impact evaluation for a proposed 200- to 300-thousand metric-ton-per-year torrefied wood production facility on the site. Ms. Tarr worked directly with State regulators including fisheries biologists to identify permitting needs and options for the proposed facility.

Wildlife Biologist, Pats Peak, Henniker, New Hampshire. Completed biomonitoring evaluations spanning the course of 10 years in Cascade Brook to assess the potential impacts of water withdrawal for snowmaking. Ms. Tarr completed biomonitoring evaluations including macroinvertebrate sampling, electrofishing evaluations, and habitat assessments. Ms. Tarr worked directly with the New Hampshire Department of Environmental Services (NHDES) to properly identify the implications of the data and highlight other contributing landscape factors to the data.

Project Manager, Town of Merrimack, New Hampshire. Prepared the first documented town-wide Comprehensive Beaver Management Plan in New Hampshire. The Plan was designed to minimize flood impacts caused by beaver, maintain important natural resources associated with beaver ponds, and minimize long-term municipal infrastructure maintenance costs. As part of this work, Ms. Tarr evaluated beaver activity at over 35 locations, developed a Beaver Habitat Suitability Model, identified appropriate best management practices for water level control, obtained cost estimates and bids, and completed construction monitoring.

Tracy L. Tarr, CWS, CESSWI

Associate Principal

Wildlife Biologist, Sunningdale Residential Development, Somersworth, New Hampshire. Completed a wildlife assessment to document wildlife habitats and species, and identify best management practices to maintain and manage wildlife habitats. Coordinated a review for grassland birds and New England cottontail. Developed a Conservation Easement Baseline Documentation report.

Wildlife Biologist, North Keene Substation, Keene, New Hampshire. Prepared a wildlife assessment to document wildlife habitats, species, and best management practices.

RARE PLANT SURVEYS

Project Manager,340 and 386 Distribution Line Project, Rochester, New Hampshire. Completed natural resource evaluation and permitting for the reconstruction of two distribution lines. Also completed survey for six State Threatened/Endangered species including button sedge (*Carex bullata*), clustered sedge (*Carex cumulata*), dwarf huckleberry (*Gaylussacia bigeloviana*), long's bulrush (*Scirpus longii*), nuttall's reed grass (*Calamagrostis cinnoides*), and variable sedge (*Carex polymorpha*).Flagged populations and monitored during construction.

Project Manager, 324 Distribution Line Project, Bedford and Manchester, New Hampshire. Completed surveys for river birch (*Betula nigra*) and long-leaved bluet (*Houstonia longifolia*). Coordinated survey data with the Natural Heritage Bureau.

Wetland Scientist, H141/R193 Transmission Line Uprate Project, Danville, Sandown, Chester, Fremont, and Exeter, New Hampshire. Completed survey for fringed gentian (*Gentianopsis crinita*), a State Threatened plant species. Mapped rare plant locations, completed local permitting, and completed construction monitoring. Documented wood turtle in the utility corridor.

Project Manager, BCS Environmental & Land Law, LLC, New Durham, New Hampshire. Completed survey for small-whorled pogonia.

Wetland Scientist, BlueWave, Naples, Maine. Completed and oversaw surveys for small-whorled pogonia.

Wetland Scientist, E194/U181 Transmission Line, Greenland and Portsmouth, New Hampshire. Oversaw surveys for great bur-reed (*Sparganium eurycarpum*), and development of best management practices to protect plants during construction.

WETLAND DELINEATION, ASSESSMENT & PERMITTING

Wetland Scientist, Town of Webster Wetland Assessment, Webster, New Hampshire. Developed a town-wide wetland assessment and ranked 25 wetlands using the NH Method to assist the Town in the development of a wetland ordinance template and town-wide wetland maps.

Wetland Scientist, Various Utility Corridors (e.g., L163 Transmission Line, W185 Distribution Line), New Hampshire. Completed wetland delineation field work and mapping. Oversaw the development of wetland permitting and access plans.

Wetland Scientist, Martin Meadow Dam, Lancaster, New Hampshire. Completed shoreland assessment and wetland function-value assessment field work in support of the upgrades to Martin Meadow Dam. Coordinated reviews with federal and state agencies, and permitted the reconstruction of the dam.

Project Manager, City of Portsmouth Athletic Fields, Portsmouth, New Hampshire. Completed wetland function-value assessment, vernal pool surveys, and permitting for the construction of three new municipal athletic fields. Coordinated local, state, and federal permitting, completed agency and municipal permitting meetings, and developed the mitigation plan for the project.

Wetland Scientist, James Pond, Exeter/Richmond, Rhode Island. Completed wetland delineation field work and documentation on approximately 900 acres of predominantly wooded and remote terrain. Prepared a beaver management plan and modeled habitat suitability of the Site.

Tracy L. Tarr, CWS, CESSWI

Associate Principal

Wetland Scientist, Plymouth Village Water & Sewer District, Plymouth, New Hampshire. Completed wetland delineation, assessment, and permitting for the replacement of a force main sewer line and access culverts along approximately 3,600 linear feet bordering the Baker River.

Wetland Scientist, Marsh Property, Greenland, New Hampshire. Completed wetland assessment field work and permitting for a bank stabilization project on Great Bay. Designed a joint planting stabilization plan.

Wetland Scientist, Albacore Park, Portsmouth, New Hampshire. Completed wetland delineation and wetland function-value assessment field work in support of the upgrades to the Albacore Park facility and associated submarine basin.

Project Manager, Town of Merrimack, New Hampshire. Completed wetland delineation on town conservation property in support of a trail parking lot project. Also, prepared the first documented town-wide Comprehensive Beaver Management Plan in New Hampshire. The Plan was designed to minimize flood impacts caused by beaver, maintain important natural resources associated with beaver ponds, and minimize long-term municipal infrastructure maintenance costs. As part of this work, Ms. Tarr evaluated beaver activity at over 35 locations, developed a Beaver Habitat Suitability Model, identified appropriate best management practices for water level control, obtained cost estimates and bids, and completed construction monitoring.

Wetland Scientist, Dartmouth College, New Hampshire. Completed wetland function-value assessment field work along 1.25-miles of a proposed alternative energy pipeline route. Wetlands were assessed utilizing the U.S. Army Corps of Engineers' Highway Methodology Workbook Supplement (ACOE, September 1999). Ms. Tarr also prepared GIS overlays of wetlands, conservation lands, wildlife habitats, and recreation areas to identify ecologically sensitive areas and assist with project scoping and impact minimization.

Wetland Scientist, Lomastro Property, Dover, New Hampshire. Completed state and local permitting for a permeable paver and retaining wall project on the Bellamy River. Successfully obtained state wetlands permit and local conditional use permit for work within 50-feet of saltmarsh habitat.

Wetland Scientist, Island Path Property, Hampton, New Hampshire. Completed wetland assessment field work, as well as local, state, and federal permitting for a residential project located in the tidal buffer zone of Great Bay.

Wetland Scientist, Public Service Company of New Hampshire. Completed wetland delineation and natural resources assessment on a 75-acre mitigation property. Wetland boundaries were delineated in accordance with the 1987 ACOE Wetlands Delineation Manual and the January 2012 Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region. A global positioning system (GPS) was used to locate and map wetlands on the site. Ms. Tarr also identified potential vernal pools and rare species habitats, and completed wetland function-value assessment field work. Ms. Tarr prepared the project report and completed GIS overlays to document the natural resource values of the targeted mitigation property.

WETLAND RESTORATION DESIGN AND MONITORING

Wetland Scientist, South Coast Rail, Berkeley, Massachusetts. Prepared an invasive species management plan for four wetland mitigation areas, and oversaw wetland mitigation construction monitoring and remedial measures.

Wildlife Biologist, Maverick Development, Auburn, New Hampshire. Completed vernal pool assessment field work and prepared a Vernal Pool Creation Plan as part of project mitigation.

Wetland Scientist, Ball Hill Wind Energy, Hanover, New York. Developed mitigation plans for a wetland mitigation site. Completed wetland delineation, wildlife documentation, and plan preparation.

Wetland Scientist, City of Keene, New Hampshire. Developed stream and wetland restoration plans to improve wetland functions including flood protection, sediment retention, nutrient removal and wildlife habitat. Completed wetland permitting and construction monitoring for a one-acre wetland restoration area. Oversaw plant selection and installation in the restoration area.

Tracy L. Tarr, CWS, CESSWI

Associate Principal

Wetland Scientist, Portsmouth Development Authority, Portsmouth, New Hampshire. Completed wetland mitigation monitoring for a wetland buffer enhancement project associated with the South Entrance Multi-use Path project. Responsible for native plant selection, and planting plan development and contractor oversight.

UTILITY CORRIDOR ASSESSMENT AND PERMITTING

Project Manager, L176 Transmission Line Rebuild Project, Franklin, Tilton, Belmont, and Laconia, New Hampshire. Completed natural resource data collection, as well as local, state, and federal permitting for the rebuild of a 13.5-mile transmission line. Presented the project at local River Advisory Committee, Conservation Commission, Planning Board, and Zoning Board of Adjustment hearings. Successfully acquired state wetland permit, shoreland permits, PUC water crossing permit, DOT permits, and conditional use permits.

Senior Project Manager, H123 Transmission Line, Merrimack and Litchfield, New Hampshire. Oversaw data collection and local, state, and federal permitting for the rebuild of the transmission line.

Project Manager, Y151 Transmission Line, Hudson, New Hampshire. Completed data collection, wetland assessment, and local, state, and federal permitting for the rebuild of the Y151 Transmission Line.

Project Manager, 381 Transmission Line, Winchester, New Hampshire. Completed wetland assessments and local, state, and federal permitting for the rebuild of the 381 Transmission Line and construction of culverts for a permanent access road. Oversaw construction monitoring.

Project Manager, 379 Transmission Line, Hinsdale, Winchester, Richmond, and Troy, New Hampshire. Oversaw permitting, archeological assessment, and construction monitoring for structure and ground wire replacement work.

Associate Principal, M127 Transmission Line, Sunapee, Springfield, New London, Wilmot, Andover, and Franklin, New Hampshire. Oversaw data collection, vernal pool assessment, permitting, tree clearing, and construction monitoring for the project.

Project Manager, 346X2 Distribution Line Project, Tuftonboro, New Hampshire. Completed vernal pool assessment, wetland function value assessment, permitting, and construction monitoring for the construction of a new distribution line.

Project Manager, Q166 Transmission Line, Fitzwilliam and Troy, New Hampshire. Completed natural resource data collection, as well as local, state, and federal permitting for the construction of a new transmission line. Also, completed construction monitoring.

Project Manager, L163 and K174 Transmission Line TRRP Projects, New Hampshire. Completed natural resource data collection and permitting review for multiple Transmission ROW Reliability Projects. Oversaw field oversight during project implementation.

Project Manager, J147 Transmission Line, Danville and Kingston, New Hampshire. Completed data collection, local/state/federal permitting, and construction monitoring for structure and davit arm replacement work.

Wetland Scientist, Peaslee Tap, Danville, New Hampshire. Completed local permitting for the construction of the Peaslee Tap.

Project Manager, South Peterborough Substation, Peterborough, New Hampshire. Completed wetland function-value assessment, state permitting, and construction monitoring for the re-construction of a distribution line at the substation.

WATERSHED MANAGEMENT

Project Manager, City of Biddeford, Biddeford, Maine. Worked directly with the City of Biddeford and Maine Department of Environmental Protection (DEP) to prepare a Watershed Management Plan for Thatcher Brook. The brook is listed on DEP's Impaired Water Bodies list for primary and secondary contact recreation impairment (bacteria) and aquatic life use violations due to macroinvertebrate impairments. Previous studies of the brook yielded limited macroinvertebrate samples. Ms. Tarr developed a specific macroinvertebrate and habitat evaluation for Thatcher Brook to enhance and supplement existing biomonitoring data. These data were used to develop habitat restoration recommendations and structural retrofit recommendations with the goal of improving the water quality of the brook to meet Class B water quality criteria.

Tracy L. Tarr, CWS, CESSWI

Associate Principal

Project Manager, Long Creek Watershed Management District, Maine. Hired as a sole-source contractor to review the Long Creek Watershed Management Plan and recommend possible changes in data collection, monitoring, and habitat/retrofit implementation in the watershed.

INVASIVE SPECIES MANAGEMENT PLAN DEVELOPMENT & MONITORING

Wetland Scientist for the Whittier Bridge, I-95 Improvement Project, Newburyport, Amesbury, and Salisbury, Massachusetts. Mapped invasive plants along 4-miles of highway and prepared GIS and map overlaps for invasive species management. Worked with the MassDOT and the contractor to develop an Invasive Plant Management Plan.

Wetland Scientist,Swanzey Roundabout Construction, Swanzey, New Hampshire. Developed the invasive species management plan for the project and completed construction monitoring.

Wetland Scientist, Essential Power, Newington, New Hampshire. Oversaw wetland delineation and the development of special permits to support vegetation and invasive species management.

CONSTRUCTION MONITORING

Erosion Control Inspector, Y170 Transmission Line and 386/386A/340 Distribution Line Project, Farmington, Milton, and Rochester, New Hampshire. Provided full-time construction monitoring services over the course of six months for an 8-mile power line project involving four overlapping existing and new lines. Ms. Tarr prepared the Stormwater Pollution Prevention Plan (SWPPP) and provided SWPPP monitoring services, erosion control inspections, wetland delineation, and rare species and exemplary community mapping. Ms. Tarr worked daily with contractors to address local, state, and federal environmental permitting requirements.

Erosion Control Inspector, Merrimack Valley Reliability Project, Tewksbury and Dracut Massachusetts and Hudson, New Hampshire. Completed erosion control monitoring and contractor training on behalf of the contractor. During construction, completed sweeps for rare turtles and snakes including wood turtle and black racer.

Erosion Control Inspector, H137 Transmission Line, Bow, New Hampshire. Provided construction monitoring services and environmental compliance oversight. Conducted weekly and post-storm inspections and interacted with construction managers and operators to implement Best Management Practices (BMPs) for erosion control and sensitive archaeological resources.

Assistant Project Manager, Public Service Company of New Hampshire. Prepared Stormwater Pollution Prevention Plans and Notice of Termination documents for multiple transmission line projects.

Relevant Experience Prior to GZA

Senior Project Manager/Wildlife Biologist, Stoney Ridge Environmental, LLC (2007 – 2012)

NHSC, Inc. (a.k.a. NH Soil Consultants, Inc.) (2000-2002, 2003-2007)

Wetland Systems Biologist, New Hampshire Fish & Game Department (2002/2003)

Research Technician, University of New Hampshire (1994-1997, 1999-2000)

- **Lead field technician for southern New Hampshire Blanding's turtle study**
- **UNH Deer Research Facility**
- **UNH Animal Research Laboratory**
- **Technician for Impacts of a Watchable Wildlife Site (completed avian point count surveys, small mammal trapping, and moose behavior assessments)**

Research Technician, NEIWPCC/EPA, Deformed frog survey (1997)

Tracy L. Tarr, CWS, CESSWI

Associate Principal

Publications

Stone, A.L., Mitchell F., Van de Poll, R., Rendall, N., Leo, M., West, M., Ammann, A., Andrews, C., Tarr, T., Tilton, M.A., Adams, C., et al., "Method for Inventorying and Evaluating Freshwater Wetlands in New Hampshire (NH Method; June 2011 Update)," University of New Hampshire Cooperative Extension, June 2011

Baber, M.J., Fleishman, E., and Babbitt, K.J., and Tarr, T.L. "The relationship between wetland hydroperiod and nestedness patterns in assemblages of larval amphibians and predatory macroinvertebrates," Oikos, 2004

Tarr, T.L., Baber, M.J., and Babbitt, K.J., "Patterns of larval amphibian distribution along a wetland hydroperiod gradient," Canadian Journal of Zoology, 2003

Tarr, T. and Babbitt, K.J., "Effects of habitat complexity and predator identity on predation of *Rana clamitans* larvae," Amphibian-Reptilia, 2002

Tarr, T. and Babbitt, K.J., "First record of *Dibolocelus ovatus* (Coleoptera:Hydrophilidae) in New Hampshire," Entomological News, 2001



Logan Young

Scientist I

Summary of Experience

Mr. Young is an environmental scientist specializing in wildlife and habitat assessment, natural resource identification, field data collection, and construction monitoring. Additional areas of experience include natural resource permitting, landscape mitigation, and geospatial analysis. He regularly reviews best management practices for wildlife assessments, listed species, and construction erosion controls, and assists in all aspects of permitting at a state and local level. Mr. Young has experience prior to GZA in managing stakeholder relationships through outreach for large-scale utility projects, as well as managing volunteer-based wildlife conservation programs.

Education

B.S., Ecology and Spatial Analysis, University of New Hampshire, 2012

Non-Degree Coursework, Oregon State University, 2021

Licenses & Registrations

40-hour HAZWOPER

Affiliations

- New Hampshire Association of Natural Resource Scientists
- The Wildlife Society
- NH Audubon

Areas of Specialization

- Wildlife Habitat Evaluation
- Threatened/Endangered Species Assessment
- Avian Surveys
- Reptile Surveys
- Electrofishing Surveys
- Tree, Shrub, and Herbaceous Plant Identification
- Rare Plant Surveys
- Construction Monitoring
- Environmental Permitting
- GIS Mapping and Analysis
- Public Outreach and Involvement

Relevant Project Experience

GZA WILDLIFE AND RARE SPECIES SURVEY

Wildlife Biologist, BWC Bauneg Beg Pond, LLC, Rare Reptile and Butterfly Species Survey, Sanford, Maine, 2021. Conducted presence/absence survey for rare species in area of a proposed solar array. Field work consisted of targeted surveys for northern black racer (*Coluber constrictor constrictor*), sleepy duskywing (*Erynnis brizo*), and Edwards' hairstreak (*Satyrium edwardsii*) based on historic presence reports and habitat features. Surveys included coordination with state biologists for methodology and preservation of collected species, and recommendations for management approaches in proposed work areas.

Wildlife Biologist, Eversource Energy, Common Nighthawk Survey, Keene, New Hampshire, 2021. Conducted presence/absence surveys for rare species in proposed construction areas of existing utility right-of-way. Field work consisted of targeted surveys for common nighthawk (*Chordeiles minor*) and evaluation of survey areas as potential nesting sites based on current and historic presence reports. Habitat features were assessed to predict potential utilization of nighthawks in construction areas and document nesting behavior following NH Audubon protocols.

Wildlife Biologist, Town of Waterville Valley, Biological Monitoring, Waterville Valley, New Hampshire, 2021. Conducted biological survey in tributaries of Mad River in long-term assessment following installation of a town-operated well. Assessment of water quality included sampling for dissolved oxygen, specific conductance, pH, and temperature. Assessment also included electrofishing surveys to sample populations of brook trout (*Salvelinus fontinalis*) in streams to determine effects to drainage area from town well.

Field Biologist, One Bon Terrain EIP, LLC, Rare Plant Survey, Amherst, New Hampshire, 2021. Conducted presence/absence survey for rare plant species in area of proposed commercial development. Field work consisted of targeted surveys for licorice goldenrod (*Soidago odora spp. odora*) and northern blazing star (*Liatris novae-angliae*) based on historic presence reports and habitat features to identify target species and determine management approach if present in proposed work areas.

Wildlife Biologist, HSR, Will County, Reptile Survey, Illinois, 2020. Conducted presence/absence surveys for turtle species in existing high-speed rail corridor. Field work consisted of meander surveys for ornate box turtle (*Terrapene ornata ornata*) in national prairie preserve, aquatic trapping surveys for Blanding's turtle (*Emydoidea*

Logan Young
Scientist I

blandingii), and evaluation of survey areas based on historic presence reports and habitat features to predict potential utilization of target species in rail corridor.

Wildlife Biologist, BJ's Wholesale Club, Aquatic Wildlife Relocation, Seabrook, New Hampshire, 2020. Conducted aquatic wildlife surveys during wetland dredge and fill activity for new construction of a retail warehouse. Aquatic wildlife was captured using electrofishing equipment and relocated on site. Special concern species American eel (*Anguilla rostrata*) , banded sunfish (*Enneacanthus obesus*), and redfin pickerel (*Esox americanus*) were identified and relocated off-site with coordination from NH Fish and Game Post-construction mitigation requirements include expansion of an existing pond and long-term monitoring of wildlife and native vegetation on site.

Wildlife Biologist, Town of Winchester, Northern Black Racer Survey, Winchester, New Hampshire, 2020. Conducted a presence/absence survey for NH State Threatened northern black racer (within a 63-acre parcel prior to construction of a proposed commercial development. Visual assessments for reptiles were completed along random traverse routes throughout all habitat types within the property, as well as identifying locations of greater potential habitat capable of supporting the species. Survey included coordination with NH Fish and Game to temporarily collect target species, if encountered, and conduct additional biomonitoring survey.

Wildlife Biologist, Proposed Residential Subdivision, Deer Wintering Area Assessment, Newbury, New Hampshire. 2021. Identified and documented the presence of potential deer wintering areas within a 50-acre parcel to support permitting of a proposed residential development. Potential deer wintering areas were assessed by habitat characterization, canopy density, and presence/absence survey of white-tailed deer.

NON-GZA WILDLIFE AND RARE SPECIES SURVEY

Field Monitor & Project Coordinator - NH Audubon, Massabesic Center, Nestbox Monitoring, Auburn, New Hampshire, 2016-Current. Coordinator and field lead for annual surveys of cavity nesting bird species for NH Audubon at Massabesic Lake. Survey focuses on populations of species in decline including eastern bluebird (*Sialia sialis*), tree swallow (*Tachycineta bicolor*), and house wren (*Troglodytes aedon*). Surveys include identification of breeding species, recording fledgling success, and managing habitat for introduced and invasive species. Program also employs and assesses techniques for management of house sparrow (*Passer domesticus*).

Field Surveyor – NH Audubon, Eastern Meadowlark Survey, Manchester, New Hampshire, 2021. Field surveyor for NH State Threatened species eastern meadowlark (*Sturnella magna*) Hillsborough County, NH. Surveys included presence/absence in airport and grassland environments during breeding season and identification of vesper sparrow (*Pooecetes gramineus*) and other grassland species in decline.

Field Surveyor - NH Audubon, Carter Hill Orchard, Seasonal Hawk Watch, Concord, New Hampshire, 2016-2020. Annual field surveyor during fall migration survey in the Merrimack River Valley. Surveys include identification of species in flight, recording presence, relative abundance, and seasonal timing of avian species with a focus on raptors.

Field Surveyor - NH Audubon & Harris Center, Pack Monadnock Raptor Observatory, Seasonal Hawk Watch, Warner, New Hampshire, 2016-2020. Annual field surveyor during fall migration survey in the Monadnock region. Surveys include identification of species in flight, recording presence, relative abundance, and seasonal timing of avian species with a focus on raptors.

Field Surveyor – NH Audubon, Massabesic Center, Summer Bat Colony Survey, Auburn, New Hampshire, 2016-2021. Field surveyor for NH State Endangered little brown bat (*Myotis lucifugus*). Survey included species identification via acoustic survey and visual count of bats in known maternity roost. Counts were conducted at beginning and end of pupping season to assess reproductive success.

Field Surveyor -Baltimore Bird Club, Cromwell Valley Park, Seasonal Hawk Watch, Parkville, Maryland, 2015. Field surveyor during fall migration survey in the Chesapeake Bay Basin region. Surveys include identification of species in flight, recording presence, relative abundance, and seasonal timing of avian species with a focus on raptors.

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Scientist I

Field Surveyor – NH Audubon, McLane Center, Chimney Swift Survey, Concord & Manchester, New Hampshire, 2014. Field surveyor for NH State Special Concern species chimney swift (*Chaetura pelagica*) during roost count surveys in Concord and Manchester, NH. Surveys included presence/absence in urban environments, identification of night roosts, and relative abundance in documented roost sites.

NON-GZA RARE PLANT SPECIES SURVEY

Field Surveyor – Native Plant Trust, New England Rare Plant Survey, Hillsborough County, New Hampshire. Field surveyor for endangered and threatened plant species in Hillsborough County, NH. Surveys included presence/absence for bird's-foot violet (*Viola pedata*), northern tubercled bog orchid (*Platanthera flava var. herbiola*), and upland boneset (*Eupatorium sessilifolium*), assessment of habitat conditions, and documentation of changes in relative abundance form prior surveys.

WILDLIFE AND RARE SPECIES ASSESSMENT

Wildlife Biologist, Bedford RLG Properties, LLC, Wildlife Assessment, Bedford, New Hampshire. Identified and documented the presence of wildlife species within a 27-acre parcel to support permitting of a proposed commercial development, with an emphasis on use by listed species in NH. Visual and audio techniques were used to assess the presence of avian, mammal, reptile, insect, fish, and botanical species along random traverse routes throughout the property. Habitat types were identified and used to characterize potential utilization of the parcel by local fauna. Findings included recommendations on best management practices for proposed construction and future land use.

Wildlife Biologist, Bowers Landing of Merrimack II, Wildlife Assessment, Merrimack, New Hampshire. Identified and documented the presence of wildlife species within an 8-acre parcel to support permitting of a proposed residential subdivision, with an emphasis on use by listed species in NH. Visual and audio techniques were used to assess the presence of avian, mammal, reptile, insect, fish, and botanical species along random traverse routes throughout the property. Habitat types were identified and used to characterize potential utilization of the parcel by local fauna. Findings included recommendations on best management practices for proposed construction and future land use.

Wildlife Biologist, BJ's Wholesale Club, Wildlife Assessment, Seabrook, New Hampshire. Identified and documented the presence of wildlife species within a 24-acre parcel to support permitting of proposed additions to new construction of a retail warehouse, with an emphasis on use by listed species in NH. Visual and audio techniques were used to assess the presence of avian, mammal, reptile, insect, fish, and botanical species along random traverse routes throughout the property. Habitat types were identified and used to characterize potential utilization of the parcel by local fauna. Findings included recommendations on best management practices for proposed construction and future land use.

Wildlife Biologist, Ducal Development, LLC, Wildlife Assessment, Hollis, New Hampshire. Identified and documented the presence of wildlife species within a 55-acre parcel to support permitting of a proposed commercial development, with an emphasis on use by listed species in NH. Visual and audio techniques were used to assess the presence of avian, mammal, reptile, insect, fish, and botanical species along random traverse routes throughout the property. Habitat types were identified and used to characterize potential utilization of the parcel by local fauna. Findings included recommendations on best management practices for proposed construction and future land use.

Wildlife Biologist, Dwarkamai Temple, Wildlife Assessment, Hudson, New Hampshire. Identified and documented the presence of wildlife and botanical species within a 10-acre parcel to support permitting of a proposed religious temple, with an emphasis on use by endangered, threatened, special concern species and species of greatest conservation need. Visual and audio techniques were used to assess the presence of avian, mammal, reptile, insect, fish, and botanical species along random traverse routes throughout the property. Habitat types were identified and used to characterize potential utilization of the parcel by local fauna. Findings included recommendations on best management practices for proposed construction and future land use.

Wildlife Biologist, FedEx Distribution Center, Wildlife Assessment, Chesterfield, New Hampshire. Identified and documented the presence of wildlife species within a 24-acre parcel to support permitting of proposed improvements to a distribution center,

Logan Young
Scientist I

with an emphasis on use by listed species in NH. Visual and audio techniques were used to assess the presence of avian, mammal, reptile, insect, fish, and botanical species along random traverse routes throughout the property. Habitat types were identified and used to characterize potential utilization of the parcel by local fauna. Findings included recommendations on best management practices for proposed construction and future land use.

Wildlife Biologist, Proposed Cluster Subdivision, Wildlife Assessment, Spofford, New Hampshire. Identified and documented the presence of wildlife species within a 29-acre parcel to support permitting of a proposed residential subdivision, with an emphasis on use by listed species in NH. Visual and audio techniques were used to assess the presence of avian, mammal, reptile, insect, fish, and botanical species along random traverse routes throughout the property. Habitat types were identified and used to characterize potential utilization of the parcel by local fauna. Findings included recommendations on best management practices for proposed construction and future land use.

Wildlife Biologist, Proposed Residential Subdivision, Wildlife Assessment, Newbury, New Hampshire. Identified and documented the presence of wildlife species within a 50-acre parcel to support permitting of a proposed residential development, with an emphasis on use by listed species in NH. Visual and audio techniques were used to assess the presence of avian, mammal, reptile, insect, fish, and botanical species along random traverse routes throughout the property. Habitat types were identified and used to characterize potential utilization of the parcel by local fauna. Findings included recommendations on best management practices for proposed construction and future land use.

Wildlife Biologist, Proposed Tradesman Shops, Wildlife Assessment, Manchester, New Hampshire. Identified and documented the presence of wildlife species within a 4-acre parcel to support permitting of a proposed commercial development, with an emphasis on use by listed species in NH. Visual and audio techniques were used to assess the presence of avian, mammal, reptile, insect, fish, and botanical species along random traverse routes throughout the property. Habitat types were identified and used to characterize potential utilization of the parcel by local fauna. Findings included recommendations on best management practices for proposed construction and future land use.

Wildlife Biologist, Roscommon Investments, LLC, Wildlife Assessment, Nashua, New Hampshire. Identified and documented the presence of wildlife species within a 5-acre parcel to support permitting of a proposed commercial development, with an emphasis on use by listed species in NH. Visual and audio techniques were used to assess the presence of avian, mammal, reptile, insect, fish, and botanical species along random traverse routes throughout the property. Habitat types were identified and used to characterize potential utilization of the parcel by local fauna. Findings included recommendations on best management practices for proposed construction and future land use.

Wildlife Biologist, Shepherd's Hill Subdivision, Wildlife Assessment, Hudson, New Hampshire. Identified and documented the presence of wildlife species within a 17-acre parcel to support permitting of a proposed residential subdivision, with an emphasis on use by listed species in NH. Visual and audio techniques were used to assess the presence of avian, mammal, reptile, insect, fish, and botanical species along random traverse routes throughout the property. Habitat types were identified and used to characterize potential utilization of the parcel by local fauna. Findings included recommendations on best management practices for proposed construction and future land use.

Wildlife Biologist, Waste Management of New Hampshire, Wildlife Assessment, Rochester, New Hampshire. Identified and documented the presence of wildlife species within a 5-acre parcel to support permitting of a proposed materials recovery facility, with an emphasis on use by listed species in NH. Visual and audio techniques were used to assess the presence of avian, mammal, reptile, insect, fish, and botanical species along random traverse routes throughout the property. Habitat types were identified and used to characterize potential utilization of the parcel by local fauna. Findings included recommendations on best management practices for proposed construction and future land use.

Wildlife Biologist, Olson Development, Wildlife Assessment, Hollis, New Hampshire. Identified and documented the presence of wildlife species within a 17-acre parcel to support permitting of a proposed residential subdivision. Visual and audio assessments

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Scientist I

for avian and mammal species were conducted along random traverse routes throughout the property in order to characterize utilization of the parcel by local fauna.

LANDSCAPE PLANNING AND RESTORATION

Environmental Scientist I, Eversource Energy, K105 Restoration Monitoring, Goffstown, New Hampshire. Post-construction monitoring for landscape restoration efforts to stabilize and prevent erosion of a sensitive property. Conducted quarterly site assessment, provided best management recommendations, and generated quarterly inspection reports of restoration progress for stakeholders from 2018-2020.

Environmental Scientist I, Eversource Energy, Seacoast Reliability Project Landscape Mitigation, Madbury, Durham, Newington, and Portsmouth, New Hampshire. Designed landscape plans for 47 properties following construction of the F107 Transmission Line. Plans designed to mitigate the view of new construction throughout the corridor in collaboration with landowners, representatives of the general public and historic resources, and utility vegetation maintenance requirements. Oversaw implementation of landscape plans by contractors, maintained schedule of work, and performed QA/QC evaluations.

INVASIVE SPECIES MANAGEMENT

Environmental Scientist , Eversource Energy, Seacoast Reliability Project Landscape Mitigation, Durham, New Hampshire. Designed management plan for removal of Japanese Knotweed (*Reynoutria japonica*) at University of New Hampshire campus to support landscape mitigation following construction of underground segments of F107 Transmission Line.

NATURAL RESOURCE ASSESSMENTS

Environmental Scientist I, Eversource Energy, M127 Transmission Line Structure Replacement Project, Sunapee, New London, Springfield, Andover, Franklin, New Hampshire. Completed vegetative inventory and assessment of functions and values of delineated wetlands to assist permitting of proposed work areas for utility structure replacements.

Environmental Scientist I, Eversource Energy, E194/U181 Transmission Line Structure Replacement Project, Newington and Portsmouth, New Hampshire. Completed vegetation inventory and assessment of functions of delineated wetlands to assist permitting of proposed work areas for utility structure replacements.

Environmental Scientist I, Rennie Farm Remediation System, Hanover, New Hampshire. Completed vegetative inventory and assessment of functions and values of delineated wetlands to assist permitting of proposed work areas for utility structure replacements.

Experience Prior to GZA

Public Outreach Specialist, Eversource Energy, Transmission Line ROW Reliability Project, Various Towns, New Hampshire. Maintained relationship between client and project stakeholders during comprehensive vegetation removal throughout utility rights-of-way in New Hampshire. Managed all stakeholder needs, landowner communications and site reviews, and facilitated resolution of all stakeholder concerns during each project phase.

Coordinator of Volunteers, NH Audubon, Auburn and Concord, New Hampshire. Coordinated all volunteer-staffed programs throughout NH including natural resource education programs and research initiatives for imperiled species in NH. Led stewardship efforts for NH Audubon conserved lands and conducted training for wildlife surveys. Participated in research initiatives for bald eagle (*Halialeetus leucocephalus*), bobolink (*Dolichonyx oryzivorus*), chimney swift, common nighthawk (*Chordeiles minor*), eastern bluebird, tree swallow, and peregrine falcon (*Falco peregrinus*).

Certifications/Training

- OSHA 10-Hour Construction Certification
- HAZWOPER 40-hour Certification

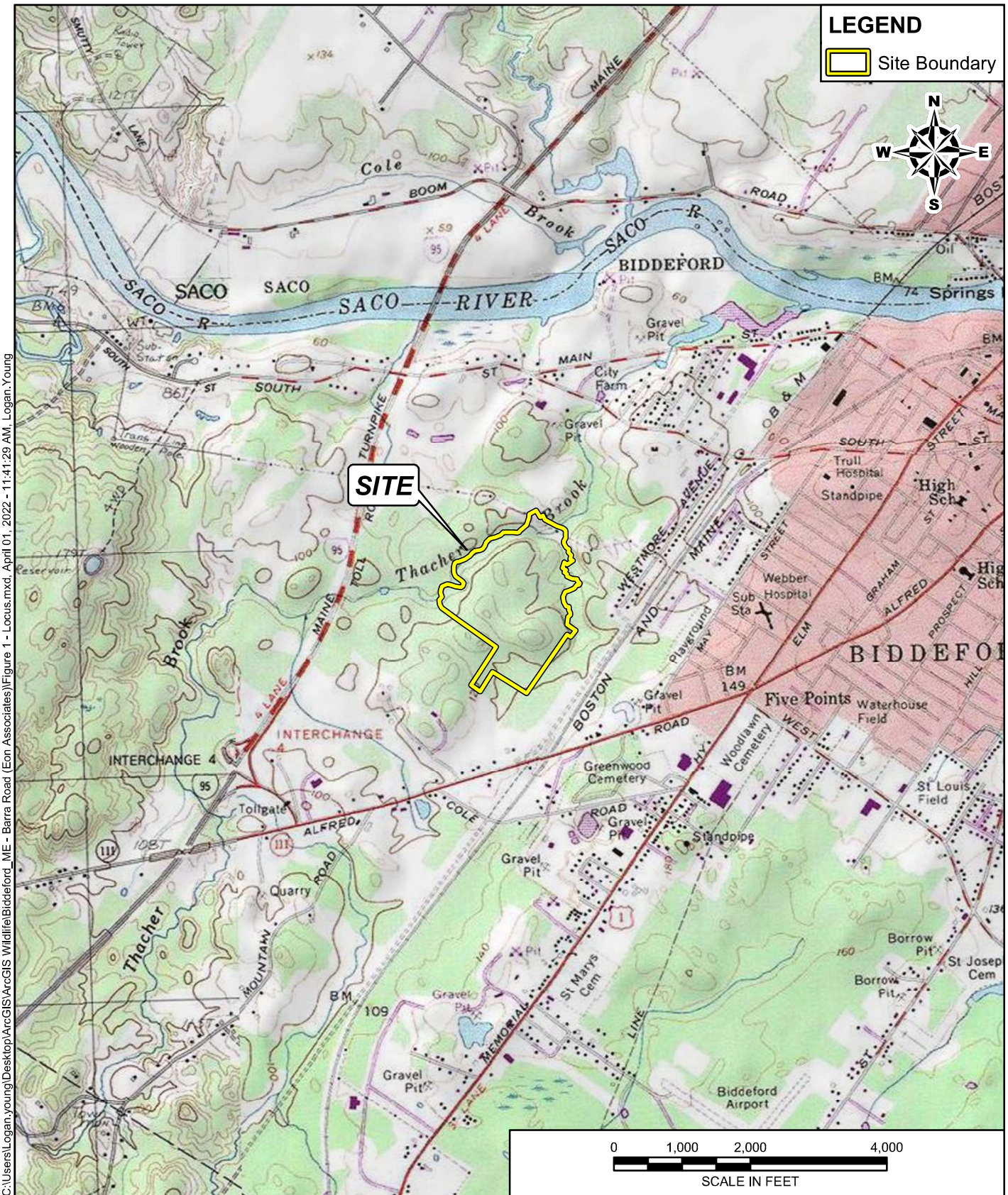
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Volunteer Activities

- NH Audubon
- Native Plant Trust
- Harris Center for Conservation Education

Figures



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NO.	ISSUE / DESCRIPTION	BY	DATE

BARRA ROAD COMPLEX
BIDDEFORD, MAINE

LOCUS PLAN

PREPARED BY:
GZA GeoEnvironmental, Inc.
Engineers and Scientists
www.gza.com

PREPARED FOR:
MIKE EON ASSOCIATES

PROJ MGR:	LTY	REVIEWED BY:	TLT	CHECKED BY:	DMZ
DESIGNED BY:	MJD	DRAWN BY:	LTY	SCALE:	1 in = 2,000 ft
DATE:	04/01/2022	PROJECT NO:	04.0191316.00	REVISION NO:	

FIG 1
SHEET NO: 1 OF 3

© 2022 - GZA GeoEnvironmental, Inc. C:\Users\Logan.young\Desktop\ArcGIS\ArcGIS Wildlife\Biddeford_ME - Barra Road (Eon Associates)\Figure 1 - Locus.mxd, April 01, 2022 - 11:41:29 AM, Logan.Young



LEGEND

- Site Boundary
- Parcel Boundary
- Public Road
- Adjusted Flowline
- Field Delineated Wetland

N
W E
S

0 230 460 920
SCALE IN FEET

NOTES:
1. AERIAL IMAGERY FROM ESRI WORLD IMAGERY BASEMAP.
2. PUBLIC ROAD AND PARCEL DATA LAYERS WERE OBTAINED FROM MAINE GEOLIBRARY AND SHOULD BE CONSIDERED APPROXIMATE.
3. SITE BOUNDARY AND WETLAND DATA WAS PROVIDED BY MIKE EON ASSOCIATES.
4. ADJUSTED FLOWLINES ARE BASED ON FIELD OBSERVATION BY GZA.

NO.	ISSUE / DESCRIPTION	BY	DATE

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BARRA ROAD COMPLEX
BIDDEFORD, MAINE

AERIAL OVERLAY

PREPARED BY:
GZA GeoEnvironmental, Inc.
Engineers and Scientists
www.gza.com

PREPARED FOR:
MIKE EON ASSOCIATES

PROJ MGR: LTY	REVIEWED BY: TLT	CHECKED BY: DMZ	FIG 2
DESIGNED BY: MJD	DRAWN BY: LTY	SCALE: 1 in = 458 ft	
DATE: 04/01/2022	PROJECT NO: 04.0191316.00	REVISION NO:	SHEET NO: 2 OF 3

© 2022 - GZA GeoEnvironmental, Inc. - C:\Users\Logan.young\Desktop\ArcGIS\ArcGIS Wildfire\Biddeford_ME - Barra Road (Eon Associates)\Figure 2 - Aerial Overlay.mxd, April 01, 2022 - 10:44:17 AM, Logan.Young



LEGEND

- Site Boundary
- Photo Point
- Adjusted Flowline
- Field Delineated Wetland
- Proposed Work Area

Land Cover Type

- Oak-Pine Forest
- Red Maple Swamp
- Grassy Shrub Marsh
- Riverine

N
W E
S

0 137.5 275 550
SCALE IN FEET

NOTES:
1. AERIAL IMAGERY FROM ESRI WORLD IMAGERY BASEMAP.
2. PUBLIC ROAD AND PARCEL DATA LAYERS WERE OBTAINED FROM MAINE GEOLIBRARY AND SHOULD BE CONSIDERED APPROXIMATE.
3. SITE BOUNDARY AND WETLAND DATA WAS PROVIDED BY MIKE EON ASSOCIATES.
4. ADJUSTED FLOWLINES ARE BASED ON FIELD OBSERVATION BY GZA.

NO.	ISSUE / DESCRIPTION	BY	DATE

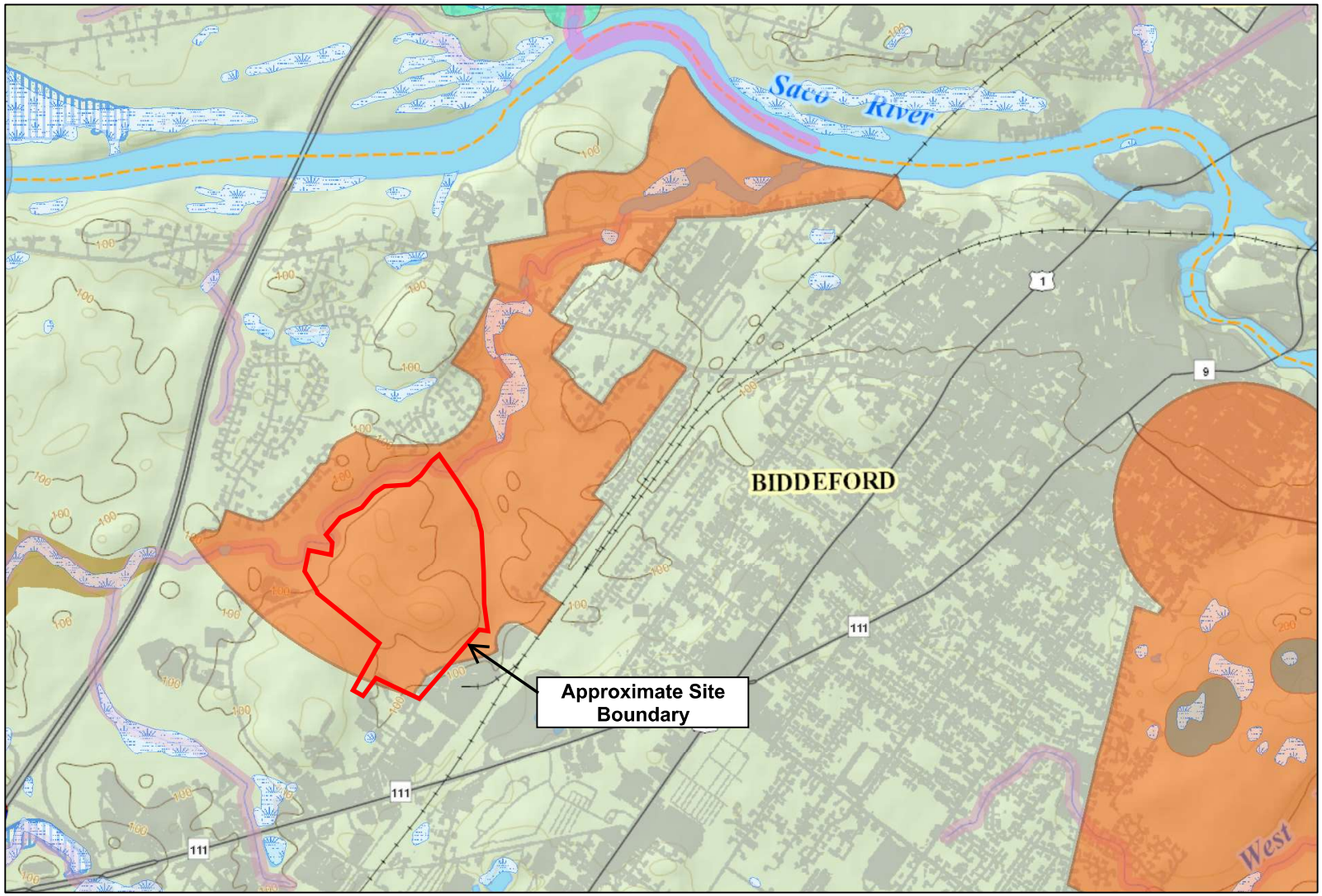
UNLESS SPECIFICALLY STATED BY WRITTEN AGREEMENT, THIS DRAWING IS THE SOLE PROPERTY OF GZA GEOENVIRONMENTAL, INC. (GZA). THE INFORMATION SHOWN ON THE DRAWING IS SOLELY FOR THE USE BY GZA'S CLIENT OR THE CLIENT'S DESIGNATED REPRESENTATIVE FOR THE SPECIFIC PROJECT AND LOCATION IDENTIFIED ON THE DRAWING. THE DRAWING SHALL NOT BE TRANSFERRED, REUSED, COPIED, OR ALTERED IN ANY MANNER FOR USE AT ANY OTHER LOCATION OR FOR ANY OTHER PURPOSE WITHOUT THE PRIOR WRITTEN CONSENT OF GZA. ANY TRANSFER, REUSE, OR MODIFICATION TO THE DRAWING BY THE CLIENT OR OTHERS, WITHOUT THE PRIOR WRITTEN EXPRESS CONSENT OF GZA, WILL BE AT THE USER'S SOLE RISK AND WITHOUT ANY RISK OR LIABILITY TO GZA.

BARRA ROAD COMPLEX
BIDDEFORD, MAINE

LAND COVER OVERLAY

PREPARED BY: GZA GeoEnvironmental, Inc. Engineers and Scientists www.gza.com		PREPARED FOR: MIKE EON ASSOCIATES	
PROJ MGR: LTY	REVIEWED BY: TLT	CHECKED BY: DMZ	FIG 3
DESIGNED BY: MJD	DRAWN BY: LTY	SCALE: 1 in = 271 ft	
DATE: 04/01/2022	PROJECT NO: 04.0191316.00	REVISION NO:	SHEET NO: 3 OF 3

© 2022 - GZA GeoEnvironmental, Inc. - C:\Users\Logan.young\Desktop\ArcGIS\ArcGIS Wildlife\Biddeford_ME - Barra Road (Eon Associates)\Figure 3 - Land Cover Type 10-7.mxd, April 01, 2022 - 12:00:34 PM, Logan.Young



BEGINNING WITH HABITAT

Legend



State of Maine

The Nature Conservancy
Protecting nature. Preserving life.

Maine Audubon

Maine Coast Heritage Trust
A Statewide Land Conservation Organization

MaineDOT

0 0.225 0.45 0.9 1.35 mi

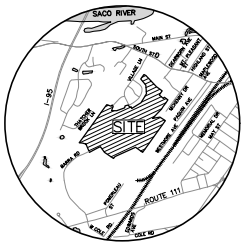
N W E S

Supported in part by Maine Outdoor Heritage Fund lottery ticket sales

Map Prepared by Maine Department of Inland Fisheries & Wildlife
March 2022

Supported in part by Loon Conservation Plate funds

MAINE LOON THANX
A NATURAL TREASURE



LOCATION MAP

SCALE: 1" = 2,000 FT

ABUTTERS LIST

SYMBOL	OWNER	TAX MAP & LOT	BOOK & PAGE
Ⓐ	DEAN G. TOURIGNY AND KATHLEEN A. MARLOWE LIVING TRUST	TAX MAP 85, LOT 79	BK. 17502, PG. 184
Ⓑ	MICHAEL B. & KATHLEEN E. WILLETT	TAX MAP 85, LOT 80	BK. 6919, PG. 67
Ⓒ	DENIS D. & SHERYL L. FOURNIER	TAX MAP 85, LOT 81	BK. 14535, PG. 269
Ⓓ	LARRY L. & DEBORAH Y. LAVERRIERE	TAX MAP 85, LOT 82	BK. 6620, PG. 272
Ⓔ	MARC P. & DENISE M. LESSARD	TAX MAP 85, LOT 83	BK. 7969, PG. 288
Ⓕ	KENNETH B. & JANICE M. NADEAU	TAX MAP 83, LOT 52	BK. 7832, PG. 335
Ⓖ	BENJAMIN E. JEROME & MARY O'NEIL	TAX MAP 83, LOT 53	BK. 17734, PG. 565
Ⓗ	PETER J. & DEBORAH K. DUMOULIN	TAX MAP 83, LOT 54	BK. 8357, PG. 269
Ⓘ	ALEXANDER & SUSAN D. MILLETT	TAX MAP 83, LOT 55	BK. 15083, PG. 144

NOTES:

1. OWNERS: INDIAN CLIFF DEVELOPMENT CORP.
P.O. BOX 444
BIDDEFORD, MAINE

SAWMILL PARK PROPERTIES, LLC.

2. PLAN REFERENCES:
A. "ALTA/NSPS LAND TITLE SURVEY" DATED JUNE 2018, MADE FOR SAXON PARTNERS, MADE BY BH2M, RECORDED IN Y.C.R.D. PLAN BOOK 418, PAGE 22.

B. "STANDARD BOUNDARY SURVEY OF VILLAGE LANE SUBDIVISION" DATED JULY 1986, MADE FOR DEVELOPERS INC., MADE BY STEVENS ASSOCIATES, RECORDED IN Y.C.R.D. PLAN BOOK 150, PAGE 29.

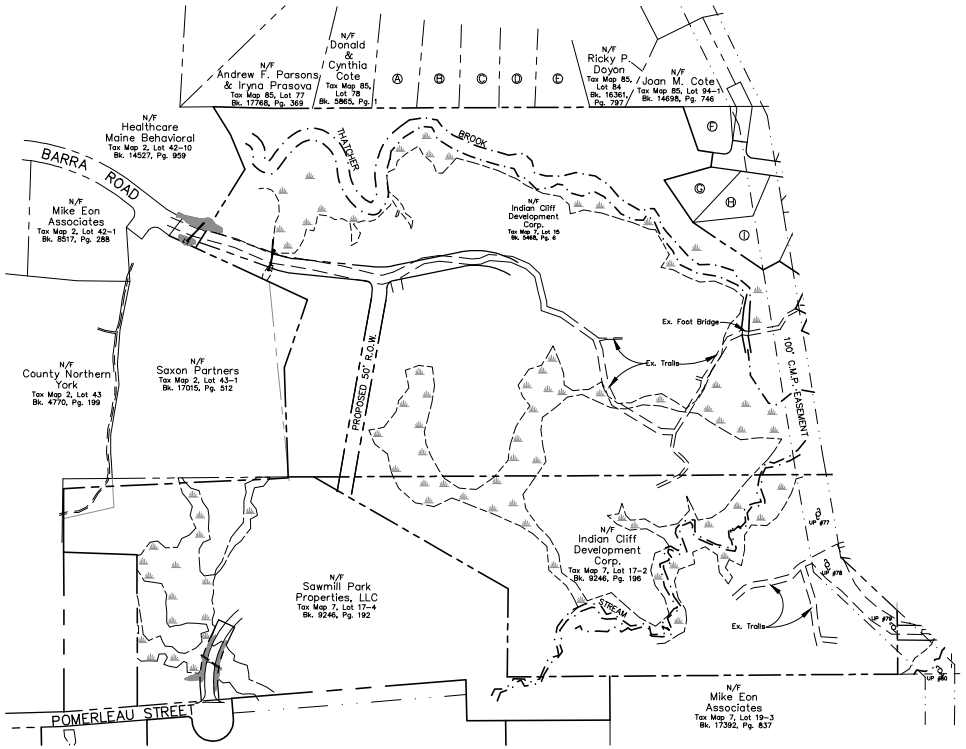
C. "VILLAGE WOODS, LOTS 5 & 6" DATED MAY 1991, MADE FOR INDIAN CLIFF DEVELOPEMENT CORP., MADE BY BH2M, RECORDED IN THE Y.C.R.D. IN PLAN BOOK 200, PAGE 50.

D. "VILLAGE WOODS, VILLAGE LANE" DATED JULY 1990, MADE FOR INDIAN CLIFF DEVELOPMENT CORP., MADE BY BH2M, RECORDED IN THE Y.C.R.D. PLAN BOOK 194, PAGE 15.

E. "FINAL PLAN–AMENDED, VILLAGE WOODS LOTS 7 THRU 12" DATED DECEMBER 1993, MADE FOR INDIAN CLIFF DEVELOPMENT CORP., MADE BY BH2M, JOB #93–249.

F. "AMENDED PLAN OF 3 LOT SUBDIVISION" DATED MARCH 1996, MADE FOR MIKE EON ASSOC., LTD, MADE BY BH2M, RECORDED IN THE Y.C.R.D. PLAN BOOK 251, PAGE 3.

GRID NORTH



LEGEND

SYMBOL	DESCRIPTION
	PROPERTY LINE
	ABUTTER PROPERTY LINE
	STREAM
	EXISTING EASEMENT
	EDGE OF GRAVEL
	LIMIT OF WETLAND
N/F	NOW OR FORMERLY
	UTILITY POLE

Scale: 1" = 200'

200' 0 200' 400'

NO.	DATE	REVISION DESCRIPTION

BH2M

Berry, Huff, McDonald, Milligan Inc.
Engineers, Surveyors

30 Main Street
Cornish, Maine 04020

Tel. (207) 839-2771
www.bh2m.com

FOR
Mike Eon
Barra Rd
Biddeford, Maine

EXISTING CONDITIONS SITE MAP

INDIAN CLIFF DEVELOPMENT CORP. & SAWMILL PARK PROPERTIES, LLC

BARRA ROAD
BIDDEFORD, MAINE

DESIGNED	DATE
D. Sherman	August 2021
DRAWN	SCALE
D. Sherman	1"=200'
CHECKED	JOB. NO.
W. Thompson	21174

SHEET 1

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GZA GeoEnvironmental, Inc.

ATTACHMENT 8
TRAFFIC SUMMARY

GORRILL PALMER

300 Southborough Drive, Suite 200
South Portland, Maine 04106
207.772.2515

MEMORANDUM
TRAFFIC STUDY
NEW RESIDENTIAL DEVELOPMENT
BIDDEFORD, ME
May 14, 2024

INTRODUCTION

Per the request of BH2M, Gorrill Palmer (GP) has calculated and evaluated specific traffic information regarding a potential residential development including 46 Avesta senior adult housing units and 7 duplexes (14 units total) for a site total of 60 units. The current site is undeveloped and located at the terminus of Barra Road. The City of Biddeford Ordinance is as follows; Article VI. Performance Standards, Section 62. Studies and impact / development fees, C.

"…, the Board may require additional studies and reports when there is reason to believe that a given project may have unreasonable or adverse impact on a given neighborhood or the community as a whole."

If a traffic study is required under C.1.a, -

"Traffic study: To be completed by a traffic engineer; this study shall report the possible impact that a given project may have on the City's roadways. Besides meeting the standards established for professionally completed reports, this study shall include local traffic accident information for the last five years prior to development."

As part of this traffic evaluation, we have reviewed/evaluated the following;

- Trip Generation
- Safety Review: 3-year & 5-year

The following summarizes the data and information used, the methodology, and the results of the evaluation.

TRIP GENERATION

Trip generation for the Avesta housing units and the duplexes has been calculated using the Institute of Transportation Engineers' (ITE) publication, *Trip Generation,* 11th Edition, the most recent edition accepted by MaineDOT. After careful review of the Land Use Codes (LUCs) provided in the 11th Edition of *Trip Generation*, the following land use codes were used to calculate the trip generation for the proposed development:

Proposed Trip Generation

- LUC 215 – Single-Family Attached Housing (14 units)
- LUC 252 – Senior Adult Housing-Multifmaily (46 units)

In calculating trip generation, MaineDOT methodology requires review of both the average rate and the fitted curve equation. If $r^2 \geq 0.80$ then the fitted curve equation is typically used, and if $r^2 < 0.80$ then the average rate is typically used. In reviewing the data for LUC 215 some time periods had an $r^2 \geq 0.80$ but using engineering judgement it was determined that by using the fitted curve equation, the trip generation rates appeared inaccurately low. Therefore, average rates were used for those time periods to reflect a more accurate (and higher) representation of trips. Trip generation calculations are provided in Attachment 1.

The following Table 1 summarizes the trip generation for single-family attached housing.

Table 1 – Trip Generation (LUC 215 – 14 Units)

Time Period	Trip Generation (Trip Ends)	
	Trip Gen Rates	Trip Generation
Weekday*	4.0	56
AM Peak Hour of Adjacent Street	0.48	7
PM Peak Hour of Adjacent Street	0.57	8
AM Peak Hour Generator	0.55	8
PM Peak Hour Generator*	0.79	11
Saturday Peak Hour Generator*	0.93	13

*Rates based on using fitted curve equation.

As can be seen in Table 1, the single-family attached housing is forecast to generate 8 and 11 trips during the AM and PM peak hours of the generator respectively.

The following Table 2 summarizes the trip generation for the senior adult housing-multifamily.

Table 2 – Trip Generation (LUC 252 – 46 Units)

Time Period	Trip Generation (Trip Ends)	
	Trip Gen Rates	Trip Generation
Weekday*	3.43	158
AM Peak Hour of Adjacent Street*	0.22	10
PM Peak Hour of Adjacent Street*	0.26	12
AM Peak Hour Generator*	0.37	17
PM Peak Hour Generator*	0.30	14
Saturday Peak Hour Generator*	0.35	16

*Rates based on using fitted curve equation.

As can be seen in Table 2 the senior adult housing-multifamily will provide 17 and 14 trips during the AM and PM peak hours of the generator respectively.

The following Table 3 summarizes the trip distribution for single-family attached housing.

Table 3 – Trip Distribution (LUC 215)

Time Period	Trip Ends		
	Enter	Exit	Total
Weekday	28	28	56
AM Peak Hour of Adjacent Street	2	5	7
PM Peak Hour of Adjacent Street	5	3	8
AM Peak Hour Generator	2	6	8
PM Peak Hour Generator	7	4	11
Saturday Peak Hour	6	7	13

The following Table 4 summarizes the trip distribution for the senior adult housing-multifamily.

Table 4 – Trip Distribution (LUC 252)

Time Period	Trip Ends		
	Enter	Exit	Total
Weekday	79	79	158
AM Peak Hour of Adjacent Street	3	7	10
PM Peak Hour of Adjacent Street	7	5	12
AM Peak Hour Generator	8	9	17
PM Peak Hour Generator	8	6	14
Saturday Peak Hour	9	7	16

The following Table 5 summarizes the combined trip distribution for both proposed uses.

Table 5 – Total Trip Distribution (Tables 3 + 4)

Time Period	Trip Ends		
	Enter	Exit	Total
Weekday	107	107	214
AM Peak Hour of Adjacent Street	5	12	17
PM Peak Hour of Adjacent Street	12	8	20
AM Peak Hour Generator	10	15	25
PM Peak Hour Generator	15	10	25
Saturday Peak Hour	15	14	29

The trip generation threshold for requiring a MaineDOT Traffic Movement Permit is 100 or more trip ends during any peak hour of any day. After reviewing the trip generation in Table 5, none of the peak hours exceed 100+ trip ends. Therefore, this development does not require a MaineDOT Traffic Movement Permit and will be solely reviewed by the City. It should be noted that this development is part of a larger subdivision, and as such, as other development within the subdivision is proposed, it will need to add the trip generation from this development in determining the need for a MaineDOT TMP.

SAFETY REVIEW

For the safety review, GP reviewed both a three-year crash history and a five-year crash history (Supporting information provided in Attachment B). The following identifies each evaluation in more detail:

Three-year crash history:

The three-year crash history was reviewed because this is the criteria used by MaineDOT to identify a location as a high crash location. The HCL criteria is discussed in more detail as follows:

To evaluate whether a location has a crash problem, MaineDOT uses two criteria to define a High Crash Location (HCL). Both criteria must be met 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.

A safety review was completed for Barra Road and the immediate area around the Barra Road / Alfred Street / West Cole Road intersection. The following summarizes those locations that met at least one of the above MaineDOT criteria.

Table 6 – Potential HCL Locations (3 year history)

Node	Location	Number of Crashes	Critical Rate Factor	HCL?
59168	Barra Road	1	1.76	No
59159	Alfred Street @ Barra Road / W Cole Road	34	1.25	Yes

As shown in Table 6, there is one location that meets the definition of a HCL (Node 59159). To identify potential mitigation, the collision diagram (Attachment B) was reviewed for

potential crash patterns, which is typically considered three or more similar crashes. Based on a review of the collision diagram, there appear to be four crash patterns as follows:

- Alfred Street northbound rear-end (3 crashes)
- Alfred Street northbound angle crashes with southbound left turning traffic (3 crashes)
- Alfred Street southbound rear-end (11 crashes)
- Alfred Street southbound angle crashes with northbound left turning traffic (7 crashes)

Left turn angle crashes: Alfred Street left turning vehicles appear to have both a permissive & protected phase. This means that at some point in the signal cycle, the left turns can make a permissive left turn opposing two through lanes. This type of movement is discouraged by the MaineDOT because it has been shown to create these types of crash patterns, and only protected left turns are allowed when opposing two through lanes. It is our understanding that this intersection is part of a larger coordinated signal system along Alfred Street, and as such, any changes to timing and/or phasing will require evaluation of the entire system. In our opinion, this signal evaluation would be beyond the responsibility of this project given the minimal trip generation and impact this project will have on the intersection.

Rear-end crashes: The rear-end crashes could be a result of inadequate timing of the yellow and/or all red times for the through traffic. As identified in the previous "Left turn angle crashes" section, the timing and/or phasing of this intersection should not be changed unless the entire Alfred Street coordinated signal system is reviewed. It is our understanding that this intersection is part of a larger coordinated signal system along Alfred Street, and as such, any changes to timing and/or phasing will require evaluation of the entire system. In our opinion, this signal evaluation would be beyond the responsibility of this project given the minimal trip generation and impact this project will have on the intersection.

Five-year crash history:

Per Biddeford City Ordinance, the five-year crash history was also reviewed. The following Table 7 summarizes the crash history for the same location identified as a HCL in the previous section for three-year review.

Table 7 – Five Year Crash History of Traffic Signal

Node	Location	Number of Crashes	Critical Rate Factor
59159	Alfred Street @ Barra Road / W Cole Road	54	1.29

Based on the information in Table 7, the five-year crash history confirms the signalized intersection has historically had challenges when it comes to safety.

Pedestrian & Bicycle Crashes:

In addition to a review of the three & five-year crash histories, GP reviewed the latest three-year history to identify if there were reportable pedestrian or bicycle crashes. Based on information provided on the Maine Public Crash Query Tool, there were no reported bicycle crashes within the anticipated study area. There was one reported pedestrian crash at the intersection of Alfred Street / Barra Road / W Cole Road. This crash occurred on 5/23/22 at 4:00 PM and was a non-fatal crash.

Summary & Conclusion

Based on this evaluation we offer the following:

1. Trip Generation: The AM & PM peak hours of the generator for the combined uses are forecast to be 25 & 23 trip ends respectively.

2. Traffic Impacts: Given the relatively low trip generation, it is our opinion is that the proposed development will not have an unreasonable or adverse impact on the neighborhood or community as a whole.

3. Safety Review: Based on a review of the three & five year crash history, the signalized intersection of Barra Road / Alfred Street / West Cole Road is classified as a high crash location, with four distinct crash patterns.

Attachments:

Attachment A – Trip Generation
Attachment B – Safety Review



u:\4300_avesta housing_biddeford\n traffic\summary memo 5-14-24.doc

Attachment A

Trip Generation

Land Use: 215
Single-Family Attached Housing

Description

Single-family attached housing includes any single-family housing unit that shares a wall with an adjoining dwelling unit, whether the walls are for living space, a vehicle garage, or storage space.

Additional Data

The database for this land use includes duplexes (defined as a single structure with two distinct dwelling units, typically joined side-by-side and each with at least one outside entrance) and townhouses/rowhouses (defined as a single structure with three or more distinct dwelling units, joined side-by-side in a row and each with an outside entrance).

The technical appendices provide supporting information on time-of-day distributions for this land use. The appendices can be accessed through either the ITETripGen web app or the trip generation resource page on the ITE website (https://www.ite.org/technical-resources/topics/trip-and-parking-generation/).

The sites were surveyed in the 1980s, the 1990s, the 2000s, and the 2010s in British Columbia (CAN), California, Georgia, Illinois, Maryland, Massachusetts, Minnesota, New Jersey, Ontario (CAN), Oregon, Pennsylvania, South Dakota, Utah, Virginia, and Wisconsin.

Source Numbers

168, 204, 211, 237, 305, 306, 319, 321, 357, 390, 418, 525, 571, 583, 638, 735, 868, 869, 870, 896, 912, 959, 1009, 1046, 1056, 1058, 1077

Single-Family Attached Housing
(215)

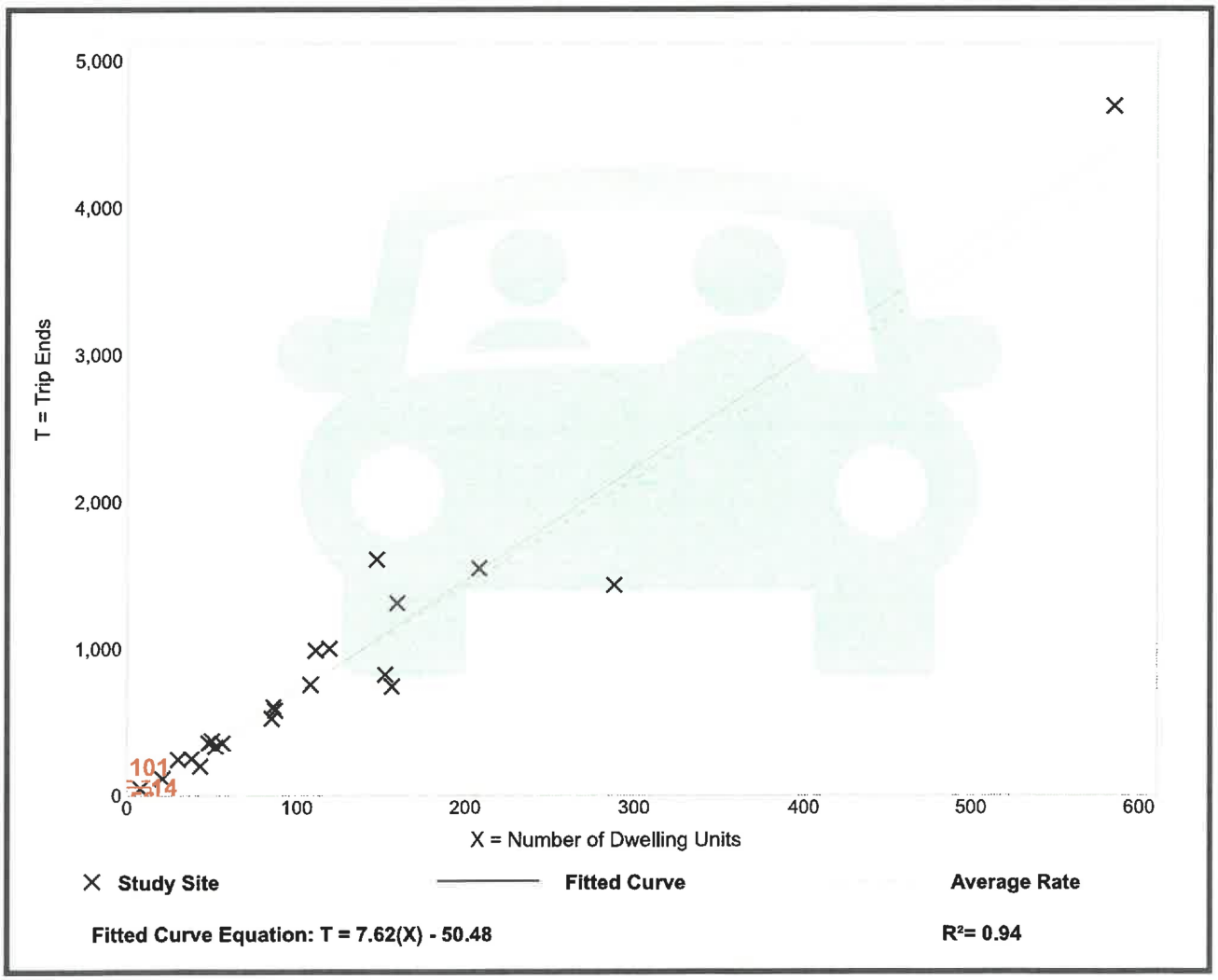
Vehicle Trip Ends vs: **Dwelling Units**
On a: **Weekday**

Setting/Location: **General Urban/Suburban**
Number of Studies: 22
Avg. Num. of Dwelling Units: 120
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
7.20	4.70 - 10.97	1.61

Data Plot and Equation



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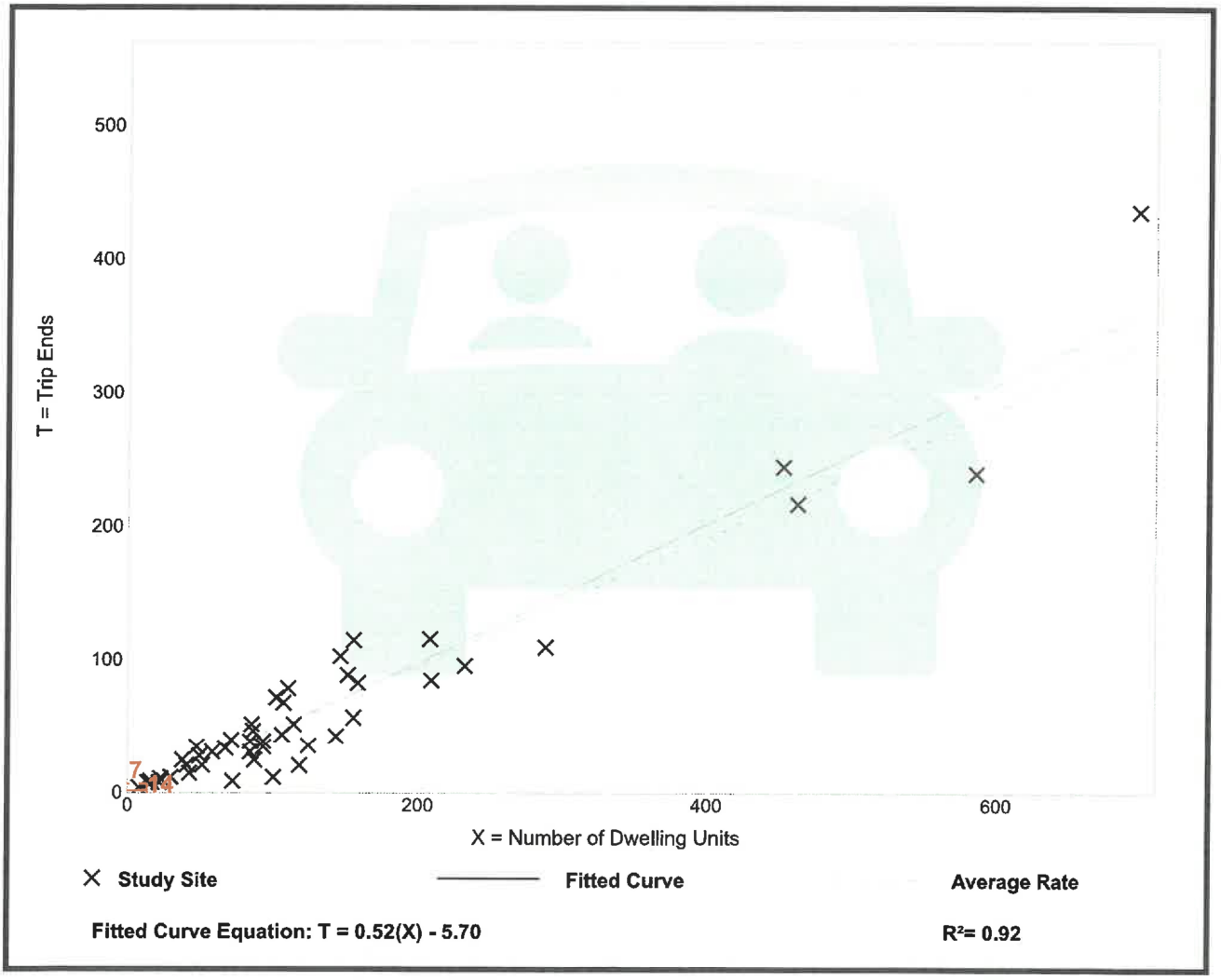
Single-Family Attached Housing
(215)

Vehicle Trip Ends vs:	**Dwelling Units**
On a:	**Weekday,**
	Peak Hour of Adjacent Street Traffic,
	One Hour Between 7 and 9 a.m.
Setting/Location:	**General Urban/Suburban**
Number of Studies:	46
Avg. Num. of Dwelling Units:	135
Directional Distribution:	25% entering, 75% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.48	0.12 - 0.74	0.14

Data Plot and Equation



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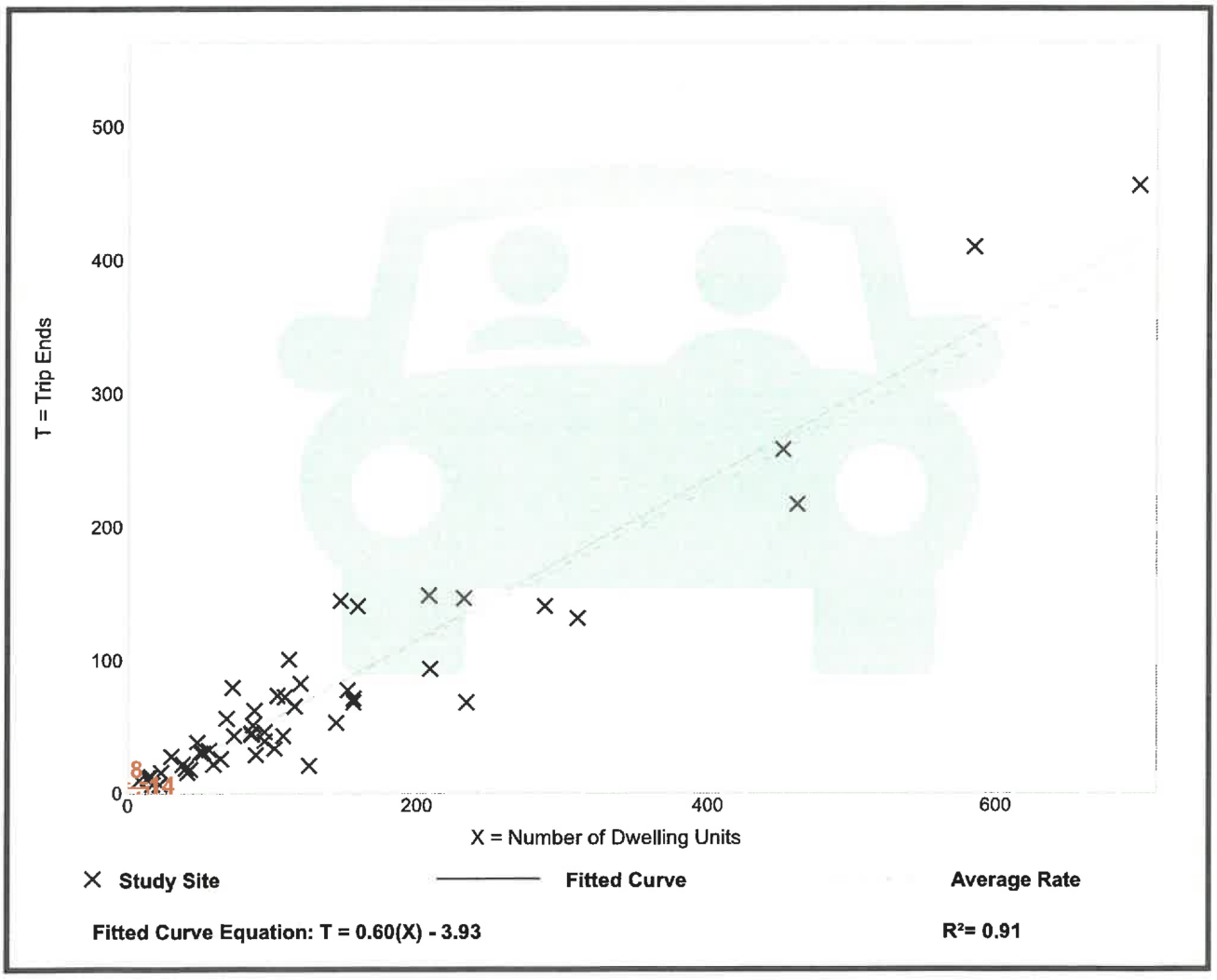
Single-Family Attached Housing
(215)

Vehicle Trip Ends vs:	**Dwelling Units**
On a:	**Weekday,**
	Peak Hour of Adjacent Street Traffic,
	One Hour Between 4 and 6 p.m.
Setting/Location:	**General Urban/Suburban**
Number of Studies:	51
Avg. Num. of Dwelling Units:	136
Directional Distribution:	59% entering, 41% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.57	0.17 - 1.25	0.18

Data Plot and Equation



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Single-Family Attached Housing
(215)

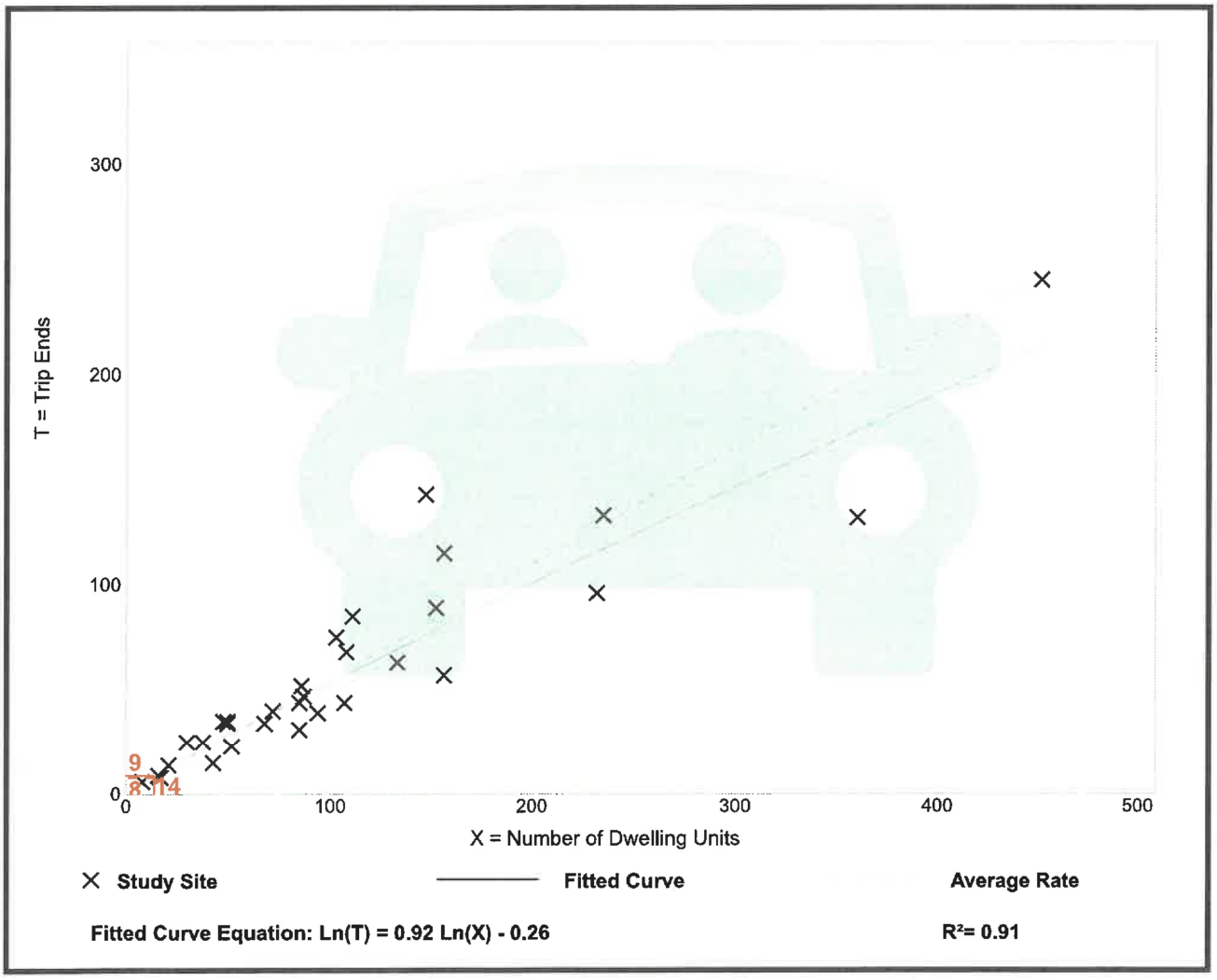
Vehicle Trip Ends vs: **Dwelling Units**
On a: **Weekday,**
AM Peak Hour of Generator

Setting/Location: **General Urban/Suburban**
Number of Studies: 31
Avg. Num. of Dwelling Units: 110
Directional Distribution: 25% entering, 75% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.55	0.35 - 0.97	0.16

Data Plot and Equation



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Single-Family Attached Housing
(215)

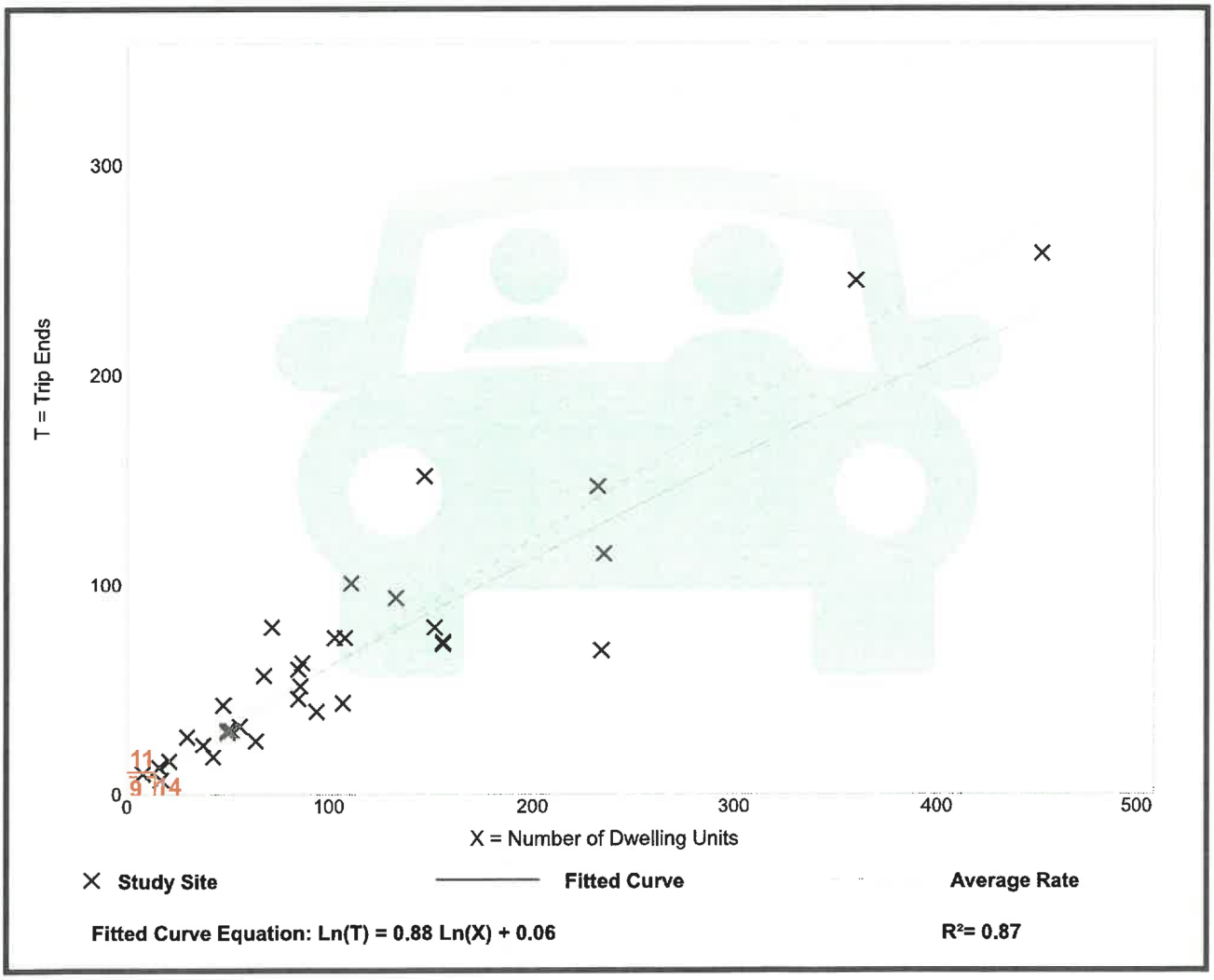
Vehicle Trip Ends vs: **Dwelling Units**
On a: **Weekday,**
PM Peak Hour of Generator

Setting/Location: **General Urban/Suburban**
Number of Studies: 34
Avg. Num. of Dwelling Units: 110
Directional Distribution: 62% entering, 38% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.61	0.29 - 1.25	0.18

Data Plot and Equation



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Single-Family Attached Housing
(215)

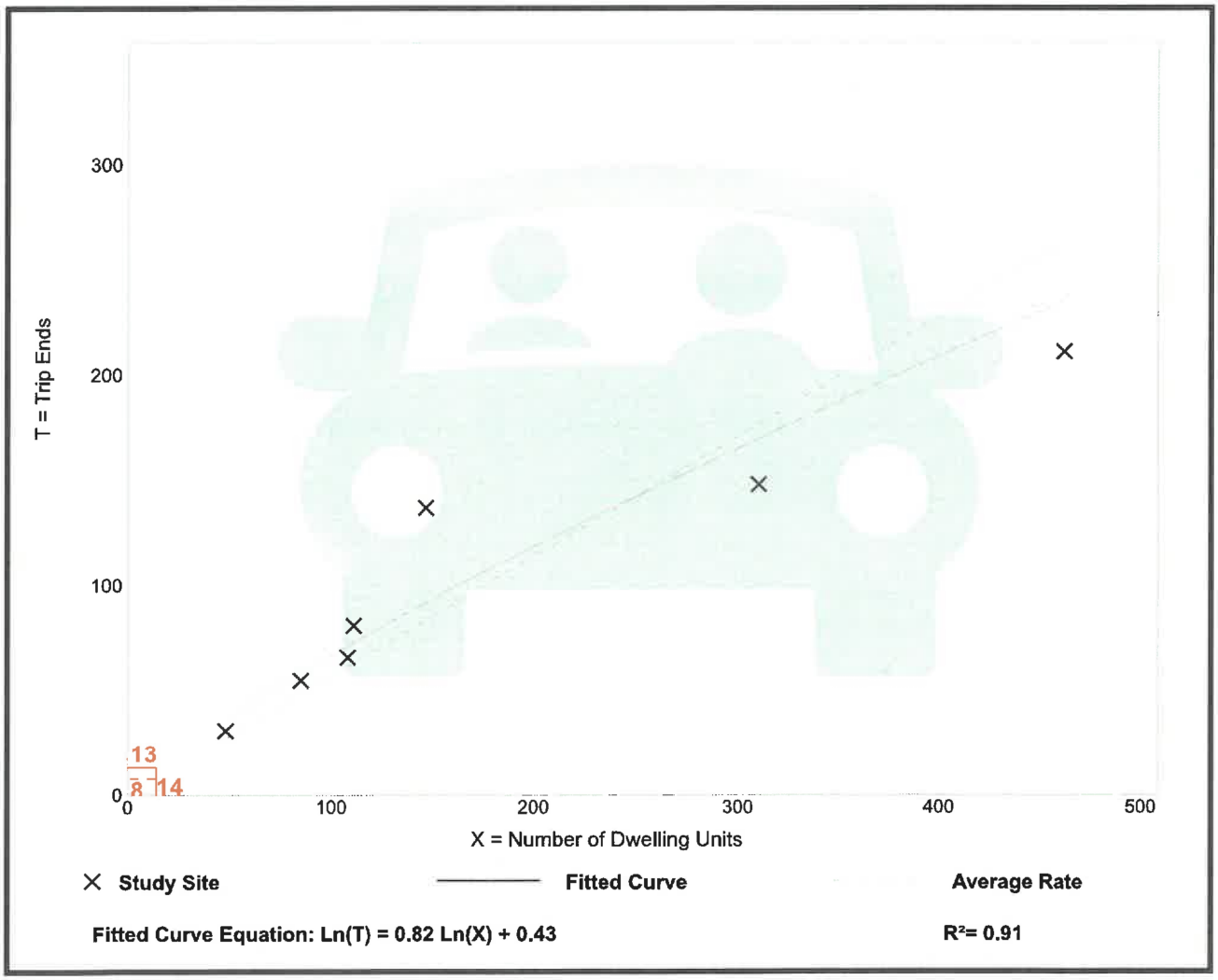
Vehicle Trip Ends vs: **Dwelling Units**
On a: **Saturday, Peak Hour of Generator**

Setting/Location: **General Urban/Suburban**
Number of Studies: 7
Avg. Num. of Dwelling Units: 182
Directional Distribution: 48% entering, 52% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.57	0.46 - 0.93	0.17

Data Plot and Equation



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Land Use: 252
Senior Adult Housing—Multifamily

Description

Senior adult housing—multifamily sites are independent living developments that are called various names including retirement communities, age-restricted housing, and active adult communities. The development has a specific age restriction for its residents, typically a minimum of 55 years of age for at least one resident of the household.

Residents in these communities are typically considered active and requiring little to no medical supervision. The percentage of retired residents varies by development. The development may include amenities such as a golf course, swimming pool, 24-hour security, transportation, and common recreational facilities. They generally lack centralized dining and on-site health facilities.

The dwelling units share both floors and walls with other units in the residential building. Senior adult housing—single-family (Land Use 251), congregate care facility (Land Use 253), assisted living (Land Use 254), and continuing care retirement community (Land Use 255) are related land uses.

Additional Data

The technical appendices provide supporting information on time-of-day distributions for this land use. The appendices can be accessed through either the ITETripGen web app or the trip generation resource page on the ITE website (https://www.ite.org/technical-resources/topics/trip-and-parking-generation/).

The sites were surveyed in the 1980s, the 1990s, and the 2000s in Alberta (CAN), California, Maryland, New Hampshire, New Jersey, Ontario (CAN), and Pennsylvania.

