CES INC Engineers • Environmental Scientists • Surveyors

LETTER OF TRANSMITTAL

Date: March 3, 2016 **JN:** 10973.002

To: Town of Hampden
Attn: Dean Bennett
Comm & Econ Develop Director
106 Western Avenue
Hampden, ME 04444

Re: Solid Waste Processing Facility
Coldbrook Road
Hampden, Maine

WE ARE SENDING YOU

☒ ATTACHED ☐ BY EMAIL ☐ UNDER SEPARATE COVER _____

COPIES	DATE	DESCRIPTION
8	March 4, 2016	Site Plan Review Application
1	2/26/2016	Application Fee (Ck #58336 - $500.00)

THESE ARE TRANSMITTED AS CHECKED BELOW:

☒ For Approval
☐ For Your Use
☐ As Requested
☐ For Review and Comment
☐ Other

☐ Approved as Submitted
☐ Approved as Noted
☐ Returned for Corrections
☐ For Bids Due_____20____

☐ Resubmit___Copies for Approval
☐ Submit___Copies for Distribution
☐ Return___Corrected Prints
☐ Prints Returned After Loan to CES

Remarks:

Copy To: _____ Signed: Sean Thies, PE (gdr)

465 South Main Street
PO Box 639
Brewer, Maine 04412
T 207.989.4824
F 207.989.4881

CES INC

58336

Re.

Check Total: $500.00

02/26/2016

Pay To Town Of Hampden

Invoice No.	Invoice Date	Invoice Amount	Amount Due	Discount	Apply	Balance
2016 02 26 Rev.Appl.	02/26/2016	500.00	500.00	0.00	500.00	0.00

CES INC

P.O. BOX 639
BREWER, ME. 04412
(207) 989-4824

MACHIAS SAVINGS BANK

52-7453/2112

58336

Five Hundred and 00/100 Dollars

DATE

2/26/2016

AMOUNT

$500.00

PAY TO THE ORDER OF

Town Of Hampden
106 Western Avenue
Hampden, ME 04444

Security Features Details on Back.

AUTHORIZED SIGNATURE

MP

SENSIBLE SOLUTIONS

CES INC

HAMPDEN SITE PLAN REVIEW APPLICATION PER ARTICLE 4 - GENERAL REGULATIONS

FOR

SOLID WASTE PROCESSING FACILITY
Coldbrook Road, Hampden, Maine

Tax Map 9, Lot 35-39 | Tax Map 14, Lot 7
Book 2838, Page 171 | Book 9145, Page 295
Book 4822, Page 251 | Book 9245, Page 295

Applicant: Municipal Review Committee, Inc.
& Fiberight, LLC
395 State Street
Ellsworth, ME 04605
207.664.1700

STATE OF MAINE
SEAN M. THIES
No. 10139
LICENSED
PROFESSIONAL ENGINEER

MARCH 3, 2016
JN: 10973.002

Application Prepared By:
CES, Inc.
465 South Main Street
P.O. Box 639
Brewer, ME 04412
207.989.4824

Corporate Office
465 South Main Street
PO Box 639
Brewer, Maine 04412
207.989.4824

www.ces-maine.com

Engineers ◆ Environmental Scientists ◆ Surveyors

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SITE PLAN - PERMITTED/CONDITIONAL USE APPLICATION

Please note that this application must be submitted with plans in conformance with Section 4.1 and 4.2 of the Hampden Zoning Ordinance. ***Incomplete applications will not be processed. All fees must be paid for application to be processed. Proper number of copies of application must be submitted in order to be processed.*** All town ordinances are available at www.hampdenmaine.gov for review.

Date: 3/1/2016

APPLICANT:

Name: Municipal Review Committee, Inc. / Fiberight,LLC

Address: 395 State Street, Ellsworth, Maine 04605

Phone: 207-664-1700 **Cell:** _____ **Email:** glounder@mrcmaine.org

AGENT:

Name of agent or representative: Sean Thies, P.E. (CES, Inc.)

Address: 465 South Main Street, P.O. Box 639, Brewer, Maine 04412

Phone: 207-989-4824 **Cell:** _____ **Email:** sthies@ces-maine.com

THE SITE:

Location of site: Coldbrook Road **Hampden tax map and lot number:** map 09 lot 35-39 map 14 lot 07

Zoning district: Industrial/Interchange **Existing use of property:** Undeveloped

Legal interest in the parcel: Option Agreement

Owner of parcel if other than applicant: H.O. Bouchard

Owner's address: 349 Coldbrook Road, Hampden, ME 04444

PROPOSED PROJECT:

Proposed use of property: Proposed Solid Waste Processing Facility. Please see attached narrative for more information

(Please include floor area per use, seating if applicable, and land area).

Proposed starting date: June 2016 **Final completion date:** Fall 2017

(APPLICATION CONTINUES ON REVERSE SIDE.)

Will your project result in more than one acre of disturbed land area? [X] Yes [ ] No.

If yes, you are required to obtain either a Construction General Permit or Stormwater Permit by Rule from the Maine Department of Environmental Protection. If you are in the Urbanized Area of Town and discharge stormwater to the Municipal Separate Storm Sewer System (MS4) a Post-construction Stormwater Management Application shall be submitted to the Town pursuant to the Town of Hampden Post-construction Stormwater Management Ordinance.

FEES: **Application fee is:** *$75.00* for structures under 3,000 sq. ft. and total site improvements under 5,000 sq. ft.; *$150.00* for structures between 3,000 and 20,000 sq. ft. and total site improvements under 50,000 sq. ft.; and *$500.00* for structures in excess of 20,000 sq. ft. and more than 50,000 sq. ft. of site improvements.
Application fee amount: $500.00

Draw account contribution: The Town of Hampden requires applicants to provide *$600.00* for the Town to hire an engineer to review their plans and, if necessary, *$1,000.00* for an engineer to review their traffic analysis. **Draw account contribution is:**_____ *(Any unspent portion of the draw account will be returned to applicant, however,* ***if additional funds are required, applicant agrees to cover all costs that the Town of Hampden may incur. Complete and accurate submissions require less time to review.)***

CERTIFICATION: By signing this form I certify that the information provided on these plans, text, and associated testimony is true and correct. I certify that all site improvements will be constructed in strict conformance with Planning Board approved plans. Furthermore, I acknowledge that if the constructed site improvements are not built in accordance with the zoning ordinance and Planning Board approved plans that I am obliged to take corrective action that may include obtaining a revised Planning Board approval or the removal of non-conforming uses and structures and site improvements. *(Agents that lack authority to certify said items should not sign this form.)*

Signature:_____ **Date:** March 2, 2016

****

OFFICE USE ONLY

Date received:_____ Date complete:_____

Fees paid: Amount/Date:_____ Draw paid: Amount/Date:_____

Conditional Use determination:_____

Planning Board action:_____ Date:_____

Conditions:_____

ARTICLE 4 - GENERAL REGULATIONS

SECTION 4.1.6 REQUIRED INFORMATION ON PLANS

Please refer to attached Sheets C-101 through C-103 for the required plan information. We are requesting a waiver from requirement 4.1.6.14-Location of trees of 12-inch diameter and over, at a point 4½-feet above ground level. The entire site is wooded. We are not proposing to keep any trees within the proposed facility development area other than within the buffer areas where possible. It is not practical to locate all trees of this size.

SECTION 4.1.7 STANDARDS GOVERNING SITE PLAN REVIEW

4.1.7 - 1

The proposed development will include a 144,000 square foot solid waste Processing Facility, 9,800 square foot Administration Building, associated parking and maneuvering areas, and an access road approximately 4,600 feet in length connecting the facility to Coldbrook Road. The proposed facility will be located in the Industrial Zone along with the majority of the access road. A small portion of the access road near Coldbrook Road is located in the Interchange Zone. According to the Town of Hampden Zoning Ordinance, this facility meets the requirements of a Conditional Use in the Industrial Zone. Three Proposed Site Plans at varying scales have been included in **Appendix 9** of this application.

4.1.7 - 2

The proposed area is currently wooded and undeveloped. The nearest developments are the interstate approximately 1,800 feet to the north and a residential neighborhood approximately 3,400 feet to the south. The proposed facility will be screened visually by trees and topography from all surrounding developments. The site has been carefully selected and designed to minimize the impact to the surrounding area and the natural drainage ways.

4.1.7 - 3

Please see the attached Traffic Narrative in **Appendix 1** as submitted in the Solid Waste Permit Application to the Maine Department of Environmental Protection (MDEP).

4.1.7 - 4

The site has been designed for the safe maneuvering of both passenger vehicles as well as large trucks. As such, the site also provides ample access for emergency vehicles to all sides of the building. The areas where pedestrians are expected will be in the passenger vehicle parking lot that will be separate from any truck traffic. Plowed snow can easily be stored in a number of areas outside of the paved roads and parking areas. The only locations that should not be used for snow storage are the three vegetated underdrained soil filters and any other important stormwater conveyances.

4.1.7 - 5

The Applicant is proposing to install an unlit sign on the northeast side of the entrance not to exceed 100 square feet in size. There will be lighting associated with the facility. The attached lighting diagram in **Appendix 8** identifies the locations of the proposed lights and shows that there will be no impact at the property lines resulting from these lights.

4.1.7 - 6
See **4.1.7 – 2** above

4.1.7 - 7
Both the site and the access road locations were carefully selected to minimize disturbance to surrounding natural resources. The access road was designed to utilize the footprint of an existing unimproved gravel road. The site was selected and designed to fit into the existing contours with minimal cut and fill.

4.1.7 - 8
All man-made or disturbed slopes proposed as part of this project will be stabilized with vegetation or, in the case of culvert outlets, rip rap. The slopes for this project are generally quite gradual with the steepest portion having a 3:1 slope.

4.1.7 - 9
The stormwater treatment system for the site was designed in accordance with Maine Chapter 500 regulations requiring that the development treat at least 95% of the proposed impervious area, 80% of the developed area, and that the post-development runoff rate will not exceed that of the pre-development condition. This development utilizes three vegetated underdrained soil filters to treat the quality of the stormwater prior to it leaving the site. These soil filters also detain the runoff and release it at a controlled rate not to exceed the pre-development flow rate. Please refer to the attached Stormwater Control narratives in **Appendix 2** as submitted in the Solid Waste Permit Application to the MDEP. The roadway itself is required to treat 75% of the impervious area and 50% of the total developed area. To accomplish this, the roadway will be treated by a series of six Filterra treebox filters. Please refer to the attached General Standards narrative in **Appendix 3** as submitted in the Stormwater Permit Application to the Maine DEP. Finally, a copy of the Maintenance Agreement for the stormwater treatment devices is included in **Appendix 4.**

4.1.7 - 10
No known existing areas of scenic or natural beauty, or rare or irreplaceable historic sites were found during our inquiries to the Maine Natural Areas Program or the Maine Historic Preservation Commission.

4.1.7 - 11
The proposed development will not impose an unreasonable burden on the affected utilities. The development will require a water supply as part of operations. We have included a copy of the letters from the Hampden Water District, Hampden Sewer Department, and Bangor Wastewater Treatment Plant in **Appendix 5** of this application stating their capacity to meet the projected demand.

4.1.7 - 12
As shown on the plan, all proposed features of the site are located within their respective setbacks. Furthermore, the development is located approximately 3,400 feet from the nearest residential area. The majority of that distance is heavily wooded, creating a very effective buffer for any audio/visual sources created by the development.

According to the MDEP Noise Standards in Chapter 400 the noise generated from the routine operation of the proposed solid waste processing facility must be less than or equal to 70 dBA for daytime and 60 dBA for nighttime hours at the facility property boundary. Additionally, there are no protected locations as defined in Ch. 400, § (1) Ii within, or in, the vicinity of the facility property boundary.

As it relates to the MDEP Solid Waste submission, the applicable noises in the thresholds are limited to routine operations of the solid waste facility. See 06-096 Ch. 400, § 4.F(2); see also 06-096 Ch. 400, § 4.F(2)(e) (listing exempt sounds). As a result, all applicable noise generating equipment will be located inside the proposed building; at no time will processing activities take place outside. We do not expect any significant impact to the noise levels at the property boundary or surrounding areas.

4.1.7 - 13
The proposed use of this development limits processing to within the building footprint which will eliminate any potential affect to surface water quality, groundwater quality and quantity, soil quality, or air quality. Furthermore, as discussed earlier, several stormwater treatment devices will be constructed to treat both the quantity and quality of the stormwater from the site prior to discharging.

SECTION 4.2.3 STANDARDS GOVERNING CONDITIONAL USE PERMITS

4.2.3 - 1
The proposed use complies with all provisions in this ordinance. Furthermore, the proposed operation of this facility complies with the performance standards previously discussed.

4.2.3 - 2
The proposed use of this development is a Solid Waste Processing Facility. As such, no regular collection of solid waste material will be required. As for the operational processing of solid waste, all activities will be under cover, within the footprint of the proposed building.

4.2.3 - 3
As previously stated, the proposed development is located approximately 1,800 feet from Interstate-95, the closest existing development. It will also be approximately 3,100 feet from the nearest residential area. It is located in an industrial zone and will be an industrial use. All operations will occur within the building. As such, from the outside, the building will be in keeping with other industrial uses. Due to the natural topography and size of the forest on all sides there should be no substantial devaluing of abutting properties resulting from this proposed development.

4.2.3 - 4
As stated in **4.1.7 - 12**, we do not expect the proposed development to cause any unreasonable noise impacts to surrounding properties. We have included a copy of the Air Emissions section of the MDEP Solid Waste Application in **Appendix 6** of this application. This document demonstrates the plan for controlling and monitoring of air quality. Furthermore, the proposed lighting at the facility meets all MDEP requirements and will not have any impact at the property line. Please see the attached lighting diagram in **Appendix 8** of this application.

4.2.3 - 5

Please see the Attached Traffic Narrative in **Appendix 1** submitted in the Solid Waste Permit Application to the Maine Department of Environmental Protection (MDEP). This project does not generate enough traffic to warrant a Traffic Movement Permit from the Maine DOT.

4.2.3 - 6

Due to the proximity of this development to abutting developments, there is no concern of denying abutters access to light or air.

4.2.3 - 7

a) There will be no impact to the level of safe and healthful conditions resulting from this project, as it will be entirely self-contained.
b) The proposed development will not cause water pollution, erosion, or sedimentation. All operations will be conducted inside the building footprint and controls have been designed throughout this development to treat the stormwater for quantity and quality prior to it leaving the site. During and after construction, the site will be stabilized using appropriate methods to prevent erosion and sedimentation.
c) The proposed site was carefully located to minimize disruption to wetlands and avoid vernal pools. The site has been permitted through the MDEP for any proposed disturbance to these resources.
d) This section is not applicable due to the distance from this site to any body of water.

4.2.3 - 8

Financial Capacity - MRC and Fiberight as co-applicants have made shared financial commitments to ensure necessary funding is available for the Project. As discussed in **4.1.7 - 1**, this application focuses on a 90 +/- acre parcel for the development of a proposed 144,000 square foot processing facility. In addition to the Facility parcel, MRC has sufficient interests to acquire property to construct a 4,600 foot access road to the proposed Facility.

In general, MRC will be responsible to secure fee ownership or long term control of the Project Site appropriate for development of the Project and shall lease or sublease the Project Site to Fiberight under a long term agreement having terms and conditions that support the development, financing, construction, and operation of the Facility, with appropriate oversight by MRC.

Fiberight and its affiliates and/or joint partners shall own the Facility and be responsible for the design, engineering, acquisition of permits (including closure and post-closure), procurement of equipment, financing, construction, start-up, testing, commissioning, operations, and maintenance thereof.

The current cost estimates for portions of the development project for which MRC has conditionally committed funding total approximately $4,230,000. MRC intends to self-finance these funds through a Tip Fee Stabilization Fund.

The current cost estimates for portions of the development project for which Fiberight will be responsible total approximately $67,000,000. Fiberight has partnered with a national energy utility affiliate (Covanta) to provide the necessary funding to complete the project.

Technical Capacity - Daily operations of the Facility are the ultimate responsibility of Fiberight who has demonstrated the ability to operate similar MSW processing facilities located in Virginia and Iowa. CES has been retained by Fiberight to prepare this Application and will remain available to provide ongoing environmental compliance assistance when needed. Included in **Appendix 7** of this application are resumes of those individuals responsible for the facility design, construction, and operation. These resumes demonstrate significant experience as it pertains to the management and operation of the Hampden, Maine facility.

MRC has demonstrated they have the technical ability to manage the affairs and concerns of their 187 municipal members. The member-led MRC has successfully managed the current 30-year contract with the Penobscot Energy Recovery Corporation (PERC) waste-to-energy facility in Orrington for the current 187 Maine communities since formed in 1991. Since that time, MRC has worked with the PERC partnership to improve facility operating and economic performance and have worked with the private owners of PERC to upgrade the facility, achieve a high level of environmental performance, and keep disposal costs down. MRC has also successfully purchased, on behalf of the Equity Charter Municipalities, a 23 percent ownership interest in the PERC facility in incremental steps between 1999 and 2004. This ownership interest in PERC has been managed by the MRC from 1999 to the present time. As part of its function, MRC monitors the PERC facility's performance on an ongoing basis through review of weekly and monthly performance reports; reviews of and votes on the facility's annual operating budget; reviews of and votes on decisions to invest in capital and major maintenance projects; and oversight of actions taken and investments made to ensure that potential environmental impacts are avoided or mitigated appropriately.

As part of their oversight of the PERC plant, MRC has retained the services of CommonWealth Resource Management Corporation (CRMC) for assistance to plan and implement programs, facilities, systems and services for managing waste streams, for recovering value from waste, and for utilizing renewable and other energy resources in ways that are environmentally responsible and economically sound. CRMC has also been retained by MRC since 1991 to provide consulting with respect to the needs of the MRC and PERC partnership. CRMC has over 32 years of experience in management and environmental consulting focusing on issues and opportunities related to resource conservation, recovery, and utilization. CRMC is also a developer of specialized energy and environmental projects on its own and through strategic partnerships. CRMC will continue to be part of the MRC team and provide necessary services to assist MRC and Fiberight in accomplishing their goals related to design, construction, operation, and maintenance of the proposed Facility. Included in **Appendix 7** of this application is a biography and resume for the CRMC Principal.

4.2.3 - 9

This section is not applicable as the proposed development is not a home occupation.

SECTION 4.4 PERFORMANCE STANDARDS

4.4.1

As stated in **4.2.3 - 4**, we have included a copy of the Air Emissions section of the MDEP Solid Waste Application in **Appendix 6** of this application. This document demonstrates the plan for controlling and monitoring of air quality. The project meets this standard as designed

4.4.2

Due to the nature of the proposed project it will note produce any electromagnetic interference.

4.4.3

The proposed site and building have been designed to meet applicable Federal, State, and local fire safety standards. The project will be required to submit plans to the State Fire Marshal's office prior to issuance of a Building Permit.

OPTION TO PURCHASE

H. O. Bouchard, Inc., a Maine corporation with a place of business in Hampden, Maine and **Hickory Development, LLC**, a Maine limited liability company with a place of business in said Hampden (hereinafter collectively referred to as *Seller*), grants to **Municipal Review Committee, Inc.**, a Maine nonprofit corporation with a place of business in Ellsworth, Maine (hereinafter referred to as *Buyer*), an option to purchase, upon the terms and conditions set forth below, the real estate, together with any improvements thereon and all easement and access rights thereto, including those described in conveyances to Seller and those exercised by Seller, located easterly of Coldbrook Road in **Hampden, Penobscot County, Maine**, generally depicted on Exhibit A attached hereto, together with an easement for a right of way for all purposes, including utility services, along the private road depicted on Exhibit A (hereinafter collectively referred to as *the Property*).

TERMS AND CONDITIONS:

1. Option Term. This Option shall be for a term commencing on the date of this agreement through March 31, 2017. This Option shall expire if not exercised on or before March 31, 2017.

2. Exercise of Option. Buyer shall exercise this Option, if at all, at any time during the term of this Option, and any renewals thereof, by giving written notice delivered by hand or by certified mail, return receipt requested, at the address provided below. Upon exercise of this option, the terms and provisions herein shall govern the purchase and sale of the Property.

3. Option Consideration. Buyer shall pay to Seller an initial option consideration of twelve thousand dollars ($12,000.00), payable within five (5) business days after Seller's execution of this agreement. Upon exercise of this Option, the initial option consideration and any additional option consideration shall be deemed an earnest money deposit and applied toward the purchase price. Except as provided herein, if the Option is not exercised, the Option Consideration shall be retained by Seller.

4. Restrictions during Option Term. During the term of this Option, and any renewals thereof, and prior to closing, Seller agrees not to sell the Property, offer to sell, mortgage, encumber, or otherwise transfer or dispose of or alter the Property without prior written consent of Buyer.

5. Inspection. Within thirty (30) days of the date of this agreement, Seller shall provide Buyer with copies of all existing engineering and environmental site assessments and reports. Seller grants to Buyer, Buyer's duly authorized agents and employees, the right, during the term of this Option and prior to Closing to enter upon the Property to conduct whatever tests and inspections of the Property that Buyer deems necessary. In the event the results of such tests and inspections are unsatisfactory to Buyer, Buyer may terminate this agreement upon written notice to Seller, which

written notice must be delivered to Seller not later than twenty (20) days prior to closing. Buyer shall defend, indemnify and hold Seller harmless from and against any and all claims, demands, suits and actions of any person or entity arising out of Buyer's tests and inspections.

6. Property. Prior to exercise of the Option by Buyer, if any, Buyer shall cause the Property to be surveyed by a licensed Maine surveyor. The survey shall depict:

a. a parcel of land containing not less than ninety (90) acres and not more than one hundred twenty (120) acres in substantially the same location and configuration as depicted on Exhibit A, and bounded northeasterly by land and/or easements now or formerly of Bangor Hydro Electric Company, bounded southerly and southwesterly by land now or formerly of Seller, and bounded northerly by the centerline of said private road referred to above; and

b. a private road leading from Coldbrook Road to the northeasterly corner of the Property. The width of said private road shall be not less than the width required by any laws, rules and regulations applicable to Buyer's intended use of the Property.

The final configuration and location of the parcel of land and the private road will be determined by a joint evaluation of the parties, including a determination as to the most favorable location for said private road and utility connections, and is subject to Seller's approval which shall not unreasonably be withheld, conditioned or delayed.

UPON EXERCISE OF THIS OPTION, THIS AGREEMENT SHALL BE CONSIDERED A PURCHASE AND SALE AGREEMENT AND THE FOLLOWING PARAGRAPHS 1 - 6 SHALL APPLY TO CONVEYANCE OF THE PROPERTY.

1. Purchase Price. The total purchase price for the Property shall be based on the valuation of $3,300.00 per acre. For purposes of determining the Purchase Price, the number of acres comprising the Property as finally configured will be rounded up or down to the nearest whole acre. After application of the option consideration/deposit, the remaining purchase price shall be paid to Seller with cash or by bank check or certified check at closing.

2. Deed. At the closing of the sale, Seller shall deliver to Buyer or Buyer's agent a duly executed and acknowledged quitclaim deed with covenant conveying to Buyer good and marketable title to the Property, free of all encumbrances other than easements, restrictions or agreements of record which do not have a material adverse effect on the value of Property or the Buyer's intended use of the Property, and existing laws , ordinances, or regulation governing the use of the Property.

3. Title Documents. Examination of the title shall be the responsibility of Buyer at Buyer's sole expense. Within thirty (30) days of the date of this agreement, Seller shall provide Buyer with copies of all existing title abstracts, title insurance policies or other title or survey information which Seller may have in Seller's possession. If Buyer finds title to the Property not to be good and marketable or subject to any easements, restrictions or agreements of record which have a material adverse effect on the value of Property or the Buyer's intended use of the Property ("defect or defects"), then the closing shall be delayed for not more than thirty (30) days in order for Seller to cure

the defect or defects. If such defect or defects cannot be removed by Seller (Seller having used reasonable efforts), Buyer may, at Buyer's sole option, either (a) terminate this agreement, in which case all parties shall be released from their obligations hereunder and the option consideration/deposit shall be returned to Buyer, or (b) accept such title as Seller can convey and consummate purchase of the Property in accordance with this agreement.

4. Possession. Exclusive possession of the Property shall be delivered to Buyer at the time of the delivery of said deed.

5. Closing. The closing of the sale contemplated hereby shall take place at the offices of Eaton Peabody, 80 Exchange Street, Bangor, Maine,, within sixty (60) days of Seller's receipt of notice of Buyer's exercise of the option as stated herein or such earlier date as specified by Buyer in its notice of exercise, unless delayed in accordance with the terms hereof.

6. Conditions of Closing. It is a condition of Closing that the private road accessing the Property shall be accepted as a public way by the Town of Hampden and that utilities, including but not limited to water and sewer, to service the Property are installed and connected to their respective service systems providers. Buyer shall be responsible for construction of the private road to standards required by the Town of Hampden for acceptance as a public way and Buyer shall have the right, at any time after the date of this agreement, to enter onto lands of Seller for purposes incidental to the same. Seller shall cooperate with Buyer in connection with any applications required for such construction and acceptance.

7. Closing Adjustments. Real property taxes and any other assessments, utility charges or other charges levied against the Property shall be prorated as of the date of the closing. Real property taxes shall be prorated based on the fiscal year of the Town of Hampden. State of Maine transfer tax shall be shared equally by Buyer and Seller. Seller shall pay all charges for recording any documents necessary to remove encumbrances from record title to the Property.

8. Confidentiality. Except to the extent required by law or as otherwise agreed by both parties in writing, neither party will disclose or use, and will direct its representatives not to disclose or use, to the detriment of the other party, the existence of this agreement, the letter of intent dated November 7, 2014, or any information concerning its subject matter unless such disclosure or use is required by law or unless such information already is publicly available through no fault of the disclosing party. If disclosure is required by law, the disclosing party shall provide to the other party notice of its intended disclosure in a manner calculated, to the greatest extent practicable under the circumstances, to afford the other party opportunity to challenge such disclosure. Upon written request of a party, the other party will promptly return or destroy any such information furnished to it.

9. Publicity. Neither party will publicly disclose the existence of this agreement or said letter of intent or the terms described herein or therein without the prior written consent of the other party.

10. Costs. Unless otherwise specifically agreed in writing, each party shall be

responsible for its own costs and expenses incurred with respect to any of the matters set forth in this agreement, including, but not limited to, legal fees, accounting fees and consulting fees. Each party agrees to indemnify the other against any claim for finder's fees or broker's commissions arising out of any commitment made by the indemnifying party.

11. Default. In the event Buyer fails to fulfill any of Buyer's obligations hereunder, this agreement shall, at the option of Seller, be terminated, and Buyer's said option considerations/deposit shall be retained by Seller as Seller's sole remedy. In the event Seller fails to fulfill any of Seller's obligations hereunder, then the option considerations/deposit shall be returned to Buyer and Buyer, at Buyer's option, may pursue its remedies at law or in equity, including but not limited to specific performance.

12. Notices. Any notice by either party to the other, as provided herein, shall be in writing and shall be effective if delivered by certified mail, return receipt requested, or by reputable overnight courier to the following address:

a. If to Seller, 349 Coldbrook Road
Hampden, ME 04444
Attn: Brian Bouchard

b. If to Buyer, c/o Karen A. Huber, Esq.
Eaton Peabody P.A.
P.O. Box 1210
80 Exchange Street
Bangor, ME 04402-1210
khuber@eatonpeabody.com

13. General Provisions.

a. This agreement shall inure to the benefit of and be binding upon the parties hereto and their respective successors and assigns. Buyer may assign this agreement, provided that Buyer shall give written notice to Seller after such assignment of the name and address for any assignee.

b. This agreement constitutes the entire agreement between the parties, supersedes all prior negotiations and understandings between them, and shall not be altered or amended except by a written amendment signed by Seller and Buyer.

c. This agreement may be simultaneously executed in any number of counterparts, each of which when duly executed and delivered shall be an original; but such counterparts shall constitute but one and the same agreement. For purposes of this agreement, a facsimile signature shall be deemed an original.

d. Seller agrees that it shall keep the terms of this agreement and the transaction contemplated herein confidential, except as may be set forth in the Memorandum of Option contemplated below. Seller acknowledges and agrees that breach of this agreement could result in irreparable harm to Buyer and that money damages would not be a sufficient remedy for any breach of this agreement by Seller. In the event of any breach, Buyer shall be entitled to specific performance and injunctive relief as remedies for any such breach. Such remedies will not be deemed to be the exclusive remedies for a breach of this agreement by Seller but will be in addition to all other remedies available at law or in equity to Buyer. Seller's obligations under this provision shall survive closing.

e. The parties agree that this Option shall not be recorded. A Memorandum of this Option to Purchase may be prepared for recording for the purpose of giving notice to third persons of the existence of this agreement.

f. If any provision of this agreement is found to be invalid or unenforceable, such finding shall not affect the validity or enforceability of any other provision hereof.

g. This agreement shall be construed and enforced in accordance with and governed by the laws of the State of Maine.

h. For purposes of this agreement, the date of this agreement shall be the date Seller executes this agreement.

[THIS SPACE LEFT INTENTIONALLY BLANK.
SIGNATURES CONTINUED ON THE NEXT PAGE.]

In witness whereof, the parties hereto have hereunto set their hands and seals as of the date set forth below.

Witness:

H.O. Bouchard, Inc.

By: _____
Brian Bouchard, Its President
Duly Authorized
Date: Dec 1, 2014

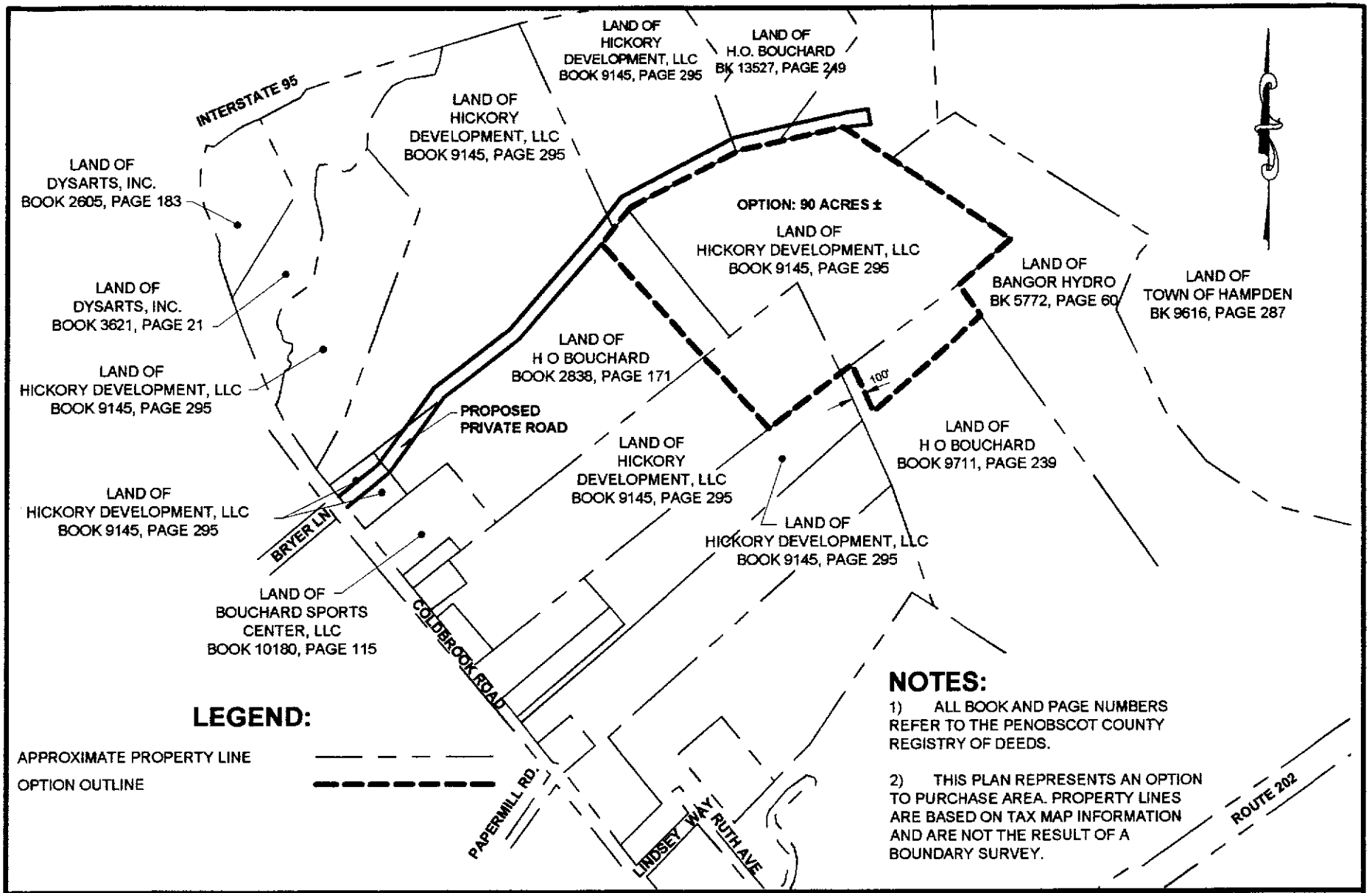
Witness:

Hickory Development, LLC

By: _____
Brian Bouchard, Its President
Duly Authorized
Date: Dec 1, 2014

Municipal Review Committee, Inc.

By: _____
Gregory Lounder, Its Executive Director,
Duly Authorized
Date: Dec 1, 2014



LEGEND:

APPROXIMATE PROPERTY LINE

OPTION OUTLINE

NOTES:

1) ALL BOOK AND PAGE NUMBERS REFER TO THE PENOBSCOT COUNTY REGISTRY OF DEEDS.

2) THIS PLAN REPRESENTS AN OPTION TO PURCHASE AREA. PROPERTY LINES ARE BASED ON TAX MAP INFORMATION AND ARE NOT THE RESULT OF A BOUNDARY SURVEY.

PROJECT TITLE: **EXHIBIT A** **HAMPDEN, PENOBSCOT COUNTY, ME**	DWG:	BY: JAT	CES INC. Engineers • Environmental Scientists • Surveyors
		DATE: 12-01-2014	
SHEET TITLE: **MUNICIPAL REVIEW COMMITTEE** **TOWN/OWNER PREFERRED LOCATION**	JN: 10973-2	REV:	
	SCALE: 1"=2000'	REV DATE:	

MEMORANDUM OF
OPTION TO PURCHASE REAL ESTATE

Optionor: **H. O. Bouchard, Inc.**
Hickory Development , LLC

Optionee: **Municipal Review Committee, Inc.**

Property: A certain lot or parcel of land containing not less than 90 acres and not more than 120 acres located on the easterly side of the Coldbrook Road in Hampden, Maine, in substantially the same location and configuration as generally depicted on Exhibit A, and bounded northeasterly by land and/or easements now or formerly of Bangor Hydro Electric Company, bounded southerly and southwesterly by land now or formerly of Optionor, and bounded northerly by the centerline of a private road leading from Coldbrook Road to the northeasterly corner of the Property in substantially the same location as depicted on Exhibit A.

Date of Option: Dec 1, 2014

Term of Option: Commences on Dec. 1, 2014 until ~~December 31, 2016~~ MARCH 31, 2017. BAB

Renewal Term: None.

IN WITNESS WHEREOF, H. O. Bouchard, Inc. and Hickory Development, LLC have caused the foregoing instrument to be signed by the undersigned, duly authorized, as of this 1st day of December, 2014.

Witness:

H.O. Bouchard, Inc.

By: Brian Bouchard
Brian Bouchard, Its President
Duly Authorized

Witness:

Hickory Development, LLC

By: Brian Bouchard
Brian Bouchard, Its President
Duly Authorized
Date: Dec 1, 2014

STATE OF MAINE

Penobscot County Dec 1, 2014

Personally appeared before me, the above named Brian Bouchard, as President of H. O. Bouchard, Inc., and acknowledged the foregoing instrument to be his free act and deed in his said capacity and the free act and deed of said corporation.

Elizabeth A. Lavin
Notary Public/Attorney at Law

Elizabeth A. Lavin
Print or type name as signed

ELIZABETH A. LAVIN
Notary Public • State of Maine
My Commission Expires April 6, 2020

February 4, 2015

Development Agreement

This Development Agreement is between the MUNICIPAL REVIEW COMMITTEE, INC. (the "MRC"), a Maine non-profit corporation with offices at 395 State Street, Ellsworth, Maine 04605, and FIBERIGHT, LLC ("Fiberight"), a Delaware limited liability company with offices at,1450 South Rolling Road, Baltimore, Maryland 21227.

Recitals

- The MRC and Fiberight each are interested in the development of a facility in eastern or central Maine for the processing of municipal solid waste ("MSW").

- The MRC represents 133 municipal entities known as Charter Municipalities that deliver MSW to a facility owned by the Penobscot Energy Recovery Company, L.P. ("PERC") under waste disposal agreements that are scheduled to terminate on March 31, 2018. The MRC anticipates that the existing waste disposal agreements with PERC will not be extended beyond their termination dates and will not be replaced with a new set of agreements to extend delivery of MSW from the Charter Municipalities to the PERC facility beyond March of 2018.

- In June 2013, the MRC issued a Request for Expressions of Interest (RFEI) to solicit proposals to develop an MSW management facility to replace the PERC facility starting in 2018. Fiberight responded to the RFEI with a proposal to develop a mixed-MSW processing and conversion facility utilizing its proprietary technology.

- The MRC Board of Directors has determined that the Fiberight proposal, if implemented, (a) could meet the MRC's objective of developing a facility to replace the PERC facility by April 1, 2018; and (b) would be advantageous as compared either to the proposals provided by other respondents to the RFEI or tothe extension of existing waste disposal arrangements with PERC.

- The MRC has resolved to work exclusively with Fiberight on development of a mixed-MSW processing and conversion facility per the proposal submitted in response to the RFEI, as subsequently clarified, and both the MRC and Fiberight are committed to working diligently to bring such facility into commercial operation by April 1, 2018.

- The MRC and Fiberight are entering into this Agreement in order to clarify their respective roles and responsibilities and to identify contingencies related to the proposed facility development.

Terms

In consideration of the mutual covenants contained herein, the parties, intending to be contractually bound, hereby agree as follows:

ARTICLE I
DEFINITIONS

"Acceptable Waste" means MSW which will be deemed acceptable for processing at the Facility in accordance with standards to be set forth in the Master Agreement.

"Change in Control" means any transaction or other event as a consequence of which (i) the owners of more than 50% of the equity of Fiberight prior to such transaction or event cease to own at least 50% of such equity; or (ii) there occurs a change in effective voting control over Fiberight; or (iii) there occurs a sale of the Facility to a party other than contemplated in the Master Agreement or otherwise approved by the MRC; or (iv) there occurs any other event resulting in transfer of operational control of the Facility to any person or entity other than Fiberight or a Fiberight Affiliate.

"Charter Municipalities" means the 133 municipal entities that deliver MSW to the PERC Facility under waste disposal agreements that are scheduled to terminate on March 31, 2018

"Joining Municipalities" means municipalities and other municipal entities that may contract to deliver MSW to the Facility under the Master Agreement.

"Facility" means the mixed-MSW processing and conversion facility utilizing Fiberight's proprietary technology to be developed pursuant to this Agreement.

"Fiberight" means Fiberight, LLC, a Delaware limited liability company.

"Fiberight Affiliate" means a person or entity controlled by, or under common control with, Fiberight.

"Joinder Agreements" means agreementsbetween the MRC and the Joining Municipalities whereby Joining Municipalities would agree to deliver MSW to the Facility pursuant to the terms and conditions set forth in the Master Agreement.

"Master Agreement" means the master waste supply agreement to be entered into by Fiberight and the MRC pursuant to which Joining Municipalities will deliver MSW to the Facility as contemplated by Section 2.1 of this Agreement.

"MRC" means the Municipal Review Committee, Inc., a Maine nonprofit corporation, and any affiliated or successor entity.

"MSW" means any municipal solid waste.

"PERC" means the Penobscot Energy Recovery Company Limited Partnership, a Maine limited partnership that presently owns and operates the PERC Facility.

"PERC Facility" means the waste-to-energy plant in Orrington, Maine currently operated by PERC.

"Project" means the acquisition, permitting, development, construction and operation of the Facility and related infrastructure.

"Project Site" means the land on which the Project will be constructed and operated.

"RFEI" means the Request for Expressions of Interest issued by the MRC in June 2013 as further described in the recitals to this Agreement.

"Site Lease" means the lease of the Project Site from the MRC to Fiberight.

ARTICLE II
ROLES AND RESPONSIBILITIES

2.1. Basic Responsibilities. The MRC and Fiberight agree on the following structure and allocation of basic roles and responsibilities for development of the Project:

a. **Ownership of Facility.** Fiberight and its affiliates and/or approved joint partners shall own the Facility and shall be responsible for the design, engineering, acquisition of permits, procurement of equipment, financing, construction, start-up, testing, commissioning, operations and maintenance thereof.

b. **Ownership of Project Site.** The MRC shall secure fee ownership or long term control of the Project Site appropriate for development of the Project and shall lease or sublease the Project Site to Fiberight under a long term agreement having terms and conditions that

support the development, financing, construction and operation of the Facility, with appropriate oversight by the MRC.

c. **Master Waste Supply Agreement.** The MRC and Fiberight shall negotiate in good faith to reach agreement on a master waste supply agreement (the "Master Agreement") by December 1, 2015. The Master Agreement shallset forth terms under which Joining Municipalities will deliverMSWto the Facility. The Master Agreement shall include commercially reasonable terms and conditions necessary to support the development, financing, construction and longterm operation of the Facilityincluding, but not limited to, the terms set forth in Section 3.1 hereof.In the event of conflicts between the terms of the Master Agreement and the terms of this Agreement, the Master Agreement shall take precedence.

d. **Waste Disposal Agreements.** The MRC will enter into appropriate waste disposal agreements with Joining Municipalities ("Joinder Agreements") pursuant to which each Joining Municipality will agree to deliver MSW to the Facility under the terms and conditions set forth in the Master Agreement.

2.2 Responsibility for Specific Development Tasks. The MRC and Fiberight agree that responsibility for specific Project related tasks shall be allocated as follows:

a. **Site Control.** The MRC shall purchase and own, or otherwise secure long term control of, the Project Site and will consult with Fiberight regarding the suitability of any potential site before it is secured.

e. **Site Lease**. The MRC and Fiberight agree to negotiate in good faith the terms of a long term lease of the Project Site adequate to protect the interests of each party and to accommodate development and financing of the Facility in accordance with the terms, conditions and principles set forth in this Agreement including, but not limited to, the terms set forth in Section 3.2 hereof.In the event of conflicts between the terms of the Site Lease and the terms of this Agreement, the Site Lease shall take precedence.

b. **Site Development.** The MRC shall secure, or assist Fiberight in securing, zoning and other land-use designations necessary in connection with development of the Project Site and the Facility. The MRC and Fiberight will work together with the host community on planning of road access, water supply, sewer capacity and other similar infrastructure upgrades related to development of the Project Site. The MRC and Fiberight agree to negotiate in good faith to reach agreement on allocation and financing of costs related

toroad access, environmental mitigation and other infrastructure upgrades to support development of the Project Site, and such agreement shall be incorporated as part of the Site Lease. Fiberight will be responsible for designing, implementing, managing, financing and contracting for utilities necessary for development and operation of the Project Site and the Facility including, but not limited to, water, sewer, electricity, natural gas and telecommunications. The Site Lease shall provide for adequate access to related utility interconnections. The MRC will ensure that Fiberight and its agents have reasonable access to the Project Site prior to the execution of the Site Lease as needed for site testing and characterization activities.

c. **Facility Design.** Fiberight will prepare a conceptual design of the Facility in sufficient detail to support (a) evaluation of potential environmental and land use impacts; (b) acquisition of required permits and approval; (c) implementation of infrastructure upgrades and utility interconnections; and (d) preparation of a pro forma economic analysis to support projections of tip fees and rebates. Fiberight will provide the MRC with an opportunity to review and comment on the conceptual design and will complete the final design as appropriate upon acquisition of all permits and prior to construction, all ona timely basis.

d. **Permitting.** Fiberight shall be responsible for preparation and filing of applications for allfederal, state and local permits required in connection with development, construction and operation of the Facility and Project Site. Fiberight will consult with the MRC on permit acquisition strategy and will provide the MRC with an opportunity to review and comment on permit applications. The MRC agrees to perform such review on a timely basis. The MRC will work with federal, state and local authorities to clarify permitting requirements and will support and facilitate issuance of required permits.

e. **Facility Agreements**. Fiberight shall be responsible for entering into agreements with third party contractors related to final design, engineering, procurement, construction, start-up, testing and commissioning of the Project Site and Facility and, following commencement of commercial operation, for operations and maintenance thereof. All material contracts shall be submitted to the MRC for review and comment prior to execution. The MRC agrees to perform such review on a timely basis.

f. **Analysis of Waste Supply.** Prior to final design and development of the Facility, the MRC shall prepare for Fiberight an analysis of MSW generation and disposition among its existing members, accounting for the status of waste reduction programs and diversion through recycling programs.

g. **JoinderAgreements.**The MRC agrees to utilize its best efforts to cause the Joining Municipalities to enter into Joinder Agreements as contemplated by Section 2.1(d) in order to accommodate development and financing of the Facility as contemplated by this Agreement and to assure an adequate supply of waste to the facility. Fiberight shall be responsible for acquiring MSW in excess of the quantities provided under the Joinder Agreements and the Master Agreement to the extent needed for the Facility to operate at capacity; provided, however, that Fiberight shall not accept MSW originating outside of the State of Maine. The MRC agrees to support Fiberight's efforts to acquire additional quantities of in-state MSW, should that be necessary, based on its knowledge of local and state conditions, provided, however, that such support shall not be deemed to require economic concessions or other financial support.

h. **Waste transportation arrangements**. The MRC and Fiberight will work together to evaluate and, if indicated, to facilitate arrangements for, efficient and cost-effective delivery of MSW from Joining Municipalities to the Facility. To the extent such arrangements involve development of remote facilities as part of a "hub-and-spoke" system, the MRC and Fiberight will work together on the development of such remote facilities either on sites to be acquired or as add-ons to existing facilities. Nothing in this paragraph shall be construed to require either Fiberight or the MRC to commit to make any capital investment in such transfer and transportation facilities except as they may otherwise agree.

i. **Product sales and related attributes and credits.** Fiberight shall be solely responsible for marketing and sale of all products produced at the Facility, including acquisition of beneficial use determinations or other regulatory approvals related to product marketing, distribution and sales. To the extent allowed by law, Fiberight shall own all tax credits, renewable energy certificates, carbon offsets, renewable fuel identification number (RIN) products, and other similar attributes that may be created or associated with construction and operation of the Facility and the production of associated products.

j. **Residuals management.**The MRC, in consultation with Fiberight, shall be responsible for securing appropriate initial arrangements for management of non-hazardous residual materials to be generated as the result of normal operation of the Facility within anticipated limits to be set forth in the Master Agreement. Fiberight shall manage disposal of all residual materials from the Facility consistent with such arrangements and shall be responsible for securing appropriate contracts in connection therewith and for all extensions or replacements of the initial agreements for residuals disposal.

k. **Financing.** Fiberight will provide funds, and will acquire financing as needed, for the costs of pre-construction development efforts related to the Project Site and the Facility including, without limitation, costs of construction of the Facility and related infrastructure, start-up, testing, commissioning, operations and maintenance. The MRC will provide funds, and will acquire financing as needed, to secure ownership or long term leasehold rights to the Project Site, for the cost of pre-construction development efforts related to the Site and for the costs of its monitoring of Facility implementation and operation.

ARTICLE III
PROJECT AGREEMENTS

3.1. Master Waste Supply Agreement. MRC and Fiberight agree to negotiate in good faith a master waste supply agreement (the "Master Agreement") with the objective of providing a structure for obtaining commitments by Joining Municipalities to deliver at least 150,000 tons per year of MSW starting in April of 2018 (such commitments to be prorated for any partial contract year). The Master Agreement shall incorporate the following principles or terms:

a. **Tip Fee.** Provide an initial tip fee not to exceed $70 per ton, with identified pass-through costs related to the actual cost of residuals disposal and other items as may be agreed upon.

b. **Term.** Provide an initial term to match the term of the Project financing, anticipated to be 15 years, with at least two appropriate options for extension provided that Fiberight has met performance standards under the Master Agreement

c. **Net Disposal Cost.** Incorporate product revenue rebates that, under anticipated conditions, would result in a net disposal cost to the Joining Municipalitieson the order of ($57) per ton.

d. **Acceptable Waste.** Provide reasonable definitions of waste that will be acceptable for processing at the Facility ("Acceptable Waste"), which shall include municipal solid waste typically collected or accepted by Maine municipalities, with defined exclusions for unprocessible items readily managed through other means

e. **Delivery.** Describe delivery obligations, which would require, to the extent permitted by law, all MSW collected or controlled by Joining Municipalities to be directed to the Facility. Joining Municipalities would retain the option to implement new waste reduction or recycling programs or to discontinue existing reuse and recycling programs,

in each case without penalty, provided that materials not reused or recycled and instead delivered to the Facility must constitute Acceptable Waste.

f. **Delivery Guaranties.** Provide the terms on which guaranties of waste delivery quantities (guaranteed annual tonnages, or GATs) would be included if required for financing, and define opportunities for mitigation of penalties for potential shortfalls through acquisition of waste from commercial sources or other means.

g. **Delivery Procedures.** Describe load delivery, inspection and acceptance procedures and requirements.

h. **Invoicing and Payment.** Describe invoicing and payments procedures and requirements.

i. **Bypass.** Address responsibility for bypass arrangements in the event commercial operation is delayed beyond April 1, 2018, or is thereafter interrupted, or in the event that the PERC Facility closes prior to March 31, 2018.

j. **Interim Supply Arrangements.** Address interim waste supply arrangements to provide MSW supplies for Facility start-up, testing and commissioning prior to March 31, 2018.

k. **Joinder Agreements.** Describe the form and content of the Joinder Agreements.

l. **Out-of-State Waste.** Prohibit acceptance of out-of-state MSW.

m. **Assignment.** Permit assignment of rights and obligations under the Master Agreement by Fiberight to a Fiberight Affiliate after the commencement of commercial operation provided that the assignee assumes all rights and obligations of Fiberight under the Master Agreement and the Site Lease and Fiberight remains liable for all obligations assumed by the assignee.Permit assignment of rights and obligations under the Master Agreement by the MRC to a successor entity representing the interests of the Joining Municipalities.

3.2 Site Lease Agreement. MRC and Fiberight agree to negotiate in good faith theSite Lease to be executed not later than needed to accommodate financing of the Project. TheSite Lease shall:

a. **Generally.** Provide terms generally adequate to permit development, construction and operation of the Facility by Fiberight. Fiberight shall have quiet enjoyment of the Project

Site during the term of the Site Lease for this purpose.

b. **Term.** Be for a minimum term of 15 years from the earlier of the commencement of commercial operations or April 1, 2018, with appropriate renewal options up to a total of40 years

c. **Site Access.** Contemplate reasonable access to the Project Site with the MRC to be responsible for obtaining necessary easements and consents incident to such access.

d. **Taxes and Fees.** Provide that Fiberight shall be responsible for property taxes, host fees and any other similar taxes and fees.

e. **Insurance.** Provide that Fiberightshall be solely responsible for maintaining adequate insurance coverage for the Project, including general liability, property and casualty, workers compensation and other customary coverages with policy limits not less than is customary in the industry.

f. **Compliance.** Provide that Fiberight shall be responsible for compliance with all agreements and permit requirements.

g. **Out-of-State Waste.** Provide that Fiberight shall be precluded from accepting out-of-state waste at the Facility.

h. **Reporting.** Include reporting requirements related to MSW received and processed, materials produced and sold, residuals generated and shipped, product revenues, financial performance, compliance with permit conditions and status of permit renewals, and other material matters, all in form and substance reasonably satisfactory to the MRC.

i. **MRC Oversight.** Define an oversight role for the MRC with respect to conduct of operations, MSW supply, product marketing, residuals disposal, significant changes in operations or nature of the business, capital improvements, relevant legislative, regulatory and permit matters and events that affect viability of the Project.

j. **Commercial Operation.** Define "commercial operation," which definition may require satisfactory completion of performance tests.

k. **Lease Payments.** Provide for triple net lease terms with nominal lease payments, subject to upward adjustment if milestones are missed.

l. **Amendment.** Allow the parties to amend the Site Lease by mutual agreement, subject to reasonable limits imposed by Fiberight's lenders.

m. **Termination.** Allow either party to terminate if Fiberight has not put adequate financing in place by January 1, 2017, or if commercial operation is not achieved by January 1, 2020, it being understood that both parties will work in good faith and with reasonable diligence to achieve those milestones.

n. **Assignment.** Permit Fiberight to assign its interest in the Site Lease to a Fiberight Affiliate after commencement of commercial operation provided that the assignee assumes all of Fiberight's rights and obligations under the Site Lease and the Master Agreement and that Fiberight remains liable for all such obligations.Permit the MRC to assign its interest in the Site Lease to a successor entity representing the interests of the Joining Municipalities.

o. **Right of First Refusal.** Give the MRC an option and right of first refusal to purchase the Facility upon notice of a potential Change in Control.

p. **Purchase Option.** Give the MRC the option to buy the Facility at fair market value at the end of the Site Lease term or upon earlier termination or breach of the Site Lease by Fiberight.

q. **Site Restoration.** Provide for removal of the Facility and restoration of the Project Site by Fiberight upon termination (through a mechanism that survives termination).

r. **Force Majeure.** Address issues related to force majeure, casualty loss and eminent domain.

s. **Quiet Enjoyment.** Provide for customary quiet enjoyment rights.

ARTICLE IV
OTHER PROVISIONS

4.1 Milestone Schedule. The MRC and Fiberight agree to use all reasonable efforts to fulfill their responsibilities and assigned tasks herein pursuant to the following milestone schedule, which presumes approval of this Development Agreement, and a resolution awarding exclusive development rights to Fiberight, on or about February 4, 2015:

Schedule	*Milestone*
March 15, 2015	Complete layout of the Project Site and confirm arrangements for development of a site access road, a water supply plan and a plan for wastewater treatment.
May 1, 2015	Prepare plan for internal use or external marketing of post-hydrolysis solids (PHS). Identify approach for supplying electricity to the facility, including fuels and equipment to be used for on-site generation of electricity, and implications of potential emissions from any on-site boiler or gasifier on air emission licensing requirements. Prepare plan for marketing and transport of industrial sugars and/or derived products. Prepare plan for processing bio-gas into pipeline-quality renewable gas, vehicle-ready compressed natural gas (CNG), or other products; and for marketing such products in light of applicable product specifications and requirements.
June 1, 2015	Prepare and submit requisite local, state and federal permit applications to the appropriate authorities. Prepare and submit applications for site plan review and any other required governmental or third party approvals.
September 1, 2015	Provide updated process flow diagram, mass, energy and water balances, facility design plans, estimates of capital costs and operating expenses; and a project pro forma and supporting assumptions and information. Provide sufficient detail to enable evaluation and verification of the feasibility of the project at the proposed performance levels and tip fees by an independent engineer/reviewer.
December 1, 2015	Complete negotiation of the Master Agreement and municipal Joinder Agreements.
December 18, 2015	MRC Board approval and execution of the Master Agreement and Site Lease at the MRC annual meeting.
January to September 2016	Votes by legislative bodies of Joining Municipalities approving the municipal Joinder Agreements.
June 30, 2016	Achieve approval of municipal Joinder Agreements with total aggregate commitment of 150,000 tons per year.
January 1, 2017	Achieve construction financing for the Facility.
April 1, 2018	Achieve commercial operation and be ready to accept incoming MSW.

4.2 Confidentiality.

a. **Confidentiality.** TheMRC and Fiberight each agree to keep confidential all Confidential Information of the other except that each may disclose such information to its officers, directors, stockholders, agents and outside legal counsel, accountants and other

consultants to the extent required in connection with negotiation or implementation of this Agreement. Each agrees to take reasonable steps to safeguard the confidentiality of any such limited disclosure.

b. **Public Announcements.** Public announcement of the Project or this Agreement shall be made only with the prior written approval of both parties. Each party agrees to work with the other to agree upon an appropriate public announcement of the execution and delivery of this Agreement and of the achievement of milestones thereunder as they occur.

c. **Use of Confidential Information.** The MRC and Fiberight each agrees that it will not use any Confidential Information obtained from the other for any purpose other than in connection with the negotiation and implementation of this Agreement.

d. **Required Disclosures.** Notwithstanding the foregoing, either party may disclose Confidential Information to the extent that it reasonably believes that it is required to do so by applicable law, regulation or court order, provided that, prior to making such a disclosure, the disclosing party will provide notice to the non-disclosing party of its intended disclosure in a time and manner calculated, to the extent practicable under the circumstances, to afford the non-disclosing party an opportunity to challenge such disclosure.

e. **Definition.** For purposes of this Agreement, "Confidential Information" means any data or information, design, process, procedure, formula, business method or improvement that is valuable to the holder thereof and which is not generally known to its competitors or to the public including, but not limited to, financial and marketing information, and specialized information and technology developed or acquired by such party, but specifically excluding any information that (i) becomes known to the general public without fault or breach on the part of the receiving party; (ii) the holder customarily provides to others without restriction on disclosure; or (iii) the receiving party obtains from a third party without breach of any nondisclosure obligation and without restriction on further disclosure.

4.3 Indemnification. Each party (for purposes of this paragraph, the "Indemnifying Party") agrees to indemnify and hold harmless the other party and its directors, officers, employees, agents and consultants (collectively, the "Indemnified Parties"), harmless against any and all liabilities, obligations, losses, damages, penalties, actions, judgments, suits, and reasonable costs, expenses or disbursements of any kind or nature whatsoever, including reasonable attorney's fees and disbursements, that may be suffered or incurred by any of the Indemnified Parties as a consequence of (i) activity related to the Project Site or the Facility undertaken by the

Indemnifying Party, its employees or agents; or (ii) a breach by the Indemnifying Party of its obligations hereunder. NOTWITHSTANDING THE FOREGOING, IN NO EVENT SHALL EITHER PARTY BE LIABLE TO THE OTHER FOR INDIRECT, SPECIAL OR CONSEQUENTIAL DAMAGES OR FOR LOSS OF ANTICIPATED PROFITS.

4.4 Insurance. During the development process,Fiberightshall maintain adequate insurance policies, including general liability, property and casualty, builders' risk, workers compensation and other appropriate coverage covering the Project Site and Facility with policy limits not less than is customary in the industry. The MRC shall be named as an additional insured on all liability and casualty insurance policies and shall be provided with not less than thirty (30) days prior notice of cancellation.

4.5 Termination

a. **Mutual Agreement.** This Agreement may be terminated at any time with the written mutual agreement of the parties.

b. **Failure to Achieve Commercial Operation.** Each party understands that, despite good faith and reasonable commercial efforts, the project may not reach fruition for a variety of reasons that are outside the reasonable control of the parties, including but not limited to, the following:

   i. Despite reasonable commercial efforts, the Project Site, including required infrastructure for road access or utility interconnections, might not receive necessary land use designations, approvals, licenses or permits.
   ii. Facility permits might not be issued despite the best efforts of Fiberight to comply with existing standards related to design, operating performance and potential impacts.
   iii. The number of Joining Municipalities willing and able to enter into Joinder Agreements might be insufficient to support timely acquisition of debt or equity financing or operation of the facility.
   iv. Fiberight might otherwise be unable to secure financing on a timely and reasonable basis.

   In the event that any of the foregoing should occur, either party may elect to terminate this Agreement by providing a thirty (30) day notice of termination to the other party.

c. **Failure to Enter Into Master Agreement.** If, despite their best efforts, the parties fail to agree on the terms of a Master Agreement by January 1, 2016, then either party may terminate this Agreement by providing a thirty (30) day notice of termination to the other.

The MRC shall not be obligated to enter into a Master Agreement on terms that, in its reasonable judgment as disclosed in a written finding, a sufficient number ofJoining Municipalities would be likely to find unacceptable such that it would not be possible to achieve the minimum delivery requirements contemplated by this Agreement.Fiberight shall not be obligated to approve entering into a Master Agreement that, in its reasonable judgment as disclosed in written finding, would preclude its acquisition of timely financing on reasonable terms.

d. **Failure to Achieve Financing.** If Fiberight fails to achieve financing by January 1, 2017, then either party may terminate this Agreement by providing a thirty (30) day notice of termination to the other.

e. **MRC Reimbursement of Fiberight Expenses.**If the Project fails to go forward due to (i) a unilateral withdrawal by the MRC of its exclusive award of development rights to Fiberight, other than as a consequence of a breach of this Agreement by Fiberight or a failure by one or both parties to achieve one or more milestones set forth herein despite their good faith efforts, or (ii) a material breach by the MRC of its obligations hereunder, then the MRC will reimburse reasonable development expenses of Fiberight incurred after the effective date of this Agreement.

f. **Fiberight Reimbursement of MRC Expenses.**If the Project fails to go forward due to material misrepresentation by Fiberight of its capabilities to design, acquire permits for, construct or operate the facility, or other material breach by Fiberight of its obligations hereunder, then Fiberight will reimburse the reasonable development expenses of the MRC incurred after the effective date of this Agreement.

g. **Survival.** The provisions of Sections 4.2, 4.3, and 4.6(b), (c), (d), (g), (h) and (i) shall survive termination of this Agreement.

4.6 Other provisions.

a. **Mutual Cooperation.** The MRC and Fiberight agree to cooperate with each other and to use good faith and fair dealing to support completion of each task and achievement of each milestone required for development of the Project Site and the Facility, and to use reasonable commercial efforts to support the efforts of the other party.

b. **Notices.** Any notice required to be provided hereunder shall be in writing and shall be (i) delivered in person, (ii) sent by recognized overnight courier with acknowledgement of receipt, (iii) sent by certified mail, return receipt requested, or (iv) sent by email with a confirmation copy sent promptly by overnight courier or certified mail, in each case to the following addresses:

If to the MRC:

Municipal Review Committee
395 State Street
Ellsworth, ME 04605
Attention: Executive Director
Email: glounder@mrcmaine.org

If to Fiberight:

_1450 South Rolling Road_____
_Baltimore, MD 21227_____
Attention: Craig Stuart-Paul_____
Email: _Craigsp@Fiberight.com_____

Either party may change the address at which notices to it are to be delivered by providing notice of such change in the manner provided above.

c. **Nature of Relationship.** The relationship between the parties established by this Agreement is contractual only and shall not be deemed to create a partnership or joint venture. Neither party shall have the right, power or authority in any way to bind the other party to any contract or obligation, expressed or implied. No employee, agent or consultant engaged by one party shall be deemed to be the employee, agent or consultant of the other.

d. **Entire Understanding.** This Agreement embodies the entire understanding of the MRC and Fiberight with respect to its subject matter and supersedes any prior agreements and understandings, whether oral or in writing. No supplement, modification or amendment of this Agreement shall be binding on the parties unless it is embodied in a writing signed by both parties. The failure of either party to enforce, or the delay of either party in enforcing, any of its rights or remedies under this Agreement shall not be deemed a continuing waiver of modification thereof.

e. **Headings.** The headings and other captions in this Agreement are for convenience of reference only and shall not be used in interpreting, construing or enforcing any of the provisions hereof.

f. **Assignment.** This Agreement shall be binding upon and shall inure to the benefit of the parties and their respective successors and assigns. Except as otherwise expressly provided herein, it may not be assigned by either party without the prior written consent of the other (which consent shall not be unreasonably withheld, delayed or conditioned), and any attempted assignment without such consent shall be void.

g. **Force Majeure.** Neither party hereto shall be liable for failure or delay in performing any of its obligations hereunder if such failure or delay is occasioned by compliance with any governmental regulation, request or order, or by circumstances beyond the reasonable control of the party so failing or delaying, including, without limitation, acts of God, war, terrorism, insurrection, fire, flood, freezes, accident, labor strikes, work stoppage or slowdown (whether or not such labor event is within the reasonable control of the parties). Each party shall (i) promptly notify the other in writing of any such event of force majeure, the expected duration thereof, and its anticipated effect on the ability of such party to perform its obligations hereunder; and (ii) make reasonable efforts to remedy any such event of force majeure. Notwithstanding the foregoing, no event of force majeure shall affect the termination rights of either party pursuant to Section 4.5 of this Agreement.

h. **Reformation.** Should any provision of this Agreement be determined to be illegal or in conflict with any law, rule, statute, ordinance or regulation, the illegal or conflicting provision shall be deemed amended to the extent necessary to remove such illegality or conflict and the validity of the remaining portion or provisions shall not be affected thereby.

i. **Governing Law; Venue.** ThisAgreement shall be governed by and construed in accordance with the laws of the State of Maine without regard for conflict of law principles. The parties expressly agree that any action or proceeding to enforce the

rights of either party under this Agreement, or otherwise related to the subject matter hereof, may not be brought or prosecuted in any court or forum other than the courts of the State of Maine or the federal District Court for the District of Maine, and each party voluntarily, unconditionally and irrevocably submits to the jurisdiction of such courts.

j. **Outside Investment.** The MRC understands that Fiberight will be seeking financing for the Facility from outside investors and lenders. The MRC agrees to make reasonable provision for, and will provide reasonable consents to support, protection of lender rights and other reasonable provisions for the security of Fiberight's investors and lenders including, without limitation, notices of defaults to identified investors and lenders with rights to cure, rights to name a replacement operator, and similar provisions related to investor and lender protection.

k. **Continuation of Waste Disposal Services.** Fiberight understands that the facility will become an essential part of the infrastructure for management of MSW in central and eastern Maine, and that its operation will make an important contribution to the protection of public health, public welfare and the environment from potential adverse impacts of solid waste management. Fiberight will incorporate into its agreements reasonable provision for continuation of solid waste management services under a variety of scenarios in the event that the Facility is not developed and operated as contemplated by this Agreement.

