



**HALEY WARD**

ENGINEERING | ENVIRONMENTAL | SURVEYING

# SITE LOCATION OF DEVELOPMENT PERMIT APPLICATION

**TO THE MAINE DEPARTMENT OF  
ENVIRONMENTAL PROTECTION  
AND  
THE LAND USE PLANNING COMMISSION**

**FOR CROSS LAKE SUBDIVISION**

T17 R5, Cross Lake Township

**Applicant:**

**IRVING WOODLANDS, LLC**

ATTN: Matthew Collin

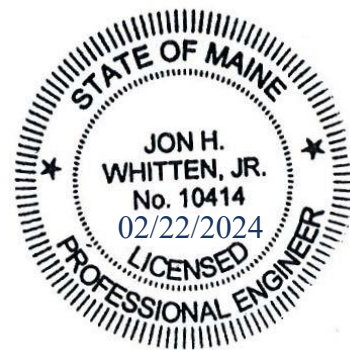
300 Union Street

P.O. Box 5777

Saint John, New Brunswick E2L 4M3

**Corporate Office**  
One Merchants Plaza  
Suite 701  
Bangor, ME 04401  
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**HALEYWARD.COM**



OCTOBER 2023

REVISED FEBRUARY 2024

JN: 10050.028

**Report Prepared By:**

**Haley Ward**

One Merchants Plaza, Suite 701 | Bangor, Maine 04401



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**APPLICATION**

**AGENT AUTHORIZATION  
SUBMISSIONS CHECKLIST**

PLEASE TYPE OR PRINT IN *INK ONLY*

This application is for: (CHECK THE ONE THAT APPLIES)		<input checked="" type="checkbox"/> 20 acre development	<input type="checkbox"/> Marine Oil Terminal	<input type="checkbox"/> Major Amendment
		<input type="checkbox"/> Planning Permit	<input type="checkbox"/> Structure	<input type="checkbox"/> Minor Amendment
		<input type="checkbox"/> Metallic Mining	<input type="checkbox"/> Subdivision	
1. Name of Applicant:	IRVING WOODLANDS LLC ATTN: MATTHEW COLLIN	6. Name of Agent: (if applicable)	Haley Ward, Inc. (Attn: Ben Kaiman)	
2. Applicant's Mailing Address:	300 UNION STREET P.O. BOX 5777 SAINT JOHN, NB E2L 4M3	7. Agent's Mailing Address:	1 Merchants Plaza, Ste 701 Bangor, Maine 04401	
3. Applicant's Daytime Phone #:	207-834-5767	8. Agent's Daytime Phone #:	207-989-4824	
4. Applicant's Fax #: (if available)		9. Agent's Fax #:	207-989-4881	
5. Applicant's e-mail address: (license will be sent via e-mail)	collin.matthew@jdirving.com	10. Agent's e-mail address (license will be sent via e-mail)	<a href="mailto:bkaiman@haleyward.com">bkaiman@haleyward.com</a>	

**PROJECT INFORMATION**

11. Name of Development:	CROSS LAKE SUBDIVISION				
12. Map and Lot #'s:	Map #: AR031	Lot #: 108	13. Deed Reference #'s:	Book #: O	Page #: 1150/158
14. Location of Project City/Town:	CROSS LAKE TWP. T17 R5	15. County:	AROOSTOOK	16. UTM Northing	5220792N
17. UTM Easting	190548066E				
18. Brief Description of Project including total parcel size:	CROSS LAKE SUBDIVISION				
19. Type of Direct Watershed: (Check all that apply)	<input checked="" type="checkbox"/> Lake not most at risk <input type="checkbox"/> River, stream or brook <input type="checkbox"/> Coastal wetland <input type="checkbox"/> Lake most at risk <input type="checkbox"/> Urban impaired stream <input type="checkbox"/> Wellhead or public water <input type="checkbox"/> Lake most at risk, severely blooming <input type="checkbox"/> Freshwater wetland				
19. Name of Waterbody Project Site drains to:	CROSS LAKE				
21. Amount of Developed Area:	Total acres: 3.50	Existing Developed area:	0		New Developed area: 3.50 acres
22. Amount of Impervious Area:	Total acres: 1.12	Existing Impervious areas:	0		New Impervious area: 1.12 acres
23. Development started prior to obtaining a license?:					<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
24. Development or any portion of the site subject to enforcement action?					<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No      If yes, name of enforcement staff involved?
25. Common scheme of development?:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	26. Title, Right or Interest:	<input checked="" type="checkbox"/> own <input type="checkbox"/> lease	<input type="checkbox"/> purchase option <input type="checkbox"/> written agreement	
27. Natural Resources Protection Act permit required?:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	If yes:	<input type="checkbox"/> PBR	<input type="checkbox"/> Tier 1	<input type="checkbox"/> Full Permit <input checked="" type="checkbox"/> Tier 2
28. Existing DEP Permit number (if applicable):	N/A				
29. Names of DEP staff person(s) present at the pre-application meeting:	Keegan Fero, Jessican Damon, Cody Obropta, John Hopeck, Billie Theriault				
30. Does agent have an interest in project? If yes, what is the interest?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No				


**CERTIFICATIONS AND SIGNATURES LOCATED ON PAGE 2**

**IMPORTANT: IF THE SIGNATURE BELOW IS NOT THE APPLICANT'S SIGNATURE, ATTACH LETTER OF AGENT AUTHORIZATION SIGNED BY THE APPLICANT.**

By signing below the applicant (or authorized agent), certifies that he or she has read and understood the following:

**CERTIFICATIONS / SIGNATURES**

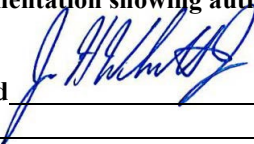
"I certify under penalty of law that I have personally examined the information submitted in this document and all attachments thereto and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the information is true, accurate, and complete. I am aware there are significant penalties for submitting false information, including the possibility of fine and imprisonment. I authorize the Department to enter the property that is the subject of this application, at reasonable hours, including buildings, structures or conveyances on the property, to determine the accuracy of any information provided herein.

Signed:  Title Agent Date: 10/10/2023

Notice of Intent to Comply with Maine Construction General Permit

With this Site Law application form and my signature, I am filing notice of my intent to carry out work which meets the requirements of the Maine Construction General Permit (MCGP). I have read and will comply with all of the MCGP standards.

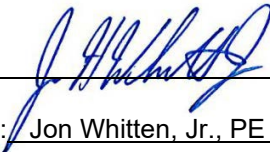
If this form is not being signed by the landowner or lessee of the property, attach documentation showing authorization to sign.

Signed  Date: 10/10/2023

**NOTE: You must file a MCGP Notice of Termination (Form K) within 20 days of completing permanent stabilization of the project site.**


**CERTIFICATION**

The person responsible for preparing this application and/or attaching pertinent site and design information hereto, by signing below, certifies that the application for development approval is complete and accurate to the best of his/her knowledge.

Signature:   
Name (print): Jon Whitten, Jr., PE  
Date: \_\_\_\_\_

Re/Cert/Lic No.: \_\_\_\_\_  
Engineer 10414  
Geologist \_\_\_\_\_  
Soil Scientist \_\_\_\_\_  
Land Surveyor \_\_\_\_\_  
Site Evaluator \_\_\_\_\_  
Active Member of the Maine Bar \_\_\_\_\_  
Professional Landscape Architect \_\_\_\_\_  
Other \_\_\_\_\_

*"I hereby authorize the DEP to send me an electronically signed decision on the license I am applying for with this application by emailing the decision to the address located on the front page of this application (see #5 for the applicant and #10 for the agent). Do not sign if you elect to "opt out" or receive the decision via regular mail.*

Signed (Applicant)  Date: \_\_\_\_\_  
and/or  
Signed (Agent) \_\_\_\_\_ Date: 10/10/2023

# Supplement S-5

Agent Authorization

For office use:

Tracking No.	Permit No.

## 1. AGENT INFORMATION

Agent Name(s) Ben Kaiman	Daytime Phone 207-989-4824	FAX (if applicable)
Business Name Haley Ward, Inc.		
Mailing Address 1 Merchants Plaza, Suite 701		Email (if applicable) bkaiman@haleyward.com
Town Bangor	State Maine	Zip Code 04401

## 2. LANDOWNER INFORMATION

\*If the applicant(s) listed on the application, to which this supplement relates, is/are NOT the landowner(s), please complete the landowner information below and then explain on what legal authority you are able to apply for permits on the landowner's behalf:

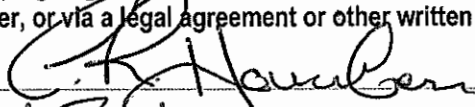
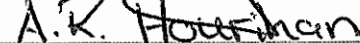
Submit as part of Exhibit B (or any other Exhibit regarding title, right, or interest), authority from the landowner to represent them in all land use matters.

Landowner Name(s) Allagash Timberlands LP	Daytime Phone (506) 636-1193	FAX (if applicable)
Mailing Address 1798 St. John Road	Email (if applicable) hourihan.anthony@eidirving.com	
Town Fort Kent	State ME	Zip Code 04743

## 3. AGENT AUTHORIZATION

I hereby authorize the individual or business listed above to act as my legal agent in all matters relating to my/our permit application(s). I understand that I am ultimately responsible for complying with all applicable regulations and with all conditions and limitations of any permits issued to me by the LUPC. I hereby authorize the agent (individual or business) to act as my legal agent in all matters relating to this permit application.

**Caution: The person(s) signing below must demonstrate that they have a legal right to apply for this permit, either as the landowner, lease holder, or via a legal agreement or other written contract with the landowner.**

Applicant Signature(s) 	Date Aug 22 / 2023
	Date

**SUBMISSIONS CHECKLIST**

If a provision is not applicable, put "NA"

**Section 1. Development description**

- \_\_\_\_\_ A. Narrative
  - \_\_\_\_\_ 1. Objectives and details
  - \_\_\_\_\_ 2. Existing facilities (with dates of construction)
- \_\_\_\_\_ B. Topographic map
  - \_\_\_\_\_ 1. Location of development boundaries
  - \_\_\_\_\_ 2. Quadrangle name
- \_\_\_\_\_ C. Construction plan
  - \_\_\_\_\_ 1. Outline of construction sequence (major aspects)
  - \_\_\_\_\_ 2. Dates
- \_\_\_\_\_ D. Drawings
  - \_\_\_\_\_ 1. Development facilities
    - \_\_\_\_\_ a. Location, function and ground area
    - \_\_\_\_\_ b. Length/cross-sections for roads
  - \_\_\_\_\_ 2. Site work (nature and extent)
  - \_\_\_\_\_ 3. Existing facilities (location, function ground area and floor area)
  - \_\_\_\_\_ 4. Topography
    - \_\_\_\_\_ a. Pre- and post-development (contours 2 ft or less)
    - \_\_\_\_\_ b. Previous construction, facilities and lot lines

\_\_\_\_\_ **Section 2. Title, right or interest** (copy of document)

**Section 3. Financial capacity**

- \_\_\_\_\_ A. Estimated costs
- \_\_\_\_\_ B. Financing
  - \_\_\_\_\_ 1. Letter of commitment to fund
  - \_\_\_\_\_ 2. Self-financing
    - \_\_\_\_\_ a. Annual report
    - \_\_\_\_\_ b. Bank statement
  - \_\_\_\_\_ 3. Other
    - \_\_\_\_\_ a. Cash equity commitment
    - \_\_\_\_\_ b. Financial plan
    - \_\_\_\_\_ c. Letter
  - \_\_\_\_\_ 4. Affordable housing information

**Section 4. Technical ability** (description)

- \_\_\_\_\_ A. Prior experience (statement)
- \_\_\_\_\_ B. Personnel (documents)

**Section 5. Noise**

- \_\_\_\_\_ A. Developments producing a minor noise impact (statement)
  - \_\_\_\_\_ 1. Residential developments
  - \_\_\_\_\_ 2. Certain non-residential subdivisions
  - \_\_\_\_\_ 3. Schools and hospitals
  - \_\_\_\_\_ 4. Other developments
    - \_\_\_\_\_ a. Type, source and location of noise
    - \_\_\_\_\_ b. Uses, zoning and plans
    - \_\_\_\_\_ c. Protected locations
    - \_\_\_\_\_ d. Minor nature of impact

- \_\_\_\_\_ e. Demonstration
- \_\_\_\_\_ B. Developments producing a major noise impact (full noise study)
- \_\_\_\_\_ 1. Baseline
- \_\_\_\_\_ a. Uses, zoning and plans
- \_\_\_\_\_ b. Protected locations
- \_\_\_\_\_ c. Quiet area
- \_\_\_\_\_ 2. Noise generated by the development
- \_\_\_\_\_ a. Type, source and location of noise
- \_\_\_\_\_ b. Sound levels
- \_\_\_\_\_ c. Control measures
- \_\_\_\_\_ d. Comparison with regulatory limits
- \_\_\_\_\_ e. Comparison with local limits

\_\_\_\_\_ **Section 6. Visual quality and scenic character**(narrative, description, visual impact analysis)

\_\_\_\_\_ **Section 7. Wildlife and fisheries** (narrative)

\_\_\_\_\_ **Section 8. Historic sites** (narrative)

\_\_\_\_\_ **Section 9. Unusual natural areas** (narrative)

**Section 10. Buffers**

- \_\_\_\_\_ A. Site plan and narrative

**Section 11. Soils**

- \_\_\_\_\_ A. Soil survey map and report
- \_\_\_\_\_ 1. Soil investigation narrative
- \_\_\_\_\_ 2. Soil survey map
- \_\_\_\_\_ B. Soil survey intensity level by development type
- \_\_\_\_\_ 1. Class A (High Intensity) Soil Survey
- \_\_\_\_\_ 2. Class B (High Intensity) Soil Survey
- \_\_\_\_\_ 3. Class C (Medium High-Intensity) Soil Survey
- \_\_\_\_\_ 4. Class D (Medium Intensity) Soil Survey
- \_\_\_\_\_ C. Geotechnical Investigation
- \_\_\_\_\_ D. Hydric soils mapping

**Section 12. Stormwater management**

- \_\_\_\_\_ A. Narrative
- \_\_\_\_\_ 1. Development location
- \_\_\_\_\_ 2. Surface water on or abutting the site
- \_\_\_\_\_ 3. Downstream ponds and lakes
- \_\_\_\_\_ 4. General topography
- \_\_\_\_\_ 5. Flooding
- \_\_\_\_\_ 6. Alterations to natural drainage ways
- \_\_\_\_\_ 7. Alterations to land cover
- \_\_\_\_\_ 8. Modeling assumptions
- \_\_\_\_\_ 9. Basic standard
- \_\_\_\_\_ 10. Flooding standard
- \_\_\_\_\_ 11. General standard
- \_\_\_\_\_ 12. Parcel size
- \_\_\_\_\_ 13. Developed area
- \_\_\_\_\_ 14. Disturbed area
- \_\_\_\_\_ 15. Impervious area
- \_\_\_\_\_ B. Maps
- \_\_\_\_\_ 1. U.S.G.S. map with site boundaries
- \_\_\_\_\_ 2. S.C.S. soils map with site boundaries
- \_\_\_\_\_ C. Drainage Plans (a pre-development plan and a post-development plan)



- \_\_\_\_\_ 1. Contours
- \_\_\_\_\_ 2. Plan elements
- \_\_\_\_\_ 3. Land cover types and boundaries
- \_\_\_\_\_ 4. Soil group boundaries
- \_\_\_\_\_ 5. Stormwater quantity subwatershed boundaries
- \_\_\_\_\_ 6. Stormwater quality subwatershed boundaries
- \_\_\_\_\_ 7. Watershed analysis points
- \_\_\_\_\_ 8. Hydrologic flow lines (w/flow types and flow lengths labeled)
- \_\_\_\_\_ 9. Runoff storage areas
- \_\_\_\_\_ 10. Roads and drives
- \_\_\_\_\_ 11. Buildings, parking lots, and other facilities
- \_\_\_\_\_ 12. Drainage system layout for storm drains, catch basins, and culverts
- \_\_\_\_\_ 13. Natural and man-made open drainage channels
- \_\_\_\_\_ 14. Wetlands
- \_\_\_\_\_ 15. Flooded areas
- \_\_\_\_\_ 16. Benchmark
- \_\_\_\_\_ 17. Stormwater detention, retention, and infiltration facilities
- \_\_\_\_\_ 18. Stormwater treatment facilities
- \_\_\_\_\_ 19. Drainage easements
- \_\_\_\_\_ 20. Identify reaches, ponds, and subwatersheds matching stormwater model
- \_\_\_\_\_ 21. Buffers
- \_\_\_\_\_ D. Runoff analysis (pre-development and post development)
  - \_\_\_\_\_ 1. Curve number computations
  - \_\_\_\_\_ 2. Time of concentration calculations
  - \_\_\_\_\_ 3. Travel time calculations
  - \_\_\_\_\_ 4. Peak discharge calculations
  - \_\_\_\_\_ 5. Reservoir routing calculations
- \_\_\_\_\_ E. Flooding Standard
  - \_\_\_\_\_ 1. Variance submissions (if applicable)
    - \_\_\_\_\_ a. Submissions for discharge to the ocean, great pond, or major river
      - \_\_\_\_\_ i. Map
      - \_\_\_\_\_ ii. Drainage plan
      - \_\_\_\_\_ iii. Drainage system design
      - \_\_\_\_\_ iv. Outfall design
      - \_\_\_\_\_ v. Easements
    - \_\_\_\_\_ b. Insignificant increase
      - \_\_\_\_\_ i. Downstream impacts
    - \_\_\_\_\_ c. Submissions for discharge to a public stormwater system
      - \_\_\_\_\_ i. Letter of permission
      - \_\_\_\_\_ ii. Proof of capacity
      - \_\_\_\_\_ ii. Outfall analysis and design (pictures)
  - \_\_\_\_\_ 2. Sizing of storm drains and culverts
  - \_\_\_\_\_ 3. Stormwater ponds and basins
    - \_\_\_\_\_ a. Impoundment sizing calculations
    - \_\_\_\_\_ b. Inlet calculations
    - \_\_\_\_\_ c. Outlet calculations
    - \_\_\_\_\_ d. Emergency spillway calculations
    - \_\_\_\_\_ e. Subsurface investigation report
    - \_\_\_\_\_ f. Embankment specifications
    - \_\_\_\_\_ g. Embankment seepage controls
    - \_\_\_\_\_ h. Outlet seepage controls
    - \_\_\_\_\_ i. Detail sheet
    - \_\_\_\_\_ j. Basin cross sections
    - \_\_\_\_\_ k. Basin plan sheet
  - \_\_\_\_\_ 4. Infiltration systems
    - \_\_\_\_\_ a. Well locations map
    - \_\_\_\_\_ b. Sand and gravel aquifer map
    - \_\_\_\_\_ c. Subsurface investigation report with test pit or boring logs

- \_\_\_\_\_ d. Permeability analysis
- \_\_\_\_\_ e. Infiltration structure design
- \_\_\_\_\_ f. Pollutant generation and transport analysis
- \_\_\_\_\_ g. Monitorings and operations plan
  - \_\_\_\_\_ i. Locations of storage points of potential contaminants
  - \_\_\_\_\_ ii. Locations of observation wells and infiltration monitoring plan
  - \_\_\_\_\_ iii. Groundwater quality monitoring plan
- \_\_\_\_\_ 5. Drainage easement declarations.
- \_\_\_\_\_ F. Stormwater quality treatment plan peak discharge calculations
  - \_\_\_\_\_ 1. Basic stabilization plan
    - \_\_\_\_\_ a. Ditches, swales, and other open channel stabilization
    - \_\_\_\_\_ b. Culvert and storm-drain outfall stabilization
    - \_\_\_\_\_ c. Earthen slope and embankment stabilization
    - \_\_\_\_\_ d. Disturbed area stabilization
    - \_\_\_\_\_ e. Gravel roads and drives stabilization
  - \_\_\_\_\_ 2. General Standard
    - \_\_\_\_\_ a. Calculations for sizing BMP
    - \_\_\_\_\_ b. Impervious area calculation
    - \_\_\_\_\_ c. Developed area calculation
    - \_\_\_\_\_ d. Summary spreadsheet of calculations
  - \_\_\_\_\_ 3. Phosphorus control plan
    - \_\_\_\_\_ a. Calculations for the site's allowable phosphorus export
    - \_\_\_\_\_ b. Calculations for determining the developed site's phosphorus export
    - \_\_\_\_\_ c. Calculations for determining any phosphorus compensation fees
  - \_\_\_\_\_ 4. Offset Credits
    - \_\_\_\_\_ a. Urban impaired stream
      - \_\_\_\_\_ Offset credit calculation
    - \_\_\_\_\_ b. Phosphorus credit determination
      - \_\_\_\_\_ i. Location map
      - \_\_\_\_\_ ii. Scaled plan
      - \_\_\_\_\_ iii. Title and right
      - \_\_\_\_\_ iv. Demolition plan
      - \_\_\_\_\_ v. Vegetation plan
      - \_\_\_\_\_ vi. Offset credit calculation
      - \_\_\_\_\_ vii. Calculation for the new allowable export
  - \_\_\_\_\_ 5. Runoff treatment measures
    - \_\_\_\_\_ a. structural measures
      - \_\_\_\_\_ i. Design drawings and specifications
      - \_\_\_\_\_ ii. Design calculations
      - \_\_\_\_\_ iii. Maintenance plan
      - \_\_\_\_\_ iv. TSS removal or phosphorus treatment factor determinations
      - \_\_\_\_\_ v. Stabilization plan
    - \_\_\_\_\_ b. Vegetated buffers
      - \_\_\_\_\_ i. Soil survey
      - \_\_\_\_\_ ii. Buffer plan
      - \_\_\_\_\_ iii. Turnout and level spreader designs
      - \_\_\_\_\_ iv. Deed restrictions
  - \_\_\_\_\_ 6. Control plan for thermal impacts to coldwater fisheries
  - \_\_\_\_\_ 7. Control plan for other pollutants
  - \_\_\_\_\_ 8. Engineering inspection of stormwater management facilities
- \_\_\_\_\_ G. Maintenance of common facilities or property
  - \_\_\_\_\_ 1. Components of the maintenance plan
    - \_\_\_\_\_ A. Maintenance of facilities by owner or operator
      - \_\_\_\_\_ 1. Site owner or operator (name legally responsible party)
      - \_\_\_\_\_ 2. Contact person responsible for maintenance
      - \_\_\_\_\_ 3. Transfer mechanism

- \_\_\_\_\_ 4. List of facilities to be maintained
- \_\_\_\_\_ 5. List of inspection and maintenance tasks for each facility
- \_\_\_\_\_ 6. Identifications of any deed covenants, easements, or restrictions
- \_\_\_\_\_ 7. Sample maintenance log
- \_\_\_\_\_ 8. Copies of any third-party maintenance contracts
- \_\_\_\_\_ B. Maintenance of facilities by homeowner's association
- \_\_\_\_\_ 1. Incorporation documents for the association
- \_\_\_\_\_ 2. Membership criteria
- \_\_\_\_\_ 3. Association officer responsible for maintenance
- \_\_\_\_\_ 4. Establishment of fee assessment for maintenance work
- \_\_\_\_\_ 5. Establishment of lien system
- \_\_\_\_\_ 6. Reference to department order(s) in association charter
- \_\_\_\_\_ 7. Transfer mechanism from developer to association
- \_\_\_\_\_ 8. List of facilities to be maintained
- \_\_\_\_\_ 9. Identification of any deed covenants, easements, or restrictions
- \_\_\_\_\_ 10. Renewal of covenants and leases
- \_\_\_\_\_ 11. List of inspection and maintenance tasks for each facility
- \_\_\_\_\_ 12. Sample maintenance log
- \_\_\_\_\_ 13. Copies of any third-party maintenance contracts
- \_\_\_\_\_ C. Maintenance of facilities by municipality or municipal district
- \_\_\_\_\_ 1. Identification of the municipal department or utility district
- \_\_\_\_\_ 2. Contact person responsible for maintenance
- \_\_\_\_\_ 3. Evidence of acceptance of maintenance responsibility
- \_\_\_\_\_ 4. Transfer mechanism from developer
- \_\_\_\_\_ 5. List of facilities to be maintained
- \_\_\_\_\_ 6. List of inspection and maintenance tasks for each facility
- \_\_\_\_\_ 7. Identifications of any deed covenants, easements, or restrictions
- \_\_\_\_\_ 8. Sample maintenance log
- \_\_\_\_\_ 2. General inspection and maintenance requirements
- \_\_\_\_\_ a. Drainage easements
- \_\_\_\_\_ b. Ditches, culverts, and catch-basin systems
- \_\_\_\_\_ c. Roadways and parking surfaces
- \_\_\_\_\_ d. Stormwater detention and retention facilities
- \_\_\_\_\_ 1. Embankment inspection and maintenance
- \_\_\_\_\_ 2. Outlet inspection and clean-out
- \_\_\_\_\_ 3. Spillway maintenance
- \_\_\_\_\_ 4. Sediment removal and disposal
- \_\_\_\_\_ e. Stormwater infiltration facilities
- \_\_\_\_\_ 1. Sediment protection plan
- \_\_\_\_\_ 2. Infiltration rehabilitation plan
- \_\_\_\_\_ 3. Sediment removal and disposal
- \_\_\_\_\_ 4. Groundwater monitoring plan
- \_\_\_\_\_ f. Proprietary treatment devices
- \_\_\_\_\_ g. Buffers
- \_\_\_\_\_ h. Other practices and measures

\_\_\_\_\_ **Section 13. Urban Impaired Stream Submissions**

- \_\_\_\_\_ 1. Off-site credits
- \_\_\_\_\_ 2. Compensation fees (Urban Impaired Stream/Phosphorus)
- \_\_\_\_\_ 3. Development impacts

\_\_\_\_\_ **Section 14. Basic Standards**

- \_\_\_\_\_ A. Narrative
- \_\_\_\_\_ 1. Soil types
- \_\_\_\_\_ 2. Existing erosion problems
- \_\_\_\_\_ 3. Critical areas
- \_\_\_\_\_ 4. Protected natural resources
- \_\_\_\_\_ 5. Erosion control measures

- \_\_\_\_\_ 6. Site stabilization
- \_\_\_\_\_ B. Implementation schedule
- \_\_\_\_\_ C. Erosion and sediment control plan
  - \_\_\_\_\_ 1. Pre-development and post-development contours
  - \_\_\_\_\_ 2. Plan scale and elements
  - \_\_\_\_\_ 3. Land cover types and boundaries
  - \_\_\_\_\_ 4. Existing erosion problems
  - \_\_\_\_\_ 5. Critical areas
  - \_\_\_\_\_ 6. Protected natural resources
  - \_\_\_\_\_ 7. Locations (general)
  - \_\_\_\_\_ 8. Locations of controls
  - \_\_\_\_\_ 9. Disturbed areas
  - \_\_\_\_\_ 10. Stabilized construction entrance
- \_\_\_\_\_ D. Details and specifications (for both temporary and permanent measures)
- \_\_\_\_\_ E. Design calculations
- \_\_\_\_\_ F. Stabilization plan
  - \_\_\_\_\_ 1. Temporary seeding
  - \_\_\_\_\_ 2. Permanent seeding
  - \_\_\_\_\_ 3. Sodding
  - \_\_\_\_\_ 4. Temporary mulching
  - \_\_\_\_\_ 5. Permanent mulching
- \_\_\_\_\_ G. Winter construction plan
  - \_\_\_\_\_ 1. Dormant seeding
  - \_\_\_\_\_ 2. Winter mulching
- \_\_\_\_\_ H. Third-party inspections
  - \_\_\_\_\_ 1. Inspector's name, address, and telephone number
  - \_\_\_\_\_ 2. Inspector's qualifications
  - \_\_\_\_\_ 3. Inspection schedule
  - \_\_\_\_\_ 4. Contractor contact
  - \_\_\_\_\_ 5. Reporting protocol

**Section 15. Groundwater**

- \_\_\_\_\_ A. Narrative
  - \_\_\_\_\_ 1. Location and maps
  - \_\_\_\_\_ 2. Quantity
  - \_\_\_\_\_ 3. Sources
  - \_\_\_\_\_ 4. Measures to prevent degradation
- \_\_\_\_\_ B. Groundwater protection plan
- \_\_\_\_\_ C. Monitoring plan
  - \_\_\_\_\_ 1. Monitoring points
  - \_\_\_\_\_ 2. Monitoring frequency
  - \_\_\_\_\_ 3. Background conditions
  - \_\_\_\_\_ 4. Monitoring parameters
  - \_\_\_\_\_ 5. Personnel qualifications
  - \_\_\_\_\_ 6. Proof of training
  - \_\_\_\_\_ 7. Equipment and methods
  - \_\_\_\_\_ 8. Quality assurance/quality control
  - \_\_\_\_\_ 9. Reporting requirements
  - \_\_\_\_\_ 10. Remedial action plan
- \_\_\_\_\_ D. Monitoring well installation report
  - \_\_\_\_\_ 1. Well location map
  - \_\_\_\_\_ 2. Elevation data
  - \_\_\_\_\_ 3. Well installation data
  - \_\_\_\_\_ 4. Well construction details
  - \_\_\_\_\_ 5. Borehole logs
  - \_\_\_\_\_ 6. Summary of depth measurements
  - \_\_\_\_\_ 7. Characteristics of subsurface strata
  - \_\_\_\_\_ 8. Well installation contract

- \_\_\_\_\_ 9. Schematic cross-sections
- \_\_\_\_\_ 10. Monitoring point summary table
- \_\_\_\_\_ 11. Protective casing
- \_\_\_\_\_ 12. On-site well identification

**Section 16. Water supply**

- \_\_\_\_\_ A. Water supply method
  - \_\_\_\_\_ 1. Individual wells (evidence of sufficient/healthful supply)
    - \_\_\_\_\_ a. Support of findings by well drillers
    - \_\_\_\_\_ b. Support of findings by geologist
  - \_\_\_\_\_ 2. Common well(s) (reports)
    - \_\_\_\_\_ a. Hydrogeology report
    - \_\_\_\_\_ b. Engineering report
    - \_\_\_\_\_ c. Well installation report
    - \_\_\_\_\_ d. Long-term safe yield and zone of influence determination
    - \_\_\_\_\_ e. Public water supply
      - \_\_\_\_\_ i. Proposed well or wells
      - \_\_\_\_\_ ii. Existing well or wells
      - \_\_\_\_\_ iii. Water quality analysis
  - \_\_\_\_\_ 3. Well construction in shallow-to-bedrock areas
  - \_\_\_\_\_ 4. Additional information
  - \_\_\_\_\_ 5. Off-site utility company or public agency
  - \_\_\_\_\_ 6. Other sources
- \_\_\_\_\_ B. Subsurface wastewater disposal systems (locations of systems and wells)
- \_\_\_\_\_ C. Total usage (statement re: total anticipated water usage)

**Section 17. Wastewater disposal**

- \_\_\_\_\_ A. On-site subsurface wastewater disposal systems (investigation results)
  - \_\_\_\_\_ 1. Site plan
  - \_\_\_\_\_ 2. Soil conditions summary table
  - \_\_\_\_\_ 3. Logs of subsurface explorations
  - \_\_\_\_\_ 4. Additional test pits, borings or probes
    - \_\_\_\_\_ a. Soil conditions A
    - \_\_\_\_\_ b. Soils with Profiles 8 and 9 parent material
    - \_\_\_\_\_ c. Soil conditions D
    - \_\_\_\_\_ d. Disposal field length 60 feet or greater
  - \_\_\_\_\_ 5. 3-bedroom design
  - \_\_\_\_\_ 6. Larger disposal systems
    - \_\_\_\_\_ a. System design details
    - \_\_\_\_\_ b. Plan view
    - \_\_\_\_\_ c. Cross sections
    - \_\_\_\_\_ d. Test pit data
    - \_\_\_\_\_ e. Mounding analysis
- \_\_\_\_\_ B. Nitrate-nitrogen impact assessment
  - \_\_\_\_\_ 1. When required
    - \_\_\_\_\_ a. Exempted\_\_\_\_\_
      - \_\_\_\_\_ i. Conventional systems meeting certain setbacks
      - \_\_\_\_\_ ii. Denitrification systems
    - \_\_\_\_\_ b. Special conditions and other exemptions
  - \_\_\_\_\_ 2. Assumptions
    - \_\_\_\_\_ a. Initial concentration
    - \_\_\_\_\_ b. Background concentration
    - \_\_\_\_\_ c. Contribution from development
    - \_\_\_\_\_ d. Mixing and dilution
    - \_\_\_\_\_ e. Severe-drought scenario
    - \_\_\_\_\_ f. Wastewater flow to subsurface wastewater disposal fields

- \_\_\_\_\_ 3. Assessment report minimum requirements
  - \_\_\_\_\_ a. Narrative and calculations
  - \_\_\_\_\_ b. Site plan
    - \_\_\_\_\_ i. Well locations
    - \_\_\_\_\_ ii. 10 mg/l and 8 mg/l isocons
    - \_\_\_\_\_ iii. Groundwater contours and groundwater flow divides
  - \_\_\_\_\_ c. References
- \_\_\_\_\_ 4. Denitrification systems
  - \_\_\_\_\_ a. Design plans and specifications
  - \_\_\_\_\_ b. Installation information
  - \_\_\_\_\_ c. Monitoring plan
  - \_\_\_\_\_ d. Maintenance
  - \_\_\_\_\_ e. Backup system
- \_\_\_\_\_ D. Municipal facility or utility company letter
- \_\_\_\_\_ E. Storage or treatment lagoons

- \_\_\_\_\_ **Section 18. Solid waste** (list: type, quantity, method of collection and location)
  - \_\_\_\_\_ A. Commercial solid waste facility (final disposal location)
  - \_\_\_\_\_ B. Off-site disposal of construction/demolition debris (final disposal location)
  - \_\_\_\_\_ C. On-site disposal of woodwaste/land clearing debris
    - \_\_\_\_\_ 1. Applicability of rules (evidence re: applicability of rules)
    - \_\_\_\_\_ 2. Burning of wood wastes
      - \_\_\_\_\_ a. Delineation on site plan
      - \_\_\_\_\_ b. Plans for handling unburned woodwaste and woodash
      - \_\_\_\_\_ c. Evidence of capacity to accept waste (approved facility)
      - \_\_\_\_\_ d. Usage of materials
      - \_\_\_\_\_ e. Data on mixing ratios and application rates
  - \_\_\_\_\_ D. Special or Hazardous Waste

- \_\_\_\_\_ **Section 19. Flooding**
  - \_\_\_\_\_ A. Explanation of flooding impact
  - \_\_\_\_\_ B. Site plan showing 100-year flood elevation
  - \_\_\_\_\_ C. Hydrology analysis
  - \_\_\_\_\_ D. FEMA flood zone map with site boundaries

- \_\_\_\_\_ **Section 20. Blasting**
  - \_\_\_\_\_ A. Site Plan or map
  - \_\_\_\_\_ B. Report
    - \_\_\_\_\_ 1. Assessment
    - \_\_\_\_\_ 2. Blasting plan

- \_\_\_\_\_ **Section 21. Air emissions** (narrative and summary)
  - \_\_\_\_\_ A. Point and non-point sources identified
  - \_\_\_\_\_ B. Emission components (point sources)

- \_\_\_\_\_ **Section 22. Odors**
  - \_\_\_\_\_ A. Identification of nature/source
  - \_\_\_\_\_ B. Estimate of areas affected
  - \_\_\_\_\_ C. Methods of control)

\_\_\_\_\_ **Section 23. Water vapor** (narrative)

\_\_\_\_\_ **Section 24. Sunlight** (statement and drawing, if required)

- \_\_\_\_\_ **Section 25. Notices**
  - \_\_\_\_\_ A. Evidence that notice sent
  - \_\_\_\_\_ B. List of abutters for purposes of notice

**Supplemental requirements for Wind Energy Developments only:**

**Section 26. Shadow flicker**

- \_\_\_\_\_ A. A copy of the Windpro Analysis and associated narrative

**Section 27. Public Safety**

- \_\_\_\_\_ A. Design safety certifications or other documents attesting to the safety of the wind turbine equipment.
- \_\_\_\_\_ B. Evidence pertaining to overspeed controls
- \_\_\_\_\_ C. Site plan documenting safety setbacks zones for each wind turbine
- \_\_\_\_\_ D. Other documents as necessary to demonstrate safety considerations

**Section 28. Tangible Benefits**

- \_\_\_\_\_ A. Narrative demonstration of tangible benefits

**Section 29. Decommissioning**

- \_\_\_\_\_ A. Description of implementation trigger for decommissioning
- \_\_\_\_\_ B. Description of extent of decommissioning
- \_\_\_\_\_ C. Itemization of total cost to complete decommissioning
- \_\_\_\_\_ D. Demonstration of financial assurance for completeness of decommissioning plan

**Section 30. Generating Facility-visual Quality and Scenic Character**

- \_\_\_\_\_ A. (narrative, description, visual impact analysis)



**SECTION 1**  
**DEVELOPMENT DESCRIPTION**





## DEVELOPMENT DESCRIPTION

### Revised February 2024

#### Objective and Details

Irving Woodlands, LLC is proposing to create a 17-lot subdivision development in Cross Lake Township, Maine. Each lot will have one single-family home and will be served by its own private water supply well. Lot sizes vary from approximately one to three acres.

The project site is to be located on an approximately 96-acre parcel that is mostly forested and undeveloped. The parcel is located off West Side Road, just south of Cross Lake.

#### Topographic Map

Please refer to the enclosed location map.

#### Construction Plan

Construction is anticipated to begin in June 2024 and last approximately eight months. Construction will be limited to the access roadway and trail, as depicted on the enclosed Plan Set.

#### Drawings

Please refer to the enclosed Site Plan Set.



**SECTION 2**

**TITLE, RIGHT OR INTEREST**

### Quitclaim Deed with Covenant

Consolidated Rambler Mines, Limited, an Ontario corporation, with a place of business in Saint John, New Brunswick, Canada, for consideration paid, grants to Allagash Timberlands LP, a Maine limited partnership with a mailing address of R.R.#3, Box 436, Fort Kent, Maine 04743, with Quitclaim Covenant, the property situated in Aroostook County, Maine, more particularly described in Schedule A attached hereto.

The property is conveyed together with all estates, tenements, hereditaments and appurtenances belonging thereto, except to the extent of any limitations specifically set forth herein.

It is the intent of the Grantor to convey to the Grantee and there is hereby conveyed all of Grantor's right, title and interest in the property, whether or not said interest is specifically described herein or in Schedule A, and without limitation by any fraction or decimal set forth in Schedule A, including, but not limited to all real property, improvements, buildings, flowage, estates, tenements, hereditaments, and appurtenances to the premises herein conveyed, except as expressly set forth herein.

In witness whereof, Consolidated Rambler Mines, Limited, has caused this instrument to be signed in its corporate name as an instrument under seal, by W.D. Jamieson its President and W.J. Dever its Secretary, hereunto duly authorized, as of the 1st day of March, 1999.

Witness:

Consolidated Rambler Mines, Limited

Randy Mac Millan

By: W.D. Jamieson  
Name: W. D. Jamieson  
Capacity: President

Randy Mac Millan

By: W.J. Dever  
Name: W. J. Dever  
Capacity: Secretary

MAINE  
REAL ESTATE  
TRANSFER TAX  
PAID



STATE OF NEW YORK )  
 ) ss.  
COUNTY OF NEW YORK )

On the 1<sup>st</sup> day of March 1999, before me personally came ~~W.D. Jamieson~~ to me known, who, being by me duly sworn, did depose and say that he resides at Rothesay, New Brunswick; that he is the President of **CONSOLIDATED RAMBLER MINES, LIMITED**, an Ontario corporation, the corporation described in and which executed the above instrument; and that he signed his name thereto as a duly authorized officer of the said corporation; and that he signed the same as the voluntary act and deed of said corporation.



*Shannabel Latham*

Notary Public  
[Notarial Seal] SHANNABEL LATHAM  
NOTARY PUBLIC, State of New York  
No. 41-4889335  
Qualified in Queens County  
Certificate Filed in New York County  
Commission Expires April 13, 1999

STATE OF NEW YORK )  
 ) ss.  
COUNTY OF NEW YORK )

W.J. Dever

On the 1<sup>st</sup> day of March 1999, before me personally came ~~W.D. Jamieson~~ to me known, who, being by me duly sworn, did depose and say that he resides at Rothesay, New Brunswick; that he is the Secretary of **CONSOLIDATED RAMBLER MINES, LIMITED**, an Ontario corporation, the corporation described in and which executed the above instrument; and that he signed his name thereto as a duly authorized officer of the said corporation; and that he signed the same as the voluntary act and deed of said corporation.



*Shannabel Latham*

Notary Public  
[Notarial Seal]  
SHANNABEL LATHAM  
NOTARY PUBLIC, State of New York  
No. 41-4889335  
Qualified in Queens County  
Certificate Filed in New York County  
Commission Expires April 13, 1999

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## SCHEDULE A

**First (Allagash):**

A certain lot or parcel of land situated in Allagash Township (formerly Township 16, Range 10, W.E.L.S.), in the County of Aroostook and State of Maine, bounded and described as follows:

Beginning at a post and stones on the south line of Township sixteen (16), Range ten (10), at a point 92.82 chains South 68° East from the southwest corner of the town, the above mentioned post and stones being the starting point for a division line; thence on and along said division line North 22° East, a distance of 361.60 chains, more or less, to a post and stones on the south line of the William Gardner lot; thence South 64° East on and along the south line of the William Gardner lot, a distance of 31.40 chains, more or less, to a post and stones, being the southeast corner of the lot; thence northeasterly along the east bank of the Allagash River by an irregular course South 39° East a distance of 0.80 chains and South 79° 45' East a distance of 3.03 chains and North 89° East a distance of 3.03 chains and North 74° 45' East a distance of 5.12 chains and North 53° 45' East a distance of 4.95 chains, all distances, more or less, to a point on the east bank of the Allagash River, said point being the intersection of the west line of the so-called John Gardner lot with the Allagash River; thence South 28° 30' West on and along said west line a distance of 3.75 chains more or less, to a post and stones; thence, continuing on and along said west line a distance of 24.80 chains, more or less, to a post and stones, being the southwest corner of the John Gardner lot; thence South 61° 30' East on and along the south line of the said lot, a distance of 25.00 chains, more or less, to a post and stones, being the southeast corner of the John Gardner lot; thence North 29° East a distance of 11.50 chains, more or less, to a post and stones, being the southwest corner of Reserved Lot No. 3; thence North 87° East on and along the south line of said lot and Lot 2 a distance of 110.67 chains, more or less, to a post and stones, being the southeast corner of Lot No. 2; thence South 8° East a distance of 1.60 chains, more or less, to the southwest corner of Lot No. 1, formerly Sarah Gardner lot; thence North 87° East on and along the south line of said lot a distance of 15.00 chains, more or less, to the southeast corner of said lot; thence North 8° West on and along the east line of said lot a distance of 38.55 chains, more or less, to a point on the south bank of the St. John River; thence easterly along the south bank of the St. John River, the south bank being bounded by an irregular course South 73° East, a distance of 6.09 chains and South 84° East, a distance of 9.12 chains, and South 82° East, a distance of 4.53 chains, and South 83° East, a distance of 9.40 chains, all distances, more or less, to a post and stones on the bank of the St. John River, said post and stones being the northwest corner of the Public Lot as surveyed out in 1947; thence South 18° East on and along the west line of Public Lot, a distance of 19.83 chains, more or less, to a post and stones on said line set on the south side of Public Highway No. 161; thence continuing along said line a distance of 60.93 chains, more or less, to a post and stones, being the southwest corner of said Public Lot; thence North 72° East on and along the south line of Public Lot a distance of 123.00 chains, more or less, to a post and stones, being the southeast corner of Public Lot; thence North 18° West on and along the east line of Public Lot, a distance of 63.00 chains, more or less, to a post and stones, being the southwest corner of Settlers' Lots; thence

North 84° East on and along the south line of Settlers' Lots, a distance of 13.81 chains, more or less, to a post on the south line of Settlers' Lots; thence South 70° East on and along the south line of Settlers' Lots a distance of 67.46 chains, more or less, to a post and stones on the east line of Township 16, Range 10; thence South 22° West on and along the east line of town, a distance of 507.51 chains, more or less, to a post and stones, being the southeast corner of Township 16, Range 10, thence North 68° West on and along the south line of Township 16, Range 10, a distance of 385.90 chains, more or less, to a post and stones, being the starting point of a division line and the point of beginning.

Excepting and reserving from the above described premises the following:

(a) That part of Lot 15 conveyed by Alex Moir to Frank Hinckley, et als as set forth in a deed from Alex Moir to Isabelle Hinckley, et als dated August 12, 1911, recorded in said Registry of Deeds in Book 69, Page 108.

(b) A lot of 5.10 acres for State Highway "771" as described in a deed from International Paper Company to the State of Maine dated April 24, 1964, recorded in said Registry of Deeds in Book 322, Page 1.

Subject to Flowage rights on the Saint John River granted Saint John Realty Company by American Realty Company in an instrument dated November 26, 1929 and recorded with said Registry of Deeds in Book 128, Page 14.

For source of title see deed of International Paper Company to Consolidated Rambler Mines Limited dated January 9, 1984 and recorded in Book 613, Page 01, of the Aroostook County Registry of Deeds (Northern Division).

For source of title see a deed from Rollande Lynch to Consolidated Rambler Mines, Limited, dated October 23, 1990 and recorded in Book 819, Page 175 of the Aroostook County Registry of Deeds (Northern Division).

Further subject as applicable to the terms of an Amended Judgment of Maine Superior Court, Aroostook County, in the Civil Action entitled Elmer Roy Hafford, et al v. Consolidated Rambler Mines, Ltd., Docket No. CV-93-219, a copy of which is recorded in Book 1108, Page 323, of the Aroostook County Registry of Deeds.

**Second (Allagash):**

A certain lot or parcel of land situated in Allagash, formerly Township 16, Range 11, W.E.L.S., in the County of Aroostook and State of Maine:

Beginning at a post and stones at the southwest corner of Township 16, Range 11; thence North 21° 30' East along the west line of Township 16, Range 11, a distance of 390.40 chains to a post and stones on the crest of the south bank of the St. John River, and being the northwest corner of said Township 16, Range 11; thence easterly along a traverse of the south shore of the St. John River, said traverse following along average high water mark, as determined by the demarcation line of gravel beach and grassy bank.

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STATION 0. Being post and stones at crest of the bank to Station 1, North 21° and 30' East 0.77 chains.

STA. 1 to STA. 2A	South 86° 37' East	5.58 chains
" 2A " 1C	South 85° 57' East	10.35 "
" 1C " 2	North 69° 56' East	14.72 "
" 2 " 2B	North 59° 03' East	22.58 "
" 2B " 3	North 40° 55' East	6.76 "
" 3 " 4	North 40° 53' East	17.42 "
" 4 " 5	North 61° 58' East	6.64 "
" 5 " 6	North 80° 28' East	3.58 "
" 6 " 7	North 85° 41' East	3.18 "
" 7 " 8	South 86° 03' East	3.42 "
" 8 " 9	South 83° 40' East	27.58 "
" 9 " 10	South 64° 30' East	15.15 "
" 10 " 11	South 56° 53' East	12.17 "
" 11 " 12	South 53° 51' East	6.70 "
" 12 " 13	South 43° 35' East	15.23 "
" 13 " 14	South 35° 19' East	18.32 "
" 14 " 15	South 35° 18' East	25.30 "
" 15 " 16	South 18° 48' East	14.80 "
" 16 " 17	South 14° 04' East	6.79 "
" 17 " 18	South 8° 18' East	16.21 "
" 18 " 18A	South 4° 00' East	3.18 "
" 18A " 18B	South 7° 55' East	5.81 "
" 18B " 18C	South 29° 41' East	10.36 "
" 18C " 20B	South 12° 01' East	9.47 "
" 20B " 20	South 75° 33' East	23.27 "
" 20" " 20D	South 9° 04' West	0.95 "

Station 20D being a post and stones at north end of Division line on crest of south bank of St. John River; thence South 21° 30' West on and along said Division line; this line being newly run out and spotted and painted tangerine yellow by Surveyors Sinclair and Holman, June 1949, a distance of 375.92 chains to post and stones; being the south end of Division line and located on the south line of Township 16, Range 11, a distance of 88.31 chains west of Base Line Number 1; thence North 68° 50' West on and along south line of Township 16, Range 11, a distance of 232.98 chains to a post and stones; being the southwest corner of Township 16, Range 11, and the point of beginning.

Excepting and reserving from the above described premises the following:

(a) A 90-rod strip of land running from the St. John River near Carter Brook and extending southerly one mile described in a deed from David Jackson, et als, to Charles Jackson dated July 16, 1946, recorded in said Registry of Deeds in Book 210, Page 249, and also described in a deed from David Jackson, et als, to Charles Jackson dated July 16, 1946, recorded in said Registry of Deeds in Book 213, Page 113.

(b) A small lot of land on the main highway road in Allagash Plantation described in a deed from Charles L. Jackson to Marie Anne Jackson dated January 18, 1947, recorded in said Registry of Deeds in Book 209, Page 559.

(c) The "Harris Farm" as described in a deed from Hamp Jackson to Charles Jackson dated April 18, 1942, recorded in said Registry of Deeds in Book 208, Page 348.

(d) A lot on the St. John River containing 94 acres, more or less, adjacent to the west line of Treaty Lot number (1) as described in a deed from Charles R. Jackson to Great Northern Paper Company dated December 15, 1948, recorded in said Registry of Deeds in Book 215, Page 190.

For source of title see deed of International Paper Company to Consolidated Rambler Mines Limited dated January 9, 1984 and recorded in Book 613, Page 01, of the Aroostook County Registry of Deeds (Northern Division).

### **Third (Allagash):**

All of the lands in Allagash formerly known as Township 17, Range 10, W.E.L.S., in the County of Aroostook and State of Maine.

Excepting and reserving from the above described premises the Public Lots located in said Township 17, Range 10, W.E.L.S.

Subject to Flowage rights on the Saint John River granted Saint John Realty Company by American Realty Company in an instrument dated November 26, 1929 and recorded with said Registry of Deeds in Book 128, Page 14.

For source of title see deed of International Paper Company to Consolidated Rambler Mines Limited dated January 9, 1984 and recorded in Book 613, Page 01, of the Aroostook County Registry of Deeds (Northern Division).

### **Fourth (Allagash):**

A 16/27 (.5925926) interest in and to a 1,567 acre parcel of land situated in Allagash, formerly Township 17, Range 11, W.E.L.S., in the County of Aroostook and State of Maine:

Beginning at a cedar post surrounded with stones on the north bank of the St. John River on the west line of Township numbered 17, Range 11, W.E.L.S. marked on the west "T 16 R. 12", on the east "17 R. 11", and "1936", and witnessed "1936"; thence north 22° east two hundred and seventy-one chains (271.00) to a cedar post and stones, marked on the northeast "Coe", on the southeast "A.R. Co. et als", on the west "1936", and witnessed "1936", being the northwest corner thereof; thence south 68° east sixty-six (66) chains and fifty (50) links, more or less, to a cedar post surrounded with stones being marked on the northwest "Coe", on the southeast "Coe", on the southwest "A.R. Co. et als", on the northeast "1936", and witnessed "1936", being the



northeast corner thereof; thence South 22° west two hundred and four chains (204) and eighty (80) links to a cedar post surrounded with stones on the north bank of the St. John River being marked on the west "A.R. Co. et als", on the east "Coe", on the south "1936", and witnessed "1936", being the southeast corner thereof; thence westerly by and along the St. John River to the point of beginning, containing 1576 acres, be the same more or less, as surveyed and the spots painted with red paint during 1936 by Frank M. Call.

Reference is also made to plan recorded in said Registry of Deeds captioned "TOWNSHIP 17, RANGE 11, W.E.L.S. AROOSTOOK COUNTY, MAINE, TO ACCOMPANY REPORT OF COMMISSIONERS FOR PARTITION SCALE: 1"=40 chains September, 1936."

For source of title see deed of International Paper Company to Consolidated Rambler Mines Limited dated January 9, 1984 and recorded in Book 613, Page 01, of the Aroostook County Registry of Deeds (Northern Division).

#### **Fifth (Caswell Plantation):**

Certain lots or parcels of land situated in Caswell Plantation, County of Aroostook, State of Maine, bounded and described as follows:

(A) The following lots of land situated in Caswell Plantation, in the County of Aroostook and State of Maine: Lots numbered one (1), two (2), three (3), four (4), five (5), six (6), seven (7), eight (8), twenty-five (25), twenty-six (26), twenty-seven (27), twenty-eight (28), twenty-nine (29), thirty (30), thirty-one (31), thirty-two (32), forty-five (45), forty-six (46), forty-seven (47), forty-eight (48), forty-nine (49), fifty (50), fifty-one (51), fifty-two (52), fifty-five (55), fifty-six (56), fifty-seven (57), fifty-eight (58), fifty-nine (59), sixty (60), sixty-one (61), sixty-two (62), seventy-one (71), seventy-two (72), seventy-three (73), seventy-four (74), seventy-five (75), seventy-six (76), seventy-seven (77), seventy-eight (78), seventy-nine (79), eighty (80), eighty-five (85), eighty-six (86), eighty-seven (87), eighty-eight (88), eighty-nine (89), ninety (90), ninety-one (91), ninety-two (92), ninety-three (93), ninety-four (94), one hundred two (102), one hundred three (103), one hundred four (104), one hundred five (105), one hundred six (106), one hundred seven (107), one hundred eight (108), one hundred seventeen (117), one hundred twenty (120), one hundred twenty-one (121), one hundred twenty-two (122), one hundred thirty-five (135), and one hundred thirty-six (136), said lots being wild land.

Excepting and reserving, however, the south half of lot numbered one hundred eight (108), and the north half of lot numbered one hundred twenty-two (122).

Also excepting and reserving that parts of lots numbered one hundred two (102), one hundred three (103), and one hundred seventeen (117), covered by the United States Government taking dated July 2, 1948, and recorded in Book 220, Page 630 of the Aroostook County Registry of Deeds (Northern Division), containing one hundred eleven and seven tenths (111.7) acres, more or less.

Subject to an easement granted by Macwahoc Company to Maine Public Service Company dated October 15, 1963, and recorded in Book 318, Page 524.

(B) Also a right of way for all purposes in common with others across farm premises now or formerly owned or occupied by Randolph Turcotte situated in said Caswell Plantation, over a farm road beginning at a point on the westerly limit of the so-called *Limestone—Van Buren Road* and extending in a westerly direction to a point on the easterly limits of the south half of lot numbered one hundred eight (108), and the north half of lot numbered one hundred twenty-two (122) lot lines in said Caswell Plantation as more particularly described in quitclaim deed from Randolph Turcotte to Wallace E. Woodman dated July 6, 1946, and recorded in the Northern District of the Aroostook Registry of Deeds in Book 208, Page 135, reference thereto being made and had.

(C) Certain lot or parcel of land situated in Caswell Plantation, County of Aroostook, State of Maine, bounded and described as follows:

One hundred fifty (150) acres of lot numbered one hundred eighteen (118), situated in the Plantation of Caswell, in the County of Aroostook and State of Maine, bounded on the north by land now or formerly owned or occupied by Wallace Woodman; on the east by land now or formerly owned or occupied by Elwood and Omer O'Neal; on the south by land now or formerly owned or occupied by Griffin and Rushmore; and on the west by the land now or formerly owned or occupied by Wallace Woodman.(D) A certain lot or parcel of land situated in Caswell Plantation, County of Aroostook, State of Maine:

Lot numbered Ninety-nine (99) according to the survey and plan of Township Letter "F", Range One, W.E.L.S., now said Caswell Plantation in said County of Aroostook, as made and returned to the State Land Office in 1861, by Benjamin F. Cutter, Surveyor.

The Grantor also conveys to the Grantee, its successors and assigns, access from the so-called Woodman Road in said Caswell Plantation to the southeast corner of Lot 113 for purposes of ingress, egress and regress, which right to way shall extend from that portion of said Woodman Road located on the northwesterly corner of Lot 128 in said Plantation, to said southeasterly corner of Lot 113, consisting of 160 acres, more or less.

(E) A certain lot or parcel of land situated in Caswell Plantation, County of Aroostook, State of Maine:

Lot Numbered One Hundred Thirteen (113) according to the survey and plan of Township Letter "F", Range One, W.E.L.S., now said Caswell Plantation in said County of Aroostook, as made and returned to the State Land Office in 1861, by Benjamin F. Cutter, Surveyor.

As to parcels D & E, Subject to the following rights and reservations:

1. Motion to Amend Petition for Condemnation by the United States of America, dated March 3, 1948, recorded in Book 213, Page 571.

2. Judgment on the Declaration of Taking No. 3 by the United State of America, dated March 24, 1948, and recorded in Book 220, Page 1.
3. Judgment on the Declaration of Taking No. 4 by the United States of America, dated July 2, 1948, and recorded in Book 220, Page 23.
4. Judgment on the Declaration of Taking No. 5 by the United States of America, recorded July 9, 1948, and recorded in Book 220, Page 30.
5. Motion to Amend Petition for Condemnation by the United States of America, recorded May 9, 1951, in Book 223, Page 539.
6. Judgment on the Declaration of Taking by the United States of America, recorded April 21, 1955, in Book 253, Page 203.

Easement granted by George White and Mildred White to New England Telephone and Telegraph Company, dated June 30, 1965, and recorded in Book 333, Page 191.

The Grantor also conveys to the Grantee, its successors and assigns, access from the so-called Woodman Road in said Caswell Plantation to the southeast corner of Lot 113 for purposes of ingress, egress and regress, which right to way shall extend from that portion of said Woodman Road located on the northwesterly corner of Lot 128 in said Plantation, to said southeasterly corner of Lot 113, consisting of 160 acres, more or less.

For source of title see deed from Macwahoc Company to Consolidated Rambler Mines, Limited dated July 13, 1993 and recorded in Book 913, Page 213, of the Aroostook County Registry of Deeds (Northern Division).

**Sixth (Connor):**

The following described land in Connor, Aroostook County, Maine: A parcel of land situate in the Northeast corner of said Town of Connor, described as follows: Bounded on the north by the north line of the Town; on the east by the east line of the Town; on the south by land formerly owned by John B. Roberts and Orman L. Keyes, and by Lot numbered Fifty (50), now or formerly owned by one Fisher and known as the Fisher Lot; on the west by the center line of said Town and said Fisher Lot, containing four thousand six hundred (4,600) acres, more or less.

Being the same premises described in a deed from the Town of Connor dated August 2, 1943 and recorded in the Northern Aroostook Registry of Deeds in Book 195, Page 64.

For source of title see deed from Great Northern Nekoosa Corporation to Consolidated Rambler Mines Limited, dated December 16, 1988, and recorded in Book 770, Page 75, of the Aroostook County Registry of Deeds (Northern Division).

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**Seventh (Connor):**

A certain parcel of land situated in the east half of the Town of Connor, in said County of Aroostook, bounded and described as follows:

Commencing on the west Caswell line at the northeast corner of lot numbered twenty-eight (28); thence north on said Caswell line three hundred fifty-four (354) rods to a white birch post marked "1921" "Town line Connor"; thence westerly parallel to the north line of said lot numbered twenty-eight (28), five hundred eighty-five (585) rods, more or less, to the center of the West Branch of Black Brook; thence southerly along the center of said Black Brook to the northwest corner of lot numbered thirty-one (31); thence along the north and east lines of lot numbered thirty-one (31) to the northwest corner of lot numbered nineteen (19); thence easterly along the north lines of lot numbered nineteen (19), twenty-one (21), twenty-two (22), twenty-four (24), twenty-six (26) and twenty-eight (28) to the place of beginning.

Excepting and reserving, however, the following described parcels of land: Fifty (50) acres on the north side of lot numbered thirty-one (31), bounded on the south by the north line of said lot numbered thirty-one (31), on the east by the east line of lot numbered thirty-one (31) extending northerly, on the west by the West Branch of Black Brook, and on the north by a line parallel with the north line of lot numbered thirty-one (31); also the gore of lot numbered nineteen (19), bounded by the north line of said lot, the east and west sides of said lot extended north and the east branch of Black Brook on the north, containing twenty-nine and two tenths (29.2) acres; also the gore of lot numbered twenty-one (21), bounded on the north by said Brook; also the gore of lot numbered twenty-two (22) and extended north far enough to contain fifty-one (51) acres; also the gore of lot numbered twenty-four (24) extended far enough north to contain fifty (50) acres.

Lots 19 through 28 referred to above are depicted on the plan recorded at Book 17, Page 666 of the Aroostook County Registry of Deeds (Northern Division).

For source of title see deed from Macwahoc Company to Consolidated Rambler Mines, Limited dated July 13, 1993 and recorded in Book 913, Page 213, of the Aroostook County Registry of Deeds (Northern Division).

**Eighth (Grand Isle):**

A certain tract of land situated in the Town of Grand Isle, County of Aroostook and State of Maine, described as follows:

All of Lots 22 through 26 inclusive; 56 through 66 inclusive; 69 through 83 inclusive; and 85 through 97 inclusive, containing seven thousand six hundred twenty-three (7,623) acres, more or less.

**SUBJECT TO** the reservations and restrictions contained in said deed.

For source of title see a deed from Great Northern Nekoosa, dated December 16, 1988 and recorded in Book 770, Page 75 of the Aroostook County Registry of Deeds (Northern Division).

**Ninth (New Canada Plantation):**

PARCEL ONE: A certain lot or parcel of land situated in New Canada Plantation (Township 17, Range 6, W.E.L.S.), in the County of Aroostook and State of Maine, being all of Lot numbered forty-six (46) in the south half of Township 17, Range 6, New Canada Plantation, containing two hundred twenty-three (223) acres, more or less.

PARCEL TWO: The south one-half of said New Canada Plantation (Township 17, Range 6, W.E.L.S.), excepting however, the Public Lot and Lots numbered one, two, three, seven, eight, twelve, thirteen and that part of lot numbered fourteen which lies westerly of Sly Brook, and lots numbered fifteen, sixteen, seventeen, twenty-three, twenty-four, thirty-five and thirty-six. The premises hereby described contains nine thousand four hundred forty-nine and forty-two hundredths (9,449.42) acres, more or less.

Subject to an easement granted to the State of Maine by deed dated October 19, 1990 and recorded in Book 821, Page 179 of the Aroostook County Registry of Deeds (Northern Division)..

For source of title see deed of International Paper Company to Consolidated Rambler Mines Limited dated January 9, 1984 and recorded in Book 613, Page 01, of the Aroostook County Registry of Deeds (Northern Division).

**Tenth (St. Francis):**

The following described lots in the southeast portion of St. Francis, being Township 17, Range 9, W.E.L.S., in the County of Aroostook and State of Maine, as shown on plan captioned Map of St. Francis Plantation, Aroostook County, Maine, by E. McCourt Macy, Engineer, dated June, 1921, recorded in the Aroostook County Registry of Deeds, Northern District, Plan Book 1, Page 13:

Lots 18, 19, 32 through 43, 45, 47, 48, 49, 51, 55 through 65, 68 through 71, the south half of Lot 73, 74 through 76, 78 through 81, 83 through 90, 92 through 95, 97 through 101, 111, 122, 127, and the block shown in the southeast corner of said town on said plan captioned: "1,625 Acs. A.R. Co. 3/4 1,218.75";

Lot 17 except for premises described in a deed from Ansel L. Lumbert, William Engel, Jennie Wilson and Elaine Wilson to Charles Nadeau dated October 22, 1904, recorded in said Registry of Deeds in Book 51, Page 251;

That portion of Lot 30 described in a deed from Saint John Realty Company to International Paper Company dated September 22, 1967, recorded in said Registry of Deeds in Book 355, Page 75;

Lot 119 except for those premises described in (i) a deed from Ansel L. Lumbert, William Engel, Jennie Wilson and Elaine Wilson to Daniel Thibodeau dated October 22, 1904, recorded in said Registry of Deeds in Book 49, Page 474; and in (ii) a deed from Ansel L. Lumbert, William Engel, Jennie Wilson and Elaine Wilson to Fred Thibodeau dated October 22, 1904, recorded in said Registry of Deeds in Book 51, Page 61;

Lot 123 except for premises described in a deed from Ansel L. Lumbert, William Engel, Jennie Wilson and Elaine Wilson to Rosanna Sturgeon dated October 22, 1904, recorded in said Registry of Deeds in Book 49, Page 438.

Excepting and reserving from Lots 34 and 35 a seven acre parcel of land described in a deed from Inhabitants of St. Francis to Maynard Thibodeau and Josie Thibodeau dated February 23, 1978, recorded in said Registry of Deeds in Book 472, Page 273.

Also excepting and reserving from said Lot 30 the premises described in a tax lien to the Town of St. Francis dated May 28, 1970, recorded in said Registry of Deeds in Book 378, Page 586.

For source of title see deed of International Paper Company to Consolidated Rambler Mines Limited dated January 9, 1984 and recorded in Book 613, Page 01, of the Aroostook County Registry of Deeds (Northern Division).

SUBJECT TO an easement granted by Consolidated Rambler Mines, Limited to Maine Public Service recorded in Book 744, Page 67 of the Aroostook County Registry of Deeds (Northern Division) to erect, maintain, repair, rebuild, operate and patrol electric transmission, distribution, and communication lines.

#### **Eleventh (St. John Plantation):**

The following described real estate situated in St. John Plantation, being Township 17, Range 8, W.E.L.S., in the County of Aroostook and State of Maine:

PARCEL ONE: A certain lot or parcel of land in said St. John Plantation, bounded and described as follows: Beginning at a cedar post in the easterly line of said Township, said post being one hundred and thirty-two chains (132) northerly of the southeast corner, said post being marked "I.P. Co." on the northerly side and "G.N.P. Co." on the southerly side; thence northerly along said easterly line to an old post at the southeast corner of the Public Lot; thence westerly along southerly boundary of the Public Lot to its southwest corner; thence northerly along the westerly boundary of Public Lot to its northwest corner in the old center line of said township; thence westerly along said center line to its intersection with the westerly boundary of said township; thence southerly along said westerly boundary, a distance of one hundred and ninety-two and thirty-five hundredths (192.35) chains to a new cedar post marked "I.P. Co." on the northerly side and "G.N.P. Co." on the southerly side; thence

easterly along new line established as the division line a distance of four hundred and eighty and ten hundredths (480.10) chains to the cedar post at the point of beginning.

PARCEL TWO: Certain lot or parcels of land situated in the north part of said St. John Plantation, being all the unlotted land lying north of the "Four Mile Strip" so-called, and portions of Lot 21 and Lot 22, as shown on a plan captioned "Plan of North Part, Twp. 17, R. 8, W.E.L.S.", recorded in said Registry of Deeds in Plan Book 32, Page 602. Said premises are described in a deed from The E. E. Ring Land Company to American Realty Company dated May 26, 1917, recorded in said Registry of Deeds in Book 77, Page 351.

Subject to the exceptions and reservations set forth in a deed from E. E. Ring Land Company to American Realty Company dated May 26, 1917 and recorded with the Aroostook County Registry of Deeds (Northern Division) in Book 77, Page 351.

For source of title see deed of International Paper Company to Consolidated Rambler Mines Limited dated January 9, 1984 and recorded in Book 613, Page 01, of the Aroostook County Registry of Deeds (Northern Division).

**Twelfth (T15 R10):**

A certain lot or parcel of land situated in Township 15, Range 10, W.E.L.S. in the County of Aroostook and State of Maine, bounded and described as follows:

Beginning at the northwest corner of said Township; thence about S 22° W by and along the west line of said Township to the thread of Big Brook; thence up the thread of said Brook to where same is intersected by the westerly line of the tract allocated to Great Northern Paper Company by Partition Deed dated September 13, 1943, recorded in Aroostook County Registry of Deeds, Northern District, in Book 198, Page 137; thence N 22° E by and along said westerly line of said Great Northern Paper Company tract and passing through a cedar post, set with stones, on the northerly side of said Brook marked "G.N.P. Co. 1942, I.P. Co." about 226.75 chains to a cedar post, set with stones, marked "I.P. Co. G.N.P. Co. 1942", witnessed "1942"; thence S 68° E by and along the northerly line of a part of said Great Northern Paper Company tract 234.68 chains to an interior base-line surveyed in 1937, and a cedar post, set with stones, marked "G.N.P. Co. I.P. Co. 1942", witnessed "1942"; thence about N 22° E by and along said base line being the westerly line of a part of said Great Northern Paper Company tract 176.00 chains to the north line of said Township at the northwest corner of said part tract; thence about N 68° W by and along said north line to the point of beginning.

Containing 7,656 acres, more or less.

Excepting and reserving from the above described premises that portion of said premises along the Allagash River conveyed by International Paper Company to the State of Maine by deed dated January 14, 1969, recorded in said Registry of Deeds in Book 367, Page 74.

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Subject to Flowage rights on the Saint John River granted Saint John Realty Company by American Realty Company in an instrument dated November 26, 1929 and recorded with said Registry of Deeds in Book 128, Page 14.

For source of title see deed of International Paper Company to Consolidated Rambler Mines Limited dated January 9, 1984 and recorded in Book 613, Page 01, of the Aroostook County Registry of Deeds (Northern Division).

**Thirteenth (T15 R5):**

All of Township 15, Range 5, W.E.L.S., in the County of Aroostook and State of Maine.

Subject to Flowage rights on the Saint John River granted Saint John Realty Company by American Realty Company in an instrument dated November 26, 1929 and recorded with said Registry of Deeds in Book 128, Page 14.

For source of title see deed of International Paper Company to Consolidated Rambler Mines Limited dated January 9, 1984 and recorded in Book 613, Page 01, of the Aroostook County Registry of Deeds (Northern Division).

**Fourteenth (T15 R6):**

PARCEL ONE: A one-half (1/2) interest in common and undivided in and to the East half of Township 15, Range 6, W.E.L.S., described in the following deeds to American Realty Company:

1. From Louise J. Sawyer dated May 15, 1917, recorded in Aroostook Registry of Deeds, Northern District, in Book 77, Page 365; and
2. From Joseph P. Bass dated June 30, 1917, recorded in said Registry of Deeds in Book 79, Page 549.

PARCEL TWO: A one-half (1/2) interest in common and undivided, being 250 unlocated acres, in the 500 acre unlocated public lot within the east half of said Township 15, Range 6, W.E.L.S., as described in a deed from the State of Maine to International Paper Company dated November 21, 1977, recorded in said Registry of Deeds in Book 470, Page 169.

For source of title see deed of International Paper Company to Consolidated Rambler Mines Limited dated January 9, 1984 and recorded in Book 613, Page 01, of the Aroostook County Registry of Deeds (Northern Division).

**Fifteenth (T16 R12):**



A certain lot or parcel of land situated in Township 16, Range 12, W.E.L.S., in the County of Aroostook and State of Maine, bounded and described as follows:

Beginning at the southeast corner of said Township, thence about N 68° W, by and along the southerly line of said Township, 152.00 chains to the southeast corner of the tracts allocated to Great Northern Paper Company by Partition Deed dated September 13, 1943, recorded in said Registry of Deeds in Book 198, Page 117, and at a cedar post, set with stones, marked "G.N.P. Co. I.P. Co. 1942, T. 15 R. 12, T. 16, R. 12", witnessed "1942"; thence N 22° E, by and along the easterly line of said Great Northern Paper Company tract, 246.69 chains to a cedar post, set with stones, on the south bank of the St. John River, marked "I.P. Co. G.N.P. Co. 1942", witnessed "1942"; thence on the same course across said river to the thread thereof; thence down said thread to where it is intersected by the thread of Fox Brook; thence up said thread of Fox Brook to where it is intersected by the easterly line of said Great Northern Paper Company tract as the same is drawn S 22° W from a point on the north line of said Township, and 152.00 chains westerly of the northeast corner thereof; thence N 22° E, by and along said Great Northern Paper Company east line, passing through a cedar post, set with stones, on the northeasterly bank of said Fox Brook, marked "G.N.P. Co. 1942, T. 16, R. 12 I.P. Co.", about 179.73 chains to the northeast corner of said Great Northern Paper Company tract on the north line of said Township, and a cedar post, set with stones, marked "G.N.P. Co., 1942, T. 16, R. 12, I.P. Co. T. 17, R. 12", witnessed "1942"; thence about S 68° E, by and along the north line of said Township, 152 chains to the northeast corner thereof; thence about S 22° W by and along the east line of said Township about 6 miles 6.03 chains to the point of beginning.

Containing 7,236 acres, more or less.

For source of title see deed of International Paper Company to Consolidated Rambler Mines Limited dated January 9, 1984 and recorded in Book 613, Page 01, of the Aroostook County Registry of Deeds (Northern Division).

**Sixteenth (T16 R4):**

All of Township 16, Range 4, W.E.L.S., in the County of Aroostook and State of Maine.

Excepting and reserving, however, from the above described premises, the following:

(a) Premises on the Caribou Road, so-called, described in a deed from Anna H. Pierce to John Carlstrom dated May 27, 1908, recorded in said Registry of Deeds in Book 53, Page 236 and in a deed from Mary L. Johnson, et als to John Carlstrom dated January 29, 1908, recorded in said Registry of Deeds in Book 53, Page 237.

(b) Six rod strip of land in the southeast corner of said township conveyed by Adelaide Mansur, et als to Bangor and Aroostook Railroad Company dated June 15, 1909, recorded in said Registry of Deeds in Book 53, Page 440.

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(c) Premises on the north line of said township described in a deed from Mellen C. Peirce, et als to George Lagasse dated May 1, 1928, recorded in said Registry of Deeds in Book 117, Page 117 and in a deed from The American Realty Company to George Lagasse dated May 1, 1928, recorded in said Registry of Deeds in Book 128, Page 586.

(d) Premises in the northwest corner of said township described in a deed from Mellen C. Peirce, et als to Israel Dubey dated May 1, 1928, recorded in said Registry of Deeds in Book 117, Page 121 and in a deed from The American Realty Company to Israel Dubey dated May 1, 1928, recorded in said Registry of Deeds in Book 129, Page 21.

(e) Two parcels of land in the northwest corner of said township described in a deed from Mellen C. Peirce, et als, to Frank Hebert dated May 1, 1928, recorded in said Registry of Deeds in Book 117, Page 122 and in a deed from The American Realty Company to Frank Hebert dated May 1, 1928, recorded in said Registry of Deeds in Book 129, Page 24.

(f) Premises in the northwest corner of said township described in a deed from Mellen C. Peirce, et als to Charles Dionne dated May 1, 1928, recorded in said Registry of Deeds in Book 117, Page 126 and in a deed from The American Realty Company to Charles Dionne dated May 1, 1928, recorded in said Registry of Deeds in Book 129, Page 32.

(g) Two parcels of land in the northwest corner of said township described in a deed from Mellen C. Peirce to Baptist Dionne dated May 1, 1928, recorded in said Registry of Deeds in Book 117, Page 150 and in a deed from The American Realty Company to Baptist Dionne dated May 1, 1928, recorded in said Registry of Deeds in Book 129, Page 106.