Source Numbers

237, 272, 576, 703, 734, 970, 1060

Senior Adult Housing - Multifamily
(252)

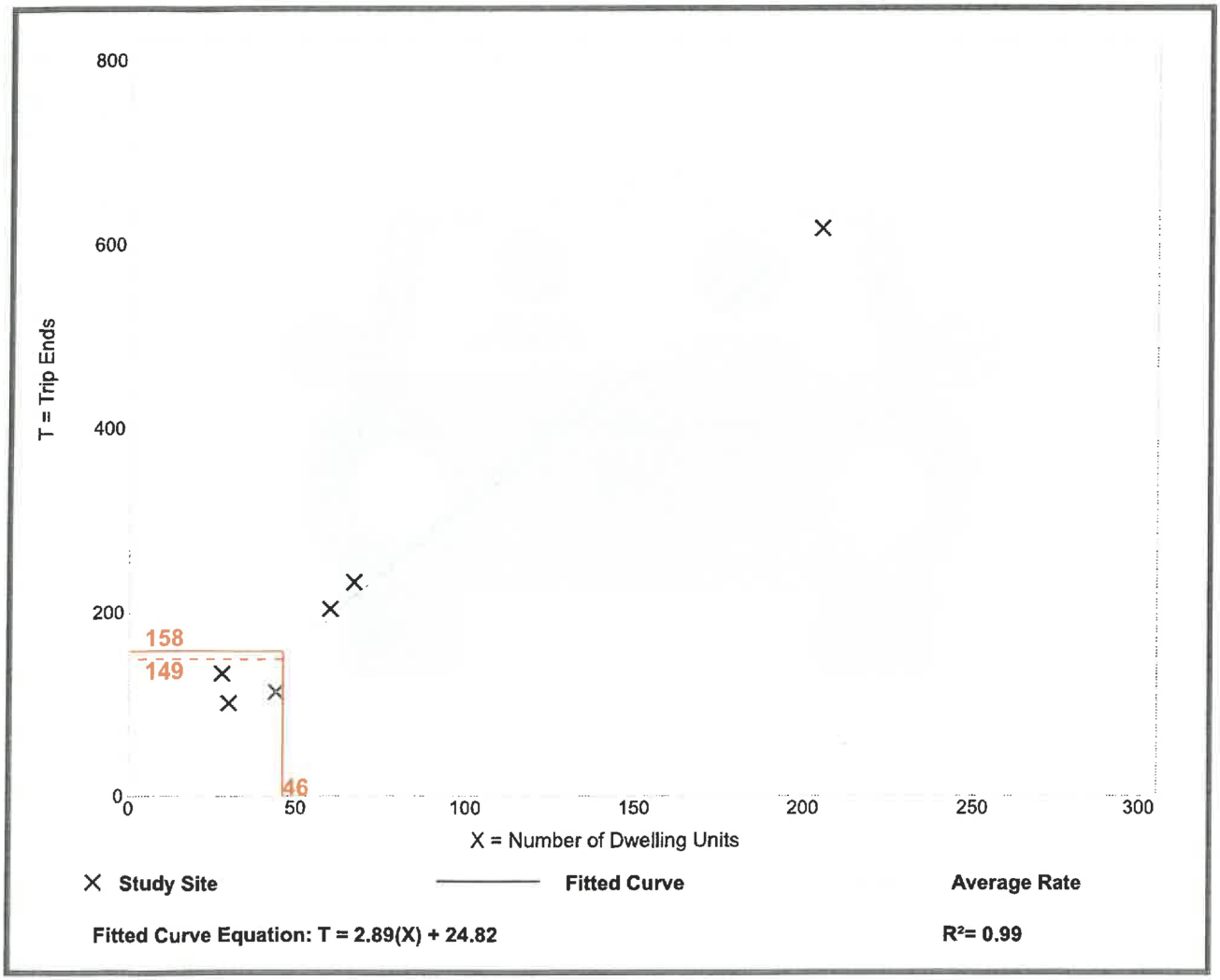
Vehicle Trip Ends vs: **Dwelling Units**
On a: **Weekday**

Setting/Location: **General Urban/Suburban**
Number of Studies: 6
Avg. Num. of Dwelling Units: 72
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
3.24	2.59 - 4.79	0.53

Data Plot and Equation



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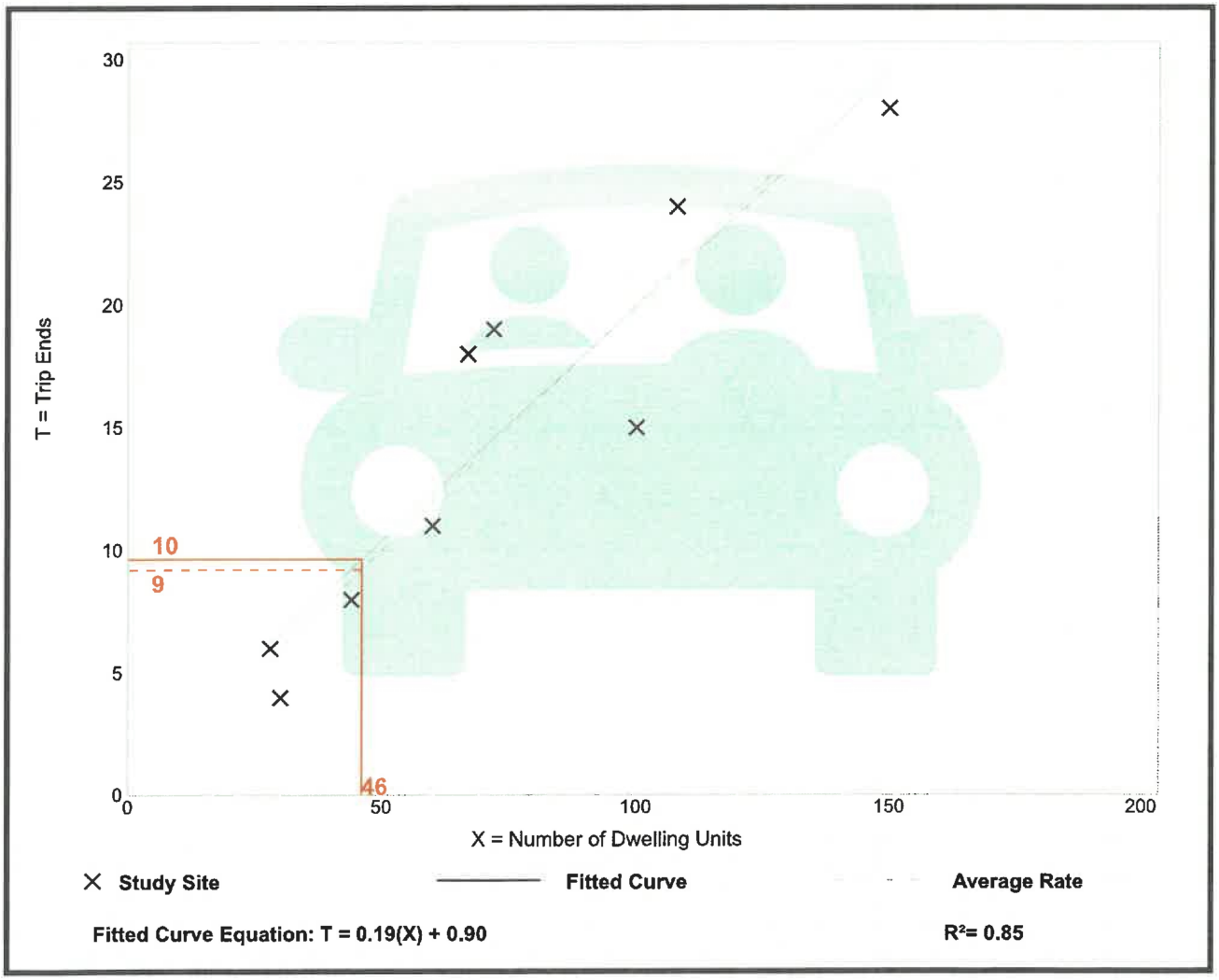
Senior Adult Housing - Multifamily
(252)

Vehicle Trip Ends vs: **Dwelling Units**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 9
Avg. Num. of Dwelling Units: 73
Directional Distribution: 34% entering, 66% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.20	0.13 - 0.27	0.04

Data Plot and Equation



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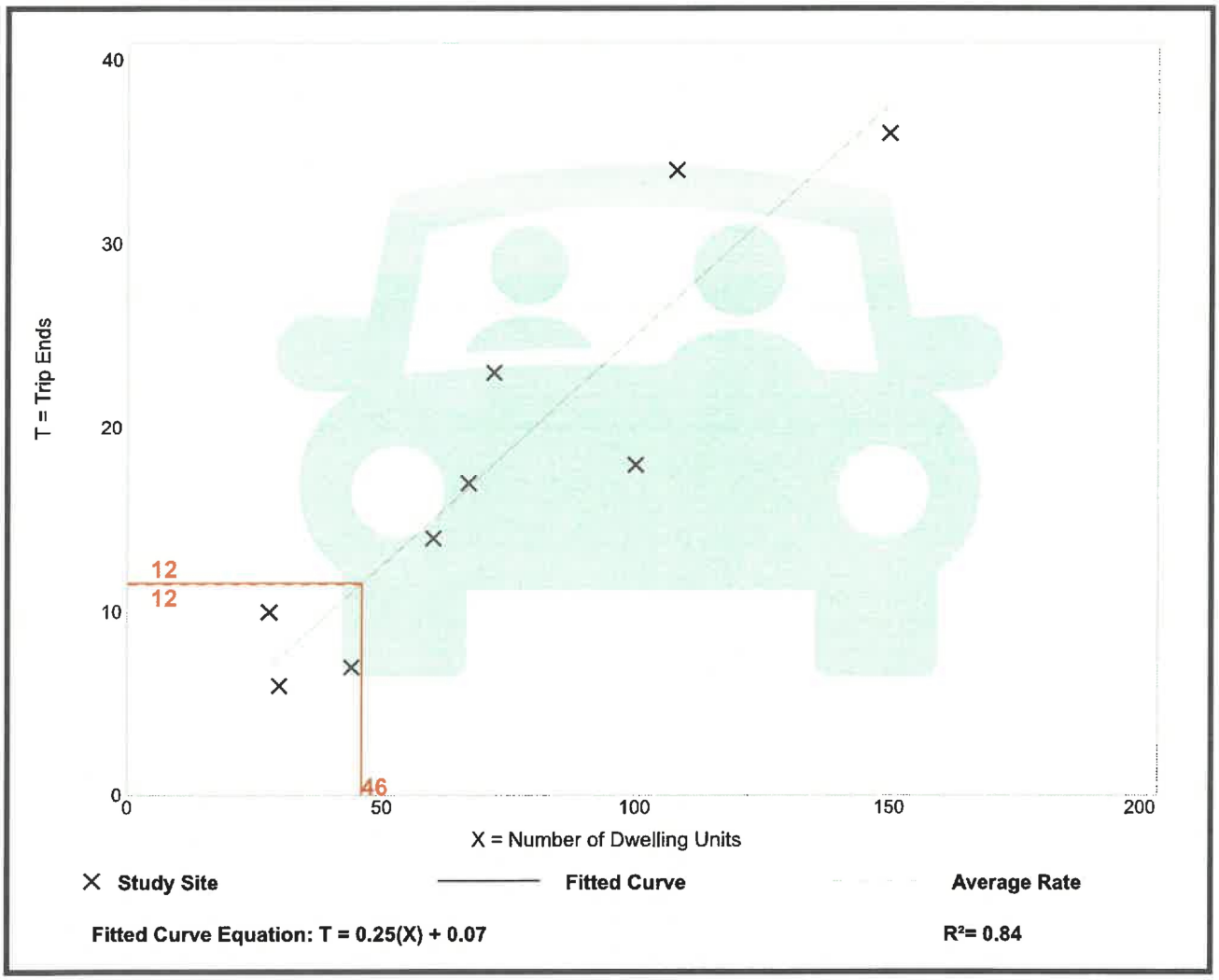
Senior Adult Housing - Multifamily
(252)

Vehicle Trip Ends vs:	**Dwelling Units**
On a:	**Weekday,**
	Peak Hour of Adjacent Street Traffic,
	One Hour Between 4 and 6 p.m.
Setting/Location:	**General Urban/Suburban**
Number of Studies:	9
Avg. Num. of Dwelling Units:	73
Directional Distribution:	56% entering, 44% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.25	0.16 - 0.36	0.06

Data Plot and Equation



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Senior Adult Housing - Multifamily
(252)

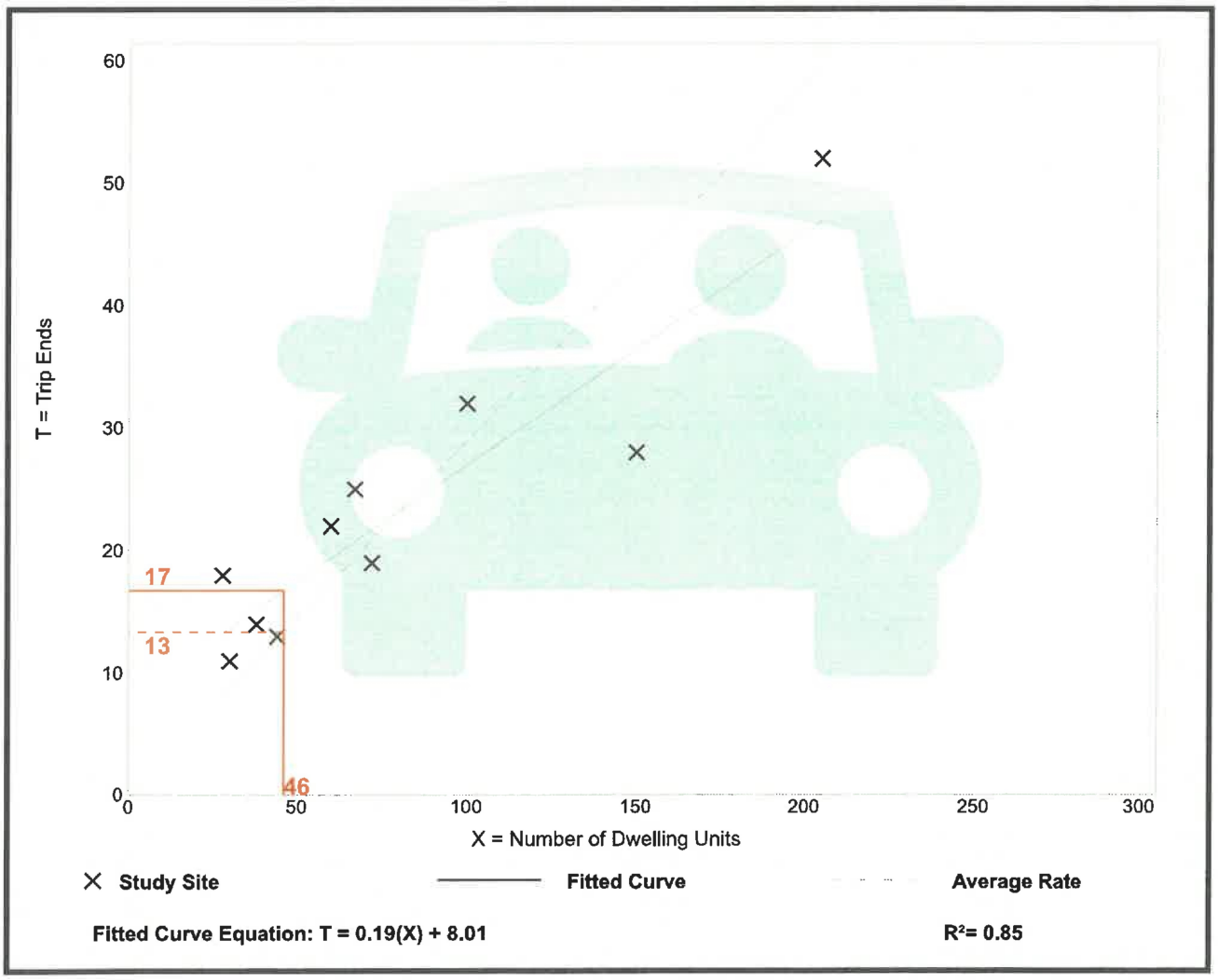
Vehicle Trip Ends vs: **Dwelling Units**
On a: **Weekday,**
AM Peak Hour of Generator

Setting/Location: **General Urban/Suburban**
Number of Studies: 10
Avg. Num. of Dwelling Units: 79
Directional Distribution: 45% entering, 55% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.29	0.19 - 0.64	0.10

Data Plot and Equation



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Senior Adult Housing - Multifamily
(252)

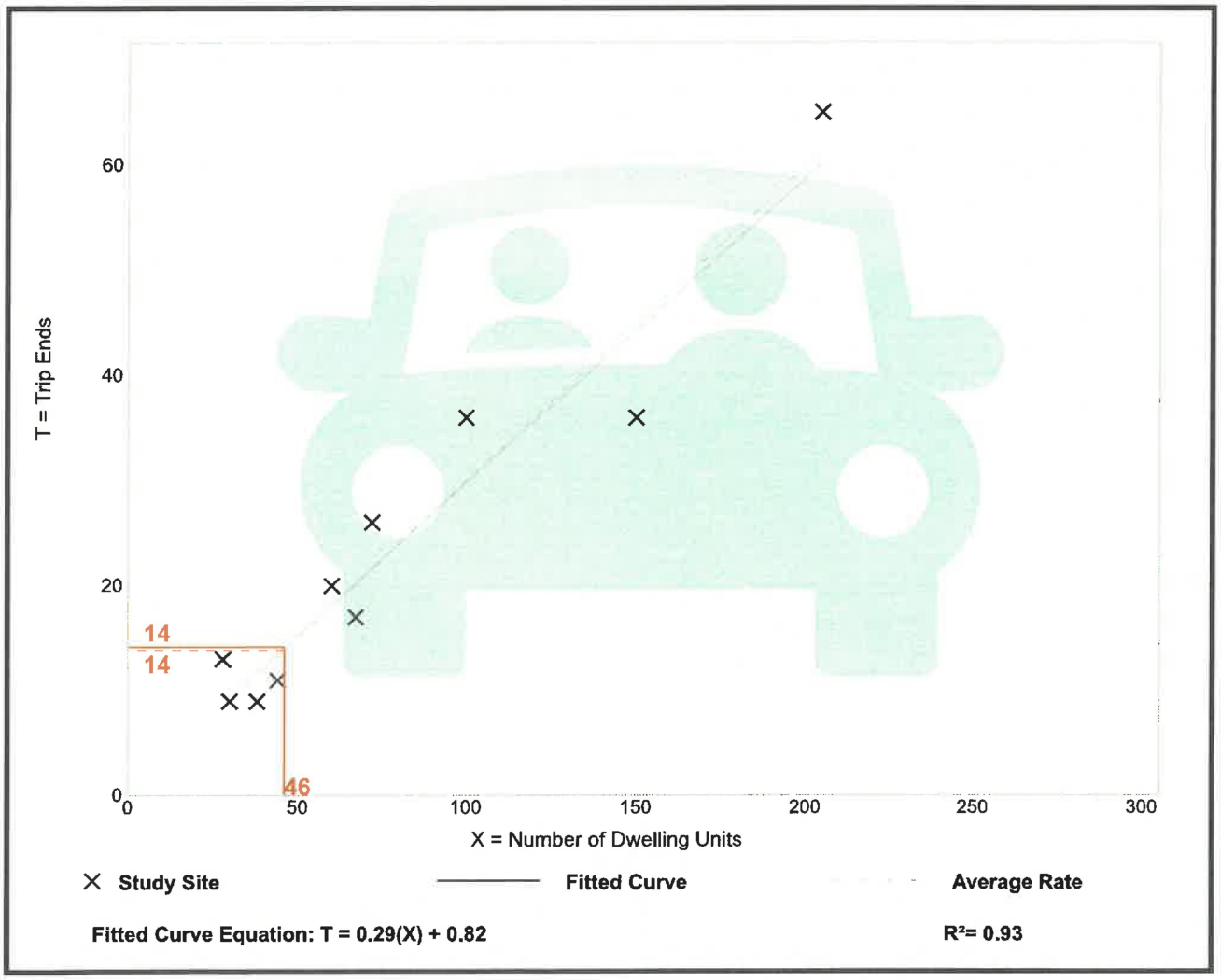
Vehicle Trip Ends vs: **Dwelling Units**
On a: **Weekday,**
PM Peak Hour of Generator

Setting/Location: **General Urban/Suburban**
Number of Studies: 10
Avg. Num. of Dwelling Units: 79
Directional Distribution: 54% entering, 46% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.30	0.24 - 0.46	0.06

Data Plot and Equation



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Senior Adult Housing - Multifamily
(252)

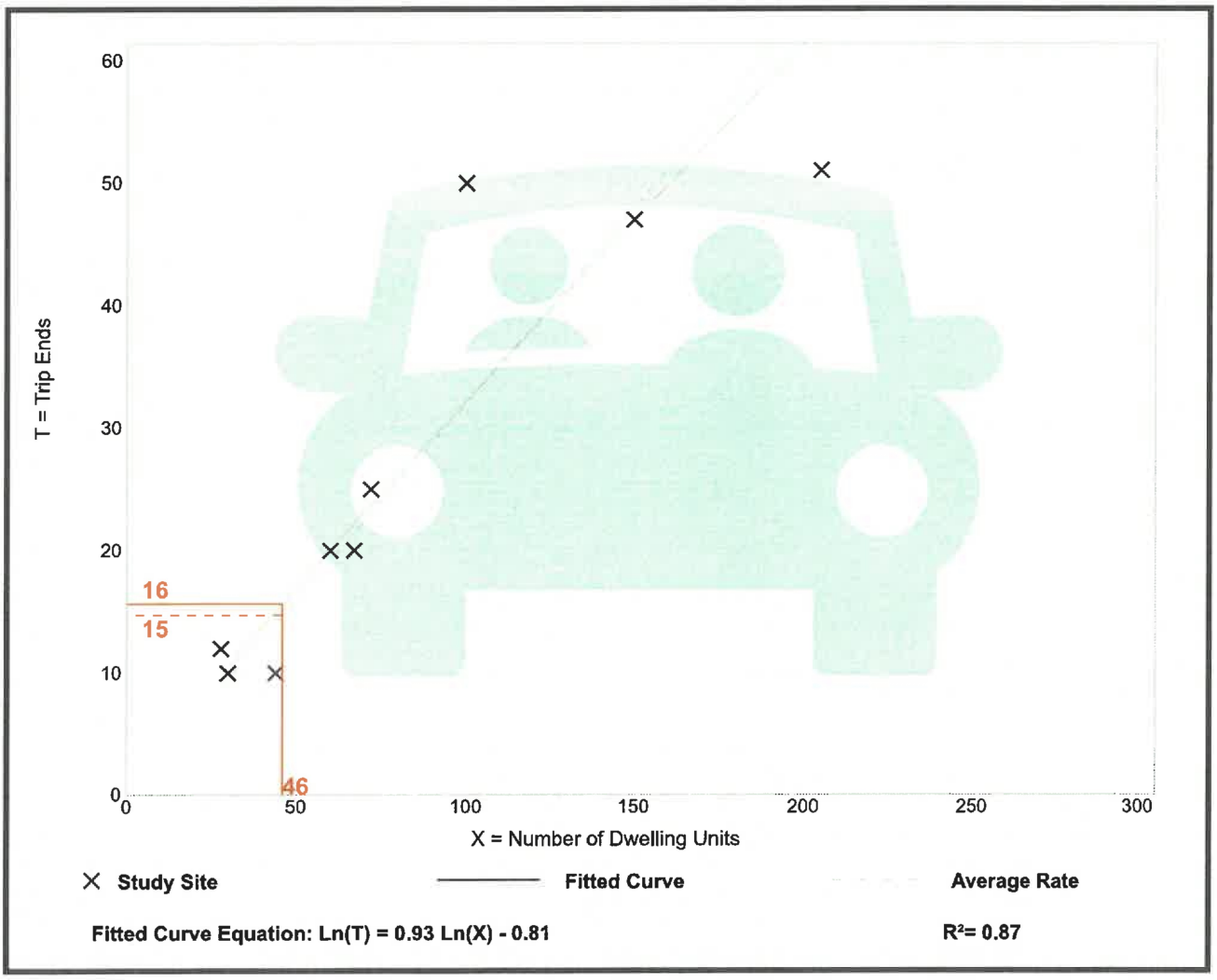
Vehicle Trip Ends vs: **Dwelling Units**
On a: **Saturday, Peak Hour of Generator**

Setting/Location: **General Urban/Suburban**
Number of Studies: 9
Avg. Num. of Dwelling Units: 84
Directional Distribution: 54% entering, 46% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.32	0.23 - 0.50	0.09

Data Plot and Equation



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Attachment B

Safety Review

H. C. L.
CRASH COLLISION DIAGRAM
DATA PACKAGE

COUNTY: **YORK** TOWN: **BIDDEFORD**

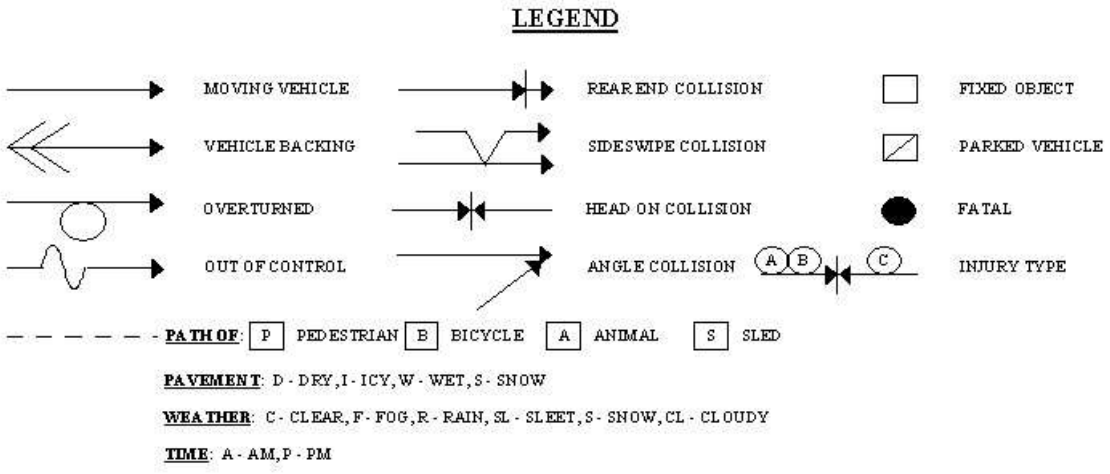
LOW NODE: **59159** HIGH NODE: **0000** REGION: **1** U/R: **URBAN**

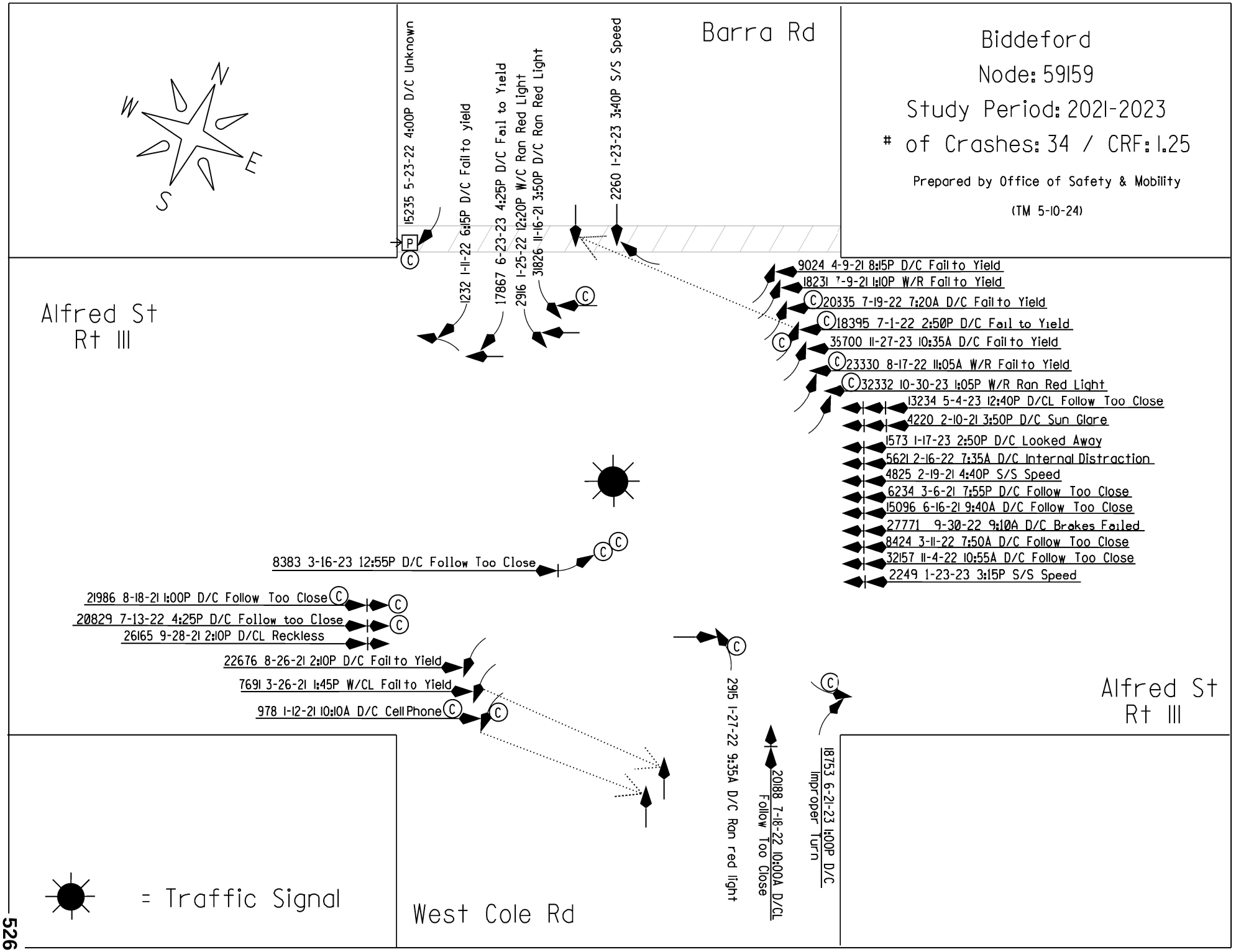
DESCRIPTION: **Int Alfred Rd & Barra Rd/West Cole Rd**

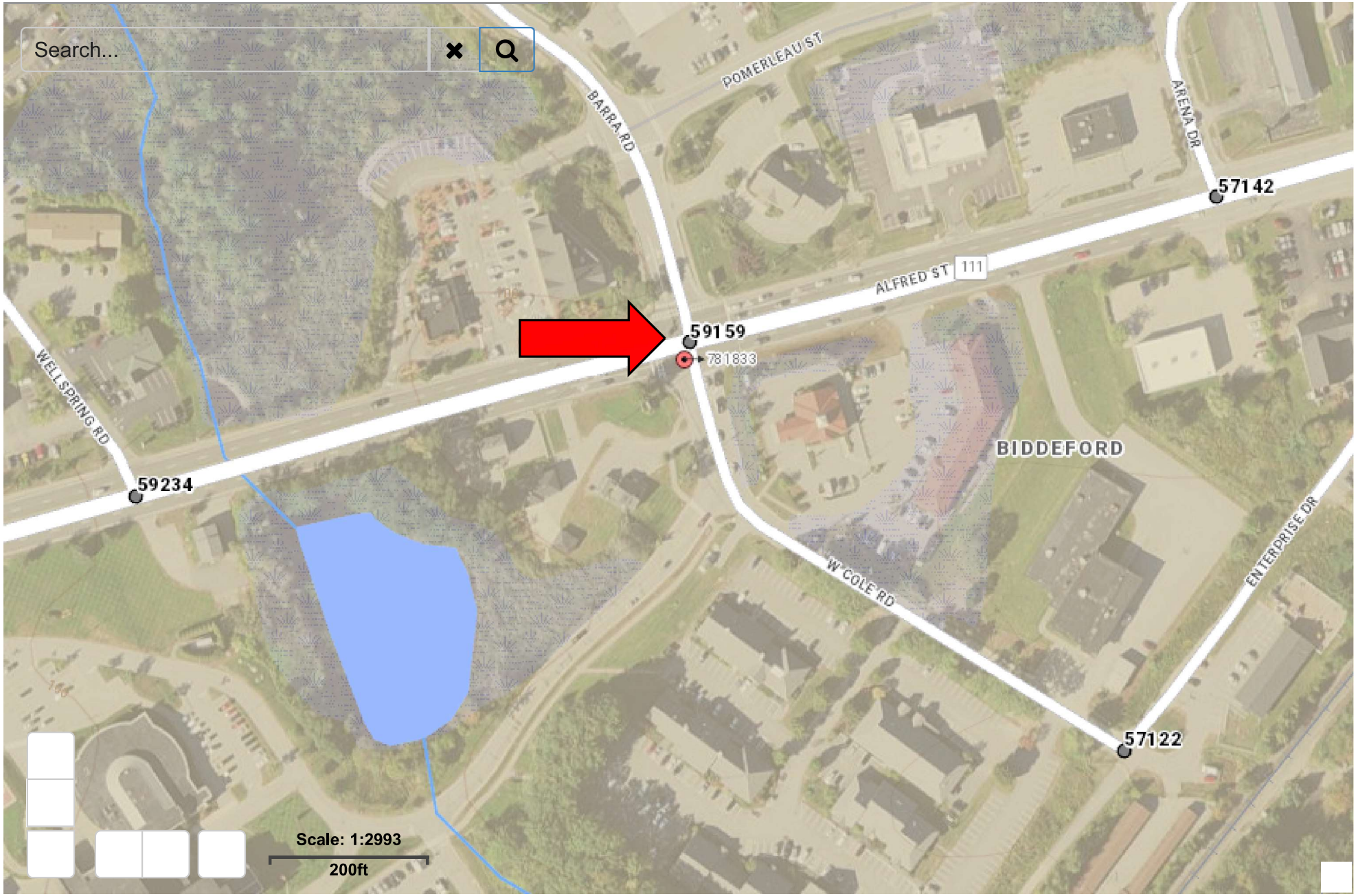
RTE # / RD #: **0111X** DATE DRAWN: **5/10/2024** DRAWN BY: **Tim**

STUDY FROM: **1/1/2021** STUDY TO: **12/31/2023**

CRASH RATE: **1.41** CRF: **1.25** % INJURY: **35.3** TOTAL CRASHES: **34**




Biddeford
Node: 59159
Study Period: 2021-2023
# of Crashes: 34 / CRF: 1.25
Prepared by Office of Safety & Mobility
(TM 5-10-24)
Barra Rd
Alfred St
Rt 111
Alfred St
Rt 111
West Cole Rd
= Traffic Signal
N
S
E
W
15235 5-23-22 4:00P D/C Unknown
1232 1-11-22 6:15P D/C Fail to yield
17867 6-23-23 4:25P D/C Fail to Yield
2916 1-25-22 12:20P W/C Ran Red Light
31826 11-16-21 3:50P D/C Ran Red Light
2260 1-23-23 3:40P S/S Speed
9024 4-9-21 8:15P D/C Fail to Yield
18231 7-9-21 1:10P W/R Fail to Yield
20335 7-19-22 7:20A D/C Fail to Yield
18395 7-1-22 2:50P D/C Fail to Yield
35700 11-27-23 10:35A D/C Fail to Yield
23330 8-17-22 11:05A W/R Fail to Yield
32332 10-30-23 1:05P W/R Ran Red Light
13234 5-4-23 12:40P D/CL Follow Too Close
4220 2-10-21 3:50P D/C Sun Glare
1573 1-17-23 2:50P D/C Looked Away
5621 2-16-22 7:35A D/C Internal Distraction
4825 2-19-21 4:40P S/S Speed
6234 3-6-21 7:55P D/C Follow Too Close
15096 6-16-21 9:40A D/C Follow Too Close
27771 9-30-22 9:10A D/C Brakes Failed
8424 3-11-22 7:50A D/C Follow Too Close
32157 11-4-22 10:55A D/C Follow Too Close
2249 1-23-23 3:15P S/S Speed
8383 3-16-23 12:55P D/C Follow Too Close
21986 8-18-21 1:00P D/C Follow Too Close
20829 7-13-22 4:25P D/C Follow too Close
26165 9-28-21 2:10P D/CL Reckless
22676 8-26-21 2:10P D/C Fail to Yield
7691 3-26-21 1:45P W/CL Fail to Yield
978 1-12-21 10:10A D/C Cell Phone
2915 1-27-22 9:35A D/C Ran red light
20188 7-18-22 10:00A D/CL Follow Too Close
18753 6-21-23 1:00P D/C Improper Turn


Search...
POMERLEAU ST
BARRA RD
ARENA DR
57142
ALFRED ST
111
59159
781833
WELLSPRING RD
59234
BIDDEFORD
W COLE RD
ENTERPRISE DR
57122
Scale: 1:2993
200ft

Maine Department Of Transportation - Office of Safety, Crash Records Section

Crash Summary Report

Report Selections and Input Parameters

REPORT SELECTIONS

☑ Crash Summary I - Single Node ☐ Section Detail ☑ Crash Summary II ☐ 1320 Public ☐ 1320 Private ☐ 1320 Summary

REPORT DESCRIPTION

Biddeford
Int Alfred Rd & Barra Rd/West Cole Rd

REPORT PARAMETERS

Year 2021, Start Month 1 through Year 2023 End Month: 12

Route: **0111X**	Start Node: **59159**	Start Offset: **0**	☐ **Exclude First Node**
	End Node: **59159**	End Offset: **0**	☐ **Exclude Last Node**

Crash Summary I

Nodes

Node	Route - MP	Node Description	U/R	Total Crashes	Injury Crashes K	A	B	C	PD	Percent Injury	Annual M Ent-Veh	Crash Rate	Critical Rate	CRF
59159	0111X - 2.06	Int of ALFRED ST BARRA RD W COLE RD	9	34	0	0	0	12	22	35.3	8.017	1.41	1.13	1.25
												Statewide Crash Rate:	0.71	
Study Years:	3.00	**NODE TOTALS:**		34	0	0	0	12	22	35.3	8.017	1.41	1.13	1.25

Crash Summary II - Characteristics

Crashes by Day and Hour

	AM												Hour of Day PM													
Day Of Week	**12**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**Un**	**Tot**
SUNDAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MONDAY	0	0	0	0	0	0	0	0	0	0	2	0	0	1	0	2	1	0	0	0	0	0	0	0	0	6
TUESDAY	0	0	0	0	0	0	0	1	0	0	1	0	1	0	2	1	0	0	1	0	0	0	0	0	0	7
WEDNESDAY	0	0	0	0	0	0	0	1	0	1	0	1	0	2	0	1	1	0	0	0	0	0	0	0	0	7
THURSDAY	0	0	0	0	0	0	0	0	0	1	0	0	2	0	1	0	0	0	0	0	0	0	0	0	0	4
FRIDAY	0	0	0	0	0	0	0	1	0	1	1	0	0	2	1	0	2	0	0	0	1	0	0	0	0	9
SATURDAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
Totals	0	0	0	0	0	0	0	3	0	3	4	1	3	5	4	4	4	0	1	1	1	0	0	0	0	**34**

Vehicle Counts by Type

Unit Type	Total	Unit Type	Total
1-Passenger Car	33	23-Bicyclist	0
2-(Sport) Utility Vehicle	24	24-Witness	6
3-Passenger Van	1	25-Other	0
4-Cargo Van (10K lbs or Less)	0	26-Construction	0
5-Pickup	12	27-Farm Vehicle	0
6-Motor Home	0	28-Horse and Buggy	0
7-School Bus	0	**Total**	**79**
8-Transit Bus	0		
9-Motor Coach	0		
10-Other Bus	0		
11-Motorcycle	0		
12-Moped	0		
13-Low Speed Vehicle	0		
14-Autocycle	0		
15-Experimental	0		
16-Other Light Trucks (10,000 lbs or Less)	0		
17-Medium/Heavy Trucks (More than 10,000 lbs)	2		
18-ATV - (4 wheel)	0		
20-ATV - (2 wheel)	0		
21-Snowmobile	0		
22-Pedestrian	1		

Crash Summary II - Characteristics

Crashes by Driver Action at Time of Crash

Driver Action at Time of Crash	Dr 1	Dr 2	Dr 3	Dr 4	Dr 5	Other	Total
No Contributing Action	1	32	5	0	0	0	38
Ran Off Roadway	0	0	0	0	0	0	0
Failed to Yield Right-of-Way	9	1	0	0	0	0	10
Ran Red Light	4	0	0	0	0	0	4
Ran Stop Sign	0	0	0	0	0	0	0
Disregarded Other Traffic Sign	0	0	0	0	0	0	0
Disregarded Other Road Markings	0	0	0	0	0	0	0
Exceeded Posted Speed Limit	0	0	0	0	0	0	0
Drove Too Fast For Conditions	3	0	0	0	0	0	3
Improper Turn	1	0	0	0	0	0	1
Improper Backing	0	0	0	0	0	0	0
Improper Passing	0	0	0	0	0	0	0
Wrong Way	0	0	0	0	0	0	0
Followed Too Closely	10	0	0	0	0	0	10
Failed to Keep in Proper Lane	0	0	0	0	0	0	0
Operated Motor Vehicle in Erratic, Reckless, Careless, Negligent or Aggressive Manner	3	0	0	0	0	0	3
Swerved or Avoided Due to Wind, Slippery Surface, Motor Vehicle, Object, Non-Motorist in Roadway	0	0	0	0	0	0	0
Over-Correcting/Over-Steering	0	0	0	0	0	0	0
Other Contributing Action	3	0	0	0	0	0	3
Unknown	0	0	0	0	0	0	0
Total	**34**	**33**	**5**	**0**	**0**	**0**	**72**

Crashes by Apparent Physical Condition And Driver

Apparent Physical Condition	Dr 1	Dr 2	Dr 3	Dr 4	Dr 5	Other	Total
Apparently Normal	33	33	5	0	0	0	71
Physically Impaired	0	0	0	0	0	0	0
Emotional(Depressed, Angry, Disturbed, etc.)	0	1	0	0	0	0	1
Ill (Sick)	0	0	0	0	0	0	0
Asleep or Fatigued	0	0	0	0	0	0	0
Under the Influence of Medications/Drugs/Alcohol	0	0	0	0	0	0	0
Other	1	0	0	0	0	0	1
Total	**34**	**34**	**5**	**0**	**0**	**0**	**73**

Driver Age by Unit Type

Age	Driver	Bicycle	SnowMobile	Pedestrian	ATV	Total
09-Under	0	0	0	0	0	0
10-14	0	0	0	0	0	0
15-19	11	0	0	0	0	11
20-24	8	0	0	0	0	8
25-29	2	0	0	0	0	2
30-39	10	0	0	0	0	10
40-49	4	0	0	0	0	4
50-59	12	0	0	0	0	12
60-69	12	0	0	0	0	12
70-79	7	0	0	0	0	7
80-Over	6	0	0	0	0	6
Unknown	0	0	0	1	0	1
Total	**72**	**0**	**0**	**1**	**0**	**73**

Crash Summary II - Characteristics

Most Harmful Event

Most Harmful Event	Total	Most Harmful Event	Total
1-Overturn / Rollover	0	38-Other Fixed Object (wall, building, tunnel, etc.)	0
2-Fire / Explosion	0	39-Unknown	0
3-Immersion	0	40-Gate or Cable	0
4-Jackknife	0	41-Pressure Ridge	0
5-Cargo / Equipment Loss Or Shift	0	**Total**	**72**
6-Fell / Jumped from Motor Vehicle	0		
7-Thrown or Falling Object	0		
8-Other Non-Collision	0		
9-Pedestrian	1		
10-Pedalcycle	0		
11-Railway Vehicle - Train, Engine	0		
12-Animal	0		
13-Motor Vehicle in Transport	68		
14-Parked Motor Vehicle	3		
15-Struck by Falling, Shifting Cargo or Anything Set in Motion by Motor Vehicle	0		
16-Work Zone / Maintenance Equipment	0		
17-Other Non-Fixed Object	0		
18-Impact Attenuator / Crash Cushion	0		
19-Bridge Overhead Structure	0		
20-Bridge Pier or Support	0		
21-Bridge Rail	0		
22-Cable Barrier	0		
23-Culvert	0		
24-Curb	0		
25-Ditch	0		
26-Embankment	0		
27-Guardrail Face	0		
28-Guardrail End	0		
29-Concrete Traffic Barrier	0		
30-Other Traffic Barrier	0		
31-Tree (Standing)	0		
32-Utility Pole / Light Support	0		
33-Traffic Sign Support	0		
34-Traffic Signal Support	0		
35-Fence	0		
36-Mailbox	0		
37-Other Post, Pole, or Support	0		

Traffic Control Devices

Traffic Control Device	Total
1-Traffic Signals (Stop & Go)	34
2-Traffic Signals (Flashing)	0
3-Advisory/Warning Sign	0
4-Stop Signs - All Approaches	0
5-Stop Signs - Other	0
6-Yield Sign	0
7-Curve Warning Sign	0
8-Officer, Flagman, School Patrol	0
9-School Bus Stop Arm	0
10-School Zone Sign	0
11-R.R. Crossing Device	0
12-No Passing Zone	0
13-None	0
14-Other	0
Total	**34**

Injury Data

Severity Code	Injury Crashes	Number Of Injuries
K	0	0
A	0	0
B	0	0
C	12	16
PD	22	0
Total	**34**	**16**

Road Character

Road Grade	Total
1-Level	33
2-On Grade	1
3-Top of Hill	0
4-Bottom of Hill	0
5-Other	0
Total	**34**

Light

Light Condition	Total
1-Daylight	30
2-Dawn	0
3-Dusk	1
4-Dark - Lighted	3
5-Dark - Not Lighted	0
6-Dark - Unknown Lighting	0
7-Unknown	0
Total	**34**

Crash Summary II - Characteristics

Crashes by Year and Month

Month	2021	2022	2023	Total
JANUARY	1	3	3	7
FEBRUARY	2	1	0	3
MARCH	2	1	1	4
APRIL	1	0	0	1
MAY	0	1	1	2
JUNE	1	0	2	3
JULY	1	4	0	5
AUGUST	2	1	0	3
SEPTEMBER	1	1	0	2
OCTOBER	0	0	1	1
NOVEMBER	1	1	1	3
DECEMBER	0	0	0	0
Total	**12**	**13**	**9**	**34**

Report is limited to the last 10 years of data.

Crash Summary II - Characteristics

Crashes by Crash Type and Type of Location

Crash Type	Straight Road	Curved Road	Three Leg Intersection	Four Leg Intersection	Five or More Leg Intersection	Driveways	Bridges	Interchanges	Other	Parking Lot	Private Way	Cross Over	Railroad Crossing	Traffic Circle-Roundabout	Total
Object in Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rear End - Sideswipe	0	0	0	16	0	0	0	0	0	0	0	0	0	0	16
Head-on - Sideswipe	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Intersection Movement	0	0	0	17	0	0	0	0	0	0	0	0	0	0	17
Pedestrians	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Train	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Went Off Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
All Other Animal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bicycle	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Jackknife	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rollover	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fire	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Submersion	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Thrown or Falling Object	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bear	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Deer	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Moose	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Turkey	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	**0**	**0**	**0**	**34**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**34**

Crash Summary II - Characteristics

Crashes by Weather, Light Condition and Road Surface

Weather / Light	Dry	Ice/Frost	Mud, Dirt, Gravel	Oil	Other	Sand	Slush	Snow	Unknown	Water (Standing, Moving)	Wet	Total
Blowing Sand, Soil, Dirt												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Blowing Snow												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Clear												
Dark - Lighted	3	0	0	0	0	0	0	0	0	0	0	3
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	20	0	0	0	0	0	0	0	0	0	1	21
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Cloudy												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	3	0	0	0	0	0	0	0	0	0	1	4
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0

Crash Summary II - Characteristics

Crashes by Weather, Light Condition and Road Surface

Weather / Light	Dry	Ice/Frost	Mud, Dirt, Gravel	Oil	Other	Sand	Slush	Snow	Unknown	Water (Standing, Moving)	Wet	Total
Fog, Smog, Smoke												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Other												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Rain												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	3	3
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Severe Crosswinds												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0

Crash Summary II - Characteristics

Crashes by Weather, Light Condition and Road Surface

Weather / Light	Dry	Ice/Frost	Mud, Dirt, Gravel	Oil	Other	Sand	Slush	Snow	Unknown	Water (Standing, Moving)	Wet	Total
Sleet, Hail (Freezing Rain or Drizzle)												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Snow												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	2	0	0	0	2
Dusk	0	0	0	0	0	0	0	1	0	0	0	1
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	**26**	**0**	**0**	**0**	**0**	**0**	**0**	**3**	**0**	**0**	**5**	**34**

Crash Summary Report

Report Selections and Input Parameters

REPORT SELECTIONS

☑ Crash Summary I ☐ Section Detail ☑ Crash Summary II ☐ 1320 Public ☐ 1320 Private ☐ 1320 Summary

REPORT DESCRIPTION

Biddeford
Alfred St-Barra Rd area

REPORT PARAMETERS

Year 2021, Start Month 1 through Year 2023 End Month: 12

Route: 3200025	Start Node: 59159	Start Offset: 0	☑ Exclude First Node
	End Node: 59168	End Offset: 0	☐ Exclude Last Node
Route: 0111X	Start Node: 57142	Start Offset: 0	☑ Exclude First Node
	End Node: 59234	End Offset: 0	☑ Exclude Last Node

Crash Summary I

Nodes

Node	Route - MP	Node Description	U/R	Total Crashes	Injury Crashes K	A	B	C	PD	Percent Injury	Annual M Ent-Veh	Crash Rate	Critical Rate	CRF
59168	3200025 - 0.32	Non Int BARRA RD	2	1	0	0	0	0	1	0.0	0.338	0.99	0.56	1.76
												Statewide Crash Rate:	0.13	
59159	0111X - 2.06	Int of ALFRED ST BARRA RD W COLE RD	9	34	0	0	0	12	22	35.3	8.017	1.41	1.13	1.25
												Statewide Crash Rate:	0.71	
Study Years:	3.00	NODE TOTALS:		35	0	0	0	12	23	34.3	8.355	1.40	1.09	1.28

Crash Summary I

Sections

Start Node	End Node	Element	Offset Begin - End	Route - MP	Section Length	U/R	Total Crashes	Injury Crashes K	A	B	C	PD	Percent Injury	Annual HMVM	Crash Rate	Critical Rate	CRF
59159	59168	5099102	0 - 0.32	3200025 - 0	0.32	2	3	0	0	0	0	3	0.0	0.00216	462.54	909.47	0.00
Int of ALFRED ST BARRA RD W COLE RD				RD INV 3200025											Statewide Crash Rate: 370.71		
59159	57142	3114974	0 - 0.13	0111X - 1.93	0.13	2	6	0	0	0	1	5	16.7	0.00953	209.84	412.20	0.00
Int of ALFRED ST BARRA RD W COLE RD				ST RTE 111											Statewide Crash Rate: 209.30		
59234	59159	3118497	0.11 - 0.14	0111X - 2.06	0.03	2	2	0	0	0	0	2	0.0	0.00237	281.28	580.94	0.00
Int of ALFRED ST WELLSPRING RD				ST RTE 111											Statewide Crash Rate: 209.30		
59234	59159	3118497	0 - 0.11	0111X - 2.06	0.11	2	4	0	0	0	1	3	25.0	0.00869	153.42	420.93	0.00
Int of ALFRED ST WELLSPRING RD				ST RTE 111											Statewide Crash Rate: 209.30		
Study Years: 3.00				Section Totals:	0.59		15	0	0	0	2	13	13.3	0.02275	219.74	365.09	0.60
				Grand Totals:	0.59		50	0	0	0	14	36	28.0	0.02275	732.48	504.06	1.45

Crash Summary

Section Details

Start Node	End Node	Element	Offset Begin - End	Route - MP	Total Crashes	Injury Crashes K	A	B	C	PD	Crash Report	Crash Date	Crash Mile Point	Injury Degree
59159	59168	5099102	0 - 0.32	3200025 - 0	3	0	0	0	0	3	2022-14993	05/27/2022	0.05	PD
											2021-9515	04/16/2021	0.06	PD
											2023-3322	01/31/2023	0.23	PD
59159	57142	3114974	0 - 0.13	0111X - 1.93	6	0	0	0	1	5	2021-15006	06/10/2021	1.94	PD
											2022-19047	07/05/2022	1.97	PD
											2022-39406	12/14/2022	1.98	C
											2022-9295	03/18/2022	1.99	PD
											2021-16822	07/02/2021	1.99	PD
											2022-17495	06/20/2022	2.01	PD
59234	59159	3118497	0.11 - 0.14	0111X - 2.06	2	0	0	0	0	2	2022-11788	04/27/2022	2.07	PD
											2022-26689	09/09/2022	2.07	PD
59234	59159	3118497	0 - 0.11	0111X - 2.06	4	0	0	0	1	3	2022-13541	05/10/2022	2.09	PD
											2021-22102	08/19/2021	2.10	C
											2023-24155	08/08/2023	2.10	PD
											2022-23332	08/15/2022	2.11	PD
				Totals:	15	0	0	0	2	13				

Crash Summary II - Characteristics

Crashes by Day and Hour

	AM												PM												
	Hour of Day																								
Day Of Week	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	Un	Tot
SUNDAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MONDAY	0	0	0	0	0	0	0	0	1	0	2	0	0	1	0	3	1	0	0	0	0	0	0	0	0	8
TUESDAY	0	0	0	0	0	0	0	1	1	0	2	0	1	0	2	1	1	0	1	0	1	0	0	0	0	11
WEDNESDAY	0	0	0	0	0	0	0	1	0	1	0	1	1	3	0	1	1	0	0	0	0	0	0	0	0	9
THURSDAY	0	0	0	0	0	0	0	0	1	1	0	0	2	0	1	0	0	1	0	0	0	0	1	0	0	7
FRIDAY	0	0	0	0	0	0	0	2	1	1	2	0	1	2	1	1	2	0	0	0	1	0	0	0	0	14
SATURDAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
Totals	0	0	0	0	0	0	0	4	4	3	6	1	5	6	4	6	5	1	1	1	2	0	1	0	0	50

Vehicle Counts by Type

Unit Type	Total	Unit Type	Total
1-Passenger Car	46	23-Bicyclist	0
2-(Sport) Utility Vehicle	34	24-Witness	8
3-Passenger Van	1	25-Other	0
4-Cargo Van (10K lbs or Less)	0	26-Construction	0
5-Pickup	20	27-Farm Vehicle	0
6-Motor Home	0	28-Horse and Buggy	0
7-School Bus	0	Total	112
8-Transit Bus	0		
9-Motor Coach	0		
10-Other Bus	0		
11-Motorcycle	0		
12-Moped	0		
13-Low Speed Vehicle	0		
14-Autocycle	0		
15-Experimental	0		
16-Other Light Trucks (10,000 lbs or Less)	0		
17-Medium/Heavy Trucks (More than 10,000 lbs)	2		
18-ATV - (4 wheel)	0		
20-ATV - (2 wheel)	0		
21-Snowmobile	0		
22-Pedestrian	1		

Crash Summary II - Characteristics

Crashes by Driver Action at Time of Crash

Driver Action at Time of Crash	Dr 1	Dr 2	Dr 3	Dr 4	Dr 5	Other	Total
No Contributing Action	1	46	5	0	0	0	52
Ran Off Roadway	1	0	0	0	0	0	1
Failed to Yield Right-of-Way	17	1	0	0	0	0	18
Ran Red Light	4	0	0	0	0	0	4
Ran Stop Sign	0	0	0	0	0	0	0
Disregarded Other Traffic Sign	0	0	0	0	0	0	0
Disregarded Other Road Markings	0	0	0	0	0	0	0
Exceeded Posted Speed Limit	0	0	0	0	0	0	0
Drove Too Fast For Conditions	3	0	0	0	0	0	3
Improper Turn	3	0	0	0	0	0	3
Improper Backing	0	0	0	0	0	0	0
Improper Passing	0	0	0	0	0	0	0
Wrong Way	0	0	0	0	0	0	0
Followed Too Closely	13	0	0	0	0	0	13
Failed to Keep in Proper Lane	2	1	0	0	0	0	3
Operated Motor Vehicle in Erratic, Reckless, Careless, Negligent or Aggressive Manner	3	0	0	0	0	0	3
Swerved or Avoided Due to Wind, Slippery Surface, Motor Vehicle, Object, Non-Motorist in Roadway	0	0	0	0	0	0	0
Over-Correcting/Over-Steering	0	0	0	0	0	0	0
Other Contributing Action	3	0	0	0	0	0	3
Unknown	0	0	0	0	0	0	0
Total	50	48	5	0	0	0	103

Crashes by Apparent Physical Condition And Driver

Apparent Physical Condition	Dr 1	Dr 2	Dr 3	Dr 4	Dr 5	Other	Total
Apparently Normal	47	48	5	0	0	0	100
Physically Impaired	1	0	0	0	0	0	1
Emotional(Depressed, Angry, Disturbed, etc.)	0	1	0	0	0	0	1
Ill (Sick)	1	0	0	0	0	0	1
Asleep or Fatigued	0	0	0	0	0	0	0
Under the Influence of Medications/Drugs/Alcohol	0	0	0	0	0	0	0
Other	1	0	0	0	0	0	1
Total	50	49	5	0	0	0	104

Driver Age by Unit Type

Age	Driver	Bicycle	SnowMobile	Pedestrian	ATV	Total
09-Under	0	0	0	0	0	0
10-14	0	0	0	0	0	0
15-19	13	0	0	0	0	13
20-24	10	0	0	0	0	10
25-29	3	0	0	0	0	3
30-39	19	0	0	0	0	19
40-49	10	0	0	0	0	10
50-59	16	0	0	0	0	16
60-69	16	0	0	0	0	16
70-79	8	0	0	0	0	8
80-Over	8	0	0	0	0	8
Unknown	0	0	0	1	0	1
Total	103	0	0	1	0	104

Crash Summary II - Characteristics

Most Harmful Event

Most Harmful Event	Total	Most Harmful Event	Total
1-Overturn / Rollover	0	38-Other Fixed Object (wall, building, tunnel, etc.)	0
2-Fire / Explosion	0	39-Unknown	0
3-Immersion	0	40-Gate or Cable	0
4-Jackknife	0	41-Pressure Ridge	0
5-Cargo / Equipment Loss Or Shift	0	Total	103
6-Fell / Jumped from Motor Vehicle	0		
7-Thrown or Falling Object	0		
8-Other Non-Collision	0		
9-Pedestrian	1		
10-Pedalcycle	0		
11-Railway Vehicle - Train, Engine	0		
12-Animal	0		
13-Motor Vehicle in Transport	98		
14-Parked Motor Vehicle	3		
15-Struck by Falling, Shifting Cargo or Anything Set in Motion by Motor Vehicle	0		
16-Work Zone / Maintenance Equipment	0		
17-Other Non-Fixed Object	0		
18-Impact Attenuator / Crash Cushion	0		
19-Bridge Overhead Structure	0		
20-Bridge Pier or Support	0		
21-Bridge Rail	0		
22-Cable Barrier	0		
23-Culvert	0		
24-Curb	0		
25-Ditch	0		
26-Embankment	0		
27-Guardrail Face	0		
28-Guardrail End	0		
29-Concrete Traffic Barrier	0		
30-Other Traffic Barrier	0		
31-Tree (Standing)	1		
32-Utility Pole / Light Support	0		
33-Traffic Sign Support	0		
34-Traffic Signal Support	0		
35-Fence	0		
36-Mailbox	0		
37-Other Post, Pole, or Support	0		

Injury Data

Severity Code	Injury Crashes	Number Of Injuries
K	0	0
A	0	0
B	0	0
C	14	18
PD	36	0
Total	50	18

Road Character

Road Grade	Total
1-Level	44
2-On Grade	6
3-Top of Hill	0
4-Bottom of Hill	0
5-Other	0
Total	50

Traffic Control Devices

Traffic Control Device	Total
1-Traffic Signals (Stop & Go)	38
2-Traffic Signals (Flashing)	0
3-Advisory/Warning Sign	0
4-Stop Signs - All Approaches	0
5-Stop Signs - Other	5
6-Yield Sign	0
7-Curve Warning Sign	0
8-Officer, Flagman, School Patrol	0
9-School Bus Stop Arm	0
10-School Zone Sign	0
11-R.R. Crossing Device	0
12-No Passing Zone	0
13-None	7
14-Other	0
Total	50

Light

Light Condition	Total
1-Daylight	44
2-Dawn	0
3-Dusk	2
4-Dark - Lighted	4
5-Dark - Not Lighted	0
6-Dark - Unknown Lighting	0
7-Unknown	0
Total	50

Crash Summary II - Characteristics

Crashes by Year and Month

Month	2021	2022	2023	Total
JANUARY	1	3	4	8
FEBRUARY	2	1	0	3
MARCH	2	2	1	5
APRIL	2	1	0	3
MAY	0	3	1	4
JUNE	2	1	2	5
JULY	2	5	0	7
AUGUST	3	3	1	7
SEPTEMBER	1	2	0	3
OCTOBER	0	0	1	1
NOVEMBER	1	1	1	3
DECEMBER	0	1	0	1
Total	16	23	11	50

Report is limited to the last 10 years of data.

Crash Summary II - Characteristics

Crashes by Crash Type and Type of Location

Crash Type	Straight Road	Curved Road	Three Leg Intersection	Four Leg Intersection	Five or More Leg Intersection	Driveways	Bridges	Interchanges	Other	Parking Lot	Private Way	Cross Over	Railroad Crossing	Traffic Circle-Roundabout	Total
Object in Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rear End - Sideswipe	5	0	0	16	0	2	0	0	0	0	0	0	0	0	23
Head-on - Sideswipe	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Intersection Movement	0	0	0	17	0	8	0	0	0	0	0	0	0	0	25
Pedestrians	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Train	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Went Off Road	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
All Other Animal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bicycle	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Jackknife	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rollover	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fire	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Submersion	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Thrown or Falling Object	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bear	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Deer	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Moose	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Turkey	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	5	1	0	34	0	10	0	0	0	0	0	0	0	0	50

Crash Summary II - Characteristics

Crashes by Weather, Light Condition and Road Surface

Weather / Light	Dry	Ice/Frost	Mud, Dirt, Gravel	Oil	Other	Sand	Slush	Snow	Unknown	Water (Standing, Moving)	Wet	Total
Blowing Sand, Soil, Dirt												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Blowing Snow												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Clear												
Dark - Lighted	4	0	0	0	0	0	0	0	0	0	0	4
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	26	0	0	0	0	0	0	0	0	0	1	27
Dusk	1	0	0	0	0	0	0	0	0	0	0	1
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Cloudy												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	5	0	0	0	0	0	0	0	0	0	3	8
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0

Crash Summary II - Characteristics

Crashes by Weather, Light Condition and Road Surface

Weather / Light	Dry	Ice/Frost	Mud, Dirt, Gravel	Oil	Other	Sand	Slush	Snow	Unknown	Water (Standing, Moving)	Wet	Total
Fog, Smog, Smoke												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Other												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Rain												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	7	7
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Severe Crosswinds												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0

Crash Summary II - Characteristics

Crashes by Weather, Light Condition and Road Surface

Weather / Light	Dry	Ice/Frost	Mud, Dirt, Gravel	Oil	Other	Sand	Slush	Snow	Unknown	Water (Standing, Moving)	Wet	Total
Sleet, Hail (Freezing Rain or Drizzle)												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Snow												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	2	0	0	0	2
Dusk	0	0	0	0	0	0	0	1	0	0	0	1
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	36	0	0	0	0	0	0	3	0	0	11	50


HEALTHCARE DR
59168
BARRA RD
BIDDEFORD
57143
POMERLEAU ST
56881
ARENA DR
57142
ALFRED ST
111
59236
WELLSPRING RD
59159
63953
ENTERPRISE DR
59234
W COLE RD
56879
58887
Scale: 1:4197
300ft

Crash Summary Report

Report Selections and Input Parameters

REPORT SELECTIONS

☑ Crash Summary I ☐ Section Detail ☑ Crash Summary II ☐ 1320 Public ☐ 1320 Private ☐ 1320 Summary

REPORT DESCRIPTION

Biddeford
Alfred St-Barra Rd area - 5 Year

REPORT PARAMETERS

Year 2019, Start Month 1 through Year 2023 End Month: 12

Route: 3200025	Start Node: 59159	Start Offset: 0	☑ Exclude First Node
	End Node: 59168	End Offset: 0	☐ Exclude Last Node
Route: 0111X	Start Node: 57142	Start Offset: 0	☑ Exclude First Node
	End Node: 59234	End Offset: 0	☑ Exclude Last Node

551

Crash Summary I

Nodes

Node	Route - MP	Node Description	U/R	Total Crashes	Injury Crashes K	A	B	C	PD	Percent Injury	Annual M Ent-Veh	Crash Rate	Critical Rate	CRF
59168	3200025 - 0.32	Non Int BARRA RD	2	1	0	0	0	0	1	0.0	0.338	0.59	0.55	1.08
												Statewide Crash Rate:	0.13	
59159	0111X - 2.06	Int of ALFRED ST BARRA RD W COLE RD	9	54	0	0	2	16	36	33.3	8.017	1.35	1.04	1.29
												Statewide Crash Rate:	0.71	
Study Years:	5.00	NODE TOTALS:		55	0	0	2	16	37	32.7	8.355	1.32	1.00	1.31

Crash Summary I

Sections

Start Node	End Node	Element	Offset Begin - End	Route - MP	Section Length	U/R	Total Crashes	Injury Crashes K	A	B	C	PD	Percent Injury	Annual HMVM	Crash Rate	Critical Rate	CRF
59159	59168	5099102	0 - 0.32	3200025 - 0	0.32	2	4	0	0	0	0	4	0.0	0.00216	370.03	801.49	0.00
Int of ALFRED ST BARRA RD W COLE RD				RD INV 3200025											Statewide Crash Rate: 370.71		
59159	57142	3114974	0 - 0.13	0111X - 1.93	0.13	2	9	0	0	0	1	8	11.1	0.00953	188.85	369.52	0.00
Int of ALFRED ST BARRA RD W COLE RD				ST RTE 111											Statewide Crash Rate: 209.30		
59234	59159	3118497	0 - 0.11	0111X - 2.06	0.11	2	6	0	0	0	1	5	16.7	0.00869	138.08	376.58	0.00
Int of ALFRED ST WELLSPRING RD				ST RTE 111											Statewide Crash Rate: 209.30		
59234	59159	3118497	0.11 - 0.14	0111X - 2.06	0.03	2	4	0	0	0	1	3	25.0	0.00237	337.53	509.45	0.00
Int of ALFRED ST WELLSPRING RD				ST RTE 111											Statewide Crash Rate: 209.30		
Study Years: 5.00				Section Totals:	0.59		23	0	0	0	3	20	13.0	0.02275	202.16	334.71	0.60
				Grand Totals:	0.59		78	0	0	2	19	57	26.9	0.02275	685.60	466.51	1.47

Crash Summary

Section Details

Start Node	End Node	Element	Offset Begin - End	Route - MP	Total Crashes	Injury Crashes K	A	B	C	PD	Crash Report	Crash Date	Crash Mile Point	Injury Degree
59159	59168	5099102	0 - 0.32	3200025 - 0	4	0	0	0	0	4	2022-14993	05/27/2022	0.05	PD
											2019-75621	10/28/2019	0.05	PD
											2021-9515	04/16/2021	0.06	PD
											2023-3322	01/31/2023	0.23	PD
59159	57142	3114974	0 - 0.13	0111X - 1.93	9	0	0	0	1	8	2021-15006	06/10/2021	1.94	PD
											2019-64180	09/06/2019	1.96	PD
											2022-19047	07/05/2022	1.97	PD
											2022-39406	12/14/2022	1.98	C
											2019-49604	04/19/2019	1.99	PD
											2021-16822	07/02/2021	1.99	PD
											2022-9295	03/18/2022	1.99	PD
											2020-3278	01/27/2020	1.99	PD
											2022-17495	06/20/2022	2.01	PD
59234	59159	3118497	0.11 - 0.14	0111X - 2.06	4	0	0	0	1	3	2019-43557	02/23/2019	2.07	C
											2020-22019	09/15/2020	2.07	PD
											2022-26689	09/09/2022	2.07	PD
											2022-11788	04/27/2022	2.07	PD
59234	59159	3118497	0 - 0.11	0111X - 2.06	6	0	0	0	1	5	2022-13541	05/10/2022	2.09	PD
											2019-52338	05/22/2019	2.09	PD
											2021-22102	08/19/2021	2.10	C
											2023-24155	08/08/2023	2.10	PD
											2022-23332	08/15/2022	2.11	PD
											2019-54678	06/12/2019	2.13	PD
				Totals:	23	0	0	0	3	20				

Crash Summary II - Characteristics

Crashes by Day and Hour

	AM												PM												
	Hour of Day																								
Day Of Week	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	Un	Tot
SUNDAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MONDAY	0	0	0	0	0	0	0	0	1	0	2	1	1	1	0	4	1	1	0	0	0	0	0	0	0	12
TUESDAY	0	0	0	0	0	0	0	1	2	0	3	0	3	0	2	2	1	0	2	0	1	0	0	0	0	17
WEDNESDAY	0	0	0	0	0	0	0	1	1	2	0	2	1	4	0	1	1	0	0	0	0	0	0	0	0	13
THURSDAY	0	0	0	0	0	0	0	1	1	1	0	1	2	0	3	1	0	2	0	0	0	0	1	0	0	13
FRIDAY	0	0	0	0	0	1	0	3	1	1	3	0	1	3	1	2	2	2	0	0	1	0	0	0	0	21
SATURDAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	2
Totals	0	0	0	0	0	1	0	6	6	4	8	4	8	8	6	11	5	5	2	1	2	0	1	0	0	78

Vehicle Counts by Type

Unit Type	Total	Unit Type	Total
1-Passenger Car	74	23-Bicyclist	0
2-(Sport) Utility Vehicle	53	24-Witness	18
3-Passenger Van	3	25-Other	0
4-Cargo Van (10K lbs or Less)	0	26-Construction	0
5-Pickup	28	27-Farm Vehicle	0
6-Motor Home	0	28-Horse and Buggy	0
7-School Bus	0	Total	180
8-Transit Bus	0		
9-Motor Coach	0		
10-Other Bus	0		
11-Motorcycle	0		
12-Moped	0		
13-Low Speed Vehicle	0		
14-Autocycle	0		
15-Experimental	0		
16-Other Light Trucks (10,000 lbs or Less)	0		
17-Medium/Heavy Trucks (More than 10,000 lbs)	3		
18-ATV - (4 wheel)	0		
20-ATV - (2 wheel)	0		
21-Snowmobile	0		
22-Pedestrian	1		

Crash Summary II - Characteristics

Crashes by Driver Action at Time of Crash

Driver Action at Time of Crash	Dr 1	Dr 2	Dr 3	Dr 4	Dr 5	Other	Total
No Contributing Action	1	72	7	0	0	0	80
Ran Off Roadway	1	0	0	0	0	0	1
Failed to Yield Right-of-Way	33	1	0	0	0	0	34
Ran Red Light	4	0	0	0	0	0	4
Ran Stop Sign	0	0	0	0	0	0	0
Disregarded Other Traffic Sign	0	0	0	0	0	0	0
Disregarded Other Road Markings	1	0	0	0	0	0	1
Exceeded Posted Speed Limit	0	0	0	0	0	0	0
Drove Too Fast For Conditions	4	0	0	0	0	0	4
Improper Turn	5	0	0	0	0	0	5
Improper Backing	0	0	0	0	0	0	0
Improper Passing	0	0	0	0	0	0	0
Wrong Way	0	0	0	0	0	0	0
Followed Too Closely	15	0	0	0	0	0	15
Failed to Keep in Proper Lane	4	1	0	0	0	0	5
Operated Motor Vehicle in Erratic, Reckless, Careless, Negligent or Aggressive Manner	5	0	0	0	0	0	5
Swerved or Avoided Due to Wind, Slippery Surface, Motor Vehicle, Object, Non-Motorist in Roadway	0	0	0	0	0	0	0
Over-Correcting/Over-Steering	0	0	0	0	0	0	0
Other Contributing Action	4	1	0	0	0	0	5
Unknown	1	1	0	0	0	0	2
Total	78	76	7	0	0	0	161

Crashes by Apparent Physical Condition And Driver

Apparent Physical Condition	Dr 1	Dr 2	Dr 3	Dr 4	Dr 5	Other	Total
Apparently Normal	75	76	7	0	0	0	158
Physically Impaired	1	0	0	0	0	0	1
Emotional(Depressed, Angry, Disturbed, etc.)	0	1	0	0	0	0	1
Ill (Sick)	1	0	0	0	0	0	1
Asleep or Fatigued	0	0	0	0	0	0	0
Under the Influence of Medications/Drugs/Alcohol	0	0	0	0	0	0	0
Other	1	0	0	0	0	0	1
Total	78	77	7	0	0	0	162

Driver Age by Unit Type

Age	Driver	Bicycle	SnowMobile	Pedestrian	ATV	Total
09-Under	0	0	0	0	0	0
10-14	0	0	0	0	0	0
15-19	16	0	0	0	0	16
20-24	17	0	0	0	0	17
25-29	10	0	0	0	0	10
30-39	25	0	0	0	0	25
40-49	15	0	0	0	0	15
50-59	28	0	0	0	0	28
60-69	24	0	0	0	0	24
70-79	14	0	0	0	0	14
80-Over	12	0	0	0	0	12
Unknown	0	0	0	1	0	1
Total	161	0	0	1	0	162

Crash Summary II - Characteristics

Most Harmful Event

Most Harmful Event	Total	Most Harmful Event	Total
1-Overturn / Rollover	0	38-Other Fixed Object (wall, building, tunnel, etc.)	0
2-Fire / Explosion	0	39-Unknown	0
3-Immersion	0	40-Gate or Cable	0
4-Jackknife	0	41-Pressure Ridge	0
5-Cargo / Equipment Loss Or Shift	0	Total	161
6-Fell / Jumped from Motor Vehicle	0		
7-Thrown or Falling Object	0		
8-Other Non-Collision	0		
9-Pedestrian	1		
10-Pedalcycle	0		
11-Railway Vehicle - Train, Engine	0		
12-Animal	0		
13-Motor Vehicle in Transport	155		
14-Parked Motor Vehicle	3		
15-Struck by Falling, Shifting Cargo or Anything Set in Motion by Motor Vehicle	0		
16-Work Zone / Maintenance Equipment	0		
17-Other Non-Fixed Object	0		
18-Impact Attenuator / Crash Cushion	0		
19-Bridge Overhead Structure	0		
20-Bridge Pier or Support	0		
21-Bridge Rail	0		
22-Cable Barrier	0		
23-Culvert	0		
24-Curb	1		
25-Ditch	0		
26-Embankment	0		
27-Guardrail Face	0		
28-Guardrail End	0		
29-Concrete Traffic Barrier	0		
30-Other Traffic Barrier	0		
31-Tree (Standing)	1		
32-Utility Pole / Light Support	0		
33-Traffic Sign Support	0		
34-Traffic Signal Support	0		
35-Fence	0		
36-Mailbox	0		
37-Other Post, Pole, or Support	0		

Injury Data

Severity Code	Injury Crashes	Number Of Injuries
K	0	0
A	0	0
B	2	2
C	19	25
PD	57	0
Total	78	27

Road Character

Road Grade	Total
1-Level	70
2-On Grade	8
3-Top of Hill	0
4-Bottom of Hill	0
5-Other	0
Total	78

Traffic Control Devices

Traffic Control Device	Total
1-Traffic Signals (Stop & Go)	60
2-Traffic Signals (Flashing)	0
3-Advisory/Warning Sign	0
4-Stop Signs - All Approaches	0
5-Stop Signs - Other	7
6-Yield Sign	0
7-Curve Warning Sign	0
8-Officer, Flagman, School Patrol	0
9-School Bus Stop Arm	0
10-School Zone Sign	0
11-R.R. Crossing Device	0
12-No Passing Zone	0
13-None	10
14-Other	1
Total	78

Light

Light Condition	Total
1-Daylight	68
2-Dawn	0
3-Dusk	2
4-Dark - Lighted	8
5-Dark - Not Lighted	0
6-Dark - Unknown Lighting	0
7-Unknown	0
Total	78

Crash Summary II - Characteristics

Crashes by Year and Month

Month	2019	2020	2021	2022	2023	Total
JANUARY	1	2	1	3	4	11
FEBRUARY	2	3	2	1	0	8
MARCH	1	0	2	2	1	6
APRIL	1	0	2	1	0	4
MAY	1	0	0	3	1	5
JUNE	1	0	2	1	2	6
JULY	1	1	2	5	0	9
AUGUST	0	1	3	3	1	8
SEPTEMBER	2	1	1	2	0	6
OCTOBER	5	1	0	0	1	7
NOVEMBER	1	1	1	1	1	5
DECEMBER	2	0	0	1	0	3
Total	18	10	16	23	11	78

Report is limited to the last 10 years of data.

Crash Summary II - Characteristics

Crashes by Crash Type and Type of Location

Crash Type	Straight Road	Curved Road	Three Leg Intersection	Four Leg Intersection	Five or More Leg Intersection	Driveways	Bridges	Interchanges	Other	Parking Lot	Private Way	Cross Over	Railroad Crossing	Traffic Circle-Roundabout	Total
Object in Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rear End - Sideswipe	9	0	0	22	0	2	0	0	0	0	0	0	0	0	33
Head-on - Sideswipe	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Intersection Movement	0	0	0	31	0	12	0	0	0	0	0	0	0	0	43
Pedestrians	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Train	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Went Off Road	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
All Other Animal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bicycle	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Jackknife	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rollover	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fire	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Submersion	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Thrown or Falling Object	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bear	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Deer	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Moose	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Turkey	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	9	1	0	54	0	14	0	0	0	0	0	0	0	0	78

Crash Summary II - Characteristics

Crashes by Weather, Light Condition and Road Surface

Weather / Light	Dry	Ice/Frost	Mud, Dirt, Gravel	Oil	Other	Sand	Slush	Snow	Unknown	Water (Standing, Moving)	Wet	Total
Blowing Sand, Soil, Dirt												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Blowing Snow												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Clear												
Dark - Lighted	5	0	0	0	0	0	0	0	0	0	0	5
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	37	0	0	0	0	0	0	0	0	0	3	40
Dusk	1	0	0	0	0	0	0	0	0	0	0	1
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Cloudy												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	12	0	0	0	0	0	0	0	0	0	4	16
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0

Crash Summary II - Characteristics

Crashes by Weather, Light Condition and Road Surface

Weather / Light	Dry	Ice/Frost	Mud, Dirt, Gravel	Oil	Other	Sand	Slush	Snow	Unknown	Water (Standing, Moving)	Wet	Total
Fog, Smog, Smoke												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Other												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Rain												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	2	2
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	8	8
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Severe Crosswinds												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0

Crash Summary II - Characteristics

Crashes by Weather, Light Condition and Road Surface

Weather / Light	Dry	Ice/Frost	Mud, Dirt, Gravel	Oil	Other	Sand	Slush	Snow	Unknown	Water (Standing, Moving)	Wet	Total
Sleet, Hail (Freezing Rain or Drizzle)												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Snow												
Dark - Lighted	0	0	0	0	0	0	0	1	0	0	0	1
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	4	0	0	0	4
Dusk	0	0	0	0	0	0	0	1	0	0	0	1
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	55	0	0	0	0	0	0	6	0	0	17	78

ATTACHMENT 9
CORRESPONDENCE WITH MAINE WATER AND THE CITY FOR SEWER AND WATER CAPACITY

City of Biddeford, Maine

City of Biddeford
Public Works Department / Engineering Division/Wastewater Administration Division
P.O. Box 586, 205 Main Street, Suite 301
Biddeford, ME 04005
Phone: (207) 284-9118, Fax: (207) 571-0662

Letter of Wastewater Treatment Plant Capacity to Serve
Residential Use Development
Barra Road

Indian Cliff Development
Main Street
Biddeford, Maine 04005

May 7, 2024

Brief description of project: **Proposed Senior Housing Project off Barra Road, Indian Cliff Development/Avesta Housing, Biddeford, Maine-** Estimated flows: **4622 gpd**.

Determination

The applicant is proposing a senior residential housing development off Barra Road. Based on the information provided in the most recent e-mail received from you, dated May 6, 2024, it is currently projected that the proposed development project will add an additional 4622 gallons per day of flow to the system. The above 4622 gpd flow is part of the modelled total flow of 10,000-GPD for development on Barra Road. (1,000-GPD for the 25 Barra Road dentist office, and 9,000-GPD for his Barra Road developments). Changes to the project from that presented to this department will require a new review of the request for ability to serve. This determination will be effective for a period of one year from the date above.

The City of Biddeford Wastewater Department has reviewed the request for the ability to serve the above described project. It has been determined that at this time, once the flow reaches the wastewater treatment facility, the City's treatment facility has sufficient capacity to treat the estimated flows from the above described project. However, it should be noted, based on studies performed by the City's engineering consultant, there are sewer and pump station capacity issues in many of the City's sewershed areas that must be addressed in order to allow any additional or new flow into the collection and conveyance system. Such sewer capacity deficits were identified in the Thatcher Brook sewershed resulting from this new development. Upgrades at the Main Street Pump Station will be required to include larger pumps and controls, a new suction line from the wet well, increased wet well capacity, and larger pressure force main piping.

The applicant will not be allowed to send more than 10,000-GPD total to the Thatcher Brook Pump Station without incurring additional infrastructure upgrades (above what upgrades would already be required at the Main Street Pump Station).

Upon approval of the Planning Board, the applicant must make application for sewer service. Flow amounts for the project will be determined at the time application is made and may or may not be the amount stated above. Final building floor plans shall be submitted at the time of application. The applicant will be required to pay all fees based on the flow amount calculated at the time application is made and prior to the issuance of any building permits. No roof drains shall be connected into the sewer system.

This Capacity to Serve Letter is intended only to indicate that the City of Biddeford Wastewater Treatment Facilities has the ability to handle and treat the flow from the above stated project once it is received at the treatment facility. Project design plans must be submitted to the City for review and comment. The Planning Department, Engineering Department or other persons from the Wastewater Department may require further studies, calculations or documentation to determine any actions that may need to be taken to address any impacts/capacity issues and/or any system upgrades that may be required to address any impacts this project may have on the City's sewer collection and conveyance system(s) or its components.

Thomas Milligan, PE
City Engineer Emeritus
City of Biddeford Engineering Department
Tom.milligan@biddefordmaine.org
207-284-9118

CC: Jeff Demers, Public Works/Wastewater Director
Roby Fecteau, Code Enforcement
David Galbraith, City Planner
Alex Buechner, Wastewater Superintendent
Craig Chekan, City Engineer
Mike Eon, Eon Entities

Chris MacDonald

From: Chris MacDonald
Sent: Tuesday, May 14, 2024 7:32 PM
To: Marcus Knipp
Cc: Ryan Fecteau; meon@mikeeonassoc.com
Subject: Barra Road Subdivision and Avesta Housing Projects - Preliminary Planning Board Submission Review 1 of 2
Attachments: Barra Road Subdivsion Planset (DRAFT) 2024-05-14.pdf

Good afternoon Marcus,

We are working with Mike Eon of Indian Cliff Development Corp and Ryan Fecteau of Avesta Housing on permitting 2 projects. The first is a subdivision by Indian Cliff to create a 9 lot subdivision off the end of Barra Road. The second is a site plan for a 46-unit affordable elderly housing project to be based on Lot A of the subdivision proposed by Indian Cliff. These projects are being applied for in parallel to meet Avesta housing's permitting timeframes. Please find the attached planset for the Subdivision project your review. We will follow up this email with a second email with a planset of the Avesta Housing project, as their combined file size is too large for a single email.

In accordance with the City of Biddeford Planning requirements, we would like to ask you to review the projects for compliance with Maine Water design standards. Ultimately, we would like to request an ability to service for both the 7 duplex lots of the subdivision as well as the 46-unit apartment building.

Please let me know if you have any comments or need additional information. We would be happy to meet with you if you wish to discuss.

Thank you,
-crm

Christopher MacDonald, P.E.
Civil Engineer

BH2M
380B Main Street
Gorham, Maine 04038
207 839-2771 x 203
www.bh2m.com

ATTACHMENT 10
INITIAL SEWER DESIGN REPORT

F.R. MAHONY & ASSOC.
frma
water supply and pollution control equipment
A Division Of
CUMMINS-WAGNER
100% Employee Owned
273 Weymouth Street, Rockland, MA 02370
tel. 781-982-9300 • fax. 781-982-1056
www.frmahony.com • www.amphidrome.com
info@frmahony.com

Pressure System Design Report

For

Barra Rd REV 1

Biddeford, ME

May 14, 2024



F.R. MAHONY & ASSOC.
frma

water supply and pollution control equipment

A Division Of
CUMMINS-WAGNER
100% Employee Owned

273 Weymouth Street, Rockland, MA 02370
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www.frmahony.com • www.amphidrome.com
info@frmahony.com

Christopher MacDonald, P.E.
Civil Engineer
BH2M
380B Main Street
Gorham, Maine 04038
207 839-2771 x 203

May 14, 2024

RE: Barra Rd, Biddeford ME REV 1

Dear Christopher;

This preliminary design analysis examines the use of the E/One Pressure Sewer System for your project. E/One has over 50 years of installation and O&M experience along with considerable research and development leading to continuous product and system improvements. E/One remains the worldwide industry standard and industry leader in the pressure sewer technology. The unique characteristics of the E/One Pressure Sewer approach provides not only a technical solution, but also an economic advantage to be realized with low up front and O&M costs.

EXTREME SERIES

System Analysis

Based on the proposed plan, we are showing forty six (46) unit elderly affordable housing apartment, and seven (7) duplex residential lots. All proposed lots will than connect to a manhole located on Barra Rd.

Using the information you provided, we ran the enclosed preliminary pressure sewer pipe sizing analysis. This was run through our Low Pressure Sewer Design Software that employs our Flow Velocity and Friction Head Loss vs. Pumps in Simultaneous Operation Spreadsheet. We have used the surface topography provided to make our analyses.

Zone Layout

Using your site plan we laid out a system of two (2) flow Zones leading to the final discharge point. Zone one (1) is showing the affordable housing unit and Zone two (2) shows the seven (7) duplex residential lots. Zone one (1) will be a 2 inch HDPE FM and Zone two (2) will be a 3 inch HDPE FM.

273 Weymouth Street, Rockland, MA 02370
tel. 781-982-9300 • fax. 781-982-1056
www.frmahony.com • www.amphidrome.com
info@frmahony.com

Computations are based on the Hazen-Williams formula for friction loss, using

calculations of cross-sectional area and flow rate to determine pipe sizes that create ”self-cleaning” velocities of 2.0 fps or higher. A "C" factor of 150, SDR HDPE pipe and the average expected daily volumes for single family homes are also used in this analysis.

The highest Total Dynamic Head generated is approximately 41 feet which is predominately head conditions when the pressure sewer pumps operate with the lift station operating. This is well below our pump’s continuous-run rating of 185 ft, and well within its intermittent, i.e., normal, operating range. Flow velocity throughout the system meets or exceeds 2 fps these characteristics and low retention time indicate that this will be a reliable, low-maintenance system.

Design Flows & System Velocity

We have used the design flows you provided.

The ADF of 6,000 gpd and commercial use would suggest that we use the DH502 duplex pump station rated to 6,000 gpd. For the residential could be met with our DH071 simplex station rated to 700 gpd. Again, due to the commercial nature of the application we have selected the DH502 station as is shown in the budget portion of the report.

E/ONE EXTREME SERIES

Appurtenances

Our normal recommendations for valve placement are as follows: flushing connections at 1,000’ to 1,500’ intervals and at branch ends and junctions; isolation valves at branch junctions; and air release valves at peaks of 25 ft or more and/or at intervals of 2,000 to 2,500 ft.

Common practice in pressure sewers requires the ability to isolate each lot with a corporation stop off the main and service lateral kit to the lot line. E/One has developed a true wastewater rated check valve which is built in to our stainless steel lateral kit shown in this report. These components are rated to 235 psi and with standard connection fittings rated to 150 psi. These items are included in the budget analyses and shown in this report.

We strongly advise against the use of waterworks check valves as they are not rated

for sewage environments. We do not like to recommend brass due to concerns for corrosion. **WEF Manual of Practice FD-12, Second Edition**, page 45 speaks to the limited success of brass or bronze alloys.

> "Besides corrosion considerations, brass is subject to de-alloying, while some
>
> bronze, such as 85-5-5, will give better performance. The terms *brass* and *bronze* are used loosely, despite having different meanings; the engineer is advised to evaluate these materials with caution."

We have also seen PVC body check valves with pressure rating to 150 psi that do not have the same rating for back pressure on the check valve. This can result in damage to the check valve and pumping issues as the check valve disc can become dislodged under pressure and then become a line obstruction. Connections to the main pressure line do not require WYE type fittings. We commonly use a TEE or saddle connection. We isolate each connection to the main line with a stainless steel corporation valve in the same manner used for other utilities such as gas and water services.

System Monitoring

We also include in this package information regarding the Sentry monitoring system for Environment One stations. This system allows the owners to monitor run times, pump starts and stops and running conditions such as amp draw, etc. This system can be monitored from a secure web access and will provide the ability to pre-empt service issues before they become emergencies.

Budget Notes
We can formally quote this when the project comes closer.

Costs of pipeline excavation and pump installation are best obtained from sources in your region. You may be better able to determine these costs. I am looking forward to working with you on this and future projects. Please contact me if you have any questions or require additional information.

Best regards,

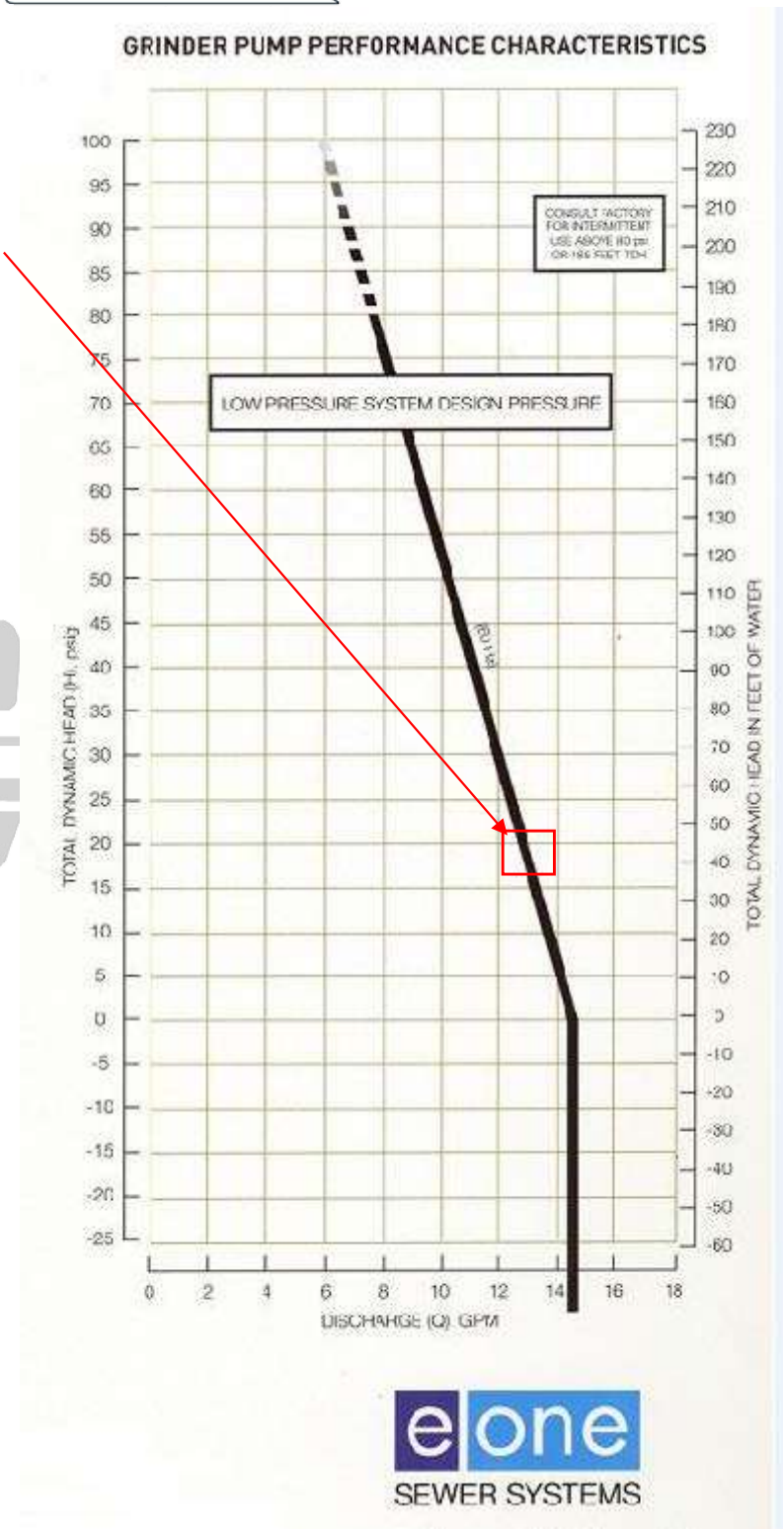
Daryl Coppola
Outside Sales Engineer
781-820-5808
dcoppola@frmahony.com

Operation Conditions

41.30 Feet is the highest TDH at simultaneous operating conditions with the expected number of pumps operating in each zone, or the head of an individual pump operating in a single zone condition.

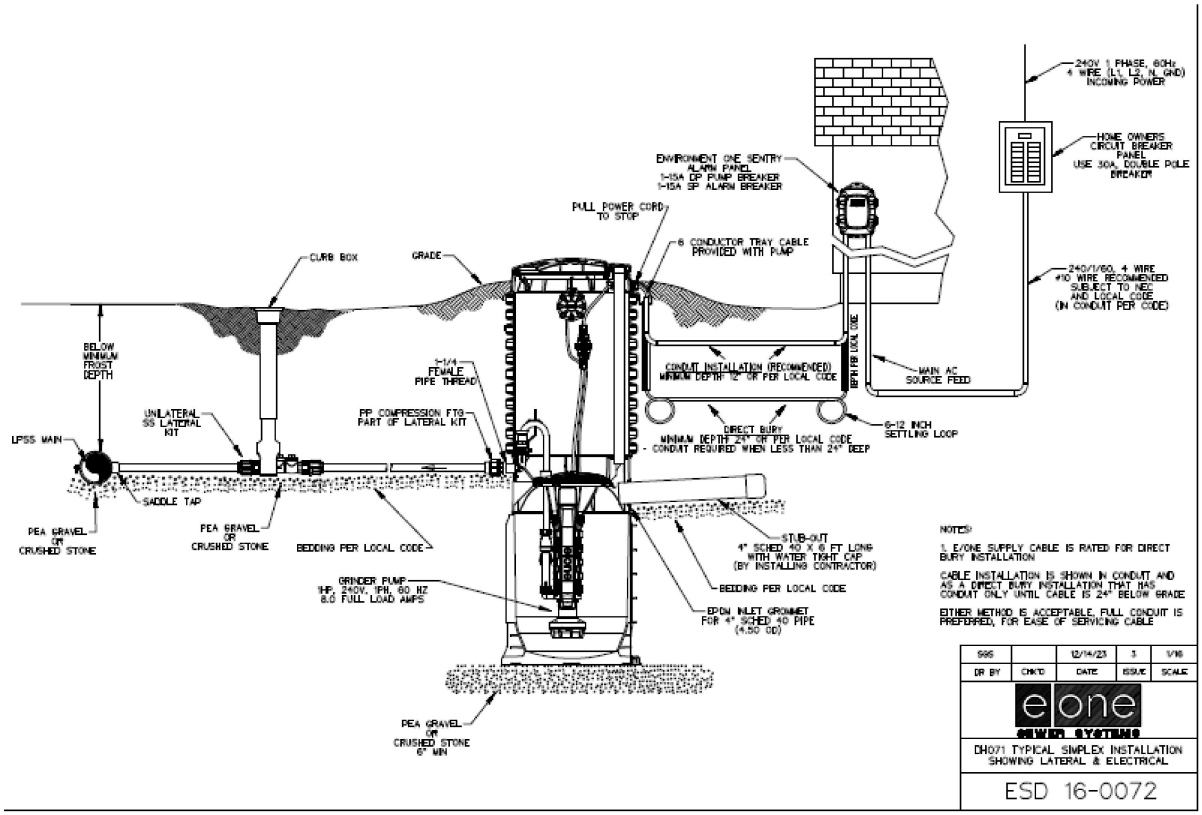
Operating range of E/One pumps from 0-185 feet TDH and from 0 to -60 feet TDH.

Anti-siphon valves in E/One cores provide for negative head pumping. In common systems with negative heads of 25-30 feet or more we recommend the use of combination air/vacuum release valves as described below.



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This image shows the typical layout of an outdoor pump unit for single-family home use. This layout will be very similar to the duplex layout. All piping for inlets and discharge will have the same orientation as shown above. The pump unit is furnished complete, ready for installation. The installer needs to confirm the power cord length and discharge and inlet configuration. Standard products are supplied with 32 foot power supply cable. Standard inlets are 4-inch Schedule 40 Grommets (@ zero degrees) with 1-1/4 inch discharge (@ 180 degrees). Other configurations are available.



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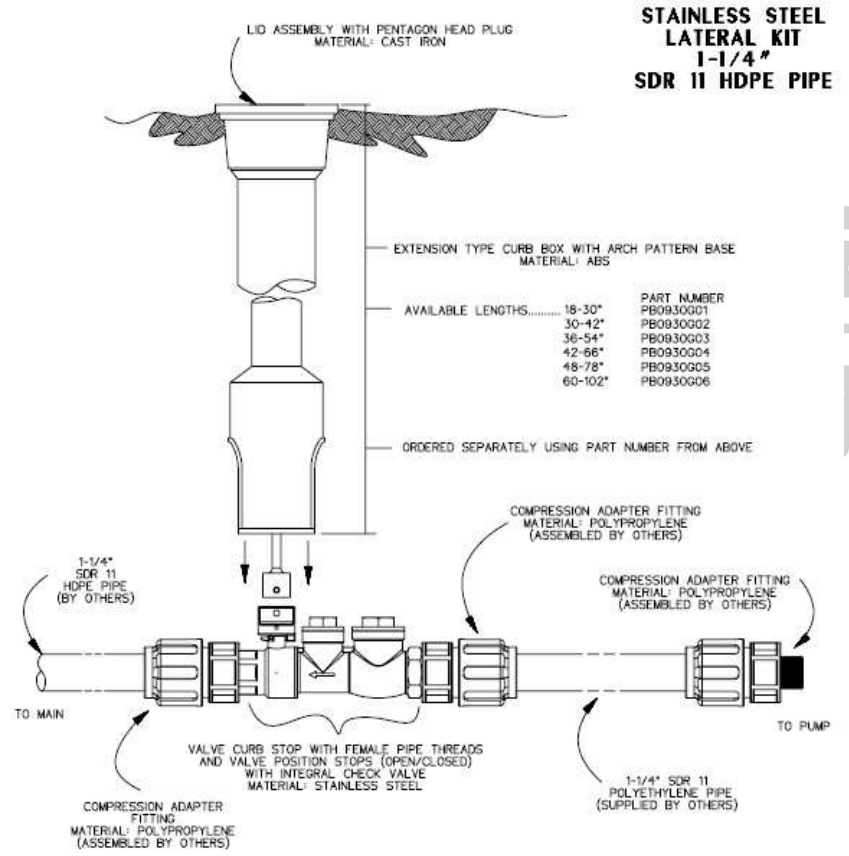
Lateral Connections



Pressure Sewer System pumps must be isolated from the common mainline with a corporation stop and curb stop lateral kit.

The lateral kit will have a full port ball valve and full port redundant check valve. Check valves shall be rated for 150 psi minimum system operating pressure including system back pressure.

Components are to be corrosion resistant Stainless Steel with Corrosion resistant PVC, Polypropylene or HDPE materials.



KIT PARTS ARE NOT ASSEMBLED

NOTES:
1. SS CURB STOP/CHECK VALVE AND FITTINGS ARE PROVIDED SEPARATELY, TO BE ASSEMBLED BY OTHERS
2. TO ASSEMBLE, APPLY A DOUBLE LAYER OF TEFLON TAPE, AND A LAYER OF PIPE DOPE (SUPPLIED BY OTHERS) TO THE THREADS ON THE PLASTIC FITTINGS AND INSTALL PER THE MANUFACTURER'S INSTRUCTIONS
3. ASSEMBLY IS TO BE PRESSURE TESTED (BY OTHERS)
4. ASSEMBLY IS TO BE USED WITH SDR11 HDPE PIPE
5. TO ORDER SS LATERAL KIT, USE PART NUMBER NC0193G01
6. CURB BOX IS TO BE ORDERED SEPARATELY, SEE ABOVE

SGS	DN	11/02/11	A	3/16
DR BY	CHK'D	DATE	ISSUE	SCALE

e|one
SEWER SYSTEMS

STAINLESS STEEL LATERAL KIT
1-1/4" SDR 11 HDPE PIPE

NA0330P02

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We recommend Pump Model DH502-104 for the 45 unit building. The station height can be adjusted to meet variable inlet elevations with 6 inch and 2 foot extensions. Stations and riser sections can be adjusted in heights in 4-inch increments. These stations are UL listed NSF and CSA certified.