IN WITNESS WHEREOF, the parties have executed this Agreement under seal as of the 4th day of February, 2015.

WITNESS:

MUNICIPAL REVIEW COMMITTEE

By _____

Its President

FIBERIGHT, LLC

By _____

Its CEO

{EP - 01724284 - v4 }

APPENDIX 1

TRAFFIC NARRATIVE

(From Solid Waste Permit Application – MDEP)

ATTACHMENT 15

TRAFFIC

Traffic at the proposed facility will enter and exit at a single point of access located at the northeast corner of the property. The facility entrance will be located at the end of a proposed 4460 foot long access road which will enter onto the Coldbrook Road directly across from the existing HO Bouchard truck facility. The proposed access road will consist of two 12-foot travel lanes with 3-foot shoulders. A Maine Department of Transportation (MaineDOT) Entrance Permit Application for the access road entrance onto Coldbrook Road was submitted and an Entrance Permit was subsequently issued by the MaineDOT. A copy of the Entrance Permit is included in this Attachment.

The main traffic generator at this facility will be the incoming MSW deliveries and to a lesser extent the outgoing waste and commodities. These materials will enter and exit the facility in trucks ranging from packer trucks to trailer trucks. Passenger vehicles will make up the remainder of the facilities traffic and will be spread out over the full 24-hours of the day as employees will be needed for multiple shifts throughout the day. No MaineDOT Traffic Movement Permit is required because the project's estimated overall traffic volume is less than 100 passenger car equivalents during the peak hour. Details on estimated traffic volumes, haul routes, safety, sight distance, and the interior road network are provided below.

TRAFFIC VOLUMES

Traffic to the facility will be composed of varying traffic components. The two primary components will be employees and incoming haul trucks carrying MSW. Additional traffic components will include general deliveries, outgoing waste residues and recyclables generated by processing, material deliveries related to the processing facility, and the outgoing product deliveries. These traffic components are broken down as follows:

Employees, Visitors, and General Deliveries

The facility is expected to employ up to 70 employees at full operation. These employees will work different shifts and will enter and exit the facility at different times of the day. It is anticipated that these employees will arrive and depart in personal vehicles such as passenger cars and trucks. Visitors and general day to day deliveries may account for an additional 20% increase above and beyond the total number of employees for a total of 84 employees, visitors, and general deliveries per day. This equates to 168 total daily vehicle trips for this facility during ordinary operations.

Incoming MSW

MSW generation varies by time of year which will correspondingly result in an increase or decrease of shipments into the facility. Daily MSW deliveries to the facility will vary from an estimated 410-550 Tons/day (for the purpose of traffic estimation an average of 525 Tons/day is used to determine the lower threshold truck volumes) to a high of 950 Tons/day. The delivery method is broken down between packer trucks which haul an average of 7 Tons, roll-offs which haul an average of 12 Tons, and trailers which haul an average of 28 tons. Based on collected data MSW deliveries are comprised of 40% packer trucks by weight, 33% roll-offs by weight, and 27% trailers by weight. From this data it is estimated that the following deliveries will be made to the facility:

Packer Trucks:	29 – 53 deliveries/day
Roll-offs:	14 – 26 deliveries/day
Trailers:	5 – 10 deliveries/day

The highest expected total MSW deliveries to this facility on any given day is 89 deliveries comprised of 53 packer trucks, 26 roll-offs, and 10 trailers.

It needs to be noted that a delivery will equate to two vehicle trips since the truck will enter the facility and exit the facility during the same day.

Additional Traffic Sources

The facility will generate a daily average of 82-130 Tons of residue waste and recyclables which will need to be shipped to a landfill for disposal or to the recycling commodities market. Residue waste and recyclables will be transported in trailers containing 28 Tons of material per trailer. This equates to a daily total of 4-5 trailers exiting the facility daily.

The plant's boilers are expected to generate between 3,000 and 4,000 tons/year of ash. Ash will be transported to a landfill for disposal using transport trailers up to 100 cubic yards. At 1.5 CY/ton this equates to 100 trips/year or 2 trips every week.

Phosphoric acid is used during processing at the proposed facility. It is estimated that 19,000 gal/year will be required. Phosphoric acid will be delivered to the facility in 55 gallon drums or totes in truckload quantities. Deliveries of phosphoric acid will equate to 4-5 deliveries per year.

Under current market conditions the industrial sugars produced at the facility will be converted to bio-methane and piped underground directly to the closest natural gas pipeline. This will require no delivery vehicles in or out of the facility for processed industrial sugars for the foreseeable future. If market conditions change in the future Fiberight has the capacity to produce up to 11,000 gallons of industrial sugars per day. These sugars would be transported off-site in 10,000 gallon tanker trucks approximately 8-10 times per week.

Urea is used during the scrubbing process for the boilers as part of its air quality requirements. It is estimated that the scrubbers will require 80,000 gallons per year and stored on-site in a 5,000 gallon tank. Urea will be delivered to the site in tanker trucks. Based on the on-site storage capacity, it is estimated that the Facility will require 16 to 20 deliveries per year.

HAUL ROUTES

The enclosed Haul Routes map shows the anticipated haul routes for MSW to the new facility. The MSW generated by the charter municipalities presently is trucked to the existing PERC plant in Orrington, Maine which is less than three aerial miles from the proposed facility in Hampden. Due to the close proximity of these two facilities the new trucking routes will show a minimal increase in mileage travelled. The blue lines on the map depict the current truck routes that will not change due to the processing facility being relocated to Hampden. The red lines show changes that will be made to the trucking routes to access the new facility in Hampden.

The MSW generated in the charter municipalities to the east of the new MRC facility in Hampden will continue to use existing routes that were used to deliver MSW to the PERC plant in Orrington except that the trucks will enter I-395 in Brewer and continue across the river to EXIT 2 and onto US Route 202. Trucks will follow US Route 202 westerly to the intersection of Coldbrook Road where they will take a right turn onto Coldbrook Road where they will travel 1.1 mile to the facility entrance on the right. The mileage travelled for this new route will increase slightly but will eliminate truck traffic through the busy South Street area of Brewer.

It is also anticipated that MSW being shipped from towns and facilities off from Route 9 will begin using State Route 46 as a bypass to access I-395 off from Route 1A. This will eliminate a

large portion of this waste from travelling through North Main Street and South Main Street in Brewer as it presently does on its trip to the existing PERC facility.

It is anticipated that the MSW produced in the Hancock County area around Bucksport will be shipped along its normal route until it reaches Route 46 in Orland where it will travel along Route 46 to the intersection of Route 1A in Holden. From this intersection the waste will be transported along Route 1A into Brewer where it will exit onto I-395 for its trip across the river to EXIT 2 and the Coldbrook Road.

The MSW generated in the charter municipalities to the north and west of the new MRC facility will continue to use existing haul routes that were used to deliver MSW to the PERC plant in Orrington except that the trucks will exit I-95 at exit 180 in Hampden and turn onto the Coldbrook Road where they will travel the 0.5 mile to the facility entrance on the left. The mileage travelled for this new route will stay approximately the same or decrease slightly and will eliminate truck traffic through the busy South Street area of Brewer.

The MSW generated in the charter municipalities to the south along the Route 1 and 3 corridors will travel their normal route north until the intersection with Route 1A in Stockton Springs. The MSW will then be transported up Route 1A to Winterport to Route 69. It is anticipated that Route 69 will be used to transport the MSW to I 95 Northbound and on to the Coldbrook Road exit and on to the facility. Route 69 was chosen to bypass the section of Route 1A which runs through Hampden and the congested traffic signal at the intersection of Route 1A and Route 9. The remaining routes from the charter municipalities to the south follow routed highways to I-95 for their transport north to Exit 180 and the Coldbrook Road. These routes were used previously to transport MSW to the PERC facility in Orrington.

The new routes of travel for the MSW deliveries follow Maine State Routed highways and the Federal Interstate I-95 and I-395 system. These roadways are built to handle truck traffic and are not posted during the spring months so access to the facility is available year round.

It bears repeating that the blue routes are existing travel routes for MSW coming to the existing PERC facility in Orrington, Maine. These routes will not change as the deliveries are moved to the proposed facility in Hampden except for the above stated route changes. The route changes are concentrated to the Interstate system and will prove to have minimal impact to the traffic patterns in the Brewer and Hampden area. If anything these changes will reduce the truck traffic volume in the North and South Main Street area of Brewer.

SAFETY ANALYSIS

The access road to the facility will intersect with the Coldbrook Road directly across from the HO Bouchard truck facility entrance. This location provides safe access to the Coldbrook road and is located to eliminate potential conflict points with the existing entrance across the Coldbrook Road.

The Coldbrook Road is a 2-lane roadway with 12-foot travel lanes and 10-foot paved shoulders designed to move trucks between US Route 202 and Interstate 95 at exit 180. Sight distance along the Coldbrook Road is very good and provides safe access for all vehicles.

A Maine Department of Transportation inventory and analysis of traffic crashes is included for the entire Coldbrook Road corridor from the southbound off-ramp of Interstate 95 to the intersection of US Route 202. Analysis of this report shows that there are no locations along that corridor, including the intersections, which are classified as High Crash Locations (HCL) as

defined by MaineDOT. An HCL is defined as any roadway segment or intersection with more than 8 crashes in any 3-year period and has a Critical Rate Factor greater than 1.0.

Analysis of the data shows that the Coldbrook Road and the related intersections are very safe. The average number of crashes on any roadway segment along Coldbrook road ranges from 0-3 in the latest 3-year period. The intersections show similar numbers except for the intersection of Coldbrook Road and US Route 202.

This intersection of Coldbrook Road and US Route 2 shows 9 crashes in the latest 3-year period but does not have a Critical Rate Factor greater than 1.0 and therefore it is not defined as an HCL. Analysis of the crash reports show that there are no identifiable safety issues with this intersection. The crashes were broken down as follows; 3 red light running crashes, 2 rear end crashes, 3 failure to yield crashes, and 1 truck crash where the load shifted and the truck went off the road without hitting any other vehicle. This type of crash history shows that there are no safety design issues with the intersection itself.

SIGHT DISTANCE

The proposed access road will be located onto the Coldbrook Road directly across the road from the HO Bouchard truck terminal. The sight distance to the left is more than 2,000 feet in this direction. The sight distance to the right is 740 feet in this direction. These sight distances exceed the requirements for a Maine Department of Transportation Entrance Permit which, as noted above, has been issued for the access road. The existing sight distance will thus provide safe and efficient access to the Coldbrook Road.

INTERIOR ROAD NETWORK

The proposed facility will be accessed by a new paved road that is expected to be owned and maintained by the Town of Hampden. The new road is proposed to be approximately 30 feet in width and end at a cul-de-sac at the proposed Facility entrance. Immediately upon entering the Facility entrance, visitors and employees will enter the staff and visitor parking lots on the right hand side. All inbound trucks will continue on the site road in an easterly direction to the inbound scale or bypass lane. The site road is two lanes, approximately 32 feet wide up to the point where it transitions to approximately 82 feet to accommodate the scales and bypass lanes. Beyond the inbound scale the road transitions to approximately 48 feet wide and three lanes. Two lanes are for inbound trucks and one for outbound trucks. The trucks then enter a large paved maneuvering area for loading/unloading at the overhead doors or loading dock areas. After unloading the trucks leave by the outbound lane to the outbound scale where they either scale out or go around the scale through the bypass lane and proceed on to the facility entrance/exit. All interior roads and parking areas will be paved. The employee and visitor parking lots provide 50 parking spaces. The speed limit of the interior roads will be limited to 15 mph.

Pedestrian use will be limited to the employee/visitor parking areas and the walkway to the administration building from those parking areas. Any pedestrian use of the truck maneuvering area would be limited to facility employees directing trucks within that area. There is a five foot sidewalk along the north side of the processing building in order to provide emergency egress points as required by building codes. Access along the south side of the building has been provided for emergency and maintenance vehicles. This access will be constructed with a gravel base, but will be seeded to grow grass.

Circulation patterns will be defined through the use of striping and signage.

Maintenance of the facility roads, parking areas, and truck maneuvering areas will include sweeping of the paved surfaces as needed as well as repair of damaged pavement as it becomes necessary.

Please refer to the Proposed Site Plan located in Attachment 12 for the layout of the facility roads, parking, and maneuvering areas.

SUMMARY

Based on the above information, the project has been designed to provide adequate provisions for safe and uncongested traffic movement into, out of, and within the proposed facility for the estimated peak day traffic volume of 356 vehicle trips/day.

The estimated peak daily traffic volume will be spread out throughout the entire day and will not create a congestion issue during either of the typical AM or PM peak hours on Coldbrook Road or the closest intersections.

The Coldbrook Road and its intersections with US Route 202 and Interstate I-95 are designed for the largest trucks expected at the proposed facility and the crash data supports that there are no safety issues along this corridor.

The haul routes from the charter municipalities will remain largely unchanged from their existing routes and follow roadways appropriate for truck traffic.

The entrance onto Coldbrook Road and the interior road network have been designed with adequate sight distance and provide for safe traffic movements.

STATE OF MAINE
VICTOR J. SMITH
No. 8604
LICENSED
PROFESSIONAL ENGINEER

6/24/15

Maine Department of Transportation

Paul R. LePage
Governor

Driveway/Entrance Permit

David Bernhardt, P.E,
Commissioner

Permit Number: 15947 - **Entrance ID:** 1

OWNER

Name:	**Hickory Development, LLC**
Address:	**PO Box 249**
	Hampden, Me 04444
Telephone:	**(207)862-4070**

Date Printed: **May 22, 2015**

LOCATION

Route:	**C531K, Coldbrook Rd**
Municipality:	**Hampden**
County:	**Penobscot**
Tax Map:	**14** Lot Number: **7/8**
Culvert Size:	**inches**
Culvert Type:	**N/R**
Culvert Length:	**feet**
Date of Permit:	**May 22, 2015**
Approved Entrance Width:	**30 feet**

In accordance with rules promulgated under 23 M.R.S.A., Chapter 13, Subchapter I, Section 704, the Maine Department of Transportation (MaineDOT) approves a permit and grants permission to perform the necessary grading to construct, in accordance with sketch or attached plan, **an Entrance** to at a point **1140** feet **East** from **Old Coldbrook Rd**, subject to the Chapter 299 Highway Driveway and Entrance Rules, standard conditions and special conditions (if any) listed below.

Conditions of Approval:

This Permittee acknowledges and agrees to comply with the Standard Conditions and Approval attached hereto and to any Specific Conditions of Approval shown here.

(W = Waiver; S = Special Condition)

S - Proposed entrance will need an over sized 36 inch STOP sign.

S - Truck Entering signs must be placed on Coldbrook Rd 300 feet on either side of proposed entrance.

S - Entrance to be built to the revised plan of C.E.S. dated 5/14/2015, attached. The plan shows that the shoulder on Coldbrook Road needs to be removed for approximately 250 feet and strethened with 4 inches of new pavement to support truck loads.

S - This entrance permit is transferable to the Municipal Review Committee, Inc. upon closing of the property option agreement between Hickory Development, LLC and the Municipal Review Committee, Inc.

Approved by: Bruce W Mattson Date: 5-22-15

Bruce W. Mattson, P.E.
Region Traffic Engineer

STANDARD CONDITIONS AND APPROVAL

1. Provide, erect and maintain all necessary barricades, lights, warning signs and other devices as directed by MaineDOT to properly safeguard traffic while the construction is in progress.

2. At no time cause the highway to be closed to traffic

3. Where the driveway is located within a curb, curb and gutter, and/or sidewalk section, completely remove the existing curb, curb and gutter, and/or sidewalk as may be required to create the driveway and restore drainage. All driveways abutting sidewalk sections shall meet the requirements set forth in the Americans with Disabilities Act of 1990, 42 U.S.C. Sec. 12131 et seq.

4. Obtain, have delivered to the site, and install any culverts and/or drainage structures which may be necessary for drainage, the size, type and length as called for in the permit pursuant to 23 M.R.S.A. Sec. 705. All culverts and/or drainage structures shall be new.

5. Start construction of the proposed driveway within twenty-four (24) months of the date of permit issuance and substantially complete construction of the proposed driveway within twelve months of commencement of construction.

6. Comply with all applicable federal, state and municipal regulations and ordinances.

7. Do not alter, without the express written consent of the MaineDOT, any culverts or drainage swales within the MaineDOT right of way.

8. File a copy of the approved driveway permit with the affected municipality or LURC, as appropriate within 5 business days of receiving the MaineDOT approval.

9. Construct and maintain the driveway side slopes to be no steeper than the adjacent roadway side slopes, but in no case to be steeper than 3 horizontal to 1 vertical, unless the side slope is behind existing roadway guardrail, in which case it shall be no steeper than 2 horizontal to 1 vertical.

10. Notify the MaineDOT of a proposed change of use served by the driveway when increase in traffic flow is expected to occur. This does not exempt the need for obtaining a Traffic Movement Permit (TMP) if trip generation meets or exceeds 100 passenger car equivalents (PCE) during the peak hour of the day.

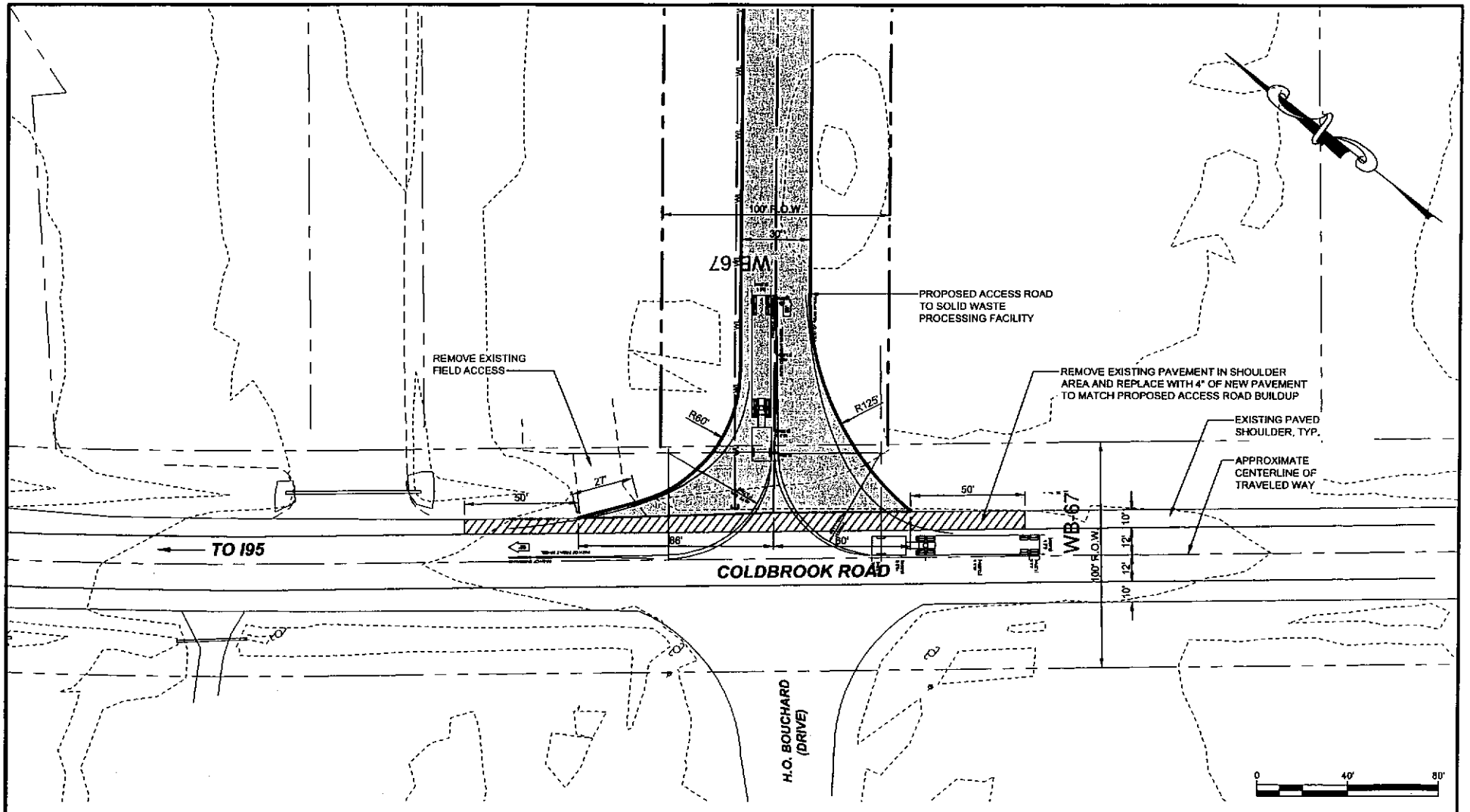
11. Construct or implement and maintain erosion and sedimentation measures sufficient to protect MaineDOT facilities.

12. Driveways shall be designed such that all maneuvering and parking of any vehicles will take place outside the highway right-of-way and where vehicles will exit the premises without backing onto the highway traveled way or shoulders. All driveways will have a turnaround area to accomodate vehicles using the premises.

FURTHER CONDITION OF THE PERMIT

The owner shall assume, the defense of, and pay all damages, fines, and penalties for which he/she shall become liable, and shall indemnify and safe harmless said Department, its representatives, agents and employees from liability, actions against all suits, claims, damages for wrongful death, personal injuries or property damage suffered by any person or association which results from the willful or negligent action or inaction of the owner/applicant (agent) and in proceedings of every kind arising out of the construction and maintenance of said entrance(s), including snow removal.

Nothing herein shall, nor is intended to, waive any defense, immunity or limitation of liability which may be available to the MaineDOT, their officers, agents or employees under the Maine Tort Claims Act or any other privileges and/or immunities provided by law. It is a further condition that the owner will agree to keep the right of way inviolate for public highway purposes and no signs (other than traffic signs and signals), posters, billboards, roadside stands, culvert end walls or private installations shall be permitted within Right of Way limits.



PROJECT TITLE: SOLID WASTE PROCESSING FACILITY HAMPDEN, MAINE	DWG: 1 OF 1	BY: BLQ	REV:	DESCRIPTION:	CES INC Engineers • Environmental Scientists • Surveyors
		DATE: 2015-05-14	REV DATE:		
SHEET TITLE: PROPOSED ACCESS ROAD INTERSECTION AT COLDBROOK ROAD	JN: 10973.003	APPROVED BY:	ISSUE:	DESCRIPTION:	
	SCALE: 1:40	CHECKED BY:	ISSUE DATE:		

Identified Haul Routes

N
W E
S

20 10 0 20
Miles

Legend

- Proposed Facility Location
- Transfer Locations
- Identified Haul Route Changes
- Existing Haul Routes
- Major Roadways
- MRC Charter Communities

MAP NOTES:

1: SITE DATA DEVELOPED BY CES, INC., DECEMBER, 2015.

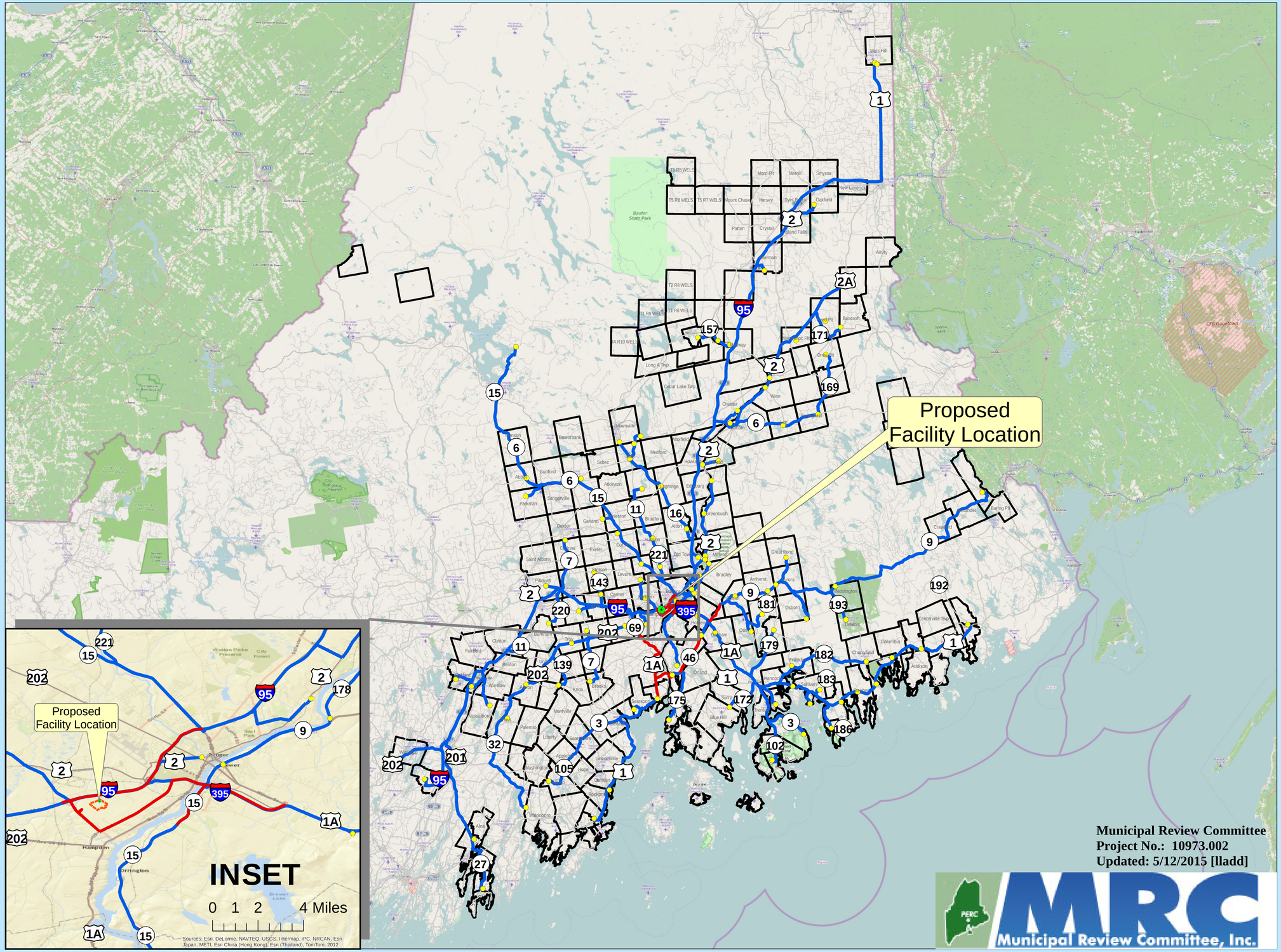
2: BASE MAPPING LAYERS ARE SERVER-BASED DATA LAYERS COURTESY OF ESRI. ACQUIRED MAY 2015.

3: MAP IS PROJECTED USING THE UNIVERSAL TRANSVERSE MERCATOR (UTM) PROJECTION, ZONE 19 NORTH, METERS AND REFERENCES THE NORTH AMERICAN DATUM OF 1983 (NAD83).

4: NORTH ARROW IS REFERENCED TO GRID NORTH.

5: INTENDED FOR REFERENCE PURPOSES ONLY. THE MRC & CES, INC. AND THEIR AFFILIATES ARE NOT RESPONSIBLE FOR THE MISUSE OF THIS MAP OR DATA DEPICTED HEREIN.

CES INC
Engineers • Environmental Scientists • Surveyors



Municipal Review Committee
Project No.: 10973.002
Updated: 5/12/2015 [lladd]

MRC
Municipal Review Committee, Inc.

MXD: P:\10973-MRC-Municipal-Review-Committee\003-Processing Facility-DSP\07-GIS_Data\MXD\HaulRouteChanges_24x36_050415n.mxd

APPENDIX 2

STORMWATER CONTROL NARRATIVES

(From Solid Waste Permit Application – MDEP)

ATTACHMENT 18 - REVISED

STORMWATER AND EROSION AND SEDIMENTATION CONTROL

Applications must include evidence that affirmatively demonstrate that there will be no unreasonable adverse effect on surface water quality, including evidence that:

(a) The applicant will comply with all applicable stormwater management standards of 06-096 CMR 500, if the proposed facility is in the direct watershed of "waterbodies most at risk from new development"; and

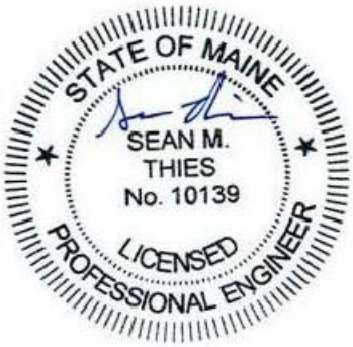
The proposed project is not located within the direct watershed of a waterbody most at risk from new development.

Included in this section are the Basic Standard and General Standard submissions of the MDEP Chapter 500 Stormwater Law. These Standards address erosion and sedimentation control and stormwater quality consistent with the submission requirements of Chapter 400, Section 4.H and 4.J.

Refer to Attachment 12 for the preliminary findings of the geotechnical investigations that have been done to date, along with boring logs, which indicate that the soils are suitable for the proposed development.

(b) A waste water discharge license has been obtained or will be obtained, if required by 38 M.R.S.A. §413.

The proposed project does not require a waste water discharge license.



ATTACHMENT 18A

BASIC STANDARD SUBMISSIONS

An Erosion and Sedimentation Plan has been prepared for the MRC/Fiberight Processing Facility. The erosion control notes in this plan address permanent stabilization measures, seeding, and mulching rates, as well as the timing of installation. Construction and installation details are also provided for the project. Additional descriptions and specifications are provided in this section. The locations of silt fence and other erosion control devices have been shown on Sheet C101.

An Inspection and Maintenance Plan has also been included. This plan includes a list of measures to be inspected and maintained, as well as the frequency and responsible parties to implement the plan.

A Housekeeping Plan has also been included. This plan provides controls to address spill prevention and possible events that could result in discharges on the site.

EROSION AND SEDIMENTATION CONTROL

1. **Pollution Prevention:** The proposed project includes the construction of a solid waste processing facility in Hampden, Maine. The facility will include an administration building, processing facility building, parking areas, and truck maneuvering area. All disturbed areas, with the exception of the buildings, and parking/maneuvering areas, will be stabilized with vegetation or riprap. Proposed downgradient wooded areas will be protected with the use of silt fence or additional control devices if necessary during construction.

2. **Sediment Barriers:** Prior to construction, sediment barriers will be installed downgradient of all disturbed areas. Sediment barriers will include silt fence, bark mulch berms, or additional measures which may become necessary.

   Sediment barriers will also be installed adjacent to any significant natural drainage channel, not otherwise protected. All installed sediment barriers will be maintained until disturbed areas are permanently stabilized.

3. **Temporary Stabilization:** Disturbed areas, which have lost natural vegetation cover, and will not be worked for more than seven days, will be temporarily stabilized. Areas within 75 feet of a wetland or waterbody will be stabilized within 48 hours of the initial disturbance or prior to any significant storm event, whichever comes first.

   Temporary stabilization will include mulch or other non-erodible material such as erosion control mesh mats. In some instances temporary stabilization may include temporary mulch and seeding, based on the time until the area will be worked or permanently stabilized.

4. **Removal of Temporary Sediment Control Measures:** After permanent stabilization of disturbed areas has been completed, temporary measures, such as silt fence, will be removed within 30 days. Any accumulated sediments will be removed and any disturbed areas permanently stabilized.

5. **Permanent Stabilization:** Once proposed construction is completed all disturbed areas, not otherwise permanently stabilized, will be permanently stabilized with vegetation, seeding, or permanent mulch.

   Vegetation plantings and seeding will include species which are suitable for the conditions of the area. Seeded areas will be protected with temporary mulch or erosion control blankets.

   Concentrated flows will not be allowed on newly seeded areas until an adequate catch of vegetation is established. It may be necessary to reseed and mulch again if germination is sparse, plant coverage is spotty, or topsoil erosion is evident. For seeded areas, permanent stabilization means a 90% cover of healthy plants with no evidence of washing or rilling of the topsoil.

Other permanent measures associated with the project include the following:

A. Permanent Mulch: Permanent mulching means total coverage of 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.

B. Permanent Riprap: Permanent riprap means that slopes and ditches stabilized with riprap have an appropriate backing of well-graded gravel or approved geotextile to prevent soil movement from behind the riprap. Properly sized angular stones will be utilized.

C. Permanent Ditches, Channels, and Swales: Permanent stabilization means the channel is stabilized with a 90% cover of healthy vegetation or with a well-graded riprap lining. There must be no evidence of slumping of the channel lining, undercutting of the channel banks, or down-cutting of the channel.

6. **Winter Construction:** At this time no earthwork is expected during the Winter months. If unexpected Winter construction occurs, additional provision will be made to protect disturbed areas from runoff. "Winter construction" includes the time between November 1 and April 15.

7. **Stormwater Channels:** Ditches, swales, and open stormwater channels are planned as part of this project. They will be stabilized with either vegetation or riprap depending on the situation to prevent soil erosion.

8. **Roads:** The proposed entrance driveway will be treated by various BMPs.

9. **Culverts:** Culverts utilized in this project will be protected on both ends and the outlet pool to prevent scour.

10. **Parking Areas:** The proposed project includes parking areas graded to collect runoff in the various proposed BMPs.

11. **Additional Requirements:** No additional requirements are proposed at this time.

INSPECTION AND MAINTENANCE

Maintenance Plan

The Owner and their Contractor will be responsible for maintenance of stormwater and erosion and sedimentation control measures during the construction of the facility. The Owner will be responsible for post construction maintenance of the site and the devices that provide treatment for the stormwater from the site as well as erosion and sedimentation control measures on the site.

A Pre- and Post-Construction Maintenance Plan for the stormwater management system is included in this section. Any questions regarding the design and maintenance of the Stormwater Management and Erosion and Sedimentation Control Systems should be directed to:

Sean Thies, P.E.
CES, Inc.
P.O. Box 639
Brewer, ME 04412

MAINTENANCE PLAN OF STORMWATER MANAGEMENT SYSTEM

The Maine Department of Environmental Protection's (MDEP) Stormwater Management for Maine: Best Management Practices latest edition, 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 seven 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 will be responsible for the inspection and maintenance of all stormwater management system components associated with the proposed project.

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. Stormwater Underdrain Soil Filters: Maintenance of the underdrain soil filters built for the treatment of stormwater will at a minimum include the items listed below.

a. Soil Filter Inspection: The soil filter should be inspected after every major storm in the first few months to ensure proper function. Thereafter, the filter should be inspected at least once every six months to ensure that it is draining within 48 hours following a 1 inch or greater rain storm: and that, following storms that fill the area to overlow, the area must drain in no less than 36 to 60 hours. If the system drains too fast, the orifice on the underdrain outlet may need to be modified.

b. Soil Filter Replacement: The vegetation within the underdrain soil filter shall be rototilled if the filter area does not drain within 48 hours. The top several inches of the filter shall be replaced with fresh material when water ponds on the surface of the bed for more than 72 hours. The removed sediments should be disposed in an acceptable manner.

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

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

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

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

g. Roadway: Sweeping of the roadways may be necessary to remove and legally dispose of any accumulated sediments.

C. DOCUMENTATION

A log shall 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.

HOUSEKEEPING

The following performance standards are proposed for the project.

1. **Spill Prevention:** Controls must be used to prevent pollutants from being discharged from materials on site, including storage practices to minimize exposure of the materials to stormwater, and appropriate spill prevention, containment, and response planning and implementation.

2. **Groundwater Protection:** During construction, liquid petroleum products and other hazardous materials with the potential to contaminate groundwater may not be stored or handled in areas of the site draining to an infiltration area. An “infiltration area” is any area of the site that by design or as a result of soils, topography and other relevant factors accumulates runoff that infiltrates into the soil. Dikes, berms, sumps, and other forms of secondary containment that prevent discharge to groundwater may be used to isolate portions of the site for the purposes of storage and handling of these materials.

3. **Fugitive Sediment and Dust:** Actions must be taken to ensure that activities do not result in noticeable erosion of soils or fugitive dust emissions during or after construction. Oil may not be used for dust control. Operations during wet months that experience tracking of mud off the site onto public roads should provide for sweeping of road areas at least once a week and prior to significant storm events. Where chronic mud tracking occurs, a stabilized construction entrance should be provided. Operations during dry months, that experience fugitive dust problems, should wet down the access roads once a week or more frequently as needed.

4. **Debris and Other Materials:** Litter, construction debris, and chemicals exposed to stormwater must be prevented from becoming a pollutant source.

5. **Trench or Foundation De-Watering:** Trench de-watering is the removal of water from trenches, foundations, coffer dams, ponds, and other areas within the construction area that retain water after excavation. In most cases the collected water is heavily silted and hinders correct and safe construction practices. The collected water must be removed from the ponded area, either through gravity or pumping, and must be spread through natural wooded buffers or removed to areas that are specifically designed to collect the maximum amount of sediment possible, like a cofferdam sedimentation basin. Avoidance measures shall be implemented to prevent water from flowing over disturbed areas of the site. Equivalent measures may be taken if approved by the department.

6. **Non-Stormwater Discharges:** Identify and prevent contamination by non-stormwater discharges.

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

ATTACHMENT 18B

STORMWATER QUALITY CONTROL NARRATIVE

ATTACHMENT 18B

STORMWATER QUALITY CONTROL NARRATIVE

The proposed development will be located on a parcel of land in Hampden approximately 90 acres in size. The existing site of the development is undeveloped and covered mainly by woodland. Shaw Brook is classified as an Urban Impaired Stream and is located to the west of the proposed parcel. Runoff from the site generally drains to a large forested wetland area to the south of the parcel before eventually discharging to the Penobscot River. Runoff from the proposed parcel does not discharge to Shaw Brook. The proposed development includes the construction of a 144,000 square foot processing building, a 9,800 square foot administrative building, scales and scale shack, and associated parking and maneuvering areas. The Chapter 500 Stormwater Management Standards require this project to meet basic, general, and flooding standards. Basic standards as outlined in Attachment 18A include: erosion and sedimentation control; inspection; and maintenance and housekeeping; respectively.

General standards require a minimum of 95% of the impervious area and 80% of the developed area associated with a project to receive treatment measures. This project proposes to treat the new development by utilizing a combination of three vegetated underdrained soil filters (VUDSF) and a roofline drip edge filter per the Maine Department of Environmental Protection's (MDEP) Stormwater BMP Manual. Treating approximately 266,661 square feet of impervious area and 379,338 square feet of developed area is 100% of the proposed project impervious area and 89.58% of the proposed project developed area. The following charts summarize the impervious and developed area proposed to be permitted 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	IMPERVIOUS AREA	DEVELOPED AREA
Proposed Site Area	266,661 SF	423,444 SF
Total	**266,661 SF**	**423,444 SF**

TREATMENT METHOD	IMPERVIOUS AREA TREATED	DEVELOPED AREA TREATED
VUDSF 1	94,425 SF	140,184 SF
VUDSF 2	56,218 SF	110,958 SF
VUDSF 3	50,574 SF	59,924 SF
Roof Dripline Filter	65,444 SF	68,272 SF
Total Area Treated	**266,661SF**	**379,338 SF**
Percent Treated of Areas	**100%**	**89.58%**

A description of the treatment systems are as follows.

1. **Underdrained Soil Filter 1:**
   Impervious Area: 94,425 SF
   Landscaped Area: 45,759 SF

Chapter 500 sizing is based on 1" × the impervious area + 0.4" × the landscape area.
94,425 SF x 1" = 7,869 CF of Required Storage
45,759 SF x 0.4" = 1,525 CF of Required Storage
9,394 CF of Required Storage. 9,851 CF was provided by design.

Surface Area of filter is based on 5% x impervious area + 2% x landscape are.
94,425 SF x .05 = 4,722
45,759 SF x .02 = 916
5,638 SF of Required Filter Area. 5,700 SF was provided by design.

2. **Underdrained Soil Filter 2:**
Impervious Area: 50,574 SF
Landscaped Area: 9,350 SF

Chapter 500 sizing is based on 1" × the impervious area + 0.4" × the landscape area.
50,574 SF x 1" = 4,215 CF of Required Storage
9,350 SF x 0.4" = 312 CF of Required Storage
4,527 CF of Required Storage. 8,134 CF was provided by design.

Surface Area of filter is based on 5% x impervious area + 2% x landscape are.
50,574 SF x .05 = 2,529
9,350 SF x .02 = 187
2,716 SF of Required Filter Area. 2,750 SF was provided by design.

3. **Underdrained Soil Filter 3:**
Impervious Area: 56,218 SF
Landscaped Area: 54,740 SF

Chapter 500 sizing is based on 1" × the impervious area + 0.4" × the landscape area.
56,218 SF x 1" = 4,685 CF of Required Storage
54,740 SF x 0.4" = 1,825 CF of Required Storage
6,510 CF of Required Storage. 7,578 CF was provided by design.

Surface Area of filter is based on 5% x impervious area + 2% x landscape are.
56,218 SF x .05 = 2,811
54,740 SF x .02 = 1,095
3,906 SF of Required Filter Area. 3,950 SF was provided by design.

4. **Roof Dripline Filter:** A roof dripline will be constructed along most of the southern edge of the proposed building. The size of the dripline was determined by the requirement that storage was needed to meet the flooding standards. At 40% porosity, the minimum crushed rock treatment storage area required is 5.5-feet wide by 5-feet deep. This is what was provided by design.

The proposed stormwater quality control devices have been designed according to the standards outlined in the *Stormwater Management for Maine, Volume III BMP Manual*, January 2006 and revised April 2007. Construction and maintenance will be according to standards outlined in this manual.

ATTACHMENT 21

FLOODING
STORMWATER MANAGEMENT QUANTITY REPORT

As shown on the included Flood Insurance Map, the Fiberight facility is not located in, or within ¼ mile, of the 100 year flood plain.

Consistent with Department regulations, a 25-year, 24-hour storm event was modeled to determine the necessary detention and outlet sizing requirements. Stormwater modeling was completed using HydroCAD software. Included in this Attachment are the HydroCAD software results for the 2-year, 10-year, and 25-year storm events, the Pre and Post Stormwater Hydrology Plans, and a narrative describing the pre and post hydrology calculations. The Proposed Site Plan included in Attachment 12 outlines the proposed development. The pre and post development conditions for the project are described below. The following narratives, calculations, and plans address the requirements of Chapter 400.4.M.2(b-i).

PRE DEVELOPMENT/EXISTING CONDITIONS

The proposed development will be located on a parcel of land in Hampden approximately 90 acres in size. The parcel is undeveloped and covered mainly by woodland. Shaw Brook is classified as an Urban Impaired Stream and is located approximately 3,000 feet to the west of the existing parcel. Runoff from the site generally drains to a large forested wetland area to the south of the parcel before eventually draining to the Penobscot River. Runoff from the proposed parcel does not drain to Shaw Brook. Similarly, in the post development conditions, the runoff will not drain to Shaw Brook.

PRE DEVELOPMENT DRAINAGE

The attached predevelopment hydrology plan shows four drainage areas for the portion of the site studied. The area south of the development was not studied as this portion of the site is not proposed to be developed as part of this application. All four subareas are comprised mostly of wooded areas and all drain toward the south.

POST DEVELOPMENT/PROPOSED CONDITIONS

The proposed development includes the construction of a 144,000 square foot processing building, a 9,800 square foot administrative building, scales and scale house, and associated parking and maneuvering areas. The proposed development will be built over a portion of previously undeveloped land and will add approximately 9.7 acres of developed area to the existing site. The development will be treated with a combination of three vegetated underdrained soil filters and a roofline drip edge filter. All of these treatment measures discharge toward the south and west ends of the site before re-joining the pre-development flow paths.

POST DEVELOPMENT DRAINAGE

The attached post developed hydrology plan shows eight drainage areas**.** **Subarea 1** includes the wooded area north of the proposed development and drains southerly to a proposed grassed swale along the north side of the driveway. The grass swale delivers stormwater runoff from the wooded area to a culvert under the driveway where it discharges near the outlet for VUDSF #3. **Subarea 2** includes the employee parking, Administrative Building, and portions of the Process Building, driveway, and access road. Stormwater from this area will flow toward a

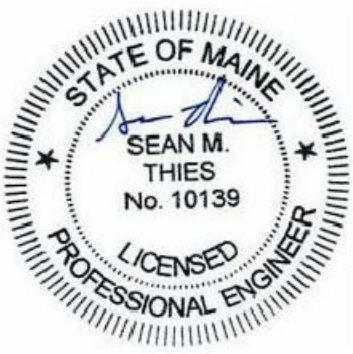
grassed swale to the west of the Administrative Building which will discharge to a vegetated underdrained soil filter for treatment. **Subareas 3a and 3b** include most of the southern half of the Process Building roof. Stormwater from the roof will drain to the south and be captured in a roofline drip edge filter for treatment prior to discharging offsite. **Subarea 4** includes the scales, and portions of the northern half of the Process Building roof, driveway, and tank area. Stormwater from this area will flow toward the grassed area between the driveway and the building where it will be collected in a vegetated underdrained soil filter prior to discharging offsite. **Subarea 5** includes a mostly wooded area to the northeast of the proposed development. Stormwater from this area generally drains toward the south before being diverted around the driveway and maneuvering areas by a vegetated ditch prior to joining a wetland area to the east of the site. **Subarea 6** includes the truck maneuvering areas for the loading/unloading area. This area is predominantly paved and stormwater will flow toward the south where it will be collected in a vegetated underdrained soil filter prior to being discharged offsite. **Subarea 7** includes the wooded area to the south of the facility. Stormwater will generally sheet flow to the southwest toward the existing forested wetland area as it did prior to the development. **Subarea 8** includes the wooded area to the southwest of the facility. Stormwater will generally sheet flow to the southwest toward the existing forested wetland area as it did prior to the development. **Subarea 9** includes vegetated area between the northwest side of the proposed processing facility and the proposed roadway. Runoff from the area drains southwesterly along the proposed roadway to a freshwater wetland south of the project site area.

A comparison of pre and post development flows for the project at the analysis point follows.

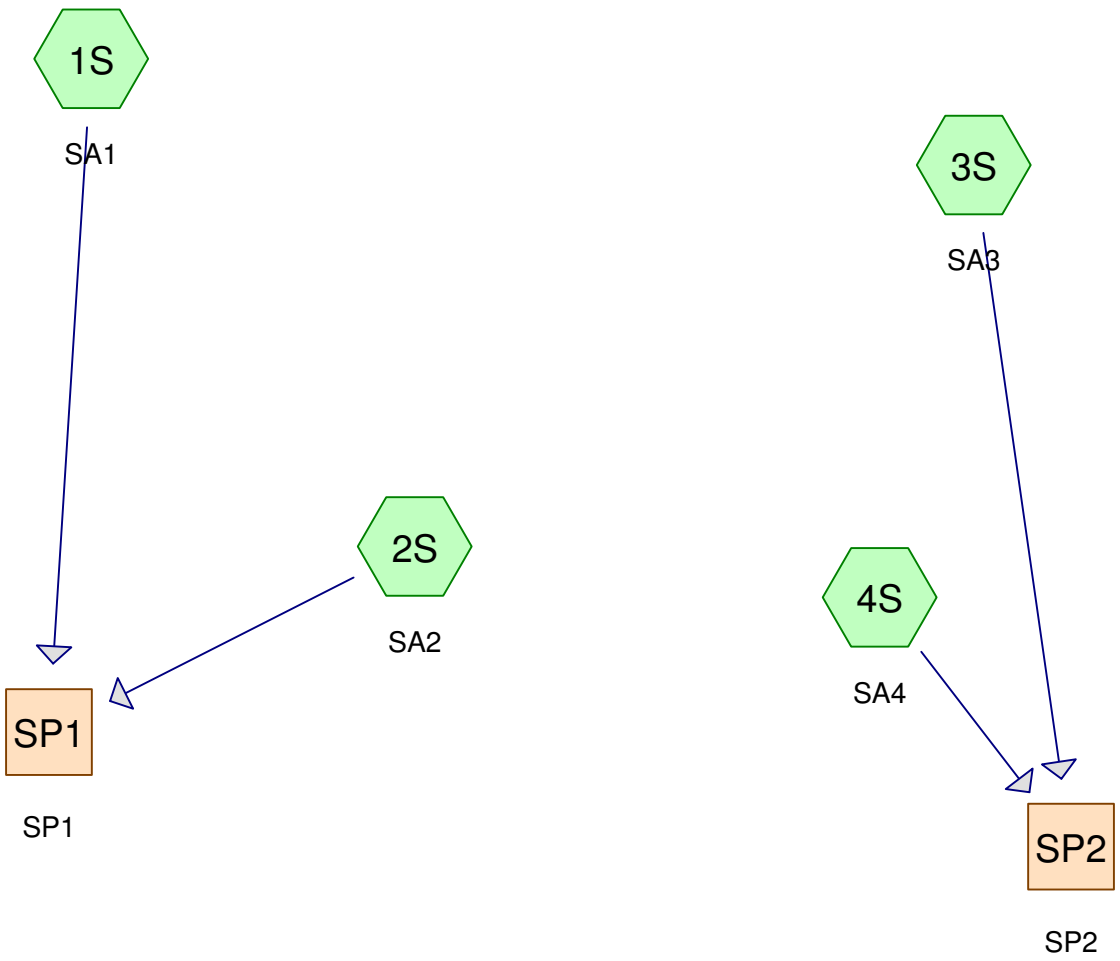
24 HOUR, TYPE III DURATION STORM			
	2 YEAR PRE/POST (CFS)	**10 YEAR PRE/POST (CFS)**	**25 YEAR PRE/POST (CFS)**
Summation Point 1	6.98/5.85	15.20/14.85	19.63/17.59
Summation Point 2	3.85/3.60	8.39/8.16	10.83/10.81

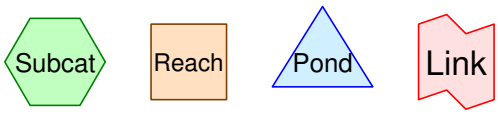
POST DEVELOPMENT ANALYSIS

The results of the analysis for this site indicate that there is a reduction in runoff from both summation points, and that all of the stormwater treatment measures are sized adequately to handle storm water runoff from 2, 10, and 25-year storm events. Accordingly, there are no anticipated adverse impacts to the down-gradient areas, and as a result the development will have no unreasonable effect on run-on, run-off, and/or infiltration relationships on-site or on adjacent properties.



PRE DEVELOPMENT - 2 YEAR





Routing Diagram for PreDevelopment
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Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
1.944	78	Meadow, non-grazed, HSG D (2S, 3S, 4S)
21.931	79	Woods, Fair, HSG D (1S, 2S, 3S, 4S)
23.875	**79**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
23.875	HSG D	1S, 2S, 3S, 4S
0.000	Other	
23.875		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	1.944	0.000	1.944	Meadow, non-grazed	2S, 3S, 4S
0.000	0.000	0.000	21.931	0.000	21.931	Woods, Fair	1S, 2S, 3S, 4S
0.000	**0.000**	**0.000**	**23.875**	**0.000**	**23.875**	**TOTAL AREA**	

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: SA1 Runoff Area=80,512 sf 0.00% Impervious Runoff Depth>0.89"
Flow Length=407' Tc=20.3 min CN=79 Runoff=1.35 cfs 0.137 af

Subcatchment 2S: SA2 Runoff Area=605,980 sf 0.00% Impervious Runoff Depth>0.87"
Flow Length=1,600' Tc=53.0 min CN=79 Runoff=6.44 cfs 1.013 af

Subcatchment 3S: SA3 Runoff Area=266,020 sf 0.00% Impervious Runoff Depth>0.87"
Flow Length=966' Tc=52.3 min CN=79 Runoff=2.85 cfs 0.445 af

Subcatchment 4S: SA4 Runoff Area=87,465 sf 0.00% Impervious Runoff Depth>0.88"
Flow Length=767' Tc=38.4 min CN=79 Runoff=1.11 cfs 0.147 af

Reach SP1: SP1 Inflow=6.98 cfs 1.150 af
Outflow=6.98 cfs 1.150 af

Reach SP2: SP2 Inflow=3.85 cfs 0.592 af
Outflow=3.85 cfs 0.592 af

Total Runoff Area = 23.875 ac Runoff Volume = 1.742 af Average Runoff Depth = 0.88"
100.00% Pervious = 23.875 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: SA1

Runoff = 1.35 cfs @ 12.30 hrs, Volume= 0.137 af, Depth> 0.89"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 Year Rainfall=2.70"

Area (sf)	CN	Description
80,512	79	Woods, Fair, HSG D
80,512		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.2	100	0.0500	0.10		**Sheet Flow, SF 1-1** Woods: Light underbrush n= 0.400 P2= 2.70"
2.2	130	0.0400	1.00		**Shallow Concentrated Flow, SCF 1-1** Woodland Kv= 5.0 fps
1.9	177	0.0500	1.57		**Shallow Concentrated Flow, SCF 1-2** Short Grass Pasture Kv= 7.0 fps
20.3	407	Total			

Summary for Subcatchment 2S: SA2

Runoff = 6.44 cfs @ 12.77 hrs, Volume= 1.013 af, Depth> 0.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 Year Rainfall=2.70"

Area (sf)	CN	Description
31,497	78	Meadow, non-grazed, HSG D
574,483	79	Woods, Fair, HSG D
605,980	79	Weighted Average
605,980		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.7	100	0.0400	0.09		**Sheet Flow, SF 2-1** Woods: Light underbrush n= 0.400 P2= 2.70"
18.5	785	0.0200	0.71		**Shallow Concentrated Flow, SCF 2-1** Woodland Kv= 5.0 fps
2.1	90	0.0100	0.70		**Shallow Concentrated Flow, SCF 2-2** Short Grass Pasture Kv= 7.0 fps
14.7	625	0.0200	0.71		**Shallow Concentrated Flow, SCF 2-3** Woodland Kv= 5.0 fps
53.0	1,600	Total			

Summary for Subcatchment 3S: SA3

Runoff = 2.85 cfs @ 12.75 hrs, Volume= 0.445 af, Depth> 0.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 Year Rainfall=2.70"

Area (sf)	CN	Description
37,610	78	Meadow, non-grazed, HSG D
228,410	79	Woods, Fair, HSG D
266,020	79	Weighted Average
266,020		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.4	100	0.0200	0.07		**Sheet Flow, SF 3-1** Woods: Light underbrush n= 0.400 P2= 2.70"
28.9	866	0.0100	0.50		**Shallow Concentrated Flow, SCF 3-1** Woodland Kv= 5.0 fps
52.3	966	Total			

Summary for Subcatchment 4S: SA4

Runoff = 1.11 cfs @ 12.57 hrs, Volume= 0.147 af, Depth> 0.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 Year Rainfall=2.70"

Area (sf)	CN	Description
15,577	78	Meadow, non-grazed, HSG D
71,888	79	Woods, Fair, HSG D
87,465	79	Weighted Average
87,465		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.2	100	0.0500	0.10		**Sheet Flow, SF 4-1** Woods: Light underbrush n= 0.400 P2= 2.70"
22.2	667	0.0100	0.50		**Shallow Concentrated Flow, SCF 4-1** Woodland Kv= 5.0 fps
38.4	767	Total			

Summary for Reach SP1: SP1

Inflow Area = 15.760 ac, 0.00% Impervious, Inflow Depth > 0.88" for 2 Year event
Inflow = 6.98 cfs @ 12.73 hrs, Volume= 1.150 af
Outflow = 6.98 cfs @ 12.73 hrs, Volume= 1.150 af, Atten= 0%, Lag= 0.0 min

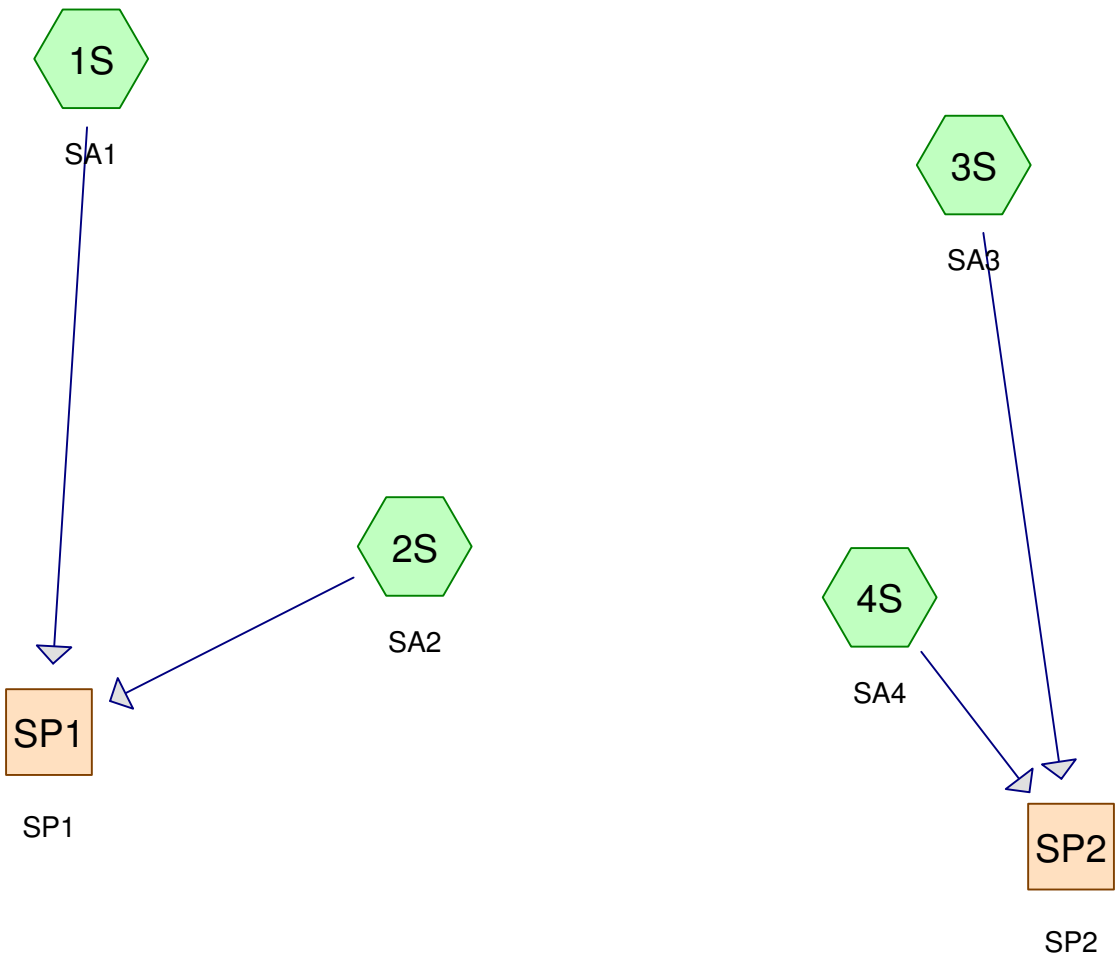
Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

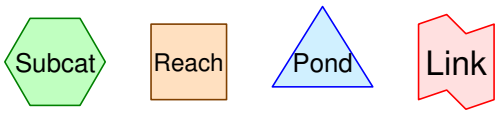
Summary for Reach SP2: SP2

Inflow Area = 8.115 ac, 0.00% Impervious, Inflow Depth > 0.88" for 2 Year event
Inflow = 3.85 cfs @ 12.70 hrs, Volume= 0.592 af
Outflow = 3.85 cfs @ 12.70 hrs, Volume= 0.592 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 - 10 YEAR





Routing Diagram for PreDevelopment
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Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
1.944	78	Meadow, non-grazed, HSG D (2S, 3S, 4S)
21.931	79	Woods, Fair, HSG D (1S, 2S, 3S, 4S)
23.875	**79**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
23.875	HSG D	1S, 2S, 3S, 4S
0.000	Other	
23.875		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	1.944	0.000	1.944	Meadow, non-grazed	2S, 3S, 4S
0.000	0.000	0.000	21.931	0.000	21.931	Woods, Fair	1S, 2S, 3S, 4S
0.000	**0.000**	**0.000**	**23.875**	**0.000**	**23.875**	**TOTAL AREA**	

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: SA1 Runoff Area=80,512 sf 0.00% Impervious Runoff Depth>1.89"
Flow Length=407' Tc=20.3 min CN=79 Runoff=2.95 cfs 0.291 af

Subcatchment 2S: SA2 Runoff Area=605,980 sf 0.00% Impervious Runoff Depth>1.87"
Flow Length=1,600' Tc=53.0 min CN=79 Runoff=14.01 cfs 2.163 af

Subcatchment 3S: SA3 Runoff Area=266,020 sf 0.00% Impervious Runoff Depth>1.87"
Flow Length=966' Tc=52.3 min CN=79 Runoff=6.21 cfs 0.950 af

Subcatchment 4S: SA4 Runoff Area=87,465 sf 0.00% Impervious Runoff Depth>1.88"
Flow Length=767' Tc=38.4 min CN=79 Runoff=2.41 cfs 0.314 af

Reach SP1: SP1 Inflow=15.20 cfs 2.454 af
Outflow=15.20 cfs 2.454 af

Reach SP2: SP2 Inflow=8.39 cfs 1.264 af
Outflow=8.39 cfs 1.264 af

Total Runoff Area = 23.875 ac Runoff Volume = 3.718 af Average Runoff Depth = 1.87"
100.00% Pervious = 23.875 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: SA1

Runoff = 2.95 cfs @ 12.29 hrs, Volume= 0.291 af, Depth> 1.89"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Year Rainfall=4.10"

Area (sf)	CN	Description
80,512	79	Woods, Fair, HSG D
80,512		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.2	100	0.0500	0.10		**Sheet Flow, SF 1-1** Woods: Light underbrush n= 0.400 P2= 2.70"
2.2	130	0.0400	1.00		**Shallow Concentrated Flow, SCF 1-1** Woodland Kv= 5.0 fps
1.9	177	0.0500	1.57		**Shallow Concentrated Flow, SCF 1-2** Short Grass Pasture Kv= 7.0 fps
20.3	407	Total			

Summary for Subcatchment 2S: SA2

Runoff = 14.01 cfs @ 12.74 hrs, Volume= 2.163 af, Depth> 1.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Year Rainfall=4.10"

Area (sf)	CN	Description
31,497	78	Meadow, non-grazed, HSG D
574,483	79	Woods, Fair, HSG D
605,980	79	Weighted Average
605,980		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.7	100	0.0400	0.09		**Sheet Flow, SF 2-1** Woods: Light underbrush n= 0.400 P2= 2.70"
18.5	785	0.0200	0.71		**Shallow Concentrated Flow, SCF 2-1** Woodland Kv= 5.0 fps
2.1	90	0.0100	0.70		**Shallow Concentrated Flow, SCF 2-2** Short Grass Pasture Kv= 7.0 fps
14.7	625	0.0200	0.71		**Shallow Concentrated Flow, SCF 2-3** Woodland Kv= 5.0 fps
53.0	1,600	Total			