(h) The premises conveyed by International Paper Company to International Paper Realty Corporation by deed dated August 31, 1981, recorded in said Registry of Deeds in Book 554, Page 254.

Subject to the following restrictions and easements:

**FIRST:** Terms and conditions of an Agreement between International Paper Company and Kerramerican, Inc. dated March 1, 1973 and recorded with said Registry of Deeds in Book 402, Page 839, including, without limitation, the rights of Kerramerican, Inc. set forth or referred to in said Agreement.

**SECOND:** Rights of Fish River Power and Storage Company in and to the bed and shores of Fish River described in deed from American Realty Company to Fish River Power and Storage Company dated June 30, 1931 and recorded with said Registry of Deeds in Book 129, Page 457.

**THIRD:** Pole line easement granted Maine Public Service Company by International Paper Company in an instrument dated July 30, 1968 and recorded with said Registry of Deeds in Book 363, Page 444.

BK 1150PG174

For source of title see deed of International Paper Company to Consolidated Rambler Mines Limited dated January 9, 1984 and recorded in Book 613, Page 01, of the Aroostook County Registry of Deeds (Northern Division).

**Seventeenth (T16 R5):**

*A certain lot or parcel of land situated in Township 16, Range 5, W.E.L.S., in the County of Aroostook and State of Maine, bounded and described as follows:*

on the North by the North line of said township;  
on the East by Dimock Brook and Square Lake;  
on the South by Thoroughfare Brook; and  
on the West by the West line of said township.

Excepting the premises conveyed by Consolidated Rambler Mines, Limited to the State of Maine recorded November 7, 1990, in Book 821, Page 179, of the Aroostook County Registry of Deeds (Northern Division) and further subject to the easements and other rights conveyed therein.

Subject to Rights to construct, reconstruct and maintain all public roads excepted and reserved by the State of Maine in deed to International Paper Company dated November 21, 1977 and recorded with the said Registry of Deeds in Book 470, Page 169.

Subject to Flowage rights granted others in and Madawaska Lake.

Subject to Drainage rights of the State of Maine for highway purposes described in deeds from International Paper Company to the State of Maine dated April 6, 1962 and July 17, 1963 and recorded with the Aroostook County Northern District Registry of Deeds in Book 302, Page 578 and Book 316, Page 186, respectively.

Subject to an Easement for underground telephone lines in the "Madawaska Lake Camp Road" described in deed from International Paper Company to New England Telephone and Telegraph Company dated September 8, 1967 and recorded with said Registry of Deeds in Book 354, Page 549.

Subject to an Easement for transmission line over strip of land 100 feet in width described in deed from International Paper Company to Maine Public Service Company dated May 30, 1951 and recorded with said Registry of Deeds in Book 230, Page 273.

For source of title see deed of International Paper Company to Consolidated Rambler Mines Limited dated January 9, 1984 and recorded in Book 613, Page 01, of the Aroostook County Registry of Deeds (Northern Division).

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**Eighteenth (T16 R5):**

A certain lot or parcel of land situated in Township 16, Range 5, W.E.L.S., in the County of Aroostook and State of Maine, bounded and described as follows:

On the North by the North line of said township and Thoroughfare Brook; on the East by the East line of said township; on the South by the South line of said township; on the West by the West line of said township, the West shore of Square Lake and Dimock Brook.

Excepting and reserving, however, those premises set off to John Scott Donworth, et als in a Partition Deed by and between International Paper Company and said John Scott Donworth, et als dated April 23, 1957, recorded in Aroostook County Registry of Deeds, Northern District, in Book 271, Page 45.

Excepting and reserving, however, from the above described premises the following:

(a) The premises conveyed by International Paper Company to International Paper Realty Corporation by deed dated August 31, 1981, recorded in said Registry of Deeds in Book 554, Page 254.

(b) The premises reserved in said Partition Deed dated April 23, 1957, and described therein as the Settlers' Lots.

(c) That portion of the above described premises included in Square Lake.

(d) The premises conveyed by Consolidated Rambler Mines, Limited to the State of Maine recorded November 7, 1990, in Book 821, Page 179, of the Aroostook County Registry of Deeds (Northern Division).

Subject to Rights to construct, reconstruct and maintain all public roads excepted and reserved by the State of Maine in deed to International Paper Company dated November 21, 1977 and recorded with the said Registry of Deeds in Book 470, Page 169.

Subject to Flowage rights granted others in and Madawaska Lake.

Subject to Drainage rights of the State of Maine for highway purposes described in deeds from International Paper Company to the State of Maine dated April 6, 1962 and July 17, 1963 and recorded with the Aroostook County Northern District Registry of Deeds in Book 302, Page 578 and Book 316, Page 186, respectively.

Subject to an Easement for underground telephone lines in the "Madawaska Lake Camp Road" described in deed from International Paper Company to New England Telephone and Telegraph Company dated September 8, 1967 and recorded with said Registry of Deeds in Book 354, Page 549.

Subject to terms and conditions of an Agreement between International Paper Company and Kerramerian, Inc. dated March 1, 1973 and recorded in Book 402< Page 839 of the Aroostook County Registry of Deeds (Northern Division), including

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without limitation, the rights of Kerramerican, Inc. set forth referred to in said Agreement.

Subject to the rights of Fish River Power and Storage Company in and to the bed and shores of Fish River described in a deed from American Realty Company to Fish River Power and Storage Company dated June 30, 1931 and recorded in Book 129, Page 457 of the Aroostook County Registry of Deeds (Northern Division).

Further subject to a Pole Line easement granted Maine Public Service Company by International Paper Company in an instrument dated July 30, 1968 and recorded in Bok 363, Page 444 of the Aroostook County Registry of Deeds (Northern Division).

Subject to an Easement for transmission line over strip of land 100 feet in width described in deed from International Paper Company to Maine Public Service Company dated May 30, 1951 and recorded with said Registry of Deeds in Book 230, Page 273.

For source of title see deed of International Paper Company to Consolidated Rambler Mines Limited dated January 9, 1984 and recorded in Book 613, Page 01, of the Aroostook County Registry of Deeds (Northern Division).

### **Nineteeth (T16 R5):**

#### Parcel I - Minnow Brook Block

A certain piece or parcel of land situated in Township 16, Range 5, W.E.L.S. in the County of Aroostook and State of Maine, and being more particularly bounded and described as follows:

Commencing at the intersection of the high water mark of Cross Lake with the centerline of Minnow Brook as shown on plan entitled "Land Title Survey of International Paper Company 'Minnow Brook' Block on Cross Lake, Township 16, Range 5, W.E.L.S., Maine, Scale 1" = 100', May, 1981, Surveyed by John B. Cahoon" and recorded in Aroostook County Registry of Deeds, Northern District, in Plan Book 9, Page 50, Maine:

Thence in a southeasterly direction along the centerline of Minnow Brook a distance of 391.92 feet to a point; thence S 39° 40' 15" W a distance of 30 feet to a 4" steel post with a brass plug set in concrete; thence continuing S 39° 40' 15" W a distance of 338.48 feet to a 4" steel post with a brass plug set in concrete; thence S 59° 44' 30" W a distance of 695.86 feet to a 1" iron pin; thence S 46° 21' 20" W a distance of 302.39 feet to a 1" iron pin; thence S 64° 22' 45" W a distance of 401.73 feet to a 1" iron pin; thence S 72° 11' 14" W a distance of 368.40 feet to a 1" iron pin; thence S 57° 30' 20" W a distance of 945.90 feet to a 1" iron pin; thence S 30° 47' 10" W a distance of 327.49 feet to a 1" iron pin; thence S 32° 29' 50" W a distance of 601.64 feet to a 1" iron pin; thence S 21° 56' 15" W a distance of 384.41 feet to a 1" iron pin; thence S 41° 18' 00" W a distance of 398.18 feet to a 1" iron pin; thence S 21° 29' 25" W a

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distance of 341.67 feet to a 1" iron pin; thence S 45° 00' 45" W a distance of 388.30 feet to a 1" iron pin; thence S 78° 07' 45" W a distance of 396.42 feet to a 4" steel post with a brass plug set in concrete; thence N 81° 38' 15" W a distance of 346.17 feet to a 4" steel post with a brass plug set in concrete; thence continuing N 81° 38' 15" W a distance of 30 feet to the centerline of an unnamed brook; thence in a northeasterly and northwesterly direction along the centerline of said unnamed brook to the high water mark of Cross Lake; thence in a southeasterly and northeasterly direction along the high water mark of Cross Lake a distance of 6,114.82 feet to the point of beginning.

Said parcel of land containing 49.12 acres.

Also meaning and intending to convey that parcel of land between the high water mark as located on the above referred to plan and normal low water mark.

## Parcel II - Fraser Camp Block

A certain piece or parcel of land situated in Township 16, Range 5, W.E.L.S. in the County of Aroostook and State of Maine, and being more particularly bounded and described as follows:

Commencing at the intersection of the high water mark of Square Lake with the southerly line of Fraser Camp Lot as shown on plan entitled "Land Title Survey of International Paper Company 'Fraser Camp' Block on Square Lake, Township 16, Range 5, W.E.L.S., Maine, Scale 1" = 100', May, 1981, Surveyed by John B. Cahoon" and recorded in Aroostook County Registry of Deeds, Northern District, in Plan Book 9, Page 51, 52, and 53, Maine:

Thence N 56° 03' 15" E a distance of 23.84 feet more or less to a 4" steel post with a brass plug set in concrete; thence continuing N 56° 03' 15" E a distance of 326.16 feet to a 4" steel post with a brass plug set in concrete; thence S 32° 29' 15" E a distance of 1,040.36 feet to a 1" iron pin; thence S 23° 03' 30" E a distance of 302.90 feet to a 1" iron pin; thence S 17° 15' 04" E a distance of 829.61 feet to a 1" iron pin; thence S 23° 13' 40" E a distance of 852.48 feet to a 1" iron pin; thence S 11° 46' 10" E a distance of 301.20 feet to a 1" iron pin; thence S 07° 06' 45" E a distance of 1,422.97 feet to a 1" iron pin; thence S 08° 41' 30" E a distance of 1,066.56 feet to a 1" iron pin; thence S 18° 14' 20" E a distance of 566.07 feet to a 1" iron pin; thence S 13° 13' 35" E a distance of 352.63 feet to a 1" iron pin; thence S 06° 36' 55" E a distance of 275.63 feet to a 1" iron pin; thence S 02° 37' 05" W a distance of 940.41 feet to a 1" iron pin; thence S 07° 02' 45" E a distance of 987.96 feet to a 1" iron pin; thence S 12° 01' 35" E a distance of 246.35 feet to a 1" iron pin; thence S 03° 54' 40" W a distance of 206.96 feet to a 1" iron pin; thence S 04° 33' 20" E a distance of 575.66 feet to a 1" iron pin; thence S 31° 25' 00" E a distance of 485.00 feet to a 1" iron pin; thence S 05° 26' 50" E a distance of 410.47 feet to a 4" steel post with a brass plug set in concrete; thence S 32° 57' 40" W a distance of 518.70 feet to a 4" steel post with a brass plug set in concrete, said post forming an angle point in the Yerxa Camp Lot; thence N 87° 30' 00" W a distance of 456.5 feet along the Yerxa Camp Lot to a 4" steel post; thence continuing N 87° 30' 00" W a distance of 17.8 feet more or less to the high water mark of Square Lake; thence in a northeasterly and northwesterly direction along the high

**BK 1150PG 178**

water mark of Square Lake a distance of 11,257.31 feet more or less to the point of beginning.

Said parcel of land containing 91.61 acres.

Also meaning and intending to convey that parcel of land between the high water mark as located on the above referred to plan and normal low water mark.

**Parcel III - Butler Brook Block**

A certain piece or parcel of land situated in Township 16, Range 5, W.E.L.S. in the County of Aroostook and State of Maine, and being more particularly bounded and described as follows:

Commencing at the intersection of the high water mark of Square Lake with the westerly line of the Yerxa Camps as shown on plan entitled "Land Title Survey of International Paper Company 'Butler Brook' Block on Square Lake, Township 16, Range 5, W.E.L.S., Maine, Scale 1" = 100', May, 1981, Surveyed by John B. Cahoon" and recorded in Aroostook County Registry of Deeds, Northern District, in Plan Book 9, Page 54, Maine:

Thence S 31° 36' 40" E a distance of 25 feet more or less to an existing cedar post; thence continuing S 31° 36' 40" E a distance of 332.04 feet to a 4" steel post with a brass plug set in concrete; thence S 69° 41' 50" W a distance of 383.07 feet to a 4" steel post with a brass plug set in concrete; thence S 76° 22' 25" W a distance of 407.84 feet to a 1" iron pin; thence S 72° 18' 15" W a distance of 468.42 feet to a 1" iron pin; thence S 61° 06' 00" W a distance of 813.15 feet to a 1" iron pin; thence S 51° 06' 40" W a distance of 265.96 feet to a 1" iron pin; thence S 40° 01' 25" W a distance of 708.55 feet to a 1" iron pin; thence S 30° 21' 00" W a distance of 617.48 feet to a 1" iron pin; thence S 41° 48' 25" W a distance of 629.42 feet to a 1" iron pin; thence S 51° 44' 35" W a distance of 390.44 feet to a 4" steel post with a brass plug set in concrete; thence S 58° 10' 35" W a distance of 482.58 feet to a 4" steel post with a brass plug set in concrete; thence continuing S 58° 10' 35" W a distance of 30 feet more or less to the centerline of Butler Brook; thence along the centerline of Butler Brook in a northwesterly and northeasterly direction a distance of 405.94 feet more or less to its intersection with the high water mark of Square Lake; thence in a northeasterly direction along the high water mark of Square Lake a distance of 5,055.48 feet more or less to the point of beginning.

Said parcel of land containing 40.96 acres.

Also meaning and intending to convey that parcel of land between the high water mark as located on the above-mentioned plan and normal low water mark.

Also conveying all easements appurtenant to the above described properties more specifically described in Exhibit B of the deed from International Paper Realty Corporation to Consolidated Rambler Mines Limited dated October 19, 1984 and recorded in Book 636, Page 44, of the Aroostook County Registry of Deeds.

For source of title see deed from International Paper Realty Corporation to Consolidated Rambler Mines Limited dated October 19, 1984 and recorded in Book 636, Page 44, of the Aroostook County Registry of Deeds (Northern Division).

EXCEPTING the following lands conveyed to the State of Maine by deed dated October 19, 1990 and recorded in Book 821, Page 179 of the Aroostook County Registry of Deeds (Northern Division).

Two parcels of land, containing five thousand six hundred and four (5,604) acres, more or less, bounded and described as follows:

Beginning at the southwest corner of T.16, R5 W.E.L.S. , thence northerly by the west line of said township 18,480 feet, more or less, to a point on said west line of said township being approximately 300 feet southerly from the south shore of a thoroughfare between Eagle Lake and Square Lake; thence easterly, keeping a distance of 300 feet southerly from the south shore of said thoroughfare of 6,864 feet, more or less, to a point; thence South 21° 30' West 1,700 feet, more or less, to the centerline of a woods road; thence northeasterly, southeasterly and southerly by the centerline of said road, 15,600 feet, more or less, to an intersection with a second woods road; thence southeasterly continuing along the centerline of said road, 2,950 feet, more or less, to another intersection ; thence southeasterly along said woods road centerline 1,952 feet more or less, to a point; thence South 54° 15' West, 9,700 feet, more or less, to a point on the South line of said township; thence westerly by the south line of said township, 12,408 feet, more or less, to the point of beginning.

Also a parcel described as follows:

Commencing at the northwest corner of the previously described parcel in T16, R5 W.E.L.S.; thence easterly along the north line of said parcel, extending on a parallel course with the south shore of said thoroughfare to the west shore of said Square Lake; thence northerly following said west shore of said Square Lake to a point 300 feet, more or less, northerly from the north shore of said thoroughfare; thence westerly, along a course parallel to and 300 feet, more or less, north of the north shore of said thoroughfare to the west line of said township to the point of beginning.

SUBJECT TO all easements and other restrictions contained in the above mentioned deed.

FURTHER SUBJECT TO a right of way conveyed to the Heed Family, Inc. by deed dated October 27, 1982 and recorded in Book 586, Page 56 of the Aroostook County Registry of Deeds (Northern Division) and by deed to Elizabeth A. Manship, et al., dated October 27, 1982 and recorded in Book 586, Page 304 of said Registry.

FURTHER EXCEPTING the repmises conveyed by American Realty Company to Fish River Power and Storage Company by deed dated June 30, 1931 and recorded in Book 129, Page 457 of the Aroostook County Registry of Deeds (Northern Division).



**Twentieth(T16 R9):**

Township 16, Range 9, W.E.L.S., situated in the County of Aroostook and State of Maine, except the public lots in the said township reserved by the State of Maine.

For source of title see deeds from International Paper Company to Consolidated Rambler Mines Limited dated January 9, 1984 and recorded in Book 613, Page 01, of the Aroostook County Registry of Deeds (Northern Division) and Irving Pulp & Paper Limited, to Consolidated Rambler Mines Limited dated December 30, 1988 and recorded on February 1, 1999 in Book 1146, Page 257 of the Aroostook County Registry of Deeds (Northern Division).

**Subject to the following easements and restrictions (T16 R9 WELS):**

Subject to Rights to construct, reconstruct and maintain all public roads excepted and reserved by the State of Maine in deed to International Paper Company dated November 21, 1977 and recorded with the Aroostook County Northern District Registry of Deeds in Book 470, Page 169.

**Twenty-first (T17 R5):**

PARCEL ONE: A certain lot or parcel of land situated in Township 17, Range 5, W.E.L.S. in the County of Aroostook and State of Maine, bounded and described as follows: Beginning at a post and stones at the southwest corner of said township; thence North 22° East in and along the westerly line thereof one hundred sixty-five and seventy-three hundredths (165.73) chains to a point marked by a post and stones; thence South 66° 30' East in and along a line spotted and painted tangerine yellow one hundred forty-seven and eleven hundredths (147.11) chains to a point marked by a post and stones; thence South 22° 10' West in and along a line spotted and painted tangerine yellow one hundred fifty-nine and ninety-four hundredths (159.94) chains to a point in the southerly line of said township, said point being marked by a post and stones; thence North 68° 45' West in and along said southerly line one hundred forty-six and sixty-three hundredths (146.63) chains to the southwesterly corner of said township, the point of beginning. The entire tract containing two thousand three hundred and ninety-two (2,392) acres, more or less.

PARCEL TWO: A certain lot or parcel of land situated in Township 17, Range 5, W.E.L.S., in the County of Aroostook and State of Maine, bounded and described as follows: Beginning at a post and stones at the northeasterly corner of said township; thence South 22° 10' West in and along the easterly line of said township two hundred ninety-nine and ninety hundredths (299.90) chains to the southerly shore line of Mud Lake; thence westerly as the course may be along said shore to the thoroughfare between said Mud Lake and Cross Lake; thence southerly on said thoroughfare to the easterly shore of said Cross Lake; thence southerly as the course may be along said easterly shore to the southerly line of said township; thence westerly in and along said southerly line to a point marked by a post and stones, said point being one hundred eighteen and sixty-nine hundredths (118.69) chains westerly from the southeasterly corner of said township; thence North 22° East in and along a line spotted and painted tangerine yellow five hundred seven and forty-nine

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hundredths (507.49) chains to a point in the northerly line of said township, said point being marked by a post and stones; thence easterly in and along said northerly line one hundred nineteen and eighty-nine hundredths (119.89) chains to the northeasterly corner of said township, the point of beginning.

The whole parcel containing four thousand nine hundred and ninety-six (4,996) acres, more or less.

Excepting and reserving, however, from the above described Parcel One and Parcel Two the premises conveyed by International Paper Company to International Paper Realty Corporation by deed dated August 3, 1981, recorded in said *Registry of Deeds* in Book 554, Page 254.

For source of title see deed of International Paper Company to Consolidated Rambler Mines Limited dated January 9, 1984 and recorded in Book 613, Page 01, of the *Aroostook County Registry of Deeds* (Northern Division).

**Twenty-second (T18 R10):**

The following described premises situated in Township Number Eighteen (18) in Range Number Ten (10) West from the east line of the State of Maine (T.18 R.10 W.E.L.S.) in the County of Aroostook, to wit:

Beginning at a point on the south line of the township, said point being seventy five decimal seven (75.7) chains, more or less, easterly of the southwest corner of the township. Said point is also the southeast corner of a parcel set off to the State of Maine as part of a partition ordered by the Superior Court of the State of Maine, the judgement ordering such partition having been filed and entered by the Clerk of such court for Aroostook County on May 9, 1986;

Thence in a northerly direction, by and along the east line of the State of Maine parcel, one hundred six decimal one (106.1) chains, more or less, to a point. Said point being the northwest corner of the parcel set off to Irving Pulp & Paper, Limited in the said partition;

Thence in an easterly direction, at all times parallel to the south line of the township two hundred forty decimal eight (240.8) chains, more or less, to a point;

Thence in a southerly direction, at all times parallel to the west line of the parcel hereby being described (said west line being the east line of the parcel set off to the State of Maine as part of the said partition) one hundred six decimal one (106.1) chains, more or less, to the south line of the township; and

Thence in a westerly direction along the south line of the township two hundred forty decimal eight (240.8) chains, more or less, to the place of beginning.

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Said lot contains two thousand five hundred fifty-five (2,555) acres more or less.

For source of title see a deed from Irving Pulp & Paper Limited, to Consolidated Rambler Mines Limited dated December 30, 1988 and recorded on February 1, 1999 in Book 1146, Page 257 of the Aroostook County Registry of Deeds (Northern Division).

**Twenty-third (Wallagrass Plantation):**

The following described premises situated in Wallagrass Plantation, being Township 17, Range 7, W.E.L.S., in the County of Aroostook and State of Maine:

Blocks 1, 2, the west half of Block 6 and that portion of the east half of Block 6 lying west of Spaulding Brook, Blocks 7, 8, 9, 10, 11, 12 and that portion of Block 14 lying westerly of Wallagrass Stream, Blocks 15, 16, 17, 18, 19, 21, 22, 23 and 24.

Excepting and reserving from the above described premises the following:

(a) Those portions of said Block 12 described in the following deeds:

(i) American Realty Company to John Williamson Mack Michaud dated March 4, 1905, recorded in said Registry of Deeds in Book 54, Page 452 (Lot AA).

(ii) American Realty Company to William B. Michaud dated May 24, 1911, recorded in said Registry of Deeds in Book 69, Page 168 (Southerly of Lot AA).

(iii) American Realty Company to Lawrence Michaud dated July 24, 1912, recorded in said Registry of Deeds in Book 69, Page 428 (Lot 124).

(iv) that portion of Block 12 set off to Myra L. O'Donnell by court appointed commissioners as described in an abstract of an action of partition, by Myra L. O'Donnell against Louis J. Sawyer et als., recorded with the Aroostook County Northern District Registry of Deeds in Book 27, Page 12.

(b) Those portions of Block 14, 19 and 21 excepted from said deed from Myra L. Donnell to American Realty Company dated May 2, 1919, recorded in said Registry of Deeds in Book 77, Page 570.

(c) The parcels described in two deeds from American Realty Company, one to Joseph Belanger dated March 4, 1905, recorded in said Registry of Deeds in Book 54, Page 479, and the second to Maxine Michaud dated March 4, 1905, recorded in said Registry of Deeds in Book 54, Page 481.

The Blocks referred to above are depicted on the Plan recorded in Book 27, Pages 660 and 661 of the Aroostook County Registry of Deeds (Northern Division).

Subject to an easement granted to the State of Maine by deed dated October 19, 1990 and recorded in Book 821, Page 179 of the Aroostook County Registry of Deeds (Northern Division).

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For source of title see deed of International Paper Company to Consolidated Rambler Mines Limited dated January 9, 1984 and recorded in Book 613, Page 01, of the Aroostook County Registry of Deeds (Northern Division).

**Twenty-fourth (Wallagrass Plantation):**

The following described premises situated in Wallagrass Plantation, Township 17, Range 7, W.E.L.S., in the County of Aroostook and State of Maine:

Blocks K and L, that portion of Lot N lying west of the New Canada Road, so-called, Block P, and those portions of Blocks R, S, T and U lying east of the said New Canada Road.

Excepting and reserving from the above described premises the following:

(a) That portion of Lot T excepted in a deed from Myra L. Donnell to Great Northern Paper Company dated April 30, 1921, recorded in said Registry of Deeds in Book 96, Page 231.

(b) That portion of Blocks K and L conveyed to Wilmer L. Saucier and Bernice B. Saucier, lying on the southerly town line of said Wallagrass Plantation and on the easterly shore of Eagle Lake, by deed dated January 31, 1972, recorded in said Registry of Deeds in Book 391, Page 495.

Subject to an easement granted to the State of Maine by deed dated October 19, 1990 and recorded in Book 821, Page 179 of the Aroostook County Registry of Deeds (Northern Division).

Subject to a right of way over two strips of land fifty (50) feet in width described in deed from the International Paper Company to the Inhabitants of Wallagrass Plantation dated May 21, 1964 and recorded in Book 322, Page 552 of the Aroostook County Registry of Deeds (Northern Division).

For source of title see deed of International Paper Company to Consolidated Rambler Mines Limited dated January 9, 1984 and recorded in Book 613, Page 01, of the Aroostook County Registry of Deeds (Northern Division).

**Twenty-fifth (Westmanland):**

Township 15, Range 4, W.E.L.S., known as Westmanland Plantation, now the Town of Westmanland, in the County of Aroostook and State of Maine.

Excepting and reserving, however, from the above described premises, the following:

A. The following lots located in the east half of said Township 15, Range 4, W.E.L.S.:

1. Lot 14, as described in two deeds to Carl F. Peterson dated June 16, 1895 and June 13, 1895, recorded in said Registry of Deeds in Book 24, Page 601 and in Book 32, Page 399, respectively;
2. Lots 28 and 29, as described in two deeds to Victor Lindberg both dated October 24, 1894, recorded in said Registry of Deeds in Book 27, Page 95 and in Book 27, Page 96, respectively;
3. Lot 6, as described in two deeds to John E. Peterson dated February 25, 1897 and February 26, 1897 and recorded in said Registry of Deeds in Book 27, Page 177 and in Book 36, Page 83, respectively;
4. South half of lot 19, as described in two deeds to Peter Nilson dated April 14, 1897 and April 17, 1897, recorded in said Registry of Deeds in Book 27, Page 315 and in Book 27, Page 317, respectively;
5. Lot 5, as described in two deeds to Nils Nelson, both dated June 15, 1899, recorded in said Registry of Deeds in Book 14, Page 39 and Book 27, Page 473, respectively;
6. North half of lot 19, as described in two deeds to Olof Nilson, both dated December 20, 1899, recorded in said Registry of Deeds in Book 27, Page 595 and in Book 27, Page 596, respectively;
7. Lot 27, as described in two deeds to Jacob Jansen, both dated August 20, 1900, recorded in said Registry of Deeds in Book 39, Page 395 and in Book 40, Page 82, respectively;
8. Lot 11, as described in two deeds to P. Emil Johnson dated July 14, 1900 and July 15, 1900, recorded in said Registry of Deeds in Book 39, Page 461 and in Book 40, Page 116, respectively;
9. Lot 15, as described in two deeds to Linus G. Anderson, both dated June 19, 1901, recorded in said Registry of Deeds in Book 40, Page 398 and in Book 43, Page 306, respectively;
10. Lot 13, as described in two deeds to August Carlson, both dated July 8, 1902, recorded in said Registry of Deeds in Book 40, Page 500 and in Book 45, Page 37, respectively;
11. Lot 25, as described in two deeds to Freeland Jones, both dated October 27, 1902, recorded in said Registry of Deeds in Book 40, Page 568 and Book 45, Page 167, respectively;
12. Lot 23, as described in two deeds to Victor Lettenowor, both dated September 9, 1903, recorded in said Registry of Deeds in Book 47, Page 241 and in Book 49, Page 8, respectively;

13. Part of lot 16, as described in two deeds to Hulda Bourkman, both dated December 23, 1903, recorded in said Registry of Deeds in Book 49, Page 12 and in Book 47, Page 249, respectively;

14. Lot 24, as described in two deeds to Carl A. Larson, both dated December 23, 1903, recorded in said Registry of Deeds in Book 49, Page 15 and in Book 47, Page 256, respectively;

15. Lot 4, as described in two deeds to Mons Jepson, both dated May 11, 1897, recorded in said Registry of Deeds in Book 54, Page 88 and in Book 51, Page 357, respectively;

16. Lot 10, as described in a deed to Axel Ledburg dated March 28, 1907, recorded in said Registry of Deeds in Book 55, Page 529;

17. Lot 17, as described in a deed to Nils B. Osland dated June 30, 1908, as described in said Registry of Deeds in Book 57, Page 100;

18. Lot 20, as described in a deed to Oscar Anderson dated June 30, 1908, recorded in said Registry of Deeds in Book 57, Page 111.

19. Lot 2, as described in two deeds to Carl Wilhelm Linsten, both dated May 11, 1897, recorded in said Registry of Deeds in Book 57, Page 162 and in Book 57, Page 164, respectively;

20. Part of lot 16, as described in a deed to Axel Hedstrom dated November 13, 1908, recorded in said Registry of Deeds in Book 63, Page 10;

21. Lot North of lot 10, as described in a deed to Erick Wedburg dated November 13, 1908, recorded in said Registry of Deeds in Book 59, Page 597;

22. Lot 12, as described in a deed to Algot Anderson dated July 13, 1909, recorded in said Registry of Deeds in Book 63, Page 326;

23. Lot 26, as described in two deeds to Sophia M. & Walfred Jacobson, both dated March 25, 1903, recorded in said Registry of Deeds in Book 67, Page 32 and in Book 61, Page 160, respectively.

B. Premises described in the following deeds to the Bangor and Aroostook Railroad Company:

1. Stockholm Lumber Company to Bangor and Aroostook Railroad Company dated October 29, 1909, recorded in said Registry of Deeds in Book 53, Page 451 (150 foot by 200 foot strip on the Railroad right of way).

2. Stockholm Lumber Company to Bangor and Aroostook Railroad Company dated September 4, 1909, recorded in said Registry of Deeds in Book 63, Page 576 (parcel of land adjacent to lot 6, being 49.48 acres, more or less).

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3. Stockholm Lumber Company to Bangor and Aroostook Railroad Company dated August 27, 1910, recorded in said Registry of Deeds in Book 70, Page 124 and re-recorded in Book 61, Page 39 (100 foot strip, being 3-1/2 acres on the easterly line of said Railroad right of way).

4. Albert W. Madigan, et als to Bangor and Aroostook Railroad Company dated July 21, 1910, recorded in said Registry of Deeds in Book 61, Page 17 (six rod strip of land in the westerly half of said Township).

5. Stockholm Lumber Company to Bangor and Aroostook Railroad Company dated November 6, 1909, recorded in said Registry of Deeds in Book 53, Page 453 (99 foot wide strip in the westerly half of said Township).

C. The premises conveyed by International Paper Company to International Paper Realty Corporation by deed dated August 31, 1981, recorded in said Registry of Deeds in Book 554, Page 254.

D. The Public Lots located in said Township 15, Range 4, W.E.L.S.

E. The Milliken Farm, so-called, being a 300 acre parcel of land in the East half of Westmanland Plantation, located on the south line of said Township, as excepted and reserved in a deed from Northern Realty Company to American Realty Company dated May 24, 1904, recorded in said Registry of Deeds in Book 102, Page 584.

F. A Parcel of .13 acres in Lot 15-1/2 conveyed by International Paper Company to State of Maine by deed dated January 25, 1972, recorded in said Registry of Deeds in Book 391, Page 566.

G. A parcel of .04 acres conveyed by Harold W. Holmquist to State of Maine dated November 10, 1966, recorded in said Registry of Deeds in Book 346, Page 270.

For source of title see deed of International Paper Company to Consolidated Rambler Mines Limited dated January 9, 1984 and recorded in Book 613, Page 01, of the Aroostook County Registry of Deeds (Northern Division).

#### ALSO CONVEYING THE FOLLOWING EASEMENTS

a) An easement fifty (50) feet wide, the centreline of which is perpendicular to and intersects the former Bangor and Aroostook Railroad centreline at Mile Post W21.75.

b) An easement fifty (50) feet wide, the centreline of which is perpendicular to and intersects the former Bangor and Aroostook Railroad centreline at Mile Post W25.18.

For source of title see easement deed from Bangor and Aroostook Railroad Company to Consolidated Rambler Mines Limited dated December 14, 1994 and recorded in Book 973, Page 262, of the Aroostook County Registry of Deeds (Northern Division).

SUBJECT TO THE FOLLOWING EASEMENT:

An easement over an existing roadway located in the Town of Westmanland, Aroostook County, Maine, known as Little Madawaska Lake Road, and more particularly described in Schedule A of the easement deed from Consolidated Rambler Mines Limited to Town of Westmanland, dated September 26, 1997 and recorded in Book 1098, Page 226, of the Aroostook County Registry of Deeds (Northern Division).

**AND ALSO CONVEYING:**

Also conveying all other lands and premises and interest in land, including flowed or submerged lands, premises and hereditaments, and all rights, privileges, servitudes, easements, licenses, concessions, waters, water rights, water powers, water courses, mills and mill sites, dams and dam sites, boom and boom sites, sluices and sluicing sites, flowage and flowage rights, not hereinabove particularly described, now owned, held or enjoyed by the Grantor and located in the State of Maine, and whether or not the same appertains to "timberlands" or otherwise and also, all buildings, erections and improvements thereon standing and being, and all rights, privileges and appurtenances thereunto belonging or in any manner appertaining, and the reversion and reversions, remainder and remainders, rents issues, and profits thereof; and all of the estate, right, title, interest, use, possession, property, claim, and demand, both at Law and in Equity, of the Grantor.

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ATTEST: *Louise M. Curran*  
REGISTER OF DEEDS





**SECTION 3**  
**FINANCIAL CAPACITY**



## SECTION 3

### FINANCIAL CAPACITY

The estimated cost of this development is \$720,000. Irving Woodlands is the developer, and they are appropriately funded. A Corporate Good Standing certificate has been provided.



# MAINE

Department of the Secretary of State  
Bureau of Corporations, Elections and Commissions

## Corporate Name Search

### Information Summary

[Subscriber activity report](#)

This record contains information from the CEC database and is accurate as of: Wed Aug 02 2023 10:13:12. Please print or save for your records.

Legal Name	Charter Number	Filing Type	Status
IRVING WOODLANDS LLC	19990605DC	LIMITED LIABILITY COMPANY (DOMESTIC)	GOOD STANDING

Filing Date	Expiration Date	Jurisdiction
02/25/1999	N/A	MAINE

**Other Names** (A=Assumed ; F=Former)

NONE

#### Clerk/Registered Agent

C T CORPORATION SYSTEM  
128 STATE ST #3

AUGUSTA, ME 04330

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If you encounter problems, visit the [troubleshooting page](#).





**SECTION 4**  
**TECHNICAL ABILITY**



# Benjamin Kaiman

## Project Manager

[bkaiman@haleyward.com](mailto:bkaiman@haleyward.com) | 207.588.0055

Ben has over eighteen years of experience in the Civil Engineering field with an emphasis in water resources and coastal high hazard design. He has contributed to a broad portfolio of projects including work with municipalities, private developers, contractors, and the Department of Transportation performing utility and stormwater design, project management, and construction administration services throughout the United States. Ben is well versed in coastal high hazard and environmentally sensitive zone design requirements. He is experienced in the preparation of local, state and federal permit applications to include local site plan applications, Site Location of Development Act (SLODA) Permits, Stormwater Permits, National Resource Protection Act (NRPA) Permits, Federal Emergency Management Agency (FEMA) map amendment applications, etc.

### PROFESSIONAL HISTORY

#### 2021 – Present

Haley Ward, Inc.  
Project Manager

#### 2019 – 2021

Alliant Engineering, Inc.  
Project Manager

#### 2003 – 2019

W.F. McCain & Associates, Inc.  
Project Engineer/Manager  
Senior Civil Designer  
CADD Technician



### CORE EXPERTISE:

*Residential Site Design and Permitting  
Commercial Site Design and Permitting  
Utilities  
Construction Administration  
Coastal High Hazard Design*

### EDUCATION:

*M.S. Civil Engineering (2019)  
University of North Florida  
  
B.S. Civil Engineering (2016)  
University of North Florida*

### REGISTRATIONS:

*FBPE Engineer Intern*

### AFFILIATIONS:

*American Society of Civil Engineers (ASCE)  
Coast, Oceans, Ports & Rivers Institute (COPRI)*



## PROJECT EXPERIENCE

### **Saco Self Storage Facility | Saco Maine**

Ben served as Project Manager on a 349-unit self-storage facility located along Portland Road in Saco, Maine. Services include site layout, grading and stormwater management design, land use permitting, and project coordination with the client, abutters, and the City of Saco. Permitting on this project included local site plan and Maine Department of Environmental Protection (MDEP) Stormwater permitting.

### **Lewiston Dialysis Clinic | Lewiston Maine**

As an integral part of a multi-discipline design team, Ben is the lead all phases of site design and permitting as Haley Ward's Project Manager on this re-development site in Lewiston, Maine. This project includes FEMA Conditional Letter of Map Revision (CLOM-R) and Letter of Map Revision (LOM-R) flood map amendment permitting as well as local and state land use permit applications.

### **East Orrington Business Park | Orrington Maine**

Provided project management services for the Town of Orrington to permit the subdivision of town land for the creation of the East Orrington Business Park.

### **\*Sweet Grass Planned Unit Development | St. Marys, Georgia**

Served as project manager on a multi-phase, multi-use planned unit development in St. Marys, Georgia that consisted of 698 multi-family units, 384 single-family units, over 90,000 square feet of commercial space and a municipal fire station.

### **\*Taco Bell | Multiple Locations throughout the US**

Served as client manager and Project Manager for a national client to develop Taco Bell restaurants.

### **\*Spring Lake Subdivision | Palm Coast, Florida**

Led all phases of site design and permitting to develop a 421-lot single-family residential subdivision in Palm Coast, Florida. While under construction, this project presented a particular challenge due to flood zone requirements and the preservation and incorporation of onsite wetlands.

### **\*Matanzas West Multifamily Apartments | Palm Coast, Florida**

Led all phases of site design and permitting to develop a 285-unit apartment complex on 185 acres that was confined to the isolated upland pockets. The site responsibilities included construction management services.



**\*Rib Crib Restaurants | Kansas City, Missouri**

Served as client manager and Project Manager for a regional client to develop a Rib Crib restaurant in downtown Kansas City.

**\*Downtown Distribution Site Re-Development | Vero Beach, Florida**

As Project Manager, Ben led the civil and structural design team in the re-development of a 60's era service station site, converting the existing building into a restaurant in downtown Vero Beach. This project won an Industry Appreciation Award from the Indian River Chamber of Commerce for Small Project Renovation.

**\*Key Largo Wastewater Treatment District, Basin G and H | Key Largo, Florida**

Provided project management services and led the design of nearly 12 miles of vacuum sewer, a vacuum pump station and three miles of force main sewer design to serve 3000 ± residents as part of a \$2.2 Billion Environmental Protection Agency (EPA) funded grant to provide clean sewer service to the Florida Keys. Performed the study/master plan for the two basins to determine the most cost-effective service methods and US Route 1 routing. The study and permitting phases of the project required close coordination with the local Florida Department of Transportation (FDOT) and Florida Department of Environmental Protection (FDEP) offices covering Monroe County and required design and Maintenance of Traffic (MOT) consideration above and beyond normal FDOT permitting (utility) requirements. It was coordinated with an ongoing roadway improvement project that was concurrently under design along with existing trail locations along the project's route. Worked closely with FDOT during the design to properly establish MOT plans for construction safety issues and traffic control issues per FDOT requirements, as well as accommodating future FDOT roadway improvements.

**\*Kawama Yacht Club Marina Re-Construction | Key Largo, Florida**

Provided Project Management, assistance to design team, coordination with local, state, and federal permitting agencies and provided full construction management services for a 120-slip marina and boat ramp.

\*Projects/Experience under previous employment.



# Drew Olehowski, PE

## Project Engineer

[dolehowski@haleyward.com](mailto:dolehowski@haleyward.com) | 207.989.4824

Drew Olehowski has five years of experience providing civil engineering design to residential and commercial clients. As a Project Engineer, Drew contributes to the design, permitting, bidding, and construction administration for a wide array of projects such as: sites, roadways, and stormwater management/erosion control systems. Drew is experienced in working with local, state, and federal agencies to obtain required permitting, including: local planning board approval; Site Location of Development; Stormwater Permit by Rule; Stormwater Permit; and the Natural Resources Protection Act.

### PROFESSIONAL HISTORY

#### 2017 – Present

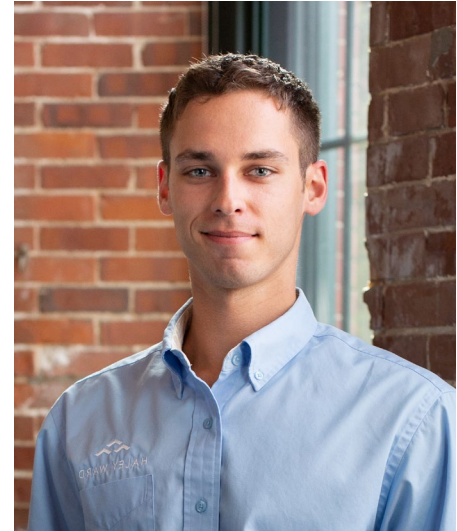
Haley Ward, Inc.  
Civil Engineer

#### Summer 2016

United States Geological Survey  
Student Trainee

#### Summer 2015

Maine Department of Transportation, Environmental Unit  
Internship



#### CORE EXPERTISE:

*Site Design and Permitting  
Utility/Roadway Design  
Environmental Permitting  
Hydrology/ Water Resources  
Construction Inspection and Administration*

#### EDUCATION:

*Master of Engineering,  
Environmental Engineering  
(2017) Rensselaer  
Polytechnic Institute, Troy,  
New York  
B.S. Environmental  
Engineering (2017),  
Rensselaer Polytechnic  
Institute, Troy, New York*

#### REGISTRATION:

*Maine PE License (#16372)  
exp 12/31/23*

*LPA Certified through  
12/31/23*





## PROJECT EXPERIENCE

### **Atlantic Salmon Stream Crossings | Various Maine Locations**

Drew was responsible for the design and construction administration and inspection of stream crossings throughout Maine. These projects consisted of the implementation of crossings that meet the requirement of maintaining the natural migratory route for the endangered Atlantic Salmon. Drew's tasks for these projects included stream surveys for fish passage assessment and culvert design, as well as basic regression hydrology for culvert and bridge sizing. His responsibilities also included general task planning and management, field work, data reduction, analysis, and construction inspection and reporting.

### **Sylvan Road Drainage Improvements | Mount Desert Island, Maine**

Drew was responsible for the construction inspection and administration of the Sylvan City Drainage project in Northeast Harbor, Maine during the Summer of 2018. This project consisted of the implementation of a full stormwater management system for a residential neighborhood. Tasks for this role included documentation of all daily construction activities, establishing communication with the project owner, residents, and project engineer while resolving any issues that would arise amongst the above parties. Drew was also accountable for various construction administration items, including change orders, submittals, and cost/quantity estimates.

### **Rumford Downtown Infrastructure Improvements | Rumford, Maine**

Drew provided construction inspection and administration of the Rumford Downtown Infrastructure Improvements project in Rumford, Maine from April 2020 to July 2020. This project consisted of a complete rebuild of all utilities (sewer, water, drainage, underground electric), roadways, and sidewalks in the downtown area. Tasks for this role included documentation of daily construction activities (work tasks completed, material quantities stored/installed, photologs,) establishing communication with the project owner, residents, and project engineer while resolving any issues that would arise amongst the above parties. Drew was also in charge of various construction administration items, including change orders, submittals, and cost/quantity estimates.

### **SWEB Wind Farm | Clifton, Maine**

Drew prepared the design and permitting of a 163-acre wind farm in Clifton, Maine. The project design included access road and tower site layout, and stormwater management. Drew was also responsible for preparing the project's Maine Department of Environmental Protection Site Location of Development permit application.



### **Solar Farm Design and Permitting | Various Maine Locations**

Drew was responsible for the design and permitting of several Solar Farm projects throughout Maine, including in Saco, Augusta, Topsham, Surry, Winthrop, and Turner. Project designs focused on stormwater management, access road layout, solar panel layout, and natural resource protection. Drew was also responsible for preparing permit applications for these solar projects, including local Site Plan Review, and Maine Department of Environmental Protection Stormwater Permit-by-rule, Site Location of Development, and Natural Resources Protection Act Permit-by-rule applications.

### **T2R9 Training Site | T2R9, Maine**

Drew was responsible for the design of a roadway in one of Maine's unorganized territories (T2R9). This project consisted of the design of a one-mile-long roadway that provided accessibility to a Department of Defense training site. The road design included horizontal and vertical alignment in an undeveloped area and was required to meet the needs of both the client and various natural resource protection agencies.

### **Gushee Private Way | Gorham, Maine**

Drew served as the Project Manager and Project Engineer for a Private Drive project in Gorham, Maine. This project consisted of a 1000-foot-long roadway for an individual client. The road design included horizontal and vertical alignment in an undeveloped area and was required to meet the needs of both the client and the municipality. This project included extensive collaboration with the Town of Gorham, as it required a local Site Plan Application and Planning Board Approval.

### **Salmons Processing Facility | Prospect, Maine**

Drew served as the Project Engineer for the design and permitting of a quarry material processing facility in Prospect, Maine that is approximately 50-acres in size. This project required obtaining Site Location of Development, Natural Resource Protection Act Tier 1 and Tier 3, and local Site Plan permits. Project design included a 4,300-foot access road, and a 50-acre site to support a mineral processing facility and storage areas. The design included a variety stormwater management and erosion control systems.

### **Emerald River of Maine | Lewiston, Maine**

Drew was responsible for the design and permitting of a commercial recreational marijuana facility in Lewiston, Maine. This project including creating a site design and obtaining a Development Review Permit from the City of Lewiston.



## TECHNICAL ABILITY

Haley Ward, Inc. is well versed in all aspects of local, State, and Federal permitting requirements; we have prepared numerous Land Use applications for the Maine Department of Environmental Protection including Site Location of Development Act Applications and Natural Resource Protection Act permits. We are knowledgeable in Stormwater Management regulations, Wetlands Mapping and Delineation and Road, Site, and Utility Design.

Ben Kaiman has overseen the preparation of this application. Ben has over 18 years of experience in the engineering industry and has been involved in the preparation of many Site Location of Development Applications for various clients.

Included are resumés for Haley Ward personnel involved with the design and preparation of this application.



**SECTION 5**  
**NOISE**



## NOISE

This development is solely residential; therefore, it is categorized as a “Development producing a minor noise impact.”



## SECTION 6

### VISUAL QUALITY AND SCENIC CHARACTER



## VISUAL QUALITY AND SCENIC CHARACTER

### Revised February 2024

This project has been designed in accordance with applicable local and state ordinances. The property will maintain a visual buffer around the perimeter of the site. Clearing of vegetation will be performed only to the extent necessary to accomplish the goals of this project and maintain compliance with the "Fish River Chain of Lakes Concept Plan", dated June 2019. There are no known scenic overlooks within the proximity of the development.



## SECTION 7

### WILDLIFE AND FISHERIES





## WILDLIFE AND FISHERIES

The Maine Department of Inland Fisheries and Wildlife has reviewed the site and its surroundings to verify the proposed project will have no adverse impacts to significant wildlife habitats or fisheries. Please see the attached response.



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



October 28, 2022

Drew Olehowski  
Haley Ward  
One Merchants Plaza, Suite 701  
Bangor, ME 04401

**RE: Information Request – Irving Woodlands LLC Project, Cross Lake Twp**

Dear Drew:

Per your request received on October 14, 2022, we have reviewed current Maine Department of Inland Fisheries and Wildlife (MDIFW) information for known locations of Endangered, Threatened, and Special Concern species; designated Essential and Significant Wildlife Habitats; and inland fisheries habitat concerns within the vicinity of the *Irving Woodlands LLC* project in Cross Lake Twp.

Our Department has not mapped any Essential Habitats that would be directly affected by your project. It should be noted that there is no comprehensive statewide inventory that includes all Rare, Threatened, and Endangered species occurrences and habitats or Significant Wildlife Habitats and that the completeness of resource maps varies by habitat type, location, and previous survey efforts. MDIFW's preliminary record searches identify known resources, but site surveys are necessary to identify other important resources that have not yet been investigated but may be present in an area. Locating a project in or in proximity to certain habitats can result in adverse impacts to those habitats and the species that utilize them and, in those situations, MDIFW will likely recommend increased siting and design considerations, operational measures, monitoring practices, and/or other efforts in attempt to avoid, minimize, and possibly mitigate for such impacts. Resource surveys, project siting, facility design/layout, and operational practices are all very important steps in this process. MDIFW provides recommendations based on known and reported resource information but, it is the applicant's ultimate responsibility to ensure that its activities do not result in substantial detrimental impacts to resources.

***Endangered, Threatened, and Special Concern Species***

Bats - Of the eight species of bats that occur in Maine, the three *Myotis* species are afforded special protection under Maine's Endangered Species Act (MESA, 12 M.R.S §12801 et. seq.): little brown bat (State Endangered), northern long-eared bat (State Endangered), and eastern small-footed bat (State Threatened). The five remaining bat species are designated as Species of Special Concern: big brown bat, red bat, hoary bat, silver-haired bat, and tri-colored bat. While a comprehensive statewide inventory for bats has not been completed, based on historical evidence, it is likely that several of these species occur within the project area during the fall/spring migration, the summer breeding season, and/or for overwintering. If the proposed project has a Federal nexus, either via funding or permitting, or if the project is not consistent with the USFWS "4(d) Rule", we recommend that you contact the U.S. Fish and Wildlife Service--Maine Fish and Wildlife Complex ([mainefieldoffice@fws.gov](mailto:mainefieldoffice@fws.gov)) for further guidance on their perspective, as the northern long-eared bat is also listed as a Threatened Species under the Federal Endangered Species Act. The USFWS "4(d) Rule" provides guidance for protection of bat winter

hibernacula and maternity roost trees for northern long-eared bats (see <https://www.fws.gov/midwest/endangered/mammals/nleb/4drule.html>). Otherwise, our Agency does not anticipate significant impacts to any of the bat species as a result of this project.

### ***Significant Wildlife Habitat***

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

### ***Fisheries Habitat***

We generally recommend maintaining 100-foot undisturbed vegetated buffers from the upland edge of all intermittent and perennial streams and any contiguous wetlands. Maintaining and enhancing buffers along these resources is critical to the protection of water temperatures, water quality, natural inputs of coarse woody debris, and various forms of aquatic life necessary to support fish and other aquatic species. Riparian buffers also provide critical habitat and important travel corridors for a variety of wildlife species. Stream crossings should be avoided, but if a stream crossing is necessary, or an existing crossing needs to be modified, it should be designed to provide for full aquatic passage. Small streams, including intermittent streams, can provide crucial rearing habitat, cold water for thermal refugia, and abundant food for juvenile salmonids on a seasonal basis. Undersized crossings may inhibit these functions and become a frequent maintenance problem that causes reoccurring damage to the resource. Generally, MDIFW recommends that all new, modified, and replacement stream crossings be sized to span at least 1.2 times the bankfull width of the stream. In addition, we generally recommend that stream crossings be open bottomed (i.e. natural bottom), although embedded structures which are backfilled with representative streambed material have been shown to be effective in providing habitat connectivity for fish and other aquatic organisms. Construction Best Management Practices should be closely followed to avoid erosion, sedimentation, alteration of stream flow, and other impacts as eroding soils can travel significant distances as well as transport other pollutants resulting in direct impacts to fish, other aquatic life, and their habitats. In addition, we recommend that any necessary instream work occur between July 15 and October 1.

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

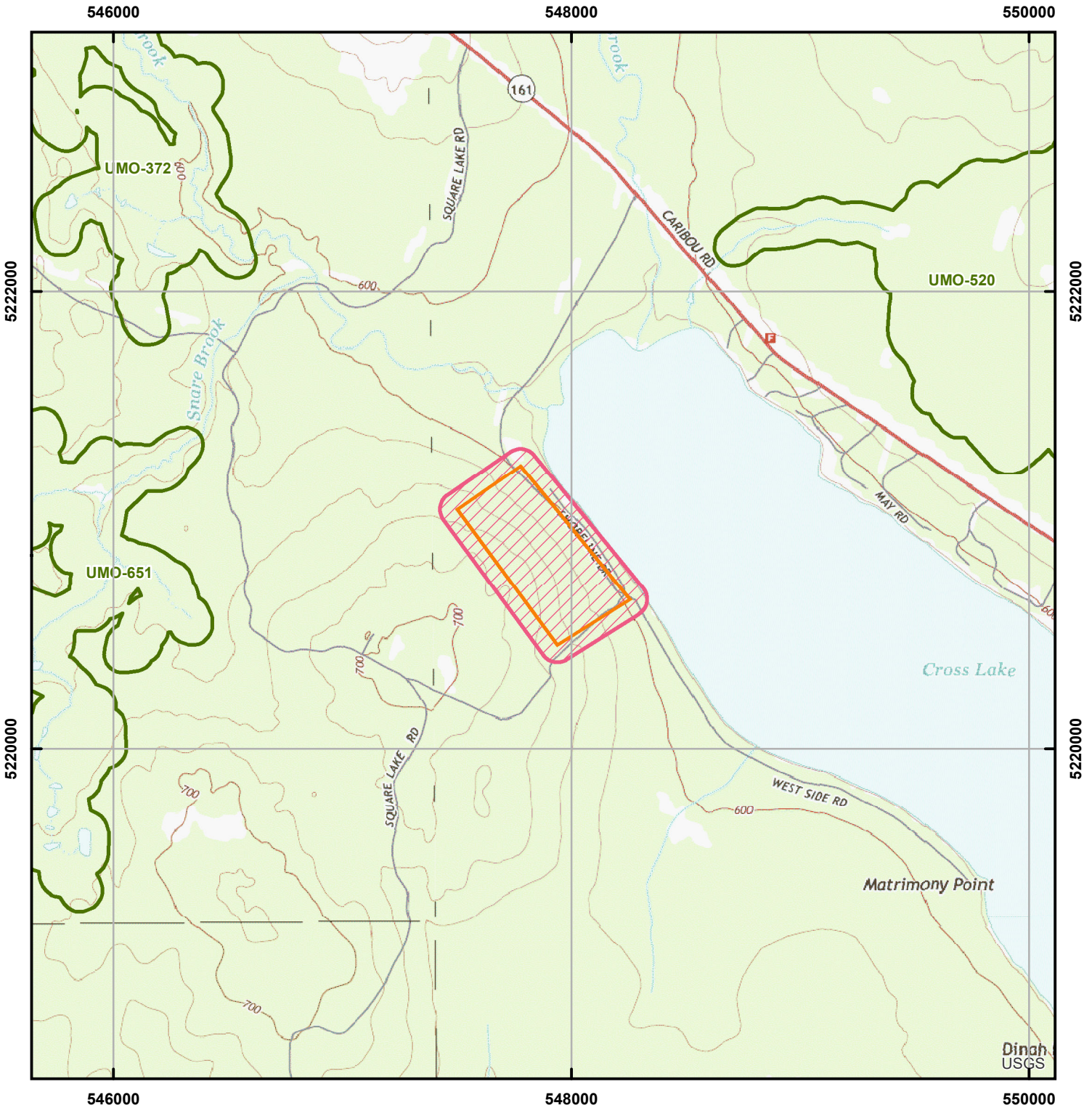
Letter to Drew Olehowski, Haley Ward  
Comments RE: Irving Woodlands LLC, Cross Lake Twp  
October 28, 2022

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

Best regards,

A handwritten signature in black ink, appearing to read 'Becca Settele', with a stylized, cursive script.

Becca Settele  
Wildlife Biologist

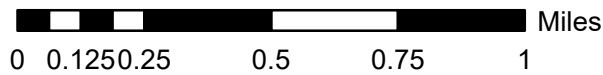


## Environmental Review of Fish and Wildlife Observations and Priority Habitats

Project Name: Irving Woodlands LLC, Cross Lake Twp  
(Version 1)



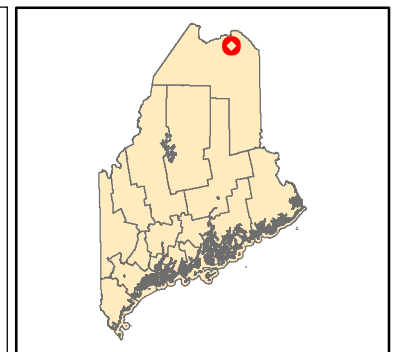
Maine Department of  
Inland Fisheries and Wildlife



Projection: UTM, NAD83, Zone 19N

Date: 10/14/2022

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





**SECTION 8**  
**HISTORIC SITES**



## HISTORIC SITES

The Maine Historic Preservation Commission has reviewed the site and determined that there are no prehistoric archaeological issues for the bulk of the project area and no additional information is needed for architectural or historic archaeological resources; since the proposed access to the south shore of Cross Lake has already been disturbed, no additional study is required. Their full response is included here.



JANET T. MILLS  
GOVERNOR

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

KIRK F. MOHNEY  
DIRECTOR

January 4, 2022

Mr. Roy Bernard  
Irving Woodlands, LLC  
PO Box 240  
St. John Plantation, ME 04743

Project: MHPC #2026-21 Northwest Corner of Cross Lake; Dangle Brook  
Development of Recreational Lots  
Town: Cross Lake Twp, ME

Dear Mr. Bernard:

In response to your recent request, I have reviewed the information received December 14, 2021 to initiate consultation on the above referenced project in accordance with the requirements of the Maine Land Use Planning Commission.

As for prehistoric/pre-European archaeology, a Phase I archaeological survey of the northern portion of the project where there is lake access. Survey within 50 yards of the lake shore would be appropriate. The shore of Cross Lake has not been systematically surveyed by professional archaeologists, so the presence or absence of a site at this location needs to be tested. The southern lake shoreline access point for this project looks to already have had some dock development -- and thus may already be disturbed. If so, no survey there would be needed. There is no prehistoric archaeological issue for the bulk of the project area west of the road (> 130 m from the lake shore).

A list of qualified prehistoric archaeologists has been enclosed and can be found on our website:  
<https://www.maine.gov/mhpc/programs/survey/approved-consultants/prehistoric>

No additional information is needed for architectural or historic archaeological resources.

If you have any questions regarding archaeology, please contact Dr. Arthur Spiess of this office at Arthur.  
[Spiess@maine.gov](mailto:Spiess@maine.gov).

If you have any questions regarding above ground properties, please contact Megan Rideout of this office at [megan.m.rideout@maine.gov](mailto:megan.m.rideout@maine.gov).

Sincerely,

Kirk F. Mohney  
State Historic Preservation Officer





## SECTION 9

### UNUSUAL NATURAL AREAS



## UNUSUAL NATURAL AREA

The Maine Natural Areas Program (MNAP) has reviewed the project site and surrounding areas to determine that no rare or unique botanical features have been documented within the specific project area. Please see the attached MNAP response.



**STATE OF MAINE**  
**DEPARTMENT OF AGRICULTURE, CONSERVATION & FORESTRY**

177 STATE HOUSE STATION  
AUGUSTA, MAINE 04333

**JANET T. MILLS**  
GOVERNOR

**AMANDA E. BEAL**  
COMMISSIONER

October 14, 2022

Drew Olehowski  
Haley Ward  
One Merchants Plaza, Suite 701  
Bangor, ME 04401

Via email: [dolehowski@haleyward.com](mailto:dolehowski@haleyward.com)

Re: Rare and exemplary botanical features in proximity to: #10050.28, Irving Woodlands, Cross Lake Subdivision, West Side Road, Cross Lake Twp, Maine

Dear Mr. Olehowski:

I have searched the Maine Natural Areas Program's Biological and Conservation Data System files in response to your request received October 14, 2022 for information on the presence of rare or unique botanical features documented from the vicinity of the project in Cross Lake Twp, Maine. Rare and unique botanical features include the habitat of rare, threatened, or endangered plant species and unique or exemplary natural communities. Our review involves examining maps, manual and computerized records, other sources of information such as scientific articles or published references, and the personal knowledge of staff or cooperating experts.

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

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

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

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

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



PHONE: (207) 287-804490  
WWW.MAINE.GOV/DACF/MNAP

Letter to Haley Ward  
Comments RE: Irving Subdivision, Cross Lake  
October 14, 2022  
Page 2 of 2

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

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

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

Sincerely,

*Lisa St. Hilaire*

Lisa St. Hilaire | Information Manager | Maine Natural Areas Program  
207-287-8044 | [lisa.st.hilaire@maine.gov](mailto:lisa.st.hilaire@maine.gov)

**Rare and Exemplary Botanical Features within 4 miles of**

**Project: #10050.28, Irving Woodlands Cross Lake Subdivision, West Side Road, Cross Lake Twp, ME**

Common Name	State Status	State Rank	Global Rank	Date Last Observed	Occurrence Number	Habitat
<b>Bitter Fleabane</b>						
	PE	SH	G5T5	1880	2	Non-tidal rivershore (non-forested, seasonally wet)
<b>Dwarf Shrub Bog</b>						
		S5	G5	2016-07-19	58	
<b>Giant Rattlesnake-plantain</b>						
	E	S1	G5	1956-06-28	7	Conifer forest (forest, upland)
<b>Low Sedge Fen</b>						
		S3	GNR	2002-07-11	15	
<b>Moor Rush</b>						
	SC	S2	G5T5	2002-07-11	5	Open wetland, not coastal nor rivershore (non-forested,
<b>Patterned Fen Ecosystem</b>						
		S3	GNR	2002-09-05	12	
		S3	GNR	2002-07-11	40	
<b>Sedge - Heath Fen</b>						
		S4	G4G5	2002-07-11	20	
		S4	G4G5	2002-09-05	23	
<b>Swamp Birch</b>						
	SC	S2S3	G5	2002-07-11	10	Forested wetland,Open wetland, not coastal nor

Date Exported: 2022-10-14 16:04

## Conservation Status Ranks

**State and Global Ranks:** This ranking system facilitates a quick assessment of a species' or habitat type's rarity and is the primary tool used to develop conservation, protection, and restoration priorities for individual species and natural habitat types. Each species or habitat is assigned both a state (S) and global (G) rank on a scale of critically imperiled (1) to secure (5). Factors such as range extent, the number of occurrences, intensity of threats, etc., contribute to the assignment of state and global ranks. The definitions for state and global ranks are comparable but applied at different geographic scales; something that is state imperiled may be globally secure.

The information supporting these ranks is developed and maintained by the Maine Natural Areas Program (state ranks) and NatureServe (global ranks).

Rank	Definition
<b>S1</b> <b>G1</b>	<b>Critically Imperiled</b> – At very high risk of extinction or elimination due to very restricted range, very few populations or occurrences, very steep declines, very severe threats, or other factors.
<b>S2</b> <b>G2</b>	<b>Imperiled</b> – At high risk of extinction or elimination due to restricted range, few populations or occurrences, steep declines, severe threats, or other factors.
<b>S3</b> <b>G3</b>	<b>Vulnerable</b> – At moderate risk of extinction or elimination due to a fairly restricted range, relatively few populations or occurrences, recent and widespread declines, threats, or other factors.
<b>S4</b> <b>G4</b>	<b>Apparently Secure</b> – At fairly low risk of extinction or elimination due to an extensive range and/or many populations or occurrences, but with possible cause for some concern as a result of local recent declines, threats, or other factors.
<b>S5</b> <b>G5</b>	<b>Secure</b> – At very low risk of extinction or elimination due to a very extensive range, abundant populations or occurrences, and little to no concern from declines or threats.
<b>SX</b> <b>GX</b>	<b>Presumed Extinct</b> – Not located despite intensive searches and virtually no likelihood of rediscovery.
<b>SH</b> <b>GH</b>	<b>Possibly Extinct</b> – Known from only historical occurrences but still some hope of rediscovery.
<b>S#S#</b> <b>G#G#</b>	<b>Range Rank</b> – A numeric range rank (e.g., S2S3 or S1S3) is used to indicate any range of uncertainty about the status of the species or ecosystem.
<b>SU</b> <b>GU</b>	<b>Unrankable</b> – Currently unrankable due to lack of information or due to substantially conflicting information about status or trends.
<b>GNR</b> <b>SNR</b>	<b>Unranked</b> – Global or subnational conservation status not yet assessed.
<b>SNA</b> <b>GNA</b>	<b>Not Applicable</b> – A conservation status rank is not applicable because the species or ecosystem is not a suitable target for conservation activities (e.g., non-native species or ecosystems).
<b>Qualifier</b>	<b>Definition</b>
<b>S#?</b> <b>G#?</b>	<b>Inexact Numeric Rank</b> – Denotes inexact numeric rank.
<b>Q</b>	<b>Questionable taxonomy that may reduce conservation priority</b> – Distinctiveness of this entity as a taxon or ecosystem type at the current level is questionable. The “Q” modifier is only used at a global level.
<b>T#</b>	<b>Intraspecific Taxon (trinomial)</b> – The status of intraspecific taxa (subspecies or varieties) are indicated by a "T-rank" following the species' global rank.

**State Status:** Endangered and Threatened are legal status designations authorized by statute. Please refer to MRSA Title 12, §544 and §544-B.

Status	Definition
<b>E</b>	<b>Endangered</b> – Any native plant species in danger of extinction throughout all or a significant portion of its range within the State or Federally listed as Endangered.
<b>T</b>	<b>Threatened</b> – Any native plant species likely to become endangered within the foreseeable future throughout all or a significant portion of its range in the State or Federally listed as Threatened.
<b>SC</b>	<b>Special Concern</b> – A native plant species that is rare in the State, but not rare enough to be considered Threatened or Endangered.
<b>PE</b>	<b>Potentially Extirpated</b> – A native plant species that has not been documented in the State in over 20 years, or loss of the last known occurrence.

**Element Occurrence (EO) Ranks:** Quality assessments that designate viability of a population or integrity of habitat. These ranks are based on size, condition, and landscape context. Range ranks (e.g., AB, BC) and uncertainty ranks (e.g., B?) are allowed. The Maine Natural Areas Program tracks all occurrences of rare plants and natural communities/ecosystems (S1-S3) as well as exemplary common natural community types (S4-S5 with EO ranks A/B).

Rank	Definition
<b>A</b>	<b>Excellent</b> – Excellent estimated viability/ecological integrity.
<b>B</b>	<b>Good</b> – Good estimated viability/ecological integrity.
<b>C</b>	<b>Fair</b> – Fair estimated viability/ecological integrity.
<b>D</b>	<b>Poor</b> – Poor estimated viability/ecological integrity.
<b>E</b>	<b>Extant</b> – Verified extant, but viability/ecological integrity not assessed.
<b>H</b>	<b>Historical</b> – Lack of field information within past 20 years verifying continued existence of the occurrence, but not enough to document extirpation.
<b>X</b>	<b>Extirpated</b> – Documented loss of population/destruction of habitat.
<b>U</b>	<b>Unrankable</b> – Occurrence unable to be ranked due to lack of sufficient information (e.g., possible mistaken identification).
<b>NR</b>	<b>Not Ranked</b> – An occurrence rank has not been assigned.

Visit the Maine Natural Areas Program website for more information  
<http://www.maine.gov/dacf/mnap>





## SECTION 10

### BUFFERS





## BUFFERS

Revised February 2024

The lots are limited to an interior portion of the property and are to be developed by individual lessees. All development must adhere to regulations defined within the "Fish River Chain of Lakes Concept Plan", dated June 2019. To this end building envelopes, limiting disturbance to each lot, have been shown within the Plan Set. Other, extensive undisturbed forested buffers will remain around the project perimeter to offer visual buffering between the new lots, existing properties, and future operations that may occur.

Additionally, roadside buffers are proposed for stormwater management. For more information on Stormwater Management, please see **Section 12** of this Application.



## SECTION 11

### SOILS



## SOILS

Please refer to the attached NRCS Soils Report showing the soils distributions for the development area. The type of the soils present in the proposed development areas are not expected to have a negative impact or pose any limitations on the project. Test pits have been taken throughout the development area to identify the suitability of soils for stormwater management and on-site wastewater disposal. Further information on this topic can be seen in Sections 12 and 17 of this application.

# Custom Soil Resource Report for **Aroostook County, Maine, Northeastern Part**



# Preface

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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](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

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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



## Custom Soil Resource Report

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

## Custom Soil Resource Report

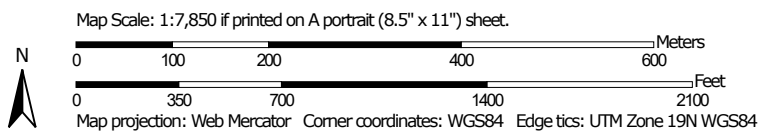
identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

# Soil Map

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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 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: Aroostook County, Maine, Northeastern Part  
 Survey Area Data: Version 24, Aug 30, 2022

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

Date(s) aerial images were photographed: Jul 24, 2021—Sep 20, 2021

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
HvB	Howland loam, 0 to 8 percent slopes, very stony	76.2	59.3%
MoA	Monarda-Burnham complex, 0 to 3 percent slopes	52.3	40.7%
<b>Totals for Area of Interest</b>		<b>128.6</b>	<b>100.0%</b>

## 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,

## Custom Soil Resource Report

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.

## Aroostook County, Maine, Northeastern Part

### HvB—Howland loam, 0 to 8 percent slopes, very stony

#### Map Unit Setting

*National map unit symbol:* 2w3y8

*Elevation:* 120 to 2,500 feet

*Mean annual precipitation:* 35 to 52 inches

*Mean annual air temperature:* 37 to 44 degrees F

*Frost-free period:* 80 to 145 days

*Farmland classification:* Not prime farmland

#### Map Unit Composition

*Howland and similar soils:* 85 percent

*Estimates are based on observations, descriptions, and transects of the mapunit.*

#### Description of Howland

##### Setting

*Landform:* Ground moraines

*Landform position (two-dimensional):* Summit, backslope

*Landform position (three-dimensional):* Base slope

*Down-slope shape:* Linear

*Across-slope shape:* Linear

*Parent material:* Coarse-loamy lodgment till

##### Typical profile

*Oa - 0 to 2 inches:* highly decomposed plant material

*E - 2 to 4 inches:* loam

*Bs - 4 to 18 inches:* gravelly silt loam

*BC - 18 to 25 inches:* gravelly silt loam

*Cd - 25 to 65 inches:* gravelly silt loam

##### Properties and qualities

*Slope:* 0 to 8 percent

*Surface area covered with cobbles, stones or boulders:* 1.5 percent

*Depth to restrictive feature:* 21 to 33 inches to densic material

*Drainage class:* Moderately well drained

*Capacity of the most limiting layer to transmit water (Ksat):* Moderately low (0.01 to 0.14 in/hr)

*Depth to water table:* About 17 to 26 inches

*Frequency of flooding:* None

*Frequency of ponding:* None

*Available water supply, 0 to 60 inches:* Low (about 5.1 inches)

##### Interpretive groups

*Land capability classification (irrigated):* None specified

*Land capability classification (nonirrigated):* 6s

*Hydrologic Soil Group:* C/D

*Ecological site:* F146XY081ME - Loamy Acidic Till

*Hydric soil rating:* No



## MoA—Monarda-Burnham complex, 0 to 3 percent slopes

### Map Unit Setting

*National map unit symbol:* 2t0yl  
*Elevation:* 120 to 2,500 feet  
*Mean annual precipitation:* 34 to 46 inches  
*Mean annual air temperature:* 37 to 41 degrees F  
*Frost-free period:* 80 to 130 days  
*Farmland classification:* Not prime farmland

### Map Unit Composition

*Monarda and similar soils:* 45 percent  
*Burnham and similar soils:* 40 percent  
*Estimates are based on observations, descriptions, and transects of the mapunit.*

### Description of Monarda

#### Setting

*Landform:* Ground moraines  
*Landform position (two-dimensional):* Toeslope  
*Landform position (three-dimensional):* Talf  
*Down-slope shape:* Linear  
*Across-slope shape:* Linear  
*Parent material:* Loamy lodgment till

#### Typical profile

*Ap - 0 to 6 inches:* silt loam  
*Bg - 6 to 20 inches:* silt loam  
*Cd - 20 to 65 inches:* gravelly silt loam

#### Properties and qualities

*Slope:* 0 to 3 percent  
*Depth to restrictive feature:* 12 to 27 inches to densic material  
*Drainage class:* Poorly drained  
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately low (0.01 to 0.14 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:* Low (about 4.6 inches)

#### Interpretive groups

*Land capability classification (irrigated):* None specified  
*Land capability classification (nonirrigated):* 7s  
*Hydrologic Soil Group:* D  
*Ecological site:* F146XY032ME - Loamy Till Bottom  
*Hydric soil rating:* Yes

### Description of Burnham

#### Setting

*Landform:* Ground moraines

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*Landform position (two-dimensional):* Toeslope

*Landform position (three-dimensional):* Talf

*Down-slope shape:* Linear

*Across-slope shape:* Linear

*Parent material:* Loamy lodgment till

### Typical profile

*Oa - 0 to 13 inches:* muck

*Bg - 13 to 18 inches:* channery silt loam

*Cdg - 18 to 65 inches:* channery silt loam

### Properties and qualities

*Slope:* 0 to 2 percent

*Depth to restrictive feature:* 5 to 20 inches to densic material

*Drainage class:* Very poorly drained

*Capacity of the most limiting layer to transmit water (Ksat):* Moderately low (0.01 to 0.14 in/hr)

*Depth to water table:* About 0 to 6 inches

*Frequency of flooding:* None

*Frequency of ponding:* Frequent

*Available water supply, 0 to 60 inches:* Moderate (about 6.9 inches)

### Interpretive groups

*Land capability classification (irrigated):* None specified

*Land capability classification (nonirrigated):* 7s

*Hydrologic Soil Group:* D

*Ecological site:* F146XY032ME - Loamy Till Bottom

*Hydric soil rating:* Yes

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## SECTION 12

### STORMWATER MANAGEMENT



**DEPARTMENT OF ENVIRONMENTAL PROTECTION  
STORMWATER APPLICATION CHECKLIST**

<b>Applicant:</b>		
<b>Project Name:</b>		
<b>Town:</b>		
Application Type:	<input type="checkbox"/> Stormwater	<input type="checkbox"/> Site Law
Watershed Name:		
Watershed Type:	<input type="checkbox"/> UIS	<input type="checkbox"/> Phosphorus <input type="checkbox"/> Neither

**Project Area Information**

	Existing to Remain <sup>1</sup>	New / Proposed	Total
Impervious (Im)			
Landscaped (Land)			
Developed (Dev) <sup>2</sup>			

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%						
Increased Runoff Treated <sup>1</sup>	4(C)(2)(a)(ii)	90% / 80% min						
% Parcel Developed <sup>2</sup>	4(C)(2)(a)(iii)	90% / 75% min						
Redevelopment <sup>3</sup> (Dev Area)	4(C)(2)(d)	0% min (SW) 50% min (Site)						
Linear	4(C)(5)(c)	75% / 50% min						
Other: Offsite Treatment/Mitigation								
<b>Project Total Area =</b>								

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 <sup>1</sup>	CPV Draindown Time	HydroCAD

1- BMP details (cross sections, elevation sections, plan view)



## STORMWATER MANAGEMENT Revised February 2024

### NARRATIVE

The intent of this Stormwater Management Plan is to comply with the requirements of the Maine Department of Environmental Protection (MDEP) Chapter 500 regulations.