Model DH071-93 Outdoor Pump

Station is rated to flows up to 700 gpd



Model DH502-104 Outdoor Pump

Station is rated to flows up to 6,000 gpd



Other station configurations are available for higher flow requirements. Please contact us for more information. Additional information may be found at www.eone.com

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SIMPLEX PANELS For DH071 Station



Standard alarm panels are the Sentry® panel mounted outside of the home as shown in the drawing (above). Options include emergency generator connection (see photo) and Redundant alarm Remote Sentry® panel shown. Other panel configurations are available. See the partial listing of panel options below.



- Basic Panels include circuit breaker for the pump and separate breaker for the alarm. These panels include alarm light, alarm buzzer and alarm silence button. ***All F. R. Mahony panels are equipped with dry contacts to enable the connection of the Remote Sentry® (battery powered redundant alarm panel option)***

- Standard options include auto transfer generator connection shown above. This panel provides automatic power transfer without having to open the alarm panel or having to operate any manual transfer switching. This feature can be added to the basic panel or the panels offered below.

- Popular options include the **"Protection Package"** which monitors and protects the system from:
  - Pump Run Dry Condition (Pump running out of water)
  - Pump Overpressure Condition (Closed valve)
  - Brownout Condition (Main voltage under 12% of nameplate)
  - High Liquid Level

- The **"Protect Plus"** panel features offer the same items in the "Protection Package" plus the following:
  - High & Low Amperage draw by the pump
  - High & Low voltage to the pump
  - Extended Runtime by the pump (indicating wear or excessive flow) (field adjustable settings)
  - Monitoring of:
    - Real-time Pump Voltage and Current
    - Cycles & Hours (can be reset)
    - Minimum & Maximum Amperage (can be reset)
    - Minimum, Maximum, Average, and Last Run Cycle (in minutes, can be reset)

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DUPLEX PANELS – Protect Plus For DH152 Station

The Sentry Duplex Protect Plus panel is an Environment One full-featured Alarm/Monitor panel. The Sentry Duplex Protect Plus panel monitors for the following operating conditions:

- Pump Run Dry Condition – Pump running out of water
- Pump Overpressure Condition – Pump operating at abnormally high wattage level Brownout Condition – Mains voltage under 12% of nameplate rating
- Overvoltage Condition – Mains voltage above 12% of nameplate rating
- High Liquid Level Real-time,
- High, and Low Voltage to the Pump Real-time,
- High, and Low Wattage drawn by the Pump
- Extended Pump Runtime (field programmable limit)

The Sentry Duplex Protect-Plus Panel displays pump status, operating parameters, and user options by means of the following indicators: LCD Display to show Pump & Panel operating conditions Four Status Indicators:

- Ready (Green LED)
- Pump Running (Green LED)
- Trouble (Amber LED)
- High Level Alarm (Red LED)

Eight Selectable Modes to view or change panel operation Menu Navigation Buttons – Enter, Scroll, Mode, ↑ 'A' and ↓ '

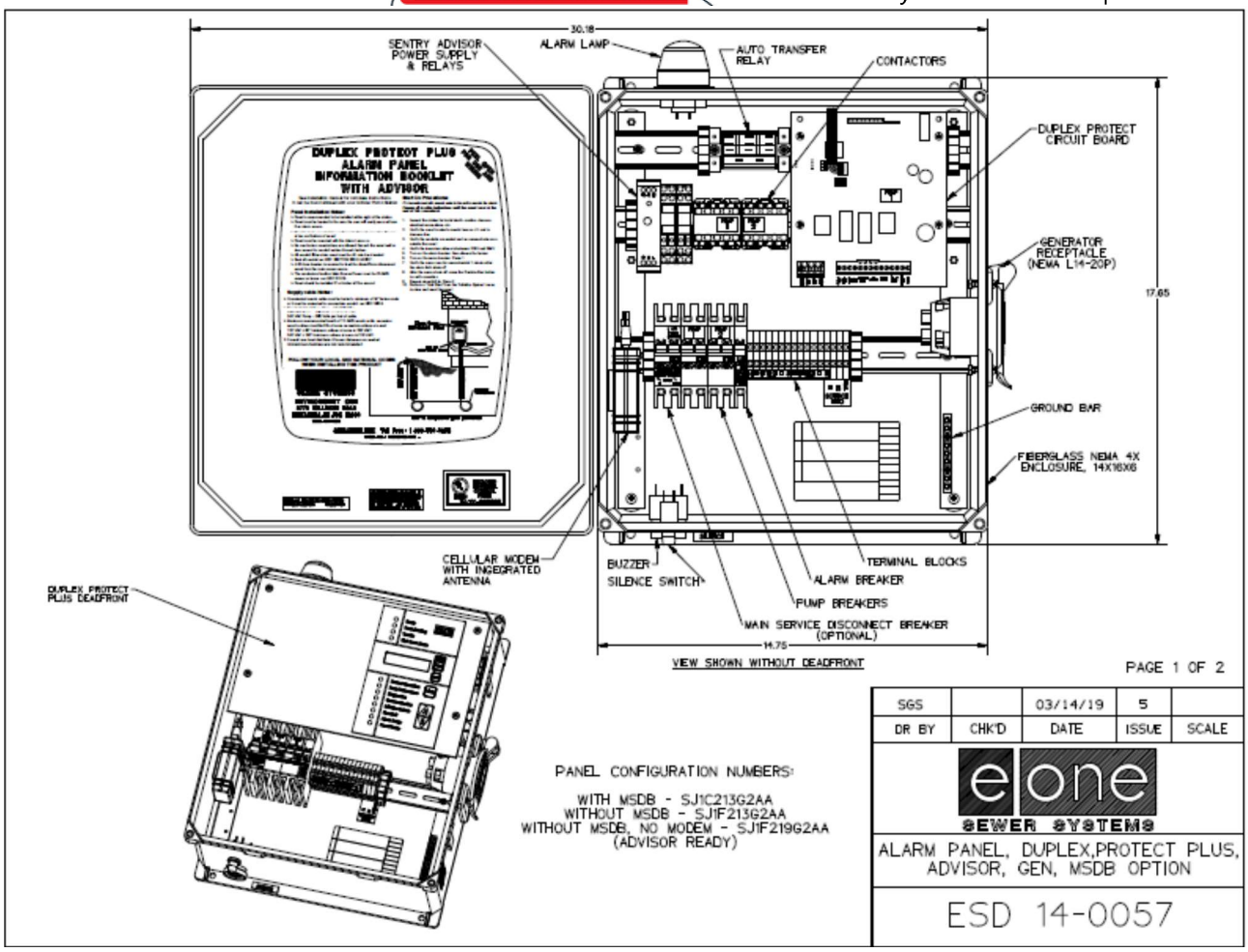
EONE EXTREME SERIES



Standard Features

- Corrosion-proof fiberglass enclosure
- NEMA 4X rated enclosure
- Lockable latch with padlock
- Circuit breakers
- Terminal blocks & ground lugs
- Dry Contacts
- Lead/Lag indicator lights
- Alarm indicator lights
- Run indicator lights
- Manual Push-to-Run

Panel options, Emergency Generator transfer switch and remote power inlet.


30.18
SENTRY ADVISOR POWER SUPPLY & RELAYS
ALARM LAMP
AUTO TRANSFER RELAY
CONTACTORS
DUPLEX PROTECT CIRCUIT BOARD
GENERATOR RECEPTACLE (NEMA L14-20P)
17.65
GROUND BAR
FIBERGLASS NEMA 4X ENCLOSURE, 14X16X6
DUPLEX PROTECT PLUS DEADFRONT
CELLULAR MODEM WITH INGEGRATED ANTENNA
BUZZER
SILENCE SWITCH
TERMINAL BLOCKS
ALARM BREAKER
PUMP BREAKERS
MAIN SERVICE DISCONNECT BREAKER (OPTIONAL)
14.75
VIEW SHOWN WITHOUT DEADFRONT
PAGE 1 OF 2
PANEL CONFIGURATION NUMBERS:
WITH MSDB - SJ1C213G2AA
WITHOUT MSDB - SJ1F213G2AA
WITHOUT MSDB, NO MODEM - SJ1F219G2AA
(ADVISOR READY)
SGS | | 03/14/19 | 5 |
DR BY | CHK'D | DATE | ISSUE | SCALE
eone SEWER SYSTEMS
ALARM PANEL, DUPLEX,PROTECT PLUS, ADVISOR, GEN, MSDB OPTION
ESD 14-0057

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Environment One Sentry Advisor System Monitoring

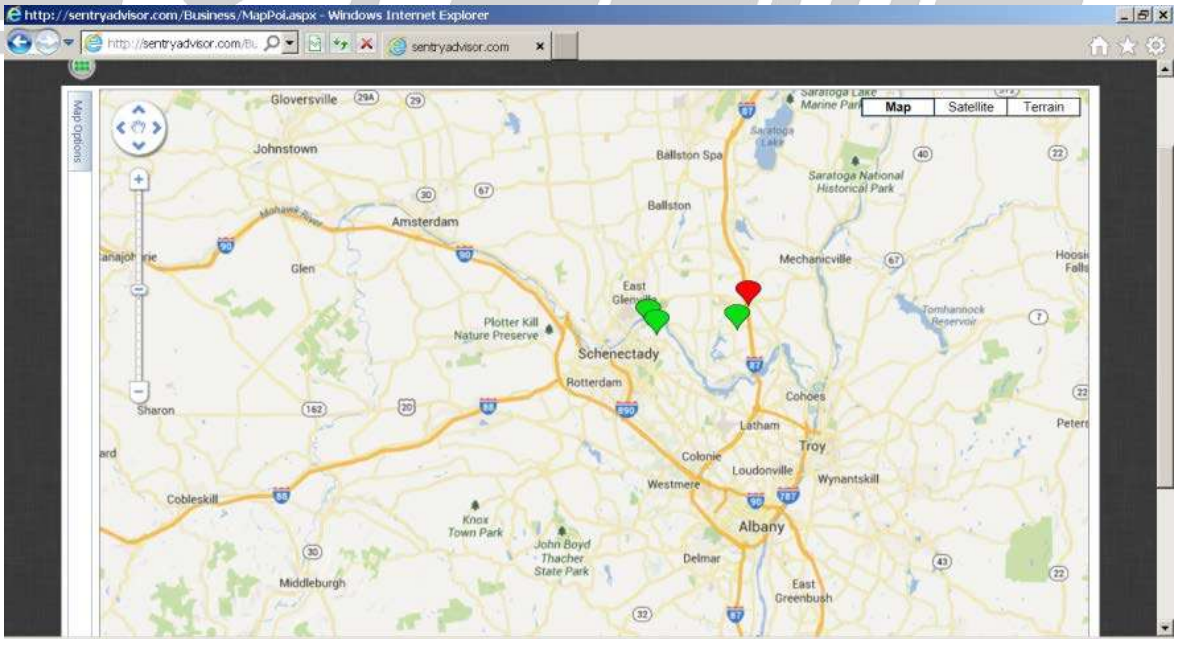
E/One Sentry Advisor offers a new level of sewer system monitoring and protection — and can even predict service needs. Let E/One Sentry Advisor monitor your system and help reduce the number of emergency service call-outs and eliminate unnecessary overtime.

E/One Sentry Advisor monitors pump performance and records every start, run time duration and stop of each grinder pump on the system. Alarm conditions can be sent automatically to service personnel. Use reports to review system performance and spot data trends such as frequent alarms or unusually long run times.

The online mapping feature shows the location of each grinder pump in the system, whether there are a few stations or hundreds.

The modem in the alarm panel transmits pump run and alarm data. The web interface can be configured to send alarm notices via SMS text, phone or e-mail to multiple contacts. Data is stored online and can be used to generate system performance reports and help identify pending service needs.

System mapping can be used for quick overview of operating conditions.



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SYSTEM FEATURES

Standard Package

- Includes all necessary components and wiring — cellular modem, antenna, auxiliary power supply, and dry contacts for both high level alarm and pump running
- High level alarm
- Run time meters (daily, cumulative, last run, minimum/maximum/average)
- Cycle counters (daily and cumulative)
- Extended run time alerts (cycle, daily, etc.)
- Generate pump run and/or alarm event reports
- Map the location of each grinder pump in the system
- Battery back-up for power loss notification

E/ONE EXTREME SERIES

Optional Features (Protect Plus Panels only)

- Brownout and over-voltage alerts
- Run dry and over-pressure alerts
- Volts, amps, watts historical information
- Volts, amps, watts related alerts
- Detailed system status
- Visibility or system settings and user defined options
- Board-level fault indications (DIP switch, watt meter, alarm circuit protection)

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All Components fit neatly inside the Sentry Panel. Reporting is through web based access with voice, text, and email alerts of critical events.



SENTRY ADVISOR
BASIC SENTRY SIMPLEX

REMOTE MONITORING OF:
- HIGH LEVEL ALARM
- PUMP RUNNING

WEB INTERFACE PROVIDES:
- RUN TIME HISTORY
  - DAILY, CUMULATIVE, LAST, MIN., MAX., AVG.
- CYCLE HISTORY
  - DAILY, CUMULATIVE
- EXTENDED RUN TIME ALERTS
  - CYCLE, DAILY
- GENERATE PUMP RUN AND/OR ALARM EVENT REPORTS
- MAP LOCATION OF EACH GRINDER PUMP IN THE SYSTEM WITH STATUS INDICATION

BACKUP BATTERY FOR POWER LOSS NOTIFICATION

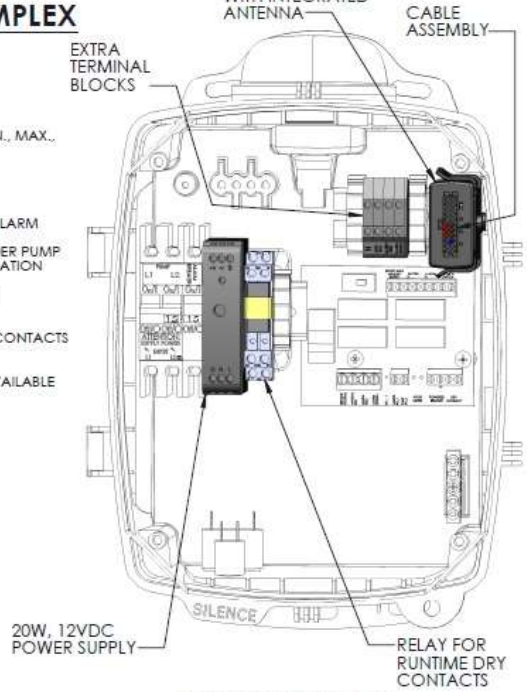
USES EXISTING BOARD ALARM DRY CONTACTS

FACTORY INSTALLED, RETROFIT, OR STANDALONE CONFIGURATIONS AVAILABLE

OPERATING TEMPERATURE RANGE:
-20C TO +70C

INPUT VOLTAGE:
85 - 264VAC

MODEM CONTAINS:
- 2 AUXILIARY A-D INPUTS
- 3 AUXILIARY DIGITAL OUTPUTS



TYPICAL SENTRY PANEL IN SENTRY ENCLOSURE, SHOWN FOR REF. ENCLOSURE DOOR NOT SHOWN

BF	11/08/2013	CTT	-	11/11/2013
DR BY	DATE	CHK'D	ISSUE	DATE

ENVIRONMENT ONE CORPORATION

CUT SHEET,ADVISOR,BASIC SENTRY 240V,2P

NA0440P02

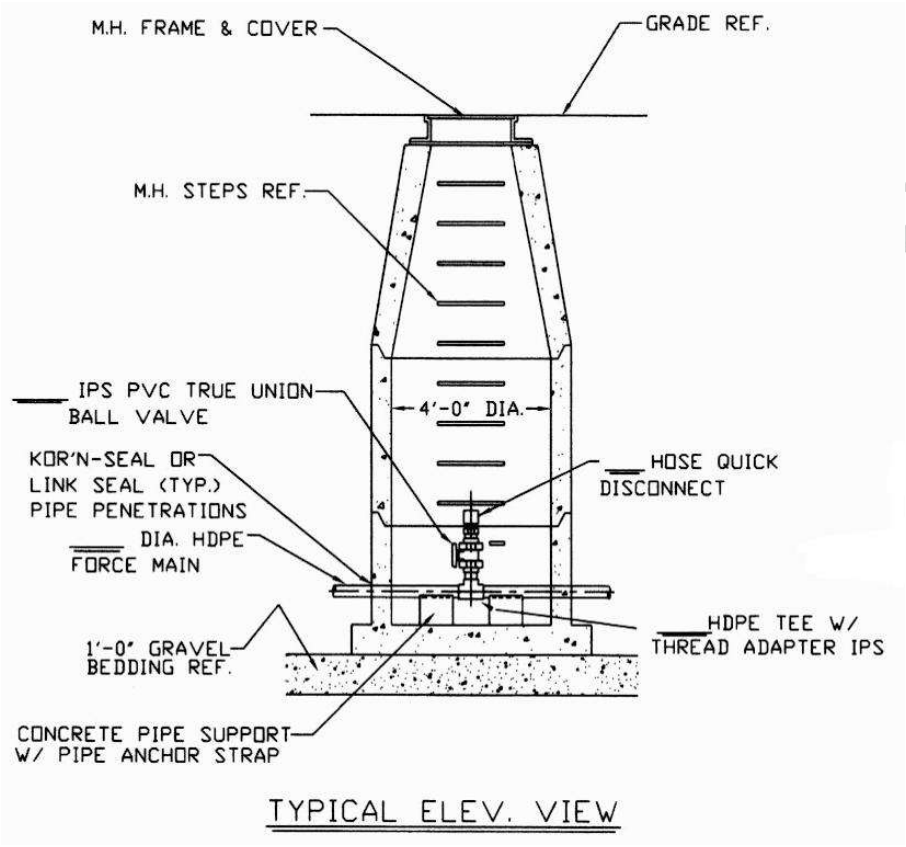
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Typical Cleanout Detail

(Optional Air/Vacuum Valve shown –right)

Cleanout detail can be modified to match typical installation needs. Inline shut offs may be added to isolate flow direction. Image shown is flow through cleanout. These structures can be terminal end of line cleanouts, or junction cleanouts as may be required. Optional air and vacuum relief valves may be added when required.





Environment One Corporation

Pressure Sewer Preliminary

Cost and Design Analysis

For

Barra Rd- Biddeford ME REV 1

Prepared For:
Christopher MacDonald, P.E. BH2M Engineers
380B Main Street
Gorham Maine 04038
Tel: 207 839-2771 x 203
Fax:
Prepared By: D.Coppola
May 14, 2024

PRELIMINARY PRESSURE SEWER - PIPE SIZING AND BRANCH ANALYSIS

Prepared By:
D.Coppola

Barra Rd- Biddeford ME REV 1

May 14, 2024

Zone Number	Connects to Zone	Number of Pumps in Zone	Accum Pumps in Zone	Gals/day per Pump	Max Flow Per Pump (gpm)	Max Sim Ops	Max Flow (GPM)	Pipe Size (inches)	Max Velocity (FPS)	Length of Main this Zone	Friction Loss Factor (ft/100 ft)	Friction Loss This Zone	Accum Fric Loss (feet)	Max Main Elevation	Minimum Pump Elevation	Static Head (feet)	Total Dynamic Head (ft)
This spreadsheet was calculated using pipe diameters for: SDR11HDPE										Friction loss calculations were based on a Constant for inside roughness "C" of:							50
1.00	2.00	2	2	6000	11.00	2	22.00	2.00	2.38	237.13	1.19	2.82	10.12	125.00	99.00	26.00	36.12
2.00	2.00	14	16	200	11.00	4	44.00	3.00	2.19	1,124.00	0.65	7.30	7.30	125.00	91.00	34.00	41.30

Note: This analysis is valid only with the use of progressive cavity type grinder pumps as manufactured by Environment One.

\\CWMDFS02\Home - Remote\dcoppola\My Documents\EONE\Maine\Biddeford\Barra Rd\Barra Rd Design Report REV 1.EOne

PRELIMINARY PRESSURE SEWER - ACCUMULATED RETENTION TIME (HR)

Barra Rd- Biddeford ME REV 1

Prepared By:
D.Coppola

May 14, 2024

Zone Number	Connects to Zone	Accumulated Total of Pumps this Zone	Pipe Size (inches)	Gallons per 100 lineal feet	Length of Zone	Capacity of Zone	Average Daily Flow	Average Fluid Changes per Day	Average Retention Time (Hr)	Accumulated Retention Time (Hr)
This spreadsheet was calculated using pipe diameters for			SDR11HDPE					Gals per Day per Dwelling		200
1.00	2.00	2	2.00	15.40	237.13	36.52	12,000	328.54	0.07	0.68
2.00	2.00	16	3.00	33.47	1,124.00	376.16	14,800	39.34	0.61	0.61

Note: This analysis is valid only with the use of progressive cavity type grinder pumps as manufactured by Environment One

ATTACHMENT 11
CORRESPONDENCE WITH CITY OF BIDDEFORD FIRE AND POLICE

Chris MacDonald

From: Dexter, Edward <Edward.Dexter@Biddefordmaine.org>
Sent: Wednesday, May 15, 2024 7:39 AM
To: Chris MacDonald
Cc: Ryan Fecteau; meon@mikeeonassoc.com; Crocker, Jason; Chekan, Craig
Subject: RE: Barra Road Subdivision and Avesta Housing Projects - Preliminary Planning Board Submission Review 2 of 2

Good Morning Chris:
Thank you for providing copies of the plans for Avesta Housing. I have some concerns that will need to be addressed.

1) The turning radius you applied in your plans shows the turn of the vehicle touching the parking curbs at each end of the middle parking area, along the back curb, and shows the truck driving over the painted area in front of the building. This is not acceptable. This does not allow any room for errant parking of the tenants where our operators will have to make adjustments based on their parking nor does it allow any consideration for snow buildup.
2) We will need a second Knox Box located at the main entrance.
3) I did not see the hydrant location added to the building unless it's on another page that I missed.

Thank you again for providing the information. We look forward to working with you to make this successful.

Sincerely,
Ed Dexter

Edward B. Dexter
Assistant Chief

Biddeford Fire Department
152 Alfred St.
Biddeford, ME. 04005

(207) 571-1686 Office
(207) 571-1687 Fax



From: Chris MacDonald <cmacdonald@bh2m.com>
Sent: Tuesday, May 14, 2024 7:37 PM
To: Dexter, Edward <Edward.Dexter@Biddefordmaine.org>
Cc: Ryan Fecteau <RFecteau@avestahousing.org>; meon@mikeeonassoc.com
Subject: Barra Road Subdivision and Avesta Housing Projects - Preliminary Planning Board Submission Review 2 of 2

EXTERNAL: This email originated from outside of the City of Biddeford email system. Do not click links or open attachments unless you recognize the sender and know the content is safe.
Good afternoon Chief Dexter,

Following up my previous email, please find the attached planset for the Avesta Housing project and a copy of the site plan showing the turning template.

Thank you,
-crm

Christopher MacDonald, P.E.
Civil Engineer

BH2M
380B Main Street
Gorham, Maine 04038
207 839-2771 x 203
www.bh2m.com



From: Chris MacDonald
Sent: Tuesday, May 14, 2024 7:34 PM
To: Dexter, Edward <Edward.Dexter@Biddefordmaine.org>
Cc: Ryan Fecteau <RFecteau@avestahousing.org>; meon@mikeeonassoc.com
Subject: Barra Road Subdivision and Avesta Housing Projects - Preliminary Planning Board Submission Review 1 of 2

Good afternoon Chief Dexter,

We are working with Mike Eon of Indian Cliff Development Corp and Ryan Fecteau of Avesta Housing on permitting 2 projects. The first is a subdivision by Indian Cliff to create a 9 lot subdivision off the end of Barra Road. The second is a site plan for a 46-unit affordable elderly housing project to be based on Lot A of the subdivision proposed by Indian Cliff. These projects are being applied for in parallel to meet Avesta housing's permitting timeframes. Please find the attached planset for the Subdivision project your review. We will follow up this email with a second email with a planset of the Avesta Housing project, as their combined file size is too large for a single email.

In accordance with the City of Biddeford Planning requirements, we would like to ask you to review the projects for safety compliance with the City of Biddeford. As you may recall, we discussed this project at some length during the sketch plan review process, and now that we are moving forward with Preliminary permitting, we wanted to give you an opportunity to review the plans and provide any additional comments you may have on the design. To help support your review, we have also pulled together a truck turning template using a 42' long double rear axle ladder truck to model the largest vehicle in the Department's fleet showing that this can safely negotiate the proposed parking lot.

We welcome any comments you may have on these plans, and would be happy to meet with you if you wish to discuss.

Thank you,
-crm

Christopher MacDonald, P.E.
Civil Engineer

BH2M
380B Main Street
Gorham, Maine 04038
207 839-2771 x 203
www.bh2m.com



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Under Maine law, documents - including e-mails - in the possession of public officials or city employees about government business may be classified as public records. There are very few exceptions. As a result, please be advised that what is written in an e-mail could be released to the public and/or the media if requested.

Chris MacDonald

From: Chris MacDonald
Sent: Tuesday, May 14, 2024 7:34 PM
To: Fisk, JoAnne
Cc: Ryan Fecteau; meon@mikeeonassoc.com
Subject: Barra Road Subdivision and Avesta Housing Projects - Preliminary Planning Board Submission Review 1 of 2
Attachments: Barra Road Subdivsion Planset (DRAFT) 2024-05-14.pdf

Good afternoon Chief Fisk,

We are working with Mike Eon of Indian Cliff Development Corp and Ryan Fecteau of Avesta Housing on permitting 2 projects. The first is a subdivision by Indian Cliff to create a 9 lot subdivision off the end of Barra Road. The second is a site plan for a 46-unit affordable elderly housing project to be based on Lot A of the subdivision proposed by Indian Cliff. These projects are being applied for in parallel to meet Avesta housing's permitting timeframes. Please find the attached planset for the Subdivision project your review. We will follow up this email with a second email with a planset of the Avesta Housing project, as their combined file size is too large for a single email.

In accordance with the City of Biddeford Planning requirements, we would like to ask you to review the projects for safety compliance with the City of Biddeford. We also would please ask that you review these plans and assign addressing for the proposed lots and Avesta development. On the proposed lots, Lots A-G and J are currently being proposed for development of duplex housing units; so 2 units per lot. Lot A is proposed as the 46-unit apartment building, and Lot H is not proposed for building development, and is a remainder lot mostly being used for stormwater control and abutter access. Mike Eon had discussed road naming with you previously, and I believe it was mutually agreed that "Trailside Way" was an acceptable name for the new road. If this need to be revised, please let us know.

We welcome any comments you may have on these plans, and would be happy to meet with you if you wish to discuss.

Thank you,
-crm

Christopher MacDonald, P.E.
Civil Engineer

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380B Main Street
Gorham, Maine 04038
207 839-2771 x 203
www.bh2m.com

ATTACHMENT 12
SALT MANAGEMENT PLAN

SALT MANAGEMENT PLAN

For: Barra Road Subdivision, a 9-Lot Subdivision off of Barra Road Biddeford, Maine

Owner/Responsible Party:

Indian Cliff Development Corp.
260 Main Street
Biddeford, ME 04005
(207) 283-3000 (Tel.)

Purpose

The following Management Plan provides a guide for monitoring and documenting winter salt storage and application as well as snow storage and disposal.

Applicability

Paved roads and sidewalks at the proposed project along Barra Road.

Responsibility

The owner of the facility will have primary responsibility for ensuring that winter maintenance activities are conducted in accordance with this plan. The owner may elect to subcontract winter maintenance responsibilities. A copy of this plan shall be provided to any subcontractors providing winter maintenance services.

Material Storage, Handling and Application

Minimal salt will be stored onsite. Salt that is stored on site will primarily be used for sidewalk and walkway applications. Salt that is stored onsite will be contained in covered, portable and water tight structures. The structures will be periodically inspected to ensure that they are operating as intended. When the structures show signs of deterioration that limit their effectiveness they will be replaced. Any salt that is spilled during loading and unloading operations will be collected and returned to the salt containment structure.

Plowing of snow in parking areas and removal of snow from walking areas will be completed prior to applying salt. Care will be taken to remove as much snow as possible from these areas prior to application of salt materials or as safety conditions dictate. Application of salt in parking and access drives will primarily be performed mechanically by truck mounted spreaders. Hand spreading of walkway areas will be permitted.

Snow Storage and Disposal

For the majority of the winter storms, plowed snow will be stored onsite. Care will be taken to avoid storage of plowed snow within stormwater management facilities. When accumulated plowed snow exceeds the capacity of the site for storage it will be removed by a subcontractor employed by the owner. The owner and subcontractor shall discuss the selected disposal location at the start of the winter season.

ATTACHMENT 13
DRAFT DEED RESTRICTIONS

EXHIBIT A
BARRA ROAD DEVELOPMENT
(the "Subdivision")
(Barra Road and Trailside Way, Biddeford, Maine)

Each of the designated lots except Lot A (unless it is specifically made subject to certain provisions hereof) (jointly and severally the "Lots") depicted on plan referred to in the deed to which this is attached (the "Plan") is conveyed subject to the following conditions and restrictions which shall run with and bind the premises conveyed hereby and the other numbered lots contained on the aforementioned Plan, shall be enforceable until December 31, 2064,(provided, however that the duties and obligations under paragraph 15 hereof shall not expire) and INDIAN CLIFF DEVELOPMENT CORPORATION and the other numbered lot owners on said plan and the Trailside Way Homeowners' Association , their respective heirs, successors and assigns, shall have the right at any time or times to proceed at law or in equity against any person violating or attempting to violate any of the provisions hereof and to compel compliance with the terms hereof, but said Indian Cliff Development Corporation, its successors and assigns, shall be under no obligation to enforce any of said restrictions:

1. No structures except one and two family residences and/or associated Accessory Dwelling Units as may be permitted under local land use ordinances and structures ordinarily appurtenant thereto shall be built or erected upon each numbered lot herein conveyed. The main living structure shall contain at least 960 square feet of living area, if a single story structure, and at least 650 square feet of living area on each floor, if a two story structure and at least a one (1) car garage shall be built at the time of initial construction either as an integral part of the residential structure or as a separate structure. Living area shall not include basements, garages, porches, breezeways or decks and the areas must be suitable, when finished, for occupancy on a year round basis. "Structures ordinarily appurtenant thereto" shall include, but shall not be limited to, garages for use of the owner of the lot constructed either as an integral part of the dwelling or as a detached building, a swimming pool, suitable garden structures including a greenhouse, and such additional structures as shall from time to time be used in connection with residential uses situated in similar neighborhoods.

2. No building or structure of any type shall be erected, placed or permitted to remain on the above described premises unless the exterior color, finish and design and placement of such building or structure on the lot shall be approved by Indian Cliff Development Corporation, its successors or specific assigns, or by its duly authorized agent, such approval shall not be unreasonably withheld, delayed or conditioned. The approval required by this paragraph shall only apply until such time as Indian Cliff Corporation or its successors or specific assigns shall cease to have any ownership interest in the real property as shown on said recorded Plan or adjacent thereto and this restriction does not necessitate the approval in any form of any other lot owner on said Plan or Trailside Way Homeowners' Association. In general, all one and two story structures shall have a minimum roof pitch of 7/12. This does not include the roof pitch of a garage or dormers, all roof shingles shall be architectural shingles in earth tone colors, and vinyl siding shall

be of a finish and appearance comparable to natural materials.

In accordance with the conditions of approval by the Biddeford Planning Board no heating systems or appliances which utilize a petroleum based fuel shall be operated or utilized on the property, provided, however, that this restriction shall not prevent the use of natural gas or propane.

3. The Grantees herein agree to complete all building construction and landscaping within twelve (12) months from the beginning of construction. Completion, as used herein, includes, but is not limited to, porches, steps, decks, platforms, carports, other outside living terraces, grading and seeding of lawns. All driveways shall be paved with asphalt or finished with pavers or finished concrete within two (2) years of the commencement of construction.

4. No junk or abandoned vehicles or vehicles of a size larger than one (1) ton in carrying capacity, nor accumulations of trash or debris shall be allowed on said premises.

5. No animals other than ordinary household pets may be kept, boarded or otherwise maintained on the premises.

6. No mobile homes shall be placed on the property at any time; provided, however, that trailers used for camping or so-called recreational vehicles, boats, trailers or similar vehicles may be stored upon the property provided they are stored in a neat and reasonable manner.

7. The within Grantees, their heirs, successors and assigns, shall not alter the area encompassed within the bounds of the drainage easements, detention ponds or natural drainage courses as indicated on the aforesaid plan in any manner which would impede or adversely affect the drainage of the adjacent areas to the above described premises.

8. All curb cuts shall be made and driveways shall be constructed in such fashion so as not to impede or adversely affect the drainage of surface water in the location of the streets as shown on said plan into the drainage easements situated either in said streets or on the lots themselves and all construction shall be done in accordance with the specifications and in the manner required by the Public Works Director of the City of Biddeford, Maine.

In the event curb cuts shall be made or driveways shall be constructed in a fashion so as to violate this covenant and restriction, Indian Cliff Development Corporation may, but shall not be required to, correct the construction so that it does not violate this paragraph and the holder of title to the above lot shall be liable for all costs of the same. Costs shall include all direct and indirect costs and all costs of collection including, but not limited to, filing fees, sheriff's fees and reasonable attorney's fees. Similarly, the holder of title to the above lot shall be liable for all costs to repair asphalt, pavement or curbing caused as a result of construction activity by the owner or his agents, contracts and employees.

9. All pulpwood and firewood shall be stored in the backyard of the dwelling.

10. Trees standing upon the within conveyed premises or trees thereafter growing thereon in excess of six (6) inches in diameter measured five (5) feet above the surface of the ground shall not be cut or removed, except as hereinafter provided. Trees of such diameter which are dead, dying or diseased may be cut and removed and living trees may be trimmed or minimally thinned in accordance with good forestry practice. Trees of lesser diameter which are dead, dying or diseased may be cut and removed and living trees may be trimmed or selectively thinned in accordance with good forestry practice and to provide growth space for larger trees. Further, trees, whether alive or dead may be cut and removed by the title holder thereof or the duly authorized agent of the title holder only to such extent as shall be minimally necessary for the construction of the buildings and accessory uses permitted upon the property and for the construction of driveways and normal lawn areas or drainage swales, detention ponds and other infrastructure improvements. It is further provided that all softwoods which may present a danger to persons or property may be cut.

With respect to Lot H as shown on the Plan, no trees or growth of any sort may be cut, trimmed or removed within the bounds of such lot such corridor, except to the extent to prevent damage to adjacent structures in the event such trees or growth are of a condition that such damage is likely to occur from high winds, large amounts of precipitation or other likely weather conditions or unless construction activities are required on such Lot in order to comply with conditions of governmental approvals.

11. No signs, advertising the sale of the lot herein conveyed, or structure thereon, or for any other purpose, shall be permitted to be erected on the property other than one sign having dimensions of not more than 24 inches by 24 inches may be placed upon the lot to be sold and any informational signage or numbering required by any municipal authority to satisfy the provisions of any life safety codes shall be permitted.

During the period of construction of the improvements allowed to be constructed upon the lot conveyed, the builder may maintain one construction information sign of a size and design approved by Indian Cliff Development Corporation.

12. Indian Cliff Development Corporation for itself, its successors and specific assigns, reserves the right to use all of the street and ways and areas marked as rights of way in any fashion shown on the Plans of the Subdivision for access to any other land adjacent or near to said Subdivision it may own or hereafter acquire. It is further agreed and understood that no purchaser of such adjacent or near land from Indian Cliff Development Corporation shall have the right to use such streets and ways for such purposes unless such right shall have been specifically granted to such purchaser by Indian Cliff Development Corporation. It is further understood and agreed that no purchaser shall have a right to access abutting land without the approval of Indian Cliff Development Corporation, which consent may be withheld or conditioned for any reason.

13. Indian Cliff Development Corporation, for itself, its successors and specific assigns, reserves the right to use all such streets and ways and rights of way shown and depicted on said

Plans, all areas shown and depicted on said Plans as utility or other easement areas (in any fashion) for the use, introduction and maintenance of all utility services and to use all existing or hereinafter installed infrastructure improvements for use of lots in the Subdivision or to any other adjacent or nearby land owned by it or its specific assigns or hereinafter acquired by it or them. It is further agreed and understood' that no purchaser of such adjacent or near land from Indian Cliff Development Corporation shall have the right to use such streets and ways for such purposes unless such right shall have been specifically granted to such purchaser by E & R Development Corporation.

14. E & R Development Corporation, reserves for itself, its successors and specific assigns, the right and privilege to alter, amend, reconfigure, combine or re-subdivide any unsold lots in the Subdivision or any adjacent real estate in its ownership or to use any such lots for access to and for the use, introduction, installation, and maintenance of utility services to any adjacent land owned by Indian Cliff Development Corporation, or hereinafter acquired by it or its specific assigns and to alter, amend or change the location of any streets, rights-of-way or access roads shown on said Plans to a location of its choosing provided that access to the premises to be conveyed is not materially impaired or affected.

15. Each owner of a lot in the Subdivision (and any owner of a lot created hereinafter from land now owned by or hereinafter acquired by Indian Cliff Development Corporation which is made specifically subject to these restrictions or obligations created herein) shall be a member of the Trailside WayHomeowners' Association (the "Association"), a Maine not-for-profit corporation at the time of the purchase of a lot or lots on the Plan. Each lot owner shall have one vote in the association for each lot owned. In the event there are multiple owners of a lot, such owners in the aggregate shall be entitled to one vote. The Association shall be charged with the costs of maintenance, repair, replacement and snow plowing of the roadways in the Subdivision and any surface or subsurface drainage systems including the detention ponds or forced main sewer installations, pipes, cleanouts and appurtenances in or out of the Subdivision to the point where they become public improvements, but not the initial installation cost thereof. In the event the roadways, the drainage systems or sewer installations or any portions thereof are not accepted by the City of Biddeford as public streets or public improvements and shall also be responsible for the maintenance and landscaping of all entrance areas, esplanades and boulevards, and the maintenance, repair and replacement of any identification signage or common mailbox systems and any appurtenances thereto. In addition, and unless the City of Biddeford shall undertake responsibility therefor, it shall be the responsibility of the Association to implement, maintain and report to appropriate municipal officials with respect to the requirements of the maintenance plan for the detention pond and stormwater system and all associated parts thereof, all in accordance with the conditions of approval by the Planning Board of the City of Biddeford. Such obligations include, but are not limited to, implementation and compliance with the requirements of the "Post-Construction Inspection & Maintenance Plan for Stormwater Facilities" prepared by _____, and the annual reporting requirements therein stated as the same may be amended from time to time as the result of valid municipal action. It shall be the responsibility of each individual lot owner to make suitable arrangements for trash removal and for the installation, maintenance, repair and

replacement of all portions of the forced main sewer system from the connection to the line located within the right of way to and including all components within the structure or structures erected on the lot.

It is specifically provided, however, that in the event adjacent land shall become subject to these restrictions, such land shall not be obligated to pay for the costs of maintenance, operation, repair and replacement of any services or utilities to which it is not connected and/or does not utilize. Further, Lot A as shown on said plan is intended to be developed as a multi-family housing project and shall not be subject to the design standards and the limitations set forth herein but shall be obligated contribute on a prorata basis (that is, one lot one share) to all monetary obligations hereunder.

16. The above restrictions contained in paragraphs (1) through (15) hereof shall not apply to any remaining land of Indian Cliff Development Corporation which may lie near or adjacent to the above described premises, except to the extent it shall be specifically made subject to the same.

Shared/rah/realesstate/subdivision/trailside/restrictions/rev5/14/2024

ATTACHMENT 14
STORMWATER MANAGEMENT REPORT

BH2M

STORMWATER MANAGEMENT REPORT

BARRA ROAD SUBDIVISION

Barra Road
Biddeford, Maine

Submitted by:

Indian Cliff Development Corp.
260 Main Street
P.O. Box 444
Biddeford, ME

And

Avesta Housing
307 Cumberland Avenue
Portland, ME

Prepared by:



BH2M
Berry, Huff, McDonald, Milligan Inc.
Engineers, Surveyors

Date:
May 2024

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1.0 INTRODUCTION

Indian Cliff Development Corporation is proposing to permit a 9 lot subdivision known as Barra Road Subdivision (the Subdivision project). The project is proposed to subdivide an approximate 7 acre portion of a larger parcel, approximately 56 acres, off of the current end of Barra Road in Biddeford, ME, known as Map 7 lot 15. The subdivision proposes to construct 2 new roads to service the subdivision, one being an extension of Barra Road, and the second being Trailside Way. The subdivision will include 7 residential lots, Lots B-G and J, meeting bulk and space standards for 2-unit duplex homes that will be offered for sale and development by others at a future time. The larger approximate 2.2-acre lot, Lot A, is proposed to be developed Avesta Housing to develop a 46-unit elderly affordable housing project (the Site project), consisting of a 4-story building, and associated parking and amenities. An additional lot, Lot H, is proposed as a non-buildable lot proposed for stormwater and site access to an abutting property. These projects are required to obtain a City of Biddeford Subdivision permit for Indian Cliff Development's 9-lot subdivision, and a City of Biddeford Site and Subdivision permit for Avesta Housing's 46-unit affordable housing project. These projects will also jointly file for a required Stormwater Law Permit from the Maine DEP.

The scope of work for these projects includes but is not limited to:

- Tree clearing and grubbing
- Stump and boulder removal
- Construction of 27' wide paved roadways with a 5' sidewalk
- Extension of municipal services and associated service connection stubs
- Installation of underground electric and communications conduit and transformer pads
- Installation of storm drain system including catch basins, storm drain culverts, and vegetated swales.
- Construction of a Grassed Underdrained Soil Filters
- Construction of proposed 46-unit affordable elderly housing building and associated utilities, parking, and stormwater management facilities.

The Stormwater Management Plan has been prepared to satisfy the requirements of the Maine Department of Environmental Protections "Stormwater Management Rules" Chapters 500, 501 and 502, the most recent version of the "Maine Stormwater Best Management Practices Manual", and the City of Biddeford's Stormwater Ordinance.

1.1 OVERVIEW OF MODELING METHODOGY AND SOURCE INFORMATION

Hydrologic Analysis: The pre and post development conditions have been modeled using modeling software (Hydrocad Version 10) which is based upon the methodology contained within the USDA Soil Conservation Service Technical Release 55. Type III 24-hour storm distributions for York County were used for the analysis. The following return periods and 24-hour rainfall depths were used for the analysis:

Return Period	24-Hour Rainfall Depth
2-Year Storm	3.30 inches
10-Year Storm	4.90 inches
25-Year Storm	6.20 inches

Soils: The soils used for the stormwater analysis were digitized from the Natural Resource Conservation Service (NRCS), web soil survey website. The source of the data is the Cumberland County Soil Survey (Class D). Refer to the following for additional documentation regarding the soils used for modelling:

- Appendix A of this Report
- Pre and Post Development Watershed Plans (Sheets A and B)

The onsite soils include:

Soil Map Unit	Unit Description	Hydrologic Soil Group
BuC	Buxton silt loam, 8-15% slopes	C
LyB	Lyman-Rock outcrop complex, 3-8% slopes	D
LyC	Lyman-Rock outcrop complex, 8-15% slopes	D
Sc	Scantic silt loam, 0-3% slopes	D

Topography: Ground Survey by BH2M and LIDAR data from the NOAA LiDAR Digital Coast Dataset

Natural Resources: Wetland delineations performed by Mark Hampton Associates

1.2 DESCRIPTION OF POINTS OF ANALYSIS

The watershed model analyzes the discharge of runoff at five Analysis Points as described below:

Analysis Point #1
Description: Culmination of flow along Thatcher Brook.
Pre Development Tributary Drainage Areas: 7.84 Acres
Post Development Tributary Drainage Areas: 7.97 Acres

Analysis Point #2
Description: Point flow to wetland along south eastern property line.
Pre Development Tributary Drainage Areas: 6.66 Acres
Post Development Tributary Drainage Areas: 6.91 Acres

Analysis Point #3
Description: Culmination of flow to low point at south western property line.
Pre Development Tributary Drainage Areas: 1.16 Acres
Post Development Tributary Drainage Areas: 0.78 Acres

1.3 PRE DEVELOPMENT CONDITIONS

The Existing Conditions are shown on Sheet 2 and Sheet A of the accompanying plans. The portion parcel to be developed encompasses an area of approximately 7 acres and is located on Barra Road in Biddeford. The parcel is mostly wooded and lies within the Thatcher Brook Watershed.

The watershed that was analyzed for this project is approximately 15.7 acres. The analysis points are described in Section 1.2 of this report. The watershed generally flows from a ridgeline central to the project and runs primary south, east and west. The project is bounded by woodland areas to the east and north, a residential apartment complex currently under construction to the south, and Thatcher Brook to the west.

The Pre-Development Watershed Map is included as Sheet A of the accompanying plans and the Calculations are attached as Appendix B.

The Pre-Development Watershed Model predicts the following peak flow rates:

Pre-Development Peak Flows (cu. ft./sec)			
Analysis Point	**2-Year**	**10-Year**	**25-Year**
AP-1	7.20	15.25	22.36
AP-2	6.10	12.15	17.39
AP-3	1.00	2.23	3.32

1.4 POST DEVELOPMENT CONDITIONS

The overall projects propose construction of the Subdivision by Indian Cliff Development and the proposed Site project by Avesta Housing. The Subdivision will

include construction of 27' wide paved roadways and 5' sidewalk intended to meet City of Biddeford standards, along above ground and underground municipal services for water, sewer, drainage specific to the Subdivision project, gas, and electric and data to support the development of the 9 new lots. The 7 duplex lots proposed by Indian Cliff Development for this subdivision are proposed to be developed by others at a later date, and service connections will be stubbed in at the time of the construction of the extension of Barra Road and Trailside Way.

Avesta Housing proposes to develop a 2.2 acre parcel as a 46-unit affordable elderly housing development as soon as development of the Subdivision and funding sources will allow. This will include the building, parking lot, connections to municipal utilities installed for the Subdivision project, and stormwater systems specific to the Site project.

For the Subdivision project, it should be noted that the 7 duplex lots proposed for future development by others have been included in the stormwater models assuming 1,000 sf per unit for driveways, or 2,000 sf per lot, and 3000 sf per lot for the duplex homes. While these assumptions are being provided in the stormwater run off models, these are not carried forward in the treatment calculations presented in the General Standards, section 1.6 of this report, as these lots are not proposed to be developed with the initial development of the Subdivision. The below is a summary of the proposed developed areas associated with construction of the public infrastructure associated with development of the Subdivision roads, and assumed duplex home lot development.

Proposed Impervious Area (Subdivision Roadways)	=	28,461 sf
Proposed Landscaped Area	=	42,876 sf
Assumed Duplex Lot Development (treatment not required)	=	35,000 sf
Proposed and Assumed Developed Area Subdivision	=	106,337 sf

Avesta Housing is proposing to develop the 46-unit affordable elderly housing project in conjunction of the initial development of the subdivision. The details of the developed areas for the Site project are summarized below.

Proposed Impervious Area (Site project Development)	=	36,710 sf
Proposed Landscaped Area	=	40,869 sf
Proposed Developed Area Avesta Site	=	77,579 sf

The projects will include Grassed Underdrained Soil Filters to provide treatment and attenuation of peak flows. These soil filters have been designed to specifically receive stormwater run off distinctly from either the proposed Subdivision infrastructure or from the Avesta Site project to keep management of these systems separated between what is proposed to be developed for the Subdivision project and what will be proposed for the Site project.

While the Subdivision and Site projects are proposed to be developed and permitted by separate entities, given the timing of development and interrelated impacts to the overall watersheds, it is best to review peak flows of their combined effects.

The Post Development Watershed Map is included as Sheet B of the accompanying plan set and the Calculations are attached as Appendix C.

The Post-Development Watershed Model predicts the following peak flow rates:

Post Development Peak Flows (cu. ft./sec)			
Analysis Point	**2-Year**	**10-Year**	**25-Year**
AP-1	7.26	15.34	22.11
AP-2	4.56	11.13	15.82
AP-3	0.68	1.47	2.17

1.5 BASIC STANDARDS

The proposed projects are required to meet the Basic Standards for the Maine DEP. To meet the Basic Standards the project designs must demonstrate that the erosion and sedimentation control, inspection and maintenance, and housekeeping standards specified in Appendices A, B, and C of 06-096 Chapter 500 (Maine DEP) are met, and that the grading or other construction activity will not impede or otherwise alter drainageways so as to have an unreasonable adverse impact on a wetland or waterbody, or an adjacent downslope parcel.

The proposed projects will provide temporary (during construction) BMP's and post-construction BMP's. Refer to Erosion Control Plans for each project's plan set plans for erosion and sedimentation control narratives and details. The project requirements for inspection and maintenance during construction and post-construction are described in the Erosion and Sedimentation Control - Inspection and Maintenance Plans found in Appendix E for the Subdivision and Appendix F for the Site project of this Report. The housekeeping standards can also be found in the respective Inspection and Maintenance Plans.

1.6 GENERAL STANDARDS

The proposed project is required to meet the General Standards. To meet the general standards, the project design must demonstrate that the stormwater management system includes treatment measures that will provide pollutant removal or treatment and mitigate for the increased frequency and duration of channel erosive flows due to runoff from smaller storms and potential temperature impacts. This must be achieved by providing treatment of no less than 95% of the impervious area and no less than 80% of the developed area. For linear portions of projects, the treatment requirements can be reduced to no less than 75% of the impervious area and no less

than 50% of the developed area (See 06-096 Chapter 500 4.C(5)(c)). For development of these projects, we have assumed that the Subdivision portions of the project will meet the 75% linear exemption criteria, and the Site portion of the project will meet the 95% criteria.

The stormwater management system includes individual Grassed Underdrained Soil Filters for both roads of the Subdivision and an additional Grassed Underdrained Soil Filter for the Site project. The proposed soil filters have been designed in accordance with the design requirements outlined in the Maine Stormwater Best Management Practices Manual, Volume III, Chapter 7.1.

Below is a summary of the treatment areas associated with the proposed infrastructure. Refer to Appendix D for detailed calculations.

Stormwater Treatment Summary Subdivision (Linear Project)	
Total Proposed (Linear) Impervious Area	28,461 sf
Total Proposed (Linear) Developed Area	71,337 sf
Total Treated (Linear) Impervious Area	26,837 sf
Total Treated (Linear) Developed Area	36,134 sf
Linear Subdivision Impervious Area Treatment %	**95.3% (75% required)**
Linear Subdivision Developed Area Treatment %	**50.7% (50% required)**

Stormwater Treatment Summary Subdivision (Linear Project)	
Total Proposed (Linear) Impervious Area	36,710 sf
Total Proposed (Linear) Developed Area	77,579 sf
Total Treated (Linear) Impervious Area	36,710 sf
Total Treated (Linear) Developed Area	62,198 sf
Impervious Area Treatment %	**100.0% (95% required)**
Developed Area Treatment %	**80.2% (80% required)**

As shown in the Table above, the stormwater management systems have been designed to meet the applicable General Standard requirements for both the Subdivision and Site projects. Detailed treatment calculations can be found in Appendix D.

1.7 PHOSPHORUS STANDARD

The proposed project is located in the watershed of Thatcher Brook. The proposed project is not located within the direct watershed of a lake or lake most-at-risk listed in 06-096 Chapter 502. The Phosphorus Standard does not apply to this project.

1.8 URBAN IMPAIRED STREAM STANDARD

The proposed project is located in the watershed of Thatcher Brook. The Thatcher Brook is listed in 06-096 Chapter 502 as an Urban Impaired Stream, however, as the

projects have been assessed by Maine DEP as a Stormwater Law project and not subject to Site Location of Development permitting, the full Maine DEP Urban Impaired Stream Standard does not apply to the project.

However, as the project is being proposed in the City of Biddeford, the City does require that the projects within an Urban Impaired Stream Watershed pay into the Compensation Fee Utilization Plan (CFUP) managed by the City at Maine DEP's prescribed rates, based on Table 1 found in 06-096 CMR 501 3.A.(1). Where there are two distinct projects being proposed and permitted, there are two sets of impact fees that will need to be assessed:

CFUP Fee Schedule – Indian Cliff Development Subdivision Project			
Type of Surface	**Compensation Fee (per acre)**	**Proposed Area (acres)**	**Compensation Fee**
Non-roof Impervious Area	$12,500	0.65	$8,125
Roof	$5,000	N/A	$N/A
Landscape Area	$2,500	0.98	$2,450
Total			**$10,575**

CFUP Fee Schedule – Avesta Site Project			
Type of Surface	**Compensation Fee (per acre)**	**Proposed Area (acres)**	**Compensation Fee**
Non-roof Impervious Area	$12,500	0.59	$7,375
Roof	$5,000	0.25	$1,250
Landscape Area	$2,500	0.94	$2,350
Total			**$10,975**

1.9 FLOODING STANDARD

The proposed project is required to meet the Flooding Standards for the City of Biddeford. To meet the Flooding Standard, the project design must demonstrate that the stormwater management systems will accomplish the following:

a) The system must detain, retain, or result in the infiltration of stormwater from 24-hour storms of the 2-year, 10-year, and 25-year frequencies such that the peak flows of stormwater from the project site do not exceed the peak flows of stormwater prior to undertaking the project.
b) The design of piped or open channel systems must be based on a 25-year, 24-hour storm without overloading or flooding beyond channel limits.
c) The areas expected to be flooded by runoff from a 10-year or 25-year, 24-hour storm must be defined, and no buildings or other similar facilities may be planned within such areas.

d) Runoff from the project may not flood the primary access road to the project and any public roads bordering the project as a result of a 25-year, 24-hour storm.

Given the combined development of these projects, both the Subdivision and Site projects flooding criteria have been developed in a single model, but as a note, this model was broken between AP-1 and AP-2&3 due to node size limitations. The following table compares the Pre and Post Development peak flow rates for the 2-year, 10-year, and 25-year return periods. Refer to Appendix B for the Pre-Development model and Appendix C for Post Development model.

Peak Flow Comparison (cu. ft./sec)						
Analysis Point	2-Year		10-Year		25-Year	
	Pre	Post	Pre	Post	Pre	Post
AP-1	7.20	7.26	15.25	15.34	22.36	22.11
AP-2	6.10	4.56	12.15	11.13	17.39	15.82
AP-3	1.00	0.68	2.23	1.47	3.32	2.17

As illustrated in the table above, development of the proposed project will create a condition where most of the post development peak rates of runoff are decreased from the pre development peak rates of runoff for events for both the Subdivision and Site projects.

The models do suggest, however, that a slight increase in run off is predicted for AP-1 during only the 2 year and 10 year events in post-construction conditions. These very minor increases, 0.06 cfs for the 2-year and 0.09 cfs increase for the 10-year events are both less than a 1% increase in their respective modeled storm events over existing conditions. Reviewing the results, these increases are mostly driven due to assumed development of duplex house lots in post-development watershed SA-1 where the project cannot provide practical storage. Given the minor nature of this increase, that this is based on assumed future development, and the fact that this run off will go directly to Thatcher Brook, we do not expect any noticeable downstream effects or flooding concerns. The projects request that waivers be granted by the City of Biddeford and Maine DEP as deemed necessary for these minor increases in run off.

Given these results, no adverse impacts will be created to the downstream conditions as a result of this development.

1.10 CLOSURE

The proposed stormwater management facilities have been designed to mitigate stormwater impacts associated with development of the proposed to meet the City of Biddeford Subdivision and Site permit requirements, as well as applicable sections of Chapter 500, 501 and 502 for Stormwater Law permit requirements.

Appendix A
Soils Reports

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for York County, Maine

Barra Road Development



Preface

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

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

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

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

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

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

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

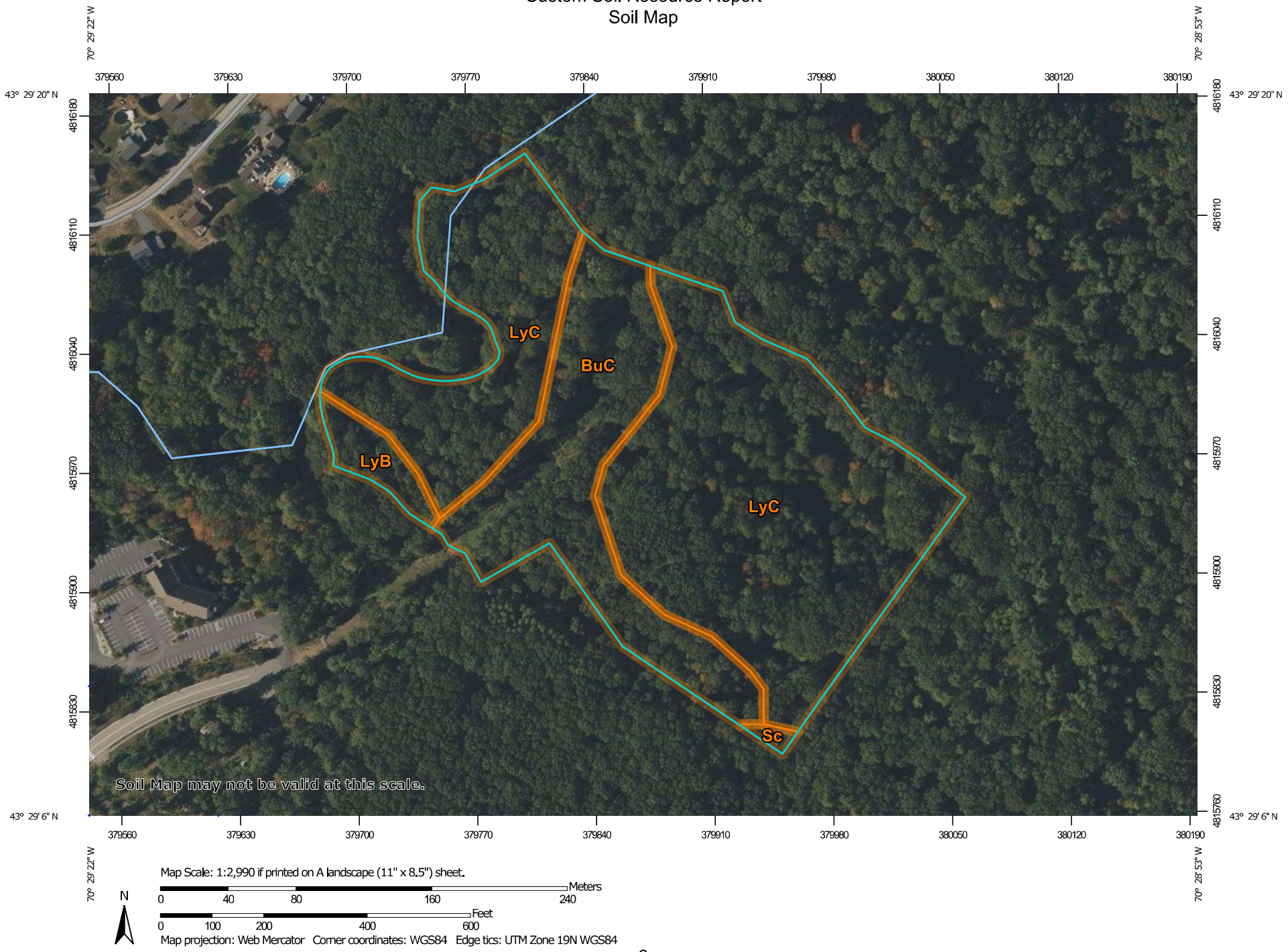
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

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

Custom Soil Resource Report
Soil Map



Map Scale: 1:2,990 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 40 80 160 240

Feet: 0 100 200 400 600

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

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

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: York County, Maine
Survey Area Data: Version 22, Sep 5, 2023

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

Date(s) aerial images were photographed: Jun 19, 2020—Sep 20, 2020

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
BuC	Buxton silt loam, 8 to 15 percent slopes	4.0	25.7%
LyB	Lyman-Rock outcrop complex, 3 to 8 percent slopes	0.5	3.2%
LyC	Lyman-Rock outcrop complex, 8 to 15 percent slopes	11.1	70.6%
Sc	Scantic silt loam, 0 to 3 percent slopes	0.1	0.4%
Totals for Area of Interest		**15.7**	**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 management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

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

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

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

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

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

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

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

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

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

York County, Maine

BuC—Buxton silt loam, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 9k55
Elevation: 10 to 900 feet
Mean annual precipitation: 34 to 48 inches
Mean annual air temperature: 43 to 46 degrees F
Frost-free period: 90 to 160 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

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

Description of Buxton

Setting

Landform: Coastal plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Glaciolacustrine deposits derived from siltstone and/or fine-silty marine deposits

Typical profile

H1 - 0 to 7 inches: silt loam
H2 - 7 to 19 inches: silt loam
H3 - 19 to 37 inches: silty clay
H4 - 37 to 65 inches: silty clay

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: About 18 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 9.8 inches)

Interpretive groups

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

LyB—Lyman-Rock outcrop complex, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2trqh
Elevation: 0 to 560 feet
Mean annual precipitation: 36 to 65 inches
Mean annual air temperature: 36 to 52 degrees F
Frost-free period: 60 to 160 days
Farmland classification: Not prime farmland

Map Unit Composition

Lyman, very stony, and similar soils: 65 percent
Rock outcrop: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Lyman, Very Stony

Setting

Landform: Mountains, hills
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Mountaintop, mountainbase, side slope, crest
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy supraglacial till derived from granite and gneiss and/or loamy supraglacial till derived from phyllite and/or loamy supraglacial till derived from mica schist

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material
A - 1 to 3 inches: loam
E - 3 to 5 inches: fine sandy loam
Bhs - 5 to 7 inches: loam
Bs1 - 7 to 11 inches: loam
Bs2 - 11 to 18 inches: channery loam
R - 18 to 28 inches: bedrock

Properties and qualities

Slope: 3 to 8 percent
Surface area covered with cobbles, stones or boulders: 1.5 percent
Depth to restrictive feature: 11 to 24 inches to lithic bedrock
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to high (0.00 to 14.03 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 3.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: D
Hydric soil rating: No

Description of Rock Outcrop

Setting
Landform: Mountains, hills
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Mountaintop, mountainbase, side slope, crest
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Igneous and metamorphic rock

Typical profile
R - 0 to 10 inches: bedrock

Properties and qualities
Slope: 3 to 8 percent
Depth to restrictive feature: 0 inches to lithic bedrock
Capacity of the most limiting layer to transmit water (Ksat): Very low to very high (0.00 to 14.17 in/hr)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s
Hydric soil rating: Unranked

LyC—Lyman-Rock outcrop complex, 8 to 15 percent slopes

Map Unit Setting
National map unit symbol: 2trqj
Elevation: 0 to 790 feet
Mean annual precipitation: 36 to 65 inches
Mean annual air temperature: 36 to 52 degrees F
Frost-free period: 60 to 160 days
Farmland classification: Not prime farmland

Map Unit Composition
Lyman, very stony, and similar soils: 62 percent
Rock outcrop: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Lyman, Very Stony

Setting
Landform: Mountains, hills
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Mountaintop, mountainbase, side slope, crest

Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy supraglacial till derived from granite and gneiss and/or loamy supraglacial till derived from phyllite and/or loamy supraglacial till derived from mica schist

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material
A - 1 to 3 inches: loam
E - 3 to 5 inches: fine sandy loam
Bhs - 5 to 7 inches: loam
Bs1 - 7 to 11 inches: loam
Bs2 - 11 to 18 inches: channery loam
R - 18 to 28 inches: bedrock

Properties and qualities

Slope: 8 to 15 percent
Surface area covered with cobbles, stones or boulders: 1.5 percent
Depth to restrictive feature: 11 to 24 inches to lithic bedrock
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to high (0.00 to 14.03 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 3.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: D
Ecological site: F144BY701ME - Shallow Till
Hydric soil rating: No

Description of Rock Outcrop

Setting

Landform: Mountains, hills
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Mountaintop, mountainbase, side slope, crest
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Igneous and metamorphic rock

Typical profile

R - 0 to 10 inches: bedrock

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: 0 inches to lithic bedrock
Capacity of the most limiting layer to transmit water (Ksat): Very low to very high (0.00 to 14.17 in/hr)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s
Ecological site: F144BY801ME - Rockland (reserved)

Hydric soil rating: Unranked

Sc—Scantic silt loam, 0 to 3 percent slopes

Map Unit Setting

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

Map Unit Composition

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

Description of Scantic

Setting

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

Typical profile

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

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 6.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: D
Ecological site: F144BY304ME - Wet Clay Flat
Hydric soil rating: Yes

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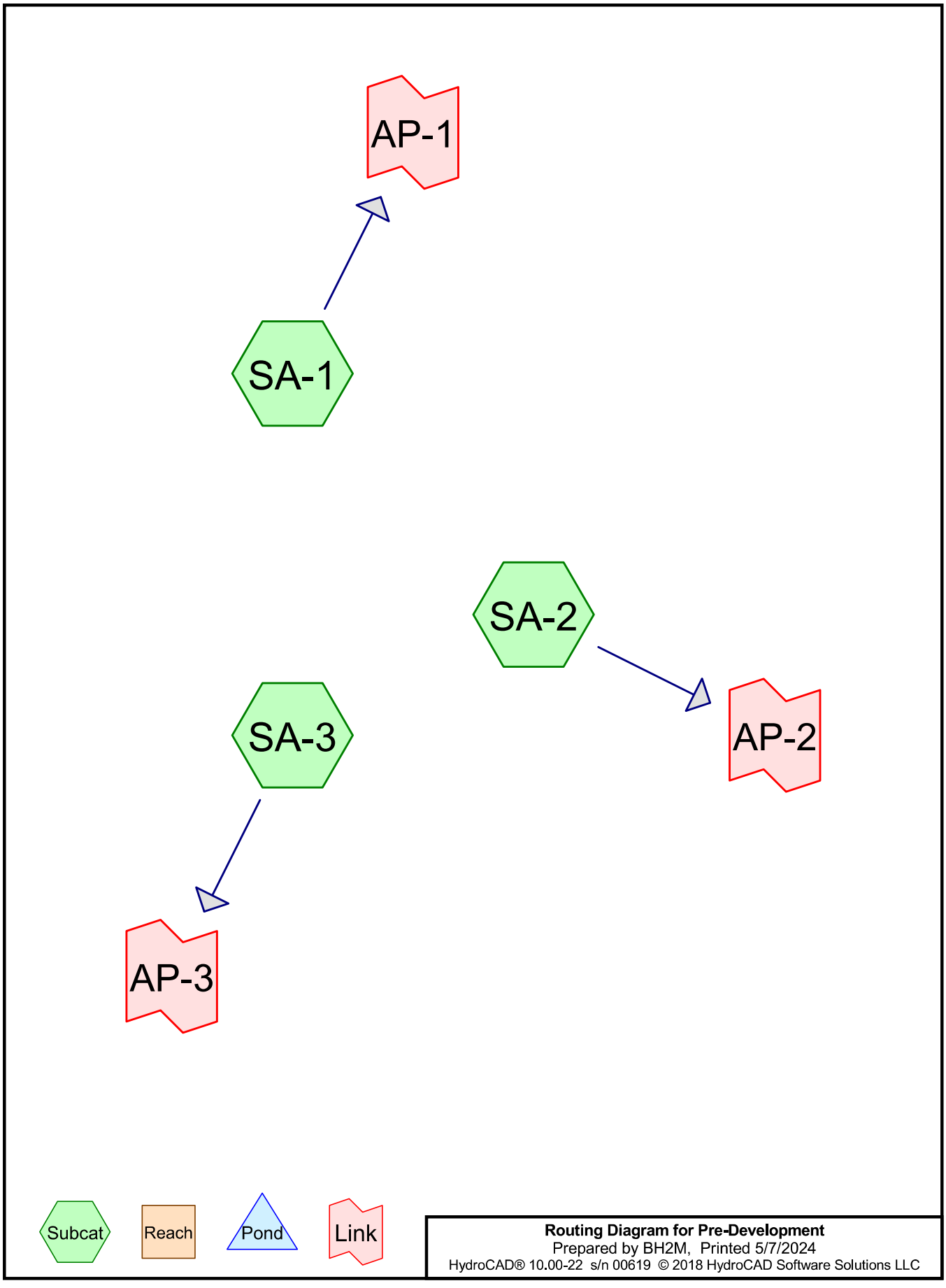
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Appendix B
Pre Development Calculations


AP-1
SA-1
SA-2
AP-2
SA-3
AP-3
Subcat
Reach
Pond
Link
Routing Diagram for Pre-Development
Prepared by BH2M, Printed 5/7/2024
HydroCAD® 10.00-22 s/n 00619 © 2018 HydroCAD Software Solutions LLC

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment SA-1: Runoff Area=341,483 sf 0.00% Impervious Runoff Depth>3.21"
Flow Length=446' Tc=17.8 min CN=75 Runoff=22.36 cfs 2.096 af

Subcatchment SA-2: Runoff Area=290,295 sf 0.00% Impervious Runoff Depth>3.49"
Flow Length=660' Tc=26.9 min CN=78 Runoff=17.39 cfs 1.939 af

Subcatchment SA-3: Runoff Area=50,383 sf 0.00% Impervious Runoff Depth>3.02"
Flow Length=150' Slope=0.1067 '/' Tc=15.0 min CN=73 Runoff=3.32 cfs 0.291 af

Link AP-1: Inflow=22.36 cfs 2.096 af
Primary=22.36 cfs 2.096 af

Link AP-2: Inflow=17.39 cfs 1.939 af
Primary=17.39 cfs 1.939 af

Link AP-3: Inflow=3.32 cfs 0.291 af
Primary=3.32 cfs 0.291 af

Total Runoff Area = 15.660 ac Runoff Volume = 4.326 af Average Runoff Depth = 3.31"
100.00% Pervious = 15.660 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment SA-1:

Runoff = 22.36 cfs @ 12.25 hrs, Volume= 2.096 af, Depth> 3.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=6.20"

Area (sf)	CN	Description
115,270	70	Woods, Good, HSG C
17,262	77	Woods, Poor, HSG C
200,676	77	Woods, Good, HSG D
8,275	83	Woods, Poor, HSG D
341,483	75	Weighted Average
341,483		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.0	150	0.1067	0.17		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.30"
2.8	296	0.1216	1.74		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
17.8	446	Total			

Summary for Subcatchment SA-2:

Runoff = 17.39 cfs @ 12.37 hrs, Volume= 1.939 af, Depth> 3.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=6.20"

Area (sf)	CN	Description
2,883	70	Woods, Good, HSG C
259,270	77	Woods, Good, HSG D
28,142	83	Woods, Poor, HSG D
290,295	78	Weighted Average
290,295		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.1	150	0.0667	0.14		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.30"
8.8	510	0.0373	0.97		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
26.9	660	Total			

Summary for Subcatchment SA-3:

Runoff = 3.32 cfs @ 12.21 hrs, Volume= 0.291 af, Depth> 3.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=6.20"

Area (sf)	CN	Description
34,989	70	Woods, Good, HSG C
3,545	77	Woods, Poor, HSG C
7,882	77	Woods, Good, HSG D
3,967	83	Woods, Poor, HSG D
50,383	73	Weighted Average
50,383		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.0	150	0.1067	0.17		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.30"

Summary for Link AP-1:

Inflow Area = 7.839 ac, 0.00% Impervious, Inflow Depth > 3.21" for 25-YR event
Inflow = 22.36 cfs @ 12.25 hrs, Volume= 2.096 af
Primary = 22.36 cfs @ 12.25 hrs, Volume= 2.096 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Link AP-2:

Inflow Area = 6.664 ac, 0.00% Impervious, Inflow Depth > 3.49" for 25-YR event
Inflow = 17.39 cfs @ 12.37 hrs, Volume= 1.939 af
Primary = 17.39 cfs @ 12.37 hrs, Volume= 1.939 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Link AP-3:

Inflow Area = 1.157 ac, 0.00% Impervious, Inflow Depth > 3.02" for 25-YR event
Inflow = 3.32 cfs @ 12.21 hrs, Volume= 0.291 af
Primary = 3.32 cfs @ 12.21 hrs, Volume= 0.291 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment SA-1: Runoff Area=341,483 sf 0.00% Impervious Runoff Depth>1.06"
Flow Length=446' Tc=17.8 min CN=75 Runoff=7.20 cfs 0.691 af

Subcatchment SA-2: Runoff Area=290,295 sf 0.00% Impervious Runoff Depth>1.23"
Flow Length=660' Tc=26.9 min CN=78 Runoff=6.10 cfs 0.683 af

Subcatchment SA-3: Runoff Area=50,383 sf 0.00% Impervious Runoff Depth>0.95"
Flow Length=150' Slope=0.1067 '/' Tc=15.0 min CN=73 Runoff=1.00 cfs 0.092 af

Link AP-1: Inflow=7.20 cfs 0.691 af
Primary=7.20 cfs 0.691 af

Link AP-2: Inflow=6.10 cfs 0.683 af
Primary=6.10 cfs 0.683 af

Link AP-3: Inflow=1.00 cfs 0.092 af
Primary=1.00 cfs 0.092 af

Total Runoff Area = 15.660 ac Runoff Volume = 1.466 af Average Runoff Depth = 1.12"
100.00% Pervious = 15.660 ac 0.00% Impervious = 0.000 ac

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment SA-1: Runoff Area=341,483 sf 0.00% Impervious Runoff Depth>2.19"
Flow Length=446' Tc=17.8 min CN=75 Runoff=15.25 cfs 1.429 af

Subcatchment SA-2: Runoff Area=290,295 sf 0.00% Impervious Runoff Depth>2.43"
Flow Length=660' Tc=26.9 min CN=78 Runoff=12.15 cfs 1.349 af

Subcatchment SA-3: Runoff Area=50,383 sf 0.00% Impervious Runoff Depth>2.03"
Flow Length=150' Slope=0.1067 '/' Tc=15.0 min CN=73 Runoff=2.23 cfs 0.196 af

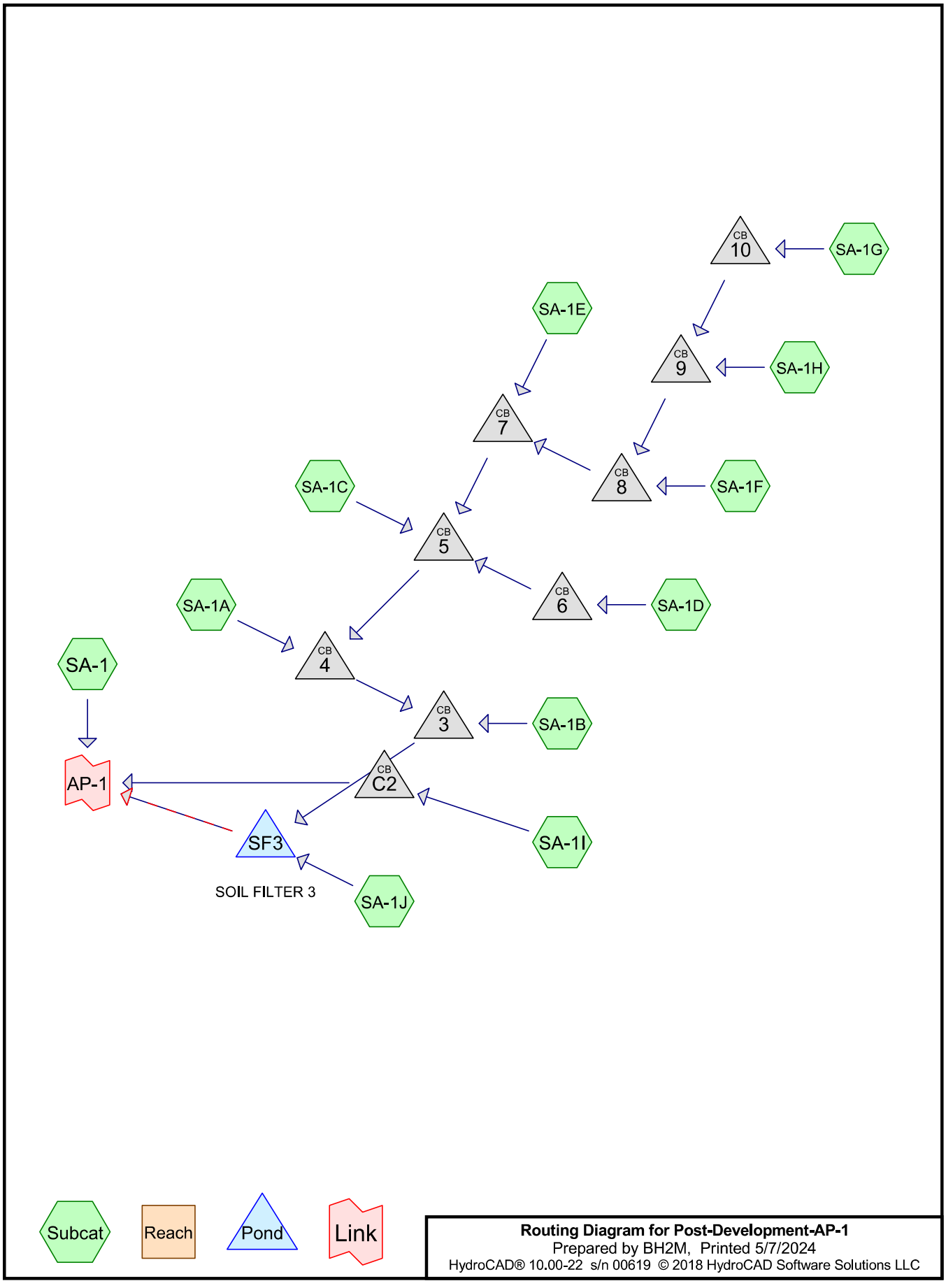
Link AP-1: Inflow=15.25 cfs 1.429 af
Primary=15.25 cfs 1.429 af

Link AP-2: Inflow=12.15 cfs 1.349 af
Primary=12.15 cfs 1.349 af

Link AP-3: Inflow=2.23 cfs 0.196 af
Primary=2.23 cfs 0.196 af

Total Runoff Area = 15.660 ac Runoff Volume = 2.973 af Average Runoff Depth = 2.28"
100.00% Pervious = 15.660 ac 0.00% Impervious = 0.000 ac

Appendix C
Post Development Calculations



Routing Diagram for Post-Development-AP-1
Prepared by BH2M, Printed 5/7/2024
HydroCAD® 10.00-22 s/n 00619 © 2018 HydroCAD Software Solutions LLC

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment SA-1: Runoff Area=267,787 sf 3.73% Impervious Runoff Depth>3.31"
Flow Length=446' Tc=17.8 min CN=76 Runoff=18.04 cfs 1.693 af

Subcatchment SA-1A: Runoff Area=1,445 sf 100.00% Impervious Runoff Depth>5.51"
Flow Length=98' Slope=0.0393 '/' Tc=6.0 min CN=98 Runoff=0.20 cfs 0.015 af

Subcatchment SA-1B: Runoff Area=1,997 sf 100.00% Impervious Runoff Depth>5.51"
Flow Length=104' Slope=0.0365 '/' Tc=6.0 min CN=98 Runoff=0.27 cfs 0.021 af

Subcatchment SA-1C: Runoff Area=3,309 sf 100.00% Impervious Runoff Depth>5.51"
Flow Length=228' Tc=6.0 min CN=98 Runoff=0.45 cfs 0.035 af

Subcatchment SA-1D: Runoff Area=4,592 sf 100.00% Impervious Runoff Depth>5.51"
Flow Length=248' Tc=6.0 min CN=98 Runoff=0.63 cfs 0.048 af

Subcatchment SA-1E: Runoff Area=1,448 sf 100.00% Impervious Runoff Depth>5.51"
Flow Length=100' Slope=0.0130 '/' Tc=6.0 min CN=98 Runoff=0.20 cfs 0.015 af

Subcatchment SA-1F: Runoff Area=2,737 sf 100.00% Impervious Runoff Depth>5.51"
Flow Length=90' Slope=0.0122 '/' Tc=6.0 min CN=98 Runoff=0.37 cfs 0.029 af

Subcatchment SA-1G: Runoff Area=2,298 sf 100.00% Impervious Runoff Depth>5.51"
Flow Length=160' Tc=6.0 min CN=98 Runoff=0.31 cfs 0.024 af

Subcatchment SA-1H: Runoff Area=2,916 sf 100.00% Impervious Runoff Depth>5.51"
Flow Length=150' Slope=0.0371 '/' Tc=6.0 min CN=98 Runoff=0.40 cfs 0.031 af

Subcatchment SA-1I: Runoff Area=39,119 sf 25.56% Impervious Runoff Depth>4.02"
Flow Length=307' Tc=13.3 min CN=83 Runoff=3.49 cfs 0.301 af

Subcatchment SA-1J: Runoff Area=19,433 sf 0.00% Impervious Runoff Depth>3.12"
Flow Length=223' Tc=12.0 min CN=74 Runoff=1.43 cfs 0.116 af

Pond 3: Peak Elev=103.70' Inflow=2.83 cfs 0.219 af
15.0" Round Culvert n=0.013 L=33.0' S=0.0052 '/' Outflow=2.83 cfs 0.219 af

Pond 4: Peak Elev=103.76' Inflow=2.55 cfs 0.198 af
15.0" Round Culvert n=0.013 L=23.0' S=0.0052 '/' Outflow=2.55 cfs 0.198 af

Pond 5: Peak Elev=106.37' Inflow=2.36 cfs 0.182 af
15.0" Round Culvert n=0.013 L=99.0' S=0.0284 '/' Outflow=2.36 cfs 0.182 af

Pond 6: Peak Elev=106.32' Inflow=0.63 cfs 0.048 af
15.0" Round Culvert n=0.013 L=23.0' S=0.0100 '/' Outflow=0.63 cfs 0.048 af

Pond 7: Peak Elev=110.85' Inflow=1.28 cfs 0.099 af
15.0" Round Culvert n=0.013 L=228.0' S=0.0202 '/' Outflow=1.28 cfs 0.099 af

Pond 8: Peak Elev=111.19' Inflow=1.08 cfs 0.084 af
15.0" Round Culvert n=0.013 L=25.0' S=0.0100 '/' Outflow=1.08 cfs 0.084 af

Pond 9: Peak Elev=111.49' Inflow=0.71 cfs 0.055 af
15.0" Round Culvert n=0.013 L=25.0' S=0.0136 '/' Outflow=0.71 cfs 0.055 af

Pond 10: Peak Elev=111.70' Inflow=0.31 cfs 0.024 af
15.0" Round Culvert n=0.013 L=23.0' S=0.0100 '/' Outflow=0.31 cfs 0.024 af

Pond C2: Peak Elev=107.64' Inflow=3.49 cfs 0.301 af
18.0" Round Culvert n=0.013 L=71.0' S=0.1007 '/' Outflow=3.49 cfs 0.301 af

Pond SF3: SOIL FILTER 3 Peak Elev=105.54' Storage=7,478 cf Inflow=4.00 cfs 0.335 af
Primary=0.98 cfs 0.246 af Secondary=0.18 cfs 0.002 af Outflow=1.15 cfs 0.248 af

Link AP-1: Inflow=22.11 cfs 2.242 af
Primary=22.11 cfs 2.242 af

Total Runoff Area = 7.968 ac Runoff Volume = 2.328 af Average Runoff Depth = 3.51"
88.26% Pervious = 7.033 ac 11.74% Impervious = 0.935 ac

Summary for Subcatchment SA-1:

Runoff = 18.04 cfs @ 12.25 hrs, Volume= 1.693 af, Depth> 3.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=6.20"

	Area (sf)	CN	Description
	55,992	70	Woods, Good, HSG C
	195,116	77	Woods, Good, HSG D
	6,515	74	>75% Grass cover, Good, HSG C
	164	80	>75% Grass cover, Good, HSG D
*	10,000	98	Assumed Future Duplexes
	267,787	76	Weighted Average
	257,787		96.27% Pervious Area
	10,000		3.73% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.0	150	0.1067	0.17		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.30"
2.8	296	0.1216	1.74		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
17.8	446	Total			

Summary for Subcatchment SA-1A:

Runoff = 0.20 cfs @ 12.09 hrs, Volume= 0.015 af, Depth> 5.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=6.20"

Area (sf)	CN	Description
1,445	98	Paved parking, HSG A
1,445		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	98	0.0393	1.82		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.30"
0.9	98	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment SA-1B:

Runoff = 0.27 cfs @ 12.09 hrs, Volume= 0.021 af, Depth> 5.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=6.20"

Area (sf)	CN	Description
1,997	98	Paved parking, HSG A
1,997		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	104	0.0365	1.79		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.30"
1.0	104	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment SA-1C:

Runoff = 0.45 cfs @ 12.09 hrs, Volume= 0.035 af, Depth> 5.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=6.20"

Area (sf)	CN	Description
3,309	98	Paved parking, HSG A
3,309		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.7	150	0.0180	1.45		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.30"
0.3	78	0.0365	3.88		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
2.0	228	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment SA-1D:

Runoff = 0.63 cfs @ 12.09 hrs, Volume= 0.048 af, Depth> 5.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=6.20"

Area (sf)	CN	Description
4,592	98	Paved parking, HSG A
4,592		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.8	150	0.0153	1.36		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.30"
0.4	98	0.0347	3.78		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
2.2	248	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment SA-1E:

Runoff = 0.20 cfs @ 12.09 hrs, Volume= 0.015 af, Depth> 5.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=6.20"

Area (sf)	CN	Description
1,448	98	Paved parking, HSG A
1,448		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	100	0.0130	1.18		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.30"
1.4	100	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment SA-1F:

Runoff = 0.37 cfs @ 12.09 hrs, Volume= 0.029 af, Depth> 5.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=6.20"

Area (sf)	CN	Description
2,737	98	Paved parking, HSG A
2,737		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	90	0.0122	1.12		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.30"
1.3	90	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment SA-1G:

Runoff = 0.31 cfs @ 12.09 hrs, Volume= 0.024 af, Depth> 5.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=6.20"

Area (sf)	CN	Description
2,298	98	Paved parking, HSG A
2,298		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	150	0.0338	1.87		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.30"
0.0	10	0.0500	4.54		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.3	160	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment SA-1H:

Runoff = 0.40 cfs @ 12.09 hrs, Volume= 0.031 af, Depth> 5.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=6.20"

Area (sf)	CN	Description
2,916	98	Paved parking, HSG A
2,916		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	150	0.0371	1.94		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.30"
1.3	150	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment SA-1I:

Runoff = 3.49 cfs @ 12.18 hrs, Volume= 0.301 af, Depth> 4.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=6.20"

	Area (sf)	CN	Description
	6,738	77	Woods, Poor, HSG C
	2,944	77	Woods, Good, HSG D
	9,623	83	Woods, Poor, HSG D
	7,804	74	>75% Grass cover, Good, HSG C
	2,010	80	>75% Grass cover, Good, HSG D
*	10,000	98	Assumed Duplexes
	39,119	83	Weighted Average
	29,119		74.44% Pervious Area
	10,000		25.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.0	150	0.1533	0.19		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.30"
0.2	45	0.0444	3.16		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.1	112	0.0357	23.00	199.30	**Parabolic Channel,** W=6.50' D=2.00' Area=8.7 sf Perim=7.9' n= 0.013
13.3	307	Total			

Summary for Subcatchment SA-1J:

Runoff = 1.43 cfs @ 12.17 hrs, Volume= 0.116 af, Depth> 3.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=6.20"

Area (sf)	CN	Description
4,710	70	Woods, Good, HSG C
8,127	77	Woods, Poor, HSG C
21	77	Woods, Good, HSG D
6,575	74	>75% Grass cover, Good, HSG C
19,433	74	Weighted Average
19,433		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.8	150	0.1933	0.21		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.30"
0.2	73	0.1986	6.68		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
12.0	223	Total			

Summary for Pond 3:

Inflow Area = 0.476 ac,100.00% Impervious, Inflow Depth > 5.51" for 25-YR event
Inflow = 2.83 cfs @ 12.09 hrs, Volume= 0.219 af
Outflow = 2.83 cfs @ 12.09 hrs, Volume= 0.219 af, Atten= 0%, Lag= 0.0 min
Primary = 2.83 cfs @ 12.09 hrs, Volume= 0.219 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 103.70' @ 12.09 hrs
Flood Elev= 106.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	102.67'	**15.0" Round Culvert** L= 33.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 102.67' / 102.50' S= 0.0052 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf

Primary OutFlow Max=2.75 cfs @ 12.09 hrs HW=103.68' (Free Discharge)
└**1=Culvert** (Barrel Controls 2.75 cfs @ 3.54 fps)

Summary for Pond 4:

Inflow Area = 0.430 ac,100.00% Impervious, Inflow Depth > 5.51" for 25-YR event
Inflow = 2.55 cfs @ 12.09 hrs, Volume= 0.198 af
Outflow = 2.55 cfs @ 12.09 hrs, Volume= 0.198 af, Atten= 0%, Lag= 0.0 min
Primary = 2.55 cfs @ 12.09 hrs, Volume= 0.198 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 103.76' @ 12.09 hrs
Flood Elev= 106.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	102.79'	**15.0" Round Culvert** L= 23.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 102.79' / 102.67' S= 0.0052 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf

Primary OutFlow Max=2.48 cfs @ 12.09 hrs HW=103.75' (Free Discharge)
└**1=Culvert** (Barrel Controls 2.48 cfs @ 3.41 fps)

Summary for Pond 5:

Inflow Area = 0.397 ac,100.00% Impervious, Inflow Depth > 5.51" for 25-YR event
Inflow = 2.36 cfs @ 12.09 hrs, Volume= 0.182 af
Outflow = 2.36 cfs @ 12.09 hrs, Volume= 0.182 af, Atten= 0%, Lag= 0.0 min
Primary = 2.36 cfs @ 12.09 hrs, Volume= 0.182 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 106.37' @ 12.09 hrs
Flood Elev= 109.60'

Device	Routing	Invert	Outlet Devices
#1	Primary	105.60'	**15.0" Round Culvert** L= 99.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 105.60' / 102.79' S= 0.0284 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf

Primary OutFlow Max=2.29 cfs @ 12.09 hrs HW=106.36' (Free Discharge)
└**1=Culvert** (Inlet Controls 2.29 cfs @ 2.96 fps)

Summary for Pond 6:

Inflow Area = 0.105 ac,100.00% Impervious, Inflow Depth > 5.51" for 25-YR event
Inflow = 0.63 cfs @ 12.09 hrs, Volume= 0.048 af
Outflow = 0.63 cfs @ 12.09 hrs, Volume= 0.048 af, Atten= 0%, Lag= 0.0 min
Primary = 0.63 cfs @ 12.09 hrs, Volume= 0.048 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 106.32' @ 12.09 hrs
Flood Elev= 109.60'

Device	Routing	Invert	Outlet Devices
#1	Primary	105.93'	**15.0" Round Culvert** L= 23.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 105.93' / 105.70' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf

Primary OutFlow Max=0.61 cfs @ 12.09 hrs HW=106.32' (Free Discharge)
1=Culvert (Barrel Controls 0.61 cfs @ 2.80 fps)

Summary for Pond 7:

Inflow Area = 0.216 ac,100.00% Impervious, Inflow Depth > 5.51" for 25-YR event
Inflow = 1.28 cfs @ 12.09 hrs, Volume= 0.099 af
Outflow = 1.28 cfs @ 12.09 hrs, Volume= 0.099 af, Atten= 0%, Lag= 0.0 min
Primary = 1.28 cfs @ 12.09 hrs, Volume= 0.099 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 110.85' @ 12.09 hrs
Flood Elev= 115.14'

Device	Routing	Invert	Outlet Devices
#1	Primary	110.31'	**15.0" Round Culvert** L= 228.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 110.31' / 105.70' S= 0.0202 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf

Primary OutFlow Max=1.24 cfs @ 12.09 hrs HW=110.84' (Free Discharge)
1=Culvert (Inlet Controls 1.24 cfs @ 2.49 fps)

Summary for Pond 8:

Inflow Area = 0.183 ac,100.00% Impervious, Inflow Depth > 5.51" for 25-YR event
Inflow = 1.08 cfs @ 12.09 hrs, Volume= 0.084 af
Outflow = 1.08 cfs @ 12.09 hrs, Volume= 0.084 af, Atten= 0%, Lag= 0.0 min
Primary = 1.08 cfs @ 12.09 hrs, Volume= 0.084 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 111.19' @ 12.09 hrs
Flood Elev= 115.28'

Device	Routing	Invert	Outlet Devices
#1	Primary	110.66'	**15.0" Round Culvert** L= 25.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 110.66' / 110.41' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf

Primary OutFlow Max=1.05 cfs @ 12.09 hrs HW=111.18' (Free Discharge)
└**1=Culvert** (Barrel Controls 1.05 cfs @ 3.19 fps)

Summary for Pond 9:

Inflow Area = 0.120 ac,100.00% Impervious, Inflow Depth > 5.51" for 25-YR event
Inflow = 0.71 cfs @ 12.09 hrs, Volume= 0.055 af
Outflow = 0.71 cfs @ 12.09 hrs, Volume= 0.055 af, Atten= 0%, Lag= 0.0 min
Primary = 0.71 cfs @ 12.09 hrs, Volume= 0.055 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 111.49' @ 12.09 hrs
Flood Elev= 115.87'

Device	Routing	Invert	Outlet Devices
#1	Primary	111.10'	**15.0" Round Culvert** L= 25.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 111.10' / 110.76' S= 0.0136 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf

Primary OutFlow Max=0.69 cfs @ 12.09 hrs HW=111.49' (Free Discharge)
└**1=Culvert** (Inlet Controls 0.69 cfs @ 2.12 fps)

Summary for Pond 10:

Inflow Area = 0.053 ac,100.00% Impervious, Inflow Depth > 5.51" for 25-YR event
Inflow = 0.31 cfs @ 12.09 hrs, Volume= 0.024 af
Outflow = 0.31 cfs @ 12.09 hrs, Volume= 0.024 af, Atten= 0%, Lag= 0.0 min
Primary = 0.31 cfs @ 12.09 hrs, Volume= 0.024 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 111.70' @ 12.09 hrs
Flood Elev= 115.67'

Device	Routing	Invert	Outlet Devices
#1	Primary	111.43'	**15.0" Round Culvert** L= 23.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 111.43' / 111.20' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf

Primary OutFlow Max=0.30 cfs @ 12.09 hrs HW=111.70' (Free Discharge)
└**1=Culvert** (Barrel Controls 0.30 cfs @ 2.39 fps)

Summary for Pond C2:

Inflow Area = 0.898 ac, 25.56% Impervious, Inflow Depth > 4.02" for 25-YR event
Inflow = 3.49 cfs @ 12.18 hrs, Volume= 0.301 af
Outflow = 3.49 cfs @ 12.18 hrs, Volume= 0.301 af, Atten= 0%, Lag= 0.0 min
Primary = 3.49 cfs @ 12.18 hrs, Volume= 0.301 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 107.64' @ 12.18 hrs
Flood Elev= 109.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	106.75'	**18.0" Round Culvert** L= 71.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 106.75' / 99.60' S= 0.1007 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf

Primary OutFlow Max=3.45 cfs @ 12.18 hrs HW=107.63' (Free Discharge)
1=Culvert (Inlet Controls 3.45 cfs @ 3.20 fps)

Summary for Pond SF3: SOIL FILTER 3

Inflow Area = 0.922 ac, 51.63% Impervious, Inflow Depth > 4.35" for 25-YR event
Inflow = 4.00 cfs @ 12.10 hrs, Volume= 0.335 af
Outflow = 1.15 cfs @ 12.51 hrs, Volume= 0.248 af, Atten= 71%, Lag= 24.4 min
Primary = 0.98 cfs @ 12.51 hrs, Volume= 0.246 af
Secondary = 0.18 cfs @ 12.51 hrs, Volume= 0.002 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 105.54' @ 12.51 hrs Surf.Area= 4,210 sf Storage= 7,478 cf

Plug-Flow detention time= 150.8 min calculated for 0.248 af (74% of inflow)
Center-of-Mass det. time= 86.8 min (842.4 - 755.6)