Summary for Subcatchment 3S: SA3

Runoff = 6.21 cfs @ 12.73 hrs, Volume= 0.950 af, Depth> 1.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Year Rainfall=4.10"

Area (sf)	CN	Description
37,610	78	Meadow, non-grazed, HSG D
228,410	79	Woods, Fair, HSG D
266,020	79	Weighted Average
266,020		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.4	100	0.0200	0.07		**Sheet Flow, SF 3-1** Woods: Light underbrush n= 0.400 P2= 2.70"
28.9	866	0.0100	0.50		**Shallow Concentrated Flow, SCF 3-1** Woodland Kv= 5.0 fps
52.3	966	Total			

Summary for Subcatchment 4S: SA4

Runoff = 2.41 cfs @ 12.54 hrs, Volume= 0.314 af, Depth> 1.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Year Rainfall=4.10"

Area (sf)	CN	Description
15,577	78	Meadow, non-grazed, HSG D
71,888	79	Woods, Fair, HSG D
87,465	79	Weighted Average
87,465		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.2	100	0.0500	0.10		**Sheet Flow, SF 4-1** Woods: Light underbrush n= 0.400 P2= 2.70"
22.2	667	0.0100	0.50		**Shallow Concentrated Flow, SCF 4-1** Woodland Kv= 5.0 fps
38.4	767	Total			

Summary for Reach SP1: SP1

Inflow Area = 15.760 ac, 0.00% Impervious, Inflow Depth > 1.87" for 10 Year event
Inflow = 15.20 cfs @ 12.69 hrs, Volume= 2.454 af
Outflow = 15.20 cfs @ 12.69 hrs, Volume= 2.454 af, Atten= 0%, Lag= 0.0 min

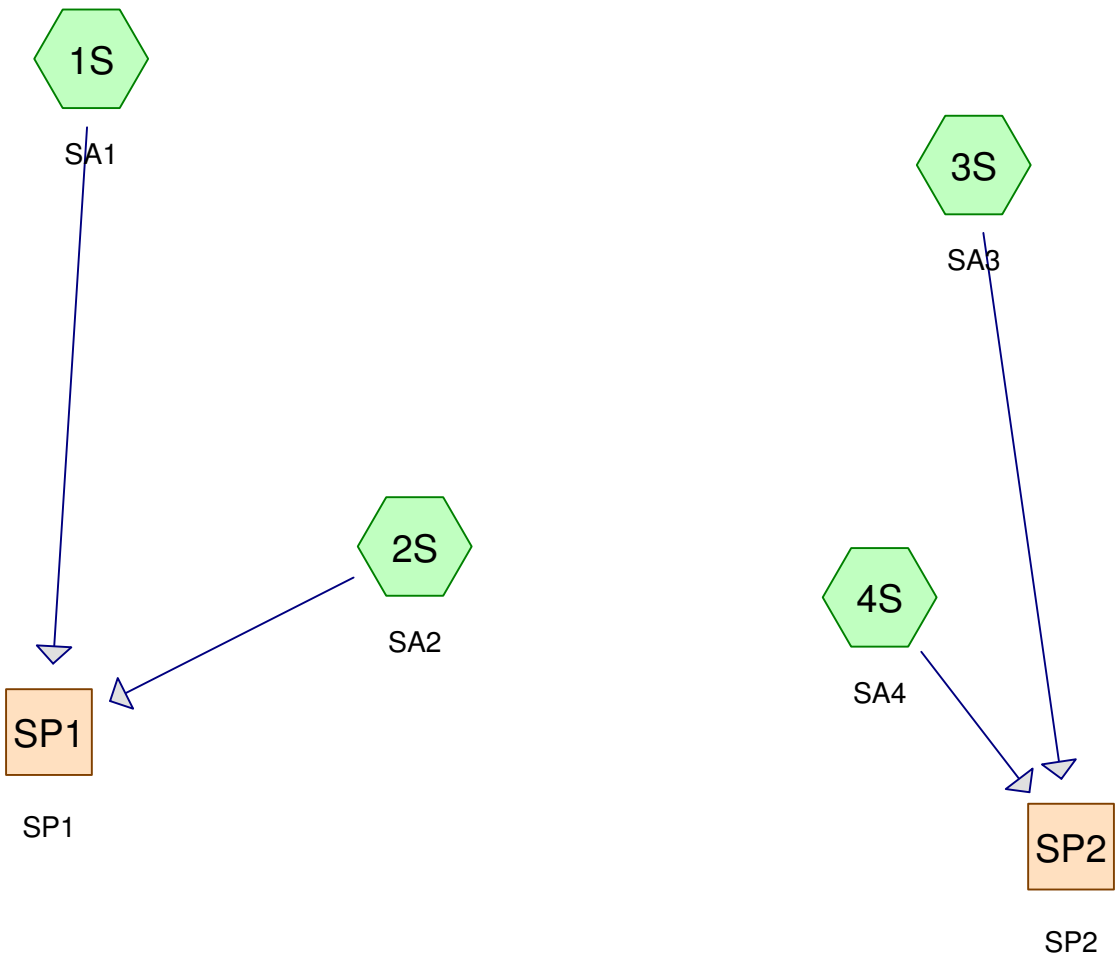
Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

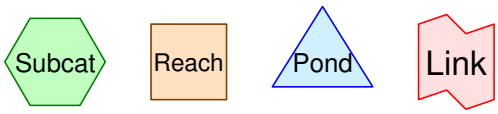
Summary for Reach SP2: SP2

Inflow Area = 8.115 ac, 0.00% Impervious, Inflow Depth > 1.87" for 10 Year event
Inflow = 8.39 cfs @ 12.67 hrs, Volume= 1.264 af
Outflow = 8.39 cfs @ 12.67 hrs, Volume= 1.264 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 - 25 YEAR





Routing Diagram for PreDevelopment
Prepared by CES, Inc., Printed 5/14/2015
HydroCAD® 10.00-12 s/n 00641 © 2014 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
1.944	78	Meadow, non-grazed, HSG D (2S, 3S, 4S)
21.931	79	Woods, Fair, HSG D (1S, 2S, 3S, 4S)
23.875	**79**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
23.875	HSG D	1S, 2S, 3S, 4S
0.000	Other	
23.875		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	1.944	0.000	1.944	Meadow, non-grazed	2S, 3S, 4S
0.000	0.000	0.000	21.931	0.000	21.931	Woods, Fair	1S, 2S, 3S, 4S
0.000	**0.000**	**0.000**	**23.875**	**0.000**	**23.875**	**TOTAL AREA**	

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: SA1 Runoff Area=80,512 sf 0.00% Impervious Runoff Depth>2.44"
Flow Length=407' Tc=20.3 min CN=79 Runoff=3.80 cfs 0.376 af

Subcatchment 2S: SA2 Runoff Area=605,980 sf 0.00% Impervious Runoff Depth>2.41"
Flow Length=1,600' Tc=53.0 min CN=79 Runoff=18.10 cfs 2.795 af

Subcatchment 3S: SA3 Runoff Area=266,020 sf 0.00% Impervious Runoff Depth>2.41"
Flow Length=966' Tc=52.3 min CN=79 Runoff=8.02 cfs 1.227 af

Subcatchment 4S: SA4 Runoff Area=87,465 sf 0.00% Impervious Runoff Depth>2.42"
Flow Length=767' Tc=38.4 min CN=79 Runoff=3.11 cfs 0.406 af

Reach SP1: SP1 Inflow=19.63 cfs 3.171 af
Outflow=19.63 cfs 3.171 af

Reach SP2: SP2 Inflow=10.83 cfs 1.633 af
Outflow=10.83 cfs 1.633 af

Total Runoff Area = 23.875 ac Runoff Volume = 4.804 af Average Runoff Depth = 2.41"
100.00% Pervious = 23.875 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: SA1

Runoff = 3.80 cfs @ 12.28 hrs, Volume= 0.376 af, Depth> 2.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year Rainfall=4.80"

Area (sf)	CN	Description
80,512	79	Woods, Fair, HSG D
80,512		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.2	100	0.0500	0.10		**Sheet Flow, SF 1-1** Woods: Light underbrush n= 0.400 P2= 2.70"
2.2	130	0.0400	1.00		**Shallow Concentrated Flow, SCF 1-1** Woodland Kv= 5.0 fps
1.9	177	0.0500	1.57		**Shallow Concentrated Flow, SCF 1-2** Short Grass Pasture Kv= 7.0 fps
20.3	407	Total			

Summary for Subcatchment 2S: SA2

Runoff = 18.10 cfs @ 12.73 hrs, Volume= 2.795 af, Depth> 2.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year Rainfall=4.80"

Area (sf)	CN	Description
31,497	78	Meadow, non-grazed, HSG D
574,483	79	Woods, Fair, HSG D
605,980	79	Weighted Average
605,980		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.7	100	0.0400	0.09		**Sheet Flow, SF 2-1** Woods: Light underbrush n= 0.400 P2= 2.70"
18.5	785	0.0200	0.71		**Shallow Concentrated Flow, SCF 2-1** Woodland Kv= 5.0 fps
2.1	90	0.0100	0.70		**Shallow Concentrated Flow, SCF 2-2** Short Grass Pasture Kv= 7.0 fps
14.7	625	0.0200	0.71		**Shallow Concentrated Flow, SCF 2-3** Woodland Kv= 5.0 fps
53.0	1,600	Total			

Summary for Subcatchment 3S: SA3

Runoff = 8.02 cfs @ 12.72 hrs, Volume= 1.227 af, Depth> 2.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year Rainfall=4.80"

Area (sf)	CN	Description
37,610	78	Meadow, non-grazed, HSG D
228,410	79	Woods, Fair, HSG D
266,020	79	Weighted Average
266,020		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.4	100	0.0200	0.07		**Sheet Flow, SF 3-1** Woods: Light underbrush n= 0.400 P2= 2.70"
28.9	866	0.0100	0.50		**Shallow Concentrated Flow, SCF 3-1** Woodland Kv= 5.0 fps
52.3	966	Total			

Summary for Subcatchment 4S: SA4

Runoff = 3.11 cfs @ 12.53 hrs, Volume= 0.406 af, Depth> 2.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year Rainfall=4.80"

Area (sf)	CN	Description
15,577	78	Meadow, non-grazed, HSG D
71,888	79	Woods, Fair, HSG D
87,465	79	Weighted Average
87,465		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.2	100	0.0500	0.10		**Sheet Flow, SF 4-1** Woods: Light underbrush n= 0.400 P2= 2.70"
22.2	667	0.0100	0.50		**Shallow Concentrated Flow, SCF 4-1** Woodland Kv= 5.0 fps
38.4	767	Total			

Summary for Reach SP1: SP1

Inflow Area = 15.760 ac, 0.00% Impervious, Inflow Depth > 2.41" for 25 Year event
Inflow = 19.63 cfs @ 12.68 hrs, Volume= 3.171 af
Outflow = 19.63 cfs @ 12.68 hrs, Volume= 3.171 af, Atten= 0%, Lag= 0.0 min

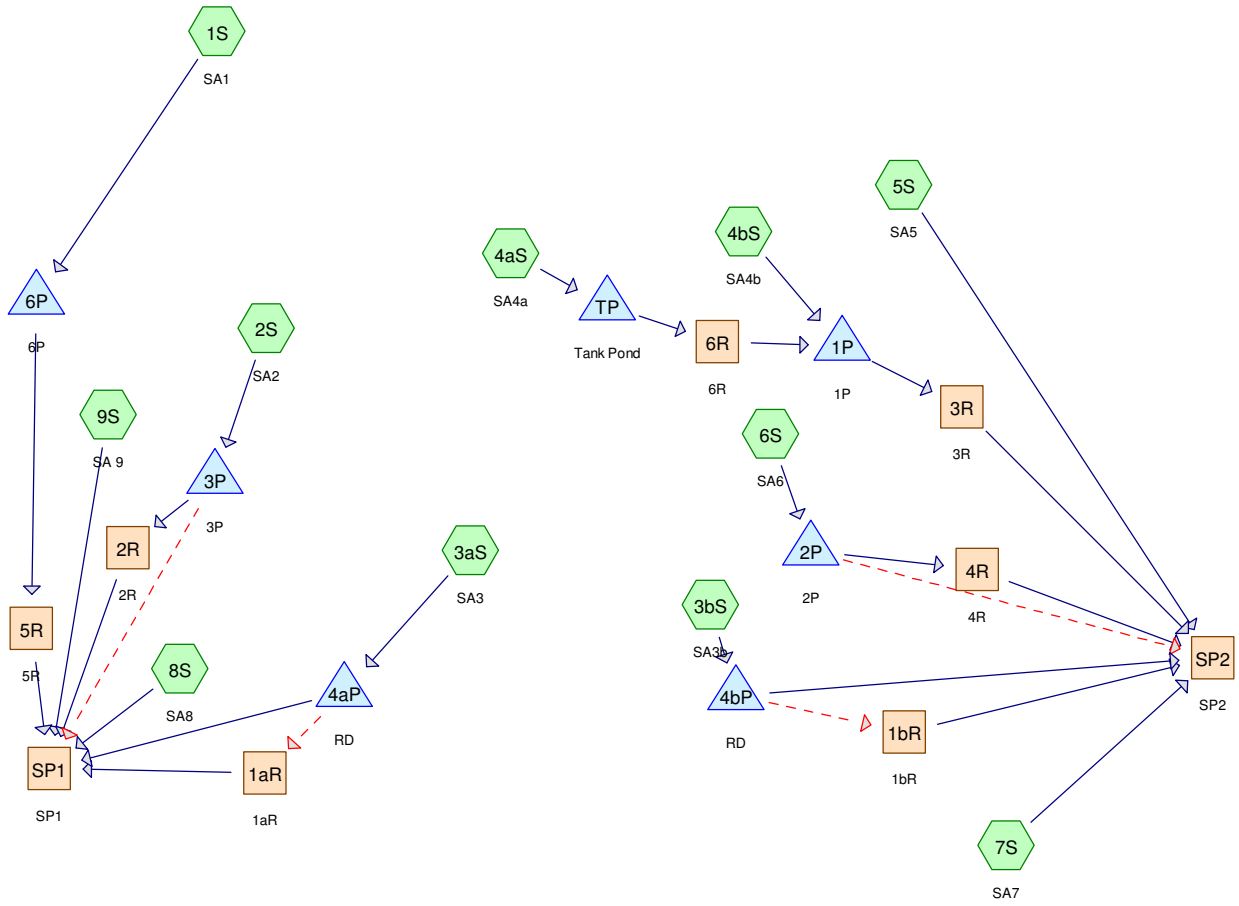
Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Reach SP2: SP2

Inflow Area = 8.115 ac, 0.00% Impervious, Inflow Depth > 2.41" for 25 Year event
Inflow = 10.83 cfs @ 12.66 hrs, Volume= 1.633 af
Outflow = 10.83 cfs @ 12.66 hrs, Volume= 1.633 af, Atten= 0%, Lag= 0.0 min

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

POST DEVELOPMENT - 2 YEAR



Subcat Reach Pond Link

Routing Diagram for PostDevelopment-20151210
Prepared by CES, Inc, Printed 12/10/2015
HydroCAD® 10.00-12 s/n 00641 © 2014 HydroCAD Software Solutions LLC

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: SA1 Runoff Area=402,743 sf 0.00% Impervious Runoff Depth>0.88"
Flow Length=1,165' Tc=41.9 min CN=79 Runoff=4.88 cfs 0.677 af

Subcatchment 2S: SA2 Runoff Area=104,782 sf 53.65% Impervious Runoff Depth>1.60"
Flow Length=520' Tc=12.5 min CN=90 Runoff=3.87 cfs 0.321 af

Subcatchment 3aS: SA3 Runoff Area=38,427 sf 95.86% Impervious Runoff Depth>2.23"
Flow Length=115' Slope=0.1670 '/' Tc=0.6 min CN=97 Runoff=2.55 cfs 0.164 af

Subcatchment 3bS: SA3b Runoff Area=29,845 sf 95.86% Impervious Runoff Depth>2.23"
Flow Length=115' Slope=0.1670 '/' Tc=0.6 min CN=97 Runoff=1.98 cfs 0.127 af

Subcatchment 4aS: SA4a Runoff Area=73,744 sf 70.78% Impervious Runoff Depth>1.86"
Flow Length=90' Slope=0.0110 '/' Tc=1.5 min CN=93 Runoff=4.17 cfs 0.262 af

Subcatchment 4bS: SA4b Runoff Area=72,594 sf 65.03% Impervious Runoff Depth>1.77"
Flow Length=150' Tc=1.7 min CN=92 Runoff=3.94 cfs 0.246 af

Subcatchment 5S: SA5 Runoff Area=136,118 sf 0.00% Impervious Runoff Depth>0.88"
Flow Length=750' Tc=34.0 min CN=79 Runoff=1.83 cfs 0.230 af

Subcatchment 6S: SA6 Runoff Area=59,924 sf 84.40% Impervious Runoff Depth>2.04"
Flow Length=260' Tc=1.9 min CN=95 Runoff=3.62 cfs 0.234 af

Subcatchment 7S: SA7 Runoff Area=60,331 sf 5.02% Impervious Runoff Depth>0.94"
Flow Length=180' Tc=20.1 min CN=80 Runoff=1.09 cfs 0.109 af

Subcatchment 8S: SA8 Runoff Area=47,172 sf 0.00% Impervious Runoff Depth>0.89"
Flow Length=190' Tc=19.2 min CN=79 Runoff=0.81 cfs 0.080 af

Subcatchment 9S: SA 9 Runoff Area=14,300 sf 0.00% Impervious Runoff Depth>0.94"
Flow Length=290' Tc=12.8 min CN=80 Runoff=0.31 cfs 0.026 af

Reach 1aR: 1aR Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.400 L=100.0' S=0.0200 '/' Capacity=133.65 cfs Outflow=0.00 cfs 0.000 af

Reach 1bR: 1bR Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.400 L=100.0' S=0.0200 '/' Capacity=133.65 cfs Outflow=0.00 cfs 0.000 af

Reach 2R: 2R Avg. Flow Depth=0.11' Max Vel=0.07 fps Inflow=0.34 cfs 0.144 af
n=0.400 L=50.0' S=0.0100 '/' Capacity=37.80 cfs Outflow=0.34 cfs 0.140 af

Reach 3R: 3R Avg. Flow Depth=0.12' Max Vel=0.07 fps Inflow=0.40 cfs 0.206 af
n=0.400 L=100.0' S=0.0100 '/' Capacity=37.80 cfs Outflow=0.39 cfs 0.188 af

Reach 4R: 4R Avg. Flow Depth=0.07' Max Vel=0.05 fps Inflow=0.11 cfs 0.103 af
n=0.400 L=100.0' S=0.0100 '/' Capacity=37.80 cfs Outflow=0.11 cfs 0.092 af

Reach 5R: 5R Avg. Flow Depth=0.27' Max Vel=0.26 fps Inflow=4.88 cfs 0.677 af
n=0.400 L=100.0' S=0.0500 '/' Capacity=84.52 cfs Outflow=4.76 cfs 0.669 af

Reach 6R: 6R Avg. Flow Depth=0.07' Max Vel=1.28 fps Inflow=0.43 cfs 0.203 af
n=0.030 L=70.0' S=0.0430 '/' Capacity=156.46 cfs Outflow=0.43 cfs 0.202 af

Reach SP1: SP1 Inflow=5.85 cfs 1.077 af
Outflow=5.85 cfs 1.077 af

Reach SP2: SP2 Inflow=3.64 cfs 0.744 af
Outflow=3.64 cfs 0.744 af

Pond 1P: 1P Peak Elev=143.12' Storage=11,210 cf Inflow=4.19 cfs 0.448 af
Outflow=0.40 cfs 0.206 af

Pond 2P: 2P Peak Elev=138.34' Storage=6,374 cf Inflow=3.62 cfs 0.234 af
Primary=0.11 cfs 0.103 af Secondary=0.00 cfs 0.000 af Outflow=0.11 cfs 0.103 af

Pond 3P: 3P Peak Elev=139.05' Storage=8,287 cf Inflow=3.87 cfs 0.321 af
Primary=0.34 cfs 0.144 af Secondary=0.00 cfs 0.000 af Outflow=0.34 cfs 0.144 af

Pond 4aP: RD Peak Elev=141.27' Storage=1,415 cf Inflow=2.55 cfs 0.164 af
Primary=0.87 cfs 0.162 af Secondary=0.00 cfs 0.000 af Outflow=0.87 cfs 0.162 af

Pond 4bP: RD Peak Elev=140.86' Storage=898 cf Inflow=1.98 cfs 0.127 af
Primary=0.81 cfs 0.126 af Secondary=0.00 cfs 0.000 af Outflow=0.81 cfs 0.126 af

Pond 6P: 6P Peak Elev=144.01' Storage=29 cf Inflow=4.88 cfs 0.677 af
18.0" Round Culvert n=0.013 L=500.0' S=0.0050 '/' Outflow=4.88 cfs 0.677 af

Pond TP: Tank Pond Peak Elev=144.59' Storage=6,395 cf Inflow=4.17 cfs 0.262 af
6.0" Round Culvert n=0.013 L=30.0' S=0.0100 '/' Outflow=0.43 cfs 0.203 af

Total Runoff Area = 23.875 ac Runoff Volume = 2.475 af Average Runoff Depth = 1.24"
73.59% Pervious = 17.569 ac 26.41% Impervious = 6.306 ac

Summary for Subcatchment 1S: SA1

Runoff = 4.88 cfs @ 12.62 hrs, Volume= 0.677 af, Depth> 0.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 Year Rainfall=2.70"

Area (sf)	CN	Description
24,192	78	Meadow, non-grazed, HSG D
362,489	79	Woods, Fair, HSG D
16,062	80	>75% Grass cover, Good, HSG D
402,743	79	Weighted Average
402,743		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.7	100	0.0400	0.09		**Sheet Flow, SF 1-1**
					Woods: Light underbrush n= 0.400 P2= 2.70"
18.5	785	0.0200	0.71		**Shallow Concentrated Flow, SCF 1-1**
					Woodland Kv= 5.0 fps
2.1	90	0.0100	0.70		**Shallow Concentrated Flow, SCF 1-2**
					Short Grass Pasture Kv= 7.0 fps
1.6	70	0.0200	0.71		**Shallow Concentrated Flow, SCF 1-3**
					Woodland Kv= 5.0 fps
2.0	120	0.0200	0.99		**Shallow Concentrated Flow, SCF 1-4**
					Short Grass Pasture Kv= 7.0 fps
41.9	1,165	Total			

Summary for Subcatchment 2S: SA2

Runoff = 3.87 cfs @ 12.17 hrs, Volume= 0.321 af, Depth> 1.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 Year Rainfall=2.70"

Area (sf)	CN	Description
56,218	98	Impervious, HSG D
48,564	80	>75% Grass cover, Good, HSG D
104,782	90	Weighted Average
48,564		46.35% Pervious Area
56,218		53.65% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	40	0.0200	1.05		**Sheet Flow, SF 2-1** Smooth surfaces n= 0.011 P2= 2.70"
10.3	60	0.0200	0.10		**Sheet Flow, SF 2-2** Grass: Dense n= 0.240 P2= 2.70"
0.5	30	0.0200	0.99		**Sheet Flow, SF 2-3** Smooth surfaces n= 0.011 P2= 2.70"
0.6	110	0.0200	2.87		**Shallow Concentrated Flow, SCF 2-1** Paved Kv= 20.3 fps
0.5	280	0.0140	9.46	529.89	**Trap/Vee/Rect Channel Flow, CF 2-1** Bot.W=2.00' D=4.00' Z= 3.0 '/' Top.W=26.00' n= 0.030 Stream, clean & straight
12.5	520	Total			

Summary for Subcatchment 3aS: SA3

Runoff = 2.55 cfs @ 12.01 hrs, Volume= 0.164 af, Depth> 2.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 Year Rainfall=2.70"

	Area (sf)	CN	Description
	36,835	98	Impervious, HSG D
*	1,592	66	Roof Dripline
	38,427	97	Weighted Average
	1,592		4.14% Pervious Area
	36,835		95.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	115	0.1670	3.04		**Sheet Flow, SF 3-1** Smooth surfaces n= 0.011 P2= 2.70"

Summary for Subcatchment 3bS: SA3b

Runoff = 1.98 cfs @ 12.01 hrs, Volume= 0.127 af, Depth> 2.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 Year Rainfall=2.70"

	Area (sf)	CN	Description
	28,609	98	Impervious, HSG D
*	1,236	66	Roof Dripline
	29,845	97	Weighted Average
	1,236		4.14% Pervious Area
	28,609		95.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	115	0.1670	3.04		**Sheet Flow, SF 3-1** Smooth surfaces n= 0.011 P2= 2.70"

Summary for Subcatchment 4aS: SA4a

Runoff = 4.17 cfs @ 12.02 hrs, Volume= 0.262 af, Depth> 1.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 Year Rainfall=2.70"

	Area (sf)	CN	Description
*	52,199	98	Impervious, HSG D
	21,545	80	>75% Grass cover, Good, HSG D
	73,744	93	Weighted Average
	21,545		29.22% Pervious Area
	52,199		70.78% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.5	90	0.0110	0.97		**Sheet Flow, SF 4a-1** Smooth surfaces n= 0.011 P2= 2.70"

Summary for Subcatchment 4bS: SA4b

Runoff = 3.94 cfs @ 12.03 hrs, Volume= 0.246 af, Depth> 1.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 Year Rainfall=2.70"

	Area (sf)	CN	Description
	25,384	80	>75% Grass cover, Good, HSG D
*	47,210	98	Impervious, HSG D
	72,594	92	Weighted Average
	25,384		34.97% Pervious Area
	47,210		65.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.7	140	0.0200	1.35		**Sheet Flow, SF 4b-1** Smooth surfaces n= 0.011 P2= 2.70"
0.0	10	0.1000	4.74		**Shallow Concentrated Flow, SCF 4b-1** Grassed Waterway Kv= 15.0 fps
1.7	150	Total			

Summary for Subcatchment 5S: SA5

Runoff = 1.83 cfs @ 12.50 hrs, Volume= 0.230 af, Depth> 0.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 Year Rainfall=2.70"

Area (sf)	CN	Description
11,975	80	>75% Grass cover, Good, HSG D
36,307	78	Meadow, non-grazed, HSG D
87,836	79	Woods, Fair, HSG D
136,118	79	Weighted Average
136,118		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.2	100	0.0500	0.10		**Sheet Flow, SF 5-1**
					Woods: Light underbrush n= 0.400 P2= 2.70"
7.0	210	0.0100	0.50		**Shallow Concentrated Flow, SCF 5-1**
					Woodland Kv= 5.0 fps
2.4	100	0.0100	0.70		**Shallow Concentrated Flow, SCF 5-2**
					Short Grass Pasture Kv= 7.0 fps
8.4	340	0.0180	0.67		**Shallow Concentrated Flow, SCF 5-3**
					Woodland Kv= 5.0 fps
34.0	750	Total			

Summary for Subcatchment 6S: SA6

Runoff = 3.62 cfs @ 12.03 hrs, Volume= 0.234 af, Depth> 2.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 Year Rainfall=2.70"

Area (sf)	CN	Description
9,350	80	>75% Grass cover, Good, HSG D
50,574	98	Impervious, HSG D
59,924	95	Weighted Average
9,350		15.60% Pervious Area
50,574		84.40% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	90	0.0330	1.51		**Sheet Flow, SF 6-1**
					Smooth surfaces n= 0.011 P2= 2.70"
0.9	170	0.0240	3.14		**Shallow Concentrated Flow, SCF 6-1**
					Paved Kv= 20.3 fps
1.9	260	Total			

Summary for Subcatchment 7S: SA7

Runoff = 1.09 cfs @ 12.30 hrs, Volume= 0.109 af, Depth> 0.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 Year Rainfall=2.70"

	Area (sf)	CN	Description
*	3,031	98	Impervious, HSG D
	50,265	79	Woods, Fair, HSG D
	7,035	80	>75% Grass cover, Good, HSG D
	60,331	80	Weighted Average
	57,300		94.98% Pervious Area
	3,031		5.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	40	0.1000	0.17		**Sheet Flow, SF 7-1**
					Grass: Dense n= 0.240 P2= 2.70"
14.2	60	0.0250	0.07		**Sheet Flow, SF 7-2**
					Woods: Light underbrush n= 0.400 P2= 2.70"
2.0	80	0.0170	0.65		**Shallow Concentrated Flow, SCF 7-1**
					Woodland Kv= 5.0 fps
20.1	180	Total			

Summary for Subcatchment 8S: SA8

Runoff = 0.81 cfs @ 12.28 hrs, Volume= 0.080 af, Depth> 0.89"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 Year Rainfall=2.70"

Area (sf)	CN	Description
40,395	79	Woods, Fair, HSG D
6,777	80	>75% Grass cover, Good, HSG D
47,172	79	Weighted Average
47,172		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	40	0.1000	0.17		**Sheet Flow, SF 8-1**
					Grass: Dense n= 0.240 P2= 2.70"
13.2	60	0.0300	0.08		**Sheet Flow, SF 8-2**
					Woods: Light underbrush n= 0.400 P2= 2.70"
2.1	90	0.0200	0.71		**Shallow Concentrated Flow, SCF 8-1**
					Woodland Kv= 5.0 fps
19.2	190	Total			

Summary for Subcatchment 9S: SA 9

Runoff = 0.31 cfs @ 12.19 hrs, Volume= 0.026 af, Depth> 0.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 Year Rainfall=2.70"

Area (sf)	CN	Description
12,287	80	>75% Grass cover, Good, HSG D
2,013	79	Woods, Fair, HSG D
14,300	80	Weighted Average
14,300		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	100	0.0500	0.15		**Sheet Flow, SF 9-1** Grass: Dense n= 0.240 P2= 2.70"
1.6	160	0.0600	1.71		**Shallow Concentrated Flow, SCF 9-1** Short Grass Pasture Kv= 7.0 fps
0.4	30	0.0500	1.12		**Shallow Concentrated Flow, SCF 9-2** Woodland Kv= 5.0 fps
12.8	290	Total			

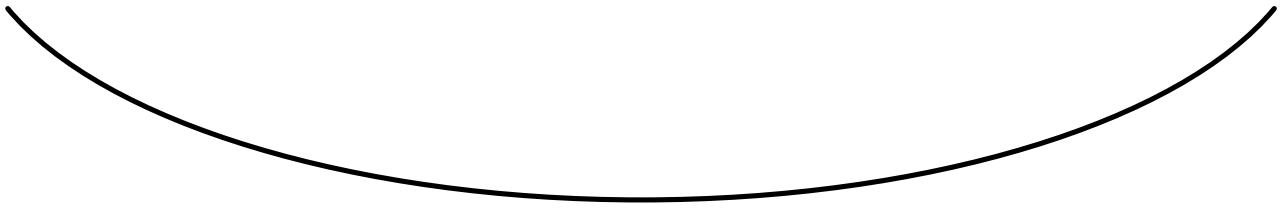
Summary for Reach 1aR: 1aR

Inflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 5.00 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 1.00' Flow Area= 333.3 sf, Capacity= 133.65 cfs

500.00' x 1.00' deep Parabolic Channel, n= 0.400 Sheet flow: Woods+light brush
Length= 100.0' Slope= 0.0200 '/'
Inlet Invert= 0.00', Outlet Invert= -2.00'



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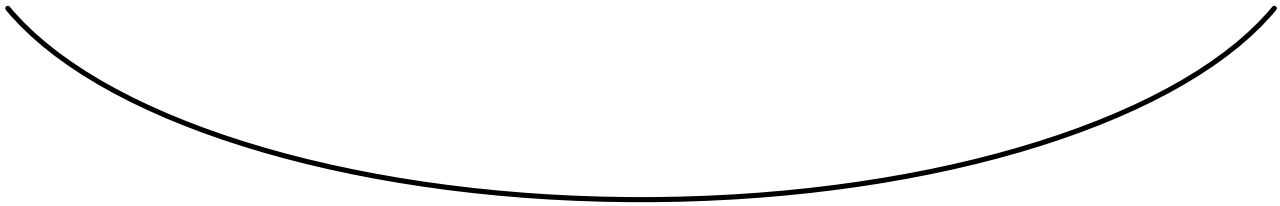
Summary for Reach 1bR: 1bR

Inflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 5.00 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 1.00' Flow Area= 333.3 sf, Capacity= 133.65 cfs

500.00' x 1.00' deep Parabolic Channel, n= 0.400 Sheet flow: Woods+light brush
Length= 100.0' Slope= 0.0200 '/'
Inlet Invert= 0.00', Outlet Invert= -2.00'



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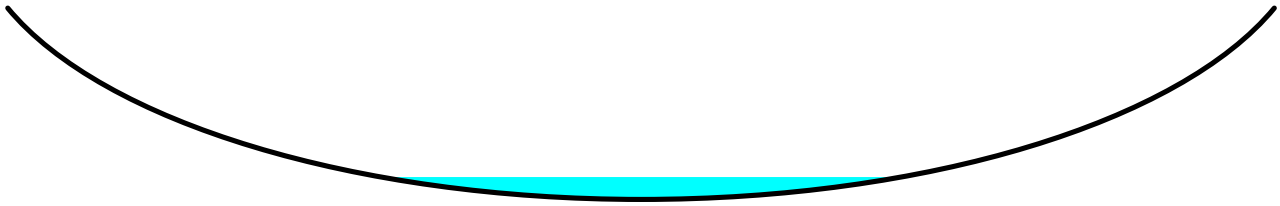
Summary for Reach 2R: 2R

Inflow Area = 2.405 ac, 53.65% Impervious, Inflow Depth > 0.72" for 2 Year event
Inflow = 0.34 cfs @ 13.71 hrs, Volume= 0.144 af
Outflow = 0.34 cfs @ 14.10 hrs, Volume= 0.140 af, Atten= 2%, Lag= 23.5 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.07 fps, Min. Travel Time= 12.5 min
Avg. Velocity = 0.05 fps, Avg. Travel Time= 18.3 min

Peak Storage= 254 cf @ 13.89 hrs
Average Depth at Peak Storage= 0.11'
Bank-Full Depth= 1.00' Flow Area= 133.3 sf, Capacity= 37.80 cfs

200.00' x 1.00' deep Parabolic Channel, n= 0.400 Sheet flow: Woods+light brush
Length= 50.0' Slope= 0.0100 '/'
Inlet Invert= 0.00', Outlet Invert= -0.50'



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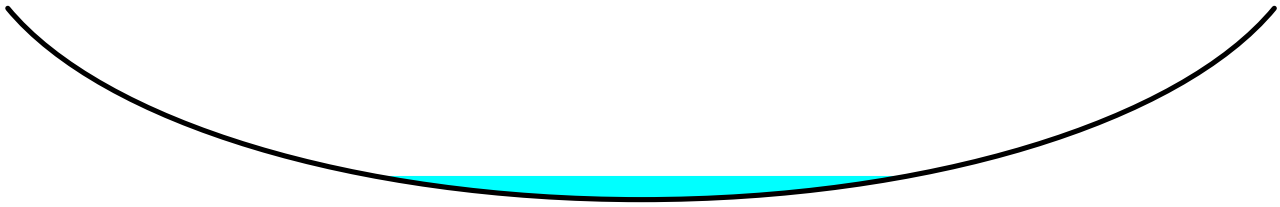
Summary for Reach 3R: 3R

Inflow Area = 3.359 ac, 67.93% Impervious, Inflow Depth > 0.73" for 2 Year event
Inflow = 0.40 cfs @ 16.15 hrs, Volume= 0.206 af
Outflow = 0.39 cfs @ 16.89 hrs, Volume= 0.188 af, Atten= 1%, Lag= 44.7 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.07 fps, Min. Travel Time= 23.9 min
Avg. Velocity = 0.05 fps, Avg. Travel Time= 35.3 min

Peak Storage= 566 cf @ 16.49 hrs
Average Depth at Peak Storage= 0.12'
Bank-Full Depth= 1.00' Flow Area= 133.3 sf, Capacity= 37.80 cfs

200.00' x 1.00' deep Parabolic Channel, n= 0.400 Sheet flow: Woods+light brush
Length= 100.0' Slope= 0.0100 '/'
Inlet Invert= 0.00', Outlet Invert= -1.00'



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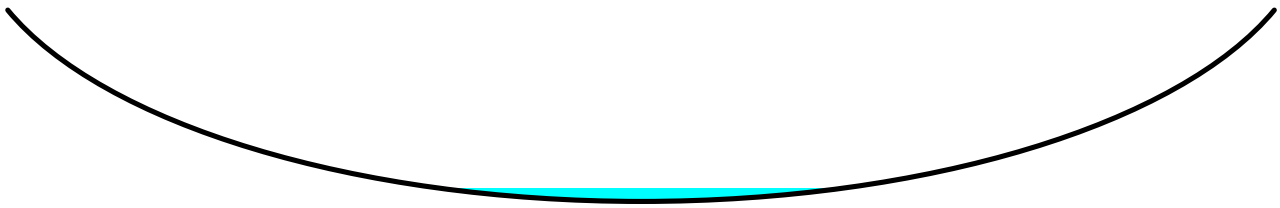
Summary for Reach 4R: 4R

Inflow Area = 1.376 ac, 84.40% Impervious, Inflow Depth > 0.89" for 2 Year event
Inflow = 0.11 cfs @ 15.65 hrs, Volume= 0.103 af
Outflow = 0.11 cfs @ 16.68 hrs, Volume= 0.092 af, Atten= 0%, Lag= 61.3 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.05 fps, Min. Travel Time= 35.4 min
Avg. Velocity = 0.04 fps, Avg. Travel Time= 41.5 min

Peak Storage= 233 cf @ 16.08 hrs
Average Depth at Peak Storage= 0.07'
Bank-Full Depth= 1.00' Flow Area= 133.3 sf, Capacity= 37.80 cfs

200.00' x 1.00' deep Parabolic Channel, n= 0.400 Sheet flow: Woods+light brush
Length= 100.0' Slope= 0.0100 '/'
Inlet Invert= 0.00', Outlet Invert= -1.00'



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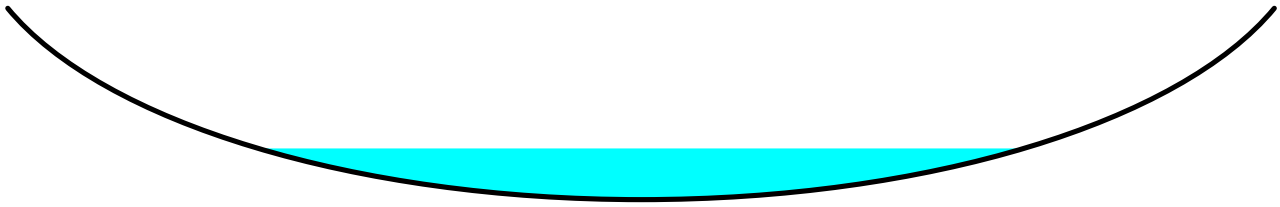
Summary for Reach 5R: 5R

Inflow Area = 9.246 ac, 0.00% Impervious, Inflow Depth > 0.88" for 2 Year event
Inflow = 4.88 cfs @ 12.62 hrs, Volume= 0.677 af
Outflow = 4.76 cfs @ 12.80 hrs, Volume= 0.669 af, Atten= 3%, Lag= 11.1 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.26 fps, Min. Travel Time= 6.4 min
Avg. Velocity = 0.13 fps, Avg. Travel Time= 12.6 min

Peak Storage= 1,820 cf @ 12.70 hrs
Average Depth at Peak Storage= 0.27'
Bank-Full Depth= 1.00' Flow Area= 133.3 sf, Capacity= 84.52 cfs

200.00' x 1.00' deep Parabolic Channel, n= 0.400 Sheet flow: Woods+light brush
Length= 100.0' Slope= 0.0500 '/'
Inlet Invert= 0.00', Outlet Invert= -5.00'



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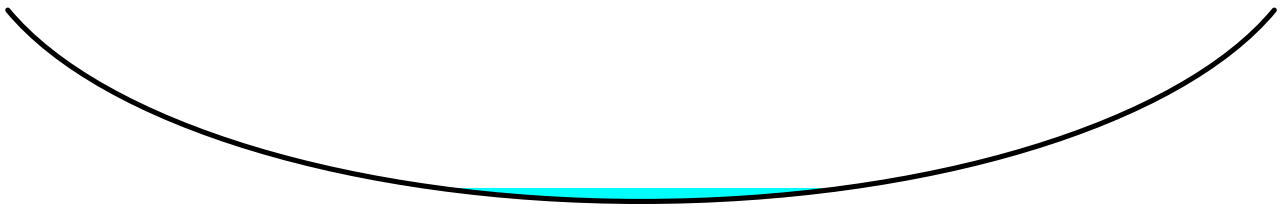
Summary for Reach 6R: 6R

Inflow Area = 1.693 ac, 70.78% Impervious, Inflow Depth > 1.44" for 2 Year event
Inflow = 0.43 cfs @ 12.69 hrs, Volume= 0.203 af
Outflow = 0.43 cfs @ 12.72 hrs, Volume= 0.202 af, Atten= 0%, Lag= 1.5 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.28 fps, Min. Travel Time= 0.9 min
Avg. Velocity = 0.83 fps, Avg. Travel Time= 1.4 min

Peak Storage= 24 cf @ 12.70 hrs
Average Depth at Peak Storage= 0.07'
Bank-Full Depth= 1.00' Flow Area= 20.0 sf, Capacity= 156.46 cfs

30.00' x 1.00' deep Parabolic Channel, n= 0.030 Short grass
Length= 70.0' Slope= 0.0430 '/'
Inlet Invert= 0.00', Outlet Invert= -3.01'



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Summary for Reach SP1: SP1

Inflow Area = 13.945 ac, 15.32% Impervious, Inflow Depth > 0.93" for 2 Year event
Inflow = 5.85 cfs @ 12.77 hrs, Volume= 1.077 af
Outflow = 5.85 cfs @ 12.77 hrs, Volume= 1.077 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 SP2: SP2

Inflow Area = 9.930 ac, 41.99% Impervious, Inflow Depth > 0.90" for 2 Year event
Inflow = 3.64 cfs @ 12.41 hrs, Volume= 0.744 af
Outflow = 3.64 cfs @ 12.41 hrs, Volume= 0.744 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 Pond 1P: 1P

Inflow Area = 3.359 ac, 67.93% Impervious, Inflow Depth > 1.60" for 2 Year event
Inflow = 4.19 cfs @ 12.03 hrs, Volume= 0.448 af
Outflow = 0.40 cfs @ 16.15 hrs, Volume= 0.206 af, Atten= 90%, Lag= 247.0 min
Primary = 0.40 cfs @ 16.15 hrs, Volume= 0.206 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 143.12' @ 16.15 hrs Surf.Area= 10,474 sf Storage= 11,210 cf

Plug-Flow detention time= 230.9 min calculated for 0.206 af (46% of inflow)
Center-of-Mass det. time= 106.9 min (937.0 - 830.1)

Volume	Invert	Avail.Storage	Storage Description
#1	141.95'	20,937 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
141.95	5,925	0	0
142.00	8,752	367	367
143.00	10,374	9,563	9,930
143.50	10,782	5,289	15,219
144.00	12,092	5,719	20,937

Device	Routing	Invert	Outlet Devices
#1	Primary	139.00'	**12.0" Round Culvert** L= 200.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 139.00' / 137.00' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	141.95'	**0.598 in/hr Exfiltration over Surface area**
#3	Device 1	143.00'	**22.0" W x 5.0" H Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.40 cfs @ 16.15 hrs HW=143.12' (Free Discharge)
└─**1=Culvert** (Passes 0.40 cfs of 5.22 cfs potential flow)
  ├─**2=Exfiltration** (Exfiltration Controls 0.14 cfs)
  └─**3=Orifice/Grate** (Orifice Controls 0.25 cfs @ 1.12 fps)

Summary for Pond 2P: 2P

Inflow Area =	1.376 ac, 84.40% Impervious, Inflow Depth > 2.04" for 2 Year event				
Inflow =	3.62 cfs @	12.03 hrs,	Volume=	0.234 af	
Outflow =	0.11 cfs @	15.65 hrs,	Volume=	0.103 af,	Atten= 97%, Lag= 217.3 min
Primary =	0.11 cfs @	15.65 hrs,	Volume=	0.103 af	
Secondary =	0.00 cfs @	5.00 hrs,	Volume=	0.000 af	

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 138.34' @ 15.65 hrs Surf.Area= 7,911 sf Storage= 6,374 cf

Plug-Flow detention time= 189.4 min calculated for 0.102 af (44% of inflow)
Center-of-Mass det. time= 94.9 min (849.0 - 754.1)

Volume	Invert	Avail.Storage	Storage Description
#1	137.45'	17,331 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
137.45	2,716	0	0
137.50	6,701	235	235
138.00	7,413	3,529	3,764
139.00	8,876	8,145	11,908
139.60	9,200	5,423	17,331

Device	Routing	Invert	Outlet Devices
#1	Primary	134.50'	**12.0" Round Culvert** L= 100.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 134.50' / 133.50' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	137.45'	**0.598 in/hr Exfiltration over Surface area**
#3	Device 1	139.00'	**20.0" W x 4.0" H Vert. Orifice/Grate** C= 0.600
#4	Secondary	139.50'	**15.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.11 cfs @ 15.65 hrs HW=138.34' (Free Discharge)
└─**1=Culvert** (Passes 0.11 cfs of 5.93 cfs potential flow)
  ├─**2=Exfiltration** (Exfiltration Controls 0.11 cfs)
  └─**3=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=137.45' (Free Discharge)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 3P: 3P

Inflow Area =	2.405 ac,	53.65% Impervious,	Inflow Depth >	1.60"	for 2 Year event
Inflow =	3.87 cfs @	12.17 hrs,	Volume=	0.321 af	
Outflow =	0.34 cfs @	13.71 hrs,	Volume=	0.144 af,	Atten= 91%, Lag= 92.2 min
Primary =	0.34 cfs @	13.71 hrs,	Volume=	0.144 af	
Secondary =	0.00 cfs @	5.00 hrs,	Volume=	0.000 af	

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 139.05' @ 13.71 hrs Surf.Area= 8,237 sf Storage= 8,287 cf

Plug-Flow detention time= 181.2 min calculated for 0.144 af (45% of inflow)
Center-of-Mass det. time= 96.0 min (881.5 - 785.4)

Volume	Invert	Avail.Storage	Storage Description
#1	137.95'	12,139 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
137.95	3,791	0	0
138.00	7,013	270	270
139.00	8,142	7,578	7,848
139.50	9,024	4,292	12,139

Device	Routing	Invert	Outlet Devices
#1	Primary	135.00'	**12.0" Round Culvert** L= 100.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 135.00' / 134.00' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	137.95'	**0.598 in/hr Exfiltration over Surface area**
#3	Device 1	139.00'	**21.4" Horiz. Orifice/Grate-NFCO R-4342 Beehive Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	139.45'	**15.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.34 cfs @ 13.71 hrs HW=139.05' (Free Discharge)
└─**1=Culvert** (Passes 0.34 cfs of 6.09 cfs potential flow)
  ├─**2=Exfiltration** (Exfiltration Controls 0.11 cfs)
  └─**3=Orifice/Grate-NFCO R-4342 Beehive Grate** (Weir Controls 0.23 cfs @ 0.76 fps)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=137.95' (Free Discharge)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 4aP: RD

Inflow Area = 0.882 ac, 95.86% Impervious, Inflow Depth > 2.23" for 2 Year event
Inflow = 2.55 cfs @ 12.01 hrs, Volume= 0.164 af
Outflow = 0.87 cfs @ 12.22 hrs, Volume= 0.162 af, Atten= 66%, Lag= 12.8 min
Primary = 0.87 cfs @ 12.22 hrs, Volume= 0.162 af
Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 141.27' @ 12.22 hrs Surf.Area= 1,557 sf Storage= 1,415 cf

Plug-Flow detention time= 20.8 min calculated for 0.162 af (99% of inflow)
Center-of-Mass det. time= 16.6 min (758.7 - 742.1)

Volume	Invert	Avail.Storage	Storage Description
#1	139.00'	3,114 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 7,785 cf Overall x 40.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
139.00	1,557	0	0
140.00	1,557	1,557	1,557
141.00	1,557	1,557	3,114
142.00	1,557	1,557	4,671
143.00	1,557	1,557	6,228
144.00	1,557	1,557	7,785

Device	Routing	Invert	Outlet Devices
#1	Primary	139.00'	**6.0" Round Culvert** L= 100.0' RCP, rounded edge headwall, Ke= 0.100 Inlet / Outlet Invert= 139.00' / 138.00' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 0.20 sf
#2	Secondary	144.00'	**503.0' long x 5.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.35 2.51 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.69 2.73 2.77 2.86

Primary OutFlow Max=0.87 cfs @ 12.22 hrs HW=141.27' (Free Discharge)
└**1=Culvert** (Barrel Controls 0.87 cfs @ 4.45 fps)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=139.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 4bP: RD

Inflow Area = 0.685 ac, 95.86% Impervious, Inflow Depth > 2.23" for 2 Year event
Inflow = 1.98 cfs @ 12.01 hrs, Volume= 0.127 af
Outflow = 0.81 cfs @ 12.16 hrs, Volume= 0.126 af, Atten= 59%, Lag= 9.0 min
Primary = 0.81 cfs @ 12.16 hrs, Volume= 0.126 af
Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 140.86' @ 12.16 hrs Surf.Area= 1,210 sf Storage= 898 cf

Plug-Flow detention time= 16.3 min calculated for 0.126 af (99% of inflow)
Center-of-Mass det. time= 12.6 min (754.7 - 742.1)

Volume	Invert	Avail.Storage	Storage Description
#1	139.00'	2,420 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 6,050 cf Overall x 40.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
139.00	1,210	0	0
140.00	1,210	1,210	1,210
141.00	1,210	1,210	2,420
142.00	1,210	1,210	3,630
143.00	1,210	1,210	4,840
144.00	1,210	1,210	6,050

Device	Routing	Invert	Outlet Devices
#1	Primary	139.00'	**6.0" Round Culvert** L= 100.0' RCP, rounded edge headwall, Ke= 0.100 Inlet / Outlet Invert= 139.00' / 138.00' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 0.20 sf
#2	Secondary	144.00'	**503.0' long x 5.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.35 2.51 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.69 2.73 2.77 2.86

Primary OutFlow Max=0.81 cfs @ 12.16 hrs HW=140.85' (Free Discharge)
└**1=Culvert** (Barrel Controls 0.81 cfs @ 4.10 fps)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=139.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 6P: 6P

Inflow Area = 9.246 ac, 0.00% Impervious, Inflow Depth > 0.88" for 2 Year event
Inflow = 4.88 cfs @ 12.62 hrs, Volume= 0.677 af
Outflow = 4.88 cfs @ 12.62 hrs, Volume= 0.677 af, Atten= 0%, Lag= 0.1 min
Primary = 4.88 cfs @ 12.62 hrs, Volume= 0.677 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 144.01' @ 12.62 hrs Surf.Area= 3,984 sf Storage= 29 cf

Plug-Flow detention time= 0.1 min calculated for 0.677 af (100% of inflow)
Center-of-Mass det. time= 0.1 min (840.8 - 840.7)

Volume	Invert	Avail.Storage	Storage Description
#1	144.00'	7,720 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
144.00	3,972	0	0
145.50	6,321	7,720	7,720

Device	Routing	Invert	Outlet Devices
#1	Primary	140.00'	**18.0" Round Culvert** L= 500.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 140.00' / 137.50' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf

Primary OutFlow Max=9.87 cfs @ 12.62 hrs HW=144.01' (Free Discharge)
└**1=Culvert** (Barrel Controls 9.87 cfs @ 5.58 fps)

Summary for Pond TP: Tank Pond

Inflow Area = 1.693 ac, 70.78% Impervious, Inflow Depth > 1.86" for 2 Year event
Inflow = 4.17 cfs @ 12.02 hrs, Volume= 0.262 af
Outflow = 0.43 cfs @ 12.69 hrs, Volume= 0.203 af, Atten= 90%, Lag= 40.1 min
Primary = 0.43 cfs @ 12.69 hrs, Volume= 0.203 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 144.59' @ 12.69 hrs Surf.Area= 11,551 sf Storage= 6,395 cf

Plug-Flow detention time= 197.2 min calculated for 0.203 af (77% of inflow)
Center-of-Mass det. time= 139.6 min (903.5 - 763.9)

Volume	Invert	Avail.Storage	Storage Description
#1	144.00'	25,049 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
144.00	10,153	0	0
146.00	14,896	25,049	25,049

Device	Routing	Invert	Outlet Devices
#1	Primary	144.00'	**6.0" Round Culvert** L= 30.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 144.00' / 143.70' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.43 cfs @ 12.69 hrs HW=144.59' (Free Discharge)
└**1=Culvert** (Inlet Controls 0.43 cfs @ 2.21 fps)

POST DEVELOPMENT - 10 YEAR

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: SA1 Runoff Area=402,743 sf 0.00% Impervious Runoff Depth>1.87"
Flow Length=1,165' Tc=41.9 min CN=79 Runoff=10.61 cfs 1.444 af

Subcatchment 2S: SA2 Runoff Area=104,782 sf 53.65% Impervious Runoff Depth>2.84"
Flow Length=520' Tc=12.5 min CN=90 Runoff=6.70 cfs 0.569 af

Subcatchment 3aS: SA3 Runoff Area=38,427 sf 95.86% Impervious Runoff Depth>3.52"
Flow Length=115' Slope=0.1670 '/' Tc=0.6 min CN=97 Runoff=3.96 cfs 0.259 af

Subcatchment 3bS: SA3b Runoff Area=29,845 sf 95.86% Impervious Runoff Depth>3.52"
Flow Length=115' Slope=0.1670 '/' Tc=0.6 min CN=97 Runoff=3.07 cfs 0.201 af

Subcatchment 4aS: SA4a Runoff Area=73,744 sf 70.78% Impervious Runoff Depth>3.14"
Flow Length=90' Slope=0.0110 '/' Tc=1.5 min CN=93 Runoff=6.84 cfs 0.443 af

Subcatchment 4bS: SA4b Runoff Area=72,594 sf 65.03% Impervious Runoff Depth>3.04"
Flow Length=150' Tc=1.7 min CN=92 Runoff=6.56 cfs 0.422 af

Subcatchment 5S: SA5 Runoff Area=136,118 sf 0.00% Impervious Runoff Depth>1.88"
Flow Length=750' Tc=34.0 min CN=79 Runoff=3.98 cfs 0.489 af

Subcatchment 6S: SA6 Runoff Area=59,924 sf 84.40% Impervious Runoff Depth>3.33"
Flow Length=260' Tc=1.9 min CN=95 Runoff=5.75 cfs 0.382 af

Subcatchment 7S: SA7 Runoff Area=60,331 sf 5.02% Impervious Runoff Depth>1.97"
Flow Length=180' Tc=20.1 min CN=80 Runoff=2.31 cfs 0.227 af

Subcatchment 8S: SA8 Runoff Area=47,172 sf 0.00% Impervious Runoff Depth>1.89"
Flow Length=190' Tc=19.2 min CN=79 Runoff=1.77 cfs 0.171 af

Subcatchment 9S: SA 9 Runoff Area=14,300 sf 0.00% Impervious Runoff Depth>1.97"
Flow Length=290' Tc=12.8 min CN=80 Runoff=0.65 cfs 0.054 af

Reach 1aR: 1aR Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.400 L=100.0' S=0.0200 '/' Capacity=133.65 cfs Outflow=0.00 cfs 0.000 af

Reach 1bR: 1bR Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.400 L=100.0' S=0.0200 '/' Capacity=133.65 cfs Outflow=0.00 cfs 0.000 af

Reach 2R: 2R Avg. Flow Depth=0.31' Max Vel=0.13 fps Inflow=3.28 cfs 0.387 af
n=0.400 L=50.0' S=0.0100 '/' Capacity=37.80 cfs Outflow=3.05 cfs 0.382 af

Reach 3R: 3R Avg. Flow Depth=0.19' Max Vel=0.09 fps Inflow=1.02 cfs 0.514 af
n=0.400 L=100.0' S=0.0100 '/' Capacity=37.80 cfs Outflow=1.01 cfs 0.489 af

Reach 4R: 4R Avg. Flow Depth=0.07' Max Vel=0.05 fps Inflow=0.12 cfs 0.122 af
n=0.400 L=100.0' S=0.0100 '/' Capacity=37.80 cfs Outflow=0.12 cfs 0.110 af

Reach 5R: 5R Avg. Flow Depth=0.37' Max Vel=0.33 fps Inflow=9.97 cfs 1.444 af
n=0.400 L=100.0' S=0.0500 '/' Capacity=84.52 cfs Outflow=9.95 cfs 1.433 af

Reach 6R: 6R Avg. Flow Depth=0.08' Max Vel=1.44 fps Inflow=0.63 cfs 0.351 af
n=0.030 L=70.0' S=0.0430 '/' Capacity=156.46 cfs Outflow=0.63 cfs 0.350 af

Reach SP1: SP1 Inflow=14.72 cfs 2.296 af
Outflow=14.72 cfs 2.296 af

Reach SP2: SP2 Inflow=7.06 cfs 1.515 af
Outflow=7.06 cfs 1.515 af

Pond 1P: 1P Peak Elev=143.28' Storage=12,860 cf Inflow=7.01 cfs 0.772 af
Outflow=1.02 cfs 0.514 af

Pond 2P: 2P Peak Elev=138.98' Storage=11,691 cf Inflow=5.75 cfs 0.382 af
Primary=0.12 cfs 0.122 af Secondary=0.00 cfs 0.000 af Outflow=0.12 cfs 0.122 af

Pond 3P: 3P Peak Elev=139.31' Storage=10,457 cf Inflow=6.70 cfs 0.569 af
Primary=3.28 cfs 0.387 af Secondary=0.00 cfs 0.000 af Outflow=3.28 cfs 0.387 af

Pond 4aP: RD Peak Elev=143.18' Storage=2,602 cf Inflow=3.96 cfs 0.259 af
Primary=1.14 cfs 0.257 af Secondary=0.00 cfs 0.000 af Outflow=1.14 cfs 0.257 af

Pond 4bP: RD Peak Elev=142.49' Storage=1,689 cf Inflow=3.07 cfs 0.201 af
Primary=1.05 cfs 0.200 af Secondary=0.00 cfs 0.000 af Outflow=1.05 cfs 0.200 af

Pond 6P: 6P Peak Elev=144.11' Storage=463 cf Inflow=10.61 cfs 1.444 af
18.0" Round Culvert n=0.013 L=500.0' S=0.0050 '/' Outflow=9.97 cfs 1.444 af

Pond TP: Tank Pond Peak Elev=144.96' Storage=10,886 cf Inflow=6.84 cfs 0.443 af
6.0" Round Culvert n=0.013 L=30.0' S=0.0100 '/' Outflow=0.63 cfs 0.351 af

Total Runoff Area = 23.875 ac Runoff Volume = 4.660 af Average Runoff Depth = 2.34"
73.59% Pervious = 17.569 ac 26.41% Impervious = 6.306 ac

Summary for Subcatchment 1S: SA1

Runoff = 10.61 cfs @ 12.59 hrs, Volume= 1.444 af, Depth> 1.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Year Rainfall=4.10"

Area (sf)	CN	Description
24,192	78	Meadow, non-grazed, HSG D
362,489	79	Woods, Fair, HSG D
16,062	80	>75% Grass cover, Good, HSG D
402,743	79	Weighted Average
402,743		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.7	100	0.0400	0.09		**Sheet Flow, SF 1-1**
					Woods: Light underbrush n= 0.400 P2= 2.70"
18.5	785	0.0200	0.71		**Shallow Concentrated Flow, SCF 1-1**
					Woodland Kv= 5.0 fps
2.1	90	0.0100	0.70		**Shallow Concentrated Flow, SCF 1-2**
					Short Grass Pasture Kv= 7.0 fps
1.6	70	0.0200	0.71		**Shallow Concentrated Flow, SCF 1-3**
					Woodland Kv= 5.0 fps
2.0	120	0.0200	0.99		**Shallow Concentrated Flow, SCF 1-4**
					Short Grass Pasture Kv= 7.0 fps
41.9	1,165	Total			

Summary for Subcatchment 2S: SA2

Runoff = 6.70 cfs @ 12.17 hrs, Volume= 0.569 af, Depth> 2.84"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Year Rainfall=4.10"

Area (sf)	CN	Description
56,218	98	Impervious, HSG D
48,564	80	>75% Grass cover, Good, HSG D
104,782	90	Weighted Average
48,564		46.35% Pervious Area
56,218		53.65% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	40	0.0200	1.05		**Sheet Flow, SF 2-1** Smooth surfaces n= 0.011 P2= 2.70"
10.3	60	0.0200	0.10		**Sheet Flow, SF 2-2** Grass: Dense n= 0.240 P2= 2.70"
0.5	30	0.0200	0.99		**Sheet Flow, SF 2-3** Smooth surfaces n= 0.011 P2= 2.70"
0.6	110	0.0200	2.87		**Shallow Concentrated Flow, SCF 2-1** Paved Kv= 20.3 fps
0.5	280	0.0140	9.46	529.89	**Trap/Vee/Rect Channel Flow, CF 2-1** Bot.W=2.00' D=4.00' Z= 3.0 '/' Top.W=26.00' n= 0.030 Stream, clean & straight
12.5	520	Total			

Summary for Subcatchment 3aS: SA3

Runoff = 3.96 cfs @ 12.01 hrs, Volume= 0.259 af, Depth> 3.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Year Rainfall=4.10"

	Area (sf)	CN	Description
	36,835	98	Impervious, HSG D
*	1,592	66	Roof Dripline
	38,427	97	Weighted Average
	1,592		4.14% Pervious Area
	36,835		95.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	115	0.1670	3.04		**Sheet Flow, SF 3-1** Smooth surfaces n= 0.011 P2= 2.70"

Summary for Subcatchment 3bS: SA3b

Runoff = 3.07 cfs @ 12.01 hrs, Volume= 0.201 af, Depth> 3.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Year Rainfall=4.10"

	Area (sf)	CN	Description
	28,609	98	Impervious, HSG D
*	1,236	66	Roof Dripline
	29,845	97	Weighted Average
	1,236		4.14% Pervious Area
	28,609		95.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	115	0.1670	3.04		**Sheet Flow, SF 3-1** Smooth surfaces n= 0.011 P2= 2.70"

Summary for Subcatchment 4aS: SA4a

Runoff = 6.84 cfs @ 12.02 hrs, Volume= 0.443 af, Depth> 3.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Year Rainfall=4.10"

	Area (sf)	CN	Description
*	52,199	98	Impervious, HSG D
	21,545	80	>75% Grass cover, Good, HSG D
	73,744	93	Weighted Average
	21,545		29.22% Pervious Area
	52,199		70.78% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.5	90	0.0110	0.97		**Sheet Flow, SF 4a-1** Smooth surfaces n= 0.011 P2= 2.70"

Summary for Subcatchment 4bS: SA4b

Runoff = 6.56 cfs @ 12.03 hrs, Volume= 0.422 af, Depth> 3.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Year Rainfall=4.10"

	Area (sf)	CN	Description
	25,384	80	>75% Grass cover, Good, HSG D
*	47,210	98	Impervious, HSG D
	72,594	92	Weighted Average
	25,384		34.97% Pervious Area
	47,210		65.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.7	140	0.0200	1.35		**Sheet Flow, SF 4b-1** Smooth surfaces n= 0.011 P2= 2.70"
0.0	10	0.1000	4.74		**Shallow Concentrated Flow, SCF 4b-1** Grassed Waterway Kv= 15.0 fps
1.7	150	Total			

Summary for Subcatchment 5S: SA5

Runoff = 3.98 cfs @ 12.48 hrs, Volume= 0.489 af, Depth> 1.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Year Rainfall=4.10"