This project involves the creation of a residential subdivision in Cross Lake Township, Maine. This permit application will account for the development of the subdivision access road by the applicant/owner. The individual lots will be developed as single-family homes by future lessees and are therefore exempt from Chapter 500 standards. Based on the Chapter 500 rules, the Basic Standards, General Standards, and Flooding Standards apply to this project.

The proposed roadway will result in approximately 1.12 Acres of new impervious area and 3.50 Acres of developed area. These areas were included in determining compliance with the Basic and General Standards. Since Phosphorus export is of great concern within the Cross Lake Watershed, we opted to meet the General Standards to be sure to minimize the phosphorus export for this project.

We have included assumptions for lot development (4,000 s.f. of impervious area and 6,000 s.f. of developed, lawn area) in determining compliance with the Flooding Standard and Section 10.32, **Phosphorus Control for Cross, Long, Mud, and Square Lake Watersheds**, within the “**Fish River Chain of Lakes Concept Plan**”, dated June 2019 (from here on out referred to as the **Concept Plan**). Please refer to the **Cross Lake Development Area Phosphorus Budget Scorecard** section of this report.

**Basic Standard Submission:** Information is provided as required for the Basic Standard Submission in **Section 14.0-Basic Standards**.

**Urban Impaired Stream Standard Submission:** This development is not located within an urban impaired stream watershed; this standard does not apply.

**General Standards Submission:** As allowed within Chapter 500 regulations, the applicant/owner is choosing to meet the General Standards in place of the Phosphorus Standards to ensure that the phosphorus export for this project is minimized, therefore leaving a larger Phosphorus Budget for future development. Please refer to the **Cross Lake Development Area Phosphorus Budget Scorecard** section of this report.

The road is defined as linear and is only required to treat 75% of new impervious and 50% of developed area for that portion. We are proposing roadside forested buffers to provide the stormwater management for this project.





1. Narrative: This project involves the creation of a residential subdivision in Cross Lake Township, Maine. This permit application will account for the creation of approximately 1.12 acres (49,035 square feet) of new impervious surface and 3.50 acres (152,845 square feet) of total developed area.
2. Drainage Plans: A set of Hydrology Plans and Proposed Site Plans are provided in this Application. These plans include watershed boundaries and locations of the stormwater management features.
3. Calculations: This project will include roadside forested buffers which have been designed in accordance with Chapter 5 of the MDEP Stormwater BMP Technical Design Manual, Volume III.
4. Details, Designs, and Specifications: Please refer to the plans for stormwater management details, designs, and specifications.

**Flooding Standard Submission:** The following information is provided as required in the Flooding Standard Submission.

1. Control of Peak Flows: The project is required to meet Flooding Standards in accordance with Chapter 500 requirements. The Pre- and Post-Development Hydrology models and narrative are located in Section 12B.
2. Details, Design, and Specifications: The model runoff calculations are performed using a HydroCAD 10.0 model. Sizing of the required stormwater treatment methods are included in Section 12A.

**Cross Lake Development Area Phosphorus Budget Scorecard:**

The **Cross Lake Development Area Phosphorus Budget (Budget)** is 44 pounds per year, as defined within Section 10.32 of the **Concept Plan**. There are five development areas defined within the **Concept Plan** and this project/development is located within the “Cross Lake A” development area. Using the impervious areas and developed areas for the development of the proposed roadway and lots, we have filled out the Pre-PPE and Post-PPE Calculation worksheets. This information is summarized within Table 12.1 below.



**Table 12.1: Pre-PPE and Post-PPE Calculations**

Land Surface Type	Acres	Export Coefficient from Table 3.1 Table 3.2	Pre-treatment Algal Av. P Export (lbs P/year)	Treatment Factor for BMP(s) from Chapter 6	Post-treatment Algal Av. P Export (lbs P/year)	Description of BMPs
Untreated Impervious	1.89	1.75	3.3075	1	3.3075	
Treated Impervious	0.68	1.75	1.19	0.4	0.476	Forested Buffers
Untreated Lawn	3.55	0.8	2.84	1	2.84	
Treated Lawn	0.87	0.8	0.696	0.4	0.2784	Forested Buffers
		<b>Total Pre-PPE (lbs P/year)</b>	<b>8.0335</b>	<b>Total Post-PPE (lbs P/year)</b>	<b>6.9019</b>	

As part of the record keeping requirements for the **Cross Lake Development Area Phosphorus Budget**, we have included Table 12.2 as a Scorecard to illustrate the impact of this project on the **Budget** and what is remaining for future projects.

**Table 12.2: Cross Lake Development Area Phosphorus Budget Scorecard**

Total Cross Lake Development Area Phosphorus Budget* (lbs P/year) =		44.00
Cross Lake Development Area	Post-treatment Algal Av. P Export (lbs P/year)	Remaining Cross Lake Phosphorus Budget
CD-3 and/or CD-4 Zones	4.00 (reserved)	40.00
Cross Lake A	6.9019	33.0981
Cross Lake B	TBD	TBD
Cross Lake C	TBD	TBD
Cross Lake D	TBD	TBD
Cross Lake E	TBD	TBD

\***Cross Lake Development Area Phosphorus Budget** is defined and discussed in the "Fish River Chain of Lakes Concept Plan", dated June 2019, Part 2,E, Section 10.32 (starting on page 115).



## SECTION 12A STORMWATER QUALITY CONTROL NARRATIVE (GENERAL STANDARD)

The Cross Lake Subdivision project is primarily being developed to provide housing opportunity in Cross Lake Township, Maine in accordance with the **Fish River Chain of Lakes Concept Plan**. In total, the project will develop approximately 3.50 acres of undeveloped forested area.

The project consists of an inner site road network. This road will be gravel and will be approximately 2,425 feet long and 18 feet wide.

Based on Maine Department of Environmental Protection stormwater standards, the required treatment is 75% of the impervious and 50% of the developed area. Portions of the road are bound by wetlands on either side and are therefore exempt from Chapter 500 treatment standards.

The project is proposing forested roadside buffers to meet stormwater quality standards. The systems will be located at various locations within the Site to maximize the treatment of runoff and provide the necessary treatment areas. The locations of these treatment devices are shown on the Proposed Site Plans.

The following tables summarize the impervious and developed area created by the project, as well as the treatment structure, area treated, and relationship with the total developed and impervious areas for the project.

### PROJECT AREA

PROJECT AREA	IMPERVIOUS AREA	DEVELOPED AREA
Total Proposed Site Area	49,035 SF (1.12 acres)	152,845 SF (3.50 acres)
Area Exempt from treatment	9,357 SF	28,377 SF
Area Eligible for treatment	39,678 SF (0.91 acres)	124,468 SF (2.85 acres)



## STORMWATER TREATMENT SYSTEMS (SITE AREA)

TREATMENT METHOD	AREA TREATED	
	IMPERVIOUS AREA	DEVELOPED AREA
Roadside Buffer A	2,865 SF	6,542 SF
Roadside Buffer B	1,908 SF	4,800 SF
Roadside Buffer C	2,314 SF	6,314 SF
Roadside Buffer D	3,699 SF	9,217 SF
Roadside Buffer E	4,165 SF	10,599 SF
Roadside Buffer F	2,451 SF	6,007 SF
Roadside Buffer G	843 SF	2,375 SF
Roadside Buffer H	1,508 SF	4,486 SF
Roadside Buffer I	6,461 SF	12,302 SF
Roadside Buffer J	3,546 SF	5,005 SF
<b>TOTAL</b>	<b>29,760 SF (0.68 acres)</b>	<b>67,647 SF (1.55 acres)</b>
<b>PERCENT OF TOTAL AREA TREATED</b>	<b>75.00 %</b>	<b>54.34 %</b>

As can be seen in the table above, we are proposing to treat **75.00%** of the Impervious Area and **54.34%** of the Developed Area from the site portion of the project. This meets the standards required by Chapter 500.

## BMP DESCRIPTIONS AND SIZING CALCULATIONS

The proposed stormwater quality control devices have been designed in accordance with the standards outlined in Stormwater Management for Maine, Volume II BMP Manual, January 2006 and revised May 2016. Construction and maintenance will be done according to the standards outlined in this manual.

Description of the treatment types are as follows:

### 1. Roadside Forested Buffers

The only stormwater BMPs proposed for this project are "Buffers Adjacent to the Downhill Side of a Road," as described in Chapter 5.3 of the MDEP BMP Manual. These forested buffers are located on slopes less than 20% and are not proposed in wetlands. The road is 24' wide with two lanes; therefore, the buffers have a flow path of 55 feet. The locations of these buffers are shown on Sheet C703.

The proposed stormwater quality control devices have been designed in accordance with the standards outlined in Stormwater Management for Maine, Volume II BMP Manual, January 2006, and revised May 2016. Construction and maintenance will be done according to the standards outlined in this manual.



**SECTION 12B**  
**STORMWATER PEAK RUNOFF CONTROL NARRATIVE (FLOODING STANDARD)**

As previously stated, the project is required to meet the flooding standard under Chapter 500 Section 4.E(2)(a). To meet the flooding standard, HydroCAD calculations were performed to compare pre-development and post-development conditions. Curve numbers and peak runoff flows were calculated using HydroCAD.

The pre-development site is undeveloped woodland with wetlands and streams. Soils on the site per the USDA web soil survey are classified as Howland Loam (Hydrologic Soil Group C/D) and Monarda-Burnham complex (Hydrologic Soil Group D.) The Site uniformly drains to the northeast to a roadside ditch along West Side Road, which ultimately drains to Cross Lake. The post-development site was broken into 8 subareas encompassing the same footprint as pre-development. Developed site areas will continue to flow to natural drainage pathways

Summation Points were chosen in similar areas between pre-development and post-development to compare peak flow runoff for the 2-year, 10-year, and 25-year storm events. Summation Points 1 and 2 are located northeast and northwest of the site and compare the runoff flowing to the roadside ditch along West Side Road, and to a stream west of the site.

Based on results of the HydroCAD, it is expected that stormwater runoff from the site will be similar or lessened in post-development conditions as in pre-development conditions. Overall, it is expected that runoff from the site will be similar to post-development conditions and a similar stormwater runoff will be realized. A comparison of each of the watershed areas in both Pre- and Post-Development is organized in the table below.

		2 Year (cfs)	10 Year (cfs)	25 Year (cfs)	25 Year Net Change (cfs)	25 Year % Change (%)
Summation Point 1	Pre	16.04	36.72	52.41	<b>-2.78</b>	<b>-5.30</b>
	Post	13.47	33.57	49.63		
Summation Point 2	Pre	16.09	36.36	51.68	<b>-0.4</b>	<b>-0.77</b>
	Post	14.99	35.65	51.28		

As can be seen in the table above, the summation points will see slight decreased post development flow rates due to division of the site watersheds and increased times of concentration. The increase in impervious surface is generally small compared to the overall watershed area, and thus does not result in an increased curve number. Development

Prepared by:  
Haley Ward, Inc.



Drew Olehowski, PE  
Project Engineer



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.

Main Engineer of Record:

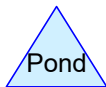
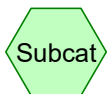
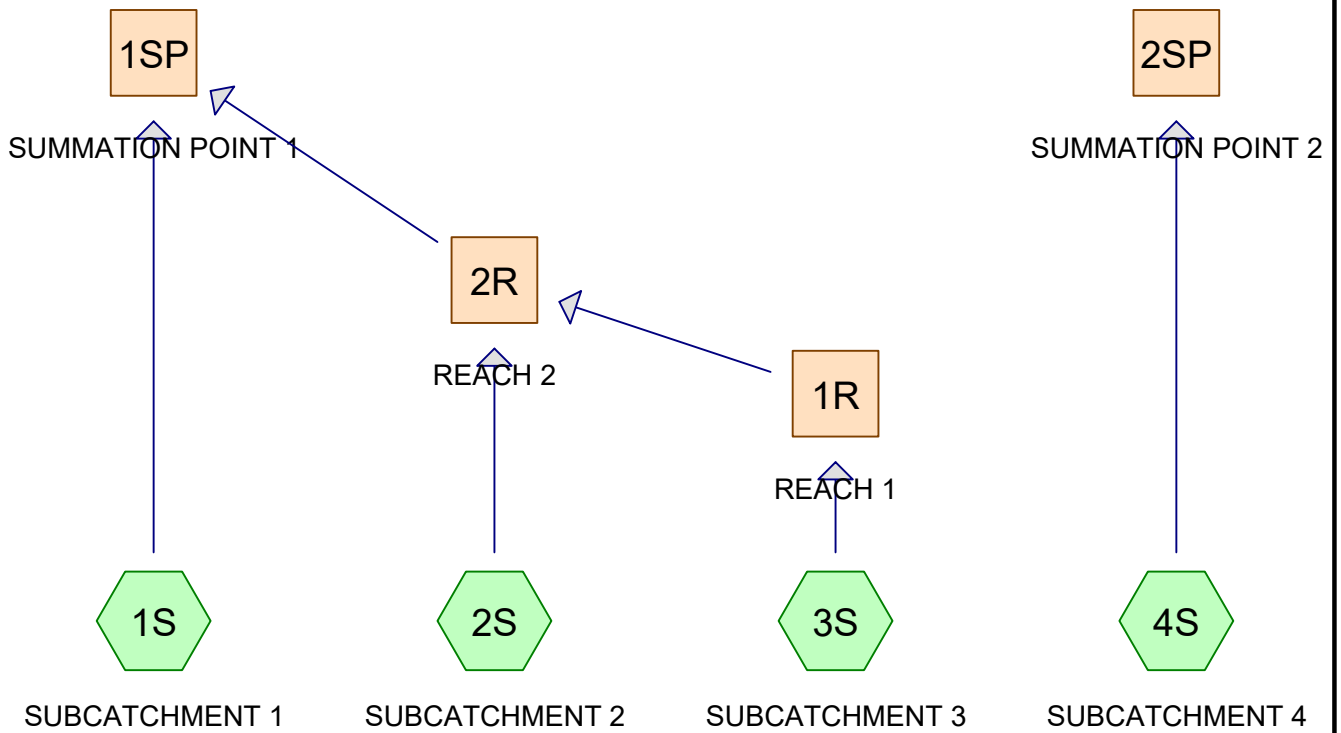
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Signature



\_\_\_\_\_  
Date

Drew Olehowski, P.E.

\_\_\_\_\_  
Name (print)



**PRE DEVELOPMENT**

Prepared by Haley Ward

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Type II 24-hr 2 YEAR Rainfall=2.20"

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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

**Subcatchment1S: SUBCATCHMENT1** Runoff Area=564,326 sf 3.79% Impervious Runoff Depth>0.53"  
Flow Length=1,740' Tc=27.3 min CN=78 Runoff=6.37 cfs 0.574 af

**Subcatchment2S: SUBCATCHMENT2** Runoff Area=606,698 sf 1.26% Impervious Runoff Depth>0.49"  
Flow Length=2,140' Tc=36.9 min CN=77 Runoff=5.05 cfs 0.569 af

**Subcatchment3S: SUBCATCHMENT3** Runoff Area=1,343,394 sf 0.31% Impervious Runoff Depth>0.49"  
Flow Length=2,530' Tc=54.0 min CN=77 Runoff=8.46 cfs 1.248 af

**Subcatchment4S: SUBCATCHMENT4** Runoff Area=2,070,860 sf 0.59% Impervious Runoff Depth>0.49"  
Flow Length=1,890' Tc=40.6 min CN=77 Runoff=16.09 cfs 1.939 af

**Reach 1R: REACH 1** Avg. Flow Depth=0.37' Max Vel=3.76 fps Inflow=8.46 cfs 1.248 af  
n=0.022 L=200.0' S=0.0150 '/' Capacity=52.49 cfs Outflow=8.45 cfs 1.246 af

**Reach 1SP: SUMMATIONPOINT 1** Inflow=16.04 cfs 2.386 af  
Outflow=16.04 cfs 2.386 af

**Reach 2R: REACH 2** Avg. Flow Depth=0.46' Max Vel=4.26 fps Inflow=12.40 cfs 1.815 af  
n=0.022 L=200.0' S=0.0150 '/' Capacity=52.49 cfs Outflow=12.38 cfs 1.812 af

**Reach 2SP: SUMMATIONPOINT 2** Inflow=16.09 cfs 1.939 af  
Outflow=16.09 cfs 1.939 af

**Total Runoff Area = 105.263 ac Runoff Volume = 4.331 af Average Runoff Depth = 0.49"**  
**99.01% Pervious = 104.218 ac 0.99% Impervious = 1.045 ac**



**PRE DEVELOPMENT**

Prepared by Haley Ward

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Type II 24-hr 2 YEAR Rainfall=2.20"

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**Summary for Subcatchment 1S: SUBCATCHMENT 1**

Runoff = 6.37 cfs @ 12.24 hrs, Volume= 0.574 af, Depth> 0.53"  
Routed to Reach 1SP : SUMMATION POINT 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type II 24-hr 2 YEAR Rainfall=2.20"

Area (sf)	CN	Description
542,926	77	Woods, Good, HSG D
* 21,400	98	IMPERVIOUS
564,326	78	Weighted Average
542,926		96.21% Pervious Area
21,400		3.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.0	50	0.0500	0.05		<b>Sheet Flow,</b> Woods: Dense underbrush n= 0.800 P2= 2.20"
8.0	540	0.0500	1.12		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
1.3	1,150	0.0600	14.65	73.26	<b>Channel Flow,</b> Area= 5.0 sf Perim= 6.0' r= 0.83' n= 0.022 Earth, clean & straight
27.3	1,740	Total			

**Summary for Subcatchment 2S: SUBCATCHMENT 2**

Runoff = 5.05 cfs @ 12.37 hrs, Volume= 0.569 af, Depth> 0.49"  
Routed to Reach 2R : REACH 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type II 24-hr 2 YEAR Rainfall=2.20"

Area (sf)	CN	Description
599,058	77	Woods, Good, HSG D
* 7,640	98	IMPERVIOUS
606,698	77	Weighted Average
599,058		98.74% Pervious Area
7,640		1.26% Impervious Area

**PRE DEVELOPMENT**

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Type II 24-hr 2 YEAR Rainfall=2.20"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.0	50	0.0500	0.05		<b>Sheet Flow,</b> Woods: Dense underbrush n= 0.800 P2= 2.20"
9.3	340	0.0150	0.61		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
0.8	80	0.1000	1.58		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
7.1	370	0.0300	0.87		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
1.7	1,300	0.0500	12.44	373.21	<b>Channel Flow,</b> Area= 30.0 sf Perim= 20.0' r= 1.50' n= 0.035 Earth, dense weeds
36.9	2,140	Total			

**Summary for Subcatchment 3S: SUBCATCHMENT 3**

Runoff = 8.46 cfs @ 12.62 hrs, Volume= 1.248 af, Depth> 0.49"  
Routed to Reach 1R : REACH 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type II 24-hr 2 YEAR Rainfall=2.20"

Area (sf)	CN	Description
1,339,194	77	Woods, Good, HSG D
* 4,200	98	IMPERVIOUS
1,343,394	77	Weighted Average
1,339,194		99.69% Pervious Area
4,200		0.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.0	50	0.0500	0.05		<b>Sheet Flow,</b> Woods: Dense underbrush n= 0.800 P2= 2.20"
6.9	390	0.0350	0.94		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
5.7	170	0.0100	0.50		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
7.7	400	0.0300	0.87		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
11.8	900	0.0650	1.27		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
3.9	620	0.0020	2.67	13.37	<b>Channel Flow,</b> Area= 5.0 sf Perim= 6.0' r= 0.83' n= 0.022 Earth, clean & straight
54.0	2,530	Total			

**PRE DEVELOPMENT**

Prepared by Haley Ward

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Type II 24-hr 2 YEAR Rainfall=2.20"

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**Summary for Subcatchment 4S: SUBCATCHMENT 4**

Runoff = 16.09 cfs @ 12.42 hrs, Volume= 1.939 af, Depth> 0.49"  
Routed to Reach 2SP : SUMMATION POINT 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type II 24-hr 2 YEAR Rainfall=2.20"

Area (sf)	CN	Description
2,058,560	77	Woods, Good, HSG D
* 12,300	98	IMPERVIOUS
2,070,860	77	Weighted Average
2,058,560		99.41% Pervious Area
12,300		0.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.0	50	0.0500	0.05		<b>Sheet Flow,</b> Woods: Dense underbrush n= 0.800 P2= 2.20"
12.1	630	0.0300	0.87		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
10.3	760	0.0600	1.22		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
0.2	450	0.0350	30.60	3,671.81	<b>Channel Flow,</b> Area= 120.0 sf Perim= 20.0' r= 6.00' n= 0.030 Earth, grassed & winding
40.6	1,890	Total			

**Summary for Reach 1R: REACH 1**

[65] Warning: Inlet elevation not specified

Inflow Area = 30.840 ac, 0.31% Impervious, Inflow Depth > 0.49" for 2 YEAR event  
Inflow = 8.46 cfs @ 12.62 hrs, Volume= 1.248 af  
Outflow = 8.45 cfs @ 12.64 hrs, Volume= 1.246 af, Atten= 0%, Lag= 1.2 min  
Routed to Reach 2R : REACH 2

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Max. Velocity= 3.76 fps, Min. Travel Time= 0.9 min  
Avg. Velocity = 1.96 fps, Avg. Travel Time= 1.7 min

Peak Storage= 450 cf @ 12.63 hrs  
Average Depth at Peak Storage= 0.37' , Surface Width= 7.21'  
Bank-Full Depth= 1.00' Flow Area= 8.0 sf, Capacity= 52.49 cfs

5.00' x 1.00' deep channel, n= 0.022 Earth, clean & straight  
Side Slope Z-value= 3.0 ' / ' Top Width= 11.00'  
Length= 200.0' Slope= 0.0150 ' / '  
Inlet Invert= 0.00', Outlet Invert= -3.00'

**PRE DEVELOPMENT**

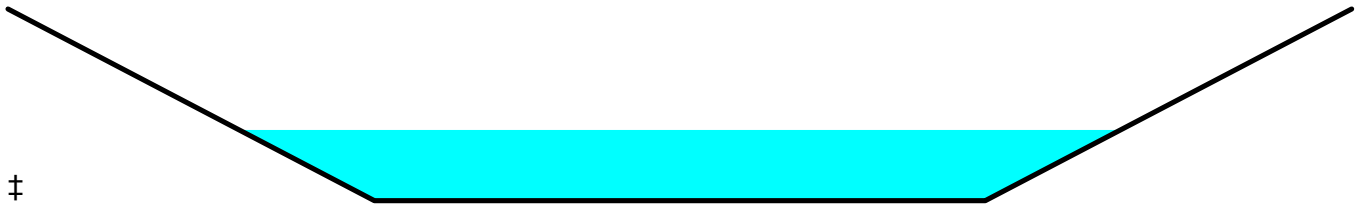
Prepared by Haley Ward

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Type II 24-hr 2 YEAR Rainfall=2.20"

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**Summary for Reach 1SP: SUMMATION POINT 1**

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area =	57.723 ac,	1.32% Impervious,	Inflow Depth > 0.50"	for 2 YEAR event
Inflow =	16.04 cfs @	12.44 hrs,	Volume=	2.386 af
Outflow =	16.04 cfs @	12.44 hrs,	Volume=	2.386 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

**Summary for Reach 2R: REACH 2**

[65] Warning: Inlet elevation not specified

Inflow Area =	44.768 ac,	0.61% Impervious,	Inflow Depth > 0.49"	for 2 YEAR event
Inflow =	12.40 cfs @	12.53 hrs,	Volume=	1.815 af
Outflow =	12.38 cfs @	12.55 hrs,	Volume=	1.812 af, Atten= 0%, Lag= 1.4 min

Routed to Reach 1SP : SUMMATION POINT 1

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Max. Velocity= 4.26 fps, Min. Travel Time= 0.8 min  
Avg. Velocity = 2.23 fps, Avg. Travel Time= 1.5 min

Peak Storage= 583 cf @ 12.54 hrs  
Average Depth at Peak Storage= 0.46' , Surface Width= 7.74'  
Bank-Full Depth= 1.00' Flow Area= 8.0 sf, Capacity= 52.49 cfs

5.00' x 1.00' deep channel, n= 0.022 Earth, clean & straight  
Side Slope Z-value= 3.0 '/' Top Width= 11.00'  
Length= 200.0' Slope= 0.0150 '/'  
Inlet Invert= 0.00', Outlet Invert= -3.00'



**PRE DEVELOPMENT**

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Type II 24-hr 2 YEAR Rainfall=2.20"

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**Summary for Reach 2SP: SUMMATION POINT 2**

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 47.540 ac, 0.59% Impervious, Inflow Depth > 0.49" for 2 YEAR event  
Inflow = 16.09 cfs @ 12.42 hrs, Volume= 1.939 af  
Outflow = 16.09 cfs @ 12.42 hrs, Volume= 1.939 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

**PRE DEVELOPMENT**

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Type II 24-hr 10 YEAR Rainfall=3.10"

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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

**Subcatchment1S: SUBCATCHMENT1** Runoff Area=564,326 sf 3.79% Impervious Runoff Depth>1.08"  
Flow Length=1,740' Tc=27.3 min CN=78 Runoff=13.82 cfs 1.169 af

**Subcatchment2S: SUBCATCHMENT2** Runoff Area=606,698 sf 1.26% Impervious Runoff Depth>1.02"  
Flow Length=2,140' Tc=36.9 min CN=77 Runoff=11.40 cfs 1.185 af

**Subcatchment3S: SUBCATCHMENT3** Runoff Area=1,343,394 sf 0.31% Impervious Runoff Depth>1.01"  
Flow Length=2,530' Tc=54.0 min CN=77 Runoff=19.19 cfs 2.603 af

**Subcatchment4S: SUBCATCHMENT4** Runoff Area=2,070,860 sf 0.59% Impervious Runoff Depth>1.02"  
Flow Length=1,890' Tc=40.6 min CN=77 Runoff=36.36 cfs 4.039 af

**Reach 1R: REACH 1** Avg. Flow Depth=0.58' Max Vel=4.87 fps Inflow=19.19 cfs 2.603 af  
n=0.022 L=200.0' S=0.0150 '/' Capacity=52.49 cfs Outflow=19.13 cfs 2.600 af

**Reach 1SP: SUMMATIONPOINT 1** Inflow=36.72 cfs 4.949 af  
Outflow=36.72 cfs 4.949 af

**Reach 2R: REACH 2** Avg. Flow Depth=0.72' Max Vel=5.48 fps Inflow=28.27 cfs 3.785 af  
n=0.022 L=200.0' S=0.0150 '/' Capacity=52.49 cfs Outflow=28.23 cfs 3.781 af

**Reach 2SP: SUMMATIONPOINT 2** Inflow=36.36 cfs 4.039 af  
Outflow=36.36 cfs 4.039 af

**Total Runoff Area = 105.263 ac Runoff Volume = 8.996 af Average Runoff Depth = 1.03"**  
**99.01% Pervious = 104.218 ac 0.99% Impervious = 1.045 ac**

**PRE DEVELOPMENT**

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Type II 24-hr 10 YEAR Rainfall=3.10"

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**Summary for Subcatchment 1S: SUBCATCHMENT 1**

Runoff = 13.82 cfs @ 12.22 hrs, Volume= 1.169 af, Depth> 1.08"  
Routed to Reach 1SP : SUMMATION POINT 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type II 24-hr 10 YEAR Rainfall=3.10"

Area (sf)	CN	Description
542,926	77	Woods, Good, HSG D
* 21,400	98	IMPERVIOUS
564,326	78	Weighted Average
542,926		96.21% Pervious Area
21,400		3.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.0	50	0.0500	0.05		<b>Sheet Flow,</b> Woods: Dense underbrush n= 0.800 P2= 2.20"
8.0	540	0.0500	1.12		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
1.3	1,150	0.0600	14.65	73.26	<b>Channel Flow,</b> Area= 5.0 sf Perim= 6.0' r= 0.83' n= 0.022 Earth, clean & straight
27.3	1,740	Total			

**Summary for Subcatchment 2S: SUBCATCHMENT 2**

Runoff = 11.40 cfs @ 12.35 hrs, Volume= 1.185 af, Depth> 1.02"  
Routed to Reach 2R : REACH 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type II 24-hr 10 YEAR Rainfall=3.10"

Area (sf)	CN	Description
599,058	77	Woods, Good, HSG D
* 7,640	98	IMPERVIOUS
606,698	77	Weighted Average
599,058		98.74% Pervious Area
7,640		1.26% Impervious Area

**PRE DEVELOPMENT**

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Type II 24-hr 10 YEAR Rainfall=3.10"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.0	50	0.0500	0.05		<b>Sheet Flow,</b> Woods: Dense underbrush n= 0.800 P2= 2.20"
9.3	340	0.0150	0.61		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
0.8	80	0.1000	1.58		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
7.1	370	0.0300	0.87		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
1.7	1,300	0.0500	12.44	373.21	<b>Channel Flow,</b> Area= 30.0 sf Perim= 20.0' r= 1.50' n= 0.035 Earth, dense weeds
36.9	2,140	Total			

**Summary for Subcatchment 3S: SUBCATCHMENT 3**

[47] Hint: Peak is 143% of capacity of segment #6

Runoff = 19.19 cfs @ 12.57 hrs, Volume= 2.603 af, Depth> 1.01"  
Routed to Reach 1R : REACH 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type II 24-hr 10 YEAR Rainfall=3.10"

Area (sf)	CN	Description
1,339,194	77	Woods, Good, HSG D
* 4,200	98	IMPERVIOUS
1,343,394	77	Weighted Average
1,339,194		99.69% Pervious Area
4,200		0.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.0	50	0.0500	0.05		<b>Sheet Flow,</b> Woods: Dense underbrush n= 0.800 P2= 2.20"
6.9	390	0.0350	0.94		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
5.7	170	0.0100	0.50		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
7.7	400	0.0300	0.87		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
11.8	900	0.0650	1.27		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
3.9	620	0.0020	2.67	13.37	<b>Channel Flow,</b> Area= 5.0 sf Perim= 6.0' r= 0.83' n= 0.022 Earth, clean & straight
54.0	2,530	Total			



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Type II 24-hr 10 YEAR Rainfall=3.10"

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**Summary for Subcatchment 4S: SUBCATCHMENT 4**

Runoff = 36.36 cfs @ 12.40 hrs, Volume= 4.039 af, Depth> 1.02"  
Routed to Reach 2SP : SUMMATION POINT 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type II 24-hr 10 YEAR Rainfall=3.10"

Area (sf)	CN	Description
2,058,560	77	Woods, Good, HSG D
* 12,300	98	IMPERVIOUS
2,070,860	77	Weighted Average
2,058,560		99.41% Pervious Area
12,300		0.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.0	50	0.0500	0.05		<b>Sheet Flow,</b> Woods: Dense underbrush n= 0.800 P2= 2.20"
12.1	630	0.0300	0.87		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
10.3	760	0.0600	1.22		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
0.2	450	0.0350	30.60	3,671.81	<b>Channel Flow,</b> Area= 120.0 sf Perim= 20.0' r= 6.00' n= 0.030 Earth, grassed & winding
40.6	1,890	Total			

**Summary for Reach 1R: REACH 1**

[65] Warning: Inlet elevation not specified

Inflow Area = 30.840 ac, 0.31% Impervious, Inflow Depth > 1.01" for 10 YEAR event  
Inflow = 19.19 cfs @ 12.57 hrs, Volume= 2.603 af  
Outflow = 19.13 cfs @ 12.60 hrs, Volume= 2.600 af, Atten= 0%, Lag= 1.6 min  
Routed to Reach 2R : REACH 2

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Max. Velocity= 4.87 fps, Min. Travel Time= 0.7 min  
Avg. Velocity = 2.30 fps, Avg. Travel Time= 1.4 min

Peak Storage= 786 cf @ 12.58 hrs  
Average Depth at Peak Storage= 0.58' , Surface Width= 8.49'  
Bank-Full Depth= 1.00' Flow Area= 8.0 sf, Capacity= 52.49 cfs

5.00' x 1.00' deep channel, n= 0.022 Earth, clean & straight  
Side Slope Z-value= 3.0 ' / ' Top Width= 11.00'  
Length= 200.0' Slope= 0.0150 ' / '  
Inlet Invert= 0.00', Outlet Invert= -3.00'

**PRE DEVELOPMENT**

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Type II 24-hr 10 YEAR Rainfall=3.10"

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**Summary for Reach 1SP: SUMMATION POINT 1**

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 57.723 ac, 1.32% Impervious, Inflow Depth > 1.03" for 10 YEAR event  
 Inflow = 36.72 cfs @ 12.40 hrs, Volume= 4.949 af  
 Outflow = 36.72 cfs @ 12.40 hrs, Volume= 4.949 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

**Summary for Reach 2R: REACH 2**

[65] Warning: Inlet elevation not specified

Inflow Area = 44.768 ac, 0.61% Impervious, Inflow Depth > 1.01" for 10 YEAR event  
 Inflow = 28.27 cfs @ 12.49 hrs, Volume= 3.785 af  
 Outflow = 28.23 cfs @ 12.51 hrs, Volume= 3.781 af, Atten= 0%, Lag= 1.1 min  
 Routed to Reach 1SP : SUMMATION POINT 1

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 5.48 fps, Min. Travel Time= 0.6 min  
 Avg. Velocity = 2.61 fps, Avg. Travel Time= 1.3 min

Peak Storage= 1,031 cf @ 12.50 hrs  
 Average Depth at Peak Storage= 0.72', Surface Width= 9.32'  
 Bank-Full Depth= 1.00' Flow Area= 8.0 sf, Capacity= 52.49 cfs

5.00' x 1.00' deep channel, n= 0.022 Earth, clean & straight  
 Side Slope Z-value= 3.0 '/' Top Width= 11.00'  
 Length= 200.0' Slope= 0.0150 '/'  
 Inlet Invert= 0.00', Outlet Invert= -3.00'



**PRE DEVELOPMENT**

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Type II 24-hr 10 YEAR Rainfall=3.10"

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**Summary for Reach 2SP: SUMMATION POINT 2**

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 47.540 ac, 0.59% Impervious, Inflow Depth > 1.02" for 10 YEAR event  
Inflow = 36.36 cfs @ 12.40 hrs, Volume= 4.039 af  
Outflow = 36.36 cfs @ 12.40 hrs, Volume= 4.039 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

**PRE DEVELOPMENT**

Type II 24-hr 25 YEAR Rainfall=3.70"

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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

**Subcatchment1S: SUBCATCHMENT1** Runoff Area=564,326 sf 3.79% Impervious Runoff Depth>1.50"  
Flow Length=1,740' Tc=27.3 min CN=78 Runoff=19.36 cfs 1.619 af

**Subcatchment2S: SUBCATCHMENT2** Runoff Area=606,698 sf 1.26% Impervious Runoff Depth>1.43"  
Flow Length=2,140' Tc=36.9 min CN=77 Runoff=16.19 cfs 1.656 af

**Subcatchment3S: SUBCATCHMENT3** Runoff Area=1,343,394 sf 0.31% Impervious Runoff Depth>1.42"  
Flow Length=2,530' Tc=54.0 min CN=77 Runoff=27.32 cfs 3.638 af

**Subcatchment4S: SUBCATCHMENT4** Runoff Area=2,070,860 sf 0.59% Impervious Runoff Depth>1.42"  
Flow Length=1,890' Tc=40.6 min CN=77 Runoff=51.68 cfs 5.642 af

**Reach 1R: REACH 1** Avg. Flow Depth=0.71' Max Vel=5.42 fps Inflow=27.32 cfs 3.638 af  
n=0.022 L=200.0' S=0.0150 '/' Capacity=52.49 cfs Outflow=27.24 cfs 3.634 af

**Reach 1SP: SUMMATIONPOINT 1** Inflow=52.41 cfs 6.902 af  
Outflow=52.41 cfs 6.902 af

**Reach 2R: REACH 2** Avg. Flow Depth=0.87' Max Vel=6.08 fps Inflow=40.31 cfs 5.289 af  
n=0.022 L=200.0' S=0.0150 '/' Capacity=52.49 cfs Outflow=40.26 cfs 5.284 af

**Reach 2SP: SUMMATIONPOINT 2** Inflow=51.68 cfs 5.642 af  
Outflow=51.68 cfs 5.642 af

**Total Runoff Area = 105.263 ac Runoff Volume = 12.554 af Average Runoff Depth = 1.43"**  
**99.01% Pervious = 104.218 ac 0.99% Impervious = 1.045 ac**

**PRE DEVELOPMENT**

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Type II 24-hr 25 YEAR Rainfall=3.70"

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**Summary for Subcatchment 1S: SUBCATCHMENT 1**

Runoff = 19.36 cfs @ 12.22 hrs, Volume= 1.619 af, Depth> 1.50"  
 Routed to Reach 1SP : SUMMATION POINT 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 25 YEAR Rainfall=3.70"

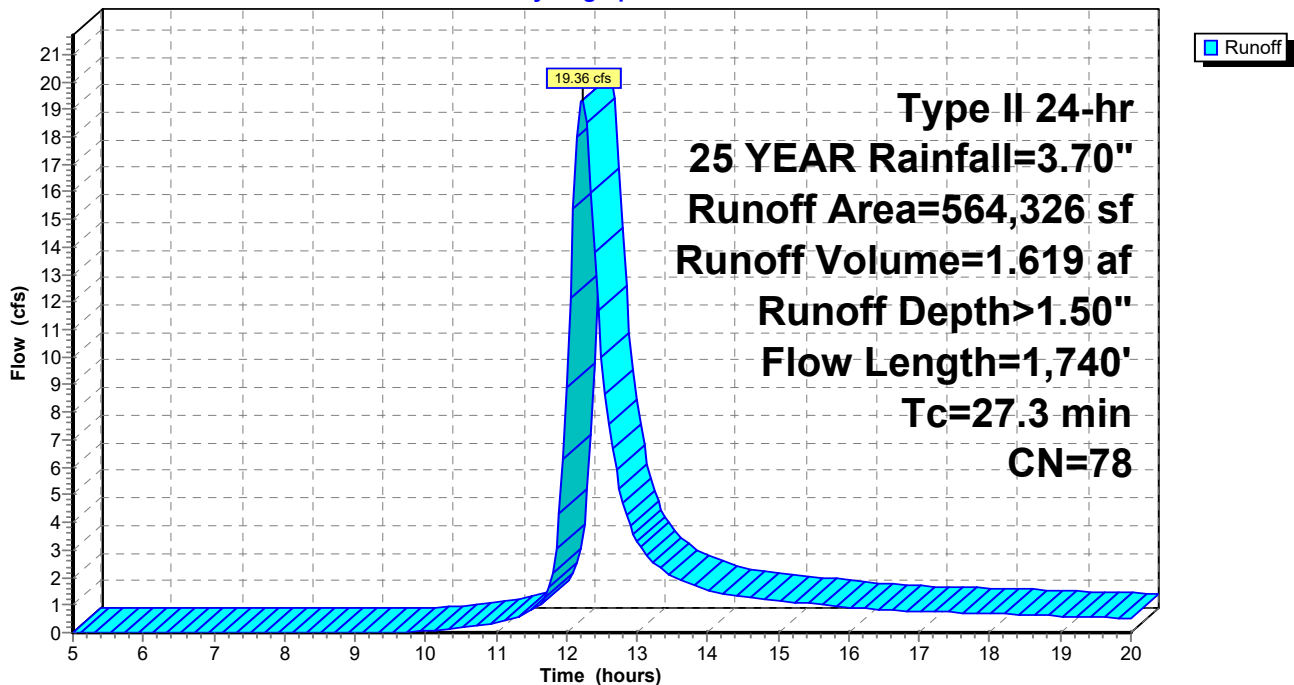
Area (sf)	CN	Description
542,926	77	Woods, Good, HSG D
* 21,400	98	IMPERVIOUS
564,326	78	Weighted Average
542,926		96.21% Pervious Area
21,400		3.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.0	50	0.0500	0.05		<b>Sheet Flow,</b> Woods: Dense underbrush n= 0.800 P2= 2.20"
8.0	540	0.0500	1.12		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
1.3	1,150	0.0600	14.65	73.26	<b>Channel Flow,</b> Area= 5.0 sf Perim= 6.0' r= 0.83' n= 0.022 Earth, clean & straight
27.3	1,740	Total			

**Subcatchment 1S: SUBCATCHMENT 1**

Hydrograph



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Type II 24-hr 25 YEAR Rainfall=3.70"

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**Summary for Subcatchment 2S: SUBCATCHMENT 2**

Runoff = 16.19 cfs @ 12.34 hrs, Volume= 1.656 af, Depth> 1.43"  
Routed to Reach 2R : REACH 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type II 24-hr 25 YEAR Rainfall=3.70"

Area (sf)	CN	Description
599,058	77	Woods, Good, HSG D
* 7,640	98	IMPERVIOUS
606,698	77	Weighted Average
599,058		98.74% Pervious Area
7,640		1.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.0	50	0.0500	0.05		<b>Sheet Flow,</b> Woods: Dense underbrush n= 0.800 P2= 2.20"
9.3	340	0.0150	0.61		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
0.8	80	0.1000	1.58		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
7.1	370	0.0300	0.87		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
1.7	1,300	0.0500	12.44	373.21	<b>Channel Flow,</b> Area= 30.0 sf Perim= 20.0' r= 1.50' n= 0.035 Earth, dense weeds
36.9	2,140	Total			

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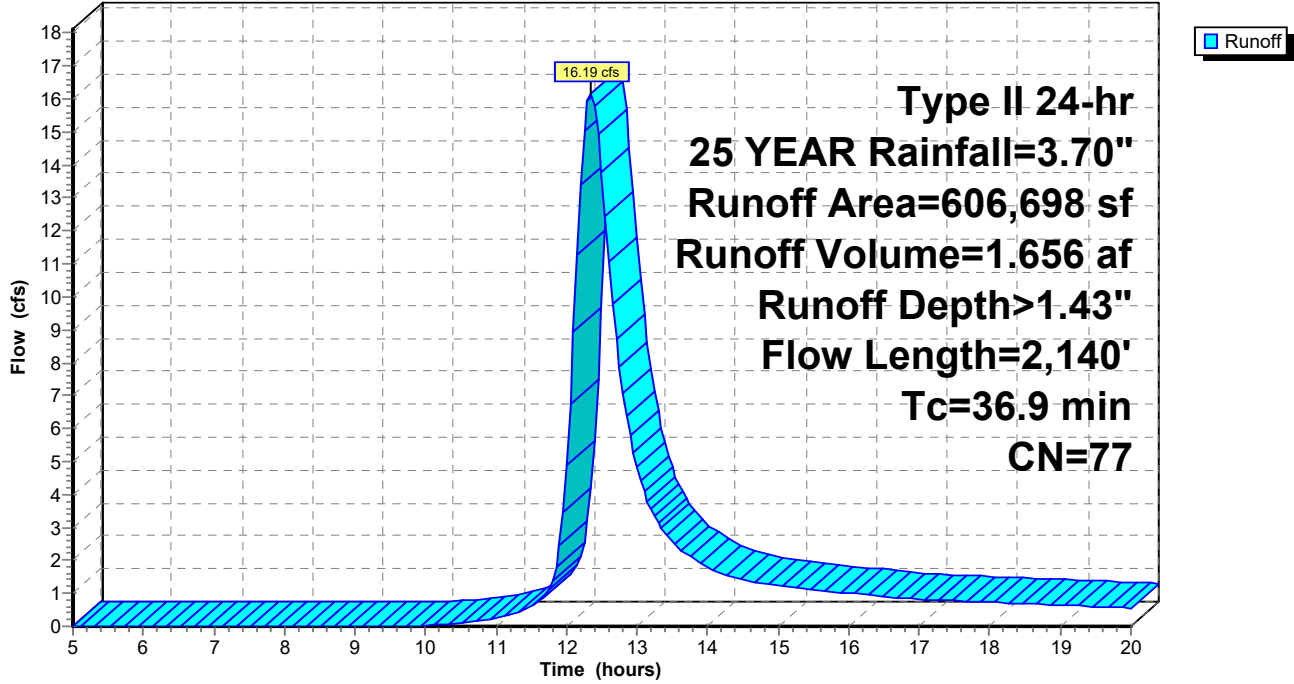
Type II 24-hr 25 YEAR Rainfall=3.70"

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**Subcatchment 2S: SUBCATCHMENT 2**

Hydrograph



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**Summary for Subcatchment 3S: SUBCATCHMENT 3**

[47] Hint: Peak is 204% of capacity of segment #6

Runoff = 27.32 cfs @ 12.56 hrs, Volume= 3.638 af, Depth> 1.42"  
 Routed to Reach 1R : REACH 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 25 YEAR Rainfall=3.70"

Area (sf)	CN	Description
1,339,194	77	Woods, Good, HSG D
* 4,200	98	IMPERVIOUS
1,343,394	77	Weighted Average
1,339,194		99.69% Pervious Area
4,200		0.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.0	50	0.0500	0.05		<b>Sheet Flow,</b> Woods: Dense underbrush n= 0.800 P2= 2.20"
6.9	390	0.0350	0.94		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
5.7	170	0.0100	0.50		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
7.7	400	0.0300	0.87		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
11.8	900	0.0650	1.27		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
3.9	620	0.0020	2.67	13.37	<b>Channel Flow,</b> Area= 5.0 sf Perim= 6.0' r= 0.83' n= 0.022 Earth, clean & straight
54.0	2,530	Total			



**PRE DEVELOPMENT**

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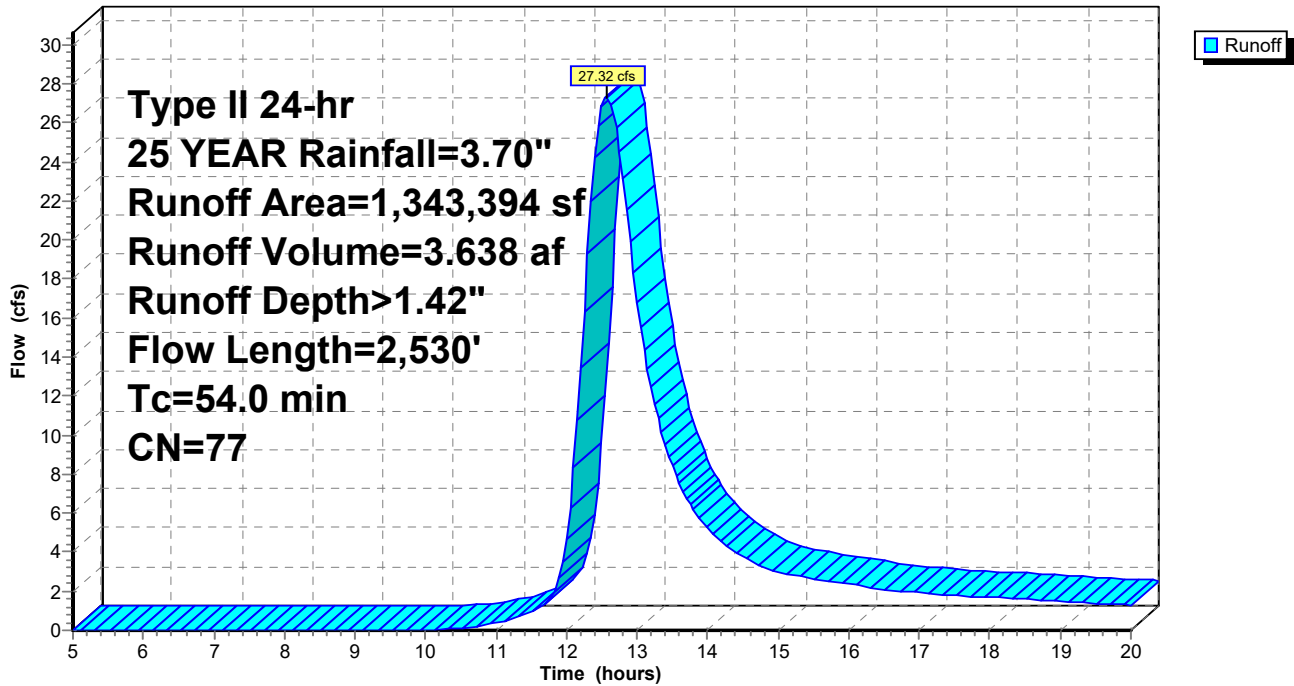
Type II 24-hr 25 YEAR Rainfall=3.70"

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**Subcatchment 3S: SUBCATCHMENT 3**

Hydrograph



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Type II 24-hr 25 YEAR Rainfall=3.70"

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**Summary for Subcatchment 4S: SUBCATCHMENT 4**

Runoff = 51.68 cfs @ 12.39 hrs, Volume= 5.642 af, Depth> 1.42"  
Routed to Reach 2SP : SUMMATION POINT 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type II 24-hr 25 YEAR Rainfall=3.70"

Area (sf)	CN	Description
2,058,560	77	Woods, Good, HSG D
* 12,300	98	IMPERVIOUS
2,070,860	77	Weighted Average
2,058,560		99.41% Pervious Area
12,300		0.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.0	50	0.0500	0.05		<b>Sheet Flow,</b> Woods: Dense underbrush n= 0.800 P2= 2.20"
12.1	630	0.0300	0.87		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
10.3	760	0.0600	1.22		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
0.2	450	0.0350	30.60	3,671.81	<b>Channel Flow,</b> Area= 120.0 sf Perim= 20.0' r= 6.00' n= 0.030 Earth, grassed & winding
40.6	1,890	Total			

**PRE DEVELOPMENT**

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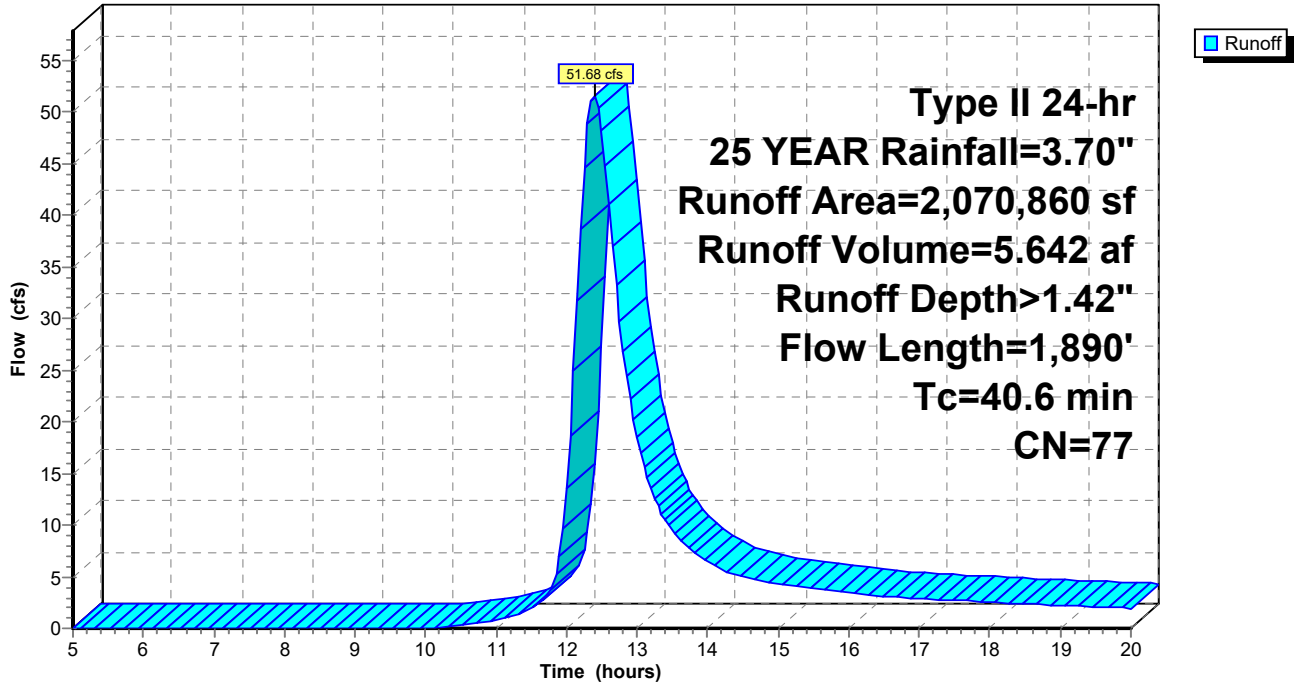
Type II 24-hr 25 YEAR Rainfall=3.70"

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**Subcatchment 4S: SUBCATCHMENT 4**

Hydrograph



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**Summary for Reach 1R: REACH 1**

[65] Warning: Inlet elevation not specified

Inflow Area = 30.840 ac, 0.31% Impervious, Inflow Depth > 1.42" for 25 YEAR event  
 Inflow = 27.32 cfs @ 12.56 hrs, Volume= 3.638 af  
 Outflow = 27.24 cfs @ 12.58 hrs, Volume= 3.634 af, Atten= 0%, Lag= 1.2 min  
 Routed to Reach 2R : REACH 2

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 5.42 fps, Min. Travel Time= 0.6 min  
 Avg. Velocity = 2.46 fps, Avg. Travel Time= 1.4 min

Peak Storage= 1,006 cf @ 12.57 hrs  
 Average Depth at Peak Storage= 0.71' , Surface Width= 9.24'  
 Bank-Full Depth= 1.00' Flow Area= 8.0 sf, Capacity= 52.49 cfs

5.00' x 1.00' deep channel, n= 0.022 Earth, clean & straight  
 Side Slope Z-value= 3.0 ' ' Top Width= 11.00'  
 Length= 200.0' Slope= 0.0150 ' '  
 Inlet Invert= 0.00', Outlet Invert= -3.00'



**PRE DEVELOPMENT**

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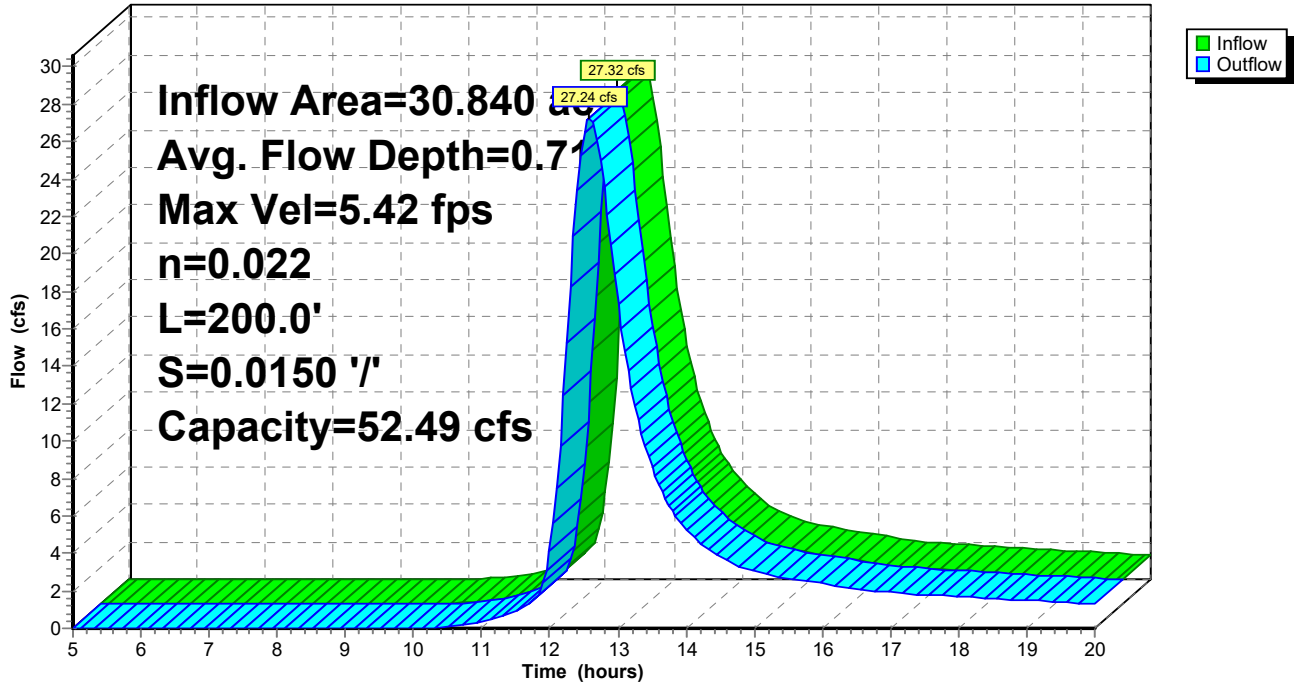
Type II 24-hr 25 YEAR Rainfall=3.70"

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**Reach 1R: REACH 1**

Hydrograph



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**Summary for Reach 1SP: SUMMATION POINT 1**

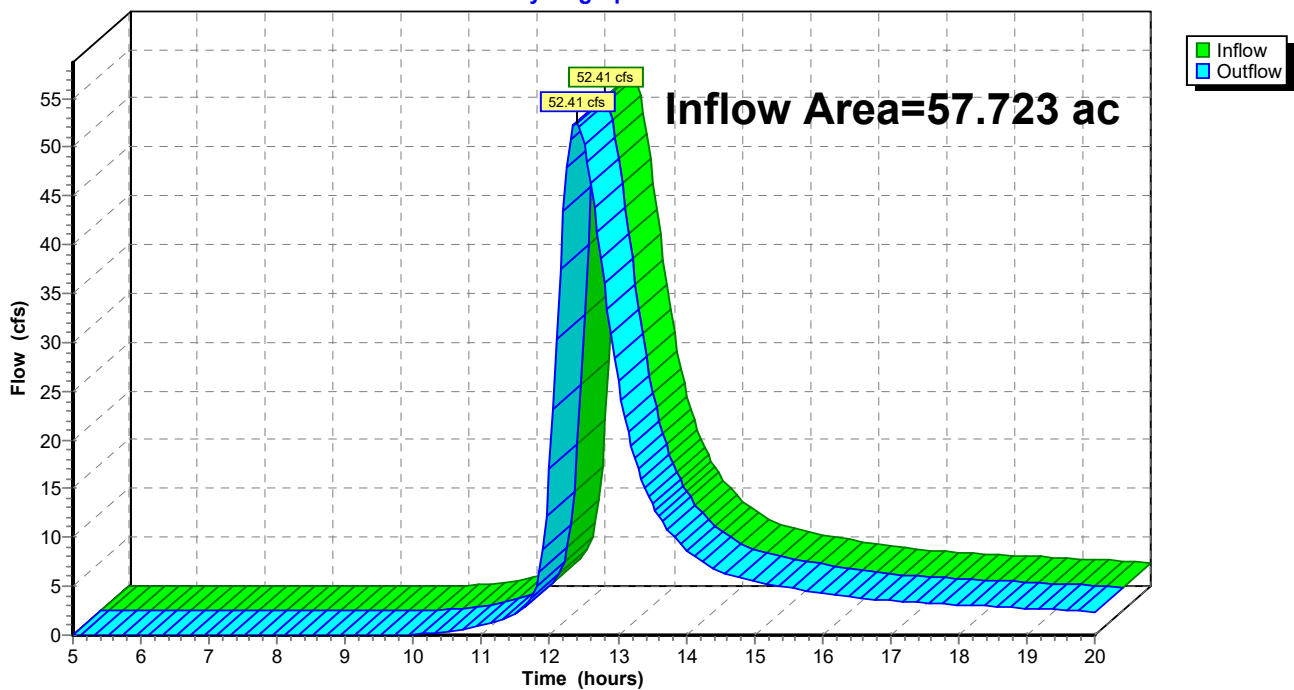
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 57.723 ac, 1.32% Impervious, Inflow Depth > 1.43" for 25 YEAR event  
Inflow = 52.41 cfs @ 12.38 hrs, Volume= 6.902 af  
Outflow = 52.41 cfs @ 12.38 hrs, Volume= 6.902 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

**Reach 1SP: SUMMATION POINT 1**

Hydrograph



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**Summary for Reach 2R: REACH 2**

[65] Warning: Inlet elevation not specified

Inflow Area = 44.768 ac, 0.61% Impervious, Inflow Depth > 1.42" for 25 YEAR event  
 Inflow = 40.31 cfs @ 12.48 hrs, Volume= 5.289 af  
 Outflow = 40.26 cfs @ 12.50 hrs, Volume= 5.284 af, Atten= 0%, Lag= 1.1 min  
 Routed to Reach 1SP : SUMMATION POINT 1

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 6.08 fps, Min. Travel Time= 0.5 min  
 Avg. Velocity = 2.78 fps, Avg. Travel Time= 1.2 min

Peak Storage= 1,325 cf @ 12.49 hrs  
 Average Depth at Peak Storage= 0.87' , Surface Width= 10.22'  
 Bank-Full Depth= 1.00' Flow Area= 8.0 sf, Capacity= 52.49 cfs

5.00' x 1.00' deep channel, n= 0.022 Earth, clean & straight  
 Side Slope Z-value= 3.0 ' ' Top Width= 11.00'  
 Length= 200.0' Slope= 0.0150 ' '  
 Inlet Invert= 0.00', Outlet Invert= -3.00'



**PRE DEVELOPMENT**

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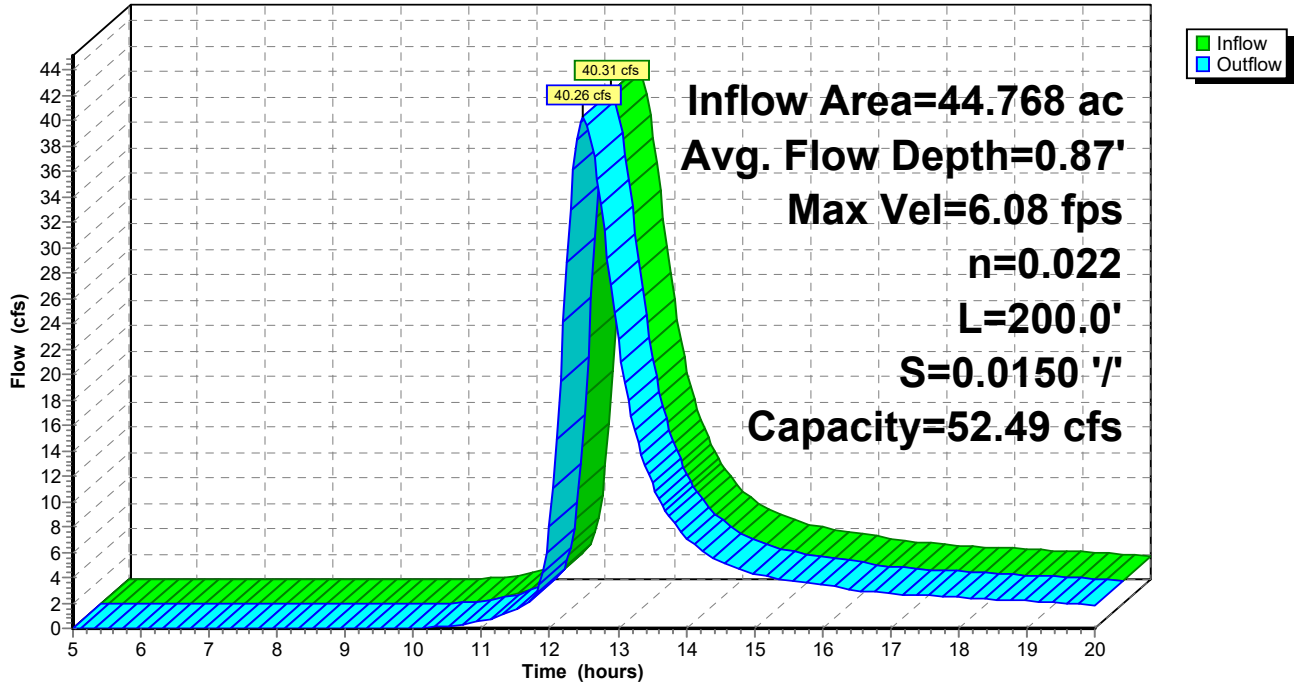
Type II 24-hr 25 YEAR Rainfall=3.70"

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**Reach 2R: REACH 2**

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**Summary for Reach 2SP: SUMMATION POINT 2**

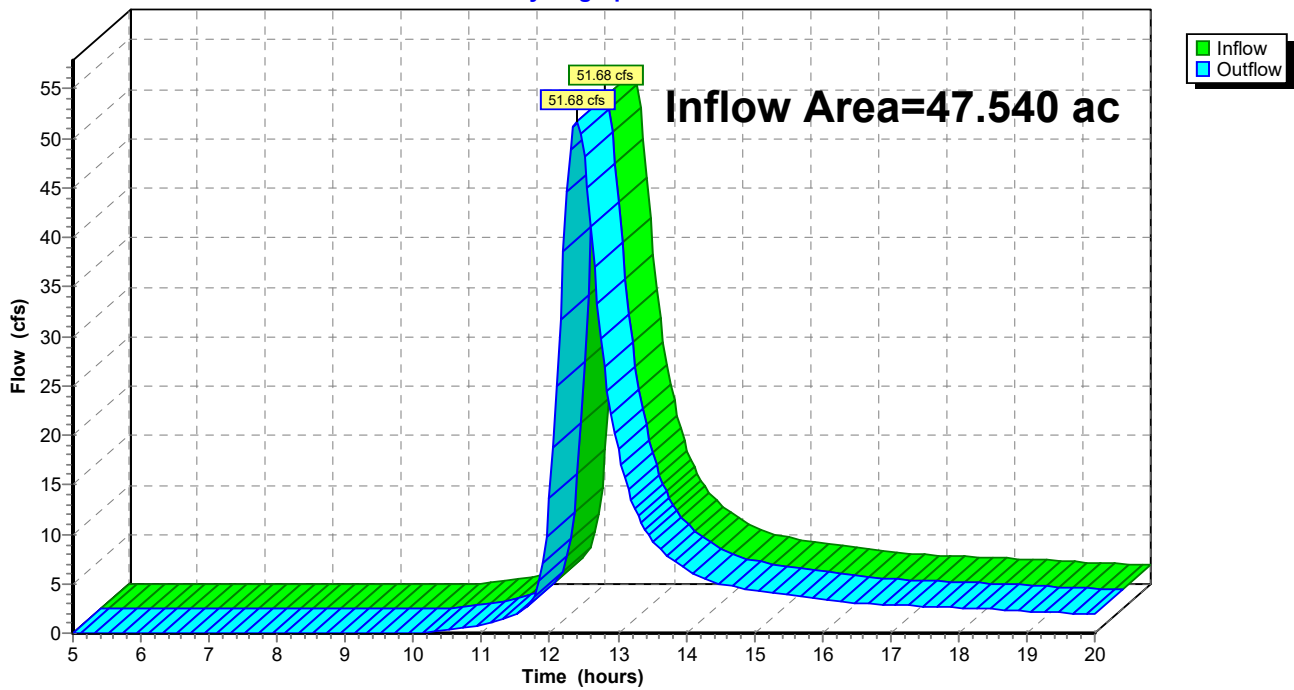
[40] Hint: Not Described (Outflow=Inflow)

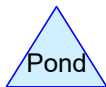
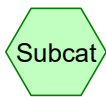
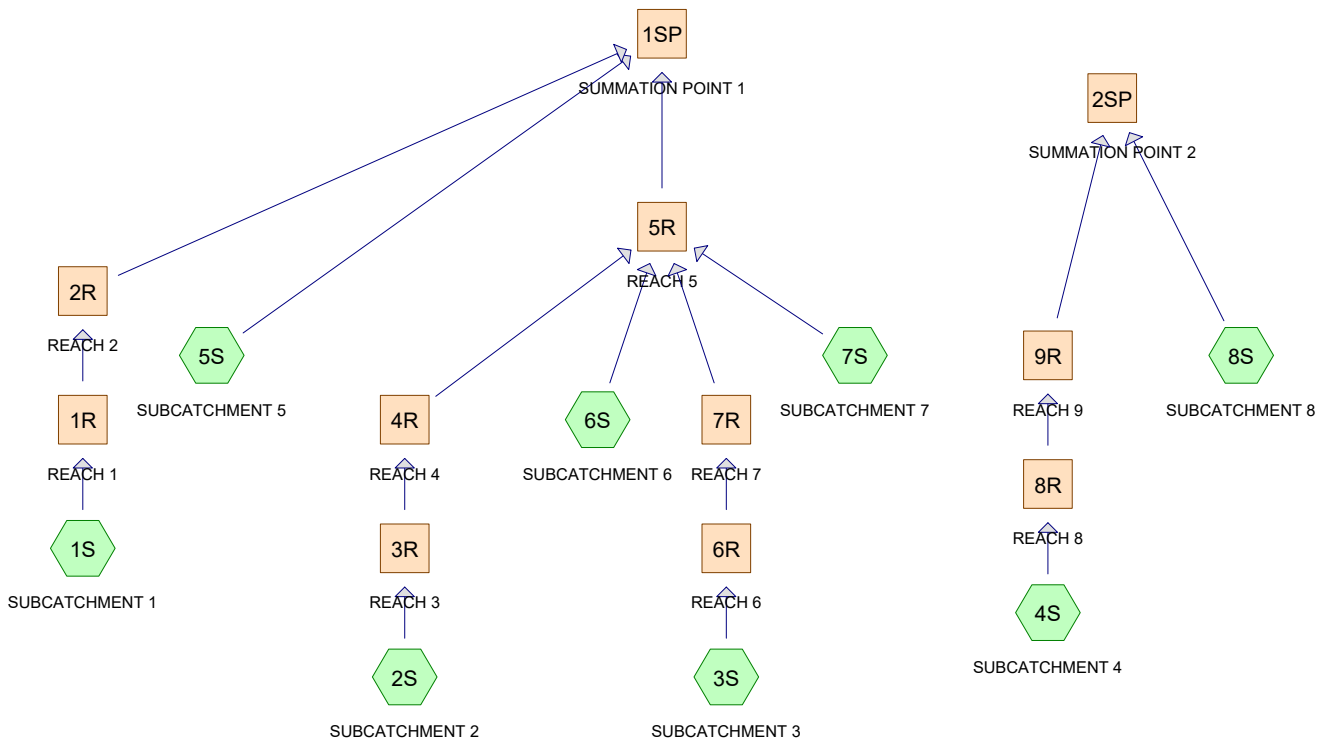
Inflow Area = 47.540 ac, 0.59% Impervious, Inflow Depth > 1.42" for 25 YEAR event  
Inflow = 51.68 cfs @ 12.39 hrs, Volume= 5.642 af  
Outflow = 51.68 cfs @ 12.39 hrs, Volume= 5.642 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

**Reach 2SP: SUMMATION POINT 2**

Hydrograph





**Routing Diagram for POST DEVELOPMENT**  
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**POST DEVELOPMENT**

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Type II 24-hr 2 YEAR Rainfall=2.20"

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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

**Subcatchment1S: SUBCATCHMENT1** Runoff Area=135,108 sf 5.23% Impervious Runoff Depth>0.53"  
 Flow Length=415' Slope=0.0500 '/' Tc=23.4 min CN=78 Runoff=1.69 cfs 0.138 af

**Subcatchment2S: SUBCATCHMENT2** Runoff Area=245,130 sf 3.12% Impervious Runoff Depth>0.53"  
 Flow Length=745' Tc=33.4 min CN=78 Runoff=2.41 cfs 0.248 af

**Subcatchment3S: SUBCATCHMENT3** Runoff Area=245,418 sf 1.71% Impervious Runoff Depth>0.49"  
 Flow Length=525' Tc=26.5 min CN=77 Runoff=2.58 cfs 0.232 af

**Subcatchment4S: SUBCATCHMENT4** Runoff Area=247,539 sf 1.01% Impervious Runoff Depth>0.49"  
 Flow Length=690' Tc=30.3 min CN=77 Runoff=2.37 cfs 0.233 af

**Subcatchment5S: SUBCATCHMENT5** Runoff Area=429,217 sf 4.49% Impervious Runoff Depth>0.53"  
 Flow Length=1,580' Tc=29.2 min CN=78 Runoff=4.64 cfs 0.436 af

**Subcatchment6S: SUBCATCHMENT6** Runoff Area=361,568 sf 1.74% Impervious Runoff Depth>0.49"  
 Flow Length=1,490' Tc=22.2 min CN=77 Runoff=4.28 cfs 0.342 af

**Subcatchment7S: SUBCATCHMENT7** Runoff Area=1,097,976 sf 1.15% Impervious Runoff Depth>0.49"  
 Flow Length=1,290' Tc=47.0 min CN=77 Runoff=7.66 cfs 1.025 af

**Subcatchment8S: SUBCATCHMENT8** Runoff Area=1,823,320 sf 1.73% Impervious Runoff Depth>0.49"  
 Flow Length=1,940' Tc=41.6 min CN=77 Runoff=13.90 cfs 1.707 af

**Reach 1R: REACH 1** Avg. Flow Depth=0.44' Max Vel=4.43 fps Inflow=1.69 cfs 0.138 af  
 15.0" Round Pipe n=0.013 L=50.0' S=0.0100 '/' Capacity=6.46 cfs Outflow=1.69 cfs 0.138 af

**Reach 1SP: SUMMATIONPOINT 1** Inflow=13.47 cfs 2.373 af  
 Outflow=13.47 cfs 2.373 af

**Reach 2R: REACH 2** Avg. Flow Depth=0.18' Max Vel=4.35 fps Inflow=1.69 cfs 0.138 af  
 n=0.022 L=1,340.0' S=0.0500 '/' Capacity=46.10 cfs Outflow=1.58 cfs 0.136 af

**Reach 2SP: SUMMATIONPOINT 2** Inflow=15.13 cfs 1.932 af  
 Outflow=15.13 cfs 1.932 af

**Reach 3R: REACH 3** Avg. Flow Depth=0.41' Max Vel=6.17 fps Inflow=2.41 cfs 0.248 af  
 18.0" Round Pipe n=0.013 L=50.0' S=0.0200 '/' Capacity=14.86 cfs Outflow=2.41 cfs 0.248 af

**Reach 4R: REACH 4** Avg. Flow Depth=0.10' Max Vel=1.87 fps Inflow=2.41 cfs 0.248 af  
 n=0.035 L=1,300.0' S=0.0500 '/' Capacity=4,427.35 cfs Outflow=2.05 cfs 0.244 af

**Reach 5R: REACH 5** Avg. Flow Depth=0.69' Max Vel=2.86 fps Inflow=11.39 cfs 1.833 af  
 n=0.025 L=1,300.0' S=0.0050 '/' Capacity=70.58 cfs Outflow=11.17 cfs 1.802 af

