January 11, 2024
05159

Carol Eyerman, Town Planner
Gorham Planning Board
Town of Gorham Municipal Offices
75 South Street, Suite 1
Gorham, ME 04038

Amended Site Plan Application, Shaw Brothers Quarry
341 Mosher Road, Tax Map 31, Lot 15, Shaw Brothers Construction, Inc.

Dear Carol:

This letter the enclosed, revised plans and supplemental information is provided in response to the Staff review comments regarding the Amended Site Plan application for the existing Shaw Brothers Construction, Inc. quarry operation located off Mosher Road as contained in the review memorandum dated December 28, 2023. As you will recall, we met with the Planning Board at their meeting on January 8, 2024 to present the proposed expansion of the quarry at which time they agreed to place the item on the next consent agenda and requested that the staff review comments be addressed. Accordingly, the staff comments are contained below and our responses are provided in ***bold italic:***

Planning Department:

1. Noise – The applicant has submitted a letter dated December 15, 2023 from R. Scott Bodwell, P.E. of Bodwell EnviroAcoustics, LLC that states "if the design of the proposed expansion is consistent with the existing quarry, including noise control measures, and there are no significant changes to the equipment operations, sound levels at the facility property line from the proposed expansion will essentially be the same as from the current quarry operations."

   Response: As also stated in the letter from Bodwell EnviroAcoustics, LLC, the only change in the operation is that the diesel generators for the aggregate operation have been replaced by electrical service.

2. The lots should be combined so that the buffer is reflected on the correct property line.

   Response: The applicant is preparing an updated deed to convey 150 feet from Tax Map 34, Lot 14 to Tax Map 31, Lot 15 (the quarry lot) as shown on the Amended Overall Site Plan and as requested. The deed for the conveyance will be submitted to Staff under separate cover upon completion.

3. Current noise data or information regarding any changes in equipment that would change the 2016 noise study outcomes should be provided since some of the comments by engineering peer review are predicated on a noise study that was submitted in 2016. The applicant has

stated that they have switched from diesel to electric equipment which will reduce off-site noise impacts.

Response: Correct. The diesel generators have been replaced by electrical service. No other changes have occurred to the in the equipment or the operation of the facility that would negatively impact the 2016 noise study.

4. Information should be submitted regarding dust control and other airborne contaminants controls as they relate compliance with State of Maine regulations.

   Response: The applicant proposes no changes to the originally approved aggregate operation. This application is submitted solely to increase the extraction area permitted for the Phase 1 quarry operation. In regards to dust control, the applicant paved the entire laydown and storage area; all of the equipment has spray bars installed and the applicant maintains a sweeper on site at all times. Based upon these measures as well as MDEP and Town inspections, it has always been the applicant's understanding that the operation is in compliance with State regulations.

5. *The applicant needs to provide additional information for review in order to make a finding regarding access, circulation, and stormwater.*

   Response: As mentioned in the original cover letter and discussed with the Planning Board, no changes are proposed to site access or circulation from the current, originally permitted site access and circulation. The only change requested by the amendment is to the approved limits of extraction for Phase 1. The enclosed stormwater management report has been updated to address the engineering peer review comments which will also be submitted to the MDEP in association with the minor amendment to the variance permit for externally drained pits.

Special Exception Standards

1. Applicant to provide comment on whether hours of operation and operation procedures will remain the same.

   Response: As stated in the original cover letter and as discussed with the Board, all other aspects of the existing operation, including hours of operation, remain the same as current operations. The only change proposed by the amendment is that the area of the quarry will now include the original property line buffer area which is no longer required.

2. A noise control berm is proposed along the northerly side where the proposed expansion is located. Bodwell EnviroAcoustics LLC was hired by the Applicant who reviewed the proposed expansion. The Town has hired Reuter Associates, LLC to peer review the project for noise.

   Response: Agreed

General Standards of Performance

1. Prevention of Erosion – Silt fence is proposed along the northeasterly side of the site, downgradient of the stormwater wet ponds and quarry expansion. This should adequately contain sediment within the property from the proposed disturbances. Although not a requirement, we recommend considering additional riprap or other practices at the Wet Pond 1

culvert inlet to protect the culvert and pond from sedimentation, especially during high periods of high activity.

Response: Riprap is shown at the inlet to the culvert to Wet Pond 1.

2. Mineral Exploration, Excavation and Gravel Pits

   a. The area for expansion should be more clearly identified on the plan with a surface area measurement per Section 2-1.C.3.b.1.c of the Land Use and Development Code (LUDC).

      Response: The dimensions of the proposed expansion area are now more clearly noted on the plan.

   b. The application indicates an estimated time schedule for future excavation has been submitted as well as a narrative that describes all accessory activities related to the site. This information could not be located within the submission materials.