Area (sf)	CN	Description
11,975	80	>75% Grass cover, Good, HSG D
36,307	78	Meadow, non-grazed, HSG D
87,836	79	Woods, Fair, HSG D
136,118	79	Weighted Average
136,118		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.2	100	0.0500	0.10		**Sheet Flow, SF 5-1**
					Woods: Light underbrush n= 0.400 P2= 2.70"
7.0	210	0.0100	0.50		**Shallow Concentrated Flow, SCF 5-1**
					Woodland Kv= 5.0 fps
2.4	100	0.0100	0.70		**Shallow Concentrated Flow, SCF 5-2**
					Short Grass Pasture Kv= 7.0 fps
8.4	340	0.0180	0.67		**Shallow Concentrated Flow, SCF 5-3**
					Woodland Kv= 5.0 fps
34.0	750	Total			

Summary for Subcatchment 6S: SA6

Runoff = 5.75 cfs @ 12.03 hrs, Volume= 0.382 af, Depth> 3.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Year Rainfall=4.10"

Area (sf)	CN	Description
9,350	80	>75% Grass cover, Good, HSG D
50,574	98	Impervious, HSG D
59,924	95	Weighted Average
9,350		15.60% Pervious Area
50,574		84.40% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	90	0.0330	1.51		**Sheet Flow, SF 6-1**
					Smooth surfaces n= 0.011 P2= 2.70"
0.9	170	0.0240	3.14		**Shallow Concentrated Flow, SCF 6-1**
					Paved Kv= 20.3 fps
1.9	260	Total			

Summary for Subcatchment 7S: SA7

Runoff = 2.31 cfs @ 12.28 hrs, Volume= 0.227 af, Depth> 1.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Year Rainfall=4.10"

	Area (sf)	CN	Description
*	3,031	98	Impervious, HSG D
	50,265	79	Woods, Fair, HSG D
	7,035	80	>75% Grass cover, Good, HSG D
	60,331	80	Weighted Average
	57,300		94.98% Pervious Area
	3,031		5.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	40	0.1000	0.17		**Sheet Flow, SF 7-1**
					Grass: Dense n= 0.240 P2= 2.70"
14.2	60	0.0250	0.07		**Sheet Flow, SF 7-2**
					Woods: Light underbrush n= 0.400 P2= 2.70"
2.0	80	0.0170	0.65		**Shallow Concentrated Flow, SCF 7-1**
					Woodland Kv= 5.0 fps
20.1	180	Total			

Summary for Subcatchment 8S: SA8

Runoff = 1.77 cfs @ 12.27 hrs, Volume= 0.171 af, Depth> 1.89"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Year Rainfall=4.10"

Area (sf)	CN	Description
40,395	79	Woods, Fair, HSG D
6,777	80	>75% Grass cover, Good, HSG D
47,172	79	Weighted Average
47,172		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	40	0.1000	0.17		**Sheet Flow, SF 8-1**
					Grass: Dense n= 0.240 P2= 2.70"
13.2	60	0.0300	0.08		**Sheet Flow, SF 8-2**
					Woods: Light underbrush n= 0.400 P2= 2.70"
2.1	90	0.0200	0.71		**Shallow Concentrated Flow, SCF 8-1**
					Woodland Kv= 5.0 fps
19.2	190	Total			

Summary for Subcatchment 9S: SA 9

Runoff = 0.65 cfs @ 12.18 hrs, Volume= 0.054 af, Depth> 1.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Year Rainfall=4.10"

Area (sf)	CN	Description
12,287	80	>75% Grass cover, Good, HSG D
2,013	79	Woods, Fair, HSG D
14,300	80	Weighted Average
14,300		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	100	0.0500	0.15		**Sheet Flow, SF 9-1** Grass: Dense n= 0.240 P2= 2.70"
1.6	160	0.0600	1.71		**Shallow Concentrated Flow, SCF 9-1** Short Grass Pasture Kv= 7.0 fps
0.4	30	0.0500	1.12		**Shallow Concentrated Flow, SCF 9-2** Woodland Kv= 5.0 fps
12.8	290	Total			

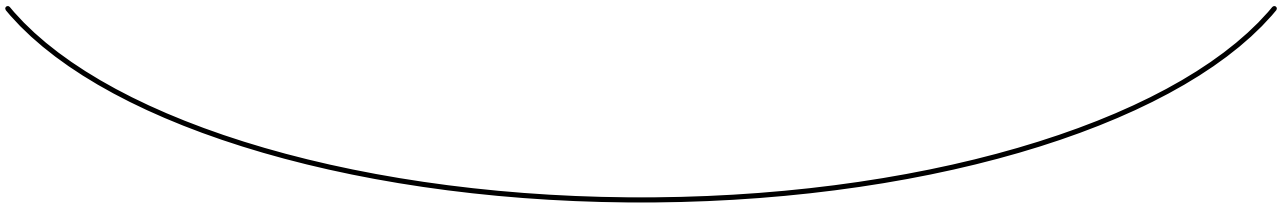
Summary for Reach 1aR: 1aR

Inflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 5.00 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 1.00' Flow Area= 333.3 sf, Capacity= 133.65 cfs

500.00' x 1.00' deep Parabolic Channel, n= 0.400 Sheet flow: Woods+light brush
Length= 100.0' Slope= 0.0200 '/'
Inlet Invert= 0.00', Outlet Invert= -2.00'



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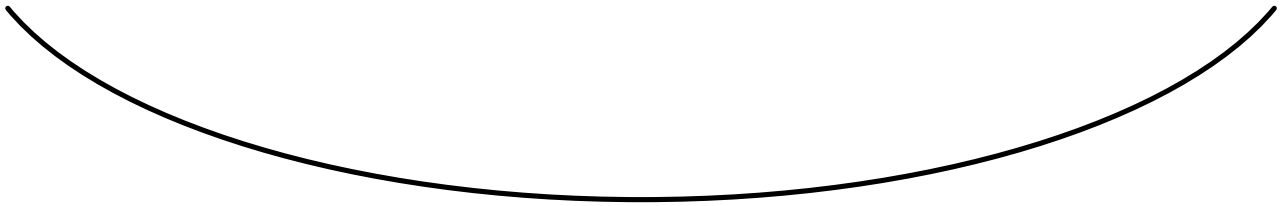
Summary for Reach 1bR: 1bR

Inflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 5.00 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 1.00' Flow Area= 333.3 sf, Capacity= 133.65 cfs

500.00' x 1.00' deep Parabolic Channel, n= 0.400 Sheet flow: Woods+light brush
Length= 100.0' Slope= 0.0200 '/'
Inlet Invert= 0.00', Outlet Invert= -2.00'



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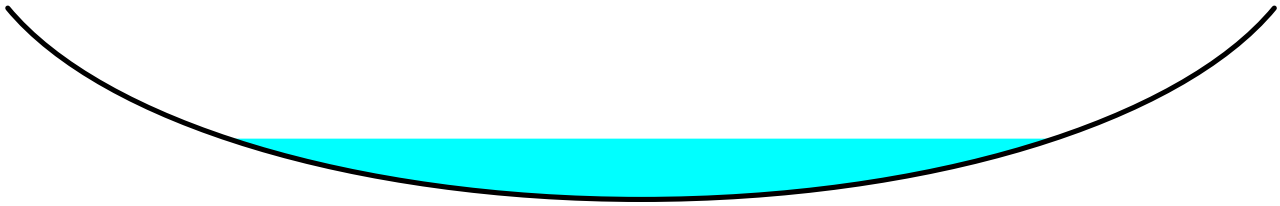
Summary for Reach 2R: 2R

Inflow Area = 2.405 ac, 53.65% Impervious, Inflow Depth > 1.93" for 10 Year event
Inflow = 3.28 cfs @ 12.43 hrs, Volume= 0.387 af
Outflow = 3.05 cfs @ 12.64 hrs, Volume= 0.382 af, Atten= 7%, Lag= 12.6 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.13 fps, Min. Travel Time= 6.4 min
Avg. Velocity = 0.05 fps, Avg. Travel Time= 15.5 min

Peak Storage= 1,168 cf @ 12.54 hrs
Average Depth at Peak Storage= 0.31'
Bank-Full Depth= 1.00' Flow Area= 133.3 sf, Capacity= 37.80 cfs

200.00' x 1.00' deep Parabolic Channel, n= 0.400 Sheet flow: Woods+light brush
Length= 50.0' Slope= 0.0100 '/'
Inlet Invert= 0.00', Outlet Invert= -0.50'



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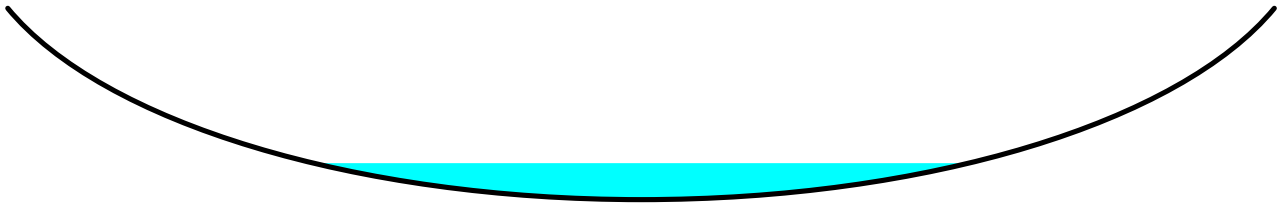
Summary for Reach 3R: 3R

Inflow Area = 3.359 ac, 67.93% Impervious, Inflow Depth > 1.83" for 10 Year event
Inflow = 1.02 cfs @ 13.53 hrs, Volume= 0.514 af
Outflow = 1.01 cfs @ 14.11 hrs, Volume= 0.489 af, Atten= 1%, Lag= 34.3 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.09 fps, Min. Travel Time= 17.9 min
Avg. Velocity = 0.06 fps, Avg. Travel Time= 27.3 min

Peak Storage= 1,083 cf @ 13.81 hrs
Average Depth at Peak Storage= 0.19'
Bank-Full Depth= 1.00' Flow Area= 133.3 sf, Capacity= 37.80 cfs

200.00' x 1.00' deep Parabolic Channel, n= 0.400 Sheet flow: Woods+light brush
Length= 100.0' Slope= 0.0100 '/'
Inlet Invert= 0.00', Outlet Invert= -1.00'



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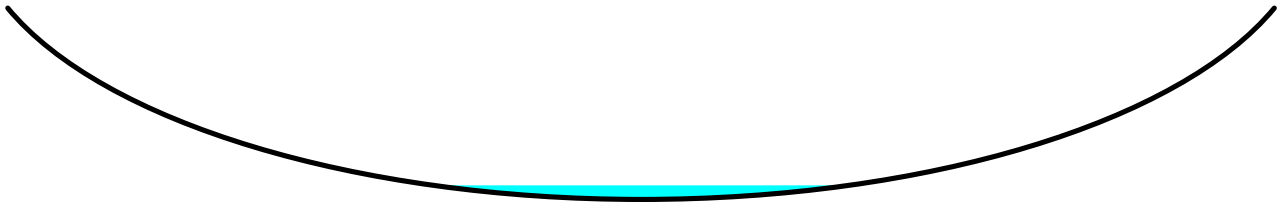
Summary for Reach 4R: 4R

Inflow Area = 1.376 ac, 84.40% Impervious, Inflow Depth > 1.06" for 10 Year event
Inflow = 0.12 cfs @ 16.86 hrs, Volume= 0.122 af
Outflow = 0.12 cfs @ 17.83 hrs, Volume= 0.110 af, Atten= 0%, Lag= 58.4 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.05 fps, Min. Travel Time= 34.3 min
Avg. Velocity = 0.04 fps, Avg. Travel Time= 38.4 min

Peak Storage= 252 cf @ 17.26 hrs
Average Depth at Peak Storage= 0.07'
Bank-Full Depth= 1.00' Flow Area= 133.3 sf, Capacity= 37.80 cfs

200.00' x 1.00' deep Parabolic Channel, n= 0.400 Sheet flow: Woods+light brush
Length= 100.0' Slope= 0.0100 '/'
Inlet Invert= 0.00', Outlet Invert= -1.00'



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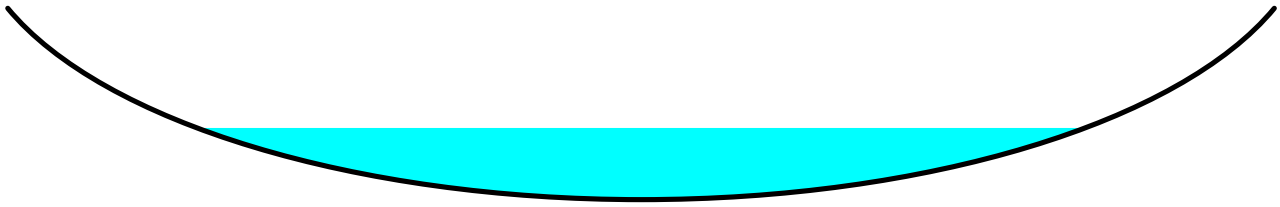
Summary for Reach 5R: 5R

Inflow Area = 9.246 ac, 0.00% Impervious, Inflow Depth > 1.87" for 10 Year event
Inflow = 9.97 cfs @ 12.71 hrs, Volume= 1.444 af
Outflow = 9.95 cfs @ 12.86 hrs, Volume= 1.433 af, Atten= 0%, Lag= 8.6 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.33 fps, Min. Travel Time= 5.1 min
Avg. Velocity = 0.16 fps, Avg. Travel Time= 10.7 min

Peak Storage= 3,033 cf @ 12.77 hrs
Average Depth at Peak Storage= 0.37'
Bank-Full Depth= 1.00' Flow Area= 133.3 sf, Capacity= 84.52 cfs

200.00' x 1.00' deep Parabolic Channel, n= 0.400 Sheet flow: Woods+light brush
Length= 100.0' Slope= 0.0500 '/'
Inlet Invert= 0.00', Outlet Invert= -5.00'



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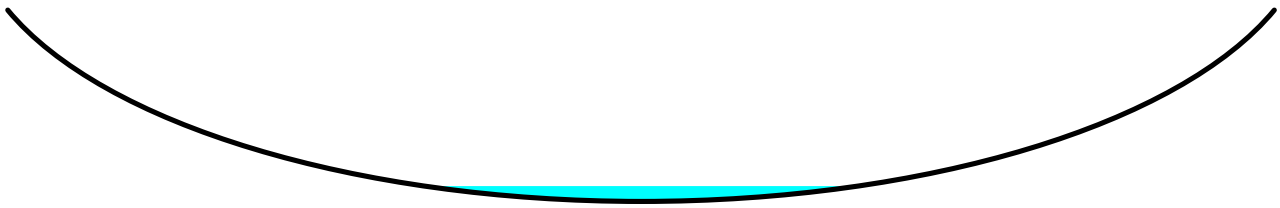
Summary for Reach 6R: 6R

Inflow Area = 1.693 ac, 70.78% Impervious, Inflow Depth > 2.49" for 10 Year event
Inflow = 0.63 cfs @ 12.79 hrs, Volume= 0.351 af
Outflow = 0.63 cfs @ 12.82 hrs, Volume= 0.350 af, Atten= 0%, Lag= 1.4 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.44 fps, Min. Travel Time= 0.8 min
Avg. Velocity = 0.97 fps, Avg. Travel Time= 1.2 min

Peak Storage= 31 cf @ 12.80 hrs
Average Depth at Peak Storage= 0.08'
Bank-Full Depth= 1.00' Flow Area= 20.0 sf, Capacity= 156.46 cfs

30.00' x 1.00' deep Parabolic Channel, n= 0.030 Short grass
Length= 70.0' Slope= 0.0430 '/'
Inlet Invert= 0.00', Outlet Invert= -3.01'



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Summary for Reach SP1: SP1

Inflow Area = 13.945 ac, 15.32% Impervious, Inflow Depth > 1.98" for 10 Year event
Inflow = 14.72 cfs @ 12.66 hrs, Volume= 2.296 af
Outflow = 14.72 cfs @ 12.66 hrs, Volume= 2.296 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 SP2: SP2

Inflow Area = 9.930 ac, 41.99% Impervious, Inflow Depth > 1.83" for 10 Year event
Inflow = 7.06 cfs @ 12.39 hrs, Volume= 1.515 af
Outflow = 7.06 cfs @ 12.39 hrs, Volume= 1.515 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 Pond 1P: 1P

Inflow Area = 3.359 ac, 67.93% Impervious, Inflow Depth > 2.76" for 10 Year event
Inflow = 7.01 cfs @ 12.03 hrs, Volume= 0.772 af
Outflow = 1.02 cfs @ 13.53 hrs, Volume= 0.514 af, Atten= 86%, Lag= 90.3 min
Primary = 1.02 cfs @ 13.53 hrs, Volume= 0.514 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 143.28' @ 13.53 hrs Surf.Area= 10,602 sf Storage= 12,860 cf

Plug-Flow detention time= 175.9 min calculated for 0.512 af (66% of inflow)
Center-of-Mass det. time= 80.8 min (906.7 - 825.9)

Volume	Invert	Avail.Storage	Storage Description
#1	141.95'	20,937 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
141.95	5,925	0	0
142.00	8,752	367	367
143.00	10,374	9,563	9,930
143.50	10,782	5,289	15,219
144.00	12,092	5,719	20,937

Device	Routing	Invert	Outlet Devices
#1	Primary	139.00'	**12.0" Round Culvert** L= 200.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 139.00' / 137.00' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	141.95'	**0.598 in/hr Exfiltration over Surface area**
#3	Device 1	143.00'	**22.0" W x 5.0" H Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=1.02 cfs @ 13.53 hrs HW=143.28' (Free Discharge)
└─**1=Culvert** (Passes 1.02 cfs of 5.30 cfs potential flow)
  ├─**2=Exfiltration** (Exfiltration Controls 0.15 cfs)
  └─**3=Orifice/Grate** (Orifice Controls 0.87 cfs @ 1.70 fps)

Summary for Pond 2P: 2P

Inflow Area =	1.376 ac,	84.40% Impervious,	Inflow Depth >	3.33"	for 10 Year event
Inflow =	5.75 cfs @	12.03 hrs,	Volume=	0.382 af	
Outflow =	0.12 cfs @	16.86 hrs,	Volume=	0.122 af,	Atten= 98%, Lag= 289.4 min
Primary =	0.12 cfs @	16.86 hrs,	Volume=	0.122 af	
Secondary =	0.00 cfs @	5.00 hrs,	Volume=	0.000 af	

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 138.98' @ 16.86 hrs Surf.Area= 8,840 sf Storage= 11,691 cf

Plug-Flow detention time= 203.5 min calculated for 0.121 af (32% of inflow)
Center-of-Mass det. time= 77.4 min (822.6 - 745.1)

Volume	Invert	Avail.Storage	Storage Description
#1	137.45'	17,331 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
137.45	2,716	0	0
137.50	6,701	235	235
138.00	7,413	3,529	3,764
139.00	8,876	8,145	11,908
139.60	9,200	5,423	17,331

Device	Routing	Invert	Outlet Devices
#1	Primary	134.50'	**12.0" Round Culvert** L= 100.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 134.50' / 133.50' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	137.45'	**0.598 in/hr Exfiltration over Surface area**
#3	Device 1	139.00'	**20.0" W x 4.0" H Vert. Orifice/Grate** C= 0.600
#4	Secondary	139.50'	**15.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.12 cfs @ 16.86 hrs HW=138.98' (Free Discharge)
└─**1=Culvert** (Passes 0.12 cfs of 6.40 cfs potential flow)
  ├─**2=Exfiltration** (Exfiltration Controls 0.12 cfs)
  └─**3=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=137.45' (Free Discharge)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 3P: 3P

Inflow Area = 2.405 ac, 53.65% Impervious, Inflow Depth > 2.84" for 10 Year event
Inflow = 6.70 cfs @ 12.17 hrs, Volume= 0.569 af
Outflow = 3.28 cfs @ 12.43 hrs, Volume= 0.387 af, Atten= 51%, Lag= 15.9 min
Primary = 3.28 cfs @ 12.43 hrs, Volume= 0.387 af
Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 139.31' @ 12.43 hrs Surf.Area= 8,689 sf Storage= 10,457 cf

Plug-Flow detention time= 117.0 min calculated for 0.386 af (68% of inflow)
Center-of-Mass det. time= 50.3 min (822.2 - 771.8)

Volume	Invert	Avail.Storage	Storage Description
#1	137.95'	12,139 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
137.95	3,791	0	0
138.00	7,013	270	270
139.00	8,142	7,578	7,848
139.50	9,024	4,292	12,139

Device	Routing	Invert	Outlet Devices
#1	Primary	135.00'	**12.0" Round Culvert** L= 100.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 135.00' / 134.00' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	137.95'	**0.598 in/hr Exfiltration over Surface area**
#3	Device 1	139.00'	**21.4" Horiz. Orifice/Grate-NFCO R-4342 Beehive Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	139.45'	**15.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=3.27 cfs @ 12.43 hrs HW=139.31' (Free Discharge)
└─**1=Culvert** (Passes 3.27 cfs of 6.28 cfs potential flow)
  ├─**2=Exfiltration** (Exfiltration Controls 0.12 cfs)
  └─**3=Orifice/Grate-NFCO R-4342 Beehive Grate** (Weir Controls 3.15 cfs @ 1.82 fps)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=137.95' (Free Discharge)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 4aP: RD

Inflow Area = 0.882 ac, 95.86% Impervious, Inflow Depth > 3.52" for 10 Year event
Inflow = 3.96 cfs @ 12.01 hrs, Volume= 0.259 af
Outflow = 1.14 cfs @ 12.29 hrs, Volume= 0.257 af, Atten= 71%, Lag= 16.8 min
Primary = 1.14 cfs @ 12.29 hrs, Volume= 0.257 af
Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 143.18' @ 12.29 hrs Surf.Area= 1,557 sf Storage= 2,602 cf

Plug-Flow detention time= 23.5 min calculated for 0.256 af (99% of inflow)
Center-of-Mass det. time= 20.0 min (756.3 - 736.3)

Volume	Invert	Avail.Storage	Storage Description
#1	139.00'	3,114 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 7,785 cf Overall x 40.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
139.00	1,557	0	0
140.00	1,557	1,557	1,557
141.00	1,557	1,557	3,114
142.00	1,557	1,557	4,671
143.00	1,557	1,557	6,228
144.00	1,557	1,557	7,785

Device	Routing	Invert	Outlet Devices
#1	Primary	139.00'	**6.0" Round Culvert** L= 100.0' RCP, rounded edge headwall, Ke= 0.100 Inlet / Outlet Invert= 139.00' / 138.00' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 0.20 sf
#2	Secondary	144.00'	**503.0' long x 5.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.35 2.51 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.69 2.73 2.77 2.86

Primary OutFlow Max=1.13 cfs @ 12.29 hrs HW=143.17' (Free Discharge)
└**1=Culvert** (Barrel Controls 1.13 cfs @ 5.78 fps)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=139.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 4bP: RD

Inflow Area = 0.685 ac, 95.86% Impervious, Inflow Depth > 3.52" for 10 Year event
Inflow = 3.07 cfs @ 12.01 hrs, Volume= 0.201 af
Outflow = 1.05 cfs @ 12.22 hrs, Volume= 0.200 af, Atten= 66%, Lag= 12.7 min
Primary = 1.05 cfs @ 12.22 hrs, Volume= 0.200 af
Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 142.49' @ 12.22 hrs Surf.Area= 1,210 sf Storage= 1,689 cf

Plug-Flow detention time= 17.7 min calculated for 0.199 af (99% of inflow)
Center-of-Mass det. time= 14.6 min (750.9 - 736.3)

Volume	Invert	Avail.Storage	Storage Description
#1	139.00'	2,420 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 6,050 cf Overall x 40.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
139.00	1,210	0	0
140.00	1,210	1,210	1,210
141.00	1,210	1,210	2,420
142.00	1,210	1,210	3,630
143.00	1,210	1,210	4,840
144.00	1,210	1,210	6,050

Device	Routing	Invert	Outlet Devices
#1	Primary	139.00'	**6.0" Round Culvert** L= 100.0' RCP, rounded edge headwall, Ke= 0.100 Inlet / Outlet Invert= 139.00' / 138.00' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 0.20 sf
#2	Secondary	144.00'	**503.0' long x 5.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.35 2.51 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.69 2.73 2.77 2.86

Primary OutFlow Max=1.05 cfs @ 12.22 hrs HW=142.49' (Free Discharge)
└**1=Culvert** (Barrel Controls 1.05 cfs @ 5.34 fps)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=139.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 6P: 6P

Inflow Area = 9.246 ac, 0.00% Impervious, Inflow Depth > 1.87" for 10 Year event
Inflow = 10.61 cfs @ 12.59 hrs, Volume= 1.444 af
Outflow = 9.97 cfs @ 12.71 hrs, Volume= 1.444 af, Atten= 6%, Lag= 7.3 min
Primary = 9.97 cfs @ 12.71 hrs, Volume= 1.444 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 144.11' @ 12.71 hrs Surf.Area= 4,151 sf Storage= 463 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.2 min (824.7 - 824.5)

Volume	Invert	Avail.Storage	Storage Description
#1	144.00'	7,720 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
144.00	3,972	0	0
145.50	6,321	7,720	7,720

Device	Routing	Invert	Outlet Devices
#1	Primary	140.00'	**18.0" Round Culvert** L= 500.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 140.00' / 137.50' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf

Primary OutFlow Max=9.97 cfs @ 12.71 hrs HW=144.11' (Free Discharge)
└**1=Culvert** (Barrel Controls 9.97 cfs @ 5.64 fps)

Summary for Pond TP: Tank Pond

Inflow Area = 1.693 ac, 70.78% Impervious, Inflow Depth > 3.14" for 10 Year event
Inflow = 6.84 cfs @ 12.02 hrs, Volume= 0.443 af
Outflow = 0.63 cfs @ 12.79 hrs, Volume= 0.351 af, Atten= 91%, Lag= 46.2 min
Primary = 0.63 cfs @ 12.79 hrs, Volume= 0.351 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 144.96' @ 12.79 hrs Surf.Area= 12,438 sf Storage= 10,886 cf

Plug-Flow detention time= 211.5 min calculated for 0.351 af (79% of inflow)
Center-of-Mass det. time= 156.5 min (908.8 - 752.4)

Volume	Invert	Avail.Storage	Storage Description
#1	144.00'	25,049 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
144.00	10,153	0	0
146.00	14,896	25,049	25,049

Device	Routing	Invert	Outlet Devices
#1	Primary	144.00'	**6.0" Round Culvert** L= 30.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 144.00' / 143.70' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.63 cfs @ 12.79 hrs HW=144.96' (Free Discharge)
└**1=Culvert** (Inlet Controls 0.63 cfs @ 3.21 fps)

POST DEVELOPMENT - 25 YEAR

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: SA1 Runoff Area=402,743 sf 0.00% Impervious Runoff Depth>2.42"
Flow Length=1,165' Tc=41.9 min CN=79 Runoff=13.69 cfs 1.865 af

Subcatchment 2S: SA2 Runoff Area=104,782 sf 53.65% Impervious Runoff Depth>3.47"
Flow Length=520' Tc=12.5 min CN=90 Runoff=8.12 cfs 0.696 af

Subcatchment 3aS: SA3 Runoff Area=38,427 sf 95.86% Impervious Runoff Depth>4.16"
Flow Length=115' Slope=0.1670 '/' Tc=0.6 min CN=97 Runoff=4.66 cfs 0.306 af

Subcatchment 3bS: SA3b Runoff Area=29,845 sf 95.86% Impervious Runoff Depth>4.16"
Flow Length=115' Slope=0.1670 '/' Tc=0.6 min CN=97 Runoff=3.62 cfs 0.237 af

Subcatchment 4aS: SA4a Runoff Area=73,744 sf 70.78% Impervious Runoff Depth>3.78"
Flow Length=90' Slope=0.0110 '/' Tc=1.5 min CN=93 Runoff=8.16 cfs 0.534 af

Subcatchment 4bS: SA4b Runoff Area=72,594 sf 65.03% Impervious Runoff Depth>3.68"
Flow Length=150' Tc=1.7 min CN=92 Runoff=7.86 cfs 0.512 af

Subcatchment 5S: SA5 Runoff Area=136,118 sf 0.00% Impervious Runoff Depth>2.43"
Flow Length=750' Tc=34.0 min CN=79 Runoff=5.13 cfs 0.632 af

Subcatchment 6S: SA6 Runoff Area=59,924 sf 84.40% Impervious Runoff Depth>3.98"
Flow Length=260' Tc=1.9 min CN=95 Runoff=6.81 cfs 0.456 af

Subcatchment 7S: SA7 Runoff Area=60,331 sf 5.02% Impervious Runoff Depth>2.53"
Flow Length=180' Tc=20.1 min CN=80 Runoff=2.96 cfs 0.292 af

Subcatchment 8S: SA8 Runoff Area=47,172 sf 0.00% Impervious Runoff Depth>2.44"
Flow Length=190' Tc=19.2 min CN=79 Runoff=2.28 cfs 0.220 af

Subcatchment 9S: SA 9 Runoff Area=14,300 sf 0.00% Impervious Runoff Depth>2.53"
Flow Length=290' Tc=12.8 min CN=80 Runoff=0.83 cfs 0.069 af

Reach 1aR: 1aR Avg. Flow Depth=0.02' Max Vel=0.03 fps Inflow=0.50 cfs 0.003 af
n=0.400 L=100.0' S=0.0200 '/' Capacity=133.65 cfs Outflow=0.04 cfs 0.003 af

Reach 1bR: 1bR Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.400 L=100.0' S=0.0200 '/' Capacity=133.65 cfs Outflow=0.00 cfs 0.000 af

Reach 2R: 2R Avg. Flow Depth=0.39' Max Vel=0.15 fps Inflow=5.12 cfs 0.513 af
n=0.400 L=50.0' S=0.0100 '/' Capacity=37.80 cfs Outflow=4.78 cfs 0.508 af

Reach 3R: 3R Avg. Flow Depth=0.22' Max Vel=0.10 fps Inflow=1.55 cfs 0.662 af
n=0.400 L=100.0' S=0.0100 '/' Capacity=37.80 cfs Outflow=1.48 cfs 0.634 af

Reach 4R: 4R Avg. Flow Depth=0.11' Max Vel=0.06 fps Inflow=0.32 cfs 0.183 af
n=0.400 L=100.0' S=0.0100 '/' Capacity=37.80 cfs Outflow=0.31 cfs 0.172 af

Reach 5R: 5R Avg. Flow Depth=0.38' Max Vel=0.34 fps Inflow=10.69 cfs 1.865 af
n=0.400 L=100.0' S=0.0500 '/' Capacity=84.52 cfs Outflow=10.67 cfs 1.852 af

Reach 6R: 6R Avg. Flow Depth=0.08' Max Vel=1.49 fps Inflow=0.71 cfs 0.417 af
n=0.030 L=70.0' S=0.0430 '/' Capacity=156.46 cfs Outflow=0.71 cfs 0.416 af

Reach SP1: SP1 Inflow=17.37 cfs 2.954 af
Outflow=17.37 cfs 2.954 af

Reach SP2: SP2 Inflow=8.90 cfs 1.966 af
Outflow=8.90 cfs 1.966 af

Pond 1P: 1P Peak Elev=143.38' Storage=13,983 cf Inflow=8.38 cfs 0.928 af
Outflow=1.55 cfs 0.662 af

Pond 2P: 2P Peak Elev=139.11' Storage=12,896 cf Inflow=6.81 cfs 0.456 af
Primary=0.32 cfs 0.183 af Secondary=0.00 cfs 0.000 af Outflow=0.32 cfs 0.183 af

Pond 3P: 3P Peak Elev=139.42' Storage=11,427 cf Inflow=8.12 cfs 0.696 af
Primary=5.12 cfs 0.513 af Secondary=0.00 cfs 0.000 af Outflow=5.12 cfs 0.513 af

Pond 4aP: RD Peak Elev=144.00' Storage=3,114 cf Inflow=4.66 cfs 0.306 af
Primary=1.23 cfs 0.300 af Secondary=0.50 cfs 0.003 af Outflow=1.73 cfs 0.304 af

Pond 4bP: RD Peak Elev=143.39' Storage=2,123 cf Inflow=3.62 cfs 0.237 af
Primary=1.16 cfs 0.236 af Secondary=0.00 cfs 0.000 af Outflow=1.16 cfs 0.236 af

Pond 6P: 6P Peak Elev=144.88' Storage=4,099 cf Inflow=13.69 cfs 1.865 af
18.0" Round Culvert n=0.013 L=500.0' S=0.0050 '/' Outflow=10.69 cfs 1.865 af

Pond TP: Tank Pond Peak Elev=145.14' Storage=13,175 cf Inflow=8.16 cfs 0.534 af
6.0" Round Culvert n=0.013 L=30.0' S=0.0100 '/' Outflow=0.71 cfs 0.417 af

Total Runoff Area = 23.875 ac Runoff Volume = 5.820 af Average Runoff Depth = 2.93"
73.59% Pervious = 17.569 ac 26.41% Impervious = 6.306 ac

Summary for Subcatchment 1S: SA1

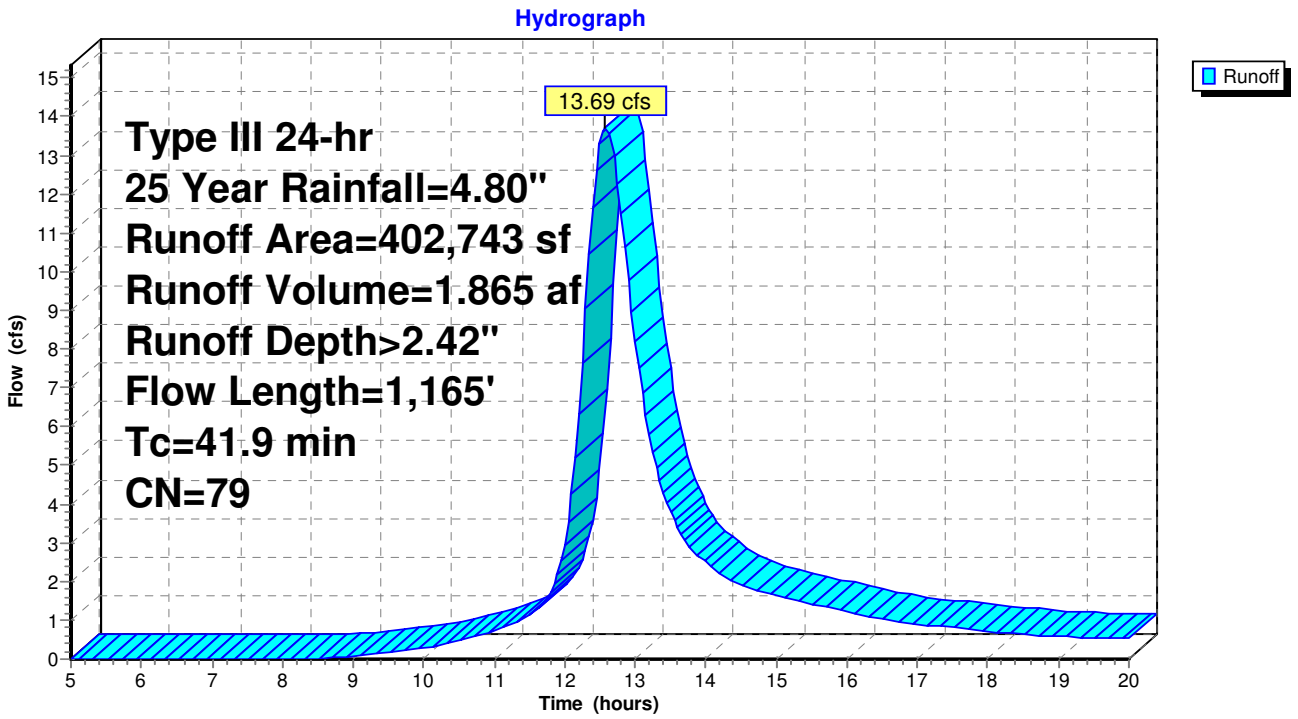
Runoff = 13.69 cfs @ 12.58 hrs, Volume= 1.865 af, Depth> 2.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year Rainfall=4.80"

Area (sf)	CN	Description
24,192	78	Meadow, non-grazed, HSG D
362,489	79	Woods, Fair, HSG D
16,062	80	>75% Grass cover, Good, HSG D
402,743	79	Weighted Average
402,743		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.7	100	0.0400	0.09		**Sheet Flow, SF 1-1**
					Woods: Light underbrush n= 0.400 P2= 2.70"
18.5	785	0.0200	0.71		**Shallow Concentrated Flow, SCF 1-1**
					Woodland Kv= 5.0 fps
2.1	90	0.0100	0.70		**Shallow Concentrated Flow, SCF 1-2**
					Short Grass Pasture Kv= 7.0 fps
1.6	70	0.0200	0.71		**Shallow Concentrated Flow, SCF 1-3**
					Woodland Kv= 5.0 fps
2.0	120	0.0200	0.99		**Shallow Concentrated Flow, SCF 1-4**
					Short Grass Pasture Kv= 7.0 fps
41.9	1,165	Total			

Subcatchment 1S: SA1



Summary for Subcatchment 2S: SA2

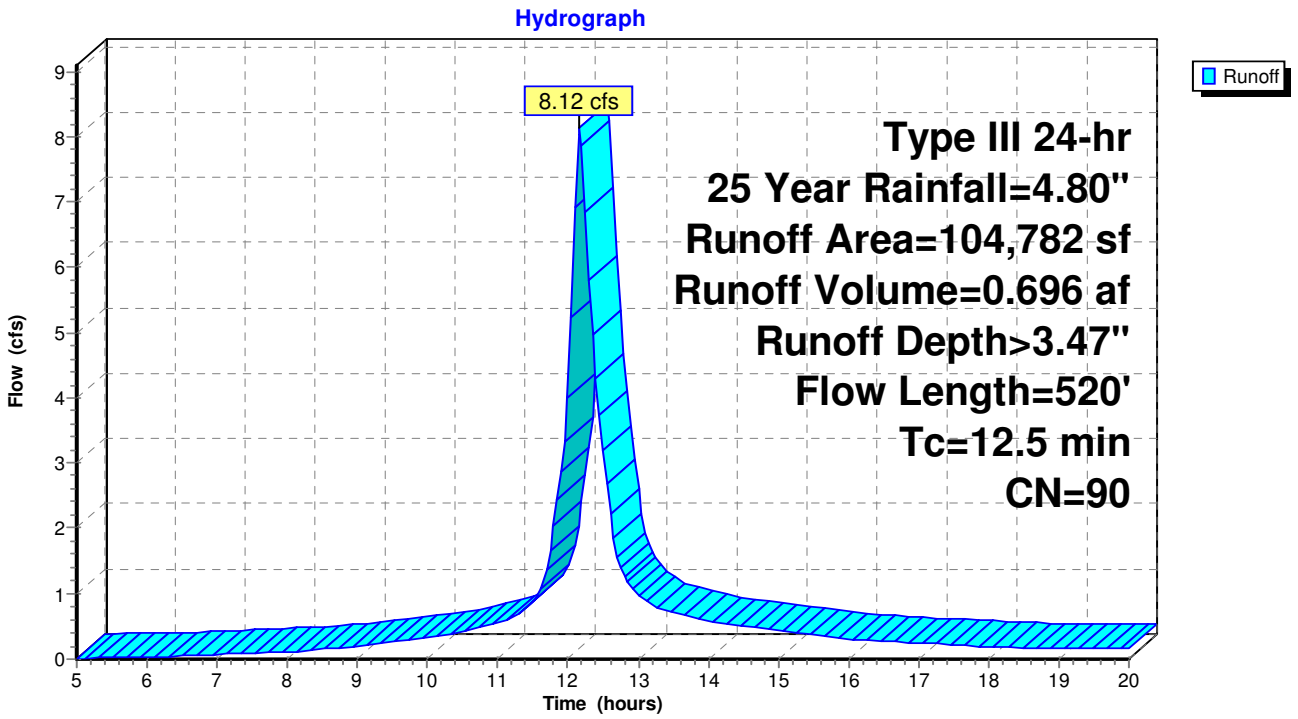
Runoff = 8.12 cfs @ 12.17 hrs, Volume= 0.696 af, Depth> 3.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year Rainfall=4.80"

Area (sf)	CN	Description
56,218	98	Impervious, HSG D
48,564	80	>75% Grass cover, Good, HSG D
104,782	90	Weighted Average
48,564		46.35% Pervious Area
56,218		53.65% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	40	0.0200	1.05		**Sheet Flow, SF 2-1** Smooth surfaces n= 0.011 P2= 2.70"
10.3	60	0.0200	0.10		**Sheet Flow, SF 2-2** Grass: Dense n= 0.240 P2= 2.70"
0.5	30	0.0200	0.99		**Sheet Flow, SF 2-3** Smooth surfaces n= 0.011 P2= 2.70"
0.6	110	0.0200	2.87		**Shallow Concentrated Flow, SCF 2-1** Paved Kv= 20.3 fps
0.5	280	0.0140	9.46	529.89	**Trap/Vee/Rect Channel Flow, CF 2-1** Bot.W=2.00' D=4.00' Z= 3.0 '/' Top.W=26.00' n= 0.030 Stream, clean & straight
12.5	520	Total			

Subcatchment 2S: SA2



Summary for Subcatchment 3aS: SA3

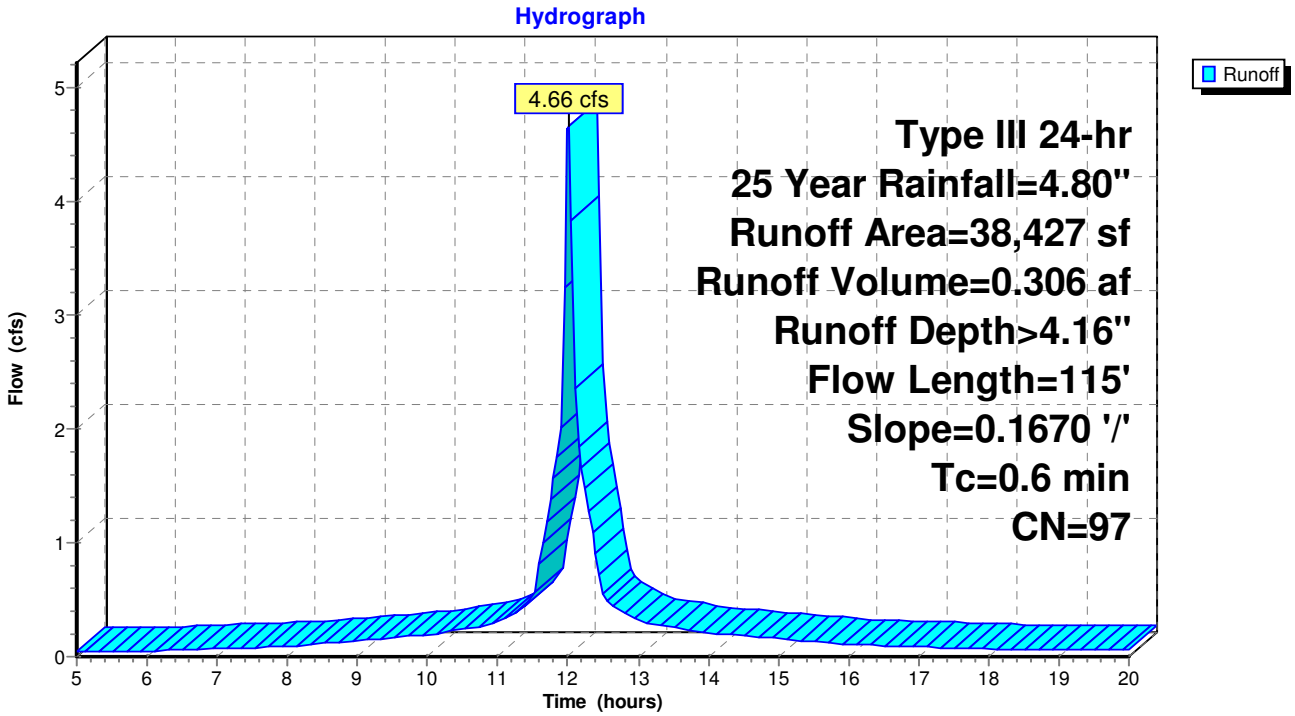
Runoff = 4.66 cfs @ 12.01 hrs, Volume= 0.306 af, Depth> 4.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year Rainfall=4.80"

	Area (sf)	CN	Description
	36,835	98	Impervious, HSG D
*	1,592	66	Roof Dripline
	38,427	97	Weighted Average
	1,592		4.14% Pervious Area
	36,835		95.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	115	0.1670	3.04		**Sheet Flow, SF 3-1** Smooth surfaces n= 0.011 P2= 2.70"

Subcatchment 3aS: SA3



Summary for Subcatchment 3bS: SA3b

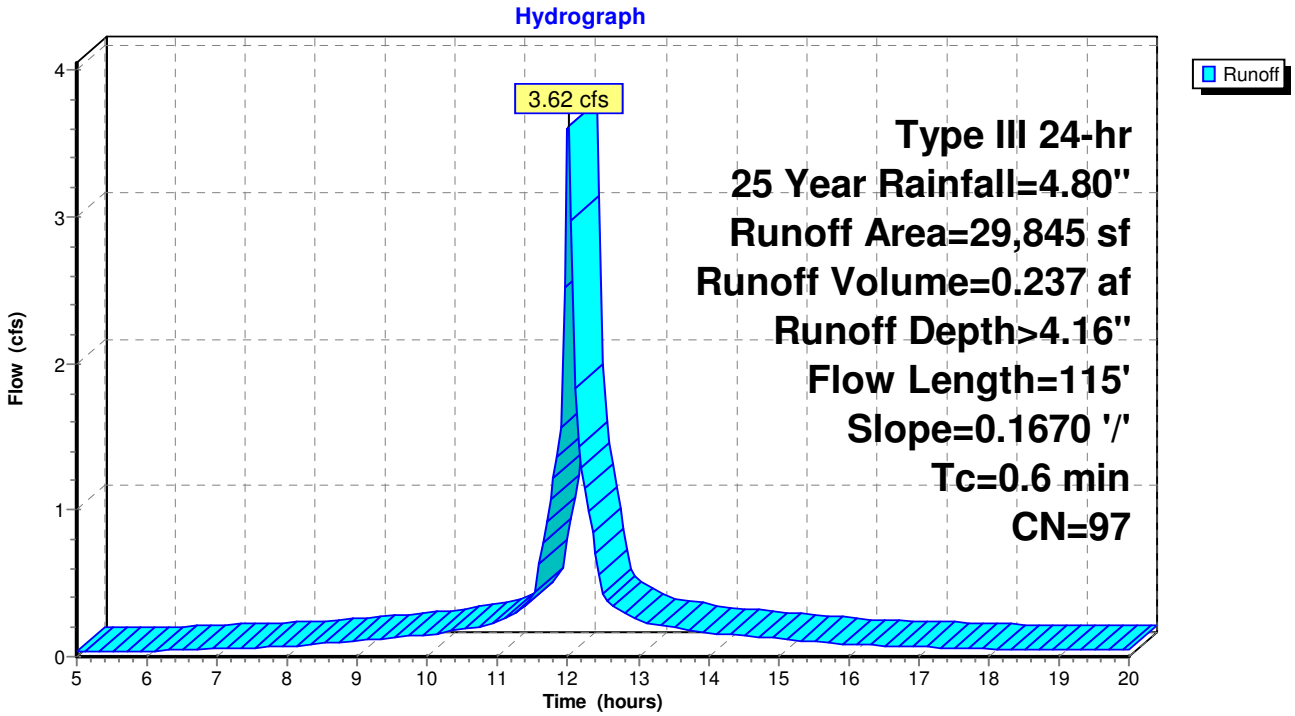
Runoff = 3.62 cfs @ 12.01 hrs, Volume= 0.237 af, Depth> 4.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year Rainfall=4.80"

	Area (sf)	CN	Description
	28,609	98	Impervious, HSG D
*	1,236	66	Roof Dripline
	29,845	97	Weighted Average
	1,236		4.14% Pervious Area
	28,609		95.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	115	0.1670	3.04		**Sheet Flow, SF 3-1** Smooth surfaces n= 0.011 P2= 2.70"

Subcatchment 3bS: SA3b



Summary for Subcatchment 4aS: SA4a

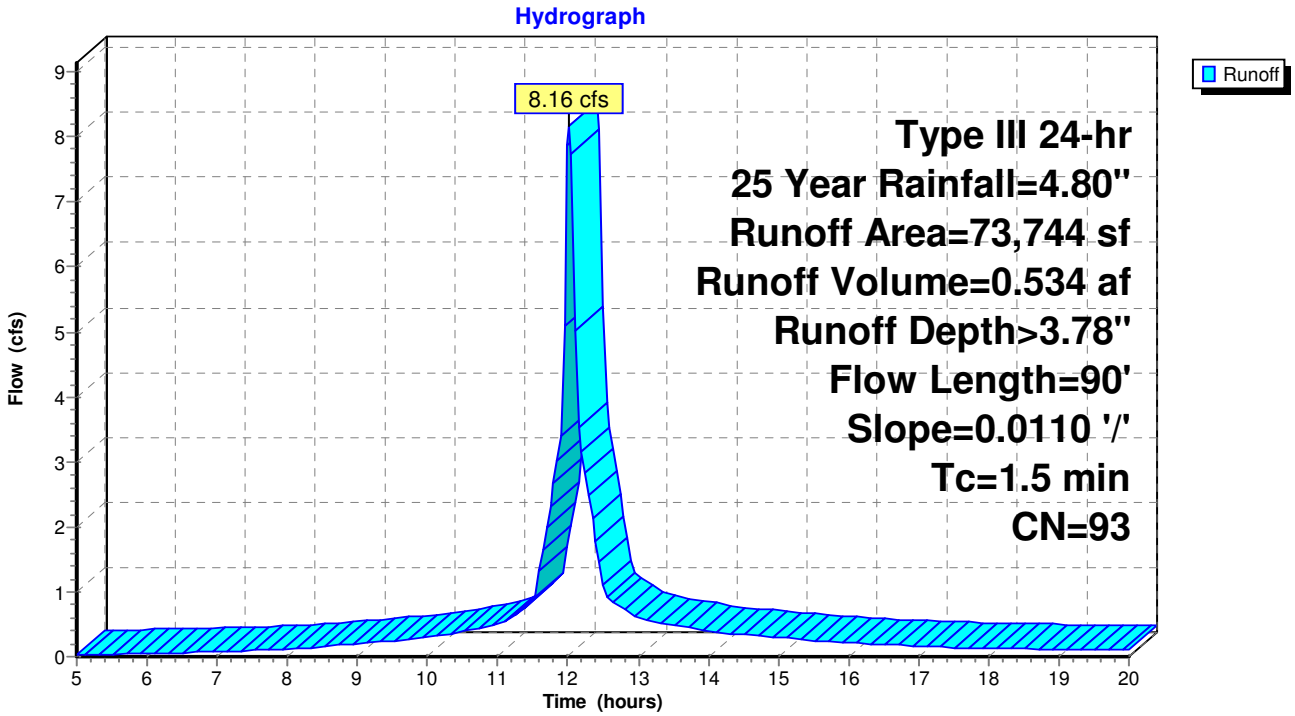
Runoff = 8.16 cfs @ 12.02 hrs, Volume= 0.534 af, Depth> 3.78"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year Rainfall=4.80"

	Area (sf)	CN	Description
*	52,199	98	Impervious, HSG D
	21,545	80	>75% Grass cover, Good, HSG D
	73,744	93	Weighted Average
	21,545		29.22% Pervious Area
	52,199		70.78% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.5	90	0.0110	0.97		**Sheet Flow, SF 4a-1** Smooth surfaces n= 0.011 P2= 2.70"

Subcatchment 4aS: SA4a



Summary for Subcatchment 4bS: SA4b

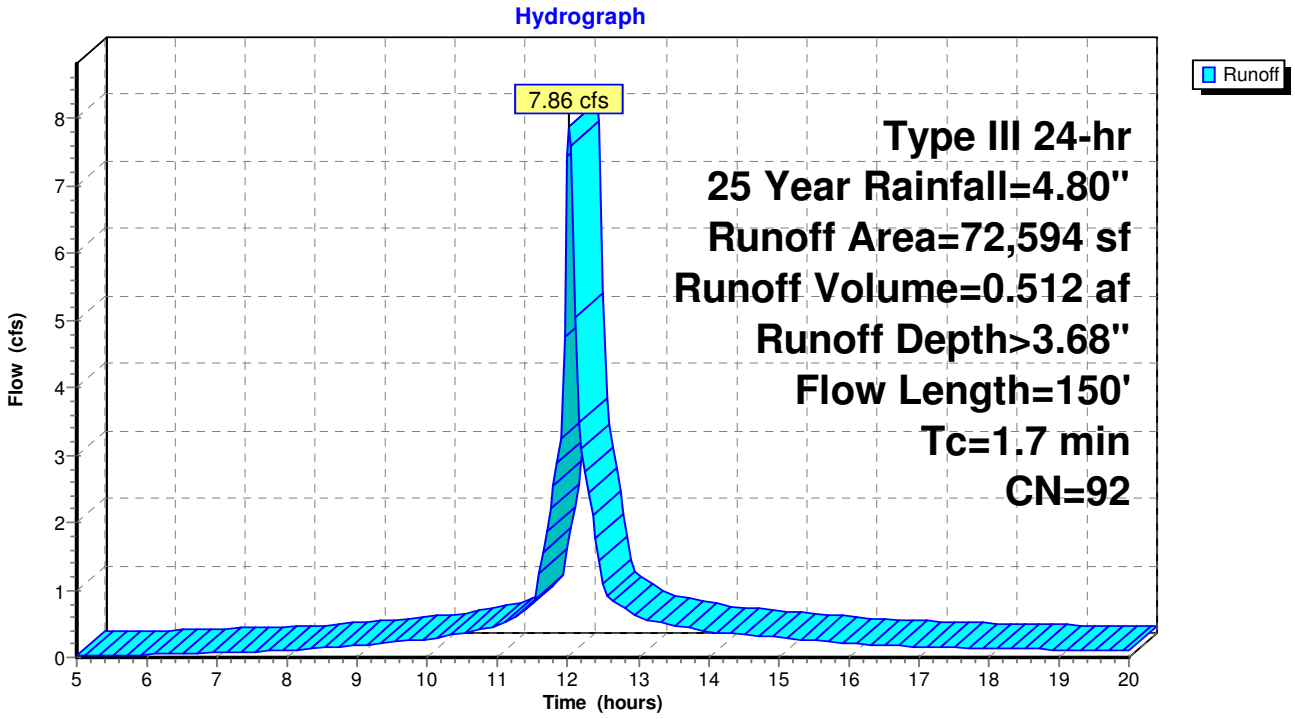
Runoff = 7.86 cfs @ 12.03 hrs, Volume= 0.512 af, Depth> 3.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year Rainfall=4.80"

	Area (sf)	CN	Description
	25,384	80	>75% Grass cover, Good, HSG D
*	47,210	98	Impervious, HSG D
	72,594	92	Weighted Average
	25,384		34.97% Pervious Area
	47,210		65.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.7	140	0.0200	1.35		**Sheet Flow, SF 4b-1** Smooth surfaces n= 0.011 P2= 2.70"
0.0	10	0.1000	4.74		**Shallow Concentrated Flow, SCF 4b-1** Grassed Waterway Kv= 15.0 fps
1.7	150	Total			

Subcatchment 4bS: SA4b



Summary for Subcatchment 5S: SA5

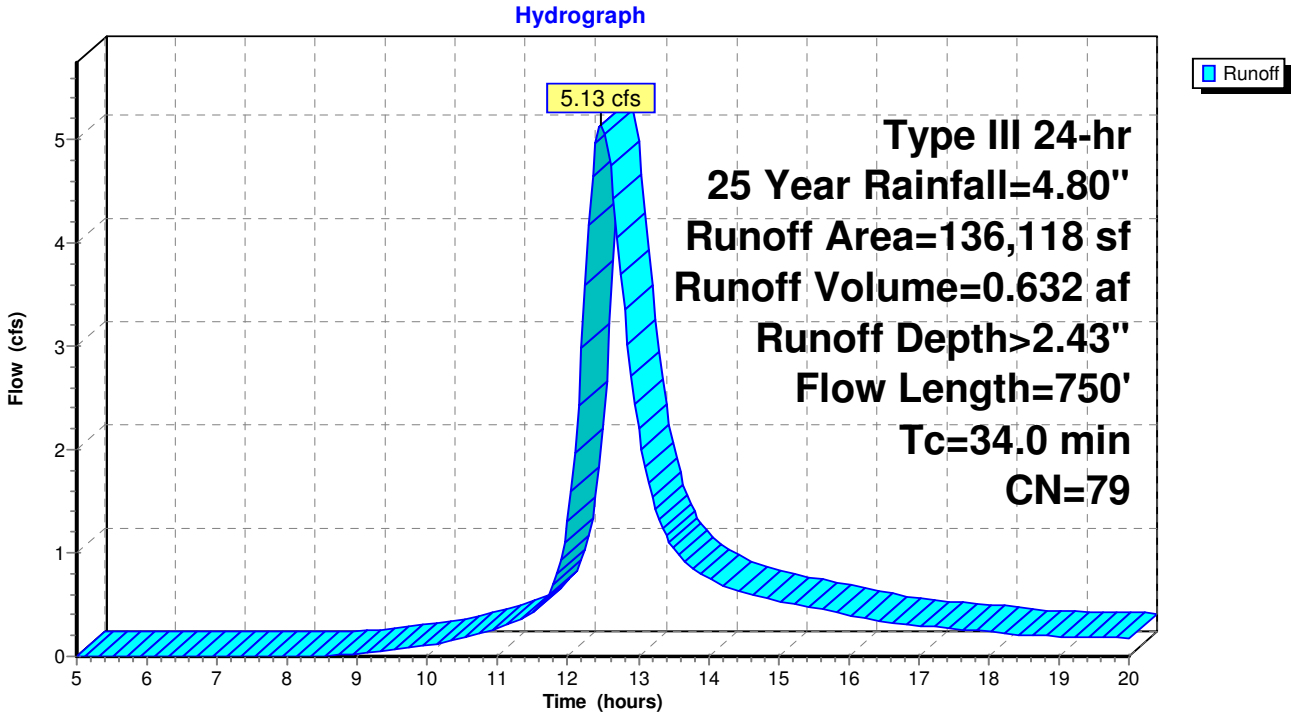
Runoff = 5.13 cfs @ 12.48 hrs, Volume= 0.632 af, Depth> 2.43"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year Rainfall=4.80"

Area (sf)	CN	Description
11,975	80	>75% Grass cover, Good, HSG D
36,307	78	Meadow, non-grazed, HSG D
87,836	79	Woods, Fair, HSG D
136,118	79	Weighted Average
136,118		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.2	100	0.0500	0.10		**Sheet Flow, SF 5-1** Woods: Light underbrush n= 0.400 P2= 2.70"
7.0	210	0.0100	0.50		**Shallow Concentrated Flow, SCF 5-1** Woodland Kv= 5.0 fps
2.4	100	0.0100	0.70		**Shallow Concentrated Flow, SCF 5-2** Short Grass Pasture Kv= 7.0 fps
8.4	340	0.0180	0.67		**Shallow Concentrated Flow, SCF 5-3** Woodland Kv= 5.0 fps
34.0	750	Total			

Subcatchment 5S: SA5



Summary for Subcatchment 6S: SA6

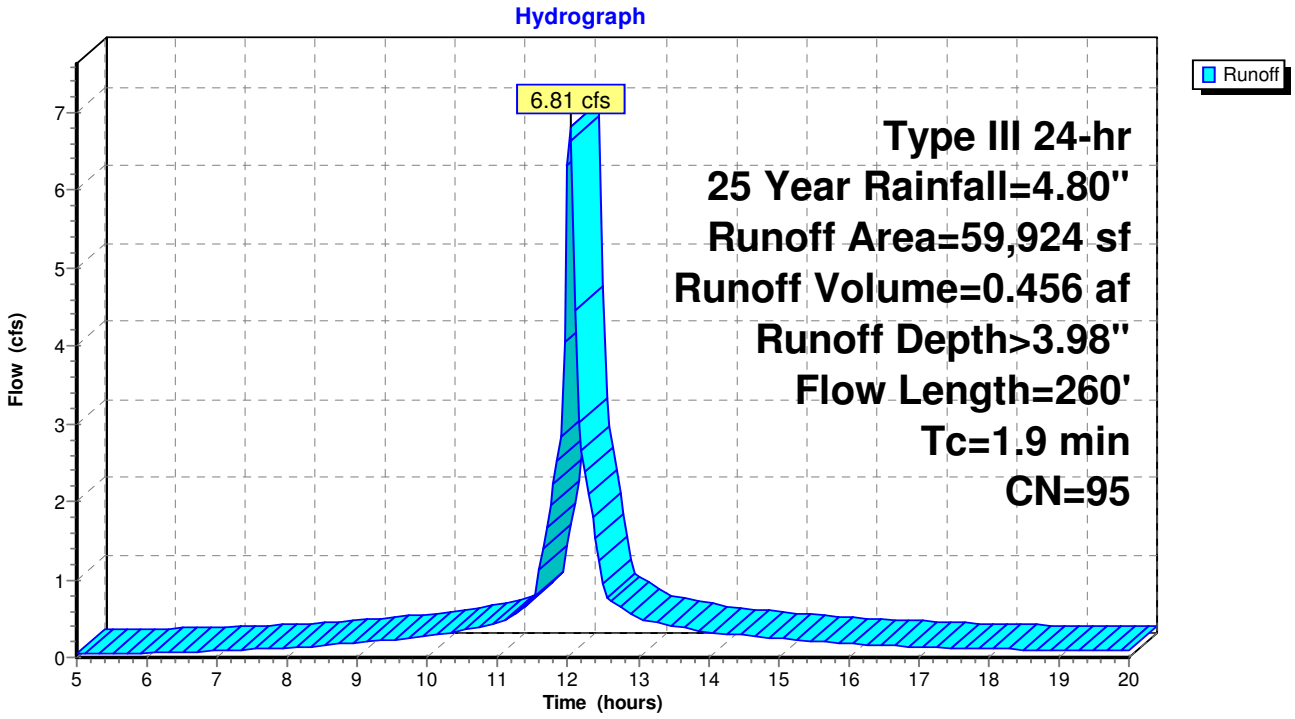
Runoff = 6.81 cfs @ 12.03 hrs, Volume= 0.456 af, Depth> 3.98"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year Rainfall=4.80"

Area (sf)	CN	Description
9,350	80	>75% Grass cover, Good, HSG D
50,574	98	Impervious, HSG D
59,924	95	Weighted Average
9,350		15.60% Pervious Area
50,574		84.40% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	90	0.0330	1.51		**Sheet Flow, SF 6-1** Smooth surfaces n= 0.011 P2= 2.70"
0.9	170	0.0240	3.14		**Shallow Concentrated Flow, SCF 6-1** Paved Kv= 20.3 fps
1.9	260	Total			