**Reach 6R: REACH 6** Avg. Flow Depth=0.51' Max Vel=4.91 fps Inflow=2.58 cfs 0.232 af  
 18.0" Round Pipe n=0.013 L=50.0' S=0.0100 '/' Capacity=10.50 cfs Outflow=2.57 cfs 0.232 af

**POST DEVELOPMENT**

*Type II 24-hr 2 YEAR Rainfall=2.20"*

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**Reach 7R: REACH 7**

Avg. Flow Depth=0.02' Max Vel=0.88 fps Inflow=2.57 cfs 0.232 af  
n=0.030 L=1,270.0' S=0.0650 '/' Capacity=1,260.32 cfs Outflow=1.54 cfs 0.223 af

**Reach 8R: REACH 8**

Avg. Flow Depth=0.48' Max Vel=4.80 fps Inflow=2.37 cfs 0.233 af  
18.0" Round Pipe n=0.013 L=50.0' S=0.0100 '/' Capacity=10.50 cfs Outflow=2.37 cfs 0.233 af

**Reach 9R: REACH 9**

Avg. Flow Depth=0.06' Max Vel=1.67 fps Inflow=2.37 cfs 0.233 af  
n=0.030 L=1,250.0' S=0.0500 '/' Capacity=207.88 cfs Outflow=1.95 cfs 0.226 af

**Total Runoff Area = 105.263 ac Runoff Volume = 4.360 af Average Runoff Depth = 0.50"**  
**98.01% Pervious = 103.170 ac 1.99% Impervious = 2.093 ac**

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Type II 24-hr 2 YEAR Rainfall=2.20"

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**Summary for Subcatchment 1S: SUBCATCHMENT 1**

Runoff = 1.69 cfs @ 12.19 hrs, Volume= 0.138 af, Depth> 0.53"  
Routed to Reach 1R : REACH 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type II 24-hr 2 YEAR Rainfall=2.20"

Area (sf)	CN	Description
128,048	77	Woods, Good, HSG D
* 7,060	98	IMPERVIOUS
135,108	78	Weighted Average
128,048		94.77% Pervious Area
7,060		5.23% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.0	50	0.0500	0.05		<b>Sheet Flow,</b> Woods: Dense underbrush n= 0.800 P2= 2.20"
5.4	365	0.0500	1.12		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
23.4	415	Total			

**Summary for Subcatchment 2S: SUBCATCHMENT 2**

Runoff = 2.41 cfs @ 12.32 hrs, Volume= 0.248 af, Depth> 0.53"  
Routed to Reach 3R : REACH 3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type II 24-hr 2 YEAR Rainfall=2.20"

Area (sf)	CN	Description
237,490	77	Woods, Good, HSG D
* 7,640	98	IMPERVIOUS
245,130	78	Weighted Average
237,490		96.88% Pervious Area
7,640		3.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.0	50	0.0500	0.05		<b>Sheet Flow,</b> Woods: Dense underbrush n= 0.800 P2= 2.20"
9.3	340	0.0150	0.61		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
0.8	80	0.1000	1.58		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
5.3	275	0.0300	0.87		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
33.4	745	Total			

**POST DEVELOPMENT**

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Type II 24-hr 2 YEAR Rainfall=2.20"

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**Summary for Subcatchment 3S: SUBCATCHMENT 3**

Runoff = 2.58 cfs @ 12.23 hrs, Volume= 0.232 af, Depth> 0.49"  
Routed to Reach 6R : REACH 6

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type II 24-hr 2 YEAR Rainfall=2.20"

Area (sf)	CN	Description
241,218	77	Woods, Good, HSG D
* 4,200	98	IMPERVIOUS
245,418	77	Weighted Average
241,218		98.29% Pervious Area
4,200		1.71% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.0	50	0.0500	0.05		<b>Sheet Flow,</b> Woods: Dense underbrush n= 0.800 P2= 2.20"
8.5	475	0.0350	0.94		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
26.5	525	Total			

**Summary for Subcatchment 4S: SUBCATCHMENT 4**

Runoff = 2.37 cfs @ 12.28 hrs, Volume= 0.233 af, Depth> 0.49"  
Routed to Reach 8R : REACH 8

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type II 24-hr 2 YEAR Rainfall=2.20"

Area (sf)	CN	Description
245,039	77	Woods, Good, HSG D
* 2,500	98	IMPERVIOUS
247,539	77	Weighted Average
245,039		98.99% Pervious Area
2,500		1.01% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.0	50	0.0500	0.05		<b>Sheet Flow,</b> Woods: Dense underbrush n= 0.800 P2= 2.20"
12.3	640	0.0300	0.87		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
30.3	690	Total			

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Type II 24-hr 2 YEAR Rainfall=2.20"

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**Summary for Subcatchment 5S: SUBCATCHMENT 5**

Runoff = 4.64 cfs @ 12.26 hrs, Volume= 0.436 af, Depth> 0.53"  
 Routed to Reach 1SP : SUMMATION POINT 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 2 YEAR Rainfall=2.20"

Area (sf)	CN	Description
409,927	77	Woods, Good, HSG D
* 19,290	98	IMPERVIOUS
429,217	78	Weighted Average
409,927		95.51% Pervious Area
19,290		4.49% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	20	0.0200	0.83		<b>Sheet Flow,</b> Smooth surfaces n= 0.011 P2= 2.20"
18.0	50	0.0500	0.05		<b>Sheet Flow,</b> Woods: Dense underbrush n= 0.800 P2= 2.20"
9.7	650	0.0500	1.12		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
1.1	860	0.0600	12.63	50.51	<b>Channel Flow,</b> Area= 4.0 sf Perim= 6.0' r= 0.67' n= 0.022 Earth, clean & straight
29.2	1,580	Total			

**Summary for Subcatchment 6S: SUBCATCHMENT 6**

Runoff = 4.28 cfs @ 12.18 hrs, Volume= 0.342 af, Depth> 0.49"  
 Routed to Reach 5R : REACH 5

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 2 YEAR Rainfall=2.20"

Area (sf)	CN	Description
355,268	77	Woods, Good, HSG D
* 6,300	98	IMPERVIOUS
361,568	77	Weighted Average
355,268		98.26% Pervious Area
6,300		1.74% Impervious Area

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Type II 24-hr 2 YEAR Rainfall=2.20"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	20	0.0200	0.83		<b>Sheet Flow,</b> Smooth surfaces n= 0.011 P2= 2.20"
18.0	50	0.0500	0.05		<b>Sheet Flow,</b> Woods: Dense underbrush n= 0.800 P2= 2.20"
2.5	170	0.0500	1.12		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
1.3	1,250	0.0500	16.17	646.68	<b>Channel Flow,</b> Area= 40.0 sf Perim= 18.0' r= 2.22' n= 0.035 Earth, dense weeds
22.2	1,490	Total			

**Summary for Subcatchment 7S: SUBCATCHMENT 7**

Runoff = 7.66 cfs @ 12.51 hrs, Volume= 1.025 af, Depth> 0.49"  
Routed to Reach 5R : REACH 5

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type II 24-hr 2 YEAR Rainfall=2.20"

Area (sf)	CN	Description
1,085,376	77	Woods, Good, HSG D
* 12,600	98	IMPERVIOUS
1,097,976	77	Weighted Average
1,085,376		98.85% Pervious Area
12,600		1.15% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	20	0.0200	0.83		<b>Sheet Flow,</b> Smooth surfaces n= 0.011 P2= 2.20"
31.3	100	0.0500	0.05		<b>Sheet Flow,</b> Woods: Dense underbrush n= 0.800 P2= 2.20"
15.3	1,170	0.0650	1.27		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
47.0	1,290	Total			

**Summary for Subcatchment 8S: SUBCATCHMENT 8**

Runoff = 13.90 cfs @ 12.44 hrs, Volume= 1.707 af, Depth> 0.49"  
Routed to Reach 2SP : SUMMATION POINT 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type II 24-hr 2 YEAR Rainfall=2.20"



**POST DEVELOPMENT**

Type II 24-hr 2 YEAR Rainfall=2.20"

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Area (sf)	CN	Description
1,791,735	77	Woods, Good, HSG D
* 31,585	98	IMPERVIOUS
1,823,320	77	Weighted Average
1,791,735		98.27% Pervious Area
31,585		1.73% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.7	50	0.0250	0.04		<b>Sheet Flow,</b> Woods: Dense underbrush n= 0.800 P2= 2.20"
17.0	1,020	0.0400	1.00		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
0.9	870	0.0400	16.09	1,930.24	<b>Channel Flow,</b> Area= 120.0 sf Perim= 58.0' r= 2.07' n= 0.030 Earth, grassed & winding

41.6 1,940 Total

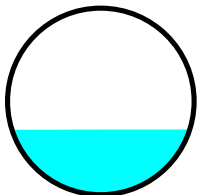
**Summary for Reach 1R: REACH 1**

Inflow Area = 3.102 ac, 5.23% Impervious, Inflow Depth > 0.53" for 2 YEAR event  
 Inflow = 1.69 cfs @ 12.19 hrs, Volume= 0.138 af  
 Outflow = 1.69 cfs @ 12.20 hrs, Volume= 0.138 af, Atten= 0%, Lag= 0.4 min  
 Routed to Reach 2R : REACH 2

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 4.43 fps, Min. Travel Time= 0.2 min  
 Avg. Velocity = 2.07 fps, Avg. Travel Time= 0.4 min

Peak Storage= 19 cf @ 12.19 hrs  
 Average Depth at Peak Storage= 0.44' , Surface Width= 1.19'  
 Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 6.46 cfs

15.0" Round Pipe  
 n= 0.013 Corrugated PE, smooth interior  
 Length= 50.0' Slope= 0.0100 '/'  
 Inlet Invert= 658.00', Outlet Invert= 657.50'



**POST DEVELOPMENT**

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Type II 24-hr 2 YEAR Rainfall=2.20"

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**Summary for Reach 1SP: SUMMATION POINT 1**

Inflow Area = 57.723 ac, 2.27% Impervious, Inflow Depth > 0.49" for 2 YEAR event  
Inflow = 13.47 cfs @ 12.68 hrs, Volume= 2.373 af  
Outflow = 13.47 cfs @ 12.68 hrs, Volume= 2.373 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

**Summary for Reach 2R: REACH 2**

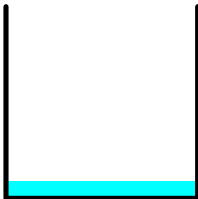
Inflow Area = 3.102 ac, 5.23% Impervious, Inflow Depth > 0.53" for 2 YEAR event  
Inflow = 1.69 cfs @ 12.20 hrs, Volume= 0.138 af  
Outflow = 1.58 cfs @ 12.35 hrs, Volume= 0.136 af, Atten= 7%, Lag= 9.0 min  
Routed to Reach 1SP : SUMMATION POINT 1

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Max. Velocity= 4.35 fps, Min. Travel Time= 5.1 min  
Avg. Velocity = 1.76 fps, Avg. Travel Time= 12.7 min

Peak Storage= 490 cf @ 12.26 hrs  
Average Depth at Peak Storage= 0.18' , Surface Width= 2.00'  
Bank-Full Depth= 2.00' Flow Area= 4.0 sf, Capacity= 46.10 cfs

2.00' x 2.00' deep channel, n= 0.022 Earth, clean & straight  
Length= 1,340.0' Slope= 0.0500 '/'  
Inlet Invert= 0.00', Outlet Invert= -67.00'



**Summary for Reach 2SP: SUMMATION POINT 2**

Inflow Area = 47.540 ac, 1.65% Impervious, Inflow Depth > 0.49" for 2 YEAR event  
Inflow = 15.13 cfs @ 12.48 hrs, Volume= 1.932 af  
Outflow = 15.13 cfs @ 12.48 hrs, Volume= 1.932 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

**Summary for Reach 3R: REACH 3**

Inflow Area = 5.627 ac, 3.12% Impervious, Inflow Depth > 0.53" for 2 YEAR event  
Inflow = 2.41 cfs @ 12.32 hrs, Volume= 0.248 af  
Outflow = 2.41 cfs @ 12.32 hrs, Volume= 0.248 af, Atten= 0%, Lag= 0.2 min  
Routed to Reach 4R : REACH 4

**POST DEVELOPMENT**

Type II 24-hr 2 YEAR Rainfall=2.20"

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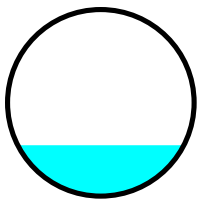
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Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Max. Velocity= 6.17 fps, Min. Travel Time= 0.1 min  
Avg. Velocity = 3.10 fps, Avg. Travel Time= 0.3 min

Peak Storage= 19 cf @ 12.32 hrs  
Average Depth at Peak Storage= 0.41' , Surface Width= 1.34'  
Bank-Full Depth= 1.50' Flow Area= 1.8 sf, Capacity= 14.86 cfs

18.0" Round Pipe  
n= 0.013 Corrugated PE, smooth interior  
Length= 50.0' Slope= 0.0200 '/'  
Inlet Invert= 0.00', Outlet Invert= -1.00'



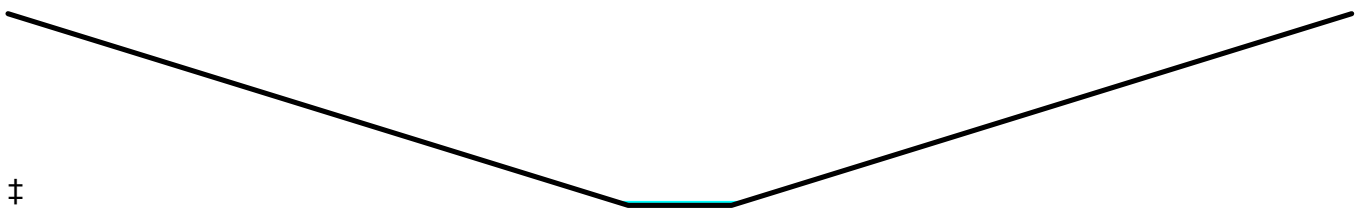
**Summary for Reach 4R: REACH 4**

Inflow Area = 5.627 ac, 3.12% Impervious, Inflow Depth > 0.53" for 2 YEAR event  
Inflow = 2.41 cfs @ 12.32 hrs, Volume= 0.248 af  
Outflow = 2.05 cfs @ 12.66 hrs, Volume= 0.244 af, Atten= 15%, Lag= 20.4 min  
Routed to Reach 5R : REACH 5

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Max. Velocity= 1.87 fps, Min. Travel Time= 11.6 min  
Avg. Velocity = 1.14 fps, Avg. Travel Time= 19.0 min

Peak Storage= 1,428 cf @ 12.47 hrs  
Average Depth at Peak Storage= 0.10' , Surface Width= 12.87'  
Bank-Full Depth= 4.00' Flow Area= 280.0 sf, Capacity= 4,427.35 cfs

10.00' x 4.00' deep channel, n= 0.035 Earth, dense weeds  
Side Slope Z-value= 15.0 '/' Top Width= 130.00'  
Length= 1,300.0' Slope= 0.0500 '/'  
Inlet Invert= 0.00', Outlet Invert= -65.00'



‡

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### Summary for Reach 5R: REACH 5

Inflow Area = 44.768 ac, 1.58% Impervious, Inflow Depth > 0.49" for 2 YEAR event  
Inflow = 11.39 cfs @ 12.57 hrs, Volume= 1.833 af  
Outflow = 11.17 cfs @ 12.79 hrs, Volume= 1.802 af, Atten= 2%, Lag= 13.4 min  
Routed to Reach 1SP : SUMMATION POINT 1

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Max. Velocity= 2.86 fps, Min. Travel Time= 7.6 min  
Avg. Velocity = 1.53 fps, Avg. Travel Time= 14.2 min

Peak Storage= 5,078 cf @ 12.67 hrs  
Average Depth at Peak Storage= 0.69' , Surface Width= 6.37'  
Bank-Full Depth= 2.00' Flow Area= 14.0 sf, Capacity= 70.58 cfs

5.00' x 2.00' deep channel, n= 0.025 Earth, clean & winding  
Side Slope Z-value= 1.0 ' / ' Top Width= 9.00'  
Length= 1,300.0' Slope= 0.0050 ' / '  
Inlet Invert= 0.00', Outlet Invert= -6.50'



### Summary for Reach 6R: REACH 6

Inflow Area = 5.634 ac, 1.71% Impervious, Inflow Depth > 0.49" for 2 YEAR event  
Inflow = 2.58 cfs @ 12.23 hrs, Volume= 0.232 af  
Outflow = 2.57 cfs @ 12.24 hrs, Volume= 0.232 af, Atten= 0%, Lag= 0.3 min  
Routed to Reach 7R : REACH 7

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Max. Velocity= 4.91 fps, Min. Travel Time= 0.2 min  
Avg. Velocity = 2.40 fps, Avg. Travel Time= 0.3 min

Peak Storage= 26 cf @ 12.23 hrs  
Average Depth at Peak Storage= 0.51' , Surface Width= 1.42'  
Bank-Full Depth= 1.50' Flow Area= 1.8 sf, Capacity= 10.50 cfs

18.0" Round Pipe  
n= 0.013 Corrugated PE, smooth interior  
Length= 50.0' Slope= 0.0100 ' / '  
Inlet Invert= 0.00', Outlet Invert= -0.50'

## POST DEVELOPMENT

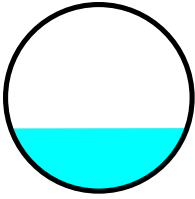
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### Summary for Reach 7R: REACH 7

Inflow Area = 5.634 ac, 1.71% Impervious, Inflow Depth > 0.49" for 2 YEAR event  
Inflow = 2.57 cfs @ 12.24 hrs, Volume= 0.232 af  
Outflow = 1.54 cfs @ 12.88 hrs, Volume= 0.223 af, Atten= 40%, Lag= 38.5 min  
Routed to Reach 5R : REACH 5

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Max. Velocity= 0.88 fps, Min. Travel Time= 24.0 min  
Avg. Velocity = 0.61 fps, Avg. Travel Time= 34.7 min

Peak Storage= 2,221 cf @ 12.48 hrs  
Average Depth at Peak Storage= 0.02' , Surface Width= 100.03'  
Bank-Full Depth= 1.00' Flow Area= 101.0 sf, Capacity= 1,260.32 cfs

100.00' x 1.00' deep channel, n= 0.030 Earth, grassed & winding  
Side Slope Z-value= 1.0 ' / ' Top Width= 102.00'  
Length= 1,270.0' Slope= 0.0650 ' / '  
Inlet Invert= 0.00', Outlet Invert= -82.55'



### Summary for Reach 8R: REACH 8

Inflow Area = 5.683 ac, 1.01% Impervious, Inflow Depth > 0.49" for 2 YEAR event  
Inflow = 2.37 cfs @ 12.28 hrs, Volume= 0.233 af  
Outflow = 2.37 cfs @ 12.29 hrs, Volume= 0.233 af, Atten= 0%, Lag= 0.3 min  
Routed to Reach 9R : REACH 9

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Max. Velocity= 4.80 fps, Min. Travel Time= 0.2 min  
Avg. Velocity = 2.41 fps, Avg. Travel Time= 0.3 min

Peak Storage= 25 cf @ 12.29 hrs  
Average Depth at Peak Storage= 0.48' , Surface Width= 1.40'  
Bank-Full Depth= 1.50' Flow Area= 1.8 sf, Capacity= 10.50 cfs

**POST DEVELOPMENT**

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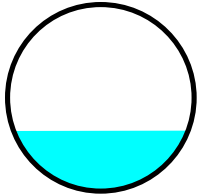
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18.0" Round Pipe  
n= 0.013 Corrugated PE, smooth interior  
Length= 50.0' Slope= 0.0100 '/'  
Inlet Invert= 0.00', Outlet Invert= -0.50'



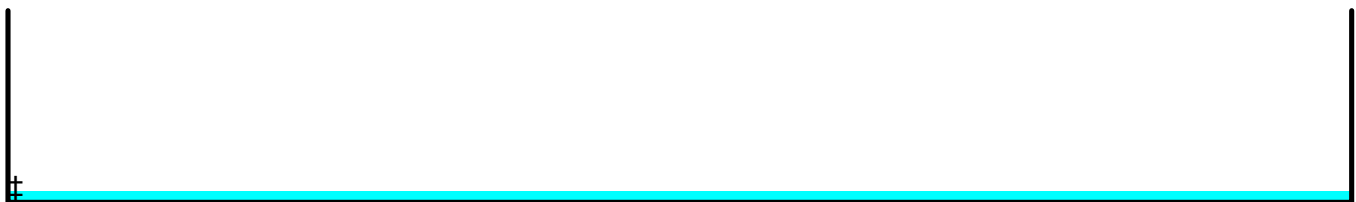
**Summary for Reach 9R: REACH 9**

Inflow Area = 5.683 ac, 1.01% Impervious, Inflow Depth > 0.49" for 2 YEAR event  
Inflow = 2.37 cfs @ 12.29 hrs, Volume= 0.233 af  
Outflow = 1.95 cfs @ 12.65 hrs, Volume= 0.226 af, Atten= 18%, Lag= 21.5 min  
Routed to Reach 2SP : SUMMATION POINT 2

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Max. Velocity= 1.67 fps, Min. Travel Time= 12.5 min  
Avg. Velocity = 0.75 fps, Avg. Travel Time= 27.6 min

Peak Storage= 1,463 cf @ 12.44 hrs  
Average Depth at Peak Storage= 0.06' , Surface Width= 20.00'  
Bank-Full Depth= 1.00' Flow Area= 20.0 sf, Capacity= 207.88 cfs

20.00' x 1.00' deep channel, n= 0.030 Earth, grassed & winding  
Length= 1,250.0' Slope= 0.0500 '/'  
Inlet Invert= 0.00', Outlet Invert= -62.50'



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Type II 24-hr 10 YEAR Rainfall=3.10"

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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

**Subcatchment1S: SUBCATCHMENT1** Runoff Area=135,108 sf 5.23% Impervious Runoff Depth>1.08"  
Flow Length=415' Slope=0.0500 '/' Tc=23.4 min CN=78 Runoff=3.65 cfs 0.280 af

**Subcatchment2S: SUBCATCHMENT2** Runoff Area=245,130 sf 3.12% Impervious Runoff Depth>1.08"  
Flow Length=745' Tc=33.4 min CN=78 Runoff=5.24 cfs 0.506 af

**Subcatchment3S: SUBCATCHMENT3** Runoff Area=245,418 sf 1.71% Impervious Runoff Depth>1.03"  
Flow Length=525' Tc=26.5 min CN=77 Runoff=5.78 cfs 0.482 af

**Subcatchment4S: SUBCATCHMENT4** Runoff Area=247,539 sf 1.01% Impervious Runoff Depth>1.02"  
Flow Length=690' Tc=30.3 min CN=77 Runoff=5.33 cfs 0.485 af

**Subcatchment5S: SUBCATCHMENT5** Runoff Area=429,217 sf 4.49% Impervious Runoff Depth>1.08"  
Flow Length=1,580' Tc=29.2 min CN=78 Runoff=10.05 cfs 0.888 af

**Subcatchment6S: SUBCATCHMENT6** Runoff Area=361,568 sf 1.74% Impervious Runoff Depth>1.03"  
Flow Length=1,490' Tc=22.2 min CN=77 Runoff=9.55 cfs 0.711 af

**Subcatchment7S: SUBCATCHMENT7** Runoff Area=1,097,976 sf 1.15% Impervious Runoff Depth>1.02"  
Flow Length=1,290' Tc=47.0 min CN=77 Runoff=17.33 cfs 2.135 af

**Subcatchment8S: SUBCATCHMENT8** Runoff Area=1,823,320 sf 1.73% Impervious Runoff Depth>1.02"  
Flow Length=1,940' Tc=41.6 min CN=77 Runoff=31.40 cfs 3.555 af

**Reach 1R: REACH 1** Avg. Flow Depth=0.67' Max Vel=5.41 fps Inflow=3.65 cfs 0.280 af  
15.0" Round Pipe n=0.013 L=50.0' S=0.0100 '/' Capacity=6.46 cfs Outflow=3.64 cfs 0.280 af

**Reach 1SP: SUMMATIONPOINT 1** Inflow=33.57 cfs 4.936 af  
Outflow=33.57 cfs 4.936 af

**Reach 2R: REACH 2** Avg. Flow Depth=0.31' Max Vel=5.73 fps Inflow=3.64 cfs 0.280 af  
n=0.022 L=1,340.0' S=0.0500 '/' Capacity=46.10 cfs Outflow=3.49 cfs 0.278 af

**Reach 2SP: SUMMATIONPOINT 2** Inflow=35.80 cfs 4.030 af  
Outflow=35.80 cfs 4.030 af

**Reach 3R: REACH 3** Avg. Flow Depth=0.62' Max Vel=7.68 fps Inflow=5.24 cfs 0.506 af  
18.0" Round Pipe n=0.013 L=50.0' S=0.0200 '/' Capacity=14.86 cfs Outflow=5.23 cfs 0.506 af

**Reach 4R: REACH 4** Avg. Flow Depth=0.16' Max Vel=2.46 fps Inflow=5.23 cfs 0.506 af  
n=0.035 L=1,300.0' S=0.0500 '/' Capacity=4,427.35 cfs Outflow=4.75 cfs 0.499 af

**Reach 5R: REACH 5** Avg. Flow Depth=1.18' Max Vel=3.84 fps Inflow=28.58 cfs 3.813 af  
n=0.025 L=1,300.0' S=0.0050 '/' Capacity=70.58 cfs Outflow=28.06 cfs 3.770 af

**Reach 6R: REACH 6** Avg. Flow Depth=0.79' Max Vel=6.08 fps Inflow=5.78 cfs 0.482 af  
18.0" Round Pipe n=0.013 L=50.0' S=0.0100 '/' Capacity=10.50 cfs Outflow=5.77 cfs 0.482 af

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*Type II 24-hr 10 YEAR Rainfall=3.10"*

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**Reach 7R: REACH 7**

Avg. Flow Depth=0.03' Max Vel=1.30 fps Inflow=5.77 cfs 0.482 af  
n=0.030 L=1,270.0' S=0.0650 '/' Capacity=1,260.32 cfs Outflow=4.25 cfs 0.468 af

**Reach 8R: REACH 8**

Avg. Flow Depth=0.76' Max Vel=5.96 fps Inflow=5.33 cfs 0.485 af  
18.0" Round Pipe n=0.013 L=50.0' S=0.0100 '/' Capacity=10.50 cfs Outflow=5.33 cfs 0.485 af

**Reach 9R: REACH 9**

Avg. Flow Depth=0.10' Max Vel=2.39 fps Inflow=5.33 cfs 0.485 af  
n=0.030 L=1,250.0' S=0.0500 '/' Capacity=207.88 cfs Outflow=4.83 cfs 0.475 af

**Total Runoff Area = 105.263 ac Runoff Volume = 9.042 af Average Runoff Depth = 1.03"**  
**98.01% Pervious = 103.170 ac 1.99% Impervious = 2.093 ac**



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Type II 24-hr 10 YEAR Rainfall=3.10"

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**Summary for Subcatchment 1S: SUBCATCHMENT 1**

Runoff = 3.65 cfs @ 12.18 hrs, Volume= 0.280 af, Depth> 1.08"  
Routed to Reach 1R : REACH 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type II 24-hr 10 YEAR Rainfall=3.10"

Area (sf)	CN	Description
128,048	77	Woods, Good, HSG D
* 7,060	98	IMPERVIOUS
135,108	78	Weighted Average
128,048		94.77% Pervious Area
7,060		5.23% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.0	50	0.0500	0.05		<b>Sheet Flow,</b> Woods: Dense underbrush n= 0.800 P2= 2.20"
5.4	365	0.0500	1.12		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
23.4	415	Total			

**Summary for Subcatchment 2S: SUBCATCHMENT 2**

Runoff = 5.24 cfs @ 12.30 hrs, Volume= 0.506 af, Depth> 1.08"  
Routed to Reach 3R : REACH 3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type II 24-hr 10 YEAR Rainfall=3.10"

Area (sf)	CN	Description
237,490	77	Woods, Good, HSG D
* 7,640	98	IMPERVIOUS
245,130	78	Weighted Average
237,490		96.88% Pervious Area
7,640		3.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.0	50	0.0500	0.05		<b>Sheet Flow,</b> Woods: Dense underbrush n= 0.800 P2= 2.20"
9.3	340	0.0150	0.61		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
0.8	80	0.1000	1.58		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
5.3	275	0.0300	0.87		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
33.4	745	Total			

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Type II 24-hr 10 YEAR Rainfall=3.10"

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**Summary for Subcatchment 3S: SUBCATCHMENT 3**

Runoff = 5.78 cfs @ 12.22 hrs, Volume= 0.482 af, Depth> 1.03"  
 Routed to Reach 6R : REACH 6

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 10 YEAR Rainfall=3.10"

Area (sf)	CN	Description
241,218	77	Woods, Good, HSG D
* 4,200	98	IMPERVIOUS
245,418	77	Weighted Average
241,218		98.29% Pervious Area
4,200		1.71% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.0	50	0.0500	0.05		<b>Sheet Flow,</b> Woods: Dense underbrush n= 0.800 P2= 2.20"
8.5	475	0.0350	0.94		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
26.5	525	Total			

**Summary for Subcatchment 4S: SUBCATCHMENT 4**

Runoff = 5.33 cfs @ 12.26 hrs, Volume= 0.485 af, Depth> 1.02"  
 Routed to Reach 8R : REACH 8

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 10 YEAR Rainfall=3.10"

Area (sf)	CN	Description
245,039	77	Woods, Good, HSG D
* 2,500	98	IMPERVIOUS
247,539	77	Weighted Average
245,039		98.99% Pervious Area
2,500		1.01% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.0	50	0.0500	0.05		<b>Sheet Flow,</b> Woods: Dense underbrush n= 0.800 P2= 2.20"
12.3	640	0.0300	0.87		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
30.3	690	Total			

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**Summary for Subcatchment 5S: SUBCATCHMENT 5**

Runoff = 10.05 cfs @ 12.25 hrs, Volume= 0.888 af, Depth> 1.08"  
Routed to Reach 1SP : SUMMATION POINT 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type II 24-hr 10 YEAR Rainfall=3.10"

Area (sf)	CN	Description
409,927	77	Woods, Good, HSG D
* 19,290	98	IMPERVIOUS
429,217	78	Weighted Average
409,927		95.51% Pervious Area
19,290		4.49% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	20	0.0200	0.83		<b>Sheet Flow,</b> Smooth surfaces n= 0.011 P2= 2.20"
18.0	50	0.0500	0.05		<b>Sheet Flow,</b> Woods: Dense underbrush n= 0.800 P2= 2.20"
9.7	650	0.0500	1.12		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
1.1	860	0.0600	12.63	50.51	<b>Channel Flow,</b> Area= 4.0 sf Perim= 6.0' r= 0.67' n= 0.022 Earth, clean & straight
29.2	1,580	Total			

**Summary for Subcatchment 6S: SUBCATCHMENT 6**

Runoff = 9.55 cfs @ 12.16 hrs, Volume= 0.711 af, Depth> 1.03"  
Routed to Reach 5R : REACH 5

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type II 24-hr 10 YEAR Rainfall=3.10"

Area (sf)	CN	Description
355,268	77	Woods, Good, HSG D
* 6,300	98	IMPERVIOUS
361,568	77	Weighted Average
355,268		98.26% Pervious Area
6,300		1.74% Impervious Area

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Type II 24-hr 10 YEAR Rainfall=3.10"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	20	0.0200	0.83		<b>Sheet Flow,</b> Smooth surfaces n= 0.011 P2= 2.20"
18.0	50	0.0500	0.05		<b>Sheet Flow,</b> Woods: Dense underbrush n= 0.800 P2= 2.20"
2.5	170	0.0500	1.12		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
1.3	1,250	0.0500	16.17	646.68	<b>Channel Flow,</b> Area= 40.0 sf Perim= 18.0' r= 2.22' n= 0.035 Earth, dense weeds
22.2	1,490	Total			

**Summary for Subcatchment 7S: SUBCATCHMENT 7**

Runoff = 17.33 cfs @ 12.48 hrs, Volume= 2.135 af, Depth> 1.02"  
Routed to Reach 5R : REACH 5

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type II 24-hr 10 YEAR Rainfall=3.10"

Area (sf)	CN	Description
1,085,376	77	Woods, Good, HSG D
* 12,600	98	IMPERVIOUS
1,097,976	77	Weighted Average
1,085,376		98.85% Pervious Area
12,600		1.15% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	20	0.0200	0.83		<b>Sheet Flow,</b> Smooth surfaces n= 0.011 P2= 2.20"
31.3	100	0.0500	0.05		<b>Sheet Flow,</b> Woods: Dense underbrush n= 0.800 P2= 2.20"
15.3	1,170	0.0650	1.27		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
47.0	1,290	Total			

**Summary for Subcatchment 8S: SUBCATCHMENT 8**

Runoff = 31.40 cfs @ 12.41 hrs, Volume= 3.555 af, Depth> 1.02"  
Routed to Reach 2SP : SUMMATION POINT 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type II 24-hr 10 YEAR Rainfall=3.10"

**POST DEVELOPMENT**

Type II 24-hr 10 YEAR Rainfall=3.10"

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Area (sf)	CN	Description
1,791,735	77	Woods, Good, HSG D
* 31,585	98	IMPERVIOUS
1,823,320	77	Weighted Average
1,791,735		98.27% Pervious Area
31,585		1.73% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.7	50	0.0250	0.04		<b>Sheet Flow,</b> Woods: Dense underbrush n= 0.800 P2= 2.20"
17.0	1,020	0.0400	1.00		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
0.9	870	0.0400	16.09	1,930.24	<b>Channel Flow,</b> Area= 120.0 sf Perim= 58.0' r= 2.07' n= 0.030 Earth, grassed & winding
41.6	1,940	Total			

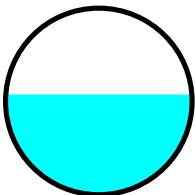
**Summary for Reach 1R: REACH 1**

Inflow Area = 3.102 ac, 5.23% Impervious, Inflow Depth > 1.08" for 10 YEAR event  
 Inflow = 3.65 cfs @ 12.18 hrs, Volume= 0.280 af  
 Outflow = 3.64 cfs @ 12.18 hrs, Volume= 0.280 af, Atten= 0%, Lag= 0.3 min  
 Routed to Reach 2R : REACH 2

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 5.41 fps, Min. Travel Time= 0.2 min  
 Avg. Velocity = 2.37 fps, Avg. Travel Time= 0.4 min

Peak Storage= 34 cf @ 12.18 hrs  
 Average Depth at Peak Storage= 0.67' , Surface Width= 1.25'  
 Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 6.46 cfs

15.0" Round Pipe  
 n= 0.013 Corrugated PE, smooth interior  
 Length= 50.0' Slope= 0.0100 '/'  
 Inlet Invert= 658.00', Outlet Invert= 657.50'



**POST DEVELOPMENT**

Type II 24-hr 10 YEAR Rainfall=3.10"

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**Summary for Reach 1SP: SUMMATION POINT 1**

Inflow Area = 57.723 ac, 2.27% Impervious, Inflow Depth > 1.03" for 10 YEAR event  
Inflow = 33.57 cfs @ 12.60 hrs, Volume= 4.936 af  
Outflow = 33.57 cfs @ 12.60 hrs, Volume= 4.936 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

**Summary for Reach 2R: REACH 2**

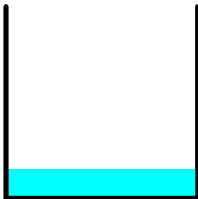
Inflow Area = 3.102 ac, 5.23% Impervious, Inflow Depth > 1.08" for 10 YEAR event  
Inflow = 3.64 cfs @ 12.18 hrs, Volume= 0.280 af  
Outflow = 3.49 cfs @ 12.30 hrs, Volume= 0.278 af, Atten= 4%, Lag= 6.8 min  
Routed to Reach 1SP : SUMMATION POINT 1

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Max. Velocity= 5.73 fps, Min. Travel Time= 3.9 min  
Avg. Velocity = 2.10 fps, Avg. Travel Time= 10.6 min

Peak Storage= 820 cf @ 12.23 hrs  
Average Depth at Peak Storage= 0.31' , Surface Width= 2.00'  
Bank-Full Depth= 2.00' Flow Area= 4.0 sf, Capacity= 46.10 cfs

2.00' x 2.00' deep channel, n= 0.022 Earth, clean & straight  
Length= 1,340.0' Slope= 0.0500 '/'  
Inlet Invert= 0.00', Outlet Invert= -67.00'



**Summary for Reach 2SP: SUMMATION POINT 2**

Inflow Area = 47.540 ac, 1.65% Impervious, Inflow Depth > 1.02" for 10 YEAR event  
Inflow = 35.80 cfs @ 12.44 hrs, Volume= 4.030 af  
Outflow = 35.80 cfs @ 12.44 hrs, Volume= 4.030 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

**Summary for Reach 3R: REACH 3**

Inflow Area = 5.627 ac, 3.12% Impervious, Inflow Depth > 1.08" for 10 YEAR event  
Inflow = 5.24 cfs @ 12.30 hrs, Volume= 0.506 af  
Outflow = 5.23 cfs @ 12.31 hrs, Volume= 0.506 af, Atten= 0%, Lag= 0.2 min  
Routed to Reach 4R : REACH 4

**POST DEVELOPMENT**

Type II 24-hr 10 YEAR Rainfall=3.10"

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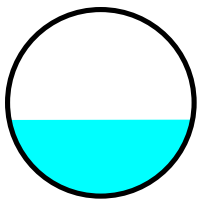
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Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Max. Velocity= 7.68 fps, Min. Travel Time= 0.1 min  
Avg. Velocity = 3.55 fps, Avg. Travel Time= 0.2 min

Peak Storage= 34 cf @ 12.30 hrs  
Average Depth at Peak Storage= 0.62' , Surface Width= 1.48'  
Bank-Full Depth= 1.50' Flow Area= 1.8 sf, Capacity= 14.86 cfs

18.0" Round Pipe  
n= 0.013 Corrugated PE, smooth interior  
Length= 50.0' Slope= 0.0200 '/'  
Inlet Invert= 0.00', Outlet Invert= -1.00'



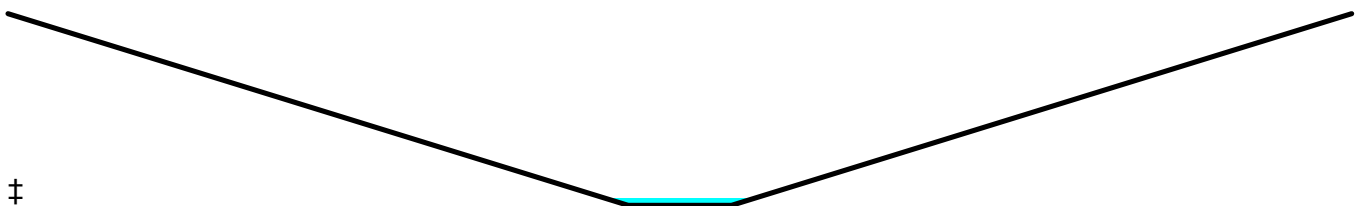
**Summary for Reach 4R: REACH 4**

Inflow Area = 5.627 ac, 3.12% Impervious, Inflow Depth > 1.08" for 10 YEAR event  
Inflow = 5.23 cfs @ 12.31 hrs, Volume= 0.506 af  
Outflow = 4.75 cfs @ 12.56 hrs, Volume= 0.499 af, Atten= 9%, Lag= 15.4 min  
Routed to Reach 5R : REACH 5

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Max. Velocity= 2.46 fps, Min. Travel Time= 8.8 min  
Avg. Velocity = 1.22 fps, Avg. Travel Time= 17.8 min

Peak Storage= 2,511 cf @ 12.42 hrs  
Average Depth at Peak Storage= 0.16' , Surface Width= 14.69'  
Bank-Full Depth= 4.00' Flow Area= 280.0 sf, Capacity= 4,427.35 cfs

10.00' x 4.00' deep channel, n= 0.035 Earth, dense weeds  
Side Slope Z-value= 15.0 '/' Top Width= 130.00'  
Length= 1,300.0' Slope= 0.0500 '/'  
Inlet Invert= 0.00', Outlet Invert= -65.00'



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Type II 24-hr 10 YEAR Rainfall=3.10"

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### Summary for Reach 5R: REACH 5

Inflow Area = 44.768 ac, 1.58% Impervious, Inflow Depth > 1.02" for 10 YEAR event  
Inflow = 28.58 cfs @ 12.52 hrs, Volume= 3.813 af  
Outflow = 28.06 cfs @ 12.68 hrs, Volume= 3.770 af, Atten= 2%, Lag= 9.5 min  
Routed to Reach 1SP : SUMMATION POINT 1

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Max. Velocity= 3.84 fps, Min. Travel Time= 5.6 min  
Avg. Velocity = 1.79 fps, Avg. Travel Time= 12.1 min

Peak Storage= 9,493 cf @ 12.58 hrs  
Average Depth at Peak Storage= 1.18' , Surface Width= 7.36'  
Bank-Full Depth= 2.00' Flow Area= 14.0 sf, Capacity= 70.58 cfs

5.00' x 2.00' deep channel, n= 0.025 Earth, clean & winding  
Side Slope Z-value= 1.0 ' / ' Top Width= 9.00'  
Length= 1,300.0' Slope= 0.0050 ' / '  
Inlet Invert= 0.00', Outlet Invert= -6.50'



### Summary for Reach 6R: REACH 6

Inflow Area = 5.634 ac, 1.71% Impervious, Inflow Depth > 1.03" for 10 YEAR event  
Inflow = 5.78 cfs @ 12.22 hrs, Volume= 0.482 af  
Outflow = 5.77 cfs @ 12.22 hrs, Volume= 0.482 af, Atten= 0%, Lag= 0.2 min  
Routed to Reach 7R : REACH 7

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Max. Velocity= 6.08 fps, Min. Travel Time= 0.1 min  
Avg. Velocity = 2.76 fps, Avg. Travel Time= 0.3 min

Peak Storage= 47 cf @ 12.22 hrs  
Average Depth at Peak Storage= 0.79' , Surface Width= 1.50'  
Bank-Full Depth= 1.50' Flow Area= 1.8 sf, Capacity= 10.50 cfs

18.0" Round Pipe  
n= 0.013 Corrugated PE, smooth interior  
Length= 50.0' Slope= 0.0100 ' / '  
Inlet Invert= 0.00', Outlet Invert= -0.50'



**POST DEVELOPMENT**

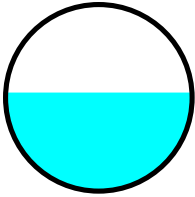
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Type II 24-hr 10 YEAR Rainfall=3.10"

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**Summary for Reach 7R: REACH 7**

Inflow Area = 5.634 ac, 1.71% Impervious, Inflow Depth > 1.03" for 10 YEAR event  
Inflow = 5.77 cfs @ 12.22 hrs, Volume= 0.482 af  
Outflow = 4.25 cfs @ 12.66 hrs, Volume= 0.468 af, Atten= 26%, Lag= 26.4 min  
Routed to Reach 5R : REACH 5

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Max. Velocity= 1.30 fps, Min. Travel Time= 16.2 min  
Avg. Velocity = 0.65 fps, Avg. Travel Time= 32.4 min

Peak Storage= 4,157 cf @ 12.39 hrs  
Average Depth at Peak Storage= 0.03' , Surface Width= 100.07'  
Bank-Full Depth= 1.00' Flow Area= 101.0 sf, Capacity= 1,260.32 cfs

100.00' x 1.00' deep channel, n= 0.030 Earth, grassed & winding  
Side Slope Z-value= 1.0 ' / ' Top Width= 102.00'  
Length= 1,270.0' Slope= 0.0650 ' / '  
Inlet Invert= 0.00', Outlet Invert= -82.55'



**Summary for Reach 8R: REACH 8**

Inflow Area = 5.683 ac, 1.01% Impervious, Inflow Depth > 1.02" for 10 YEAR event  
Inflow = 5.33 cfs @ 12.26 hrs, Volume= 0.485 af  
Outflow = 5.33 cfs @ 12.27 hrs, Volume= 0.485 af, Atten= 0%, Lag= 0.2 min  
Routed to Reach 9R : REACH 9

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Max. Velocity= 5.96 fps, Min. Travel Time= 0.1 min  
Avg. Velocity = 2.77 fps, Avg. Travel Time= 0.3 min

Peak Storage= 45 cf @ 12.27 hrs  
Average Depth at Peak Storage= 0.76' , Surface Width= 1.50'  
Bank-Full Depth= 1.50' Flow Area= 1.8 sf, Capacity= 10.50 cfs

**POST DEVELOPMENT**

Type II 24-hr 10 YEAR Rainfall=3.10"

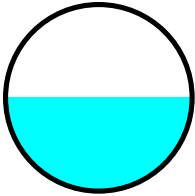
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18.0" Round Pipe  
n= 0.013 Corrugated PE, smooth interior  
Length= 50.0' Slope= 0.0100 '/'  
Inlet Invert= 0.00', Outlet Invert= -0.50'



**Summary for Reach 9R: REACH 9**

Inflow Area = 5.683 ac, 1.01% Impervious, Inflow Depth > 1.02" for 10 YEAR event  
Inflow = 5.33 cfs @ 12.27 hrs, Volume= 0.485 af  
Outflow = 4.83 cfs @ 12.51 hrs, Volume= 0.475 af, Atten= 9%, Lag= 14.8 min  
Routed to Reach 2SP : SUMMATION POINT 2

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Max. Velocity= 2.39 fps, Min. Travel Time= 8.7 min  
Avg. Velocity = 0.92 fps, Avg. Travel Time= 22.6 min

Peak Storage= 2,530 cf @ 12.37 hrs  
Average Depth at Peak Storage= 0.10' , Surface Width= 20.00'  
Bank-Full Depth= 1.00' Flow Area= 20.0 sf, Capacity= 207.88 cfs

20.00' x 1.00' deep channel, n= 0.030 Earth, grassed & winding  
Length= 1,250.0' Slope= 0.0500 '/'  
Inlet Invert= 0.00', Outlet Invert= -62.50'



**POST DEVELOPMENT**

Type II 24-hr 25 YEAR Rainfall=3.70"

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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

**Subcatchment1S: SUBCATCHMENT1** Runoff Area=135,108 sf 5.23% Impervious Runoff Depth>1.50"  
 Flow Length=415' Slope=0.0500 '/' Tc=23.4 min CN=78 Runoff=5.11 cfs 0.388 af

**Subcatchment2S: SUBCATCHMENT2** Runoff Area=245,130 sf 3.12% Impervious Runoff Depth>1.50"  
 Flow Length=745' Tc=33.4 min CN=78 Runoff=7.35 cfs 0.701 af

**Subcatchment3S: SUBCATCHMENT3** Runoff Area=245,418 sf 1.71% Impervious Runoff Depth>1.43"  
 Flow Length=525' Tc=26.5 min CN=77 Runoff=8.18 cfs 0.673 af

**Subcatchment4S: SUBCATCHMENT4** Runoff Area=247,539 sf 1.01% Impervious Runoff Depth>1.43"  
 Flow Length=690' Tc=30.3 min CN=77 Runoff=7.56 cfs 0.677 af

**Subcatchment5S: SUBCATCHMENT5** Runoff Area=429,217 sf 4.49% Impervious Runoff Depth>1.50"  
 Flow Length=1,580' Tc=29.2 min CN=78 Runoff=14.09 cfs 1.230 af

**Subcatchment6S: SUBCATCHMENT6** Runoff Area=361,568 sf 1.74% Impervious Runoff Depth>1.44"  
 Flow Length=1,490' Tc=22.2 min CN=77 Runoff=13.49 cfs 0.993 af

**Subcatchment7S: SUBCATCHMENT7** Runoff Area=1,097,976 sf 1.15% Impervious Runoff Depth>1.42"  
 Flow Length=1,290' Tc=47.0 min CN=77 Runoff=24.65 cfs 2.983 af

**Subcatchment8S: SUBCATCHMENT8** Runoff Area=1,823,320 sf 1.73% Impervious Runoff Depth>1.42"  
 Flow Length=1,940' Tc=41.6 min CN=77 Runoff=44.63 cfs 4.965 af

**Reach 1R: REACH 1** Avg. Flow Depth=0.84' Max Vel=5.83 fps Inflow=5.11 cfs 0.388 af  
 15.0" Round Pipe n=0.013 L=50.0' S=0.0100 '/' Capacity=6.46 cfs Outflow=5.09 cfs 0.388 af

**Reach 1SP: SUMMATIONPOINT 1** Inflow=49.63 cfs 6.888 af  
 Outflow=49.63 cfs 6.888 af

**Reach 2R: REACH 2** Avg. Flow Depth=0.39' Max Vel=6.42 fps Inflow=5.09 cfs 0.388 af  
 n=0.022 L=1,340.0' S=0.0500 '/' Capacity=46.10 cfs Outflow=4.92 cfs 0.385 af

**Reach 2SP: SUMMATIONPOINT 2** Inflow=51.32 cfs 5.631 af  
 Outflow=51.32 cfs 5.631 af

**Reach 3R: REACH 3** Avg. Flow Depth=0.75' Max Vel=8.38 fps Inflow=7.35 cfs 0.701 af  
 18.0" Round Pipe n=0.013 L=50.0' S=0.0200 '/' Capacity=14.86 cfs Outflow=7.35 cfs 0.701 af

**Reach 4R: REACH 4** Avg. Flow Depth=0.19' Max Vel=2.76 fps Inflow=7.35 cfs 0.701 af  
 n=0.035 L=1,300.0' S=0.0500 '/' Capacity=4,427.35 cfs Outflow=6.76 cfs 0.692 af

**Reach 5R: REACH 5** Avg. Flow Depth=1.48' Max Vel=4.32 fps Inflow=41.97 cfs 5.323 af  
 n=0.025 L=1,300.0' S=0.0050 '/' Capacity=70.58 cfs Outflow=41.20 cfs 5.273 af

**Reach 6R: REACH 6** Avg. Flow Depth=1.00' Max Vel=6.57 fps Inflow=8.18 cfs 0.673 af  
 18.0" Round Pipe n=0.013 L=50.0' S=0.0100 '/' Capacity=10.50 cfs Outflow=8.17 cfs 0.673 af

**POST DEVELOPMENT**

*Type II 24-hr 25 YEAR Rainfall=3.70"*

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**Reach 7R: REACH 7**

Avg. Flow Depth=0.04' Max Vel=1.54 fps Inflow=8.17 cfs 0.673 af  
n=0.030 L=1,270.0' S=0.0650 '/' Capacity=1,260.32 cfs Outflow=6.43 cfs 0.656 af

**Reach 8R: REACH 8**

Avg. Flow Depth=0.94' Max Vel=6.47 fps Inflow=7.56 cfs 0.677 af  
18.0" Round Pipe n=0.013 L=50.0' S=0.0100 '/' Capacity=10.50 cfs Outflow=7.55 cfs 0.677 af

**Reach 9R: REACH 9**

Avg. Flow Depth=0.13' Max Vel=2.77 fps Inflow=7.55 cfs 0.677 af  
n=0.030 L=1,250.0' S=0.0500 '/' Capacity=207.88 cfs Outflow=6.99 cfs 0.666 af

**Total Runoff Area = 105.263 ac Runoff Volume = 12.610 af Average Runoff Depth = 1.44"**  
**98.01% Pervious = 103.170 ac 1.99% Impervious = 2.093 ac**

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Type II 24-hr 25 YEAR Rainfall=3.70"

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**Summary for Subcatchment 1S: SUBCATCHMENT 1**

Runoff = 5.11 cfs @ 12.17 hrs, Volume= 0.388 af, Depth> 1.50"  
 Routed to Reach 1R : REACH 1

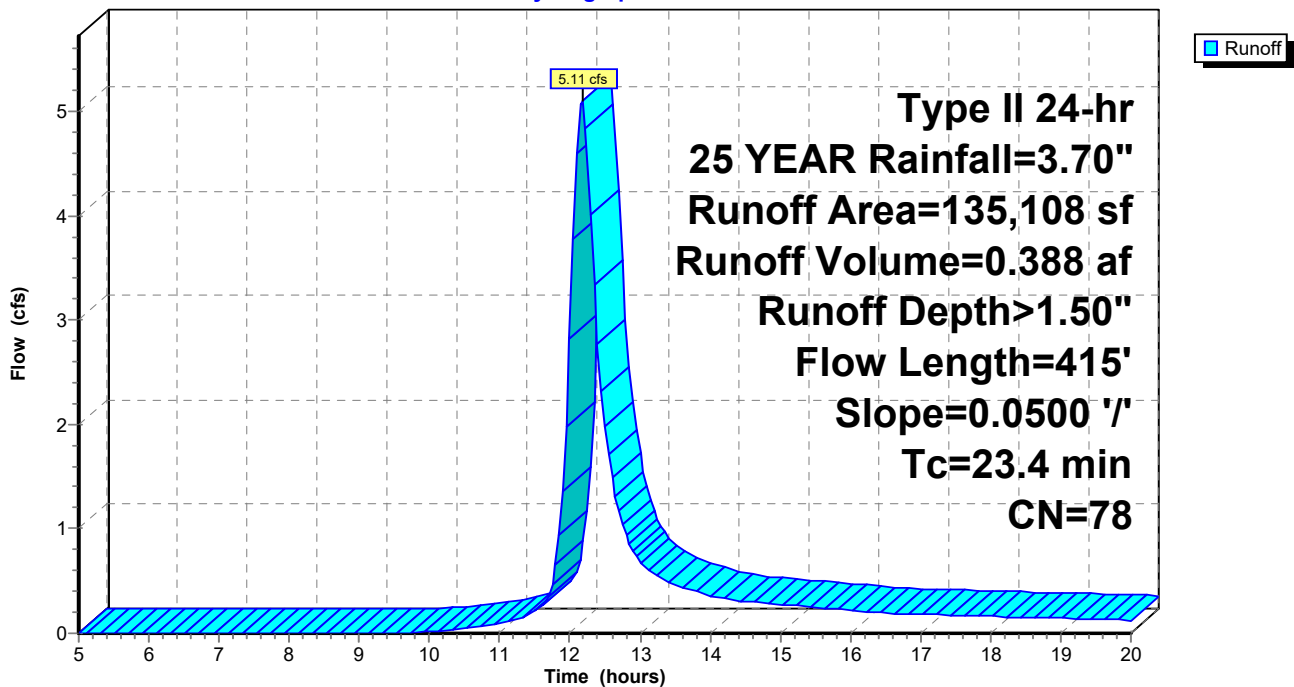
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 25 YEAR Rainfall=3.70"

Area (sf)	CN	Description
128,048	77	Woods, Good, HSG D
* 7,060	98	IMPERVIOUS
135,108	78	Weighted Average
128,048		94.77% Pervious Area
7,060		5.23% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.0	50	0.0500	0.05		<b>Sheet Flow,</b> Woods: Dense underbrush n= 0.800 P2= 2.20"
5.4	365	0.0500	1.12		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
23.4	415	Total			

**Subcatchment 1S: SUBCATCHMENT 1**

Hydrograph



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Type II 24-hr 25 YEAR Rainfall=3.70"

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**Summary for Subcatchment 2S: SUBCATCHMENT 2**

Runoff = 7.35 cfs @ 12.30 hrs, Volume= 0.701 af, Depth> 1.50"  
 Routed to Reach 3R : REACH 3

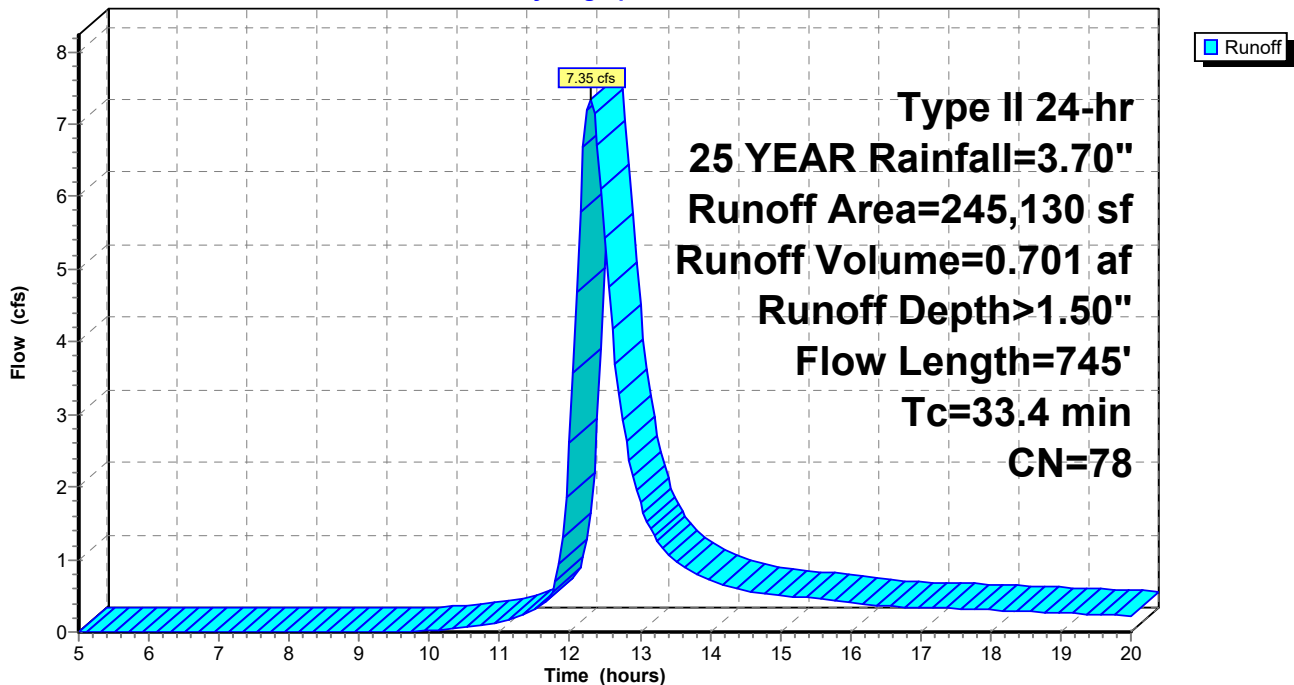
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 25 YEAR Rainfall=3.70"

Area (sf)	CN	Description
237,490	77	Woods, Good, HSG D
* 7,640	98	IMPERVIOUS
245,130	78	Weighted Average
237,490		96.88% Pervious Area
7,640		3.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.0	50	0.0500	0.05		<b>Sheet Flow,</b> Woods: Dense underbrush n= 0.800 P2= 2.20"
9.3	340	0.0150	0.61		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
0.8	80	0.1000	1.58		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
5.3	275	0.0300	0.87		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
33.4	745	Total			

**Subcatchment 2S: SUBCATCHMENT 2**

Hydrograph



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Type II 24-hr 25 YEAR Rainfall=3.70"

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**Summary for Subcatchment 3S: SUBCATCHMENT 3**

Runoff = 8.18 cfs @ 12.21 hrs, Volume= 0.673 af, Depth> 1.43"  
 Routed to Reach 6R : REACH 6

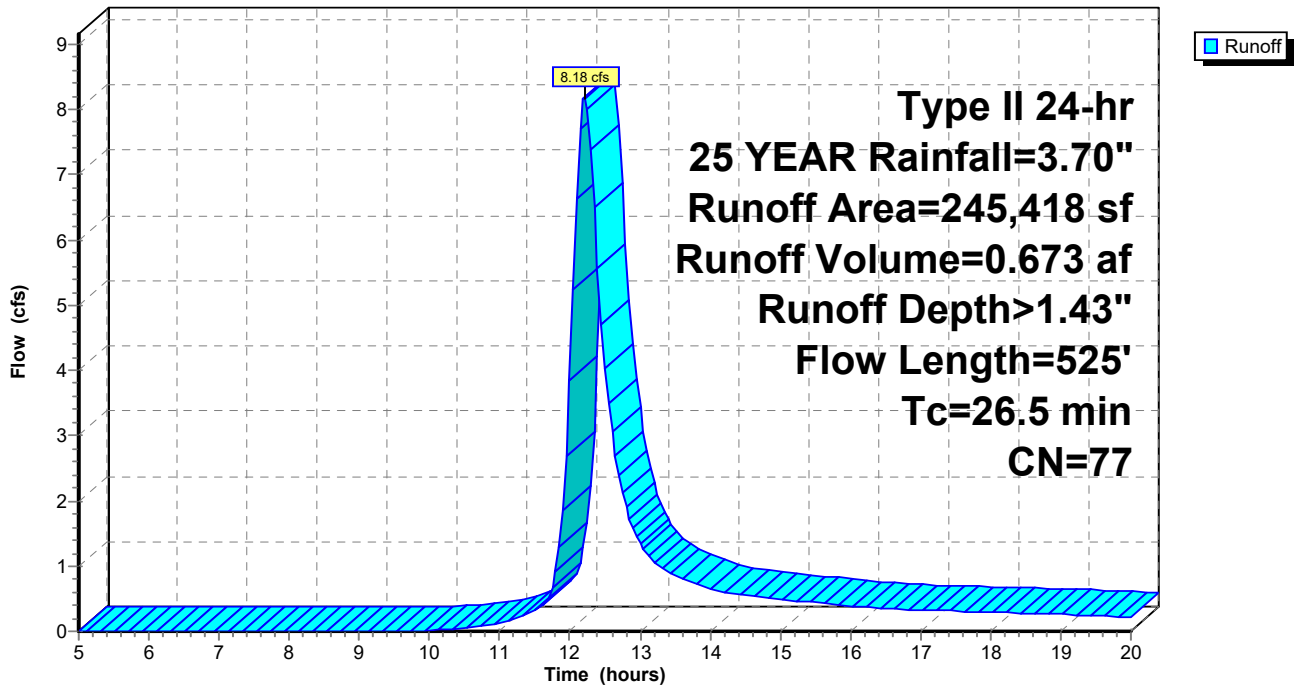
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 25 YEAR Rainfall=3.70"

Area (sf)	CN	Description
241,218	77	Woods, Good, HSG D
* 4,200	98	IMPERVIOUS
245,418	77	Weighted Average
241,218		98.29% Pervious Area
4,200		1.71% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.0	50	0.0500	0.05		<b>Sheet Flow,</b> Woods: Dense underbrush n= 0.800 P2= 2.20"
8.5	475	0.0350	0.94		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
26.5	525	Total			

**Subcatchment 3S: SUBCATCHMENT 3**

Hydrograph



**POST DEVELOPMENT**

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Type II 24-hr 25 YEAR Rainfall=3.70"

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**Summary for Subcatchment 4S: SUBCATCHMENT 4**

Runoff = 7.56 cfs @ 12.26 hrs, Volume= 0.677 af, Depth> 1.43"  
 Routed to Reach 8R : REACH 8

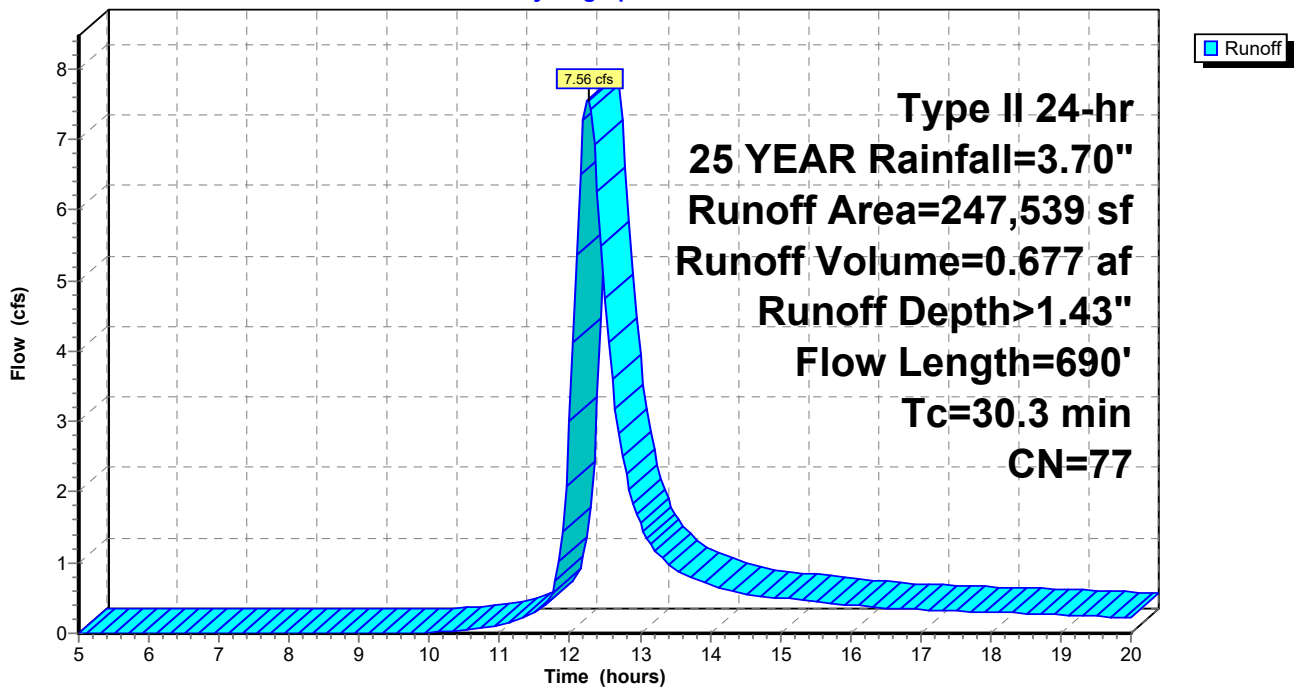
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 25 YEAR Rainfall=3.70"

Area (sf)	CN	Description
245,039	77	Woods, Good, HSG D
* 2,500	98	IMPERVIOUS
247,539	77	Weighted Average
245,039		98.99% Pervious Area
2,500		1.01% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.0	50	0.0500	0.05		<b>Sheet Flow,</b> Woods: Dense underbrush n= 0.800 P2= 2.20"
12.3	640	0.0300	0.87		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
30.3	690	Total			

**Subcatchment 4S: SUBCATCHMENT 4**

Hydrograph





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**Summary for Subcatchment 5S: SUBCATCHMENT 5**

Runoff = 14.09 cfs @ 12.24 hrs, Volume= 1.230 af, Depth> 1.50"  
 Routed to Reach 1SP : SUMMATION POINT 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 25 YEAR Rainfall=3.70"

Area (sf)	CN	Description
409,927	77	Woods, Good, HSG D
* 19,290	98	IMPERVIOUS
429,217	78	Weighted Average
409,927		95.51% Pervious Area
19,290		4.49% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	20	0.0200	0.83		<b>Sheet Flow,</b> Smooth surfaces n= 0.011 P2= 2.20"
18.0	50	0.0500	0.05		<b>Sheet Flow,</b> Woods: Dense underbrush n= 0.800 P2= 2.20"
9.7	650	0.0500	1.12		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
1.1	860	0.0600	12.63	50.51	<b>Channel Flow,</b> Area= 4.0 sf Perim= 6.0' r= 0.67' n= 0.022 Earth, clean & straight
29.2	1,580	Total			

**POST DEVELOPMENT**

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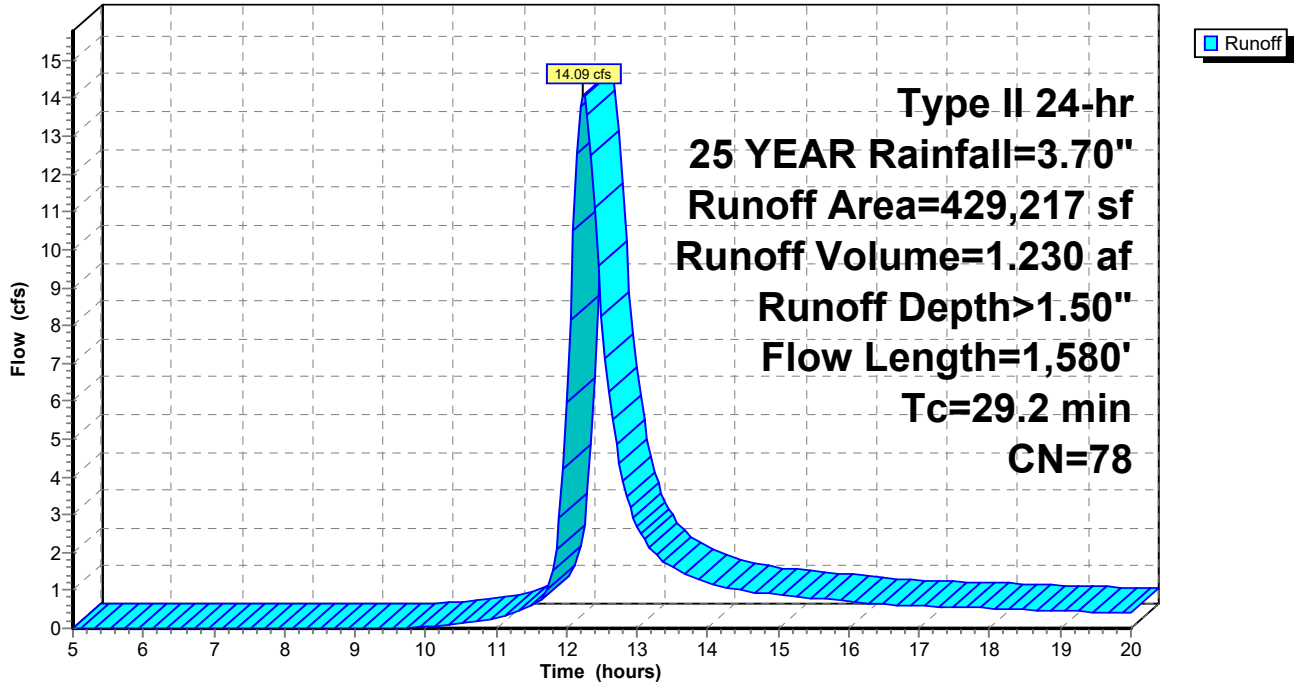
Type II 24-hr 25 YEAR Rainfall=3.70"

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**Subcatchment 5S: SUBCATCHMENT 5**

Hydrograph



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Type II 24-hr 25 YEAR Rainfall=3.70"

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**Summary for Subcatchment 6S: SUBCATCHMENT 6**

Runoff = 13.49 cfs @ 12.16 hrs, Volume= 0.993 af, Depth> 1.44"  
Routed to Reach 5R : REACH 5

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type II 24-hr 25 YEAR Rainfall=3.70"

Area (sf)	CN	Description
355,268	77	Woods, Good, HSG D
* 6,300	98	IMPERVIOUS
361,568	77	Weighted Average
355,268		98.26% Pervious Area
6,300		1.74% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	20	0.0200	0.83		<b>Sheet Flow,</b> Smooth surfaces n= 0.011 P2= 2.20"
18.0	50	0.0500	0.05		<b>Sheet Flow,</b> Woods: Dense underbrush n= 0.800 P2= 2.20"
2.5	170	0.0500	1.12		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
1.3	1,250	0.0500	16.17	646.68	<b>Channel Flow,</b> Area= 40.0 sf Perim= 18.0' r= 2.22' n= 0.035 Earth, dense weeds
22.2	1,490	Total			

**POST DEVELOPMENT**

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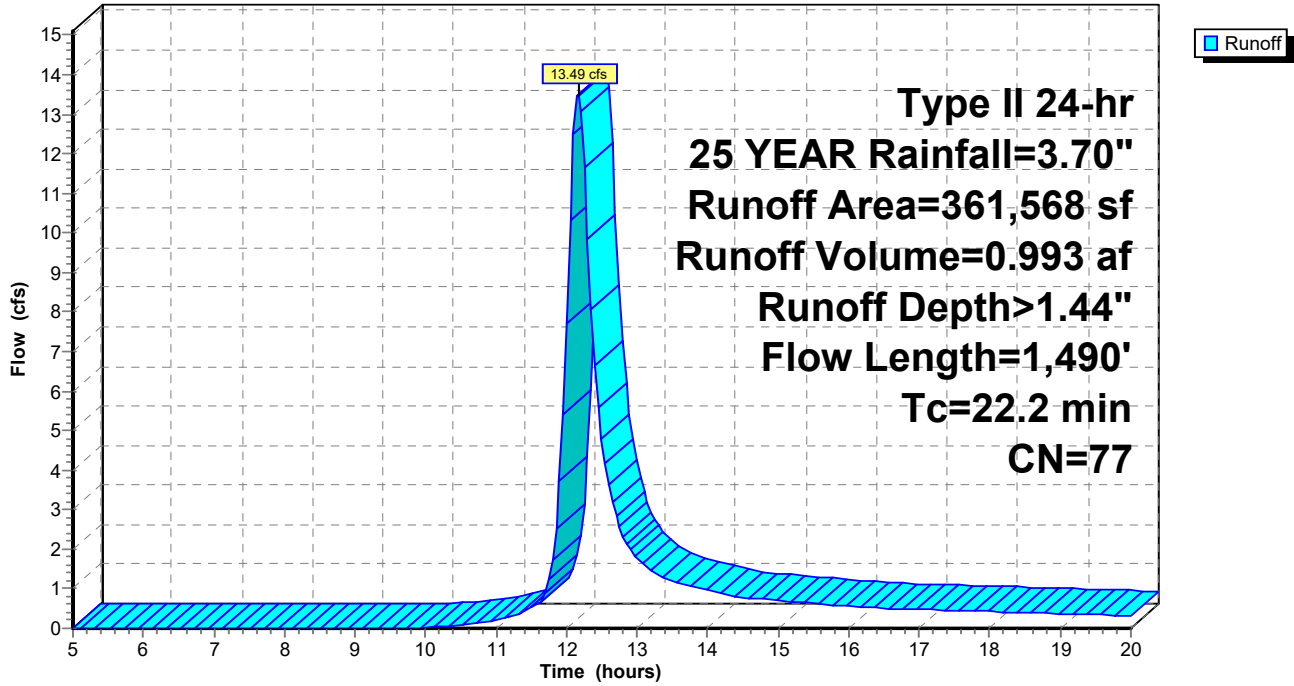
Type II 24-hr 25 YEAR Rainfall=3.70"

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**Subcatchment 6S: SUBCATCHMENT 6**

Hydrograph



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**Summary for Subcatchment 7S: SUBCATCHMENT 7**

Runoff = 24.65 cfs @ 12.47 hrs, Volume= 2.983 af, Depth> 1.42"  
 Routed to Reach 5R : REACH 5