      Response: The timeline for the expansion will include initial clearing and extraction this construction season and then the remainder of the extraction to the elevational limits of phase 1 will occur in accordance with phase 1 quarry operations based upon market conditions.

   c. Will the permanent safety fence extend around the proposed expansion? It is unclear from the plan whether it is existing and proposed and its extent.

      Response: The existing safety fence is now noted to be relocated to the limits of the expansion.

   d. Provide comment on how access to the site will be controlled per Section 2-1.C.3.b.1.d of the LUDC.

      Response: No new access to the quarry is proposed. Only the existing access drives and controls to the site as originally approved will be utilized.

   e. Is there an existing erosion and sedimentation control plan meeting the standards of the Cumberland County Soil and Conservation District already in place per Section 2-1.C.3.b.1.f of the LUCD? Is it applicable to the expansion or does it need to be revised?

      Response: The originally approved erosion and sediment control plan is applicable for this minor expansion.

   f. Submit a reclamation plan that includes this expansion of the site per Section 2-1.C.3.b.1.g of the LUDC.

      Response: Sheet 2 of 3, which depicts the final grades of the expansion area relative to the final grades approved for the original Phase 1 quarry, is the reclamation plan for the expansion. A note has been added to loam and seed the final slope.

3. The proposed expansion is not in a floodplain, shoreland, or other known protected resource area.

   Response: Agreed

Site Plan Requirements:

1. Access to the Site – Will the expansion generate additional traffic to the site?

   Response: No additional traffic will be generated due to the expanded quarry area.

2. Access Into the Site – Vehicular access points are not proposed to the altered. See comment 2d in the General Standards of Performance regarding site access.

   Response: No changes are proposed to the existing, approved access drives.

3. Stormwater Management

   a. The total acreage of the existing (138.96 acres) and proposed (135.85 acres) watersheds in HydroCAD do not match. Although this is a small difference, please explain why they do not match.

      Response: The existing and proposed HydroCAD models have been revised to provide consistent total areas. The updated HydroCAD model is attached with the response to comments.

   b. Applicant to clarify how much new impervious area is proposed. The stormwater management report references 2.4 acres of new impervious area. The pre-development HydroCAD model includes 2.53 acres of impervious area, while the post-development HydroCAD model includes 42.61 acres. Table 1 in Appendix 1 of the stormwater management report shows 41.98 acres of total impervious area on site, which 40.48 acres of is treated.

      Response: The total impervious area being proposed with the expansion is 2.69 acres. The total amount of impervious area in the proposed HydroCAD model (42.61 acres) is correct and Table 1 in Appendix 1 of the stormwater management report has been updated to show the correct total area to match the HydroCAD model.

   c. Applicant to clarify how much of the impervious area is treated. There appear to be discrepancies. Please check and revise as needed. Tributary acreage to Pond 1 in post-development HydroCAD model does not seem to match Table 1 or Wetpond #1 Design. The post-development HydroCAD model shows 47.35 acres draining to Pond 1, of which 78.33% (37.09 acres) is impervious. Wetpond #1 Design sheet shows 37.39 acres of impervious area and 8.31 acres of landscaped area, which totals 45.7 acres.

      Response: The proposed tributary acreage to Pond 1 is 37.09 acres. This number has been updated in the post-development HydroCAD model, Table 1 of Appendix 1, and the Wetpond #1 Design sheet to show the correct impervious acreage. A copy of Table

of Appendix 1 and the Wetpond #1 Design sheet are attached with the response to comments.

d. The site is subject to the Town's Stormwater Ordinance, Chapter 2 Post Construction Stormwater Best Management provisions, which requires a Post-Construction Stormwater Management Plan for stormwater best management practices (BMPs). Please revise and submit the Inspection, Maintenance, and Housekeeping Plan for the existing stormwater practices, provided as part of the site plan review for the 2016 amendment, as needed to be applicable to the proposed expansion. See chapter 2, Section 6.1 of the Stormwater Ordinance for specific requirements of the Plan.

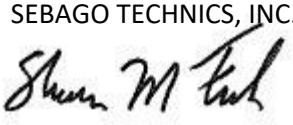
Response: An Inspection, Maintenance, and Housekeeping plan for the existing stormwater BMPs is attached with the response to comments.

4. Landscaping – A landscaping plan was not submitted. Is the vegetation berm installation proposed or existing? Additional information should be provided on the plan to clarify what this consists of.

Response: No new landscaping is proposed as the expansion area is buffered from abutting properties by the additional property obtained by the applicant and the existing vegetation. All other aspects of the originally approved landscape plan, including the vegetated berm, have been installed and will not be impacted.