Subcatchment 6S: SA6



Summary for Subcatchment 7S: SA7

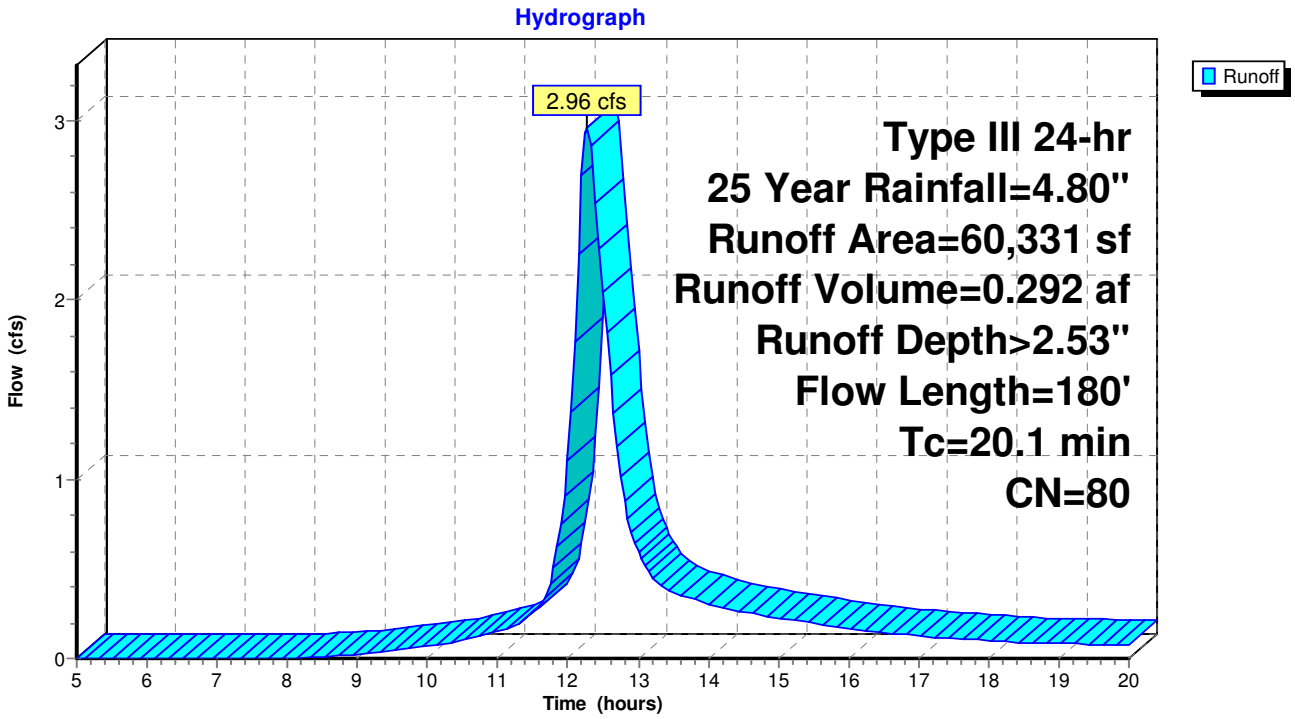
Runoff = 2.96 cfs @ 12.28 hrs, Volume= 0.292 af, Depth> 2.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year Rainfall=4.80"

	Area (sf)	CN	Description
*	3,031	98	Impervious, HSG D
	50,265	79	Woods, Fair, HSG D
	7,035	80	>75% Grass cover, Good, HSG D
	60,331	80	Weighted Average
	57,300		94.98% Pervious Area
	3,031		5.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	40	0.1000	0.17		**Sheet Flow, SF 7-1** Grass: Dense n= 0.240 P2= 2.70"
14.2	60	0.0250	0.07		**Sheet Flow, SF 7-2** Woods: Light underbrush n= 0.400 P2= 2.70"
2.0	80	0.0170	0.65		**Shallow Concentrated Flow, SCF 7-1** Woodland Kv= 5.0 fps
20.1	180	Total			

Subcatchment 7S: SA7



Summary for Subcatchment 8S: SA8

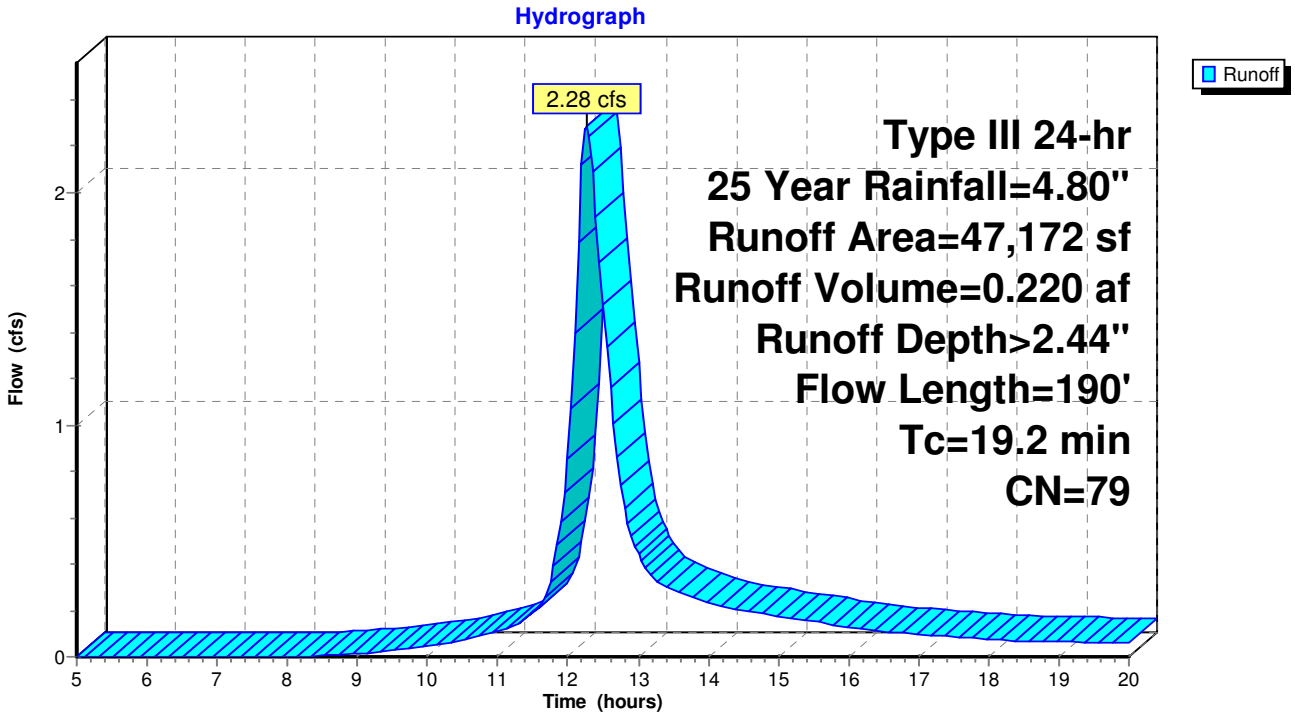
Runoff = 2.28 cfs @ 12.27 hrs, Volume= 0.220 af, Depth> 2.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year Rainfall=4.80"

Area (sf)	CN	Description
40,395	79	Woods, Fair, HSG D
6,777	80	>75% Grass cover, Good, HSG D
47,172	79	Weighted Average
47,172		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	40	0.1000	0.17		**Sheet Flow, SF 8-1** Grass: Dense n= 0.240 P2= 2.70"
13.2	60	0.0300	0.08		**Sheet Flow, SF 8-2** Woods: Light underbrush n= 0.400 P2= 2.70"
2.1	90	0.0200	0.71		**Shallow Concentrated Flow, SCF 8-1** Woodland Kv= 5.0 fps
19.2	190	Total			

Subcatchment 8S: SA8



Summary for Subcatchment 9S: SA 9

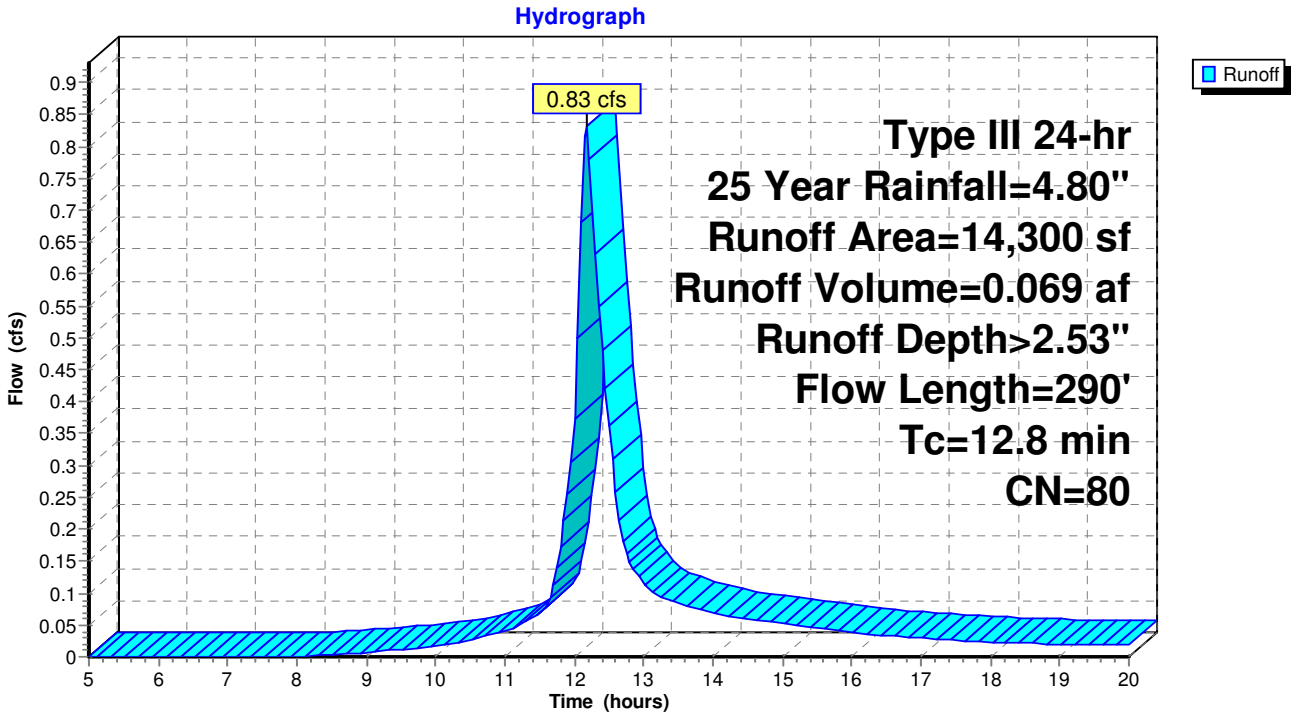
Runoff = 0.83 cfs @ 12.18 hrs, Volume= 0.069 af, Depth> 2.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year Rainfall=4.80"

Area (sf)	CN	Description
12,287	80	>75% Grass cover, Good, HSG D
2,013	79	Woods, Fair, HSG D
14,300	80	Weighted Average
14,300		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	100	0.0500	0.15		**Sheet Flow, SF 9-1** Grass: Dense n= 0.240 P2= 2.70"
1.6	160	0.0600	1.71		**Shallow Concentrated Flow, SCF 9-1** Short Grass Pasture Kv= 7.0 fps
0.4	30	0.0500	1.12		**Shallow Concentrated Flow, SCF 9-2** Woodland Kv= 5.0 fps
12.8	290	Total			

Subcatchment 9S: SA 9



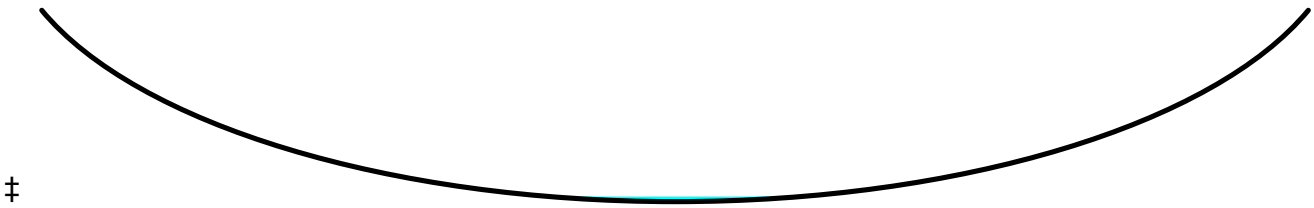
Summary for Reach 1aR: 1aR

Inflow	=	0.50 cfs @	12.21 hrs,	Volume=	0.003 af
Outflow	=	0.04 cfs @	13.15 hrs,	Volume=	0.003 af, Atten= 92%, Lag= 57.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.03 fps, Min. Travel Time= 48.6 min
Avg. Velocity = 0.02 fps, Avg. Travel Time= 82.7 min

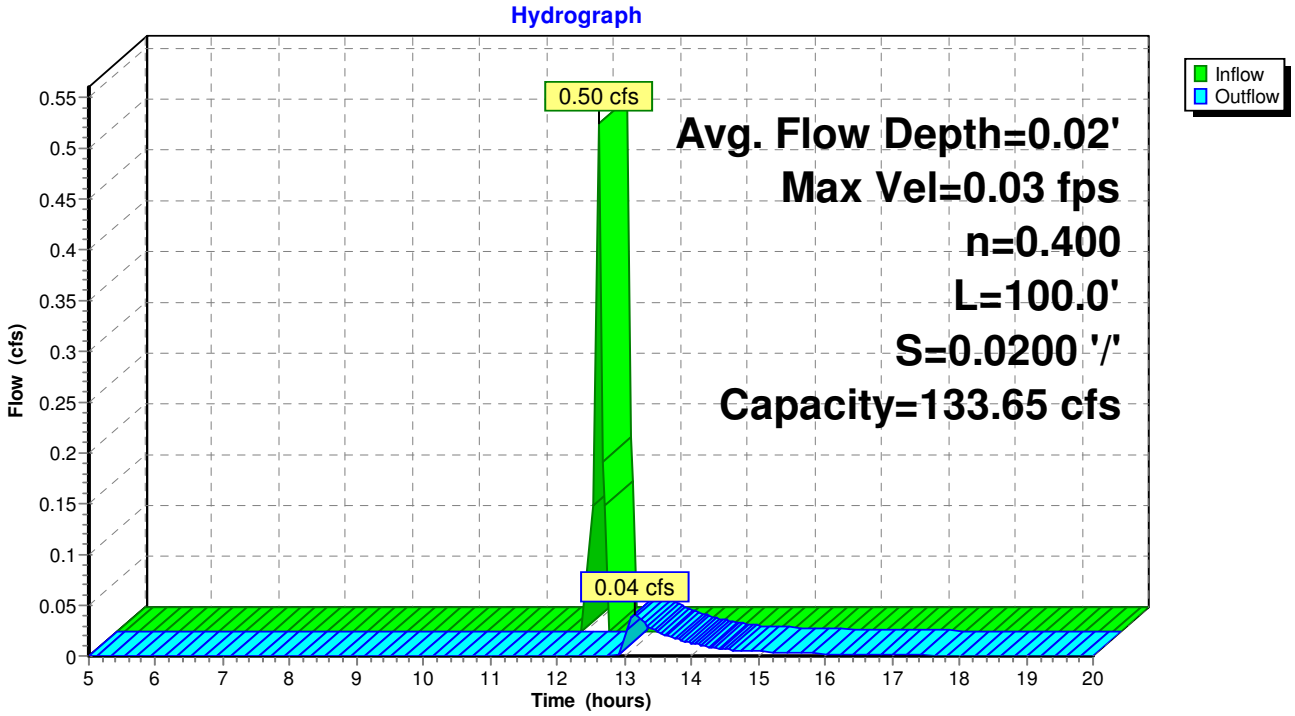
Peak Storage= 123 cf @ 12.34 hrs
Average Depth at Peak Storage= 0.02'
Bank-Full Depth= 1.00' Flow Area= 333.3 sf, Capacity= 133.65 cfs

500.00' x 1.00' deep Parabolic Channel, n= 0.400 Sheet flow: Woods+light brush
Length= 100.0' Slope= 0.0200 '/'
Inlet Invert= 0.00', Outlet Invert= -2.00'



‡

Reach 1aR: 1aR



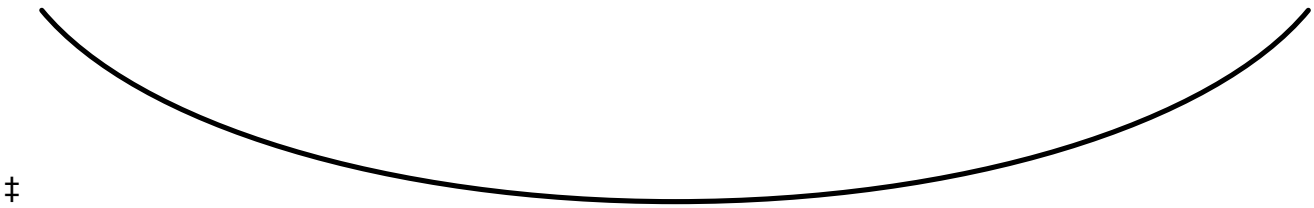
Summary for Reach 1bR: 1bR

Inflow	=	0.00 cfs @	5.00 hrs,	Volume=	0.000 af
Outflow	=	0.00 cfs @	5.00 hrs,	Volume=	0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 5.00 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 1.00' Flow Area= 333.3 sf, Capacity= 133.65 cfs

500.00' x 1.00' deep Parabolic Channel, n= 0.400 Sheet flow: Woods+light brush
Length= 100.0' Slope= 0.0200 '/'
Inlet Invert= 0.00', Outlet Invert= -2.00'



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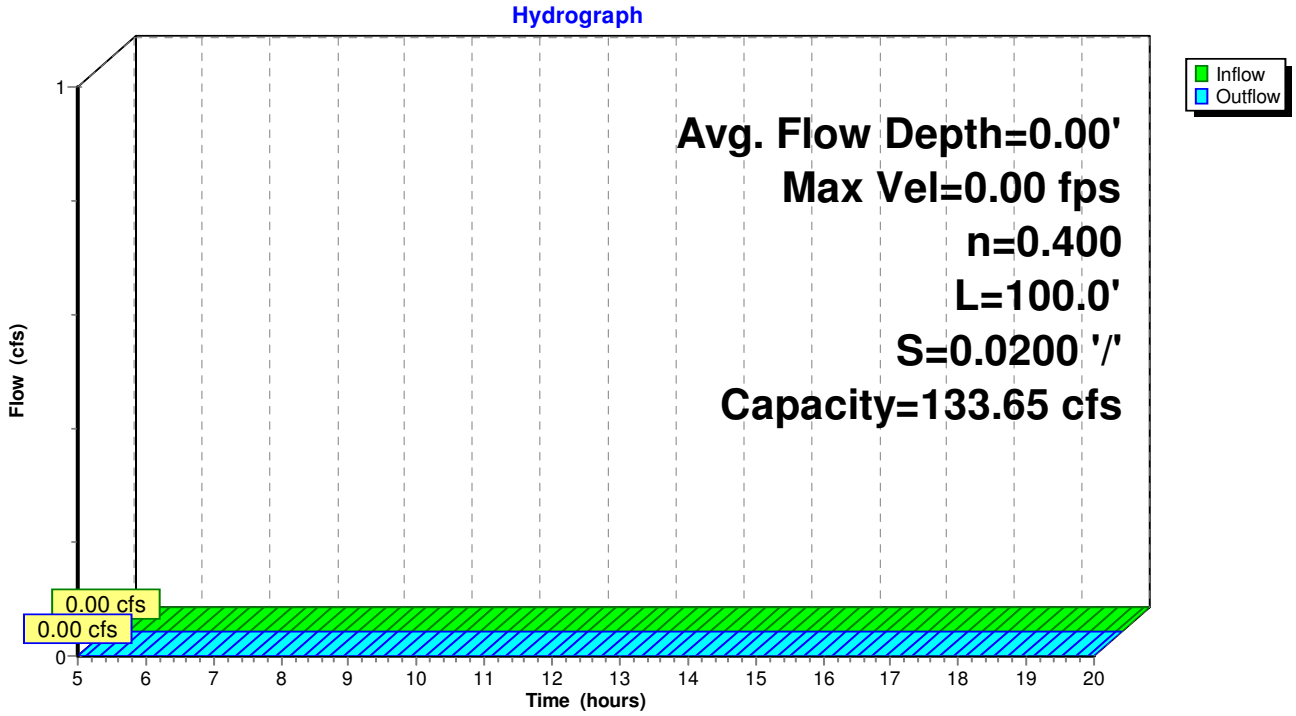
Reach 1bR: 1bR



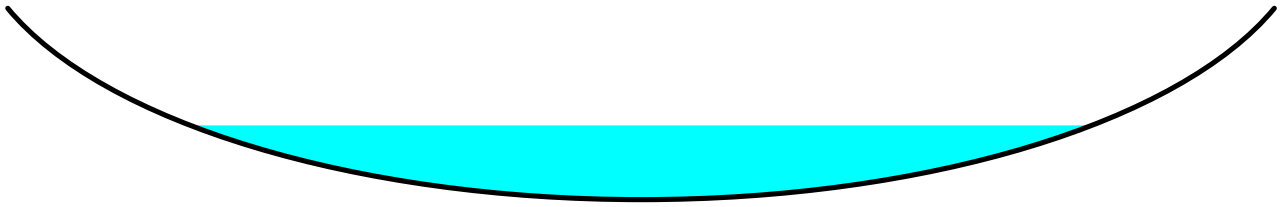
Summary for Reach 2R: 2R

Inflow Area = 2.405 ac, 53.65% Impervious, Inflow Depth > 2.56" for 25 Year event
Inflow = 5.12 cfs @ 12.35 hrs, Volume= 0.513 af
Outflow = 4.78 cfs @ 12.53 hrs, Volume= 0.508 af, Atten= 7%, Lag= 11.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.15 fps, Min. Travel Time= 5.6 min
Avg. Velocity = 0.06 fps, Avg. Travel Time= 14.4 min

Peak Storage= 1,596 cf @ 12.44 hrs
Average Depth at Peak Storage= 0.39'
Bank-Full Depth= 1.00' Flow Area= 133.3 sf, Capacity= 37.80 cfs

200.00' x 1.00' deep Parabolic Channel, n= 0.400 Sheet flow: Woods+light brush
Length= 50.0' Slope= 0.0100 '/'
Inlet Invert= 0.00', Outlet Invert= -0.50'



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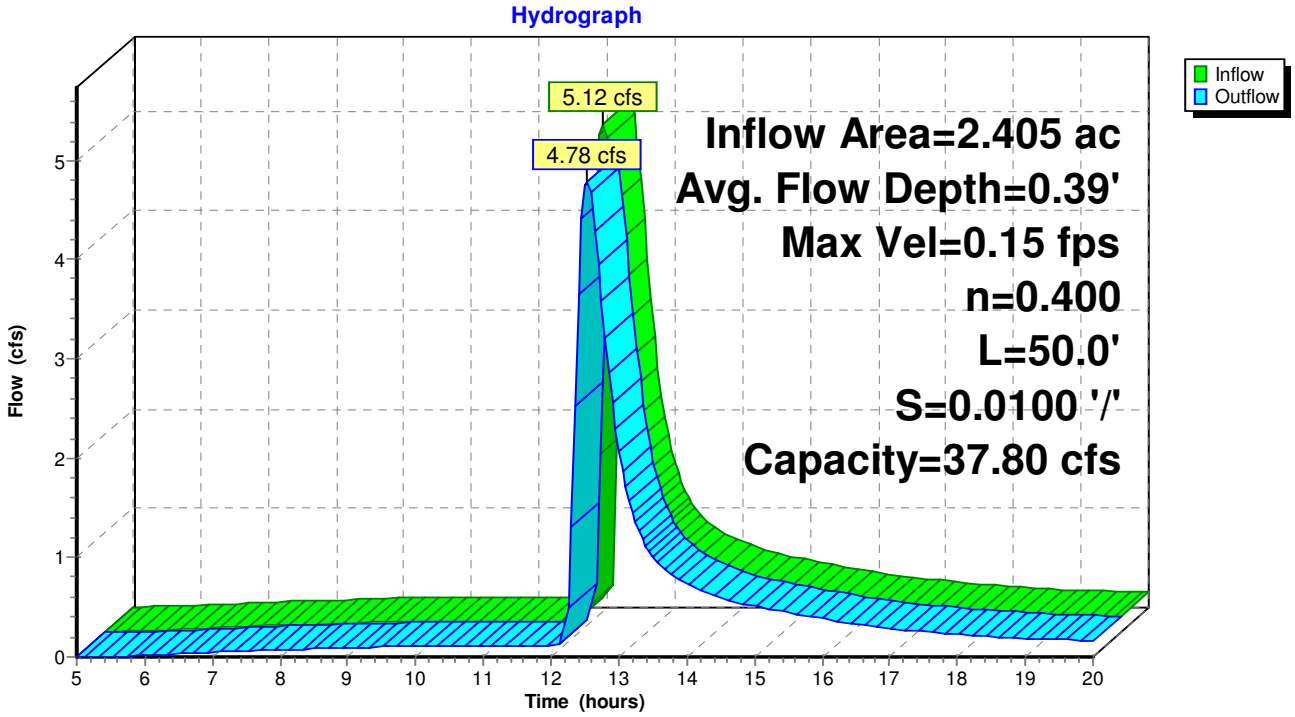
Reach 2R: 2R



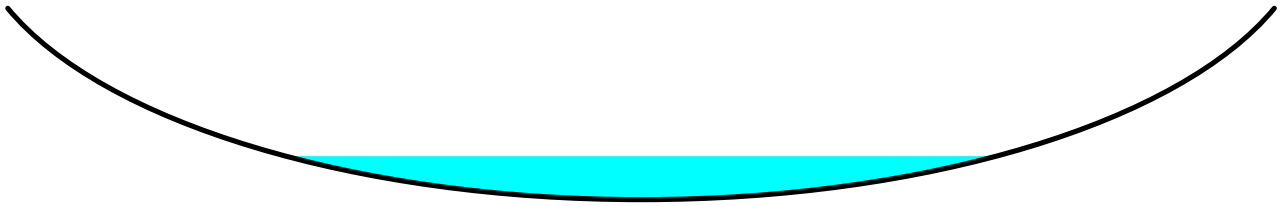
Summary for Reach 3R: 3R

Inflow Area = 3.359 ac, 67.93% Impervious, Inflow Depth > 2.36" for 25 Year event
Inflow = 1.55 cfs @ 12.62 hrs, Volume= 0.662 af
Outflow = 1.48 cfs @ 13.26 hrs, Volume= 0.634 af, Atten= 5%, Lag= 38.3 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.10 fps, Min. Travel Time= 15.9 min
Avg. Velocity = 0.07 fps, Avg. Travel Time= 25.3 min

Peak Storage= 1,417 cf @ 12.99 hrs
Average Depth at Peak Storage= 0.22'
Bank-Full Depth= 1.00' Flow Area= 133.3 sf, Capacity= 37.80 cfs

200.00' x 1.00' deep Parabolic Channel, n= 0.400 Sheet flow: Woods+light brush
Length= 100.0' Slope= 0.0100 '/'
Inlet Invert= 0.00', Outlet Invert= -1.00'



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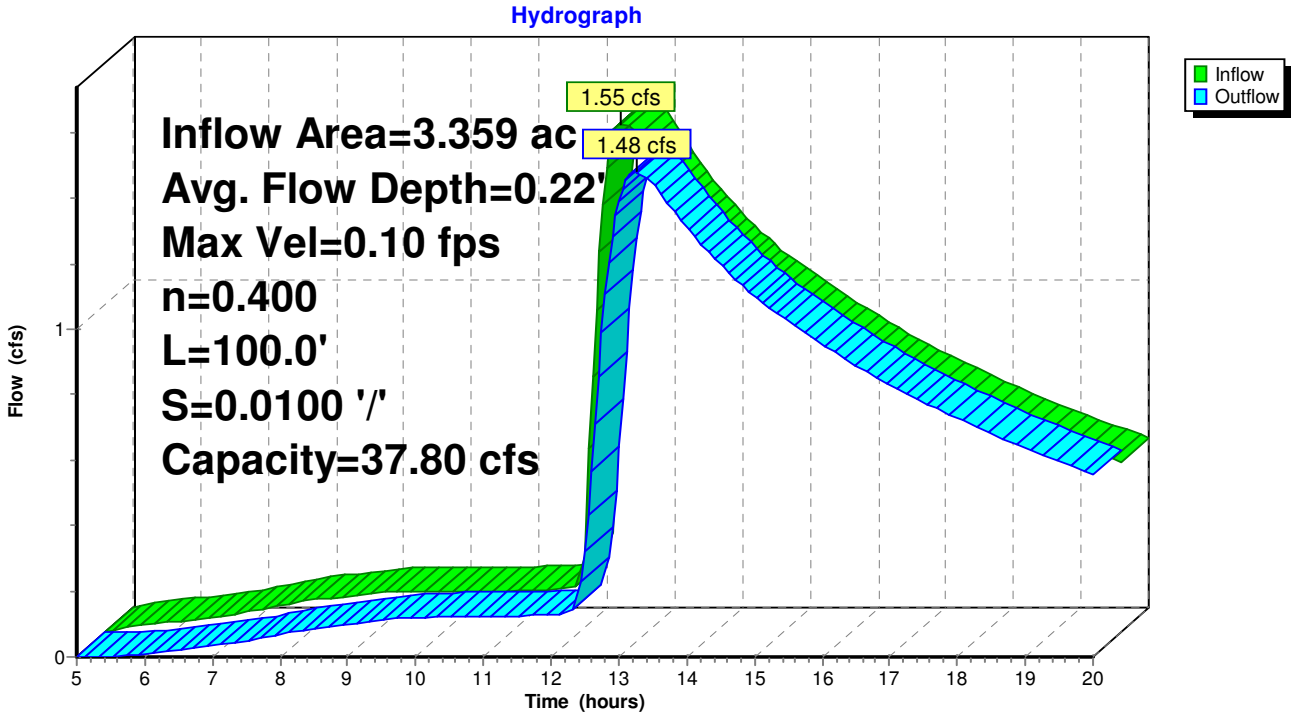
Reach 3R: 3R



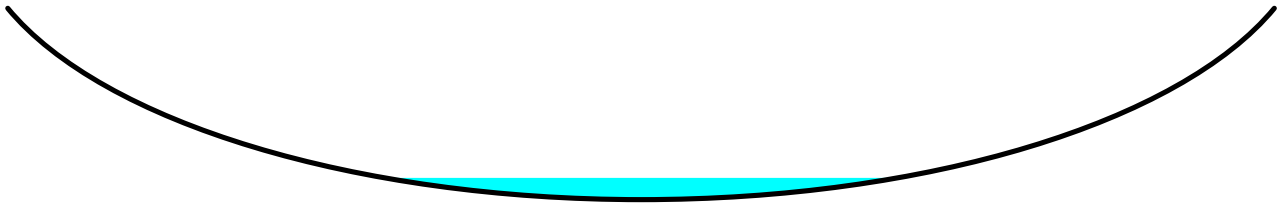
Summary for Reach 4R: 4R

Inflow Area = 1.376 ac, 84.40% Impervious, Inflow Depth > 1.59" for 25 Year event
Inflow = 0.32 cfs @ 14.04 hrs, Volume= 0.183 af
Outflow = 0.31 cfs @ 14.90 hrs, Volume= 0.172 af, Atten= 2%, Lag= 51.9 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.06 fps, Min. Travel Time= 25.7 min
Avg. Velocity = 0.05 fps, Avg. Travel Time= 34.4 min

Peak Storage= 484 cf @ 14.47 hrs
Average Depth at Peak Storage= 0.11'
Bank-Full Depth= 1.00' Flow Area= 133.3 sf, Capacity= 37.80 cfs

200.00' x 1.00' deep Parabolic Channel, n= 0.400 Sheet flow: Woods+light brush
Length= 100.0' Slope= 0.0100 '/'
Inlet Invert= 0.00', Outlet Invert= -1.00'



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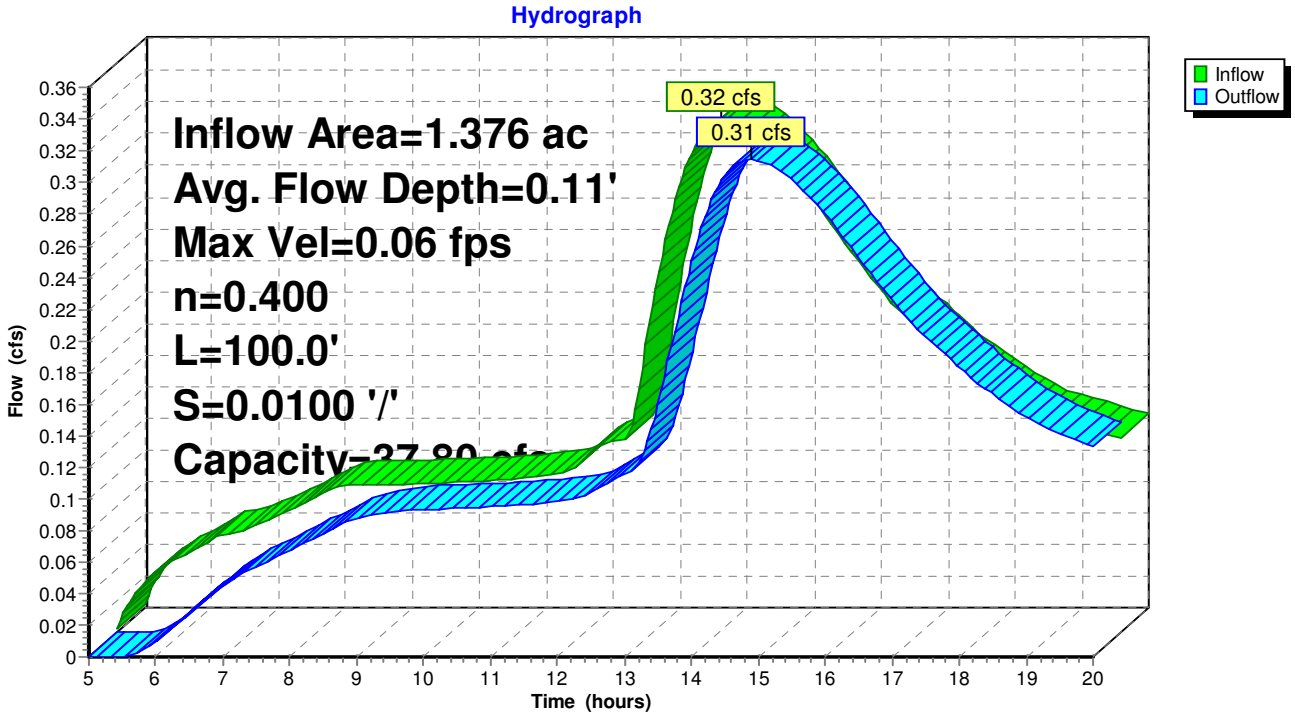
Reach 4R: 4R



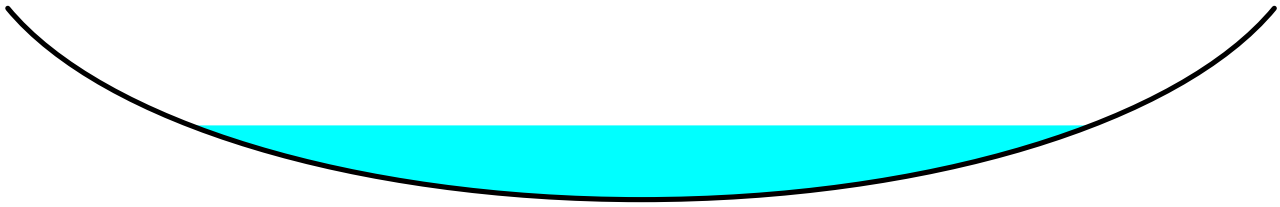
Summary for Reach 5R: 5R

Inflow Area = 9.246 ac, 0.00% Impervious, Inflow Depth > 2.42" for 25 Year event
Inflow = 10.69 cfs @ 12.85 hrs, Volume= 1.865 af
Outflow = 10.67 cfs @ 12.99 hrs, Volume= 1.852 af, Atten= 0%, Lag= 8.4 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.34 fps, Min. Travel Time= 5.0 min
Avg. Velocity = 0.16 fps, Avg. Travel Time= 10.1 min

Peak Storage= 3,182 cf @ 12.90 hrs
Average Depth at Peak Storage= 0.38'
Bank-Full Depth= 1.00' Flow Area= 133.3 sf, Capacity= 84.52 cfs

200.00' x 1.00' deep Parabolic Channel, n= 0.400 Sheet flow: Woods+light brush
Length= 100.0' Slope= 0.0500 '/'
Inlet Invert= 0.00', Outlet Invert= -5.00'



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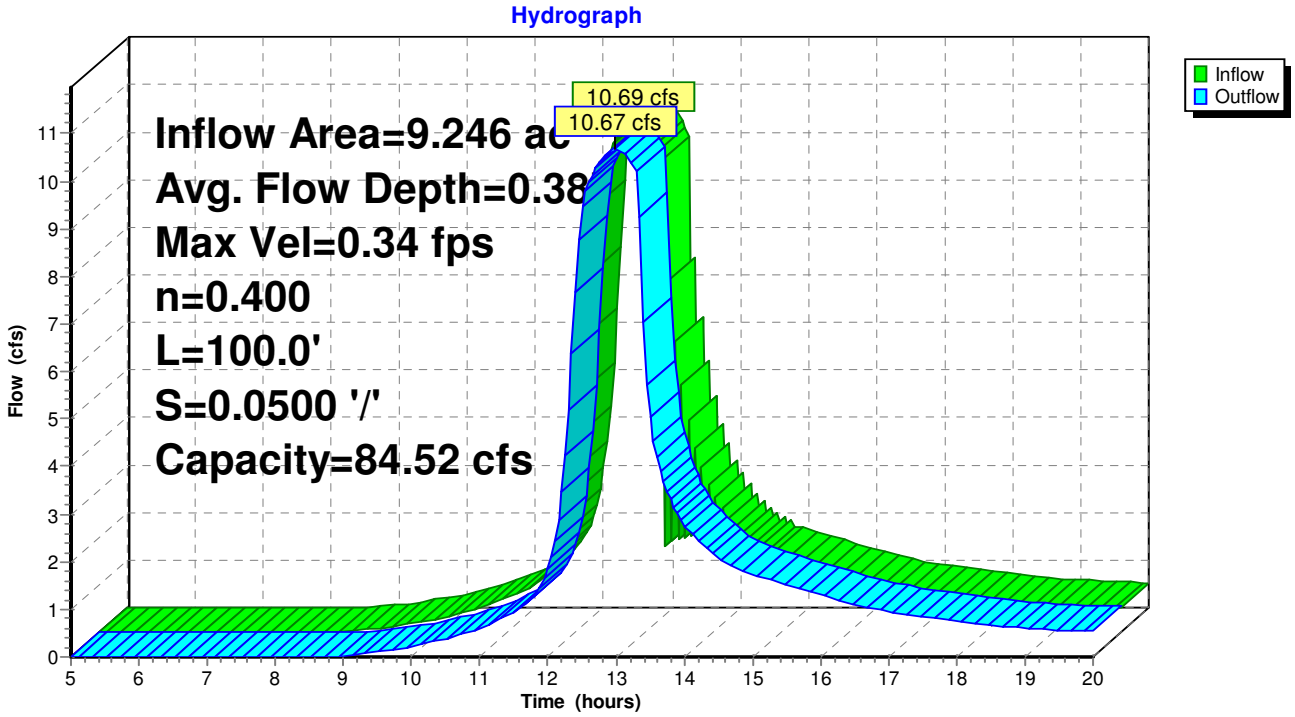
Reach 5R: 5R



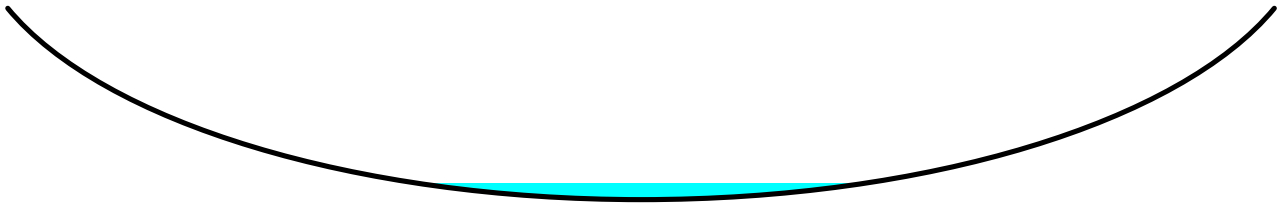
Summary for Reach 6R: 6R

Inflow Area = 1.693 ac, 70.78% Impervious, Inflow Depth > 2.96" for 25 Year event
Inflow = 0.71 cfs @ 12.85 hrs, Volume= 0.417 af
Outflow = 0.71 cfs @ 12.87 hrs, Volume= 0.416 af, Atten= 0%, Lag= 1.3 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.49 fps, Min. Travel Time= 0.8 min
Avg. Velocity = 1.03 fps, Avg. Travel Time= 1.1 min

Peak Storage= 33 cf @ 12.86 hrs
Average Depth at Peak Storage= 0.08'
Bank-Full Depth= 1.00' Flow Area= 20.0 sf, Capacity= 156.46 cfs

30.00' x 1.00' deep Parabolic Channel, n= 0.030 Short grass
Length= 70.0' Slope= 0.0430 '/'
Inlet Invert= 0.00', Outlet Invert= -3.01'



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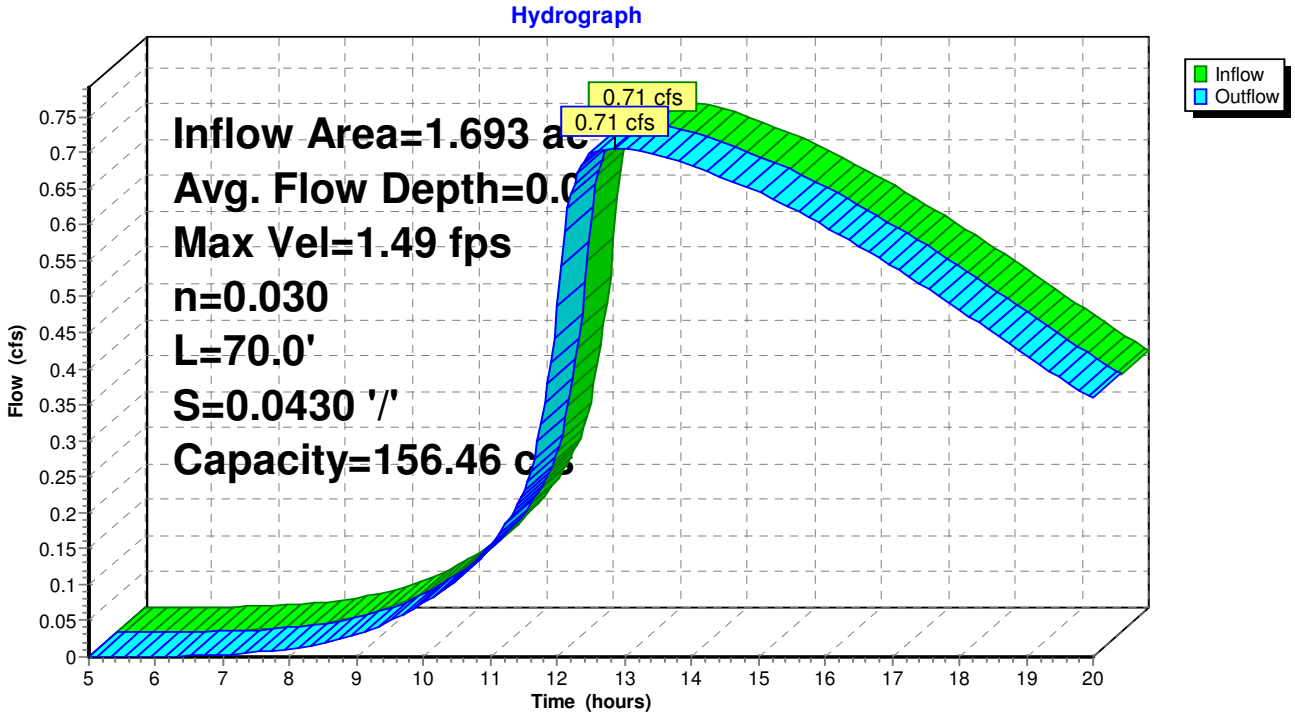
Reach 6R: 6R

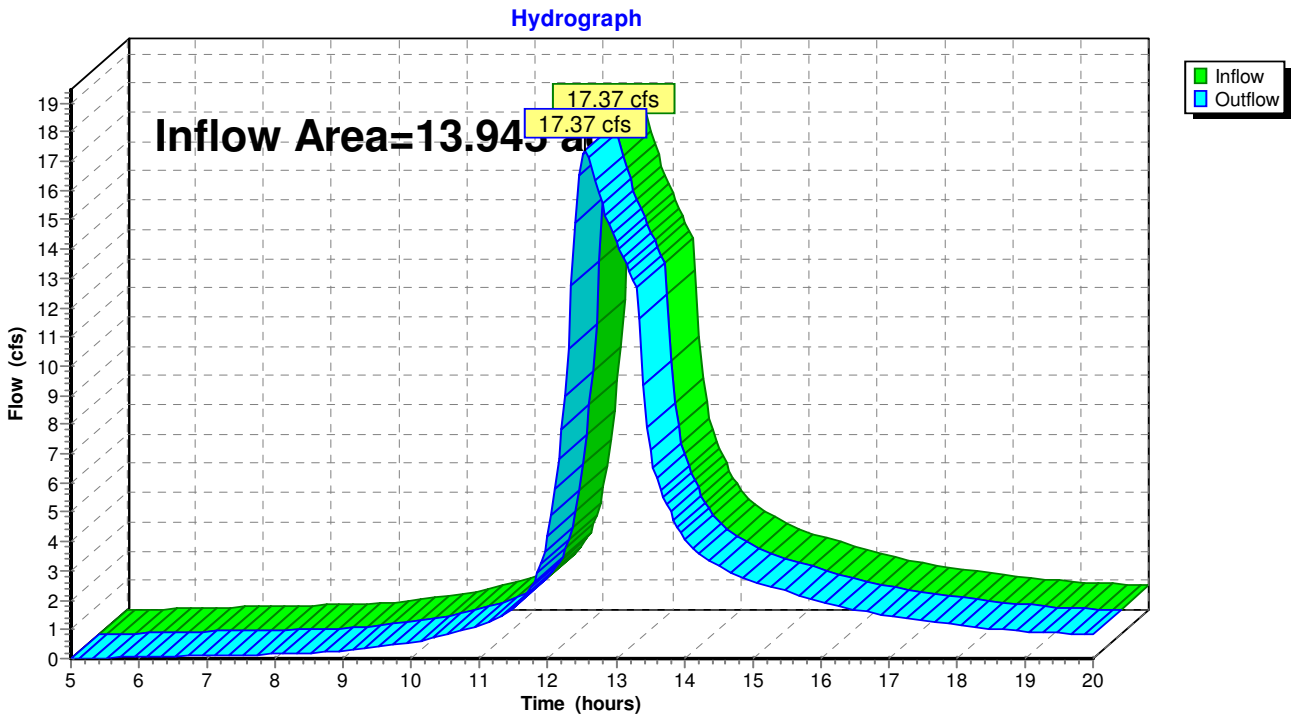


Summary for Reach SP1: SP1

Inflow Area = 13.945 ac, 15.32% Impervious, Inflow Depth > 2.54" for 25 Year event
Inflow = 17.37 cfs @ 12.54 hrs, Volume= 2.954 af
Outflow = 17.37 cfs @ 12.54 hrs, Volume= 2.954 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 SP1: SP1

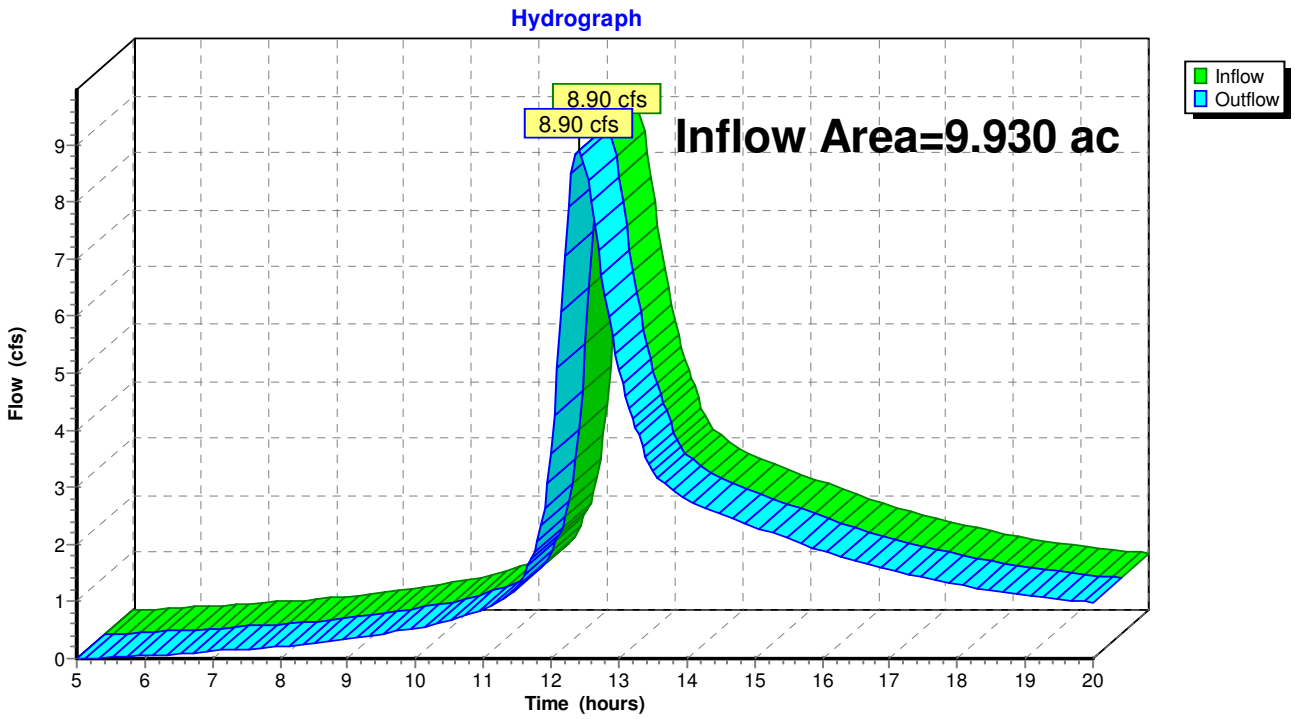


Summary for Reach SP2: SP2

Inflow Area = 9.930 ac, 41.99% Impervious, Inflow Depth > 2.38" for 25 Year event
Inflow = 8.90 cfs @ 12.40 hrs, Volume= 1.966 af
Outflow = 8.90 cfs @ 12.40 hrs, Volume= 1.966 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 SP2: SP2



Summary for Pond 1P: 1P

Inflow Area = 3.359 ac, 67.93% Impervious, Inflow Depth > 3.31" for 25 Year event
Inflow = 8.38 cfs @ 12.03 hrs, Volume= 0.928 af
Outflow = 1.55 cfs @ 12.62 hrs, Volume= 0.662 af, Atten= 81%, Lag= 35.6 min
Primary = 1.55 cfs @ 12.62 hrs, Volume= 0.662 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 143.38' @ 12.62 hrs Surf.Area= 10,688 sf Storage= 13,983 cf

Plug-Flow detention time= 157.6 min calculated for 0.660 af (71% of inflow)
Center-of-Mass det. time= 71.3 min (894.7 - 823.3)

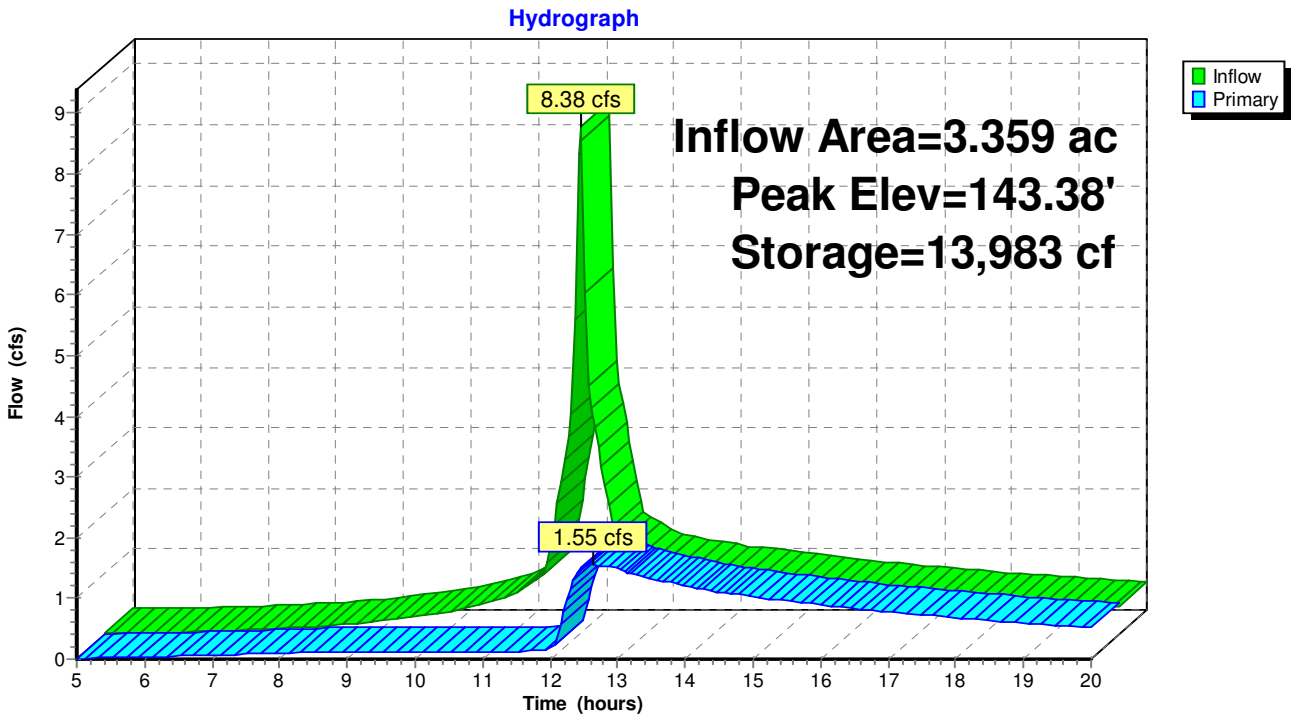
Volume	Invert	Avail.Storage	Storage Description
#1	141.95'	20,937 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
141.95	5,925	0	0
142.00	8,752	367	367
143.00	10,374	9,563	9,930
143.50	10,782	5,289	15,219
144.00	12,092	5,719	20,937

Device	Routing	Invert	Outlet Devices
#1	Primary	139.00'	**12.0" Round Culvert** L= 200.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 139.00' / 137.00' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	141.95'	**0.598 in/hr Exfiltration over Surface area**
#3	Device 1	143.00'	**22.0" W x 5.0" H Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=1.55 cfs @ 12.62 hrs HW=143.38' (Free Discharge)
└─**1=Culvert** (Passes 1.55 cfs of 5.35 cfs potential flow)
  ├─**2=Exfiltration** (Exfiltration Controls 0.15 cfs)
  └─**3=Orifice/Grate** (Orifice Controls 1.40 cfs @ 1.99 fps)

Pond 1P: 1P


Hydrograph
Inflow
Primary
8.38 cfs
1.55 cfs
Inflow Area=3.359 ac
Peak Elev=143.38'
Storage=13,983 cf
Flow (cfs)
Time (hours)
0
1
2
3
4
5
6
7
8
9
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20

Summary for Pond 2P: 2P

Inflow Area = 1.376 ac, 84.40% Impervious, Inflow Depth > 3.98" for 25 Year event
Inflow = 6.81 cfs @ 12.03 hrs, Volume= 0.456 af
Outflow = 0.32 cfs @ 14.04 hrs, Volume= 0.183 af, Atten= 95%, Lag= 120.4 min
Primary = 0.32 cfs @ 14.04 hrs, Volume= 0.183 af
Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 139.11' @ 14.04 hrs Surf.Area= 8,936 sf Storage= 12,896 cf

Plug-Flow detention time= 206.1 min calculated for 0.182 af (40% of inflow)
Center-of-Mass det. time= 97.9 min (840.4 - 742.4)

Volume	Invert	Avail.Storage	Storage Description
#1	137.45'	17,331 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

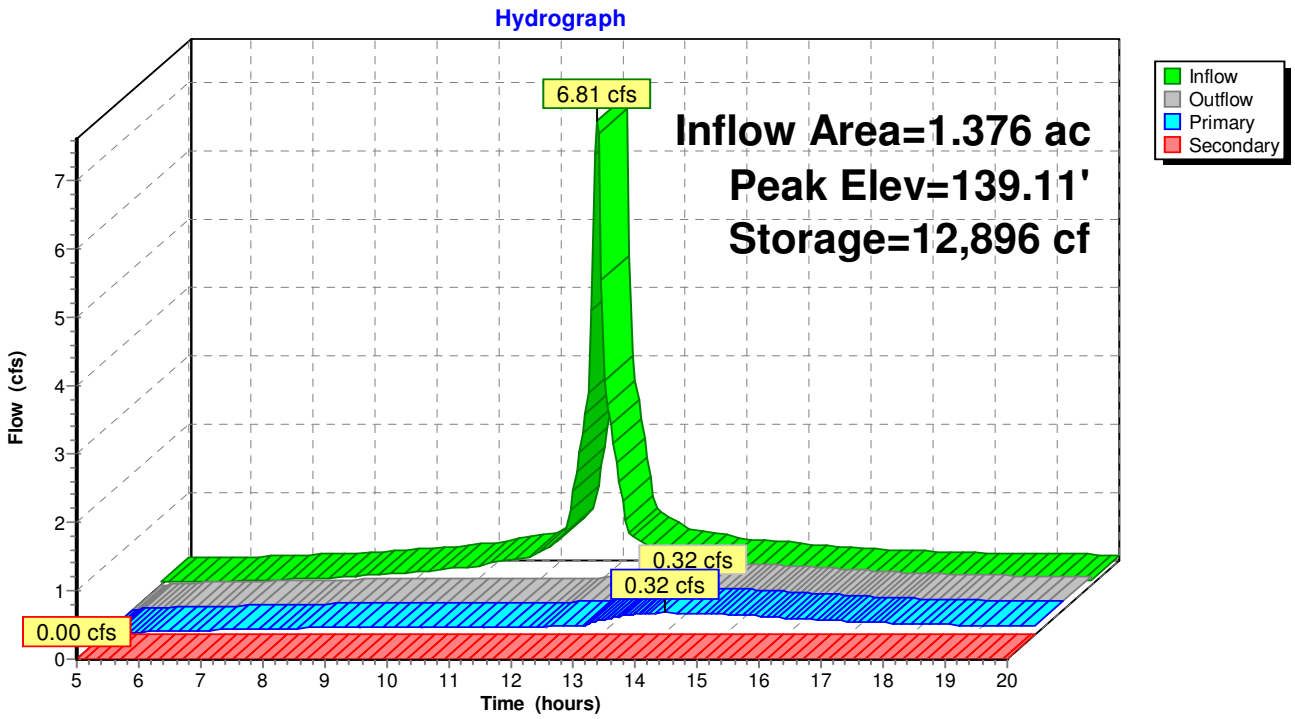
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
137.45	2,716	0	0
137.50	6,701	235	235
138.00	7,413	3,529	3,764
139.00	8,876	8,145	11,908
139.60	9,200	5,423	17,331

Device	Routing	Invert	Outlet Devices
#1	Primary	134.50'	**12.0" Round Culvert** L= 100.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 134.50' / 133.50' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	137.45'	**0.598 in/hr Exfiltration over Surface area**
#3	Device 1	139.00'	**20.0" W x 4.0" H Vert. Orifice/Grate** C= 0.600
#4	Secondary	139.50'	**15.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.32 cfs @ 14.04 hrs HW=139.11' (Free Discharge)
└─**1=Culvert** (Passes 0.32 cfs of 6.50 cfs potential flow)
  ├─**2=Exfiltration** (Exfiltration Controls 0.12 cfs)
  └─**3=Orifice/Grate** (Orifice Controls 0.20 cfs @ 1.07 fps)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=137.45' (Free Discharge)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 2P: 2P


Hydrograph
6.81 cfs
Inflow Area=1.376 ac
Peak Elev=139.11'
Storage=12,896 cf
0.32 cfs
0.32 cfs
0.00 cfs
Inflow
Outflow
Primary
Secondary
Flow (cfs)
Time (hours)
0
1
2
3
4
5
6
7
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20

Summary for Pond 3P: 3P

Inflow Area = 2.405 ac, 53.65% Impervious, Inflow Depth > 3.47" for 25 Year event
Inflow = 8.12 cfs @ 12.17 hrs, Volume= 0.696 af
Outflow = 5.12 cfs @ 12.35 hrs, Volume= 0.513 af, Atten= 37%, Lag= 10.7 min
Primary = 5.12 cfs @ 12.35 hrs, Volume= 0.513 af
Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 139.42' @ 12.35 hrs Surf.Area= 8,884 sf Storage= 11,427 cf

Plug-Flow detention time= 105.1 min calculated for 0.511 af (73% of inflow)
Center-of-Mass det. time= 44.3 min (811.5 - 767.1)

Volume	Invert	Avail.Storage	Storage Description
#1	137.95'	12,139 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

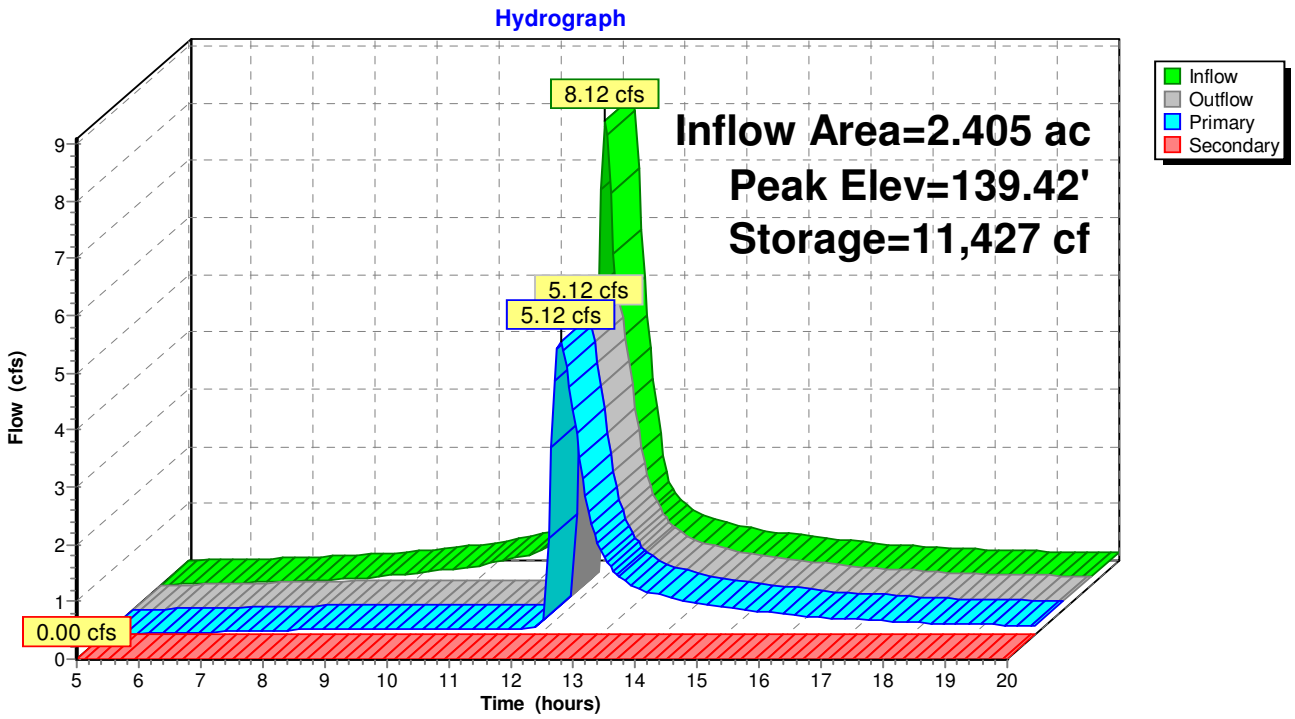
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
137.95	3,791	0	0
138.00	7,013	270	270
139.00	8,142	7,578	7,848
139.50	9,024	4,292	12,139

Device	Routing	Invert	Outlet Devices
#1	Primary	135.00'	**12.0" Round Culvert** L= 100.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 135.00' / 134.00' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	137.95'	**0.598 in/hr Exfiltration over Surface area**
#3	Device 1	139.00'	**21.4" Horiz. Orifice/Grate-NFCO R-4342 Beehive Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	139.45'	**15.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=5.11 cfs @ 12.35 hrs HW=139.42' (Free Discharge)
└─**1=Culvert** (Passes 5.11 cfs of 6.36 cfs potential flow)
  ├─**2=Exfiltration** (Exfiltration Controls 0.12 cfs)
  └─**3=Orifice/Grate-NFCO R-4342 Beehive Grate** (Weir Controls 4.99 cfs @ 2.12 fps)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=137.95' (Free Discharge)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 3P: 3P