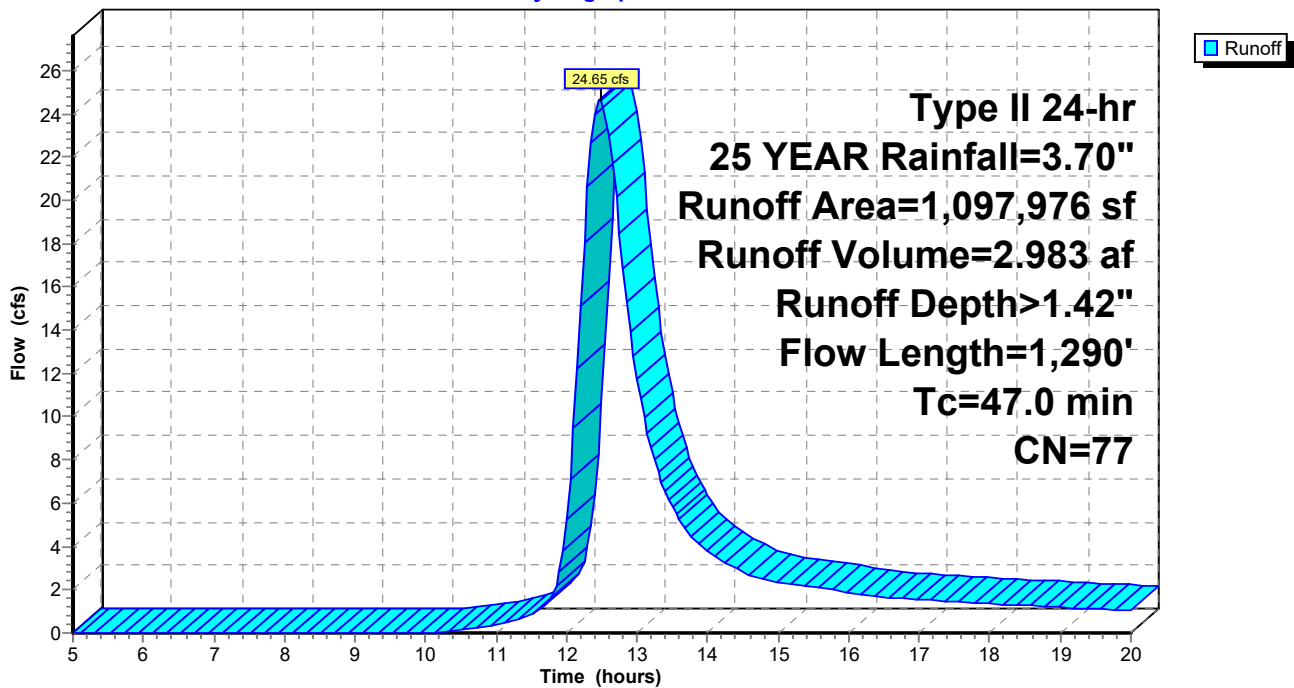
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 25 YEAR Rainfall=3.70"

Area (sf)	CN	Description
1,085,376	77	Woods, Good, HSG D
* 12,600	98	IMPERVIOUS
1,097,976	77	Weighted Average
1,085,376		98.85% Pervious Area
12,600		1.15% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	20	0.0200	0.83		<b>Sheet Flow,</b> Smooth surfaces n= 0.011 P2= 2.20"
31.3	100	0.0500	0.05		<b>Sheet Flow,</b> Woods: Dense underbrush n= 0.800 P2= 2.20"
15.3	1,170	0.0650	1.27		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
47.0	1,290	Total			

**Subcatchment 7S: SUBCATCHMENT 7**

Hydrograph



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Type II 24-hr 25 YEAR Rainfall=3.70"

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**Summary for Subcatchment 8S: SUBCATCHMENT 8**

Runoff = 44.63 cfs @ 12.40 hrs, Volume= 4.965 af, Depth> 1.42"  
 Routed to Reach 2SP : SUMMATION POINT 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 25 YEAR Rainfall=3.70"

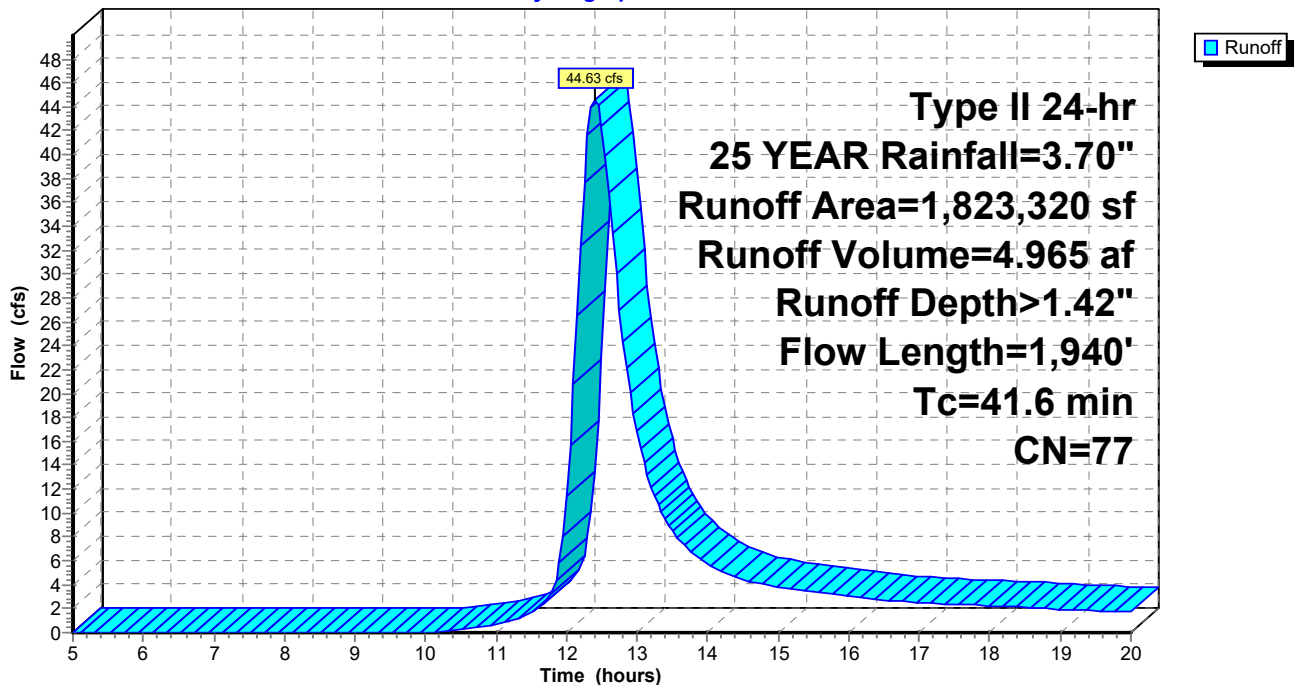
Area (sf)	CN	Description
1,791,735	77	Woods, Good, HSG D
* 31,585	98	IMPERVIOUS
1,823,320	77	Weighted Average
1,791,735		98.27% Pervious Area
31,585		1.73% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.7	50	0.0250	0.04		<b>Sheet Flow,</b> Woods: Dense underbrush n= 0.800 P2= 2.20"
17.0	1,020	0.0400	1.00		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
0.9	870	0.0400	16.09	1,930.24	<b>Channel Flow,</b> Area= 120.0 sf Perim= 58.0' r= 2.07' n= 0.030 Earth, grassed & winding
41.6	1,940	Total			

**Subcatchment 8S: SUBCATCHMENT 8**

Hydrograph



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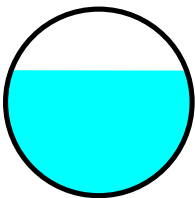
**Summary for Reach 1R: REACH 1**

Inflow Area = 3.102 ac, 5.23% Impervious, Inflow Depth > 1.50" for 25 YEAR event  
Inflow = 5.11 cfs @ 12.17 hrs, Volume= 0.388 af  
Outflow = 5.09 cfs @ 12.18 hrs, Volume= 0.388 af, Atten= 0%, Lag= 0.3 min  
Routed to Reach 2R : REACH 2

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Max. Velocity= 5.83 fps, Min. Travel Time= 0.1 min  
Avg. Velocity = 2.50 fps, Avg. Travel Time= 0.3 min

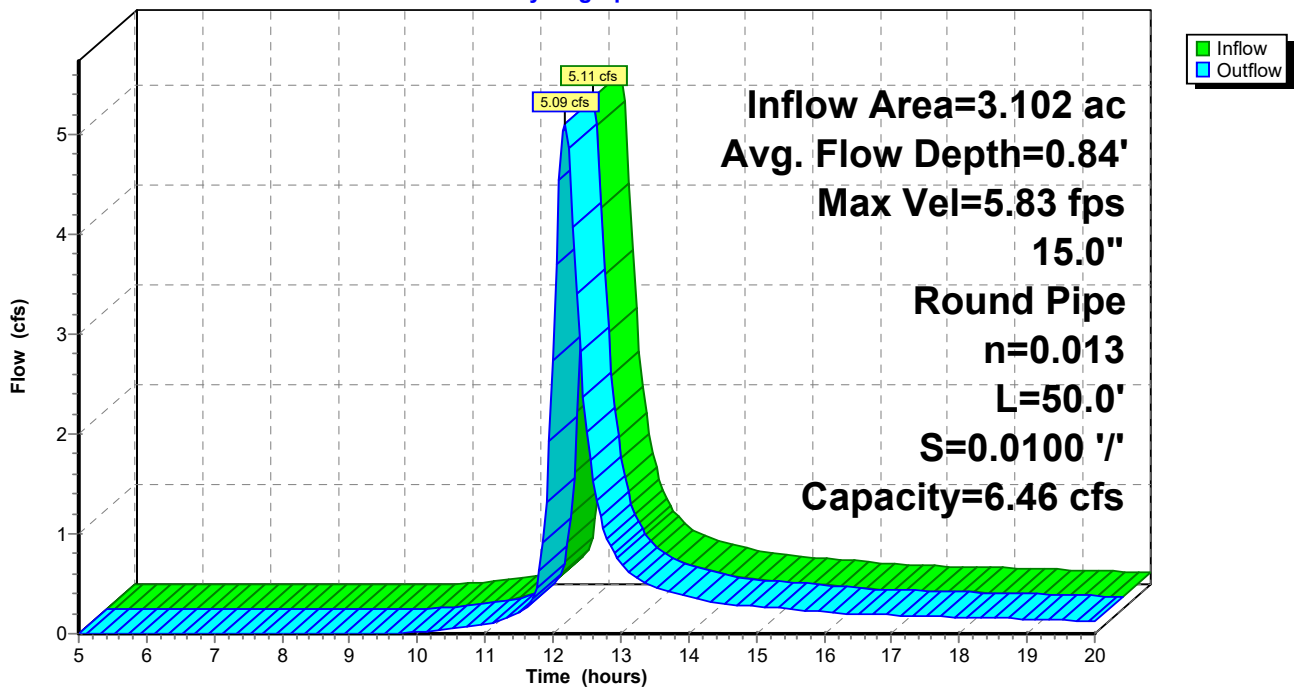
Peak Storage= 44 cf @ 12.17 hrs  
Average Depth at Peak Storage= 0.84' , Surface Width= 1.17'  
Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 6.46 cfs

15.0" Round Pipe  
n= 0.013 Corrugated PE, smooth interior  
Length= 50.0' Slope= 0.0100 '/  
Inlet Invert= 658.00', Outlet Invert= 657.50'



**Reach 1R: REACH 1**

Hydrograph



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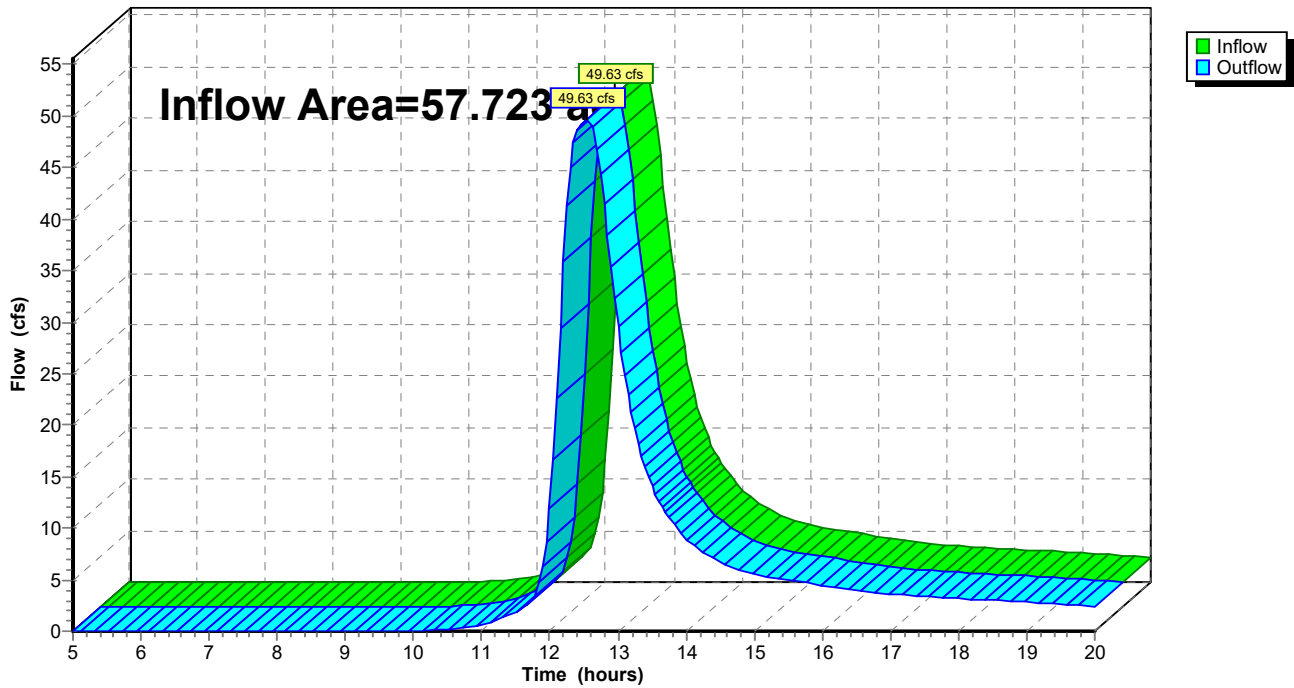
**Summary for Reach 1SP: SUMMATION POINT 1**

Inflow Area = 57.723 ac, 2.27% Impervious, Inflow Depth > 1.43" for 25 YEAR event  
Inflow = 49.63 cfs @ 12.54 hrs, Volume= 6.888 af  
Outflow = 49.63 cfs @ 12.54 hrs, Volume= 6.888 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

**Reach 1SP: SUMMATION POINT 1**

Hydrograph





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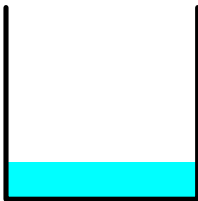
**Summary for Reach 2R: REACH 2**

Inflow Area = 3.102 ac, 5.23% Impervious, Inflow Depth > 1.50" for 25 YEAR event  
Inflow = 5.09 cfs @ 12.18 hrs, Volume= 0.388 af  
Outflow = 4.92 cfs @ 12.28 hrs, Volume= 0.385 af, Atten= 3%, Lag= 6.0 min  
Routed to Reach 1SP : SUMMATION POINT 1

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Max. Velocity= 6.42 fps, Min. Travel Time= 3.5 min  
Avg. Velocity = 2.25 fps, Avg. Travel Time= 9.9 min

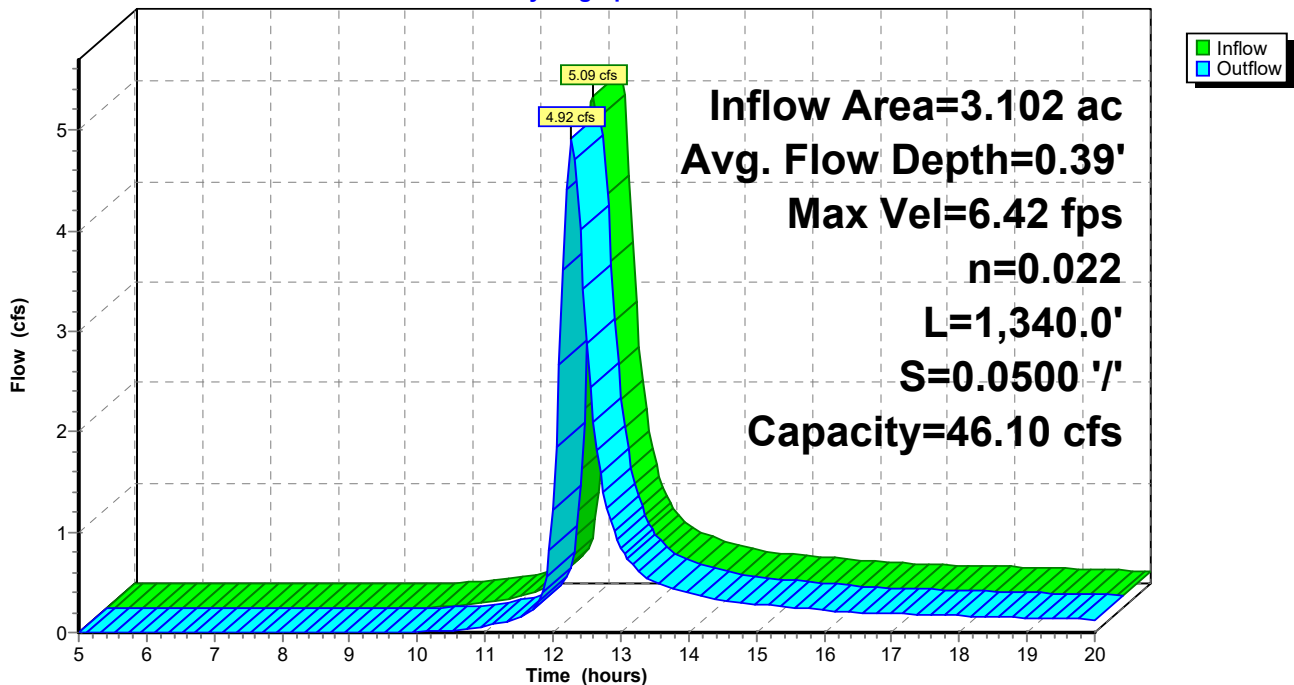
Peak Storage= 1,033 cf @ 12.22 hrs  
Average Depth at Peak Storage= 0.39' , Surface Width= 2.00'  
Bank-Full Depth= 2.00' Flow Area= 4.0 sf, Capacity= 46.10 cfs

2.00' x 2.00' deep channel, n= 0.022 Earth, clean & straight  
Length= 1,340.0' Slope= 0.0500 '/'  
Inlet Invert= 0.00', Outlet Invert= -67.00'



**Reach 2R: REACH 2**

Hydrograph



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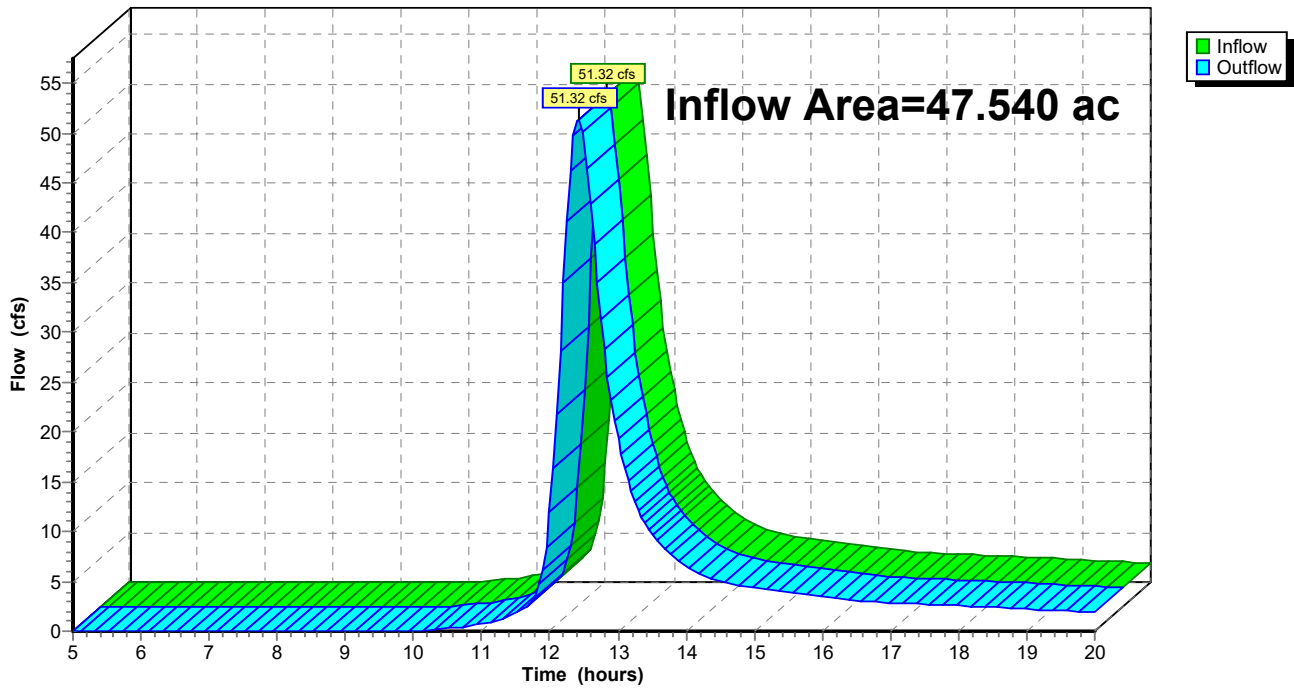
**Summary for Reach 2SP: SUMMATION POINT 2**

Inflow Area = 47.540 ac, 1.65% Impervious, Inflow Depth > 1.42" for 25 YEAR event  
Inflow = 51.32 cfs @ 12.42 hrs, Volume= 5.631 af  
Outflow = 51.32 cfs @ 12.42 hrs, Volume= 5.631 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

**Reach 2SP: SUMMATION POINT 2**

Hydrograph



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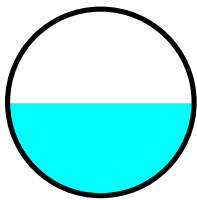
**Summary for Reach 3R: REACH 3**

Inflow Area = 5.627 ac, 3.12% Impervious, Inflow Depth > 1.50" for 25 YEAR event  
Inflow = 7.35 cfs @ 12.30 hrs, Volume= 0.701 af  
Outflow = 7.35 cfs @ 12.30 hrs, Volume= 0.701 af, Atten= 0%, Lag= 0.2 min  
Routed to Reach 4R : REACH 4

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Max. Velocity= 8.38 fps, Min. Travel Time= 0.1 min  
Avg. Velocity = 3.74 fps, Avg. Travel Time= 0.2 min

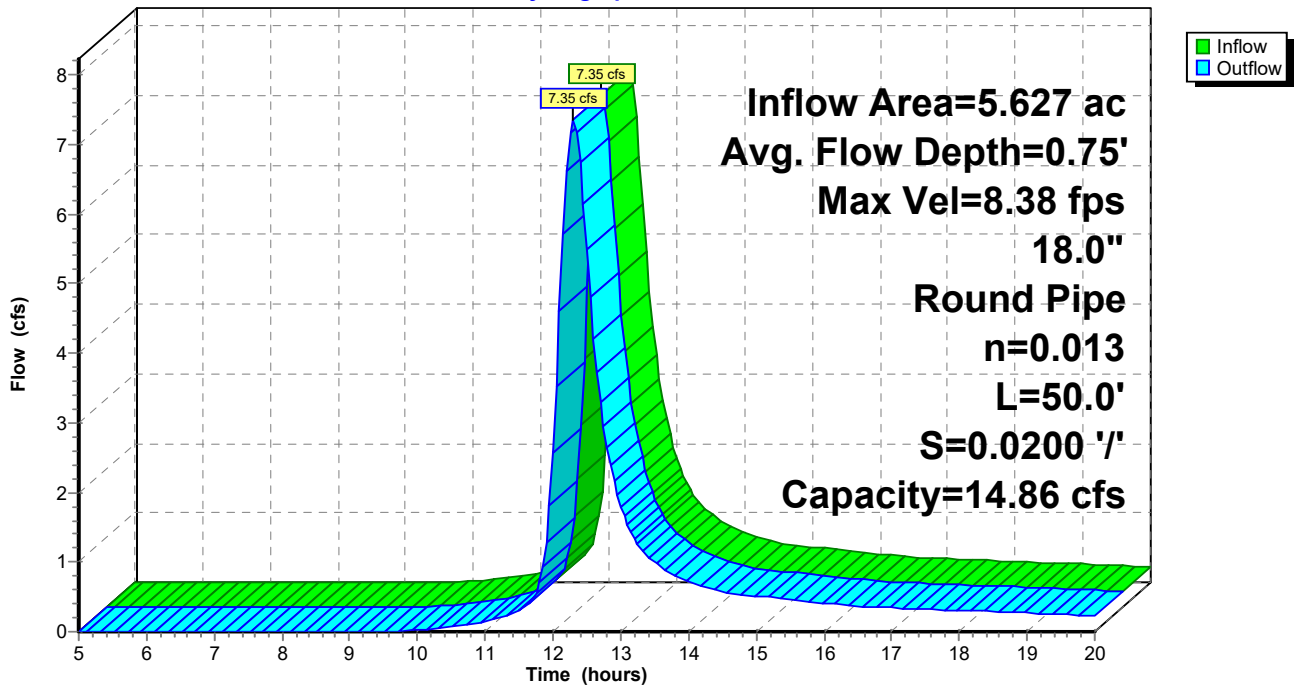
Peak Storage= 44 cf @ 12.30 hrs  
Average Depth at Peak Storage= 0.75' , Surface Width= 1.50'  
Bank-Full Depth= 1.50' Flow Area= 1.8 sf, Capacity= 14.86 cfs

18.0" Round Pipe  
n= 0.013 Corrugated PE, smooth interior  
Length= 50.0' Slope= 0.0200 '/'  
Inlet Invert= 0.00', Outlet Invert= -1.00'



**Reach 3R: REACH 3**

Hydrograph



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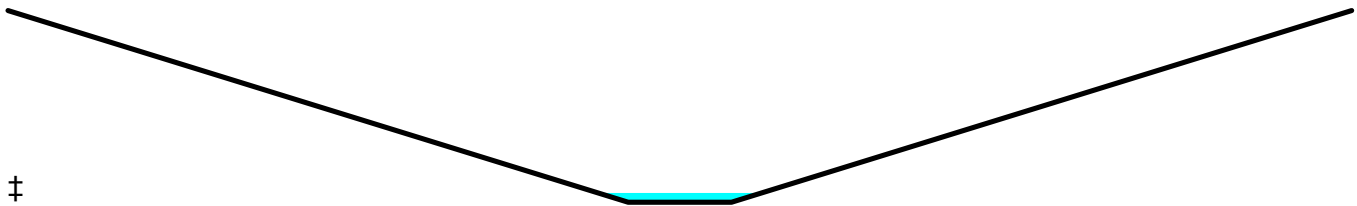
**Summary for Reach 4R: REACH 4**

Inflow Area = 5.627 ac, 3.12% Impervious, Inflow Depth > 1.50" for 25 YEAR event  
 Inflow = 7.35 cfs @ 12.30 hrs, Volume= 0.701 af  
 Outflow = 6.76 cfs @ 12.53 hrs, Volume= 0.692 af, Atten= 8%, Lag= 13.7 min  
 Routed to Reach 5R : REACH 5

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 2.76 fps, Min. Travel Time= 7.8 min  
 Avg. Velocity = 1.26 fps, Avg. Travel Time= 17.1 min

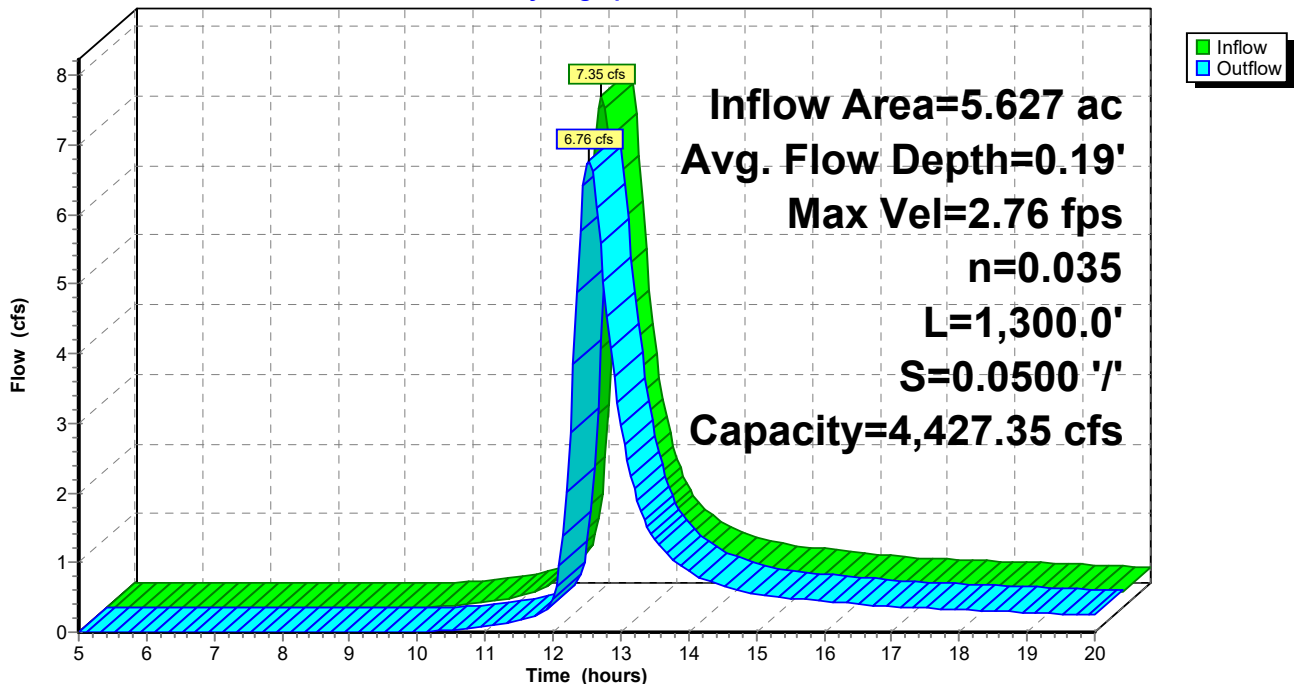
Peak Storage= 3,197 cf @ 12.40 hrs  
 Average Depth at Peak Storage= 0.19' , Surface Width= 15.73'  
 Bank-Full Depth= 4.00' Flow Area= 280.0 sf, Capacity= 4,427.35 cfs

10.00' x 4.00' deep channel, n= 0.035 Earth, dense weeds  
 Side Slope Z-value= 15.0 ' / ' Top Width= 130.00'  
 Length= 1,300.0' Slope= 0.0500 ' / '  
 Inlet Invert= 0.00', Outlet Invert= -65.00'



**Reach 4R: REACH 4**

Hydrograph



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**Summary for Reach 5R: REACH 5**

Inflow Area = 44.768 ac, 1.58% Impervious, Inflow Depth > 1.43" for 25 YEAR event  
Inflow = 41.97 cfs @ 12.49 hrs, Volume= 5.323 af  
Outflow = 41.20 cfs @ 12.63 hrs, Volume= 5.273 af, Atten= 2%, Lag= 8.4 min  
Routed to Reach 1SP : SUMMATION POINT 1

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Max. Velocity= 4.32 fps, Min. Travel Time= 5.0 min  
Avg. Velocity = 1.90 fps, Avg. Travel Time= 11.4 min

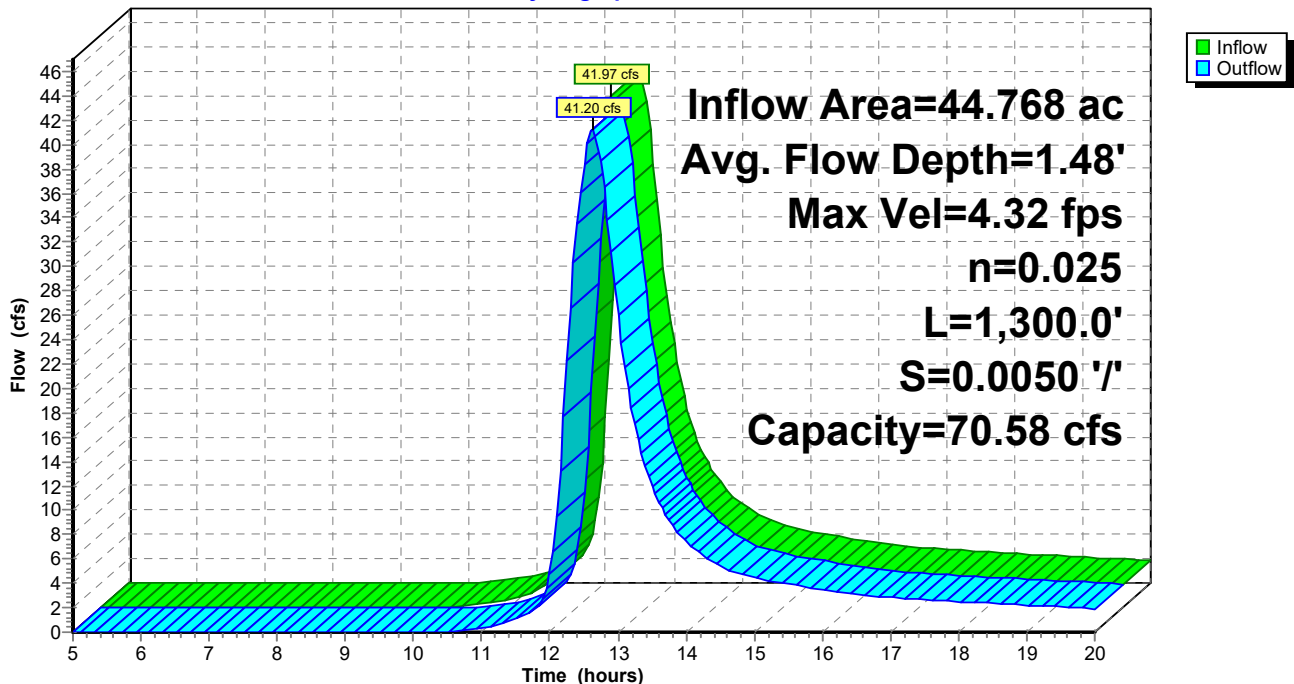
Peak Storage= 12,430 cf @ 12.55 hrs  
Average Depth at Peak Storage= 1.48' , Surface Width= 7.95'  
Bank-Full Depth= 2.00' Flow Area= 14.0 sf, Capacity= 70.58 cfs

5.00' x 2.00' deep channel, n= 0.025 Earth, clean & winding  
Side Slope Z-value= 1.0 '/' Top Width= 9.00'  
Length= 1,300.0' Slope= 0.0050 '/'  
Inlet Invert= 0.00', Outlet Invert= -6.50'



**Reach 5R: REACH 5**

Hydrograph



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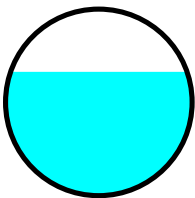
**Summary for Reach 6R: REACH 6**

Inflow Area = 5.634 ac, 1.71% Impervious, Inflow Depth > 1.43" for 25 YEAR event  
 Inflow = 8.18 cfs @ 12.21 hrs, Volume= 0.673 af  
 Outflow = 8.17 cfs @ 12.22 hrs, Volume= 0.673 af, Atten= 0%, Lag= 0.2 min  
 Routed to Reach 7R : REACH 7

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 6.57 fps, Min. Travel Time= 0.1 min  
 Avg. Velocity = 2.92 fps, Avg. Travel Time= 0.3 min

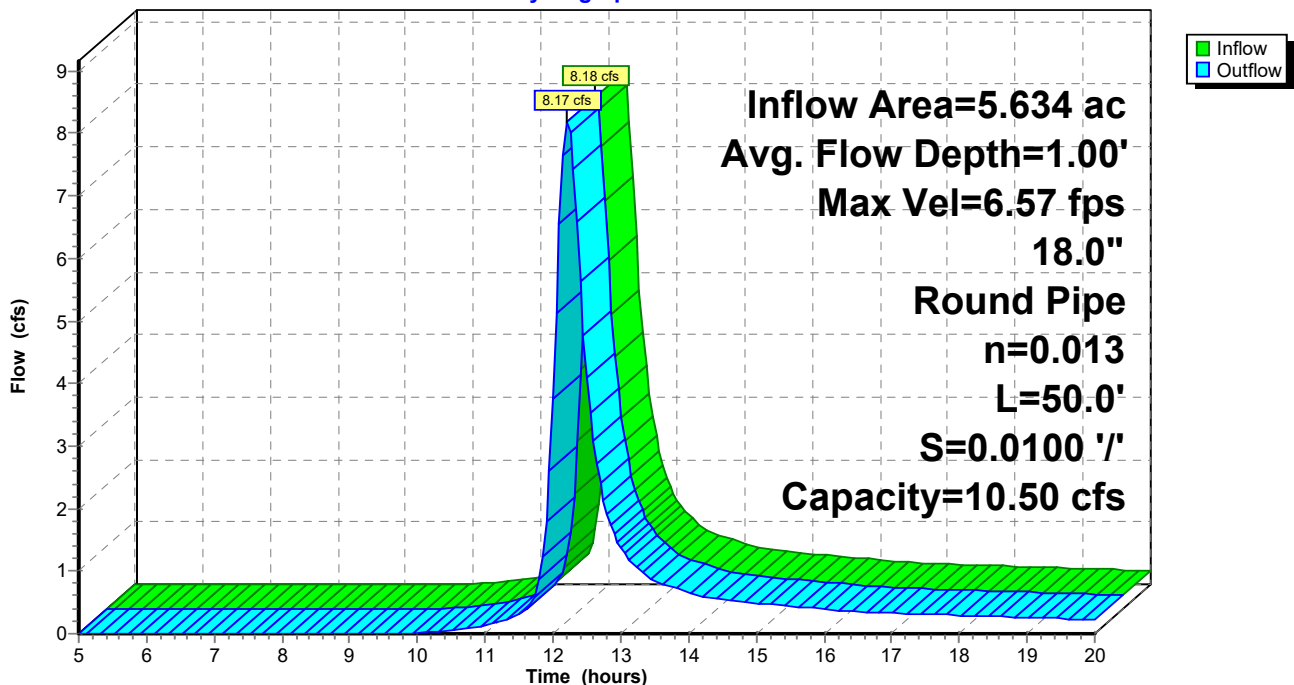
Peak Storage= 62 cf @ 12.21 hrs  
 Average Depth at Peak Storage= 1.00' , Surface Width= 1.42'  
 Bank-Full Depth= 1.50' Flow Area= 1.8 sf, Capacity= 10.50 cfs

18.0" Round Pipe  
 n= 0.013 Corrugated PE, smooth interior  
 Length= 50.0' Slope= 0.0100 '/'  
 Inlet Invert= 0.00', Outlet Invert= -0.50'



**Reach 6R: REACH 6**

Hydrograph



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**Summary for Reach 7R: REACH 7**

Inflow Area = 5.634 ac, 1.71% Impervious, Inflow Depth > 1.43" for 25 YEAR event  
Inflow = 8.17 cfs @ 12.22 hrs, Volume= 0.673 af  
Outflow = 6.43 cfs @ 12.59 hrs, Volume= 0.656 af, Atten= 21%, Lag= 22.5 min  
Routed to Reach 5R : REACH 5

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Max. Velocity= 1.54 fps, Min. Travel Time= 13.8 min  
Avg. Velocity = 0.68 fps, Avg. Travel Time= 31.3 min

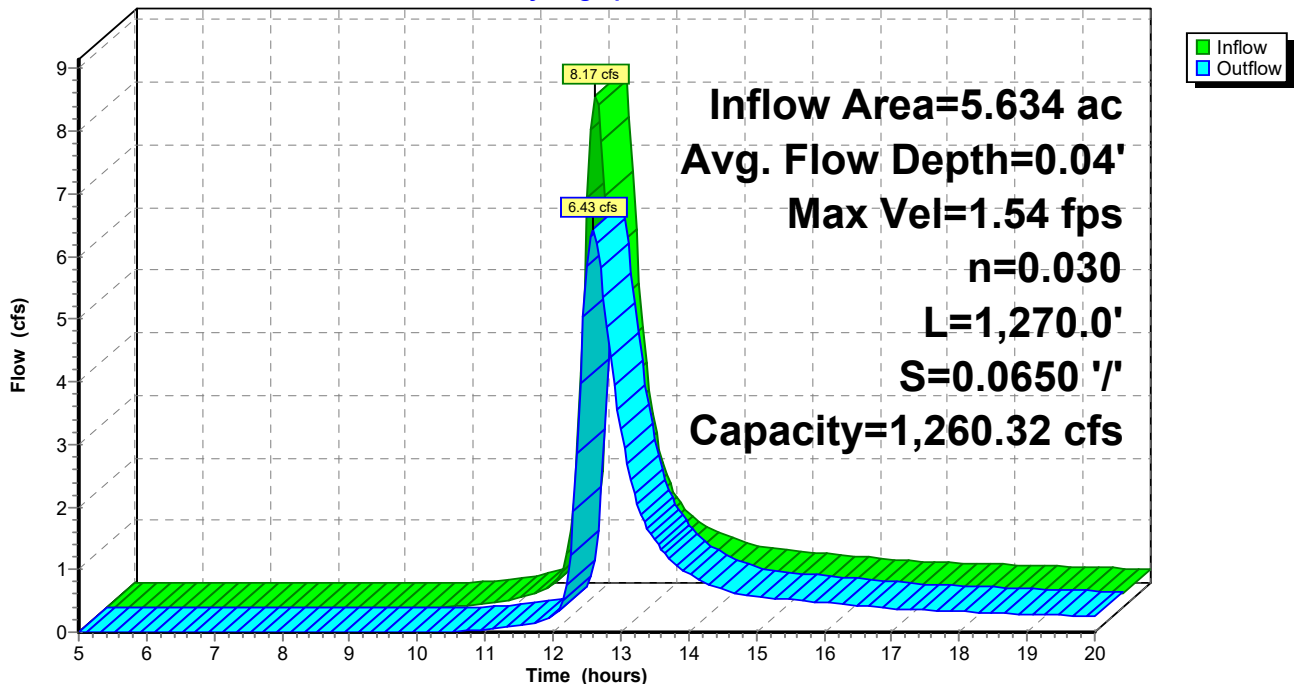
Peak Storage= 5,356 cf @ 12.36 hrs  
Average Depth at Peak Storage= 0.04' , Surface Width= 100.08'  
Bank-Full Depth= 1.00' Flow Area= 101.0 sf, Capacity= 1,260.32 cfs

100.00' x 1.00' deep channel, n= 0.030 Earth, grassed & winding  
Side Slope Z-value= 1.0 '/' Top Width= 102.00'  
Length= 1,270.0' Slope= 0.0650 '/'  
Inlet Invert= 0.00', Outlet Invert= -82.55'



**Reach 7R: REACH 7**

Hydrograph



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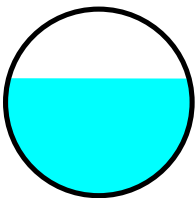
**Summary for Reach 8R: REACH 8**

Inflow Area = 5.683 ac, 1.01% Impervious, Inflow Depth > 1.43" for 25 YEAR event  
Inflow = 7.56 cfs @ 12.26 hrs, Volume= 0.677 af  
Outflow = 7.55 cfs @ 12.26 hrs, Volume= 0.677 af, Atten= 0%, Lag= 0.2 min  
Routed to Reach 9R : REACH 9

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Max. Velocity= 6.47 fps, Min. Travel Time= 0.1 min  
Avg. Velocity = 2.92 fps, Avg. Travel Time= 0.3 min

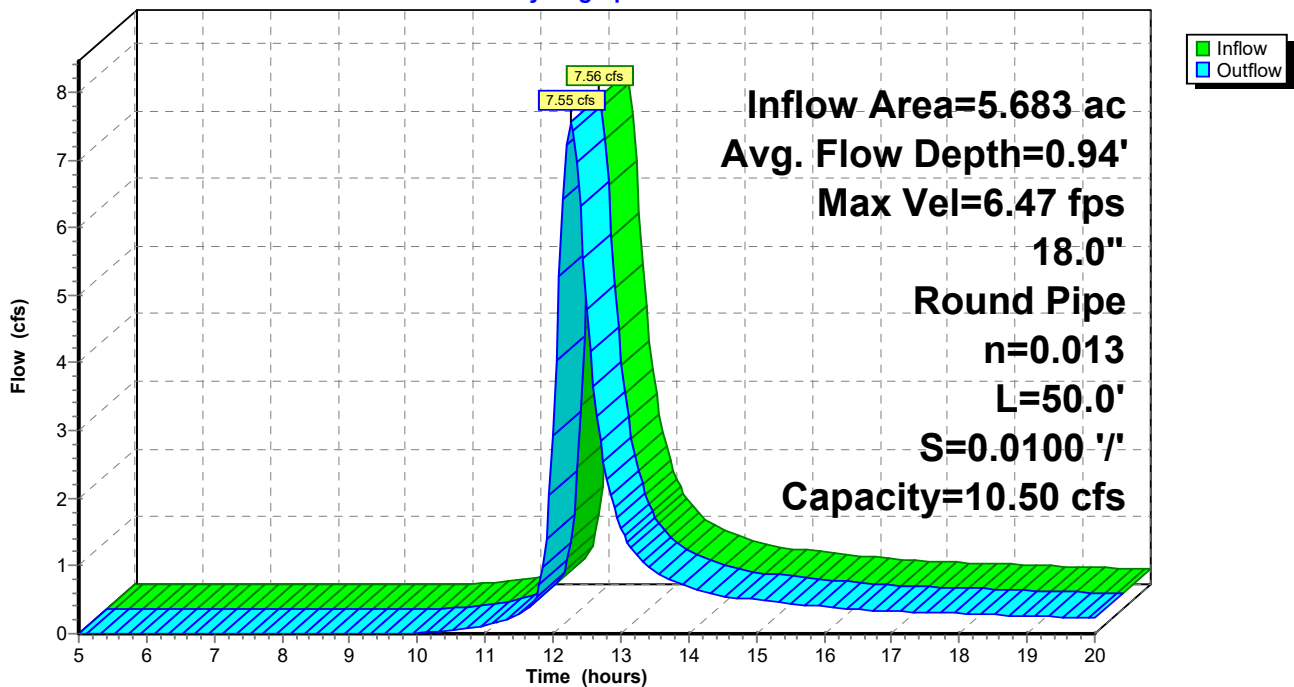
Peak Storage= 58 cf @ 12.26 hrs  
Average Depth at Peak Storage= 0.94' , Surface Width= 1.45'  
Bank-Full Depth= 1.50' Flow Area= 1.8 sf, Capacity= 10.50 cfs

18.0" Round Pipe  
n= 0.013 Corrugated PE, smooth interior  
Length= 50.0' Slope= 0.0100 '/'  
Inlet Invert= 0.00', Outlet Invert= -0.50'



**Reach 8R: REACH 8**

Hydrograph





**POST DEVELOPMENT**

Prepared by Haley Ward

HydroCAD® 10.20-2b s/n 00641 © 2021 HydroCAD Software Solutions LLC

Type II 24-hr 25 YEAR Rainfall=3.70"

Printed 7/27/2023

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**Summary for Reach 9R: REACH 9**

Inflow Area = 5.683 ac, 1.01% Impervious, Inflow Depth > 1.43" for 25 YEAR event  
 Inflow = 7.55 cfs @ 12.26 hrs, Volume= 0.677 af  
 Outflow = 6.99 cfs @ 12.47 hrs, Volume= 0.666 af, Atten= 7%, Lag= 12.7 min  
 Routed to Reach 2SP : SUMMATION POINT 2

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 2.77 fps, Min. Travel Time= 7.5 min  
 Avg. Velocity = 0.99 fps, Avg. Travel Time= 21.0 min

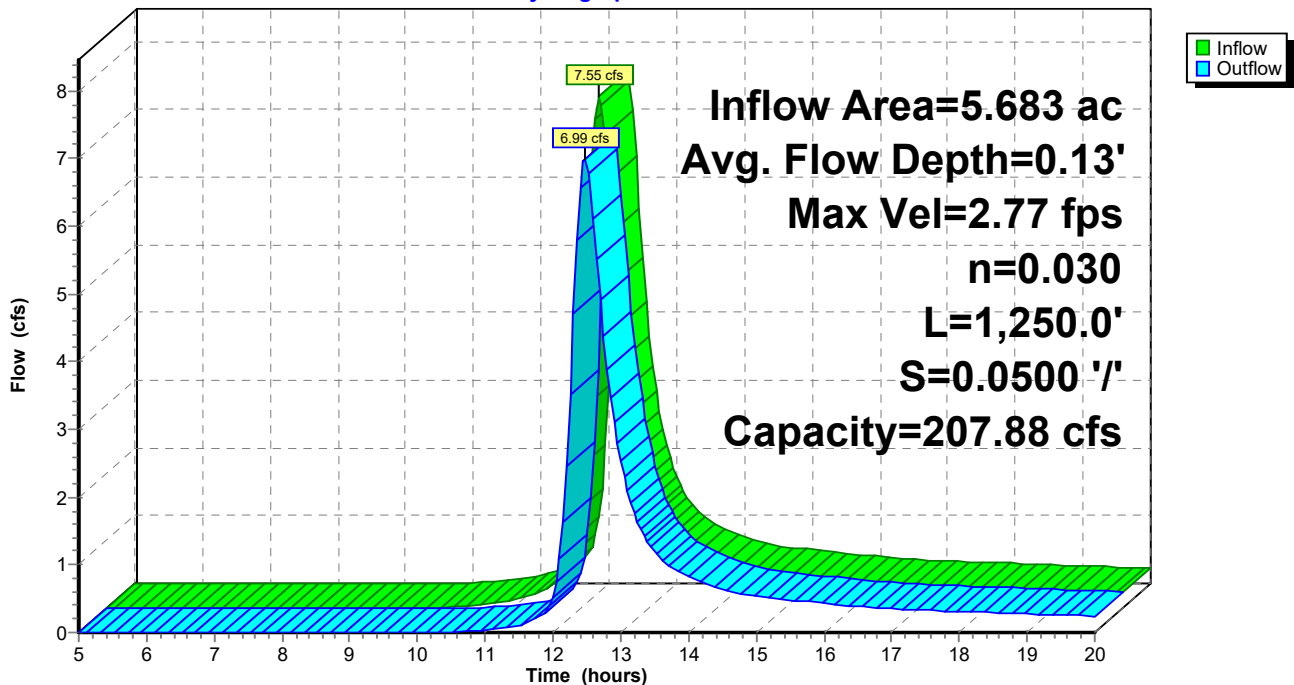
Peak Storage= 3,168 cf @ 12.35 hrs  
 Average Depth at Peak Storage= 0.13' , Surface Width= 20.00'  
 Bank-Full Depth= 1.00' Flow Area= 20.0 sf, Capacity= 207.88 cfs

20.00' x 1.00' deep channel, n= 0.030 Earth, grassed & winding  
 Length= 1,250.0' Slope= 0.0500 '/'  
 Inlet Invert= 0.00', Outlet Invert= -62.50'



**Reach 9R: REACH 9**

Hydrograph





## SECTION 13

### URBAN IMPAIRED STREAM SUBMISSIONS



## URBAN IMPAIRED STREAM

The proposed project is not within the watershed of an urban impaired stream. This section does not apply.



## SECTION 14

### BASIC STANDARDS SUBMISSIONS



## BASIC STANDARDS

### EROSION AND SEDIMENTATION PLAN

- A. Narrative. The proposed construction will require the implementation of temporary and permanent erosion control measures. These measures will be implemented in accordance with the Maine Erosion and Sediment Control Best Management Practices (BMPs) Manual, prior to removal of any on-site vegetation or disturbance of any on-site soil. The general erosion and sediment control specifications and details, as provided within this section, are intended to describe measures to be used by contractors working on the site to maintain compliance with the standards established in the BMPs. These standards include information on temporary and permanent erosion control measures, rates of seeding and applied mulch, slope and soil stabilization, effect of construction schedule, and other details.

The proposed location and use of erosion control measures on-site are shown on the Proposed Site Plan provided with this application. There are no known existing erosion control concerns with the site. Implementation of proper erosion control measures will be required by site conditions to confine sediment and debris within the limit of soil disturbance. Proper use and maintenance of erosion control measures will provide protection against off-site transport of sediment and discharge of sediment to undisturbed areas of the development.

- B. Completion Date. Summer 2024
- C. Site Features. For site features please refer to the enclosed plan.
- D. Temporary and Permanent Erosion Control Measures. For temporary and permanent erosion control measures please refer to the enclosed plan.
- E. Limits of Disturbed Areas. Areas of disturbance will be limited to the proposed work shown on the enclosed plan.
- F. Design Drawings and Specifications. For design drawings please refer to the enclosed plan. The following specifications will be utilized by the site contractor during construction of the project.



## SECTION 14A EROSION CONTROL PLAN SPECIFICATIONS

### A. General

1. All work and measures will be as per the Maine Erosion and Sediment Control BMPs manual.
2. The following specifications will be employed.

### B. Prior to Construction

1. Prior to beginning of construction, erosion and sedimentation controls shall be in place.

### C. During Construction

1. Exposed soil surfaces will be treated immediately if they are to remain ungraded more than 30 days, or if they are at final grades.
2. Drainage ways, either designed or incidental, will have filter barriers installed.
3. All work and materials necessary to minimize sediment loss from the site will be provided.
4. All erosion control measures will be inspected and repaired after every rainfall greater than ½-inch and at least daily during rain events lasting longer than 24 hours.

### D. Post Construction

1. Erosion control measures will be maintained until permanent soil stabilization has been achieved with a growth of vegetation greater than 90%.



## SOIL PROTECTION AND EROSION CONTROL

### PART 1 - GENERAL

#### 1.01 Description of Work

- A. Provide and maintain devices to control erosion, siltation, sedimentation, and dust that occur during construction operations. Undertake every reasonable precaution and do whatever is necessary to avoid erosion of soil and to prevent silting of wetland areas and drainage ditches.
- B. Provide measures to control dust caused whether on or off the project site.
- C. Deficiencies in erosion control measures indicated by failures or erosion will be corrected as soon as reasonably possible by providing additional measures or different techniques to correct the situation and prevent subsequent erosion.
- D. Exposure of soils on embankments, excavations, and graded areas will be kept as short as possible. Initiate seeding and other erosion control practices as soon as reasonably possible.

#### 1.02 Quality Assurance

- A. Conform to all requirements of applicable Federal, State, and local permits and conform to the recommendations of the Maine Erosion and Sediment Control BMPs (see Part B below) whether the measures are specifically noted herein, or not.
- B. Standards: Maine Erosion and Sediment Control BMPs Manual, hereinafter called Erosion Control Handbook.

### PART 2 - PRODUCTS

**2.01 Materials:** Use the following materials to implement and construct erosion control measures.

- A. Hay Bale: Rectangular shaped bales of hay or straw weighing at least 40 pounds per bale; free from noxious weed seeds and rough or woody materials.
- B. Mulch: Type and use as specified by the Erosion Control Handbook
  - 1. Long fibered hay or straw in dry condition and which are relatively free of weeds and foreign matter detrimental to plant life.
  - 2. Mulch netting: Plastic or nylon mesh netting with approximate openings of ¼-inch to 1-inch.



C. Permanent Seeding: Cut and fill slopes and disturbed areas will be stabilized as follows:

1. Four inches of loam will be spread over disturbed areas and smoothed to a uniform surface.
2. In lieu of tests, agricultural limestone will be spread at the rate of three tons per acre. 10-20-20 fertilizer will follow at the rate of 800 lbs. per acre. These two soil additives will be incorporated into the soil prior to seeding.
3. Following seed bed preparation, back slopes will be seeded to a mixture of 83% creeping red fescue, and 17% rye grass. Seeding rate is 3 lbs. per 1,000 square feet. Lawn quality sod may be substituted for seed.
4. Hay mulch at the rate of 90 lbs. per 1,000 square feet of a hydro-application of asphalt, wood, or paper fiber will be applied following seeding. A suitable binder such as curason or terrtack will be used on hay mulch for wind control.
5. If final seeding of the disturbed areas is not completed by September 15th of the year of the construction, then on that date these areas will be graded and a cover crop of rye at the rate of 112 lbs/acre or 3 lbs/1,000 sq. ft. will be applied. The rye seeding will be preceded by an application of 3 tons of lime and 800 lbs. of 10-20-20 fertilizer or its equivalent and covered by a layer of jute mat to aide in stabilization.

### **PART 3 - EXECUTION**

#### **3.01 Construction**

A. Hay Bales:

1. Install as directed by Erosion Control Handbook, and stake with required stakes.

B. Mulch:

1. Undertake after each area has been properly prepared.
2. When seed for erosion control is sown prior to placing the mulch, place mulch on the seeded areas within 48 hours after seeding.
3. Blowing chopped mulch will be permitted.
4. Hay mulch should cover the ground enough to shade it, but the mulch should not be so thick that a person standing cannot see the ground through the mulch.
5. Remove matted mulch or bunches.





### C. Temporary Erosion Control Matting (where necessary):

#### 1. Surface Preparation:

- a. Conform to grades for slopes and ditches shown of the drawings.
- b. Finish to a smooth and even condition with all debris, roots, stones, and lumps raked out and removed.
- c. Loosen soil surface to permit bedding of the matting.
- d. Unless otherwise directed, apply seed prior to placement.

#### 2. Installation:

- a. Place strips lengthwise in the direction of the flow of water.
- b. Where strips are laid parallel or meet as in a tee, overlap at least four inches.
- c. Overlap ends at least six inches in a shingle fashion.
- d. The up-slope end of each strip of the matting will be turned down and buried to a depth of not less than six inches with the soil firmly tamped against it.
- e. Build check slots at right angles to the direction of the flow of water. Space so that one check slot or one end occurs within each 50 feet of slope length. Construct by placing a tight fold of the matting at least six inches vertically into the ground and tamp the same as up-slope ends.
- f. Bury edges of matting around the edges of the catch basins and other structures.
- g. Where determined by the Engineers, additional seed will be spread over matting, particularly at those locations disturbed by building the slots. Matting will then be pressed onto the ground with a light lawn roller or by other satisfactory means.
- h. Drive staples vertically into the ground flush with the surface.
- i. On slopes flatter than 4:1, space staples not more than three feet and one row, alternately spaced, down the center.
- j. On grades 4:1 or steeper, place in the same three rows, but spaced two feet apart.
- k. On all overlapping or butting edges, double the number of staples, with the spacing halved; all ends of the matting and all required check slots will likewise have staples spaced every foot.

### D. Permanent Seeding:

1. Seed with appropriate seeds and application rates as noted in Section 2.01C.
2. Mulch areas where seeding has been applied. Do not mulch seeded areas where matting will be immediately installed.



E. Topsoil Storage:

1. Topsoil which is stockpiled on the site for use in loam applications will be placed out of natural drainages, in piles that have side slopes of 2:1 to 1.5:1.
2. A trench (depth as required) will be constructed around the base of the pile to prevent eroding soil from washing into drainages.

F. Dust Control: Utilize the application of sprinkled water to reduce the emission of airborne soil particulates from the Project site.

G. Temporary Berms: Construct temporary barriers along the toe of embankments using side drains, as necessary.

H. Temporary Basins: Construct temporary sedimentation basins adequate to avoid siltation of surface water bodies.

I. Other Temporary Measures:

1. Type and use will be as specified in the Erosion Control Handbook.

J. Winter Stabilization Notes

1. At this time, it is not expected that significant soil disturbance will occur during winter months or periods of heavy icing. If construction is performed during these times, the following construction practices will be followed.
  - a. All disturbed areas not stabilized with stone or other measures will have approved erosion control matting installed and be dormant seeded.
  - b. No frozen soil material or material containing significant snow or ice will be used for fill material.
  - c. All material stockpiles will have silt fence and/or hay bales installed downgradient of piles.
  - d. Follow general erosion control notes described previously wherever possible and as conditions permit.

### **3.02 Maintenance**

A. Inspect erosion control practices immediately after each rainfall greater than ½-inch and at least daily during rainfall lasting longer than 24 hours or snowmelt for damage. Provide maintenance and make appropriate repairs or replacement.



- B. Remove silt from around hay bales when it has reached one foot above grade or prior to expected heavy runoff or siltation.
- C. Repair matting if any staples become loosened or raised, or if any matting becomes loose, torn, or undermined, make satisfactory repairs immediately.

### **3.03 Removal of Temporary Erosion Control**

- A. Remove temporary materials and devices when permanent soil stabilization has been substantially achieved. For vegetated areas, substantially complete means 95% vegetated cover has been established.
- B. Level and grade to the extent required to present a sightly appearance and to prevent any obstruction of the flow of water or any other interference with the operation of or access to the permanent works.
- C. Remove unsuitable materials from site and dispose of in a lawful manner.



## SECTION 14B INSPECTION AND MAINTENANCE

The following Maintenance Plan will be employed for this facility. Irving Woodlands, LLC will be responsible for all maintenance. Erosion control measures for this site were designed by:

Drew Olehowski, PE  
Haley Ward, Inc.  
One Merchants Plaza  
Bangor, Maine 04401  
(207) 989-4824  
[dolehowski@haleyward.com](mailto:dolehowski@haleyward.com)

A Pre- and Post-Construction Maintenance Plan for the stormwater management system and erosion control measures are included in this section.



## MAINTENANCE PLAN

The MDEP's Stormwater Management for Maine: Best Management Practices (2006), and the MDEP's Chapter 500: Stormwater Management were used as guidelines in the development of this Maintenance Plan. General maintenance requirements are listed below.

### A. DURING CONSTRUCTION

The general contractor will be responsible for the inspection and maintenance of all stormwater management system components during construction.

**Inspection:** Inspection of disturbed and impervious areas, erosion control measures, materials' storage areas that are exposed to precipitation, and locations where vehicles enter or exit the site will be performed at least once a week as well as before and after a storm event, and prior to completing permanent stabilization measures. Inspections shall be conducted by a person with knowledge of erosion and stormwater control, including the standards and conditions in the permit.

**Maintenance:** All erosion control measures will be kept in effective operating condition until areas are permanently stabilized. If BMPs need to be maintained or modified, additional BMPs are necessary, or other corrective action is needed, implementation will be completed within 7 calendar days and prior to any rainfall event.

**Documentation:** A log shall be kept summarizing the inspections and any corrective action taken. A copy of the log is provided at the end of this section, and is titled, Construction Inspection Log.

### B. POST-CONSTRUCTION

The Owner or their assigns will be responsible for the inspection and maintenance of all stormwater management system components.

#### Inspection and Corrective Action

1. Vegetated Areas: Inspections and maintenance of vegetated areas will be performed early in the growing season or after significant rainfall to identify any erosion problems. Areas where erosion is evident will be covered with an appropriate lining, or erosive flows will be diverted to an area able to handle the flows. Any bare areas or areas with sparse growth will be replanted.



2. Ditches, Swales, and Culverts: Inspections and maintenance of ditches, culverts, and swales will be performed in the Spring, late Fall, and after rain events greater than 1-inch in depth to remove any obstructions to flow, to remove any accumulated sediments within the structures, and to repair any erosion of channel linings, check dams, inlet protection, or outlet protection. Vegetated ditches and swales must be mowed no more than twice per year and cut no less than 6-inch in height.
3. Inspection: shall be performed by an individual with experience and/or training on the maintenance and functions of these devices.
4. Roadways: Gravel roadways will be graded at least twice per year, if needed, to maintain drainage patterns as designed
5. Documentation: A log will be kept summarizing the inspections, maintenance, and any corrective action taken. A copy of the log is provided at the end of this section, and is titled, BMP Inspection Log.
6. 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.



## SECTION 14C HOUSEKEEPING

1. Spill Prevention - During construction, controls will be used to prevent pollutants from being discharged from materials on site, including storage practices to minimize exposure of the materials to stormwater, and appropriate spill prevention, containment, and response planning and implementation.
2. Groundwater Protection - During construction, liquid petroleum products and other hazardous materials with the potential to contaminate groundwater will not be stored or handled in areas of the site draining to an infiltration area. 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 will be taken to ensure that activities do not result in noticeable erosion of soils or fugitive dust emissions during or after construction. Oil will not be used for dust control. Water will be used for dust control during construction.

Operations during wet months that cause mud to be tracked off the site onto public roads will provide sweeping of the road areas at least once per week and prior to significant storm events.

4. Debris and Other Materials - Litter, construction debris, and chemicals exposed to stormwater will be prevented from becoming a pollutant source. The nature of this development will not cause problems related to debris and other materials.
5. Trench or Foundation De-Watering - If de-watering is necessary, the collected water will be removed from the ponded area and spread through natural wooded buffers or discharged into a construction sedimentation basin. The water will not be allowed to flow over disturbed areas to the site.



# IRVING WOODLANDS, LLC CONSTRUCTION INSPECTION LOG

Inspection Date	Inspector (Name and Qualifications)	Major Observations	Work Performed

**Notes**

- 1) Major Observations include the operation and maintenance of erosion and sedimentation controls, materials storage areas, and vehicle access points to the parcel. Major Observations must include BMPs that need maintenance, BMPs that failed to operate as designed or proved inadequate for a particular location, and locations(s) where additional BMPs are needed. For each BMP requiring maintenance, BMP needing replacement, and location needing additional BMPs, note in the log the corrective action taken and when it was taken.
- 2) Work Performed will include a description of the corrective action taken, the date the corrective action was taken, and the name and qualifications of the person taking the corrective actions
- 3) The log must be made accessible to MDEP staff and a copy must be provided upon request.
- 4) The permittee shall retain a copy of the log for a period of at least three years from the completion of permanent stabilization.





# IRVING WOODLANDS, LLC BMP INSPECTION LOG

Date	Inspector (Name and Qualifications)	ID Number	BMP Structure	Work Performed	Comments

**Notes**

- 1) If a maintenance task requires the clean-out of any sediments or debris, indicate where the sediment and debris was disposed after removal.
- 2) BMP structures shall be numbered sequentially and located on attached site map.
- 3) The log must be made accessible to MDEP staff and a copy must be provided upon request.
- 4) The permittee shall retain a copy of the log for a period of at least five years from the completion of permanent stabilization.



INSPECTION AND MAINTENANCE PLAN FOR STORMWATER MANAGEMENT STRUCTURES (BMPS)		
	INSPECTION SCHEDULE	CORRECTIVE ACTIONS
<b>VEGETATED AREAS</b>	Annually early spring and after heavy rains	Inspect all slopes and embankments and replant areas of bare soil or with sparse growth
		Armor fill 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
<b>DITCHES, SWALES AND OPEN STORMWATER CHANNELS</b>	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
<b>CULVERTS</b>	Spring and late fall and after heavy rains	Repair riprap where underlying filter fabric or gravel is showing or if stones have dislodged
		Remove accumulated sediments and debris at the inlet, outlet, or within the conduit
<b>CATCHBASINS</b>	Annually in the spring	Remove any obstruction to flow
		Remove sediments and debris from the bottom of the basin and inlet grates
<b>ROADWAYS AND PARKING AREAS</b>	Annually in the spring or as needed	Remove floating debris and oils (using oil absorptive pads) from any trap
		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
<b>RESOURCE AND TREATMENT BUFFERS</b>	Annually in the spring	Ensure that stormwater runoff is not impeded by false ditches of sediment in the shoulder
		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
<b>WETPONDS AND DETENTION BASINS</b>	Annually in fall and after heavy rains	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
		Inspect the embankments for settlement, slope erosion, piping, and slumping
		Mow the embankment to control woody vegetation
		Inspect the outlet structure for broken seals, obstructed orifices, and plugged trash racks
		Remove and dispose of sediments and debris within the control structure
<b>FILTRATION AND INFILTRATION BASINS</b>	Annually in the spring and late fall	Repair any damage to trash racks or debris guards
		Replace any dislodged stone in riprap spillways
		Remove and dispose of accumulated sediments within the impoundment and forebay
		Clean the basin of debris, sediment and hydrocarbons
		Provide for the removal and disposal of accumulated sediments within the basin
<b>PROPRIETARY DEVICES</b>	As specified by manufacturer	Renew the basin media if it fails to drain within 72 hours after a one inch rainfall event
		Till, seed and mulch the basin if vegetation is sparse
<b>OTHER PRACTICES</b>	As specified for devices	Repair riprap where underlying filter fabric or gravel is showing or where stones have dislodged
		Contact with a third-party for inspection and maintenance
		Follow the manufacturer's plan for cleaning of devices
		Contact the department for appropriate inspection and maintenance requirements for other drainage control and runoff treatment measures.



**SECTION 15**  
**GROUNDWATER**



## GROUNDWATER

### A. Narrative and report

#### 1. Location and Maps

Copies of the Maine Geological Survey (MGS) Sand and Gravel Aquifer Map, Surficial Geology map, and the Bedrock Geological map showing the project area have been provided. The site is not located in a significant sand and gravel aquifer. The surface material at the site is till, described as a heterogeneous mixture of sand, silt, clay, and stones, which is underlain by unnamed sedimentary rocks.

#### 2. Quantity

The proposed development will consist of 17 lots, each with one single-family home. Each dwelling is to be served by its own private water supply well. Per the Maine Subsurface Wastewater Disposal Rules, the water demand for a three-bedroom home is 270 gallons per day (gpd) per dwelling unit. The total demand for the development will be  $17 \text{ units} * 270 \text{ gpd/unit} = 4,590 \text{ gpd}$ .

#### 3. Sources

This development is solely residential. Potential sources of contamination include wastewater, which will be treated using private subsurface wastewater disposal systems. The MDEP's Environmental and Geographic Analysis Database was analyzed to determine if there are any existing sources of contamination that may impact the development. The nearest mapped sources are leaking aboveground residential storage tanks. These tanks are on the opposite side of Cross Lake, approximately 0.7 miles at the closest point. These tanks are not expected to impact the development due to their downgradient location.

#### 4. Measures to Prevent Degradation

The site is proposed to be developed with properly designed stormwater and wastewater disposal facilities as described in Sections 12 and 17 of the SLODA application, respectively.

### B. Groundwater Protection Plan

This development will not use or store hazardous or polluting materials; therefore, a Groundwater Protection Plan is not required.

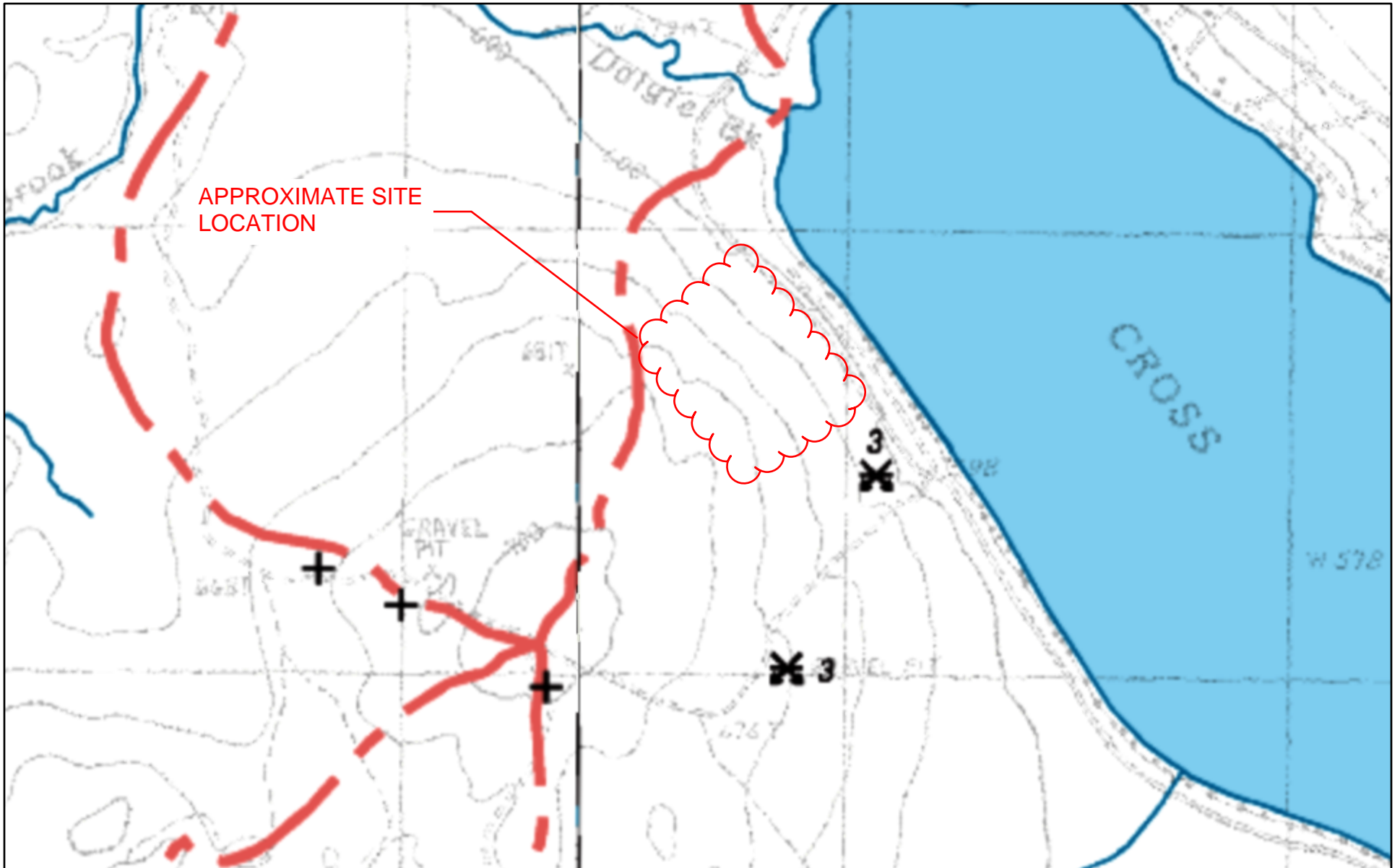
### C. Monitoring Plan

Not Applicable

### D. Monitoring Well Installation Report

Not Applicable

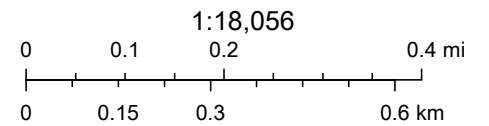
# Aquifers 24K



10/11/2022, 3:06:44 PM

Image

- Red: Band\_1
- Green: Band\_2



Maine Geological Survey, Province of New Brunswick, Esri Canada, Esri, HERE, Garmin, GeoTechnologies, Inc., USGS, METI/NASA, EPA, USDA,

Maine Geological Survey





**SECTION 16**  
**WATER SUPPLY**



## WATER SUPPLY Revised February 2024

### A. Water Supply Method

#### 1. Individual Wells

The proposed development will consist of a subdivision creating 17 new lots, each with one single-family home. Each dwelling is to be served by its own private water supply well; it will be the responsibility of future lot lessees to comply with all rules and regulations concerning the planning, installation and maintenance of a private well. Per the Maine Subsurface Wastewater Disposal Rules, the water demand for a 3-bedroom home is 270 gallons per day (gpd) per dwelling unit. The total demand for the development will be  $17 \text{ units} * 270 \text{ gpd/unit} = 4,590 \text{ gpd}$ .