Volume	Invert	Avail.Storage	Storage Description
#1	102.50'	7,821 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)
#2	100.17'	1,119 cf	**Custom Stage Data (Irregular)** Listed below (Recalc) 2,798 cf Overall x 40.0% Voids
		8,940 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
102.50	1,201	155.6	0	0	1,201
103.00	1,528	170.8	681	681	1,604
104.00	2,069	189.7	1,792	2,472	2,176
105.00	2,666	208.5	2,361	4,833	2,804
106.00	3,320	227.4	2,987	7,821	3,495

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
100.17	1,201	155.6	0	0	1,201
102.50	1,201	155.6	2,798	2,798	1,564

Device	Routing	Invert	Outlet Devices
#1	Device 4	104.00'	**8.0" W x 3.0" H Vert. Orifice/Grate** C= 0.600
#2	Device 3	100.17'	**2.410 in/hr Exfiltration over Surface area**
#3	Device 4	100.17'	**0.6" Vert. Orifice/Grate** C= 0.600
#4	Primary	100.17'	**15.0" Round Culvert** L= 20.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 100.17' / 100.07' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf
#5	Secondary	105.50'	**10.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.97 cfs @ 12.51 hrs HW=105.54' (Free Discharge)
└─**4=Culvert** (Passes 0.97 cfs of 12.87 cfs potential flow)
  ├─**1=Orifice/Grate** (Orifice Controls 0.95 cfs @ 5.72 fps)
  └─**3=Orifice/Grate** (Orifice Controls 0.02 cfs @ 11.13 fps)
    └─**2=Exfiltration** (Passes 0.02 cfs of 0.23 cfs potential flow)

Secondary OutFlow Max=0.16 cfs @ 12.51 hrs HW=105.54' (Free Discharge)
└─**5=Broad-Crested Rectangular Weir** (Weir Controls 0.16 cfs @ 0.45 fps)

Summary for Link AP-1:

Inflow Area = 7.968 ac, 11.74% Impervious, Inflow Depth > 3.38" for 25-YR event
Inflow = 22.11 cfs @ 12.24 hrs, Volume= 2.242 af
Primary = 22.11 cfs @ 12.24 hrs, Volume= 2.242 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment SA-1: Runoff Area=267,787 sf 3.73% Impervious Runoff Depth>1.12"
Flow Length=446' Tc=17.8 min CN=76 Runoff=5.99 cfs 0.571 af

Subcatchment SA-1A: Runoff Area=1,445 sf 100.00% Impervious Runoff Depth>2.87"
Flow Length=98' Slope=0.0393 '/' Tc=6.0 min CN=98 Runoff=0.10 cfs 0.008 af

Subcatchment SA-1B: Runoff Area=1,997 sf 100.00% Impervious Runoff Depth>2.87"
Flow Length=104' Slope=0.0365 '/' Tc=6.0 min CN=98 Runoff=0.14 cfs 0.011 af

Subcatchment SA-1C: Runoff Area=3,309 sf 100.00% Impervious Runoff Depth>2.87"
Flow Length=228' Tc=6.0 min CN=98 Runoff=0.24 cfs 0.018 af

Subcatchment SA-1D: Runoff Area=4,592 sf 100.00% Impervious Runoff Depth>2.87"
Flow Length=248' Tc=6.0 min CN=98 Runoff=0.33 cfs 0.025 af

Subcatchment SA-1E: Runoff Area=1,448 sf 100.00% Impervious Runoff Depth>2.87"
Flow Length=100' Slope=0.0130 '/' Tc=6.0 min CN=98 Runoff=0.10 cfs 0.008 af

Subcatchment SA-1F: Runoff Area=2,737 sf 100.00% Impervious Runoff Depth>2.87"
Flow Length=90' Slope=0.0122 '/' Tc=6.0 min CN=98 Runoff=0.20 cfs 0.015 af

Subcatchment SA-1G: Runoff Area=2,298 sf 100.00% Impervious Runoff Depth>2.87"
Flow Length=160' Tc=6.0 min CN=98 Runoff=0.17 cfs 0.013 af

Subcatchment SA-1H: Runoff Area=2,916 sf 100.00% Impervious Runoff Depth>2.87"
Flow Length=150' Slope=0.0371 '/' Tc=6.0 min CN=98 Runoff=0.21 cfs 0.016 af

Subcatchment SA-1I: Runoff Area=39,119 sf 25.56% Impervious Runoff Depth>1.57"
Flow Length=307' Tc=13.3 min CN=83 Runoff=1.39 cfs 0.117 af

Subcatchment SA-1J: Runoff Area=19,433 sf 0.00% Impervious Runoff Depth>1.01"
Flow Length=223' Tc=12.0 min CN=74 Runoff=0.44 cfs 0.037 af

Pond 3: Peak Elev=103.37' Inflow=1.49 cfs 0.114 af
15.0" Round Culvert n=0.013 L=33.0' S=0.0052 '/' Outflow=1.49 cfs 0.114 af

Pond 4: Peak Elev=103.46' Inflow=1.35 cfs 0.103 af
15.0" Round Culvert n=0.013 L=23.0' S=0.0052 '/' Outflow=1.35 cfs 0.103 af

Pond 5: Peak Elev=106.13' Inflow=1.24 cfs 0.095 af
15.0" Round Culvert n=0.013 L=99.0' S=0.0284 '/' Outflow=1.24 cfs 0.095 af

Pond 6: Peak Elev=106.21' Inflow=0.33 cfs 0.025 af
15.0" Round Culvert n=0.013 L=23.0' S=0.0100 '/' Outflow=0.33 cfs 0.025 af

Pond 7: Peak Elev=110.69' Inflow=0.68 cfs 0.052 af
15.0" Round Culvert n=0.013 L=228.0' S=0.0202 '/' Outflow=0.68 cfs 0.052 af

Pond 8: Peak Elev=111.03' Inflow=0.57 cfs 0.044 af
15.0" Round Culvert n=0.013 L=25.0' S=0.0100 '/' Outflow=0.57 cfs 0.044 af

Pond 9: Peak Elev=111.38' Inflow=0.37 cfs 0.029 af
15.0" Round Culvert n=0.013 L=25.0' S=0.0136 '/' Outflow=0.37 cfs 0.029 af

Pond 10: Peak Elev=111.62' Inflow=0.17 cfs 0.013 af
15.0" Round Culvert n=0.013 L=23.0' S=0.0100 '/' Outflow=0.17 cfs 0.013 af

Pond C2: Peak Elev=107.28' Inflow=1.39 cfs 0.117 af
18.0" Round Culvert n=0.013 L=71.0' S=0.1007 '/' Outflow=1.39 cfs 0.117 af

Pond SF3: SOIL FILTER 3 Peak Elev=104.21' Storage=4,043 cf Inflow=1.83 cfs 0.151 af
Primary=0.23 cfs 0.067 af Secondary=0.00 cfs 0.000 af Outflow=0.23 cfs 0.067 af

Link AP-1: Inflow=7.26 cfs 0.756 af
Primary=7.26 cfs 0.756 af

Total Runoff Area = 7.968 ac Runoff Volume = 0.840 af Average Runoff Depth = 1.26"
88.26% Pervious = 7.033 ac 11.74% Impervious = 0.935 ac

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment SA-1: Runoff Area=267,787 sf 3.73% Impervious Runoff Depth>2.27"
Flow Length=446' Tc=17.8 min CN=76 Runoff=12.41 cfs 1.162 af

Subcatchment SA-1A: Runoff Area=1,445 sf 100.00% Impervious Runoff Depth>4.33"
Flow Length=98' Slope=0.0393 '/' Tc=6.0 min CN=98 Runoff=0.16 cfs 0.012 af

Subcatchment SA-1B: Runoff Area=1,997 sf 100.00% Impervious Runoff Depth>4.33"
Flow Length=104' Slope=0.0365 '/' Tc=6.0 min CN=98 Runoff=0.21 cfs 0.017 af

Subcatchment SA-1C: Runoff Area=3,309 sf 100.00% Impervious Runoff Depth>4.33"
Flow Length=228' Tc=6.0 min CN=98 Runoff=0.36 cfs 0.027 af

Subcatchment SA-1D: Runoff Area=4,592 sf 100.00% Impervious Runoff Depth>4.33"
Flow Length=248' Tc=6.0 min CN=98 Runoff=0.49 cfs 0.038 af

Subcatchment SA-1E: Runoff Area=1,448 sf 100.00% Impervious Runoff Depth>4.33"
Flow Length=100' Slope=0.0130 '/' Tc=6.0 min CN=98 Runoff=0.16 cfs 0.012 af

Subcatchment SA-1F: Runoff Area=2,737 sf 100.00% Impervious Runoff Depth>4.33"
Flow Length=90' Slope=0.0122 '/' Tc=6.0 min CN=98 Runoff=0.29 cfs 0.023 af

Subcatchment SA-1G: Runoff Area=2,298 sf 100.00% Impervious Runoff Depth>4.33"
Flow Length=160' Tc=6.0 min CN=98 Runoff=0.25 cfs 0.019 af

Subcatchment SA-1H: Runoff Area=2,916 sf 100.00% Impervious Runoff Depth>4.33"
Flow Length=150' Slope=0.0371 '/' Tc=6.0 min CN=98 Runoff=0.31 cfs 0.024 af

Subcatchment SA-1I: Runoff Area=39,119 sf 25.56% Impervious Runoff Depth>2.88"
Flow Length=307' Tc=13.3 min CN=83 Runoff=2.54 cfs 0.216 af

Subcatchment SA-1J: Runoff Area=19,433 sf 0.00% Impervious Runoff Depth>2.11"
Flow Length=223' Tc=12.0 min CN=74 Runoff=0.97 cfs 0.078 af

Pond 3: Peak Elev=103.56' Inflow=2.23 cfs 0.172 af
15.0" Round Culvert n=0.013 L=33.0' S=0.0052 '/' Outflow=2.23 cfs 0.172 af

Pond 4: Peak Elev=103.63' Inflow=2.01 cfs 0.155 af
15.0" Round Culvert n=0.013 L=23.0' S=0.0052 '/' Outflow=2.01 cfs 0.155 af

Pond 5: Peak Elev=106.27' Inflow=1.86 cfs 0.143 af
15.0" Round Culvert n=0.013 L=99.0' S=0.0284 '/' Outflow=1.86 cfs 0.143 af

Pond 6: Peak Elev=106.28' Inflow=0.49 cfs 0.038 af
15.0" Round Culvert n=0.013 L=23.0' S=0.0100 '/' Outflow=0.49 cfs 0.038 af

Pond 7: Peak Elev=110.79' Inflow=1.01 cfs 0.078 af
15.0" Round Culvert n=0.013 L=228.0' S=0.0202 '/' Outflow=1.01 cfs 0.078 af

Pond 8: Peak Elev=111.13' Inflow=0.85 cfs 0.066 af
15.0" Round Culvert n=0.013 L=25.0' S=0.0100 '/' Outflow=0.85 cfs 0.066 af

Pond 9: Peak Elev=111.45' Inflow=0.56 cfs 0.043 af
15.0" Round Culvert n=0.013 L=25.0' S=0.0136 '/' Outflow=0.56 cfs 0.043 af

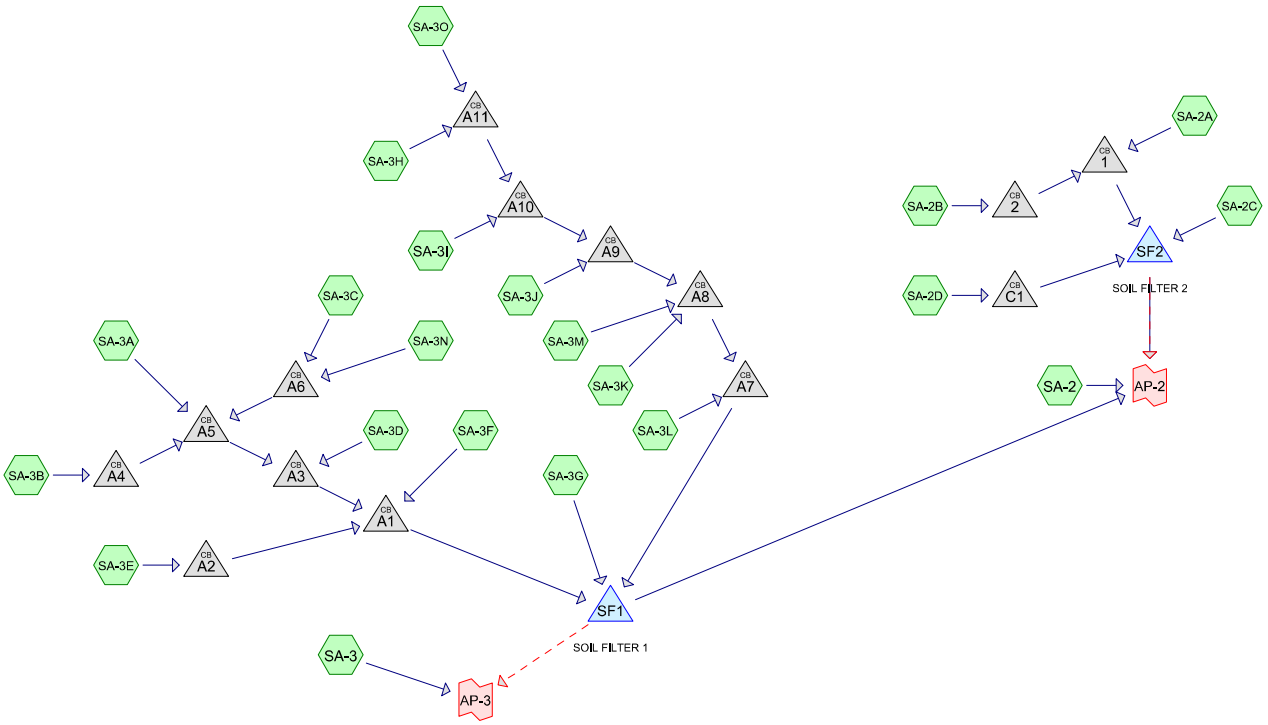
Pond 10: Peak Elev=111.67' Inflow=0.25 cfs 0.019 af
15.0" Round Culvert n=0.013 L=23.0' S=0.0100 '/' Outflow=0.25 cfs 0.019 af

Pond C2: Peak Elev=107.49' Inflow=2.54 cfs 0.216 af
18.0" Round Culvert n=0.013 L=71.0' S=0.1007 '/' Outflow=2.54 cfs 0.216 af

Pond SF3: SOIL FILTER 3 Peak Elev=104.93' Storage=5,766 cf Inflow=3.01 cfs 0.250 af
Primary=0.74 cfs 0.164 af Secondary=0.00 cfs 0.000 af Outflow=0.74 cfs 0.164 af

Link AP-1: Inflow=15.34 cfs 1.543 af
Primary=15.34 cfs 1.543 af

Total Runoff Area = 7.968 ac Runoff Volume = 1.628 af Average Runoff Depth = 2.45"
88.26% Pervious = 7.033 ac 11.74% Impervious = 0.935 ac



Routing Diagram for Post-Development-AP-2 & 3
Prepared by BH2M, Printed 5/7/2024
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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment SA-2: Runoff Area=213,390 sf 5.52% Impervious Runoff Depth>3.49"
Flow Length=660' Tc=26.9 min CN=78 Runoff=12.79 cfs 1.425 af

Subcatchment SA-2A: Runoff Area=2,664 sf 100.00% Impervious Runoff Depth>5.51"
Flow Length=190' Tc=6.0 min CN=98 Runoff=0.36 cfs 0.028 af

Subcatchment SA-2B: Runoff Area=3,431 sf 100.00% Impervious Runoff Depth>5.51"
Flow Length=190' Tc=6.0 min CN=98 Runoff=0.47 cfs 0.036 af

Subcatchment SA-2C: Runoff Area=2,417 sf 0.00% Impervious Runoff Depth>3.72"
Flow Length=40' Slope=0.1750 '/' Tc=6.0 min CN=80 Runoff=0.25 cfs 0.017 af

Subcatchment SA-2D: Runoff Area=11,870 sf 42.12% Impervious Runoff Depth>4.65"
Flow Length=223' Tc=13.7 min CN=89 Runoff=1.18 cfs 0.106 af

Subcatchment SA-3: Runoff Area=33,979 sf 0.00% Impervious Runoff Depth>3.11"
Flow Length=108' Slope=0.0370 '/' Tc=17.6 min CN=74 Runoff=2.17 cfs 0.202 af

Subcatchment SA-3A: Runoff Area=7,214 sf 90.84% Impervious Runoff Depth>5.36"
Flow Length=102' Slope=0.0069 '/' Tc=6.0 min CN=96 Runoff=0.97 cfs 0.074 af

Subcatchment SA-3B: Runoff Area=2,033 sf 100.00% Impervious Runoff Depth>5.51"
Flow Length=82' Slope=0.0201 '/' Tc=6.0 min CN=98 Runoff=0.28 cfs 0.021 af

Subcatchment SA-3C: Runoff Area=1,985 sf 4.33% Impervious Runoff Depth>3.82"
Flow Length=40' Slope=0.0150 '/' Tc=6.0 min CN=81 Runoff=0.21 cfs 0.014 af

Subcatchment SA-3D: Runoff Area=5,267 sf 100.00% Impervious Runoff Depth>5.51"
Flow Length=81' Slope=0.0172 '/' Tc=6.0 min CN=98 Runoff=0.72 cfs 0.056 af

Subcatchment SA-3E: Runoff Area=2,493 sf 100.00% Impervious Runoff Depth>5.51"
Flow Length=80' Slope=0.0225 '/' Tc=6.0 min CN=98 Runoff=0.34 cfs 0.026 af

Subcatchment SA-3F: Runoff Area=2,482 sf 93.67% Impervious Runoff Depth>5.36"
Flow Length=60' Slope=0.0200 '/' Tc=6.0 min CN=96 Runoff=0.33 cfs 0.025 af

Subcatchment SA-3G: Runoff Area=7,939 sf 0.00% Impervious Runoff Depth>3.42"
Flow Length=60' Slope=0.0875 '/' Tc=6.0 min CN=77 Runoff=0.76 cfs 0.052 af

Subcatchment SA-3H: Runoff Area=2,721 sf 100.00% Impervious Runoff Depth>5.51"
Flow Length=211' Tc=6.0 min CN=98 Runoff=0.37 cfs 0.029 af

Subcatchment SA-3I: Runoff Area=7,229 sf 35.86% Impervious Runoff Depth>4.55"
Flow Length=150' Slope=0.0140 '/' Tc=6.0 min CN=88 Runoff=0.88 cfs 0.063 af

Subcatchment SA-3J: Runoff Area=1,332 sf 0.00% Impervious Runoff Depth>4.55"
Flow Length=47' Slope=0.0638 '/' Tc=6.0 min CN=88 Runoff=0.16 cfs 0.012 af

Subcatchment SA-3K: Runoff Area=2,569 sf 0.00% Impervious Runoff Depth>3.82"
Flow Length=48' Slope=0.0625 '/' Tc=6.0 min CN=81 Runoff=0.27 cfs 0.019 af

Subcatchment SA-3L: Runoff Area=1,602 sf 0.00% Impervious Runoff Depth>3.72"
Flow Length=33' Slope=0.0758 '/' Tc=6.0 min CN=80 Runoff=0.17 cfs 0.011 af

Subcatchment SA-3M: Runoff Area=4,848 sf 100.00% Impervious Runoff Depth>5.51"
Tc=6.0 min CN=98 Runoff=0.66 cfs 0.051 af

Subcatchment SA-3N: Runoff Area=5,537 sf 100.00% Impervious Runoff Depth>5.51"
Tc=6.0 min CN=98 Runoff=0.75 cfs 0.058 af

Subcatchment SA-3O: Runoff Area=12,046 sf 0.00% Impervious Runoff Depth>3.61"
Flow Length=197' Tc=12.3 min CN=79 Runoff=1.01 cfs 0.083 af

Pond 1: Peak Elev=111.54' Inflow=0.83 cfs 0.064 af
15.0" Round Culvert n=0.013 L=22.0' S=0.0505 '/' Outflow=0.83 cfs 0.064 af

Pond 2: Peak Elev=111.99' Inflow=0.47 cfs 0.036 af
15.0" Round Culvert n=0.013 L=23.0' S=0.0200 '/' Outflow=0.47 cfs 0.036 af

Pond A1: Peak Elev=113.87' Inflow=3.61 cfs 0.275 af
15.0" Round Culvert n=0.013 L=27.0' S=0.0100 '/' Outflow=3.61 cfs 0.275 af

Pond A10: Peak Elev=114.63' Inflow=2.11 cfs 0.175 af
15.0" Round Culvert n=0.013 L=45.0' S=0.0051 '/' Outflow=2.11 cfs 0.175 af

Pond A11: Peak Elev=114.52' Inflow=1.29 cfs 0.112 af
15.0" Round Culvert n=0.013 L=16.0' S=0.0050 '/' Outflow=1.29 cfs 0.112 af

Pond A2: Peak Elev=113.74' Inflow=0.34 cfs 0.026 af
15.0" Round Culvert n=0.013 L=60.0' S=0.0100 '/' Outflow=0.34 cfs 0.026 af

Pond A3: Peak Elev=114.21' Inflow=2.93 cfs 0.224 af
15.0" Round Culvert n=0.013 L=41.0' S=0.0100 '/' Outflow=2.93 cfs 0.224 af

Pond A4: Peak Elev=114.99' Inflow=0.28 cfs 0.021 af
15.0" Round Culvert n=0.013 L=49.0' S=0.0100 '/' Outflow=0.28 cfs 0.021 af

Pond A5: Peak Elev=114.89' Inflow=2.21 cfs 0.168 af
15.0" Round Culvert n=0.013 L=77.0' S=0.0100 '/' Outflow=2.21 cfs 0.168 af

Pond A6: Peak Elev=115.06' Inflow=0.97 cfs 0.073 af
15.0" Round Culvert n=0.013 L=52.0' S=0.0050 '/' Outflow=0.97 cfs 0.073 af

Pond A7: Peak Elev=113.93' Inflow=3.35 cfs 0.268 af
15.0" Round Culvert n=0.013 L=59.0' S=0.0051 '/' Outflow=3.35 cfs 0.268 af

Pond A8: Peak Elev=114.19' Inflow=3.18 cfs 0.256 af
15.0" Round Culvert n=0.013 L=59.0' S=0.0051 '/' Outflow=3.18 cfs 0.256 af

Pond A9: Peak Elev=114.42' Inflow=2.26 cfs 0.186 af
15.0" Round Culvert n=0.013 L=89.0' S=0.0051 '/' Outflow=2.26 cfs 0.186 af

Pond C1: Peak Elev=116.09' Inflow=1.18 cfs 0.106 af
15.0" Round Culvert n=0.013 L=88.0' S=0.0625 '/' Outflow=1.18 cfs 0.106 af

Pond SF1: SOIL FILTER 1 Peak Elev=115.42' Storage=13,514 cf Inflow=7.70 cfs 0.595 af
Primary=1.86 cfs 0.423 af Secondary=0.00 cfs 0.000 af Outflow=1.86 cfs 0.423 af

Pond SF2: SOIL FILTER 2 Peak Elev=111.68' Storage=2,301 cf Inflow=2.06 cfs 0.187 af
Primary=2.01 cfs 0.140 af Secondary=0.00 cfs 0.000 af Outflow=2.01 cfs 0.140 af

Link AP-2: Inflow=15.82 cfs 1.988 af
Primary=15.82 cfs 1.988 af

Link AP-3: Inflow=2.17 cfs 0.202 af
Primary=2.17 cfs 0.202 af

Total Runoff Area = 7.692 ac Runoff Volume = 2.410 af Average Runoff Depth = 3.76"
82.89% Pervious = 6.375 ac 17.11% Impervious = 1.316 ac

Summary for Subcatchment SA-2:

Runoff = 12.79 cfs @ 12.37 hrs, Volume= 1.425 af, Depth> 3.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=6.20"

	Area (sf)	CN	Description
	28	70	Woods, Good, HSG C
	185,628	77	Woods, Good, HSG D
	70	74	>75% Grass cover, Good, HSG C
	15,880	80	>75% Grass cover, Good, HSG D
	1,784	98	Paved parking, HSG A
*	10,000	98	Assumed Duplexes
	213,390	78	Weighted Average
	201,606		94.48% Pervious Area
	11,784		5.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.1	150	0.0667	0.14		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.30"
8.8	510	0.0373	0.97		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
26.9	660	Total			

Summary for Subcatchment SA-2A:

Runoff = 0.36 cfs @ 12.09 hrs, Volume= 0.028 af, Depth> 5.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=6.20"

Area (sf)	CN	Description
2,664	98	Paved parking, HSG A
2,664		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	150	0.0338	1.87		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.30"
0.2	40	0.0375	3.93		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.5	190	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment SA-2B:

Runoff = 0.47 cfs @ 12.09 hrs, Volume= 0.036 af, Depth> 5.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=6.20"

Area (sf)	CN	Description
3,431	98	Paved parking, HSG A
3,431		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	150	0.0338	1.87		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.30"
0.2	40	0.0375	3.93		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.5	190	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment SA-2C:

Runoff = 0.25 cfs @ 12.09 hrs, Volume= 0.017 af, Depth> 3.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=6.20"

Area (sf)	CN	Description
2,417	80	>75% Grass cover, Good, HSG D
2,417		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.9	40	0.1750	0.34		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.30"
1.9	40	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment SA-2D:

Runoff = 1.18 cfs @ 12.18 hrs, Volume= 0.106 af, Depth> 4.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=6.20"

	Area (sf)	CN	Description
	4,951	83	Woods, Poor, HSG D
	1,919	80	>75% Grass cover, Good, HSG D
*	5,000	98	Assumed Duplex
	11,870	89	Weighted Average
	6,870		57.88% Pervious Area
	5,000		42.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.3	150	0.1433	0.19		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.30"
0.1	12	0.1433	1.89		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.3	61	0.0300	3.68	5.52	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=0.50' Z= 2.0 '/' Top.W=4.00' n= 0.035
13.7	223	Total			

Summary for Subcatchment SA-3:

Runoff = 2.17 cfs @ 12.25 hrs, Volume= 0.202 af, Depth> 3.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=6.20"

Area (sf)	CN	Description
15,066	70	Woods, Good, HSG C
2,921	77	Woods, Poor, HSG C
6,644	77	Woods, Good, HSG D
530	83	Woods, Poor, HSG D
6,997	74	>75% Grass cover, Good, HSG C
1,821	80	>75% Grass cover, Good, HSG D
33,979	74	Weighted Average
33,979		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.6	108	0.0370	0.10		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.30"

Summary for Subcatchment SA-3A:

Runoff = 0.97 cfs @ 12.09 hrs, Volume= 0.074 af, Depth> 5.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=6.20"

Area (sf)	CN	Description
661	80	>75% Grass cover, Good, HSG D
6,553	98	Paved parking, HSG A
7,214	96	Weighted Average
661		9.16% Pervious Area
6,553		90.84% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.9	102	0.0069	0.92		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.30"
1.9	102	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment SA-3B:

Runoff = 0.28 cfs @ 12.09 hrs, Volume= 0.021 af, Depth> 5.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=6.20"

Area (sf)	CN	Description
2,033	98	Paved parking, HSG A
2,033		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	82	0.0201	1.35		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.30"
1.0	82	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment SA-3C:

Runoff = 0.21 cfs @ 12.09 hrs, Volume= 0.014 af, Depth> 3.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=6.20"

Area (sf)	CN	Description
1,899	80	>75% Grass cover, Good, HSG D
86	98	Paved parking, HSG A
1,985	81	Weighted Average
1,899		95.67% Pervious Area
86		4.33% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	40	0.0150	1.04		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.30"
0.6	40	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment SA-3D:

Runoff = 0.72 cfs @ 12.09 hrs, Volume= 0.056 af, Depth> 5.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=6.20"

Area (sf)	CN	Description
5,267	98	Paved parking, HSG A
5,267		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1	81	0.0172	1.26		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.30"
1.1	81	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment SA-3E:

Runoff = 0.34 cfs @ 12.09 hrs, Volume= 0.026 af, Depth> 5.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=6.20"

Area (sf)	CN	Description
2,493	98	Paved parking, HSG A
2,493		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	80	0.0225	1.40		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.30"
1.0	80	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment SA-3F:

Runoff = 0.33 cfs @ 12.09 hrs, Volume= 0.025 af, Depth> 5.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=6.20"

Area (sf)	CN	Description
157	74	>75% Grass cover, Good, HSG C
2,325	98	Paved parking, HSG A
2,482	96	Weighted Average
157		6.33% Pervious Area
2,325		93.67% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	60	0.0200	1.26		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.30"
0.8	60	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment SA-3G:

Runoff = 0.76 cfs @ 12.09 hrs, Volume= 0.052 af, Depth> 3.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=6.20"

Area (sf)	CN	Description
3,478	74	>75% Grass cover, Good, HSG C
4,461	80	>75% Grass cover, Good, HSG D
7,939	77	Weighted Average
7,939		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	60	0.0875	0.28		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.30"
3.6	60	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment SA-3H:

Runoff = 0.37 cfs @ 12.09 hrs, Volume= 0.029 af, Depth> 5.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=6.20"

Area (sf)	CN	Description
2,721	98	Paved parking, HSG A
2,721		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.0	150	0.0128	1.27		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.30"
0.4	61	0.0156	2.54		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
2.4	211	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment SA-3I:

Runoff = 0.88 cfs @ 12.09 hrs, Volume= 0.063 af, Depth> 4.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=6.20"

Area (sf)	CN	Description
3,551	80	>75% Grass cover, Good, HSG D
1,086	91	Gravel roads, HSG D
2,592	98	Paved parking, HSG A
7,229	88	Weighted Average
4,637		64.14% Pervious Area
2,592		35.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.9	150	0.0140	1.31		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.30"
1.9	150	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment SA-3J:

Runoff = 0.16 cfs @ 12.09 hrs, Volume= 0.012 af, Depth> 4.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=6.20"

Area (sf)	CN	Description
398	80	>75% Grass cover, Good, HSG D
934	91	Gravel roads, HSG D
1,332	88	Weighted Average
1,332		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	47	0.0638	0.24		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.30"
3.3	47	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment SA-3K:

Runoff = 0.27 cfs @ 12.09 hrs, Volume= 0.019 af, Depth> 3.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=6.20"

Area (sf)	CN	Description
2,334	80	>75% Grass cover, Good, HSG D
235	91	Gravel roads, HSG D
2,569	81	Weighted Average
2,569		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.4	48	0.0625	0.24		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.30"
3.4	48	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment SA-3L:

Runoff = 0.17 cfs @ 12.09 hrs, Volume= 0.011 af, Depth> 3.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=6.20"

Area (sf)	CN	Description
1,602	80	>75% Grass cover, Good, HSG D
1,602		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	33	0.0758	0.24		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.30"
2.3	33	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment SA-3M:

Runoff = 0.66 cfs @ 12.09 hrs, Volume= 0.051 af, Depth> 5.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=6.20"

Area (sf)	CN	Description
4,848	98	Roofs, HSG A
4,848		100.00% Impervious Area

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

Summary for Subcatchment SA-3N:

Runoff = 0.75 cfs @ 12.09 hrs, Volume= 0.058 af, Depth> 5.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=6.20"

Area (sf)	CN	Description
5,537	98	Roofs, HSG A
5,537		100.00% Impervious Area

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

Summary for Subcatchment SA-3O:

Runoff = 1.01 cfs @ 12.17 hrs, Volume= 0.083 af, Depth> 3.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=6.20"

Area (sf)	CN	Description
5,099	77	Woods, Good, HSG D
6,947	80	>75% Grass cover, Good, HSG D
12,046	79	Weighted Average
12,046		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.0	143	0.1670	0.20		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.30"
0.3	54	0.0200	3.01	4.51	**Trap/Vee/Rect Channel Flow,** Bot.W=2.00' D=0.50' Z= 2.0 '/' Top.W=4.00' n= 0.035
12.3	197	Total			

Summary for Pond 1:

Inflow Area = 0.140 ac,100.00% Impervious, Inflow Depth > 5.51" for 25-YR event
Inflow = 0.83 cfs @ 12.09 hrs, Volume= 0.064 af
Outflow = 0.83 cfs @ 12.09 hrs, Volume= 0.064 af, Atten= 0%, Lag= 0.0 min
Primary = 0.83 cfs @ 12.09 hrs, Volume= 0.064 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 111.54' @ 12.09 hrs
Flood Elev= 116.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	111.11'	**15.0" Round Culvert** L= 22.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 111.11' / 110.00' S= 0.0505 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf

Primary OutFlow Max=0.81 cfs @ 12.09 hrs HW=111.53' (Free Discharge)
1=Culvert (Inlet Controls 0.81 cfs @ 2.21 fps)

Summary for Pond 2:

Inflow Area = 0.079 ac,100.00% Impervious, Inflow Depth > 5.51" for 25-YR event
Inflow = 0.47 cfs @ 12.09 hrs, Volume= 0.036 af
Outflow = 0.47 cfs @ 12.09 hrs, Volume= 0.036 af, Atten= 0%, Lag= 0.0 min
Primary = 0.47 cfs @ 12.09 hrs, Volume= 0.036 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 111.99' @ 12.09 hrs
Flood Elev= 116.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	111.67'	**15.0" Round Culvert** L= 23.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 111.67' / 111.21' S= 0.0200 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf

Primary OutFlow Max=0.45 cfs @ 12.09 hrs HW=111.98' (Free Discharge)
1=Culvert (Inlet Controls 0.45 cfs @ 1.90 fps)

Summary for Pond A1:

Inflow Area = 0.620 ac, 89.94% Impervious, Inflow Depth > 5.33" for 25-YR event
Inflow = 3.61 cfs @ 12.09 hrs, Volume= 0.275 af
Outflow = 3.61 cfs @ 12.09 hrs, Volume= 0.275 af, Atten= 0%, Lag= 0.0 min
Primary = 3.61 cfs @ 12.09 hrs, Volume= 0.275 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 113.87' @ 12.09 hrs
Flood Elev= 118.31'

Device	Routing	Invert	Outlet Devices
#1	Primary	112.77'	**15.0" Round Culvert** L= 27.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 112.77' / 112.50' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf

Primary OutFlow Max=3.51 cfs @ 12.09 hrs HW=113.85' (Free Discharge)
1=Culvert (Barrel Controls 3.51 cfs @ 4.15 fps)

Summary for Pond A10:

Inflow Area = 0.505 ac, 24.15% Impervious, Inflow Depth > 4.15" for 25-YR event
Inflow = 2.11 cfs @ 12.11 hrs, Volume= 0.175 af
Outflow = 2.11 cfs @ 12.11 hrs, Volume= 0.175 af, Atten= 0%, Lag= 0.0 min
Primary = 2.11 cfs @ 12.11 hrs, Volume= 0.175 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 114.63' @ 12.11 hrs
Flood Elev= 117.30'

Device	Routing	Invert	Outlet Devices
#1	Primary	113.78'	**15.0" Round Culvert** L= 45.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 113.78' / 113.55' S= 0.0051 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf

Primary OutFlow Max=2.07 cfs @ 12.11 hrs HW=114.62' (Free Discharge)
1=Culvert (Barrel Controls 2.07 cfs @ 3.34 fps)

Summary for Pond A11:

Inflow Area = 0.339 ac, 18.43% Impervious, Inflow Depth > 3.96" for 25-YR event
Inflow = 1.29 cfs @ 12.15 hrs, Volume= 0.112 af
Outflow = 1.29 cfs @ 12.15 hrs, Volume= 0.112 af, Atten= 0%, Lag= 0.0 min
Primary = 1.29 cfs @ 12.15 hrs, Volume= 0.112 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 114.52' @ 12.15 hrs
Flood Elev= 117.30'

Device	Routing	Invert	Outlet Devices
#1	Primary	113.86'	**15.0" Round Culvert** L= 16.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 113.86' / 113.78' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf

Primary OutFlow Max=1.28 cfs @ 12.15 hrs HW=114.52' (Free Discharge)
1=Culvert (Barrel Controls 1.28 cfs @ 2.83 fps)

Summary for Pond A2:

Inflow Area = 0.057 ac,100.00% Impervious, Inflow Depth > 5.51" for 25-YR event
Inflow = 0.34 cfs @ 12.09 hrs, Volume= 0.026 af
Outflow = 0.34 cfs @ 12.09 hrs, Volume= 0.026 af, Atten= 0%, Lag= 0.0 min
Primary = 0.34 cfs @ 12.09 hrs, Volume= 0.026 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 113.74' @ 12.09 hrs
Flood Elev= 118.40'

Device	Routing	Invert	Outlet Devices
#1	Primary	113.47'	**15.0" Round Culvert** L= 60.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 113.47' / 112.87' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf

Primary OutFlow Max=0.33 cfs @ 12.09 hrs HW=113.74' (Free Discharge)
1=Culvert (Barrel Controls 0.33 cfs @ 2.60 fps)

Summary for Pond A3:

Inflow Area = 0.506 ac, 88.38% Impervious, Inflow Depth > 5.31" for 25-YR event
Inflow = 2.93 cfs @ 12.09 hrs, Volume= 0.224 af
Outflow = 2.93 cfs @ 12.09 hrs, Volume= 0.224 af, Atten= 0%, Lag= 0.0 min
Primary = 2.93 cfs @ 12.09 hrs, Volume= 0.224 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 114.21' @ 12.09 hrs
Flood Elev= 119.21'

Device	Routing	Invert	Outlet Devices
#1	Primary	113.28'	**15.0" Round Culvert** L= 41.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 113.28' / 112.87' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf

Primary OutFlow Max=2.85 cfs @ 12.09 hrs HW=114.19' (Free Discharge)
1=Culvert (Barrel Controls 2.85 cfs @ 4.15 fps)

Summary for Pond A4:

Inflow Area = 0.047 ac,100.00% Impervious, Inflow Depth > 5.51" for 25-YR event
Inflow = 0.28 cfs @ 12.09 hrs, Volume= 0.021 af
Outflow = 0.28 cfs @ 12.09 hrs, Volume= 0.021 af, Atten= 0%, Lag= 0.0 min
Primary = 0.28 cfs @ 12.09 hrs, Volume= 0.021 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 114.99' @ 12.09 hrs
Flood Elev= 119.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	114.74'	**15.0" Round Culvert** L= 49.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 114.74' / 114.25' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf

Primary OutFlow Max=0.27 cfs @ 12.09 hrs HW=114.98' (Free Discharge)
1=Culvert (Barrel Controls 0.27 cfs @ 2.44 fps)

Summary for Pond A5:

Inflow Area = 0.385 ac, 84.73% Impervious, Inflow Depth > 5.24" for 25-YR event
Inflow = 2.21 cfs @ 12.09 hrs, Volume= 0.168 af
Outflow = 2.21 cfs @ 12.09 hrs, Volume= 0.168 af, Atten= 0%, Lag= 0.0 min
Primary = 2.21 cfs @ 12.09 hrs, Volume= 0.168 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 114.89' @ 12.09 hrs
Flood Elev= 119.86'

Device	Routing	Invert	Outlet Devices
#1	Primary	114.15'	**15.0" Round Culvert** L= 77.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 114.15' / 113.38' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf

Primary OutFlow Max=2.15 cfs @ 12.09 hrs HW=114.88' (Free Discharge)
1=Culvert (Barrel Controls 2.15 cfs @ 4.17 fps)

Summary for Pond A6:

Inflow Area = 0.173 ac, 74.75% Impervious, Inflow Depth > 5.06" for 25-YR event
Inflow = 0.97 cfs @ 12.09 hrs, Volume= 0.073 af
Outflow = 0.97 cfs @ 12.09 hrs, Volume= 0.073 af, Atten= 0%, Lag= 0.0 min
Primary = 0.97 cfs @ 12.09 hrs, Volume= 0.073 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 115.06' @ 12.09 hrs
Flood Elev= 120.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	114.51'	**15.0" Round Culvert** L= 52.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 114.51' / 114.25' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf

Primary OutFlow Max=0.94 cfs @ 12.09 hrs HW=115.05' (Free Discharge)
1=Culvert (Barrel Controls 0.94 cfs @ 2.75 fps)

Summary for Pond A7:

Inflow Area = 0.743 ac, 31.41% Impervious, Inflow Depth > 4.33" for 25-YR event
Inflow = 3.35 cfs @ 12.10 hrs, Volume= 0.268 af
Outflow = 3.35 cfs @ 12.10 hrs, Volume= 0.268 af, Atten= 0%, Lag= 0.0 min
Primary = 3.35 cfs @ 12.10 hrs, Volume= 0.268 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 113.93' @ 12.10 hrs
Flood Elev= 118.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	112.80'	**15.0" Round Culvert** L= 59.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 112.80' / 112.50' S= 0.0051 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf

Primary OutFlow Max=3.34 cfs @ 12.10 hrs HW=113.93' (Free Discharge)
1=Culvert (Barrel Controls 3.34 cfs @ 3.78 fps)

Summary for Pond A8:

Inflow Area = 0.706 ac, 33.05% Impervious, Inflow Depth > 4.36" for 25-YR event
Inflow = 3.18 cfs @ 12.10 hrs, Volume= 0.256 af
Outflow = 3.18 cfs @ 12.10 hrs, Volume= 0.256 af, Atten= 0%, Lag= 0.0 min
Primary = 3.18 cfs @ 12.10 hrs, Volume= 0.256 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 114.19' @ 12.10 hrs
Flood Elev= 118.55'

Device	Routing	Invert	Outlet Devices
#1	Primary	113.10'	**15.0" Round Culvert** L= 59.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 113.10' / 112.80' S= 0.0051 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf

Primary OutFlow Max=3.17 cfs @ 12.10 hrs HW=114.19' (Free Discharge)
1=Culvert (Barrel Controls 3.17 cfs @ 3.74 fps)

Summary for Pond A9:

Inflow Area = 0.536 ac, 22.78% Impervious, Inflow Depth > 4.18" for 25-YR event
Inflow = 2.26 cfs @ 12.11 hrs, Volume= 0.186 af
Outflow = 2.26 cfs @ 12.11 hrs, Volume= 0.186 af, Atten= 0%, Lag= 0.0 min
Primary = 2.26 cfs @ 12.11 hrs, Volume= 0.186 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 114.42' @ 12.11 hrs
Flood Elev= 119.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	113.55'	**15.0" Round Culvert** L= 89.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 113.55' / 113.10' S= 0.0051 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf

Primary OutFlow Max=2.23 cfs @ 12.11 hrs HW=114.41' (Free Discharge)
1=Culvert (Barrel Controls 2.23 cfs @ 3.49 fps)

Summary for Pond C1:

Inflow Area = 0.272 ac, 42.12% Impervious, Inflow Depth > 4.65" for 25-YR event
Inflow = 1.18 cfs @ 12.18 hrs, Volume= 0.106 af
Outflow = 1.18 cfs @ 12.18 hrs, Volume= 0.106 af, Atten= 0%, Lag= 0.0 min
Primary = 1.18 cfs @ 12.18 hrs, Volume= 0.106 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 116.09' @ 12.18 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	115.50'	**15.0" Round Culvert** L= 88.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 115.50' / 110.00' S= 0.0625 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf

Primary OutFlow Max=1.16 cfs @ 12.18 hrs HW=116.09' (Free Discharge)
1=Culvert (Inlet Controls 1.16 cfs @ 2.06 fps)

Summary for Pond SF1: SOIL FILTER 1

Inflow Area = 1.545 ac, 51.20% Impervious, Inflow Depth > 4.62" for 25-YR event
Inflow = 7.70 cfs @ 12.09 hrs, Volume= 0.595 af
Outflow = 1.86 cfs @ 12.51 hrs, Volume= 0.423 af, Atten= 76%, Lag= 24.9 min
Primary = 1.86 cfs @ 12.51 hrs, Volume= 0.423 af
Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 115.42' @ 12.51 hrs Surf.Area= 7,594 sf Storage= 13,514 cf

Plug-Flow detention time= 150.2 min calculated for 0.421 af (71% of inflow)
Center-of-Mass det. time= 84.1 min (837.5 - 753.3)

Volume	Invert	Avail.Storage	Storage Description
#1	112.50'	14,242 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)
#2	110.17'	2,353 cf	**Custom Stage Data (Irregular)** Listed below (Recalc) 5,883 cf Overall x 40.0% Voids
		16,596 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
112.50	2,525	234.7	0	0	2,525
113.00	3,054	254.8	1,393	1,393	3,317
114.00	3,847	273.7	3,443	4,836	4,155
115.00	4,696	292.5	4,264	9,100	5,048
116.00	5,602	311.4	5,142	14,242	6,005

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
110.17	2,525	234.7	0	0	2,525
112.50	2,525	234.7	5,883	5,883	3,072

Device	Routing	Invert	Outlet Devices
#1	Device 4	114.00'	**12.0" W x 4.0" H Vert. Orifice/Grate** C= 0.600
#2	Device 3	110.17'	**2.410 in/hr Exfiltration over Surface area**
#3	Device 4	110.17'	**1.0" Vert. Orifice/Grate** C= 0.600
#4	Primary	110.17'	**15.0" Round Culvert** L= 22.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 110.17' / 110.06' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf
#5	Secondary	115.50'	**10.0' long x 4.0' breadth Broad-Crested Rectangular Weir**

Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00
2.50 3.00 3.50 4.00 4.50 5.00 5.50
Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66
2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=1.86 cfs @ 12.51 hrs HW=115.42' (Free Discharge)
└**4=Culvert** (Passes 1.86 cfs of 12.71 cfs potential flow)
  ├**1=Orifice/Grate** (Orifice Controls 1.80 cfs @ 5.39 fps)
  └**3=Orifice/Grate** (Orifice Controls 0.06 cfs @ 10.99 fps)
    └**2=Exfiltration** (Passes 0.06 cfs of 0.42 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=110.17' (Free Discharge)
└**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond SF2: SOIL FILTER 2

Inflow Area = 0.468 ac, 54.44% Impervious, Inflow Depth > 4.80" for 25-YR event
Inflow = 2.06 cfs @ 12.12 hrs, Volume= 0.187 af
Outflow = 2.01 cfs @ 12.15 hrs, Volume= 0.140 af, Atten= 2%, Lag= 2.0 min
Primary = 2.01 cfs @ 12.15 hrs, Volume= 0.140 af
Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 111.68' @ 12.15 hrs Surf.Area= 2,080 sf Storage= 2,301 cf

Plug-Flow detention time= 107.4 min calculated for 0.140 af (75% of inflow)
Center-of-Mass det. time= 46.2 min (801.3 - 755.2)

Volume	Invert	Avail.Storage	Storage Description
#1	110.00'	3,173 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)
#2	107.67'	540 cf	**Custom Stage Data (Irregular)** Listed below (Recalc) 1,349 cf Overall x 40.0% Voids
		3,713 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
110.00	579	115.4	0	0	579
111.00	1,169	158.3	857	857	1,523
112.00	1,672	177.1	1,413	2,270	2,052
112.50	1,944	186.5	903	3,173	2,339

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
107.67	579	115.4	0	0	579
110.00	579	115.4	1,349	1,349	848

Device	Routing	Invert	Outlet Devices
#1	Device 4	111.50'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Device 3	107.67'	**2.410 in/hr Exfiltration over Surface area**
#3	Device 4	107.67'	**0.6" Vert. Orifice/Grate** C= 0.600
#4	Primary	107.67'	**15.0" Round Culvert** L= 26.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 107.67' / 105.40' S= 0.0873 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf
#5	Secondary	112.00'	**10.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=2.00 cfs @ 12.15 hrs HW=111.68' (Free Discharge)
└**4=Culvert** (Passes 2.00 cfs of 10.87 cfs potential flow)
  ├**1=Orifice/Grate** (Weir Controls 1.98 cfs @ 1.38 fps)
  └**3=Orifice/Grate** (Orifice Controls 0.02 cfs @ 9.61 fps)
    └**2=Exfiltration** (Passes 0.02 cfs of 0.12 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=107.68' (Free Discharge)
└**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Link AP-2:

Inflow Area = 6.912 ac, 19.04% Impervious, Inflow Depth > 3.45" for 25-YR event
Inflow = 15.82 cfs @ 12.36 hrs, Volume= 1.988 af
Primary = 15.82 cfs @ 12.36 hrs, Volume= 1.988 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Link AP-3:

Inflow Area = 0.780 ac, 0.00% Impervious, Inflow Depth > 3.11" for 25-YR event
Inflow = 2.17 cfs @ 12.25 hrs, Volume= 0.202 af
Primary = 2.17 cfs @ 12.25 hrs, Volume= 0.202 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment SA-2: Runoff Area=213,390 sf 5.52% Impervious Runoff Depth>1.23"
Flow Length=660' Tc=26.9 min CN=78 Runoff=4.49 cfs 0.502 af

Subcatchment SA-2A: Runoff Area=2,664 sf 100.00% Impervious Runoff Depth>2.87"
Flow Length=190' Tc=6.0 min CN=98 Runoff=0.19 cfs 0.015 af

Subcatchment SA-2B: Runoff Area=3,431 sf 100.00% Impervious Runoff Depth>2.87"
Flow Length=190' Tc=6.0 min CN=98 Runoff=0.25 cfs 0.019 af

Subcatchment SA-2C: Runoff Area=2,417 sf 0.00% Impervious Runoff Depth>1.37"
Flow Length=40' Slope=0.1750 '/' Tc=6.0 min CN=80 Runoff=0.09 cfs 0.006 af

Subcatchment SA-2D: Runoff Area=11,870 sf 42.12% Impervious Runoff Depth>2.04"
Flow Length=223' Tc=13.7 min CN=89 Runoff=0.54 cfs 0.046 af

Subcatchment SA-3: Runoff Area=33,979 sf 0.00% Impervious Runoff Depth>1.00"
Flow Length=108' Slope=0.0370 '/' Tc=17.6 min CN=74 Runoff=0.68 cfs 0.065 af

Subcatchment SA-3A: Runoff Area=7,214 sf 90.84% Impervious Runoff Depth>2.69"
Flow Length=102' Slope=0.0069 '/' Tc=6.0 min CN=96 Runoff=0.50 cfs 0.037 af

Subcatchment SA-3B: Runoff Area=2,033 sf 100.00% Impervious Runoff Depth>2.87"
Flow Length=82' Slope=0.0201 '/' Tc=6.0 min CN=98 Runoff=0.15 cfs 0.011 af

Subcatchment SA-3C: Runoff Area=1,985 sf 4.33% Impervious Runoff Depth>1.43"
Flow Length=40' Slope=0.0150 '/' Tc=6.0 min CN=81 Runoff=0.08 cfs 0.005 af

Subcatchment SA-3D: Runoff Area=5,267 sf 100.00% Impervious Runoff Depth>2.87"
Flow Length=81' Slope=0.0172 '/' Tc=6.0 min CN=98 Runoff=0.38 cfs 0.029 af

Subcatchment SA-3E: Runoff Area=2,493 sf 100.00% Impervious Runoff Depth>2.87"
Flow Length=80' Slope=0.0225 '/' Tc=6.0 min CN=98 Runoff=0.18 cfs 0.014 af

Subcatchment SA-3F: Runoff Area=2,482 sf 93.67% Impervious Runoff Depth>2.69"
Flow Length=60' Slope=0.0200 '/' Tc=6.0 min CN=96 Runoff=0.17 cfs 0.013 af

Subcatchment SA-3G: Runoff Area=7,939 sf 0.00% Impervious Runoff Depth>1.18"
Flow Length=60' Slope=0.0875 '/' Tc=6.0 min CN=77 Runoff=0.26 cfs 0.018 af

Subcatchment SA-3H: Runoff Area=2,721 sf 100.00% Impervious Runoff Depth>2.87"
Flow Length=211' Tc=6.0 min CN=98 Runoff=0.20 cfs 0.015 af

Subcatchment SA-3I: Runoff Area=7,229 sf 35.86% Impervious Runoff Depth>1.96"
Flow Length=150' Slope=0.0140 '/' Tc=6.0 min CN=88 Runoff=0.40 cfs 0.027 af

Subcatchment SA-3J: Runoff Area=1,332 sf 0.00% Impervious Runoff Depth>1.96"
Flow Length=47' Slope=0.0638 '/' Tc=6.0 min CN=88 Runoff=0.07 cfs 0.005 af

Subcatchment SA-3K: Runoff Area=2,569 sf 0.00% Impervious Runoff Depth>1.43"
Flow Length=48' Slope=0.0625 '/' Tc=6.0 min CN=81 Runoff=0.10 cfs 0.007 af

Subcatchment SA-3L: Runoff Area=1,602 sf 0.00% Impervious Runoff Depth>1.37"
Flow Length=33' Slope=0.0758 '/' Tc=6.0 min CN=80 Runoff=0.06 cfs 0.004 af

Subcatchment SA-3M: Runoff Area=4,848 sf 100.00% Impervious Runoff Depth>2.87"
Tc=6.0 min CN=98 Runoff=0.35 cfs 0.027 af

Subcatchment SA-3N: Runoff Area=5,537 sf 100.00% Impervious Runoff Depth>2.87"
Tc=6.0 min CN=98 Runoff=0.40 cfs 0.030 af

Subcatchment SA-3O: Runoff Area=12,046 sf 0.00% Impervious Runoff Depth>1.30"
Flow Length=197' Tc=12.3 min CN=79 Runoff=0.36 cfs 0.030 af

Pond 1: Peak Elev=111.42' Inflow=0.44 cfs 0.033 af
15.0" Round Culvert n=0.013 L=22.0' S=0.0505 '/' Outflow=0.44 cfs 0.033 af

Pond 2: Peak Elev=111.90' Inflow=0.25 cfs 0.019 af
15.0" Round Culvert n=0.013 L=23.0' S=0.0200 '/' Outflow=0.25 cfs 0.019 af

Pond A1: Peak Elev=113.50' Inflow=1.86 cfs 0.139 af
15.0" Round Culvert n=0.013 L=27.0' S=0.0100 '/' Outflow=1.86 cfs 0.139 af

Pond A10: Peak Elev=114.30' Inflow=0.89 cfs 0.072 af
15.0" Round Culvert n=0.013 L=45.0' S=0.0051 '/' Outflow=0.89 cfs 0.072 af

Pond A11: Peak Elev=114.26' Inflow=0.51 cfs 0.045 af
15.0" Round Culvert n=0.013 L=16.0' S=0.0050 '/' Outflow=0.51 cfs 0.045 af

Pond A2: Peak Elev=113.67' Inflow=0.18 cfs 0.014 af
15.0" Round Culvert n=0.013 L=60.0' S=0.0100 '/' Outflow=0.18 cfs 0.014 af

Pond A3: Peak Elev=113.90' Inflow=1.50 cfs 0.113 af
15.0" Round Culvert n=0.013 L=41.0' S=0.0100 '/' Outflow=1.50 cfs 0.113 af

Pond A4: Peak Elev=114.92' Inflow=0.15 cfs 0.011 af
15.0" Round Culvert n=0.013 L=49.0' S=0.0100 '/' Outflow=0.15 cfs 0.011 af

Pond A5: Peak Elev=114.66' Inflow=1.13 cfs 0.084 af
15.0" Round Culvert n=0.013 L=77.0' S=0.0100 '/' Outflow=1.13 cfs 0.084 af

Pond A6: Peak Elev=114.89' Inflow=0.48 cfs 0.036 af
15.0" Round Culvert n=0.013 L=52.0' S=0.0050 '/' Outflow=0.48 cfs 0.036 af

Pond A7: Peak Elev=113.48' Inflow=1.47 cfs 0.115 af
15.0" Round Culvert n=0.013 L=59.0' S=0.0051 '/' Outflow=1.47 cfs 0.115 af

Pond A8: Peak Elev=113.77' Inflow=1.40 cfs 0.111 af
15.0" Round Culvert n=0.013 L=59.0' S=0.0051 '/' Outflow=1.40 cfs 0.111 af

Pond A9: Peak Elev=114.08' Inflow=0.96 cfs 0.077 af
15.0" Round Culvert n=0.013 L=89.0' S=0.0051 '/' Outflow=0.96 cfs 0.077 af

Pond C1: Peak Elev=115.89' Inflow=0.54 cfs 0.046 af
15.0" Round Culvert n=0.013 L=88.0' S=0.0625 '/' Outflow=0.54 cfs 0.046 af

Pond SF1: SOIL FILTER 1 Peak Elev=114.16' Storage=7,822 cf Inflow=3.58 cfs 0.272 af
Primary=0.26 cfs 0.104 af Secondary=0.00 cfs 0.000 af Outflow=0.26 cfs 0.104 af

Pond SF2: SOIL FILTER 2 Peak Elev=111.55' Storage=2,107 cf Inflow=0.97 cfs 0.086 af
Primary=0.30 cfs 0.039 af Secondary=0.00 cfs 0.000 af Outflow=0.30 cfs 0.039 af

Link AP-2: Inflow=4.56 cfs 0.646 af
Primary=4.56 cfs 0.646 af

Link AP-3: Inflow=0.68 cfs 0.065 af
Primary=0.68 cfs 0.065 af

Total Runoff Area = 7.692 ac Runoff Volume = 0.925 af Average Runoff Depth = 1.44"
82.89% Pervious = 6.375 ac 17.11% Impervious = 1.316 ac

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment SA-2: Runoff Area=213,390 sf 5.52% Impervious Runoff Depth>2.43"
Flow Length=660' Tc=26.9 min CN=78 Runoff=8.93 cfs 0.991 af

Subcatchment SA-2A: Runoff Area=2,664 sf 100.00% Impervious Runoff Depth>4.33"
Flow Length=190' Tc=6.0 min CN=98 Runoff=0.29 cfs 0.022 af

Subcatchment SA-2B: Runoff Area=3,431 sf 100.00% Impervious Runoff Depth>4.33"
Flow Length=190' Tc=6.0 min CN=98 Runoff=0.37 cfs 0.028 af

Subcatchment SA-2C: Runoff Area=2,417 sf 0.00% Impervious Runoff Depth>2.62"
Flow Length=40' Slope=0.1750 '/' Tc=6.0 min CN=80 Runoff=0.18 cfs 0.012 af

Subcatchment SA-2D: Runoff Area=11,870 sf 42.12% Impervious Runoff Depth>3.46"
Flow Length=223' Tc=13.7 min CN=89 Runoff=0.89 cfs 0.079 af

Subcatchment SA-3: Runoff Area=33,979 sf 0.00% Impervious Runoff Depth>2.11"
Flow Length=108' Slope=0.0370 '/' Tc=17.6 min CN=74 Runoff=1.47 cfs 0.137 af

Subcatchment SA-3A: Runoff Area=7,214 sf 90.84% Impervious Runoff Depth>4.16"
Flow Length=102' Slope=0.0069 '/' Tc=6.0 min CN=96 Runoff=0.76 cfs 0.057 af

Subcatchment SA-3B: Runoff Area=2,033 sf 100.00% Impervious Runoff Depth>4.33"
Flow Length=82' Slope=0.0201 '/' Tc=6.0 min CN=98 Runoff=0.22 cfs 0.017 af

Subcatchment SA-3C: Runoff Area=1,985 sf 4.33% Impervious Runoff Depth>2.71"
Flow Length=40' Slope=0.0150 '/' Tc=6.0 min CN=81 Runoff=0.15 cfs 0.010 af

Subcatchment SA-3D: Runoff Area=5,267 sf 100.00% Impervious Runoff Depth>4.33"
Flow Length=81' Slope=0.0172 '/' Tc=6.0 min CN=98 Runoff=0.57 cfs 0.044 af

Subcatchment SA-3E: Runoff Area=2,493 sf 100.00% Impervious Runoff Depth>4.33"
Flow Length=80' Slope=0.0225 '/' Tc=6.0 min CN=98 Runoff=0.27 cfs 0.021 af

Subcatchment SA-3F: Runoff Area=2,482 sf 93.67% Impervious Runoff Depth>4.16"
Flow Length=60' Slope=0.0200 '/' Tc=6.0 min CN=96 Runoff=0.26 cfs 0.020 af

Subcatchment SA-3G: Runoff Area=7,939 sf 0.00% Impervious Runoff Depth>2.36"
Flow Length=60' Slope=0.0875 '/' Tc=6.0 min CN=77 Runoff=0.53 cfs 0.036 af

Subcatchment SA-3H: Runoff Area=2,721 sf 100.00% Impervious Runoff Depth>4.33"
Flow Length=211' Tc=6.0 min CN=98 Runoff=0.29 cfs 0.023 af

Subcatchment SA-3I: Runoff Area=7,229 sf 35.86% Impervious Runoff Depth>3.37"
Flow Length=150' Slope=0.0140 '/' Tc=6.0 min CN=88 Runoff=0.67 cfs 0.047 af

Subcatchment SA-3J: Runoff Area=1,332 sf 0.00% Impervious Runoff Depth>3.37"
Flow Length=47' Slope=0.0638 '/' Tc=6.0 min CN=88 Runoff=0.12 cfs 0.009 af

Subcatchment SA-3K: Runoff Area=2,569 sf 0.00% Impervious Runoff Depth>2.71"
Flow Length=48' Slope=0.0625 '/' Tc=6.0 min CN=81 Runoff=0.20 cfs 0.013 af

Subcatchment SA-3L: Runoff Area=1,602 sf 0.00% Impervious Runoff Depth>2.62"
Flow Length=33' Slope=0.0758 '/' Tc=6.0 min CN=80 Runoff=0.12 cfs 0.008 af

Subcatchment SA-3M: Runoff Area=4,848 sf 100.00% Impervious Runoff Depth>4.33"
Tc=6.0 min CN=98 Runoff=0.52 cfs 0.040 af

Subcatchment SA-3N: Runoff Area=5,537 sf 100.00% Impervious Runoff Depth>4.33"
Tc=6.0 min CN=98 Runoff=0.59 cfs 0.046 af

Subcatchment SA-3O: Runoff Area=12,046 sf 0.00% Impervious Runoff Depth>2.53"
Flow Length=197' Tc=12.3 min CN=79 Runoff=0.71 cfs 0.058 af

Pond 1: Peak Elev=111.49' Inflow=0.65 cfs 0.050 af
15.0" Round Culvert n=0.013 L=22.0' S=0.0505 '/' Outflow=0.65 cfs 0.050 af

Pond 2: Peak Elev=111.95' Inflow=0.37 cfs 0.028 af
15.0" Round Culvert n=0.013 L=23.0' S=0.0200 '/' Outflow=0.37 cfs 0.028 af

Pond A1: Peak Elev=113.71' Inflow=2.82 cfs 0.214 af
15.0" Round Culvert n=0.013 L=27.0' S=0.0100 '/' Outflow=2.82 cfs 0.214 af

Pond A10: Peak Elev=114.49' Inflow=1.55 cfs 0.127 af
15.0" Round Culvert n=0.013 L=45.0' S=0.0051 '/' Outflow=1.55 cfs 0.127 af

Pond A11: Peak Elev=114.41' Inflow=0.93 cfs 0.081 af
15.0" Round Culvert n=0.013 L=16.0' S=0.0050 '/' Outflow=0.93 cfs 0.081 af

Pond A2: Peak Elev=113.71' Inflow=0.27 cfs 0.021 af
15.0" Round Culvert n=0.013 L=60.0' S=0.0100 '/' Outflow=0.27 cfs 0.021 af

Pond A3: Peak Elev=114.08' Inflow=2.29 cfs 0.174 af
15.0" Round Culvert n=0.013 L=41.0' S=0.0100 '/' Outflow=2.29 cfs 0.174 af

Pond A4: Peak Elev=114.96' Inflow=0.22 cfs 0.017 af
15.0" Round Culvert n=0.013 L=49.0' S=0.0100 '/' Outflow=0.22 cfs 0.017 af

Pond A5: Peak Elev=114.79' Inflow=1.73 cfs 0.130 af
15.0" Round Culvert n=0.013 L=77.0' S=0.0100 '/' Outflow=1.73 cfs 0.130 af

Pond A6: Peak Elev=114.98' Inflow=0.75 cfs 0.056 af
15.0" Round Culvert n=0.013 L=52.0' S=0.0050 '/' Outflow=0.75 cfs 0.056 af

Pond A7: Peak Elev=113.73' Inflow=2.49 cfs 0.197 af
15.0" Round Culvert n=0.013 L=59.0' S=0.0051 '/' Outflow=2.49 cfs 0.197 af

Pond A8: Peak Elev=114.01' Inflow=2.38 cfs 0.189 af
15.0" Round Culvert n=0.013 L=59.0' S=0.0051 '/' Outflow=2.38 cfs 0.189 af

Pond A9: Peak Elev=114.28' Inflow=1.67 cfs 0.136 af
15.0" Round Culvert n=0.013 L=89.0' S=0.0051 '/' Outflow=1.67 cfs 0.136 af

Pond C1: Peak Elev=116.01' Inflow=0.89 cfs 0.079 af
15.0" Round Culvert n=0.013 L=88.0' S=0.0625 '/' Outflow=0.89 cfs 0.079 af

Pond SF1: SOIL FILTER 1 Peak Elev=114.79' Storage=10,504 cf Inflow=5.83 cfs 0.448 af
Primary=1.32 cfs 0.277 af Secondary=0.00 cfs 0.000 af Outflow=1.32 cfs 0.277 af

Pond SF2: SOIL FILTER 2 Peak Elev=111.64' Storage=2,246 cf Inflow=1.57 cfs 0.141 af
Primary=1.44 cfs 0.094 af Secondary=0.00 cfs 0.000 af Outflow=1.44 cfs 0.094 af

Link AP-2: Inflow=11.13 cfs 1.363 af
Primary=11.13 cfs 1.363 af

Link AP-3: Inflow=1.47 cfs 0.137 af
Primary=1.47 cfs 0.137 af

Total Runoff Area = 7.692 ac Runoff Volume = 1.717 af Average Runoff Depth = 2.68"
82.89% Pervious = 6.375 ac 17.11% Impervious = 1.316 ac

Appendix D
Water Quality Calculations and BMP Sizing

BH2M
380B Main Street
Gorham, Maine 04038

WATER QUALITY CALCULATIONS
Barra Road Subdivision
Biddeford

Subcatchment ID	Proposed Impervious Area (sq. ft.)	Proposed Lawn Area (sq. ft.)	Proposed Developed Area (sq. ft.)	Treated Impervious Area (sq. ft.)	Treated Developed Area (sq. ft.)	BMP ID
1	0	7,559	7,559	0	0	Untreated
1A	1,445		1,445	1,445	1,445	Soil Filter 3
1B	1,997		1,997	1,997	1,997	Soil Filter 3
1C	3,309		3,309	3,309	3,309	Soil Filter 3
1D	4,592		4,592	4,592	4,592	Soil Filter 3
1E	1,448		1,448	1,448	1,448	Soil Filter 3
1F	2,737		2,737	2,737	2,737	Soil Filter 3
1G	2,298		2,298	2,298	2,298	Soil Filter 3
1H	2,916		2,916	2,916	2,916	Soil Filter 3
1I		9,814	9,814	0	0	Untreated
1J		6,085	6,085	0	4,961	Soil Filter 3
2	1,624	15,082	16,706	0	0	Untreated
2A	2,664		2,664	2,664	2,664	Soil Filter 2
2B	3,431		3,431	3,431	3,431	Soil Filter 2
2C		2,417	2,417	0	2,417	Soil Filter 2
2D	0	1,919	1,919	0	1,919	Soil Filter 2
Total	**28,461**	**42,876**	**71,337**	**26,837**	**36,134**	

Subdivision Linear Treatment Summary	
Total Proposed Impervious Area (sq. ft.)=	28,461
Total Proposed Developed Area (sq. ft.)=	71,337
Total Treated Impervious Area (sq. ft.)=	26,837
Total Treated Developed Area (sq. ft.)=	36,134
Impervious Area Treatment %* =	**94.3%**
Developed Area Treatment % =	**50.7%**

Barra Road Subdivision Biddeford - SF2 - Trailside Way Grassed Underdrain Soil Filter Calculations

Subcatchment ID	Proposed Impervious Area (ft^2)	WQ Impervious Area Runoff Depth (inches)	WQ Impervious Volume Required (ft^3)	Proposed Landscaped Area (ft^2)	WQ Landscape Area Runoff Depth (inches)	WQ Landscape Volume Required (ft^3)	Total WQ Volume Required (ft^3)
2A	2,664	1.00	222	0	0.40	0	222
2B	3,431	1.00	286	0	0.40	0	286
2C	0	1.00	0	2,417	0.40	81	81
2D	0	1.00	0	1,919	0.40	64	64
Total	**6,095**		**508**	**4,336**		**145**	**652**

Summary of Underdrain Filter Sizing		
Total WQ Volume Required (ft^3)	**652**	
WQ Volume Provided (ft^3)	1,520	OK
Filter Surface Elevation	110.00	
WQ Surface Elevation	111.50	
Invert of Underdrain	107.67	
5% of Tributary Impervious Area (ft^2)	305	
2% of Tributary Landscaped (ft^2)	87	
Filter Surface Area Required (ft^2)	**391**	
Filter Surface Area Provided (ft^2)	579	OK

Underdrain Filter Volume				
Elevation	Surface Area (ft^2)	Average Stage Area (ft^2)	Stage Volume (ft^3)	Cumulative Volume (ft^3)
110	579			0
		874	874	
111	1,169			874
		1,291	646	
111.5	1,414			1,520
		1,543	771	
112	1,672			2,291
		1,833	917	
112.5	1,994			3,208
			Water Quality Volume Provided (at Elevation 111.5) =	**1,520**

Orifice Sizing		
Discharge Coefficient	0.62	
Orifice Size (inches)	0.625	(5/8")
Orifice Size (feet)	0.05	
Orifice Area (ft^2)	0.002	
Orifice Centerline Elevation	107.70	

Orifice Eqn: $C*A*(2gH)^{\wedge 1/2}$

Q (cfs)	Stage Elevation	Total Drawdown at Stage	Pond Area	Drawdown Time (hrs)
0.0161	110	0.00	579	0.00
0.0193	111	1.00	1,169	16.87
0.0207	111.5	0.50	1,414	9.50
			Total Drawdown Time =	**26.37**

Required Sediment Storage		
Area to be Sanded	0.1	acres
Sand Used per Storm	500	lbs/acre-storm
Weight of Sand	90	lbs/cf
# of Storms per Year	10	storms/year
Sediment Storage Required	**7.77**	**cf/year**

Provided Storage Volume		
Total # of CB's	2	
Sump Depth	2	ft
CB Diameter	4	ft
CB Sediment Storage Volume	50.24	cf
Forebay Volume	100	cf
Total Volume	**150.24**	**cf**

Barra Road Subdivision Biddeford - SF 3 - Barra Road Grassed Underdrain Soil Filter Calculations

Subcatchment ID	Proposed Impervious Area (ft^2)	WQ Impervious Area Runoff Depth (inches)	WQ Impervious Volume Required (ft^3)	Proposed Landscaped Area (ft^2)	WQ Landscape Area Runoff Depth (inches)	WQ Landscape Volume Required (ft^3)	Total WQ Volume Required (ft^3)
1A	1,445	1.00	120	0	0.40	0	120
1B	1,997	1.00	166	0	0.40	0	166
1C	3,309	1.00	276	0	0.40	0	276
1D	4,592	1.00	383	0	0.40	0	383
1E	1,448	1.00	121	0	0.40	0	121
1F	2,737	1.00	228	0	0.40	0	228
1G	2,298	1.00	192	0	0.40	0	192
1H	2,916	1.00	243	0	0.40	0	243
1J	0	1.00	0	4,961	0.40	165	165
Total	**20,742**		**1,729**	**4,961**		**165**	**1,894**

Summary of Underdrain Filter Sizing		
Total WQ Volume Required (ft^3)	**1,894**	
WQ Volume Provided (ft^3)	2,480	OK
Filter Surface Elevation	102.50	
WQ Surface Elevation	104.00	
Invert of Underdrain	100.17	
5% of Tributary Impervious Area (ft^2)	1,037	
2% of Tributary Landscaped (ft^2)	99	
Filter Surface Area Required (ft^2)	**1,136**	
Filter Surface Area Provided (ft^2)	1,201	OK

Underdrain Filter Volume				
Elevation	Surface Area (ft^2)	Average Stage Area (ft^2)	Stage Volume (ft^3)	Cumulative Volume (ft^3)
102.5	1,201			0
		1,364	682	
103	1,528			682
		1,798	1,798	
104	2,069			2,480
		2,367	2,367	
105	2,666			4,847
		2,993	2,993	
106	3,320			7,840
			Water Quality Volume Provided (at Elevation 22) =	**2,480**

Orifice Sizing		
Discharge Coefficient	0.62	
Orifice Size (inches)	0.625	(5/8")
Orifice Size (feet)	0.05	
Orifice Area (ft^2)	0.002	
Orifice Centerline Elevation	100.20	

Orifice Eqn: $C*A*(2gH)^{\wedge 1/2}$

Q (cfs)	Stage Elevation	Total Drawdown at Stage	Pond Area	Drawdown Time (hrs)
0.0161	102.5	0.00	1,201	0.00
0.0177	103	0.50	1,528	11.96
0.0207	104	1.00	2,069	27.81
			Total Drawdown Time =	**39.78**

Required Sediment Storage		
Area to be Sanded	0.5	acres
Sand Used per Storm	500	lbs/acre-storm
Weight of Sand	90	lbs/cf
# of Storms per Year	10	storms/year
Sediment Storage Required	**26.45**	**cf/year**

Provided Storage Volume		
Total # of CB's	8	
Sump Depth	2	ft
CB Diameter	4	ft
CB Sediment Storage Volume	200.96	cf
Forebay Volume	53	cf
Total Volume	**253.96**	**cf**

BH2M
380B Main Street
Gorham, Maine 04038

WATER QUALITY CALCULATIONS
Avesta Barra Road 46-Unit
Biddeford

Subcatchment ID	Proposed Impervious Area (sq. ft.)	Proposed Lawn Area (sq. ft.)	Proposed Developed Area (sq. ft.)	Treated Impervious Area (sq. ft.)	Treated Developed Area (sq. ft.)	BMP ID
2		6,563	6,563	0	0	Untreated
3		8,818	8,818	0	0	Untreated
3A	6,553	661	7,214	6,553	7,214	Soil Filter 1
3B	2,033		2,033	2,033	2,033	Soil Filter 1
3C	86	1,899	1,985	86	1,985	Soil Filter 1
3D	5,267		5,267	5,267	5,267	Soil Filter 1
3E	2,493		2,493	2,493	2,493	Soil Filter 1
3F	2,325	157	2,482	2,325	2,482	Soil Filter 1
3G		7,939	7,939	0	7,939	Soil Filter 1
3H	2,721		2,721	2,721	2,721	Soil Filter 1
3I	3,678	3,551	7,229	3,678	7,229	Soil Filter 1
3J	934	398	1,332	934	1,332	Soil Filter 1
3K	235	2,334	2,569	235	2,569	Soil Filter 1
3L		1,602	1,602	0	1,602	Soil Filter 1
3M	4,848		4,848	4,848	4,848	Soil Filter 1
3N	5,537		5,537	5,537	5,537	Soil Filter 1
3O		6,947	6,947	0	6,947	Soil Filter 1
Total	**36,710**	**40,869**	**77,579**	**36,710**	**62,198**	

Avesta Site Treatment Summary	
Total Proposed Impervious Area (sq. ft.)=	36,710
Total Proposed Developed Area (sq. ft.)=	77,579
Total Treated Impervious Area (sq. ft.)=	36,710
Total Treated Developed Area (sq. ft.)=	62,198
Impervious Area Treatment %* =	**100.0%**
Developed Area Treatment % =	**80.2%**

Avesta Barra Road Biddeford - SF1 - Grassed Underdrain Soil Filter Calculations

Subcatchment ID	Proposed Impervious Area (ft^2)	WQ Impervious Area Runoff Depth (inches)	WQ Impervious Volume Required (ft^3)	Proposed Landscaped Area (ft^2)	WQ Landscape Area Runoff Depth (inches)	WQ Landscape Volume Required (ft^3)	Total WQ Volume Required (ft^3)
3A	6,553	1.00	546	661	0.40	22	568
3B	2,033	1.00	169	0	0.40	0	169
3C	86	1.00	7	1,899	0.40	63	70
3D	5,267	1.00	439	0	0.40	0	439
3E	2,493	1.00	208	0	0.40	0	208
3F	2,325	1.00	194	157	0.40	5	199
3G	0	1.00	0	7,939	0.40	265	265
3H	2,721	1.00	227	0	0.40	0	227
3I	3,678	1.00	307	3,551	0.40	118	425
3J	934	1.00	78	398	0.40	13	91
3K	235	1.00	20	2,334	0.40	78	97
3L	0	1.00	0	1,602	0.40	53	53
3M	4,848	1.00	404	0	0.40	0	404
3N	5,537	1.00	461	0	0.40	0	461
3O	0	1.00	0	6,947	0.40	232	232
Total	**36,710**		**3,059**	**25,488**		**850**	**3,909**

Summary of Underdrain Filter Sizing		
Total WQ Volume Required (ft^3)	**3,909**	
WQ Volume Provided (ft^3)	4,845	OK
Filter Surface Elevation	112.50	
WQ Surface Elevation	114.00	
Invert of Underdrain	110.17	
5% of Tributary Impervious Area (ft^2)	1,836	
2% of Tributary Landscaped (ft^2)	510	
Filter Surface Area Required (ft^2)	**2,345**	
Filter Surface Area Provided (ft^2)	2,525	OK

Underdrain Filter Volume				
Elevation	Surface Area (ft^2)	Average Stage Area (ft^2)	Stage Volume (ft^3)	Cumulative Volume (ft^3)
112.5	2,525			0
		2,789	1,395	
113	3,054			1,395
		3,450	3,450	
114	3,847			4,845
		4,055	2,028	
114.5	4,264			6,872
		4,480	2,240	
115	4,696			9,112
Water Quality Volume Provided (at Elevation 144.5) =				**4,845**

Orifice Sizing	
Discharge Coefficient	0.62
Orifice Size (inches)	1
Orifice Size (feet)	0.08
Orifice Area (ft^2)	0.005
Orifice Centerline Elevation	110.21

Orifice Eqn: $C*A*(2gH)^{\wedge 1/2}$

Q (cfs)	Stage Elevation	Total Drawdown at Stage	Pond Area	Drawdown Time (hrs)
0.0410	112.5	0.00	2,525	0.00
0.0453	113	0.50	3,054	9.37
0.0528	114	1.00	3,847	20.24
			Total Drawdown Time =	**29.61**

Required Sediment Storage		
Area to be Sanded	0.8	acres
Sand Used per Storm	500	lbs/acre-storm
Weight of Sand	90	lbs/cf
# of Storms per Year	10	storms/year
Sediment Storage Required	**46.82**	**cf/year**

Provided Storage Volume		
Total # of CB's	12	
Sump Depth	2	ft
CB Diameter	4	ft
CB Sediment Storage Volume	301.44	cf
Forebay Volume	106	cf
Total Volume	**407.44**	**cf**

Appendix E

Inspection and Maintenance Manual – Indian Cliff Development Subdivision Project

EROSION AND SEDIMENTATION CONTROL

INSPECTION AND MAINTENANCE PLAN

Barra Road Subdivision
Barra Road
Biddeford, Maine

Submitted by:

Indian Cliff Development Corp.
260 Main Street
P.O. Box 444
Biddeford, ME

Prepared by:

BH2M
Berry, Huff, McDonald, Milligan Inc.
Engineers, Surveyors

Date:
May 2024

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1.0 INTRODUCTION

The intent of this plan is to establish inspection and maintenance procedures to be implemented for erosion and sediment control best management practices (BMP's) during construction, as well as for post-construction stormwater BMP's, for a 9 lot Subdivision. This plan has been prepared in conformance with the requirements set forth in 06-096 Chapter 500 – Stormwater Management, and the City of Biddeford Post-Construction Stormwater Management requirements.

1.1 PROJECT DESCRIPTION

The applicant, Indian Cliff Development Corp., is proposing a 9 lot Subdivision off the end of Barra Road in Biddeford, Maine. The project seeks to permit 7 new residential lots meeting bulk and space requirements for duplex housing to be developed by others, 1 new lot proposed to be developed by Avesta Housing, 1 new non-buildable lot supporting stormwater and access, and 2 roads meeting City requirements, to be offered to the City for acceptance. The project is required to obtain a Stormwater Law Permit from the Maine DEP and a Subdivision Permit from the City of Biddeford. The Avesta Housing property will be permitted independent of this Plan.

The scope of work includes but is not limited to:

- Tree clearing
- Stumping, grubbing and subgrade preparation.
- Construction of 2 new City Streets
- Construction of public utilities
- Construction of stormwater BMP's

The proposed development will create approximately 0.65 acres of new impervious area.

1.2 REQUIRED PERMITS

The following is a list of Municipal, State, and Federal permits that are required for the Project:

Municipal
City of Biddeford Subdivision Permit

State of Maine
Maine DEP Stormwater Law Permit

1.3 REFERENCES

This plan has been developed in accordance with the following:

- Stormwater Management Law 38 M.R.S. §420-C and §420-D
  http://legislature.maine.gov/statutes/38/title38sec420-C.html
  http://legislature.maine.gov/statutes/38/title38sec420-D.html

- 06-096 Chapter 500 – Stormwater Management
  http://www.maine.gov/sos/cec/rules/06/096/096c500.docx

- General Permit – Construction Activity
  Maine Pollutant Discharge Elimination System (MPDES)
  https://www.maine.gov/dep/land/stormwater/construction.html

- Maine Erosion and Sediment Control Best Management Practices (BMPs)
  Manual for Designers and Engineers
  https://www.maine.gov/dep/land/erosion/escbmps/esc_bmp_engineers.pdf

- Maine Erosion and Sediment Control Practices Field Guide for Contractors
  https://www.maine.gov/dep/land/erosion/escbmps/esc_bmp_field.pdf

- MaineDOT Best Management Practices for Erosion and Sedimentation Control
  https://www.maine.gov/mdot/env/documents/bmp/BMP2008full.pdf

- City of Biddeford Maine Ordinances
  https://ecode360.com/BI3074

1.4 RESPONSIBLE PARTIES

Preparer/Design Engineer:	Christopher MacDonald, PE BH2M 380B Main Street Gorham, ME 04038 (207) 839-2771
Developer/Applicant:	Indian Cliff Development Corp. 260 Main Street P.O. Box 444 Biddeford, Maine
Site Contractor:	TBD
Owner:	Indian Cliff Development Corp. 260 Main Street P.O. Box 444 Biddeford, Maine
Post Construction Stormwater Inspector:	Barra Road Homeowners Association or City of Biddeford (After Street Acceptance)
Stormwater Maintenance	Barra Road Homeowners Association or City of Biddeford (After Street Acceptance)
During Construction:	Indian Cliff Development Corp.
Post Construction:	Barra Road Homeowners Association or City of Biddeford (After Street Acceptance)

During construction, the Developer/Applicant or their representatives will be responsible for implementing the erosion and sediment control BMP's as well routine inspections and maintenance of the BMP's.

Post-construction stormwater BMP inspection, maintenance, reporting, and required recertifications will be the responsibility of the property owner.

1.5 INSPECTION AND MAINTENANCE – DURING CONSTRUCTION

Anyone who conducts or directs an activity that involves exposing, filling or displacing soil or other earthen materials should take appropriate measures to prevent erosion and the loss of sediment beyond the project site or into a sensitive resource. Erosion and sediment control measures should be in place before the activity begins and should remain functional until the site is permanently stabilized. All measures should remain effective until all areas are permanently stabilized. Any disturbed area should be regularly inspected until the site is fully stabilized with either 90% grass cover or a permanent impervious surface such as pavement. A person who has the knowledge of erosion and sediment control measures and of stormwater management practices should inspect the site at a minimum once a week, and before and after a storm event. Any failing measure should be repaired or modified to adequately stabilize the site prior to the next storm event or no later than 7 calendar days. The inspection frequency table found in Appendix D shall be used as a guide for inspecting each specific BMP. The inspection form found in Appendix B shall be used to record the inspection, its outcome, and the required maintenance.

Refer to the Plans found in Appendix A for additional erosion and sediment control details and narratives.

General Inspection, Maintenance, and Documentation Requirements

1. Inspection and corrective action: Inspect disturbed and impervious areas, erosion control measures, and material 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, 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.

2. Maintenance: If BMP's 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. All measures must be maintained in effective operating condition until areas are permanently stabilized.

3. Documentation: Maintain a binder with construction inspection forms summarizing the inspections and any corrective action taken. The forms must include the name and qualifications of the person making the inspections, the date of the inspections, and major observations about the operation and maintenance of erosion and sedimentation controls, materials storage areas, and vehicle access points to the parcel. Refer to Appendix B for the construction inspection form. Major observations must include BMP's that need maintenance, BMP's that failed to

operate as designed or proved inadequate for a particular location, and locations where additional BMPs are needed. For each BMP requiring maintenance, BMP needing replacement, and location needing additional BMPs, note in the inspection form what corrective action taken and when it was taken. The Owner shall retain a copy of the inspection forms for a period of at least five years from the completion of permanent stabilization.

Site-Specific BMP's

Refer to Appendix D for inspection and maintenance requirements and frequencies of site-specific BMP's. Refer to the Plans found in Appendix A for narratives and details of the site-specific BMP's. The following is a list of the site-specific BMP's that will require routine inspection and maintenance:

- Sedimentation Barriers (Silt Fence or Erosions Control Mix Berm)
- Stabilized Construction Entrance
- Construction Limit Barrier Fence
- Stone Check Dam
- Temporary Sediment Trap
- Temporary Grass/Stone Lined Swale
- Roadways
- Snow Storage Areas
- Sediment Forebays
- Pipe Outlets
- Grassed Underdrained Soil Filter

Winter Construction

Winter construction is construction activity performed during the period from November 1 through April 15. If disturbed areas are not stabilized with permanent measures by November 1 or new soil disturbance occurs after November 1, but before April 15, then these areas must be protected and runoff from them must be controlled by additional measures and restrictions.

1. Site Stabilization: For winter stabilization, hay mulch is applied at twice the standard temporary stabilization rate. At the end of each construction day, areas that have been brought to final grade must be stabilized. Mulch may not be spread on top of snow.

2. Sediment Barriers: All areas within 75 feet of a protected natural resource must be protected with a double row of sediment barriers.

3. Ditches: All vegetated ditch lines that have not been stabilized by November 1, or will be worked during the winter construction period, must be stabilized with an appropriate stone lining backed by an appropriate gravel bed or geotextile unless specifically released from this standard by Maine DEP.

4. Slopes: Mulch netting must be used to anchor mulch on all slopes greater than 8% unless erosion control blankets or erosion control mix is being used on these slopes.

Refer to the Plans contained in Appendix A for additional winter construction erosion and sediment control requirements.

1.6 INSPECTION AND MAINTENANCE – POST-CONSTRUCTION

The long-term operation and maintenance of a stormwater management system is as critical to its performance as its design and construction. Proper operation and maintenance practices ensure that stormwater BMP's continue to improve water quality by removing pollutants effectively over the long-term and decreasing the risk of re-suspending sediment. Without proper maintenance, BMPs are likely to fail and will no longer provide treatment of stormwater. The following includes a summary of the inspection, maintenance, and documentation requirements for post-construction stormwater BMP's.

Refer to the Plans contained in Appendix A for details and locations of site-specific post-construction BMP's.

General Inspection, Maintenance, and Documentation Requirements

1. Inspection and maintenance: All measures must be maintained in effective operating condition. A person with knowledge of erosion and stormwater control, including the standards and conditions in the permit, shall conduct the inspections. The following areas, facilities, and measures must be inspected and identified deficiencies must be corrected. Areas, facilities, and measures other than those listed below may also require inspection on a specific site.

    a) Inspect vegetated areas, particularly slopes and embankments, early in the growing season or after significant rainfall events (1 inch in 24-hour period) to identify active or potential erosion problems. Replant bare areas or areas with sparse growth. Where rill erosion is evident, armor the area with an appropriate lining or divert the erosive flows to on-site areas able to withstand the concentrated flows.

    b) Inspect ditches, swales and other open stormwater channels in the spring, in late fall, and after significant rainfall events (1 inch in 24-hour period) to remove any obstructions to flow, remove accumulated sediments and debris, to control vegetated growth that could obstruct flow, and to repair any erosion of the ditch lining. Vegetated ditches must be mowed at least annually or otherwise maintained to control the growth of woody vegetation and maintain flow capacity. Any woody vegetation growing through riprap linings must also be removed. Repair any slumping side slopes as soon as practicable. If the ditch has a riprap lining, replace riprap on areas where any underlying filter fabric or underdrain gravel is showing through the stone or where stones

have dislodged. The channel must receive adequate routine maintenance to maintain capacity and prevent or correct any erosion of the channel's bottom or side slopes.

c) Inspect culverts in the spring, in late fall, and after heavy rains to remove any obstructions to flow; remove accumulated sediments and debris at the inlet, at the outlet, and within the conduit; and to repair any erosion damage at the culvert's inlet and outlet.

d) Inspect at least once per year, each underdrained soil filter, including the filter embankments, vegetation, underdrain piping, and overflow spillway. Remove and dispose of accumulated sediments in the filter. If needed, rehabilitate any clogged surface linings, and flush underdrain piping.

2. Regular maintenance

    1. 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. Grading of gravel roads, or grading of the gravel shoulders of gravel or paved roads, must be routinely performed to ensure that stormwater drains immediately off the road surface to adjacent buffer areas or stable ditches, and is not impeded by accumulations of graded material on the road shoulder or by excavation of false ditches in the shoulder. If water bars or open-top culverts are used to divert runoff from road surfaces, clean-out any sediments within or at the outlet of these structures to restore their function.

3. Documentation: Maintain a binder of inspection forms summarizing inspection, maintenance, and any corrective actions taken. The inspection forms must include the date on which each inspection or maintenance task was performed, a description of the inspection findings or maintenance completed, and the name of the inspector or maintenance personnel performing the task. Refer to Appendix C for inspection forms. If a maintenance task requires the clean-out of any sediments or debris, indicate where the sediment and debris was disposed of after removal. The log must be made accessible to Department staff and a copy provided to the Department upon request. The Owner shall retain a copy of the logs for a period of at least five years from the completion of permanent stabilization.

4. The site-specific post-construction BMP's for the project include the following:

    - Vegetated swales
    - Roadways and shoulders
    - Storm Drain System
    - Snow storage areas

- Rip rap inlet and outlet aprons
- Sediment forebay
- Pipe outlets
- Grassed Underdrained Soil Filter

1.7 HOUSEKEEPING

The following performance standards shall apply:

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

NOTE: Any spill or release of toxic or hazardous substances must be reported to the Department. For oil spills, call 1-800-482-0777 which is available 24 hours a day. For

spills of toxic or hazardous material, call 1-800-452-4664 which is available 24 hours a day. For more information, visit the Department's website at : http://www.maine.gov/dep/spills/emergspillresp/

2. Groundwater protection: During construction, liquid petroleum products and other hazardous materials with the potential to contaminate groundwater may not be stored or handled in areas of the site draining to an infiltration area. An "infiltration area" is any area of the site that by design or as a result of soils, topography and other relevant factors accumulates runoff that infiltrates into the soil. Dikes, berms, sumps, and other forms of secondary containment that prevent discharge to groundwater may be used to isolate portions of the site for the purposes of storage and handling of these materials. Any project proposing infiltration of stormwater must provide adequate pre-treatment of stormwater prior to discharge of stormwater to the infiltration area, or provide for treatment within the infiltration area in order to prevent the accumulation of fines, reduction in infiltration rate, and consequent flooding and destabilization.

   See 06-096 Chapter 500 - Appendix D for license by rule standards for infiltration of stormwater.

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

3. Fugitive sediment and dust: Actions must be taken to ensure that activities do not result in noticeable erosion of soils or fugitive dust emissions during or after construction. Oil may not be used for dust control, but other water additives may be

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

NOTE: Take care in sourcing water. Dewatering a stream without a permit from the Department may violate state water quality standards and the *Natural Resources Protection Act*.

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

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

5. Excavation de-watering: Excavation de-watering is the removal of water from trenches, foundations, coffer dams, ponds, and other areas within the construction area that retain water after excavation. In most cases the collected water is heavily silted and hinders correct and safe construction practices. The collected water removed from the ponded area, either through gravity or pumping, must be spread through natural wooded buffers or removed to areas that are specifically designed to collect the maximum amount of sediment possible, like a cofferdam sedimentation basin. Avoid allowing the water to flow over disturbed areas of the site. Equivalent measures may be taken if approved by the Department.

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

6. Authorized Non-stormwater discharges: Identify and prevent contamination by non-stormwater discharges. Where allowed non-stormwater discharges exist, they must be identified and steps should be taken to ensure the implementation of appropriate pollution prevention measures for the non- stormwater component(s) of the discharge. Authorized non-stormwater discharges are:

   a) Discharges from firefighting activity;
   b) Fire hydrant flushings;

c) Vehicle washwater if detergents are not used and washing is limited to the exterior of vehicles (engine, undercarriage and transmission washing is prohibited);
d) Dust control runoff in accordance with permit conditions;
e) Routine external building washdown, not including surface paint removal, that does not involve detergents;
f) Pavement washwater (where spills/leaks of toxic or hazardous materials have not occurred, unless all spilled material had been removed) if detergents are not used;
g) Uncontaminated air conditioning or compressor condensate;
h) Uncontaminated groundwater or spring water;

i) Foundation or footer drain-water where flows are not contaminated;
j) Uncontaminated excavation dewatering;
k) Potable water sources including waterline flushings; and
l) Landscape irrigation.

7. Unauthorized non-stormwater discharges: The Department's approval under this Chapter does not authorize a discharge that is mixed with a source of non-stormwater, other than those discharges in compliance with 06-096 Chapter 500 - Appendix C (6). Specifically, the Department's approval does not authorize discharges of the following:

    a) Wastewater from the washout or cleanout of concrete, stucco, paint, form release oils, curing compounds or other construction materials;
    b) Fuels, oils or other pollutants used in vehicle and equipment operation and maintenance;
    c) Soaps, solvents, or detergents used in vehicle and equipment washing; and
    d) Toxic or hazardous substances from a spill or other release.

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

Appendix A
Plans

Appendix B
Construction Inspection Forms

CONSTRUCTION INSPECTION FORM FOR EROSION AND SEDIMENT CONTROL						
General Information:						
Site Name:	Date:			Inspected by:		
Owner:						
Retained 3PI:	Last Rain Date:			Amount:		
Reason for Inspection:	Weekly	Winter	Final	Rain Event	Complaint	
Description of disturbed area:						
Photos:						
	YES/NO/NA	**COMMENTS**				
1. Is an Erosion and Sediment Control Plan available?						
ESC plan on-site and followed						
Other:						
2. Are all erosion control practices installed properly, maintained and functioning?						
Disturbed areas stable						
Concentrated flow inlet/outlet protection						
All areas at final grade						
Disturbed dormant areas stabilized						
Access roads and parking						
Hillsides and stockpiles						
Other:						
3. Are all sedimentation control practices installed properly, maintained and functioning?						
Construction entrance						
Sedimentation basins/traps/diversions						
Perimeter controls						
Check dams						
Other:						
4. Is maintenance of ESC measures, construction activities and housekeeping kept-up?						
Sedimentation/erosion in ditches						
Tracked Sediment or dust at exits						
Hazardous material storage and spill control practices						
Waste management (concrete, hazardous material, etc.)						
Other:						
5. Violation, Corrective Actions, Recommendations						
Sediment discharged from site?						
Corrective action required?						
Site compliant with all permits?						
Notice of violation or stop work order issued?						
Comments/Corrective Actions (complete corrective actions before the next rain event and within 7 day)						

Appendix C
Post-Construction Inspection Forms

Barra Road Subdivision Biddeford **Post-Construction Inspection Form (Ditches, Swales and Open Stormwater Channels)**					
Project name:	Date:		Inspected by:		
Owner name:					
Last rain date:	Amount:				
Reason for inspection:	Rain Event	Monthly	Annually	Maint. Performed	Other (Specify)
General description of BMP condition/recent maintenance performed:					
Photos: (Attach)					

Inspection Details	**Comments**	**Maintenance Required**
Obstructions, sediment or debris noticeable in ditch line?		
Mowing required?		
Woody vegetation apparent in ditches?		
Side slopes stable? Signs of slumping?		
Rip rap stable? Underlying filter fabric visible?		