Hydrograph
8.12 cfs
5.12 cfs
5.12 cfs
0.00 cfs
Inflow Area=2.405 ac
Peak Elev=139.42'
Storage=11,427 cf
Inflow
Outflow
Primary
Secondary
Flow (cfs)
Time (hours)
0
1
2
3
4
5
6
7
8
9
5
6
7
8
9
10
11
12
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14
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16
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20

Summary for Pond 4aP: RD

Inflow Area = 0.882 ac, 95.86% Impervious, Inflow Depth > 4.16" for 25 Year event
Inflow = 4.66 cfs @ 12.01 hrs, Volume= 0.306 af
Outflow = 1.73 cfs @ 12.21 hrs, Volume= 0.304 af, Atten= 63%, Lag= 11.9 min
Primary = 1.23 cfs @ 12.20 hrs, Volume= 0.300 af
Secondary = 0.50 cfs @ 12.21 hrs, Volume= 0.003 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 144.00' @ 12.20 hrs Surf.Area= 1,557 sf Storage= 3,114 cf

Plug-Flow detention time= 24.5 min calculated for 0.303 af (99% of inflow)
Center-of-Mass det. time= 21.2 min (755.9 - 734.6)

Volume	Invert	Avail.Storage	Storage Description
#1	139.00'	3,114 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 7,785 cf Overall x 40.0% Voids

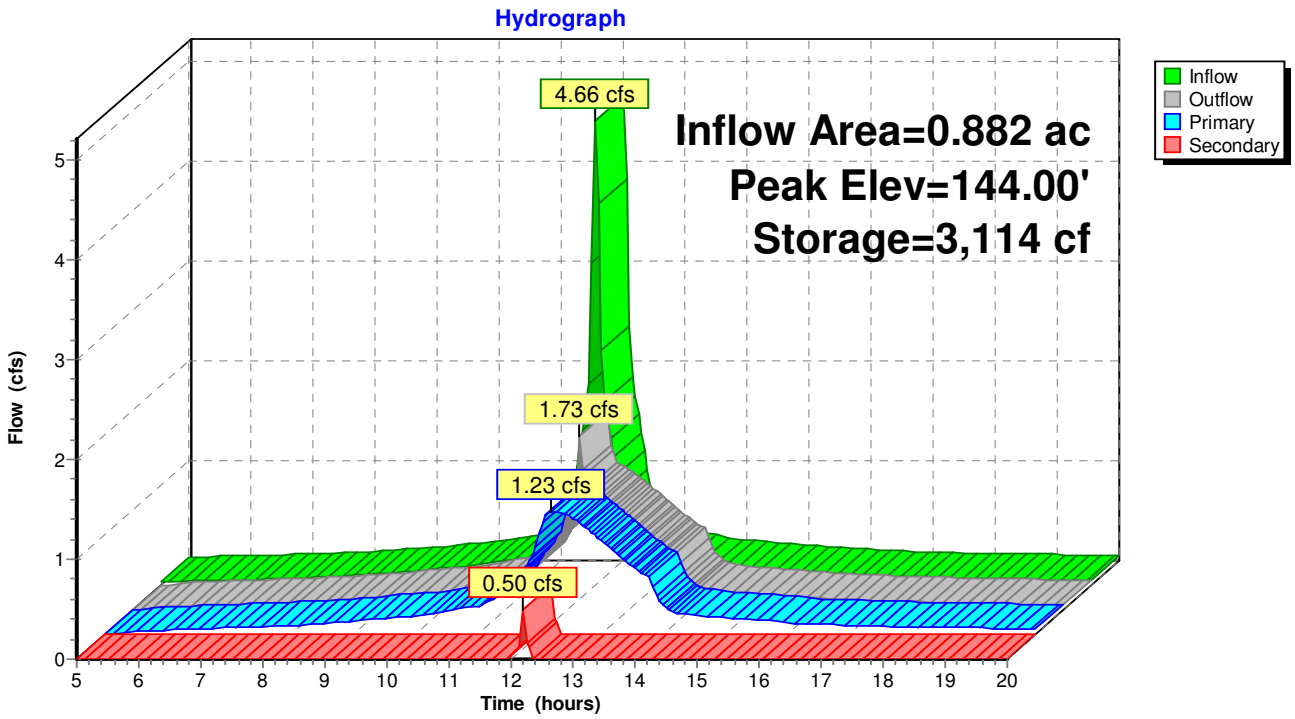
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
139.00	1,557	0	0
140.00	1,557	1,557	1,557
141.00	1,557	1,557	3,114
142.00	1,557	1,557	4,671
143.00	1,557	1,557	6,228
144.00	1,557	1,557	7,785

Device	Routing	Invert	Outlet Devices
#1	Primary	139.00'	**6.0" Round Culvert** L= 100.0' RCP, rounded edge headwall, Ke= 0.100 Inlet / Outlet Invert= 139.00' / 138.00' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 0.20 sf
#2	Secondary	144.00'	**503.0' long x 5.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.35 2.51 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.69 2.73 2.77 2.86

Primary OutFlow Max=1.23 cfs @ 12.20 hrs HW=144.00' (Free Discharge)
└**1=Culvert** (Barrel Controls 1.23 cfs @ 6.27 fps)

Secondary OutFlow Max=0.09 cfs @ 12.21 hrs HW=144.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Weir Controls 0.09 cfs @ 0.10 fps)

Pond 4aP: RD


Hydrograph
4.66 cfs
1.73 cfs
1.23 cfs
0.50 cfs
Inflow Area=0.882 ac
Peak Elev=144.00'
Storage=3,114 cf
Inflow
Outflow
Primary
Secondary
Flow (cfs)
Time (hours)
0
1
2
3
4
5
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20

Summary for Pond 4bP: RD

Inflow Area = 0.685 ac, 95.86% Impervious, Inflow Depth > 4.16" for 25 Year event
Inflow = 3.62 cfs @ 12.01 hrs, Volume= 0.237 af
Outflow = 1.16 cfs @ 12.24 hrs, Volume= 0.236 af, Atten= 68%, Lag= 14.2 min
Primary = 1.16 cfs @ 12.24 hrs, Volume= 0.236 af
Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 143.39' @ 12.24 hrs Surf.Area= 1,210 sf Storage= 2,123 cf

Plug-Flow detention time= 18.7 min calculated for 0.235 af (99% of inflow)
Center-of-Mass det. time= 15.8 min (750.4 - 734.6)

Volume	Invert	Avail.Storage	Storage Description
#1	139.00'	2,420 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 6,050 cf Overall x 40.0% Voids

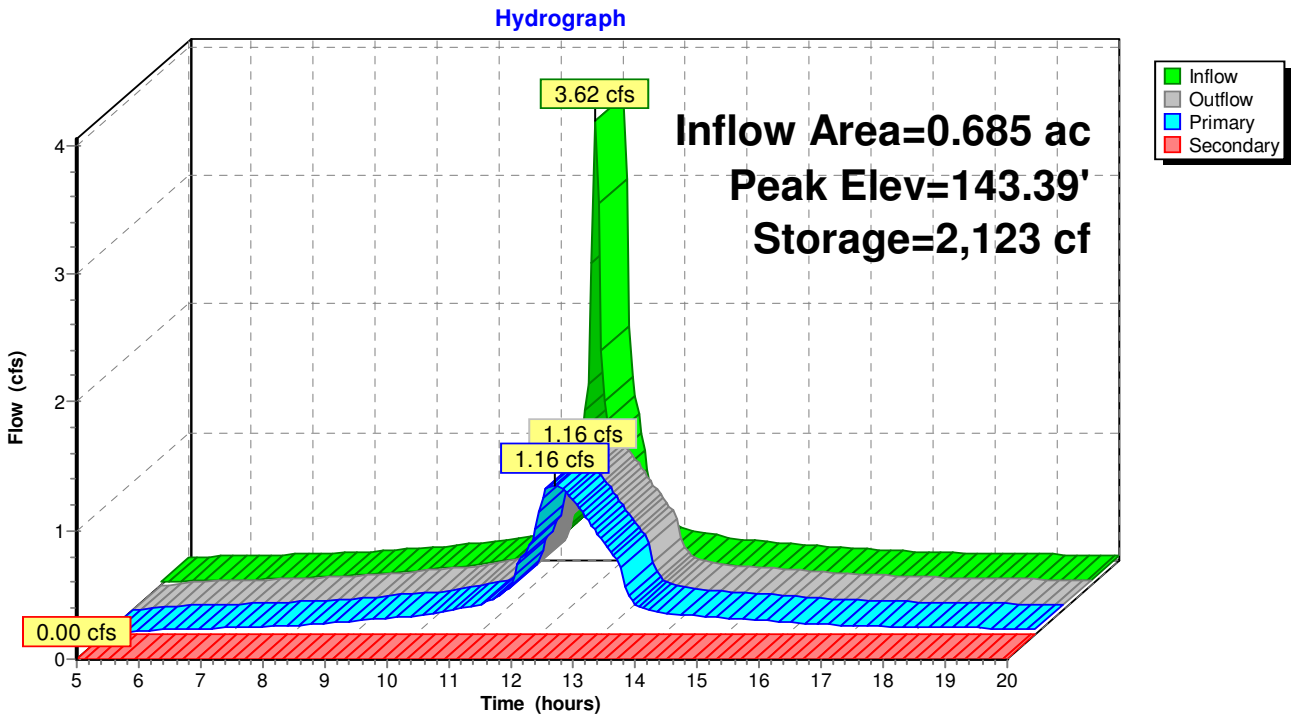
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
139.00	1,210	0	0
140.00	1,210	1,210	1,210
141.00	1,210	1,210	2,420
142.00	1,210	1,210	3,630
143.00	1,210	1,210	4,840
144.00	1,210	1,210	6,050

Device	Routing	Invert	Outlet Devices
#1	Primary	139.00'	**6.0" Round Culvert** L= 100.0' RCP, rounded edge headwall, Ke= 0.100 Inlet / Outlet Invert= 139.00' / 138.00' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 0.20 sf
#2	Secondary	144.00'	**503.0' long x 5.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.35 2.51 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.69 2.73 2.77 2.86

Primary OutFlow Max=1.16 cfs @ 12.24 hrs HW=143.38' (Free Discharge)
└**1=Culvert** (Barrel Controls 1.16 cfs @ 5.91 fps)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=139.01' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 4bP: RD


Hydrograph
3.62 cfs
Inflow Area=0.685 ac
Peak Elev=143.39'
Storage=2,123 cf
1.16 cfs
1.16 cfs
0.00 cfs
Inflow
Outflow
Primary
Secondary
Flow (cfs)
Time (hours)
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20

Summary for Pond 6P: 6P

Inflow Area =	9.246 ac,	0.00% Impervious,	Inflow Depth >	2.42"	for 25 Year event
Inflow =	13.69 cfs @	12.58 hrs,	Volume=	1.865 af	
Outflow =	10.69 cfs @	12.85 hrs,	Volume=	1.865 af,	Atten= 22%, Lag= 15.8 min
Primary =	10.69 cfs @	12.85 hrs,	Volume=	1.865 af	

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 144.88' @ 12.85 hrs Surf.Area= 5,349 sf Storage= 4,099 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 1.7 min (820.6 - 818.9)

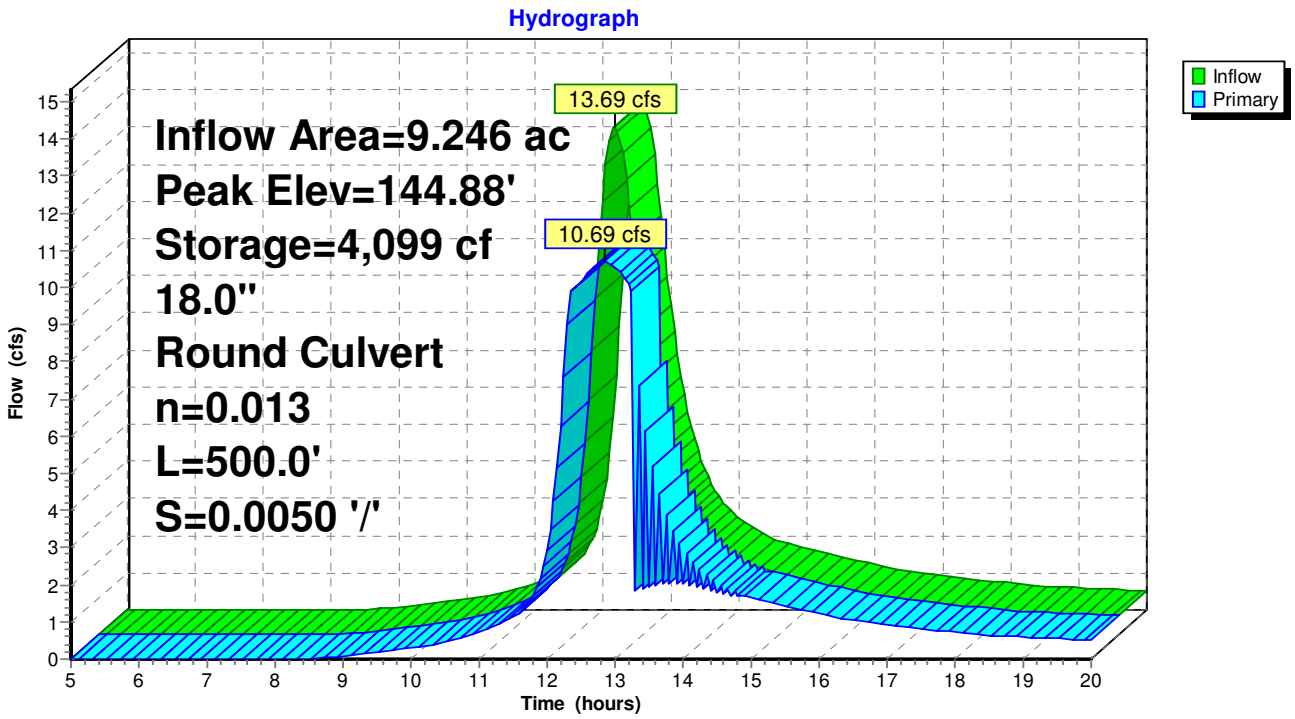
Volume	Invert	Avail.Storage	Storage Description
#1	144.00'	7,720 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
144.00	3,972	0	0
145.50	6,321	7,720	7,720

Device	Routing	Invert	Outlet Devices
#1	Primary	140.00'	**18.0" Round Culvert** L= 500.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 140.00' / 137.50' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf

Primary OutFlow Max=10.69 cfs @ 12.85 hrs HW=144.88' (Free Discharge)
└**1=Culvert** (Barrel Controls 10.69 cfs @ 6.05 fps)

Pond 6P: 6P


Hydrograph
Inflow
Primary
13.69 cfs
10.69 cfs
Inflow Area=9.246 ac
Peak Elev=144.88'
Storage=4,099 cf
18.0"
Round Culvert
n=0.013
L=500.0'
S=0.0050 '/'
Flow (cfs)
Time (hours)

Summary for Pond TP: Tank Pond

Inflow Area = 1.693 ac, 70.78% Impervious, Inflow Depth > 3.78" for 25 Year event
Inflow = 8.16 cfs @ 12.02 hrs, Volume= 0.534 af
Outflow = 0.71 cfs @ 12.85 hrs, Volume= 0.417 af, Atten= 91%, Lag= 49.5 min
Primary = 0.71 cfs @ 12.85 hrs, Volume= 0.417 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 145.14' @ 12.85 hrs Surf.Area= 12,867 sf Storage= 13,175 cf

Plug-Flow detention time= 217.8 min calculated for 0.417 af (78% of inflow)
Center-of-Mass det. time= 160.9 min (909.7 - 748.8)

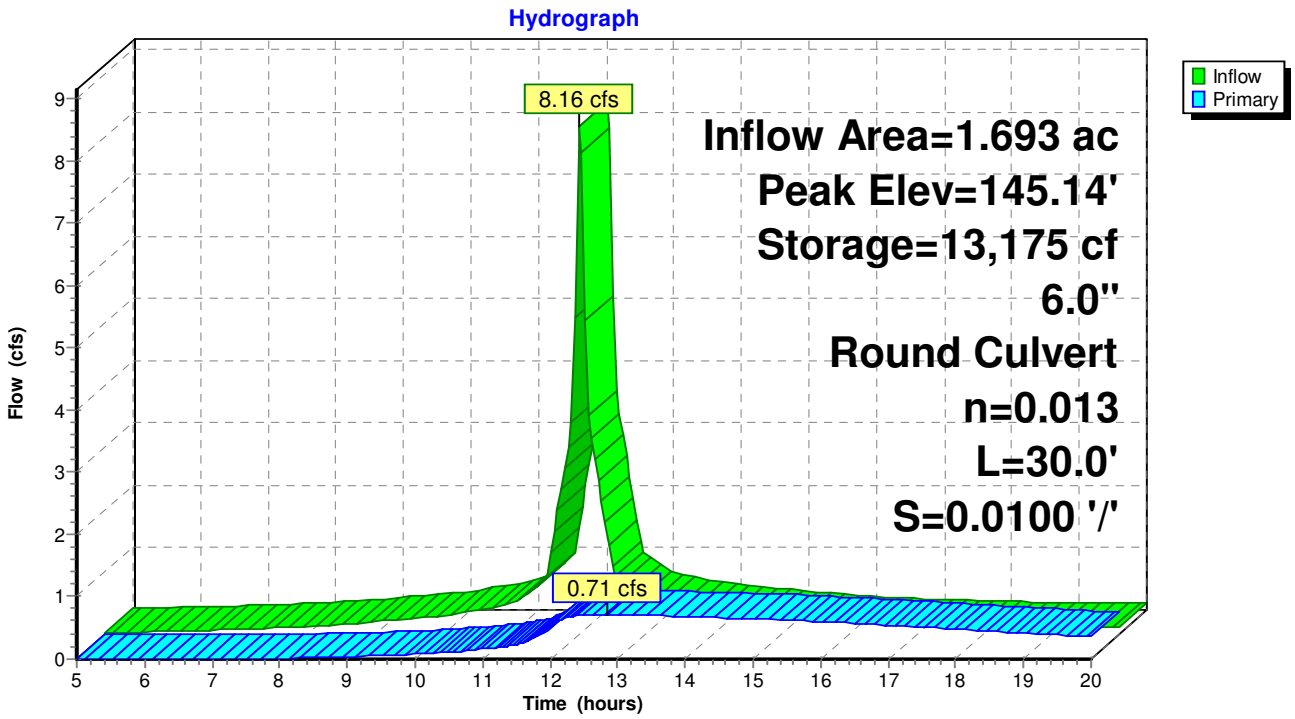
Volume	Invert	Avail.Storage	Storage Description
#1	144.00'	25,049 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
144.00	10,153	0	0
146.00	14,896	25,049	25,049

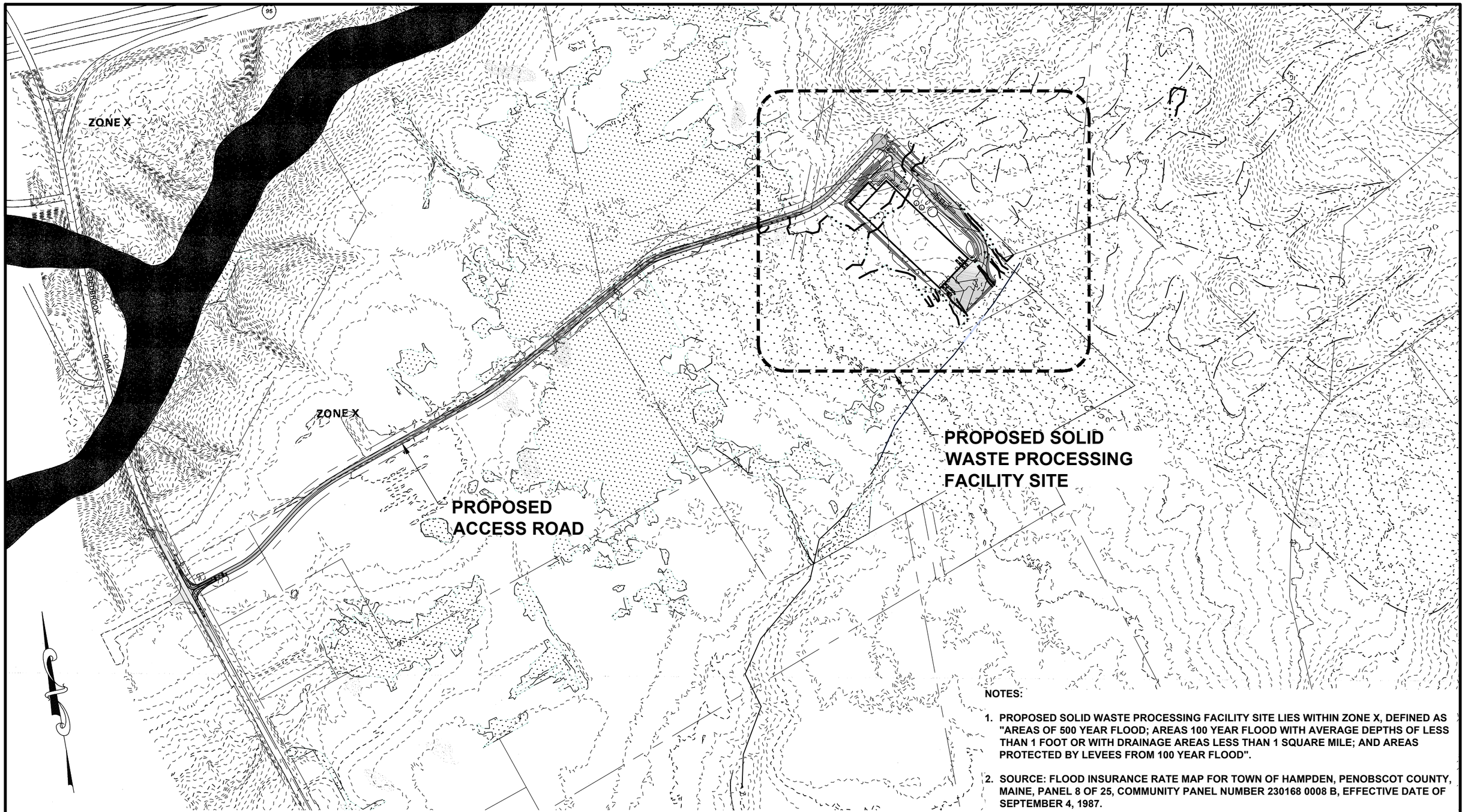
Device	Routing	Invert	Outlet Devices
#1	Primary	144.00'	**6.0" Round Culvert** L= 30.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 144.00' / 143.70' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.71 cfs @ 12.85 hrs HW=145.14' (Free Discharge)
└**1=Culvert** (Inlet Controls 0.71 cfs @ 3.60 fps)

Pond TP: Tank Pond



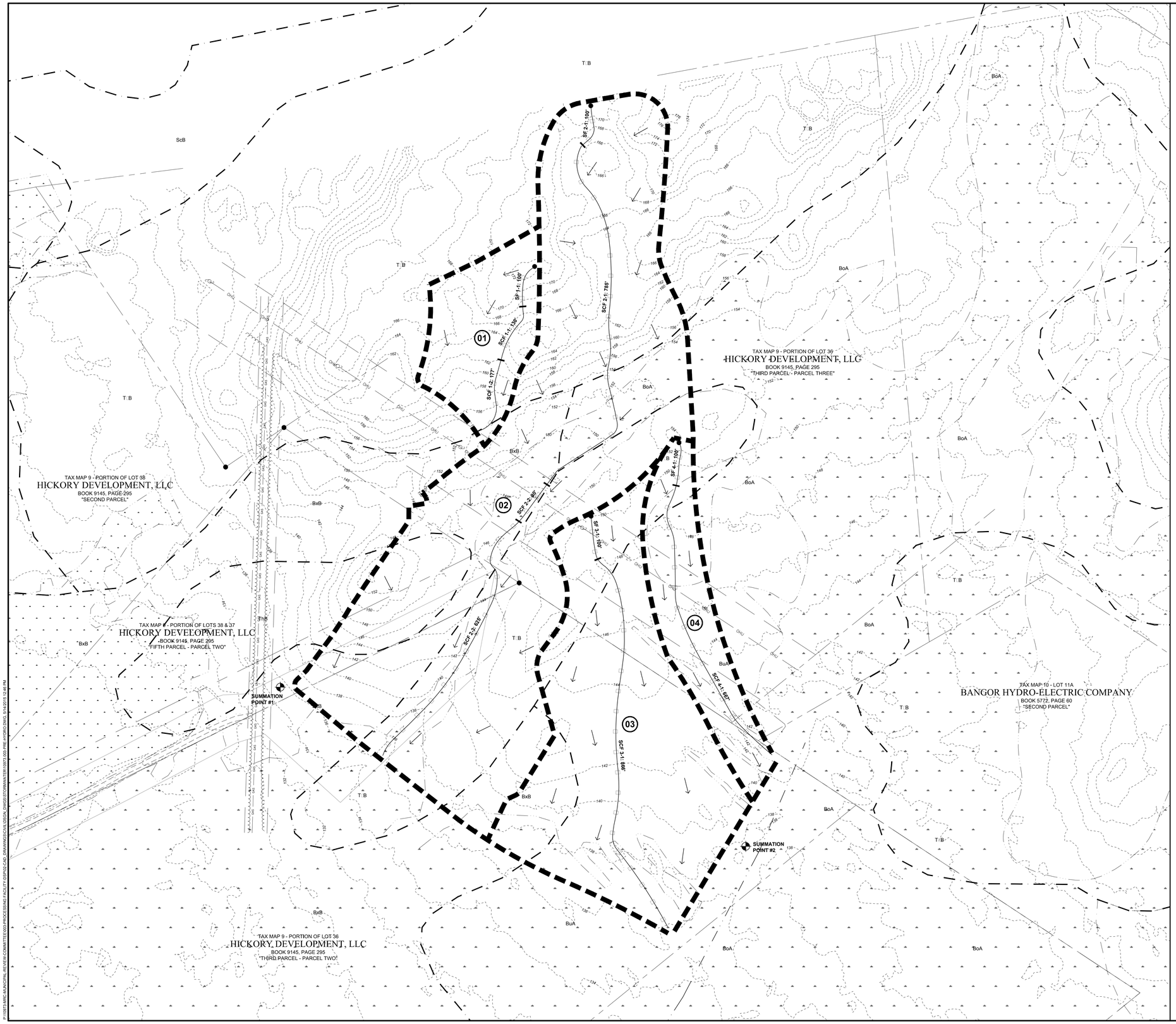
FLOOD INSURANCE MAP
PRE DEVELOPMENT HYDROLOGY PLAN
POST DEVELOPMENT HYDROLOGY PLAN



NOTES:

1. PROPOSED SOLID WASTE PROCESSING FACILITY SITE LIES WITHIN ZONE X, DEFINED AS "AREAS OF 500 YEAR FLOOD; AREAS 100 YEAR FLOOD WITH AVERAGE DEPTHS OF LESS THAN 1 FOOT OR WITH DRAINAGE AREAS LESS THAN 1 SQUARE MILE; AND AREAS PROTECTED BY LEVEES FROM 100 YEAR FLOOD".
2. SOURCE: FLOOD INSURANCE RATE MAP FOR TOWN OF HAMPDEN, PENOBSCOT COUNTY, MAINE, PANEL 8 OF 25, COMMUNITY PANEL NUMBER 230168 0008 B, EFFECTIVE DATE OF SEPTEMBER 4, 1987.

PROJECT TITLE: **MRC / FIBERIGHT SOLID WASTE PROCESSING FACILITY HAMPDEN, MAINE**	DWG: 1 OF 1	BY: BLQ	REV:	DESCRIPTION:	CES INC Engineers • Environmental Scientists • Surveyors
		DATE: 2015-05-07	REV DATE:		
SHEET TITLE: **FLOOD INSURANCE RATE MAP**	JN: 10973	APPROVED BY: CTM	ISSUE:	DESCRIPTION:	
	SCALE: 1"=500'	CHECKED BY:	ISSUE DATE:		



LEGEND:

- FLOW DIRECTION
- FLOW PATH
- WATERSHED I.D. (01)
- WATERSHED BOUNDARY
- SOILS BOUNDARY
- EDGE OF GRAVEL
- EDGE OF PAVEMENT
- PROPERTY LINE
- 1 FOOT CONTOUR (397)
- 5 FOOT CONTOUR (395)
- TREELINE
- WETLAND

ABBREVIATIONS:

SF SHEET FLOW
SCF SHALLOW CONCENTRATED FLOW

BoA BIDDEFORD MUCKY PEAT, 3□ SLOPES
BuA BUXTON SILT LOAM, 0-2□ SLOPES
BxB BUXTON, SCANTIC, AND BIDDEFORD STONY SILT LOAMS, 0-8□ SLOPES
ThB THORNDIKE VERY ROCKY SILT 8□ SLOPES
T:B THORNDIKE VERY ROCKY LOAM, 2-8□ SLOPES

GRID NORTH

PRE-DEVELOPMENT HYDROLOGY PLAN
FOR
SOLID WASTE PROCESSING FACILITY
HAMPDEN, MAINE

GRAPHIC SCALE
100 0 50 100 200 400
(IN FEET)
1 inch = 100 ft.

Bangor
45 South Main Street
PO Box 639
Bangor, ME
T:207-989-4824
F:207-989-4881

Presque Isle
44 Main Street
PO Box 627
Presque Isle, ME
T:207-764-8412
F:207-764-8414

Waterville
44 Main Street
Suite 204
Waterville, ME
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F:207-680-2204

Machias
67 Water Street
PO Box 587
Machias, ME
T:207-255-3270
F:207-255-8387

Bar Harbor
1172 Bar Harbor Hwy 102
PO Box 537
Bar Harbor, ME
T:207-288-0587
F:207-288-9888

Lewiston
44 Lisbon Street
Lewiston, ME
T:207-795-6009
F:207-795-6168

CES INC
Engineers • Environmental Scientists • Surveyors

PROJECT TITLE
MRC / FIBERIGHT SOLID WASTE PROCESSING FACILITY
HAMPDEN, MAINE

SHEET TITLE
PRE-DEVELOPMENT HYDROLOGY PLAN

REV	DESCRIPTION	DATE	DRAWN BY	CHECKED BY
R7				
R6				
R5				
R4				
R3				
R2				
R1				

STATE OF MAINE
SEAN M. THIES
No. 10139
5-13-2015
LICENSED
PROFESSIONAL ENGINEER

ISSUED FOR PERMITTING

SCALE	1"=100'
DATE	2015-05-11
DRAWN BY	BLQ
CHECKED BY	ACH/SMT
DESIGNED BY	CTM
APPROVED BY	SMT
JOB NUMBER	10973.003
DRAWING NUMBER	C701

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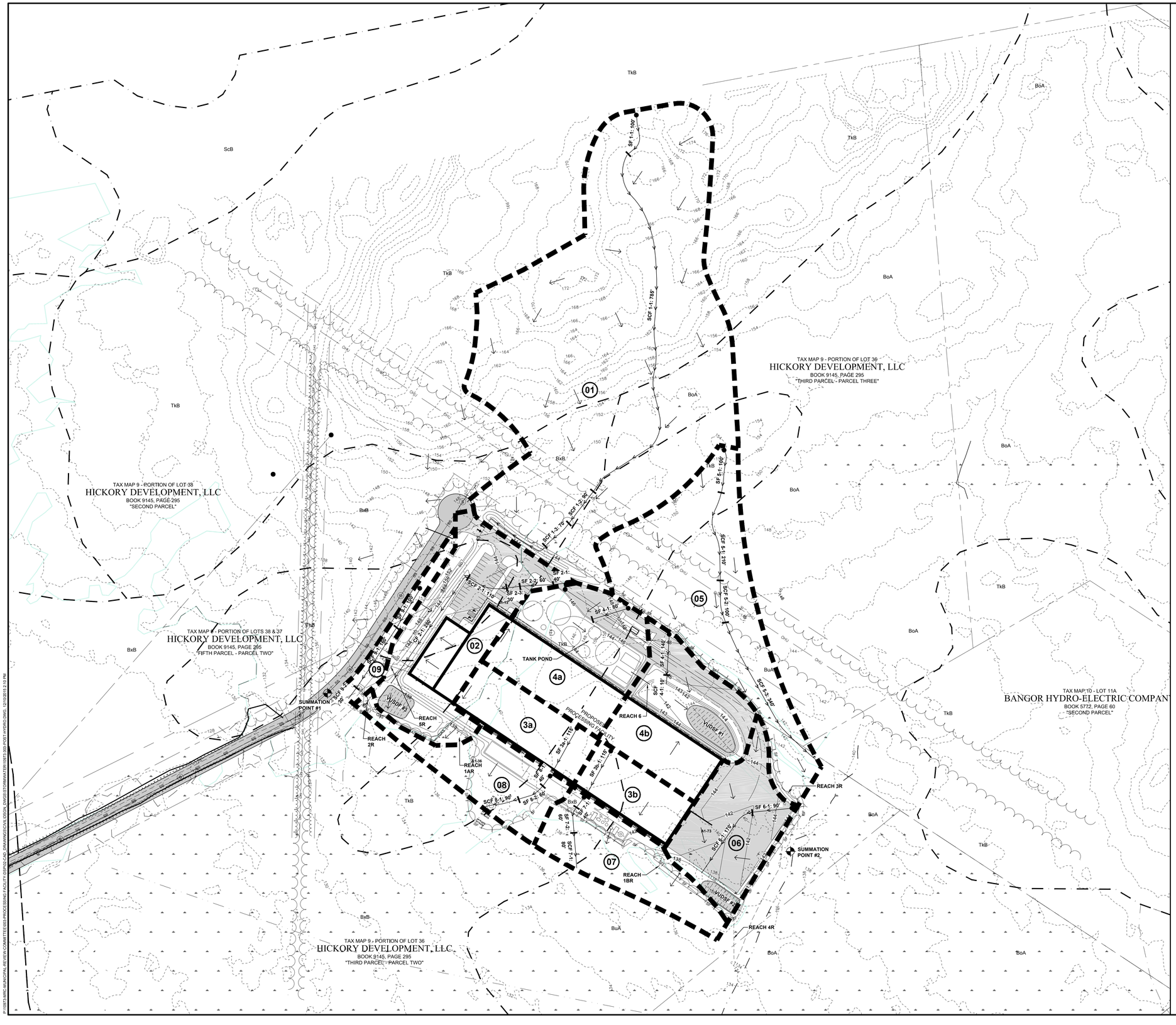

LEGEND:

- FLOW DIRECTION
- FLOW PATH
- WATERSHED I.D. (01)
- WATERSHED BOUNDARY
- UTILITY POLE
- EDGE OF GRAVEL
- EDGE OF PAVEMENT
- PROPERTY LINE
- 1 FOOT CONTOUR (397)
- 5 FOOT CONTOUR (395)
- TREELINE
- GRAVEL SURFACE
- PAVED SURFACE
- WETLAND
- SOIL FILTER AREA

ABBREVIATIONS:

SF	SHEET FLOW
SCF	SHALLOW CONCENTRATED FLOW
CF	CHANNEL FLOW
PF	PIPE FLOW
BoA	BIDDEFORD MUCKY PEAT, 3% SLOPES
BuA	BUXTON SILT LOAM, 0-2% SLOPES
BxB	BUXTON, SCANTIC, AND BIDDEFORD STONY SILT LOAMS, 0-8% SLOPES
ThB	THORNDIKE VERY ROCKY SILT 8% SLOPES
TkB	THORNDIKE VERY ROCKY LOAM, 2-8% SLOPES

GRID NORTH

POST-DEVELOPMENT HYDROLOGY PLAN
FOR
SOLID WASTE PROCESSING FACILITY
HAMPDEN, MAINE

GRAPHIC SCALE

100 0 50 100 200 400

(IN FEET)
1 inch = 100 ft.

Bangor
489 South Main Street
PO Box 639
Bangor, ME
T:207-989-4824
F:207-989-4881

Presque Isle
4 Spruce Street
PO Box 627
Presque Isle, ME
T:207-764-5412
F:207-764-9414

Waterville
44 Main Street
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Waterville, ME
T:207-680-2202
F:207-680-2204

Lewiston
35 Phillips Hwy 102
Lewiston, ME
T:207-795-6009
F:207-795-6168

Machias
2 Dublin Street
PO Box 587
Machias, ME
T:207-255-0270
F:207-255-8387

Bar Harbor
1 Wayfarer Way
Bar Harbor, ME
T:207-288-0587
F:207-288-9888

CES INC
Engineers • Environmental Scientists • Surveyors

PROJECT TITLE
MRC / FIBERIGHT SOLID WASTE PROCESSING FACILITY
HAMPDEN, MAINE

SHEET TITLE
POST-DEVELOPMENT HYDROLOGY PLAN

REV	DESCRIPTION	DATE	DRAWN BY	CHECKED BY
R2				
R1				
R0				

STATE OF MAINE
SEAN M. THIES
No. 10139
12/10/2015
LICENSED
PROFESSIONAL ENGINEER

SCALE	1"=100'
DATE	2015-12-10
DRAWN BY	BLQ/WAB
CHECKED BY	ACH/SMT
DESIGNED BY	CTM
APPROVED BY	
JOB NUMBER	10973.003
DRAWING NUMBER	C702

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APPENDIX 3

GENERAL STANDARDS

(From Stormwater Permit Application – MDEP)

GENERAL STANDARD SUBMISSIONS

The proposed project will construct a paved Access Road intersecting Coldbrook Road and will include the creation of approximately 145,257 square feet of impervious area on parcels totaling 4.03 acres in size. The proposed road will take the place of an existing gravel road with approximately 41,314 square feet of impervious surface. The net new impervious area will be approximately 103,943 square feet. The proposed Access Road will result in approximately 261,250 square feet of developed area. The developed area from the existing gravel road totals approximately 177,346 square feet. The net new developed area will be approximately 82,904 square feet.

The entire project area is located on the north side of Coldbrook Road and is in the Penobscot River Watershed. Since this project meets the definition of a linear portion, the Maine Department of Environmental Protection General Standards requires the treatment of 75% of the impervious surface and 50% of the developed area resulting from the project. At this time, the project is proposing to utilize a series of five Filterra treebox filters to meet the stormwater quality standards. The following chart summarizes the treatment structure, area treated, and relationship with the total impervious and developed areas for the project.

PROJECT AREA	NET NEW IMPERVIOUS AREA	NET NEW DEVELOPED AREA
ACCESS ROADWAY	103,943 SF	82,904 SF

TREATMENT METHOD	IMPERVIOUS AREA	DEVELOPED AREA
TREE BOX FILTER #1	14,250 SF	14,250 SF
TREE BOX FILTER #2	14,250 SF	14,250 SF
TREE BOX FILTER #3	21,810 SF	21,810 SF
TREE BOX FILTER #4	21,810 SF	21,810 SF
TREE BOX FILTER #5	4,749 SF	4,749 SF
TREE BOX FILTER #6	4,749 SF	4,749 SF
TOTAL TREATED AREA	**81,618 SF**	**81,618 SF**
PERCENT TREATED OF AREAS	78.5%	98.4%

A description of each treatment area is as follows:

1. **Tree Box Filter #1:** A tree box filter will be constructed and established on the left side of the Access Road at station 22+50. This tree box filter will receive stormwater runoff from the Access Road from station 13+00 to 22+50. The Access Road is crowned through this area and is graded to drain from right to left. Stormwater is collected along the curb line and delivered to a tree box filter which outlets the treated runoff toward a large wetland area to the South and eventually the Penobscot River. Sizing for the proposed tree box filter is as follows:

Impervious Area: 14,250 SF
Landscaped Area: 0 SF
Total Treatment Area: 14,250 SF (0.33 Acres)

Sizing based on MDEP Division of Watershed Management Memo dated January 21, 2015, which details Filterra Bioretention System sizing without an Isolator Row for a drainage area of between 0.26 and 0.33 Acres to be Filterra Model Number 8x6 or 6x8.

2. **Tree Box Filter #2:** A tree box filter will be constructed and established on the right side of the Access Road at station 22+50. This tree box filter will receive stormwater runoff from the Access Road from station 13+00 to 22+50. The Access Road is crowned through this area and is graded to drain from left to right. Stormwater is collected along the curb line and delivered to a tree box filter which outlets the treated runoff toward a large wetland area to the South and eventually the Penobscot River. Sizing for the proposed tree box filter is as follows:

   Impervious Area: 14,250 SF
   Landscaped Area: 0 SF
   Total Treatment Area: 14,250 SF (0.33 Acres)

   Sizing based on MDEP Division of Watershed Management Memo dated January 21, 2015, which details Filterra Bioretention System sizing without an Isolator Row for a drainage area of between 0.26 and 0.33 Acres to be Filterra Model Number 8x6 or 6x8.

3. **Tree Box Filter #3:** A tree box filter will be constructed and established on the left side of the Access Road at station 29+00. This tree box filter will receive stormwater runoff from the Access Road from station 29+00 to 43+54. The Access Road is crowned through this area and is graded to drain from right to left. Stormwater is collected along the curb line and delivered to a tree box filter which outlets the treated runoff toward a large wetland area to the South and eventually the Penobscot River. Sizing for the proposed tree box filter is as follows:

   Impervious Area: 21,810 SF
   Landscaped Area: 0 SF
   Total Treatment Area: 21,810 SF (0.50 Acres)

   Sizing based on MDEP Division of Watershed Management Memo dated January 21, 2015, which details Filterra Bioretention System sizing without an Isolator Row for a drainage area of between 0.43 and 0.50 Acres to be Filterra Model Number 12x6 or 6x12.

4. **Tree Box Filter #4:** A tree box filter will be constructed and established on the right side of the Access Road at station 29+00. This tree box filter will receive stormwater runoff from the Access Road from station 29+00 to 43+54. The Access Road is crowned through this area and is graded to drain from left to right. Stormwater is collected along the curb line and delivered to a tree box filter which outlets the treated runoff toward a large wetland area to the South and eventually the Penobscot River. Sizing for the proposed tree box filter is as follows:

Impervious Area: 21,810 SF
Landscaped Area: 0 SF
Total Treatment Area: 21,810 SF (0.50 Acres)

Sizing based on MDEP Division of Watershed Management Memo dated January 21, 2015, which details Filterra Bioretention System sizing without an Isolator Row for a drainage area of between 0.43 and 0.50 Acres to be Filterra Model Number 12x6 or 6x12.

5. **Tree Box Filter #5:** A tree box filter will be constructed and established on the left side of the Access Road at station 45+44. This tree box filter will receive stormwater runoff from the Access Road from station 43+84 to 46+13. The Access Road is crowned through this area and is graded to drain from left to right. Stormwater is collected along the curb line and delivered to a tree box filter which outlets the treated runoff toward a large wetland area to the South and eventually the Penobscot River. Sizing for the proposed tree box filter is as follows:

   Impervious Area: 4,749 SF
   Landscaped Area: 0 SF
   Total Treatment Area: 4,749 SF (0.11 Acres)

   Sizing based on MDEP Division of Watershed Management Memo dated January 21, 2015, which details Filterra Bioretention System sizing without an Isolator Row for a drainage area of up to 0.17 Acres to be Filterra Model Number 4x6 or 6x4.

6. **Tree Box Filter #6:** A tree box filter will be constructed and established on the right side of the Access Road at station 45+44. This tree box filter will receive stormwater runoff from the Access Road from station 43+84 to 46+13. The Access Road is crowned through this area and is graded to drain from left to right. Stormwater is collected along the curb line and delivered to a tree box filter which outlets the treated runoff toward a large wetland area to the South and eventually the Penobscot River. Sizing for the proposed tree box filter is as follows:

   Impervious Area: 4,749 SF
   Landscaped Area: 0 SF
   Total Treatment Area: 4,749 SF (0.11 Acres)

   Sizing based on MDEP Division of Watershed Management Memo dated January 21, 2015, which details Filterra Bioretention System sizing without an Isolator Row for a drainage area of up to 0.17 Acres to be Filterra Model Number 4x6 or 6x4.

The proposed stormwater quality control devices have been designed according to the standards outlined in the *Stormwater Management for Maine, Volume III BMP Manual*, January 2006 and revised July 2009. Construction and maintenance will be according to standards outlined in this manual.

APPENDIX 4

MAINTENANCE AGREEMENT

APPENDIX 1

Maintenance Agreement for Stormwater Management Facilities

This Maintenance Agreement is made this day of _____ 20___ by and between _____ and the Town of Hampden, Maine.

The project name is _____.

The location is: _____, Hampden, Maine.

The project's Tax Map and Lot Numbers are Tax Map _____, Lot_____.

The project is shown on a plan entitled "_____" dated_____ and most recently revised on _____, approved by the _____ [Municipal Permitting Board] on _____ and recorded in the Penobscot County Registry of Deeds in Plan Book _____ Page _____ (the "Project").

WHEREAS, the approval of the Project includes Stormwater Management Facilities which requires periodic maintenance; and

WHEREAS, in consideration of the approval of the Project the Town of Hampden requires that periodic maintenance be performed on the Stormwater Management Facilities;

NOW, THEREFORE, in consideration of the mutual benefits accruing from the approval of the Project by the Town and the agreement of _____ to maintain the Stormwater Management Facilities, the parties hereby agree as follows:

1. _____, for herself/himself/itself, and her/his/its successors and assigns, agrees to the following:

(a) To inspect, clean, maintain, and repair the Stormwater Management Facilities, which includes, to the extent they exist, parking areas, catch basins, detention basins or ponds, drainage swales, pipes and related structures, as required by **Section 6** of the Town's Post-Construction Stormwater Management Ordinance, to prevent the build up and storage of sediment and debris in the system;

(b) To repair any deficiencies in the *Stormwater Management Facilities* noted during the required inspection;

(c) To provide a summary report on the inspection, maintenance, and repair activities performed, as required by **Section 6** of the Town's Post-Construction Stormwater Management Ordinance, on the *Stormwater Management Facilities* to the Town *Enforcement Authority*;

(d) To allow access by Town personnel or the Town's designee for inspecting the *Stormwater Management Facilities* for conformance with these requirements.

(e) To create a homeowners' association for the purpose of maintaining the *Stormwater Management Facilities*.

2. Upon creation of the homeowners' association, the homeowners' association shall become responsible for compliance with the terms of this Agreement.

3. This Agreement shall constitute a covenant running with the land, and _____ shall reference this Agreement in all deeds to lots and/or units within the Project.

_____

_____ By: _____
Witness Its:

TOWN OF HAMPDEN

_____ By: _____
Witness Printed Name: _____
Its: _____

STATE OF MAINE
_____, ss. _____, 20__

Personally appeared the above-named _____ _____, the _____ of _____, and acknowledged the foregoing Agreement to be said person's free act and deed in said capacity.

Before me,

_____
Notary Public / Attorney at Law

Printed Name:_____

STATE OF MAINE
Penobscot, ss. _____, 20__

Personally appeared the above-named _____, the _____ of the Town of Hampden, and acknowledged the foregoing Agreement to be said his/her free act and deed in said capacity.

Before me,

_____
Notary Public / Attorney at Law

Print Name: _____

APPENDIX 5

UTILITY CAPACITY LETTERS

Hampden Water District

Tel: (207) 862-3490
Fax: (207) 862-3595
www.hampdenwaterdistrict.org

P.O. Box 218
Hampden, ME 04444-0218

2/22/16

Travis Noyes
CES, Inc.
465 S. Main St.
Brewer, ME 04412

Re: Fiberight/ MRC Hampden Solid Waste Processing Facility

Dear Travis,

We have reviewed your request to serve a proposed solid waste facility located off Coldbrook Road that has been proposed by the Municipal Review Committee and Fiberight.

The District has been informed of the intended maximum consumption of 432,000 gallons per day, equivalent to a rate of 300 gpm. We have reviewed the demand information that you provided with our engineering consultant and we feel that we can serve the facility demand with preconditions as noted in the letter from Woodard & Curran that is included as an attachment.

The Hampden Water District reserves the right to negotiate any unseen impacts on the District's facilities or operation one year from the date of start-up of the solid waste processing facility.

We do have concerns regarding District maintenance activities on the facility's water supply, as follows:

- Does the facility include the capability to maintain operation during water outages resulting from water main breaks, firefighting activities, or other emergency conditions?
- The District performs periodic maintenance activities such as tank inspections, water main flushing, and other repairs that may require a reduction in water use to avoid impacting fire storage volume and service pressure. Can the facility operate at a reduced water demand if required by the District?
- The District requests to review the design of the facility's water service connections for domestic and fire protection.

As we have worked together in the past on various concerns, I have no doubt future agreeable plans could address these two scenarios.

We look forward to the continued efforts from both parties on this project.

Sincerely,

Jamie Holyoke
Working Superintendent
Hampden Water District

Cc: Dean Bennett, Town Planner, Economic Developer, Town of Hampden

Chip Haskell

From: Travis Noyes
Sent: Thursday, March 03, 2016 1:28 PM
To: Chip Haskell
Subject: FW: MRC/Fiberight
Attachments: Fiberight-CES Letter signed.pdf

Travis Noyes, P.E. ♦ Engineering Division Director | Project Manager
P 207.989.4824 | F 207.989.4881 | C 207.356.9707

CES INC
Engineers ♦ Environmental Scientists ♦ Surveyors
465 South Main Street, P.O. Box 639, Brewer, Maine 04412 | www.ces-maine.com

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From: Travis Noyes
Sent: Wednesday, March 02, 2016 2:57 PM
To: Sean Currier
Cc: Sean Thies
Subject: FW: MRC/Fiberight

Hi Sean,

CES is in the process of preparing land use applications for the MRC/Fiberight project to submit to the Town of Hampden. We hope to submit by Friday. One item of note was support as it relates to the sewer. We have gotten a letter of support from the City of Bangor as it relates to wastewater, which I am sharing in this email.

Could you provide us a similar letter, or email, with the caveats and exclusions you need, to help support our project that can be presented with our package to the Town's planning board? We are obviously still working through issues but figure that the planning board may ask for something or require something.

As to the capacity of the existing sewer in Ammo Park, and its ability to serve this project, I would offer the following:

The project will be served by an 8" PVC main recently constructed in the Ammo Park subdivision. The flattest section of that system has been designed at a slope of 0.005, or one half of a percent. This yields a full flow capacity of nearly 500 gpm. The project's daily maximum flow is anticipated to be 180,000 gallons. Assuming the maximum flow is delivered at this rate, a pump capable of 125 gpm is needed. We will design the pump station to accommodate more than this. We understand there are other concerns as it relates to the collection system our project will connect to and those will be addressed in the near future. Obviously installation of a larger gravity main through Ammo Park would provide more capacity for future development potential.

The information provided by Woodard and Curran as it relates to the potential future flows from our project and the area's development potential, was helpful. Kyle Corbeil and I spoke about this information and as noted, peaking factors provided by W&C do not apply to our project. In looking at several industry standards for wastewater system design and planning (Metcalf and Eddy, TR-16), it is clear that peak hourly flow rates for industrial use do not follow the same pattern as you would expect from domestic sewage, which appears to be what was utilized as the basis for peak hourly flows for the development potential. It really comes down to the variability of the process of each individual industrial user and therefore a blanket factor can't be applied with any level of certainty to any of the industrial flows when looking at capacity.

The final pump station flowrate chosen will be done in close coordination with the Town, the City, and your consultant, and it will balance both the existing capacity concerns downstream and the ability to serve future development.

Please give me a shout if you have any questions on my request.

Travis Noyes, P.E. ♦ Engineering Division Director | Project Manager
P 207.989.4824 | **F** 207.989.4881 | **C** 207.356.9707

CESINC
Engineers ♦ Environmental Scientists ♦ Surveyors
465 South Main Street, P.O. Box 639, Brewer, Maine 04412 | www.ces-maine.com

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From: Smith, Amanda [mailto:amanda.smith@bangormaine.gov]
Sent: Thursday, February 18, 2016 9:00 AM
To: Travis Noyes
Subject: RE: MRC/Fiberight

Here's the signed copy, Travis.
Keep me posted on how things are progressing.
-Amanda

From: Travis Noyes [mailto:tnoyes@ces-maine.com]
Sent: Thursday, February 18, 2016 8:08 AM
To: Smith, Amanda
Subject: RE: MRC/Fiberight

Amanda,

Could you send along a signed copy via email today if you get a chance?

Again, thanks for your input and timely response.

Travis Noyes, P.E. ♦ Engineering Division Director | Project Manager
P 207.989.4824 | **F** 207.989.4881 | **C** 207.356.9707

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From: Smith, Amanda [mailto:amanda.smith@bangormaine.gov]
Sent: Wednesday, February 17, 2016 3:17 PM
To: Travis Noyes
Cc: 'townmanager@hampdenmaine.gov'; 'Sean Currier'; Rudzinski, Andy
Subject: RE: MRC/Fiberight

Good afternoon Travis,

Please take a look at the attached letter and let me know if that will suffice for the requirements needed for the DEP Solid Waste standards.
If you have any questions or comments, feel free to give me a call tomorrow (207)992-4471.

Thanks,
-Amanda

From: Travis Noyes [mailto:tnoyes@ces-maine.com]
Sent: Tuesday, February 16, 2016 6:11 PM
To: Rudzinski, Andy; Smith, Amanda
Subject: MRC/Fiberight

Andy/Amanda,

As you know, our project is proceeding forward.

We continue to work with Fiberight to get information from them as it relates to Priority Pollutants. We have gotten some information but may need to supplement it. I'd like to discuss with one of you if possible.

Beyond this, we need a letter from the City that supports the project based on the flowrate information you have been provided to date. It is critically important for us to get this information soon so our solid waste permit can be hand soon. I have offered below the general requirement to document adequate utilities to the Development as it relates to the DEP Solid Waste standards.

Would the City be able to offer a letter that provides the support we need for the project, as we have discussed, in a way that you can also, if necessary, provide yourself with whatever safety net you need to be comfortable with. We recognize that we have to meet local limits and other requirements as an industrial user. If you want to document that this is a condition of your approval and support than that would be fine.

Essentially, we need you to commit to the project at the demand we have stated. There are obviously technical and legal issues that will be maneuvered but this is a critical step in the process..

If you have questions, feel free to call my cell tomorrow. I am on the road from 730 to 10, in meetings from 10 to 2, and back on the road again from 2 to 430.

Thanks and I look forward to hearing from you.

06 096 Chapter 400

4.L. Adequate Provision for Utilities and No Unreasonable Adverse Effect on Existing or Proposed Utilities

*(1) **Standards**. The applicant shall provide for adequate utilities and the proposed solid waste facility may not have an unreasonable adverse effect on existing or proposed utilities in the municipality or area served by those utilities.*

(a) There must be adequate water supplies for the solid waste facility; and

(b) Appropriate sanitary waste water disposal must exist for the solid waste facility.

*(2) **Submissions**. An application must include evidence that affirmatively demonstrates that the applicant has made adequate provision for utilities, including water supplies, sewerage facilities and solid waste disposal, and that the proposed solid waste facility will not have an unreasonable adverse effect on existing or proposed utilities in the municipality or areas served by those utilities, including the following information, when appropriate:*

(a) Verification that the facility will be served by the appropriate utilities;

(b) Evidence that a sufficient and healthful water supply will be provided; and

(c) The identification of all aspects of the proposed solid waste facility that require access to or use of utilities, along with the provisions that have been made to use those utilities and to comply with any requirements and provisions of the utility.

Travis Noyes, P.E. ♦ Engineering Division Director | Project Manager
P 207.989.4824 | **F** 207.989.4881 | **C** 207.356.9707

CESINC
Engineers ♦ Environmental Scientists ♦ Surveyors
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WASTEWATER TREATMENT PLANT

Andrew F. Rudzinski, Director
Water Quality Management
andy.rudzinski@bangormaine.gov

February 17, 2016

Travis Noyes, P.E.
CES, Inc.
465 South Main St.
P.O. Box 639
Brewer, ME 04412

RE: NEW SEWER SERVICE FOR FIBERIGHT FACILITY, HAMPDEN

Dear Travis Noyes, P.E.:

We have reviewed the information, provided by you, pertinent to the above subject matter. Information provided, to this point, is limited to an estimated daily flow of 150,000 gpd.

The wastewater treatment plant (WWTP) has capacity, at this time, to accept this additional flow during "dry-weather" (non-CSO) conditions. Flow will be curtailed during CSO events. It will be the responsibility of the user to make alternative arrangements such as on-site storage or trucking to alternative sites during these times.

The user shall meet all requirements of the Federal and State Pretreatment regulations, the Town of Hampden and City of Bangor Sewer Use Ordinance concerning reporting, construction & maintenance, installation of sample points, flow metering devices and other pretreatment controls. The user shall provide access to City & Town personnel for purposes of inspection & sample collection. All such provisions shall be submitted to the Pretreatment Coordinator for pre-approval, including drawings, plans… ect. The user will also be required to provide the City with an Industrial User Permit Application and a Pretreatment Survey & Disclosure form.

Should it be determined that, for any reason whatsoever, adverse effects are noted, or anticipated, at the WWTP, the user shall be required to pre-treat discharge to acceptable levels. Local limits or Categorical limits, as appropriate, shall be met & maintained. Other pollutants of concern shall be monitored as needed. Additionally, flows shall not result in "slug loads" at any time and equalization shall be provided for.

760 Main St. • Bangor, Maine 04401
207.992.4470 • Fax 207.947.3537
www.bangormaine.gov

The Town of Hampden & City of Bangor reserve the right to modify, amend or reject any agreement, plan or proposal for the purpose of protecting the integrity of the WWTP, sewer collection system and any and all control mechanisms in existence.

Should you have any questions or comments, please contact me.

Sincerely,

Amanda Smith
Industrial Pretreatment Coordinator
Safety Coordinator
City of Bangor- WWTP
760 Main St.
Bangor, Maine 04401
(207)992-4471
amanda.smith@bangormaine.gov

cc: Angus Jennings – Hampden Town Manager

Sean Currier – Hampden Public Works Director

Andrew Rudzinski – Bangor Director of Water Quality Management

APPENDIX 6

AIR EMISSIONS

(From Solid Waste Permit Application – MDEP)

ATTACHMENT 17

AIR QUALITY

In accordance with the standards for No Unreasonable Adverse Effects on Air Quality stated in 06 096 CMR Chapter 400, Section 4(G)(1)(a)-(c), the facility may not unreasonably affect air quality. The proposed processing facility will address these requirements by demonstrating the site operations will meet the following standards:

a) The applicant must obtain an air emission license if required;
b) The facility must control fugitive dust and nuisance odors; and
c) Open burning of solid waste, other than clean or painted wood waste, is prohibited.

A description of how these standards are to be met is provided in the submission requirements discussed below.

In accordance with 06-096 CMR Chapter 409.3.G(1)(a), this section sets forth information regarding the location, design, and operational procedures of the Facility that collectively demonstrate the facility will not cause an odor nuisance. For ease of reference, information is provided in bold in response to the applicable Section 409.3.G criteria.

G. Odor Control

(1) For facilities other than those that process wastewater treatment sludge from publicly owned treatment works and facilities that process septage: Based upon the location, design, and operational procedures of the proposed facility, the applicant must demonstrate that the facility will not cause an odor nuisance. This demonstration may be done by one or more of the following:

(a) A demonstration that the materials handled at the facility do not generate objectionable odors;

Fiberight has selected a site location and designed the proposed facility with operational and engineering controls to control potential objectionable or nuisance odors. These controls are part of the process design to minimize generation and provide control of objectionable odors and nuisance odors at occupied buildings.

The initial consideration for minimization of nuisance odors at residential occupied buildings was selection of site location and orientation. Abutters to the site are zoned as industrial and rural. The site is buffered by forested area and is approximately 3,400 feet away from the nearest residential occupied building.

All MSW unloading occurs inside the processing building. The eastern end of the building is the designated MSW receiving area. The overhead doors remain closed until trucks are in position to back into the tipping floor. Each overhead door is designed for high-speed and high frequency operation. This allows the doors to be closed for longer intervals than typical steel panel overhead doors. The overhead doors used to access the MSW unloading area will be kept in the closed position to the maximum extent possible and actuated by motion

sensors. Two doors are used to access three off-load positions and will be subject to constant traffic. In order to minimize the number of trucks in the parking lot at any one time the tipping floor is designed to accommodate one transfer trailer and three packers simultaneously.

The primary operational control for nuisance odors is minimization of residence time and quantity of MSW on the tipping floor. The tipping floor is designed with capacity for approximately two days of MSW receipts and two days of primary processed material. The MSW is moved from the tipping floor to the processing line as quickly as possible. Limited time on the tipping floor reduces any potential nuisance and objectionable odors generated by the decomposition of the putrescible waste component of the MSW. In addition, the Facility's operations are designed to process any organics continuously for entry into the wash stage prior to decomposition in order to maintain the Facility's sugar and sugar production efficiency which further reduces any potential nuisance odors. Fiberight will utilize the principle of First-In-First-Out operation to the maximum extent possible to minimize the residence time of waste on the tipping floor.

The tipping floor and processing portion of the facility are maintained under constant negative pressure. The odor control system consists of two air handling fans. The control systems use a fan rated at approximately 50,000 ACFM to draw air from the tipping floor and processing area at all times. When the overhead doors are opened a second fan actuates to draw a total of 100,000 ACFM from the tipping floor and processing areas. The combination of fans maintains the processing area under negative pressure even with the overhead doors in the open position. The designed pressure differential is 0.10 inches of water column. The exhaust from each fan is treated in with an odor scrubbing system. The odors present in the exhaust fan air are captured in the scrubber media and prevented from entering the atmosphere.

In accordance with 06 096 CMR Chapter 400.4.G(2), the following lists the submission requirements specific to "No Unreasonable Adverse Effect On Air Quality". For each of the submission requirements, a response has been provided in bold print.

(2) Submissions. Applications must include evidence that affirmatively demonstrates that the proposed facility will not unreasonably adversely affect air quality, including the following information, when appropriate:

(a) Evidence that an air emission license has been or will be obtained if required;

Fiberight, LLC and MRC have been in contact with Lynn Muzzey of the MDEP Air Bureau and will be submitting an application for a Minor Source Air License as defined in Chapter 115. This license application has been submitted and addresses potential fugitive emissions from on-site vehicle traffic and material handling, the outlet of the fugitive odor scrubber, the exhaust from two (2) boilers, and an open flare.

(b) Description of the actions that the operator will undertake to control fugitive dust from the solid waste facility when a problem attributable to the facility occurs beyond the property boundary;

Fugitive dust attributable to the Fiberight processing facility is not anticipated to occur beyond the property boundary of the facility. All areas that will be subject to vehicle and truck traffic will be paved and no bulk material handling operations will occur outside the processing building. The travel ways and parking areas will be maintained in accordance with the facility's Operations and Maintenance plan. Should fugitive dust emissions occur beyond the property boundary the facility operator will assess the source of the dust and will use a combination of cleaning of travel ways and, if necessary, spray water to control dust.

(c) The identification of any sources of nuisance odors from the facility;

Exposure of MSW to the ambient air is a potential source of nuisance odors as MSW is transported to the facility and initially transferred for processing. The facility's design and operations, however, are planned to prevent any potential nuisance odors from creating unreasonably adverse effects on air quality due to (i) sizing of the facility's tip floor, (ii) minimal queue wait for MSW transport vehicles; and (3) air control measures, such as fans (explained in more detail below).

(d) An estimation of the area that would be affected by the nuisance odor, based on general experience in dealing with the material or process that is the source of the odors;

Based on operations at comparable facilities, the potential nuisance odors are expected to be contained in the processing building. Potential odor from MSW in trucks is expected to be in low concentration and to not cause a nuisance odor at residential occupied buildings beyond the property boundary.

(e) Proposed systems for enclosure of nuisance odor-producing materials and processes, and proposed uses of technology to control, reduce or eliminate odors; and

Fiberight has selected a site location and designed the proposed facility with operational and engineering controls integral to the process design to minimize generation and provide control of objectionable odors and nuisance odors at occupied buildings.

The initial consideration for minimization of nuisance odors at residential occupied buildings was selection of site location and orientation. Abutters to the site are zoned as industrial and rural. The site is buffered by forested area and is approximately 3,400 feet away from the nearest residential occupied building.