#### 2. Common wells

None proposed for this development

#### 3. Well Construction in shallow-to-bedrock areas

Overburden thickness and depth to bedrock in upland areas of the site are expected to be less than 10 feet based on surficial and aquifer mapping presented in Section 15. Because the wells and subsurface wastewater disposal systems are both proposed on-site, any well drilling location that encounters bedrock at 10 feet or less will be constructed with casing set a minimum of 20 feet below the solid bedrock surface.

#### 4. Additional Information

None required at this time.

#### 5. Off-Site Utility Company or Public Agency

There are no municipal water supplies near the site. Haley Ward has determined that on-site bedrock wells are the best water supply source for each lot at this site, therefore, a letter from an off-site supplier is not needed.

#### 6. Other Sources

No other sources of water supply will be utilized.

### B. Subsurface Wastewater Disposal

The water supply wells and subsurface wastewater disposal systems are to be handled on-site. The site lots vary in size from one to three acres, which should provide adequate space for the required setbacks and siting of the water supply wells upgradient/cross-gradient to the proposed disposal systems and stormwater structures.





### C. Total Usage

*Water demand:* The proposed development will consist of a subdivision creating 17 new lots, each with one single-family home. Each dwelling is to be served by its own private water supply well. Per the Maine Subsurface Wastewater Disposal Rules, the water demand for a three-bedroom home is 270 gpd per dwelling unit. The total demand for the development will be  $17 \text{ units} * 270 \text{ gpd/unit} = 4,590 \text{ gpd}$ .

*Sustainable Well Yield:* Given the geologic setting of the proposed development, it is reasonable to assume that recharge to the groundwater aquifers will rely on infiltration of precipitation, which falls on the property and in particular the upgradient watershed. The average annual recharge to the bedrock aquifer supplying the proposed on-site wells was estimated by applying assumptions generally accepted by hydrogeologic practitioners, academics, and regulators in the State of Maine.

Groundwater recharge is a function of precipitation amount, runoff, transpiration, and infiltration. The portion of precipitation that does not runoff directly to streams and is not transpired by vegetation is available to infiltrate the ground and recharge the aquifer. The MGS reports that, on average, 7.5% to 20% of incident precipitation on till soils ultimately enters the groundwater system as recharge (Gerber, 1985). The average precipitation for Aroostook County is reported by the National Oceanic and Atmospheric Administration (NOAA) as 39.60 inches, which is close to the average overall value of precipitation for the State of Maine (42 inches).

The proposed project parcel is approximately 96 acres in size. The subdivision development area encompasses approximately 48 acres of the project parcel. The maximum lot coverage for each individual lot within the subdivision is 30% and the maximum building envelope is 40%. Assuming maximum buildup of each lot and the development of the access roadway, the total impervious area for the development could approach 12.63 acres (several areas will be left undeveloped, see **Section 12** for actual, proposed impervious and developed area calculations). Using the site's 83.37 acres of pervious area for groundwater recharge in calculating annual site groundwater recharge, it is apparent that annual groundwater demand for the parcel will be lower than the annual recharge. The following assumptions have been made in calculating a conservative estimate for average annual groundwater recharge:

1. It is assumed that 83.37 acres of the total 96-acre parcel will contribute recharge to groundwater on the site.



2. An estimated 10% of precipitation will enter the aquifer as recharge (3.96 inches).

Accordingly, the estimated value for available recharge for the site is:

$$3.96" \times 1\text{ft}/12" \times 83.37 \text{ acres} \times 43,560 \text{ ft}^2/\text{acre} = 1,198,427 \text{ ft}^3$$

$$1,198,427 \text{ ft}^3 \times 7.48 \text{ gal}/\text{ft}^3 = 8,964,234 \text{ gallons}$$

This value is rounded to 8.96 MG per year of groundwater recharge available.

Assessment of Water Supply and Demand. As noted above, the proposed development may require approximately 4,590 gpd, with annual water demand of approximately 1.68 MG. As previously noted, the estimate of available annual site groundwater recharge is 8.96 MG. This equates to approximately 19% of average annual recharge.

Wastewater will be treated on-site and allowed to infiltrate into the subsurface wastewater disposal fields. This operation should reduce the estimated demand of 4,590 gpd and would lead to some recharge to the aquifer system.

In our opinion, given the volume of water estimated to be withdrawn is 19% of the estimated combined area annual groundwater recharge, the risk of adverse effects from on-site groundwater withdrawal to off-site wells or protected natural resources (as defined in 38 M.R.S.A. § 480-B) is low.

## REFERENCES

Ground Water Recharge Rates for Maine Soils and Bedrock, Gerber 1985, Geologic Society of Maine, Selected Papers on the Hydrogeology of Maine.



## SECTION 17

### WASTEWATER DISPOSAL



## WASTEWATER DISPOSAL Revised February 2024

### On-Site subsurface wastewater disposal systems:

#### 1. **Site Plan:**

Refer to the proposed site plan for topography, project boundaries, and layout of the proposed development; including the location of all subsurface explorations (test pits, borings, etc.) proposed on-site, water supply wells, or existing off-site wells within 300 feet of the project boundaries and proposed subsurface wastewater disposal field locations. Individual subsurface wastewater disposal fields (septic systems) are to be permitted and developed by future, individual lessees.

#### 2. **Soil Conditions**

Test pits identified favorable conditions for wastewater disposal.

#### 3. **Logs of subsurface explorations**

Test Pit Logs are attached within this section.

#### 4. **Additional subsurface explorations**

At least one test pit indicating a suitable soil condition was recorded on each lot. Additional subsurface explorations will be the responsibility of the future, individual lessees.

#### 5. **3-Bedroom Design**

The actual design of the septic systems will be the responsibility of the future, individual lessees.

#### 6. **Larger Disposal Systems**

The actual design of the septic systems will be the responsibility of the future, individual lessees.

**SOIL PROFILE / CLASSIFICATION INFORMATION**

**SOIL SCIENTIST DESCRIPTION OF SOIL CONDITIONS AT PROJECT SITES**

Project Name: Cross Lake Subdiv Applicant Name: Inna Project Location (municipality): T17 R55 Cross Lake Twp

Exploration Symbol # 5000  Test Pit  Boring  Probe  
8 " Organic horizon thickness Ground surface elev. \_\_\_\_\_  
58 " Depth:  of exploration, or  to refusal

Horizon	Color	Texture	Structure	Consistence	Redox
Bw1	10YR5/1	grav silo	abk	firm/sat	2.5y 6/4
Bw2	2.5y 4/3	v grav silo	↓	firm	↓
BC	10YR 5/1	silo	platy	v. firm	10YR 6/6
bedrock refusal @ 50" / excav seepage @ bottom					

Soil Series/Phase Name: \_\_\_\_\_ Limiting Factor 0 "  Groundwater  Restrictive Layer  Bedrock  
 Depth \_\_\_\_\_

Drainage Class:  ED  SED  WD  MWD  SPD  PD  VPD  
 Slope \_\_\_\_\_ Percent  
 Hydric Soil:  No  Yes  
 Hydrologic: \_\_\_\_\_ Soil Group

Exploration Symbol # 5001  Test Pit  Boring  Probe  
2 " Organic horizon thickness Ground surface elev. \_\_\_\_\_  
42 " Depth:  of exploration, or  to refusal

Horizon	Color	Texture	Structure	Consistence	Redox
Bhs	5YR4/4	grav silo	gran	fr	none
BS	10YR5/6	↓	↓	↓	↓
Bw	2.5y 5/3	v grav silo	abk	firm	↓
BC	2.5y 5/4	cy grav silo	abk	v firm	10YR 4/6
bedrock @ 40" / excav of seepage					

Soil Series/Phase Name: \_\_\_\_\_ Limiting Factor 13 "  Groundwater  Restrictive Layer  Bedrock  
 Depth \_\_\_\_\_

Drainage Class:  ED  SED  WD  MWD  SPD  PD  VPD  
 Slope \_\_\_\_\_ Percent  
 Hydric Soil:  No  Yes  
 Hydrologic: \_\_\_\_\_ Soil Group

Exploration Symbol # 5002  Test Pit  Boring  Probe  
2 " Organic horizon thickness Ground surface elev. \_\_\_\_\_  
17 " Depth:  of exploration, or  to refusal

Horizon	Color	Texture	Structure	Consistence	Redox
	strong brn	SILLO	GR	FRI	NUMH
	yellow brn	Channey	↓	↓	↓
limit of observation = 17" refusal/cobble? hand dug					

Soil Series/Phase Name: \_\_\_\_\_ Limiting Factor 17 "  Groundwater  Restrictive Layer  Bedrock  
 Depth \_\_\_\_\_

Drainage Class:  ED  SED  WD  MWD  SPD  PD  VPD  
 Slope \_\_\_\_\_ Percent  
 Hydric Soil:  No  Yes  
 Hydrologic: \_\_\_\_\_ Soil Group

Exploration Symbol # 5003  Test Pit  Boring  Probe  
2 " Organic horizon thickness Ground surface elev. \_\_\_\_\_  
22 " Depth:  of exploration, or  to refusal

Horizon	Color	Texture	Structure	Consistence	Redox
	grayish y	SILLO	GR	FRI	none
	7.5Y4/6	↓	↓	↓	↓
	2.5y 5/4	becoming sandy	subting	firm	CEP
Potw/r Aug. refusal @ 22" hand dug					

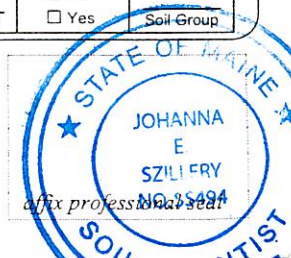
Soil Series/Phase Name: \_\_\_\_\_ Limiting Factor 17 "  Groundwater  Restrictive Layer  Bedrock  
 Depth \_\_\_\_\_

Drainage Class:  ED  SED  WD  MWD  SPD  PD  VPD  
 Slope \_\_\_\_\_ Percent  
 Hydric Soil:  No  Yes  
 Hydrologic: \_\_\_\_\_ Soil Group

**SOIL SCIENTIST INFORMATION AND SIGNATURE**

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**SOIL PROFILE / CLASSIFICATION INFORMATION**

**SOIL SCIENTIST DESCRIPTION OF SOIL CONDITIONS AT PROJECT SITES**

Project Name: Cross Lake subdvn Applicant Name: Irving Project Location (municipality): 717 R55 Cross Lake Twp

Exploration Symbol # 5004  Test Pit  Boring  Probe  
2 " Organic horizon thickness Ground surface elev. \_\_\_\_\_  
13 " Depth:  of exploration, or  to refusal

Horizon	Color	Texture	Structure	Consistence	Redox
Bhs	7.5YR 4/6	ch silt	gran	vfr	none
			sbk	fr	↓
bedrock @ 11" / excav					

Soil Series/Phase Name: \_\_\_\_\_ Limiting Factor 11 "  Groundwater  Restrictive Layer  Bedrock  
 Depth \_\_\_\_\_

Drainage Class  ED  SED  WD  MWD  SPD  PD  VPD Slope \_\_\_\_\_ Percent \_\_\_\_\_ Hydric Soil  No  Yes Hydrologic \_\_\_\_\_ Soil Group \_\_\_\_\_

Exploration Symbol # 5005  Test Pit  Boring  Probe  
2 " Organic horizon thickness Ground surface elev. \_\_\_\_\_  
24 " Depth:  of exploration, or  to refusal

Horizon	Color	Texture	Structure	Consistence	Redox
Bm		ch silt	GR	FRI	
DYB			SAB	st. firm	FIF
LOB			mass	Firm	C4D
limit of observation = 24" excav. dug					

Soil Series/Phase Name: \_\_\_\_\_ Limiting Factor 16 "  Groundwater  Restrictive Layer  Bedrock  
 Depth \_\_\_\_\_

Drainage Class  ED  SED  WD  MWD  SPD  PD  VPD Slope \_\_\_\_\_ Percent \_\_\_\_\_ Hydric Soil  No  Yes Hydrologic \_\_\_\_\_ Soil Group \_\_\_\_\_

Exploration Symbol # 5006  Test Pit  Boring  Probe  
2 " Organic horizon thickness Ground surface elev. \_\_\_\_\_  
13 " Depth:  of exploration, or  to refusal

Horizon	Color	Texture	Structure	Consistence	Redox
Bhs	7.5YR 4/6	silt	gran	vr	g
		ven	sbk	fr	↓
refusal @ 11" bedrock excav dug					

Soil Series/Phase Name: \_\_\_\_\_ Limiting Factor 11 "  Groundwater  Restrictive Layer  Bedrock  
 Depth \_\_\_\_\_

Drainage Class  ED  SED  WD  MWD  SPD  PD  VPD Slope \_\_\_\_\_ Percent \_\_\_\_\_ Hydric Soil  No  Yes Hydrologic \_\_\_\_\_ Soil Group \_\_\_\_\_

Exploration Symbol # 5007  Test Pit  Boring  Probe  
2 " Organic horizon thickness Ground surface elev. \_\_\_\_\_  
60 " Depth:  of exploration, or  to refusal

Horizon	Color	Texture	Structure	Consistence	Redox
Bhs	7.5YR 3/4	silt			
			gran	fr	none
Bs	7.5YR 4/6	grav silt	↓	firm	10YR 5/6
Bc	2.5Y 5/4	v grav silt	platy		5/6 5/6
C	2.5Y 3/2	silt	↓	v firm	2.5Y 5/6
limit of obsen = 60" / excav					

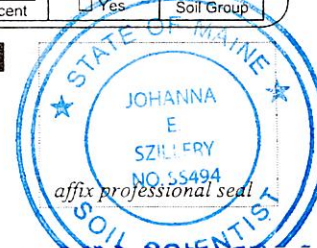
Soil Series/Phase Name: \_\_\_\_\_ Limiting Factor 12 "  Groundwater  Restrictive Layer  Bedrock  
 Depth \_\_\_\_\_

Drainage Class  ED  SED  WD  MWD  SPD  PD  VPD Slope \_\_\_\_\_ Percent \_\_\_\_\_ Hydric Soil  No  Yes Hydrologic \_\_\_\_\_ Soil Group \_\_\_\_\_

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**SOIL PROFILE / CLASSIFICATION INFORMATION**

**SOIL SCIENTIST DESCRIPTION OF SOIL CONDITIONS AT PROJECT SITES**

Project Name: Cross Lake Subdivn Applicant Name: Irving Project Location (municipality): T17 R55 Cross Lake Twp

Exploration Symbol # 5008  Test Pit  Boring  Probe  
3 " Organic horizon thickness Ground surface elev. \_\_\_\_\_  
47 " Depth:  of exploration, or  to refusal

Horizon	Color	Texture	Structure	Consistence	Redox
0	10YR 2/7	SILO	GR	FRI	none
10	10YR 3/6				
20					
30	10YR 4/6	v ch silo		firm	
40					
50					
60					

Soil Series/Phase Name: \_\_\_\_\_ Limiting Factor  Groundwater  Restrictive Layer  Bedrock  
 Depth 18 "

Drainage Class:  ED  SED  WD  MWD  SPD  PD  VPD  
 Slope \_\_\_\_\_ Percent  
 Hydric Soil:  No  Yes  
 Hydrologic \_\_\_\_\_ Soil Group

Exploration Symbol # 5009  Test Pit  Boring  Probe  
2 " Organic horizon thickness Ground surface elev. \_\_\_\_\_  
17 " Depth:  of exploration, or  to refusal

Horizon	Color	Texture	Structure	Consistence	Redox
0	7.5YR 2/2	silo	gran	fr	none
10					
20	5YR 3/4	v ch silo			
30					
40					
50					
60					

Soil Series/Phase Name: \_\_\_\_\_ Limiting Factor  Groundwater  Restrictive Layer  Bedrock  
 Depth 15 "

Drainage Class:  ED  SED  WD  MWD  SPD  PD  VPD  
 Slope \_\_\_\_\_ Percent  
 Hydric Soil:  No  Yes  
 Hydrologic \_\_\_\_\_ Soil Group

Exploration Symbol # 5010  Test Pit  Boring  Probe  
1 " Organic horizon thickness Ground surface elev. \_\_\_\_\_  
41 " Depth:  of exploration, or  to refusal

Horizon	Color	Texture	Structure	Consistence	Redox
0	10YR 6/3			vfr	
10	5YR 4/4	silo	gran	fr	none
20	10YR 4/4				
30	10YR 5/3	ch silo	abk	firm	10YR 4/6
40					c, f
50	2.5Y 3/3	v ch silo			
60					

Soil Series/Phase Name: \_\_\_\_\_ Limiting Factor  Groundwater  Restrictive Layer  Bedrock  
 Depth 13 "

Drainage Class:  ED  SED  WD  MWD  SPD  PD  VPD  
 Slope \_\_\_\_\_ Percent  
 Hydric Soil:  No  Yes  
 Hydrologic \_\_\_\_\_ Soil Group

Exploration Symbol # 5011  Test Pit  Boring  Probe  
 \_\_\_\_\_ " Organic horizon thickness Ground surface elev. \_\_\_\_\_  
 \_\_\_\_\_ " Depth:  of exploration, or  to refusal

Horizon	Color	Texture	Structure	Consistence	Redox
0					
10					
20					
30					
40					
50					
60					

Soil Series/Phase Name: \_\_\_\_\_ Limiting Factor  Groundwater  Restrictive Layer  Bedrock  
 Depth 10 "

Drainage Class:  ED  SED  WD  MWD  SPD  PD  VPD  
 Slope \_\_\_\_\_ Percent  
 Hydric Soil:  No  Yes  
 Hydrologic \_\_\_\_\_ Soil Group

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**SOIL PROFILE / CLASSIFICATION INFORMATION**

**SOIL SCIENTIST DESCRIPTION OF SOIL CONDITIONS AT PROJECT SITES**

Project Name: Cross Lake subdrn Applicant Name: Inung Project Location (municipality): T17 R55 Cross Lake Twp

Exploration Symbol # 5012  Test Pit  Boring  Probe  
3 " Organic horizon thickness Ground surface elev. \_\_\_\_\_  
19 " Depth:  of exploration, or  to refusal

Horizon	Color	Texture	Structure	Consistence	Redox
E	7.5YR 6/2	silo	gran	vfr	
Bhs	7.5YR 4/6	ch silo			none
Bs	10YR 5/6	v ch silo		frable	
weathered bedrock @ 16" / hand dug					
φ seepage					

Soil Series/Phase Name: \_\_\_\_\_ Limiting Factor 16 "  Groundwater  Restrictive Layer  Bedrock  
 Depth \_\_\_\_\_  
 Drainage Class:  ED  SED  WD  MWD  SPD  PD  VPD  
 Slope \_\_\_\_\_ Percent  
 Hydric Soil:  No  Yes  
 Hydrologic \_\_\_\_\_  
 Soil Group \_\_\_\_\_

Exploration Symbol # 5013  Test Pit  Boring  Probe  
3 " Organic horizon thickness Ground surface elev. \_\_\_\_\_  
20 " Depth:  of exploration, or  to refusal

Horizon	Color	Texture	Structure	Consistence	Redox
Bhs	7.5YR 4/6	silo	gran	vfr	none
Bs	10YR 4/6	chan silo		firm	
refusal/ assumed bedrock @ 17" hand dug					
φ seepage					

Soil Series/Phase Name: \_\_\_\_\_ Limiting Factor 17 "  Groundwater  Restrictive Layer  Bedrock  
 Depth \_\_\_\_\_  
 Drainage Class:  ED  SED  WD  MWD  SPD  PD  VPD  
 Slope \_\_\_\_\_ Percent  
 Hydric Soil:  No  Yes  
 Hydrologic \_\_\_\_\_  
 Soil Group \_\_\_\_\_

Exploration Symbol # 5014  Test Pit  Boring  Probe  
2 " Organic horizon thickness Ground surface elev. \_\_\_\_\_  
20 " Depth:  of exploration, or  to refusal

Horizon	Color	Texture	Structure	Consistence	Redox
Bhs	10YR 5/6	ch silo	gran	vfr	none
Bs	10YR 4/6	v ch silo	sbk	fr	
limit of observation = 18" assumed bedrock / hand dug					

Soil Series/Phase Name: \_\_\_\_\_ Limiting Factor 18 "  Groundwater  Restrictive Layer  Bedrock  
 Depth \_\_\_\_\_  
 Drainage Class:  ED  SED  WD  MWD  SPD  PD  VPD  
 Slope \_\_\_\_\_ Percent  
 Hydric Soil:  No  Yes  
 Hydrologic \_\_\_\_\_  
 Soil Group \_\_\_\_\_

Exploration Symbol # 5015  Test Pit  Boring  Probe  
3 " Organic horizon thickness Ground surface elev. \_\_\_\_\_  
10 " Depth:  of exploration, or  to refusal

Horizon	Color	Texture	Structure	Consistence	Redox
E	7.5YR 6/2	silo	gran	fr.	none
Bs	5YR 3/4	chan silo			
bedrock / weathered @ 7" / excav					
φ seepage					

Soil Series/Phase Name: \_\_\_\_\_ Limiting Factor 7 "  Groundwater  Restrictive Layer  Bedrock  
 Depth \_\_\_\_\_  
 Drainage Class:  ED  SED  WD  MWD  SPD  PD  VPD  
 Slope \_\_\_\_\_ Percent  
 Hydric Soil:  No  Yes  
 Hydrologic \_\_\_\_\_  
 Soil Group \_\_\_\_\_

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**SOIL PROFILE / CLASSIFICATION INFORMATION**

**SOIL SCIENTIST DESCRIPTION OF SOIL CONDITIONS AT PROJECT SITES**

Project Name: Cross Lake Subdivn Applicant Name: Inung Project Location (municipality): 717 R55 Cross Lake Twp

Exploration Symbol # 5016  Test Pit  Boring  Probe  
2 " Organic horizon thickness Ground surface elev. \_\_\_\_\_  
17 " Depth:  of exploration, or  to refusal

Horizon	Color	Texture	Structure	Consistence	Redox
E	10YR 6/3	silt			
Bhs	5YR 4/1	chansilt	gran	v fr.	none
BS	10YR 5/6	v ch silt			
@ 15" v channery bedrock assumed hand dug					
# seepage					

Soil Series/Phase Name: \_\_\_\_\_ Limiting Factor  Groundwater  Restrictive Layer  Bedrock  
 Depth 15 "  No  Yes  
 Drainage Class:  ED  SED  WD  MWD  SPD  PD  VPD  
 Slope \_\_\_\_\_ Percent  
 Hydric Soil:  No  Yes  
 Hydrologic \_\_\_\_\_ Soil Group

Exploration Symbol # 5017  Test Pit  Boring  Probe  
3 " Organic horizon thickness Ground surface elev. \_\_\_\_\_  
20 " Depth:  of exploration, or  to refusal

Horizon	Color	Texture	Structure	Consistence	Redox
Bhs	5YR 4/4	silt	gran	v fr	none
Bs1	10YR 5/6	chansilt			
Bs2		v ch silt		friable	
@ 17" assumed bedrock / hand dug					
# seepage					

Soil Series/Phase Name: \_\_\_\_\_ Limiting Factor  Groundwater  Restrictive Layer  Bedrock  
 Depth 17 "  No  Yes  
 Drainage Class:  ED  SED  WD  MWD  SPD  PD  VPD  
 Slope \_\_\_\_\_ Percent  
 Hydric Soil:  No  Yes  
 Hydrologic \_\_\_\_\_ Soil Group

Exploration Symbol # 5018  Test Pit  Boring  Probe  
4 " Organic horizon thickness Ground surface elev. \_\_\_\_\_  
29 " Depth:  of exploration, or  to refusal

Horizon	Color	Texture	Structure	Consistence	Redox
Bs1	7.5YR 4/6	grav. silt	gran	v fr	none
Bs2	10YR 4/4			friable	
BC	2.5Y 5/4	v grav silt	abk/ platy	firm	10YR 6/6
bedrock @ 25" / excav					
seepage at bottom of pit					

Soil Series/Phase Name: \_\_\_\_\_ Limiting Factor  Groundwater  Restrictive Layer  Bedrock  
 Depth 14 "  No  Yes  
 Drainage Class:  ED  SED  WD  MWD  SPD  PD  VPD  
 Slope \_\_\_\_\_ Percent  
 Hydric Soil:  No  Yes  
 Hydrologic \_\_\_\_\_ Soil Group

Exploration Symbol # 5019  Test Pit  Boring  Probe  
2 " Organic horizon thickness Ground surface elev. \_\_\_\_\_  
16 " Depth:  of exploration, or  to refusal

Horizon	Color	Texture	Structure	Consistence	Redox
A	2.5Y 3/2	muck silt	sbk	fr-sat	
Bw	10YR 5/1	gr. silt			10YR 6/6
BwZ				firm	cf
limit of observation 54"					
hand dug					

Soil Series/Phase Name: \_\_\_\_\_ Limiting Factor  Groundwater  Restrictive Layer  Bedrock  
 Depth 0 "  No  Yes  
 Drainage Class:  ED  SED  WD  MWD  SPD  PD  VPD  
 Slope \_\_\_\_\_ Percent  
 Hydric Soil:  No  Yes  
 Hydrologic \_\_\_\_\_ Soil Group

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**SOIL PROFILE / CLASSIFICATION INFORMATION**

**SOIL SCIENTIST DESCRIPTION OF SOIL CONDITIONS AT PROJECT SITES**

Project Name: Cross Lake Subdiv Applicant Name: Trung Project Location (municipality): 717 RSS Cross Lake Twp

Exploration Symbol # SD20  Test Pit  Boring  Probe  
3 " Organic horizon thickness Ground surface elev. \_\_\_\_\_  
21 " Depth:  of exploration, or  to refusal

Horizon	Color	Texture	Structure	Consistence	Redox
A	10YR23/2	silt	abk	v fr	none
B <sub>td</sub>	10YR5/6			sat	
B <sub>2</sub>	7.5Y5/2			firm	10YR6/6
bedrock @ 18" / excav					
panding at bottom of pit					

Soil Series/Phase Name: \_\_\_\_\_ Limiting Factor 10 "  Groundwater  
 Restrictive Layer  
 Bedrock  
 Drainage Class:  ED  SED  WD  MWD  SPD  PD  VPD  
 Slope: \_\_\_\_\_ Percent  
 Hydric Soil:  No  Yes  
 Hydrologic: \_\_\_\_\_ Soil Group

Exploration Symbol # SD21  Test Pit  Boring  Probe  
2 " Organic horizon thickness Ground surface elev. \_\_\_\_\_  
18 " Depth:  of exploration, or  to refusal

Horizon	Color	Texture	Structure	Consistence	Redox
B <sub>ts</sub>	10YR3/6	Ch silt	gran	v fr	
B <sub>s</sub>	10YR4/4	vr		fr	
		silt	sks		
			gran		
limit of investigation 18"					
hand dug					

Soil Series/Phase Name: \_\_\_\_\_ Limiting Factor 18 "  Groundwater  
 Restrictive Layer  
 Bedrock  
 Drainage Class:  ED  SED  WD  MWD  SPD  PD  VPD  
 Slope: \_\_\_\_\_ Percent  
 Hydric Soil:  No  Yes  
 Hydrologic: \_\_\_\_\_ Soil Group

Exploration Symbol # SD22  Test Pit  Boring  Probe  
3 " Organic horizon thickness Ground surface elev. \_\_\_\_\_  
42 " Depth:  of exploration, or  to refusal

Horizon	Color	Texture	Structure	Consistence	Redox
	10Yr 4/6	silt	GR	FRI	
	10Yr 5/6	gnly silt			
				SIF	C&D
	2.5Y 5/4	v. Gr silt	Platy	Firm	
			Blocky		seep
Limit of investigation = 42"					
Excav. Dig					

Soil Series/Phase Name: \_\_\_\_\_ Limiting Factor 9 "  Groundwater  
 Restrictive Layer  
 Bedrock  
 Drainage Class:  ED  SED  WD  MWD  SPD  PD  VPD  
 Slope: \_\_\_\_\_ Percent  
 Hydric Soil:  No  Yes  
 Hydrologic: \_\_\_\_\_ Soil Group

Exploration Symbol # SD23  Test Pit  Boring  Probe  
2 " Organic horizon thickness Ground surface elev. \_\_\_\_\_  
23 " Depth:  of exploration, or  to refusal

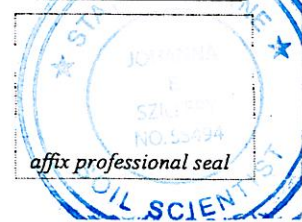
Horizon	Color	Texture	Structure	Consistence	Redox
	10Yr 7/1	silt	GR	FRI	
	10Yr 4/6				
	10Yr 5/5	Channery			
	2.5Y 5/6	Medium weathered	SAB	SIFirm	C&D
limit of investigation = 23"					
Excav. Dig					

Soil Series/Phase Name: \_\_\_\_\_ Limiting Factor 11 "  Groundwater  
 Restrictive Layer  
 Bedrock  
 Drainage Class:  ED  SED  WD  MWD  SPD  PD  VPD  
 Slope: \_\_\_\_\_ Percent  
 Hydric Soil:  No  Yes  
 Hydrologic: \_\_\_\_\_ Soil Group

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**SOIL PROFILE / CLASSIFICATION INFORMATION**

**SOIL SCIENTIST DESCRIPTION OF SOIL CONDITIONS AT PROJECT SITES**

Project Name: Cross Lake Subdivn Applicant Name: Inung Project Location (municipality): T17 R55 Cross Lake Twp

Exploration Symbol # 5024  Test Pit  Boring  Probe  
2 " Organic horizon thickness Ground surface elev. \_\_\_\_\_  
10 " Depth:  of exploration, or  to refusal

Horizon	Color	Texture	Structure	Consistence	Redox
Bs	7.5YR 4/4	silo	gran	fr.	none
bedrock @ 8" / ex					

Soil Series/Phase Name: \_\_\_\_\_ Limiting Factor 8  Groundwater  Restrictive Layer  Bedrock  
 Depth \_\_\_\_\_  
 Drainage Class  ED  SED  WD  MWD  SPD  PD  VPD Slope \_\_\_\_\_ Percent Hydric Soil  No  Yes Hydrologic \_\_\_\_\_ Soil Group

Exploration Symbol # 5025  Test Pit  Boring  Probe  
2 " Organic horizon thickness Ground surface elev. \_\_\_\_\_  
40 " Depth:  of exploration, or  to refusal

Horizon	Color	Texture	Structure	Consistence	Redox
Bhs	7.5YR 5/8	silo	GR	FRI	
Bs	10YR 6/6				
BC	2.5Y 5/4 silty silo		SAB	Firm	C&D
BR @ 20" - 24"					
↓ weathered B/R to 40" WL↑					

Soil Series/Phase Name: \_\_\_\_\_ Limiting Factor 15  Groundwater  Restrictive Layer  Bedrock  
 Depth \_\_\_\_\_  
 Drainage Class  ED  SED  WD  MWD  SPD  PD  VPD Slope \_\_\_\_\_ Percent Hydric Soil  No  Yes Hydrologic \_\_\_\_\_ Soil Group

Exploration Symbol # 5026  Test Pit  Boring  Probe  
3 " Organic horizon thickness Ground surface elev. \_\_\_\_\_  
18 " Depth:  of exploration, or  to refusal

Horizon	Color	Texture	Structure	Consistence	Redox
Bhs	7.5YR 4/6	ch silo	gran	v fr friable	none
Bs	10YR 4/6	v.ch silo			
weathered bedrock @ 15" / excav					
↓ seepage					

Soil Series/Phase Name: \_\_\_\_\_ Limiting Factor 15  Groundwater  Restrictive Layer  Bedrock  
 Depth \_\_\_\_\_  
 Drainage Class  ED  SED  WD  MWD  SPD  PD  VPD Slope \_\_\_\_\_ Percent Hydric Soil  No  Yes Hydrologic \_\_\_\_\_ Soil Group

Exploration Symbol # 5027  Test Pit  Boring  Probe  
2 " Organic horizon thickness Ground surface elev. \_\_\_\_\_  
21 " Depth:  of exploration, or  to refusal

Horizon	Color	Texture	Structure	Consistence	Redox
Bhs	7.5Y 4/6	channeled silo	SAB	FR	none
weathered rock					
limit of investigation = 21"					
Excav. dug					
seep					

Soil Series/Phase Name: \_\_\_\_\_ Limiting Factor 6  Groundwater  Restrictive Layer  Bedrock  
 Depth \_\_\_\_\_  
 Drainage Class  ED  SED  WD  MWD  SPD  PD  VPD Slope \_\_\_\_\_ Percent Hydric Soil  No  Yes Hydrologic \_\_\_\_\_ Soil Group

**SOIL SCIENTIST INFORMATION AND SIGNATURE**

Signature: Johanna Szillery  
 Name Printed: \_\_\_\_\_

Date: 9/21/2023  
LS 494  
 SS License No. \_\_\_\_\_



SOIL PROFILE / CLASSIFICATION INFORMATION

SOIL SCIENTIST DESCRIPTION OF SOIL CONDITIONS AT PROJECT SITES

Project Name: Cross Lake Subdivn

Applicant Name: Inung

Project Location (municipality): 717 R55 CrossLake Twp

Exploration Symbol # 5028  Test Pit  Boring  Probe  
3 " Organic horizon thickness Ground surface elev. \_\_\_\_\_  
22 " Depth:  of exploration, or  to refusal

Horizon	Color	Texture	Structure	Consistence	Redox
0					
E					
BHS	5YR4/6	cn sito	gran	vfr	none
		↓	↓	↓	
BS	10YR4/6	v ch.		fr	
		↓	↓	↓	
	2.5Y 3/3	ex ch sito	sbk		10YR 4/6
		↓	↓	↓	
	bedrock @ 21" / excav.				
	seepage in pit @				
	bottom				

Soil Series/Phase Name: \_\_\_\_\_ Limiting Factor 19 "  Groundwater  Restrictive Layer  Bedrock  
 Depth \_\_\_\_\_  
 Drainage Class  ED  SED  WD  MWD  SPD  PD  VPD Slope \_\_\_\_\_ Percent Hydric Soil  No  Yes Hydrologic \_\_\_\_\_ Soil Group \_\_\_\_\_

Exploration Symbol # 5029  Test Pit  Boring  Probe  
2 " Organic horizon thickness Ground surface elev. \_\_\_\_\_  
36 " Depth:  of exploration, or  to refusal

Horizon	Color	Texture	Structure	Consistence	Redox
0					
	2.5Y 3/4	SL	GR	FRI	none
	↓	↓	↓	↓	
	10YR 5/6	grav	SAB		
		↓	↓	↓	
					canine ditches
					no seep
					WR
	limit of investigation = 36"				
	(other face BR @ 12")				

Soil Series/Phase Name: \_\_\_\_\_ Limiting Factor 16 "  Groundwater  Restrictive Layer  Bedrock  
 Depth \_\_\_\_\_  
 Drainage Class  ED  SED  WD  MWD  SPD  PD  VPD Slope \_\_\_\_\_ Percent Hydric Soil  No  Yes Hydrologic \_\_\_\_\_ Soil Group \_\_\_\_\_

Exploration Symbol # 5030  Test Pit  Boring  Probe  
2 " Organic horizon thickness Ground surface elev. \_\_\_\_\_  
49 " Depth:  of exploration, or  to refusal

Horizon	Color	Texture	Structure	Consistence	Redox
0					
	7.5Y 4/6	S. loam	GR	FRI	
	↓	↓	↓	↓	
	10YR 5/6				none
		↓	↓	↓	
	2.5Y 5/6	GR+ CH Siloam		Fvm	CAD (no seep)
		↓	↓	↓	
			platy		
		weathered rock			
	excav. dug limit of investigation = 49"				

Soil Series/Phase Name: \_\_\_\_\_ Limiting Factor 14 "  Groundwater  Restrictive Layer  Bedrock  
 Depth \_\_\_\_\_  
 Drainage Class  ED  SED  WD  MWD  SPD  PD  VPD Slope \_\_\_\_\_ Percent Hydric Soil  No  Yes Hydrologic \_\_\_\_\_ Soil Group \_\_\_\_\_

Exploration Symbol # 5031  Test Pit  Boring  Probe  
3 " Organic horizon thickness Ground surface elev. \_\_\_\_\_  
38 " Depth:  of exploration, or  to refusal

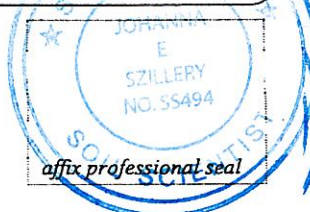
Horizon	Color	Texture	Structure	Consistence	Redox
0					
	5Y 4/6	SALOAM	GR	FRI	N/A
	↓	↓	↓	↓	
	10YR 4/6	channey SAIO TO EXH (channey)			
		↓	↓	↓	
		weathered rock			no seep
	limit of investigation = 38"				
	excav. dug				

Soil Series/Phase Name: \_\_\_\_\_ Limiting Factor 21 "  Groundwater  Restrictive Layer  Bedrock  
 Depth \_\_\_\_\_  
 Drainage Class  ED  SED  WD  MWD  SPD  PD  VPD Slope \_\_\_\_\_ Percent Hydric Soil  No  Yes Hydrologic \_\_\_\_\_ Soil Group \_\_\_\_\_

SOIL SCIENTIST INFORMATION AND SIGNATURE

Signature: Johanna Szillery  
Name Printed: Johanna Szillery

Date: 9/21/2023  
SS License No.: L55 494



**SOIL PROFILE / CLASSIFICATION INFORMATION**

**SOIL SCIENTIST DESCRIPTION OF SOIL CONDITIONS AT PROJECT SITES**

Project Name: Cross Lake subdivn Applicant Name: Inng Project Location (municipality): T17 R55 Cross Lake Twp

Exploration Symbol # 5032  Test Pit  Boring  Probe  
2 " Organic horizon thickness Ground surface elev. \_\_\_\_\_  
18 " Depth:  of exploration, or  to refusal

Horizon	Color	Texture	Structure	Consistence	Redox
0	Bhs 5YR4/4	ch silo	gran	v fr	none
10	BS 10YR4/6	↓	↓	fr	↓
20	2.5Y5/3		sbk	↓	10YR4/6
30	limit of observation = 16" / hand dug				

Soil Series/Phase Name: \_\_\_\_\_ Limiting Factor 12 "  Groundwater  Restrictive Layer  Bedrock  
 Depth \_\_\_\_\_  
 Drainage Class:  ED  SED  WD  MWD  SPD  PD  VPD  
 Slope \_\_\_\_\_ Percent  
 Hydric Soil:  No  Yes  
 Hydrologic \_\_\_\_\_  
 Soil Group \_\_\_\_\_

Exploration Symbol # 5033  Test Pit  Boring  Probe  
3 " Organic horizon thickness Ground surface elev. \_\_\_\_\_  
16 " Depth:  of exploration, or  to refusal

Horizon	Color	Texture	Structure	Consistence	Redox
0	E 10YR6/2	grav	gran	v fr	none
10	Bhs 7.5Y4/4	silo	↓	fr	none
20	BS 10YR4/6	↓	↓	firm	10YR4/4
30	limit of observation 16" / hand dug				

Soil Series/Phase Name: \_\_\_\_\_ Limiting Factor 13 "  Groundwater  Restrictive Layer  Bedrock  
 Depth \_\_\_\_\_  
 Drainage Class:  ED  SED  WD  MWD  SPD  PD  VPD  
 Slope \_\_\_\_\_ Percent  
 Hydric Soil:  No  Yes  
 Hydrologic \_\_\_\_\_  
 Soil Group \_\_\_\_\_

Exploration Symbol # 5034  Test Pit  Boring  Probe  
2 " Organic horizon thickness Ground surface elev. \_\_\_\_\_  
15 " Depth:  of exploration, or  to refusal

Horizon	Color	Texture	Structure	Consistence	Redox
0	E 10YR6/2	silo	gran	v fr	none
10	Bhs 5YR4/4				↓
20	BS 10YR4/6	grav silo	↓	firm	10YR4/6
30	BC 2.5Y5/3				cf

Soil Series/Phase Name: \_\_\_\_\_ Limiting Factor 11 "  Groundwater  Restrictive Layer  Bedrock  
 Depth \_\_\_\_\_  
 Drainage Class:  ED  SED  WD  MWD  SPD  PD  VPD  
 Slope \_\_\_\_\_ Percent  
 Hydric Soil:  No  Yes  
 Hydrologic \_\_\_\_\_  
 Soil Group \_\_\_\_\_

Exploration Symbol # \_\_\_\_\_  Test Pit  Boring  Probe  
 \_\_\_\_\_ " Organic horizon thickness Ground surface elev. \_\_\_\_\_  
 \_\_\_\_\_ " Depth:  of exploration, or  to refusal

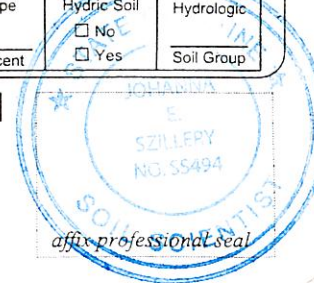
Horizon	Color	Texture	Structure	Consistence	Redox
0					
10					
20					
30					
40					
50					
60					

Soil Series/Phase Name: \_\_\_\_\_ Limiting Factor 11 "  Groundwater  Restrictive Layer  Bedrock  
 Depth \_\_\_\_\_  
 Drainage Class:  ED  SED  WD  MWD  SPD  PD  VPD  
 Slope \_\_\_\_\_ Percent  
 Hydric Soil:  No  Yes  
 Hydrologic \_\_\_\_\_  
 Soil Group \_\_\_\_\_

**SOIL SCIENTIST INFORMATION AND SIGNATURE**

Signature: Johanna Szilley  
 Name Printed: \_\_\_\_\_

Date: 9/21/2023  
 SS License No.: LSS 494





**SECTION 18**  
**SOLID WASTE**



## SOLID WASTE

### Revised February 2024

#### **Municipal Solid Waste:**

For a residential development consisting of 17 year-round dwelling units, one would expect the average, maximum waste generation rate to be approximately 208 pounds per day. Waste from this development is expected to be limited to common household waste. This results in an estimated annual production of 38 tons of municipal solid waste. It will be the individual lot lessees' responsibility to dispose of their own waste. (These calculations assume that all dwellings will be regularly inhabited during any given year. It is not expected that all units for this project will be regularly inhabited during any given year.)

Source:

<https://www2.calrecycle.ca.gov/wastecharacterization/general/rates>

#### **Site Clearing and Grubbing:**

The development is proposed on an undeveloped, forested site. This project will result in approximately 3.5 acres of clearing by the applicant/owner. Another 8.5 acres can be expected to support the construction of single-family homes (cabins) by individual lessees. If it is assumed that the construction generates 300 cubic yards of vegetative waste per acre, the total volume would be 3,600 cubic yards. Cleared vegetation and tailings will be processed on-site and used for erosion control.

Source:

[https://www.maine.gov/dacf/lupc/projects/windpower/redington/Documents/Section\\_18\\_Solid\\_Waste/Section\\_18\\_Solid\\_Waste.pdf](https://www.maine.gov/dacf/lupc/projects/windpower/redington/Documents/Section_18_Solid_Waste/Section_18_Solid_Waste.pdf)

#### **Construction and Demolition Debris:**

There will be no demolition associated with this development.

The construction of individual single-family homes does not generally generate a significant amount of construction debris. Disposal of such debris will be the responsibility of the individual lot lessees and their contractors.



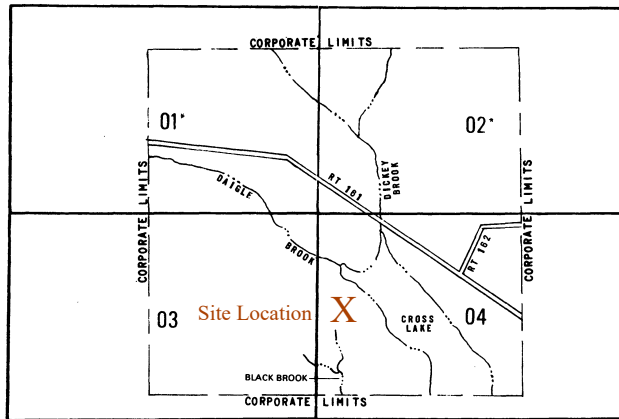
**SECTION 19**  
**FLOODING**





## FLOODING

Please refer to the attached flood map. The proposed project is located in Flood Zone "C" as shown on FEMA Flood Insurance Rate Map Community Panel Number 230048 0015 A. Flood Zone "C" is defined as areas of minimal flood hazard; therefore, this project is not at risk for flooding and will not increase flooding risk on adjacent properties as shown in Section 12.



\*PAGE NOT PRINTED-AREA IN ZONE C

LAND USE CONTROL EXERCISED BY THE STATE OF MAINE

KEY TO SYM

ZONE DESIGNATIONS\*

Base Flood Elevation Line with elevation in feet  
 Base Flood Elevation where uniform within  
 Elevation Reference Mark  
 River Mile

\*EXPLANATION OF ZONE

A flood insurance map displays the zone designations for flood hazards. The zone designations used by FEMA are:

- | Zone   | Explanation  |
|--------|--|
| A      | Areas of 100-year flood; base flood elevations   |
| AO     | Areas of 100-year shallow flooding; flood depth velocity (feet per second) less than 15              |
| AH     | Areas of 100-year shallow flooding where depth flood elevations are shown, but no flood hazard       |
| A1-A30 | Areas of 100-year flood; base flood elevations   |
| A99    | Areas of 100-year flood to be protected by a flood elevation and flood hazard factors not determined |
| B      | Area between limits of 100-year flood and 500-year where depths less than 1 foot                     |
| C      | Areas outside 500-year flood   |
| D      | Areas of undetermined, but possible, flood hazard  |
| V      | Areas of 100-year coastal flood with velocity hazard factors not determined                          |
| V1-V30 | Areas of 100-year coastal flood with velocity hazard factor determined                               |

NOTES TO USER

Certain areas not in the special flood hazard areas (zone structures)

This map is for flood insurance purposes only; it does not show the community or all planimetric features outside special flood hazard areas.  
 Refer to the FLOOD INSURANCE RATE MAP EFFECTIVE ACTUAL RATES apply to structures in the zones where elevations are shown.  
 To determine if flood insurance is available in this community, contact the National Flood Insurance Program, at (800) 638-6620

INITIAL IDENTIFICATION: FEBRUARY 7, 1975  
 FLOOD HAZARD BOUNDARY MAP REVISIONS:  
 FLOOD INSURANCE RATE MAP EFFECTIVE: MAINE  
 FLOOD INSURANCE RATE MAP REVISIONS:

federal emergency management



**FIRM**  
**FLOOD INSURANCE**  
**MAP IN**  
**TOWNSHIP OF T17**  
**ARDOOSTOOK C**  
**COMMUNITY NUMBER**



**SECTION 20**  
**BLASTING**



## **BLASTING**

No blasting is anticipated for this project. If blasting is required, a blasting plan specific to the project site in accordance with Title 38 M.R.S. § 490-Z914) will be completed prior to the start of construction.



**SECTION 21**  
**AIR EMISSIONS**



## AIR EMISSIONS

Fugitive dust control measures will be implemented throughout the construction phases that will minimize the transportation of dust off the property at any given time. Permanent stabilization of the site will occur as each phase is completed. See the erosion control measures within Section 14 for more details.

As a result of these steps, the project will not have an unreasonable adverse effect on ambient air quality.



## SECTION 22

### ODORS



## ODORS

No noticeable odors are expected to be generated by the everyday use of the proposed residential development. As such, this section does not apply.





**SECTION 23**  
**WATER VAPOR**



## WATER VAPOR

The traditional residential use of the development is not expected to produce any noticeable amounts of water vapor exported into the air or into abutting properties. Therefore, it can be concluded that there are no sources of large water vapor emissions associated with this project and this project will not cause an unreasonable alteration of climate.



## SECTION 24

### SUNLIGHT



## SUNLIGHT

This project proposes no structures that will block abutting properties from access to direct sunlight.

### SUNLIGHT

The duplexes will not exceed two stories, not included daylight basements in some cases. Additionally, when comparing the proximity and scale of the proposed development to the existing buildings on adjacent lots, it can be concluded that this project will not block access to direct sunlight to abutting structures.



**SECTION 25**  
**NOTICES**



## NOTICES

The Applicant owns all abutting property to the proposed development. In an effort to be a good neighbor, they have sent out an informational notice to adjacent property owners informing them of the proposed development. A copy of said notice is enclosed.

Also enclosed is the Notice of Intent to File that will be published in the Saint John Valley Times and a list of interested parties that received the notice.



300 Union Street  
Saint John, NB  
E2L4M3

September 25, 2023

Subject: Concept Plan Public Notice for Potential Land Development

Dear Recreational Camp License Holder,

As responsible stewards of the land, Irving Woodlands, LLC is committed to providing a public forum with knowledge of upcoming developments and improvements to the area for current leaseholders. Irving Woodlands, LLC has been working with government authorities to identify areas around Fish River Lakes for residential and commercial lot development.

Project overview:

- Irving Woodlands, LLC seek to develop 17 non-waterfront lots west by southwest from West Side Road for the purpose of residential and commercial lease lots. This project will not be utilizing West Side Road.
- Each lot will be approximately 1,000 feet from Cross Lake, with a combined area of approximately 50 acres on a 100-acre lot. While these lots will be non-waterfront, private water access will be provided by a footpath to allow for carry in-carry out boat launches.
- A specific amount of area within the 100 acres in and around the lots will be kept for conservation purposes, i.e., deeryards, wetlands.

All state and local LUPC and DEP permitting is currently being handled by a third-party environmental engineering firm, and the new development will have its own lease association bylaws and roads committee. Preliminary roadwork for this project is anticipated to commence prior to the spring of 2024, and the goal of Irving Woodlands, LLC is to provide available lots for lease without impacting the current leaseholders' natural surroundings, both physically and visually.

Irving Woodlands, LLC encourages any recreational camp license holders to reach out to [x@jdirving.com](mailto:x@jdirving.com) with any questions or concerns.

Regards,



## PUBLIC NOTICE: NOTICE OF INTENT TO FILE

Please take notice that Irving Woodlands, LLC, 300 Union Street, PO Box 5777, Saint John, NB E2L 4M3, 207-834-5767 filed a Site Location of Development Act permit application with the Maine Department of Environmental Protection (Department), pursuant to the provisions of 38 M.R.S.A. §§ 481 thru 490 on October 12, 2023. The application is for the development of a subdivision in Cross Lake on the property identified as Map AR031, Lot 108 in Cross Lake Township, T17 R5.

The Site Location application will include a request, pursuant to 12 M.R.S.A. § 685-B(1-A)(B-1), that the Land Use Planning Commission (Commission) certify to the Department that the development is an allowed use in the subdistricts in which it is proposed, and that the development will comply with applicable Commission land use standards that are not considered in the Department's review.

The Site Location application, including the request for certification, will be filed for public inspection at the Department's office in Bangor and the Commission's office in *Ashland* during normal working hours. A copy of the application may also be seen on the Department's website<sup>1</sup>, on the Commission's website<sup>2</sup> (at the Aroostook County office, and at the municipal office(s) in Cross Lake, Maine.

A request for a Department public hearing must be received by the Department in writing, no later than 20 days after the application is found by the Department to be complete and is accepted for processing. A public hearing on the Site Location application may or may not be held at the discretion of the Commissioner or Board of Environmental Protection. Public comment on the Site Location application will be accepted by the Department throughout the processing of the application.

For Federally licensed, permitted, or funded activities in the Coastal Zone, review of the Site Location application shall also constitute the State's consistency review in accordance with the Maine Coastal Program pursuant to Section 307 of the federal Coastal Zone Management Act, 16 U.S.C. § 1456. *(Delete if not applicable)*

Written public comments on the Site Law application may be sent to the Department's regional office in Bangor where the application is filed for public inspection:  
Attn. Keegan Fero, [keegan.feero@maine.gov](mailto:keegan.feero@maine.gov), 207-941-4570, MDEP, Eastern Maine Regional Office, 106 Hogan Road, Bangor, Maine 04401.

A request for a Commission public hearing on the request for certification and/or a petition for leave to intervene in any such hearing must be received by the Commission in writing no later than 20 days after the request for certification is found by the Commission to be complete and accepted for processing. The Commission will consider the degree of public interest when determining whether to hold a public hearing, but the decision whether to hold a hearing is at the Commission's discretion. If the Commission holds a public hearing, members of the public also may offer testimony at the hearing without formally intervening in the hearing, and/or may submit written comments until the close of the record. A request or petition that is not timely filed will be denied unless





the requestor/petitioner shows good cause for failure to file on time. Filing may be by electronic mail or facsimile if followed by receipt of an original signed document within five working days. The Commission's provisions for intervention may be found in Chapter 5, section 5.13 of the Commission's rules, which are available on their website<sup>3</sup>.

If no public hearing is held, interested persons may submit written comments on the certification throughout the processing of the certification. Written public comments and questions on the request for certification may be mailed to the Commission's office in Ashland: Land Use Planning Commission, 45 Radar Road, Ashland, Maine 04732, or emailed to [billi.j.theriault@maine.gov](mailto:billi.j.theriault@maine.gov) or faxed to (207) 287-7439.

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<sup>1</sup> [www.maine.gov/dep/land/sitelaw/selected-developments/index.html](http://www.maine.gov/dep/land/sitelaw/selected-developments/index.html)

<sup>2</sup> [www.maine.gov/dacf/lupc/projects/site\\_law\\_certification/slc\\_links.shtml](http://www.maine.gov/dacf/lupc/projects/site_law_certification/slc_links.shtml)

<sup>3</sup> [www.maine.gov/dacf/lupc/laws\\_rules/rule\\_chapters/additional\\_chapters.html](http://www.maine.gov/dacf/lupc/laws_rules/rule_chapters/additional_chapters.html).



**SECTION 26**  
**LUPC SUPPLEMENT**



## LUPC SUPPLEMENT

### 12 M.R.S. § 685-B(4)

#### **SECTION B TRAFFIC AND TRANSPORTATION**

Adequate provisions have been made for parking and circulation on and from the site, please see the enclosed Site Plans for more details. The site is not anticipated to cause any congestion or unsafe conditions with regards to traffic and transportation.

#### **SECTION E CONFORMANCE WITH STATUTE, REGULATIONS, STANDARDS AND PLANS**

To the best of our knowledge, this application is in conformance with all statutes, regulations, standards, and plans that are applicable to the proposed development.

#### **SECTION F SUBDIVISION APPROVAL**

The proposed application does not involve the permitting of any structures at this time. Fire, police, and ambulance service providers have indicated that they have the capacity to serve the proposed development.

#### **CLOSING PARAGRAPH**

To the best of our knowledge, this application includes the necessary substantial evidence for approval and the public's health, safety and general welfare are not at risk as a result of the proposed development.

### 10.11 NONCONFORMING USES AND STANDARDS

The proposed development is not a nonconforming use; therefore, this section does not apply.

#### 10.24, B

The proposed development does not seek approval for a special exception use; therefore, this section does not apply.

### 10.25,A STRUCTURES ADJACENT TO LAKES

#### **Landowner Equity**

The applicant acknowledges that the proposed development will not exceed its proportionate share of total allowable development.

#### **Lake Management Classification Standards**

Cross Lake is categorized as a Management Class 5 Lake. The ordinance states that subdivisions within 250 feet of the normal high-water mark of these lakes within the D-ES, D-GN2, D-RS2, or D-RS3 subdistricts must be designed in accordance with Section 10.25,Q,4,b. The proposed development does not fall within any of those subdistricts; therefore, this section does not apply.



## 10.25,B PROSPECTIVELY ZONED AREAS

### DIMENSIONAL STANDARDS

#### a. Road Frontage Requirements

All road frontage requirements have been met.

#### b. Building setbacks from roads

All building setback requirements have been met.

#### c. Lot Coverage Requirements

All lot coverage requirements have been met.

#### d. Structure Height

Structure height will vary depending on individual owners' preferences, but requirements for this section will be adhered to.

### BUILDING LAYOUT

The proposed development does not fall within the D-GN, D-GN2, D-GN3, D-RS, or D-RS2 subdistrict; therefore, this section does not apply.

## 10.25,D VEHICULAR CIRCULATION, ACCESS, AND PARKING

### General Circulation

Provisions have been made for vehicular access to and within the project to safely and efficiently handle the traffic attributable to the development.

### Access Management

Access to the development is in compliance with Maine Department of Transportation safety standards.

### Parking Layout and Design

Each lot will be provided with sufficient parking to meet the needs of the development.

### Subdivision and Development Roadway Design Specifications

The development is proposing to construct a Level B, Class 1 roadway and will be designed in such a way to meet all criteria set forth in this section.

## 10.25,E NATURAL CHARACTER AND CULTURAL RESOURCES

### HILLSIDE RESOURCES

LUPC rules define hillside as "an area of two or more contiguous acres having a sustained slope of 15% or greater." The proposed development does not fall within an area that fits the description of a hillside; therefore, this section does not apply.

## 10.25,F,2 LIGHTING

### LIGHTING STANDARDS FOR EXTERIOR LIGHT LEVELS, GLARE REDUCTION, AND ENERGY CONSERVATION.

All lighting standard requirements will be the responsibility of the individual landowners to adhere to as the lots are sold to new owners; no common area lighting is proposed as part of the development of the subdivision.



## 10.25,Q Subdivision and Lot Creation

### COUNTING PARCELS

The proposed development creates 17 new lots. The remaining lots of land will be retained by the owner for a period of at least five years and are therefore exempt from the lot count as defined in 10.25,Q,1g,2,a.

### SPAGHETTI LOTS

No spaghetti lots were created as part of the proposed development.

### LAYOUT AND DESIGN

#### a. Locations and Layouts

The proposed subdivision development has a Basic layout design which is an allowed layout for the location based on Table 10.25,Q-1.

#### b. Harmonious Fit

The proposed development has been designed to fit into the natural environment to the greatest extent practicable. The development is not visible from nearby bodies of water or access roads and each lot has appropriate buffers.

#### c. Building Envelope

Building envelope areas have been shown on the enclosed Site Plan and have been designated in accordance with the criteria requirements.

#### d. Common Open Space

Common open space can be shown on the enclosed Site Plan.

#### e. Shoreland Development

This section is not applicable.

#### f. Legal Right of Access to Subdivision Lots

All lots in the proposed subdivision will have legal right of access to said lot.

#### g. Emergency Service Waiver

Emergency services will be provided to the subdivision by Ambulance Service Inc; a waiver does not apply.

#### h. Recreational Resource Capacity for Recreation-Based Subdivisions.

This section is not applicable.

### PROCEDURAL REQUIREMENTS

#### Sketch Plan Review

The site plan was reviewed during the pre-application meeting with members of the Maine Department of Environmental Protection and Land Use Planning Commission. The development was designed to meet all criteria set forth in the applicable requirements.



### **Conveyance of Lots or Dwelling Units**

No conveyance of lots will occur without a certificate of compliance; all lot's boundary corners will have appropriate monumentation.

### **Recording of large lot land divisions**

This section is not applicable.

### **10.25,S COMMON OPEN SPACE**

There is no land that is currently designated as Common Open Space; therefore, this section does not apply.

### **10.25,T ACTIVITIES IN FLOOD PRONE AREAS**

The proposed development is not located within a flood prone area; please refer to Section 19 of this application for more information. This section is not applicable.

### **10.25,U AFFORDABLE HOUSING**

The proposed subdivision is not an affordable housing development. This section is not applicable.

### **10.26,A THROUGH G DIMENSIONAL REQUIREMENTS**

The subdivision lots have been designed to meet all size, road frontage, setback, and coverage requirements. No shoreline frontage is proposed, this section does not apply. Structure requirements will be the responsibility of the individual lot owners to conform to those standards. No exceptions are requested at this time.

### **10.27,A AGRICULTURAL ACTIVITIES**

The proposed development does not involve any agricultural activities; this section is not applicable.

### **10.27,B VEGETATION CLEARING**

The proposed development has adhered to all vegetative clearing requirements set forth in this section; please refer to the enclosed Site Plan.

### **10.27,C MINERAL EXPLORATION AND EXTRACTION**

The proposed development does not involve any mineral exploration and extraction; this section is not applicable.

### **10.27,E TIMBER HARVESTING**

The proposed development does not involve any timber harvesting activities; this section is not applicable.

### **10.27,G MOTORIZED RECREATIONAL GOLD PROSPECTING**

The proposed development does not involve any motorized recreational gold prospecting; this section is not applicable.



## **10.27,H DRIVEWAYS ASSOCIATED WITH RESIDENTIAL STRUCTURES AND USES**

### **1. Applicability**

The proposed driveways would be for single-family homes as part of a subdivision approval process.

### **2. Water Body and Wetland Setbacks**

LUPC oversight applies to individually permitted residences only; therefore, this section does not apply.

### **3. Property Line Setback**

LUPC oversight applies to individually permitted residences only; therefore, this section does not apply.

### **4. Road Frontage**

LUPC oversight applies to individually permitted residences only; therefore, this section does not apply.

## **10.27,L TRAILERED RAMPS, HAND-CARRY LAUNCHES, AND WATER-ACCESS WAYS**

No trailered ramps, hand-carry launches or water-access ways are proposed as part of this development; therefore, this section does not apply.

## **10.27,M SERVICE DROPS**

Individual lot owners will be responsible for any necessary service drops.

## **10.27,N HOME-BASED BUSINESSES**

The proposed development is not a home-based business; this section is not applicable.

## **10.27,O PERMANENT DOCKING STRUCTURES**

No permanent docking structures are proposed as part of the development; this section does not apply.

## **10.27,P ACCESSORY STRUCTURES**

There are no accessory structures proposed as part of this development. Should the future lot owners wish to add accessory structures, it will be their responsibility to meet all applicable conditions.

## **10.27,Q RECREATIONAL LODGING FACILITIES**

The proposed development is not a recreational lodging facility; this section is not applicable.

## **10.27,R RURAL BUSINESSES**

The proposed development is not a rural business; this section is not applicable.



### **10.27,S COMMERCIAL BUSINESSES**

The proposed development is not a commercial business; this section is not applicable.

### **CHAPTER 13**

No metallic mineral exploration or mining certifications are planned as part of the proposed development; this section is not applicable.





## DRAWINGS

G001 Cover Sheet  
C001 Notes  
C101 Proposed Subdivision Plan  
C102 Erosion Control and Grading Plan  
C201 Plan and Profile STA 0+00 to 9+25  
C202 Plan and Profile STA 9+25 to 18+00  
C203 Plan and Profile STA 18+00 to 24+25  
C501 Details  
C701 Pre-Development Hydrology Plan  
C702 Post-Development Hydrology Plan  
C703 Treatment Plan

# IRVING WOODLANDS, LLC CROSS LAKE SUBDIVISION

WEST SIDE ROAD, T17 R5, CROSS LAKE TOWNSHIP, MAINE



LOCATION MAP

## INDEX OF DRAWINGS

G001	COVER SHEET
C001	NOTES
C101	PROPOSED SUBDIVISION PLAN
C102	EROSION CONTROL AND GRADING PLAN
C201	PLAN AND PROFILE STA 0+00 TO 9+25
C202	PLAN AND PROFILE STA 9+25 TO 18+00
C203	PLAN AND PROFILE STA 18+00 TO 24+25
C501	DETAILS
C701	PRE-DEVELOPMENT HYDROLOGY PLAN
C702	POST-DEVELOPMENT HYDROLOGY PLAN
C703	TREATMENT PLAN

**ISSUED FOR PERMITTING**

**OCTOBER 6, 2023**

***REVISED FEBRUARY 22, 2024***



FILE LOCATION: P:\M10050-RV10050-CROSS-LAKE\_CAMP\_DEV\DIVISION\BLDG-CAD\TEXTUAL\10050-028-CRV.DWG, 2024.02.21, 3:39 PM

## EROSION AND SEDIMENTATION CONTROL NOTES

1. EROSION AND SEDIMENT CONTROL BEST MANAGEMENT PRACTICES (BMP) SHALL BE INSTALLED PRIOR TO ANY EARTH MOVING OR SOIL DISTURBANCE ACTIVITIES. BMP SHALL COMPLY WITH THE MAINE DEPARTMENT OF ENVIRONMENTAL PROTECTION RULES AND REGULATIONS AND MAINE EROSION AND SEDIMENT CONTROL PRACTICES FIELD GUIDE FOR CONTRACTORS. [HTTPS://WWW.MAINE.GOV/DEP/LAND/EROSION/ESC/BMP/ESC\\_BMP\\_FIELD.PDF](https://www.maine.gov/dep/land/erosion/esc/bmps/esc_bmp_field.pdf)
2. ALL SEDIMENTATION AND EROSION CONTROL MEASURES SHALL BE IN ACCORDANCE WITH THE MAINE EROSION AND SEDIMENTATION CONTROL BEST MANAGEMENT PRACTICES (BMP), PUBLISHED BY THE BUREAU OF LAND AND WATER QUALITY, MAINE DEPARTMENT OF ENVIRONMENTAL PROTECTION, LATEST EDITION.
3. ALL SEDIMENT BARRIERS AND EROSION CONTROL MEASURES SHALL BE INSTALLED BEFORE THE START OF CONSTRUCTION AS NOTED IN THE WRITTEN EROSION AND SEDIMENT CONTROL PLAN.
4. EROSION CONTROL MEASURES WITHIN 50 FEET OF PROTECTED NATURAL RESOURCES SHALL HAVE A DOUBLE PERIMETER EROSION CONTROL AND DISTURBED AREAS MUST BE TEMPORARILY OR PERMANENTLY STABILIZED WITHIN 7 DAYS.
5. OPEN AREAS THAT ARE STRIPPED OR GRADED SHALL BE LIMITED TO ONE ACRE OR NO LARGER THAN CAN BE MULCHED IN ONE DAY.
6. SEDIMENT BARRIERS SHALL BE PLACED DOWNGRADIENT OF ALL STOCKPILES. STORMWATER RUNOFF SHOULD BE PREVENTED FROM RUNNING INTO STOCKPILES.
7. MINIMUM EROSION CONTROL MEASURES WILL NEED TO BE IMPLEMENTED AND THE CONTRACTOR WILL BE RESPONSIBLE TO MAINTAIN ALL COMPONENTS OF THE EROSION CONTROL PLAN UNTIL THE SITE IS FULLY STABILIZED. HOWEVER, BASED ON SITE AND WEATHER CONDITIONS DURING CONSTRUCTION, ADDITIONAL EROSION CONTROL MEASURES MAY NEED TO BE IMPLEMENTED. ALL AREAS OF INSTABILITY AND EROSION MUST BE REPAIRED IMMEDIATELY DURING CONSTRUCTION AND NEED TO BE MAINTAINED UNTIL THE SITE IS FULLY STABILIZED OR VEGETATION IS ESTABLISHED. A CONSTRUCTION LOG MUST BE MAINTAINED FOR THE EROSION AND SEDIMENTATION CONTROL INSPECTIONS AND MAINTENANCE.
8. MINIMIZE DISTURBED AREA AND PROTECT NATURAL DOWNGRADIENT BUFFER AREAS TO THE EXTENT PRACTICABLE. CONTROL STORMWATER VOLUME AND VELOCITY WITHIN THE SITE TO MINIMIZE SOIL EROSION.
9. WHENEVER PRACTICABLE, NO DISTURBANCE ACTIVITIES SHOULD TAKE PLACE WITHIN 50 FEET OF ANY PROTECTED NATURAL RESOURCE. IF DISTURBANCE ACTIVITIES TAKE PLACE BETWEEN 30 FEET AND 50 FEET OF ANY PROTECTED NATURAL RESOURCE, AND STORMWATER DISCHARGES THROUGH THE DISTURBED AREAS TOWARD THE PROTECTED NATURAL RESOURCE, PERIMETER EROSION CONTROLS MUST BE DOUBLED. IF DISTURBANCE ACTIVITIES TAKE PLACE LESS THAN 30 FEET FROM ANY PROTECTED NATURAL RESOURCE, AND STORMWATER DISCHARGES THROUGH THE DISTURBED AREAS TOWARD THE PROTECTED NATURAL RESOURCE, PERIMETER EROSION CONTROLS MUST BE DOUBLED, AND DISTURBED AREAS MUST BE TEMPORARILY OR PERMANENTLY STABILIZED WITHIN 7 DAYS.
10. PRIOR TO CONSTRUCTION, PROPERLY INSTALL SEDIMENT BARRIERS AT THE DOWN GRADIENT EDGE OF ANY AREA TO BE DISTURBED AND ADJACENT TO ANY DRAINAGE CHANNELS WITHIN THE DISTURBED AREA. SEDIMENT BARRIERS SHOULD BE INSTALLED DOWNGRADIENT OF SOIL OR SEDIMENT STOCKPILES AND STORMWATER PREVENTED FROM RUNNING ONTO THE STOCKPILE. MAINTAIN THE SEDIMENT BARRIERS BY REMOVING ACCUMULATED SEDIMENT, OR REMOVING AND REPLACING THE BARRIER, UNTIL THE DISTURBED AREA IS PERMANENTLY STABILIZED. WHERE A DISCHARGE TO A STORM DRAIN INLET OCCURS, IF THE STORM DRAIN CARRIES WATER DIRECTLY TO A SURFACE WATER AND YOU HAVE AUTHORITY TO ACCESS THE STORM DRAIN INLET, YOU MUST INSTALL AND MAINTAIN PROTECTION MEASURES THAT REMOVE SEDIMENT FROM THE DISCHARGE.
11. PRIOR TO CONSTRUCTION, PROPERLY INSTALL A STABILIZED CONSTRUCTION ENTRANCE (SCE) AT ALL POINTS OF EGRESS FROM THE SITE. THE SCE IS A STABILIZED PAD OF AGGREGATE, UNDERLAIN BY A GEOTEXTILE FILTER FABRIC, USED TO PREVENT TRAFFIC TRACKING MATERIAL AWAY FROM THE SITE ONTO PUBLIC ROWS. MAINTAIN THE SCE UNTIL ALL DISTURBED AREAS ARE STABILIZED.
12. INSTALL SILT FENCES OR SEDIMENT BARRIERS ALONG CONTOUR DIVIDING FLAT AND STEEP SLOPES. AREAS WITH DIFFERENT DISTURBANCE SCHEDULES, AROUND TEMPORARY STOCKPILES OR IN OTHER UNSPECIFIED POSSIBLE CIRCUMSTANCES SHOULD BE CONSIDERED BY THE CONTRACTOR. THE INTENT OF SUCH INTERMITTENT SILT FENCES IS TO LIMIT SEDIMENT TRANSPORT WITHIN THE SITE TOWARD THE PROTECTED RESOURCES.
13. SILT FENCE AND SEDIMENT BARRIERS WILL BE INSPECTED, REPLACED AND/OR REPAIRED IMMEDIATELY FOLLOWING ANY SIGNIFICANT RAINFALL (0.5 INCH OR GREATER) OR SNOW MELT OR LOSS OF SERVICEABILITY DUE TO SEDIMENT ACCUMULATION. AT A MINIMUM, ALL EROSION CONTROL DEVICES WILL BE OBSERVED WEEKLY.
14. EROSION CONTROL MIX BERMS SHALL CONSIST OF A MIX OF SHREDDED WOOD FRAGMENTS AND GRIT THAT MUST BE WELL GRADED WITH AN ORGANIC CONTENT THAT IS BETWEEN 50 AND 100% OF WEIGHT. MINERAL PORTION OF THE MIX SHOULD BE NATURALLY INCLUDED IN THE PRODUCT WITH NO ROCKS GREATER THAN 4-INCHES OR LARGE AMOUNTS OF FINES (SILTS AND CLAYS). MIX SHOULD BE FREE OF REFUSE OR MATERIAL TOXIC TO PLANT GROWTH.
15. EROSION CONTROL MIX SHALL BE USED ON SLOPES 3:1 OR SHALLOWER. SLOPES BETWEEN 3:1 AND 2:1 SHALL HAVE EROSION CONTROL BLANKET. SLOPES BETWEEN 2:1 AND 1.5:1 SHALL HAVE RIP RAP. SLOPES GREATER THAN 1.5:1 ARE PROHIBITED.
16. HAYBALES MAY BE INSTALLED IN ADDITION TO SILT FENCE OR USED AROUND CATCH BASINS TO PROVIDE ADDITIONAL SEDIMENT CAPTURE AND CONTROL.
17. EROSION CONTROL BLANKETS INTENDED FOR TEMPORARY SLOPE OR CHANNEL STABILIZATION SIMILAR TO NORTH AMERICAN GREEN ERONET BIODEGRADABLE EROSION CONTROL BLANKET OR SIMILAR.
18. DURING THE CONSTRUCTION PHASE, INTERCEPTED SEDIMENT WILL BE RETURNED TO CONSTRUCTION SITE.
19. SEDIMENT CONTROL DEVICES SHALL REMAIN IN PLACE AND BE MAINTAINED BY THE CONTRACTOR UNTIL AREAS UPSLOPE ARE STABILIZED BY A SUITABLE GROWTH OF GRASS. ONCE A SUITABLE GROWTH OF GRASS HAS BEEN OBTAINED, ALL TEMPORARY EROSION CONTROL ITEMS SHALL BE REMOVED BY THE CONTRACTOR. ANY SEDIMENT DEPOSITS REMAINING IN PLACE AFTER THEY ARE REMOVED SHALL BE DRESSED TO CONFORM WITH THE EXISTING GRADE, PREPARED, SEEDED, AND MULCHED IMMEDIATELY.
20. A SUITABLE BINDER SUCH AS TERRACK WILL BE USED ON THE HAY MULCH FOR WIND CONTROL.
21. IF FINAL SEEDING OF DISTURBED AREAS IS NOT COMPLETED BY SEPTEMBER 15TH OF THE YEAR OF CONSTRUCTION, THEN ON THAT DATE THESE AREAS WILL BE GRADED AND SEEDED WITH WINTER RYE AT THE RATE OF 112 POUNDS PER ACRE OR 3 POUNDS PER 1000 SQUARE FEET. THE RYE SEEDING WILL BE PRECEDED BY AN APPLICATION OF 3 TONS OF LIME AND 800 LBS. OF 10-20-20 FERTILIZER OR ITS EQUIVALENT. MULCH WILL BE APPLIED AT A RATE OF 90 POUNDS PER 1000 SQUARE FEET.
22. IF THE RYE SEEDING CANNOT BE COMPLETED BY OCTOBER 1ST OR IF THE RYE DOES NOT MAKE ADEQUATE GROWTH BY DECEMBER 1ST, THEN ON THOSE DATES, HAY MULCH WILL BE APPLIED AT 150 POUNDS PER 1000 SQUARE FEET.
23. WITHIN 7 DAYS OF THE CESSATION OF CONSTRUCTION ACTIVITIES IN AN AREA THAT WILL NOT BE WORKED FOR MORE THAN 7 DAYS, STABILIZE ANY EXPOSED SOIL WITH MULCH, OR OTHER NON-ERODIBLE COVER. STABILIZE AREAS WITHIN 75 FEET OF A WETLAND OR WATER BODY WITHIN 48 HOURS OF THE INITIAL DISTURBANCE OF THE SOIL OR PRIOR TO ANY STORM EVENT, WHICHEVER COMES FIRST.
24. REMOVE ANY TEMPORARY CONTROL MEASURES, SUCH AS SILT FENCE, WITHIN 30 DAYS AFTER PERMANENT STABILIZATION IS ACHIEVED. REMOVE ANY ACCUMULATED SEDIMENTS AND STABILIZE.
25. PERMANENT STABILIZATION: IF THE AREA WILL NOT BE WORKED FOR MORE THAN ONE YEAR OR HAS BEEN BROUGHT TO FINAL GRADE, THEN PERMANENTLY STABILIZE THE AREA WITHIN 7 DAYS BY PLANTING VEGETATION, SEEDING, SOD, OR THROUGH THE USE OF PERMANENT MULCH, OR RIP-RAP, OR ROAD SUB-BASE. IF USING VEGETATION FOR STABILIZATION, SELECT THE PROPER VEGETATION FOR THE LIGHT, MOISTURE, AND SOIL CONDITIONS, AMEND AREAS OF DISTURBED SUBSOILS WITH TOPSOIL, COMPOST, OR FERTILIZERS; PROTECT SEEDED AREAS WITH MULCH OR, IF NECESSARY, EROSION CONTROL BLANKETS AND SCHEDULE SOODING, PLANTING, AND SEEDING SO TO AVOID DIE-OFF FROM SUMMER DROUGHT AND FALL FROSTS. NEWLY SEEDER OR SODDED AREAS MUST BE PROTECTED FROM VEHICLE TRAFFIC, EXCESSIVE PEDESTRIAN TRAFFIC, AND CONCENTRATED RUNOFF UNTIL THE VEGETATION IS WELL ESTABLISHED WITH 80% COVER BY HEALTHY VEGETATION. IF NECESSARY, AREAS MUST BE REWORKED AND RE-STABILIZED IF GERMINATION IS SPARSE, PLANT COVERAGE IS SPOTTY, OR TOPSOIL EROSION IS EVIDENT. ONE OR MORE OF THE FOLLOWING MAY APPLY TO A PARTICULAR SITE.
  - A. SEEDED AREAS: FOR SEEDDED AREAS, PERMANENT STABILIZATION MEANS A 90% COVER OF THE DISTURBED AREA WITH MATURE, HEALTHY PLANTS WITH NO EVIDENCE OF WASHING OR RILLING OF THE TOPSOIL.
  - B. SODDED AREAS: FOR SODDED AREAS, PERMANENT STABILIZATION MEANS THE COMPLETE BINDING OF THE SOD ROOTS INTO THE UNDERLYING SOIL WITH NO SLUMPING OF THE SOD OR DIE-OFF.
  - C. PERMANENT MULCH: FOR MULCHED AREAS, PERMANENT MULCHING MEANS TOTAL COVERAGE OF THE EXPOSED AREA WITH AN APPROVED MULCH MATERIAL. EROSION CONTROL MIX MAY BE USED AS MULCH FOR PERMANENT STABILIZATION ACCORDING TO THE APPROVED APPLICATION RATES AND LIMITATIONS.
  - D. RIP-RAP: FOR AREAS STABILIZED WITH RIP-RAP, PERMANENT STABILIZATION MEANS THAT SLOPES STABILIZED WITH RIP-RAP HAVE AN APPROPRIATE BACKING OF A WELL-GRADED GRAVEL OR APPROVED GEOTEXTILE TO PREVENT SOIL MOVEMENT FROM BEHIND THE RIP-RAP. STONE MUST BE SIZED APPROPRIATELY. IT IS RECOMMENDED THAT ANGULAR STONE BE USED.
  - E. PAVED AREAS: FOR PAVED AREAS, PERMANENT STABILIZATION MEANS THE PLACEMENT OF THE COMPACTED GRAVEL SUBBASE IS COMPLETED, PROVIDED IT IS FREE OF FINE MATERIALS THAT MAY RUNOFF WITH A RAIN EVENT.
  - F. DITCHES, CHANNELS, AND SWALES: FOR OPEN CHANNELS, PERMANENT STABILIZATION MEANS THE CHANNEL IS STABILIZED WITH A 90% COVER OF HEALTHY VEGETATION, WITH A WELL-GRADED RIP-RAP LINING, TURF REINFORCEMENT MAT, OR WITH ANOTHER NON-EROSIVE LINING SUCH AS CONCRETE OR ASPHALT PAVEMENT. THERE MUST BE NO EVIDENCE OF SLUMPING OF THE CHANNEL LINING, UNDERCUTTING OF THE CHANNEL BANKS, OR DOWNCUTTING OF THE CHANNEL.
26. ALL DISTURBED AREAS WILL BE SEDED WITH 2.5 LBS. RED FESCUE AND 0.5 LBS. RYE GRASS PER 1,000 SQUARE FEET AND MULCHED AT A RATE OF 90 LBS. PER 1,000 SQUARE FEET OR EQUIVALENT APPLICATION OF SEED AND MULCH.
27. IF PERMANENT BMP LOCATIONS ARE TO BE USED AS SEDIMENT TRAPS THEN THE AREAS OF THE AREAS OF THE BMP'S SHALL BE RESTORED AS NEEDED TO PREPARE FOR LONG TERM USE, SUCH AS BY REMOVAL OF SEDIMENT, REGRADING ELEVATIONS, INSTALLING UNDERDRAINS (WHERE APPROPRIATE) AND STABILIZING THE AREA.
28. 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.
  - A. 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.
  - B. SEDIMENT BARRIERS: ALL AREAS WITHIN 75 FEET OF A PROTECTED NATURAL RESOURCE MUST BE PROTECTED WITH A DOUBLE ROW OF SEDIMENT BARRIERS.
  - C. DITCH: 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 THE DEPARTMENT.
  - D. 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.
29. STORMWATER CHANNELS, DITCHES, SWALES, AND OTHER OPEN STORMWATER CHANNELS MUST BE DESIGNED, CONSTRUCTED, AND STABILIZED USING MEASURES THAT ACHIEVE LONG-TERM EROSION CONTROL. DITCHES, SWALES AND OTHER OPEN STORMWATER CHANNELS MUST BE SIZED TO HANDLE, AT A MINIMUM, THE EXPECTED VOLUME RUN-OFF. EACH CHANNEL SHOULD BE CONSTRUCTED IN SECTIONS SO THAT THE SECTIONS GRADING, SHAPING, AND INSTALLATION OF THE PERMANENT LINING CAN BE COMPLETED THE SAME DAY. IF A CHANNEL'S FINAL GRADING OR LINING INSTALLATION MUST BE DELAYED, THEN DIVERSION BERMS MUST BE USED TO DIVERT STORMWATER AWAY FROM THE CHANNEL. PROPERLY-SPACED CHECK DAMS MUST BE INSTALLED IN THE CHANNEL TO SLOW THE WATER VELOCITY, AND A TEMPORARY LINING INSTALLED ALONG THE CHANNEL TO PREVENT SCOURING.
  - A. THE CHANNEL SHOULD RECEIVE ADEQUATE ROUTINE MAINTENANCE TO MAINTAIN CAPACITY AND PREVENT OR CORRECT ANY EROSION OF THE CHANNEL'S BOTTOM OR SIDE SLOPES.
  - B. WHEN THE WATERSHED DRAINING TO A DITCH OR SWALE IS LESS THAN 1 ACRE OF TOTAL DRAINAGE AND LESS THAN ¼ ACRE OF IMPERVIOUS AREA, DIVERSION OF RUNOFF TO ADJACENT WOODED OR OTHERWISE VEGETATED BUFFER AREAS IS ENCOURAGED WHERE THE OPPORTUNITY EXISTS.
30. CULVERTS: CULVERTS MUST BE SIZED TO AVOID UNINTENDED FLOODING OF UPSTREAM AREAS OR FREQUENT OVERTOPPING OF ROADWAYS. CULVERT INLETS MUST BE PROTECTED WITH APPROPRIATE MATERIALS FOR THE EXPECTED ENTRANCE VELOCITY, AND PROTECTION MUST EXTEND AT LEAST AS HIGH AS THE EXPECTED MAXIMUM ELEVATION OF STORAGE BEHIND THE CULVERT. CULVERT OUTLET DESIGN MUST INCORPORATE MEASURES, SUCH AS APRONS, TO PREVENT SCOUR OF THE STREAM CHANNEL. OUTLET PROTECTION MEASURES MUST BE DESIGNED TO STAY WITHIN THE CHANNEL LIMITS. THE DESIGN MUST TAKE ACCOUNT OF TAILWATER DEPTH.
31. ADDITIONAL REQUIREMENTS MAY BE APPLIED ON A SITE-SPECIFIC BASIS.