We are hopeful that this letter and the enclosed information adequately addresses the outstanding review comments such that the project may proceed to approval from the Planning Board. Upon your review of the enclosed information, however, please call with any questions or comments. Thank you for your consideration.

Sincerely,
SEBAGO TECHNICS, INC.



Shawn M. Frank, P.E.
Senior Vice President, Commercial Development

SMF/DJS:

cc: Shaw Brothers Construction, Inc.

SEBAGO TECHNICS

CIVIL ENGINEERING • SURVEYING • LANDSCAPE ARCHITECTURE

STORMWATER MANAGEMENT REPORT

For

BRICKYARD QUARRY
GORHAM, MAINE

Prepared for:

Shaw Brothers Construction Inc.
341 Mosher Road
Gorham, Maine 04038

Prepared by:

Sebago Technics, Inc.
75 John Roberts Rd, Suite 4A
South Portland, ME 04106

January 11, 2024

STORMWATER MANAGEMENT REPORT
BRICKYARD QUARRY
GORHAM, MAINE

1. Introduction

This Stormwater Management Plan Report has been prepared to present analyses performed to address the potential impacts associated with the project due to proposed modification in stormwater runoff characteristics and land cover changes. The stormwater management controls that are outlined in this report have been designed to suit the proposed development and to comply with applicable regulatory requirements.

The proposed development will consist of an expansion to the existing Brickyard Quarry behind the Shaw Brothers office and shop on Mosher Road (Route 237) in Gorham. The expansion of the quarry as shown on the provided plans is proposed to extend approximately 150 feet toward the northern property line to obtain the ledge within the originally required buffer and match the grading design that was previously approved. It is anticipated that the total increase in impervious area associated with the expansion consisting of the floor of the quarry will be around 2.69 acres. The stormwater HydroCAD model, calculations, and plans were updated to accommodate the quarry expansion. The current stormwater management was reviewed to verify that the proposed expansion meets the current Maine DEP standards for flooding and treatment.

2. Stormwater Management

General Standard - Chapter 500, Section 4(C)
Updated BMP sizing and treatment calculations are provided as Appendix 1.

The existing wet pond that treats and detains the quarry operations was reviewed with the additional impervious area. With the additional area directed to the pond, the existing permanent pool volume was not met. The wet pond was expanded toward the west and regraded to meet the required permanent pool volume per DEP standards. Through the pond modifications to treat the associated impervious area from the quarry, 95.2% of new impervious area and 92.9% of new developed area will be receiving treatment. This meets the requirements for the Maine DEP General Standards.

Flooding Standard - Chapter 500, Section 4(F)
The Flooding Standard requires a project's stormwater management system detain, retain, or result in the infiltration of stormwater from 24-hour storms of the 2, 10, and 25-year frequencies such that the peak flows of stormwater from the project site do not exceed the peak flows of stormwater prior to undertaking the project. As such, a runoff evaluation was performed using the methodology outlined in the USDA Soil Conservation Service's "Urban Hydrology for Small Watersheds - Technical Release #55 (TR-55)". HydroCAD computer software was utilized to perform the calculations. The original stormwater management plan utilized rainfall data from Chapter 500, Appendix H prior to the 2015 updated rainfall events. The HydroCAD models for the pre-development and post-development conditions were updated to reflect the current rainfall duration. Rainfall values for Cumberland County are listed in the table below.

Storm Frequency Precipitation (in./24 hr) Cumberland County	
2-year	3.1
10-year	4.6
25-year	5.8

The following table presents the results of the peak runoff calculations at the analysis points for the existing and proposed conditions.

Stormwater Peak Discharge Summary Table

Study Point	2-Year Storm			10-Year Storm			25-Year Storm		
	Pre (cfs)	Post (cfs)	Diff. (cfs)	Pre (cfs)	Post (cfs)	Diff. (cfs)	Pre (cfs)	Post (cfs)	Diff. (cfs)
SP1	8.63	5.75	-2.88	28.36	9.41	-18.95	44.37	11.54	-32.83
SP2	18.40	14.55	-3.85	33.48	27.38	-6.10	45.85	38.06	-7.79
SP3	4.76	4.38	-0.38	10.55	9.95	-0.60	15.68	14.94	-0.74
SP4	5.63	5.60	-0.03	12.54	12.50	-0.04	18.66	18.61	-0.05
SP5	7.47	5.62	-1.85	19.99	13.99	-6.00	31.77	21.68	-10.09
SP6	3.15	2.46	-0.69	9.51	8.92	-0.59	15.73	15.62	-0.11
SP7	2.07	1.21	-0.86	5.77	3.50	-2.27	9.29	5.69	-3.60
SP8	3.35	0.51	-2.84	9.67	2.04	-7.63	15.73	3.67	-12.06
SP9	1.71	0.67	-1.04	5.19	1.66	-3.53	8.57	2.59	-5.98

The HydroCAD Data output sheets from this analysis are appended to this report (Appendix 2) along with the Stormwater Management Plans (Appendix 3). The model predicts that the peak runoff rates in the post-development condition at Study Points 1 through 9 are below pre-development runoff rates for the 2, 10, and 25-year storm events with implementation of the stormwater management practices.