Additional Comments:

Barra Road Subdivision Biddeford **Post-Construction Inspection Form (Roadway and Parking Areas)**					
Project name:	Date:		Inspected by:		
Owner name:					
Last rain date:	Amount:				
Reason for inspection:	Rain Event	Monthly	Annually	Maint. Performed	Other (Specify)
General description of BMP condition/recent maintenance performed:					
Photos: (Attach)					

Inspection Details	**Comments**	**Maintenance Required**
Winter sand accumulation apparent?		
Pavement Sweeping required?		
Gravel shoulders graded appropriately?		
Gravel road grading required?		
Low spots causing puddling?		

Additional Comments:

Barra Road Subdivision Biddeford **Post-Construction Inspection Form (Storm Drain System including culverts)**					
Project name:	Date:		Inspected by:		
Owner name:					
Last rain date:	Amount:				
Reason for inspection:	Rain Event	Monthly	Annually	Maint. Performed	Other (Specify)
General description of BMP condition/recent maintenance performed:					
Photos: (Attach)					

Inspection Details	**Comments**	**Maintenance Required**
Accumulated debris or sediment at inlet, outlet, or within culvert/storm drain?		
Flow obstructions present?		
Erosion apparent at culvert inlet/outlet?		

Additional Comments:

Barra Road Subdivision Biddeford **Post-Construction Inspection Form (Underdrain Filter)**					
Project name:	Date:		Inspected by:		
Owner name:					
Last rain date:	Amount:				
Reason for inspection:	Rain Event	Monthly	Annually	Maint. Performed	Other (Specify)
General description of BMP condition/recent maintenance performed:					
Photos: (Attach)					

Inspection Details	**Comments**	**Maintenance Required**
Debris apparent in basin bottom?		
Vegetation established in basin bottom?		
Basin draining within 72 hours?		
Inlet forebay rip rap stable and free of debris?		
Embankment and side slopes stable? Sloughs or unvegetated areas apparent?		
Outlet free of debris? Rip rap stable?		
Valve in operating condition?		
Outlet control structure operational free of debris?		
Orifice free of debris and operational?		

Additional Comments:

Barra Road Subdivision Biddeford **Post-Construction Inspection Form (Vegetated Area)**					
Project name:	Date:		Inspected by:		
Owner name:					
Last rain date:	Amount:				
Reason for inspection:	Rain Event	Monthly	Annually	Maint. Performed	Other (Specify)
General description of BMP condition/recent maintenance performed:					
Photos: (Attach)					

Inspection Details	**Comments**	**Maintenance Required**
All slopes and embankments well vegetated? Signs of sparse growth?		
Rill erosion apparent in vegetated areas?		
Downs slope of level spreaders/ditch turnouts stable?		
Mowing of vegetated areas appropriate?		

Additional Comments:

Appendix D

Inspection Frequency Checklist and Long-Term Inspection & Maintenance Plan

EROSION AND SEDIMENT CONTROL MEASURES AND ACTIVITY	INSPECTION FREQUENCY		
	Weekly	Before and After a Storm	After Construction
SEDIMENT BARRIERS			
Sediment barriers are installed prior to soil disturbances	X	X	
Silt fences are keyed in and tight	X	X	
Barriers are repaired and replaced as necessary	X	X	
Barriers are removed when the site is stabilized - Silt fence should be cut at the ground surface			X
TEMPORARY STABILIZATION			
Areas are stabilized if idle for 14 days or more	X	X	
Daily stabilization within 100 ft of a natural resource	X	X	
MULCH			
Seed and mulch within 7 days of final grading. Ground is not visible	X	X	
Erosion control mix is 4-6 inch thick	X	X	
Erosion control blankets or hay mulch are anchored	X	X	
VEGETATION			
Vegetation provides 90% soil cover	X		X
Loam or soil amendment were provided	X		X
New seeded areas are mulched and protected from vehicle, foot traffic and runoff	X	X	X
Areas that will remain unworked for more than 1 year are vegetated with grass	X		
SLOPES AND EMBANKMENTS			
Final graded slopes and embankments are stabilized	X	X	X
Diversions are provided for areas with rill erosion	X	X	X
Areas steeper than 2:1 are riprapped	X		
Stones are angular, durable and various in size	X		
Riprap is underlain with a gravel layer or filter fabric	X		
STORMWATER CHANNELS AND CULVERTS			
Ditches and swales are permanently stabilized–channels that will be riprapped have been over-excavated	X	X	X
Ditches are clear of obstructions, accumulated sediments or debris	X	X	X
Ditch lining/bottoms are free of erosion	X	X	X
Check dams are spaced correctly to slow flow velocity	X		
Underlying filter fabric or gravel is not visible	X	X	X
Culvert aprons and plunge pools are sized for expected flows volume and velocity	X		
Stones are angular, durable and various in size	X		
Culverts are sized to avoid upgradient flooding	X	X	
Culvert protection extends to the maximum flow elevation within the ditch	X	X	X
Culvert is embedded, not hanging	X	X	X

ROADWAYS AND PARKING SURFACES			
The gravel pad at the construction entrance is clear from sediments	X	X	
Roads are graded to drain		X	X
Cross drainage (culvert) is provided	X		
False ditches (from winter sand) are graded		X	X
BUFFERS			
Buffers are free of erosion or concentrated flows		X	X
The downgradient of spreaders and turnouts is stable		X	X
Level spreaders are on the contour			X
The number of spreaders and ditch turnouts is adequate for flow distribution		X	X
Any sediment accumulation is removed from within spreader or turnouts		X	X
WINTER CONSTRUCTION (November 1st-April15th)			
Final graded areas are mulched daily at twice the normal rate with hay, and anchor (not on snow)	Daily		
A double row of sediment barrier is provided for all areas within 100 ft of a sensitive resource (use erosion control mix on frozen ground)	Daily		
Newly constructed ditches are riprapped	Daily		
Slopes greater than 8% are covered with an erosion control blanket or a 4-inch layer of erosion control mix	Daily		
HOUSEKEEPING PUNCH LIST			
All disturbed areas are permanently stabilized, and plantings are established (grass seeds have germinated with 90% vegetative cover)			X
All trash, sediments, debris or any solid waste have been removed from stormwater channels, catch basins, detention structures, discharge points, etc.			X
All ESC devices have been removed: (silt fence and posts, diversions and sediment structures, etc.)			X
All deliverables (certifications, survey information, as-built plans, reports, notice of termination (NOT), etc.) in accordance with all permit requirements have been submitted to town, Maine DEP, association, owner, etc.			X

INSPECTION AND MAINTENANCE PLAN FOR STORMWATER MANAGEMENT STRUCTURES (BMPS)

	INSPECTION SCHEDULE	CORRECTIVE ACTIONS
VEGETATED AREAS	Annually early spring and after heavy rains	Inspect all slopes and embankments and replant areas of bare soil or with sparse growth
		Armor rill erosion areas with riprap or divert the runoff to a stable area
		Inspect and repair down-slope of all spreaders and turn-outs for erosion
		Mow vegetation as specified for the area
DITCHES, SWALES AND OPEN STORMWATER CHANNELS	Annually spring and late fall and after heavy rains	Remove obstructions, sediments or debris from ditches, swales and other open channels
		Repair any erosion of the ditch lining
		Mow vegetated ditches
		Remove woody vegetation growing through riprap
		Repair any slumping side slopes
		Repair riprap where underlying filter fabric or gravel is showing or if stones have dislodge
CULVERTS	Spring and late fall and after heavy rains	Remove accumulated sediments and debris at the inlet, outlet, or within the conduit
		Remove any obstruction to flow
		Repair any erosion damage at the culvert's inlet and outlet
ROADWAYS AND PARKING AREAS	Annually in the spring or as needed	Clear and remove accumulated winter sand in parking lots and along roadways
		Sweep pavement to remove sediment
		Grade road shoulders and remove accumulated winter sand
		Grade gravel roads and gravel shoulders
		Clean out the sediment within water bars or open-top culverts
		Ensure that stormwater runoff is not impeded by false ditches of sediment in the shoulder
RESOURCE AND TREATMENT BUFFERS	Annually in the spring	Inspect buffers for evidence of erosion, concentrated flow, or encroachment by development
		Manage the buffer's vegetation with the requirements in any deed restrictions
		Repair any sign of erosion within a buffer
		Inspect and repair down-slope of all spreaders and turn-outs for erosion
		Install more level spreaders, or ditch turn-outs if needed for a better distribution of flow
		Clean out any accumulation of sediment within the spreader bays or turnout pools
		Mow non-wooded buffers no shorter than six inches and less than three times per year
OTHER PRACTICES	As specified for devices	Contact the department for appropriate inspection and maintenance requirements for other drainage control and runoff treatment measures.

Appendix E

Post Construction – Maintenance of Stormwater Management Systems

DEPARTMENT OF ENVIRONMENTAL PROTECTION
Bureau of Land Resources
17 State House Station
Augusta, Maine 04333

FIVE-YEAR RECERTIFICATION FOR LONG-TERM MAINTENANCE OF STORMWATER MANAGEMENT SYSTEMS

For Site Location & Stormwater Projects

This form complies with the condition that requires reporting every 5 years on the long-term maintenance of stormwater management structures of projects permitted under the Stormwater Management Law since 2005. Complete the following sections, include inspection photos, and use additional paper if needed. A copy of the report if the inspection was performed by a professional experienced in BMP maintenance should be included. Electronic copy of this form and information about the five-year recertication are available on the Maine DEP website at: http://www.maine.gov/dep/land/stormwater/stormwaterbmps/

Please type or print in black ink only

Owner/Licensee		**3rd Party Inspection Company** (if applicable)	
Name of Representative:		**Name of Inspector or preparer of report:**	
Company:		**Company:**	
Mailing Address:		**Mailing Address:**	
Daytime Phone #:		**Daytime Phone #:**	
E-mail Address:		**E-mail Address:**	

LOCATION OF DEVELOPMENT			
Name of Project:			
Address and Town:			
DEP Permit Number:		**Year of Permit:**	

PROJECT SPECIFICS	
If the project is unfinished, please describe its current status and your plans for the future. The filing of this report of on-site long-term maintenance activities is still required.	
If the project is within a MPDES Regulated Town, the maintenance report prepared for the town should be submitted with this form.	
If the project is a subdivision with a Homeowner's association, identify the responsible party.	
Confirm that the required recording of deed restrictions for the protection of buffers or conservation land has been done, and that the buffers are maintained according to the restrictions.	
Identify the contractor for the required renewal of a 5-year maintenance contract for the inspection, cleaning and maintenance of manufactured proprietary structures.	
Is a maintenance log available for review?	

LONG-TERM MAINTENANCE (please comment on the following):
All areas of the development have been inspected for erosion, and appropriate steps have been taken to permanently stabilize these areas.
All stormwater control structures have been inspected for damage, wear, malfunction, and appropriate steps have been taken to repair or replace the failing systems.
The erosion control and stormwater maintenance plan for the site is being implemented as written, and a maintenance log has been created and is being maintained.

CERTIFICATIONS/SIGNATURES
By signing below. the owner (or authorized agent) certifies that all stormwater management structures at the project described above are stable and operational as designed.
Signed:_____ Title_____Date:_____
This completed form and all supporting documents summarized above shall be sent to the following address. An emailed report is appropriate and should be sent to Recert-DEP@maine.gov Five-year Recertification Bureau of Land Resources 17 State House Station Augusta, ME 04333 Tel: (207) 287-2624 or (207) 287-2602

Appendix F

Inspection and Maintenance Manual – Avesta Site Project

EROSION AND SEDIMENTATION CONTROL

INSPECTION AND MAINTENANCE PLAN

Avesta Housing
Barra Road
Biddeford, Maine

Submitted by:

Avesta Housing
307 Cumberland Avenue
Portland, ME

Prepared by:

BH2M
Berry, Huff, McDonald, Milligan Inc.
Engineers, Surveyors

Date:
May 2024

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1.0 INTRODUCTION

The intent of this plan is to establish inspection and maintenance procedures to be implemented for erosion and sediment control best management practices (BMP's) during construction, as well as for post-construction stormwater BMP's, for a 46-unit affordable elderly housing project for Avesta Housing. This plan has been prepared in conformance with the requirements set forth in 06-096 Chapter 500 – Stormwater Management, and the City of Biddeford Post-Construction Stormwater Management requirements.

1.1 PROJECT DESCRIPTION

The applicant, Avesta Housing, is proposing a 46-unit apartment building off the end of Barra Road in Biddeford, Maine. This project is proposed as part of a subdivision by Indian Cliff Development Corp. on Lot A of the subdivision approximately 2.2 acres in size. The project is required to obtain a Stormwater Law Permit from the Maine DEP and a Site and Subdivision Permit from the City of Biddeford.

The scope of work includes but is not limited to:

- Tree clearing
- Stumping, grubbing and subgrade preparation.
- Grading of lot and construction of access and parking
- Construction of a 46-unit 4 story apartment building
- Construction of public utilities
- Construction of stormwater BMP's

The proposed development will create approximately 0.84 acres of new impervious area.

1.2 REQUIRED PERMITS

The following is a list of Municipal, State, and Federal permits that are required for the Project:

Municipal
City of Biddeford Site and Subdivision Permit

State of Maine
Maine DEP Stormwater Law Permit

1.3 REFERENCES

This plan has been developed in accordance with the following:

- Stormwater Management Law 38 M.R.S. §420-C and §420-D
  http://legislature.maine.gov/statutes/38/title38sec420-C.html
  http://legislature.maine.gov/statutes/38/title38sec420-D.html

- 06-096 Chapter 500 – Stormwater Management
  http://www.maine.gov/sos/cec/rules/06/096/096c500.docx

- General Permit – Construction Activity
  Maine Pollutant Discharge Elimination System (MPDES)
  https://www.maine.gov/dep/land/stormwater/construction.html

- Maine Erosion and Sediment Control Best Management Practices (BMPs)
  Manual for Designers and Engineers
  https://www.maine.gov/dep/land/erosion/escbmps/esc_bmp_engineers.pdf

- Maine Erosion and Sediment Control Practices Field Guide for Contractors
  https://www.maine.gov/dep/land/erosion/escbmps/esc_bmp_field.pdf

- MaineDOT Best Management Practices for Erosion and Sedimentation Control
  https://www.maine.gov/mdot/env/documents/bmp/BMP2008full.pdf

- City of Biddeford Maine Ordinances
  https://ecode360.com/BI3074

1.4 RESPONSIBLE PARTIES

Preparer/Design Engineer:	Christopher MacDonald, PE BH2M 380B Main Street Gorham, ME 04038 (207) 839-2771
Developer/Applicant:	Avesta Housing 307 Cumberland Avenue Portland, ME
Site Contractor:	TBD
Owner:	Indian Cliff Development Corp. 260 Main Street P.O. Box 444 Biddeford, Maine
Post Construction Stormwater Inspector:	Avesta Housing
Stormwater Maintenance	Avesta Housing
During Construction:	Avesta Housing
Post Construction:	Avesta Housing

During construction, the Developer/Applicant or their representatives will be responsible for implementing the erosion and sediment control BMP's as well routine inspections and maintenance of the BMP's.

Post-construction stormwater BMP inspection, maintenance, reporting, and required recertifications will be the responsibility of the property owner.

1.5 INSPECTION AND MAINTENANCE – DURING CONSTRUCTION

Anyone who conducts or directs an activity that involves exposing, filling or displacing soil or other earthen materials should take appropriate measures to prevent erosion and the loss of sediment beyond the project site or into a sensitive resource. Erosion and sediment control measures should be in place before the activity begins and should remain functional until the site is permanently stabilized. All measures should remain effective until all areas are permanently stabilized. Any disturbed area should be regularly inspected until the site is fully stabilized with either 90% grass cover or a permanent impervious surface such as pavement. A person who has the knowledge of erosion and sediment control measures and of stormwater management practices should inspect the site at a minimum once a week, and before and after a storm event. Any failing measure should be repaired or modified to adequately stabilize the site prior to the next storm event or no later than 7 calendar days. The inspection frequency table found in Appendix D shall be used as a guide for inspecting each specific BMP. The inspection form found in Appendix B shall be used to record the inspection, its outcome, and the required maintenance.

Refer to the Plans found in Appendix A for additional erosion and sediment control details and narratives.

General Inspection, Maintenance, and Documentation Requirements

1. Inspection and corrective action: Inspect disturbed and impervious areas, erosion control measures, and material 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, 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.

2. Maintenance: If BMP's 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. All measures must be maintained in effective operating condition until areas are permanently stabilized.

3. Documentation: Maintain a binder with construction inspection forms summarizing the inspections and any corrective action taken. The forms must include the name and qualifications of the person making the inspections, the date of the inspections, and major observations about the operation and maintenance of erosion and sedimentation controls, materials storage areas, and vehicle access points to the parcel. Refer to Appendix B for the construction inspection form. Major observations must include BMP's that need maintenance, BMP's that failed to

operate as designed or proved inadequate for a particular location, and locations where additional BMPs are needed. For each BMP requiring maintenance, BMP needing replacement, and location needing additional BMPs, note in the inspection form what corrective action taken and when it was taken. The Owner shall retain a copy of the inspection forms for a period of at least five years from the completion of permanent stabilization.

Site-Specific BMP's

Refer to Appendix D for inspection and maintenance requirements and frequencies of site-specific BMP's. Refer to the Plans found in Appendix A for narratives and details of the site-specific BMP's. The following is a list of the site-specific BMP's that will require routine inspection and maintenance:

- Sedimentation Barriers (Silt Fence or Erosions Control Mix Berm)
- Stabilized Construction Entrance
- Construction Limit Barrier Fence
- Stone Check Dam
- Temporary Sediment Trap
- Temporary Grass/Stone Lined Swale
- Roadways
- Snow Storage Areas
- Sediment Forebays
- Pipe Outlets
- Grassed Underdrained Soil Filter

Winter Construction

Winter construction is construction activity performed during the period from November 1 through April 15. If disturbed areas are not stabilized with permanent measures by November 1 or new soil disturbance occurs after November 1, but before April 15, then these areas must be protected and runoff from them must be controlled by additional measures and restrictions.

1. Site Stabilization: For winter stabilization, hay mulch is applied at twice the standard temporary stabilization rate. At the end of each construction day, areas that have been brought to final grade must be stabilized. Mulch may not be spread on top of snow.

2. Sediment Barriers: All areas within 75 feet of a protected natural resource must be protected with a double row of sediment barriers.

3. Ditches: All vegetated ditch lines that have not been stabilized by November 1, or will be worked during the winter construction period, must be stabilized with an appropriate stone lining backed by an appropriate gravel bed or geotextile unless specifically released from this standard by Maine DEP.

4. Slopes: Mulch netting must be used to anchor mulch on all slopes greater than 8% unless erosion control blankets or erosion control mix is being used on these slopes.

Refer to the Plans contained in Appendix A for additional winter construction erosion and sediment control requirements.

1.6 INSPECTION AND MAINTENANCE – POST-CONSTRUCTION

The long-term operation and maintenance of a stormwater management system is as critical to its performance as its design and construction. Proper operation and maintenance practices ensure that stormwater BMP's continue to improve water quality by removing pollutants effectively over the long-term and decreasing the risk of re-suspending sediment. Without proper maintenance, BMPs are likely to fail and will no longer provide treatment of stormwater. The following includes a summary of the inspection, maintenance, and documentation requirements for post-construction stormwater BMP's.

Refer to the Plans contained in Appendix A for details and locations of site-specific post-construction BMP's.

General Inspection, Maintenance, and Documentation Requirements

1. Inspection and maintenance: All measures must be maintained in effective operating condition. A person with knowledge of erosion and stormwater control, including the standards and conditions in the permit, shall conduct the inspections. The following areas, facilities, and measures must be inspected and identified deficiencies must be corrected. Areas, facilities, and measures other than those listed below may also require inspection on a specific site.

    a) Inspect vegetated areas, particularly slopes and embankments, early in the growing season or after significant rainfall events (1 inch in 24-hour period) to identify active or potential erosion problems. Replant bare areas or areas with sparse growth. Where rill erosion is evident, armor the area with an appropriate lining or divert the erosive flows to on-site areas able to withstand the concentrated flows.

    b) Inspect ditches, swales and other open stormwater channels in the spring, in late fall, and after significant rainfall events (1 inch in 24-hour period) to remove any obstructions to flow, remove accumulated sediments and debris, to control vegetated growth that could obstruct flow, and to repair any erosion of the ditch lining. Vegetated ditches must be mowed at least annually or otherwise maintained to control the growth of woody vegetation and maintain flow capacity. Any woody vegetation growing through riprap linings must also be removed. Repair any slumping side slopes as soon as practicable. If the ditch has a riprap lining, replace riprap on areas where any underlying filter fabric or underdrain gravel is showing through the stone or where stones

have dislodged. The channel must receive adequate routine maintenance to maintain capacity and prevent or correct any erosion of the channel's bottom or side slopes.

c) Inspect culverts in the spring, in late fall, and after heavy rains to remove any obstructions to flow; remove accumulated sediments and debris at the inlet, at the outlet, and within the conduit; and to repair any erosion damage at the culvert's inlet and outlet.

d) Inspect at least once per year, each underdrained soil filter, including the filter embankments, vegetation, underdrain piping, and overflow spillway. Remove and dispose of accumulated sediments in the filter. If needed, rehabilitate any clogged surface linings, and flush underdrain piping.

2. Regular maintenance

    1. 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. Grading of gravel roads, or grading of the gravel shoulders of gravel or paved roads, must be routinely performed to ensure that stormwater drains immediately off the road surface to adjacent buffer areas or stable ditches, and is not impeded by accumulations of graded material on the road shoulder or by excavation of false ditches in the shoulder. If water bars or open-top culverts are used to divert runoff from road surfaces, clean-out any sediments within or at the outlet of these structures to restore their function.

3. Documentation: Maintain a binder of inspection forms summarizing inspection, maintenance, and any corrective actions taken. The inspection forms must include the date on which each inspection or maintenance task was performed, a description of the inspection findings or maintenance completed, and the name of the inspector or maintenance personnel performing the task. Refer to Appendix C for inspection forms. If a maintenance task requires the clean-out of any sediments or debris, indicate where the sediment and debris was disposed of after removal. The log must be made accessible to Department staff and a copy provided to the Department upon request. The Owner shall retain a copy of the logs for a period of at least five years from the completion of permanent stabilization.

4. The site-specific post-construction BMP's for the project include the following:

    - Vegetated swales
    - Roadways and shoulders
    - Storm Drain System
    - Snow storage areas

- Rip rap inlet and outlet aprons
- Sediment forebay
- Pipe outlets
- Grassed Underdrained Soil Filter

1.7 HOUSEKEEPING

The following performance standards shall apply:

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

NOTE: Any spill or release of toxic or hazardous substances must be reported to the Department. For oil spills, call 1-800-482-0777 which is available 24 hours a day. For

spills of toxic or hazardous material, call 1-800-452-4664 which is available 24 hours a day. For more information, visit the Department's website at : http://www.maine.gov/dep/spills/emergspillresp/

2. Groundwater protection: During construction, liquid petroleum products and other hazardous materials with the potential to contaminate groundwater may not be stored or handled in areas of the site draining to an infiltration area. An "infiltration area" is any area of the site that by design or as a result of soils, topography and other relevant factors accumulates runoff that infiltrates into the soil. Dikes, berms, sumps, and other forms of secondary containment that prevent discharge to groundwater may be used to isolate portions of the site for the purposes of storage and handling of these materials. Any project proposing infiltration of stormwater must provide adequate pre-treatment of stormwater prior to discharge of stormwater to the infiltration area, or provide for treatment within the infiltration area in order to prevent the accumulation of fines, reduction in infiltration rate, and consequent flooding and destabilization.

   See 06-096 Chapter 500 - Appendix D for license by rule standards for infiltration of stormwater.

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

3. Fugitive sediment and dust: Actions must be taken to ensure that activities do not result in noticeable erosion of soils or fugitive dust emissions during or after construction. Oil may not be used for dust control, but other water additives may be

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

NOTE: Take care in sourcing water. Dewatering a stream without a permit from the Department may violate state water quality standards and the *Natural Resources Protection Act*.

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

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

5. Excavation de-watering: Excavation de-watering is the removal of water from trenches, foundations, coffer dams, ponds, and other areas within the construction area that retain water after excavation. In most cases the collected water is heavily silted and hinders correct and safe construction practices. The collected water removed from the ponded area, either through gravity or pumping, must be spread through natural wooded buffers or removed to areas that are specifically designed to collect the maximum amount of sediment possible, like a cofferdam sedimentation basin. Avoid allowing the water to flow over disturbed areas of the site. Equivalent measures may be taken if approved by the Department.

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

6. Authorized Non-stormwater discharges: Identify and prevent contamination by non-stormwater discharges. Where allowed non-stormwater discharges exist, they must be identified and steps should be taken to ensure the implementation of appropriate pollution prevention measures for the non- stormwater component(s) of the discharge. Authorized non-stormwater discharges are:

   a) Discharges from firefighting activity;
   b) Fire hydrant flushings;

c) Vehicle washwater if detergents are not used and washing is limited to the exterior of vehicles (engine, undercarriage and transmission washing is prohibited);
d) Dust control runoff in accordance with permit conditions;
e) Routine external building washdown, not including surface paint removal, that does not involve detergents;
f) Pavement washwater (where spills/leaks of toxic or hazardous materials have not occurred, unless all spilled material had been removed) if detergents are not used;
g) Uncontaminated air conditioning or compressor condensate;
h) Uncontaminated groundwater or spring water;

i) Foundation or footer drain-water where flows are not contaminated;
j) Uncontaminated excavation dewatering;
k) Potable water sources including waterline flushings; and
l) Landscape irrigation.

7. Unauthorized non-stormwater discharges: The Department's approval under this Chapter does not authorize a discharge that is mixed with a source of non-stormwater, other than those discharges in compliance with 06-096 Chapter 500 - Appendix C (6). Specifically, the Department's approval does not authorize discharges of the following:

    a) Wastewater from the washout or cleanout of concrete, stucco, paint, form release oils, curing compounds or other construction materials;
    b) Fuels, oils or other pollutants used in vehicle and equipment operation and maintenance;
    c) Soaps, solvents, or detergents used in vehicle and equipment washing; and
    d) Toxic or hazardous substances from a spill or other release.

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

Appendix A
Plans

Appendix B
Construction Inspection Forms

CONSTRUCTION INSPECTION FORM FOR EROSION AND SEDIMENT CONTROL						
General Information:						
Site Name:	Date:		Inspected by:			
Owner:						
Retained 3PI:	Last Rain Date:			Amount:		
Reason for Inspection:	Weekly	Winter	Final	Rain Event	Complaint	
Description of disturbed area:						
Photos:						
	YES/NO/NA	**COMMENTS**				
1. Is an Erosion and Sediment Control Plan available?						
ESC plan on-site and followed						
Other:						
2. Are all erosion control practices installed properly, maintained and functioning?						
Disturbed areas stable						
Concentrated flow inlet/outlet protection						
All areas at final grade						
Disturbed dormant areas stabilized						
Access roads and parking						
Hillsides and stockpiles						
Other:						
3. Are all sedimentation control practices installed properly, maintained and functioning?						
Construction entrance						
Sedimentation basins/traps/diversions						
Perimeter controls						
Check dams						
Other:						
4. Is maintenance of ESC measures, construction activities and housekeeping kept-up?						
Sedimentation/erosion in ditches						
Tracked Sediment or dust at exits						
Hazardous material storage and spill control practices						
Waste management (concrete, hazardous material, etc.)						
Other:						
5. Violation, Corrective Actions, Recommendations						
Sediment discharged from site?						
Corrective action required?						
Site compliant with all permits?						
Notice of violation or stop work order issued?						
Comments/Corrective Actions (complete corrective actions before the next rain event and within 7 day)						

Appendix C
Post-Construction Inspection Forms

Avesta Housing Biddeford **Post-Construction Inspection Form (Ditches, Swales and Open Stormwater Channels)**					
Project name:	Date:		Inspected by:		
Owner name:					
Last rain date:	Amount:				
Reason for inspection:	Rain Event	Monthly	Annually	Maint. Performed	Other (Specify)
General description of BMP condition/recent maintenance performed:					
Photos: (Attach)					

Inspection Details	**Comments**	**Maintenance Required**
Obstructions, sediment or debris noticeable in ditch line?		
Mowing required?		
Woody vegetation apparent in ditches?		
Side slopes stable? Signs of slumping?		
Rip rap stable? Underlying filter fabric visible?		

Additional Comments:

Avesta Housing Biddeford **Post-Construction Inspection Form (Roadway and Parking Areas)**					
Project name:	Date:		Inspected by:		
Owner name:					
Last rain date:	Amount:				
Reason for inspection:	Rain Event	Monthly	Annually	Maint. Performed	Other (Specify)
General description of BMP condition/recent maintenance performed:					
Photos: (Attach)					

Inspection Details	**Comments**	**Maintenance Required**
Winter sand accumulation apparent?		
Pavement Sweeping required?		
Gravel shoulders graded appropriately?		
Gravel road grading required?		
Low spots causing puddling?		

Additional Comments:

Avesta Housing Biddeford **Post-Construction Inspection Form (Storm Drain System including culverts)**					
Project name:	Date:		Inspected by:		
Owner name:					
Last rain date:	Amount:				
Reason for inspection:	Rain Event	Monthly	Annually	Maint. Performed	Other (Specify)
General description of BMP condition/recent maintenance performed:					
Photos: (Attach)					

Inspection Details	**Comments**	**Maintenance Required**
Accumulated debris or sediment at inlet, outlet, or within culvert/storm drain?		
Flow obstructions present?		
Erosion apparent at culvert inlet/outlet?		
Additional Comments:		

Avesta Housing Biddeford **Post-Construction Inspection Form (Underdrain Filter)**					
Project name:	Date:		Inspected by:		
Owner name:					
Last rain date:	Amount:				
Reason for inspection:	Rain Event	Monthly	Annually	Maint. Performed	Other (Specify)
General description of BMP condition/recent maintenance performed:					
Photos: (Attach)					

Inspection Details	**Comments**	**Maintenance Required**
Debris apparent in basin bottom?		
Vegetation established in basin bottom?		
Basin draining within 72 hours?		
Inlet forebay rip rap stable and free of debris?		
Embankment and side slopes stable? Sloughs or unvegetated areas apparent?		
Outlet free of debris? Rip rap stable?		
Valve in operating condition?		
Outlet control structure operational free of debris?		
Orifice free of debris and operational?		

Additional Comments:

Avesta Housing Biddeford **Post-Construction Inspection Form (Vegetated Area)**					
Project name:	Date:		Inspected by:		
Owner name:					
Last rain date:	Amount:				
Reason for inspection:	Rain Event	Monthly	Annually	Maint. Performed	Other (Specify)
General description of BMP condition/recent maintenance performed:					
Photos: (Attach)					

Inspection Details	**Comments**	**Maintenance Required**
All slopes and embankments well vegetated? Signs of sparse growth?		
Rill erosion apparent in vegetated areas?		
Downs slope of level spreaders/ditch turnouts stable?		
Mowing of vegetated areas appropriate?		

Additional Comments:

Appendix D

Inspection Frequency Checklist and Long-Term Inspection & Maintenance Plan

EROSION AND SEDIMENT CONTROL MEASURES AND ACTIVITY	INSPECTION FREQUENCY		
	Weekly	Before and After a Storm	After Construction
SEDIMENT BARRIERS			
Sediment barriers are installed prior to soil disturbances	X	X	
Silt fences are keyed in and tight	X	X	
Barriers are repaired and replaced as necessary	X	X	
Barriers are removed when the site is stabilized - Silt fence should be cut at the ground surface			X
TEMPORARY STABILIZATION			
Areas are stabilized if idle for 14 days or more	X	X	
Daily stabilization within 100 ft of a natural resource	X	X	
MULCH			
Seed and mulch within 7 days of final grading. Ground is not visible	X	X	
Erosion control mix is 4-6 inch thick	X	X	
Erosion control blankets or hay mulch are anchored	X	X	
VEGETATION			
Vegetation provides 90% soil cover	X		X
Loam or soil amendment were provided	X		X
New seeded areas are mulched and protected from vehicle, foot traffic and runoff	X	X	X
Areas that will remain unworked for more than 1 year are vegetated with grass	X		
SLOPES AND EMBANKMENTS			
Final graded slopes and embankments are stabilized	X	X	X
Diversions are provided for areas with rill erosion	X	X	X
Areas steeper than 2:1 are riprapped	X		
Stones are angular, durable and various in size	X		
Riprap is underlain with a gravel layer or filter fabric	X		
STORMWATER CHANNELS AND CULVERTS			
Ditches and swales are permanently stabilized–channels that will be riprapped have been over-excavated	X	X	X
Ditches are clear of obstructions, accumulated sediments or debris	X	X	X
Ditch lining/bottoms are free of erosion	X	X	X
Check dams are spaced correctly to slow flow velocity	X		
Underlying filter fabric or gravel is not visible	X	X	X
Culvert aprons and plunge pools are sized for expected flows volume and velocity	X		
Stones are angular, durable and various in size	X		
Culverts are sized to avoid upgradient flooding	X	X	
Culvert protection extends to the maximum flow elevation within the ditch	X	X	X
Culvert is embedded, not hanging	X	X	X

ROADWAYS AND PARKING SURFACES			
The gravel pad at the construction entrance is clear from sediments	X	X	
Roads are graded to drain		X	X
Cross drainage (culvert) is provided	X		
False ditches (from winter sand) are graded		X	X
BUFFERS			
Buffers are free of erosion or concentrated flows		X	X
The downgradient of spreaders and turnouts is stable		X	X
Level spreaders are on the contour			X
The number of spreaders and ditch turnouts is adequate for flow distribution		X	X
Any sediment accumulation is removed from within spreader or turnouts		X	X
WINTER CONSTRUCTION (November 1st-April15th)			
Final graded areas are mulched daily at twice the normal rate with hay, and anchor (not on snow)	Daily		
A double row of sediment barrier is provided for all areas within 100 ft of a sensitive resource (use erosion control mix on frozen ground)	Daily		
Newly constructed ditches are riprapped	Daily		
Slopes greater than 8% are covered with an erosion control blanket or a 4-inch layer of erosion control mix	Daily		
HOUSEKEEPING PUNCH LIST			
All disturbed areas are permanently stabilized, and plantings are established (grass seeds have germinated with 90% vegetative cover)			X
All trash, sediments, debris or any solid waste have been removed from stormwater channels, catch basins, detention structures, discharge points, etc.			X
All ESC devices have been removed: (silt fence and posts, diversions and sediment structures, etc.)			X
All deliverables (certifications, survey information, as-built plans, reports, notice of termination (NOT), etc.) in accordance with all permit requirements have been submitted to town, Maine DEP, association, owner, etc.			X

INSPECTION AND MAINTENANCE PLAN FOR STORMWATER MANAGEMENT STRUCTURES (BMPS)

	INSPECTION SCHEDULE	CORRECTIVE ACTIONS
VEGETATED AREAS	Annually early spring and after heavy rains	Inspect all slopes and embankments and replant areas of bare soil or with sparse growth
		Armor rill erosion areas with riprap or divert the runoff to a stable area
		Inspect and repair down-slope of all spreaders and turn-outs for erosion
		Mow vegetation as specified for the area
DITCHES, SWALES AND OPEN STORMWATER CHANNELS	Annually spring and late fall and after heavy rains	Remove obstructions, sediments or debris from ditches, swales and other open channels
		Repair any erosion of the ditch lining
		Mow vegetated ditches
		Remove woody vegetation growing through riprap
		Repair any slumping side slopes
		Repair riprap where underlying filter fabric or gravel is showing or if stones have dislodge
CULVERTS	Spring and late fall and after heavy rains	Remove accumulated sediments and debris at the inlet, outlet, or within the conduit
		Remove any obstruction to flow
		Repair any erosion damage at the culvert's inlet and outlet
ROADWAYS AND PARKING AREAS	Annually in the spring or as needed	Clear and remove accumulated winter sand in parking lots and along roadways
		Sweep pavement to remove sediment
		Grade road shoulders and remove accumulated winter sand
		Grade gravel roads and gravel shoulders
		Clean out the sediment within water bars or open-top culverts
		Ensure that stormwater runoff is not impeded by false ditches of sediment in the shoulder
RESOURCE AND TREATMENT BUFFERS	Annually in the spring	Inspect buffers for evidence of erosion, concentrated flow, or encroachment by development
		Manage the buffer's vegetation with the requirements in any deed restrictions
		Repair any sign of erosion within a buffer
		Inspect and repair down-slope of all spreaders and turn-outs for erosion
		Install more level spreaders, or ditch turn-outs if needed for a better distribution of flow
		Clean out any accumulation of sediment within the spreader bays or turnout pools
		Mow non-wooded buffers no shorter than six inches and less than three times per year
OTHER PRACTICES	As specified for devices	Contact the department for appropriate inspection and maintenance requirements for other drainage control and runoff treatment measures.

Appendix E

Post Construction – Maintenance of Stormwater Management Systems

DEPARTMENT OF ENVIRONMENTAL PROTECTION
Bureau of Land Resources
17 State House Station
Augusta, Maine 04333

FIVE-YEAR RECERTIFICATION FOR LONG-TERM MAINTENANCE OF STORMWATER MANAGEMENT SYSTEMS

For Site Location & Stormwater Projects

This form complies with the condition that requires reporting every 5 years on the long-term maintenance of stormwater management structures of projects permitted under the Stormwater Management Law since 2005. Complete the following sections, include inspection photos, and use additional paper if needed. A copy of the report if the inspection was performed by a professional experienced in BMP maintenance should be included. Electronic copy of this form and information about the five-year recertication are available on the Maine DEP website at: http://www.maine.gov/dep/land/stormwater/stormwaterbmps/

Please type or print in black ink only

Owner/Licensee		**3rd Party Inspection Company** (if applicable)	
Name of Representative:		**Name of Inspector or preparer of report:**	
Company:		**Company:**	
Mailing Address:		**Mailing Address:**	
Daytime Phone #:		**Daytime Phone #:**	
E-mail Address:		**E-mail Address:**	

LOCATION OF DEVELOPMENT			
Name of Project:			
Address and Town:			
DEP Permit Number:		**Year of Permit:**	

PROJECT SPECIFICS	
If the project is unfinished, please describe its current status and your plans for the future. The filing of this report of on-site long-term maintenance activities is still required.	
If the project is within a MPDES Regulated Town, the maintenance report prepared for the town should be submitted with this form.	
If the project is a subdivision with a Homeowner's association, identify the responsible party.	
Confirm that the required recording of deed restrictions for the protection of buffers or conservation land has been done, and that the buffers are maintained according to the restrictions.	
Identify the contractor for the required renewal of a 5-year maintenance contract for the inspection, cleaning and maintenance of manufactured proprietary structures.	
Is a maintenance log available for review?	

LONG-TERM MAINTENANCE (please comment on the following):
All areas of the development have been inspected for erosion, and appropriate steps have been taken to permanently stabilize these areas.
All stormwater control structures have been inspected for damage, wear, malfunction, and appropriate steps have been taken to repair or replace the failing systems.
The erosion control and stormwater maintenance plan for the site is being implemented as written, and a maintenance log has been created and is being maintained.

CERTIFICATIONS/SIGNATURES
By signing below. the owner (or authorized agent) certifies that all stormwater management structures at the project described above are stable and operational as designed.
Signed:_____ **Title**_____**Date:**_____
This completed form and all supporting documents summarized above shall be sent to the following address. An emailed report is appropriate and should be sent to Recert-DEP@maine.gov Five-year Recertification Bureau of Land Resources 17 State House Station Augusta, ME 04333 Tel: (207) 287-2624 or (207) 287-2602

Appendix G
Maine DEP Stormwater Application Checklist

DEPARTMENT OF ENVIRONMENTAL PROTECTION
STORMWATER APPLICATION CHECKLIST

Applicant: Indian Cliff Development Corp. & Avesta Housing			
Project Name: Barra Road Subdivision			
Town: Biddeford			
Application Type:		☑ Stormwater	☐ Site Law
Watershed Name: Thatcher Brook			
Watershed Type:	☑ UIS	☐ Phosphorus	☐ Neither

Project Area Information

	Existing to Remain[1]	New / Proposed	Total
Impervious (Im)	0	1.50 Acres	1.50 Acres
Landscaped (Land)	0	1.92 Acres	1.92 Acres
Developed (Dev)[2]	0	3.42 Acres	3.42 Acres

1- If area is not subject to treatment, provide reason and show in a separate column in the Water Quality Calc table.
2- Developed area = Impervious Area + Landscaped Area

A. BASIC STANDARD

1. **Erosion and Sedimentation Controls** (Appendix A, page 32 of Chapter 500: https://www.maine.gov/sos/cec/rules/06/096/096c500.docx:)
   - Guidance in Department ESC BMP Manuals

2. **Inspection & Maintenance** (Appendix B, page 37 of Chapter 500)

   Construction Phase: Show on Plans the following:
   - Responsibility for inspection and maintenance
   - Construction schedule (how long will it take and in what sequence/critical path to build)
   - Inspection frequency
   - Scope of inspection
   - Inspector qualifications
   - Define storm event that triggers a wet weather inspection (0.5" of rain in 24 hours)
   - Documentation (3 years minimum)

   Post-Construction: Include in written I&M Plan the following:
   - Responsibility for inspection and maintenance
   - Inspection frequency for each BMP
   - Inspection form for each BMP
   - Inspector qualifications
   - Define storm event that triggers a wet weather inspection (1" of rain in 24 hours)
   - Documentation (5 years, minimum)
   - Project is subject to Department 5-Year Recertification

3. **Good Housekeeping** (Appendix C, page 41 of Chapter 500)
   - Show all seven elements on Plans.

B. GENERAL STANDARD

Must provide the following on WQ Treatment Plan: All BMPs with subcatchments including time of concentration (Tc) lines, flow lengths and flow types.

1. **Soil Explorations** (test pit completed by a certified soil scientist) at each proposed BMP
   - Include test pit summary table on detail plan.
   - If there is potential ledge, address in design.
   - If shallow groundwater, address in design.

2. **Treatment Standards** (modify to fit project): Fill out the following table for the applicable standards that apply.

Applicable Standard	Section in Ch. 500	Required Treatment (Im / Dev)	Area Eligible		Area Treated		Provided Treatment %	
			Im	Dev	Im	Dev	Im	Dev
General Standard	4(C)(2(a)(i)	95% / 80%	0.84	1.78	0.84	1.43	100.0	80.2
Increased Runoff Treated[1]	4(C)(2)(a)(ii)	90% / 80% min	0	0	0	0	0	0
% Parcel Developed[2]	4(C)(2)(a)(iii)	90% / 75% min	0	0	0	0	0	0
Redevelopment[3] (Dev Area)	4(C)(2)(d)	0% min (SW) 50% min (Site)	0	0	0	0	0	0
Linear	4(C)(5)(c)	75% / 50% min	0.65	1.64	0.62	0.83	94.3	50.7
Other: Offsite Treatment/Mitigation			0	0	0	0	0	0
Project Total Area =			1.50	3.42	1.46	2.26	97.3	66.1

1- If proposing to treat more than the first flush, state why meeting Ch. 500, § 4(C)(2(a)(i) is not practicable.
2- Reduced % based on portion of parcel developed.
3- Include pollutant impact ranking calculations (current and proposed) and a figure showing the Redevelopment window.

3. **Proposed BMPs:** Please provide the following information on the Table below for EACH BMP.

BMPs Proposed	#	Pretreatment	Sizing calcs	Detail on Plans[1]	CPV Draindown Time	HydroCAD
Soil Filter	3	Yes	Yes	Yes	Yes	Yes

1- BMP details (cross sections, elevation sections, plan view)

Link to Stormwater Design BMP Volumes I, II, III
https://www.maine.gov/dep/land/stormwater/stormwaterbmps/index.html

- Provide Construction Oversight Notes.
- If BMP is unlined, review and satisfy (Appendix E Sections 4(b) and 4(c), page 50 of Chapter 500).
- Treatment buffers (Appendix F, page 56 of Chapter 500): must provide sample deed restriction (Appendix G, page 64 of Chapter 500).
- Infiltration must satisfy Appendix D, page 44 of Chapter 500.
- Is conveyance designed to a 10-year, 24-hour storm?
- Is a drainage easement required for any areas to be flooded?
- Discharge to a public storm sewer system: Must provide authorization from the authority.

If proposing Proprietary BMPs, provide:

- Letter from vendor approving sizing and siting https://www.maine.gov/dep/land/stormwater/stormwaterbmps/index.html.
- Executed 5-Year I&M Agreement with a provider approved by vendor.
- Narrative section and specific inspection forms in the written I&M Plan.
- Pervious pavement: Must provide Executed 5-Year I&M Agreement and vacuum equipment used.

C. PHOSPHORUS STANDARD

MUST provide on the WQ Treatment Plan: BMPs with subcatchments including time of concentration (Tc) lines, flow lengths and flow types;

Provide export calculations clearly showing distinct BMPs: Phosphorus Table Calculations Worksheet 4 july 2015.xlsx.

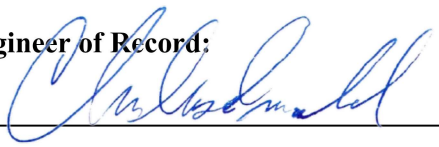
D. FLOODING STANDARD

1. Add pre- and post- peak flow rates table to post development plan for storms (2-, 10-, 25-year).
2. Is primary access road passable up to a 25-year, 24-hour storm?
3. If requesting a waiver of the Flooding Standard, must state justification for the waiver.
4. HydroCad or other runoff model
   - If post peak flow rate is > pre-peak flow, a waiver request will be needed with justification Ch. 500, § 4(F)(3)(a) or (b),
   - If discharging to wetland see Chap. 500, § 4(I).

This checklist has been designed by DEP stormwater engineers as a guidance tool to assist applicants and their consultants when preparing stormwater applications. Completing the checklist is recommended and valuable, but it is not a substitute for reviewing Ch. 500, and completing all the items on the checklist does not automatically mean all the Ch. 500 requirements have been satisfied. The contents of Ch. 500 should be reviewed carefully for the applicable requirements that apply to your proposed project.

I have reviewed this checklist and included in my submission all the required elements of this checklist that apply to the proposed project.

Maine Engineer of Record:



May 7, 2024

Signature **Date**

Christopher R. MacDonald P.E. Maine # 11985

Name (print)

than 50% of the developed area (See 06-096 Chapter 500 4.C(5)(c)). For development of these projects, we have assumed that the Subdivision portions of the project will meet the 75% linear exemption criteria, and the Site portion of the project will meet the 95% criteria.

The stormwater management system includes individual Grassed Underdrained Soil Filters for both roads of the Subdivision and an additional Grassed Underdrained Soil Filter for the Site project. The proposed soil filters have been designed in accordance with the design requirements outlined in the Maine Stormwater Best Management Practices Manual, Volume III, Chapter 7.1.

Below is a summary of the treatment areas associated with the proposed infrastructure. Refer to Appendix D for detailed calculations.

Stormwater Treatment Summary Indian Cliff Subdivision (Linear Project)	
Total Proposed (Linear) Impervious Area	28,461 sf
Total Proposed (Linear) Developed Area	71,337 sf
Total Treated (Linear) Impervious Area	26,837 sf
Total Treated (Linear) Developed Area	36,134 sf
Linear Subdivision Impervious Area Treatment %	**95.3% (75% required)**
Linear Subdivision Developed Area Treatment %	**50.7% (50% required)**

Stormwater Treatment Summary Avesta Site	
Total Proposed Impervious Area	36,710 sf
Total Proposed Developed Area	77,579 sf
Total Treated Impervious Area	36,710 sf
Total Treated Developed Area	62,198 sf
Impervious Area Treatment %	**100.0% (95% required)**
Developed Area Treatment %	**80.2% (80% required)**

As shown in the Table above, the stormwater management systems have been designed to meet the applicable General Standard requirements for both the Subdivision and Site projects. Detailed treatment calculations can be found in Appendix D.

1.7 PHOSPHORUS STANDARD

The proposed project is located in the watershed of Thatcher Brook. The proposed project is not located within the direct watershed of a lake or lake most-at-risk listed in 06-096 Chapter 502. The Phosphorus Standard does not apply to this project.

1.8 URBAN IMPAIRED STREAM STANDARD

The proposed project is located in the watershed of Thatcher Brook. The Thatcher Brook is listed in 06-096 Chapter 502 as an Urban Impaired Stream, however, as the

CITY OF BIDDEFORD - SITE PLAN APPLICATION DRAWING CHECKLIST *LAST REVISED: 04/18/23*

CHECKLIST DIRECTIONS:
1. The following checklist must be completely filled out by the applicant for any Site Plan submittal to the Planning Department.
2. Applicant to confirm all of the items listed are included within the submittal. Any missing items must have adequate reasoning to justify their absence.
3. City to review applicant's submittal and checklist responses. Projects missing submittal information with non-acceptable reasoning will be rejected.
4. Items in BLACK are required for 'Preliminary Site Plan' approval & 'Final Site Plan' approval.
5. Items in BLUE are only required for 'Final Site Plan' approval.

SUBMITTAL INFORMATION - TO BE FILLED OUT BY APPLICANT	
Project Name:	Barra Road Subdivision
Planning Board # (if available):	2024.21
Applicant Name/Info:	Indian Cliff Development Corp
Submittal #/Type (Prelim/Final):	Preliminary Subdivision
Submittal Date:	15-May-24

SUBMITTAL REQUIREMENT		APPLICANT RESPONSE		CITY REVIEW RESPONSE	
ITEM NUMBER	DESCRIPTION	INFORMATION PROVIDED (YES/NO)	REASON NOT PROVIDED/COMMENT	ACCEPTABLE (YES/NO-REVISE & RESUBMIT)	COMMENT
1	GENERAL PLAN REQUIREMENTS				
A	Drawing specific legends (linetypes, hatches, etc.)	Yes			
B	Individual drawing layer control should be utilized: freeze/thawing, changing lineweights, and screening (i.e. screen existing layers on a proposed plan, freeze topography and underground utilities on a proposed site plan)	Yes			
C	North arrows, standard engineering scale viewports, dated revision blocks	Yes			
D	All drawings and surveys must be in the following coordinate systems: NAD83 Maine State Plane West (Horizontal) and NAVD88 (Vertical)	Yes			
E	Drawings need to be designed, signed & sealed by a Maine licensed professional engineer (PE); all boundary survey data needs to be performed by a licensed professional land surveyor (PLS)	Yes			
2	COVER SHEET				
A	Project Name & Property Address	Yes			
B	Project Team Contact Information (Owner, Engineer, Contractor, etc.)	Yes			
C	Site Location Map	Yes			
D	Sheet Set List of Drawings	Yes			
E	Tax Map and Lot ID	Yes			
F	Zoning & Shoreland Zone Information	Yes			
G	Existing Use Description	Yes			
H	Proposed Use Description	Yes			
I	Required Waiver/Variances (Yes/No); if yes, plan must clearly list waivers/variances requesting	No	No waivers proposed		
J	Name of Drainage Watershed	Yes			
K	Within the MS4 Urbanized Area (Yes/No)	No			
L	Natural resources (streams, wetlands, etc.) located on-site or adjacent to the property (Yes/No)	Yes			
M	Within the 100-year Flood Zone (Yes/No)	Yes			
N	Public Road Proposed (Yes/No)	Yes			
O	Private Road Proposed (Yes/No)	No			
P	Public Sewer Connection (Yes/No); if yes, need to include a proposed sewer flow calculation per Maine s Subsurface Wastewater Disposal Rules, Chapter 241, Section 4 (Tables 4A & 4C)	Yes	Proposed to be serviced by Low Pressure Sewer		
Q	Public Storm Drain Connection (Yes/No)	No	No public storm drain connections proposed		
R	Limits of Disturbance in acres	Yes	Provided in Stormwater Report		
S	Pervious Land Cover square footage, existing and proposed	Yes	Provided in Stormwater Report		
T	Impervious Land Cover square footage (Pavement/Gravel), existing and proposed	Yes	Provided in Stormwater Report		
U	Building Roof square footage, existing and proposed	No	No buildings proposed, see Avesta Site Plan Application		
V	Assigned Planning Board Number	Yes	2024.21 As assigned during sketch plan application		
W	Estimated cut/fill earthwork volumes; if disturbing within Flood Zone, separate set of earthwork volumes required (site vs. within flood zone)				
3	EXISTING CONDITIONS PLAN				
A	Horizontal & Vertical Datums annotated (NAD83 & NAVD88)	Yes			
B	Survey Benchmark Locations (with XYZ Coordinates annotated)	Yes	A benchmark is shown on the boundary survey, but a new benchmark will be established closer to the project and provided in subsequent revisions to the plans		
C	Property & Right-of-Way Lines	Yes			
D	Boundary line information (bearings, distances, etc.)	Yes			
E	Property pin and monumentation locations	Yes			
F	Existing easements with proper ownership identified	Yes			
G	Road Names & Individual Lot Labels (Map, Lot, Owner, Acreage)	Yes			
H	Location of any Natural Resources and their respective buffers (wetlands, streams, etc.)	Yes			
I	100-year Flood Zone Limits & Elevation	Yes			
J	USDA-NRCS Soil Boundaries and Labels	Yes			
K	Existing contours with adequate contour labelling; minimum 1 contour interval	Yes			
L	Existing building FFEs annotated	No	No existing buildings on proposed project area		
M	Spot elevations for existing building corners, door entrances, accessible parking/walkways, road centerlines, and bottom/top of curbs	No	No existing buildings on proposed project area		
N	Existing buildings & structures	No	No existing buildings on proposed project area		
O	Existing pavement areas & number of parking spaces	No	No existing buildings on proposed project area		
P	Existing ADA ramp geometry, detectable warning plates, and ADA parking spaces	No	No existing buildings on proposed project area		
Q	Existing site features (sidewalks, retaining walls, curbing, lightpoles, guide rails, dumpsters, fencing)	Yes	Abutting project under construction, completed conditions shown assumed as existing		
R	Existing signage and striping	Yes			
S	Existing underground utility locations (storm, sewer, force main, water, gas, elec, tele)	Yes			

	T	Existing above-ground utility locations (manholes, catch basins, utility poles, hydrants, transformers, riprap)	Yes			
	U	Rim, invert in, invert out, pipe size, cardinal direction (N, E, S, W) information for any existing utility infrastructure being tied into (upstream/downstream/outfalls)	Yes			
	V	Existing tree lines, street trees, free-standing trees (12 or larger diameter at breast height), and vegetation	Yes			
	W	Location of any borings, drinking wells, and monitoring wells	Yes			
4		SITE DEMOLITION & EROSION CONTROL (E&SC) PLAN				
	A	Limits-of-disturbance outlined and acreage annotated	Yes			
	B	Location of any Natural Resources and their respective buffers (wetlands, streams, etc.)	Yes			
	C	100-year Flood Zone Limits	Yes			
	D	Callout existing site features to be demolished/removed/replaced	Yes			
	E	Callout existing utilities to be demolished/removed/abandoned-in-place	Yes			
	F	Hatch existing buildings and pavement to be removed	Yes			
	G	Construction Entrance location(s)	Yes			
	H	Perimeter E&SC control location(s) (i.e. silt fence, erosion berm mix)	Yes			
	I	Stockpile and staging area(s) identified (with proper perimeter control)	Yes			
	J	Inlet protection location(s)	Yes			
	K	Note requiring contractor to implement dust control measures throughout construction	Yes			
	L	Note requiring contractor to pave utility trenches within right-of-way within 3 days of excavation or prior to any rain event	Yes			
	M	If groundwater expected, show dewatering/silt bag location(s); show temporary pumping routing				
	N	If large development is proposed with an extensive underground stormwater conveyance network, show sediment trap/basin location(s) needed for constructability/phasing; provide sizing calculations				
5		SITE PLAN/SUBDIVISION PLAN				
	A	Partial Site Plans needed for any viewport scale greater than 1 =20	No	1" = 30' scale plans appropriate for project detail		
	B	Existing property and right-of-way lines	Yes			
	C	Proposed subdivision lot lines and labels	Yes			
	D	Required Zoning Setbacks shown with dimensions and annotation	Yes			
	E	Bulk requirement summary table (zoning/parking calculations)	Yes			
	F	Location of any Natural Resources and their respective buffers (wetlands, streams, etc.)	Yes			
	G	100-year Flood Zone Limits	Yes			
	H	Proposed building outlines, door entrances and loading docks	Yes	See Avesta Site Plans		
	I	Proposed building labels	Yes			
	J	Proposed road extents; provide clear annotation if roads will be public or private	Yes			
	K	Proposed parking and accessible parking locations; annotate parking space counts	Yes			
	L	Proposed signage, parking striping, and traffic striping	Yes			
	M	Detailed ADA ramp geometry, detectable warning surfaces, and ADA parking striping/signage; existing & proposed	Yes			
	N	Proposed site features (i.e. curbing, walls, fencing, guiderail, fire hydrant, transformers, light pole locations)	Yes			
	O	Separate hatching for buildings, sidewalks, pavement, landscaping	Yes			
	P	Proposed landscaping; detailed landscaping design should be on separate plans	No	Not Applicable		
	Q	Designated snow storage areas	Yes			
	R	Proposed dumpster locations and trash removal access	No	Not Applicable		
	S	Linear dimensions of all drive aisles, sidewalk widths, parking spaces, loading docks	No	Not Applicable		
	T	Radial dimensions for all curbs, landscaped islands, sidewalks	Yes			
	U	Road centerline stationing shown, labelled every 0+50 with curve data	Yes			
	V	If Private Road is proposed, final recorded plans must clearly note that proposed private roads will not be submitted in the future for public acceptance	No	Not Applicable		
	W	If Private Road is proposed, final recorded plans must clearly note that the City is not responsible for any maintenance, repair, plowing, or trash removal of proposed private roads	No	Not Applicable		
	X	Planning Board signature block for final recording	Yes			
6		GRADING PLAN				
	A	Partial Grading Plans needed for any viewport greater than 1 =20	No	1" = 30' scale plans appropriate for project detail		
	B	Limits-of-disturbance outlined and acreage annotated	Yes			
	C	Proposed Building Labels with Individual Finished Floor Elevations (FFEs)	No	Not Applicable		
	D	Existing contours with adequate contour labelling, screened; minimum 1 contour interval	Yes			
	E	Proposed contours with adequate contour labelling; minimum 1 contour interval	Yes			
	F	Detailed grading for all ditches, swales, outfalls, and riprap	Yes			
	G	All proposed contours tie-into existing contours at limits-of-disturbance outline	Yes			
	H	Existing spot elevations for all asphalt and curb tie-in locations	Yes			
	I	Location of any Natural Resources and their respective buffers (wetlands, streams, etc.)	Yes			
	J	100-year Flood Zone Limits	Yes			
	K	Proposed spot elevations for all important roadway geometric points and/or on a 50 maximum interval: low/high points, PC/PT, road centerline, edge-of-asphalt	Yes			
	L	Proposed spot elevations for all curblines (bottom/top-of-curb) and sidewalks	Yes			
	M	Proposed spot elevations for all parking and drive aisle geometry points	Yes			
	N	Proposed spot elevations for all building corners and door-entry locations	No	Not Applicable		
	O	Proposed retaining wall/loading dock elevations (bottom/top of wall)	No	Not Applicable		
	P	Proposed spot elevations for all ADA ramp/landing/parking stall geometry points	No	Not Applicable		
	Q	Proposed % slope arrows for all ADA parking spaces and sidewalks	No	Not Applicable		

R	Proposed longitudinal % slope arrows for drainage ditch centerlines	Yes			
S	Proposed % slope arrows for roads, parking areas, and landscape tie-in areas	Yes			
T	Estimated cut/fill earthwork volumes; if disturbing within Flood Zone, separate set of earthwork volumes required (site vs. within flood zone)				
7	ROAD PROFILES (if public/private road proposed)				
A	Existing surface; dashed and screened	Yes			
B	Proposed surface; continuous and bold	Yes			
C	Corresponding centerline stationing and curve data annotation	Yes			
D	Road cross-section including proposed surface cross slopes; include multiple sections for various road cross slope conditions proposed (crowned, superelevated)	Yes			
E	Horizontal and vertical scale bars	Yes			
F	Clear annotation if proposed road will be public or private	Yes			
G	If Private Road is proposed, plans must clearly note that proposed private roads will not be submitted in the future for public acceptance	No	Not Applicable		
H	If Private Road is proposed, plans must clearly note that the City is not responsible for any maintenance, repair, plowing, or trash removal of proposed private roads	No	Not Applicable		
8	UTILITY PLAN				
A	Existing underground utility locations; screened (storm, sewer, force main, water, gas, electric, telecom)	Yes			
B	Existing above-ground utility locations; screened (manholes, catch basins, utility poles, hydrants, riprap)	Yes			
C	Rim, invert in, invert out, pipe size, cardinal direction (N, E, S, W) information for any existing utility infrastructure being tied into (upstream/downstream/outfalls)	Yes			
D	Proposed underground utility locations; bold (storm, sewer, force main, water, gas, electric, telecom, lighting)	Yes			
E	Proposed above-ground utility locations; bold (manholes, catch basins, utility poles, hydrants, transformers, riprap)	Yes			
F	Proposed storm culverts, outfalls, and riprap locations and sizes	Yes			
G	Storm/sewer structure labels must include: rim, inverts in, inverts out, pipe sizes, cardinal directions (N, E, S, W)	Yes			
H	Storm/sewer pipe labels must include: linear footage, pipe size, material, slope	Yes			
I	Flow directional arrows for storm & sewer pipes	Yes			
J	Proposed & existing site features shown that could conflict with proposed utilities (trees, signs, lightpoles, bollards, foundations, guiderails)	Yes			
K	All storm drains must be sized to convey the 25-year storm	Yes			
L	Sewer force main sizes and invert elevations	Yes			
M	Sewer pump station locations, model, rim, inverts, pipe sizes, cardinal directions (N,E,S,W)	Yes			
N	Grease trap & oil-water separator locations, sizes, elevations	No	Not Applicable		
O	Water, gas, electric, and telecom sizes labelled	Yes			
9	UTILITY PROFILES	No	All Gravity Information shown on plans		
A	Utility profiles for all gravity storm drains and sewer pipes, including all laterals, catch basins, culverts, and outfalls; profiles preferred to be aligned on the pipe centerline (not superimposed on the road centerline)				
B	Existing surface; dashed and screened				
C	Proposed surface; continuous and bold				
D	Storm/sewer structure labels must include: rim, inverts in, inverts out, pipe sizes, cardinal directions (N, E, S, W)				
E	Storm/sewer pipe labels must include: linear footage, pipe size, material, slope				
F	Existing and proposed gravity pipe crossings shown; sizes labelled and depths/clearance annotated				
G	Existing and proposed electric/water/telecom/gas crossings shown at approximate depths; sizes labelled and depths/clearance annotated				
H	Known ledge or groundwater elevations				
I	For all storm drains, 25-year HGL must be shown on profiles with starting tailwater condition identified				
J	For storm outfalls, include riprap sizing and grading extents				
K	Horizontal and vertical scale bars				
10	DETAILS				
A	Road section detail, including pavement & gravel depths	Yes			
B	Sidewalk, paver, crosswalk, and any other pavement section details				
C	Pavement sawcut detail	Yes			
D	Utility trench/backfill detail	Yes			
E	All site feature details; curbing, retaining walls, fencing, guiderails, dumpsters, etc.	Yes			
F	Signage, striping, and ADA details	Yes			
G	E&S notes and details; only show applicable/proposed measures	Yes			
H	Utility structure details (manholes, cleanouts, fittings, handholes, transformer pads, hydrants)	Yes			
I	Storm outfall & riprap details	Yes			
J	Drainage ditch cross section identifying minimum depth, minimum bed width, and maximum side slopes	Yes			
K	Pump station, grease trap, and oil-water separator details	Yes			
L	Conduit section details	Yes			
M	Miscellaneous details (as needed)	Yes			
11	LANDSCAPING, LIGHTING & PHOTOMETRIC PLANS				

A	As required by ordinance; at a minimum: locations, counts, and species/models must be identified	No	Not Applicable		
B	Landscaping & lighting details	No	Not Applicable		
12	DOCUMENTS/REPORTS/CALCULATIONS				
A	On initial preliminary submittal applications, applicant must submit a development review and inspection fee. Applicant to coordinate fee amount with City Planner prior to submittal. This fee will be drawn against to cover the following type of services throughout the project life cycle (and may require replenishing): i. 3rd Party City Peer-Review ii. Site Inspections during the permitting process iii. Erosion & Sediment Control Inspections during construction iv. Right-of-Way Inspections during construction	Yes	Per Sketch plan application, Sketch Plan Application fees of $6,835 paid, Preliminary Application fees $1,515 paid with this application, Final Application fees of $825 will be paid		
B	Predevelopment & Post-development Drainage Area Maps, including: i. Subdrainage areas delineated and labeled ii. Points of Interest/Analysis shown and labeled iii. Hatching for different land cover areas (impervious, pervious, gravel) iv. Time of concentration (Tc) paths & durations v. Save City-standardized stormwater summary tables	Yes			
C	An approved Sewer Ability-to-Serve Letter from the Engineering Department: i. Applicant to submit proposed sewer flow calculations per Maine s Subsurface Wastewater Disposal Rules, Chapter 241, Section 4 (Tables 4A & 4C)	Yes	See Application		
D	A Performance Guarantee Cost Estimate utilizing Planning s template				
E	25-year hydraulic calculations for all storm conveyance piping (rational method), including starting tailwater conditions/documentation	Yes	See Stormwater Report		
F	If any SWM water quality BMP or detention facility is proposed, hydrologic model exports/hydrographs must be submitted for the for the 2, 10, 25, & 100-year storm frequencies	Yes	See Stormwater Report		
G	Sizing calculations for any SWM water quality BMP or detention facility	Yes	See Stormwater Report		
H	A stormwater maintenance manual for any proposed SWM water quality BMP or detention facility, including: i. Annual maintenance requirements ii. Annual inspection requirements by a licensed PE; noting that all inspection reports/logs need to be submitted to the Engineering Department by March 1st each following year, identifying what on-going maintenance has occurred and what remedial repairs are needed iii. Signed Property Owner Agreement: including the current property owner s contact information and signature; it must be noted that all stormwater BMP maintenance requirements are linked to the property for perpetuity and transfer to any new ownership	Yes	See Stormwater Report		
I	Salt Management Plan	Yes			
J	Sewer pump station sizing calculations	Yes			
K	Sewer pump station maintenance plan	No	To be provided for final application		
L	Grease trap sizing calculations	No	Not Applicable		
M	Homeowner Association (HOA) agreement for any private road serving two (2) lots or more	Yes	See Application		
N	Summary list & copy of any required DOT/DEP/USACE permits & approvals	No	Project will apply for Maine DEP Stormwater Law Permit and provide copy when filed		

BARRA ROAD SUBDIVISION

BARRA ROAD
BIDDEFORD, MAINE

FOR
INDIAN CLIFF DEVELOPMENT CORP.
260 MAIN STREET
P.O. BOX 444
BIDDEFORD, MAINE

PLAN INDEX

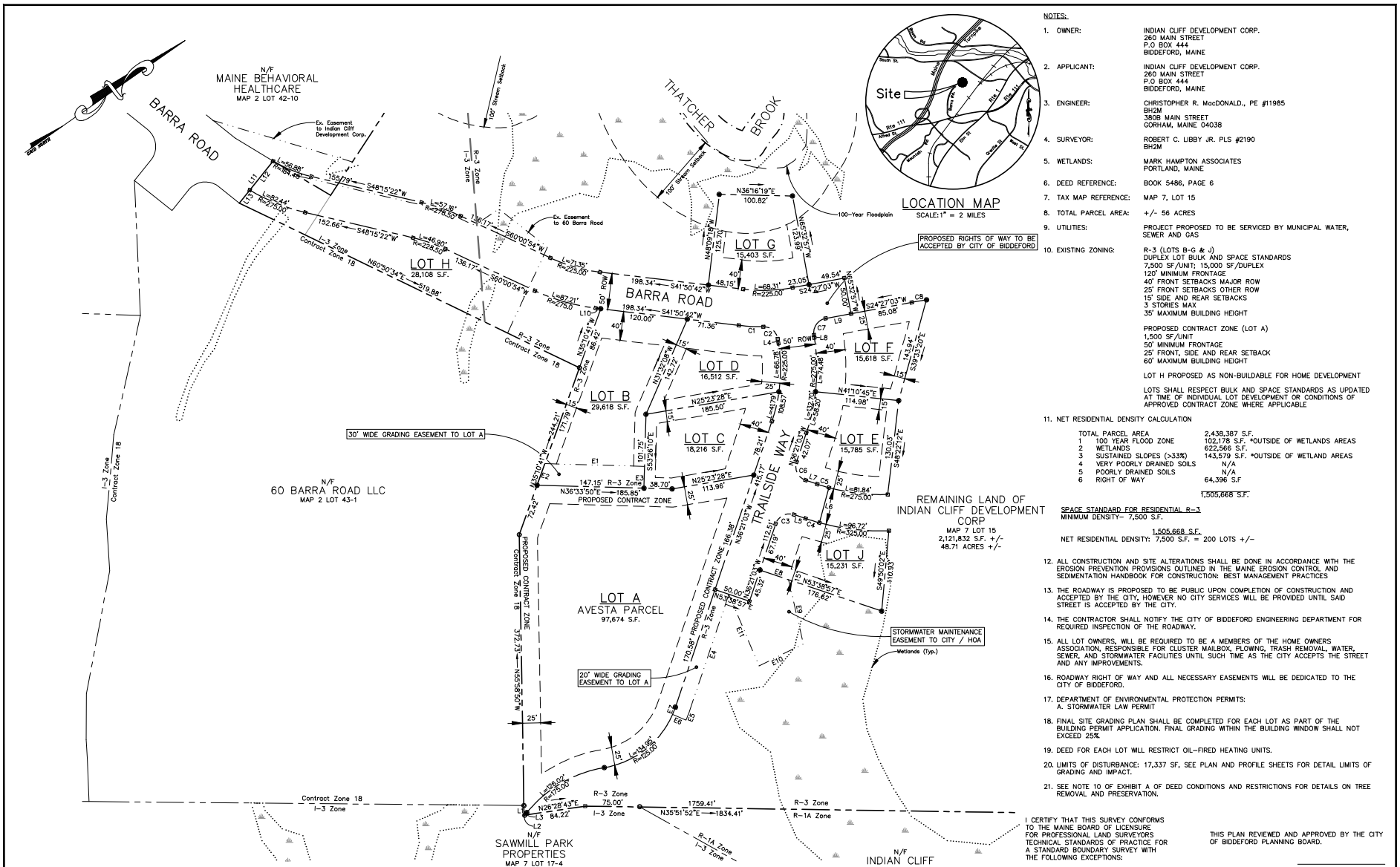
1	SUBDIVISION PLAN
2	STANDARD BOUNDARY SURVEY PLAN
3	EXISTING CONDITIONS PLAN
4	PLAN & PROFILE - BARRA ROAD (STA. 203+00 to 209+00)
5	PLAN & PROFILE - TRAILSIDE WAY (STA. 300+00 to 304+12.93)
6	EROSION CONTROL DETAILS
7	UTILITY DETAILS
8	DETAILS A
9	GRASSED UNDERDRAINED SOIL FILTER 2 DETAILS
10	GRASSED UNDEDRRAINED SOIL FILTER 3 DETAILS
A	PRE DEVELOPMENT PLAN
B	POST DEVELOPMENT PLAN

BH2M

Berry, Huff, McDonald, Milligan Inc.
Engineers, Surveyors

380B Main Street
Gorham, Maine 04038

Tel. (207) 839-2771
Fax (207) 839-8250



LOCATION MAP

SCALE: 1" = 2 MILES

NOTES:

1. OWNER: INDIAN CLIFF DEVELOPMENT CORP. 260 MAIN STREET P.O BOX 444 BIDDEFORD, MAINE
2. APPLICANT: INDIAN CLIFF DEVELOPMENT CORP. 260 MAIN STREET P.O BOX 444 BIDDEFORD, MAINE
3. ENGINEER: CHRISTOPHER R. MacDONALD., PE #11985 BH2M 380B MAIN STREET GORHAM, MAINE 04038
4. SURVEYOR: ROBERT C. LIBBY JR. PLS #2190 BH2M
5. WETLANDS: MARK HAMPTON ASSOCIATES PORTLAND, MAINE
6. DEED REFERENCE: BOOK 5486, PAGE 6
7. TAX MAP REFERENCE: MAP 7, LOT 15
8. TOTAL PARCEL AREA: +/- 56 ACRES
9. UTILITIES: PROJECT PROPOSED TO BE SERVICED BY MUNICIPAL WATER, SEWER AND GAS
10. EXISTING ZONING: R-3 (LOTS B-G & J) DUPLEX LOT BULK AND SPACE STANDARDS 7,500 SF/UNIT; 15,000 SF/DUPLEX 120' MINIMUM FRONTAGE 40' FRONT SETBACKS MAJOR ROW 25' FRONT SETBACKS OTHER ROW 15' SIDE AND REAR SETBACKS 3 STORIES MAX 35' MAXIMUM BUILDING HEIGHT

    PROPOSED CONTRACT ZONE (LOT A) 1,500 SF/UNIT 50' MINIMUM FRONTAGE 25' FRONT, SIDE AND REAR SETBACK 60' MAXIMUM BUILDING HEIGHT

    LOT H PROPOSED AS NON-BUILDABLE FOR HOME DEVELOPMENT

    LOTS SHALL RESPECT BULK AND SPACE STANDARDS AS UPDATED AT TIME OF INDIVIDUAL LOT DEVELOPMENT OR CONDITIONS OF APPROVED CONTRACT ZONE WHERE APPLICABLE
11. NET RESIDENTIAL DENSITY CALCULATION

	TOTAL PARCEL AREA	2,438,387 S.F.
1	100 YEAR FLOOD ZONE	102,178 S.F. *OUTSIDE OF WETLANDS AREAS
2	WETLANDS	622,566 S.F.
3	SUSTAINED SLOPES (>33%)	143,579 S.F. *OUTSIDE OF WETLAND AREAS
4	VERY POORLY DRAINED SOILS	N/A
5	POORLY DRAINED SOILS	N/A
6	RIGHT OF WAY	64,396 S.F
		1,505,668 S.F.

SPACE STANDARD FOR RESIDENTIAL R-3
MINIMUM DENSITY- 7,500 S.F.

1,505,668 S.F.
NET RESIDENTIAL DENSITY: 7,500 S.F. = 200 LOTS +/-

12. ALL CONSTRUCTION AND SITE ALTERATIONS SHALL BE DONE IN ACCORDANCE WITH THE EROSION PREVENTION PROVISIONS OUTLINED IN THE MAINE EROSION CONTROL AND SEDIMENTATION HANDBOOK FOR CONSTRUCTION: BEST MANAGEMENT PRACTICES
13. THE ROADWAY IS PROPOSED TO BE PUBLIC UPON COMPLETION OF CONSTRUCTION AND ACCEPTED BY THE CITY, HOWEVER NO CITY SERVICES WILL BE PROVIDED UNTIL SAID STREET IS ACCEPTED BY THE CITY.
14. THE CONTRACTOR SHALL NOTIFY THE CITY OF BIDDEFORD ENGINEERING DEPARTMENT FOR REQUIRED INSPECTION OF THE ROADWAY.
15. ALL LOT OWNERS, WILL BE REQUIRED TO BE A MEMBERS OF THE HOME OWNERS ASSOCIATION, RESPONSIBLE FOR CLUSTER MAILBOX, PLOWING, TRASH REMOVAL, WATER, SEWER, AND STORMWATER FACILITIES UNTIL SUCH TIME AS THE CITY ACCEPTS THE STREET AND ANY IMPROVEMENTS.
16. ROADWAY RIGHT OF WAY AND ALL NECESSARY EASEMENTS WILL BE DEDICATED TO THE CITY OF BIDDEFORD.
17. DEPARTMENT OF ENVIRONMENTAL PROTECTION PERMITS:
    A. STORMWATER LAW PERMIT
18. FINAL SITE GRADING PLAN SHALL BE COMPLETED FOR EACH LOT AS PART OF THE BUILDING PERMIT APPLICATION. FINAL GRADING WITHIN THE BUILDING WINDOW SHALL NOT EXCEED 25%.
19. DEED FOR EACH LOT WILL RESTRICT OIL-FIRED HEATING UNITS.
20. LIMITS OF DISTURBANCE: 17,337 SF, SEE PLAN AND PROFILE SHEETS FOR DETAIL LIMITS OF GRADING AND IMPACT.
21. SEE NOTE 10 OF EXHIBIT A OF DEED CONDITIONS AND RESTRICTIONS FOR DETAILS ON TREE REMOVAL AND PRESERVATION.

I CERTIFY THAT THIS SURVEY CONFORMS TO THE MAINE BOARD OF LICENSURE FOR PROFESSIONAL LAND SURVEYORS TECHNICAL STANDARDS OF PRACTICE FOR A STANDARD BOUNDARY SURVEY WITH THE FOLLOWING EXCEPTIONS:

1. NO SURVEYORS REPORT

ROBERT C. LIBBY JR. PLS #2190

THIS PLAN REVIEWED AND APPROVED BY THE CITY OF BIDDEFORD PLANNING BOARD.

DATE

CHAIR

LEGEND

SYMBOL	DESCRIPTION
⊡ GMF	GRANITE MONUMENT FOUND
○ IPF/IRF	IRON PIPE/IRON ROD FOUND
○ CIRF	CAPPED IRON ROD FOUND
●	5/8" IRON ROD W/ CAP TO BE SET
⊡	GRANITE MONUMENT TO BE SET
———	PROPERTY LINE
— — —	BUILDING SETBACK
— — —	ABUTTER PROPERTY LINE
.....	WETLANDS

CURVE DATA

C1	R=275.00', L=33.93'
C2	R=20.00', L=28.35'
C3	R=20.00', L=31.42'
C4	R=325.00', L=19.85'
C5	R=275.00', L=16.80'
C6	R=20.00', L=31.42'
C7	R=20.00', L=30.87'
C8	R=775.00', L=20.46'

LINE DATA

L1	N55°58'50"W, 13.43'
L2	S26°28'43"W, 0.95'
L3	N15°45'13"W, 4.62'
L4	N63°35'9"53"W, 6.16'
L5	N53°38'57"E, 16.68'
L6	N39°51'01"W, 50.00'
L7	N53°38'57"E, 16.68'
L8	N63°59'53"W, 3.82'
L9	S24°27'03"W, 35.55'
L10	S41°50'42"W, 6.98'
L11	N16°18'07"W, 74.29'
L12	N16°18'07"W, 51.42'
L13	N16°18'07"W, 22.87'

EASEMENT DATA

E1	N36°33'50"E, 137.26'
E2	S35°10'41"E, 31.59'
E3	S53°26'10"E, 30.00'
E4	N36°21'03"W, 170.58'
E5	R=145.00', L=12.43
E6	N58°33'38"E, 20.00'
E7	R=125.00', L=10.72'
E8	S53°38'57"W, 41.35'
E9	S68°05'39"E, 90.73'
E10	S08°37'45"W, 68.17'
E11	N77°52'50"W, 106.94'

NO.	DATE	REVISION DESCRIPTION
1	5/15/24	Submitted for Preliminary Permit Application

BH2M
Berry, Huff, MacDonald, Milligan Inc.
Engineers, Surveyors
380B Main Street
Gorham, Maine 04038
Tel (207) 839-2771
www.bh2m.com

FOR
Indian Cliff Development Corp
260 Main Street
P.O. Box 444
Biddeford, Maine

SUBDIVISION PLAN

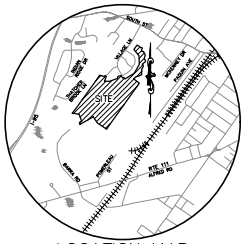
BARRA ROAD SUBDIVISION

BARRA ROAD
BIDDEFORD, MAINE

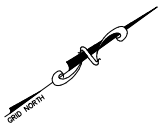
DESIGNED	DATE
C. MacDonald	May 2024
DRAWN	SCALE
B. Monsen	1" = 60'
CHECKED	JOB. NO.
C. MacDonald	22056

SHEET
1

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LOCATION MAP
SCALE: 1" = 2000'

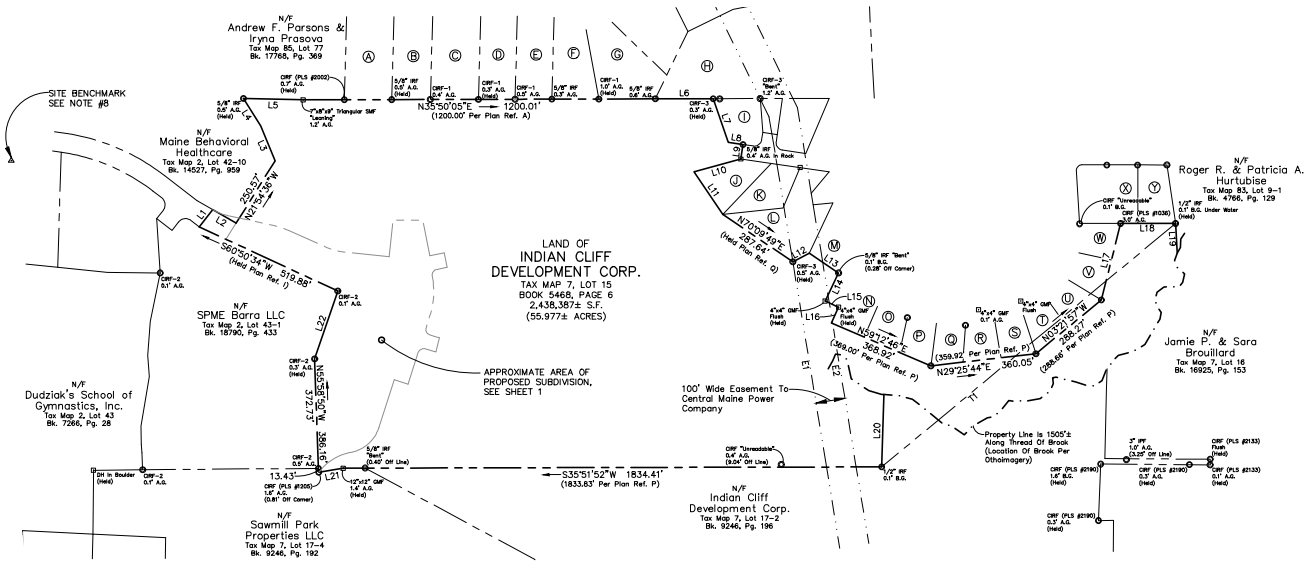


ABUTTER LIST

SYMBOL	OWNER	TAX MAP	LOT	BOOK/PAGE
A	DONALD J. & CYNTHIA J. COTE	85	78	5865/1
B	JAMES A. & MARY ANN GOLDMAN	85	79	18831/647
C	MICHAEL B. & KATHLEEN E. WILLETT	85	80	6919/67
D	WENDY ANN & RICHARD ST. PIERRE	85	81	19131/665
E	LARRY L. & DEBORAH Y. LAVERRIERE	85	82	6620/272
F	MARC P. & DENISE M. LESSARD	85	83	7969/288
G	RICKY P. DOYON	85	84	16361/797
H	JOAN M. COTE	85	94-1	14698/746
I	KENNETH B. & JANICE M. NADEAU	83	52	7832/335
J	BENJAMIN E. JEROME & MARY O'NEIL	83	53	17734/565
K	PETER J. & DEBORAH K. DUMOULIN	83	54	8357/269
L	ALEXANDER & SUSAN D. MILLETT	83	55	15083/144
M	BRIAN R. & LINDA L. LAVERRIERE	83	47	5902/173
N	THOMAS J. & TINA F. CALLAHAN	83	22	4679/154
O	CONSOLEE MUKAMULIGO	83	21	18805/383
P	NATHAN R. CADORETTE & SHELBI P. GUIMOND	83	20	17626/398
Q	JANET & KATELYN M. GENDRON	83	19	19124/290
R	DONALD R. GIRARD & ATHENA M. PAPPACONSTANTINE	83	18	11664/145
S	MARIA Y. GILLEY	83	17	17456/494
T	WILLIAM R. CLINE	83	16	8941/310
U	RICHARD M. WENTWORTH & CONSTANCE J. SAYER	83	15	4520/23
V	MARY L. MAYO	83	14	16360/870
W	KEVIN EARL SR. & CAROL JEAN DURAN	83	13	4661/291
X	ALBERT L. & JOAN M. NOLETTE	83	11	3861/165
Y	BANG H. & THUY DUONG NGOC NGUYEN	83	10	15757/564

NOTES:

1. OWNER: INDIAN CLIFF DEVELOPMENT CORP.
260 MAIN STREET
P.O. BOX 444
BIDDEFORD, ME
2. SURVEYOR: ROBERT C. LIBBY JR. PLS #2190
BH2M
380B MAIN STREET
GORHAM, MAINE
3. DEED REFERENCE: BK. 5468, PG. 6
4. AREA OF PARCEL: 2,438,387± S.F. (55.977± AC.)
5. TAX MAP REFERENCE: MAP 7, LOT 15
6. ZONING: I-3, R-3 AND PROPOSED CONTRACT ZONE, SEE SHEET 1 FOR ZONE BOUNDARIES AND APPLICABLE BULK AND SPACE REQUIREMENTS
7. ALL BEARINGS REFER TO GRID NORTH, NAD-83.
8. BENCHMARK: 8" SPIKE SET IN GROUND
ELEV. 112.09 (NAVD88)
9. PLAN REFERENCES:
A. "SITE PLAN - REVISED, THATCHER BROOK ESTATES", DATED JULY 1989, FOR MIKE EON ASSOC. LTD, BY BH2M, AND RECORDED IN THE YORK COUNTY REGISTRY OF DEEDS IN PLAN BOOK 209, PAGE 26.
B. "AMENDED SUBDIVISION PLAN, THATCHER BROOKS ESTATES", DATED AUGUST 2018, FOR ERIC DOYON, BY BH2M, JOB NUMBER 18086.
C. "FIFTH AMENDED SUBDIVISION PLAN", DATED SEPTEMBER 2014, FOR THE CITY OF BIDDEFORD, BY OWEN HASKELL, INC. AND RECORDED IN THE YORK COUNTY REGISTRY OF DEEDS IN PLAN BOOK 371, PAGE 50.
D. "ALFRED ROAD INDUSTRIAL PARK", DATED AUGUST 1977, FOR CITY OF BIDDEFORD, BY DES ROBERTS & HENRY, INC. AND RECORDED IN THE YORK COUNTY REGISTRY OF DEEDS IN PLAN BOOK 93, PAGE 24.
E. "STANDARD BOUNDARY SURVEY & EXISTING CONDITIONS PLAN", DATED DECEMBER 2022, FOR BIDDEFORD-OLD ORCHARD BEACH-SACO TRANSIT COMMITTEE, BY BH2M, JOB NUMBER 22223.
F. "STANDARD BOUNDARY SURVEY", DATED FEBRUARY 1999, FOR LIVERMORE FALLS TRUST COMPANY, BY LIVINGSTON-HUGHES AND RECORDED IN THE YORK COUNTY REGISTRY OF DEEDS IN PLAN BOOK 246, PAGE 15.
G. "SITE PLAN", DATED JANUARY 2017, FOR WESTFIELD INC., BY BH2M, JOB NUMBER 16170.
H. "SITE PLAN", DATED JANUARY 2021, FOR WESTFIELD INC., BY BH2M, JOB NUMBER 21278.
I. "ALTA/NSPS LAND TITLE SURVEY", DATED JANUARY 2023, FOR 60 BARRA ROAD LLC,BY BH2M, JOB NUMBER 22137.
J. "STANDARD BOUNDARY SURVEY OF VILLAGE LANE SUBDIVISION", DATED JULY 1986, FOR DEVELOPERS INC. BY STEVENS ASSOCIATES AND RECORDED IN THE YORK COUNTY REGISTRY OF DEEDS IN PLAN BOOK 150, PAGE 29.
K. "VILLAGE WOODS", DATED JULY 1990, FOR INDIAN CLIFF DEVELOPMENT CORP., BY BH2M AND RECORDED IN THE YORK COUNTY REGISTRY OF DEEDS IN PLAN BOOK 194, PAGE 15.
L. "VILLAGE WOODS, LOTS 5 & 6", DATED MAY 1991, FOR INDIAN CLIFF DEVELOPMENT CORP., BY BH2M AND RECORDED IN THE YORK COUNTY REGISTRY OF DEEDS IN PLAN BOOK 200, PAGE 50.
M. "AMENDED PLAN OF 3 LOT SUBDIVISION", DATED MARCH 1996, FOR MIKE EON ASSOC., LTD., BY BH2M AND RECORDED IN THE YORK COUNTY REGISTRY OF DEEDS IN PLAN BOOK 251, PAGE 3.
N. "STANDARD BOUNDARY SURVEY PLAN SHOWING LAND OF DANIEL LEMOVITZ & SAMUEL KARLIN", DATED AUGUST 1985, BY OAK POINT ASSOCIATES AND RECORDED IN THE YORK COUNTY REGISTRY OF DEEDS IN PLAN BOOK 142, PAGE 4.
O. "PLAN OF LOTS BELONGING TO ALEXANDER EON", DATED DECEMBER 1948, BY LIBBY & DOW ENGINEERS AND RECORDED IN THE YORK COUNTY REGISTRY OF DEEDS IN PLAN BOOK 15, PAGE 31.
P. "SURVEY PLAN OF LAND OWNED BY MERREAL CORPORATION", DATED MARCH 1990, BY SEBAGO TECHNICS INC. AND RECORDED IN THE YORK COUNTY REGISTRY OF DEEDS IN PLAN BOOK 192, PAGE 16.
Q. "FINAL PLAN-AMENDED, VILLAGE WOODS", DATED DECEMBER 1993, FOR INDIAN CLIFF DEVELOPMENT CORP., BY BH2M AND RECORDED IN THE YORK COUNTY REGISTRY OF DEEDS IN PLAN BOOK 222, PAGE 27.



LEGEND

SYMBOL	DESCRIPTION
● CAPPED IRON ROD TO BE SET	
⊡ GMF	GRANITE MONUMENT FOUND
○ IRF/IRF	IRON ROD/PIPE FOUND
○ CIRF	CAPPED IRON ROD FOUND
○ CIRF-1	CAPPED IRON ROD FOUND (PLS #1119)
○ CIRF-2	CAPPED IRON ROD FOUND (PLS #2190)
○ CIRF-3	CAPPED IRON ROD FOUND (PLS #611)
A.G./B.G.	ABOVE GRADE/BELOW GRADE
N/F	NOW OR FORMERLY
	PROPERTY LINE
	ABUTTER PROPERTY LINE
	EXISTING EDGE OF PAVEMENT
	EXISTING EDGE OF GRAVEL
	EDGE OF STREAM
	EASEMENT LINE

Scale: 1" = 200'
200' 0 200' 400'

EASEMENT LINE DATA:
E1 – N63°18'17"W 707.74'
E2 – N63°18'17"W 706.37'
TIE LINE DATA:
T1 – N03°37'14"W 1299.52'

LINE DATA:
L1 – N16°18'07"W 74.29' (Held Plan Ref. I)
L2 – N65°55'22"E 92.15' (Held Plan Ref. I)
L3 – N76°36'23"W 128.33' (Held Plan Ref. P)
L4 – N85°53'07"W 110.71' (110.83' Plan Ref. P)
L5 – N37°24'14"E 203.19' (203.01' Plan Ref. P)
L6 – N35°50'05"E 197.05' (197.07' Plan Ref. M)
L7 – S73°07'50"E 157.56' (157.63' Plan Ref. Q)
L8 – N44°08'23"E 50.00' (Held Plan Ref. Q)
L9 – S45°51'37"E 50.00' (Held Plan Ref. Q)
L10 – S20°38'23"W 165.00' (Held Plan Ref. Q)
L11 – S88°07'20"E 175.22' (Held Plan Ref. Q)
L12 – N08°19'42"E 63.25' (Held Plan Ref. K)
L13 – N69°49'42"E 120.00' (Held Plan Ref. K)
L14 – S28°38'36"E 105.78' (105.62' Plan Ref. K)
L15 – N61°14'04"E 49.99' (50.00' Plan Ref. K)
L16 – S29°40'26"E 59.40' (59.04' Plan Ref. P)
L17 – N39°47'55"W 268.81' (269.08' Plan Ref. P)
L18 – N36°00'52"E 186.99' (187.00' Plan Ref. P)
L19 – S57°15'29"E 101'± To Thread of Brook
L20 – N52°19'51"W 246'± To Thread of Brook
L21 – S26°28'43"W 85.17' (84.65' Plan Ref. P)
L22 – N35°10'41"W 244.21'

I CERTIFY THAT THIS SURVEY CONFORMS TO THE MAINE BOARD OF LICENSURE FOR PROFESSIONAL LAND SURVEYORS TECHNICAL STANDARDS OF PRACTICE FOR A STANDARD BOUNDARY SURVEY WITH THE FOLLOWING EXCEPTIONS:

1. NO SURVEYORS REPORT

ROBERT C. LIBBY JR. PLS #2190

NO.	DATE	REVISION DESCRIPTION
1	5/15/24	Submitted for Preliminary Permit Application

BH2M
Berry, Huff, MacDonald, Milligan Inc.
Engineers, Surveyors
380B Main Street
Gorham, Maine 04038
Tel. (207) 839-2771
www.bh2m.com

FOR:
Indian Cliff Development Corp
260 Main Street
P.O. Box 444
Biddeford, Maine

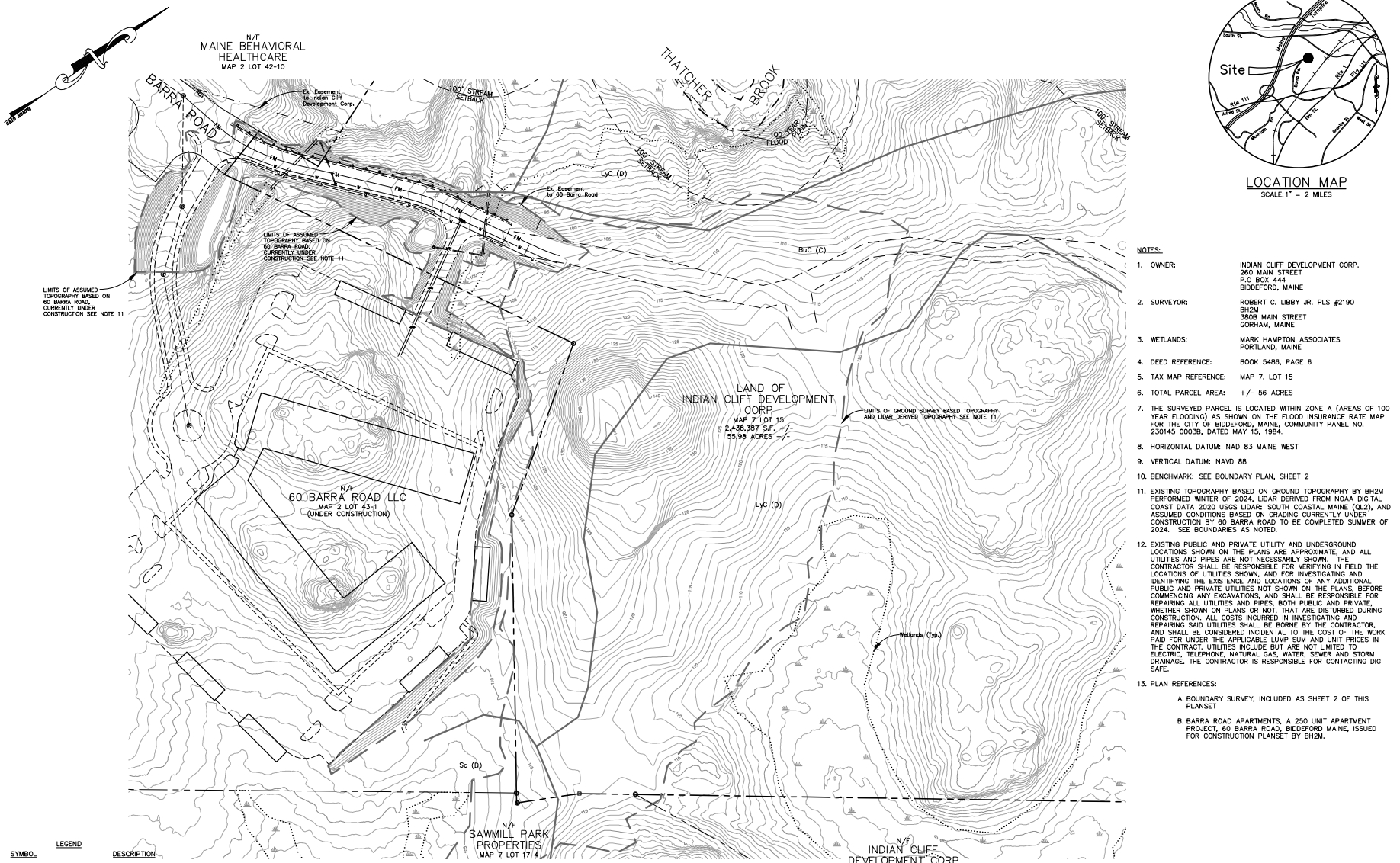
STANDARD BOUNDARY SURVEY PLAN
BARRA ROAD SUBDIVISION
BARRA ROAD
BIDDEFORD, MAINE

DESIGNED	DATE
T. Taggett	May 2024
DRAWN	SCALE
Dept.	1" = 200'
CHECKED	JOB. NO.
R. Libby Jr.	22056

SHEET
2

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© 2021, 2022 BERRY, HUFF, MACDONALD, MILLIGAN, Chadwick Baker & Dinsmore, LLC



LOCATION MAP
SCALE: 1" = 2 MILES

NOTES:

1. OWNER: INDIAN CLIFF DEVELOPMENT CORP.
260 MAIN STREET
P.O BOX 444
BIDDEFORD, MAINE
2. SURVEYOR: ROBERT C. LIBBY JR. PLS #2190
BH2M
3806 MAIN STREET
GORHAM, MAINE
3. WETLANDS: MARK HAMPTON ASSOCIATES
PORTLAND, MAINE
4. DEED REFERENCE: BOOK 5486, PAGE 6
5. TAX MAP REFERENCE: MAP 7, LOT 15
6. TOTAL PARCEL AREA: +/- 56 ACRES
7. THE SURVEYED PARCEL IS LOCATED WITHIN ZONE A (AREAS OF 100 YEAR FLOODING) AS SHOWN ON THE FLOOD INSURANCE RATE MAP FOR THE CITY OF BIDDEFORD, MAINE, COMMUNITY PANEL NO. 230145 0003B, DATED MAY 15, 1984.
8. HORIZONTAL DATUM: NAD 83 MAINE WEST
9. VERTICAL DATUM: NAVD 88
10. BENCHMARK: SEE BOUNDARY PLAN, SHEET 2
11. EXISTING TOPOGRAPHY BASED ON GROUND TOPOGRAPHY BY BH2M PERFORMED WINTER OF 2024, LIDAR DERIVED FROM NOAA DIGITAL COAST DATA 2020 USGS LIDAR: SOUTH COASTAL MAINE (QL2), AND ASSUMED CONDITIONS BASED ON GRADING CURRENTLY UNDER CONSTRUCTION BY 60 BARRA ROAD TO BE COMPLETED SUMMER OF 2024. SEE BOUNDARIES AS NOTED.
12. EXISTING PUBLIC AND PRIVATE UTILITY AND UNDERGROUND LOCATIONS SHOWN ON THE PLANS ARE APPROXIMATE, AND ALL UTILITIES AND PIPES ARE NOT NECESSARILY SHOWN. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING IN FIELD THE LOCATIONS OF UTILITIES SHOWN, AND FOR INVESTIGATING AND IDENTIFYING THE EXISTENCE AND LOCATIONS OF ANY ADDITIONAL PUBLIC AND PRIVATE UTILITIES NOT SHOWN ON THE PLANS, BEFORE COMMENCING ANY EXCAVATIONS, AND SHALL BE RESPONSIBLE FOR REPAIRING ALL UTILITIES AND PIPES, BOTH PUBLIC AND PRIVATE, WHETHER SHOWN ON PLANS OR NOT, THAT ARE DISTURBED DURING CONSTRUCTION. ALL COSTS INCURRED IN INVESTIGATING AND REPAIRING SAID UTILITIES SHALL BE BORNE BY THE CONTRACTOR, AND SHALL BE CONSIDERED INCIDENTAL TO THE COST OF THE WORK PAID FOR UNDER THE APPLICABLE LUMP SUM AND UNIT PRICES IN THE CONTRACT. UTILITIES INCLUDE BUT ARE NOT LIMITED TO ELECTRIC, TELEPHONE, NATURAL GAS, WATER, SEWER AND STORM DRAINAGE. THE CONTRACTOR IS RESPONSIBLE FOR CONTACTING DIG SAFE.
13. PLAN REFERENCES:
   A. BOUNDARY SURVEY, INCLUDED AS SHEET 2 OF THIS PLANSET
   B. BARRA ROAD APARTMENTS, A 250 UNIT APARTMENT PROJECT, 60 BARRA ROAD, BIDDEFORD MAINE, ISSUED FOR CONSTRUCTION PLANSET BY BH2M.