### INSPECTION AND MAINTENANCE

THE FOLLOWING STANDARDS MUST BE MET DURING CONSTRUCTION:

1. INSPECT DISTURBED AND IMPERVIOUS AREAS, EROSION CONTROL MEASURES, MATERIALS STORAGE AREAS THAT ARE EXPOSED TO PRECIPITATION, AND LOCATIONS WHERE VEHICLES ENTER OR EXIT THE SITE. INSPECT THESE AREAS AT LEAST ONCE A WEEK AND WHEN ONE OR MORE AREAS ARE REPAIRED (0.5 OR MORE IN A CONSECUTIVE 24-HOUR PERIOD), 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. IF BEST MANAGEMENT PRACTICES (BMP) 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 BMP'S OR SIGNIFICANT REPAIR OF BMP'S ARE NECESSARY, IMPLEMENTATION MUST BE COMPLETED WITHIN 7 CALENDAR DAYS AND PRIOR TO ANY STORM EVENT (0.5" OR MORE IN A CONSECUTIVE 24-HOUR PERIOD). ALL MEASURES MUST BE MAINTAINED IN EFFECTIVE OPERATING CONDITION UNTIL AREAS ARE PERMANENTLY STABILIZED.
3. KEEP A LOG (REPORT) SUMMARIZING THE INSPECTIONS AND ANY CORRECTIVE ACTION TAKEN. THE LOG MUST INCLUDE THE NAME(S) AND QUALIFICATIONS OF THE PERSON MAKING THE INSPECTIONS, THE DATE(S) OF THE INSPECTIONS, AND MAJOR OBSERVATIONS ABOUT THE OPERATION AND MAINTENANCE OF EROSION AND SEDIMENTATION CONTROLS, MATERIALS STORAGE AREAS, AND VEHICLES ACCESS POINTS TO THE PARCEL. MAJOR OBSERVATIONS MUST INCLUDE BMP'S THAT NEED MAINTENANCE, BMP'S THAT FAILED TO OPERATE AS DESIGNED OR PROVED INADEQUATE FOR A PARTICULAR LOCATION, AND LOCATIONS WHERE ADDITIONAL BMP'S ARE NEEDED. FOR EACH BMP REQUIRING MAINTENANCE, BMP NEEDING REPLACEMENT, AND LOCATION NEEDING ADDITIONAL BMP'S, NOTE IN THE LOG THE CORRECTIVE ACTION TAKEN AND WHEN IT WAS TAKEN.

### HOUSEKEEPING

1. SPILL PREVENTION: CONTROLS MUST BE USED TO PREVENT POLLUTANTS FROM CONSTRUCTION AND WASTE MATERIALS STORED ON SITE TO ENTER STORMWATER, WHICH INCLUDES STORAGE PRACTICES TO MINIMIZE EXPOSURE OF THE MATERIALS TO STORMWATER. THE SITE CONTRACTOR OR OPERATOR MUST DEVELOP, AND IMPLEMENT AS NECESSARY, APPROPRIATE SPILL PREVENTION, CONTAINMENT, AND RESPONSE PLANNING MEASURES.
2. GROUNDWATER PROTECTION: DURING CONSTRUCTION, LIQUID PETROLEUM PRODUCTS AND OTHER HAZARDOUS MATERIALS WITH THE POTENTIAL TO CONTAMINATE GROUNDWATER MAY NOT BE STORED OR HANDLED IN AREAS OF THE SITE DRAINING TO AN INFILTRATION AREA. AN "INFILTRATION AREA" IS ANY AREA OF THE SITE THAT BY DESIGN OR AS A RESULT OF SOILS, TOPOGRAPHY AND OTHER RELEVANT FACTORS ACCUMULATES RUNOFF THAT INFILTRATES INTO THE SOIL, DIKES, BERMS, SUMPS, AND OTHER FORMS OF SECONDARY CONTAINMENT THAT PREVENT DISCHARGE TO GROUNDWATER MAY BE USED TO ISOLATE PORTIONS OF THE SITE FOR THE PURPOSES OF STORAGE AND HANDLING OF THESE MATERIALS. ANY PROJECT PROPOSING INFILTRATION OF STORMWATER MUST PROVIDE ADEQUATE PRE-TREATMENT OF STORMWATER PRIOR TO DISCHARGE TO 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.

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. OR MAY NOT BE USED FOR DUST CONTROL, BUT OTHER WATER ADDITIVES MAY BE CONSIDERED AS NEEDED 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.
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.
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.
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.
  - (A) DISCHARGES FROM FIREFIGHTING ACTIVITY;
  - (B) FIRE HYDRANT FLUSHINGS;
  - (C) VEHICLE WASHWATER IF DETERGENTS ARE NOT USED AND WASHING IS LIMITED TO THE EXTERIOR OF VEHICLES (ENGINE, UNDERCARRIAGE AND TRANSMISSION WASHING IS PROHIBITED);
  - (D) DUST CONTROL RUNOFF IN ACCORDANCE WITH PERMIT CONDITIONS AND APPENDIX C(3);
  - (E) ROUTINE EXTERNAL BUILDING WASHDOWN, NOT INCLUDING SURFACE PAINT REMOVAL, THAT DOES NOT INVOLVE DETERGENTS;
  - (F) PAVEMENT WASHWATER (WHERE SPILLS/LEAKS OF TOXIC OR HAZARDOUS MATERIALS HAVE NOT OCCURRED, UNLESS ALL SPILLED MATERIAL HAD BEEN REMOVED) IF DETERGENTS ARE NOT USED;
  - (G) UNCONTAMINATED AIR CONDITIONING OR COMPRESSOR CONDENSATE;
  - (H) UNCONTAMINATED GROUNDWATER OR SPRING WATER;
  - (I) FOUNDATION OR FOOTER DRAIN-WATER WHERE FLOWS ARE NOT CONTAMINATED;
  - (J) UNCONTAMINATED EXCAVATION DEWATERING (SEE REQUIREMENTS IN APPENDIX C(5));
  - (K) POTABLE WATER SOURCES INCLUDING WATERLINE FLUSHINGS; AND
  - (L) LANDSCAPE IRRIGATION.
7. UNAUTHORIZED NON-STORMWATER DISCHARGES: THE DEPARTMENT'S APPROVAL UNDER THIS CHAPTER DOES NOT AUTHORIZE A DISCHARGE THAT IS MIXED WITH A SOURCE OF NON STORMWATER, OTHER THAN THOSE DISCHARGES IN COMPLIANCE WITH APPENDIX C (6). SPECIFICALLY, THE DEPARTMENT'S APPROVAL DOES NOT AUTHORIZE DISCHARGES OF THE FOLLOWING:
  - (A) WASTEWATER FROM THE WASHOUT OR CLEANOUT OF CONCRETE, STUCCO, PAINT, FORM RELEASE OILS, CURING COMPOUNDS OR OTHER CONSTRUCTION MATERIALS;
  - (B) FUELS, OILS OR OTHER POLLUTANTS USED IN VEHICLE AND EQUIPMENT OPERATION AND MAINTENANCE;
  - (C) SOAPS, SOLVENTS, OR DETERGENTS USED IN VEHICLE AND EQUIPMENT WASHING; AND
  - (D) TOXIC OR HAZARDOUS SUBSTANCES FROM A SPILL OR OTHER RELEASE.

## GENERAL CONSTRUCTION NOTES

1. THIS PROJECT GENERALLY CONSISTS OF THE CONSTRUCTION OF APPROXIMATELY 2.425 LF OF ROADWAY WITH CUL-DE-SAC FOR A NEW 18 LOT SUBDIVISION. VEGETATED SWALES AND CULVERTS PROVIDE ALL SURFACE RESTORATION, TEMPORARY UTILITIES, EROSION CONTROL, TRAFFIC CONTROL AND OTHER WORK AS SPECIFIED OR APPURTENANT. WORK IS GENERALLY LIMITED TO THE RIGHT OF WAY. LOT DEVELOPMENT SHALL BE THE RESPONSIBILITY OF THE FUTURE LOT OWNER.
2. CONTRACTOR TO PROVIDE OWNER AND ENGINEER WITH A WORK PLAN OUTLINING THE WORK SCHEDULE, TRAFFIC CONTROL PLAN, AND WORK AREA BARRICADING PLAN TO BE APPROVED BY THE OWNER AND ENGINEER PRIOR TO CONSTRUCTION.
3. THE CONTRACTOR SHALL COORDINATE ALL CONSTRUCTION WITH THE TOWN, UTILITY COMPANIES, DIG SAFE, AND EMERGENCY SERVICES WHERE APPLICABLE. CONTRACTOR SHALL NOTIFY ALL UTILITIES PRIOR TO COMMENCING WORK TO ALLOW SUFFICIENT TIME TO LOCATE AND MARK THE LOCATION OF ALL BURIED UTILITIES. CONTRACTOR SHALL ALSO CONTACT "DIG SAFE", TELEPHONE NO 811 OR 888-DIG-SAFE. REPAIR OF ANY DAMAGED UTILITY WILL BE INCIDENTAL TO THIS PROJECT.
4. THE CONTRACTOR SHALL NOTIFY THE OWNER AND ENGINEER IN WRITING OF ANY CONDITION OR OCCURRENCE THAT REPRESENTS A CHANGE IN PROJECT SCOPE. VERBAL NOTIFICATION IS REQUIRED PRIOR TO PROCEEDING WITH THE WORK OF THE PROJECT AND WRITTEN NOTIFICATION MUST BE PROVIDED. REQUESTS FOR FEE ADJUSTMENTS WILL NOT BE CONSIDERED UNLESS PROPER NOTICE IS GIVEN.
5. THE CONTRACTOR SHALL PROVIDE ALL LABOR, EQUIPMENT, AND MATERIALS AS REQUIRED TO PERFORM THE WORK AS INDICATED ON THE DRAWINGS AND IN THE SPECIFICATIONS. ALL WORK SHALL BE COMPLETED IN ACCORDANCE WITH THE APPLICABLE FEDERAL, STATE AND LOCAL CODES.
6. CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL NECESSARY CONSTRUCTION PERMITS. PERMIT APPLICATIONS SHALL BE SUBMITTED WITH ADEQUATE TIME SO AS NOT TO DELAY CONSTRUCTION.
7. THE CONTRACTOR SHALL SUPERVISE AND INSPECT THE WORK OF THIS PROJECT IN AN EFFICIENT AND COMPETENT MANNER. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR THE MEANS, METHODS, TECHNIQUES, SEQUENCES, AND PROCEDURES USED TO COMPLETE THE WORK. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ENSURING THE WORK IS IN ACCORDANCE WITH THE CONTRACT DOCUMENTS. A REPRESENTATIVE OF THE GENERAL CONTRACTOR SHALL BE PRESENT DURING ALL PHASES OF THE WORK.
8. SAFETY IS THE RESPONSIBILITY OF THE CONTRACTOR. PERFORM ALL WORK IN ACCORDANCE WITH SAFETY STANDARDS OF APPLICABLE LAWS, BUILDING AND CONSTRUCTION CODES, THE "MANUAL OF ACCIDENT PREVENTION IN CONSTRUCTION" PUBLISHED BY THE ASSOCIATED GENERAL CONTRACTORS OF AMERICA, THE REQUIREMENTS OF THE OCCUPATIONAL SAFETY AND HEALTH ACT OF 1970, AND THE REQUIREMENTS OF TITLE 9 OF THE CODE OF FEDERAL REGULATIONS, PART 1926, "SAFETY AND HEALTH REGULATIONS FOR CONSTRUCTION".
9. THE LOCATIONS OF ALL PROPERTY LINES AND RIGHT OF WAYS ARE APPROXIMATE (SHOWN FOR REFERENCE ONLY), UNLESS NOTED OTHERWISE. PROPERTY LINES AND RIGHT OF WAYS SHOWN ARE NOT INTENDED TO REPRESENT LEGAL BOUNDARIES.
10. THE LOCATION, TYPE AND SIZE OF EXISTING PIPES, DUCTS, CONDUITS AND OTHER UNDERGROUND STRUCTURES SHOWN ON THE DRAWINGS ARE NOT WARRANTED TO BE EXACT NOR IS IT WARRANTED THAT ALL UNDERGROUND STRUCTURES ARE SHOWN. CONTRACTOR SHALL FIELD VERIFY ALL UTILITY LOCATIONS PRIOR TO COMMENCEMENT OF CONSTRUCTION. DEPTH OF SERVICES ARE UNKNOWN AND SHALL BE FIELD VERIFIED BY THE CONTRACTOR. EXCAVATING TEST PITS AS NECESSARY TO VERIFY UTILITY LOCATIONS AND DEPTHS SHALL BE INCIDENTAL TO THIS PROJECT.
11. THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING TOPOGRAPHY AND EXISTING CONDITIONS PRIOR TO CONSTRUCTION.
12. CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING PIPE SIZES, INVERTS, AND LOCATIONS, AND SHALL INCLUDE IN SUBMITTAL PRIOR TO ORDERING.
13. LAYOUT OF THE PROJECT IS THE RESPONSIBILITY OF THE CONTRACTOR AND SHALL BE APPROVED BY THE ENGINEER. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL GRADE AND LAYOUT CONTROL. LAYOUT SHOULD BE PERFORMED WITH SURVEY EQUIPMENT AND OVERSEEN BY A LICENSED SURVEYOR. A CAD FILE WILL BE AVAILABLE TO THE CONTRACTOR.
14. THE WORK SHALL INCORPORATE EROSION CONTROL MEASURES WHICH ARE COMPLIANT WITH THE LATEST VERSION OF "MAINE EROSION AND SEDIMENT CONTROL HANDBOOK FOR CONSTRUCTION" BEST MANAGEMENT PRACTICES".
15. CONTRACTOR SHALL BE REQUIRED TO PROVIDE DUST CONTROL FOR PROJECT WHICH CAN INCLUDE, BUT IS NOT LIMITED TO, WATER AND CALCIUM CHLORIDE. COST IS INCIDENTAL TO THE PROJECT.
16. RESTRICT ACCESS TO SITE THROUGH THE USE OF APPROPRIATE SIGNAGE, GATES, BARRIERS, FENCES, ETC. SITE SHALL BE LEFT WITH APPROPRIATE SAFETY MEASURES IN PLACE DURING NON-WORKING HOURS. NO TRENCH SHALL BE LEFT OPEN DURING NON-WORKING HOURS. SITE SAFETY IS THE RESPONSIBILITY OF CONTRACTOR, DURING BOTH WORKING AND NON-WORKING HOURS.
17. CONTRACTOR SHALL PERFORM ALL CONSTRUCTION ACTIVITIES RELATED TO THE PROJECT WITHIN THE CONFINES OF THE SITE. ANY ACTIVITY, MATERIAL STORAGE ETC. TAKING PLACE ON PRIVATE PROPERTY SHALL BE WITH THE EXPRESS WRITTEN PERMISSION OF THE OWNER AND PROPERTY OWNER AND COORDINATED WITH THE OWNER. WORK OUTSIDE OF THESE LIMITS MAY BE REQUIRED.
18. THE CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO PREVENT EQUIPMENT FLUIDS FROM REACHING ANY WATER COURSE. ANY INADVERTENT FLUID DISCHARGES SHALL BE IMMEDIATELY CLEANED FROM THE WATERS USING WHATEVER MEANS NECESSARY, AS DETERMINED BY THE ENGINEER.
19. ALL WATER SERVICES WILL HAVE A MINIMUM OF 6.0 FEET COVER UNLESS NOTED OTHERWISE OR APPROVED BY THE ENGINEER.
20. CONTRACTOR SHALL BACKFILL TRENCH FOLLOWING EACH DAYS CONSTRUCTION. NO OPEN TRENCHES WILL BE ALLOWED OVERNIGHT UNLESS APPROVED BY ENGINEER AND PROPERLY BARRICADED (IE. SNOW FENCING, CHAIN LINK FENCING, JERSEY BARRIER OR APPROVED EQUAL). CAUTION RIBBON AND EQUIPMENT PLACEMENT WILL NOT BE APPROVED AS BARRICADING. CONTRACTOR IS RESPONSIBLE TO MAINTAIN TRENCH AS DIRECTED BY THE ENGINEER.
21. ALL FINISH SURFACES SHALL BE INSTALLED TO PROMOTE POSITIVE DRAINAGE. IN NO WAY SHALL THE NEW FINISH SURFACES CREATE DRAINAGE PROBLEMS THAT DID NOT EXIST PRIOR TO CONSTRUCTION.
22. EXISTING FACILITIES, PLANTINGS AND IMPROVEMENTS (I.E. TREES, LIGHT POLES, SIGNS, TRAILS, ETC.) SHALL BE REMOVED AND REPLACED OR PROTECTED AS REQUIRED DURING CONSTRUCTION. THE ASSOCIATED COSTS ARE INCIDENTAL TO THE PROJECT RESTORE ALL AREAS DISTURBED BY CONTRACTORS' OPERATION TO ORIGINAL CONDITIONS (GRAVEL, PAVEMENT, GRASS, CURB, ETC.) UNLESS NOTED OTHERWISE ON THE PLANS. RESTORATION OF ROADS, CURBS, PARKING SURFACES AND LAWNS DAMAGED BY THE CONTRACTOR SHALL BE INCIDENTAL TO THE PROJECT.
23. ALL MATERIALS SCHEDULED FOR REMOVAL SHALL BE DISPOSED OF IN A LEGAL MANNER BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE OWNER. THE OWNER HAS THE FIRST RIGHT AND REFUSAL FOR ANY DEMOLITION MATERIALS DISPOSAL OF SURPLUS SOIL MATERIAL. SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR; SURPLUS MATERIAL SHALL NOT BE DISPOSED OF ON THE PROJECT SITE. DISPOSAL SHALL BE MADE ONLY AT WASTE AREAS WHICH ARE LICENSED TO ACCEPT SUCH MATERIALS, UNLESS THE MATERIAL IS ACCEPTABLE FOR USE AS FILL IN OTHER AREAS OF THE PROJECT. THE OWNER HAS THE FIRST RIGHT AND REFUSAL FOR ANY SURPLUS SOIL MATERIALS.
24. ALL TEST PITS NECESSARY TO LOCATE SERVICES SHALL BE INCIDENTAL TO THE PROJECT.
25. PROPERLY PROTECT AND DO NOT DISTURB PROPERTY IRONS AND MONUMENTS. IF DISTURBED, THE PROPERTY MONUMENT WILL BE RESET AT THE CONTRACTOR'S EXPENSE, BY A REGISTERED LAND SURVEYOR APPROVED BY THE ENGINEER.

## GENERAL NOTES:

1. THIS PLAN IS ORIENTED TO THE MAINE STATE PLANE COORDINATE SYSTEM, EAST ZONE, NAD 83 DATUM.
2. ELEVATIONS REFER TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVOD88).
3. NO INVESTIGATION OF THE EXISTENCE OR LOCATION OF SUBTERRANEAN UTILITY INFRASTRUCTURE HAS BEEN PERFORMED.
4. NATURAL RESOURCE FIELD SURVEYS WERE COMPLETED BY HALEY WARD IN OCTOBER 2022 IN ACCORDANCE WITH 1987 CORPS OF ENGINEERS WETLAND DELINEATION MANUAL AND THE 2012 NORTH-CENTRAL AND NORTHEAST REGIONAL SUPPLEMENT (VERSION 2.0)
5. EXISTING TOPOGRAPHY SHOWN IS 2018-2019 STATE OF MAINE LIDAR. CROWN OF MAINE AND WAS OBTAINED FROM NOAA DIGITAL ACCESS VIEWER.
6. EXISTING FEATURES WERE PROVIDED AS GIS GEODATABASE BY CLIENT.

## MATERIAL SPECIFICATIONS

1. SAND BEDDING SHALL MEET MDOT STANDARD SPECIFICATION 703.05.	
2. AGGREGATE BASE GRAVEL SHALL MEET MDOT STANDARD SPECIFICATION 703.06 TYPE A.	
3. AGGREGATE SUBBASE GRAVEL SHALL MEET MDOT STANDARD SPECIFICATION 703.06 TYPE D.	
4. STRUCTURAL FILL TO MEET MDOT STANDARD SPECIFICATION 703.06 TYPE A.	
5. SEEDING SHALL MEET MDOT STANDARD SPECIFICATION 717.03 METHOD ONE.	
6. BACKFILL MATERIAL SHALL MEET THE FOLLOWING FOR COMPACTION:	
FILL AND BACKFILL LOCATION	MODIFIED PROCTOR DENSITY %
ROADWAY	95
UNDER OR WITHIN FIVE FEET OF STRUCTURES	95
FILL FOR EROSION REPAIR AREAS	92
TRENCHES THROUGH NON-ROADWAY AREAS	92
IN EMBANKMENT (INCLUDING TEMPORARY)	92
PIPE BEDDING AND TRENCHING	92

## ABBREVIATIONS

@	AT	MAX.	MAXIMUM
ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE	MDOT	MAINE DEPT. OF TRANSPORTATION
APPROX±	APPROXIMATELY	MH	MANHOLE
		MIN	MINIMUM
BLDG	BUILDING	N	NORTHING
		NE	NORTHEAST
		N.T.S.	NOT TO SCALE
		NW	NON WOVEN GEOTEXTILE
CL	CENTERLINE	OO	OUTSIDE DIAMETER
CB	CATCH BASIN	OP	ON CENTER
		OZ	OVERHEAD
CLR	CLEAR	PH	POUNCES
COMP	CORRUGATED METAL PIPE	PERF	PERFORATED
CO	CLEANOUT	PSF	POUNDS PER SQUARE FOOT
CPE	CORRUGATED POLYETHYLENE	PSI	POUNDS PER SQUARE INCH
		PVC	POLYVINYL CHLORIDE
DI	DUCTILE IRON	PL	PROPERTY LINE
DIA	DIAMETER	POH	PROPOSED OVERHEAD ELECTRIC
		PUGE	PROPOSED UNDERGROUND ELECTRIC
E	EASTING	R	RADIUS
EL	ELEVATION	S	SLOPE
EFM	EXISTING FORCE MAIN	SCL	STORMWATER COLLECTION LINE
EPS	EXTRUDED POLYSTYRENE	SCS	STORMWATER COLLECTION SYSTEM
		SDR	STANDARD DIMENSION RATIO
		SE	SOUTHEAST
		SH	SHEET
		SQT	SQUARE
		SS	STAINLESS STEEL
		SY	SQUARE YARD
FM	FORCEMAIN	T	TEMPORARY BENCH MARK
		INT.	TOP OF CONCRETE
		INV.	TYPICAL
		INV.	INVERT

REV.	DATE	DESCRIPTION	BY	CHK.
2024.02.22	PER MDEP REVIEW COMMENTS		BLJ	AWW

## FOR REGULATORY REVIEW NOT FOR CONSTRUCTION



### HALEY WARD

ENGINEERING | ENVIRONMENTAL | SURVEYING

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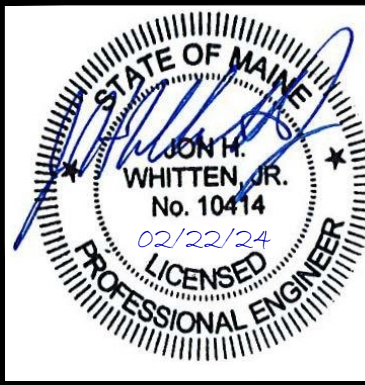
### IRVING WOODLANDS, LLC.

300 UNION STREET, P.O. BOX 5777, SAINT JOHN, NB E2L 4M3

## CROSS LAKE SUBDIVISION

T17 RS CROSS LAKE TOWNSHIP, MAINE

TITLE	<b>NOTES</b>	
DATE	2023.10.06	SCALE N.T.S.
DRAWN BY	BLJ	DESIGNED BY BLQ/DJO
CHECKED BY	BJK	
PROJECT No.	10050.028	
DRAWING No.	C001	
REV.	1	



**GENERAL NOTES:**

- BUILDING ENVELOPES SHALL NOT EXCEED 40% OF THE LOT AREA.
- IMPERVIOUS AREA WITH A BUILDING ENVELOPE SHALL NOT EXCEED 30% OF THE LOT AREA.

**REQUIRED PERMITS:**

- MDEP SITE LAW PERMIT WITH LUPC SUPPLEMENT.
- NRPA PERMIT BY RULE (PBR).
- NRPA TIER 2 (30,420 SF OF WETLAND IMPACT PROPOSED).

**PARCEL INFORMATION**

TAX ID: 038990158-2  
 MAP AND LOT: MAP AR-01 / LOT 108  
 ZONE OR DISTRICT: D-FRL-RS  
 SITE USE: RESIDENTIAL SUBDIVISION  
 FLOOD ZONE: C (MINIMAL FLOOD HAZARD)  
 RECORD OWNER: IRVING WOODLANDS, LLC  
 300 UNION STREET, P.O. BOX 5777  
 SAINT JOHN, NB E2L 4M3

**SITE DEVELOPMENT DATA**

	SF	AC
EXISTING IMPERVIOUS:	0	0.00
NEW IMPERVIOUS:	49,035	1.1
TOTAL IMPERVIOUS:	49,035	1.1
TOTAL DEVELOPED:	152,845	3.5

**DESIGN STANDARDS**

	REQUIRED	PROVIDED
MIN. LOT SIZE:	40,000 SF	43,560 AC
MAXIMUM LOT COVERAGE:	30%	<30%
MIN. LOT FRONTAGE:	100 FT	>100 FT
MIN. FRONT YARD SETBACK:	30 FT	30 FT
MIN. SIDE YARD SETBACK:	15 FT	15 FT
MIN. REAR YARD SETBACK:	15 FT	>15 FT

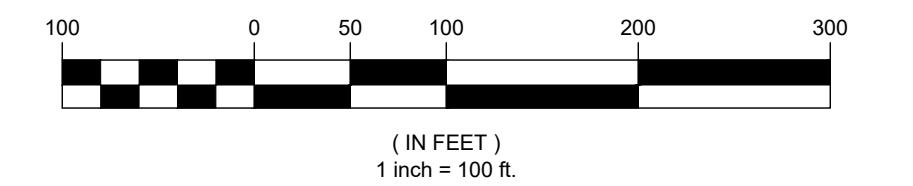
**ROADWAY DESIGN STANDARDS**

	REQUIRED	PROVIDED
LENGTH	N/A	2,425 LF
TRAVEL SURFACE WIDTH	18 FT	18 FT
OUTER CUL DE SAC RADIUS	48'	48'
WEARING SURFACE	3 IN	6 IN
BASE	18 IN	18 IN
AVERAGE GRADE	N/A	2.70%
MAX GRADE	10%	6%
ROADWAY CROSS SLOPE	3%	3%
NUMBER OF CULVERTS	N/A	6
RIGHT OF WAY WIDTH	50 FT	66 FT

**LEGEND:**

DESCRIPTION	EXISTING	PROPOSED
PROPERTY LINE	---	---
EXCAVATED TEST PIT	⊕ 5006	
HAND DUG TEST PIT	⊕ 5021	
BENCHMARK	⊕	
SURVEY STATION	⊕	
UTILITY POLE	⊕	
SIGN		⊕
EDGE OF GRAVEL	---	---
EDGE OF PAVEMENT	---	---
MAJOR FOOT CONTOUR	--- 100 ---	--- 100 ---
MINOR FOOT CONTOUR	---	--- 98 ---
OVERHEAD UTILITY	---	---
SETBACK	---	---
SILT FENCE	---	---
WETLAND	---	---
APPROXIMATE HWL	---	---
BROOK OR STREAM	---	---
PERMITTING SETBACK	---	---
GRAVEL SURFACE		[Pattern]
PAVED SURFACE		[Pattern]
WETLAND		[Pattern]
25' STREAM BUFFER		[Pattern]
STORMWATER BUFFER		[Pattern]

**GRAPHIC SCALE**



REV.	DATE	DESCRIPTION	BY	CHK.
1	2024.02.22	PER MDEP REVIEW COMMENTS	BLQ	JHW

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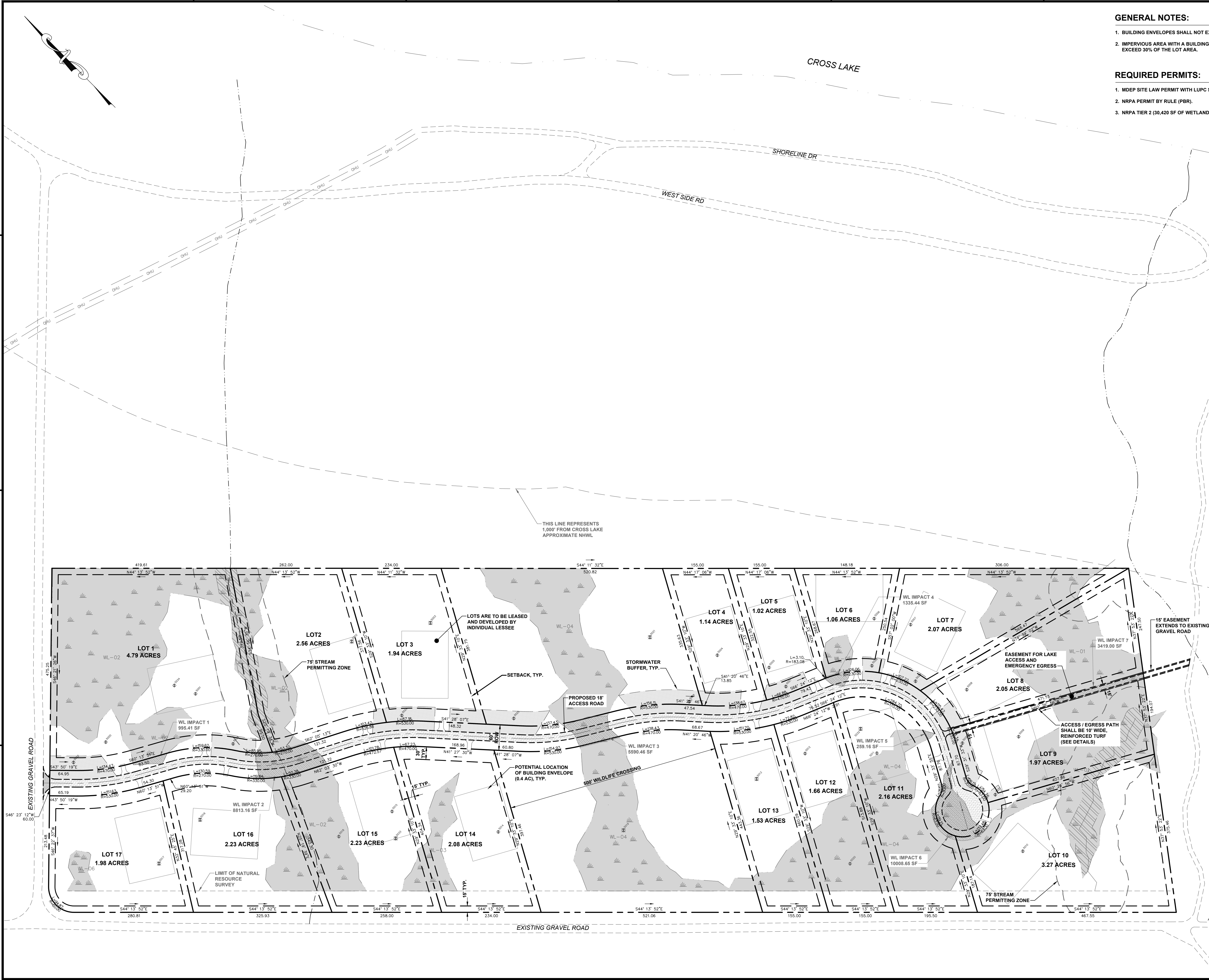
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 Bangor, Maine 04401  
 WWW.HALEYWARD.COM  
 207.767.4824

**IRVING WOODLANDS, LLC.**  
 300 UNION STREET, P.O. BOX 5777, SAINT JOHN, NB E2L 4M3  
**CROSS LAKE SUBDIVISION**  
 T17 R5 CROSS LAKE TOWNSHIP, MAINE

**PROPOSED SUBDIVISION PLAN**

	DATE: 2023.10.06	SCALE: 1"=100'	
	DRAWN BY: BLQ	DESIGNED BY: BLQ/DJO	CHECKED BY: BJK
	PROJECT No.: 10050.028		
	DRAWING No.: <b>C101</b>	REV: <b>1</b>	

FILE LOCATION: P:\METRO\IRVINGWOODLANDS\CROSS LAKE\_CAMP\_3\BREVISED\CROSS LAKE\_CAMP\_3\DWG\10050.028-C101.DWG, 2024.02.21, 5:38 PM



THIS LINE REPRESENTS 1,000' FROM CROSS LAKE APPROXIMATE NHWL

LOTS ARE TO BE LEASED AND DEVELOPED BY INDIVIDUAL LESSEE

SETBACK, TYP.

PROPOSED 18' ACCESS ROAD

POTENTIAL LOCATION OF BUILDING ENVELOPE (0.4 AC), TYP.

600' WILDLIFE CROSSING

ACCESS / EGRESS PATH SHALL BE 10' WIDE, REINFORCED TURF (SEE DETAILS)

15' EASEMENT EXTENDS TO EXISTING GRAVEL ROAD

EASEMENT FOR LAKE ACCESS AND EMERGENCY EGRESS

75' STREAM PERMITTING ZONE

LIMIT OF NATURAL RESOURCE SURVEY

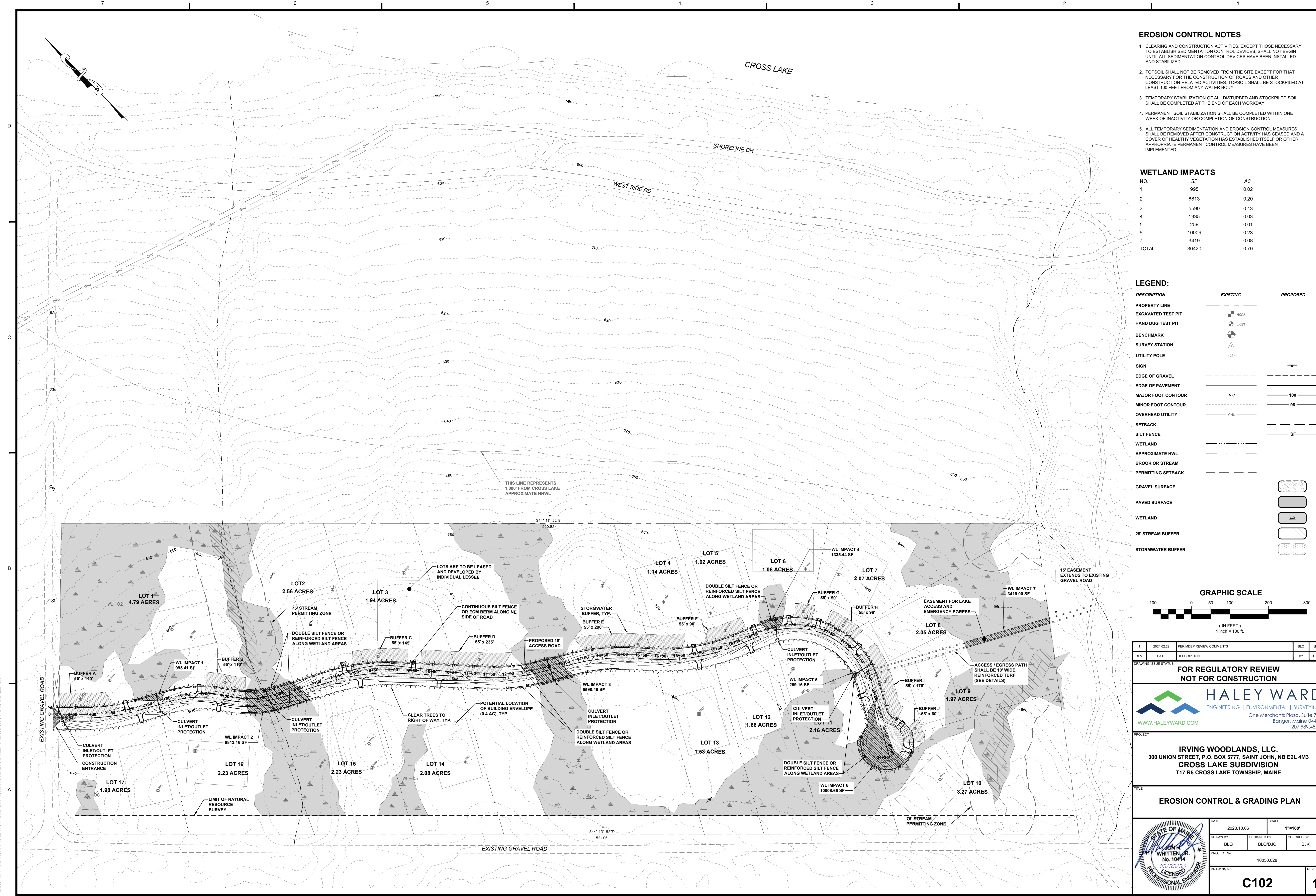
STORMWATER BUFFER, TYP.

75' STREAM PERMITTING ZONE

EXISTING GRAVEL ROAD

EXISTING GRAVEL ROAD

EXISTING GRAVEL ROAD



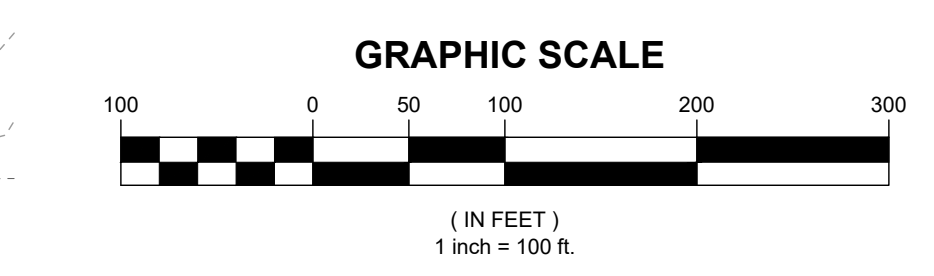
- ### EROSION CONTROL NOTES
- CLEARING AND CONSTRUCTION ACTIVITIES, EXCEPT THOSE NECESSARY TO ESTABLISH SEDIMENTATION CONTROL DEVICES, SHALL NOT BEGIN UNTIL ALL SEDIMENTATION CONTROL DEVICES HAVE BEEN INSTALLED AND STABILIZED.
  - TOPSOIL SHALL NOT BE REMOVED FROM THE SITE EXCEPT FOR THAT NECESSARY FOR THE CONSTRUCTION OF ROADS AND OTHER CONSTRUCTION-RELATED ACTIVITIES. TOPSOIL SHALL BE STOCKPILED AT LEAST 100 FEET FROM ANY WATER BODY.
  - TEMPORARY STABILIZATION OF ALL DISTURBED AND STOCKPILED SOIL SHALL BE COMPLETED AT THE END OF EACH WORKDAY.
  - PERMANENT SOIL STABILIZATION SHALL BE COMPLETED WITHIN ONE WEEK OF INACTIVITY OR COMPLETION OF CONSTRUCTION.
  - ALL TEMPORARY SEDIMENTATION AND EROSION CONTROL MEASURES SHALL BE REMOVED AFTER CONSTRUCTION ACTIVITY HAS CEASED AND A COVER OF HEALTHY VEGETATION HAS ESTABLISHED ITSELF OR OTHER APPROPRIATE PERMANENT CONTROL MEASURES HAVE BEEN IMPLEMENTED.

### WETLAND IMPACTS

NO.	SF	AC
1	995	0.02
2	8813	0.20
3	5590	0.13
4	1335	0.03
5	259	0.01
6	10009	0.23
7	3419	0.08
TOTAL	30420	0.70

### LEGEND:

DESCRIPTION	EXISTING	PROPOSED
PROPERTY LINE	---	---
EXCAVATED TEST PIT	5006	
HAND DUG TEST PIT	5021	
BENCHMARK	5021	
SURVEY STATION	5021	
UTILITY POLE	5021	
SIGN		---
EDGE OF GRAVEL	---	---
EDGE OF PAVEMENT	---	---
MAJOR FOOT CONTOUR	100	100
MINOR FOOT CONTOUR	98	98
OVERHEAD UTILITY	OHU	OHU
SETBACK	---	---
SILT FENCE		SF
WETLAND	---	---
APPROXIMATE HWL	---	---
BROOK OR STREAM	---	---
PERMITTING SETBACK	---	---
GRAVEL SURFACE		---
PAVED SURFACE		---
WETLAND		---
25' STREAM BUFFER		---
STORMWATER BUFFER		---



2024.02.22	PER MDEP REVIEW COMMENTS	BLQ	JHW
REV.	DATE	DESCRIPTION	BY

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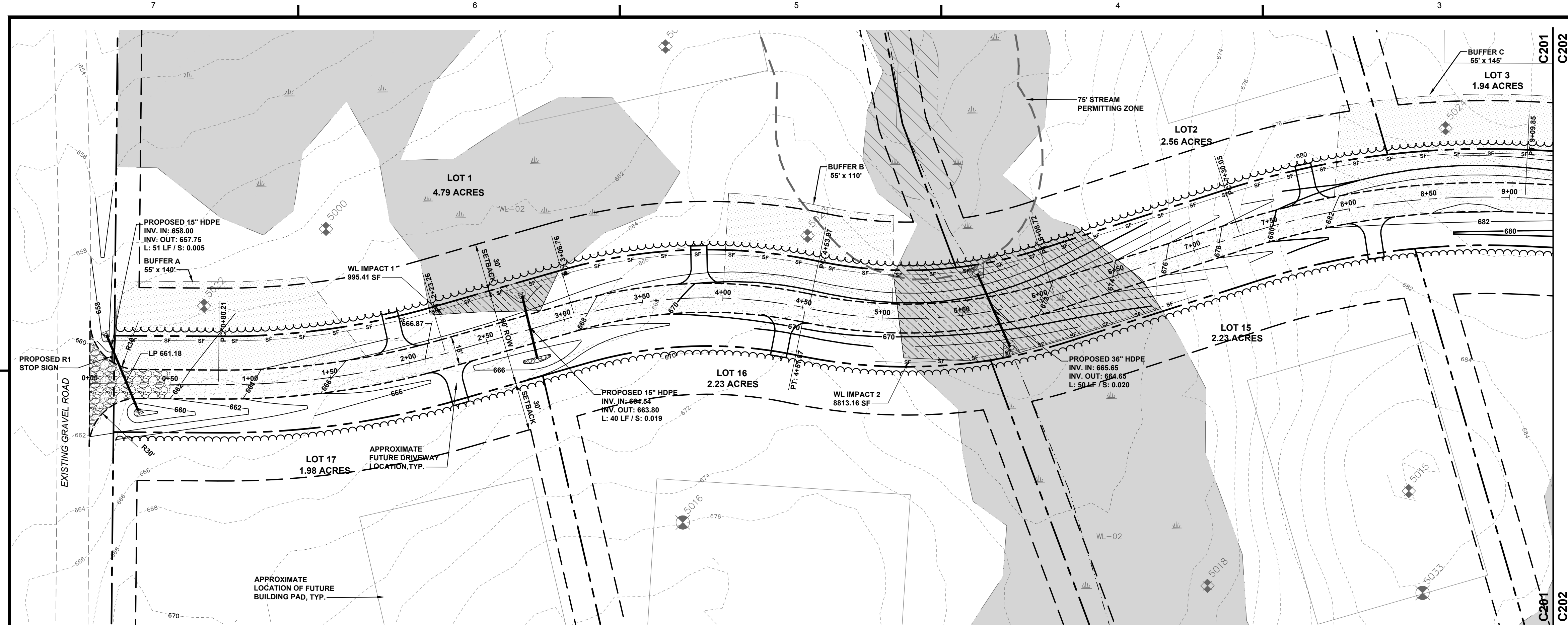
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300 UNION STREET, P.O. BOX 5777, SAINT JOHN, NB E2L 4M3  
**CROSS LAKE SUBDIVISION**  
T17 R5 CROSS LAKE TOWNSHIP, MAINE

**EROSION CONTROL & GRADING PLAN**

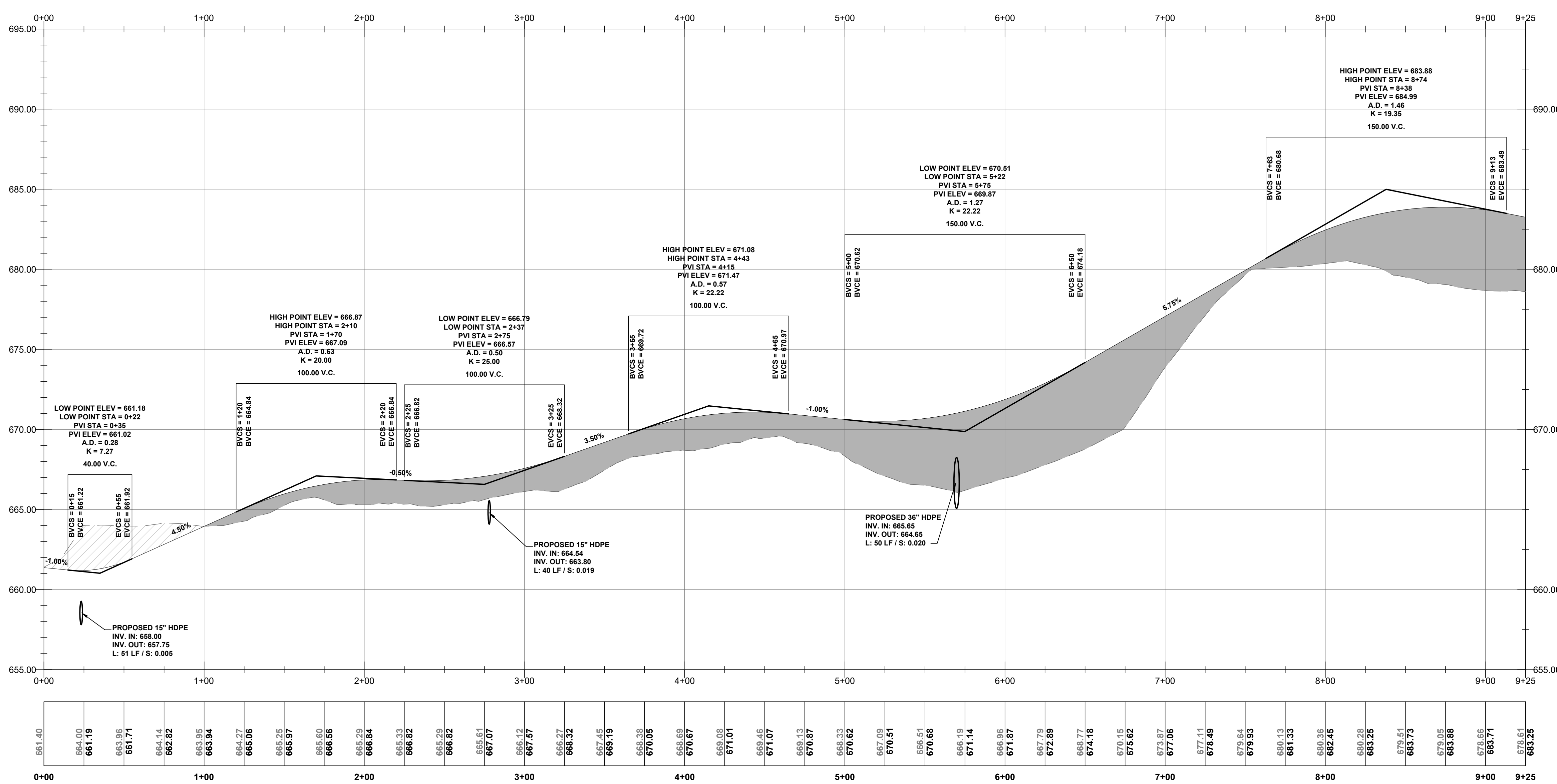
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	DRAWN BY	BLQ	DESIGNED BY	BLQ/DJO
	CHECKED BY	BLQ	PROJECT No.	10050.028
	DRAWING No.	C102	REV.	1

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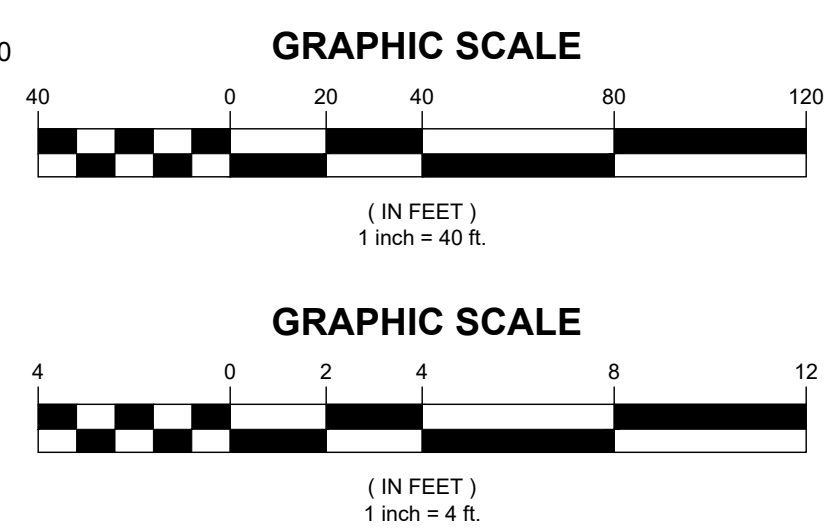


**LEGEND:**

DESCRIPTION	EXISTING	PROPOSED
PROPERTY LINE	---	---
BENCHMARK	⊕	---
SURVEY STATION	⊕	---
UTILITY POLE	⊕	---
SIGN	---	---
EDGE OF GRAVEL	---	---
EDGE OF PAVEMENT	---	---
MAJOR FOOT CONTOUR	---	---
MINOR FOOT CONTOUR	---	---
OVERHEAD UTILITY	---	---
SETBACK	---	---
SILT FENCE	---	---
WETLAND	---	---
APPROXIMATE HWL	---	---
BROOK OR STREAM	---	---
PERMITTING SETBACK	---	---
GRAVEL SURFACE	---	---
PAVED SURFACE	---	---
WETLAND	---	---
25' STREAM BUFFER	---	---
STORMWATER BUFFER	---	---



**PROFILE VIEW OF ROAD CL - STA 0+00 TO 9+25**  
 SCALE: H: 1"=40' / V: 1"=4'



REV.	DATE	DESCRIPTION	BY	CHK.
1	2024.02.22	PER MDEP REVIEW COMMENTS	BLQ	JHW

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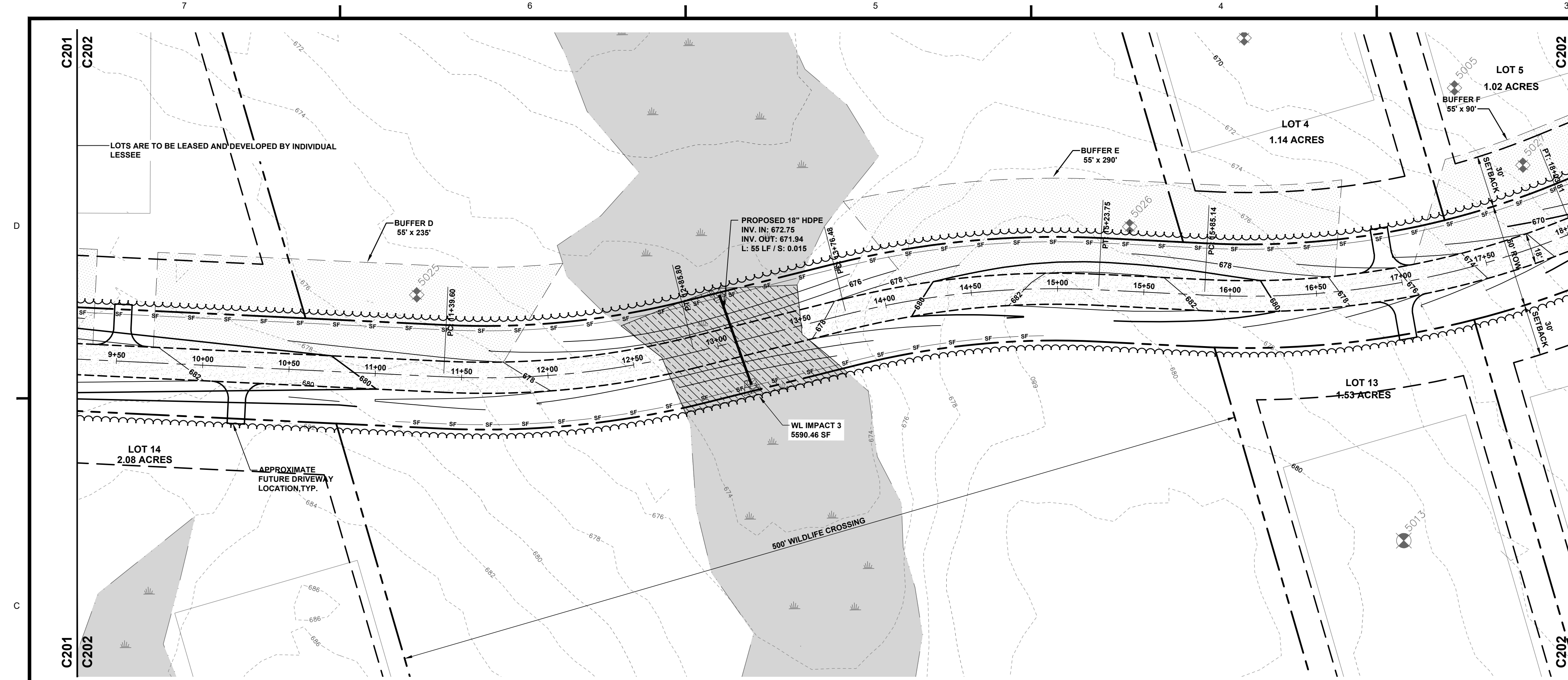
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**CROSS LAKE SUBDIVISION**  
 T17 R5 CROSS LAKE TOWNSHIP, MAINE

**PLAN AND PROFILE  
 STA 0+00 TO 9+25**

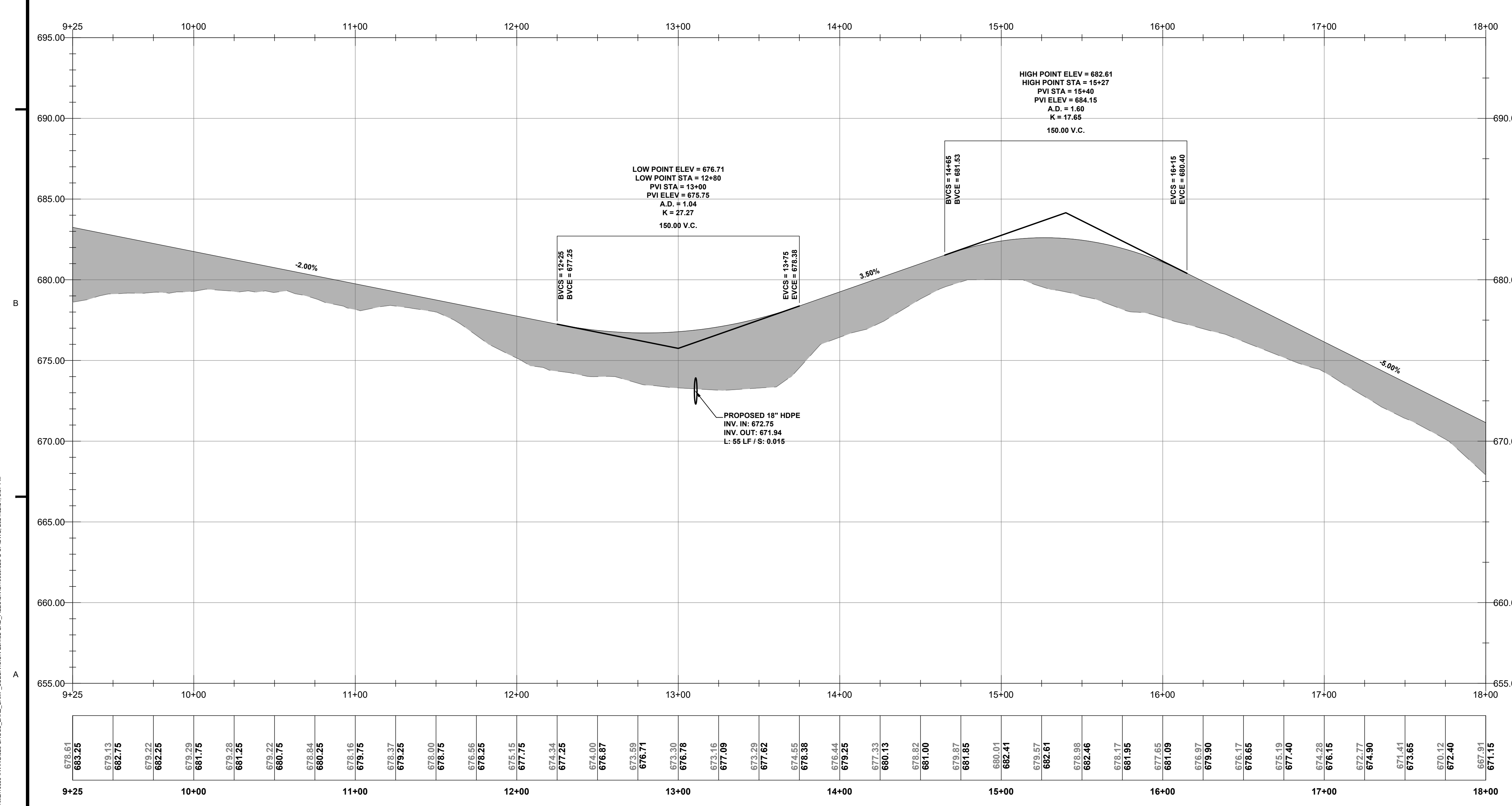
DATE: 2023.10.06 SCALE: 1"=40'  
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 PROJECT No.: 10050.028  
 DRAWING No.: **C201** REV: **1**

FILE LOCATION: P:\METRO\IRVINGWOODLANDS\CROSSLAKE\_CAMP\_3\REVISED\DWG\C201-CAD\FIELD\CAL\10050.028-C-SP1.DWG, 2024.02.21, 5:37 PM

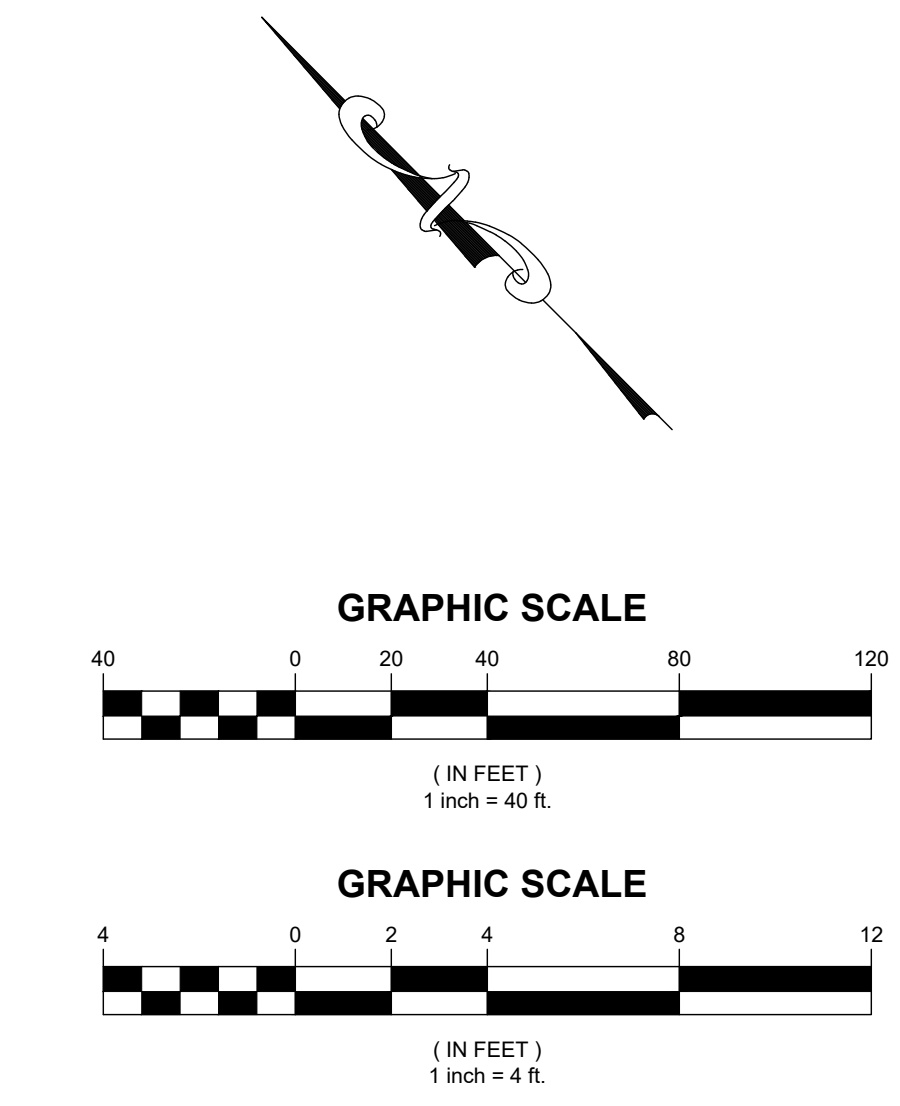


**LEGEND:**

DESCRIPTION	EXISTING	PROPOSED
PROPERTY LINE	---	---
BENCHMARK	⊕	⊕
SURVEY STATION	⊕	⊕
UTILITY POLE	⊕	⊕
SIGN	⊕	⊕
EDGE OF GRAVEL	---	---
EDGE OF PAVEMENT	---	---
MAJOR FOOT CONTOUR	---	---
MINOR FOOT CONTOUR	---	---
OVERHEAD UTILITY	---	---
SETBACK	---	---
SILT FENCE	---	---
WETLAND	---	---
APPROXIMATE HWL	---	---
BROOK OR STREAM	---	---
PERMITTING SETBACK	---	---
GRAVEL SURFACE	---	---
PAVED SURFACE	---	---
WETLAND	---	---
25' STREAM BUFFER	---	---
STORMWATER BUFFER	---	---



**PROFILE VIEW OF ROAD CL - STA 9+25 TO 18+00**  
 SCALE: H: 1"=40' / V: 1"=4'



REV.	DATE	DESCRIPTION	BY	CHK.
1	2024.02.22	PER MDEP REVIEW COMMENTS	BLQ	JHW

**FOR REGULATORY REVIEW  
NOT FOR CONSTRUCTION**

**HALEY WARD**  
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 One Merchants Plaza, Suite 701  
 Bangor, Maine 04401  
 207.987.4824  
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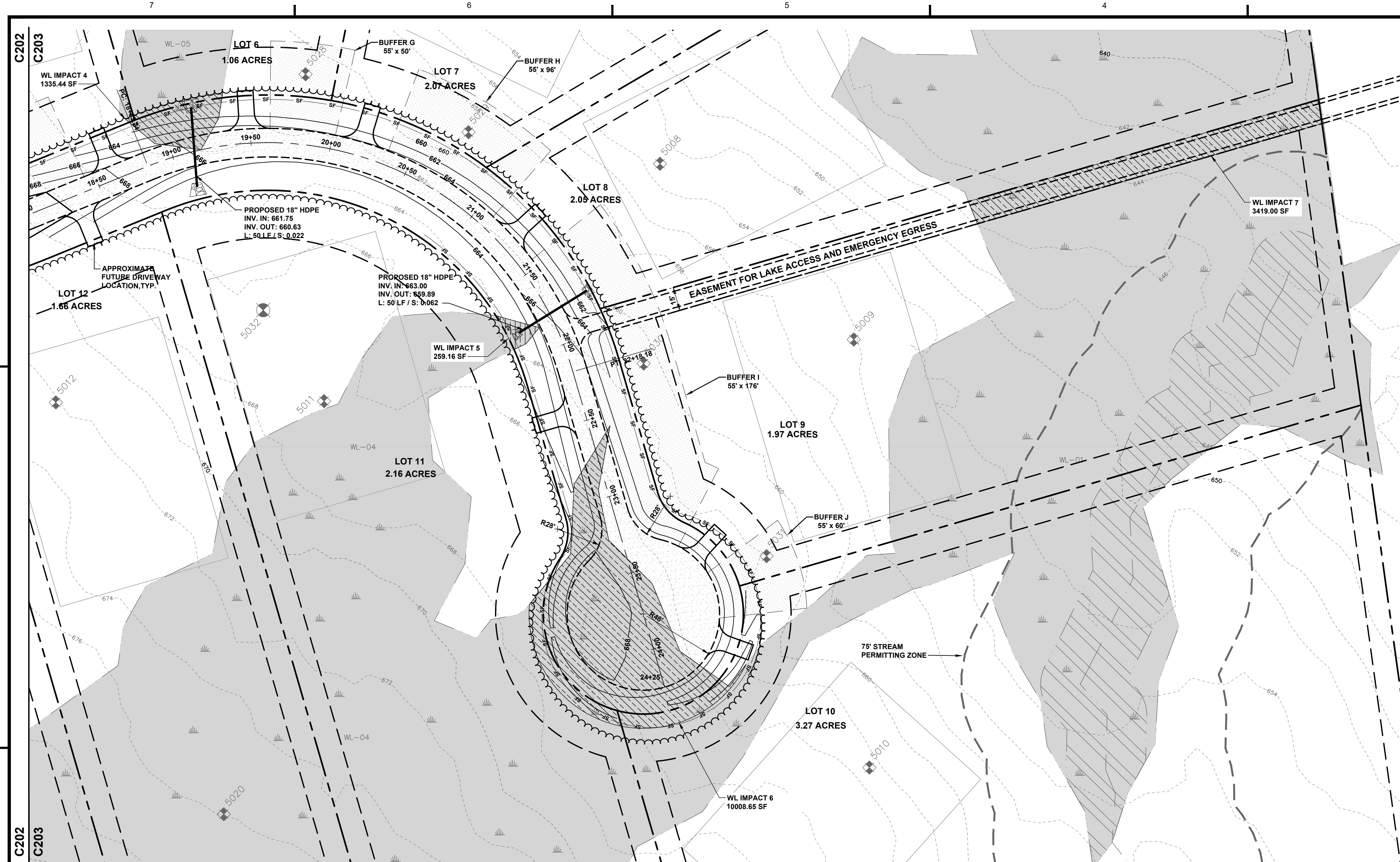
PROJECT:  
**IRVING WOODLANDS, LLC.**  
 300 UNION STREET, P.O. BOX 5777, SAINT JOHN, NB E2L 4M3  
**CROSS LAKE SUBDIVISION**  
 T17 R5 CROSS LAKE TOWNSHIP, MAINE