All MSW unloading occurs inside the processing building. The eastern end of the building is the designated MSW receiving area. The overhead doors remain closed until trucks are in position to back into the tipping floor. Each overhead door is designed for high-speed and high frequency operation. This allows the doors to be closed for longer intervals than typical steel panel overhead doors. The overhead doors used to access the MSW unloading area will be kept in the closed position to the maximum extent possible and actuated by motion sensors. Two doors are used to access three off-load positions and will be

subject to constant traffic. In order to minimize the number of trucks in the parking lot at any one time the tipping floor is designed to accommodate one transfer trailer and three packers simultaneously.

The primary operational control for nuisance odors is minimization of residence time and quantity of MSW on the tipping floor. The tipping floor is designed with capacity for approximately two days of MSW receipts and two days of primary processed material. The MSW is moved from the tipping floor to the processing line as quickly as possible. Limited time on the tipping floor reduces any potential nuisance and objectionable odors generated by the decomposition of the putrescible waste component of the MSW. In addition, the Facility's operations are designed to process any organics continuously for entry into the wash stage prior to decomposition in order to maintain the Facility's sugar and sugar production efficiency which further reduces any potential nuisance odors. Fiberight will utilize the principle of First-In-First-Out operation to the maximum extent possible to minimize the residence time of waste on the tipping floor.

The tipping floor and processing portion of the facility are maintained under constant negative pressure. The odor control system consists of two air handling fans. The control systems use a fan rated at approximately 50,000 ACFM to draw air from the tipping floor and processing area at all times. When the overhead doors are opened a second fan actuates to draw a total of 100,000 ACFM from the tipping floor and processing areas. The combination of fans maintains the processing area under negative pressure even with the overhead doors in the open position. The designed pressure differential is 0.10 inches of water column. The exhaust from each fan is treated in with an odor scrubbing system. The odors present in the exhaust fan air are captured in the scrubber media and prevented from entering the atmosphere.

(f) Evidence that the solid waste facility will not unreasonably alter climate if the facility has or is proposed to have water cooling towers.

The Fiberight facility will need two small cooling towers to meet the facility's needs. The water evaporation and drift associated with the cooling towers proposed in this project will be minimal and will not unreasonably alter climate. The cooling towers are anticipated to evaporate approximately 112 gallons per minute. This is not a sufficient quantity to cause localized fog banks or icing beyond the property line of the facility. Seasonal/Annual Cooling Tower Impact (SACTI) model has been historically used to model the effects of cooling towers associated with nuclear power and fossil fuel power generation facilities but is no longer commercially available.

APPENDIX 7

RESUMES

Craig Stuart-Paul
Fiberight, Chief Executive Officer / President

Professional Experience
Craig Stuart-Paul has developed a variety of businesses since moving from Great Britain in 1988, starting with The Oxford Brewing Company, Maryland's first microbrewery. He then entered the recycling business with the formation of Resource Recovery of Maryland in 1994. This business focused on processing recycled glass into furnace ready material for the glass container industry. Mr. Stuart-Paul founded Fairfax Recycling, Inc. in 1996 and implemented key technologies, management systems and team building processes to create a highly successful recycling organization that was both a model in efficiency and low staff turnover.

Past Experience
Mr. Stuart-Paul was an industry pioneer in the use of optical sorting technologies for contaminant removal. In 1996 he formed Fairfax Recycling, Inc, a company focusing on recycling residential materials collected in central Maryland and Northern Virginia. He grew this business to be a large regional recycler, processing over 150,000 tons of recycled materials annually before selling the business to a fortune 50 company in 2004. Mr. Stuart-Paul then formed Atlantic Recycling Technologies, LLC and Fiberight LLC to develop advanced fiber recovery and alternative fuel technologies. In addition, he has been part of the design and build team of several large recycling plants in the United States and Europe collectively processing over 350,000 tons per year of wastes. He holds a business degree from the University of Brighton, England.

Professional

Relevant Project Listing

Fiberight Lawrenceville Demonstration Plant - 2012	Working with Mr. Iantosca and Fiberight's technical director, Nick Thompson, conceived, financed and helped design and manage construction of the nation's first integrated waste processing plant to use a bio-chemical process for organic conversion. Facility now has over 5,000 hours of operational experience.
Greenstar Aldridge MRF – 2006 (United Kingdom)	Brought in for peer review of designs for single stream recycling facility. Substantially changed design, process flow & layout and became key member of project team. Involved in project management from concept to final commissioning. Plant now handles almost 40 TPH of mixed wastes & recyclables, the largest of its kind in the U.K. Project cost >$20mm (land, building & equipment)
KIT Kat Road MRF - 2005	Working with Waste Management, Inc. conceived and managed construction of 8 acre recycling plant facility. Managed permitting, site & building construction in a project where the equipment and building were being constructed together to expedite time to operations commencement. - Project cost >$15mm (land, building & equipment)
Atlantic Recycling Technologies - 2003	Conceived, designed and implemented technology and system to handle contaminated waste fiber from Fairfax Recycling's MRF operations. Progressed operation and technology through a series of market tests and used change systems to optimize business for enzymatic conversion of biomass when enzymes became viable. Pre-cursor to Fiberight. Project cost >$3.5mm
Palymyra Fire Rebuild 2000	One of Fairfax' 3 PA locations was lost to a major fire. Rebuilt substantial portions of building, replaced over 90% of equipment, negotiated with all stakeholders and achieved new plant operations in less than 120 days. Project cost >$2mm

Craig Stuart-Paul
Fiberight, Chief Executive Officer / President

Fairfax Recycling, PA - 1999	Took knowledge from VA plant and incorporated processes into three Pennsylvania facilities and established efficient processes and systems in all three. Demonstrated ability to deploy systems in multiple locations. Project cost <$1mm
Fairfax Recycling, Process Upgrade 1998	Designed and implemented a system using novel screening methods that increased plant throughput from 18 TPH to almost 35 TPH while maintaining quality standards. Integrated new balers & rolling stock. Project cost <$1mm
Fairfax Recycling, Commingle Project 1996	Conceived and implemented container recycling & sort system that allowed waste collectors to reduce amount of curbside sorting and increase household collections over 30% per route per day. Project cost >$1mm
Resource Recovery of Maryland - 1995	Conceived and implemented integrated glass recycling process featuring novel optical sorting technology. Project included site selection & permitting, engineering & ground up equipment installation. Project cost <$1mm
Oxford Brewing Co. 1990	Designed and implemented integrated brewing operations in association with master brewer to produce consistent beer batches, control sterility, and manage a biochemical process.

Other Professional / Business Affiliations

Maryland Recyclers Coalition, President 2004 - 2005

Awards / Honors / Publications

Barclays Bank Young Businessman of the Year, 1985

Education / Training
HND Business Studies, University of Brighton (Great Britain), 1985

Fiberight

Alan Iantosca
Fiberight, Project Team Leader & VP of Engineering

Professional Experience
Business Development Executive with the ability to build a winning team, develop strategies, set strategic direction and develop and close the complex deal within that strategy. Consistent record of improving profits through creative and effective asset and cost management. Solid business, engineering and operating background with proficiency in analyzing commercial arrangements for upside potential. Skilled in creating positive relationships with both internal and external customers and negotiating with win-win results. Also experienced in organizational development, acquisitions and new venture start-ups.

Fiberight LLC LLC, **2011 – Present**

EMC, O'Fallon, MO 2007 – 2010

Vice President / General Manager, Energy Market Sector / Eastern Region
Worked as an independent contractor, responsible for the development and execution of the energy market sector strategy and the eastern region strategy to identify, develop and win industrial and municipal opportunities providing water and wastewater services to identified / targeted customers. Coordinated the overall management and P&L for all existing and future opportunities in the eastern region. Won and renewed multiple water and wastewater contracts in the energy market sector and in the eastern region.

- Introduced EMC to DuPont, Bayer Material Sciences, Linde, ConocoPhillips, CITGO, Sunoco, BP and Valero through previous relationships resulting in obtaining exclusive development positions with Bayer, BP, Citgo, Linde and Sunoco and participation in competitive situations with ConocoPhillips and Valero.
- Annually developed over ten projects with customers in the eastern region and energy market sector.
- Managed seven industrial facilities supplying water and wastewater services in the refining, chemicals and food industries.

THE BOC GROUP, Murray Hill, NJ 2000 – 2007

Global Vice President, Business Development / VP Major Tonnage Projects
Directed global business development activities and teams to win identified major targets mainly in the petroleum, chemicals and metals sectors, including both grass root projects and acquisitions.

- Won and executed four hydrogen supply and one air separation project from US$12M – US$130M.
- Represented BOC in successful contract development for US$255M ASU / Power Project in Mexico.
- Annually developed over 10 projects in various stages, ranging from $10M to over $750M.
- Negotiated Strategic Alliance Agreement with number 1 independent refining company in US.
- Completed successful construction and start-up of 2 $20M Air Separation Unit (ASU) Projects.
- Initiated formation of project consortiums to bid $200M / $750M ASU / Power Projects in Venezuela.
- Led change management process for implementation of new BU strategy / operating model for US.

AMERICAN REF-FUEL COMPANY, Houston, TX 1988 – 2000

General Manager, Essex County Resource Recovery Facility, Newark, NJ 1995 – 2000

Directed operations of the $350M Essex County Resource Recovery Facility, annual gross revenues of $65M. Responsible for P&L, facility staff of 100 employees, organizational and business development, asset improvement, customer, government, regulatory and media relations.

- Analyzed/restructured business deal with EBT improvement of 24%/year for five consecutive years.
- Operated facility at 8% increased throughput while maintaining maintenance costs at original level.
- Piloted safety process optimization and cost management systems which became company standard.
- Initiated sustainable cost reduction program cutting annual cost by $0.5M en-route to $1M.
- Obtained OSHA VPP Star Site certification achieving 13 months without an OSHA recordable injury.
- Recognized in company for leadership, teamwork and empowerment skills.

Alan Iantosca
Fiberight, Project Team Leader & VP of Engineering

AMERICAN REF-FUEL COMPANY, Houston, TX 1988 – 2000

Manager, Operations, Houston, TX 1994 – 1995
Key member on due diligence teams for acquisition of two Ref-Fuel facilities. Coordinated operations input and lessons learned in the design of the Niagara, NY facility $150M construction retrofit.

Head of Engineering, Birmingham, UK 1992 – 1994
Key member of ex-patriot team and Operating Committee Member starting up WTE joint venture with English power company. Directed all company engineering and environmental activities.

Manager, Operations Support, Houston, TX 1991 – 1992
Liaison between the operations Department and the Corporate Office including support of existing projects and new development activities.

Start-up Manager, Newark, NJ 1989 – 1991
Structured and executed a safe, environmentally sound, cost effective and on schedule start-up of the Essex County Resource Recovery Facility (ECRRF), the largest WTE facility in New Jersey.

Operations Project Manager, NY, NY 1988 – 1989
Lead member on design team for the ECRRF providing operating / business input and guidance to the team ensuring a design with the lowest possible evaluated capital cost while facilitating efficient operations and ease of construction and maintenance.

AIR PRODUCTS AND CHEMICALS, INC., Allentown, PA 1979 – 1988

Assistant Production Manager 1984 – 1988
Managed 5 domestic and 5 international tonnage air separation plants providing pipeline gases and bulk liquids via pipeline and bulk tanker to the steel and electronic industries and also a LNG peak shaving facility. Involved in formation / growth of international joint ventures in Korea, Thailand and Malaysia.

Design Engineer / Operations Mechanical Engineer 1979 – 1984
Designed and executed new and retrofit asset improvement projects up to $1M. Involved in the design, construction, start-up and repair of various plants and systems in the U.S. and overseas. Performed staff function in piping stress analysis, plant HVAC design / specification and design, specification and procurement of packaged process and utility systems.

EDUCATION

BS, Mechanical Engineering, Villanova University, Villanova, PA

Continuing Business Education, Columbia University, New York, NY

Fiberight

Steven T. Ragiel
Fiberight Board Member – Responsible for Hampden Project

Project Team Role:

Mr. Ragiel is a Fiberight board member who will take an executive position with the company to focus on the Hampden project. Mr. Ragiel will fill important project, commercial and contracting roles, as well as providing technical assistance with matters regarding waste management, recycling and the pre-sorting process for the planned Hampden plant.

Education / Training
Vanderbilt University, Nashville, Tennessee, Bachelor of Chemical Engineering, 1986

Professional Experience

Seasoned executive with proven leadership qualities, solid growth credentials, entrepreneurial orientation, and success in applying technology to business opportunities. Twenty years of world-wide experience in commodity-driven manufacturing businesses. Excellent track-record of building teams, integrating acquisitions, tailoring solutions for customers, restructuring capacity, hedging commodity risk, reducing unit costs and improving margins in order to increase shareholder value.

GREENSTAR North America, Houston, Texas / Dublin, Ireland
CEO, Director (2005 – Present)
Founded and built Greenstar North America into a $200 million/year, 20 facility, multi-material commodity processor and manufacturer. Member of and reporting into the Greenstar Board of Directors with full responsibility for the development and implementation of the initial business plan, ongoing strategic planning, annual budgets, P+L performance, hedging strategy, financial controls and human resource development.

- Growth driven through a combination of acquisitions and organic sales. Primary customer base includes major solid waste haulers, municipalities and multinational companies.
- Integrated acquisitions through a combination of; cultural workshops, a detailed communications strategy, the implementation of common metrics and common financial and operating software packages, sharing of operational best practices and peer reviews of major capital investments.
- Implemented innovative automated ballistic and optical processing at regional hubs in order to increase both out-bound quality and yield while significantly reducing labor costs.
- Implemented a commodity upgrading strategy that included the manufacture of reflective glass beads for use in highway construction, production of furnace ready cullet for use in the manufacture of new glass bottles, and the conversion of recycled HDPE bottles into food grade HDPE packaging in the UK.
- Rationalized acquired company SG+A costs through the centralization of all accounting, HR, Finance, hedging and procurement functions.
- Improved acquired company safety performance by 60% over a two year period from a starting OSHA recordable TRIR metric of over 12.0 to a current rate under 5.0.
- 2005 through first half of 2006 – Dublin Ireland based – advised Greenstar Ireland and Greenstar UK on the implementation of customer account profitability and the build out of manufacturing infrastructure.

Past Experience

RECYCLE AMERICA ALLIANCE LLC, Houston, Texas / Chicago Illinois
President
(1997 - 2005)
Initiated and built Recycle America Alliance (RAA) into the largest recycling company in North America with $750 million/year in diversified manufacturing and commodity marketing revenues. Managed all aspects of the business including: P+L, Sales and Marketing, 3,000 employees, 80 manufacturing facilities, 100 product grade offering and 20 sales offices. Member of and reported to the RAA Board of Directors.

- Increased annual EBITDA by over $35 million, in the period 2004 vs. 2003 as a result of $8 million in SG+A cost reductions, an 8% improvement in manufacturing plant labor cost per ton, and 5% volume growth.
- Built the Recycle America brand into the premiere recycle services offering in North America.

Steven T. Ragiel
Fiberight Board Member – Responsible for Hampden Project

- Generated overall compound revenue growth of more than 25% per year, 1997 through 2005.
- Significant organic growth achieved through building a customer service culture and a revitalized sales and marketing program focused on key regional and national retail and IPS accounts.
- Built strong partnerships with both domestic and international paper mill customers through long term contracts and direct mill investment in RAA plants.
- Implemented a $100 million multi-year investment program to upgrade plants using optical scanning and ballistic separation technologies, generating an average pretax ROI at the upgraded sites in excess of 25%.
- Implemented a "Manufacturing Excellence" program of key metrics, benchmarking, facility scorecards, and annual awards – decreased manufacturing cost per ton by 29% from 1999 to 2005.
- Rationalized capacity by closing and combining over 70 processing sites. The average volume per remaining plant increased by 150%.
- Negotiated and executed 25 acquisitions and successfully kept owners of acquired businesses engaged in the company. Success in this area due mainly to building an effective change management and entrepreneurial culture at RAA.
- Built a pulp and paper financial trading business in year 2000 to provide customers with price risk management tools and Hedged out 70% of overall RAA revenues. In 2004, spun-off the trading business to a strategic buyer while maintaining preferred access to markets.

WASTE MANAGEMENT INTERNATIONAL plc, London, England
Director of Resource Recovery
(1992-1997)
Brand management responsibility for $225 million per year, international resource recovery business.

- Expanded operations to meet surging customer demand for resource recovery services. New demand driven primarily by the initial round of Product Stewardship legislation in Europe and Asia.
- Grew manufacturing network from 17 facilities in five countries in 1992 to over 70 facilities in 17 countries by 1997 in Europe, Asia, and Australia. Growth was generated through a balance of 50% organic-green field start-ups and 50% acquisition activity.

WASTE MANAGEMENT OF NORTH AMERICA, Atlanta, Georgia
Region Manager
(1990 - 1992)
Responsible for manufacturing operations in a ten-state region in the southeastern US.

HDR ENGINEERING, Alexandria, Virginia
Technical Director (1987 - 1990)
Responsible for evaluating competitive bids, negotiating terms, and awarding service contracts.

Other Professional / Business Affiliations

- National Recycling Coalition, Board of Directors and Executive Committee, year 2000 to 2006
- PRI, Board of Directors, 1997-1999, Joint Venture with Stone Container
- CRA, Board of Directors, 1997–2000, Joint Venture with American National Can/Pechiney
- RAA was the National Recycling Coalition, annual "Recycle Works" award winner for 2003. Award recognizes outstanding corporate and personal contributions to recycling in the United States.
- *"Waste News"* Newsmaker of the Year runner-up in 2000 and 2003.

Introduction Bio of George H. Aronson
Waste Conversion Technologies: Now and Coming
Speaker for 8:30 to 9:40 concurrent session on Monday

George Aronson is a principal and co-founder of CommonWealth Resource Management Corporation with more than 30 years of consulting experience in the area of solid waste management. He began working in Maine in 1989, when he assisted the towns that subsequently formed the MRC to re-negotiate their waste disposal agreements with PERC. Mr. Aronson is now leading the MRC's efforts to plan for MSW management after the PERC agreements expire in 2018. Mr. Aronson's other clients include the Town of Nantucket, which has operated a mixed-MSW composting facility since 2001, and the Town of Bourne, Massachusetts, where he led procurement and negotiation of a site lease and development agreement with Harvest Power for a large-scale AD facility for source-separated organics. Mr. Aronson's company, CRMC, recently brought into commercial operation an anaerobic digestion facility to process food waste into bio-gas for electricity generation at the Crapo Hill landfill in Dartmouth, Massachusetts.

Mr. Aronson has a bachelor's degree in mechanical engineering from MIT and a master's degree from the John F. Kennedy School of Government at Harvard University. For the last two years, he has spoken at the Environmental Protection Technology International Forum in Yenchang, Jiangshu Province, north of Shanghai, China.

GEORGE H. ARONSON
Principal

PROFESSIONAL QUALIFICATIONS

EDUCATION

Master in Public Policy, Kennedy School of Government at Harvard University (1983).

Bachelor of Science in Mechanical Engineering, Massachusetts Institute of Technology (1978).

SUMMARY OF EXPERIENCE

Nearly twenty years of progressively responsible experience supporting the development of capital projects and programs as an analyst, project manager, and senior management consultant, with a broad record of accomplishment in the fields of solid waste management, independent power production, utility regulation and energy conservation. Areas of expertise include:

Business and economic analysis in support of internal and external investments in or acquisition of environmental facilities, programs, and services, including waste–to-energy, landfill gas utilization, materials recovery, and renewable resource power generation projects and enterprises.

Procurement of solid waste management facilities and services on behalf of facility/service sponsors and users, including identifying and structuring of business ownership and financing arrangements; preparation of procurement documents; proposal evaluation; and support of vendor selection and service contract negotiations.

Development of integrated plans for resource management, including the design and implementation of waste reduction and recycling strategies and development of transportation and disposal arrangements at landfills and waste-to-energy facilities.

Acquisition of power purchase agreements, including energy market assessments, proposal preparation, contract negotiations, interconnection studies and contracts and acquisition of regulatory approvals.

SELECTED PROJECT EXPERIENCE

Independent Power Producer. Supported development of landfill gas-to-energy facilities at seven landfills in the Northeast and numerous other landfills nation-wide. Projected landfill gas quantities; analyzed data on landfill gas quality and composition; evaluated technical and economic feasibility of utilization alternatives; prepared proposals for facility development and energy recovery and sales; negotiated contracts with public and private landfill owners; acquired and negotiated electric power and thermal energy sales agreements; and supported acquisition of environmental permits and project financing. Prepared pro forma economic analyses of landfill gas utilization facilities in support of feasibility studies, investment decisions, and control technology assessments. Managed interconnection studies and implementation of interconnection efforts during construction. Coordinated local development efforts with landfill owners throughout the development and construction process.

Municipal Review Committee. Representing group of >80 Maine municipalities in successful redevelopment of $100 million refuse-derived-fuel (RDF) waste-to-energy facility facing bankruptcy. Assessed facility technical and economic condition, outlined negotiation strategy, and presented results to public officials. Negotiated interim agreement, monitored operations, and supported negotiation and compliance with long-term agreement Supported restructuring of the agreements and refinancing of the facility in order to mitigate impacts of the existing power purchase agreement on utility stranded costs while minimizing impacts on tipping fees. Review tipping fee calculations, pass-through costs and capital improvement proposals on an ongoing basis.

Major Law Firm. Prepared testimony regarding future waste disposal market conditions in Massachusetts as expert witness in support of litigation defense for a large integrated waste management services company. Collected and analyzed historical data on tip fees and available disposal capacity at regional disposal facilities. Prepared testimony based on analysis of market trends that led to negotiated settlement of outstanding issues**.**

City of Holyoke, Massachusetts. Performed market assessment to identify the available alternatives for disposal of waste at the end of a ten-year contract. Surveyed waste-to-energy facilities, landfills and transfer stations throughout southern New England and identified associated transportation requirements and potential disposal costs and contract terms. Used the survey to develop a request for proposals for waste disposals, which attracted four

strong responses. Assisted in evaluating the proposals, selecting the preferred vendor, and finalizing a long-term agreement for disposal services. The procured agreement provided Holyoke with savings of more than 20 percent in disposal costs as compared to its previous arrangement.

National Waste Services Company. Supported initiatives to extend operating permits and to gain approval for horizontal and vertical expansions at existing Massachusetts landfills. Prepared documents in support of environmental impacts review process. Acquired and reviewed data on current and projected capacity at existing and proposed disposal facilities. Developed model to project waste generation and diversion rates and to compare the demand and supply of waste disposal capacity under a wide variety of market conditions. Utilized model results as the basis for developing permitting strategies and for presenting comments to the Massachusetts Department of Environmental Protection.

Prudential Management Advisors Inc. Assisted bondholders in sale of position in troubled waste-to-energy facility. Evaluated facility technical capabilities, operating costs conditions of local disposal market in order to assess potential economic performance. Identified potential purchaser and assisted in negotiation of purchase agreement and facility refinancing.

An International Facility Developer. Prepared competitive bids and participated in negotiations for the long-term sale to regulated utilities of energy output from proposed 240 TPD waste-to-energy facility. Developed energy pricing strategies and performed project pro-forma economic analyses. Analyzed regional waste generation and disposal capacity to demonstrate need for the facility to meet environmental permitting requirements.

Various public clients. Prepared requests for proposals, and evaluation manuals to procure construct, operate, and/or own waste-to-energy facilities, mixed-waste composting facilities, and business, technical, and cost proposals, as well as financing and marketing plans. Supported public selection process, vendor contract negotiations, site selection and development activities, acquisition of environmental permits, financing, construction monitoring. Involved in more than 30 projects at all phases of development.

The Chelsea Receivership. Recommended new user fee rate schedule for solid waste collection and disposal services offered by municipal solid waste department. Analyzed collection and disposal quantities and costs for various classes of waste generators. Identified and evaluated various user fee approaches and rate schedule alternatives.

Town of Marblehead, Massachusetts. Coordinated the technical and economic assessment of a proposed solid waste recycling, processing and combustion facility that would use innovative technology to convert waste to fuel. Reviewed proposed facility to determine whether claimed technical performance could be achieved and whether proposed tipping fees were reasonable and adequate. Compared proposed tipping fees to the range of alternatives available to the Town. Prepared comprehensive written report and presented results and recommendations to Town Selectmen at public meeting.

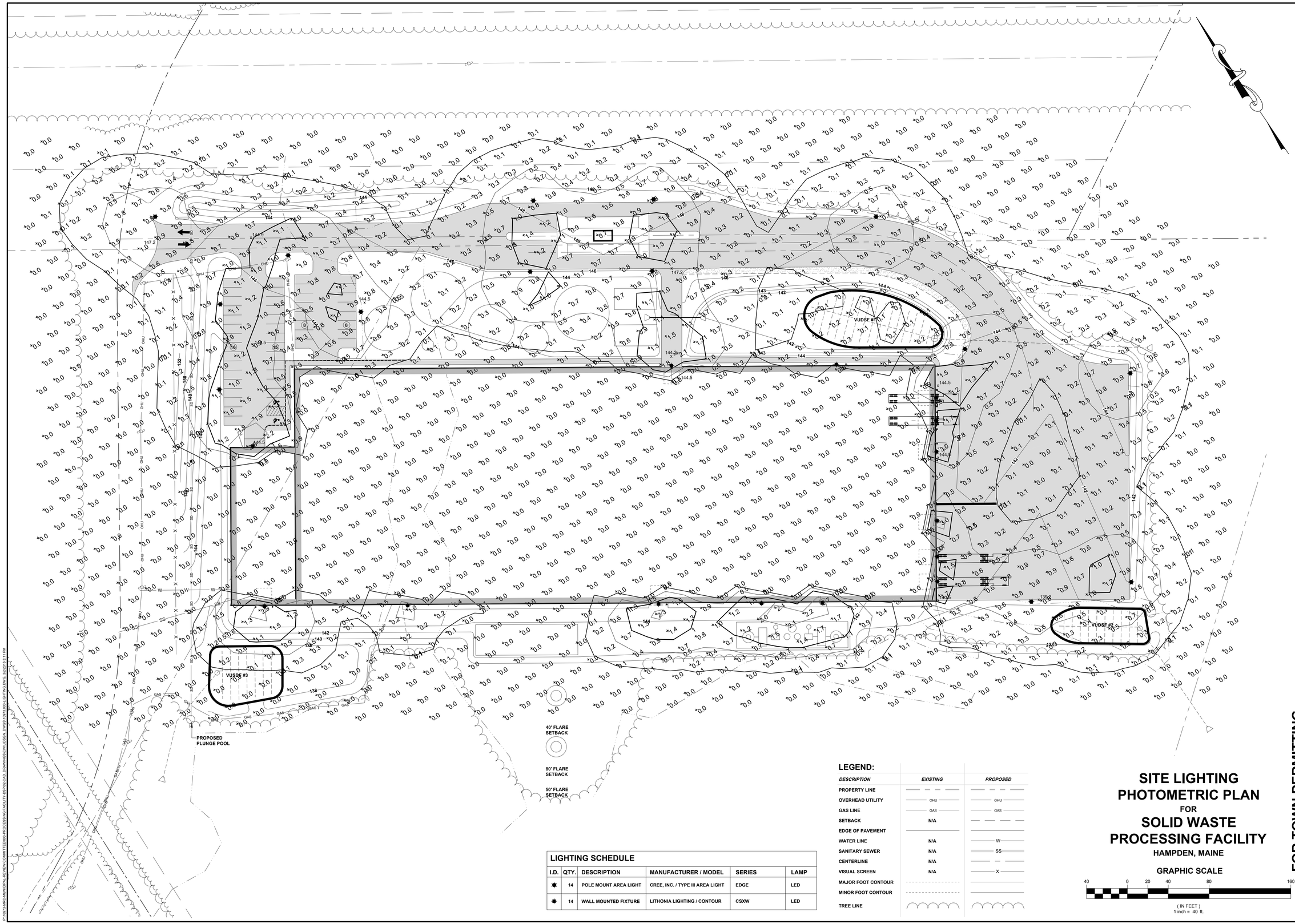
City of Concord, New Hampshire. Managed and directed preparation of Solid Waste Master Plan. Analyzed waste quantities and composition, reviewed federal and state waste reduction and recycling initiatives, evaluated residential curbside recycling alternatives, and presented commercial sector recycling program initiatives. Assessed existing disposal commitments and evaluated disposal alternatives for vehicle wastes, construction and demolition debris, yard wastes, and bulky wastes. Reviewed public works department organizational structure, productivity of collection operations, opportunities for privatization, budgeting practices, and potential for implementing user fees. Presented recommendations to City Council.

Orange County, Florida. Deputy project manager for preparation of Refuse Disposal Facilities Master Plan for large publicly-owned landfill and associated recycling and composting collection and processing programs. Analyzed waste quantities and composition, estimated remaining landfill capacity and development costs, evaluated alternatives for recycling, composting, volume reduction, and waste-to-energy, assessed the need for transfer stations, and prepared life-cycle cost analysis of alternative systems. Worked with electric utility to assess technical and economic feasibility of co-combusting refuse-derived fuel with pulverized coal in proposed electric generating station. Presented results to citizens groups and public officials.

Town of Sharon, Massachusetts. As Chair of Recycling Advisory Committee since 1992, designed and implemented town's curbside recycling program. Developed requests for proposals, evaluated bids, and recommended vendors to selectmen. Worked with vendors to deliver recycling bins and provide public education during program start-up efforts. Involved in ongoing efforts to monitor program implementation and to continue public education efforts.

APPENDIX 8

LIGHTING DIAGRAM



LIGHTING SCHEDULE

I.D.	QTY.	DESCRIPTION	MANUFACTURER / MODEL	SERIES	LAMP
✱	14	POLE MOUNT AREA LIGHT	CREE, INC. / TYPE III AREA LIGHT	EDGE	LED
✱	14	WALL MOUNTED FIXTURE	LITHONIA LIGHTING / CONTOUR	CSXW	LED

LEGEND:

DESCRIPTION	EXISTING	PROPOSED
PROPERTY LINE		
OVERHEAD UTILITY	OHU	OHU
GAS LINE	GAS	GAS
SETBACK	N/A	
EDGE OF PAVEMENT		
WATER LINE	N/A	W
SANITARY SEWER	N/A	SS
CENTERLINE	N/A	
VISUAL SCREEN	N/A	X
MAJOR FOOT CONTOUR		
MINOR FOOT CONTOUR		
TREE LINE		

SITE LIGHTING PHOTOMETRIC PLAN
FOR
SOLID WASTE PROCESSING FACILITY
HAMPDEN, MAINE

GRAPHIC SCALE

40 0 20 40 80 160

(IN FEET)
1 inch = 40 ft.

FOR TOWN PERMITTING

CES INC
Engineers • Environmental Scientists • Surveyors

Brewer
46 South Main Street
PO Box 639
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T 207-989-4824
F 207-989-4881

Presque Isle
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F 207-764-9414

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Waterville, ME
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F 207-680-2204

Machias
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Machias, ME
T 207-255-8370
F 207-255-8387

Bar Harbor
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T 207-288-5587
F 207-288-6688

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84 Mechanic Street
Lewiston, ME
T 207-795-6009
F 207-795-6128

PROJECT TITLE
MRC / FIBERIGHT SOLID WASTE PROCESSING FACILITY
HAMPDEN, MAINE

SHEET TITLE
SITE LIGHTING PHOTOMETRIC PLAN

REV.	DESCRIPTION	DATE	DRAWN BY	CHECKED BY
R1				
R2				
R3				
R4				
R5				
R6				
R7				

STATE OF MAINE
SEAN M. THIES
No. 10139
03/03/2016
LICENSED
PROFESSIONAL ENGINEER

SCALE	1"=150'
DATE	2016-02-29
DRAWN BY	BLQ/WAB
CHECKED BY	SMT
DESIGNED BY	BLQ/SMT
APPROVED BY	SMT
JOB NUMBER	10973.003
DRAWING NUMBER	C104

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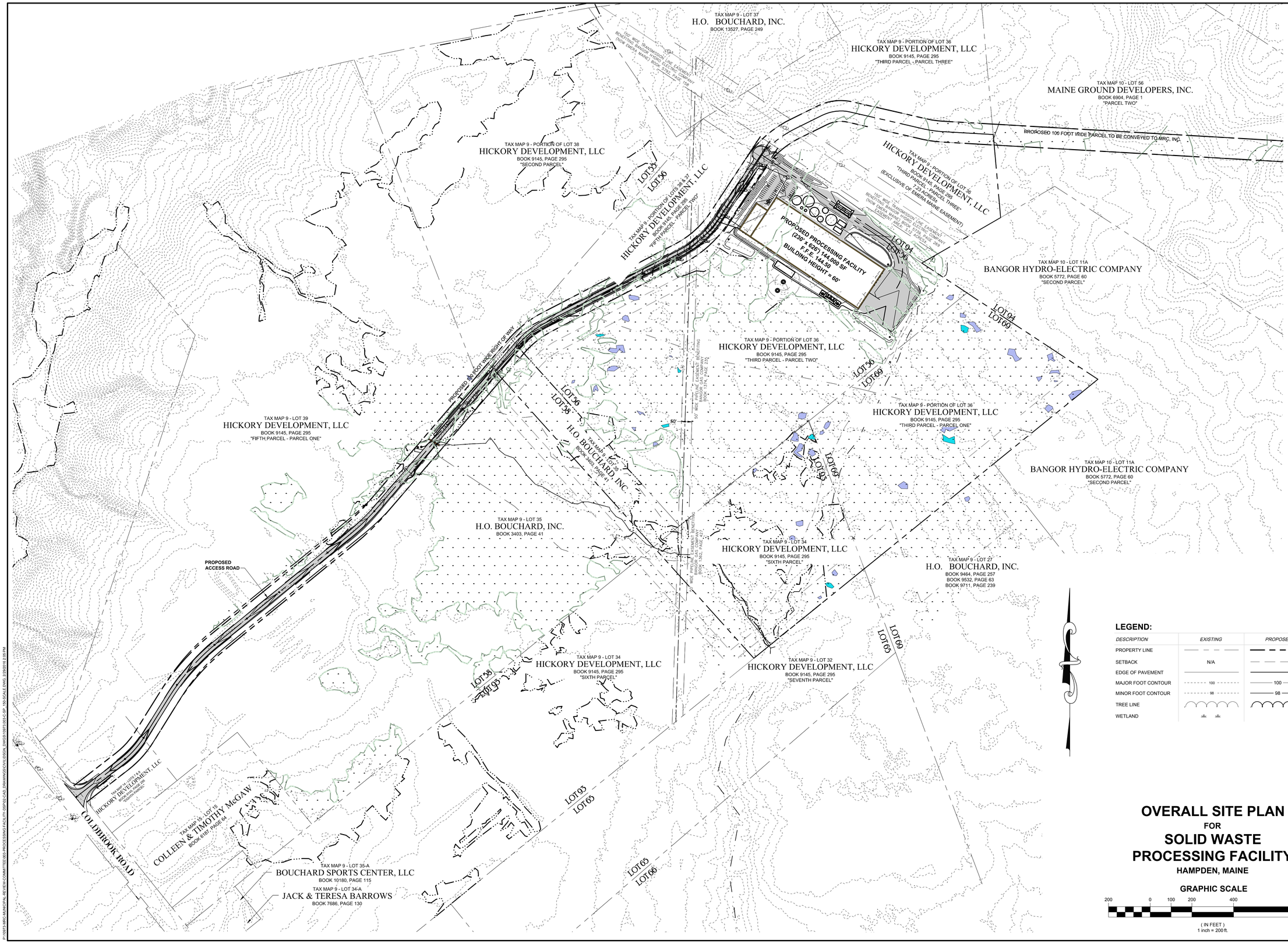
APPENDIX 9

PROPOSED SITE PLANS

C101	Overall Site Plan
C102	Proposed Site Plan
C103	Enlarged Site Plan
C201	Plan and Profile Sta 0+00 to 11+50
C202	Plan and Profile Sta 11+50 to 23+50
C203	Plan and Profile Sta 23+50 to 35+00
C204	Plan and Profile Sta 35+00 to 46+50
C501	Site Details
C502	Site Details
C503	Site Details
C504	Site Details



LEGEND:

DESCRIPTION	EXISTING	PROPOSED
PROPERTY LINE		
SETBACK	N/A	
EDGE OF PAVEMENT		
MAJOR FOOT CONTOUR	100	100
MINOR FOOT CONTOUR	98	98
TREE LINE		
WETLAND		

OVERALL SITE PLAN
FOR
SOLID WASTE PROCESSING FACILITY
HAMPDEN, MAINE

GRAPHIC SCALE

200 0 100 200 400 800

(IN FEET)
1 inch = 200 ft.

FOR TOWN PERMITTING

CES INC
Engineers • Environmental Scientists • Surveyors

Brewer
465 South Main Street
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F: 207-288-0588

Lewiston
640 Main Street
Lewiston, ME
T: 207-795-6009
F: 207-795-6128

PROJECT TITLE
MRC / FIBERIGHT SOLID WASTE PROCESSING FACILITY
HAMPDEN, MAINE

SHEET TITLE
OVERALL SITE PLAN

REV.	DESCRIPTION	DATE	DRAWN BY	CHECKED BY
R7				
R6				
R5				
R4				
R3				
R2				
R1				

STATE OF MAINE
SEAN M. THIES
No. 10139
03/03/2016
LICENSED
PROFESSIONAL ENGINEER

SCALE	1"=200'
DATE	2016-02-29
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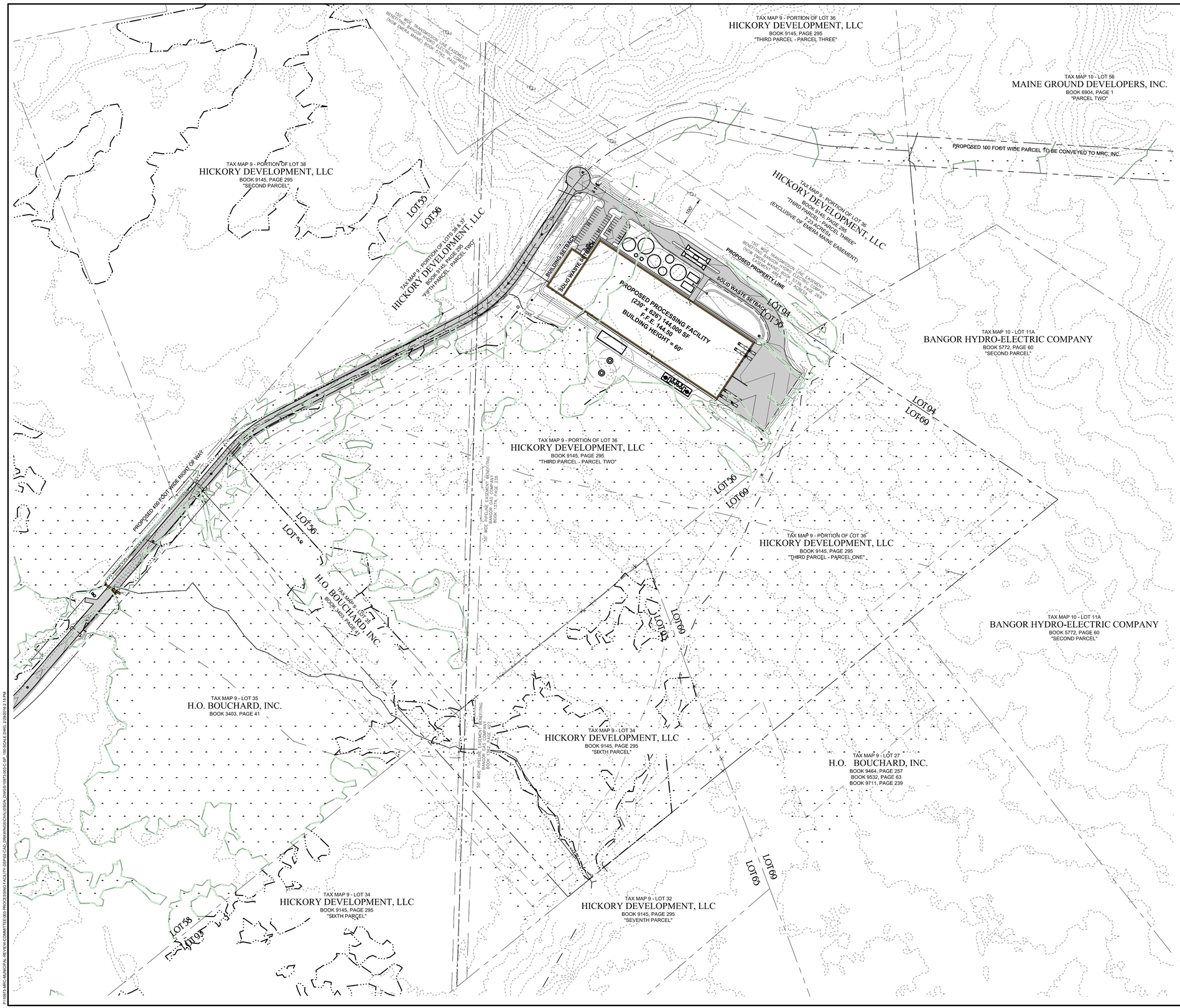
CHECKED BY	SMT
DESIGNED BY	SMT
APPROVED BY	SMT
JOB NUMBER	10973.003
DRAWING NUMBER	C101



LEGEND:

DESCRIPTION	EXISTING	PROPOSED
PROPERTY LINE		
SETBACK	N/A	
EDGE OF PAVEMENT		
MAJOR FOOT CONTOUR	100	100
MINOR FOOT CONTOUR	98	98
TREE LINE		
WETLAND		

PROPOSED SITE PLAN
FOR
SOLID WASTE PROCESSING FACILITY
HAMPDEN, MAINE

GRAPHIC SCALE

150 0 75 150 300 600

(IN FEET)
1 inch = 150 ft.

FOR TOWN PERMITTING

Pinnacle Isle
4439 Main Street
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F 207-784-9414

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F 207-680-2204

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F 207-989-4881

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F 207-288-6688

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Machias, ME
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F 207-255-8387

CES INC
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PROJECT TITLE
MRC / FIBERIGHT SOLID WASTE PROCESSING FACILITY
HAMPDEN, MAINE

SHEET TITLE
SITE PLAN

REV.	DESCRIPTION	DATE	DRAWN BY	CHECKED BY
R2				
R1				
R2				
R3				
R4				
R2				
R2				
R1				

STATE OF MAINE
SEAN M. THIES
No. 10139
03/03/2016
CENSEO
PROFESSIONAL ENGINEER

SCALE	1"=150'
DATE	2016-02-29
DRAWN BY	BLQ
CHECKED BY	SMT
DESIGNED BY	BLQ/SMT
APPROVED BY	SMT
JOB NUMBER	10973.003
DRAWING NUMBER	C102

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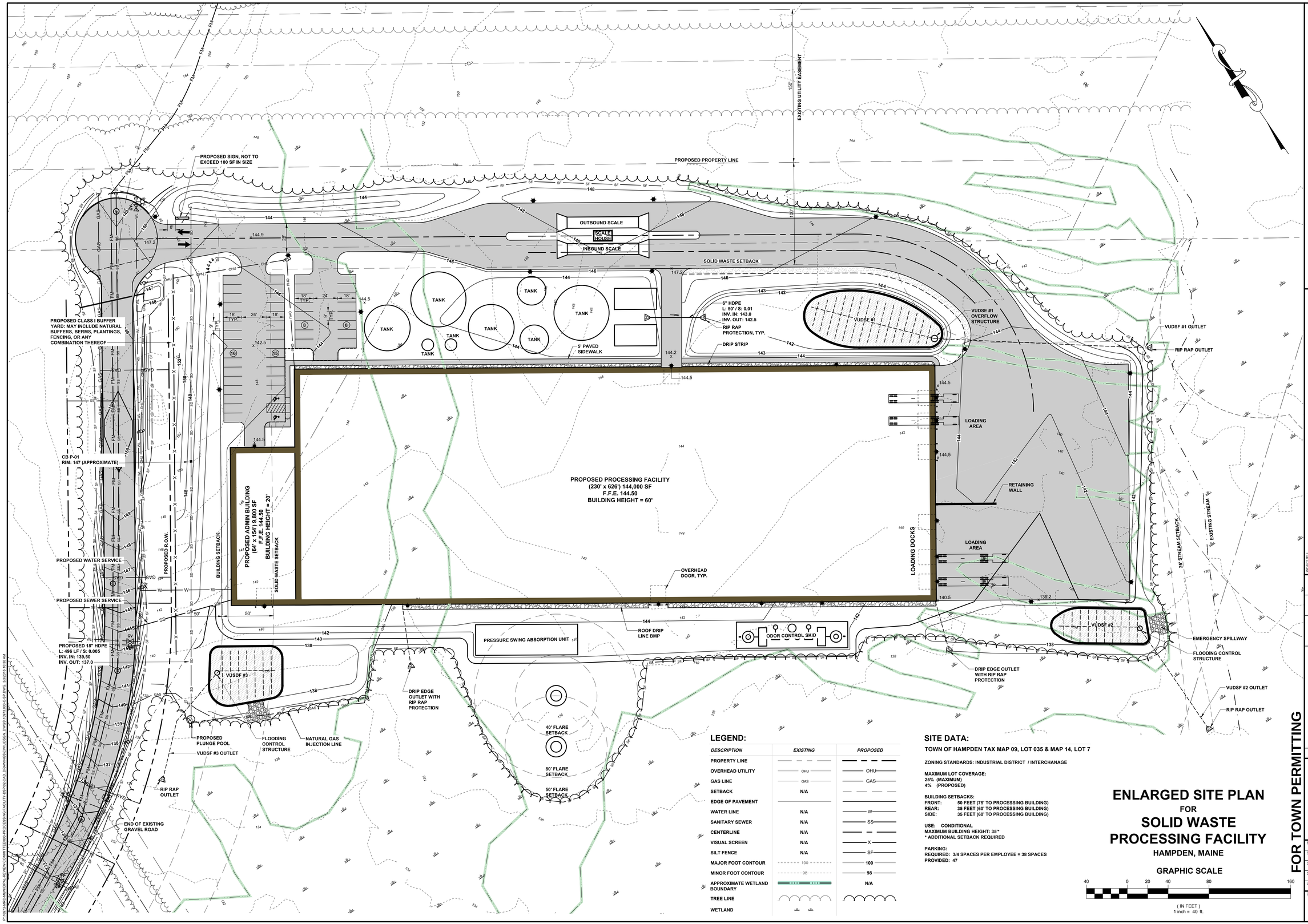

LEGEND:

DESCRIPTION	EXISTING	PROPOSED
PROPERTY LINE		
OVERHEAD UTILITY	OHU	OHU
GAS LINE	GAS	GAS
SETBACK	N/A	
EDGE OF PAVEMENT		
WATER LINE	N/A	W
SANITARY SEWER	N/A	SS
CENTERLINE	N/A	
VISUAL SCREEN	N/A	X
SILT FENCE	N/A	SF
MAJOR FOOT CONTOUR	100	100
MINOR FOOT CONTOUR	98	98
APPROXIMATE WETLAND BOUNDARY		N/A
TREE LINE		
WETLAND		

SITE DATA:

TOWN OF HAMPDEN TAX MAP 09, LOT 035 & MAP 14, LOT 7

ZONING STANDARDS: INDUSTRIAL DISTRICT / INTERCHANAGE

MAXIMUM LOT COVERAGE:
25% (MAXIMUM)
4% (PROPOSED)

BUILDING SETBACKS:
FRONT: 50 FEET (75' TO PROCESSING BUILDING)
REAR: 35 FEET (60' TO PROCESSING BUILDING)
SIDE: 35 FEET (60' TO PROCESSING BUILDING)

USE: CONDITIONAL
MAXIMUM BUILDING HEIGHT: 35'*
* ADDITIONAL SETBACK REQUIRED

PARKING:
REQUIRED: 3/4 SPACES PER EMPLOYEE = 38 SPACES
PROVIDED: 47

ENLARGED SITE PLAN
FOR
SOLID WASTE PROCESSING FACILITY
HAMPDEN, MAINE

GRAPHIC SCALE
40 0 20 40 80 160
(IN FEET)
1 inch = 40 ft.

FOR TOWN PERMITTING

Brewer
489 South Main Street
PO Box 639
Brewer, ME
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F 207-989-4881

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F 207-288-6688

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44 Lisbon Street
Lewiston, ME
T 207-795-6009
F 207-795-6128

CES INC
Engineers • Environmental Scientists • Surveyors

PROJECT TITLE
MRC / FIBERIGHT SOLID WASTE PROCESSING FACILITY
HAMPDEN, MAINE

SHEET TITLE
ENLARGED SITE PLAN

REV.	DESCRIPTION	DATE	DRAWN BY	CHECKED BY
R7				
R6				
R5				
R4				
R3				
R2				
R1				

STATE OF MAINE
SEAN M. THIES
No. 10139
03/03/2016
LICENSED
PROFESSIONAL ENGINEER

SCALE	1"=150'
DATE	2016-03-03
DRAWN BY	BLQ/WAB
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JOB NUMBER	10973.003
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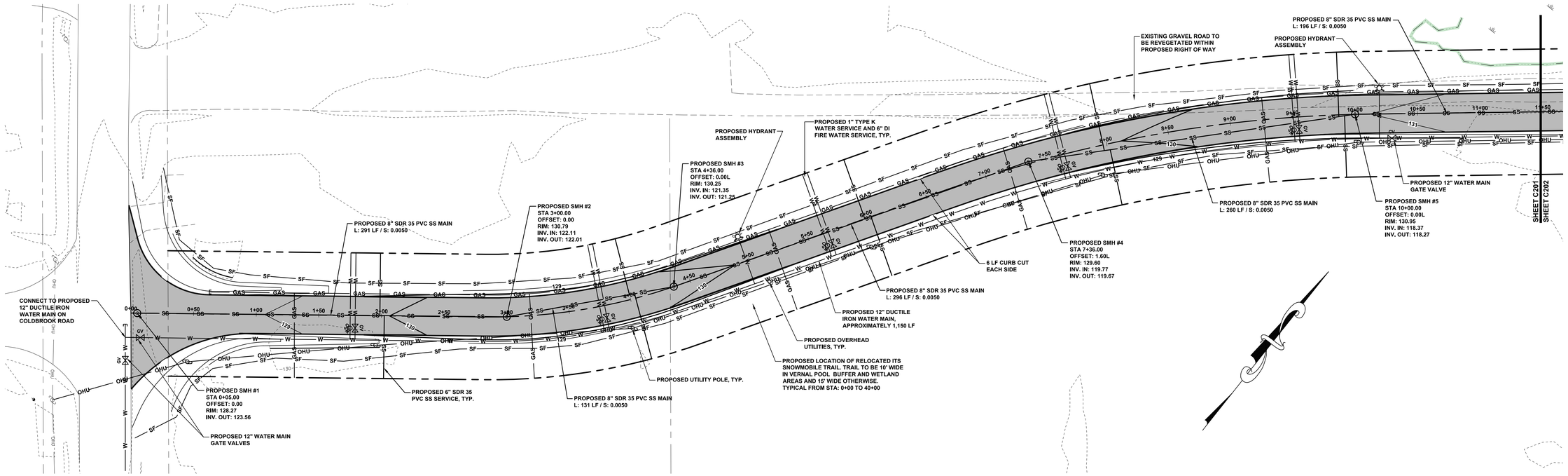
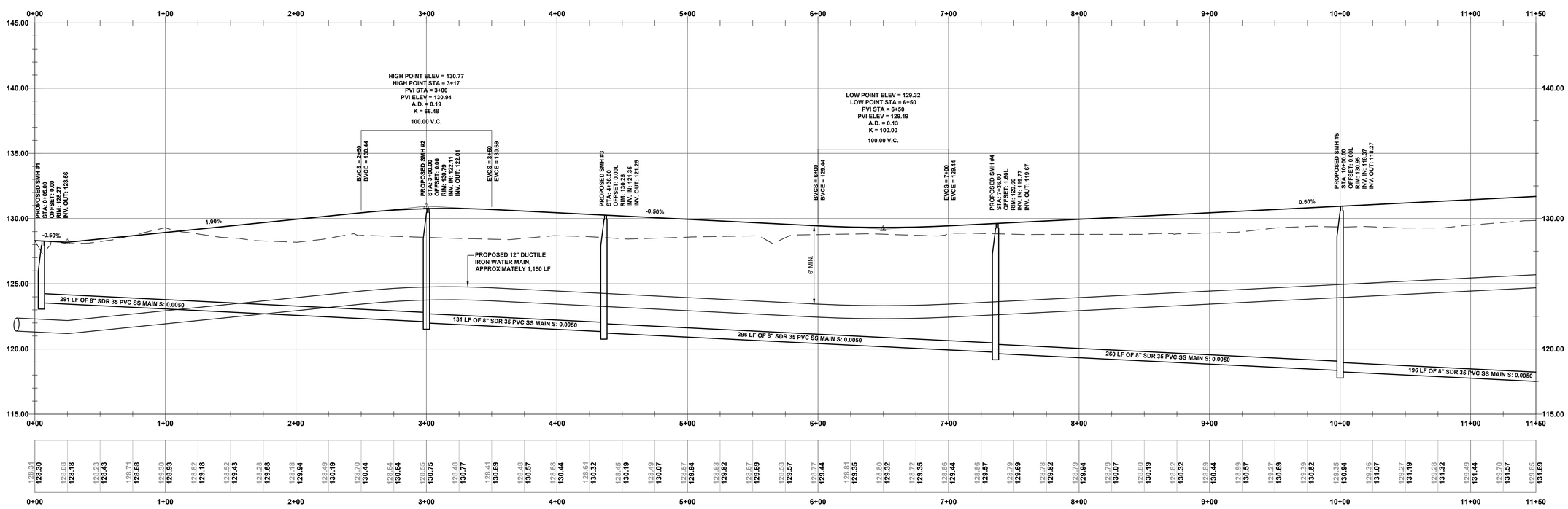


PLAN - STA: 0+00 TO 11+50

SCALE: 1"=40'



PROFILE - STA: 0+00 TO 11+50

SCALE: H: 1"=40'
V: 1"=4'

GRAPHIC SCALE

40 0 20 40 80 160

(IN FEET)
1 inch = 40 ft.

FOR TOWN PERMITTING

Brewer
Brewer Spectrum Main Street
PO Box 639
Brewer, ME
T 207-989-4824
F 207-989-4881

Presque Isle
Presque Isle Main Street
PO Box 627
Presque Isle, ME
T 207-764-8412
F 207-764-8414

Waterville
Waterville Main Street
Suite 204
Waterville, ME
T 207-680-2202
F 207-680-2204

Lewiston
Lewiston Main Street
Lewiston, ME
T 207-795-6009
F 207-795-6168

Bar Harbor
Bar Harbor Hwy 102
Bar Harbor, ME
T 207-288-0587
F 207-288-0588

Machias
Machias Main Street
PO Box 587
Machias, ME
T 207-255-8270
F 207-255-8367

CES INC
Engineers • Environmental Scientists • Surveyors

PROJECT TITLE
MRC / FIBERIGHT ACCESS ROAD
HAMPDEN, MAINE

SHEET TITLE
PLAN AND PROFILE
STA: 0+00 TO 11+50

REV.	DESCRIPTION	DATE	DRAWN BY	CHECKED BY
R7				
R6				
R5				
R4				
R3				
R2				
R1				

STATE OF MAINE
SEAN M. THIES
No. 10139
03/03/2016
LICENSED
PROFESSIONAL ENGINEER

SCALE	1"=40'
DATE	2015-02-20
DRAWN BY	WAB
CHECKED BY	ACH
DESIGNED BY	ACH
APPROVED BY	SMT
JOB NUMBER	10973.002
DRAWING NUMBER	C201

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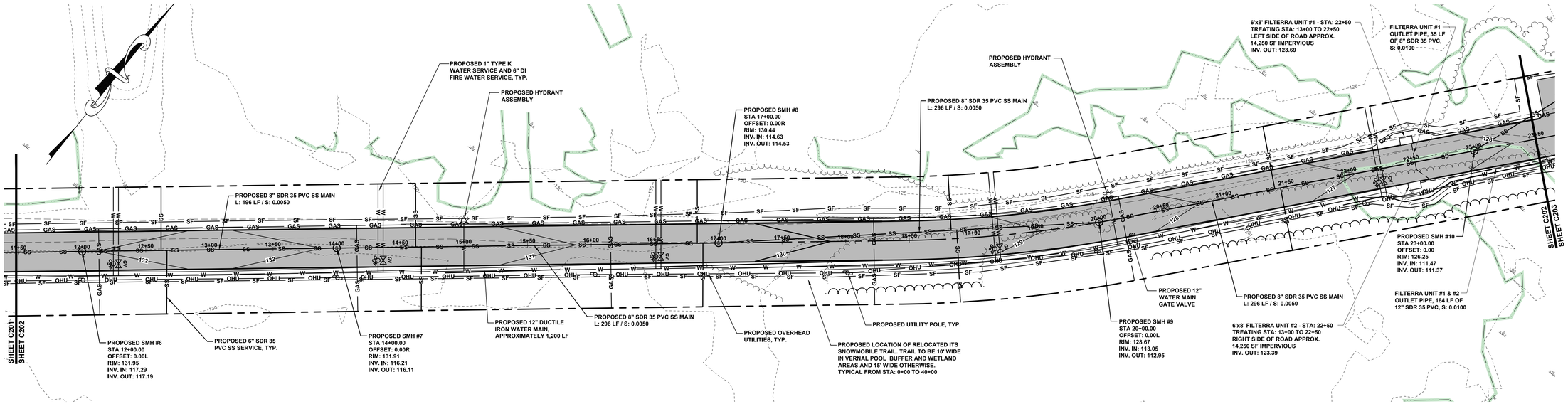
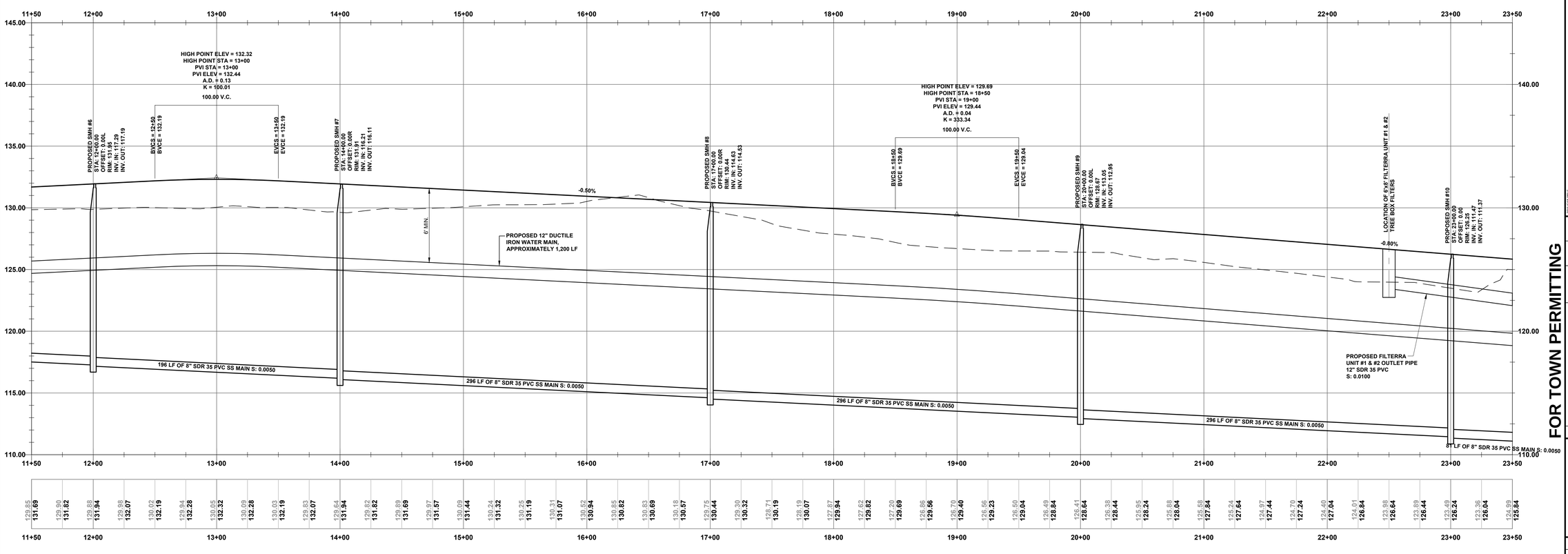


PLAN - STA: 11+50 TO 23+50

SCALE: 1"=40'



PROFILE - STA: 11+50 TO 23+50

SCALE: H: 1"=40'
V: 1"=4'

GRAPHIC SCALE

40 0 20 40 80 160

(IN FEET)
1 inch = 40 ft.

FOR TOWN PERMITTING

Brewer
48 Maplewood Avenue
Suite 204
Portland, ME
T: 207-780-2202
F: 207-780-2204

Waterville
44 Main Street
Suite 204
Waterville, ME
T: 207-680-2202
F: 207-680-2204

Bangor
489 South Main Street
PO Box 639
Bangor, ME
T: 207-989-4824
F: 207-989-4881

Presque Isle
PO Box 627
Presque Isle, ME
T: 207-764-8412
F: 207-764-8414

Lewiston
415 Lisbon Street
Lewiston, ME
T: 207-795-6009
F: 207-795-6168

Machias
4 Court Street
PO Box 587
Machias, ME
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Bar Harbor
1 Knox Road, Hwy 102
Bar Harbor, ME
T: 207-288-0087
F: 207-288-6688

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REV	DESCRIPTION	DATE	DRAWN BY	CHECKED BY
R2				
R1				
R0				

PROJECT TITLE
MRC / FIBERIGHT ACCESS ROAD
HAMPDEN, MAINE

SHEET TITLE
PLAN AND PROFILE
STA: 11+50 TO 23+50

STATE OF MAINE
SEAN M. THIES
No. 10139
03/03/2016
LICENSED
PROFESSIONAL ENGINEER

SCALE	1"=40'
DATE	2015-02-20
DRAWN BY	WAB
CHECKED BY	ACH
DESIGNED BY	ACH
APPROVED BY	SMT
JOB NUMBER	10973.002
DRAWING NUMBER	C202

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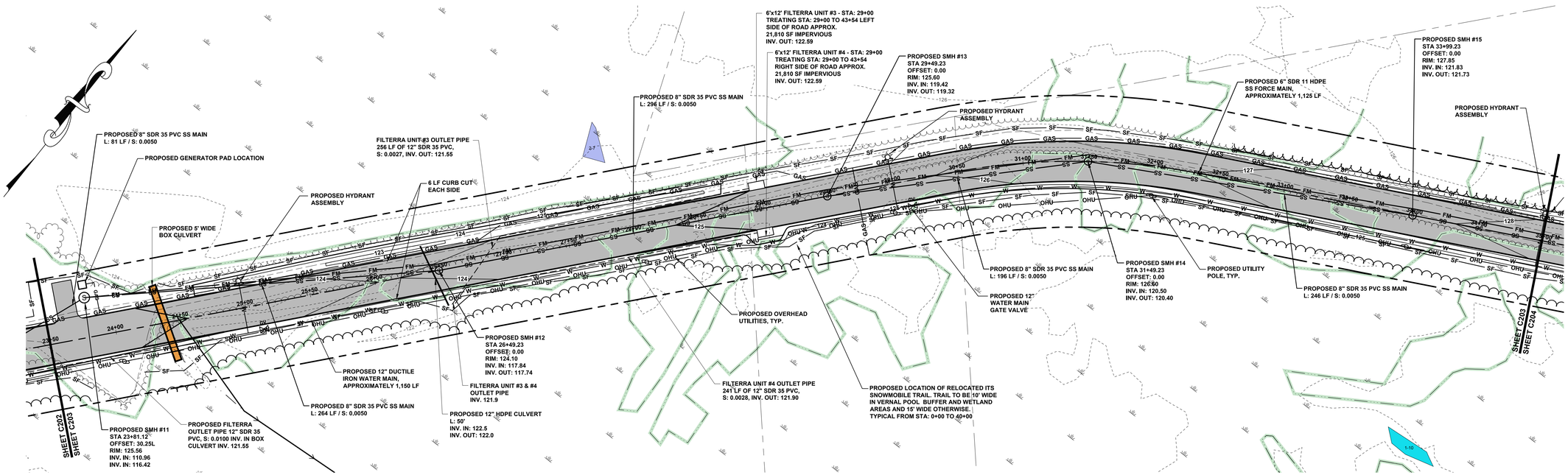

PLAN - STA: 23+50 TO 35+00

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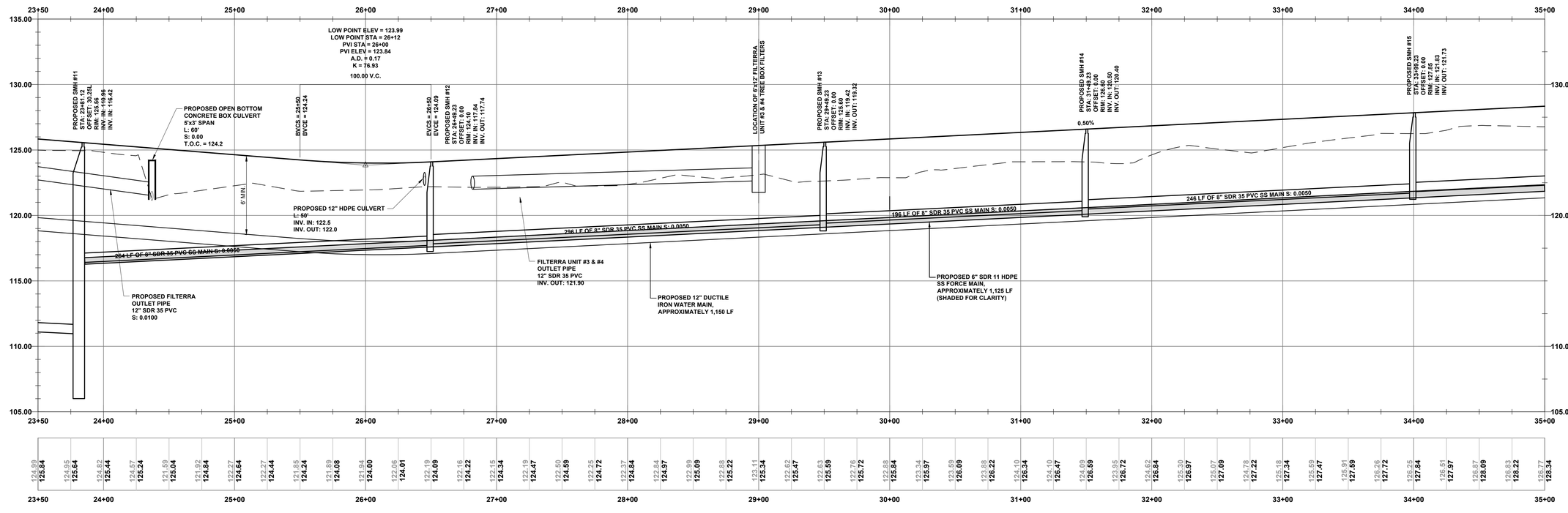

PROFILE - STA: 23+50 TO 35+00

SCALE: H: 1"=40'
V: 1"=4'

GRAPHIC SCALE

40 0 20 40 80 160

(IN FEET)
1 inch = 40 ft.