LEGEND

SYMBOL	DESCRIPTION
⊡ GMF	GRANITE MONUMENT FOUND
○ IPF/IRF	IRON PIPE/IRON ROD FOUND
○ CIRF	CAPPED IRON ROD FOUND
◉ IRS	5/8" IRON ROD W/ CAP TO BE SET
⊡	GRANITE MONUMENT TO BE SET
UTILITY POLE	
PROPERTY LINE	
ABUTTER PROPERTY LINE	
WETLANDS	
W	WATER MAIN
FM	FORCEMAIN
G	GAS MAIN
OHU	OVERHEAD UTILITIES

SOILS LEGEND

SYMBOL	DESCRIPTION
	SOIL BOUNDARY LINES

SOIL DESIGNATION
AdB(A)
- SLOPE DESIGNATION
- HYDROLOGIC SOIL GROUP
- HYDROLOGIC SOIL

HYDROLOGIC SOIL GROUP

SOIL	GROUP
BUXTON (BuC)	C
LYMAN-ROCK (LyB)	D
LYMAN-ROCK (LyC)	D
SCANTIC (Sc)	D

NO.	DATE	REVISION DESCRIPTION
1	5/15/24	Submitted for Preliminary Permit Application

BH2M
Berry, Huff, MacDonald, Milligan Inc.
Engineers, Surveyors
3806 Main Street
Gorham, Maine 04038
Tel (207) 856-2771
www.bh2m.com

FOR
Indian Cliff Development Corp
260 Main Street
P.O. Box 444
Biddeford, Maine

EXISTING CONDITIONS PLAN

BARRA ROAD SUBDIVISION

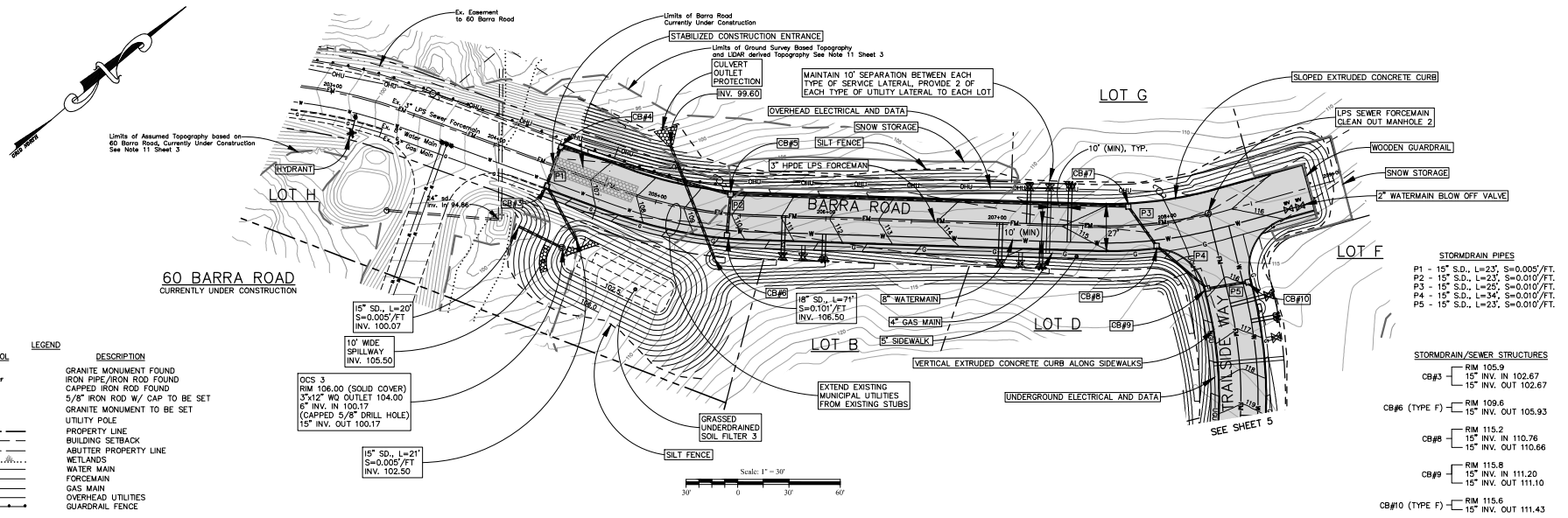
BARRA ROAD
BIDDEFORD, MAINE

DESIGNED	DATE
C. MacDonald	May 2024
DRAWN	SCALE
Dept.	1" = 60'
CHECKED	JOB. NO.
C. MacDonald	22056

SHEET
3

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60 BARRA ROAD
CURRENTLY UNDER CONSTRUCTION

LEGEND

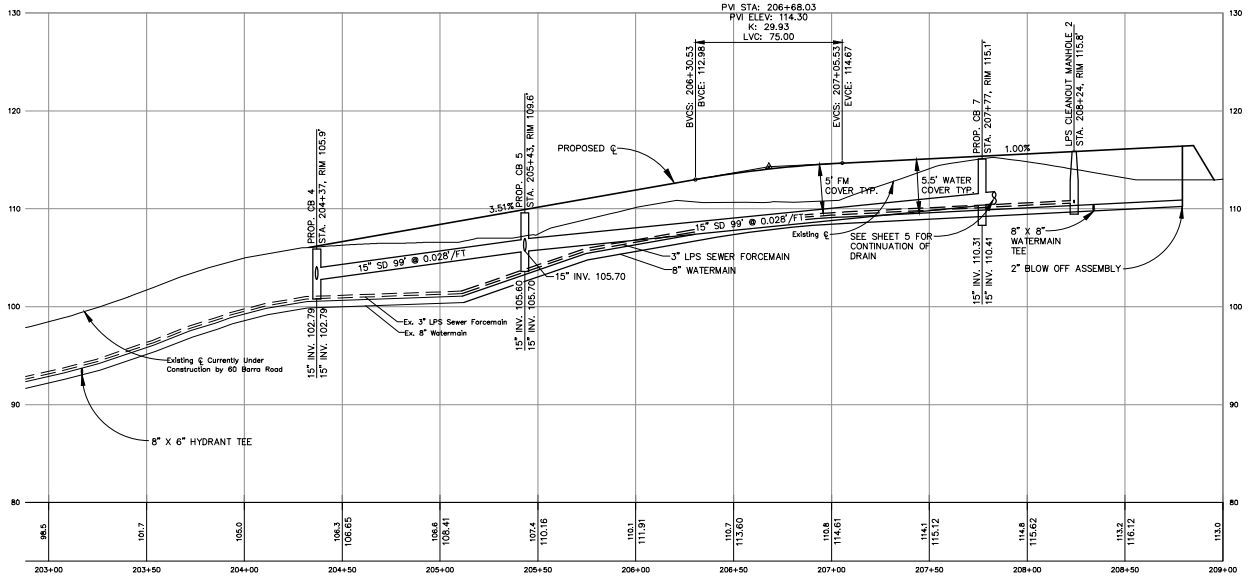
SYMBOL	DESCRIPTION
⊡ GMF	GRANITE MONUMENT FOUND
○ IPF/IRF	IRON PIPE/IRON ROD FOUND
○ CIRF	CAPPED IRON ROD FOUND
● IRS	5/8" IRON ROD W/ CAP TO BE SET
⊡	GRANITE MONUMENT TO BE SET
PU	UTILITY POLE
	PROPERTY LINE
	BUILDING SETBACK
	ABUTTER PROPERTY LINE
	WETLANDS
W	WATER MAIN
FM	FORCEMAIN
G	GAS MAIN
OHU	OVERHEAD UTILITIES
	GUARDRAIL FENCE

STORMDRAIN PIPES
P1 - 15" S.D., L=23', S=0.005'/FT.
P2 - 15" S.D., L=23', S=0.010'/FT.
P3 - 15" S.D., L=25', S=0.010'/FT.
P4 - 15" S.D., L=34', S=0.010'/FT.
P5 - 15" S.D., L=23', S=0.010'/FT.

STORMDRAIN/SEWER STRUCTURES
CB#3 — RIM 105.9; 15" INV. IN 102.67; 15" INV. OUT 102.67
CB#6 (TYPE F) — RIM 109.6; 15" INV. OUT 105.93
CB#8 — RIM 115.2; 15" INV. IN 110.76; 15" INV. OUT 110.66
CB#9 — RIM 115.8; 15" INV. IN 111.20; 15" INV. OUT 111.10
CB#10 (TYPE F) — RIM 115.6; 15" INV. OUT 111.43

NOTES:

1. CONTRACTOR TO IDENTIFY STOCKPILE AREAS AND APPROPRIATE EROSION AND SEDIMENTATION CONTROL PRIOR TO CONSTRUCTION.
2. CONTRACTOR TO IMPLEMENT DUST CONTROL MEASURES THROUGHOUT CONSTRUCTION.
3. CONTRACTOR TO PAVE UTILITY TRENCHES WITHIN ROW WITHIN 3 DAYS OF EXCAVATION OR PRIOR TO ANY RAIN EVENT.
4. THERE SHALL BE NO SNOW STORAGE WITHIN THE GRASSED UNDERDRAINED SOIL FILTERS OR FOREBAYS AT ANY TIME.



BARRA ROAD
SCALE
VERTICAL: 1" = 6'
HORIZONTAL: 1" = 30'

NO.	DATE	REVISION DESCRIPTION
1	5/15/24	Submitted for Preliminary Permit Application

BH2M
Berry, Huff, MacDonald, Milligan Inc.
Engineers, Surveyors
380B Main Street
Gorham, Maine 04038
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FOR:
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LP, Dan Hall
260 Main Street
Biddeford, Maine

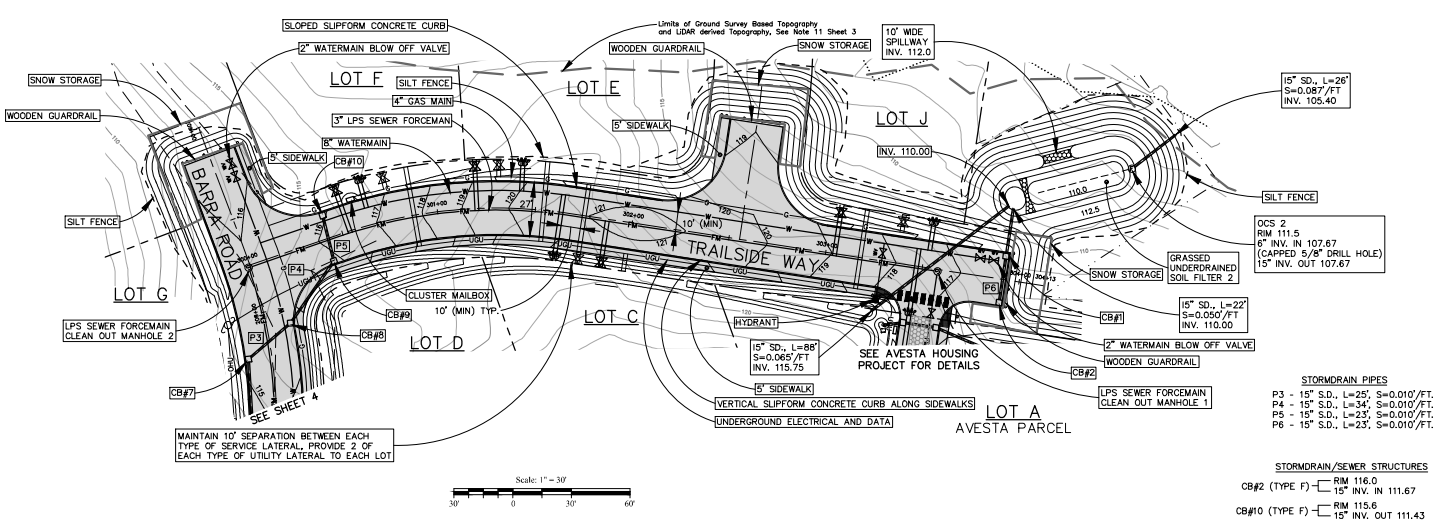
PLAN & PROFILE
BARRA ROAD (STA. 203+00 to 209+00)

BARRA ROAD SUBDIVISION
BARRA ROAD
BIDDEFORD, MAINE

DESIGNED	DATE
C. MacDonald	April 2024
DRAWN	SCALE
Dept.	1" = 30'
CHECKED	JOB. NO.
C. MacDonald	22056

SHEET
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LEGEND

SYMBOL	DESCRIPTION
⊡ GMF	GRANITE MONUMENT FOUND
○ IPF/IRF	IRON PIPE/IRON ROD FOUND
○ CIRF	CAPPED IRON ROD FOUND
● IRS	5/8" IRON ROD W/ CAP TO BE SET
⊡	GRANITE MONUMENT TO BE SET
UP	UTILITY POLE
	PROPERTY LINE
	BUILDING SETBACK
	ABUTTER PROPERTY LINE
	WETLANDS
W	WATER MAIN
FM	FORCEMAIN
G	GAS MAIN
OHU	OVERHEAD UTILITIES
	GUARDRAIL FENCE

STORMDRAIN PIPES

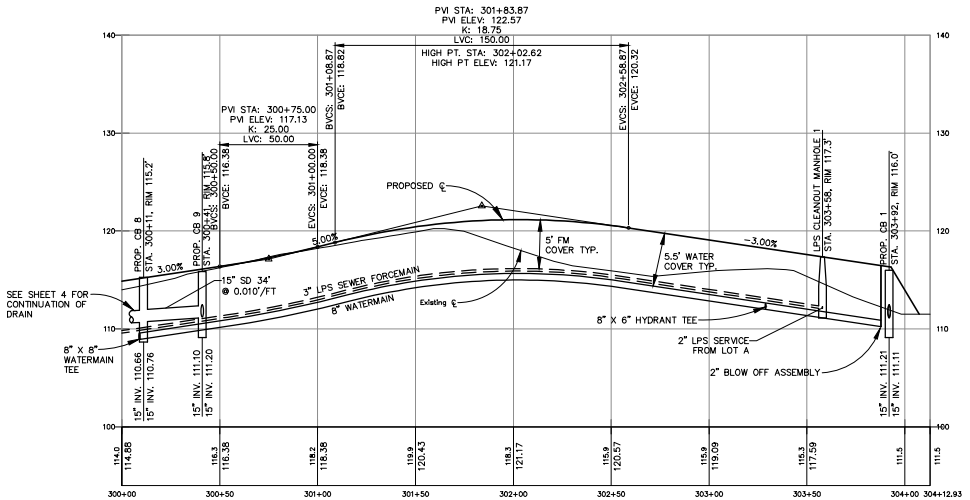
P3 - 15" S.D., L=25', S=0.010'/FT.
P4 - 15" S.D., L=34', S=0.010'/FT.
P5 - 15" S.D., L=23', S=0.010'/FT.
P6 - 15" S.D., L=23', S=0.010'/FT.

STORMDRAIN/SEWER STRUCTURES

CB#2 (TYPE F) — RIM 116.0, 15" INV. IN 111.67
CB#10 (TYPE F) — RIM 115.6, 15" INV. OUT 111.43

NOTES:

1. CONTRACTOR TO IDENTIFY STOCKPILE AREAS AND APPROPRIATE EROSION AND SEDIMENTATION CONTROL PRIOR TO CONSTRUCTION.
2. CONTRACTOR TO IMPLEMENT DUST CONTROL MEASURES THROUGHOUT CONSTRUCTION.
3. CONTRACTOR TO PAVE UTILITY TRENCHES WITHIN ROW WITHIN 3 DAYS OF EXCAVATION OR PRIOR TO ANY RAIN EVENT.
4. THERE SHALL BE NO SNOW STORAGE WITHIN THE GRASSED UNDERDRAINED SOIL FILTERS OR FOREBAYS AT ANY TIME.



TRAILSIDE WAY

SCALE
VERTICAL: 1" = 6'
HORIZONTAL: 1" = 30'

NO.	DATE	REVISION DESCRIPTION
1	5/15/24	Submitted for Preliminary Permit Application

BH2M

Berry, Huff, MacDonald, Milligan Inc.
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38(B) Main Street
Gorham, Maine 04038
Tel: (207) 858-2777
www.bh2m.com

FOR:
Indian Cliff Development Corp
LP, D/B/A Avesta
260 Main Street
Biddeford, Maine

PLAN & PROFILE
TRAILSIDE WAY (STA. 300+00 to 304+12.93)

BARRA ROAD SUBDIVISION
BARRA ROAD
BIDDEFORD, MAINE

DESIGNED	DATE
C. MacDonald	May 2024
DRAWN	SCALE
Dept.	1" = 30'
CHECKED	JOB. NO.
C. MacDonald	22056

SHEET
5

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EROSION AND SEDIMENT CONTROL PLAN

THIS PLAN HAS BEEN DEVELOPED AS A STRATEGY TO CONTROL SOIL EROSION AND SEDIMENTATION DURING AND AFTER CONSTRUCTION. THIS PLAN IS BASED ON THE STANDARDS AND SPECIFICATIONS FOR EROSION PREVENTION IN DEVELOPING AREAS AS CONTAINED IN THE LATEST REVISION OF TO THE 2016 MAINE EROSION AND SEDIMENT CONTROL BMP'S MANUAL FOR DESIGNERS AND ENGINEERS, AND THE LATEST REVISION TO THE 2014 MAINE EROSION AND SEDIMENT CONTROL FIELD GUIDE FOR CONTRACTORS. SEE MANUALS FOR ADDITIONAL INFORMATION AND DETAILS.

THE PROPOSED LOCATIONS OF SILTATION AND EROSION CONTROL STRUCTURES ARE SHOWN ON THE SITE PLAN.

1. ALL CONSTRUCTION INSPECTIONS SHALL BE CONDUCTED BY SOMEONE WITH KNOWLEDGE OF EROSION AND STORMWATER CONTROL, INCLUDING STANDARDS AND PERMIT CONDITIONS. CONSTRUCTION INSPECTIONS SHALL BE PERFORMED AT LEAST ONCE A WEEK, AND PRIOR TO AND 24 HOURS AFTER A WET WEATHER EVENT (0.5 INCH/MORE IN A 24 HOUR PERIOD). CONSTRUCTION INSPECTION AND CORRECTIVE ACTION DOCUMENTATION RECORDS SHALL BE MAINTAINED FOR A MINIMUM OF 5 YEARS.
2. THE SCOPE OF CONSTRUCTION INSPECTIONS INCLUDE THE EROSION AND SEDIMENTATION CONTROL MEASURES AS WELL AS DISTURBED AREAS, MATERIAL STORAGE AREAS, AND LOCATIONS WHERE VEHICLES ENTER AND EXIT THE SITE.
3. ALL SEDIMENT AND EROSION CONTROL MEASURES SHALL BE DONE IN ACCORDANCE WITH THE "MAINE EROSION AND SEDIMENT CONTROL BMP'S", DEPARTMENT OF ENVIRONMENTAL PROTECTION, LATEST REVISION.
4. THOSE AREAS UNDERGOING ACTUAL CONSTRUCTION WILL BE LEFT IN AN UNTREATED OR UNVEGETATED CONDITION FOR A MINIMUM TIME. AREAS SHALL BE PERMANENTLY STABILIZED WITHIN 7 DAYS OF FINAL GRADING AND TEMPORARILY STABILIZED WITHIN 7 DAYS OF INITIAL DISTURBANCE OF THE SOIL. IF THE DISTURBANCE IS WITHIN 75 FEET OF A WETLAND OR WATERBODY, THE AREA SHALL BE STABILIZED WITHIN 2 DAYS OR PRIOR TO ANY STORM EVENT, WHICHEVER COMES FIRST.
5. EXCAVATION AND EARTHWORK SHALL BE DONE SUCH THAT NO MORE THAN 10 ACRES OF THE SITE IS WITHOUT STABILIZATION AT ANY ONE TIME.
6. EXPOSED AREA SHOULD BE LIMITED TO THAT WHICH CAN BE MULCHED IN ONE DAY.
7. CONTINUATION OF EARTHWORK OPERATIONS ON ADDITIONAL AREAS SHALL NOT BEGIN UNTIL THE EXPOSED SOIL SURFACE ON THE AREA BEING WORKED HAS BEEN STABILIZED SUCH THAT NO MORE THAN ONE ACRE OF THE SITE IS WITHOUT EROSION CONTROL PROTECTION.
8. SEDIMENT BARRIERS (EROSION CONTROL MIX, STONE CHECK DAMS, STABILIZED CONSTRUCTION ENTRANCE, ETC.) SHOULD BE INSTALLED PRIOR TO ANY SOIL DISTURBANCE OF THE CONTRIBUTING DRAINAGE AREA ABOVE THEM. THE CONTRACTOR SHALL MAINTAIN THE STABILIZED CONSTRUCTION ENTRANCE UNTIL ALL DISTURBED AREAS ARE STABILIZED.
9. INSTALL EROSION CONTROL MIX AT TOE OF SLOPES TO FILTER SILT FROM RUNOFF. SEE E.C. MIX DETAIL FOR PROPER INSTALLATION. EROSION CONTROL MIX WILL REMAIN IN PLACE PER NOTE #7. THE USE OF AN EROSION CONTROL MIX BERM IS PROHIBITED AT THE BASE OF SLOPES STEEPER THAN 8% OR WHERE THERE IS FLOWING WATER.
10. ALL EROSION CONTROL STRUCTURES WILL BE INSPECTED, REPLACED, AND/OR REPAIRED EVERY 7 DAYS AND IMMEDIATELY BEFORE AND FOLLOWING ANY SIGNIFICANT RAINFALL (0.5 INCH OR MORE IN A 24-HOUR PERIOD) OR SNOW MELT OR WHEN NO LONGER SERVICEABLE DUE TO SEDIMENT ACCUMULATION OR DECOMPOSURE. IF AN INSPECTION DETERMINES THAT A CORRECTIVE ACTION IS REQUIRED, THE ACTION OR REPAIR SHALL BE STARTED BY THE END OF THE NEXT WORKDAY AND COMPLETED WITHIN SEVEN DAYS OR BEFORE THE NEXT STORM EVENT. SEDIMENT DEPOSITS SHOULD BE REMOVED AFTER EACH STORM EVENT. THEY MUST BE REMOVED WHEN DEPOSITS REACH APPROXIMATELY ONE HALF THE HEIGHT OF THE BARRIER. SEDIMENT CONTROL MIX SHALL BE REPLACED WHEN ALTERATIONS APPEAR IMMINENT. ANY DISTURBED AREAS LEFT EXPOSED AFTER SEDIMENT CONTROL MEASURES SHALL BE REMOVED WITHIN 30 DAYS OF PERMANENT STABILIZATION. PERMANENT STABILIZATION IS SOD OR GRASS CATCH IN VEGETATED AREAS.
11. NO SLOPES, EITHER PERMANENT OR TEMPORARY, SHALL BE STEEPER THAN ONE AND ONE HALF TO ONE (1.5 TO 1).
12. IF FINAL SEEDING OF THE DISTURBED AREAS IS NOT COMPLETED 45 DAYS PRIOR TO THE FIRST KILLING FROST, USE TEMPORARY MULCHING (DORMANT SEEDING MAY BE ATTEMPTED AS WELL) TO PROTECT THE SITE AND DELAY SEEDING UNTIL THE NEXT RECOMMENDED SEEDING PERIOD.
13. TEMPORARY SEEDING OF DISTURBED AREAS THAT HAVE NOT BEEN FINAL GRADED SHALL BE COMPLETED BY AUG. 15 OR 45 DAYS PRIOR TO THE FIRST KILLING FROST (OCT. 1) TO PROTECT FROM SPRING RUNOFF PROBLEMS.
14. DURING THE CONSTRUCTION PHASE, INTERCEPTED SEDIMENT SHALL BE REMOVED TO THE AREA DESIGNATED AND REGRADED ONTO OPEN AREAS. POST SEEDING SEDIMENT, IF ANY WILL BE DISPOSED OF IN AN ACCEPTABLE MANNER.
15. REVEGETATION MEASURES WILL COMMENCE UPON COMPLETION OF CONSTRUCTION EXCEPT AS NOTED ABOVE. ALL DISTURBED AREAS NOT OTHERWISE STABILIZED WILL BE GRADED, SMOOTHED, AND PREPARED FOR FINAL SEEDING AS FOLLOWS:
   a. APPLY LIMESTONE AND FERTILIZER ACCORDING TO SOIL TEST. IF SOIL TESTING IS NOT FEASIBLE ON SMALL OR VARIABLE SITES, OR WHERE TIMING IS CRITICAL, FERTILIZER MAY BE APPLIED AT THE RATE OF 600 POUNDS PER ACRE OR 18.4 POUNDS PER 1,000 SQUARE FEET USING 10–20–20 OR EQUIVALENT. APPLY GROUND LIMESTONE AT 2 TONS PER ACRE (92 LBS PER 1,000 SQ. FT.). (EQUIVALENT TO 50# CALCIUM PLUS MAGNESIUM OXIDE) AT A RATE OF 3 TONS PER ACRE (138 LB PER 1,000 SQ. FT.).
   b. HAY MULCH AT THE RATE OF 70–90 LBS PER 1000 SQUARE FEET OVER SEEDED AREAS. UNANCHORED OR WINDY AREAS, ANCHOR MULCH WITH PEG AND TWINE (1 SQ. YD./BLOCK). HYDRAULIC MULCHES MAY ALSO BE USED. APPLIED AT A RATE OF 5 LBS PER 1000 SQUARE FEET FOR PAPER MULCH OR 40 LBS PER 1000 SQUARE FEET OR AS DIRECTED BY THE MANUFACTURER. ON SLOPES GREATER THAN 3:1 EROSION CONTROL MIX MAY BE USED, SEE EROSION CONTROL MIX NOTES BELOW.
   c. FOR DISTURBED AREAS TO BE MAINTAINED IN POST–CONSTRUCTION AS A MEADOW BUFFER, APPLY A 60–50 MIX OF ERNST FUZZ N' BUZZ PREMIUM AND NATIVE CLOVER MIX AT SUPPLIERS RECOMMENDED APPLICATION RATES.
16. ALL TEMPORARY EROSION CONTROL MEASURES SHALL BE REMOVED WITHIN 30 DAYS ONCE THE SITE IS STABILIZED WITH 90% GRASS CATCH IN VEGETATED AREAS. TEMPORARY EROSION AND SEDIMENT CONTROL BLANKET SHALL BE USED IN ALL DITCHES AND SWALES AS SHOWN IN DETAILS.
17. WETLANDS WILL BE PROTECTED WITH EROSION CONTROL MIX OR SILT FENCE INSTALLED AT THE EDGE FOR THE WETLAND OR THE BOUNDARY OF WETLAND DISTURBANCE. ALL AREAS WITHIN 75 FEET OF A PROTECTED NATURAL RESOURCE MUST BE PROTECTED WITH A DOUBLE ROW OF SEDIMENT BARRIERS DURING WINTER CONSTRUCTION.
18. ALL STORMWATER WILL BE PREVENTED FROM RUNNING ONTO STOCKPILES. SEDIMENT BARRIERS WILL BE INSTALLED DOWNGRADIENT OF ALL STOCKPILES.
19. PERMANENT POST–CONSTRUCTION BMP'S (VEGETATED SWALES, WET PONDS, ETC.) WILL NOT BE USED TO MANAGE FLOWS DURING CONSTRUCTION WITHOUT SPECIAL PROTECTION AND/OR RESTORATION.

ADDITIONAL TEMPORARY SEED MIXTURE (FOR PERIODS LESS THAN 12 MONTHS):

SEED
ERNST WATER RYEGRASS 112 LBS/ACRE

EROSION CONTROL MIX

EROSION CONTROL MIX (ECM) SHALL MEET THE REQUIREMENTS PROVIDED IN THE LATEST REVISION OF MAINE DEP'S EROSION AND SEDIMENTATION CONTROL BMP MANUAL. ECM IS ACCEPTABLE FOR USE ON SLOPES OF GREATER THAN 3:1 BUT LESS THAN 1:1. ECM SHALL CONSIST OF WELL–GRADED ORGANIC COMPONENT 50 – 100% OF DRY WEIGHT, AND COMPRISED OF FIBROUS AND ELONGATED FRAGMENTS. ECM SHALL BE FREE FROM REFUSE, MATERIAL TOXIC TO PLANT GROWTH OR CONSTRUCTION DEBRIS. ECM SHALL BE EVENLY DISTRIBUTED AND APPLIED AT A THICKNESS OF 2" ON 3:1 SLOPES, WITH AN ADDITIONAL 1/2" PER 20' OF SLOPE FOR A MAXIMUM OF 100' IN LENGTH. SLOPES GREATER THAN 3:1, ECM SHALL BE APPLIED AT THICKNESS OF 4" OR 5" FOR SLOPES GREATER THAN 80' IN LENGTH.

SLOPES GREATER THAN 3:1 MAY ALSO REQUIRE ADDITIONAL SLOPE STABILIZATION DEPENDING ON UPGRADIENT RUNOFF AND OTHER SITE SPECIFIC CONDITIONS. SEE SLOPE STABILIZATION DETAIL FOR ADDITIONAL INFORMATION.

EROSION CONTROL DURING CONSTRUCTION

WINTER CONSTRUCTION

1. WINTER CONSTRUCTION PERIOD: NOVEMBER 1 THROUGH APRIL 15
2. OVERWINTER STABILIZATION OF DITCHES AND CHANNELS:
   ALL STONE–LINED DITCHES AND CHANNELS MUST BE CONSTRUCTED AND STABILIZED BY NOVEMBER 15. ALL GRASS LINED DITCHES AND CHANNELS MUST BE CONSTRUCTED AND STABILIZED BY SEPTEMBER 1. IF A DITCH OR CHANNEL IS NOT GRASS–LINED BY SEPTEMBER 1, THEN ONE OF THE FOLLOWING ACTIONS MUST BE TAKEN TO STABILIZE THE DITCH FOR LATE FALL AND WINTER.
   A. INSTALL A SOD LINING IN THE DITCH:
      A DITCH MUST BE LINED WITH PROPERLY INSTALLED SOD BY OCTOBER 1. PROPER INSTALLATION INCLUDES: 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 SOD AT THE BASE OF THE DITCH WITH JUTE OR PLASTIC MESH TO PREVENT THE SOD FROM SLOUGHING DURING FLOW CONDITIONS. SEE THE PERMANENT VEGETATION BMP SECTION.
   B. INSTALL A STONE LINING IN THE DITCH:
      A DITCH MUST BE LINED WITH STONE RIPRAP BY NOVEMBER 15. A REGISTERED PROFESSIONAL ENGINEER MUST BE HIRED TO DETERMINE THE STONE SIZE AND LINING THICKNESS NEEDED TO WITHSTAND THE ANTICIPATED FLOW VELOCITIES AND FLOW DEPTHS WITHIN THE DITCH. IF NECESSARY, THE CONTRACTOR WILL REGRADE THE DITCH PRIOR TO PLACING THE STONE LINING SO TO PREVENT THE STONE LINING FROM REDUCING THE DITCH'S CROSS–SECTIONAL AREA.
3. OVERWINTER STABILIZATION OF DISTURBED SLOPES:
   ALL STONE–COVERED SLOPES MUST BE CONSTRUCTED AND STABILIZED BY NOVEMBER 15. ALL SLOPES TO BE VEGETATED MUST BE SEEDED AND MULCHED BY SEPTEMBER 1. THE DEPARTMENT WILL CONSIDER ANY AREA HAVING A GRADE GREATER THAN 15% TO BE A SLOPE. IF A SLOPE TO BE VEGETATED IS NOT STABILIZED BY SEPTEMBER 1, THEN ONE OF THE FOLLOWING ACTIONS MUST BE TAKEN TO STABILIZE THE SLOPE FOR LATE FALL AND WINTER. STABILIZE THE SOIL WITH TEMPORARY VEGETATION AND EROSION CONTROL MATTING BY OCTOBER 1. THE DISTURBED SLOPE MUST BE SEEDED WITH WINTER RYE AT A SEEDING RATE OF 3 POUNDS PER 1000 SQUARE FEET OR 112 POUNDS PER ACRE AND MULCHED. APPLY MULCH FOR WINTER PROTECTION AND ANCHOR MULCH OVER THE SEEDING. IF RYE FAILS TO GROW TO AT LEAST THREE INCHES PRIOR TO COVER AT LEAST TOP OF THE SLOPE BY NOVEMBER 1, THEN THE CONTRACTOR WILL COVER THE SLOPE WITH A LAYER OF EROSION CONTROL MIX OR WITH STONE RIPRAP AS DESCRIBED IN THE FOLLOWING STANDARDS.
   A. STABILIZE THE SOIL WITH SOD:
      THE DISTURBED SLOPE MUST BE STABILIZED WITH PROPERLY INSTALLED SOD BY OCTOBER 1. PROPER INSTALLATION INCLUDES: PINNING THE SOD ONTO THE SOIL WITH WIRE PINS, ROLLING THE SOD TO GUARANTEE CONTACT BETWEEN THE SOD AND UNDERLYING SOIL, AND WATERING THE SOD TO PROMOTE ROOT GROWTH INTO THE DISTURBED SOIL. THE CONTRACTOR WILL NOT USE LATE SEASON SOD INSTALLATION TO STABILIZE SLOPES HAVING A GRADE GREATER THAN 33% (3H:1V) OR HAVING GROUNDWATER SEEPS ON THE SLOPE FACE.
   B. STABILIZE THE SOIL WITH EROSION CONTROL MIX:
      EROSION CONTROL MIX MUST BE PROPERLY INSTALLED BY NOVEMBER 15. THE CONTRACTOR WILL NOT USE EROSION CONTROL MIX TO STABILIZE SLOPES HAVING GREATER THAN 50% (2H:1V) OR HAVING GROUNDWATER SEEPS ON THE SLOPE FACE. SEE THE EROSION CONTROL MIX NOTES FOR ADDITIONAL DETAILS.
   C. STABILIZE THE SOIL WITH STONE RIPRAP:
      PLACE A LAYER OF STONE RIPRAP ON THE SLOPE BY NOVEMBER 15. THE DEVELOPMENT'S OWNER WILL HIRE A REGISTERED PROFESSIONAL ENGINEER TO DETERMINE THE STONE SIZE NEEDED FOR STABILITY ON THE SLOPE AND TO DESIGN A FILTER LAYER FOR UNDERNEATH THE RIPRAP.
4. OVERWINTER STABILIZATION OF DISTURBED SOILS:
   BY SEPTEMBER 15, ALL DISTURBED SOILS AREAS HAVING A SLOPE LESS THAN 15% MUST BE SEEDED AND MULCHED. IF THE DISTURBED AREAS ARE NOT STABILIZED BY THIS DATE, THEN ONE OF THE FOLLOWING ACTIONS MUST BE TAKEN TO STABILIZE THE SOIL FOR LATE FALL AND WINTER.
   A. STABILIZE THE SOIL WITH TEMPORARY VEGETATION:
      BY OCTOBER 1, SEED THE DISTURBED SOIL WITH WINTER RYE AT A SEEDING RATE OF 3 POUNDS PER 1000 SQUARE FEET OR 112 POUNDS PER ACRE. MULCH THE SOIL WITH HAY OR STRAW AT 75 POUNDS PER 1000 SQUARE FEET, AND ANCHOR THE MULCH WITH PLASTIC NETTING. MONITOR GROWTH OF THE RYE. IF THE RYE FAILS TO GROW AT LEAST THREE INCHES OR FAILS TO COVER AT LEAST 80% OF THE DISTURBED SOIL BEFORE NOVEMBER 1, THEN MULCH THE AREA FOR OVER–WINTER PROTECTION AS DESCRIBED BELOW.
   B. STABILIZE THE SOIL WITH SOD:
      STABILIZE THE DISTURBED SOIL WITH PROPERLY INSTALLED SOD BY OCTOBER 1. PROPER INSTALLATION INCLUDES: PINNING THE SOD ONTO THE SOIL WITH WIRE PINS, ROLLING THE SOD TO GUARANTEE CONTACT BETWEEN THE SOD AND UNDERLYING SOIL, AND WATERING THE SOD TO PROMOTE ROOT GROWTH INTO THE DISTURBED SOIL.
   C. STABILIZE THE SOIL WITH MULCH:
      BY NOVEMBER 15, MULCH THE DISTURBED SOIL BY SPREADING HAY OR STRAW AT A RATE OF AT LEAST 150 POUNDS PER 1000 SQUARE FEET ON THE AREA SO THAT NO SOIL IS VISIBLE THROUGH THE MULCH. IMMEDIATELY AFTER APPLYING THE MULCH, ANCHOR THE MULCH WITH PLASTIC NETTING TO PREVENT WIND FROM MOVING THE MULCH OFF THE SITE. MULCH SLOPES WITH A GRADE GREATER THAN 8%.
5. MAINTENANCE:
   IF AN INSPECTION DETERMINES THAT A CORRECTIVE ACTION IS REQUIRED, THE ACTION OR REPAIR SHALL BE STARTED BY THE END OF THE NEXT WORKDAY AND COMPLETED WITHIN SEVEN DAYS OR BEFORE THE NEXT STORM EVENT. MAINTENANCE OF EROSION CONTROL MEASURES SHALL BE PERFORMED DURING THE WINTER MELTING SEASON, ONCE A WEEK AND BEFORE AND AFTER EACH RAINFALL SNOW STORM OR PERIOD OF THAWING AND RUNOFF. THE SITE SUPERINTENDENT SHALL BE RESPONSIBLE FOR THE INSPECTIONS AND SHALL BE RESPONSIBLE TO PERFORM REPAIRS AS NEEDED TO MAINTAIN CONTINUOUS FUNCTION. FOLLOWING THE TEMPORARY AND/OR FINAL SEEDING AND MULCHING, THE CONTRACTOR SHALL IN THE SPRING, INSPECT AND REPAIR ANY DAMAGES AND/OR BARE SPOTS. AN ESTABLISHED VEGETATIVE COVER MEANS A MINIMUM OF 85 TO 90% OF AREAS SEEDED WITH VIGOROUS GROWTH.

   STABILIZATION SCHEDULE BEFORE WINTER:

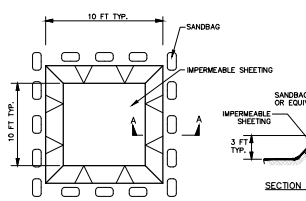
   SEPTEMBER 15 — ALL DISTURBED AREAS MUST BE SEEDED AND MULCHED.
   ALL SLOPES MUST BE STABILIZED WITH SOD OR MULCH.
   ALL GRASS LINED DITCHES AND CHANNELS MUST BE STABILIZED WITH MULCH OR AN EROSION CONTROL BLANKET.

   OCTOBER 1 — IF THE SLOPE IS STABILIZED WITH AN EROSION CONTROL BLANKET AND SEEDED, ALL DISTURBED AREAS TO BE PROTECTED WITH AN ANNUAL GRASS MUST BE SEEDED AT A SEEDING RATE OF 3 POUNDS PER 1000 SQUARE FEET AND MULCHED.

   NOVEMBER 15 — ALL STONE LINED DITCHES AND CHANNELS MUST BE CONSTRUCTED AND STABILIZED. SLOPES THAT ARE COVERED WITH RIPRAP MUST BE CONSTRUCTED BY THAT DATE.
6. DURING WINTER CONSTRUCTION PERIOD ALL SNOW SHALL BE REMOVED FROM AREAS OF SEEDING AND MULCHING PRIOR TO PLACEMENT.
7. AREAS WITHIN 75 FEET OF STREAMS, WETLANDS, AND OTHER PROTECTED NATURAL RESOURCES THAT ARE NOT STABILIZED WITH VEGETATION BY DEC. 1 SHALL BE MULCHED AND ANCHORED WITH NETTING. IF WORK CONTINUES IN THIS AREA DURING THE WINTER, A DOUBLE LINE OF SEDIMENT BARRIERS MUST BE USED.

HOUSEKEEPING

1. SPILL PREVENTION: CONTROLS MUST BE USED TO PREVENT POLLUTANTS FROM BEING DISCHARGED FROM MATERIALS I. ON SITE, INCLUDING STORAGE PRACTICES TO MINIMIZE EXPOSURE OF THE MATERIALS TO STORMWATER, AND APPROPRIATE SPILL PREVENTION, CONTAINMENT, AND RESPONSE PLANNING AND IMPLEMENTATION.
2. GROUNDWATER PROTECTION: DURING CONSTRUCTION, LIQUID PETROLEUM PRODUCTS AND OTHER HAZARDOUS MATERIALS WITH THE POTENTIAL TO CONTAMINATE GROUNDWATER MAY NOT BE STORED OR HANDLED IN AREAS OF THE SITE DRAINING TO AN INFILTRATION AREA. AN "INFILTRATION AREA" IS ANY AREA OF THE SITE THAT BY DESIGN OR AS A RESULT OF SOILS, TOPOGRAPHY, AND OTHER RELEVANT FACTORS ACCUMULATES RUNOFF THAT INFILTRATES INTO THE SOIL. DIKES, BERMS, SUMPS, AND OTHER FORMS OF SECONDARY CONTAINMENT THAT PREVENT DISCHARGE TO GROUNDWATER MAY BE USED TO ISOLATE PORTIONS OF THE SITE FOR THE PURPOSES OF STORAGE AND HANDLING OF THESE MATERIALS.
3. FUGITIVE SEDIMENT AND DUST: ACTIONS MUST BE TAKEN TO ENSURE THAT ACTIVITIES DO NOT RESULT IN NOTICEABLE FUGITIVE SEDIMENT AND DUST AS FUGITIVE DUST EMISSIONS DURING OR AFTER CONSTRUCTION. OIL MY NOT BE USED FOR DUST CONTROL. ANY OFFSITE TRACKING OF MUD OR SEDIMENT SHALL BE VACUUMED IMMEDIATELY AND PRIOR TO THE NEXT SIGNIFICANT STORM EVENT.
4. DEBRIS AND OTHER MATERIALS: LITTER, CONSTRUCTION DEBRIS, AND CHEMICALS EXPOSED TO STORMWATER MUST BE PREVENTED FROM BECOMING A POLLUTANT SOURCE.
5. TRENCH OR FOUNDATION DE–WATERING: TRENCH DE–WATERING IS THE REMOVAL OF WATER FROM TRENCHES, FOUNDATIONS, COFFER DAMS, PONDS, AND OTHER AREAS WITHIN THE CONSTRUCTION AREA THAT RETAIN WATER AFTER EXCAVATION. IN MOST CASES, THE WATER MUST BE PUMPED OUT TO ALLOW FOR CONSTRUCTION. IN OTHER CASES, THE PRESENCE OF WATER HINDERS CONSTRUCTION PRACTICES. THE COLLECTED WATER MUST BE RELEASED FROM THE FOUNDED EXCAVATION THROUGH GRAVITY OR PUMPING, AND MUST BE SPREAD THROUGH NATURAL WOODED BUFFERS OR REMOVED TO AREAS THAT ARE SPECIFICALLY DESIGNED TO COLLECT THE MAXIMUM AMOUNT OF SEDIMENT POSSIBLE. LIKE A COFFERDAM SEDIMENTATION BASIN AVOID ALLOWING THE WATER TO FLOW OVER DISTURBED AREAS OF THE SITE. EQUIVALENT MEASURES MAY BE TAKEN IF APPROVED BY THE DEPARTMENT.
6. NON–STORMWATER DISCHARGES: IDENTIFY AND PREVENT CONTAMINATION BY NON–STORMWATER DISCHARGES, WHERE ALLOWED NON–STORMWATER DISCHARGES EXIST, THEY MUST BE IDENTIFIED AND STEPS SHOULD BE TAKEN TO ENSURE THE IMPLEMENTATION OF APPROPRIATE POLLUTION PREVENTION MEASURES FOR THE NON–STORMWATER COMPONENT(S) OF THE DISCHARGE. AUTHORIZED NON–STORMWATER DISCHARGES ARE:
   - DISCHARGES FROM FIREFIGHTING ACTIVITY;
   - FIRE HYDRANT FLUSHINGS;
   - VEHICLE WASHWATER IF DETERGENTS ARE NOT USED AND WASHING IS LIMITED TO THE EXTERIOR OF VEHICLES (ENGINE, UNDERCARRIAGE AND TRANSMISSION WASHING IS PROHIBITED);
   - DUST CONTROL RUNOFF IN ACCORDANCE WITH PERMIT CONDITIONS AND APPENDIX (C)(3) OF MAINE DEP 06-096 CHAPTER 500;
   - ROUTINE EXTERNAL BUILDING WASHDOWN, NOT INCLUDING SURFACE PAINT REMOVAL, THAT DOES NOT INVOLVE DETERGENTS;
   - PAVEMENT WASHWATER (WHERE SPILLS/LEAKS OF TOXIC OR HAZARDOUS MATERIALS HAVE NOT OCCURRED, UNLESS ALL SPILLED MATERIAL HAD BEEN REMOVED) IF DETERGENTS ARE NOT USED;
   - UNCONTAMINATED AIR CONDITIONING OR COMPRESSOR CONDENSATE;
   - UNCONTAMINATED GROUNDWATER OR SPRING WATER;
   - FOUNDATION OR FOOTER DRAIN–WATER WHERE FLOWS ARE NOT CONTAMINATED;
   - UNCONTAMINATED EXCAVATION DEWATERING (SEE REQUIREMENTS IN APPENDIX C(5) MAINE DEP 06-096 CHAPTER 500);
   - POTABLE WATER SOURCES INCLUDING WATERLINE FLUSHINGS; AND
   - LANDSCAPE IRRIGATION.
7. UNAUTHORIZED NON–STORMWATER DISCHARGES: THE DEPARTMENT'S APPROVAL UNDER THIS CHAPTER DOES NOT AUTHORIZE A DISCHARGE THAT IS MIXED WITH A SOURCE OF NON–STORMWATER, OTHER THAN THOSE DISCHARGES IN COMPLIANCE WITH APPENDIX (C6) MAINE DEP 06-096 CHAPTER 500. SPECIFICALLY, THE DEPARTMENT'S APPROVAL DOES NOT AUTHORIZE DISCHARGES OF THE FOLLOWING:
   - WASTEWATER FROM THE WASHOUT OR CLEANOUT OF CONCRETE, STUCCO, PAINT, FORM RELEASE OILS, CURING COMPOUNDS OR OTHER CONSTRUCTION MATERIALS;
   - FUELS, OILS OR OTHER POLLUTANTS USED IN VEHICLE AND EQUIPMENT OPERATION AND MAINTENANCE;
   - SOAPS, SOLVENTS, OR DETERGENTS USED IN VEHICLE AND EQUIPMENT WASHING; AND
   - TOXIC OR HAZARDOUS SUBSTANCES FROM A SPILL OR OTHER RELEASE.
8. ADDITIONAL REQUIREMENTS: ADDITIONAL REQUIREMENTS MAY BE APPLIED ON A SITE–SPECIFIC BASIS.



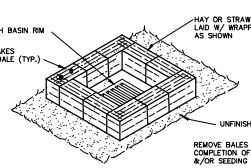
PLAN

SECTION A–A

CONSTRUCTION SPECIFICATIONS

1. LOCATE WASHOUT STRUCTURE A MINIMUM OF 50 FEET AWAY FROM OPEN CHANNELS, STORM DRAIN INLETS, SENSITIVE AREAS, WETLANDS, BUFFERS AND WATER COURSES AND AWAY FROM CONSTRUCTION TRAFFIC.
2. SIZE WASHOUT STRUCTURE FOR VOLUME NECESSARY TO CONTAIN WASH WATER AND SOLIDS AND MAINTAIN AT LEAST 4 INCHES OF FREEBOARD. TYPICAL DIMENSIONS ARE 10 FEET X 10 FEET X 3 FEET DEEP.
3. PREPARE SOIL BASE FREE OF ROCKS OR OTHER DEBRIS THAT MAY CAUSE TEARS OR HOLES IN THE LINER. FOR LINER, USE 10 MIL OR THICKER UV RESISTANT, IMPERMEABLE SHEETING, FREE OF HOLES AND TEARS OR OTHER DEFECTS THAT COMPROMISE IMPERMEABILITY OF THE MATERIAL.
4. PROVIDE A SIGN FOR THE WASHOUT IN CLOSE PROXIMITY TO THE FACILITY.
5. KEEP CONCRETE WASHOUT STRUCTURE WATER TIGHT, REPLACE IMPERMEABLE LINER IF DAMAGED (E.G., RIPPED, PUNCTURED), EMPTY OR REPLACE WASHOUT STRUCTURE THAT IS 75 PERCENT FULL, AND DISPOSE OF ACCUMULATED MATERIAL PROPERLY. DO NOT REUSE PLASTIC LINER. WET–VACUUM STORED LIQUIDS THAT HAVE NOT EVAPORATED AND DISPOSE OF IN AN APPROVED MANNER. PRIOR TO FORECASTED RAINSTORMS, REMOVE LIQUIDS OR COVER STRUCTURE TO PREVENT OVERFLOWS. REMOVE HARDENED SOLIDS, WHOLE OR BROKEN UP, FOR DISPOSAL OR RECYCLING. MAINTAIN RUNOFF DIVERSION AROUND EXCAVATED WASHOUT STRUCTURE UNTIL STRUCTURE IS REMOVED.

CONCRETE WASHOUT STRUCTURE
N.T.S.

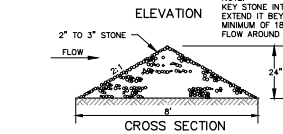


LOW POINT SEDIMENT CONTROL BARRIER
N.T.S.

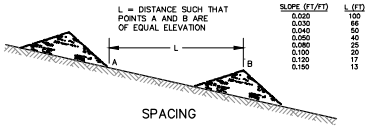


ELEVATION

NOTE:
KEY STONE INTO CHANNEL BANKS AND EXTEND IT BEYOND THE ABUTMENTS A MINIMUM OF 18" (0.5m) TO PREVENT FLOW AROUND DAM.



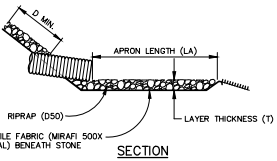
CROSS SECTION



SLOPE (FT/FT)	L (FT)
0.020	100
0.030	66
0.040	50
0.050	40
0.060	25
0.100	20
0.120	17
0.150	13

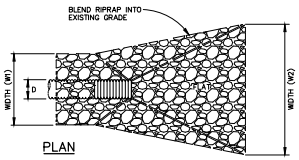
SPACING

STONE CHECK DAM DETAIL
NTS



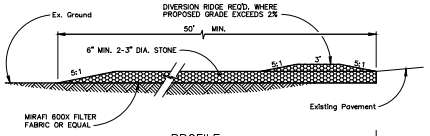
SECTION

APRON SCHEDULE					
CULV. DIA. (D)	D50 (IN.)	T (IN.)	LA (FT.)	W1 (FT.)	W2 (FT.)
12" OR LESS	6"	15"	10'	3'	13'
15"	6"	15"	10'	3.75'	14'
18"	6"	15"	12'	4.5'	17'
24"	6"	15"	14'	6'	20'
30"	6"	15"	18'	7.5'	26'
36"	12"	24"	24'	9'	33'
42"	12"	24"	30'	10.5'	41'
48"	12"	24"	34'	12'	46'
60"	18"	32"	38'	15'	53'

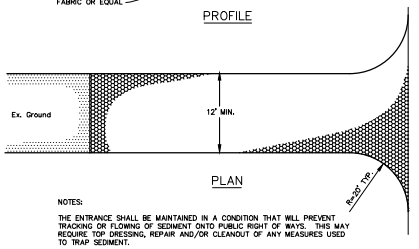


PLAN

PIPE OUTLET PROTECTION
NTS



PROFILE



PLAN

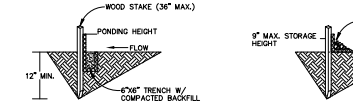
NOTES:

THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION THAT WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHT OF WAYS. THIS MAY REQUIRE TOP DRESSING, REPAIR AND/OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT.

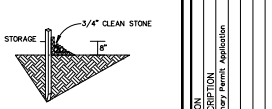
WHEN NECESSARY, WHEELS SHALL BE CLEANED PRIOR TO ENTRANCE ONTO PUBLIC RIGHT OF WAY.

WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH CRUSHED STONE THAT DRAINS INTO AN APPROVED SEDIMENT TRAP OR SEDIMENT BASIN.

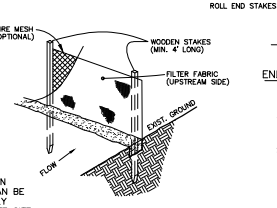
STABILIZED CONSTRUCTION ENTRANCE
NTS



WITH TRENCHING



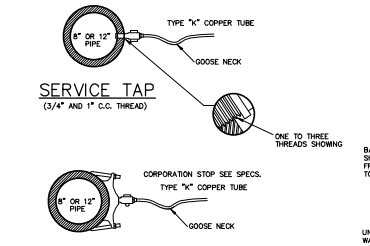
WITHOUT TRENCHING



NOTE:

SILT FENCE OR EROSION CONTROL MIX BERM CAN BE USED INTERCHANGEABLY BASED ON APPROPRIATE SITE CONDITIONS AND MATERIAL AVAILABILITY.

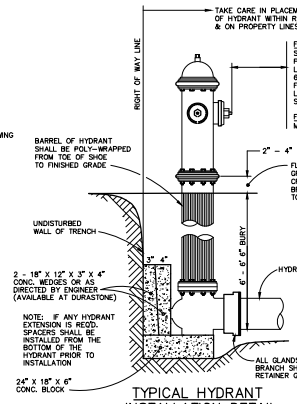
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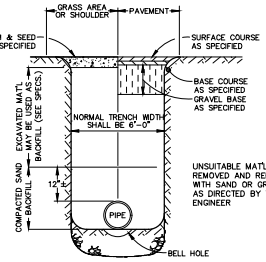
SERVICE TAP
(3/4" AND 1" C.C. THREAD)

SERVICE SADDLE
(1-1/2" & 2" C.C. OR IRON PIPE THREAD)

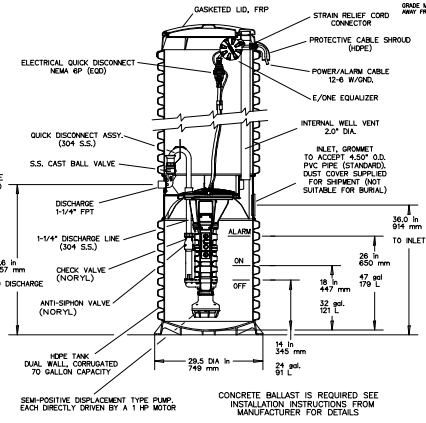
NOTE: SERVICE CONNECTIONS (DIRECT TAPS AND SERVICE CLAMPS) WILL BE INSTALLED SO THAT THE OUTLET IS AT AN ANGLE OF NOT MORE THAN 45° ABOVE THE HORIZONTAL. ALWAYS PUT A BEND OR "GOOSENECK" IN THE SERVICE LINE PRIOR TO CONNECTING TO PROVIDE FLEXIBILITY AND "GIVE" TO COUNTERACT THE EFFECTS OF A LOAD DUE TO SETTLEMENT OR EXPANSION AND/OR CONTRACTION (SEE DETAILS).



TYPICAL HYDRANT INSTALLATION DETAIL
NTS

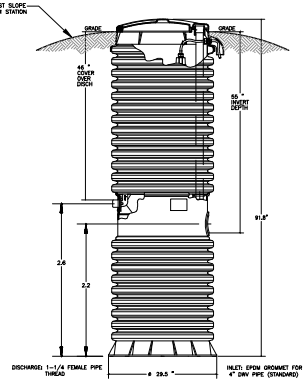


WATER THROUGH EARTH TRENCH
N.T.S.



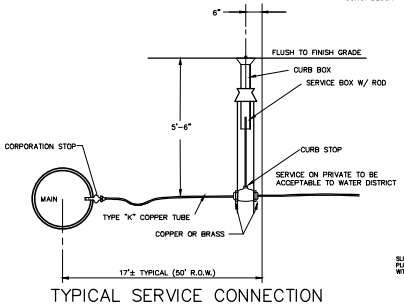
SEMI-POSITIVE DISPLACEMENT TYPE PUMP, EACH DIRECTLY DRIVEN BY A 1 HP MOTOR

CONCRETE BALLAST IS REQUIRED SEE INSTALLATION INSTRUCTIONS FROM MANUFACTURER FOR DETAILS

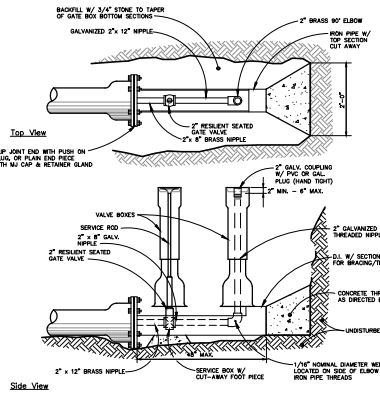


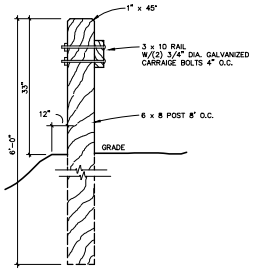
NOTE: LOW PRESSURE SEWER PUMP DETAILS PROVIDED AS GUIDANCE FOR SEWER INSTALLATION FOR LOTS 6-11 AND LOTS 12-15. INTALLATION BY OTHERS AT TIME OF HOME CONSTRUCTION.

(MODEL DH071-93)
E ONE LOW PRESSURE SEWER PUMP DETAIL
NTS

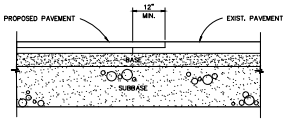


TYPICAL SERVICE CONNECTION
N.T.S.


BACKFILL W/ 3/4" STONE TO TAPER OF GATE BOX BOTTOM SECTIONS
GALVANIZED 2"x 12" NIPPLE
2" BRASS 90° ELBOW
HDPE PIPE W/ TOP SECTION CUT AWAY
2" RESILIENT SEATED GATE VALVE
2"x 6" BRASS NIPPLE
Top View
SLIP JOINT END WITH PUSH ON PLUG, OR PLAIN END PIECE WITH MJ CAP & RETAINER GLAND
2" GALV. COUPLING W/ PVC OR GAL. PLUG (HAND TIGHT)
2" MIN. - 6" MAX.
VALVE BOXES
SERVICE ROD
2" x 8" GALV. NIPPLE
2" RESILIENT SEATED GATE VALVE
2" GALVANIZED THREADED NIPPLE
SLIP JOINT
SLIP JOINT
SLIP JOINT

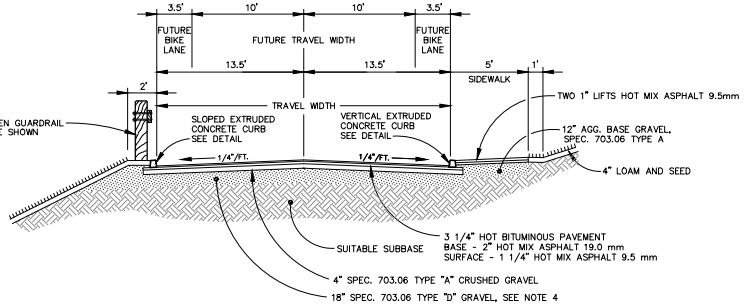


TYPICAL WOODEN GUARD RAIL
NTS



SAWCUT EXIST. PAVEMENT ALONG A SMOOTH LINE TO A NEAT EVEN VERTICAL JOINT. APPLY TACK PRIOR TO PROPOSED PAVING (AS REQ'D)

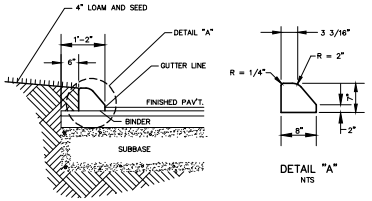
PAVEMENT JOINT DETAIL
N.T.S.



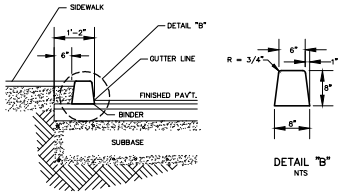
NOTES:

1. ALL MATERIALS AND CONSTRUCTION SHALL CONFORM TO MDOT STANDARDS SPECIFICATIONS, REVISED MARCH 2020, AND MOST RECENT SUPPLEMENTAL SPECIFICATIONS.
2. SEE MDOT 401 FOR MATERIALS AND MDOT 413 FOR INSTALLATION.
3. ALL MATERIALS SHALL BE COMPACTED TO ACHIEVE 95% OF MAXIMUM DENSITY.
4. AGGREGATE SUBBASE SHALL MEET THE REQUIREMENTS OF MAINE DOT SPECIFICATION 703.06 TYPE D, WITH THE EXCEPTION THAT THE AGGREGATE SUBBASE SHALL NOT CONTAIN PARTICLES OF ROCK THAT WILL NOT PASS THE 4 INCH SQUARE MESH SIEVE.

ROAD TYPICAL SECTION
NTS



SLOPED CURB
NTS

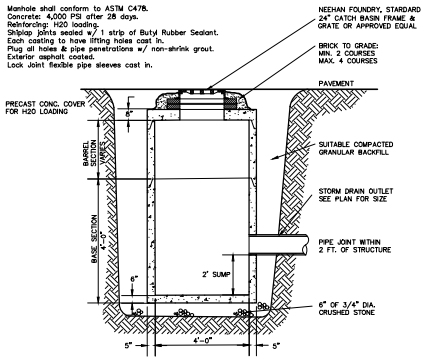


VERTICAL CURB
NTS

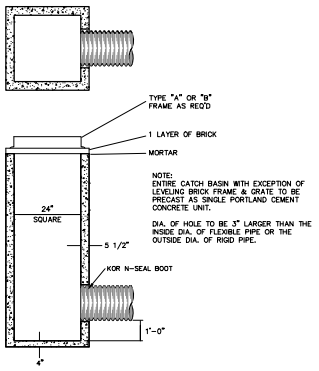
NOTES:

1. 1 LB. FIBER MESH SHALL BE ADDED TO EVERY CUBIC YARD OF CONCRETE. THE CONCRETE WILL CONTAIN THE MAXIMUM AMOUNT OF WATER TO BE OF A CONSISTENCY THAT THE CONCRETE WILL MAINTAIN THE SHAPE OF THE CURB SECTION WITHOUT SUPPORT. THIS MIX ALSO MEETS THE READY MIX REQUIREMENTS OF ASTM C94 AND WILL MEET OR EXCEED 4,000 PSI IN 28 DAYS.
2. THE PAVEMENT SHALL BE THOROUGHLY CLEANED TO REMOVE DUST, DIRT AND OIL BEFORE APPROVED ADHESIVE IS APPLIED PER MANUFACTURERS SPECIFICATIONS.
3. THE FIBER REINFORCED MIX SHALL BE FED INTO THE VIBRATING HOPPER WHERE IT IS COMPACTED INTO THE DESIRED MOLD PROFILE.
4. FRESHLY EXTRUDED CURB SHALL BE LIGHTLY TOUCHED UP WITH A STEEL HAND TROWEL. CONTROL JOINTS SHALL BE TOOLED AS SOON AS POSSIBLE AT 9' INTERVALS. ADDITIONAL CONTROL JOINTS ADDED ON RADIUS AS NECESSARY.
5. THE FINISHED CURB WILL BE COATED WITH AN APPROVED CURING COMPOUND.
6. FOLLOW MANUFACTURERS INSTALLATION INSTRUCTIONS AND TEMPERATURE RESTRICTIONS.
7. USE VERTICAL CURB FOR ALL AREAS ADJACENT TO SIDEWALK. USE SLOPED CURB IN ALL OTHER AREAS.

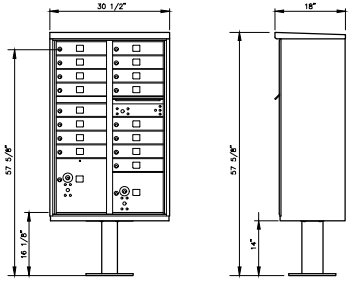
EXTRUDED CONCRETE CURB
NTS



PRECAST CONCRETE CATCH BASIN DETAIL
N.T.S.



CATCH BASIN TYPE "F"
N.T.S.



NOTES:

1. CLUSTER MAILBOX UNIT SHALL BE APROVED FOR USPS APPLICATION.
2. CONTRACTOR/OWNER SHALL SUBMIT TECHNICAL MATERIALS TO LOCAL POSTAL SERVICE FOR APPROVAL.
3. DIMENSIONS SHOWN ARE APPROXIMATE FOR 16 DOOR CLUSTER MAILBOX FOR USE BY THE PROPOSED 7 DUPLEX LOTS.
4. SEE MANUFACTURERS SPECS. FOR UNIT FOUNDATION AND MOUNTING.

CLUSTER MAILBOX
NTS

NO.	DATE	REVISION DESCRIPTION
1	5/15/24	Submitted for Preliminary Permit Application

BH2M
Berry, Huff, MacDonald, Milligan Inc.
Engineers, Surveyors
38 Main Street
Gorham, Maine 04038
Tel (207) 839-2771
www.bh2m.com

FOR:
Indian Cliff Development Corp
200 Main Street
P.O. BOX 444
Biddeford, Maine

DETAILS A

BARRA ROAD SUBDIVISION

BARRA ROAD
BIDDEFORD, MAINE

DESIGNED	DATE
C. MacDonald	May 2024
DRAWN	SCALE
Dept.	As Noted
CHECKED	JOB. NO.
C. MacDonald	22056

SHEET
8

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GRASSED UNDERDRAIN SOIL FILTER NOTES

REFERENCES

1. MAINE STORMWATER BEST MANAGEMENT PRACTICES (BMP), VOLUME III BMP TECHNICAL DESIGN MANUAL, CHAPTER 7 FILTRATION BMP'S (LATEST REVISION).

CONSTRUCTION METHODS

1. THE CONTRACTOR IS RESPONSIBLE FOR ALL CONSTRUCTION MATERIALS, INSTALLATION, MEANS, METHODS, AND SCHEDULING.
2. ALL WORK SHALL BE IN CONFORMANCE WITH THE PROJECT PLANS AND BMP'S REFERENCED ABOVE.
3. THE SOIL FILTER MEDIA AND VEGETATION SHALL NOT BE INSTALLED UNTIL THE AREA THAT DRAINS TO THE FILTER HAS BEEN PERMANENTLY STABILIZED WITH PAVEMENT OR OTHER STRUCTURES, BOTH VEGETATION COVER OR PERMANENT STABILIZATION.

DE-WATERING PLAN

1. DURING CONSTRUCTION OF THE SITE AND VEGETATED SOIL FILTER, THE CONTRACTOR SHALL BE PREPARED TO IMPLEMENT A DEWATERING PLAN IN ANTICIPATION OF HEAVY RAIN EVENTS.
2. THE AREA OF THE BASIN MAY BE EXCAVATED IN PREPARATION OF THE INSTALLATION OF THE UNDERDRAIN AND MAY BE USED FOR A SEDIMENT TRAP FOR THE SITE DURING CONSTRUCTION. AFTER EXCAVATION OF THE BASIN, THE OUTLET STRUCTURE AND PIPING SYSTEM SHALL BE INSTALLED AT THE APPROPRIATE ELEVATION AND PROTECTED WITH A SEDIMENT BARRIER. THE BASIN IS TO BE USED AS A SEDIMENT TRAP, THE SIDES OF THE EMBANKMENTS MUST BE MULCHED AND MAINTAINED TO PREVENT EROSION.

SOIL MEDIA

1. THE SOIL MEDIA SHALL CONSIST OF SILTY SANDY SOIL OR SOIL MIXTURE COMBINED WITH 20% TO 25% BY VOLUME (NO LESS THAN 10% BY DRY WEIGHT) OF MODERATELY SHREDDED BARK OR WOOD FIBER MULCH.
2. THE SOIL FILTER MEDIA SAND SHALL MEET THE GRADATION IN TABLE 7-2 (MDOT 703.01) WITH ADDITIONAL FINES ADDED IF NECESSARY.
3. THE RESULTING SOIL FILTER MEDIA SHALL HAVE 8% TO 12% BY WEIGHT PASSING THE #200 SIEVE AND SHALL HAVE A CLAY CONTENT OF LESS THAN 2%.
4. THE COARSE GRAVEL MATERIAL SHALL MEET THE GRADATION OF TABLE 7.1 (MDOT 703.22 UNDERDRAIN, TYPE B).
5. THE FILTER MEDIA SHALL BE LIGHTLY COMPACTED BY SATURATING THE MEDIA IN 6" TO 9" LIFTS AND SHALL HAVE A PERMEABILITY OF 2.4 IN/HR TO 4 IN/HR.
6. THE CLAY CONTENT SHALL BE < 2%.

CONSTRUCTION

1. SOIL FILTER MEDIA, COARSE GRAVEL, AND UNDERDRAIN BEDDING MATERIAL SHALL BE COMPACTED TO BETWEEN 90% AND 92% STANDARD PROCTOR.
2. PERFORATED UNDERDRAIN PIPE SHALL BE 4" AND 6" SCHEDULE 40 OR SDR 35 PVC PIPE. SPACED 8 FEET AND 4 FEET ON CENTER AS SHOWN ON PLANS.
3. 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.
4. OUTFLOW OF THE VEGETATED SOIL FILTER SHALL BE CONTROLLED BY A 3" PLASTIC TYPE 34-6 BALL VALVE WITH TYPE 816 BALL VALVE HANDLE 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.
5. ALL EQUIPMENT USED WITHIN THE LIMITS OF THE VEGETATED SOIL FILTER SHALL BE LOW GROUND PRESSURE VEHICLES (LESS THAN 2.0 PSI) WHEN FULLY LOADED.
6. IF VEGETATION IS NOT ESTABLISHED WITHIN THE FIRST YEAR, THE CONTRACTOR SHALL INSTALL A 2-3 INCH LAYER OF LOAM (WITH LESS THAN 2% CLAY AS TESTED VIA HYDROMETER TEST) ON THE SURFACE OF THE GRASS FILTER AND RE-SEED/MULCH.
7. THE SURFACE OF THE VEGETATED SOIL FILTER SHALL BE PLANTED WITH A GRASS SPECIES THAT IS TOLERANT OF FREQUENT INUNDATION AND WELL-DRAINED SOILS. UPON SEEDING, THE SURFACES SHALL BE MULCHED WITH HAY OR AN EROSION CONTROL BLANKET BUT SHALL NOT BE FERTILIZED. AN APPROPRIATE SEED MIXTURE SHOULD CONTAIN THE FOLLOWING OR BE AN EQUIVALENT CONSERVATION TYPE MIX:

CREEPING RED FESCUE	20 LBS/ACRE
TALL FESCUE	20 LBS/ACRE
BIRDSFOOT TREFOIL	8 LBS/ACRE
TOTAL	48 LBS/ACRE

TESTING AND SUBMITTALS

1. THE CONTRACTOR SHALL IDENTIFY THE LOCATION OF THE SOURCE OF EACH COMPONENT OF THE FILTER MEDIA. ALL TESTING RESULTS SHALL BE SUBMITTED TO THE PROJECT ENGINEER.
2. SUBMIT SAMPLES OF EACH TYPE OF MATERIAL TO BE BLENDED FOR THE MIXED FILLER MEDIA AND SAMPLES OF THE UNDERDRAIN BEDDING MATERIAL. SAMPLES MUST BE A COMPOSITE OF THREE DIFFERENT LOCATIONS (GRABS) FROM THE STOCKPILE OR PIT FACE. SAMPLE SIZE WILL BE DETERMINED BY TESTING LABORATORY.
3. THE CONTRACTOR SHALL PERFORM A SIEVE ANALYSIS CONFORMING TO ASTM C136 (STANDARD TEST METHODS FOR SIEVE ANALYSIS OF FINE AND COARSE AGGREGATES, 1996A) ON EACH TYPE OF SAMPLE MATERIAL INCLUDING A HYDROMETER TEST FOR CLAY CONTENT.
4. THE CONTRACTOR SHALL PERFORM A PERMEABILITY TEST ON THE SOIL MEDIA MIXTURE CONFORMING TO ASTM D2434.
5. THE CONTRACTOR SHALL PERFORM ONE COMPACTION DENSITY TEST ON THE IN-PLACE SOIL FILTER MEDIA FOR EVERY 1,500 S.F. OF BED OR FRACTION THEREOF. THE TEST SHALL CONFORM TO ASTM 2922.
6. UPON COMPLETION OF THE VEGETATED SOIL FILTER MEDIA AND THE ESTABLISHMENT OF 90% CATCH OF GRASS OVER THE FILTER MEDIA, THE CONTRACTOR SHALL FLOOD THE VEGETATED BASIN TO THE SPILLWAY WITH CLEAR WATER AND ADJUST THE OUTFLOW TO OBTAIN A 24-HOUR TO 32-HOUR RELEASE TIME.

CONSTRUCTION OVERSIGHT

1. THE CONTRACTOR SHALL MEET THE "CONSTRUCTION OVERSIGHT" SECTION OF CHAPTER 7, FILTRATION BMP'S (REVISED MAY 2016) OF THE STORMWATER MANAGEMENT FOR MAINE, VOLUME III, BMP'S TECHNICAL DESIGN MANUAL.
2. THE DESIGN ENGINEER SHALL BE CONDUCTING PERIODIC SITE OVERSIGHT OF THE CONSTRUCTION AS DESCRIBED BELOW AND IN COMPLIANCE WITH THE PERMITS.
3. THE ENGINEER SHALL REVIEW AND APPROVE ALL CONTRACTOR SUBMITTALS.
4. THE CONTRACTOR SHALL GIVE THE ENGINEER A PROPOSED CONSTRUCTION SCHEDULE AND A 48-HOUR NOTICE FOR ALL SITE VISITS.
5. INSPECTIONS SHALL INCLUDE:
   - PRE-CONSTRUCTION MEETING WITH CONTRACTOR
   - INSPECTION OF EXCAVATION IF USED FOR SEDIMENT TRAP
   - INSPECTION OF EXCAVATED HOLE.
   - AFTER PRELIMINARY CONSTRUCTION OF THE FILTER GRADES AND BOTTOM, THE UNDERDRAIN PIPES ARE INSTALLED BUT NOT BACK-FILLED.
   - AFTER THE DRAINAGE LAYER IS CONSTRUCTED AND PRIOR TO INSTALLATION OF THE FILTER MEDIA.
   - AFTER FILTER MEDIA HAS BEEN INSTALLED AND SEEDED.
   - AFTER ONE YEAR TO INSPECT VEGETATION UPTAKE AND OBSERVE
   - FLOODING TEST.

LEVEL SPREADER STONE SIZE

SIEVE DESIGNATION METRIC	SIEVE DESIGNATION US CUSTOMARY	% BY WEIGHT PASSING SQUARE MESH SIEVES
300 MM	12"	100
150 MM	6"	84–100
75 MM	3"	68–83
25.4 MM	1"	42–55
4.75 MM	NO. 4	8–12

TABLE 7-1
UNDERDRAIN SPECS.
MDOT #703.22

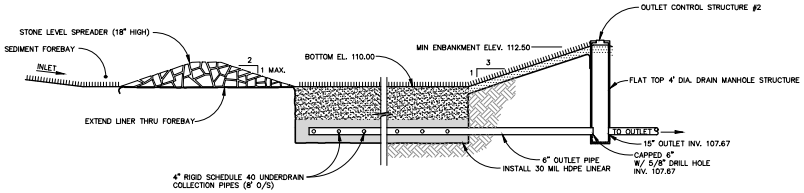
SIEVE SIZE	% BY WEIGHT
UNDERDRAIN TYPE B	
1"	90-100
1/2"	75-100
#4	50-100
#20	15-80
#50	0-15
#200	0-5
SIEVE SIZE	**% BY WEIGHT**
UNDERDRAIN TYPE C	
1"	100
3/4"	90-100
3/8"	0-75
#4	0-10
#10	0-5

TABLE 7-2
AGGREGATE SPECS.
MDOT #703.01

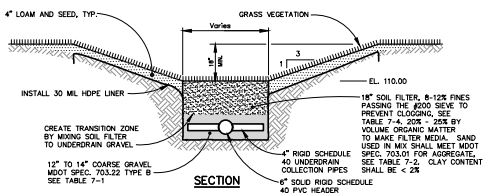
SIEVE SIZE	% BY WEIGHT
3/8"	100
#4	95-100
#8	80-100
#16	50-85
#30	25-60
#60	10-30
#100	2-10
#200	0-5

TABLE 7-4
COARSE LOAMY SAND SIEVE ANALYSIS SPECIFICATION

SIEVE #	% PASSING BY WEIGHT
#10	90-100
#40	60-100
#60	15-40
#200	8-15

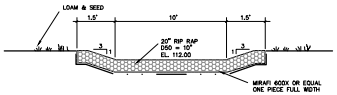


PROFILE

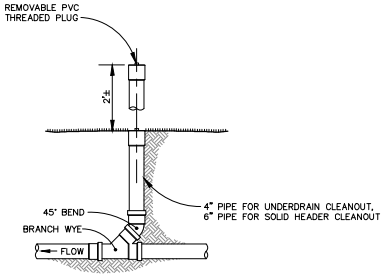


SECTION

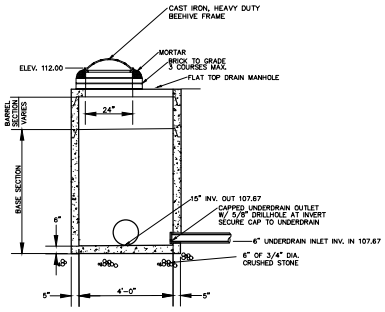
GRASSED UNDERDRAIN SOIL FILTER
NTS



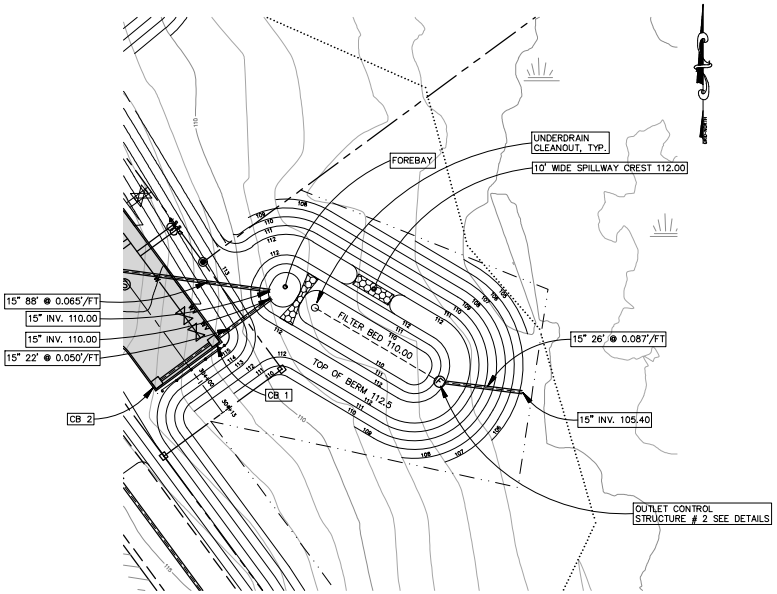
SPILLWAY TRANSVERSE SECTION
N.T.S.



CLEANOUT DETAIL
N.T.S.



OUTLET CONTROL STRUCTURE 2
N.T.S.



GRASSED UNDERDRAINED SOIL FILTER 2 PLAN
Scale: 1" = 20'
20' 0 20' 40'

NO.	DATE	REVISION DESCRIPTION
1	5/15/24	Submitted for Preliminary Permit Application

BH2M
Berry, Huff, MacDonald, Milligan Inc.
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Gorham, Maine 04038
Tel. (207) 839-2771
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FOR:
Indian Cliff Development Corp
200 Main Street
P.O. Box 444
Biddeford, Maine

GRASSED UNDERDRAINED SOIL FILTER 2 DETAILS

BARRA ROAD SUBDIVISION

BARRA ROAD
BIDDEFORD, MAINE

DESIGNED C. MacDonald	DATE May 2024
DRAWN Staff	SCALE As Noted
CHECKED C. MacDonald	JOB. NO. 24017

SHEET
9

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GRASSED UNDERDRAIN SOIL FILTER NOTES

REFERENCES

1. MAINE STORMWATER BEST MANAGEMENT PRACTICES (BMP), VOLUME III BMP TECHNICAL DESIGN MANUAL, CHAPTER 7 FILTRATION BMP'S (LATEST REVISION).

CONSTRUCTION METHODS

1. THE CONTRACTOR IS RESPONSIBLE FOR ALL CONSTRUCTION MATERIALS, INSTALLATION, MEANS, METHODS, AND SCHEDULING.
2. ALL WORK SHALL BE IN CONFORMANCE WITH THE PROJECT PLANS AND BMP'S REFERENCED ABOVE.
3. THE SOIL FILTER MEDIA AND VEGETATION SHALL NOT BE INSTALLED UNTIL THE AREA THAT DRAINS TO THE FILTER HAS BEEN PERMANENTLY STABILIZED WITH PAVEMENT OR OTHER STRUCTURES, WITH VEGETATION COVER OR PERMANENT STABILIZATION.

DE-WATERING PLAN

1. DURING CONSTRUCTION OF THE SITE AND VEGETATED SOIL FILTER, THE CONTRACTOR SHALL BE PREPARED TO IMPLEMENT A DEWATERING PLAN IN ANTICIPATION OF HEAVY RAIN EVENTS.
2. THE AREA OF THE BASIN MAY BE EXCAVATED IN PREPARATION OF THE INSTALLATION OF THE UNDERDRAIN AND MAY BE USED FOR A SEDIMENT TRAP FOR THE SITE DURING CONSTRUCTION. AFTER EXCAVATION OF THE BASIN, THE OUTLET STRUCTURE AND PIPING SYSTEM SHALL BE INSTALLED AT THE APPROPRIATE ELEVATION AND PROTECTED WITH A SEDIMENT BARRIER. THE BASIN IS TO BE USED AS A SEDIMENT TRAP, THE SIDES OF THE EMBANKMENTS MUST BE MULCHED AND MAINTAINED TO PREVENT EROSION.

SOIL MEDIA

1. THE SOIL MEDIA SHALL CONSIST OF SILTY SANDY SOIL OR SOIL MIXTURE COMBINED WITH 20% TO 25% BY VOLUME (NO LESS THAN 10% BY DRY WEIGHT) OF MODERATELY SHREDDED BARK OR WOOD FIBER MULCH.
2. THE SOIL FILTER MEDIA SAND SHALL MEET THE GRADATION IN TABLE 7-2 (MDOT 703.01) WITH ADDITIONAL FINES ADDED IF NECESSARY.
3. THE RESULTING SOIL FILTER MEDIA SHALL HAVE 8% TO 12% BY WEIGHT PASSING THE #200 SIEVE AND SHALL HAVE A CLAY CONTENT OF LESS THAN 2%.
4. THE COARSE GRAVEL MATERIAL SHALL MEET THE GRADATION OF TABLE 7.1 (MDOT 703.22 UNDERDRAIN, TYPE B).
5. THE FILTER MEDIA SHALL BE LIGHTLY COMPACTED BY SATURATING THE MEDIA IN 6" TO 9" LIFTS AND SHALL HAVE A PERMEABILITY OF 2.4 IN/HR TO 4 IN/HR.
6. THE CLAY CONTENT SHALL BE < 2%.

CONSTRUCTION

1. SOIL FILTER MEDIA, COARSE GRAVEL, AND UNDERDRAIN BEDDING MATERIAL SHALL BE COMPACTED TO BETWEEN 90% AND 92% STANDARD PROCTOR.
2. PERFORATED UNDERDRAIN PIPE SHALL BE 4" AND 6" SCHEDULE 40 OR SDR 35 PVC PIPE. SPACED 8 FEET AND 4 FEET ON CENTER AS SHOWN ON PLANS.
3. 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.
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5. ALL EQUIPMENT USED WITHIN THE LIMITS OF THE VEGETATED SOIL FILTER SHALL BE LOW GROUND PRESSURE VEHICLES (LESS THAN 2.0 PSI) WHEN FULLY LOADED.
6. IF VEGETATION IS NOT ESTABLISHED WITHIN THE FIRST YEAR, THE CONTRACTOR SHALL INSTALL A 2-3 INCH LAYER OF LOAM (WITH LESS THAN 2% CLAY AS TESTED VIA HYDROMETER TEST) ON THE SURFACE OF THE GRASS FILTER AND RE-SEED/MULCH.
7. THE SURFACE OF THE VEGETATED SOIL FILTER SHALL BE PLANTED WITH A GRASS SPECIES THAT IS TOLERANT OF FREQUENT INUNDATION AND WELL-DRAINED SOILS. UPON SEEDING, THE SURFACES SHALL BE MULCHED WITH HAY OR AN EROSION CONTROL BLANKET BUT SHALL NOT BE FERTILIZED. AN APPROPRIATE SEED MIXTURE SHOULD CONTAIN THE FOLLOWING OR BE AN EQUIVALENT CONSERVATION TYPE MIX:

CREEPING RED FESCUE	20 LBS/ACRE
TALL FESCUE	20 LBS/ACRE
BIRDSFOOT TREFOIL	8 LBS/ACRE
TOTAL	48 LBS/ACRE

TESTING AND SUBMITTALS

1. THE CONTRACTOR SHALL IDENTIFY THE LOCATION OF THE SOURCE OF EACH COMPONENT OF THE FILTER MEDIA. ALL TESTING RESULTS SHALL BE SUBMITTED TO THE PROJECT ENGINEER.
2. SUBMIT SAMPLES OF EACH TYPE OF MATERIAL TO BE BLENDED FOR THE MIXED FILLER MEDIA AND SAMPLES OF THE UNDERDRAIN BEDDING MATERIAL. SAMPLES MUST BE A COMPOSITE OF THREE DIFFERENT LOCATIONS (GRABS) FROM THE STOCKPILE OR PIT FACE. SAMPLE SIZE WILL BE DETERMINED BY TESTING LABORATORY.
3. THE CONTRACTOR SHALL PERFORM A SIEVE ANALYSIS CONFORMING TO ASTM C136 (STANDARD TEST METHODS FOR SIEVE ANALYSIS OF FINE AND COARSE AGGREGATES, 1996A) ON EACH TYPE OF SAMPLE MATERIAL INCLUDING A HYDROMETER TEST FOR CLAY CONTENT.
4. THE CONTRACTOR SHALL PERFORM A PERMEABILITY TEST ON THE SOIL MEDIA MIXTURE CONFORMING TO ASTM D2434.
5. THE CONTRACTOR SHALL PERFORM ONE COMPACTION DENSITY TEST ON THE IN-PLACE SOIL FILTER MEDIA FOR EVERY 1,500 S.F. OF BED OR FRACTION THEREOF. THE TEST SHALL CONFORM TO ASTM 2922.
6. UPON COMPLETION OF THE VEGETATED SOIL FILTER MEDIA AND THE ESTABLISHMENT OF 90% CATCH OF GRASS OVER THE FILTER MEDIA, THE CONTRACTOR SHALL FLOOD THE VEGETATED BASIN TO THE SPILLWAY WITH CLEAR WATER AND ADJUST THE OUTFLOW TO OBTAIN A 24-HOUR TO 32-HOUR RELEASE TIME.

CONSTRUCTION OVERSIGHT

1. THE CONTRACTOR SHALL MEET THE "CONSTRUCTION OVERSIGHT" SECTION OF CHAPTER 7, FILTRATION BMP'S (REVISED MAY 2016) OF THE STORMWATER MANAGEMENT FOR MAINE, VOLUME III, BMP'S TECHNICAL DESIGN MANUAL.
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3. THE ENGINEER SHALL REVIEW AND APPROVE ALL CONTRACTOR SUBMITTALS.
4. THE CONTRACTOR SHALL GIVE THE ENGINEER A PROPOSED CONSTRUCTION SCHEDULE AND A 48-HOUR NOTICE FOR ALL SITE VISITS.
5. INSPECTIONS SHALL INCLUDE:
   - PRE-CONSTRUCTION MEETING WITH CONTRACTOR
   - INSPECTION OF EXCAVATION IF USED FOR SEDIMENT TRAP
   - INSPECTION OF EXCAVATED HOLE.
   - AFTER PRELIMINARY CONSTRUCTION OF THE FILTER GRADES AND BACK, THE UNDERDRAIN PIPES ARE INSTALLED BUT NOT BACKFILLED.
   - AFTER THE DRAINAGE LAYER IS CONSTRUCTED AND PRIOR TO INSTALLATION OF THE FILTER MEDIA.
   - AFTER FILTER MEDIA HAS BEEN INSTALLED AND SEEDED.
   - AFTER ONE YEAR TO INSPECT VEGETATION UPTAKE AND OBSERVE
   - FLOODING TEST.

LEVEL SPREADER STONE SIZE

SIEVE DESIGNATION METRIC	SIEVE DESIGNATION US CUSTOMARY	% BY WEIGHT PASSING SQUARE MESH SIEVES
300 MM	12"	100
150 MM	6"	84–100
75 MM	3"	68–83
25.4 MM	1"	42–55
4.75 MM	NO. 4	8–12

TABLE 7-1
UNDERDRAIN SPECS.
MDOT #703.22

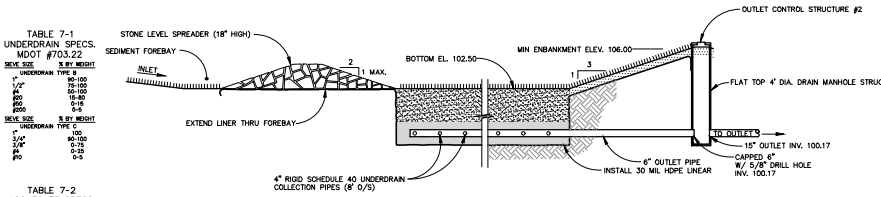
SIEVE SIZE	% BY WEIGHT
UNDERDRAIN TYPE B	
1"	90-100
1/2"	75-100
#4	50-100
#20	15-80
#50	0-15
#200	0-5
SIEVE SIZE	% BY WEIGHT
UNDERDRAIN TYPE C	
1"	100
3/4"	90-100
3/8"	0-75
#4	0-10
#10	0-5

TABLE 7-2
AGGREGATE SPECS.
MDOT #703.01

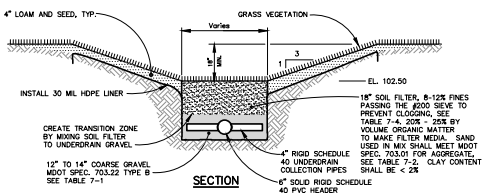
SIEVE SIZE	% BY WEIGHT
3/8"	100
#4	95-100
#8	80-100
#16	50-85
#30	25-60
#60	10-30
#100	2-10
#200	0-5

TABLE 7-4
COARSE LOAMY SAND SIEVE ANALYSIS SPECIFICATION

SIEVE #	% PASSING BY WEIGHT
#3/8	90-100
#50	70-90
#60	15-40
#200	8-15

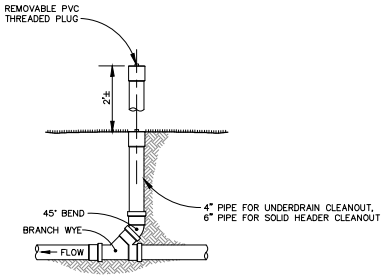


PROFILE

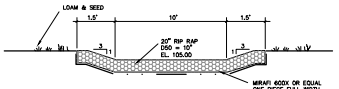


SECTION

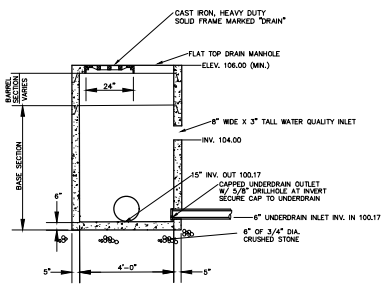
GRASSED UNDERDRAIN
SOIL FILTER
NTS



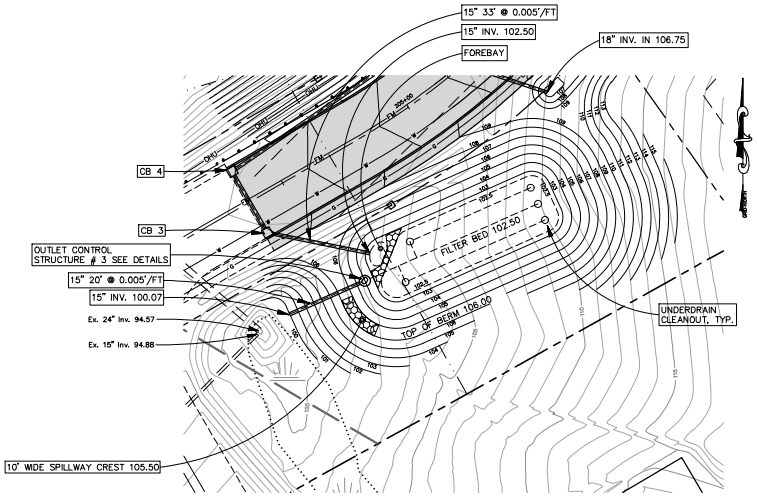
CLEANOUT DETAIL
N.T.S.