TITLE:  
**PLAN AND PROFILE**  
**STA 9+25 TO 18+00**

DATE: 2023.10.06 SCALE: 1"=40'  
 DRAWN BY: BLQ DESIGNED BY: BLQ/DJO CHECKED BY: BJK  
 PROJECT No.: 10050.028  
 DRAWING No.: **C202** REV: **1**

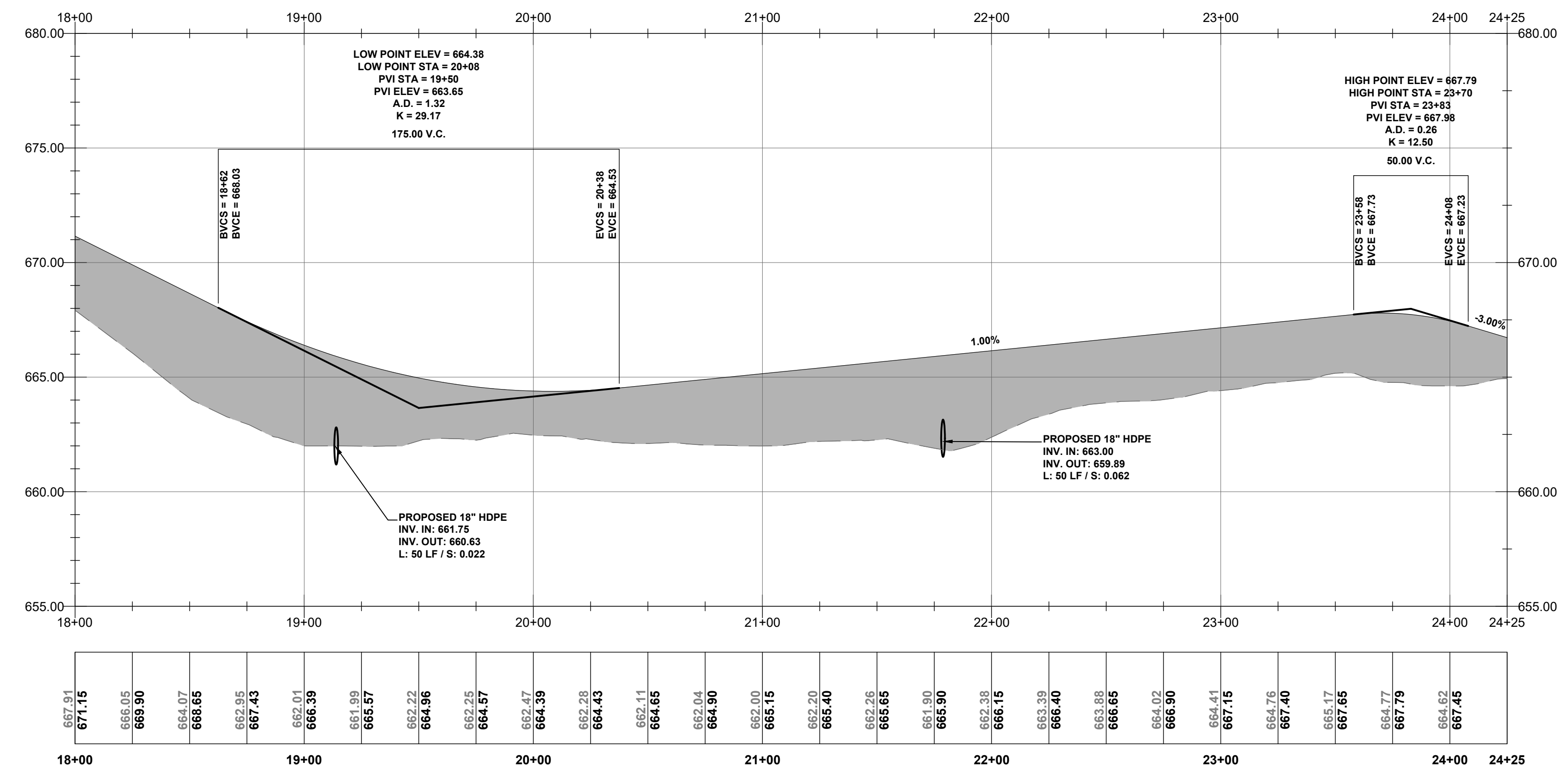
STATE OF MAINE  
 JONATHAN R. WHITTEN, JR.  
 No. 10414  
 02/22/23  
 LICENSED PROFESSIONAL ENGINEER

FILE LOCATION: P:\METRO\IRVINGWOODLANDS\CROSSLAKE\_CAMP\_S\BIDDING\DWG\BIDDING\CAD\FIELD\CAL\10050.028-C-SP1.DWG, 2024.02.21, 5:37 PM

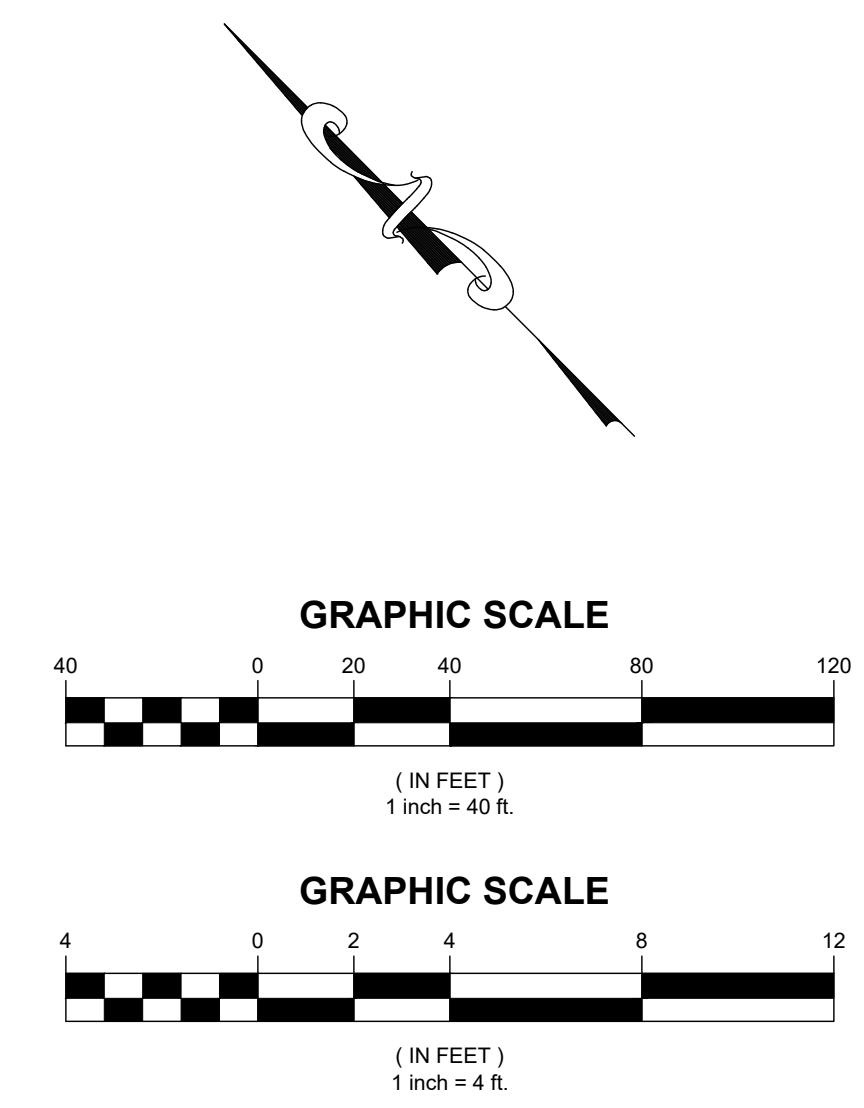


**LEGEND:**

DESCRIPTION	EXISTING	PROPOSED
PROPERTY LINE	---	---
BENCHMARK	⊕	⊕
SURVEY STATION	⊕	⊕
UTILITY POLE	⊕	⊕
SIGN	⊕	⊕
EDGE OF GRAVEL	---	---
EDGE OF PAVEMENT	---	---
MAJOR FOOT CONTOUR	---	---
MINOR FOOT CONTOUR	---	---
OVERHEAD UTILITY	---	---
SETBACK	---	---
SILT FENCE	---	---
WETLAND	---	---
APPROXIMATE HWL	---	---
BROOK OR STREAM	---	---
PERMITTING SETBACK	---	---
GRAVEL SURFACE	---	---
PAVED SURFACE	---	---
WETLAND	---	---
25' STREAM BUFFER	---	---
STORMWATER BUFFER	---	---



PROFILE VIEW OF ROAD CL - STA 18+00 TO 24+25  
SCALE: H: 1"=40' / V: 1"=4'



REV.	DATE	DESCRIPTION	BY	CHK.
1	2024.02.22	PER MDEP REVIEW COMMENTS	BLQ	JHW

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PROJECT  
**IRVING WOODLANDS, LLC.**  
300 UNION STREET, P.O. BOX 5777, SAINT JOHN, NB E2L 4M3  
**CROSS LAKE SUBDIVISION**  
T17 R5 CROSS LAKE TOWNSHIP, MAINE

TITLE  
**PLAN AND PROFILE  
STA 18+00 TO 24+25**

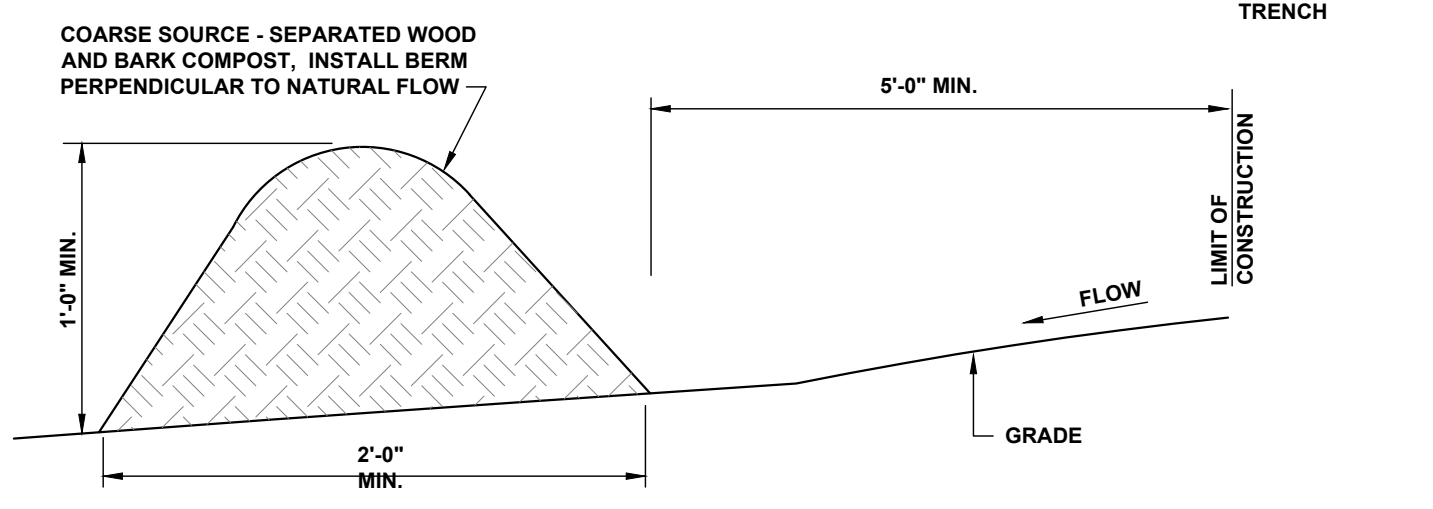
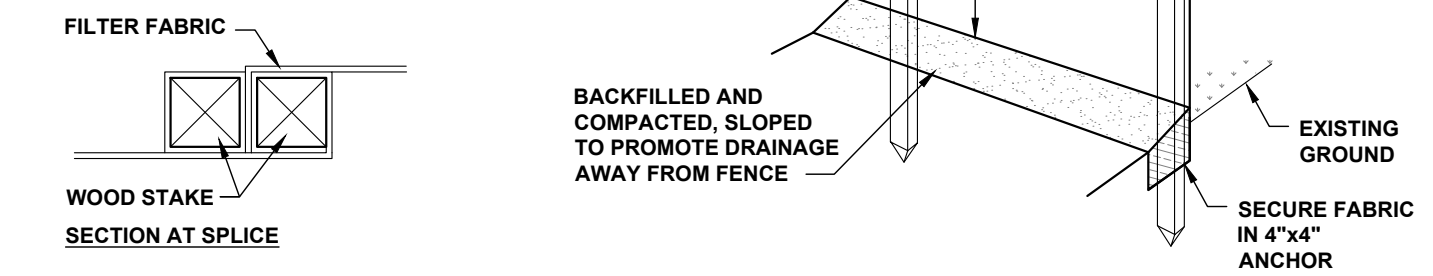
DATE: 2023.10.06 SCALE: 1"=40'  
DRAWN BY: BLQ DESIGNED BY: BLQ/DJO CHECKED BY: BJK  
PROJECT No.: 10050.028  
DRAWING No.: **C203** REV: **1**

STATE OF MAINE  
JONATHAN R. WHITTEN, JR.  
No. 10414  
LICENSED PROFESSIONAL ENGINEER

FILE LOCATION: P:\METRO\IRVINGWOODLANDS\LAKE\_CAMP\_BUDVIEW\DWG\2024\C203-CL-PRF.DWG, 2024.02.21, 5:37 PM

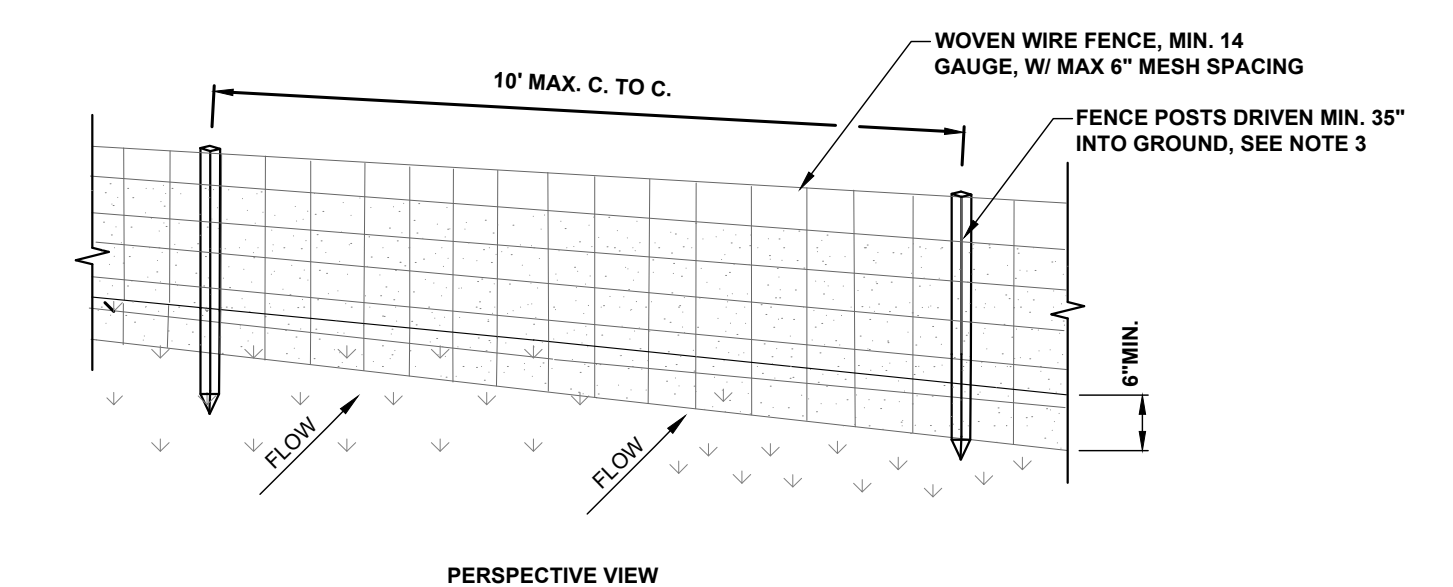


- NOTES:
- KEY FABRIC IN A 6"x6" TRENCH W/BACKFILL AND COMPACT.
  - SILT FENCE SHALL BE A 3' FENCE WITH A MINIMUM GRAB STRENGTH OF 120 LBS.
  - SILT FENCE SHALL BE USED FOR SILT CONTROL ALONG PERIMETER OF SITE.

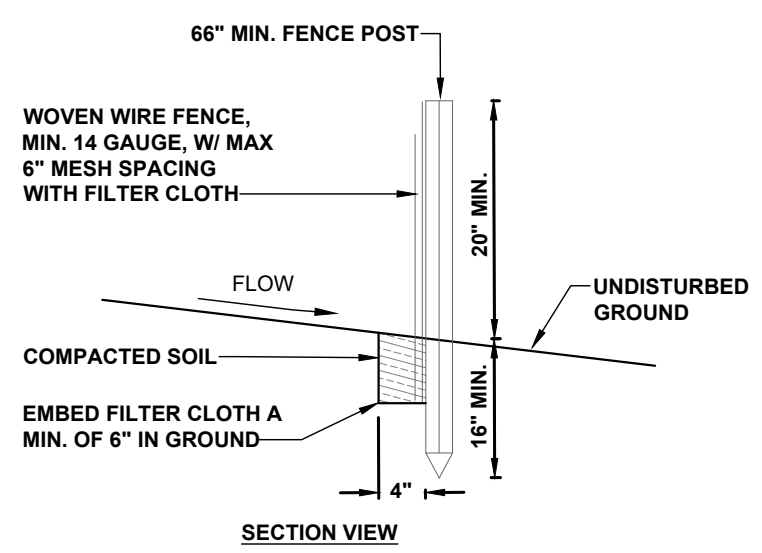


NOTE: THE EROSION CONTROL MIX MUST BE WELL-GRADED WITH AN ORGANIC COMPONENT THAT IS BETWEEN 50 AND 100% OF DRY WEIGHT, AND THAT IS COMPOSED OF FIBROUS AND ELONGATED FRAGMENTS. THE MINERAL PORTION OF THE MIX SHOULD BE NATURALLY INCLUDED IN THE PRODUCT WITH NO LARGER ROCKS (>4") OR LARGE AMOUNTS OF FINES (SILTS AND CLAYS). IN STUMP GRINDING, THE MINERAL SOIL ORIGINATES FROM THE ROOT BALL AND SHOULD NOT BE REMOVED BEFORE GRINDING. THE MIX SHOULD BE FREE OF REFUSE, MATERIAL TOXIC TO PLANT GROWTH OR UNSUITABLE MATERIAL (BARK CHIPS, GROUND CONSTRUCTION DEBRIS OR REPROCESSED WOOD PRODUCTS).

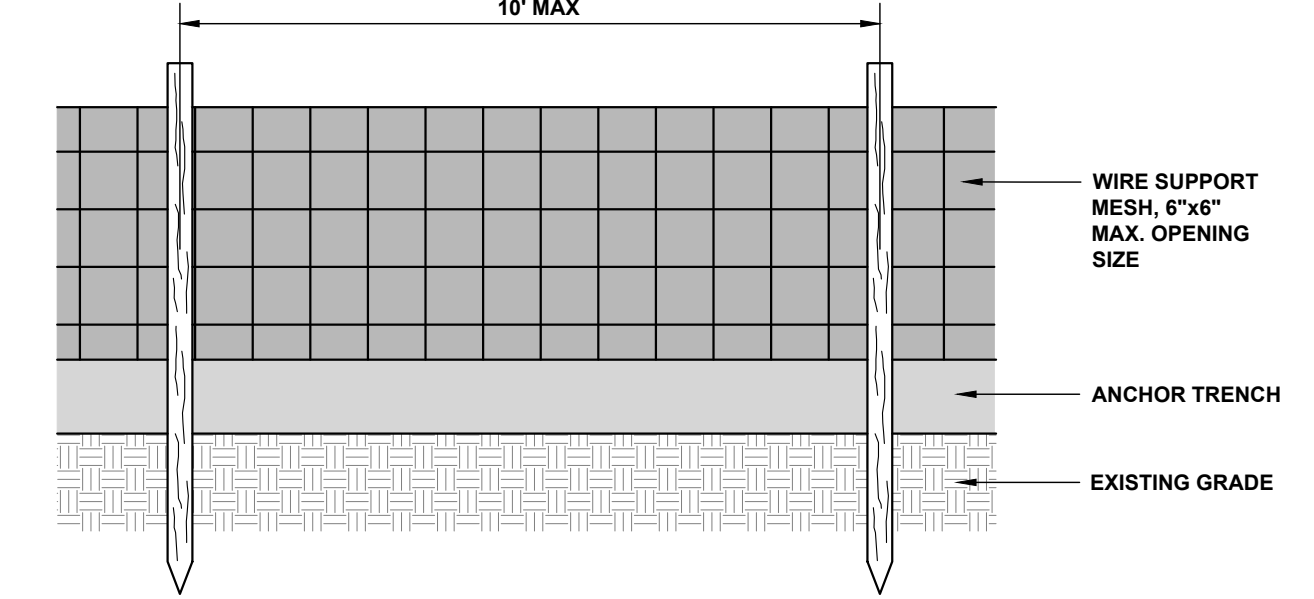
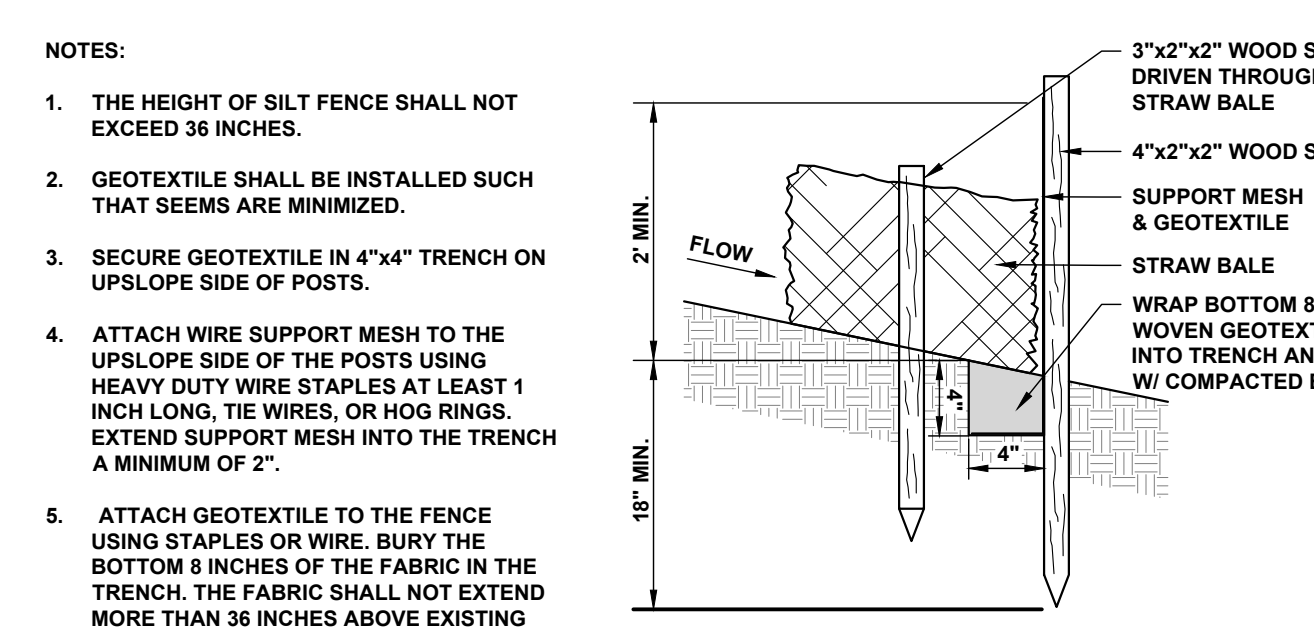
**SILT FENCE AND EROSION CONTROL MIX BERM DETAILS**  
N.T.S. ECM BERM MAY BE USED FOR INTERIOR SILT CONTROL ONLY



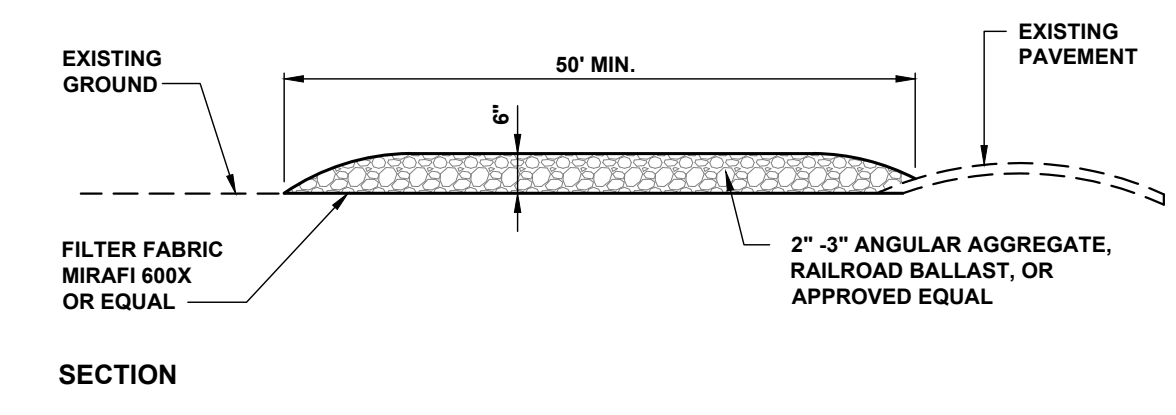
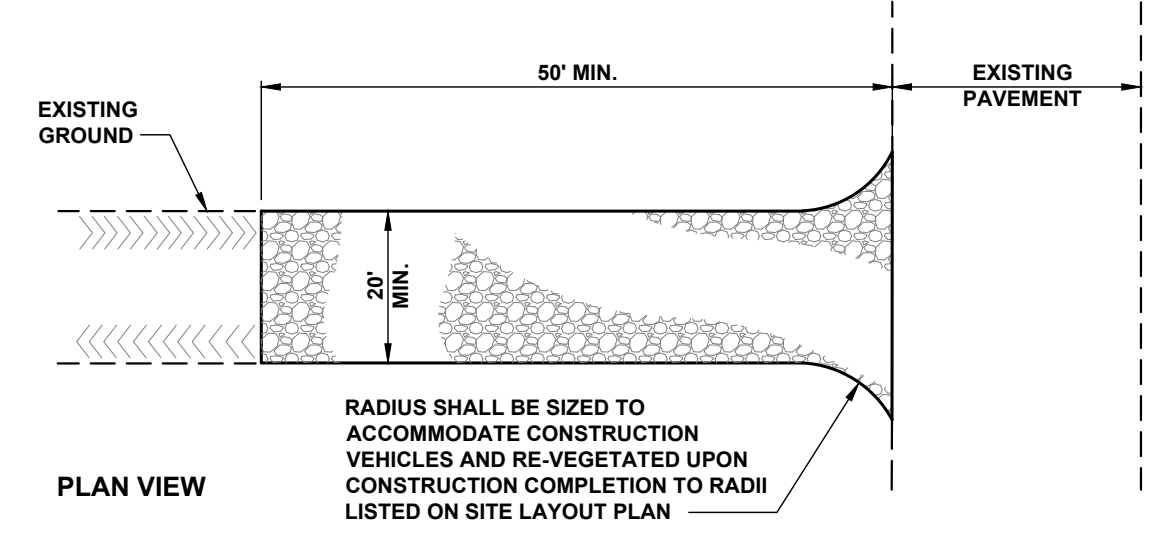
- NOTES:
- WOVEN WIRE FENCE TO BE FASTENED SECURELY TO FENCE POSTS WITH WIRE TIES OR STAPLES. POSTS SHALL BE STEEL (T OR U TYPE), OR HARDWOOD.
  - FILTER CLOTH TO BE TO BE FASTENED SECURELY TO WOVEN WIRE FENCE WITH TIES SPACED EVERY 24" AT TOP AND MID SECTION.
  - WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER THEY SHALL BE OVERLAPPED BY SIX INCHES AND FOLDED. FILTER CLOTH SHALL BE EITHER FILTER X, MIRAFI 100X, STABILINKA T140N, OR APPROVED EQUIVALENT.
  - PREFABRICATED UNITS SHALL BE GEOPAB, ENVIROFENCE, OR APPROVED EQUIVALENT MEETING THE MINIMUM REQUIREMENTS SHOWN.
  - MAINTENANCE SHALL BE PERFORMED AS NEEDED AND MATERIAL REMOVED WHEN "BULGES" DEVELOP IN THE SILT FENCE.



**REINFORCED SILT FENCE DETAIL**  
N.T.S.

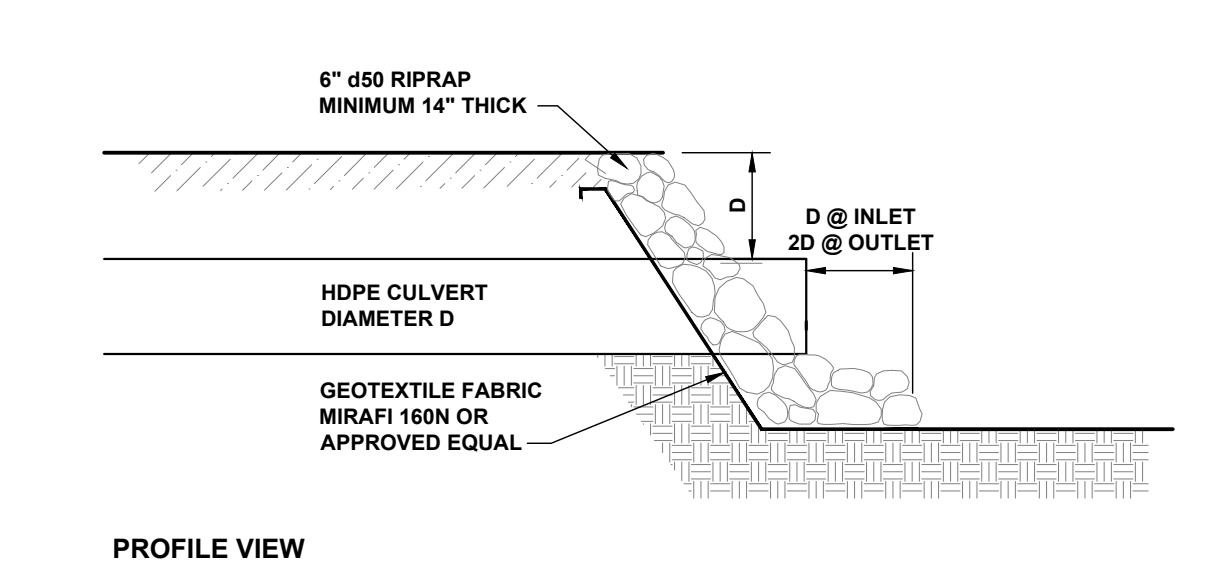
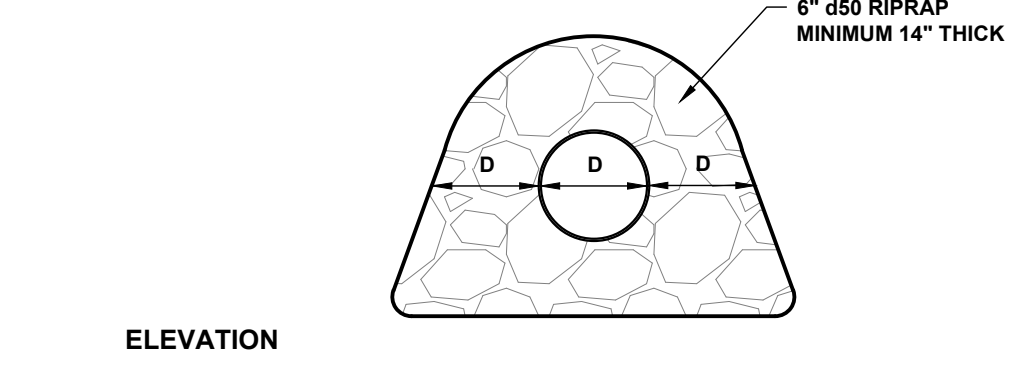


**SILT FENCE & STRAW BALES DETAIL**  
N.T.S.

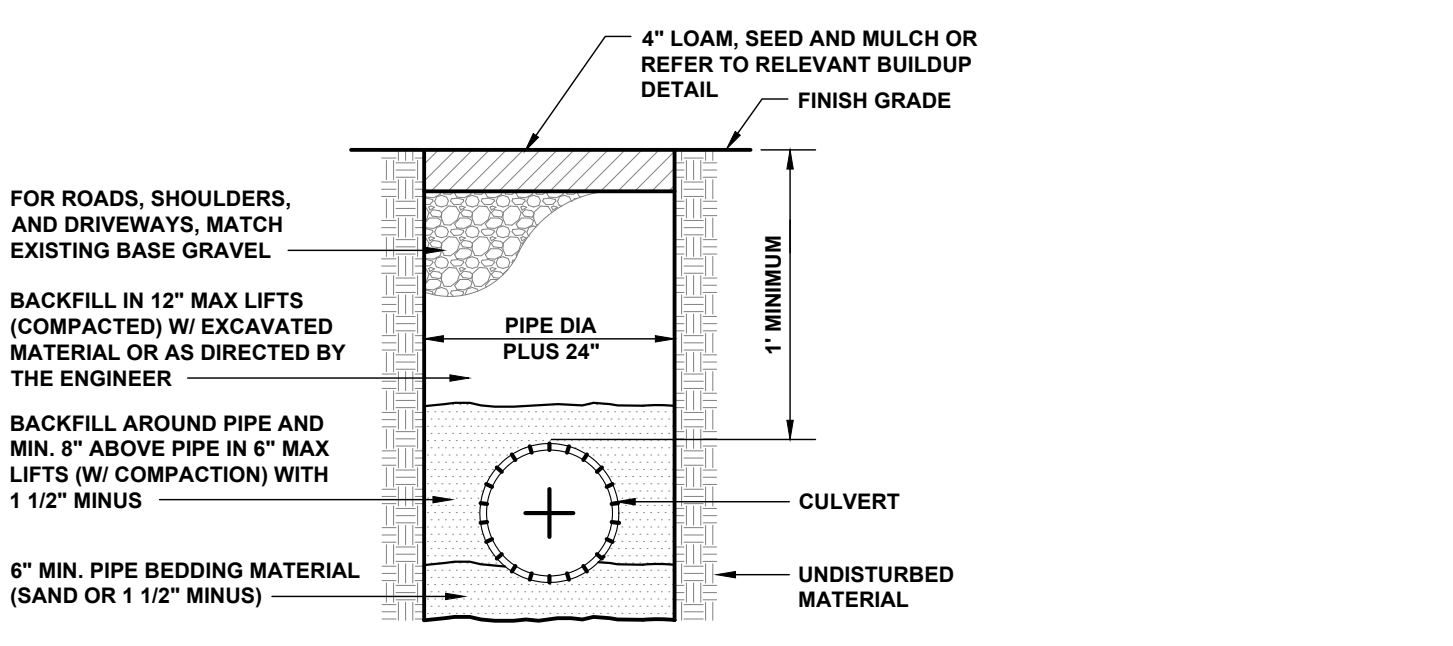


- NOTES:
- CONTRACTOR SHALL ADD STONE TO ENTRANCE AS MUD/SILT MATERIAL ACCUMULATES.
  - ANY SEDIMENT TRACKED OFF SITE SHALL BE CLEANED UP IN A MANNER IN WHICH SEDIMENT DOES NOT CONTAMINATE DOWN GRADIENT WATER RESOURCES.

**STABILIZED CONSTRUCTION ENTRANCE DETAIL**  
N.T.S.

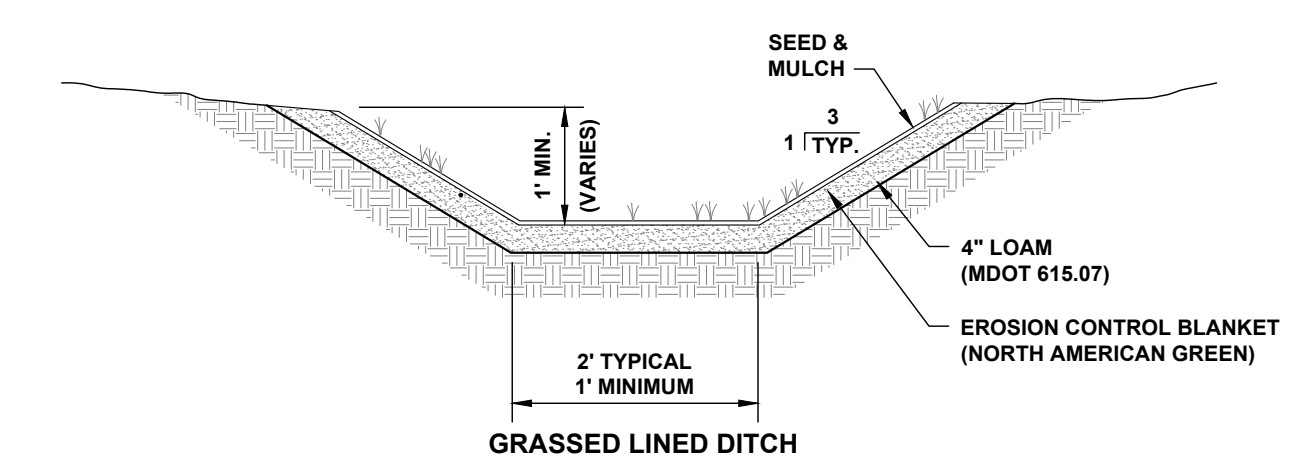
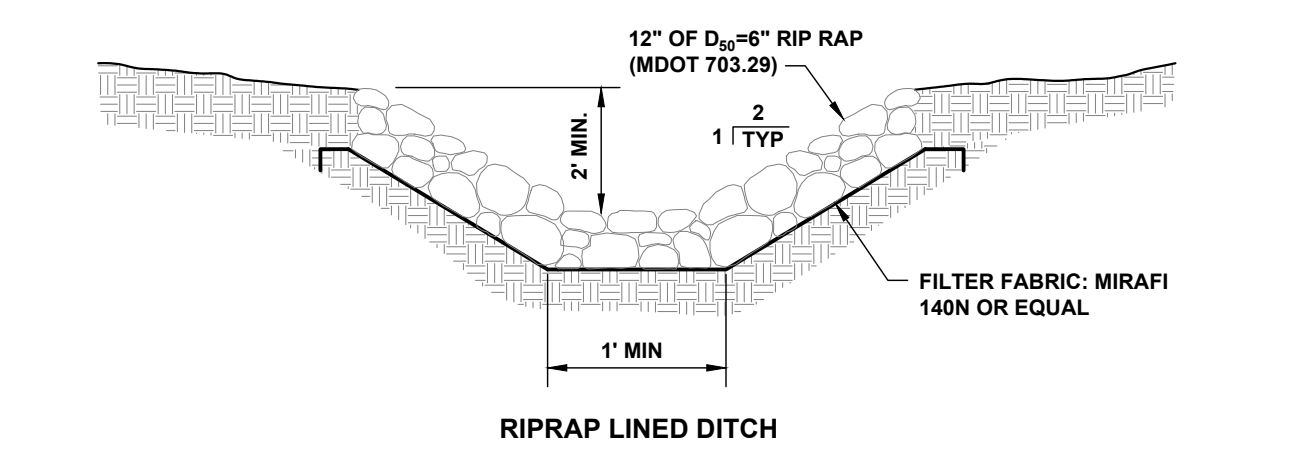


**TYPICAL RIPRAP LINED DITCH**  
N.T.S.



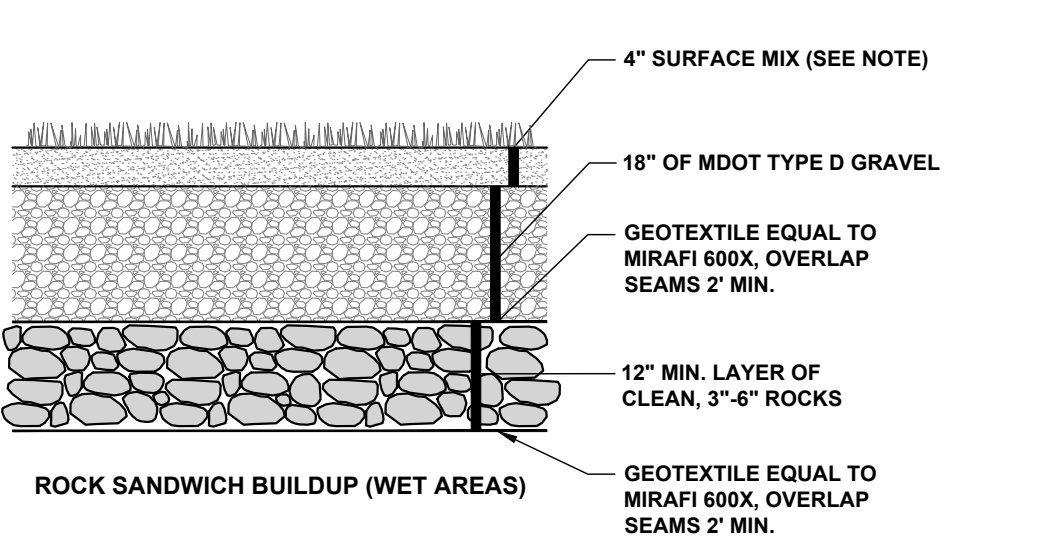
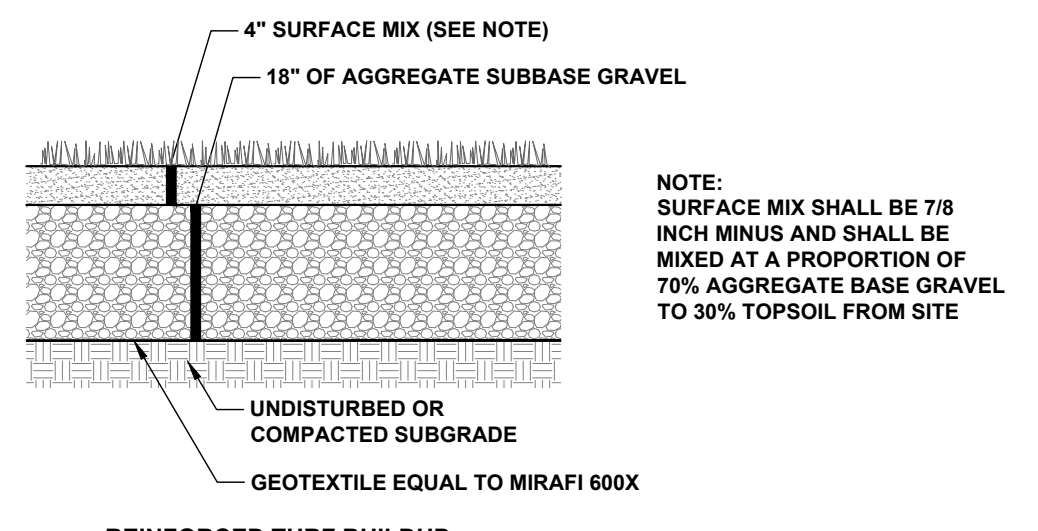
- NOTE:
- PAYMENT LIMITS SHALL BE 6' WIDE (3' EACH SIDE OF CULVERT)

**TYPICAL CULVERT TRENCH DETAIL**  
N.T.S.

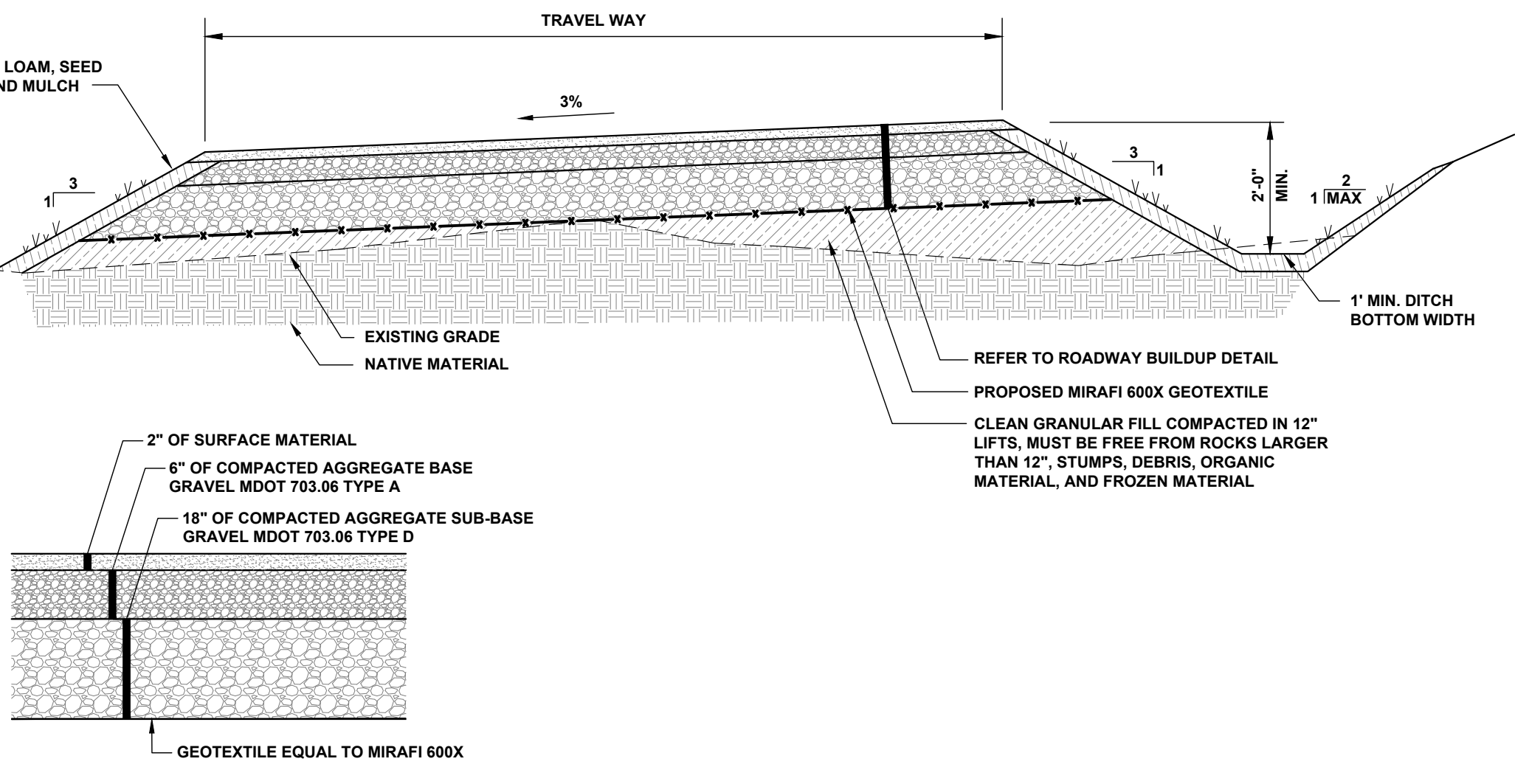


- SIDESLOPE TREATMENT:  
3:1 OR FLATTER: EROSION CONTROL MIX  
3:1 TO 2:1: EROSION CONTROL BLANKET  
2:1 TO 1.5:1: RIP RAP  
1.5:1 = MAX SLOPE

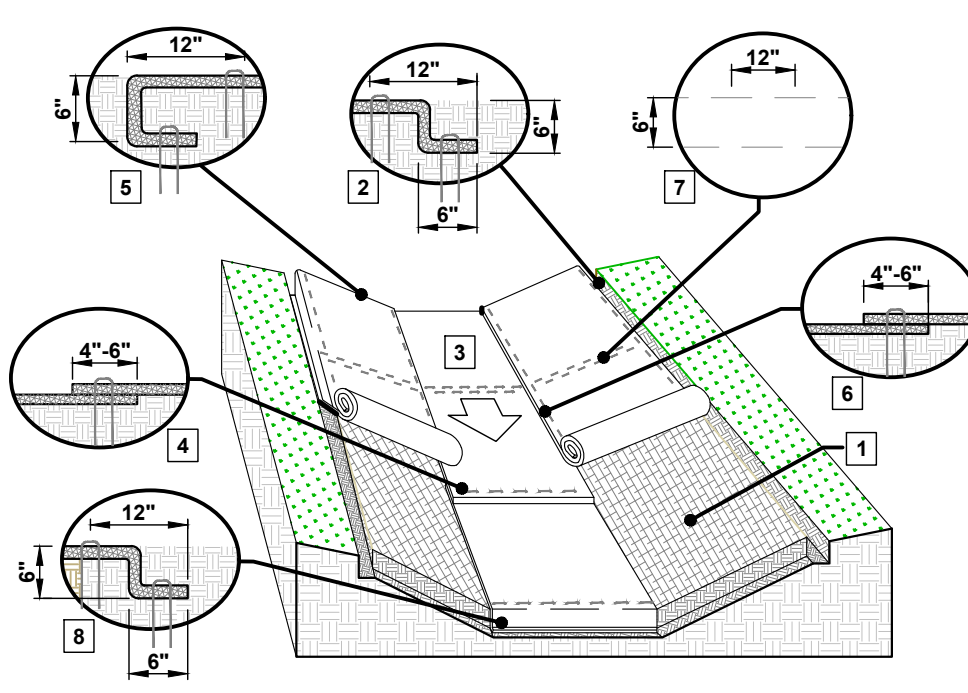
**TYPICAL DITCH DETAILS**  
N.T.S.



**TYPICAL BUILDUP DETAILS FOR LAKE ACCESS AND EMERGENCY EGRESS PATH THROUGH EASEMENT**  
N.T.S.

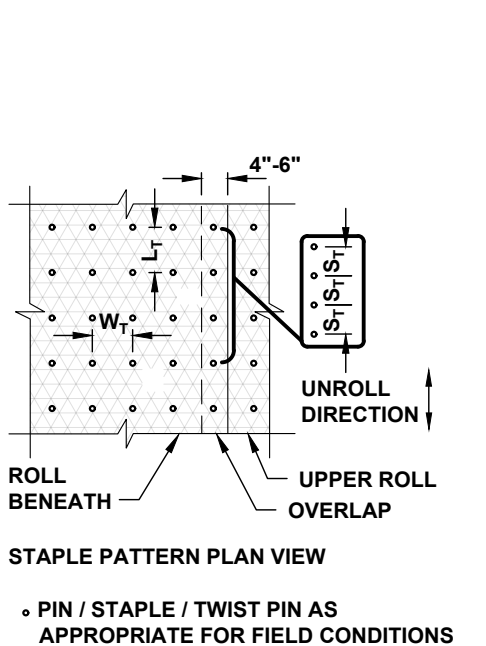


**TYPICAL SUPERELEVATED ROADWAY CROSS SECTION & BUILDUP**  
N.T.S.



- CRITICAL POINTS  
A. OVERLAPS AND SEAMS  
B. PROJECTED WATER LINE  
C. CHANNEL BOTTOMSIDE SLOPE VERTICES
- NOTES:  
\*HORIZONTAL STAPLE SPACING SHOULD BE ALTERED IF NECESSARY TO ALLOW STAPLES TO SECURE THE CRITICAL POINTS ALONG THE CHANNEL SURFACE.

**EROSION CONTROL BLANKET DETAILS**  
N.T.S.

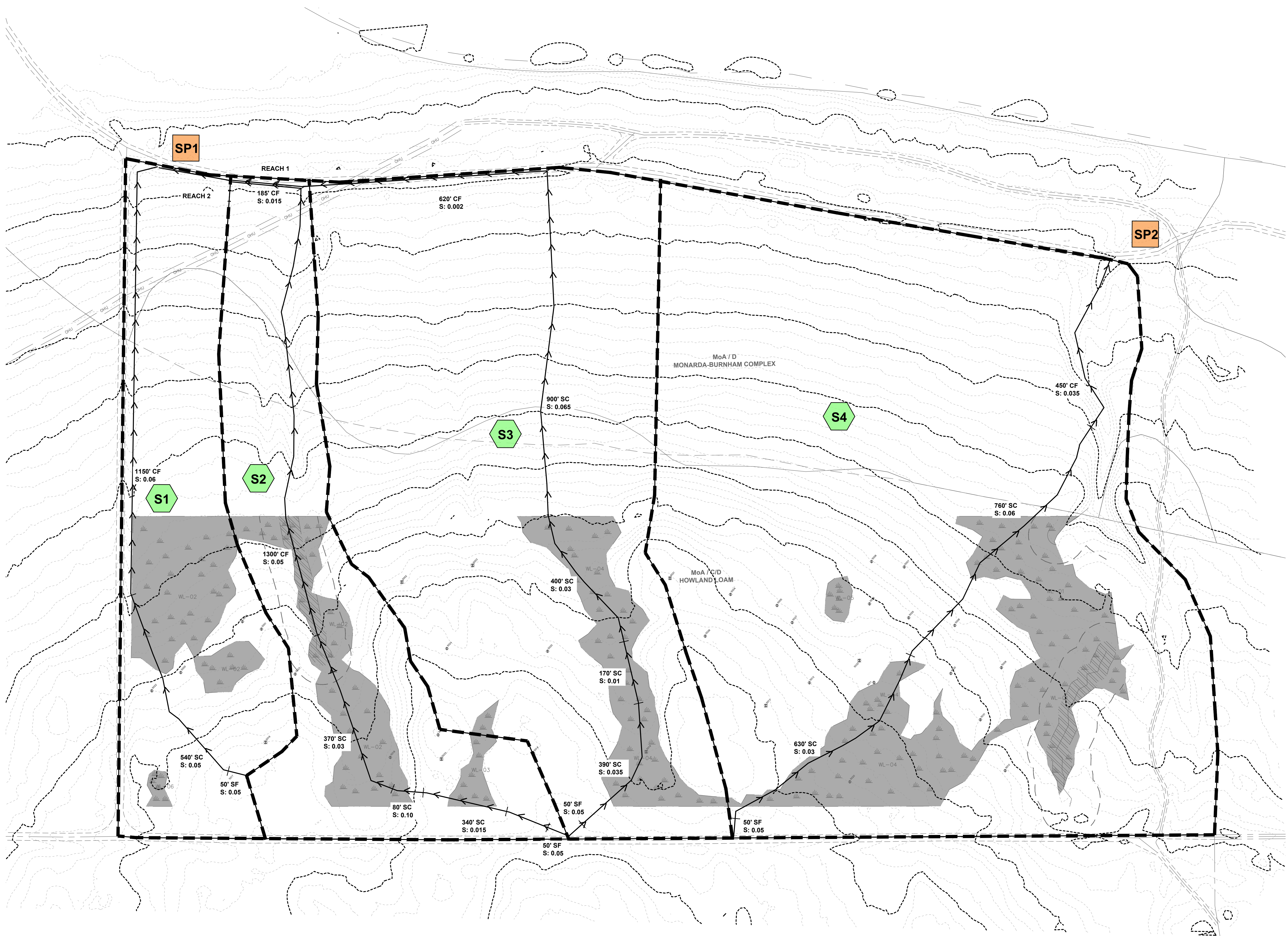


Dimension	Staple Pattern
W <sub>1</sub>	20" (50 cm)
L <sub>1</sub>	20" (50 cm)
S <sub>1</sub>	18" (45 cm)
Nominal Frequency	3.8 / SY

- INSTRUCTIONS**
- PREPARE SOIL BEFORE INSTALLING ROLLED EROSION CONTROL PRODUCTS (RECPs), INCLUDING ANY NECESSARY APPLICATION OF LIME, FERTILIZER, AND SEED. GROUND SURFACE MUST BE FREE OF DEBRIS, ROCKS, CLAY CLODS AND RAKED SMOOTH SUFFICIENT TO ALLOW INTIMATE CONTACT OF THE RECP WITH THE SOIL OVER THE ENTIRETY OF THE INSTALLATION.
  - BEGIN AT THE TOP OF THE CHANNEL BY ANCHORING THE RECPs IN A 6" (15 CM) DEEP X 6" (15 CM) WIDE TRENCH WITH APPROXIMATELY 12" (30 CM) OF RECPs EXTENDED BEYOND THE UP-SLOPE PORTION OF THE TRENCH. USE SHORMAX MAT AT THE CHANNEL/CULVERT OUTLET AS SUPPLEMENTAL SCOUR PROTECTION AS NEEDED. ANCHOR THE RECPs WITH A ROW OF STAPLES/STAPLES/PINS APPROXIMATELY 12" (30 CM) APART IN THE BOTTOM OF THE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING. APPLY SEED TO THE COMPACTED SOIL AND FOLD THE REMAINING 12" (30 CM) PORTION OF RECPs BACK OVER THE SEED AND COMPACTED SOIL. SECURE RECPs OVER COMPACTED SOIL WITH A ROW OF STAPLES/STAPLES/PINS SPACED APPROXIMATELY 12" (30 CM) APART ACROSS THE WIDTH OF THE RECPs.
  - ROLL CENTER RECPs IN DIRECTION OF WATER FLOW IN BOTTOM OF CHANNEL. RECPs WILL UNROLL WITH APPROPRIATE SIDE AGAINST THE SOIL SURFACE. ALL RECPs MUST BE SECURELY FASTENED TO SOIL SURFACE BY PLACING STAPLES/STAPLES/PINS IN APPROPRIATE LOCATIONS AS SHOWN IN THE STAPLE PATTERN GUIDE.
  - PLACE CONSECUTIVE RECPs END-OVER-END (SHINGLE STYLE) WITH A 4" - 6" (10 - 15 CM) OVERLAP. USE A DOUBLE ROW OF STAPLES STAGGERED 4" APART AND 4" ON CENTER TO SECURE RECPs.
  - FULL LENGTH EDGE OF RECPs AT TOP OF SIDE SLOPES MUST BE ANCHORED WITH A ROW OF STAPLES/STAPLES/PINS SPACED AT S<sub>1</sub> APART IN A 6" (15 CM) DEEP X 6" (15 CM) WIDE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING.
  - ADJACENT RECPs MUST BE OVERLAPPED APPROXIMATELY 4" - 6" (10 - 15 CM) AND SECURED WITH STAPLES/STAPLES/PINS AT S<sub>1</sub>.
  - IN HIGH FLOW CHANNEL APPLICATIONS A STAPLE CHECK SLOT IS RECOMMENDED AT 30 TO 40 FOOT (9 - 12M) INTERVALS. USE A DOUBLE ROW OF STAPLES STAGGERED 6" (15 CM) APART AND 12" (30 CM) ON CENTER OVER ENTIRE WIDTH OF THE CHANNEL.
  - THE TERMINAL END OF THE RECPs MUST BE ANCHORED WITH A ROW OF STAPLES/STAPLES/PINS SPACED AT S<sub>1</sub> APART IN A 6" (15 CM) DEEP X 6" (15 CM) WIDE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING.
  - FASTENERS SHOULD PROVIDE A MINIMUM OF TWENTY POUNDS OF PULLOUT RESISTANCE. SIX-INCH (15 CM) X ONE-INCH (2.5 CM) ELEVEN GAUGE STAPLES ARE TYPICALLY ADEQUATE. IN LOOSE SOILS, LONGER STAPLES MAY BE NECESSARY, TWIST PINS CAN PROVIDE THE GREATEST PULLOUT RESISTANCE. IN HARD OR ROCKY SOILS, STRAIGHT PINS MAY BE USED WHERE STAPLES OR TWIST PINS ARE REFUSED, PROVIDED THE MINIMUM PULLOUT REQUIREMENTS ARE MET. BIO-DEGRADABLE FASTENERS SHALL NOT BE USED WITH VMAX (TRM) OR TMAX (HFRM) MATERIALS.

REV	DATE	DESCRIPTION	BLQ	AWH
1	2024.02.22	PER MDEP REVIEW COMMENTS		
DRAWING ISSUE STATUS				
<b>FOR REGULATORY REVIEW NOT FOR CONSTRUCTION</b>				
<p>HALEY WARD ENGINEERING   ENVIRONMENTAL   SURVEYING One Merchants Plaza, Suite 701 Bangor, Maine 04401 207.987.4824</p>				
PROJECT				
<b>IRVING WOODLANDS, LLC.</b> 300 UNION STREET, P.O. BOX 5777, SAINT JOHN, NB E2L 4M3 <b>CROSS LAKE SUBDIVISION</b> T17 R5 CROSS LAKE TOWNSHIP, MAINE				
TITLE				
<b>DETAILS</b>				
DATE		SCALE		N.T.S.
DRAWN BY		DESIGNED BY	CHECKED BY	
BLQ		BLQ/DJO	BJK	
PROJECT No.				
10050.028				
DRAWING No.				
<b>C501</b>				
REV				
<b>1</b>				

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**LEGEND**

- WATERSHED BOUNDARY
- TC FLOW PATH
- SOILS BOUNDARY
- SHEET FLOW
- SHALLOW CONCENTRATED FLOW
- CHANNEL FLOW
- SUB-CATCHMENT I.D.
- STORMWATER STUDY POINT

1	2024.02.22	PER MDEP REVIEW COMMENTS	BLQ	JHW
REV.	DATE	DESCRIPTION	BY	CHK.

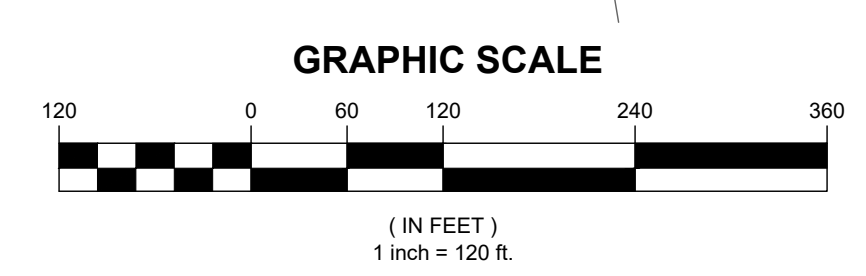
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NOT FOR CONSTRUCTION**

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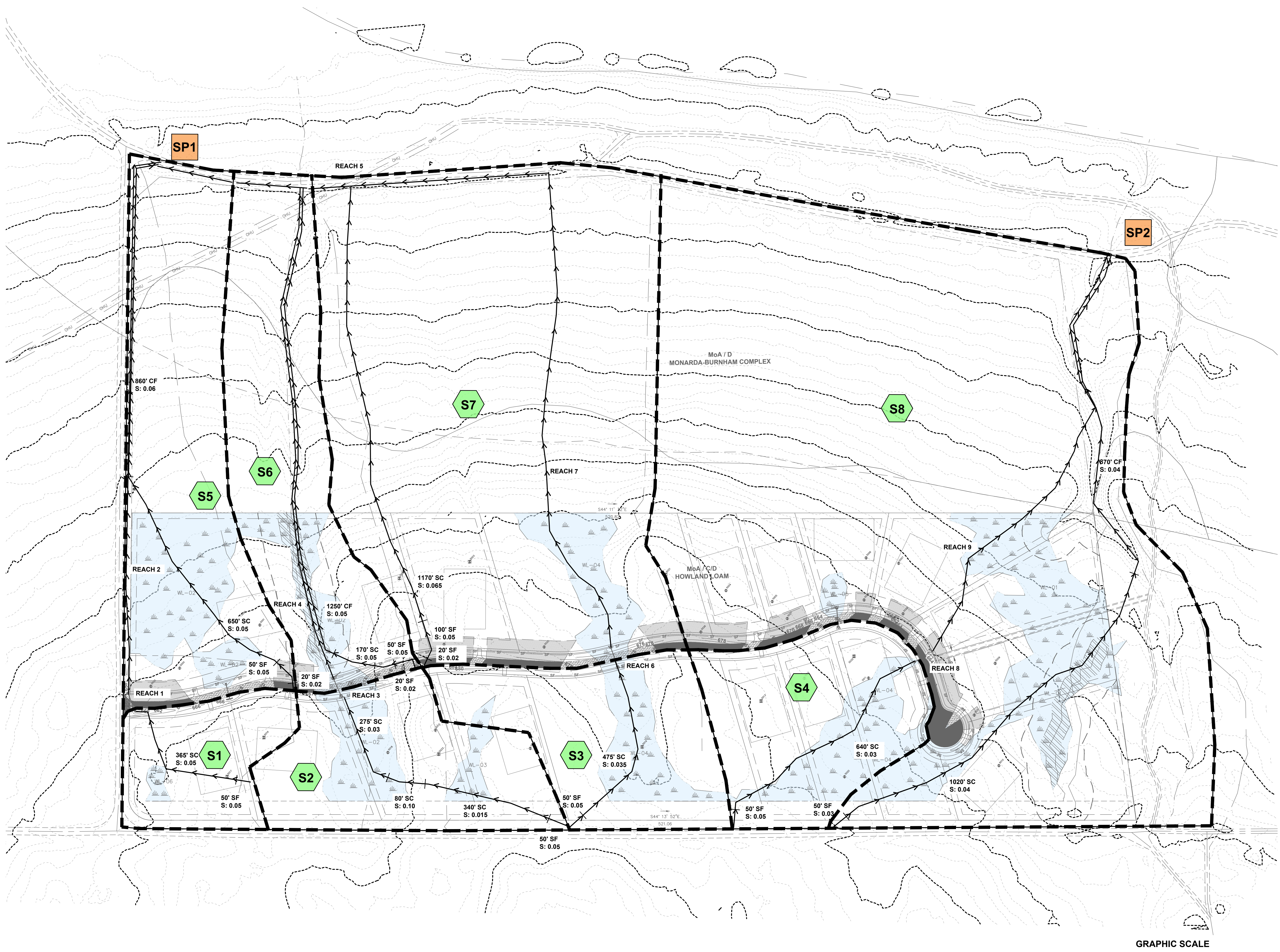
PROJECT  
**IRVING WOODLANDS, LLC.**  
300 UNION STREET, P.O. BOX 5777, SAINT JOHN, NB E2L 4M3  
**CROSS LAKE SUBDIVISION**  
T17 R5 CROSS LAKE TOWNSHIP, MAINE

TITLE  
**PRE DEVELOPMENT HYDROLOGY PLAN**

	DATE	2023.10.06	SCALE	1"=120'
	DRAWN BY	PJM	DESIGNED BY	BLQ/DJO
	CHECKED BY	BLQ/DJO	PROJECT No.	10050.028
	DRAWING No.	<b>C701</b>		REV.



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**LEGEND**

WATERSHED BOUNDARY	---
TC FLOW PATH	→→→→
SOILS BOUNDARY	---
SHEET FLOW	SF
SHALLOW CONCENTRATED FLOW	SC
CHANNEL FLOW	CF
SUB-CATCHMENT I.D.	S1
STORMWATER STUDY POINT	SP1

REV	DATE	DESCRIPTION	BY	CHK
1	2024.02.22	PER MDEP REVIEW COMMENTS	BLQ	JHW

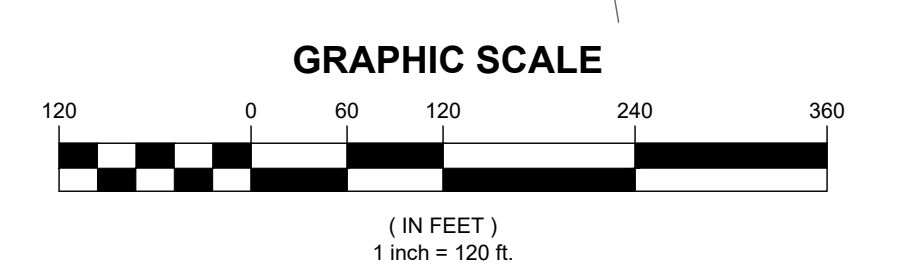
**FOR REGULATORY REVIEW  
NOT FOR CONSTRUCTION**

**HALEY WARD**  
ENGINEERING | ENVIRONMENTAL | SURVEYING  
One Merchants Plaza, Suite 701  
Bangor, Maine 04401  
207.989.4824  
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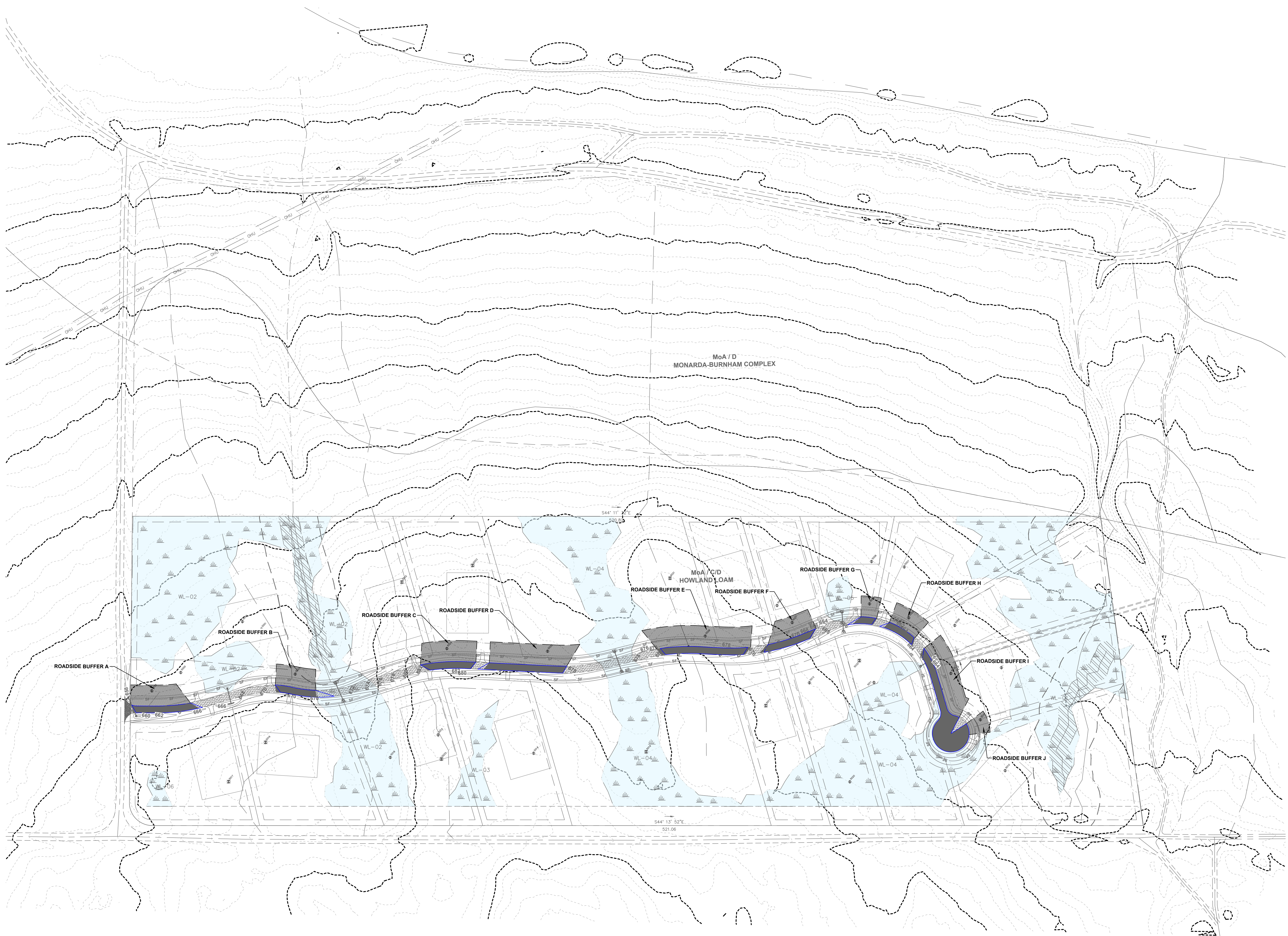
PROJECT  
**IRVING WOODLANDS, LLC.**  
300 UNION STREET, P.O. BOX 5777, SAINT JOHN, NB E2L 4M3  
**CROSS LAKE SUBDIVISION**  
T17 R5 CROSS LAKE TOWNSHIP, MAINE

TITLE  
**POST DEVELOPMENT HYDROLOGY PLAN**

	DATE	2023.10.06	SCALE	1"=120'
	DRAWN BY	PJM	DESIGNED BY	BLQ/DJO
	CHECKED BY	BLQ/DJO	PROJECT NO.	10050.028
	DRAWING NO.	<b>C702</b>	REV.	<b>1</b>



FILE LOCATION: P:\METRO\IRVINGWOODLANDS\CROSS LAKE\_CAMP\_3\SUBDIVISION\020-CAD\_FILES\CAD\10050-020-C-HYDRO-TREATMENT.DWG, 2024.02.21, 4:43 PM



STORMWATER QUALITY TREATMENT		
Roadside Buffer A	2,865 SF	6,542 SF
Roadside Buffer B	1,908 SF	4,800 SF
Roadside Buffer C	2,314 SF	6,314 SF
Roadside Buffer D	3,499 SF	9,217 SF
Roadside Buffer E	4,165 SF	10,599 SF
Roadside Buffer F	2,451 SF	6,007 SF
Roadside Buffer G	843 SF	2,375 SF
Roadside Buffer H	1,508 SF	4,484 SF
Roadside Buffer I	6,461 SF	12,302 SF
Roadside Buffer J	3,546 SF	5,005 SF
<b>TOTAL</b>	<b>29,760 SF (0.68 acres)</b>	<b>67,647 SF (1.55 acres)</b>
<b>PERCENT OF TOTAL AREA TREATED</b>	<b>75.00%</b>	<b>54.34%</b>

**LEGEND**

- WATERSHED BOUNDARY: Dashed line
- TC FLOW PATH: Solid line with arrows
- SOILS BOUNDARY: Dotted line
- SHEET FLOW: SF
- SHALLOW CONCENTRATED FLOW: SC
- CHANNEL FLOW: CF
- SUB-CATCHMENT I.D.: Green hexagon with 'S1'
- STORMWATER STUDY POINT: Orange square with 'SP1'

REV.	DATE	DESCRIPTION	BY	CHK.
1	2024.02.22	PER MDEP REVIEW COMMENTS	BLQ	JHW

**FOR REGULATORY REVIEW  
NOT FOR CONSTRUCTION**

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**IRVING WOODLANDS, LLC.**  
300 UNION STREET, P.O. BOX 5777, SAINT JOHN, NB E2L 4M3  
**CROSS LAKE SUBDIVISION**  
T17 R5 CROSS LAKE TOWNSHIP, MAINE

**STORMWATER TREATMENT PLAN**

	DATE	2023.10.06	SCALE	1"=120'
	DRAWN BY	PJM	DESIGNED BY	DJO
	CHECKED BY	BJK	PROJECT No.	10050.028
	DRAWING No.	<b>C703</b>	REV.	<b>1</b>