FOR TOWN PERMITTING

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PROJECT TITLE
MRC / FIBERIGHT ACCESS ROAD
HAMPDEN, MAINE

SHEET TITLE
PLAN AND PROFILE
STA: 23+50 TO 35+00

REV	DESCRIPTION	DATE	DRAWN BY	CHECKED BY
R1				
R2				
R3				
R4				
R5				
R6				

STATE OF MAINE
SEAN M. THIES
No. 10139
03/03/2016
LICENSED
PROFESSIONAL ENGINEER

SCALE	1"=40'
DATE	2015-02-20
DRAWN BY	WAB
CHECKED BY	ACH
DESIGNED BY	ACH
APPROVED BY	SMT
JOB NUMBER	10973.002
DRAWING NUMBER	C203

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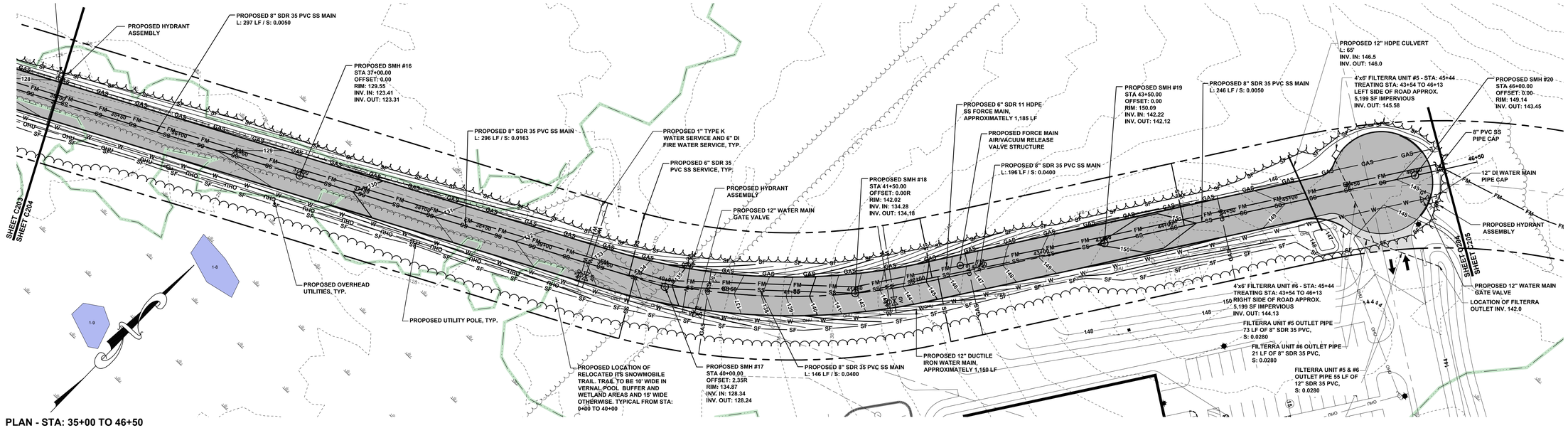
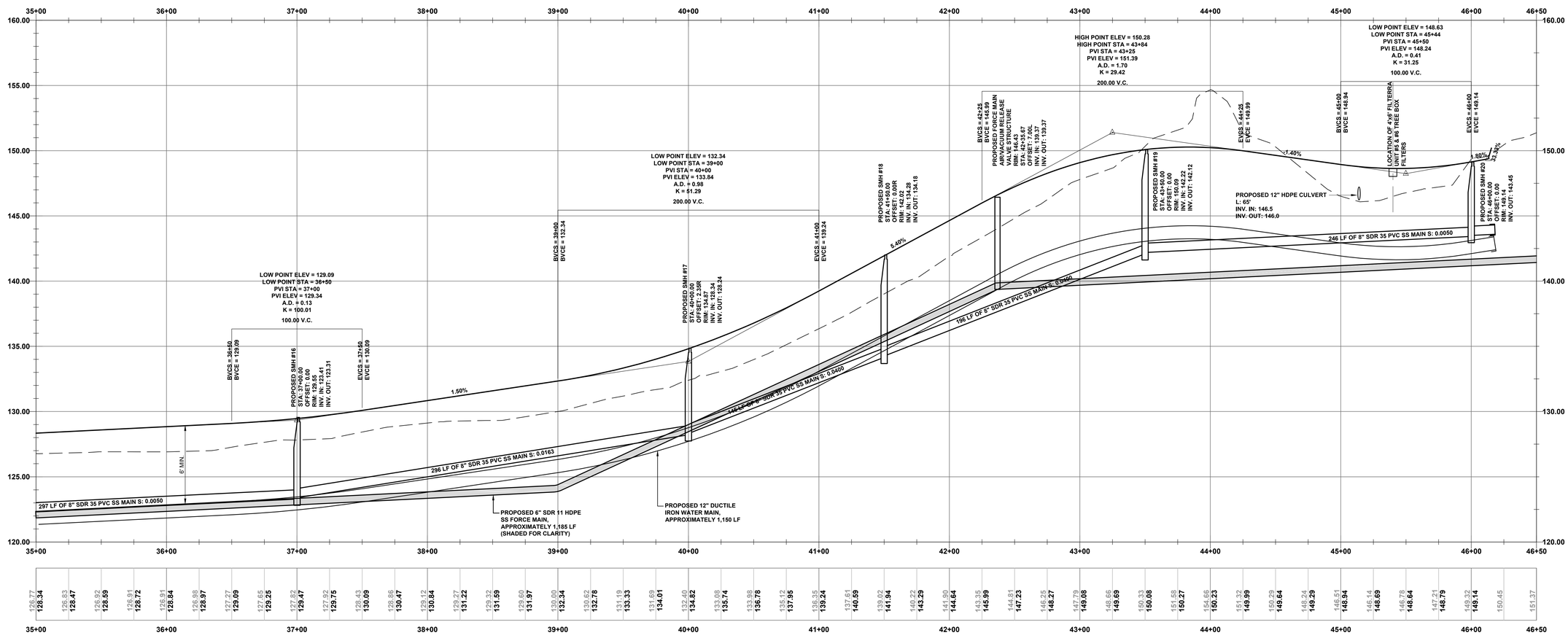


PLAN - STA: 35+00 TO 46+50

SCALE: 1"=40'



PROFILE - STA: 35+00 TO 46+50

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(IN FEET)
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Engineers • Environmental Scientists • Surveyors

PROJECT TITLE
MRC / FIBERIGHT ACCESS ROAD
HAMPDEN, MAINE

SHEET TITLE
PLAN AND PROFILE
STA: 35+00 TO 46+50

REV.	DESCRIPTION	DATE	DRAWN BY	CHECKED BY
R7				
R6				
R5				
R4				
R3				
R2				
R1				

FOR TOWN PERMITTING

STATE OF MAINE
SEAN M. THIES
No. 10139
03/03/2016
LICENSED
PROFESSIONAL ENGINEER

SCALE	1"=40'
DATE	2015-02-20
DRAWN BY	WAB
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DESIGNED BY	ACH
APPROVED BY	SMT
JOB NUMBER	10973.002
DRAWING NUMBER	C204

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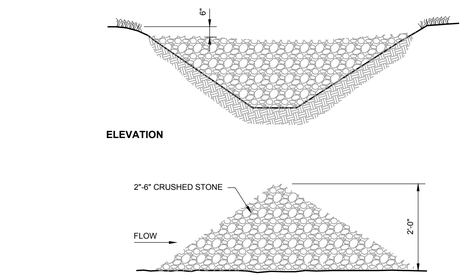
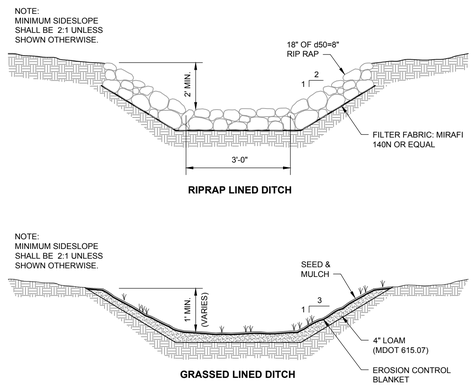


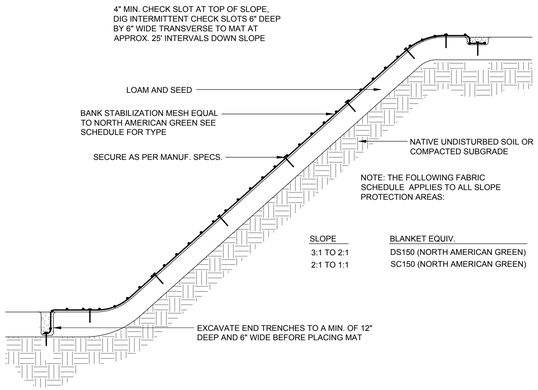
STONE CHECK DAM DETAIL

N.T.S.



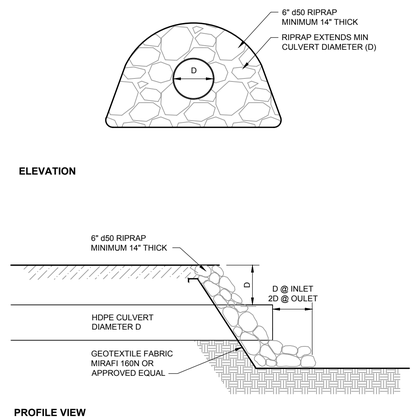
TYPICAL DITCH DETAILS

N.T.S.



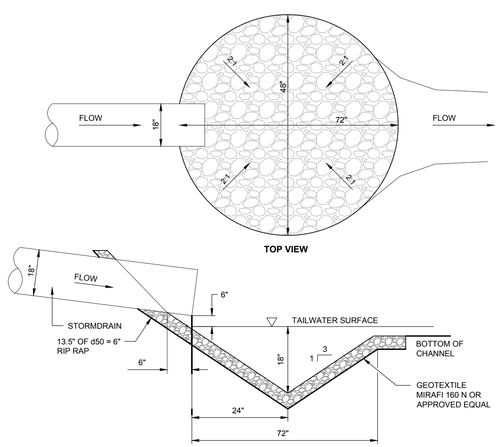
BANK STABILIZATION DETAIL

N.T.S.



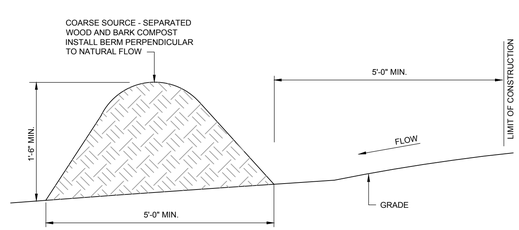
TYPICAL CULVERT INLET/OUTLET PROTECTION DETAIL

N.T.S.



TYPICAL PLUNGE POOL DETAIL

N.T.S.

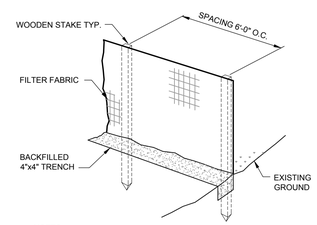


EROSION CONTROL BERM DETAIL

N.T.S. (MAY BE USED AS AN ALTERNATE TO SILT FENCE)

GENERAL NOTES

1. THE UTILITY LOCATIONS SHOWN ARE APPROXIMATE AND REQUIRE FIELD VERIFICATION BY THE CONTRACTOR.
2. CONTRACTOR SHALL COORDINATE CONSTRUCTION ACTIVITY WITH UTILITY COMPANIES, EMERGENCY SERVICES, THE TOWN, AND MDOT.
3. 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.
4. CONTRACTOR SHALL PERFORM ALL CONSTRUCTION ACTIVITIES RELATED TO THE PROJECT WITHIN THE CONFINES OF EASEMENTS SECURED BY THE TOWN OF HAMPDEN. ANY CONSTRUCTION ACTIVITY, MATERIAL STORAGE ETC., TAKING PLACE ON PRIVATE PROPERTY SHALL BE WITH THE EXPRESS WRITTEN PERMISSION OF THE OWNER.
5. IF UNEXPECTED HAZARDOUS WASTE OR MATERIALS CONTAINING HAZARDOUS WASTE ARE ENCOUNTERED DURING CONSTRUCTION, THE CONTRACTOR SHALL IMMEDIATELY CEASE WORK AND CONTACT THE OWNER, ENGINEER, CONTRACTING OFFICER, AND DEP. WHEN A DEP APPROVED ACTION PLAN IS DETERMINED, WORK SHALL CONTINUE, AND ALL HAZARDOUS WASTE AND MATERIALS CONTAINING HAZARDOUS WASTE SHALL BE DISPOSED OF IN COMPLIANCE WITH THE APPROVED ACTION PLAN AND ALL APPLICABLE FEDERAL, STATE, AND LOCAL LAWS.
6. MOVEABLE TRENCH BOXES SHALL BE USED ON OPEN TRENCH EXCAVATIONS.
7. 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.
8. 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".
9. 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.
10. THE CONTRACTOR SHALL COORDINATE ALL CONSTRUCTION WITH THE TOWN OF HAMPDEN, MAINE, UTILITY COMPANIES, DIG SAFE, EMERGENCY SERVICES AND MAINE DEPARTMENT OF TRANSPORTATION (MDOT) 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 800-225-4977. REPAIR OF ANY DAMAGED UTILITY WILL BE INCIDENTAL TO THIS PROJECT.
11. INSULATE ALL WATER MAINS WITH LESS THAN 6.0 FEET OF COVER, OR WHERE DIRECTED BY THE ENGINEER. RIGID INSULATION REQUIRED: CLOSED-CELL RIGID FOAMED POLYSTYRENE, EQUAL TO "STYROFOAM" HI-60, BY DOW CHEMICAL. 2" THICK BY 4' WIDE, UNLESS OTHERWISE NOTED.
12. CONTRACTOR SHALL MAINTAIN TRAFFIC IN A SAFE MANNER AT ALL TIMES DURING CONSTRUCTION. THE CONTRACTOR SHALL MAKE EVERY EFFORT TO MAINTAIN CONTINUOUS TRAFFIC FLOW DURING CONSTRUCTION. THE ROADS SHALL NOT BE CLOSED TO TRAFFIC WITHOUT PERMISSION FROM THE TOWN OF HAMPDEN.
13. 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.
14. RESTORE ALL AREA DISTURBED BY CONTRACTOR'S OPERATIONS TO ORIGINAL CONDITION (GRAVEL, PAVEMENT, GRASS, ETC.) UNLESS NOTED OTHERWISE ON PLANS. RESTORATION OF GRAVEL ROAD AND DRIVEWAY SURFACES AND LAWNS DAMAGED BY CONTRACTOR SHALL BE INCIDENTAL TO THE PROJECT.
15. EXISTING FACILITIES AND IMPROVEMENTS (I.E. TREES, LIGHT POLES, SIGNS, ETC.) SHALL BE REMOVED AND REPLACED OR PROTECTED AS REQUIRED DURING CONSTRUCTION. THE ASSOCIATED COSTS ARE INCIDENTAL TO THE PROJECT. BRACING OF UTILITY POLES, WHERE REQUIRED, SHALL BE INCIDENTAL TO THE PROJECT AND NO SEPARATE PAYMENT SHALL BE MADE.
16. IT IS ASSUMED THAT THERE IS NO BEDROCK WITHIN THE PROJECT LIMITS, BUT A PROVISION WITHIN THE BID FORM PROVIDES FOR A UNIT COST IN THE EVENT THAT BEDROCK OR ROCKS EXCEEDING 2 CY IN VOLUME ARE ENCOUNTERED. PAYMENT WILL BE IN A UNIT PRICE BASIS AS INDICATED IN THE SPECIFICATIONS.
17. WHENEVER POSSIBLE, EXISTING PLANTINGS SHALL BE PRESERVED BY WHATEVER METHOD NECESSARY INCLUDING TRANSPLANTING AND/OR TEMPORARY RELOCATION.
18. 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.
19. CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL NECESSARY CONSTRUCTION PERMITS. PERMIT APPLICATIONS SHALL BE SUBMITTED WITH ADEQUATE TIME SO AS NOT TO DELAY CONSTRUCTION.
20. WHEN MAKING INTERCONNECTIONS TO ACTIVE COMBINED, SEPARATED, OR STORM SEWER LINES, PERFORM SUCH WORK AT LOW FLOW TIMES AND IN A MANNER TO MAINTAIN FLOWS. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING TEMPORARY BY-PASS PUMPING OF FLOWS OR OTHER MEANS AS NECESSARY TO ENSURE CONTINUOUS FLOW. THIS COST SHALL BE CONSIDERED INCIDENTAL TO THE CONTRACT.
21. ALL FINISH SURFACES SHALL BE INSTALLED TO PROMOTE POSITIVE DRAINAGE. IN NO WAY SHALL THE NEW FINISH SURFACES AND CONVEYANCES CREATE DRAINAGE PROBLEMS THAT DID NOT EXIST PRIOR TO CONSTRUCTION.
22. CONTRACTOR SHALL BE RESPONSIBLE FOR THE LAYOUT OF ALL PROPOSED WORK AS SHOWN ON DRAWINGS.
23. STATIONS AND OFFSETS FOR MANHOLES, CATCH BASINS, AND OTHER STRUCTURES ARE SHOWN TO THE CENTER OF EACH.
24. 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. IT IS ASSUMED THAT THE RIGHT OF WAY IS DEFINED BY THE OUTSIDE EDGE OF EXISTING CURB OR OUTSIDE EDGE OF SIDEWALK WHERE APPLICABLE.
25. HOURS FOR THE PROJECT WILL BE MONDAY THROUGH FRIDAY, FROM 7:00 AM TO 7:00 PM, UNLESS OTHERWISE AUTHORIZED BY THE OWNER.
26. DECHLORINATION OF DISINFECTION WATER WILL BE A REQUIREMENT DURING THE PIPE DISINFECTION PROCESS.



NOTES:

1. KEY FABRIC IN A 4"x4" TRENCH W/BACKFILL.
2. SILT FENCE SHALL BE A 3' FENCE WITH A MINIMUM GRAB STRENGTH OF 120 LBS.

SILT FENCE DETAIL

N.T.S.

EROSION CONTROL NOTES

1. ALL SEDIMENTATION AND EROSION CONTROL MEASURES SHALL BE IN ACCORDANCE WITH THE MAINE EROSION AND SEDIMENTATION CONTROL BMPS, PUBLISHED BY THE BUREAU OF LAND AND WATER QUALITY, MAINE DEPARTMENT OF ENVIRONMENTAL PROTECTION, LATEST EDITION.
2. SILT FENCE WILL BE INSPECTED, REPLACED AND/OR REPAIRED IMMEDIATELY FOLLOWING ANY SIGNIFICANT RAINFALL OR SNOW MELT OR LOSS OF SERVICEABILITY DUE TO SEDIMENT ACCUMULATION. AT A MINIMUM, ALL EROSION CONTROL DEVICES WILL BE OBSERVED WEEKLY.
3. DURING THE CONSTRUCTION PHASE, INTERCEPTED SEDIMENT WILL BE RETURNED TO CONSTRUCTION SITE.
4. 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.
5. ALL DISTURBED AREAS WILL BE SEEDED 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.
6. A SUITABLE BINDER SUCH AS CURASOL OR TERRTACK WILL BE USED ON THE HAY MULCH FOR WIND CONTROL.
7. 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.
8. 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.
9. INTERIOR SILT FENCES 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 INTERIOR SILT FENCES IS TO LIMIT SEDIMENT TRANSPORT WITHIN THE SITE TOWARD THE PROTECTED CATCH BASIN INLETS TO MINIMIZE SEDIMENT REMOVAL REQUIRED BY THE EROSION CONTROL NOTE 9 PROTECTIONS AND EXTEND LIFE OF SUCH DEVICES.
10. THE CONTRACTOR SHALL PROVIDE A SEDIMENT BASIN FOR ALL WATER PUMPED FROM EXCAVATIONS. BASIN SHALL BE DESIGNED AND CONSTRUCTED IN ACCORDANCE WITH THE "MAINE EROSION AND SEDIMENT HANDBOOK FOR CONSTRUCTION: BEST MANAGEMENT PRACTICES". THE CONTRACTOR SHALL SUBMIT FOR REVIEW/APPROVAL PRIOR TO BEGINNING ANY PROJECT WORK.
11. CONSTRUCTION OVERSIGHT:
    THE CONTRACTOR WILL RETAIN THE SERVICES OF A PROFESSIONAL ENGINEER TO INSPECT THE CONSTRUCTION AND STABILIZATION OF ALL STORMWATER MANAGEMENT STRUCTURES. ONCE ALL STORMWATER MANAGEMENT STRUCTURES ARE CONSTRUCTED AND STABILIZED, THE INSPECTING ENGINEER WILL NOTIFY THE DEPARTMENT IN WRITING WITHIN 30 DAYS TO STATE THAT THE POND HAS BEEN COMPLETED. ACCOMPANYING THE ENGINEER'S NOTIFICATION MUST BE A LOG OF THE ENGINEER'S INSPECTIONS GIVING THE DATE OF EACH INSPECTION, THE TIME OF EACH INSPECTION, AND THE ITEMS INSPECTED ON EACH VISIT, AND INCLUDE ANY TESTING DATA OR SIEVE ANALYSIS DATA OF EVERY MINERAL SOIL AND SOIL MEDIA SPECIFIED IN THE PLANS AND USED ON SITE.
12. DEWATERING
    A DEWATERING PLAN IS NEEDED TO ADDRESS EXCAVATION DE-WATERING FOLLOWING HEAVY RAINFALL EVENTS OR WHERE THE EXCAVATION MAY INTERCEPT THE GROUNDWATER TABLE DURING CONSTRUCTION. THE COLLECTED WATER NEEDS TREATMENT AND A DISCHARGE POINT THAT WILL NOT CAUSE DOWNGRADIENT EROSION AND OFFSITE SEDIMENTATION OR WITHIN A RESOURCE. PLEASE FOLLOW THE DETAILS OF SUCH A PLAN.
13. FILTRATION STRUCTURES:
    ROUTINE CLEARING OF ACCUMULATED TRASH AND DEBRIS IS REQUIRED TO PREVENT CLOGGING OF THE INLET OPENING (JUST AS WITH ANY CATCH BASIN, INLET OR OTHER IN-CURB UNIT). AMERICAST INCLUDES A ONE-YEAR MAINTENANCE PLAN WITH EACH FILTERRA® SYSTEM TO ENSURE THE SYSTEMS ARE OPERATING PER SPECIFICATIONS. IN ADDITION, THE OWNER WILL PROVIDE AN EXECUTED 5 YEAR INSPECTION AND MAINTENANCE CONTRACT PRIOR TO CONSTRUCTION. SAID CONTRACT WILL BE WITH A PROFESSIONAL WITH KNOWLEDGE OF EROSION AND STORMWATER CONTROL, INCLUDING A DETAILED WORKING KNOWLEDGE OF THE PROPOSED BMP'S.

    THE COMPANY RECOMMENDS THAT LONG-TERM MAINTENANCE BE PERFORMED ON AT LEAST A SEMI-ANNUAL BASIS (GENERALLY SPRING AND FALL SERVICING) TO HELP PRESERVE FILTERRA® FLOW-THROUGH RATES AND TREATMENT PERFORMANCE ALSO FOUND IN THE FILTERRA® IOM. EACH MAINTENANCE SESSION SHOULD INCLUDE, AT A MINIMUM, THE FOLLOWING:

    * INSPECTION OF THE SYSTEM STRUCTURE AND MEDIA;
    * REMOVAL OF TRASH AND SILT FROM THE FILTER SURFACE;
    * REPLACEMENT OF THE SURFACE MULCH LAYER. COMPLETE REPLACEMENT OF THE SOIL MEDIA IS GENERALLY
    * REQUIRED ONLY AS PART OF A SPILL CLEAN-UP.
    * PRUNING OF VEGETATION. IF VEGETATION IS IN DEAD OR IN POOR HEALTH, IT WILL REPLACEMENT; AND
    * APPROPRIATE DISPOSAL OF ALL REFUSED ITEMS.

    AMERICAST OFFERS EXTENDED MAINTENANCE SERVICES OR TRAINING TO FACILITATE ON-GOING MAINTENANCE. A MORE DETAILED DESCRIPTION OF THE MAINTENANCE PROCEDURES IS PRESENTED IN THE FILTERRA® IOM.
14. UNDERDRAINED FILTER BASINS:
    CONSTRUCTION SEQUENCE: THE SOIL FILTER MEDIA AND VEGETATION MUST NOT BE INSTALLED UNTIL THE AREA THAT DRAINS TO THE FILTER HAS BEEN PERMANENTLY STABILIZED WITH PAVEMENT OR OTHER STRUCTURE, 90% VEGETATION COVER, OR OTHER PERMANENT STABILIZATION UNLESS THE RUNOFF FROM THE CONTRIBUTING DRAINAGE AREA IS DIVERTED AROUND THE FILTER UNTIL STABILIZATION IS COMPLETED.
    COMPACTION OF SOIL FILTER: FILTER SOIL MEDIA AND UNDERDRAIN BEDDING MATERIAL MUST BE COMPACTED TO BETWEEN 90% AND 92% STANDARD PROCTOR. THE BED SHOULD BE INSTALLED IN AT LEAST 2 LIFTS OF 9 INCHES TO PREVENT POCKETS OF LOOSE MEDIA.
    CONSTRUCTION OVERSIGHT: INSPECTION BY A PROFESSIONAL ENGINEER WILL OCCUR AT A MINIMUM:
    - AFTER THE PRELIMINARY CONSTRUCTION OF THE FILTER GRADES AND ONCE THE UNDERDRAIN PIPES ARE INSTALLED BUT NOT BACKFILLED,
    - AFTER THE DRAINAGE LAYER IS CONSTRUCTED AND PRIOR TO THE INSTALLATION OF THE FILTER MEDIA,
    - AFTER THE FILTER MEDIA HAS BEEN INSTALLED AND SEEDED. BIO-RETENTION CELLS MUST BE STABILIZED PER THE PROVIDED PLANTING SCHEME AND DENSITY FOR THE CANOPY COVERAGE OF 30 AND 50%.
    - AFTER ONE YEAR TO INSPECT HEALTH OF THE VEGETATION AND MAKE CORRECTIONS, AND
    - ALL THE MATERIAL USED FOR THE CONSTRUCTION OF THE FILTER BASIN MUST BE CONFIRMED AS SUITABLE BY THE DESIGN ENGINEER. TESTING MUST BE DONE BY A CERTIFIED LABORATORY TO SHOW THAT THEY ARE PASSING DEP SPECIFICATIONS.

    TESTING AND SUBMITTALS: THE CONTRACTOR SHALL IDENTIFY THE LOCATION OF THE SOURCE OF EACH COMPONENT OF THE FILTER MEDIA. ALL RESULTS OF FIELD AND LABORATORY TESTING SHALL BE SUBMITTED TO THE PROJECT ENGINEER FOR CONFIRMATION. THE CONTRACTOR SHALL:
    - SELECT SAMPLES FOR SAMPLING OF EACH TYPE OF MATERIAL TO BE BLENDED FOR THE MIXED FILTER MEDIA AND SAMPLES OF THE UNDERDRAIN BEDDING MATERIAL. SAMPLES MUST BE A COMPOSITE OF THREE DIFFERENT LOCATIONS (GRABS) FROM THE STOCKPILE OR PIT FACE. SAMPLE SIZE REQUIRED WILL BE DETERMINED BY THE TESTING LABORATORY.
    - PERFORM A SIEVE ANALYSIS CONFORMING TO STM C136 (STANDARD TEST METHOD FOR SIEVE ANALYSIS OF FINE AND COURSE AGGREGATES 1996A) ON EACH TYPE OF THE SAMPLE MATERIAL. THE RESULTING SOIL FILTER MEDIA MIXTURE MUST HAVE 8% TO 12% BY WEIGHT PASSING THE #200 SIEVE, A CLAY CONTENT OF LESS THAN 2% (DETERMINED HYDROMETER GRAIN SIZE ANALYSIS) AND HAVE 10% DRY WEIGHT OF ORGANIC MATTER.
    - PERFORM A PERMEABILITY TEST ON THE SOIL FILTER MEDIA MIXTURE CONFORMING TO ASTM D2434 WITH THE MIXTURE COMPACTED TO 90-92% OF MAXIMUM DRY DENSITY BASED ON ASTM D698.
15. STONE BERMED LEVEL LIP SPREADER
    INSPECTIONS BY A PROFESSIONAL ENGINEER SHALL CONSIST OF WEEKLY VISITS TO THE SITE TO INSPECT EACH LEVEL SPREADERS CONSTRUCTION, STONE BERM MATERIAL AND PLACEMENT, SETTLING BASIN FROM INITIAL GROUND DISTURBANCE TO FINAL STABILIZATION OF THE LEVEL SPREADER.
16. ROOF DRIP EDGE FILTERS:
    INSPECTIONS BY A PROFESSIONAL ENGINEER SHALL CONSIST OF WEEKLY VISITS TO THE SITE TO INSPECT EACH THE ROOF DRIP EDGE FILTER'S UNDERDRAIN CONSTRUCTION, FILTER MATERIAL PLACEMENT, AND OVERFLOW FROM INITIAL GROUND DISTURBANCE TO FINAL STABILIZATION OF THE FILTER.
17. DEWATERING
    A DEWATERING PLAN IS NEEDED TO ADDRESS EXCAVATION DE-WATERING FOLLOWING HEAVY RAINFALL EVENTS OR WHERE THE EXCAVATION MAY INTERCEPT THE GROUNDWATER TABLE DURING CONSTRUCTION. THE COLLECTED WATER NEEDS TREATMENT AND A DISCHARGE POINT THAT WILL NOT CAUSE DOWNGRADIENT EROSION AND OFFSITE SEDIMENTATION OR WITHIN A RESOURCE. PLEASE FOLLOW THE DETAILS OF SUCH A PLAN.
18. BASIC STANDARDS - EROSION CONTROL MEASURES:
    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

    THE MAINE EROSION AND SEDIMENT CONTROL HANDBOOK FOR CONSTRUCTION: BEST MANAGEMENT PRACTICES AS PUBLISHED IN 1991 BY THE CUMBERLAND COUNTY SOIL AND WATER CONSERVATION DISTRICT AND THE MAINE DEPARTMENT OF ENVIRONMENTAL PROTECTION HAS BEEN CHANGED TO THE "MAINE EROSION AND SEDIMENT CONTROL BMPS" PUBLISHED BY THE MAINE DEP IN 2003. ALL REFERENCES SHOULD BE CHANGED TO THE NEW MANUAL. HTTP://WWW.MAINE.GOV/DEP/BLWQ/DOCSTAND/ESCBMPS/INDEX.HTM

Waldoboro
4 Main Street
Suite 204
Waldoboro, ME
T:207-689-0202
F:207-689-2204

Freeport Site
96 Main Street
PO Box 627
Freeport, ME
T:207-764-8414
F:207-764-8414

Lewiston
640 Main Street
Lewiston, ME
T:207-795-6009
F:207-795-6019

Bangor
Penobscot Main Street
PO Box 659
Bangor, ME
T:207-866-4824
F:207-989-4881

Bar Harbor
106 Sieur Ave 102
Bar Harbor, ME
T:207-288-0587
F:207-288-0588

Machias
PO Box 3
Machias, ME
T:207-255-0220
F:207-255-0587

CES INC
Engineers • Environmental Scientists • Surveyors

PROJECT TITLE
MRC / FIBERIGHT ACCESS ROAD
HAMPDEN, MAINE

SHEET TITLE
SITE DETAILS

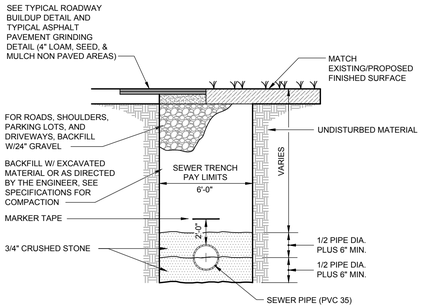
REV	DESCRIPTION	DATE	DRAWN BY	CHECKED BY
R1				
R2				
R3				
R4				
R5				
R6				
R7				

FOR TOWN PERMITTING

STATE OF MAINE
SEAN M. THIES
No. 10139
03/03/2016
LICENSED
PROFESSIONAL ENGINEER

SCALE	NO SCALE
DATE	2015-02-20
DRAWN BY	WAB
CHECKED BY	ACH
DESIGNED BY	ACH
APPROVED BY	SMT
JOB NUMBER	10973.002
DRAWING NUMBER	C501

P:\10973-MRC-ELIAS\CIVIL\REV4-COMMITTEE\ESC-ACCESS ROAD-UTILITY EXTENSION\ESP02-CAD_DRAWINGS\ETA_DESIGN_DWGS\10973.002-C-C501.DWG, 3/3/2016 11:49 AM

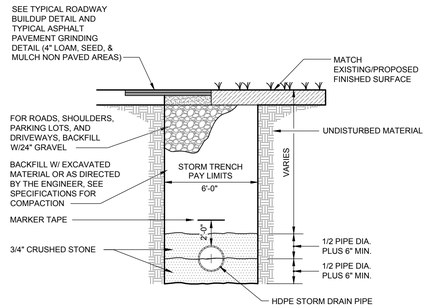


NOTE:

1. MATCH EXISTING SURFACE FINISH, EXCEPT WHERE NOTED. IN LAWN AREAS INSTALL 4" OF LOAM AND SEED AND MULCH.

TYPICAL SEWER TRENCH DETAIL

N.T.S.

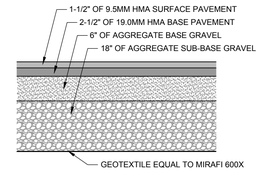


NOTE:

1. MATCH EXISTING SURFACE FINISH, EXCEPT WHERE NOTED. IN LAWN AREAS INSTALL 4" OF LOAM AND SEED AND MULCH.

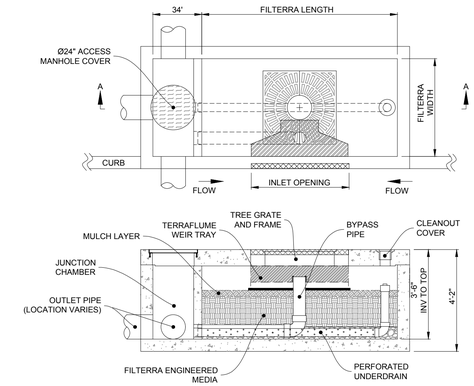
TYPICAL STORM DRAIN TRENCH DETAIL

N.T.S.



TYPICAL ROADWAY BUILDUP DETAIL

N.T.S.



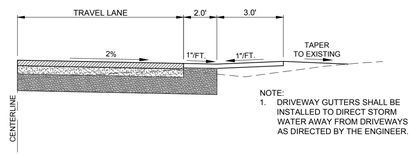
UNIT TO BE SET PLUMB AND LEVEL

DESIGNATION (LENGTH x WIDTH)	INLET OPENING	MAX BYPASS PIPE SIZE	MAX BYPASS FLOW (CFS)	MAX OUTLET PIPE SIZE
4x4	4'-0"	6" PVC	1.42	6" PVC
4x6 OR 6x4	4'-0" *	8" PVC	1.89	8" PVC
4x8 OR 8x4	4'-0" *	8" PVC	1.89	8" PVC
6x6	4'-0" *	8" PVC	1.89	8" PVC
6x8 OR 8x6	4'-0" *	8" PVC	1.89	8" PVC
6x10 OR 10x6	4'-0" *	8" PVC	1.89	8" PVC
6x12 OR 12x6	4'-0" *	10" PVC	2.37	10" PVC
7x13 OR 13x7	4'-0" *	10" PVC	2.37	10" PVC

* CONTACT FILTERRA FOR LARGER INLET OPENINGS OR DIFFERENT AVAILABLE CONFIGURATIONS

FILTERRA DETAIL

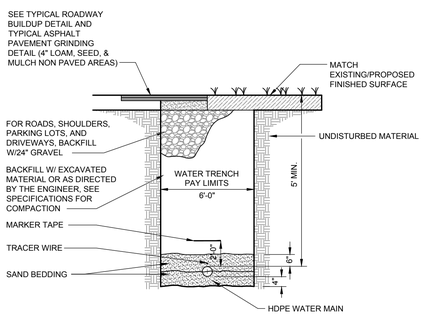
N.T.S.



NOTE:
1. DRIVEWAY GUTTERS SHALL BE INSTALLED TO DIRECT STORM WATER AWAY FROM DRIVEWAYS AS DIRECTED BY THE ENGINEER.

TYPICAL DRIVEWAY VALLEY DETAIL

N.T.S.

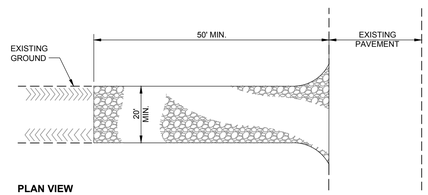


NOTE:

1. MATCH EXISTING SURFACE FINISH, EXCEPT WHERE NOTED. IN LAWN AREAS INSTALL 4" OF LOAM AND SEED AND MULCH.

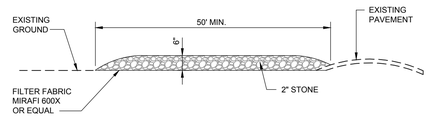
TYPICAL TRENCH DETAIL - HDPE WATER MAIN

N.T.S.



PLAN VIEW

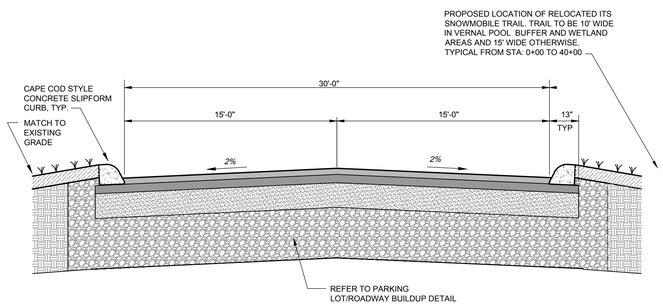
NOTE: CONTRACTOR SHALL ADD STONE TO ENTRANCE AS MUD/SILT MATERIAL ACCUMULATES



SECTION

STABILIZED CONSTRUCTION ENTRANCE DETAIL

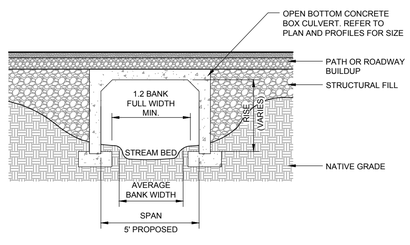
N.T.S.



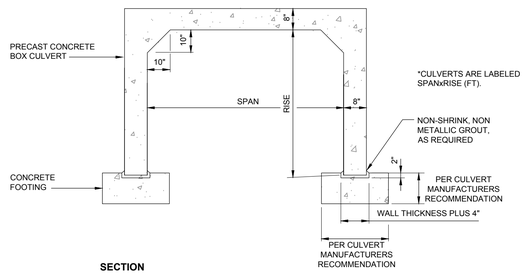
TYPICAL CROWNED ROADWAY CROSS SECTION

N.T.S.

THE INTENT OF THE DESIGN IS FOR ALL BOX CULVERTS TO BE INSTALLED LEVEL FROM INLET TO OUTLET. THE ELEVATION OF THE TOP OF CONCRETE HAS BEEN GIVEN WITH THE INTENT TO MAINTAIN A MINIMUM OF 1' OF COVER OVER THE TOP OF CONCRETE AND PROVIDE FOOTING OVER ENTIRE LENGTH OF CULVERT. CULVERT MAY BE REQUIRED TO BE FIELD FIT UNDER DIRECTION OF ENGINEER.



ELEVATION



SECTION

TYPICAL BOX CULVERT DETAIL

N.T.S.

FOUNDATION GENERAL NOTES:

1. PRE-CAST BRIDGE DECK SHALL BE DESIGNED AND PROVIDED BY AMERICAN CONCRETE INDUSTRIES AND BASED ON A MODIFIED HL93 LOADING.

2. WHERE LEDGE IS ENCOUNTERED, FOUNDATIONS SHALL BEAR DIRECTLY ON LEDGE. IN CASES OF PARTIAL LEDGE CONDITIONS, PROVIDE A MINIMUM OF 12 INCHES OF CRUSHED STONE BELOW FOUNDATION. IN NO CASE SHALL FOUNDATIONS BEAR PARTIALLY ON LEDGE AND PARTIALLY ON SOIL.

FOUNDATION MATERIAL SPECIFICATIONS:

1.) CONCRETE

A.) ULTIMATE COMPRESSIVE STRENGTH AT 28 DAYS F'C = 4,000 PSI.
B.) SLUMP/DESIGNATED COARSE AGGREGATE 4"±1"3/4"
C.) AIR ENTRAINMENT 5-7% ALL EXTERIOR EXPOSED CONCRETE
D.) PLACE CONCRETE IN ACCORDANCE WITH ACI 301
E.) ALL CONCRETE WORK TO CONFORM TO ACI 318
F.) USE ADMIXTURES ONLY WHEN APPROVED BY ENGINEER

2.) REINFORCEMENT

A.) ALL REINFORCEMENT TO BE GRADE 60 AND CONFORM TO ASTM A615
B.) COMPLETE REINFORCING WORK IN ACCORDANCE WITH ACI 318
C.) SPLICE #4 REBAR A MINIMUM OF 18 INCHES
D.) SPLICE #5 REBAR A MINIMUM OF 24 INCHES
E.) SPLICE #6 REBAR A MINIMUM OF 30 INCHES

3.) STRUCTURAL FILL PLACED ADJACENT TO FOUNDATIONS AS BACKFILL WILL BE CLEAN GRANULAR MATERIAL, FREE FROM ORGANIC MATTER, FROZEN MATERIAL AND OTHER DELETERIOUS MATERIALS. MAXIMUM PARTICLE SIZE OF 6"

4.) GRAVEL SUB-BASE TO BE SAND OR GRAVEL CONSISTING OF HARD DURABLE PARTICLES WHICH ARE FREE FROM VEGETABLE MATTER, LUMPS, OR BALLS OF CLAY, AND OTHER DELETERIOUS SUBSTANCES. THE GRADATION OF THE PORTION WHICH WILL PASS A 3 INCH SIEVE IS TO MEET THE GRADING REQUIREMENTS OF THE FOLLOWING TABLE:

SIEVE SIZE	WEIGHT PASSING (%)
1/4"	25-70
NO. 40	0-30
NO. 200	0-7

Waterville
44 Main Street
Suite 204
Waterville, ME
T:207-680-2202
F:207-695-2204

Presque Isle
97 Main Street
PO Box 627
Presque Isle, ME
T:207-764-8414
F:207-764-8414

Bar Harbor
108 Solon Ind. Park 112
Bar Harbor, ME
T:207-288-0587
F:207-288-0588

Bangor
1-7 Broadway/Main Street
PO Box 659
Bangor, ME
T:207-989-4824
F:207-989-4881

Machias
Main Street
PO Box 37
Machias, ME
T:207-255-8270
F:207-255-8387

CES INC
Engineers • Environmental Scientists • Surveyors

PROJECT TITLE
MRC / FIBERIGHT ACCESS ROAD
HAMPDEN, MAINE

SHEET TITLE
SITE DETAILS

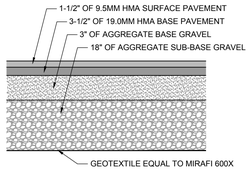
REV.	DESCRIPTION	DATE	DRAWN BY	CHECKED BY
R1				
R2				
R3				
R4				
R5				
R6				
R7				

STATE OF MAINE
SEAN M. THIES
No. 10139
03/03/2016
CENSED
PROFESSIONAL ENGINEER

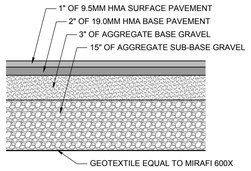
SCALE	NO SCALE
DATE	2015-02-20
DRAWN BY	WAB
CHECKED BY	ACH
DESIGNED BY	ACH
APPROVED BY	SMT
JOB NUMBER	10973.002
DRAWING NUMBER	C502

FOR TOWN PERMITTING

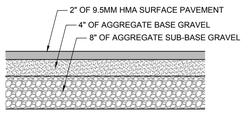
P:\10973\MRC\A-MCP\ALI-REVIEW-COMMITTEE\05\ACCESS ROAD\UTILITY EXTENSION-05\PROJ\C\DWGS\ACAD_DRAWINGS\01\A_DESIGN_DWGS\10973-02-C-01.DWG 3/3/2016 11:49 AM



TYP. PAVEMENT BUILDUP - TYPE 1 (TRUCK TRAVEL SURFACE)



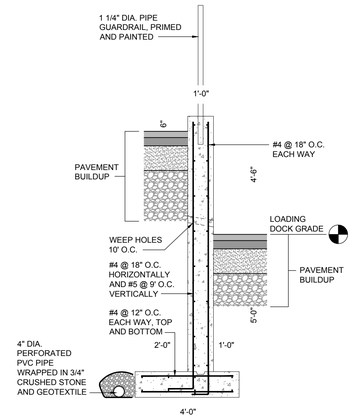
TYP. PAVEMENT BUILDUP - TYPE 2 (PASSENGER VEHICLE TRAVEL SURFACE)



SIDEWALK BUILDUP

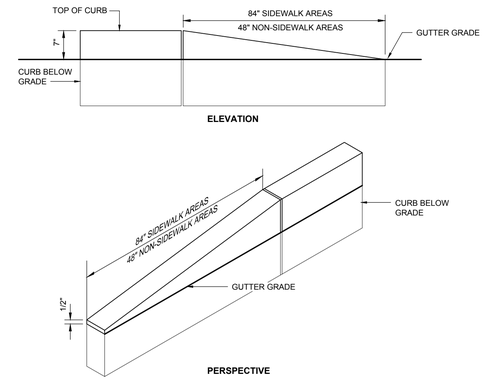
TYPICAL SITE PAVEMENT BUILDUP DETAILS

N.T.S.



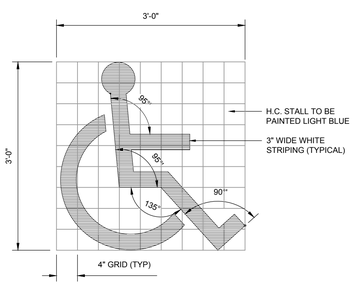
TYPICAL RETAINING WALL DETAILS

N.T.S.



TYPICAL CURB TERMINATION DETAIL

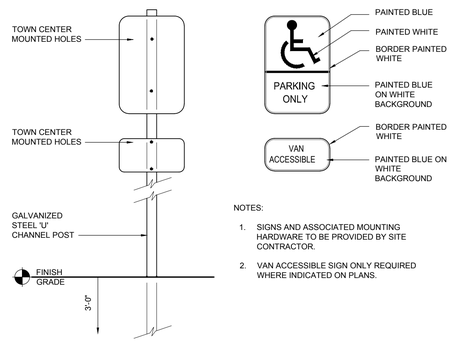
N.T.S.



NOTE: CENTER SYMBOL WITHIN PARKING STALL

TYPICAL HANDICAP PARKING STALL SYMBOL

N.T.S.

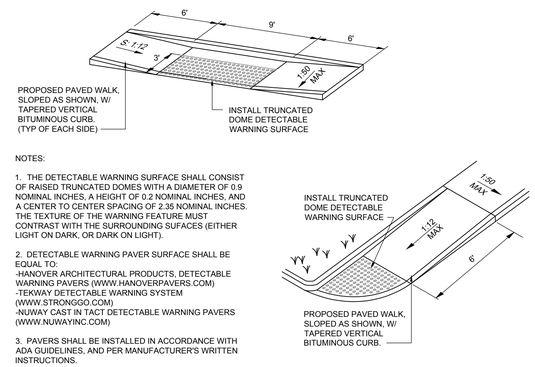


NOTES:

1. SIGNS AND ASSOCIATED MOUNTING HARDWARE TO BE PROVIDED BY SITE CONTRACTOR.
2. VAN ACCESSIBLE SIGN ONLY REQUIRED WHERE INDICATED ON PLANS.

TYPICAL HANDICAP PARKING SIGN DETAIL

N.T.S.



NOTES:

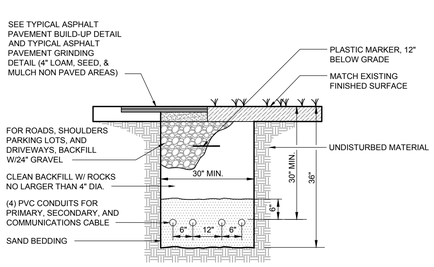
1. THE DETECTABLE WARNING SURFACE SHALL CONSIST OF RAISED TRUNCATED DOMES WITH A DIAMETER OF 0.9 NOMINAL INCHES, A HEIGHT OF 0.2 NOMINAL INCHES, AND A CENTER TO CENTER SPACING OF 2.35 NOMINAL INCHES. THE TEXTURE OF THE WARNING FEATURE MUST CONTRAST WITH THE SURROUNDING SUFACES (EITHER LIGHT ON DARK, OR DARK ON LIGHT).

2. DETECTABLE WARNING PAVER SURFACE SHALL BE EQUAL TO:
-HANOVER ARCHITECTURAL PRODUCTS, DETECTABLE WARNING PAVERS (WWW.HANOVERPAVERS.COM)
-TEKWAY DETECTABLE WARNING SYSTEM (WWW.STRONGGO.COM)
-NUWAY CAST IN TACT DETECTABLE WARNING PAVERS (WWW.NUWAYINC.COM)

3. PAVERS SHALL BE INSTALLED IN ACCORDANCE WITH ADA GUIDELINES, AND PER MANUFACTURER'S WRITTEN INSTRUCTIONS.

TYPICAL HANDICAP CURB RAMP DETAILS

N.T.S.

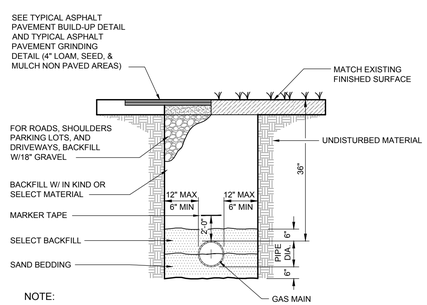


NOTES:

1. SIZE, NUMBER, MATERIAL, AND ARRANGEMENT OF CONDUIT SHALL BE COORDINATED WITH INDIVIDUAL UTILITIES.
2. ALL ELECTRICAL CONDUIT AND STRUCTURES SHALL BE WATER TIGHT.

TYPICAL UNDERGROUND UTILITY TRENCH DETAIL

N.T.S.

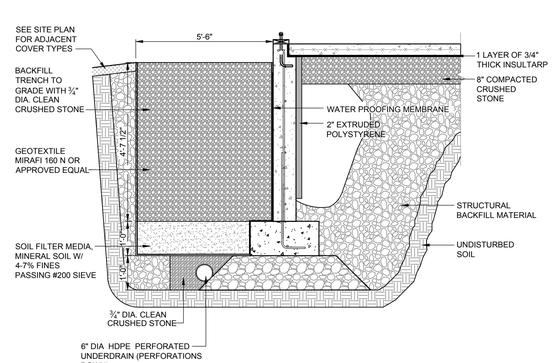


NOTE:

1. COMPACT ALL GRANULAR MATERIAL AND BACKFILL TO 95%.
2. SIDE CLEARANCE APPLICABLE TO BACKHOE OPERATIONS.

TYPICAL GAS TRENCH DETAIL

N.T.S.



ROOF DRIP EDGE FILTRATION DETAIL

N.T.S.

Waterville
44 Main Street
Suite 204
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T:207-680-2202
F:207-680-2204

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F:207-764-8414

Lewiston
640 Main Street
Lewiston, ME
T:207-795-6009
F:207-795-6119

Bar Harbor
108 Sieur de Monts Hwy 102
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T:207-288-5587
F:207-288-5088

Bangor
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T:207-989-4824
F:207-989-4881

Machias
4 Court Street
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Machias, ME
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F:207-255-8387

CES INC
Engineers • Environmental Scientists • Surveyors

PROJECT TITLE
MRC / FIBERIGHT SOLID WASTE PROCESSING FACILITY
HAMPDEN, MAINE

SHEET TITLE
SITE DETAILS

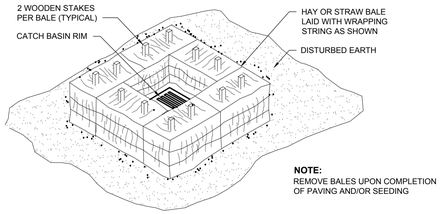
REV.	DESCRIPTION	DATE	DRAWN BY	CHECKED BY
R1				
R2				
R3				
R4				
R5				
R6				
R7				

STATE OF MAINE
SEAN M. THIES
No. 10139
03/03/2016
LICENSED
PROFESSIONAL ENGINEER

SCALE	NO SCALE
DATE	2016-03-03
DRAWN BY	BLQ
CHECKED BY	SMT
DESIGNED BY	ACH
APPROVED BY	SMT
JOB NUMBER	10973.003
DRAWING NUMBER	C503

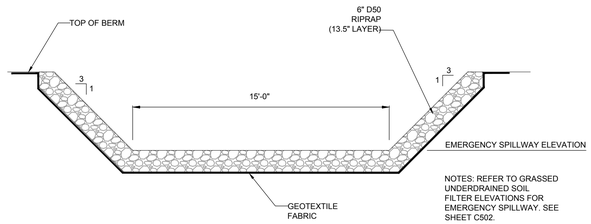
FOR TOWN PERMITTING

G:\SERVERS\WEBPROJECTS\10973-MRC-AUGUSTA\FINAL-REVIEW-COMMITTEE\003-PROCESSING FACILITY-CEPS\CAD_DRAWINGS\CIVIL\DISCK\DWGS\10973-D3-C-DT.DWG, 3/3/2016 11:52 AM



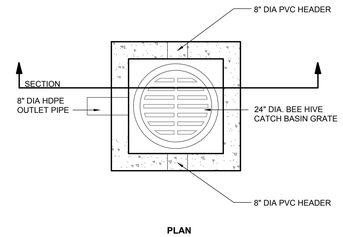
LOW POINT SEDIMENTATION CONTROL BARRIER DETAIL

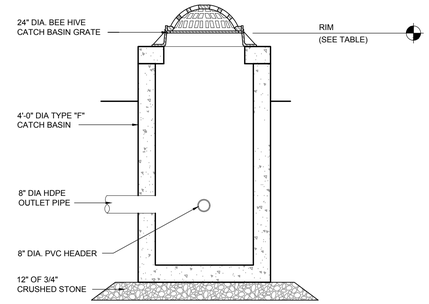
N.T.S.



GRASSED UNDERDRAINED SOIL FILTER EMERGENCY SPILLWAY DETAIL

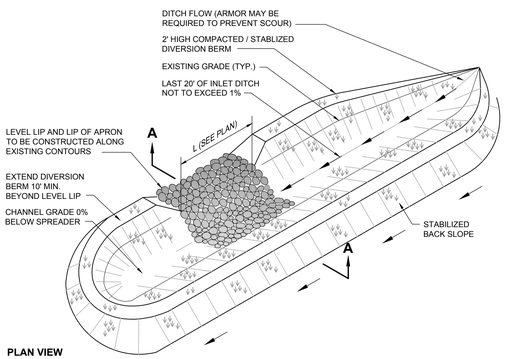
N.T.S.



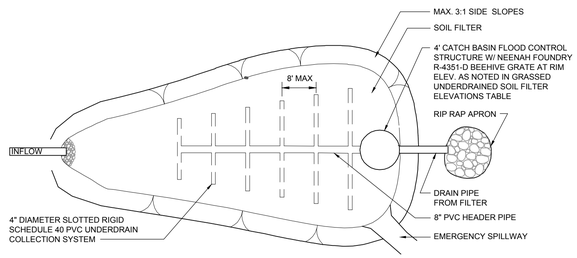


OVERFLOW OUTLET STRUCTURE DETAIL

N.T.S.



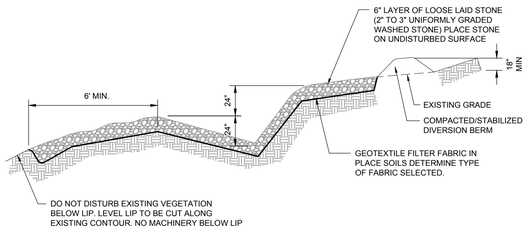
PLAN VIEW



PLAN VIEW

NOTES:

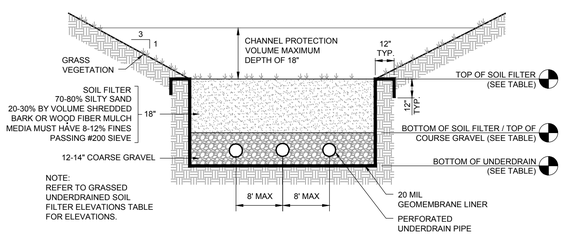
1. SPREADERS SHALL BE INSTALLED WITH A LEVEL INSTRUMENT. CONSTRUCT LEVEL LIP TO 0% GRADE TO ENSURE UNIFORM SHEET FLOW. LEVEL SPREADER SHALL BE CONSTRUCTED ON UNDISTURBED SOIL (NOT FILL).
2. SELECT GEOTEXTILE FABRIC BASED ON UNDISTURBED SOILS (SANDS, SILTS, CLAYS, ETC.)
3. PLACE 6" LAYER OF UNIFORMLY GRADED STONE 2" TO 3" IN DIA. RAKE TO FORM SMOOTH UNIFORM SURFACE. DO NOT FILL VOIDS IN STONE.
4. THE INLET DITCH SHALL NOT EXCEED A 1% GRADE FOR AT LEAST 20 FEET BEFORE ENTERING THE SPREADER.
5. STORM RUN-OFF CONVERTED TO SHEET FLOW ACROSS OUTLET APRON SHALL FLOW ONTO STABILIZED AREAS. RUN-OFF SHALL NOT BE RECONCENTRATED IMMEDIATELY BELOW THE POINT OF DISCHARGE.
6. PERIODIC INSPECTION AND REQUIRED MAINTENANCE SHALL BE PROVIDED.
7. CONSTRUCTION OF LEVEL LIP SPREADER SHALL BE FROM UPHILL SIDE ONLY. LEVEL LIP & AREA BELOW SPREADER SHALL BE AT EXISTING GRADES & UNDISTURBED BY EARTHWORK OR EQUIPMENT.
8. CONSTRUCT SPREADER WITH LIP AT EXISTING ELEVATION AS SPECIFIED.
9. DOWNGRADIENT RECEIVING AREA MUST BE NATURALLY WELL VEGETATED.
10. DISCHARGE NOT PERMITTED WITHIN 25' OF A STREAM OR WETLAND. CONSULT DEP IF STRUCTURE MUST BE WITHIN 75' OF STREAM OR WATER BODY.



SECTION A-A

LEVEL LIP SPREADER DETAILS

N.T.S.



SECTION

GRASSED UNDERDRAINED SOIL FILTER ELEVATIONS

I.D.	APPROXIMATE EXISTING ELEVATION (FT)	EMERGENCY SPILLWAY ELEVATION (FT)	OUTLET CONTROL STRUCTURE ELEVATION (FT)	PROPOSED TOP OF SOIL FILTER (FT)	PROPOSED BOTTOM OF SOIL FILTER / TOP OF COARSE GRAVEL (FT)	PROPOSED ELEVATION OF PIPE BED (FT)	PROPOSED BOTTOM OF COARSE GRAVEL (FT)	STRUCTURE LINED (YES/NO)	FLOODING CONTROL STRUCTURE RIM ELEVATION (FT)	25 YEAR STORM ELEVATION (FT)	TOP OF BERM (FT)	25 YEAR INFLOW (CFS)	FLOW DEPTH (FT) ASSUMING PRIMARY OUTLET FAILS
USF1	143.0	143.0 *	143.0	142.0	140.5	139.8	139.5	YES	143.0	144.0	144.50	8.38	---
USF2	138.0	139.5	139.0	137.5	136.0	135.3	135.0	YES	139.0	139.1	139.60	6.81	0.04
USF3	138.0	139.5	139.0	138.0	136.5	135.8	135.5	YES	139.0	139.4	139.95	8.12	0.37

* NOTE: OVERFLOW DEVICE IS A BASIN STRUCTURE.

GRASSED UNDERDRAIN SOIL FILTER FIELD DETAIL

N.T.S.

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CES INC
Engineers • Environmental Scientists • Surveyors

PROJECT TITLE
MRC / FIBERIGHT SOLID WASTE PROCESSING FACILITY
HAMPDEN, MAINE

SHEET TITLE
EROSION CONTROL DETAILS AND NOTES

REV	DESCRIPTION	DATE	DRAWN BY	CHECKED BY
R1				
R2				
R3				
R4				
R5				
R6				

FOR TOWN PERMITTING

STATE OF MAINE
SEAN M. THIES
No. 10139
03/03/2016
LICENSED
PROFESSIONAL ENGINEER

SCALE	NO SCALE
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CHECKED BY	SMT
DESIGNED BY	ACH
APPROVED BY	SMT
JOB NUMBER	10973.003
DRAWING NUMBER	C504

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