SPILLWAY TRANSVERSE SECTION
N.T.S.



OUTLET CONTROL STRUCTURE 3
N.T.S.



GRASSED UNDERDRAINED SOIL FILTER 3 PLAN
Scale: 1" = 20'
20' 0 20' 40'

NO.	DATE	REVISION DESCRIPTION
1	5/15/24	Submitted for Preliminary Permit Application

BH2M
Berry, Huff, MacDonald, Milligan Inc.
Engineers, Surveyors
38 Main Street
Gorham, Maine 04038
Tel. (207) 839-2771
www.bh2m.com

FOR:
Indian Cliff Development Corp
200 Main Street
P.O. Box 444
Biddeford, Maine

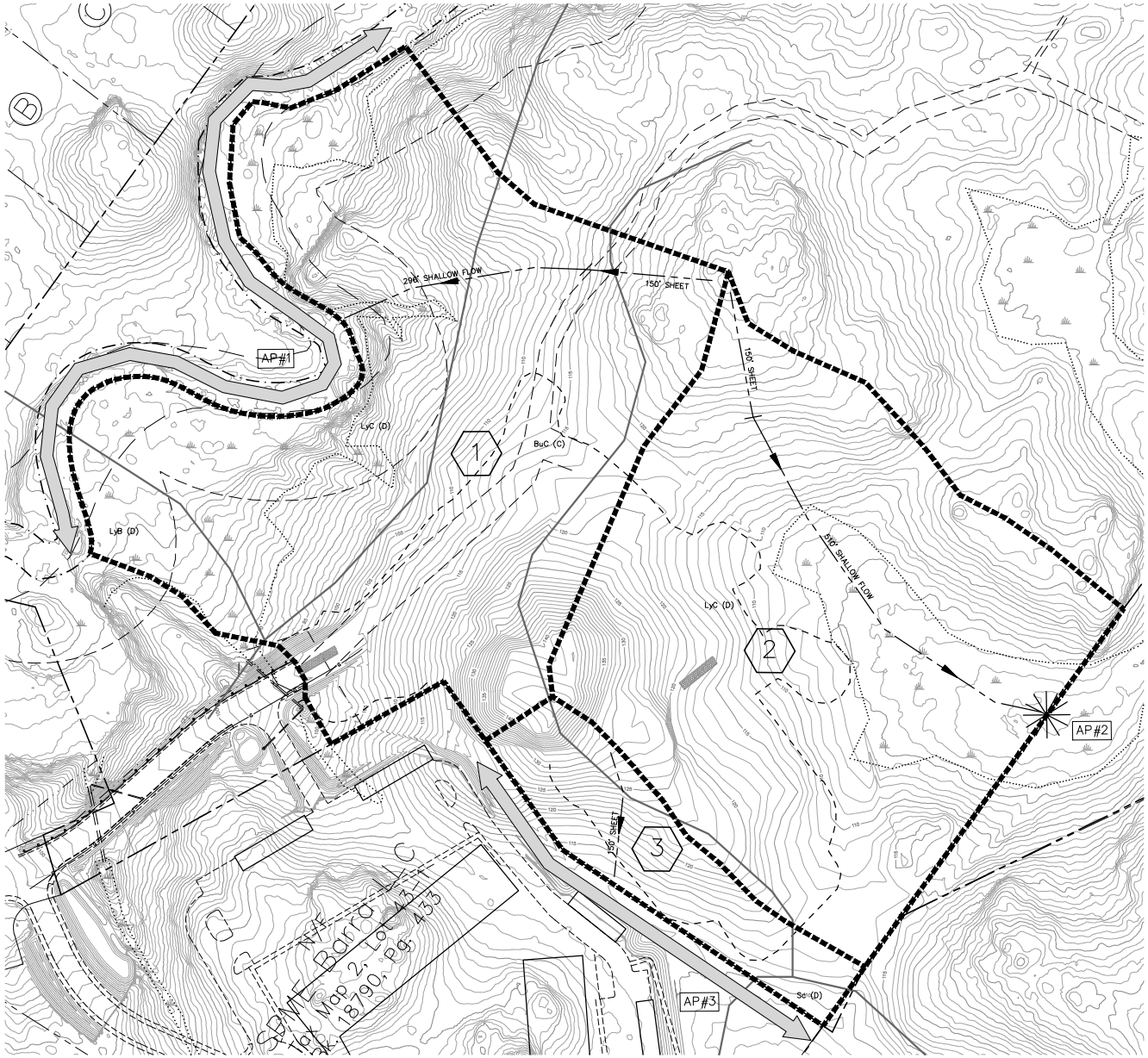
GRASSED UNDERDRAINED SOIL FILTER 3 DETAILS

BARRA ROAD SUBDIVISION
BARRA ROAD
BIDDEFORD, MAINE

DESIGNED C. MacDonald	DATE May 2024
DRAWN Staff	SCALE As Noted
CHECKED C. MacDonald	JOB. NO. 24017

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GRID

LEGEND

SYMBOL	DESCRIPTION
12	POND
12	DRAINAGE SUB AREA
R12	REACH
	DRAINAGE AREA BOUNDARY
	TIME OF CONCENTRATION ROUTE
	LIMIT OF WETLANDS
64	EXISTING CONTOUR
64	PROPOSED CONTOUR

PRE DEVELOPMENT FLOWS

ANALYSIS POINT	2 YR. STORM	10 YR. STORM	25 YR. STORM
AP-1	7.20 CFS	15.25 CFS	22.36 CFS
AP-2	6.10 CFS	12.15 CFS	17.39 CFS
AP-3	1.00 CFS	2.23 CFS	3.32 CFS

Scale: 1" = 60'
60' 0 60' 120'

SOIL DESIGNATION
AdB(A)
SLOPE DESIGNATION
HYDROLOGIC SOIL GROUP
HYDROLOGIC SOIL

SOILS LEGEND

SYMBOL	DESCRIPTION
	SOIL BOUNDARY LINES
	LIMIT OF WETLANDS

HYDROLOGIC SOIL GROUP

SOIL	GROUP
BUXTON (BuC)	C
LYMAN-ROCK (LyB)	D
LYMAN-ROCK (LyC)	D
SCANTIC (Sc)	D

NO.	DATE	REVISION DESCRIPTION
1	5/15/24	Submitted for Preliminary Permit Application

STATE OF MAINE — CHRISTOPHER S. MACDONALD — No. 11983 — REGISTERED PROFESSIONAL ENGINEER — 6/25/24

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Tel. (207) 856-2771
www.bh2m.com

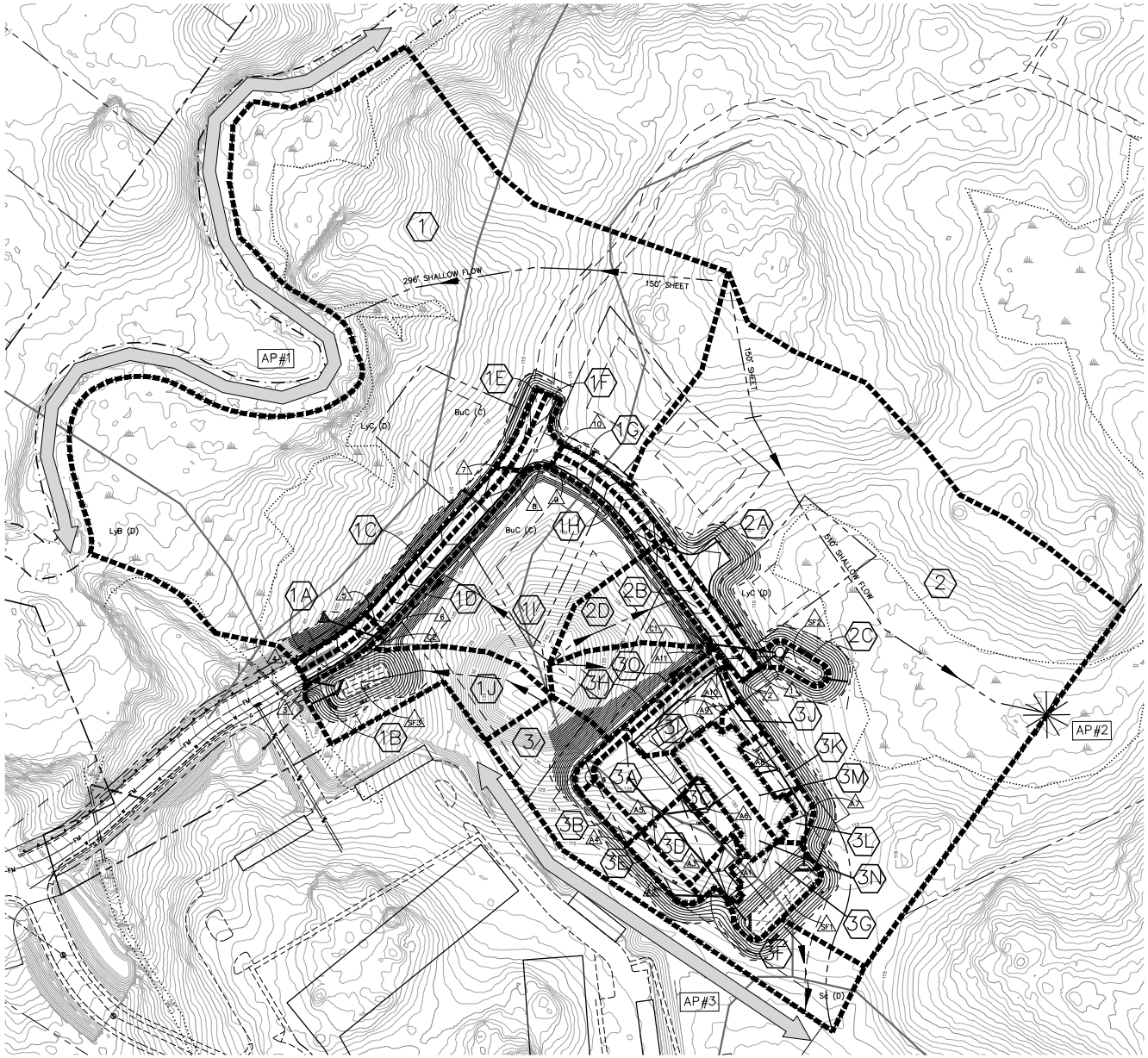
FOR:
Indian Cliff Development Corp
200 Main Street
P.O. Box 444
Biddeford, Maine

PRE-DEVELOPMENT PLAN
BARRA ROAD SUBDIVISION
BARRA ROAD
BIDDEFORD, MAINE

DESIGNED	DATE
B. Monsen	April 2024
DRAWN	SCALE
Dept.	1" = 60'
CHECKED	JOB. NO.
C. MacDonald	24017

SHEET
A

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Tc SUMMARY
(FOR THOSE NOT LABELED ON THE PLAN)

SUBCATCHMENT	Tc ROUTE
SA-1I	150' SHEET, 45' SHALLOW, 112' CHANNEL
SA-1J	150' SHEET, 73' SHALLOW
SA-2D	150' SHEET, 12' SHALLOW, 61' CHANNEL
SA-3	108' SHEET
SA-3O	143' SHEET, 54' CHANNEL

NOTE: SA-1A THROUGH SA-1H & SA-2A THROUGH SA-2C & SA-3A THROUGH SA-3N HAVE TC PATHS LESS THAN 0.1 HOURS (6 MIN.), THE TR-55 LIMITATION ON MIN. TC, AND ARE ASSUMED AS 6 MIN.

LEGEND

SYMBOL	DESCRIPTION
12	POND
12	DRAINAGE SUB AREA
R12	REACH
	DRAINAGE AREA BOUNDARY
	TIME OF CONCENTRATION ROUTE
	LIMIT OF WETLANDS
64	EXISTING CONTOUR
64	PROPOSED CONTOUR

POST (PRE) DEVELOPMENT FLOWS

ANALYSIS POINT	2 YR. STORM	10 YR. STORM	25 YR. STORM
AP-1	7.26 (7.20) CFS	15.34 (15.25) CFS	22.11 (22.36) CFS
AP-2	4.56 (6.10) CFS	11.13 (12.15) CFS	15.82 (17.39) CFS
AP-3	0.68 (1.00) CFS	1.47 (2.23) CFS	2.17 (3.32) CFS

Scale: 1" = 60'
60' 0 60' 120'

SOIL DESIGNATION
SLOPE DESIGNATION
AdB(A)
HYDROLOGIC SOIL GROUP
HYDROLOGIC SOIL

SOILS LEGEND

SYMBOL	DESCRIPTION
	SOIL BOUNDARY LINES
	LIMIT OF WETLANDS

HYDROLOGIC SOIL GROUP

SOIL	GROUP
BUXTON (BuC)	C
LYMAN-ROCK (LyB)	D
LYMAN-ROCK (LyC)	D
SCANTIC (Sc)	D

NO.	DATE	REVISION DESCRIPTION
1	5/15/24	Submitted for Preliminary Permit Application

BH2M
Berry, Huff, MacDonald, Milligan Inc.
Engineers, Surveyors
38 Main Street
Gorham, Maine 04038
Tel. (207) 839-2771
www.bh2m.com

FOR:
Indian Cliff Development Corp
200 Main Street
P.O. Box 444
Biddeford, Maine

POST-DEVELOPMENT PLAN

BARRA ROAD SUBDIVISION

BARRA ROAD
BIDDEFORD, MAINE

DESIGNED	DATE
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CITY OF BIDDEFORD

Planning and Development Department

David C.M. Galbraith
Deputy Director/City Planner
205 Main Street
P.O. Box 586
Biddeford, ME 04005
(207) 284-9115
David.Galbraith@biddefordmaine.org

PLANNING BOARD STAFF REPORT

TO: Chair Patoine and Members of the Biddeford Planning Board

FROM: David C.M. Galbraith, City Planner & Deputy Director of the Planning & Development Dept.

DATE: May 28, 2024

RE: 2024.18 Preliminary Plan Application for AVESTA Housing to build a 46 unit low income housing project for the elderly. Property is located at Barra Road (Tax Map 7, Lot 15) in the R-3 zone.

MEETING DATE: June 5, 2024 at 6:00 PM

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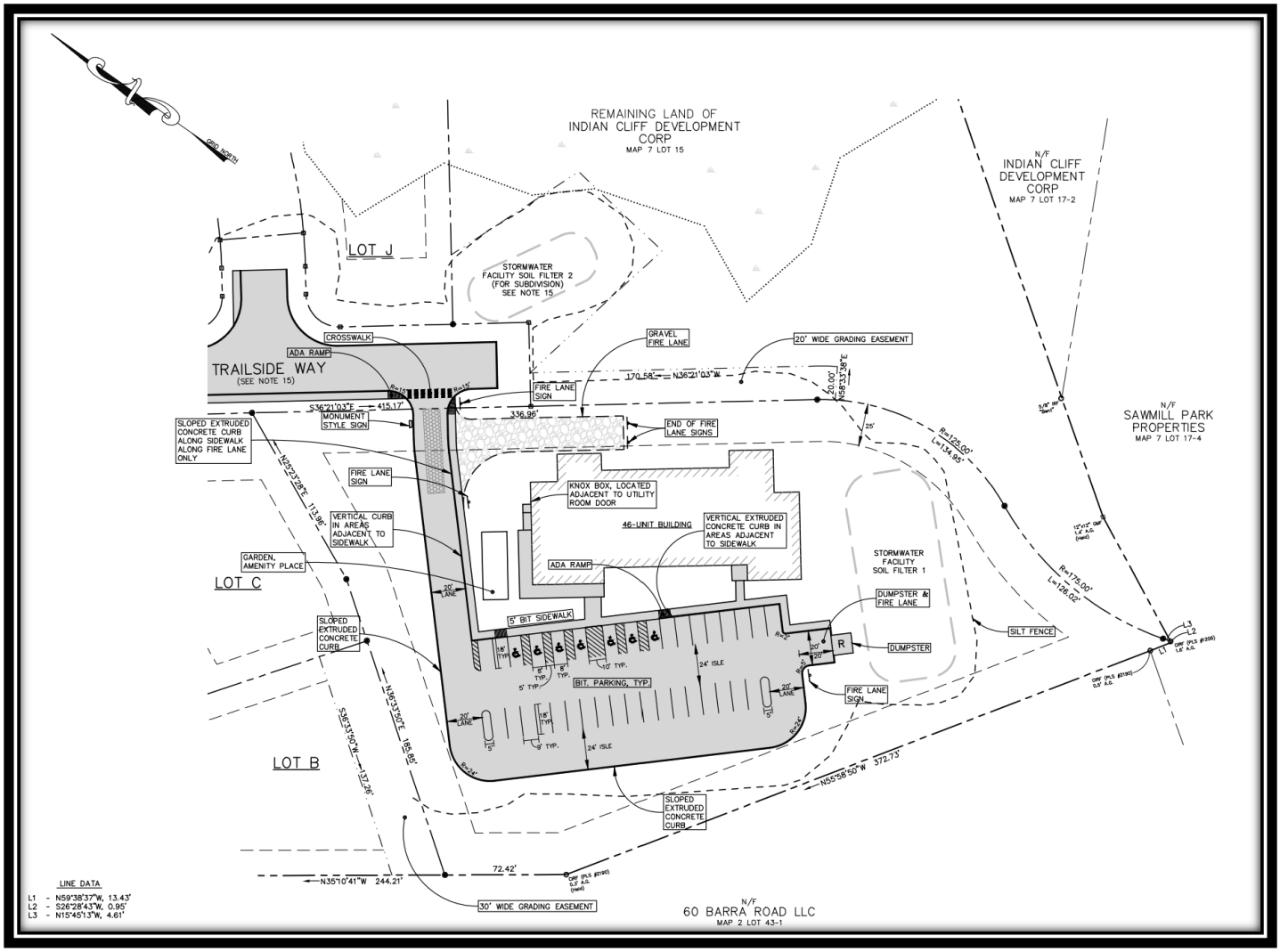
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The proposed Avesta Housing project is a four story, 46 unit, low / moderate income (LMI), senior housing development. The subject property (Tax Map 7, Lot 15) is a proposed 2.2-acre property lot located to the east of Barra Road, immediately north of the 60 Barra Road project (Reveler, formerly Saxon), and is located in the R-3 zoning district.

The project will be accessed via an extension of Barra Road to a new connecting roadway to be named Trailside Way. The proposed roadway name has been approved by the City's E-911 Addressing Officer who determined that the roadway name does not conflict with other street names in the City. In addition to site plan review and approval, the project will also require 1) A subdivision plan approval and 2) Contract Zone review and approval. The proposed subdivision and Contract Zone have been applied for by the Indian Cliff Development Corp. which is owned, in part, by Michael Eon. These projects / development reviews are being run concurrently.

2024.18 Preliminary Plan Application for AVESTA Housing to build a 46 unit low income housing project for the elderly. Property is located at Barra Road (Tax Map 7, Lot 15) in the R-3 zone.
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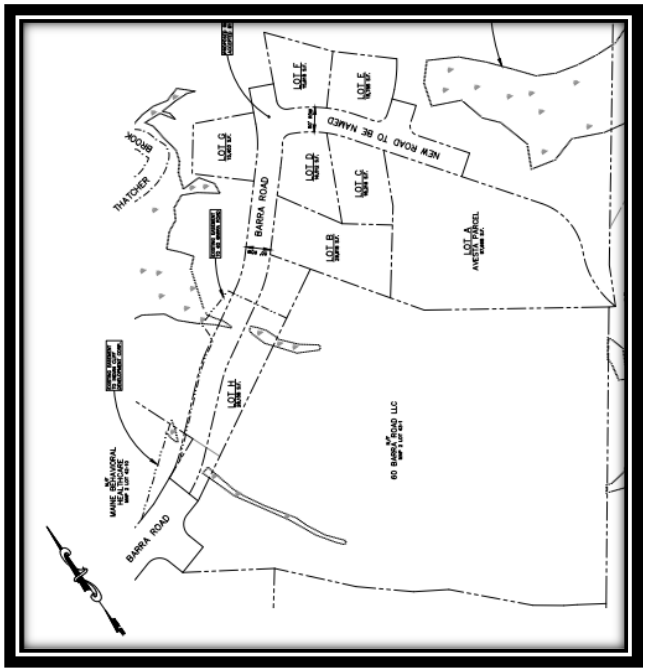
Avesta Housing – 46 Unit, LMI senior housing project

The Indian Cliff applications are being run parallel to the Avesta Site Plan Approval. As such the following process / approvals for the combined projects will require the following:

1. Avesta Housing – Site Plan: Sketch Plan Approval, Preliminary Approval and Final Site Plan approval. These three reviews will be conducted solely by the Planning Board.

2. Indian Cliff Development – Subdivision:

2024.18 Preliminary Plan Application for AVESTA Housing to build a 46 unit low income housing project for the elderly. Property is located at Barra Road (Tax Map 7, Lot 15) in the R-3 zone.
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The subdivision project proposes to subdivide approximately 7 acres of the existing parcel to provide 9 new lots, with Lot A being the parcel proposed for Avesta's development, Lots B through G being proposed as single family or duplex lots for Indian Cliff Development Corp, and Lot H being a remainder lot that is not proposed for housing development. Lot H currently features stormwater and access easements granted to Reveler for development of the 60 Barra Road project, which construction is currently ongoing, and will propose to provide stormwater management for the extension of Barra Road proposed by Indian Cliff Development.

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Avesta Housing – South Elevation Front / Interior Elevation View

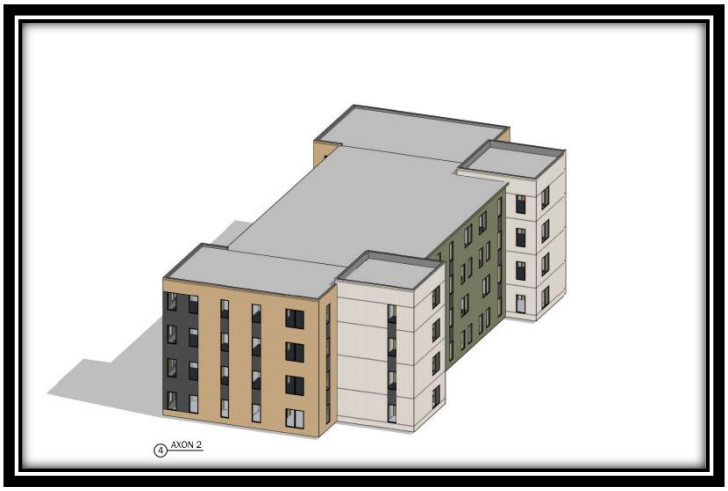


Avesta Housing – North Elevation - Roadway Elevation View

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Massing Perspective – South Elevation



Massing Perspective – North Elevation

As the site plan, subdivision plan and Contract Zone are intertwined, Staff will be running these projects concurrently. The Applicants have submitted preliminary subdivision plans and their proposed Contract Zone documents which will be discussed under the Indian Cliff Development application (Subdivision & Contract Zone).

2. PROJECT DATA/INFORMATION

1.	Applicant:	AVESTA Housing 307 Cumberland Avenue Portland, ME 04101
2.	Owner of Property:	Indian Cliff Development Corp
3.	Agent:	Christopher MacDonald P.E. BH2M 380B Maine Street Gorham, ME 04038
4.	Surveyor:	Same as above
5.	Project Location:	Barra Road
6.	Project Tax Map #/Lot #:	Tax Map 7, Lot 15
7.	Lot Size:	2.2 Acres
8.	Base Zoning:	R-3
9.	Overlay Zoning:	N/A
10.	Existing Use:	Vacant Land
11.	Proposed Use:	46 Unit Low Income Housing for Elderly
12.	Approvals Required:	Subdivision/Site Plan
13.	Uses in the Vicinity:	Commercial/Medical
14.	Waivers Needed:	a. None
18.	Waivers Granted:	a. None
22.	Other Non-City Permits Required:	
23.	LDR Attachment A: Fees Paid:	Preliminary Plan Fees Paid

25.	Planning Board Review History: April 14, 2024- Sketch Plan; June 5, 2024- Preliminary

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Per City ordinance, this application is subject to Site Plan (Land Development Regulations, Article XI) review and Subdivision Review (Chapter 66 – Subdivisions) and approval by the Planning Board.

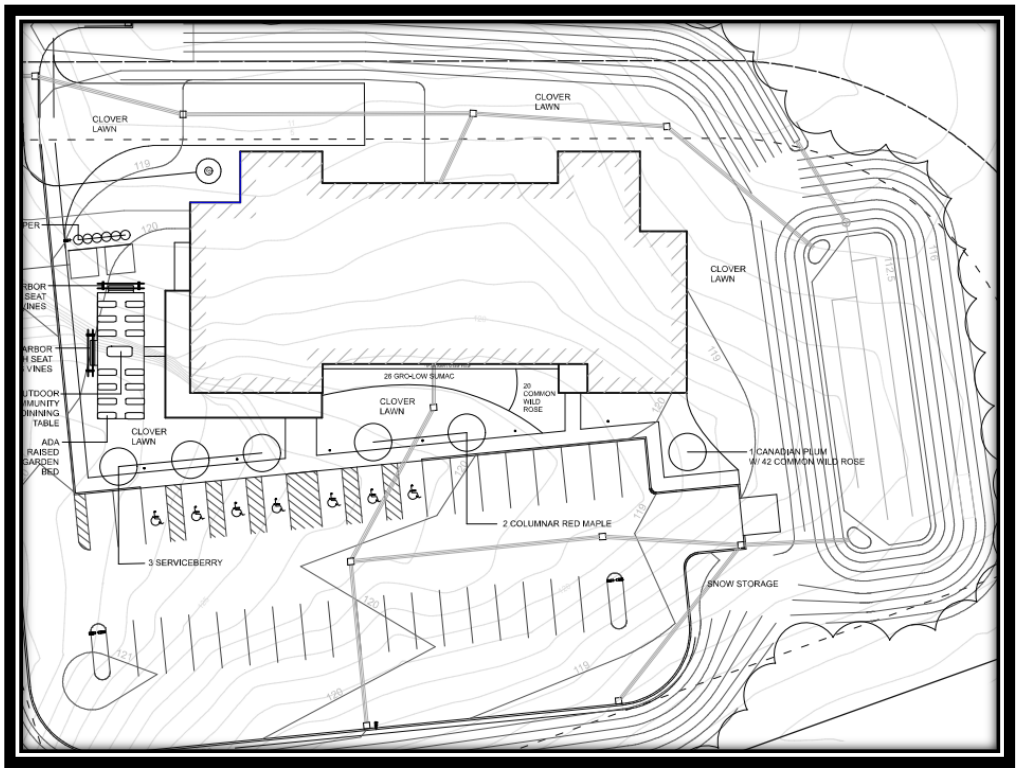
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Proposed Landscape Plan – Sheet L-1 of the Preliminary Application Plan Set

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City Staff has held a number of meetings with the Avesta team and have made significant changes / progress to the proposed site plan, primarily around emergency vehicle access. In general terms Staff is supportive of the sketch plan proposal.The Application before the Board is a preliminary plan review. Staff has provided the above comments to be incorporated into the Preliminary Subdivision Application. As the Application is for a "preliminary plan review" no formal Planning Board action is required. However, the Board should take this opportunity to review the plans, and identify any items not previously identified and additional items the Board may wish to review as part of this application. Should the Board wish to formally make a motion sample motions are provided below:

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a)_____

b)_____

c)_____

2024.18 Preliminary Plan Application for AVESTA Housing to build a 46 unit low income housing project for the elderly. Property is located at Barra Road (Tax Map 7, Lot 15) in the R-3 zone.
Planning Board Meeting Date: June 5, 2024

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CITY OF BIDDEFORD

Planning and Development Department

David C.M. Galbraith
Deputy Director/City Planner
205 Main Street
P.O. Box 586
Biddeford, ME 04005
(207) 284-9115
David.Galbraith@biddefordmaine.org

PLANNING BOARD STAFF REPORT

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FROM: David C.M. Galbraith, City Planner & Deputy Director of the Planning & Development Dept.

DATE: May 28, 2024

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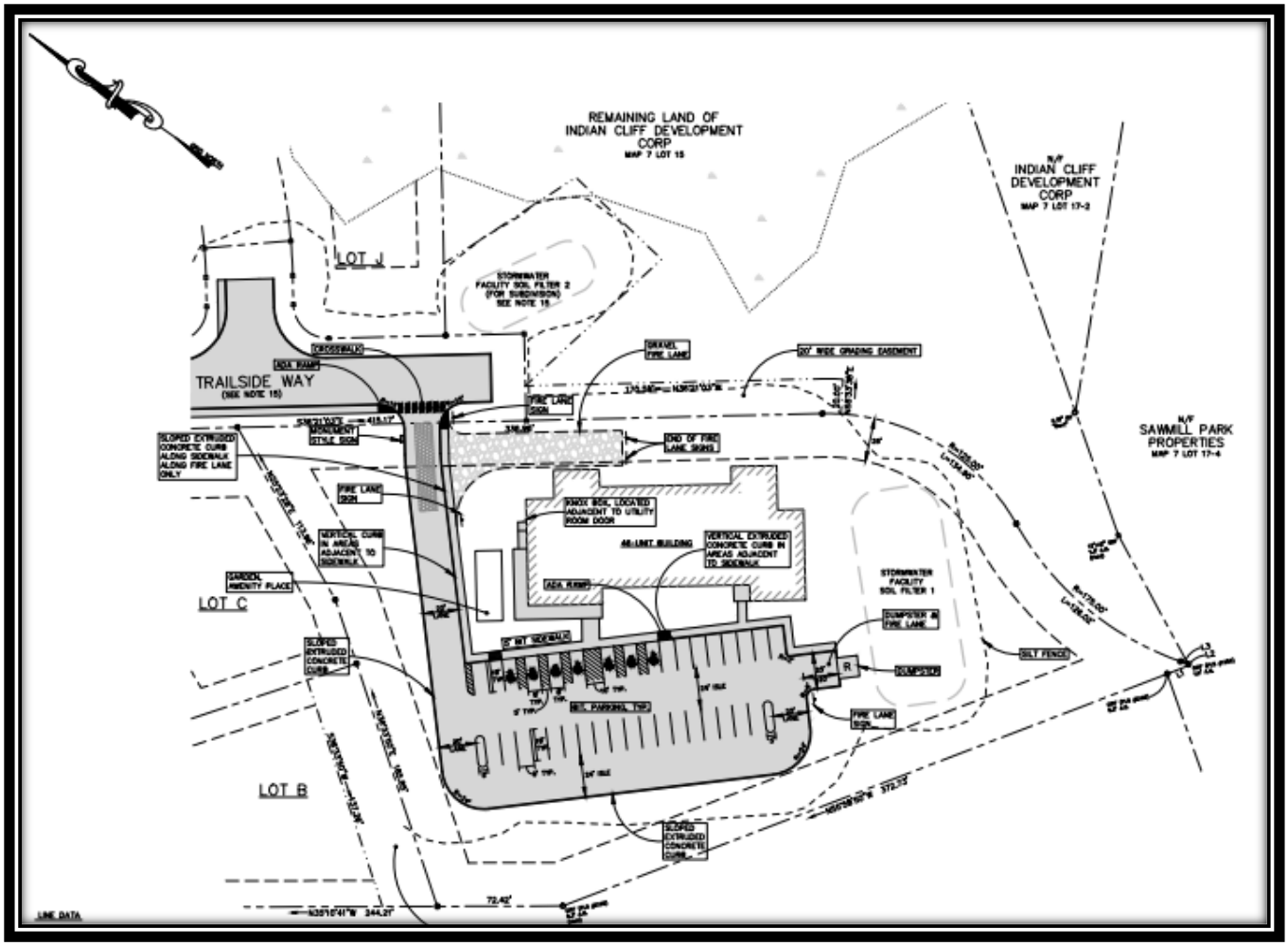
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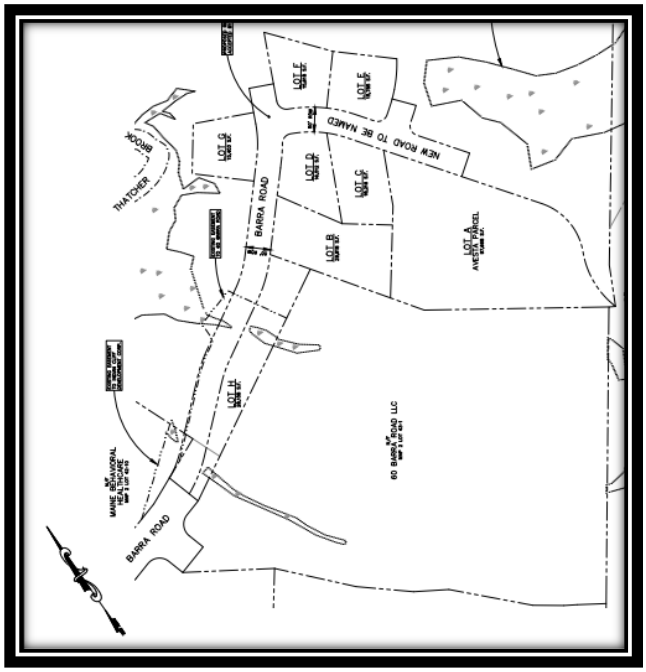
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Avesta Housing – South Elevation Front / Interior Elevation View

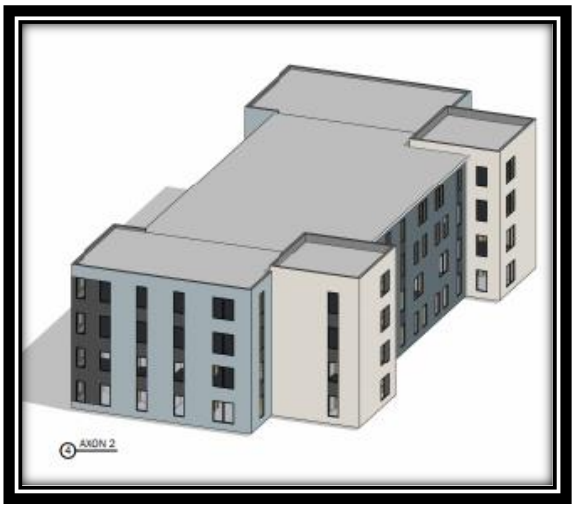
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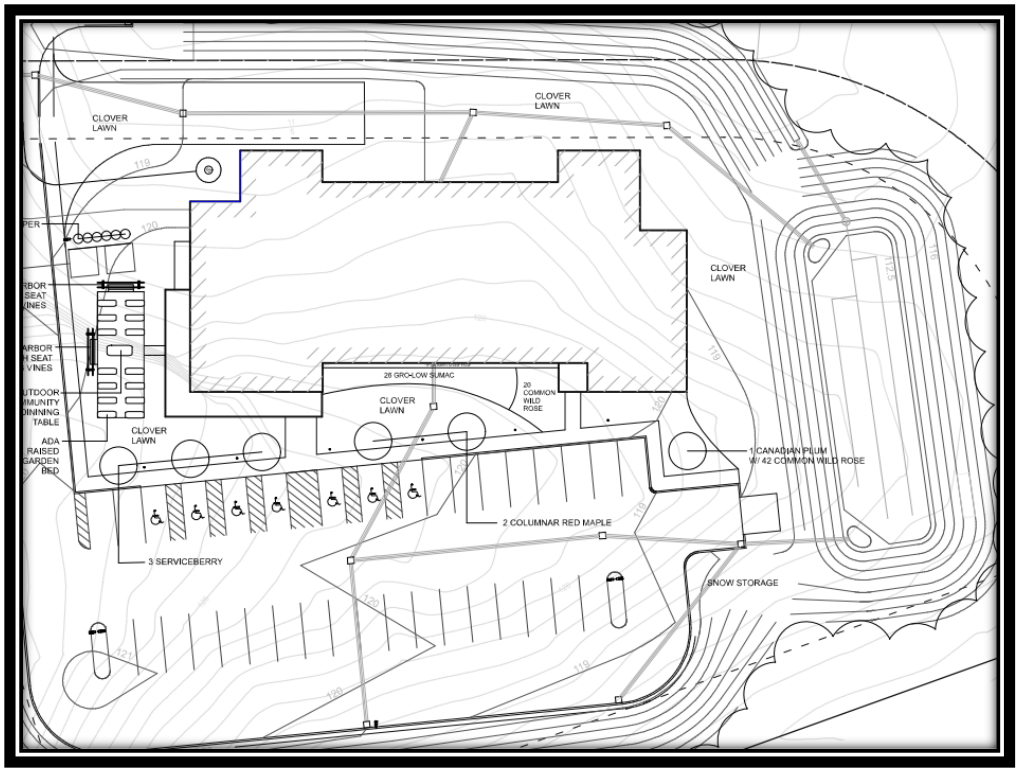
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2024.18 Preliminary Plan Application for AVESTA Housing to build a 64 unit low income housing project for the elderly. Property is located at Barra Road (Tax Map 7, Lot 15) in the R-3 zone.
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a)_____

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a)_____

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than 50% of the developed area (See 06-096 Chapter 500 4.C(5)(c)). For development of these projects, we have assumed that the Subdivision portions of the project will meet the 75% linear exemption criteria, and the Site portion of the project will meet the 95% criteria.

The stormwater management system includes individual Grassed Underdrained Soil Filters for both roads of the Subdivision and an additional Grassed Underdrained Soil Filter for the Site project. The proposed soil filters have been designed in accordance with the design requirements outlined in the Maine Stormwater Best Management Practices Manual, Volume III, Chapter 7.1.

Below is a summary of the treatment areas associated with the proposed infrastructure. Refer to Appendix D for detailed calculations.

Stormwater Treatment Summary Indian Cliff Subdivision (Linear Project)	
Total Proposed (Linear) Impervious Area	28,461 sf
Total Proposed (Linear) Developed Area	71,337 sf
Total Treated (Linear) Impervious Area	26,837 sf
Total Treated (Linear) Developed Area	36,134 sf
Linear Subdivision Impervious Area Treatment %	**95.3% (75% required)**
Linear Subdivision Developed Area Treatment %	**50.7% (50% required)**

Stormwater Treatment Summary Avesta Site	
Total Proposed Impervious Area	36,710 sf
Total Proposed Developed Area	77,579 sf
Total Treated Impervious Area	36,710 sf
Total Treated Developed Area	62,198 sf
Impervious Area Treatment %	**100.0% (95% required)**
Developed Area Treatment %	**80.2% (80% required)**

As shown in the Table above, the stormwater management systems have been designed to meet the applicable General Standard requirements for both the Subdivision and Site projects. Detailed treatment calculations can be found in Appendix D.

1.7 PHOSPHORUS STANDARD

The proposed project is located in the watershed of Thatcher Brook. The proposed project is not located within the direct watershed of a lake or lake most-at-risk listed in 06-096 Chapter 502. The Phosphorus Standard does not apply to this project.

1.8 URBAN IMPAIRED STREAM STANDARD

The proposed project is located in the watershed of Thatcher Brook. The Thatcher Brook is listed in 06-096 Chapter 502 as an Urban Impaired Stream, however, as the

CITY OF BIDDEFORD - SITE PLAN APPLICATION DRAWING CHECKLIST *LAST REVISED: 04/18/23*

CHECKLIST DIRECTIONS:
1. The following checklist must be completely filled out by the applicant for any Site Plan submittal to the Planning Department.
2. Applicant to confirm all of the items listed are included within the submittal. Any missing items must have adequate reasoning to justify their absence.
3. City to review applicant's submittal and checklist responses. Projects missing submittal information with non-acceptable reasoning will be rejected.
4. Items in BLACK are required for 'Preliminary Site Plan' approval & 'Final Site Plan' approval.
5. Items in BLUE are only required for 'Final Site Plan' approval.

SUBMITTAL INFORMATION - TO BE FILLED OUT BY APPLICANT	
Project Name:	Avesta Biddeford
Planning Board # (if available):	2024.18
Applicant Name/Info:	Avesta Housing
Submittal #/Type (Prelim/Final):	Preliminary Site and Subdivision Applications
Submittal Date:	15-May-24

SUBMITTAL REQUIREMENT		APPLICANT RESPONSE		CITY REVIEW RESPONSE	
ITEM NUMBER	DESCRIPTION	INFORMATION PROVIDED (YES/NO)	REASON NOT PROVIDED/COMMENT	ACCEPTABLE (YES/NO-REVISE & RESUBMIT)	COMMENT
1	GENERAL PLAN REQUIREMENTS				
A	Drawing specific legends (linetypes, hatches, etc.)	Yes			
B	Individual drawing layer control should be utilized: freeze/thawing, changing lineweights, and screening (i.e. screen existing layers on a proposed plan, freeze topography and underground utilities on a proposed site plan)	Yes			
C	North arrows, standard engineering scale viewports, dated revision blocks	Yes			
D	All drawings and surveys must be in the following coordinate systems: NAD83 Maine State Plane West (Horizontal) and NAVD88 (Vertical)	Yes			
E	Drawings need to be designed, signed & sealed by a Maine licensed professional engineer (PE); all boundary survey data needs to be performed by a licensed professional land surveyor (PLS)	Yes			
2	COVER SHEET				
A	Project Name & Property Address	Yes			
B	Project Team Contact Information (Owner, Engineer, Contractor, etc.)	Yes			
C	Site Location Map	Yes			
D	Sheet Set List of Drawings	Yes			
E	Tax Map and Lot ID	Yes			
F	Zoning & Shoreland Zone Information	Yes			
G	Existing Use Description	Yes			
H	Proposed Use Description	Yes			
I	Required Waiver/Variances (Yes/No); if yes, plan must clearly list waivers/variances requesting	No	No waivers proposed		
J	Name of Drainage Watershed	Yes			
K	Within the MS4 Urbanized Area (Yes/No)	Yes			
L	Natural resources (streams, wetlands, etc.) located on-site or adjacent to the property (Yes/No)	Yes			
M	Within the 100-year Flood Zone (Yes/No)	No	Flood zone shown where applicable, project not in flood zone		
N	Public Road Proposed (Yes/No)	Yes			
O	Private Road Proposed (Yes/No)	No	No private ways proposed		
P	Public Sewer Connection (Yes/No); if yes, need to include a proposed sewer flow calculation per Maine s Subsurface Wastewater Disposal Rules, Chapter 241, Section 4 (Tables 4A & 4C)	Yes	Based on detailed analysis by City Engineering department		
Q	Public Storm Drain Connection (Yes/No)	No	No public storm drain connections proposed		
R	Limits of Disturbance in acres	Yes	Provided in Stormwater Report		
S	Pervious Land Cover square footage, existing and proposed	Yes	Provided in Stormwater Report		
T	Impervious Land Cover square footage (Pavement/Gravel), existing and proposed	Yes	Provided in Stormwater Report		
U	Building Roof square footage, existing and proposed	Yes	Provided in Stormwater Report		
V	Assigned Planning Board Number	Yes	2024.18 as provided during the sketch plan submission		
W	Estimated cut/fill earthwork volumes; if disturbing within Flood Zone, separate set of earthwork volumes required (site vs. within flood zone)				
3	EXISTING CONDITIONS PLAN				
A	Horizontal & Vertical Datums annotated (NAD83 & NAVD88)	Yes			
B	Survey Benchmark Locations (with XYZ Coordinates annotated)	Yes	A benchmark is shown on the boundary survey, but a new benchmark will be established closer to the project and provided in subsequent revisions to the plans		
C	Property & Right-of-Way Lines	Yes			
D	Boundary line information (bearings, distances, etc.)	Yes			
E	Property pin and monumentation locations	Yes			
F	Existing easements with proper ownership identified	Yes			
G	Road Names & Individual Lot Labels (Map, Lot, Owner, Acreage)	Yes			
H	Location of any Natural Resources and their respective buffers (wetlands, streams, etc.)	Yes			
I	100-year Flood Zone Limits & Elevation	Yes			
J	USDA-NRCS Soil Boundaries and Labels	Yes	Provided in Stormwater Report		
K	Existing contours with adequate contour labelling; minimum 1 contour interval	Yes			
L	Existing building FFEs annotated	No	No existing buildings on proposed project area		
M	Spot elevations for existing building corners, door entrances, accessible parking/walkways, road centerlines, and bottom/top of curbs	No	No existing buildings on proposed project area		
N	Existing buildings & structures	No	No existing buildings on proposed project area		
O	Existing pavement areas & number of parking spaces	No	No existing parking		
P	Existing ADA ramp geometry, detectable warning plates, and ADA parking spaces	No	No existing sidewalks		
Q	Existing site features (sidewalks, retaining walls, curbing, lightpoles, guide rails, dumpsters, fencing)	No	No existing site features		
R	Existing signage and striping	No	No existing roads		
S	Existing underground utility locations (storm, sewer, force main, water, gas, elec, tele)	No	All utilities are proposed by the accompanying subdivision project		

	T	Existing above-ground utility locations (manholes, catch basins, utility poles, hydrants, transformers, riprap)	No	No existing utilities		
	U	Rim, invert in, invert out, pipe size, cardinal direction (N, E, S, W) information for any existing utility infrastructure being tied into (upstream/downstream/outfalls)	No	No existing utilities		
	V	Existing tree lines, street trees, free-standing trees (12 or larger diameter at breast height), and vegetation	Yes	Site fully wooded		
	W	Location of any borings, drinking wells, and monitoring wells	Yes	Included in geotechnial report		
4		SITE DEMOLITION & EROSION CONTROL (E&SC) PLAN				
	A	Limits-of-disturbance outlined and acreage annotated	Yes			
	B	Location of any Natural Resources and their respective buffers (wetlands, streams, etc.)	Yes			
	C	100-year Flood Zone Limits	Yes			
	D	Callout existing site features to be demolished/removed/replaced	No	No existing structures or infrastructure		
	E	Callout existing utilities to be demolished/removed/abandoned-in-place	No	No existing structures or infrastructure		
	F	Hatch existing buildings and pavement to be removed	No	No existing structures or infrastructure		
	G	Construction Entrance location(s)	Yes			
	H	Perimeter E&SC control location(s) (i.e. silt fence, erosion berm mix)	Yes			
	I	Stockpile and staging area(s) identified (with proper perimeter control)	Yes			
	J	Inlet protection location(s)	Yes			
	K	Note requiring contractor to implement dust control measures throughout construction	Yes			
	L	Note requiring contractor to pave utility trenches within right-of-way within 3 days of excavation or prior to any rain event	Yes			
	M	If groundwater expected, show dewatering/silt bag location(s); show temporary pumping routing				
	N	If large development is proposed with an extensive underground stormwater conveyance network, show sediment trap/basin location(s) needed for constructability/phasing; provide sizing calculations				
5		SITE PLAN/SUBDIVISION PLAN				
	A	Partial Site Plans needed for any viewport scale greater than 1 =20				
	B	Existing property and right-of-way lines	Yes			
	C	Proposed subdivision lot lines and labels	Yes			
	D	Required Zoning Setbacks shown with dimensions and annotation	Yes			
	E	Bulk requirement summary table (zoning/parking calculations)	Yes	Parking calc's based on report provided in Attatchment 10		
	F	Location of any Natural Resources and their respective buffers (wetlands, streams, etc.)	Yes			
	G	100-year Flood Zone Limits	Yes			
	H	Proposed building outlines, door entrances and loading docks	Yes			
	I	Proposed building labels	Yes			
	J	Proposed road extents; provide clear annotation if roads will be public or private	Yes			
	K	Proposed parking and accessible parking locations; annotate parking space counts	Yes			
	L	Proposed signage, parking striping, and traffic striping	Yes			
	M	Detailed ADA ramp geometry, detectable warning surfaces, and ADA parking striping/signage; existing & proposed	Yes			
	N	Proposed site features (i.e. curbing, walls, fencing, guiderail, fire hydrant, transformers, light pole locations)	Yes			
	O	Separate hatching for buildings, sidewalks, pavement, landscaping	Yes			
	P	Proposed landscaping; detailed landscaping design should be on separate plans	Yes			
	Q	Designated snow storage areas	Yes			
	R	Proposed dumpster locations and trash removal access	Yes			
	S	Linear dimensions of all drive aisles, sidewalk widths, parking spaces, loading docks	Yes			
	T	Radial dimensions for all curbs, landscaped islands, sidewalks	Yes			
	U	Road centerline stationing shown, labelled every 0+50 with curve data	No	Not Applicable, no roadways proposed		
	V	If Private Road is proposed, final recorded plans must clearly note that proposed private roads will not be submitted in the future for public acceptance	No	Not Applicable, no private ways		
	W	If Private Road is proposed, final recorded plans must clearly note that the City is not responsible for any maintenance, repair, plowing, or trash removal of proposed private roads	No	Not Applicable, no private ways		
	X	Planning Board signature block for final recording	Yes			
6		GRADING PLAN				
	A	Partial Grading Plans needed for any viewport greater than 1 =20	No	1" = 30' Plans provided are at an appropirate scale for detail		
	B	Limits-of-disturbance outlined and acreage annotated	Yes			
	C	Proposed Building Labels with Individual Finished Floor Elevations (FFEs)	Yes			
	D	Existing contours with adequate contour labelling, screened; minimum 1 contour interval	Yes			
	E	Proposed contours with adequate contour labelling; minimum 1 contour interval	Yes			
	F	Detailed grading for all ditches, swales, outfalls, and riprap	Yes			
	G	All proposed contours tie-into existing contours at limits-of-disturbance outline	Yes			
	H	Existing spot elevations for all asphalt and curb tie-in locations	No	Ties into proposed conditions for the Barra Road Subdivision, being jointly applied for		
	I	Location of any Natural Resources and their respective buffers (wetlands, streams, etc.)	Yes			
	J	100-year Flood Zone Limits	No	Not Applicable		
	K	Proposed spot elevations for all important roadway geometric points and/or on a 50 maximum interval: low/high points, PC/PT, road centerline, edge-of-asphalt	Yes			
	L	Proposed spot elevations for all curblines (bottom/top-of-curb) and sidewalks	Yes			
	M	Proposed spot elevations for all parking and drive aisle geometry points	Yes			
	N	Proposed spot elevations for all building corners and door-entry locations	Yes			
	O	Proposed retaining wall/loading dock elevations (bottom/top of wall)	No	Not Applicable		
	P	Proposed spot elevations for all ADA ramp/landing/parking stall geometry points	Yes			
	Q	Proposed % slope arrows for all ADA parking spaces and sidewalks	Yes			

	R	Proposed longitudinal % slope arrows for drainage ditch centerlines	Yes			
	S	Proposed % slope arrows for roads, parking areas, and landscape tie-in areas	Yes			
	T	Estimated cut/fill earthwork volumes; if disturbing within Flood Zone, separate set of earthwork volumes required (site vs. within flood zone)				
7		ROAD PROFILES (if public/private road proposed)	No	Road not Proposed		
	A	Existing surface; dashed and screened				
	B	Proposed surface; continuous and bold				
	C	Corresponding centerline stationing and curve data annotation				
	D	Road cross-section including proposed surface cross slopes; include multiple sections for various road cross slope conditions proposed (crowned, superelevated)				
	E	Horizontal and vertical scale bars				
	F	Clear annotation if proposed road will be public or private				
	G	If Private Road is proposed, plans must clearly note that proposed private roads will not be submitted in the future for public acceptance				
	H	If Private Road is proposed, plans must clearly note that the City is not responsible for any maintenance, repair, plowing, or trash removal of proposed private roads				
8		UTILITY PLAN				
	A	Existing underground utility locations; screened (storm, sewer, force main, water, gas, electric, telecom)	Yes			
	B	Existing above-ground utility locations; screened (manholes, catch basins, utility poles, hydrants, riprap)	Yes			
	C	Rim, invert in, invert out, pipe size, cardinal direction (N, E, S, W) information for any existing utility infrastructure being tied into (upstream/downstream/outfalls)	No	No existing structures or infrastructure		
	D	Proposed underground utility locations; bold (storm, sewer, force main, water, gas, electric, telecom, lighting)	Yes			
	E	Proposed above-ground utility locations; bold (manholes, catch basins, utility poles, hydrants, transformers, riprap)	Yes			
	F	Proposed storm culverts, outfalls, and riprap locations and sizes	Yes			
	G	Storm/sewer structure labels must include: rim, inverts in, inverts out, pipe sizes, cardinal directions (N, E, S, W)	Yes			
	H	Storm/sewer pipe labels must include: linear footage, pipe size, material, slope	Yes			
	I	Flow directional arrows for storm & sewer pipes	Yes			
	J	Proposed & existing site features shown that could conflict with proposed utilities (trees, signs, lightpoles, bollards, foundations, guiderails)	Yes			
	K	All storm drains must be sized to convey the 25-year storm	Yes			
	L	Sewer force main sizes and invert elevations	Yes			
	M	Sewer pump station locations, model, rim, inverts, pipe sizes, cardinal directions (N,E,S,W)	Yes			
	N	Grease trap & oil-water separator locations, sizes, elevations	No	Not Applicable		
	O	Water, gas, electric, and telecom sizes labelled	Yes			
9		UTILITY PROFILES	No	All gravity drain information shown on plans		
	A	Utility profiles for all gravity storm drains and sewer pipes, including all laterals, catch basins, culverts, and outfalls; profiles preferred to be aligned on the pipe centerline (not superimposed on the road centerline)				
	B	Existing surface; dashed and screened				
	C	Proposed surface; continuous and bold				
	D	Storm/sewer structure labels must include: rim, inverts in, inverts out, pipe sizes, cardinal directions (N, E, S, W)				
	E	Storm/sewer pipe labels must include: linear footage, pipe size, material, slope				
	F	Existing and proposed gravity pipe crossings shown; sizes labelled and depths/clearance annotated				
	G	Existing and proposed electric/water/telecom/gas crossings shown at approximate depths; sizes labelled and depths/clearance annotated				
	H	Known ledge or groundwater elevations				
	I	For all storm drains, 25-year HGL must be shown on profiles with starting tailwater condition identified				
	J	For storm outfalls, include riprap sizing and grading extents				
	K	Horizontal and vertical scale bars				
10		DETAILS				
	A	Road section detail, including pavement & gravel depths	Yes			
	B	Sidewalk, paver, crosswalk, and any other pavement section details	Yes			
	C	Pavement sawcut detail	Yes			
	D	Utility trench/backfill detail	Yes			
	E	All site feature details; curbing, retaining walls, fencing, guiderails, dumpsters, etc.	Yes			
	F	Signage, striping, and ADA details	Yes			
	G	E&S notes and details; only show applicable/proposed measures	Yes			
	H	Utility structure details (manholes, cleanouts, fittings, handholes, transformer pads, hydrants)	Yes			
	I	Storm outfall & riprap details	Yes			
	J	Drainage ditch cross section identifying minimum depth, minimum bed width, and maximum side slopes	Yes			
	K	Pump station, grease trap, and oil-water separator details	Yes			
	L	Conduit section details	Yes			
	M	Miscellaneous details (as needed)	Yes			
11		LANDSCAPING, LIGHTING & PHOTOMETRIC PLANS				

A	As required by ordinance; at a minimum: locations, counts, and species/models must be identified	Yes			
B	Landscaping & lighting details	Yes			
12	DOCUMENTS/REPORTS/CALCULATIONS				
A	On initial preliminary submittal applications, applicant must submit a development review and inspection fee. Applicant to coordinate fee amount with City Planner prior to submittal. This fee will be drawn against to cover the following type of services throughout the project life cycle (and may require replenishing): i. 3rd Party City Peer-Review ii. Site Inspections during the permitting process iii. Erosion & Sediment Control Inspections during construction iv. Right-of-Way Inspections during construction	Yes	Per Sketch plan application, Sketch Plan Application fees of $12,915 paid, Preliminary Application fees $8,355 paid with this application, Final Application fees of $825 will be paid		
B	Predevelopment & Post-development Drainage Area Maps, including: i. Subdrainage areas delineated and labeled ii. Points of Interest/Analysis shown and labeled iii. Hatching for different land cover areas (impervious, pervious, gravel) iv. Time of concentration (Tc) paths & durations v. Save City standard/set stormwater summary tables	Yes			
C	An approved Sewer Ability-to-Serve Letter from the Engineering Department: i. Applicant to submit proposed sewer flow calculations per Maine s Subsurface Wastewater Disposal Rules, Chapter 241, Section 4 (Tables 4A & 4C)	Yes	See Application		
D	A Performance Guarantee Cost Estimate utilizing Planning s template				
E	25-year hydraulic calculations for all storm conveyance piping (rational method), including starting tailwater conditions/documentation	Yes	See Stormwater Report		
F	If any SWM water quality BMP or detention facility is proposed, hydrologic model exports/hydrographs must be submitted for the for the 2, 10, 25, & 100-year storm frequencies	Yes	See Stormwater Report		
G	Sizing calculations for any SWM water quality BMP or detention facility	Yes	See Stormwater Report		
H	A stormwater maintenance manual for any proposed SWM water quality BMP or detention facility, including: i. Annual maintenance requirements ii. Annual inspection requirements by a licensed PE; noting that all inspection reports/logs need to be submitted to the Engineering Department by March 1st each following year, identifying what on-going maintenance has occurred and what remedial repairs are needed iii. Signed Property Owner Agreement: including the current property owner s contact information and signature; it must be noted that all stormwater BMP maintenance requirements are linked to the property for perpetuity and transfer to any new ownership	Yes	See Stormwater Report		
I	Salt Management Plan	Yes			
J	Sewer pump station sizing calculations	Yes			
K	Sewer pump station maintenance plan	No	To be provided for final application		
L	Grease trap sizing calculations	No	Not Applicable		
M	Homeowner Association (HOA) agreement for any private road serving two (2) lots or more	No	Not Applicable		
N	Summary list & copy of any required DOT/DEP/USACE permits & approvals	No	Project will apply for Maine DEP Stormwater Law Permit and provide copy when filed		

AVESTA HOUSING PROJECT

BARRA ROAD
BIDDEFORD, MAINE

FOR

AVESTA
HOUSING

PLAN INDEX

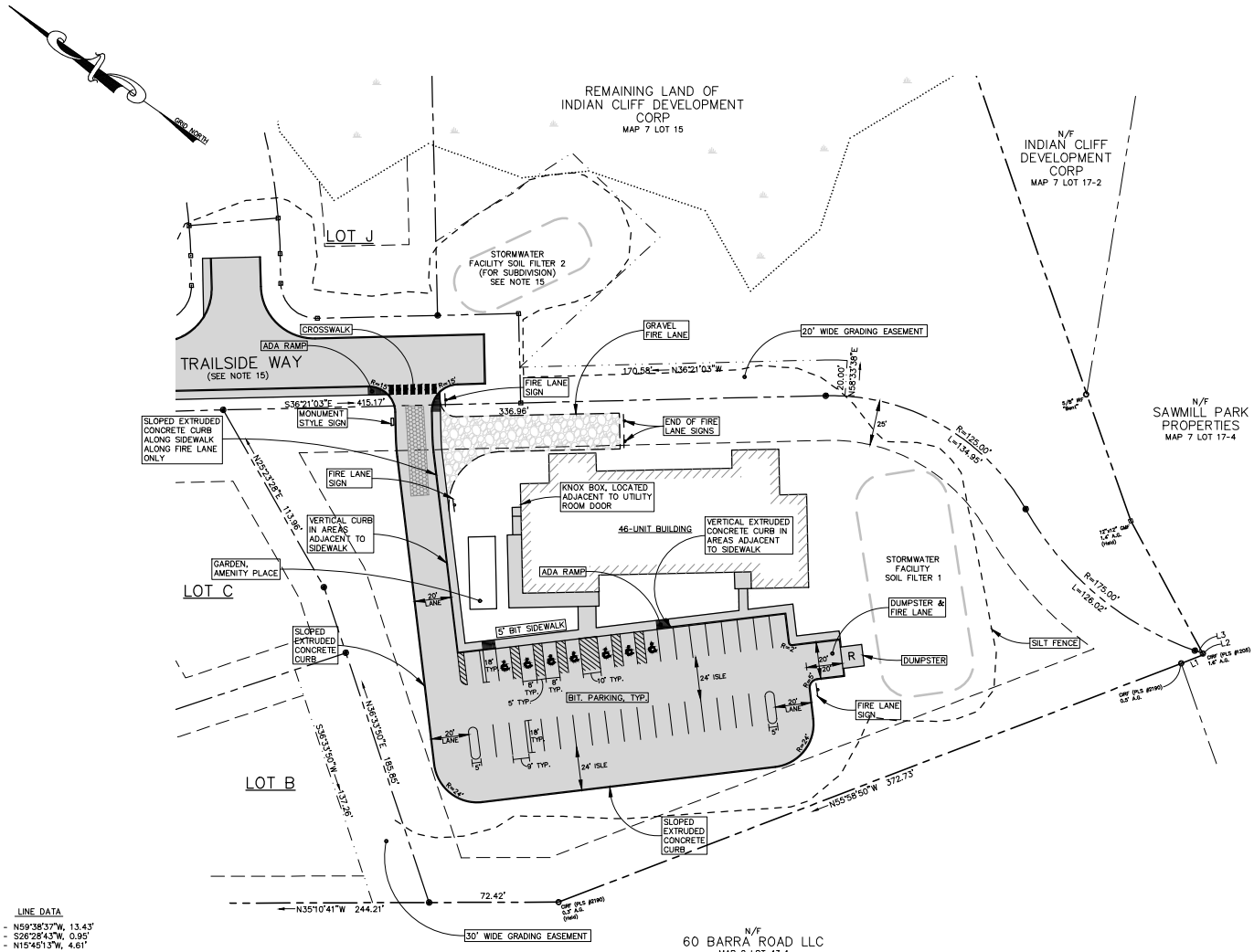
1	SITE PLAN
2	EXISTING CONDITIONS PLAN
3	GRADING PLAN
4	DETAILS A
5	DETAILS B
6	GRASSED UNDERDRAIN SOIL FILTER 1 DETAILS
7	EROSION CONTROL DETAILS
A	PRE DEVELOPMENT PLAN
B	POST DEVELOPMENT PLAN
L-1	LANDSCAPING PLANS (BY RASOR LANDSCAPE ARCHITECTURE)
M	PHOTOMETRIC PLANS (BY CHARRON REFLEX LIGHTING)
SD	ARCHITECTURE PLANS (BY LASSEL ARCHITECTS)

BH2M

Berry, Huff, McDonald, Milligan Inc.
Engineers, Surveyors

380B Main Street
Gorham, Maine 04038

Tel. (207) 839-2771
Fax (207) 839-8250



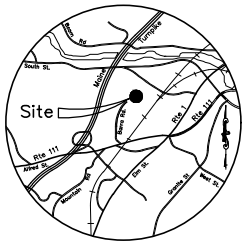
LINE DATA

L1 - N59°38'37"W, 13.43'
L2 - S26°28'43"W, 0.95'
L3 - N15°45'13"W, 4.61'

LEGEND

SYMBOL	DESCRIPTION
⊡ GMF	GRANITE MONUMENT FOUND
○ IPF/IRF	IRON PIPE/IRON ROD FOUND
○ CRF	CAPPED IRON ROD FOUND
◉ IRS	5/8" IRON ROD W/ CAP TO BE SET
⊡	GRANITE MONUMENT TO BE SET
	PROPERTY LINE
	BUILDING SETBACK
	ABUTTER PROPERTY LINE
	WETLANDS
	PROPOSED GRAVEL
	PROPOSED EASEMENT

Scale: 1" = 30'



LOCATION MAP
SCALE: 1" = 2 MILES

NOTES:

1. OWNER: INDIAN CLIFF DEVELOPMENT CORP.
260 MAIN STREET
P.O BOX 444
BIDDEFORD, MAINE
2. APPLICANT: AVESTA HOUSING
307 CUMBERLAND AVENUE
PORTLAND, MAINE
3. ENGINEER: CHRISTOPHER R. MacDONALD., PE #11985
BH2M
380B MAIN STREET
GORHAM, MAINE 04038
4. SURVEYOR: ROBERT C. LIBBY JR. PLS #2190
BH2M
5. WETLANDS: MARK HAMPTON ASSOCIATES
PORTLAND, MAINE
6. DEED REFERENCE: BOOK 5486, PAGE 6
7. TAX MAP REFERENCE: MAP 7, LOT 15; LOT A OF PROPOSED BARRA ROAD SUBDIVISION
8. ZONING: R-3 (CURRENT)
DUPLEX LOT BULK AND SPACE STANDARDS
7,500 SF/UNIT; 15,000 SF/DUPLEX
120' MINIMUM FRONTAGE
40' FRONT SETBACKS MAJOR ROW
25' FRONT SETBACKS OTHER ROW
15' SIDE AND REAR SETBACKS
3 STORIES MAX
35' MAXIMUM BUILDING HEIGHT

PROPOSED CONTRACT ZONE
1,500 SF/UNIT
50' MINIMUM FRONTAGE
25' FRONT, SIDE AND REAR SETBACK
60' MAXIMUM BUILDING HEIGHT
9. PROJECT AREA: +/- 2.2 ACRES
10. PROPOSED USE: 46-UNIT ELDERLY LOW INCOME HOUSING
11. ELECTRIC/TELEPHONE SERVICE: UNDERGROUND SERVICE ALONG TRAILSIDE WAY
12. SEWER SERVICE: PUBLIC SERVICE ALONG TRAILSIDE WAY
13. WATER SERVICE: PUBLIC WATER ALONG TRAILSIDE WAY
14. PARKING: 35 SPOTS PROPOSED; 0.75-UNIT
15. THIS PROJECT IS PROPOSED TO BE CONSTRUCTED ON LOT A OF THE BARRA ROAD SUBDIVISION, CURRENTLY UNDER REVIEW BY THE CITY OF BIDDEFORD. THIS PLAN SHOWS SOME OF THE FACILITIES PROPOSED BY THE SUBDIVISION FOR REFERENCE ONLY. PLEASE SEE INDIAN CLIFF DEVELOPMENT CORP. SUBDIVISION APPLICATION AND PLANS FOR ADDITIONAL DETAILS.
16. A MONUMENT STYLE SIGN IS PROPOSED AT PROJECT ENTRANCE.

THIS PLAN REVIEWED AND APPROVED BY THE TOWN OF BIDDEFORD PLANNING BOARD.

DATE

CHAIR

NO.	DATE	REVISION DESCRIPTION
1	5/15/24	Submitted for Preliminary Permit Application

STATE OF MAINE — CHRISTOPHER R. MacDONALD — REGISTERED PROFESSIONAL ENGINEER

BH2M
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Engineers, Surveyors
380B Main Street
Gorham, Maine 04038
Tel (207) 839-2771
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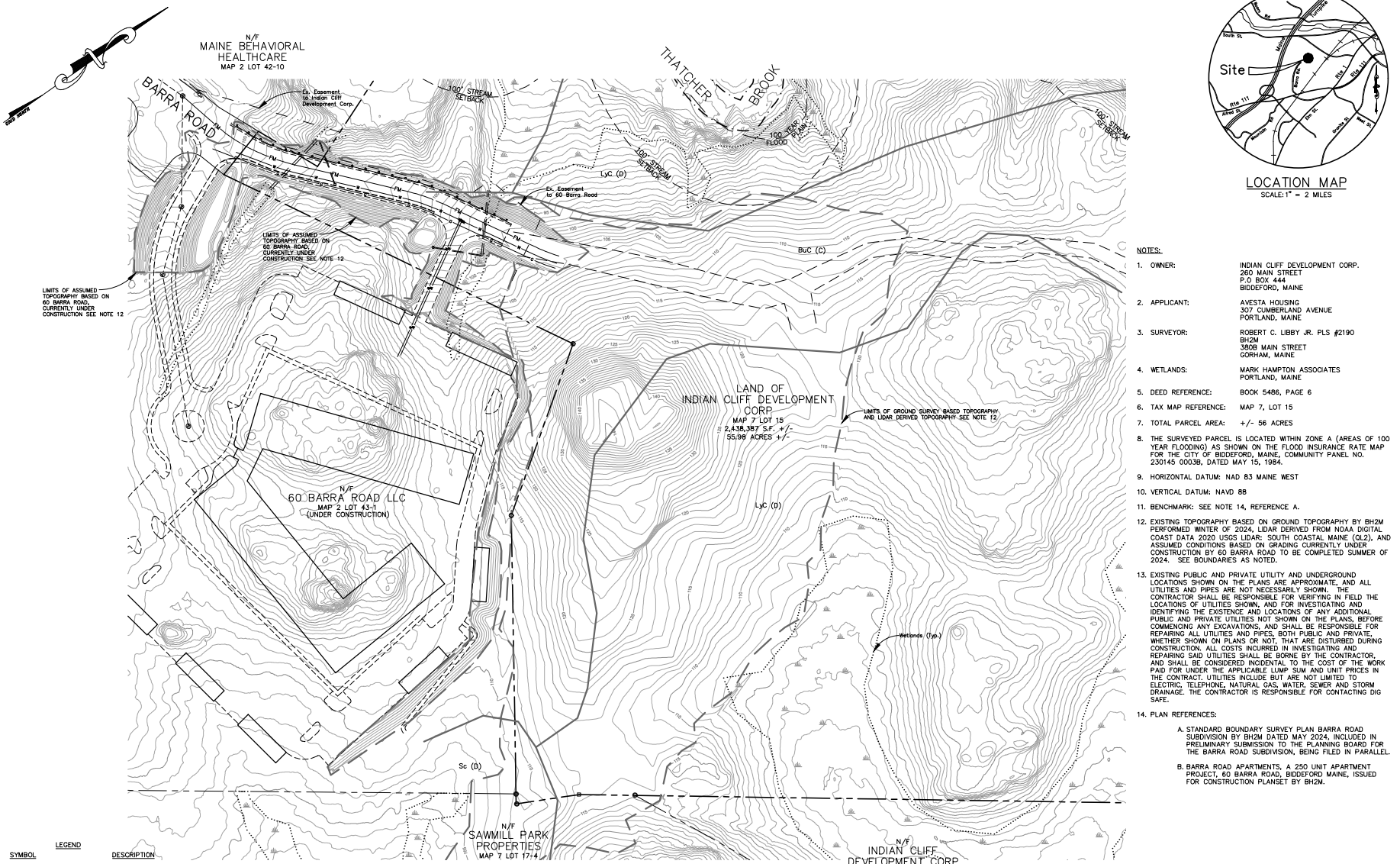
FOR
Avesta Housing
307 Cumberland Avenue
Portland, Maine

SITE PLAN
AVESTA HOUSING PROJECT
BARRA ROAD
BIDDEFORD, MAINE

DESIGNED	DATE
C. MacDonald	May 2024
DRAWN	SCALE
Dept.	1" = 30'
CHECKED	JOB. NO.
C. MacDonald	24017

SHEET
1

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LOCATION MAP
SCALE: 1" = 2 MILES

NOTES:

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BH2M
3806 MAIN STREET
GORHAM, MAINE
4. WETLANDS: MARK HAMPTON ASSOCIATES
PORTLAND, MAINE
5. DEED REFERENCE: BOOK 5486, PAGE 6
6. TAX MAP REFERENCE: MAP 7, LOT 15
7. TOTAL PARCEL AREA: +/- 56 ACRES
8. THE SURVEYED PARCEL IS LOCATED WITHIN ZONE A (AREAS OF 100 YEAR FLOODING) AS SHOWN ON THE FLOOD INSURANCE RATE MAP FOR THE CITY OF BIDDEFORD, MAINE, COMMUNITY PANEL NO. 230145 0003B, DATED MAY 15, 1984.
9. HORIZONTAL DATUM: NAD 83 MAINE WEST
10. VERTICAL DATUM: NAVD 88
11. BENCHMARK: SEE NOTE 14, REFERENCE A.
12. EXISTING TOPOGRAPHY BASED ON GROUND TOPOGRAPHY BY BH2M PERFORMED WINTER OF 2024, LIDAR DERIVED FROM NOAA DIGITAL COAST DATA 2020 USGS LIDAR: SOUTH COASTAL MAINE (QL2), AND ASSUMED CONDITIONS BASED ON GRADING CURRENTLY UNDER CONSTRUCTION BY 60 BARRA ROAD TO BE COMPLETED SUMMER OF 2024. SEE BOUNDARIES AS NOTED.
13. EXISTING PUBLIC AND PRIVATE UTILITY AND UNDERGROUND LOCATIONS SHOWN ON THE PLANS ARE APPROXIMATE, AND ALL UTILITIES AND PIPES ARE NOT NECESSARILY SHOWN. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING IN FIELD THE LOCATIONS OF UTILITIES SHOWN, AND FOR INVESTIGATING AND IDENTIFYING THE EXISTENCE AND LOCATIONS OF ANY ADDITIONAL PUBLIC AND PRIVATE UTILITIES NOT SHOWN ON THE PLANS. BEFORE COMMENCING ANY EXCAVATIONS, AND SHALL BE RESPONSIBLE FOR REPAIRING ALL UTILITIES AND PIPES, BOTH PUBLIC AND PRIVATE, WHETHER SHOWN ON PLANS OR NOT, THAT ARE DISTURBED DURING CONSTRUCTION. ALL COSTS INCURRED IN INVESTIGATING AND REPAIRING SAID UTILITIES SHALL BE BORNE BY THE CONTRACTOR, AND SHALL BE CONSIDERED INCIDENTAL TO THE COST OF THE WORK PAID FOR UNDER THE APPLICABLE LUMP SUM AND UNIT PRICES IN THE CONTRACT. UTILITIES INCLUDE BUT ARE NOT LIMITED TO ELECTRIC, TELEPHONE, NATURAL GAS, WATER, SEWER AND STORM DRAINAGE. THE CONTRACTOR IS RESPONSIBLE FOR CONTACTING DIG SAFE.
14. PLAN REFERENCES:
   A. STANDARD BOUNDARY SURVEY PLAN BARRA ROAD SUBDIVISION BY BH2M DATED MAY 2024, INCLUDED IN PRELIMINARY SUBMISSION TO THE PLANNING BOARD FOR THE BARRA ROAD SUBDIVISION, BEING FILED IN PARALLEL.
   B. BARRA ROAD APARTMENTS, A 250 UNIT APARTMENT PROJECT, 60 BARRA ROAD, BIDDEFORD, MAINE, ISSUED FOR CONSTRUCTION PLANSET BY BH2M.

LEGEND

SYMBOL	DESCRIPTION
⊡ GMF	GRANITE MONUMENT FOUND
○ IPF/IRF	IRON PIPE/IRON ROD FOUND
○ CIRF	CAPPED IRON ROD FOUND
◉ IRS	5/8" IRON ROD W/ CAP TO BE SET
⊡	GRANITE MONUMENT TO BE SET
UP	UTILITY POLE
	PROPERTY LINE
	ABUTTER PROPERTY LINE
	WETLANDS
W	WATER MAIN
FM	FORCEMAIN
G	GAS MAIN
OHU	OVERHEAD UTILITIES

SOILS LEGEND

SYMBOL	DESCRIPTION
	SOIL BOUNDARY LINES

SOIL DESIGNATION
AdB(A)
- SLOPE DESIGNATION
- HYDROLOGIC SOIL GROUP
- HYDROLOGIC SOIL

HYDROLOGIC SOIL GROUP

SOIL	GROUP
BUXTON (BuC)	C
LYMAN-ROCK (LyB)	D
LYMAN-ROCK (LyC)	D
SCANTIC (Sc)	D

NO.	DATE	REVISION DESCRIPTION
1	5/15/24	Submitted for Preliminary Permit Application

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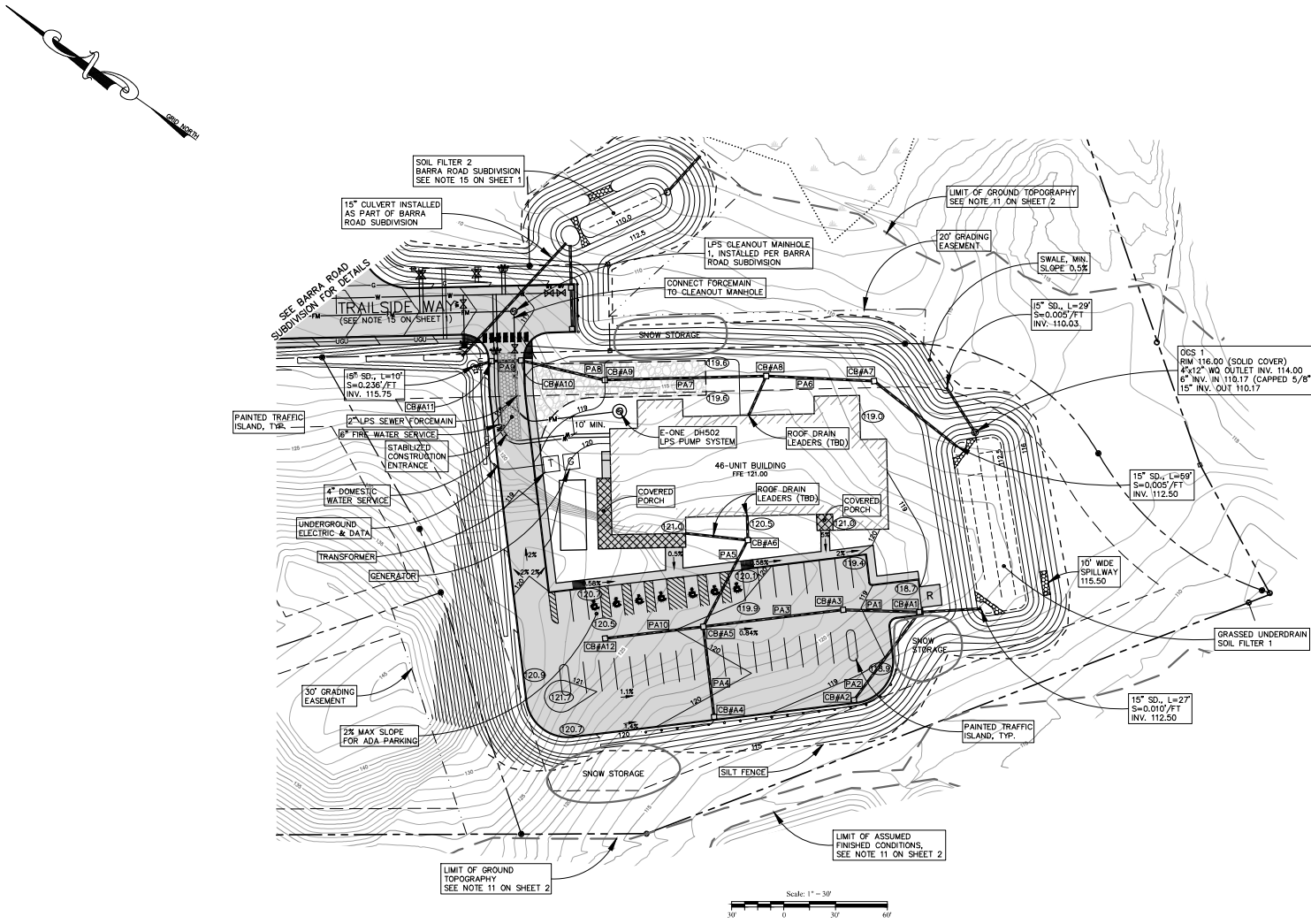
FOR
Avesta Housing
307 Cumberland Avenue
Portland, Maine

EXISTING CONDITIONS PLAN
AVESTA HOUSING PROJECT
BARRA ROAD
BIDDEFORD, MAINE

DESIGNED	DATE
C. MacDonald	May 2024
DRAWN	SCALE
Dept.	1" = 60'
CHECKED	JOB. NO.
C. MacDonald	24017

SHEET
2

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STORMDRAIN PIPES

PA1 - 15" S.D., L=41', S=0.010'/FT.
PA2 - 15" S.D., L=60', S=0.010'/FT.
PA3 - 15" S.D., L=77', S=0.010'/FT.
PA4 - 15" S.D., L=49', S=0.010'/FT.
PA5 - 15" S.D., L=52', S=0.005'/FT.
PA6 - 15" S.D., L=59', S=0.005'/FT.
PA7 - 15" S.D., L=89', S=0.005'/FT.
PA8 - 15" S.D., L=45', S=0.005'/FT.
PA9 - 15" S.D., L=16', S=0.005'/FT.
PA10 - 15" S.D., L=53', S=0.035'/FT.

STORMDRAIN/SEWER STRUCTURES

CB#A1 — RIM 118.3; 15" INV. IN 112.87; 15" INV. IN 112.87; 15" INV. OUT 112.77
CB#A2 (TYPE F) — RIM 118.4; 15" INV. OUT 113.47
CB#A3 — RIM 119.2; 15" INV. IN 113.38; 15" INV. OUT 113.28
CB#A4 (TYPE F) — RIM 119.5; 15" INV. OUT 114.74
CB#A5 — RIM 119.8; 15" INV. IN 114.25; 15" INV. IN 114.25; 15" INV. IN 114.25; 15" INV. OUT 114.15
CB#A6 — RIM 120.0; 8" INV. IN 115.09 (ROOF DRAIN); 8" INV. IN 115.09 (ROOF DRAIN); 15" INV. OUT 114.51
CB#A7 — RIM 118.5; 15" INV. IN 112.80; 15" INV. OUT 112.80
CB#A8 — RIM 118.5; 8" INV. IN 115.09 (ROOF DRAIN); 15" INV. IN 113.10; 15" INV. OUT 113.10
CB#A9 — RIM 119.0; 15" INV. IN 113.55; 15" INV. OUT 113.55
CB#A10 — RIM 117.3; 15" INV. IN 113.78; 15" INV. OUT 113.78
CB#A11 — RIM 117.3; 15" INV. IN 113.86; 15" INV. OUT 113.86
CB#A12 (TYPE F) — RIM 120.3; 15" INV. OUT 116.00

NOTES:

1. STOCKPILE AREAS TO BE IDENTIFIED PRIOR BY CONTRACTOR PRIOR TO CONSTRUCTION ALONG WITH EROSION AND SEDIMENTATION CONTROLS.
2. CONTRACTOR TO IMPLEMENT DUST CONTROL MEASUREMENTS THROUGHOUT CONSTRUCTION.
3. PAVE UTILITY TRENCHES WITHIN THE CITY R.O.W. WITHIN 3 DAYS OF EXCAVATION OR PRIOR TO THE NEXT RAIN EVENT.
4. PROPOSED DISTURBANCE OF 77,579 SF.

LEGEND

SYMBOL	DESCRIPTION
GMF	GRANITE MONUMENT FOUND
IPF/IRF	IRON PIPE/IRON ROD FOUND
CIRF	CAPPED IRON ROD FOUND
IRS	5/8" IRON ROD W/ CAP TO BE SET
	GRANITE MONUMENT TO BE SET
	UTILITY POLE
	PROPERTY LINE
	BUILDING SETBACK
	ABUTTER PROPERTY LINE
	WETLANDS
W	WATER MAIN
FM	FORCEMAIN
G	GAS MAIN
UGU	UNDERGROUND UTILITIES
	GUARDRAIL

NO.	DATE	REVISION DESCRIPTION
1	5/15/24	Submitted for Preliminary Permit Application

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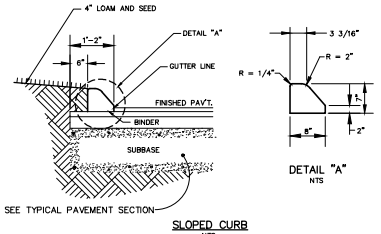
FOR:
Avesta Housing
307 Cumberland Avenue
Portland, Maine

GRADING PLAN
AVESTA HOUSING PROJECT
BARRA ROAD
BIDDEFORD, MAINE

DESIGNED	DATE
C. MacDonald	April 2024
DRAWN	SCALE
Dept.	1" = 30'
CHECKED	JOB. NO.
C. MacDonald	24017

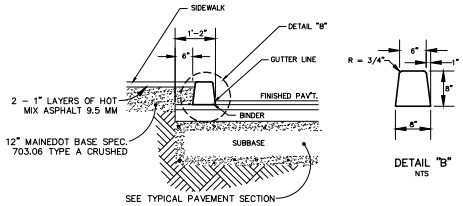
SHEET
3

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SLOPED CURB
NTS

DETAIL "A"
NTS



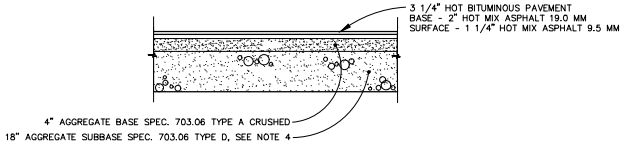
VERTICAL CURB
NTS

DETAIL "B"
NTS

NOTES:

1. 1 LB. FIBER MESH SHALL BE ADDED TO EVERY CUBIC YARD OF CONCRETE. THE CONCRETE WILL CONTAIN THE MAXIMUM AMOUNT OF WATER TO BE OF A CONSISTENCY THAT THE CONCRETE WILL MAINTAIN THE SHAPE OF THE CURB SECTION WITHOUT SUPPORT. THIS MIX ALSO MEETS THE READY MIX REQUIREMENTS OF ASTM C94 AND WILL MEET OR EXCEED 4,000 PSI IN 28 DAYS.
2. THE PAVEMENT SHALL BE THOROUGHLY CLEANED TO REMOVE DUST, DIRT AND OIL BEFORE APPROVED ADHESIVE IS APPLIED PER MANUFACTURERS SPECIFICATIONS.
3. THE FIBER REINFORCED MIX SHALL BE FED INTO THE VIBRATING HOPPER WHERE IT IS COMPACTED INTO THE DESIRED MOLD PROFILE.
4. FRESHLY EXTRUDED CURB SHALL BE LIGHTLY TOUCHED UP WITH A STEEL HAND TROWEL. CONTROL JOINTS SHALL BE TOOLED AS SOON AS POSSIBLE AT 9' INTERVALS. ADDITIONAL CONTROL JOINTS ADDED ON RADIUS AS NECESSARY.
5. THE FINISHED CURB WILL BE COATED WITH AN APPROVED CURING COMPOUND.
6. FOLLOW MANUFACTURERS INSTALLATION INSTRUCTIONS AND TEMPERATURE RESTRICTIONS.
7. USE VERTICAL CURB FOR ALL AREAS ADJACENT TO SIDEWALK. USE SLOPED CURB IN ALL OTHER AREAS.

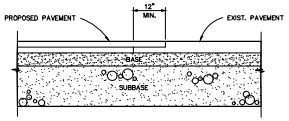
EXTRUDED CONCRETE CURB
NTS



NOTES:

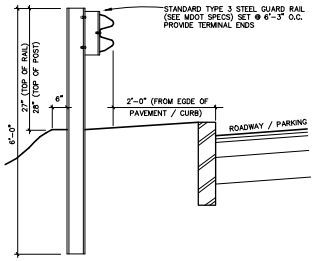
1. ALL MATERIALS AND CONSTRUCTION SHALL CONFORM TO MDOT STANDARDS SPECIFICATIONS, REVISED MARCH 2020, AND MOST RECENT SUPPLEMENTAL SPECIFICATIONS.
2. SEE MDOT 401 FOR MATERIALS AND MDOT 413 FOR INSTALLATION.
3. ALL MATERIALS SHALL BE COMPACTED TO ACHIEVE 95% OF MAXIMUM DENSITY.
4. AGGREGATE SUBBASE SHALL MEET THE REQUIREMENTS OF MAINE DOT SPECIFICATION 703.06 TYPE D, WITH THE EXCEPTION THAT THE AGGREGATE SUBBASE SHALL NOT CONTAIN PARTICLES OF ROCK THAT WILL NOT PASS THE 4 INCH SQUARE MESH SIEVE.

TYPICAL PAVEMENT SECTION
N.T.S.

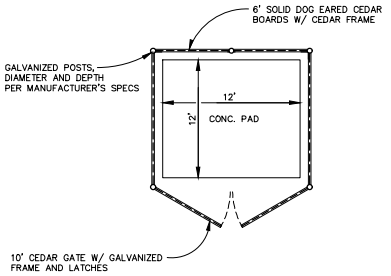


SAWCUT EXIST. PAVEMENT ALONG A SMOOTH LINE TO A NEAT EVEN VERTICAL JOINT, APPLY TACK PRIOR TO PROPOSED PAVING (AS REQ'D)

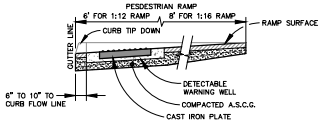
PAVEMENT JOINT DETAIL
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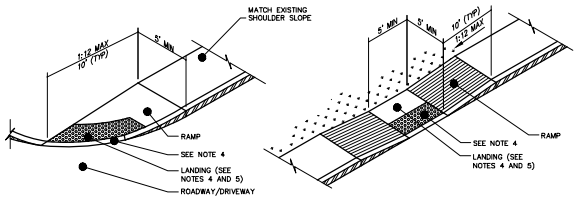
STEEL GUARD RAIL
N.T.S.



DUMPSTER ENCLOSURE
NTS



SIDE SECTION OF DETECTABLE WARNING, WELL, CURB AND GUTTER



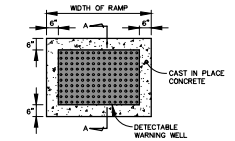
TYPE 1

TYPE 2

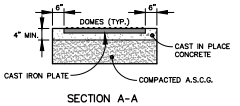
ADA RAMPS
N.T.S.

NOTE:

1. CURB RAMP LENGTHS ARE BASED ON SIX (6) INCH CURB REVEAL HEIGHT AND NO RUNNING SLOPE. RAMP LENGTHS SHALL BE ADJUSTED AS NECESSARY TO ACCOMMODATE VARYING CURB REVEAL HEIGHTS AND TO MATCH RUNNING SLOPES OF ADJACENT ROADWAY AND SIDEWALK SLOPES TO MAINTAIN A RAMP THAT DOES NOT EXCEED THE MAXIMUM RAMP SLOPE OF 1:12.
2. DETECTABLE WARNINGS SHALL CONSIST OF RAISED TRUNCATED DOMES AND SHALL HAVE A BASE DIAMETER OF 0.9 INCHES (23 mm) MINIMUM AND 1.4 INCHES (36 mm) MAXIMUM; A TOP DIAMETER OF 50 PERCENT OF THE BASE DIAMETER MINIMUM TO 65 PERCENT OF THE BASE DIAMETER MAXIMUM AND A HEIGHT OF 0.2 INCHES (5.1 mm). A CENTER-TO-CENTER SPACING OF 1.6 INCHES (41mm) MINIMUM AND 2.4 INCHES (61mm) MAXIMUM; AND A BASE-TO-BASE SPACING OF 0.65 INCHES (17mm) MINIMUM, MEASURED BETWEEN THE MOST ADJACENT DOMES ON A SQUARE GRID.
3. DETECTABLE WARNINGS SHALL CONTRAST VISUALLY WITH ADJOINING SURFACES, EITHER LIGHT-ON-DARK, OR DARK-ON-LIGHT. THE MATERIAL USED TO PROVIDE CONTRAST SHALL BE AN INTEGRAL PART OF THE WALKING SURFACE. DETECTABLE WARNINGS USED ON INTERIOR SURFACES SHALL DIFFER FROM ADJOINING WALKING SURFACES IN RESILIENCY OR SOUND-ON-CANE CONTACT.
4. ALL ACCESSIBLE ROUTE SIDEWALKS INTERSECTING ROADWAYS, DRIVEWAYS, OR OTHER VEHICULAR CROSSINGS REQUIRE DETECTABLE WARNINGS. DETECTABLE WARNING ZONES SHALL BE INSTALLED SIX (6) INCHES (OR THE HORIZONTAL THICKNESS OF THE ADJACENT CURB) FROM THE FLOW LINE OF THE CURB, EXTEND INTO THE SIDEWALK FOR A 24" DEPTH, AND COVER THE COMPLETE WIDTH OF THE SIDEWALK OR RAMP AREA. DETECTABLE WARNING ZONES SHALL CONFORM TO THE SLOPE REQUIREMENTS OF THE RAMP, LANDING, OR ACCESSIBLE ROUTE AS DEFINED IN THE SPECIFIED DETAIL. DETECTABLE WARNINGS SHALL NOT BE INSTALLED IN FLARED SIDES, IF THE RAMP INCLUDES FLARED SIDES.
5. ALL LANDING AREAS SHALL BE 4 FEET WIDE BY 4 FEET LONG (MINIMUM DIMENSIONS). THE SLOPE OF THE LANDING AREA SHALL NOT EXCEED A 1:48 IN ANY DIRECTION.
6. ALL ACCESSIBLE ROUTE SLOPES ADJOINING THE LANDING AREA, EXCLUDING THE CURB RAMP, SHALL NOT EXCEED A SLOPE OF 1:20 UNLESS OTHERWISE NOTED.



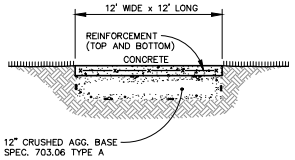
PLAN VIEW OF DETECTABLE WARNING WELL



SECTION A-A

NOTE: ALL DETECTABLE WARNING AREAS SHALL START 6-10" FROM THE FLOW LINE OF THE CURB, BE 24" IN DEPTH AND COVER THE COMPLETE WIDTH OF THE RAMP AREA ONLY.

DETECTABLE WARNING MAT EMBEDDING
NTS



CONCRETE	-	8" THICK 4,000 PSI @ 28 DAYS, 3/4" MAX. AGGRIGATE, 3-5% AIR ENTRAINMENT, 4" MAX. SLUMP
REINFORCEMENT	-	#4 BARS AT 12" O.C. EACH WAY, TOP AND BOTTOM
FINISH	-	SCREED AND BULL FLOAT, BROOM FINISH PERPENDICULAR TO TRAVEL DIRECTION
JOINTS	-	SAWCUT TO 1/3 DEPTH AT 5'-6' O.C.
SEALING	-	APPLY POLY SULFIDE LIQUID SEALANT, GRAY PER MANUFACTURER'S SPEC'S.

DUMPSTER PAD
NTS

NO.	DATE	REVISION DESCRIPTION
1	5/15/24	Submitted for Preliminary Permit Application

BH2M
Berry, Huff, MacDonald, Milligan Inc.
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Gorham, Maine 04038
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FOR
Avesta Housing
307 Cumberland Avenue
Portland, Maine

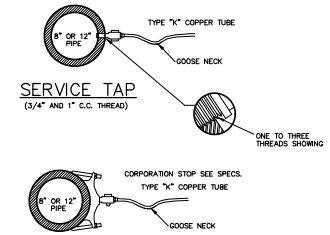
DETAILS A
AVESTA HOUSING PROJECT
BAXTER ROAD
BIDDEFORD, MAINE

DESIGNED	DATE
C. MacDonald	May 2024
DRAWN	SCALE
Dept.	As Noted
CHECKED	JOB. NO.
C. MacDonald	24017

SHEET
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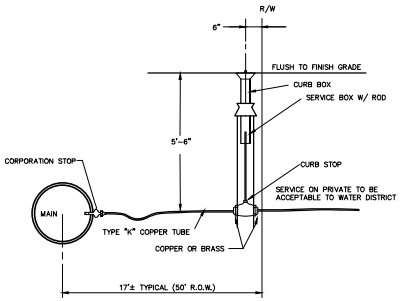
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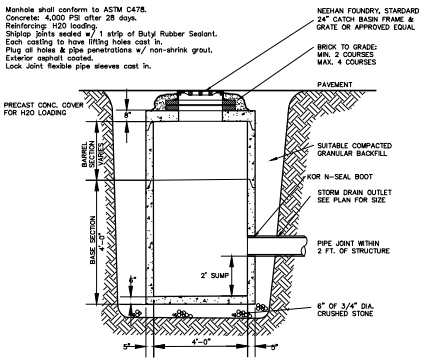
SERVICE TAP
(3/4" AND 1" C.C. THREAD)

SERVICE SADDLE
(1-1/2" & 2" C.C. OR IRON PIPE THREAD)

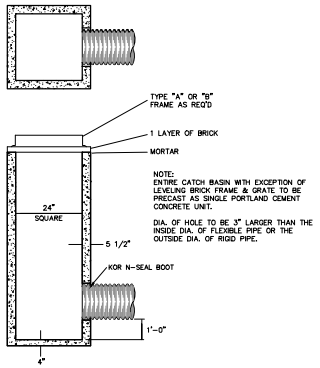
NOTE: SERVICE CONNECTIONS (DIRECT TAPS AND SERVICE CLAMPS) WILL BE INSTALLED SO THAT THE OUTLET IS AT AN ANGLE OF NOT MORE THAN 45° ABOVE THE HORIZONTAL. ALWAYS PUT A BEND OR "GOOSENECK" IN THE SERVICE LINE PRIOR TO CONNECTING TO PROVIDE FLEXIBILITY AND "GIVE" TO COUNTERACT THE EFFECTS OF A LOAD DUE TO SETTLEMENT OR EXPANSON AND/OR CONTRACTION (SEE DETAILS).



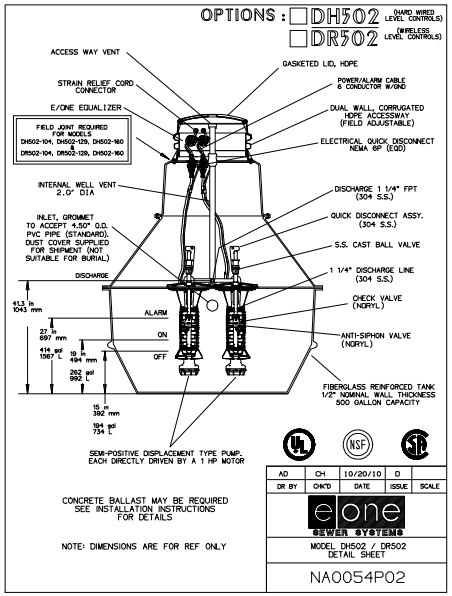
TYPICAL SERVICE CONNECTION
N.T.S.



PRECAST CONCRETE CATCH BASIN DETAIL
N.T.S.



CATCH BASIN TYPE "F"
N.T.S.

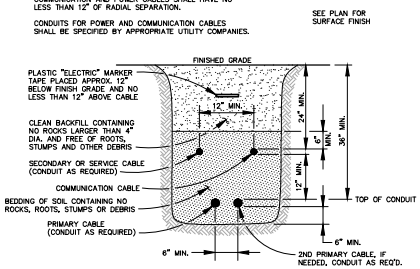


NOTES:

INSTALLATION SHOULD NOT ALLOW THE INTER-TWINING OF CABLES.

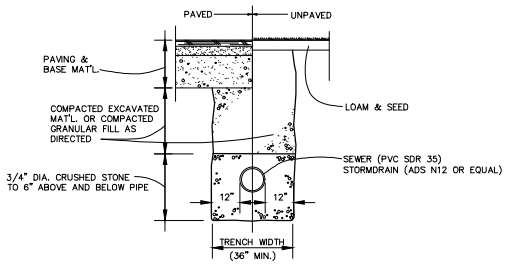
COMMUNICATION AND POWER CABLES SHALL HAVE NO LESS THAN 12" OF RADIAL SEPARATION.

CONDUITS FOR POWER AND COMMUNICATION CABLES SHALL BE SPECIFIED BY APPROPRIATE UTILITY COMPANIES.



UNDERGROUND CABLE TRENCH
NTS

NOTES:
1. Trench width shown is payment width for rockexcavation & replacement of unsuitable material.
2. Do not mechanically compact directly over flexible pipe (e.g. PVC, Poltyethylene)
3. Concrete pipe shall have sand bedding.



TRENCH DETAIL
NTS

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FOR
Avesta Housing
307 Cumberland Avenue
Portland, Maine

DETAILS B

AVESTA HOUSING PROJECT

BAXTER ROAD
BIDDEFORD, MAINE

DESIGNED	DATE
C. MacDonald	May 2024
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GRASSED UNDERDRAIN SOIL FILTER NOTES

REFERENCES

1. MAINE STORMWATER BEST MANAGEMENT PRACTICES (BMP), VOLUME III BMP TECHNICAL DESIGN MANUAL, CHAPTER 7 FILTRATION BMP'S (LATEST REVISION).

CONSTRUCTION METHODS

1. THE CONTRACTOR IS RESPONSIBLE FOR ALL CONSTRUCTION MATERIALS, INSTALLATION, MEANS, METHODS, AND SCHEDULING.
2. ALL WORK SHALL BE IN CONFORMANCE WITH THE PROJECT PLANS AND BMP'S REFERENCED ABOVE.
3. THE SOIL FILTER MEDIA AND VEGETATION SHALL NOT BE INSTALLED UNTIL THE AREA THAT DRAINS TO THE FILTER HAS BEEN PERMANENTLY STABILIZED WITH PAVEMENT OR OTHER STRUCTURES, WITH VEGETATION COVER OR PERMANENT STABILIZATION.

DE-WATERING PLAN

1. DURING CONSTRUCTION OF THE SITE AND VEGETATED SOIL FILTER, THE CONTRACTOR SHALL BE PREPARED TO IMPLEMENT A DEWATERING PLAN IN ANTICIPATION OF HEAVY RAIN EVENTS.
2. THE AREA OF THE BASIN MAY BE EXCAVATED IN PREPARATION OF THE INSTALLATION OF THE UNDERDRAIN AND MAY BE USED FOR A SEDIMENT TRAP FOR THE SITE DURING CONSTRUCTION. AFTER EXCAVATION OF THE BASIN, THE OUTLET STRUCTURE AND PIPING SYSTEM SHALL BE INSTALLED AT THE APPROPRIATE ELEVATION AND PROTECTED WITH A SEDIMENT BARRIER. THE BASIN IS TO BE USED AS A SEDIMENT TRAP, THE SIDES OF THE EMBANKMENTS MUST BE MULCHED AND MAINTAINED TO PREVENT EROSION.

SOIL MEDIA

1. THE SOIL MEDIA SHALL CONSIST OF SILTY SANDY SOIL OR SOIL MIXTURE COMBINED WITH 20% TO 25% BY VOLUME (NO LESS THAN 10% BY DRY WEIGHT) OF MODERATELY SHREDDED BARK OR WOOD FIBER MULCH.
2. THE SOIL FILTER MEDIA SAND SHALL MEET THE GRADATION IN TABLE 7-2 (MDOT 703.01) WITH ADDITIONAL FINES ADDED IF NECESSARY.
3. THE RESULTING SOIL FILTER MEDIA SHALL HAVE 8% TO 12% BY WEIGHT PASSING THE #200 SIEVE AND SHALL HAVE A CLAY CONTENT OF LESS THAN 2%.
4. THE COARSE GRAVEL MATERIAL SHALL MEET THE GRADATION OF TABLE 7.1 (MDOT 703.22 UNDERDRAIN, TYPE B).
5. THE FILTER MEDIA SHALL BE LIGHTLY COMPACTED BY SATURATING THE MEDIA IN 6" TO 9" LIFTS AND SHALL HAVE A PERMEABILITY OF 2.4 IN/HR TO 4 IN/HR.
6. THE CLAY CONTENT SHALL BE < 2%.

CONSTRUCTION

1. SOIL FILTER MEDIA, COARSE GRAVEL, AND UNDERDRAIN BEDDING MATERIAL SHALL BE COMPACTED TO BETWEEN 90% AND 92% STANDARD PROCTOR.
2. PERFORATED UNDERDRAIN PIPE SHALL BE 4" AND 6" SCHEDULE 40 OR SDR 35 PVC PIPE. SPACED 8 FEET AND 4 FEET ON CENTER AS SHOWN ON PLANS.
3. 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.
4. OUTFLOW OF THE VEGETATED SOIL FILTER SHALL BE CONTROLLED BY A 3" PLASTIC TYPE 34-6 BALL VALVE WITH TYPE 816 BALL VALVE HANDLE 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.
5. ALL EQUIPMENT USED WITHIN THE LIMITS OF THE VEGETATED SOIL FILTER SHALL BE LOW GROUND PRESSURE VEHICLES (LESS THAN 2.0 PSI) WHEN FULLY LOADED.
6. IF VEGETATION IS NOT ESTABLISHED WITHIN THE FIRST YEAR, THE CONTRACTOR SHALL INSTALL A 2-3 INCH LAYER OF LOAM (WITH LESS THAN 2% CLAY AS TESTED VIA HYDROMETER TEST) ON THE SURFACE OF THE GRASS FILTER AND RE-SEED/MULCH.
7. THE SURFACE OF THE VEGETATED SOIL FILTER SHALL BE PLANTED WITH A GRASS SPECIES THAT IS TOLERANT OF FREQUENT INUNDATION AND WELL-DRAINED SOILS. UPON SEEDING, THE SURFACES SHALL BE MULCHED WITH HAY OR AN EROSION CONTROL BLANKET BUT SHALL NOT BE FERTILIZED. AN APPROPRIATE SEED MIXTURE SHOULD CONTAIN THE FOLLOWING OR BE AN EQUIVALENT CONSERVATION TYPE MIX:

CREEPING RED FESCUE	20 LBS/ACRE
TALL FESCUE	20 LBS/ACRE
BIRDSFOOT TREFOIL	8 LBS/ACRE
TOTAL	48 LBS/ACRE

TESTING AND SUBMITTALS

1. THE CONTRACTOR SHALL IDENTIFY THE LOCATION OF THE SOURCE OF EACH COMPONENT OF THE FILTER MEDIA. ALL TESTING RESULTS SHALL BE SUBMITTED TO THE PROJECT ENGINEER.
2. SUBMIT SAMPLES OF EACH TYPE OF MATERIAL TO BE BLENDED FOR THE MIXED FILLER MEDIA AND SAMPLES OF THE UNDERDRAIN BEDDING MATERIAL. SAMPLES MUST BE A COMPOSITE OF THREE DIFFERENT LOCATIONS (GRABS) FROM THE STOCKPILE OR PIT FACE. SAMPLE SIZE WILL BE DETERMINED BY TESTING LABORATORY.
3. THE CONTRACTOR SHALL PERFORM A SIEVE ANALYSIS CONFORMING TO ASTM C136 (STANDARD TEST METHODS FOR SIEVE ANALYSIS OF FINE AND COARSE AGGREGATES, 1996A) ON EACH TYPE OF SAMPLE MATERIAL INCLUDING A HYDROMETER TEST FOR CLAY CONTENT.
4. THE CONTRACTOR SHALL PERFORM A PERMEABILITY TEST ON THE SOIL MEDIA MIXTURE CONFORMING TO ASTM D2434.
5. THE CONTRACTOR SHALL PERFORM ONE COMPACTION DENSITY TEST ON THE IN-PLACE SOIL FILTER MEDIA FOR EVERY 1,500 S.F. OF BED OR FRACTION THEREOF. THE TEST SHALL CONFORM TO ASTM 2922.
6. UPON COMPLETION OF THE VEGETATED SOIL FILTER MEDIA AND THE ESTABLISHMENT OF 90% CATCH OF GRASS OVER THE FILTER MEDIA, THE CONTRACTOR SHALL FLOOD THE VEGETATED BASIN TO THE SPILLWAY WITH CLEAR WATER AND ADJUST THE OUTFLOW TO OBTAIN A 24-HOUR TO 32-HOUR RELEASE TIME.

CONSTRUCTION OVERSIGHT

1. THE CONTRACTOR SHALL MEET THE "CONSTRUCTION OVERSIGHT" SECTION OF CHAPTER 7, FILTRATION BMP'S (REVISED MAY 2016) OF THE STORMWATER MANAGEMENT FOR MAINE, VOLUME III, BMP'S TECHNICAL DESIGN MANUAL.
2. THE DESIGN ENGINEER SHALL BE CONDUCTING PERIODIC SITE OVERSIGHT OF THE CONSTRUCTION AS DESCRIBED BELOW AND IN COMPLIANCE WITH THE PERMITS.
3. THE ENGINEER SHALL REVIEW AND APPROVE ALL CONTRACTOR SUBMITTALS.
4. THE CONTRACTOR SHALL GIVE THE ENGINEER A PROPOSED CONSTRUCTION SCHEDULE AND A 48-HOUR NOTICE FOR ALL SITE VISITS.
5. INSPECTIONS SHALL INCLUDE:
   - PRE-CONSTRUCTION MEETING WITH CONTRACTOR
   - INSPECTION OF EXCAVATION IF USED FOR SEDIMENT TRAP
   - INSPECTION OF EXCAVATED HOLE.
   - AFTER PRELIMINARY CONSTRUCTION OF THE FILTER GRADES AND BOTTOM, THE UNDERDRAIN PIPES ARE INSTALLED BUT NOT BACK-FILLED.
   - AFTER THE DRAINAGE LAYER IS CONSTRUCTED AND PRIOR TO INSTALLATION OF THE FILTER MEDIA.
   - AFTER FILTER MEDIA HAS BEEN INSTALLED AND SEEDED.
   - AFTER ONE YEAR TO INSPECT VEGETATION UPTAKE AND OBSERVE
   - FLOODING TEST.

LEVEL SPREADER STONE SIZE

SIEVE DESIGNATION METRIC	SIEVE DESIGNATION US CUSTOMARY	% BY WEIGHT PASSING SQUARE MESH SIEVES
300 MM	12"	100
150 MM	6"	84–100
75 MM	3"	68–83
25.4 MM	1"	42–55
4.75 MM	NO. 4	8–12

TABLE 7-1
UNDERDRAIN SPECS.
MDOT #703.22

SIEVE SIZE	% BY WEIGHT UNDERDRAIN TYPE B
1"	90-100
1/2"	75-100
#4	50-100
#20	15-80
#50	0-15
#200	0-5

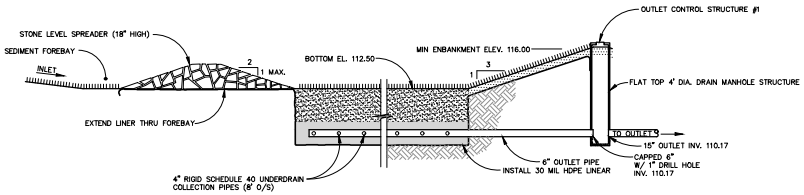
SIEVE SIZE	% BY WEIGHT UNDERDRAIN TYPE C
1"	100
3/4"	90-100
3/8"	0-75
#4	0-10
#10	0-5

TABLE 7-2
AGGREGATE SPECS.
MDOT #703.01

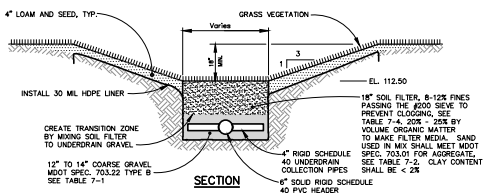
SIEVE SIZE	% BY WEIGHT
3/8"	100
#4	95-100
#8	80-100
#16	50-85
#30	25-60
#60	10-30
#100	2-10
#200	0-5

TABLE 7-4
COARSE LOAMY SAND SIEVE ANALYSIS SPECIFICATION

SIEVE #	% PASSING BY WEIGHT
#10	85-100
#40	45-80
#60	15-40
#200	8-15

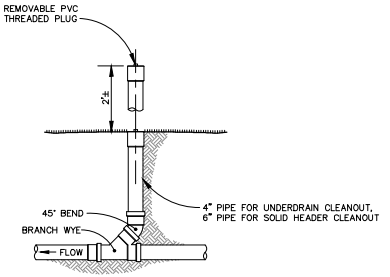


PROFILE

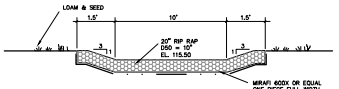


SECTION

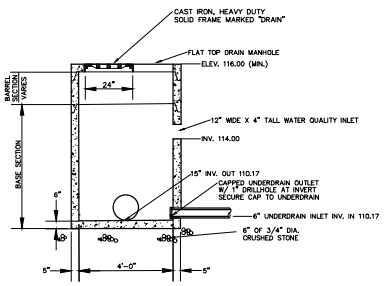
GRASSED UNDERDRAIN SOIL FILTER
NTS



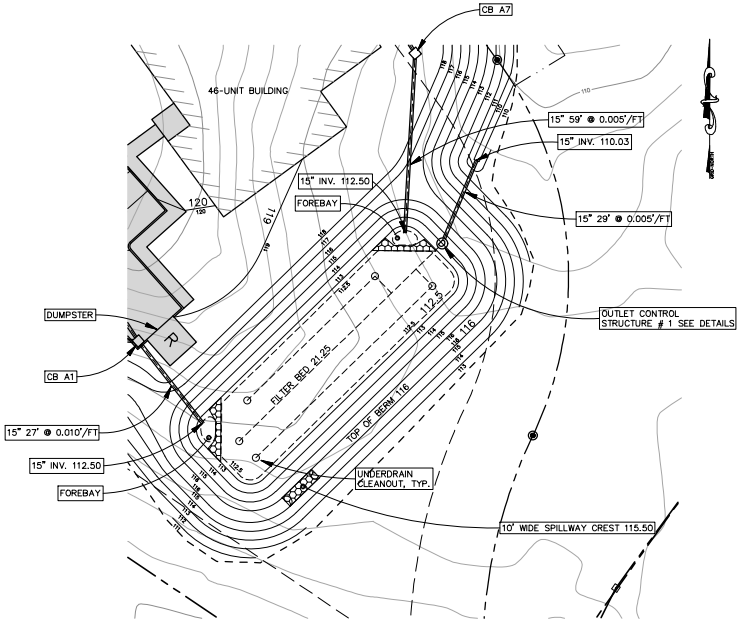
CLEANOUT DETAIL
N.T.S.



SPILLWAY TRANSVERSE SECTION
N.T.S.



OUTLET CONTROL STRUCTURE 1
N.T.S.



GRASSED UNDERDRAINED SOIL FILTER 1 PLAN
Scale: 1" = 20'
20' 0 20' 40'

NO.	DATE	REVISION DESCRIPTION
1	5/15/24	Submitted for Preliminary Permit Application

BH2M
Berry, Huff, MacDonald, Milligan Inc.
Engineers, Surveyors
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Gorham, Maine 04038
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FOR:
Avesta Housing
307 Cumberland Avenue
Portland, Maine

GRASSED UNDERDRAINED SOIL FILTER 1 DETAILS
AVESTA HOUSING PROJECT
BARRA ROAD
BIDDEFORD, MAINE

DESIGNED	DATE
C. MacDonald	May 2024
DRAWN	SCALE
Staff	As Noted
CHECKED	JOB. NO.
C. MacDonald	24017

SHEET
6

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EROSION AND SEDIMENT CONTROL PLAN

THIS PLAN HAS BEEN DEVELOPED AS A STRATEGY TO CONTROL SOIL EROSION AND SEDIMENTATION DURING AND AFTER CONSTRUCTION. THIS PLAN IS BASED ON THE STANDARDS AND SPECIFICATIONS FOR EROSION PREVENTION IN DEVELOPING AREAS AS CONTAINED IN THE LATEST REVISION OF TO THE 2016 MAINE EROSION AND SEDIMENT CONTROL BMP'S MANUAL FOR DESIGNERS AND ENGINEERS, AND THE LATEST REVISION TO THE 2014 MAINE EROSION AND SEDIMENT CONTROL FIELD GUIDE FOR CONTRACTORS. SEE MANUALS FOR ADDITIONAL INFORMATION AND DETAILS.

THE PROPOSED LOCATIONS OF SILTATION AND EROSION CONTROL STRUCTURES ARE SHOWN ON THE SITE PLAN.

1. ALL CONSTRUCTION INSPECTIONS SHALL BE CONDUCTED BY SOMEONE WITH KNOWLEDGE OF EROSION AND STORMWATER CONTROL, INCLUDING STANDARDS AND PERMIT CONDITIONS. CONSTRUCTION INSPECTIONS SHALL BE PERFORMED AT LEAST ONCE A WEEK, AND PRIOR TO AND 24 HOURS AFTER A WET WEATHER EVENT (0.5 INCHES OR MORE IN A 24 HOUR PERIOD). CONSTRUCTION INSPECTION AND CORRECTIVE ACTION DOCUMENTATION RECORDS SHALL BE MAINTAINED FOR A MINIMUM OF 5 YEARS.
2. THE SCOPE OF CONSTRUCTION INSPECTIONS INCLUDE THE EROSION AND SEDIMENTATION CONTROL MEASURES AS WELL AS DISTURBED AREAS, MATERIAL STORAGE AREAS, AND LOCATIONS WHERE VEHICLES ENTER AND EXIT THE SITE.
3. ALL SEDIMENT AND EROSION CONTROL MEASURES SHALL BE DONE IN ACCORDANCE WITH THE "MAINE EROSION AND SEDIMENT CONTROL BMP'S", DEPARTMENT OF ENVIRONMENTAL PROTECTION, LATEST REVISION.
4. THOSE AREAS UNDERGOING ACTUAL CONSTRUCTION WILL BE LEFT IN AN UNTREATED OR UNVEGETATED CONDITION FOR A MINIMUM TIME. AREAS SHALL BE PERMANENTLY STABILIZED WITHIN 7 DAYS OF FINAL GRADING AND TEMPORARILY STABILIZED WITHIN 7 DAYS OF INITIAL DISTURBANCE OF THE SOIL. IF THE DISTURBANCE IS WITHIN 75 FEET OF A WETLAND OR WATERBODY, THE AREA SHALL BE STABILIZED WITHIN 2 DAYS OR PRIOR TO ANY STORM EVENT, WHICHEVER COMES FIRST.
5. EXCAVATION AND EARTHWORK SHALL BE DONE SUCH THAT NO MORE THAN 10 ACRES OF THE SITE IS WITHOUT STABILIZATION AT ANY ONE TIME.
6. EXPOSED AREA SHOULD BE LIMITED TO THAT WHICH CAN BE MULCHED IN ONE DAY.
7. CONTINUATION OF EARTHWORK OPERATIONS ON ADDITIONAL AREAS SHALL NOT BEGIN UNTIL THE EXPOSED SOIL SURFACE ON THE AREA BEING WORKED HAS BEEN STABILIZED SUCH THAT NO MORE THAN ONE ACRE OF THE SITE IS WITHOUT EROSION CONTROL PROTECTION.
8. SEDIMENT BARRIERS (EROSION CONTROL MIX, STONE CHECK DAMS, STABILIZED CONSTRUCTION ENTRANCE, ETC.) SHOULD BE INSTALLED PRIOR TO ANY SOIL DISTURBANCE OF THE CONTRIBUTING DRAINAGE AREA ABOVE THEM. THE CONTRACTOR SHALL MAINTAIN THE STABILIZED CONSTRUCTION ENTRANCE UNTIL ALL DISTURBED AREAS ARE STABILIZED.
9. INSTALL EROSION CONTROL MIX AT TOE OF SLOPES TO FILTER SILT FROM RUNOFF. SEE E.C. MIX DETAIL FOR PROPER INSTALLATION. EROSION CONTROL MIX WILL REMAIN IN PLACE PER NOTE #7. THE USE OF AN EROSION CONTROL MIX BERM IS PROHIBITED AT THE BASE OF SLOPES STEEPER THAN 8% OR WHERE THERE IS FLOWING WATER.
10. ALL EROSION CONTROL STRUCTURES WILL BE INSPECTED, REPLACED, AND/OR REPAIRED EVERY 7 DAYS AND IMMEDIATELY BEFORE AND FOLLOWING ANY SIGNIFICANT RAINFALL (0.5 INCH OR MORE IN A 24-HOUR PERIOD) OR SNOW MELT OR WHEN NO LONGER SERVICEABLE DUE TO SEDIMENT ACCUMULATION OR DECOMPOSURE. IF AN INSPECTION DETERMINES THAT A CORRECTIVE ACTION IS REQUIRED, THE ACTION OR REPAIR SHALL BE STARTED BY THE END OF THE NEXT WORKDAY AND COMPLETED WITHIN SEVEN DAYS OR BEFORE THE NEXT STORM EVENT. SEDIMENT DEPOSITS SHOULD BE REMOVED AFTER EACH STORM EVENT. THEY MUST BE REMOVED WHENEVER DEPOSITS REACH APPROXIMATELY ONE HALF THE HEIGHT OF THE BARRIER. SEDIMENT CONTROL MEASURES SHALL REMAIN IN PLACE UNTIL ALL DISTURBED AREAS ARE PERMANENTLY STABILIZED. ONCE ADJACENT AREAS HAVE HEALED, ANY EROSION CONTROL MEASURES SHALL BE REMOVED WITHIN 30 DAYS OF PERMANENT STABILIZATION. PERMANENT STABILIZATION IS SOD/ GRASS CATCH IN VEGETATED AREAS.
11. NO SLOPES, EITHER PERMANENT OR TEMPORARY, SHALL BE STEEPER THAN ONE AND ONE HALF TO ONE (1.5 TO 1).
12. IF FINAL SEEDING OF THE DISTURBED AREAS IS NOT COMPLETED 45 DAYS PRIOR TO THE FIRST KILLING FROST, USE TEMPORARY MULCHING (DORMANT SEEDING MAY BE ATTEMPTED AS WELL) TO PROTECT THE SITE AND DELAY SEEDING UNTIL THE NEXT RECOMMENDED SEEDING PERIOD.
13. TEMPORARY SEEDING OF DISTURBED AREAS THAT HAVE NOT BEEN FINAL GRADED SHALL BE COMPLETED BY AUG. 15 OR 45 DAYS PRIOR TO THE FIRST KILLING FROST (OCT. 1) TO PROTECT FROM SPRING RUNOFF PROBLEMS.
14. DURING THE CONSTRUCTION PHASE, INTERCEPTED SEDIMENT SHALL BE RETURNED TO THE SITE AND REGRADED ONTO OPEN AREAS. POST SEEDING SEDIMENT, IF ANY WILL BE DISPOSED OF IN AN ACCEPTABLE MANNER.
15. REVEGETATION MEASURES WILL COMMENCE UPON COMPLETION OF CONSTRUCTION EXCEPT AS NOTED ABOVE. ALL DISTURBED AREAS NOT OTHERWISE STABILIZED WILL BE GRADED, SMOOTHED, AND PREPARED SEEDING AS FOLLOWS:
   a. APPLY LIMESTONE AND FERTILIZER ACCORDING TO SOIL TEST. IF SOIL TESTING IS NOT FEASIBLE ON SMALL OR VARIABLE SITES, OR WHERE TIMING IS CRITICAL, FERTILIZER MAY BE APPLIED AT THE RATE OF 600 POUNDS PER ACRE OR 18.4 POUNDS PER 1,000 SQUARE FEET USING 10-20-20 (N-P205-H20) OR EQUIVALENT. APPLY GROUND LIMESTONE (EQUIVALENT TO 50# CALCIUM PLUS MAGNESIUM OXIDE) AT A RATE OF 3 TONS PER ACRE (138 LB PER 1,000 SQ. FT.).
   b. HAY MULCH AT THE RATE OF 70–90 LBS PER 1000 SQUARE FEET OVER 75% OF DISTURBED AREA. FOR WINDY AREAS, ANCHOR MULCH WITH PEG AND TWINE (1 SQ. YD./BLOCK). HYDRAULIC MULCHES MAY ALSO BE USED. APPLIED AT A RATE OF 1 BAG PER 1000 SQUARE FEET FOR PAPER MULCH OR 1 LBS PER 1000 SQUARE FEET OR AS DIRECTED BY THE MANUFACTURER. ON SLOPES GREATER THAN 3:1 EROSION CONTROL MIX MAY BE USED, SEE EROSION CONTROL MIX NOTES BELOW.
   c. FOR DISTURBED AREAS TO BE MAINTAINED IN POST–CONSTRUCTION AS A MEADOW BUFFER, APPLY A 80–50 MIX OF ERNST FUZZ N' BUZZ PREMIUM AND NATIVE CLOVER MIX AT SUPPLIERS RECOMMENDED APPLICATION RATES.
16. ALL TEMPORARY EROSION CONTROL MEASURES SHALL BE REMOVED WITHIN 30 DAYS ONCE THE SITE IS STABILIZED WITH 90% GRASS CATCH IN VEGETATED AREAS. TEMPORARY EROSION AND SEDIMENT CONTROL BARRIER SHALL BE USED IN ALL DITCHES AND SWALES AS SHOWN IN DETAILS.
17. WETLANDS WILL BE PROTECTED WITH EROSION CONTROL MIX OR SILT FENCE INSTALLED AT THE EDGE FOR THE WETLAND OR THE BOUNDARY OF WETLAND DISTURBANCE. ALL AREAS WITHIN 75 FEET OF A PROTECTED NATURAL RESOURCE MUST BE PROTECTED WITH A DOUBLE ROW OF SEDIMENT BARRIERS DURING WINTER CONSTRUCTION.
18. ALL STORMWATER WILL BE PREVENTED FROM RUNNING ONTO STOCKPILES. SEDIMENT BARRIERS WILL BE INSTALLED DOWNGRADIENT OF ALL STOCKPILES.
19. PERMANENT POST–CONSTRUCTION BMP'S (VEGETATED SWALES, WET PONDS, ETC.) WILL NOT BE USED TO MANAGE FLOWS DURING CONSTRUCTION WITHOUT SPECIAL PROTECTION AND/OR RESTORATION.

ADDITIONAL TEMPORARY SEED MIXTURE (FOR PERIODS LESS THAN 12 MONTHS):

SEED	RATE
ERNST WATER RYEGRASS	112 LBS/ACRE

EROSION CONTROL MIX

EROSION CONTROL MIX (ECM) SHALL MEET THE REQUIREMENTS PROVIDED IN THE LATEST REVISION OF MAINE DEP'S EROSION AND SEDIMENTATION CONTROL BMP MANUAL. ECM IS ACCEPTABLE FOR USE ON SLOPES OF GREATER THAN 3:1 BUT LESS THAN 1:1. ECM SHALL CONSIST OF WELL–GRADED ORGANIC COMPONENT 50 – 100% OF DRY WEIGHT, AND COMPRISED OF FIBROUS AND ELONGATED FRAGMENTS. ECM SHALL BE FREE FROM REFUSE, MATERIAL TOXIC TO PLANT GROWTH OR CONSTRUCTION DEBRIS. ECM SHALL BE EVENLY DISTRIBUTED AND APPLIED AT A THICKNESS OF 2" ON 3:1 SLOPES, WITH AN ADDITIONAL 1/2" PER 20' OF SLOPE FOR A MAXIMUM OF 100' IN LENGTH. SLOPES GREATER THAN 3:1, ECM SHALL BE APPLIED AT THICKNESS OF 4" OR 5" FOR SLOPES GREATER THAN 80' IN LENGTH.

SLOPES GREATER THAN 3:1 MAY ALSO REQUIRE ADDITIONAL SLOPE STABILIZATION DEPENDING ON UPGRADIENT RUNOFF AND OTHER SITE SPECIFIC CONDITIONS. SEE SLOPE STABILIZATION DETAIL FOR ADDITIONAL INFORMATION.

EROSION CONTROL DURING CONSTRUCTION

WINTER CONSTRUCTION

1. WINTER CONSTRUCTION PERIOD: NOVEMBER 1 THROUGH APRIL 15
2. OVERWINTER STABILIZATION OF DITCHES AND CHANNELS:
   ALL STONE-LINED DITCHES AND CHANNELS MUST BE CONSTRUCTED AND STABILIZED BY NOVEMBER 15. ALL GRASS LINED DITCHES AND CHANNELS MUST BE CONSTRUCTED AND STABILIZED BY SEPTEMBER 1. IF A DITCH OR CHANNEL IS NOT GRASS-LINED BY SEPTEMBER 1, THEN ONE OF THE FOLLOWING ACTIONS MUST BE TAKEN TO STABILIZE THE DITCH FOR LATE FALL AND WINTER.
   A. INSTALL A SOD LINING IN THE DITCH:
      A DITCH MUST BE LINED WITH PROPERLY INSTALLED SOD BY OCTOBER 1. PROPER INSTALLATION INCLUDES: 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, AND ANCHORING SOD AT THE BASE OF THE DITCH WITH JUTE OR PLASTIC MESH TO PREVENT THE SOD FROM SLOUGHING DURING FLOW CONDITIONS. SEE THE PERMANENT VEGETATION BMP SECTION.
   B. INSTALL A STONE LINING IN THE DITCH:
      A DITCH MUST BE LINED WITH STONE RIPRAP BY NOVEMBER 15. A REGISTERED PROFESSIONAL ENGINEER MUST BE HIRED TO DETERMINE THE STONE SIZE AND LINING THICKNESS NEEDED TO WITHSTAND THE ANTICIPATED FLOW VELOCITIES AND FLOW DEPTHS WITHIN THE DITCH. IF NECESSARY, THE CONTRACTOR WILL REGRADE THE DITCH PRIOR TO PLACING THE STONE LINING SO TO PREVENT THE STONE LINING FROM REDUCING THE DITCH'S CROSS-SECTIONAL AREA.
3. OVERWINTER STABILIZATION OF DISTURBED SLOPES:
   ALL STONE-COVERED SLOPES MUST BE CONSTRUCTED AND STABILIZED BY NOVEMBER 15. ALL SLOPES TO BE VEGETATED MUST BE SEEDED AND MULCHED BY SEPTEMBER 1. THE DEPARTMENT WILL CONSIDER ANY AREA HAVING A GRADE GREATER THAN 15% TO BE A SLOPE. IF A SLOPE TO BE VEGETATED IS NOT STABILIZED BY SEPTEMBER 1, THEN ONE OF THE FOLLOWING ACTIONS MUST BE TAKEN TO STABILIZE THE SLOPE FOR LATE FALL AND WINTER. STABILIZE THE SOIL WITH TEMPORARY VEGETATION AND EROSION CONTROL MIX BY OCTOBER 1. THE DISTURBED SLOPE MUST BE SEEDED WITH WINTER RYE AT A SEEDING RATE OF 2 POUNDS PER 1000 SQUARE FEET, AND MULCHED WITH HAY OR STRAW AT 75 POUNDS PER 1000 SQUARE FEET, AND ANCHORED WITH MULCH NETTING TO PREVENT WIND FROM MOVING THE MULCH. IF THE RYE FAILS TO GROW AT LEAST THREE INCHES OR FAILS TO COVER AT LEAST 90% OF THE DISTURBED SOIL BEFORE NOVEMBER 1, THEN THE CONTRACTOR WILL COVER THE SLOPE WITH A LAYER OF EROSION CONTROL MIX OR WITH STONE RIPRAP AS DESCRIBED IN THE FOLLOWING STANDARDS.
   A. STABILIZE THE SOIL WITH SOD:
      THE DISTURBED SLOPE MUST BE STABILIZED WITH PROPERLY INSTALLED SOD BY OCTOBER 1. PROPER INSTALLATION INCLUDES: 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 CONTRACTOR WILL NOT USE LATE SEASON SOD INSTALLATION TO STABILIZE SLOPES HAVING A GRADE GREATER THAN 33% (3H:1V) OR HAVING GROUNDWATER SEEPS ON THE SLOPE FACE.
   B. STABILIZE THE SOIL WITH EROSION CONTROL MIX:
      EROSION CONTROL MIX MUST BE PROPERLY INSTALLED BY NOVEMBER 15. THE CONTRACTOR WILL NOT USE EROSION CONTROL MIX TO STABILIZE SLOPES HAVING GREATER THAN 50% (2H:1V) OR HAVING GROUNDWATER SEEPS ON THE SLOPE FACE. SEE EROSION CONTROL MIX NOTES FOR ADDITIONAL CRITERIA.
   C. STABILIZE THE SOIL WITH STONE RIPRAP:
      PLACE A LAYER OF STONE RIPRAP ON THE SLOPE BY NOVEMBER 15. THE DEVELOPER'S OWNER WILL HIRE A REGISTERED PROFESSIONAL ENGINEER TO DETERMINE THE STONE SIZE NEEDED FOR STABILITY ON THE SLOPE AND TO DESIGN A FILTER LAYER FOR UNDERNEATH THE RIPRAP.
4. OVERWINTER STABILIZATION OF DISTURBED SOILS:
   BY SEPTEMBER 15, ALL DISTURBED SOIL AREAS HAVING A SLOPE LESS THAN 15% MUST BE SEEDED AND MULCHED. IF THE DISTURBED AREAS ARE NOT STABILIZED BY THIS DATE, THEN ONE OF THE FOLLOWING ACTIONS MUST BE TAKEN TO STABILIZE THE SOIL FOR LATE FALL AND WINTER.
   A. STABILIZE THE SOIL WITH TEMPORARY VEGETATION:
      BY OCTOBER 1, SEED THE DISTURBED SOIL WITH WINTER RYE AT A SEEDING RATE OF 2 POUNDS PER 1000 SQUARE FEET, AND MULCH THE SEEDED SOIL WITH HAY OR STRAW AT 75 POUNDS PER 1000 SQUARE FEET, AND ANCHOR THE MULCH WITH STONE OR PLASTIC NETTING TO PREVENT WIND FROM MOVING THE MULCH. IF THE RYE FAILS TO GROW AT LEAST THREE INCHES OR FAILS TO COVER AT LEAST 90% OF THE DISTURBED SOIL BEFORE NOVEMBER 1, THEN MULCH THE AREA FOR OVER-WINTER PROTECTION AS DESCRIBED BELOW.
   B. STABILIZE THE SOIL WITH SOD:
      STABILIZE THE DISTURBED SOIL WITH PROPERLY INSTALLED SOD BY OCTOBER 1. PROPER INSTALLATION INCLUDES: PINNING THE SOD ONTO THE SOIL WITH WIRE PINS, ROLLING THE SOD TO GUARANTEE CONTACT BETWEEN THE SOD AND UNDERLYING SOIL, AND WATERING THE SOD TO PROMOTE ROOT GROWTH INTO THE DISTURBED SOIL.
   C. STABILIZE THE SOIL WITH MULCH:
      BY NOVEMBER 15, MULCH THE DISTURBED SOIL BY SPREADING HAY OR STRAW AT A RATE OF AT LEAST 150 POUNDS PER 1000 SQUARE FEET ON THE AREA SO THAT NO SOIL IS VISIBLE THROUGH THE MULCH. IMMEDIATELY AFTER APPLYING THE MULCH, ANCHOR THE MULCH WITH PLASTIC NETTING TO PREVENT WIND FROM MOVING THE MULCH OFF THE DISTURBED SOIL. MONITOR GROWTH OF THE RYE. IF THE RYE FAILS TO GROW AT LEAST THREE INCHES OR FAILS TO COVER AT LEAST 90% OF THE DISTURBED SOIL BEFORE NOVEMBER 1, THEN MULCH THE AREA FOR OVER-WINTER PROTECTION AS DESCRIBED BELOW.
5. MAINTENANCE:
   IF AN INSPECTION DETERMINES THAT A CORRECTIVE ACTION IS REQUIRED, THE ACTION OR REPAIR SHALL BE STARTED BY THE END OF THE NEXT WORKDAY AND COMPLETED WITHIN SEVEN DAYS OR BEFORE THE NEXT STORM EVENT. MAINTENANCE ACTIVITIES SHALL BE APPLIED AS NEEDED DURING THE CONSTRUCTION SEASON. ONCE A WEEK AND BEFORE AND AFTER EACH RAINFALL SNOW STORM OR PERIOD OF THAWING AND RUNOFF, THE SITE SUPERINTENDENT SHALL INSPECT THE SITE TO ENSURE THAT ALL EROSION CONTROL MEASURES PERFORM PROPERLY. REPAIRS AS NEEDED TO ENSURE NON-CONTINUOUS FUNCTION, FOLLOWING THE TEMPORARY AND/OR FINAL SEEDING AND MULCHING, THE CONTRACTOR SHALL IN THE SPRING, INSPECT AND REPAIR ANY DAMAGES AND/OR BARE SPOTS. AN ESTABLISHED VEGETATIVE COVER MEANS A MINIMUM OF 85 TO 90% OF AREAS VEGETATED WITH VIGOROUS GROWTH.

STABILIZATION SCHEDULE BEFORE WINTER:

SEPTEMBER 15	ALL DISTURBED AREAS MUST BE SEEDED AND MULCHED. ALL SLOPES MUST BE STABILIZED WITH MULCH. ALL GRASS LINED DITCHES AND CHANNELS MUST BE STABILIZED WITH MULCH OR AN EROSION CONTROL BLANKET.
OCTOBER 1	IF THE SLOPE IS STABILIZED WITH AN EROSION CONTROL BLANKET AND SEEDED, ALL DISTURBED AREAS TO BE PROTECTED WITH AN ANNUAL GRASS MUST BE SEEDED AT A SEEDING RATE OF 3 POUNDS PER 1000 SQUARE FEET AND MULCHED.
NOVEMBER 15	ALL STONE LINED DITCHES AND CHANNELS MUST BE CONSTRUCTED AND STABILIZED. SLOPES THAT ARE COVERED WITH RIPRAP MUST BE CONSTRUCTED BY THAT DATE.

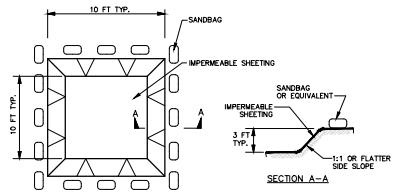
6. DURING WINTER CONSTRUCTION PERIOD ALL SNOW SHALL BE REMOVED FROM AREAS OF SEEDING AND MULCHING PRIOR TO PLACEMENT.
7. AREAS WITHIN 75 FEET OF STREAMS, WETLANDS, AND OTHER PROTECTED NATURAL RESOURCES THAT ARE NOT STABILIZED WITH VEGETATION BY DEC. 1 SHALL BE MULCHED AND ANCHORED WITH NETTING. IF WORK CONTINUES IN THIS AREA DURING THE WINTER, A DOUBLE LINE OF SEDIMENT BARRIERS MUST BE USED.

HOUSEKEEPING

1. SPILL PREVENTION: CONTROLS MUST BE USED TO PREVENT POLLUTANTS FROM BEING DISCHARGED FROM MATERIALS I. ON SITE, INCLUDING STORAGE PRACTICES TO MINIMIZE EXPOSURE OF THE MATERIALS TO STORMWATER, AND APPROPRIATE SPILL PREVENTION, CONTAINMENT, AND RESPONSE PLANNING AND IMPLEMENTATION.
2. GROUNDWATER PROTECTION: DURING CONSTRUCTION, LIQUID PETROLEUM PRODUCTS AND OTHER HAZARDOUS MATERIALS WITH THE POTENTIAL TO CONTAMINATE GROUNDWATER MAY NOT BE STORED OR HANDLED IN AREAS OF THE SITE DRAINING TO AN INFILTRATION AREA. AN "INFILTRATION AREA" IS ANY AREA OF THE SITE THAT BY DESIGN OR AS A RESULT OF SOILS, TOPOGRAPHY, AND OTHER RELEVANT FACTORS ACCUMULATES RUNOFF THAT INFILTRATES INTO THE SOIL. DIKES, BERMS, SUMPS, AND OTHER FORMS OF SECONDARY CONTAINMENT THAT PREVENT DISCHARGE TO GROUNDWATER MAY BE USED TO ISOLATE PORTIONS OF THE SITE FOR THE PURPOSES OF STORAGE AND HANDLING OF THESE MATERIALS.
3. FUGITIVE SEDIMENT AND DUSTS: ACTIONS MUST BE TAKEN TO ENSURE THAT ACTIVITIES DO NOT RESULT IN NOTICEABLE EROSION OF SOILS OR FUGITIVE DUST EMISSIONS DURING OR AFTER CONSTRUCTION. OIL MY NOT BE USED FOR DUST CONTROL. ANY OFFSITE TRACKING OF MUD OR SEDIMENT SHALL BE VACUUMED IMMEDIATELY AND PRIOR TO THE NEXT SIGNIFICANT STORM EVENT.
4. DEBRIS AND OTHER MATERIALS: LITTER, CONSTRUCTION DEBRIS, AND CHEMICALS EXPOSED TO STORMWATER MUST BE PREVENTED FROM BECOMING A POLLUTANT SOURCE.
5. TRENCH OR FOUNDATION DE-WATERING: TRENCH DE-WATERING IS THE REMOVAL OF WATER FROM TRENCHES, FOUNDATIONS, COFFER DAMS, PONDS, AND OTHER AREAS WITHIN THE CONSTRUCTION AREA THAT RETAIN WATER DURING EXCAVATION FOR UTILITIES OR FOUNDATIONS. THE CONTRACTOR SHALL NOT RETAIN WATER IN EXCAVATIONS OVERNIGHT UNLESS APPROVED BY THE ENGINEER. HEAVILY SILTED WATER MUST BE PUMPED THROUGH A DEWATERING PRACTICE. THE COLLECTED WATER MUST BE RELEASED FREELY TO A VEGETATED AREA EITHER THROUGH GRAVITY OR PUMPING, AND MUST BE SPREAD THROUGH NATURAL WOODED BUFFERS OR REMOVED TO AREAS THAT ARE SPECIFICALLY DESIGNED TO COLLECT THE MAXIMUM AMOUNT OF SEDIMENT POSSIBLE. LIKE A CONTRACTOR SEDIMENTATION BASIN AVOID ALLOWING THE WATER TO FLOW OVER DISTURBED AREAS OF THE SITE. EQUIVALENT MEASURES MAY BE TAKEN IF APPROVED BY THE DEPARTMENT.
6. NON-STORMWATER DISCHARGES: IDENTIFY AND PREVENT CONTAMINATION BY NON-STORMWATER DISCHARGES, WHERE ALLOWED NON-STORMWATER DISCHARGES EXIST, THEY MUST BE IDENTIFIED AND STEPS SHOULD BE TAKEN TO ENSURE THE IMPLEMENTATION OF APPROPRIATE POLLUTION PREVENTION MEASURES FOR THE NON-STORMWATER COMPONENT(S) OF THE DISCHARGE. AUTHORIZED NON-STORMWATER DISCHARGES ARE:
   - DISCHARGES FROM FIREFIGHTING ACTIVITY;
   - FIRE HYDRANT FLUSHINGS;
   - VEHICLE WASHWATER IF DETERGENTS ARE NOT USED AND WASHING IS LIMITED TO THE EXTERIOR OF VEHICLES (ENGINE, UNDERCARRIAGE AND TRANSMISSION WASHING IS PROHIBITED);
   - DUST CONTROL RUNOFF IN ACCORDANCE WITH PERMIT CONDITIONS AND APPENDIX (C)(3) OF MAINE DEP 06-096 CHAPTER 500;
   - ROUTINE EXTERNAL BUILDING WASHDOWN, NOT INCLUDING SURFACE PAINT REMOVAL, THAT DOES NOT INVOLVE DETERGENTS;
   - PAVEMENT WASHWATER (WHERE SPILLS/LEAKS OF TOXIC OR HAZARDOUS MATERIALS HAVE NOT OCCURRED, UNLESS ALL SPILLED MATERIAL HAD BEEN REMOVED) IF DETERGENTS ARE NOT USED;
   - UNCONTAMINATED AIR CONDITIONING OR COMPRESSOR CONDENSATE;
   - UNCONTAMINATED GROUNDWATER OR SPRING WATER;
   - FOUNDATION OR FOOTER DRAIN-WATER WHERE FLOWS ARE NOT CONTAMINATED;
   - UNCONTAMINATED EXCAVATION DEWATERING (SEE REQUIREMENTS IN APPENDIX C(5) MAINE DEP 06-096 CHAPTER 500);
   - POTABLE WATER SOURCES INCLUDING WATERLINE FLUSHINGS; AND
   - LANDSCAPE IRRIGATION.
7. UNAUTHORIZED NON-STORMWATER DISCHARGES: THE DEPARTMENT'S APPROVAL UNDER THIS CHAPTER DOES NOT AUTHORIZE A DISCHARGE THAT IS MIXED WITH A SOURCE OF NON STORMWATER, OTHER THAN THOSE DISCHARGES IN COMPLIANCE WITH APPENDIX C(6) MAINE DEP 06-096 CHAPTER 500. SPECIFICALLY, THE DEPARTMENT'S APPROVAL DOES NOT AUTHORIZE DISCHARGES OF THE FOLLOWING:
   - WASTEWATER FROM THE WASHOUT OR CLEANOUT OF CONCRETE, STUCCO, PAINT, FORM RELEASE OILS, CURING COMPOUNDS OR OTHER CONSTRUCTION MATERIALS;
   - FUELS, OILS OR OTHER POLLUTANTS USED IN VEHICLE AND EQUIPMENT OPERATION AND MAINTENANCE;
   - SOAPS, SOLVENTS, OR DETERGENTS USED IN VEHICLE AND EQUIPMENT WASHING; AND
   - TOXIC OR HAZARDOUS SUBSTANCES FROM A SPILL OR OTHER RELEASE.
8. ADDITIONAL REQUIREMENTS: ADDITIONAL REQUIREMENTS MAY BE APPLIED ON A SITE-SPECIFIC BASIS.

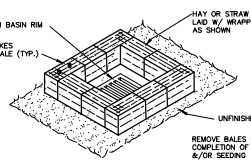
CONSTRUCTION SPECIFICATIONS

1. LOCATE WASHOUT STRUCTURE A MINIMUM OF 50 FEET AWAY FROM OPEN CHANNELS, STORM DRAIN INLETS, SENSITIVE AREAS, WETLANDS, BUFFERS AND WATER COURSES AND AWAY FROM CONSTRUCTION TRAFFIC.
2. SIZE WASHOUT STRUCTURE FOR VOLUME NECESSARY TO CONTAIN WASH WATER AND SOLIDS AND MAINTAIN AT LEAST 4 INCHES OF FREEBOARD. TYPICAL DIMENSIONS ARE 10 FEET X 10 FEET X 3 FEET DEEP.
3. PREPARE SOIL BASE FREE OF ROCKS OR OTHER DEBRIS THAT MAY CAUSE TEARS OR HOLES IN THE LINER. FOR LINER, USE 10 MIL OR THICKER UV RESISTANT, IMPERMEABLE SHEETING, FREE OF HOLES AND TEARS OR OTHER DEFECTS THAT COMPROMISE IMPERMEABILITY OF THE MATERIAL.
4. PROVIDE A SIGN FOR THE WASHOUT IN CLOSE PROXIMITY TO THE FACILITY.
5. KEEP CONCRETE WASHOUT STRUCTURE WATER TIGHT. REPLACE IMPERMEABLE LINER IF DAMAGED (E.G., RIPPED OR PUNCTURED). EMPTY OR REPLACE WASHOUT STRUCTURE WHEN IT IS 75% PERCENT FULL, AND DISPOSE OF ACCUMULATED MATERIAL PROPERLY. DO NOT REUSE PLASTIC LINER. WET–VACUUM STORED LIQUIDS THAT HAVE NOT EVAPORATED AND DISPOSE OF IN AN APPROVED MANNER. PRIOR TO FORECASTED RAINSTORMS, REMOVE LIQUIDS OR COVER STRUCTURE TO PREVENT OVERFLOWS. REMOVE HARDENED SOLIDS, WHOLE OR BROKEN UP, FOR DISPOSAL OR RECYCLING. MAINTAIN RUNOFF DIVERSION AROUND EXCAVATED WASHOUT STRUCTURE UNTIL STRUCTURE IS REMOVED.

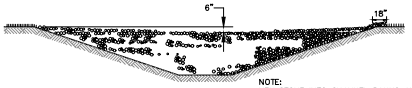


PLAN

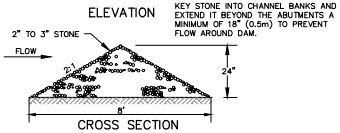
CONCRETE WASHOUT STRUCTURE
N.T.S.

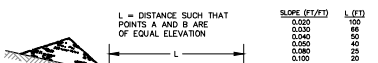


LOW POINT SEDIMENT CONTROL BARRIER
N.T.S.



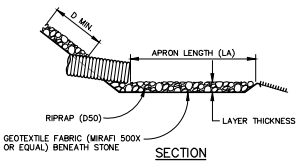
NOTE:
KEY STONE INTO CHANNEL BANKS AND EXTEND IT BEYOND THE ABUTMENTS A MINIMUM OF 18" (0.5m) TO PREVENT FLOW AROUND DAM.



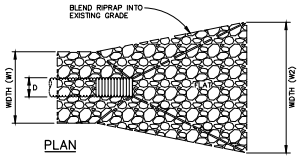


SLOPE (FT/FT)	L (FT)
0.020	100
0.030	66
0.040	50
0.060	40
0.080	25
0.100	20
0.130	17
0.150	13

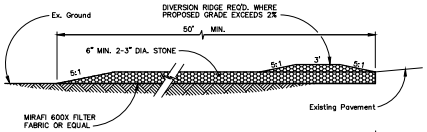
STONE CHECK DAM DETAIL
NTS

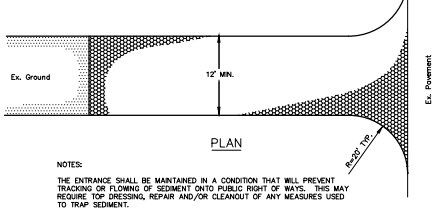


APRON SCHEDULE					
CULV. DIA. (D)	D50 (IN.)	T (IN.)	LA (FT.)	W1 (FT.)	W2 (FT.)
12" OR LESS	6"	15"	10'	5'	15'
15"	6"	15"	10'	3.75'	14'
18"	6"	15"	12.5'	4.5'	17'
24"	6"	15"	15'	6'	20'
30"	6"	15"	18.5'	7.5'	26'
36"	6"	15"	24'	9'	33'
42"	12"	24"	30'	10.5'	41'
48"	12"	24"	32'	12'	46'
60"	18"	33"	38'	15'	53'



PIPE OUTLET PROTECTION
NTS





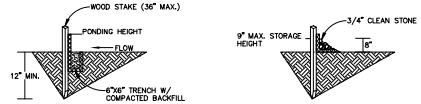
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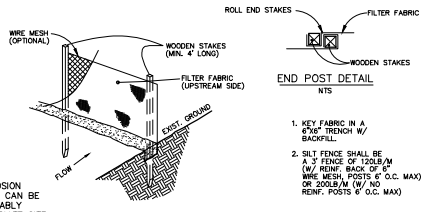
THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION THAT WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHT OF WAYS. THIS MAY REQUIRE TOP DRESSING, REPAIR AND/OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT.

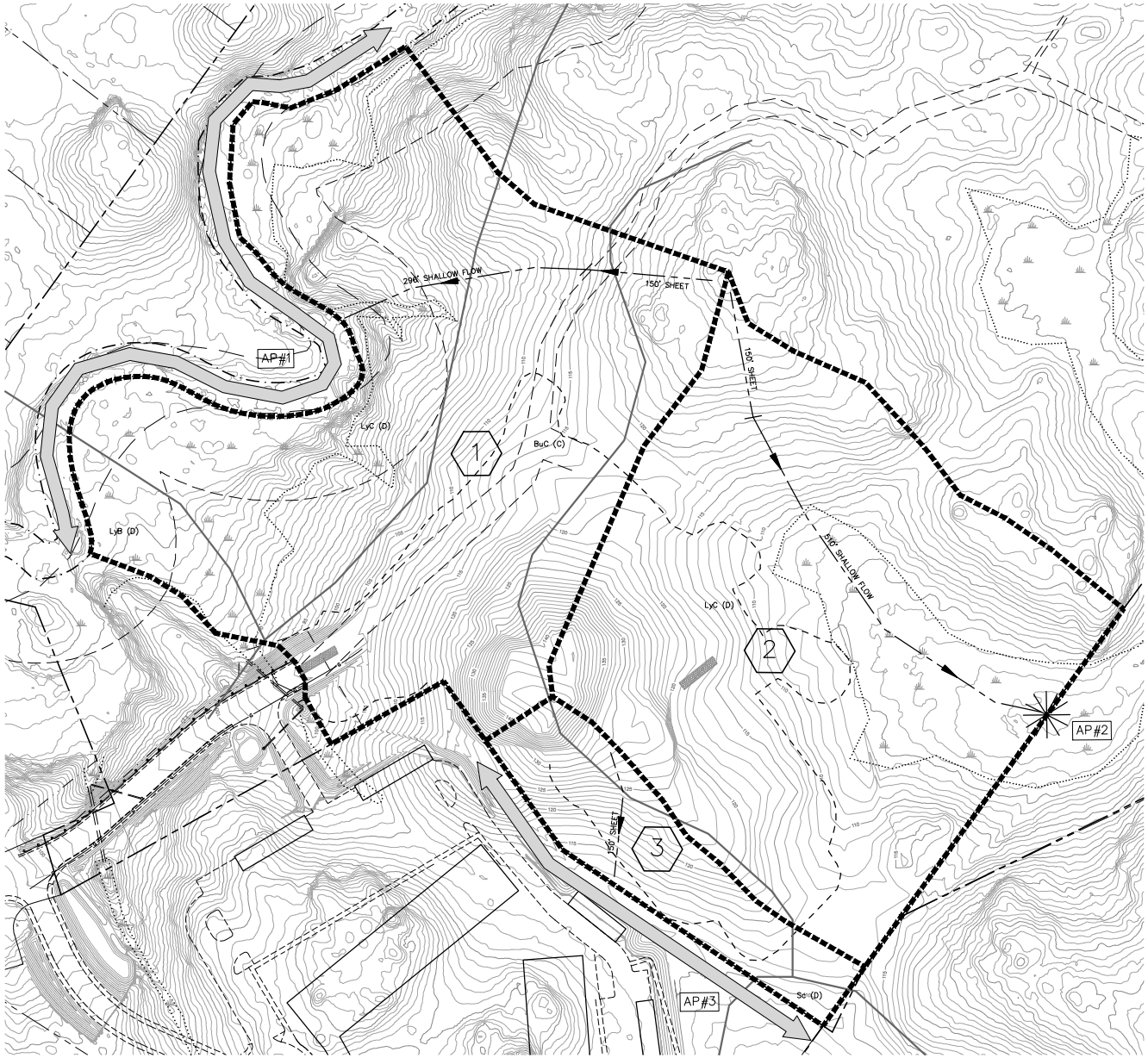
WHEN NECESSARY, WHEELS SHALL BE CLEANED PRIOR TO ENTRANCE ONTO PUBLIC RIGHT OF WAY.

WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH CRUSHED STONE THAT DRAINS INTO AN APPROVED SEDIMENT TRAP OR SEDIMENT BASIN.

STABILIZED CONSTRUCTION ENTRANCE
NTS




WIRE MESH (OPTIONAL)
WOODEN STAKES (MIN. 4' LONG)
F



LEGEND

SYMBOL	DESCRIPTION
12	POND
12	DRAINAGE SUB AREA
R12	REACH
	DRAINAGE AREA BOUNDARY
	TIME OF CONCENTRATION ROUTE
	LIMIT OF WETLANDS
64	EXISTING CONTOUR
64	PROPOSED CONTOUR

PRE DEVELOPMENT FLOWS

ANALYSIS POINT	2 YR. STORM	10 YR. STORM	25 YR. STORM
AP-1	7.20 CFS	15.25 CFS	22.36 CFS
AP-2	6.10 CFS	12.15 CFS	17.39 CFS
AP-3	1.00 CFS	2.23 CFS	3.32 CFS

Scale: 1" = 60'
60' 0 60' 120'

SOIL DESIGNATION
AdB(A)
SLOPE DESIGNATION
HYDROLOGIC SOIL GROUP
HYDROLOGIC SOIL

SOILS LEGEND

SYMBOL	DESCRIPTION
	SOIL BOUNDARY LINES
	LIMIT OF WETLANDS

HYDROLOGIC SOIL GROUP

SOIL	GROUP
BUXTON (BuC)	C
LYMAN-ROCK (LyB)	D
LYMAN-ROCK (LyC)	D
SCANTIC (Sc)	D

NO.	DATE	REVISION DESCRIPTION
1	5/15/24	Submitted for Preliminary Permit Application

STATE OF MAINE — Kristopher M. Gallant — 14025 — REGISTERED PROFESSIONAL ENGINEER

BH2M
Berry, Huff, MacDonald, Milligan Inc.
Engineers, Surveyors
380B Main Street
Gorham, Maine 04038
Tel. (207) 856-2771
www.bh2m.com

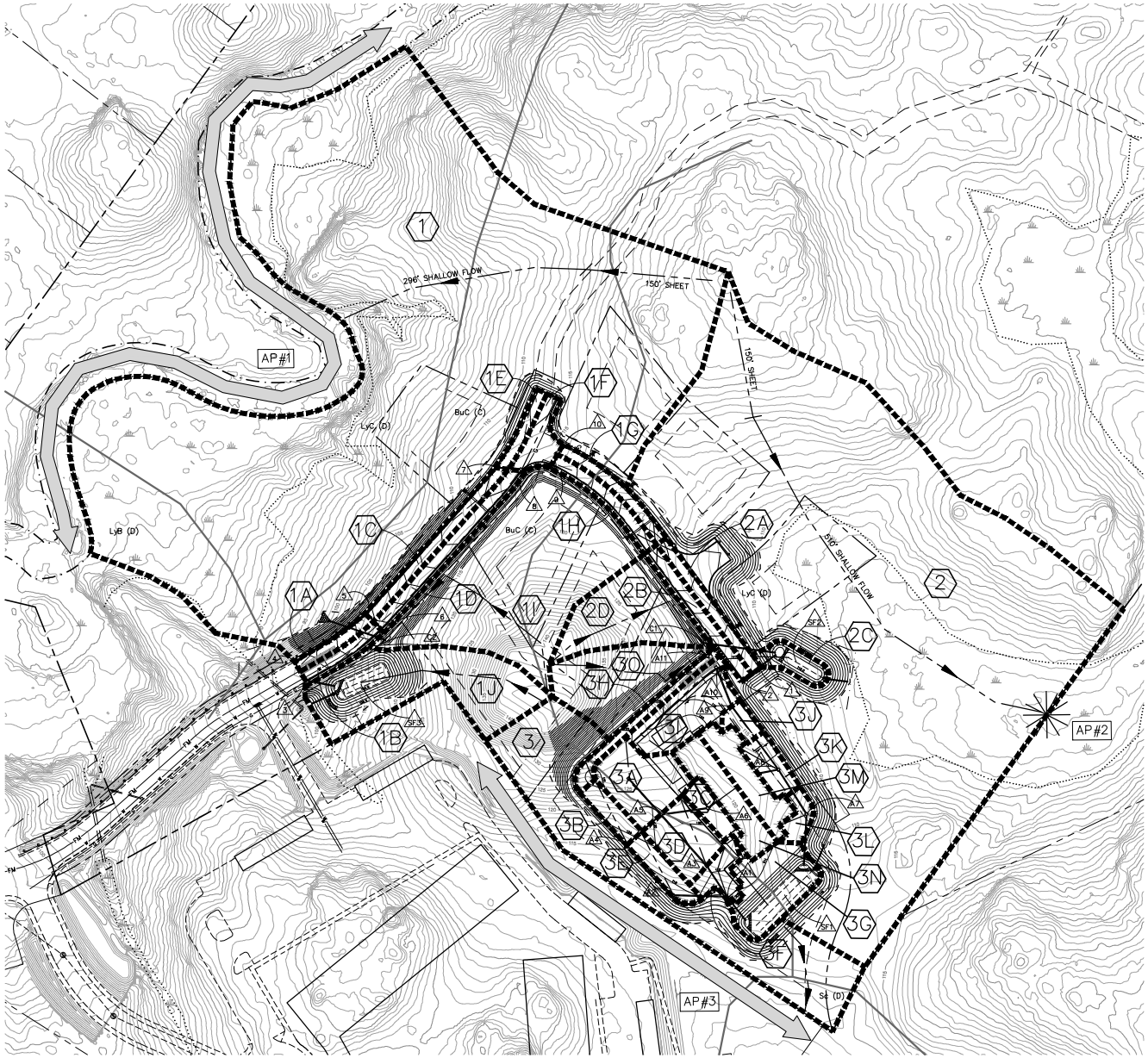
FOR:
Avesta Housing
307 Cumberland Avenue
Portland, ME 04101

PRE-DEVELOPMENT PLAN
AVESTA HOUSING PROJECT
BAKER ROAD
BEDFORD, MAINE

DESIGNED	DATE
B. Monsen	April 2024
DRAWN	SCALE
Dept.	1" = 60'
CHECKED	JOB. NO.
C. MacDonald	24017

SHEET
A

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Tc SUMMARY
(FOR THOSE NOT LABELED ON THE PLAN)

SUBCATCHMENT	Tc ROUTE
SA-1I	150' SHEET, 45' SHALLOW, 112' CHANNEL
SA-1J	150' SHEET, 73' SHALLOW
SA-2D	150' SHEET, 12' SHALLOW, 61' CHANNEL
SA-3	108' SHEET
SA-3O	143' SHEET, 54' CHANNEL

NOTE: SA-1A THROUGH SA-1H & SA-2A THROUGH SA-2C & SA-3A THROUGH SA-3N HAVE TC PATHS LESS THAN 0.1 HOURS (6 MIN.), THE TR-55 LIMITATION ON MIN. TC, AND ARE ASSUMED AS 6 MIN.

LEGEND

SYMBOL	DESCRIPTION
12	POND
12	DRAINAGE SUB AREA
R12	REACH
	DRAINAGE AREA BOUNDARY
	TIME OF CONCENTRATION ROUTE
	LIMIT OF WETLANDS
64	EXISTING CONTOUR
64	PROPOSED CONTOUR

POST (PRE) DEVELOPMENT FLOWS

ANALYSIS POINT	2 YR. STORM	10 YR. STORM	25 YR. STORM
AP-1	7.26 (7.20) CFS	15.34 (15.25) CFS	22.11 (22.36) CFS
AP-2	4.56 (6.10) CFS	11.13 (12.15) CFS	15.82 (17.39) CFS
AP-3	0.68 (1.00) CFS	1.47 (2.23) CFS	2.17 (3.32) CFS

Scale: 1" = 60'
60' 0 60' 120'

SOIL DESIGNATION
SLOPE DESIGNATION
AdB(A)
HYDROLOGIC SOIL GROUP
HYDROLOGIC SOIL

SOILS LEGEND

SYMBOL	DESCRIPTION
	SOIL BOUNDARY LINES
	LIMIT OF WETLANDS

HYDROLOGIC SOIL GROUP

SOIL	GROUP
BUXTON (BuC)	C
LYMAN-ROCK (LyB)	D
LYMAN-ROCK (LyC)	D
SCANTIC (Sc)	D

NO.	DATE	REVISION DESCRIPTION
1	5/15/24	Submitted for Preliminary Permit Application

STATE OF MAINE — Kevin Bunker — 14302 — REGISTERED PROFESSIONAL ENGINEER

BH2M
Berry, Huff, MacDonald, Milligan Inc.
Engineers, Surveyors
38 Mills Street, Gorham, Maine 04038
Tel: (207) 856-2771
www.bh2m.com

FOR:
Avesta Housing
307 Cumberland Avenue
Portland, ME 04101

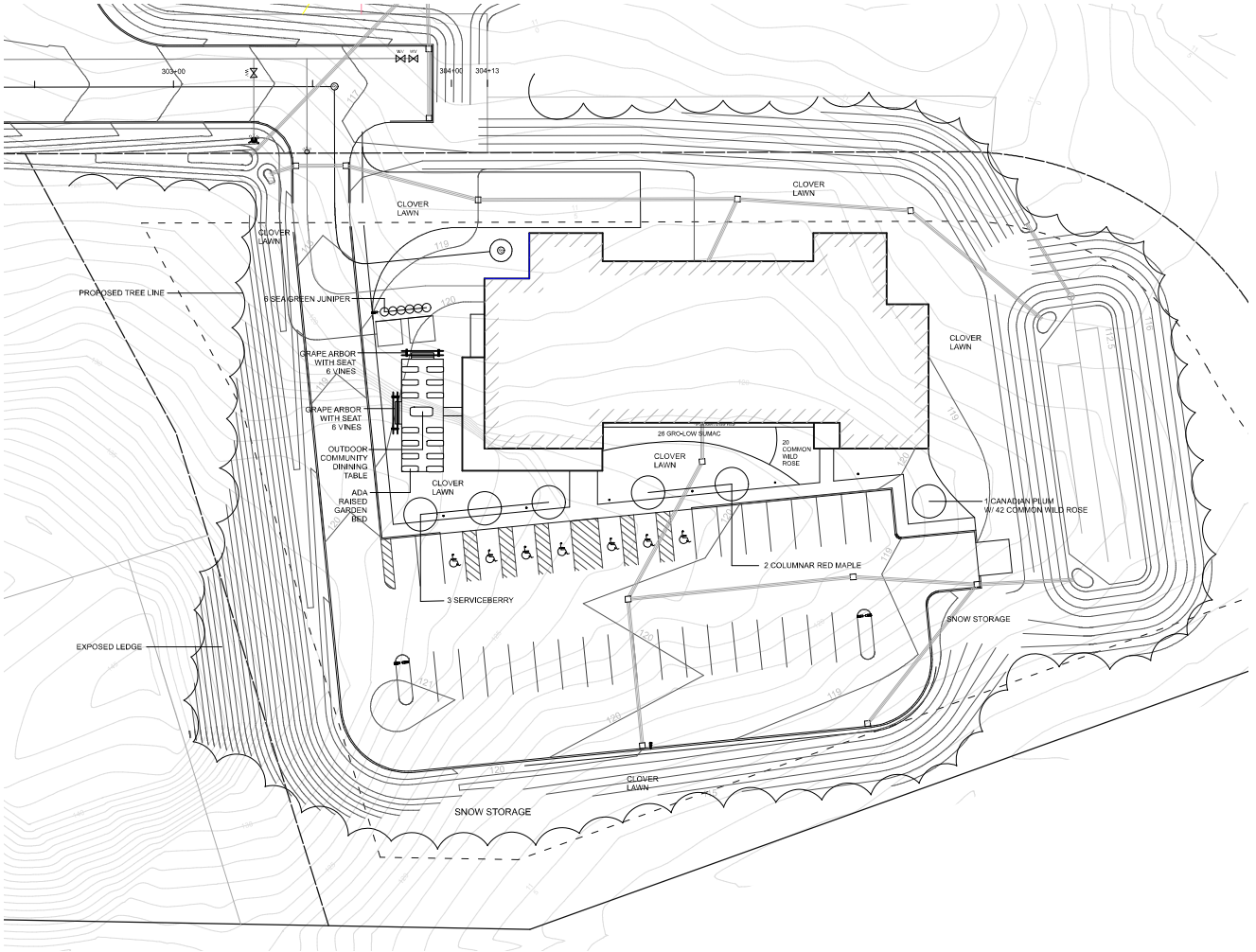
POST-DEVELOPMENT PLAN
AVESTA HOUSING PROJECT
BARRA ROAD
BIDDEFORD, MAINE

DESIGNED	DATE
B. Monsen	April 2024
DRAWN	SCALE
Dept.	1" = 60'
CHECKED	JOB. NO.
C. MacDonald	24017

SHEET
B

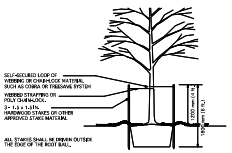
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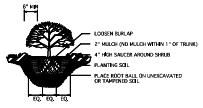
QUANTITY	BOTANICAL NAME	COMMON NAME	SIZE	REMARKS
2	Acer rubrum	Red Maple Armstrong Gold	3" Clp.	BB / Columnar
3	Amelanchier canadensis	Canadian Serviceberry	7' Ht.	BB
6	Juniperus chinensis	Sea Green Juniper	#5	
62	Rosa virginiana	Common Wild Rose	1 Gallon	
26	Rhus aromatica	Gro-Low Fragrant Sumac	1 Gallon	
1	Prunus nigra	Canadian Plum	7' Ht.	BB
12	Vitis labrusca, V. riparia	Wild Grape	#5	

Lawn Note: "Clover Lawn Mix" by OPN Seed or similar approved by Landscape Architect. Install and maintain per manufacturer and industry standards for clover mix lawns.



TYPICAL TREE PLANTING DETAIL

N.T.S.



TYPICAL SHRUB/VINE PLANTING DETAIL

N.T.S.

GENERAL NOTES:

1. CALL DIGSAFE PRIOR TO SITE WORK: 888-344-7233
2. BASE INFORMATION FROM OWNER.
3. REFER TO CIVIL AND ARCHITECTURAL DRAWINGS FOR SITE LAYOUT AND GRADING.
3. REFERENCE CIVIL DRAWINGS FOR GRADING, UTILITY, STORMWATER, AND OTHER SITE DETAILS. COORDINATE ALL LANDSCAPE WITH CIVIL AND ARCHITECTURE DRAWINGS
4. SEE PHOTOMETRIC PLAN FOR LIGHTING DETAILS
5. EROSION CONTROL MEASURES PER CIVIL DRAWINGS
6. ALL PLANTING SOILS TO MEET UMO EXTENSION SPECIFICATIONS

Project:

Avesta Housing Project

Barra Road
Biddeford, ME 04092

Owners:

Avesta Housing
307 Cumberland Ave
Portland, ME 04101

Architect:
Lassel Architects
South Berwick, ME

Civil Engineer:
BH2M
Gorham, ME

Landscape Architect:
_rasor
87 Main Street
Yarmouth, ME 04096
207-319-1606
hello@rasor.co

0' 20'

1" = 20'

MITCHELL RASOR No. 2827 REGISTERED LANDSCAPE ARCHITECT STATE OF MAINE

Landscape Plan

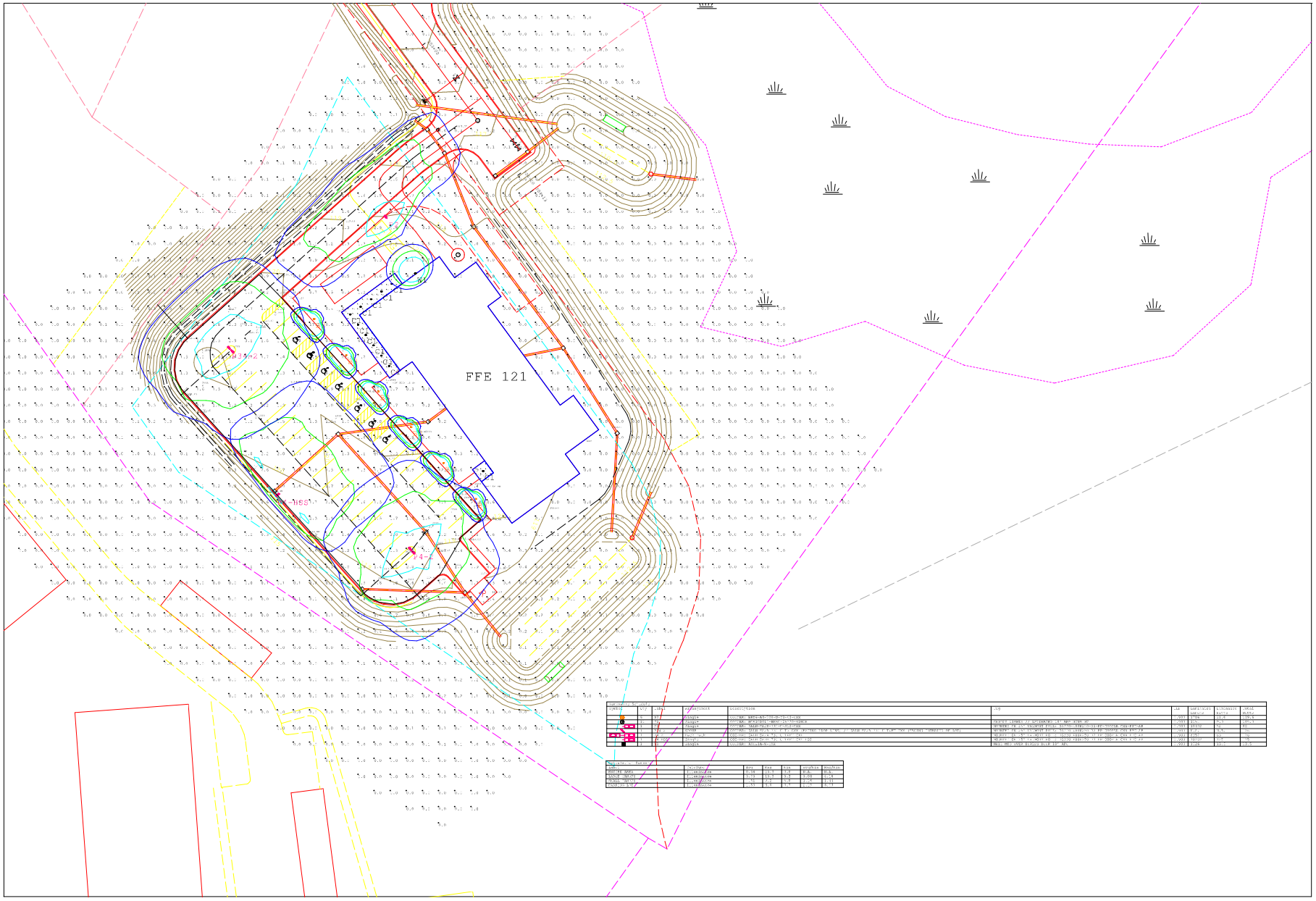
for permitting

No.	Revision / Issue	Date
1	Planning Board	5.15.24

Design: MR | Checked: MR
Drawn: MR | Approved: MR

Project: 2024.13

L-1



CHARRON REFLEX LIGHTING

#	Date	Comments

Revisions

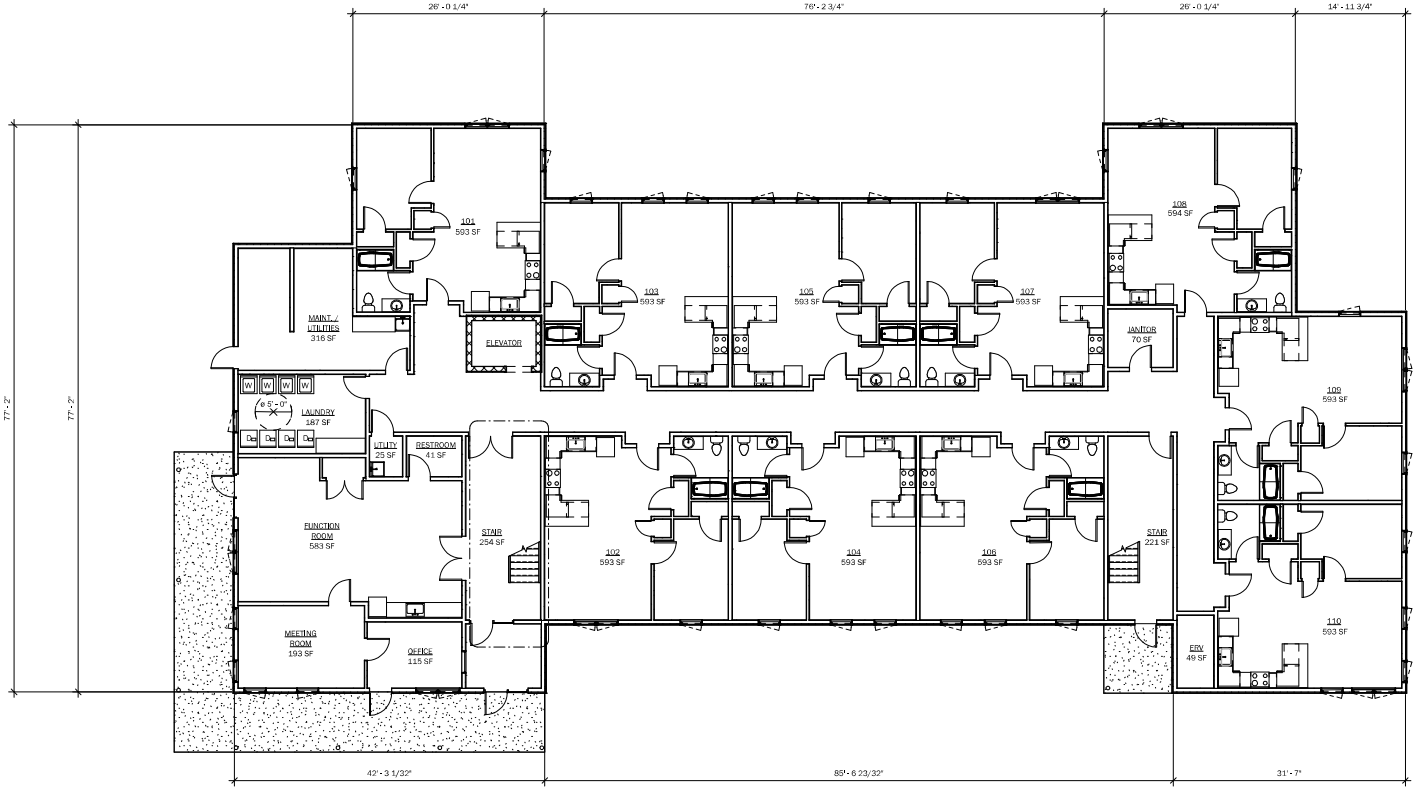
Drawn By: Michael OBrien
Checked By:
Date:5/9/2024
Contact: mobrien@charroninc.com
Scale: NTS

AVESTA BARRA ROAD
COOPER OPTION

BIDDEFORD, ME

Page M of 1

LASSEL
ARCHITECTS
370 MAIN STREET
SOUTH BERWICK, ME 03908
207 384 2049
lasselarchitects.com



1 FIRST FLOOR PLAN
1/8" = 1'-0"

5/6/2024 10:33:23 AM \\Server\Jobs\FILES CURRENT\24-03 Avesta Barra Road-Biddeford\6_DRAWINGS\6.2 REVIT\ 24-03DEFORD - AVESTA BARRA - SD-02 - NO FIRST FLOOR MTOW.rvt

CLIENT:
AVESTA

PROJECT:
BARRA ROAD

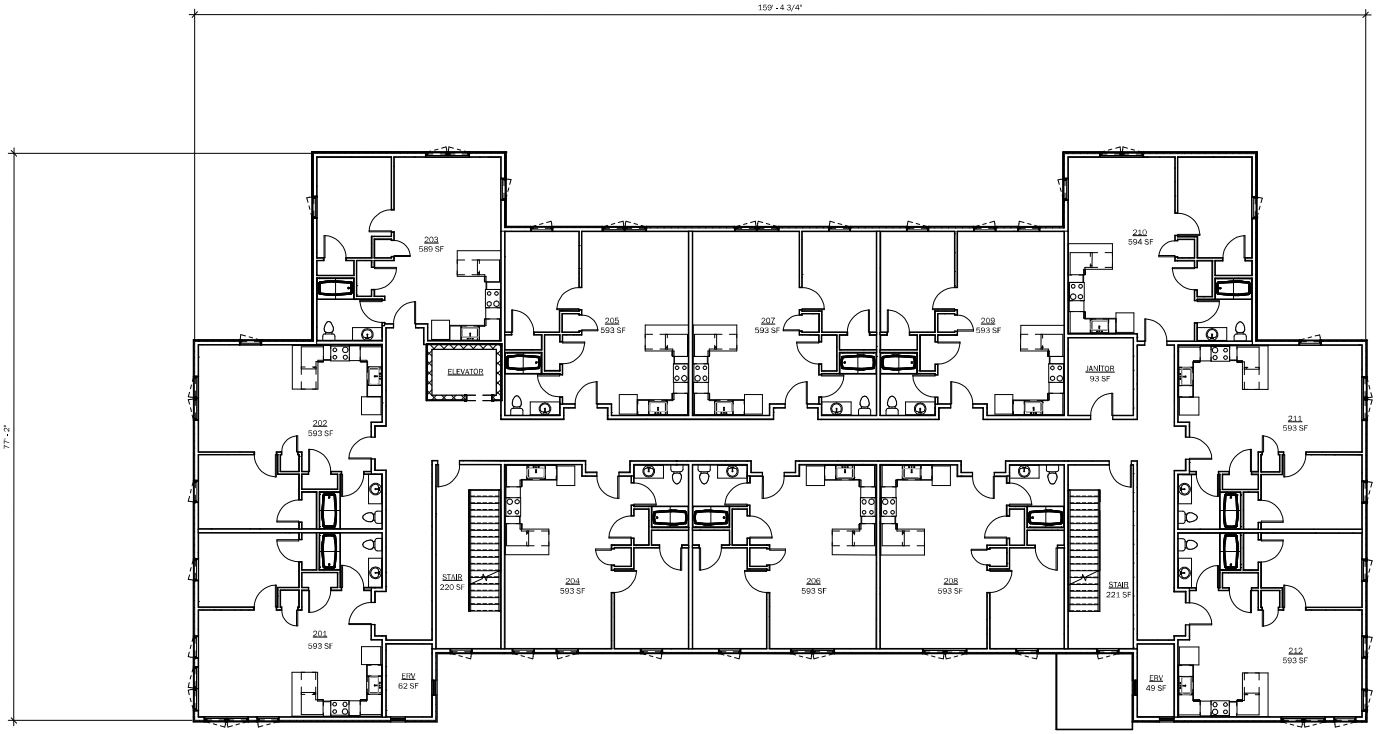
DRAFT

PROJECT NUMBER: 24.03
DATE: MAY 2024
SCALE: AS NOTED
REVISION:

DRAWING NAME: FIRST FLOOR PLAN
DRAWING NUMBER: SD - 01

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ARCHITECTS
370 MAIN STREET
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207 384 2049
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1 SECOND FLOOR PLAN
1/8" = 1'-0"

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CLIENT:
AVESTA

PROJECT:
BARRA ROAD

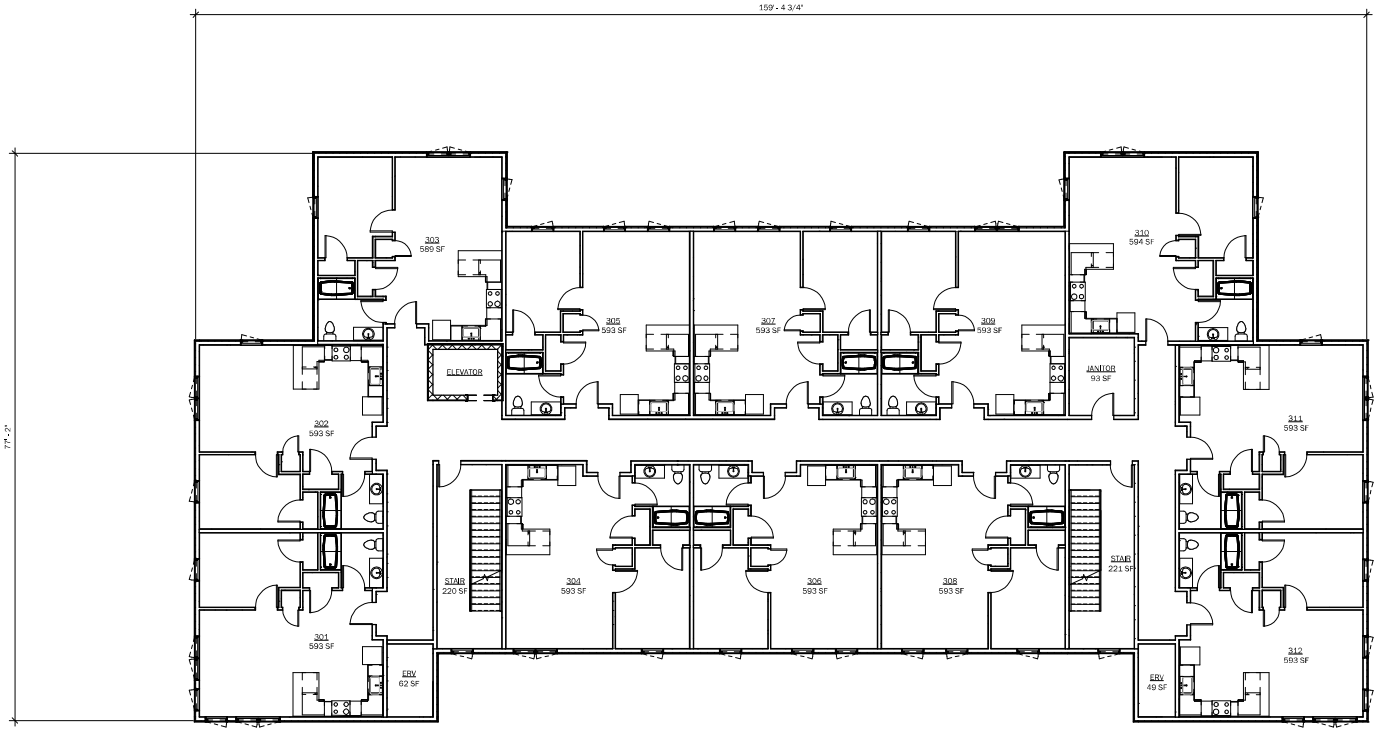
DRAFT

PROJECT NUMBER: 24.03
DATE: MAY 2024
SCALE: AS NOTED
REVISION:

DRAWING NAME: SECOND FLOOR PLAN
DRAWING NUMBER: SD - 02

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ARCHITECTS
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207 384 2049
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1 THIRD FLOOR PLAN
1/8" = 1'-0"

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CLIENT:
AVESTA

PROJECT:
BARRA ROAD

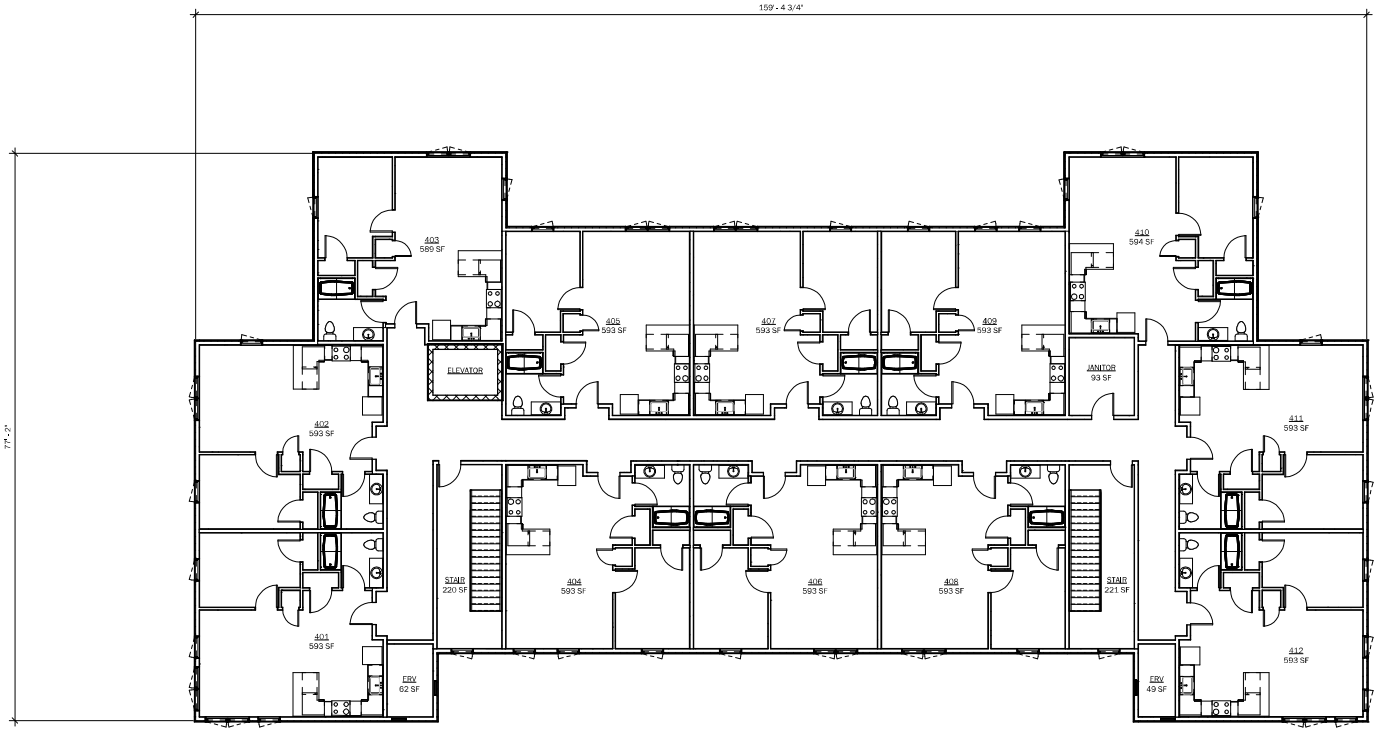
DRAFT

PROJECT NUMBER: 24.03
DATE: MAY 2024
SCALE: AS NOTED
REVISION:

DRAWING NAME: THIRD FLOOR PLAN
DRAWING NUMBER: SD - 03

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SOUTH BERWICK, ME 03908
207 384 2049
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1 FOURTH FLOOR PLAN
1/8" = 1'-0"

5/6/2024 10:33:24 AM \\Server\Jobs\FILES CURRENT\24-03 Avesta Barra Road-Biddeford\8_DRAWINGS\8.2 REVIT\ BIDDEFORD - AVESTA BARRA - SD-02 - NO FIRST FLOOR.RVTDWJKT

CLIENT:
AVESTA

PROJECT:
BARRA ROAD

DRAFT

PROJECT NUMBER: 24.03
DATE: MAY 2024
SCALE: AS NOTED
REVISION:

DRAWING NAME: FOURTH FLOOR PLAN
DRAWING NUMBER: SD - 04

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1 EAST - SD/DD
1/8" = 1'-0"

3 NORTH - SD/DD
1/8" = 1'-0"



2 WEST - SD/DD
1/8" = 1'-0"

4 SOUTH SD/DD
1/8" = 1'-0"

CLIENT:
AVESTA

PROJECT:
BARRA ROAD

DRAFT

PROJECT NUMBER: 24.03
DATE: MAY 2024
SCALE: AS NOTED
REVISION:

DRAWING NAME: EXTERIOR ELEVATIONS
DRAWING NUMBER: SD - 05

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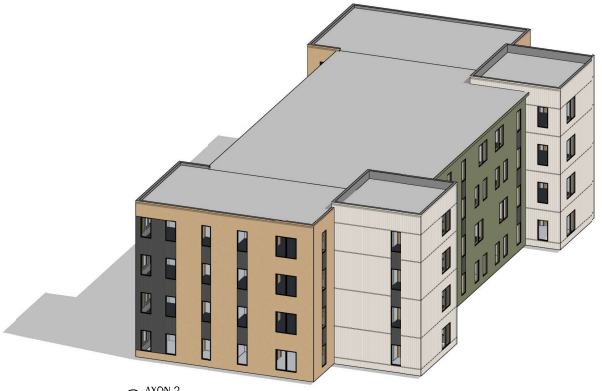
1 PERSPECTIVE 1



3 AXON 1



2 PERSPECTIVE 2



4 AXON 2

CLIENT:
AVESTA

PROJECT:
BARRA ROAD

DRAFT

PROJECT NUMBER: 24.03
DATE: MAY 2024
SCALE: AS NOTED
REVISION:

DRAWING NAME: 3D VIEWS
DRAWING NUMBER: SD - 06

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CLIENT:
AVESTA

PROJECT:
BARRA ROAD

DRAFT

PROJECT NUMBER: 24.03
DATE: MAY 2024
SCALE: AS NOTED
REVISION:

DRAWING NAME:
PROPOSED MATERIALS

DRAWING NUMBER:
SD - 07

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