3. Summary

It is determined that the existing stormwater management infrastructure with updated rainfall data and the modifications to the wet pond will adequately manage and treat stormwater runoff as required by the Maine DEP.

Prepared by:
SEBAGO TECHNICS, INC.

Dylan J. Stuart
Civil Engineer

Appendix 1

Stormwater Quality Calculations

Brickyard Quarry
Gorham, Maine
STI Project No. 05159

Table 1
IMPERVIOUS AREA / DEVELOPED AREA TREATMENT SUMMARY

Sucatchment ID (HydroCAD)	Area Description	Total Impervious Area (Ac.)	Total Impervious Area Requiring Treatment (Ac.)	Total Impervious Area Receiving Treatment (Ac.)	Total Developed Area (Ac.)	Total Developed Area Requiring Treatment (Ac.)	Total Developed Area Receiving Treatment (Ac.)
11	Impervious	37.09	35.24	37.09	37.09	35.24	37.09
	Landscape				8.31	6.65	8.31
12	Impervious	0.03	0.03	0.03	0.03	0.03	0.03
	Landscape				0.00	0.00	0.00
13	Impervious	3.43	3.26	3.43	3.43	3.26	3.43
	Landscape				5.29	4.23	5.29
14	Impervious	0.00	0.00	0.00	0.00	0.00	0.00
	Landscape				0.69	0.55	0.00
15	Impervious	0.00	0.00	0.00	0.00	0.00	0.00
	Landscape				0.20	0.16	0.00
21	Impervious	1.82	1.73	0.00	1.82	1.73	0.00
	Landscape				0.54	0.43	0.00
31	Impervious	0.24	0.23	0.00	0.24	0.23	0.00
	Landscape				0.41	0.33	0.00
51	Impervious	0.00	0.00	0.00	0.00	0.00	0.00
	Landscape				0.25	0.20	0.00
TOTAL		**42.61**	**40.48**	**40.55**	**58.30**	**53.03**	**54.15**

TOTAL IMPERVIOUS AREA RECEIVING TREATMENT (Ac.)	**40.55**
TOTAL IMPERVIOUS AREA (Ac.)	**42.61**
% OF AREA IMPERVIOUS RECEIVING TREATMENT	**95.2%**
TOTAL DEVELOPED AREA RECEIVING TREATMENT (Ac.)	**54.15**
TOTAL DEVELOPED AREA (Ac.)	**58.30**
% OF AREA DEVELOPED RECEIVING TREATMENT	**92.9%**

SEBAGO TECHNICS, INC.	JOB	05159					
75 John Roberts Road	SHEET NO.	1			OF	1	
Suite 4A	CALCULATED BY		DJS		DATE	1/8/24	
SOUTH PORTLAND, MAINE 04106	CHECKED BY		SMF		DATE	1/8/24	
(207) 200-2100 FAX (207) 856-2206	FILE NAME	05159Pondcalcs5			SCALE	N.T.S.	

Wetpond #1 Design

See Attached Stage-Storage Table

Mean Depth: Elev.=102.60 Storage Volume / Surface Area = 3.10'

Surface Area=49,744 S.F.

Storage Volume=154,380 C.F.

Permanent Pool Volume:

Permanent Pool Elev.=103.65

Impervious Area=(37.09 Ac.)*(43,560 S.F.)*(1.5")*(1'/12") = 201,955 C.F.

Landscape Area=(8.31 Ac)*(43,560 S.F.)*(0.6)*(1'/12") = 18,099 C.F.

Total Volume = 220,054 C.F.

Required Permanent Pool Volume Elevation = 103.62

Proposed Permanent Pool Volume Elevation = 103.65

Channel Protection Pool Volume:

Impervious Area=(37.09 Ac.)*(43,560 S.F.)*(1.0")*(1'/12") = 134,637 C.F.

Landscape Area=(8.31 Ac)*(43,560 S.F.)*(0.4)*(1'/12") = 12,066 C.F.

Total Volume = 146,703 C.F.

Required Channel Protection Volume Elevation = 105.35

Proposed Channel Protection Volume Elevation = 106.00

Bench Elevation=103.65

Underdrain Elevation = 101.15

Bench Width=8'

Trench Pipe Length = 147,791 C.F. / 1,000 C.F.)*(3') = 443'

Length to Width Ratio:

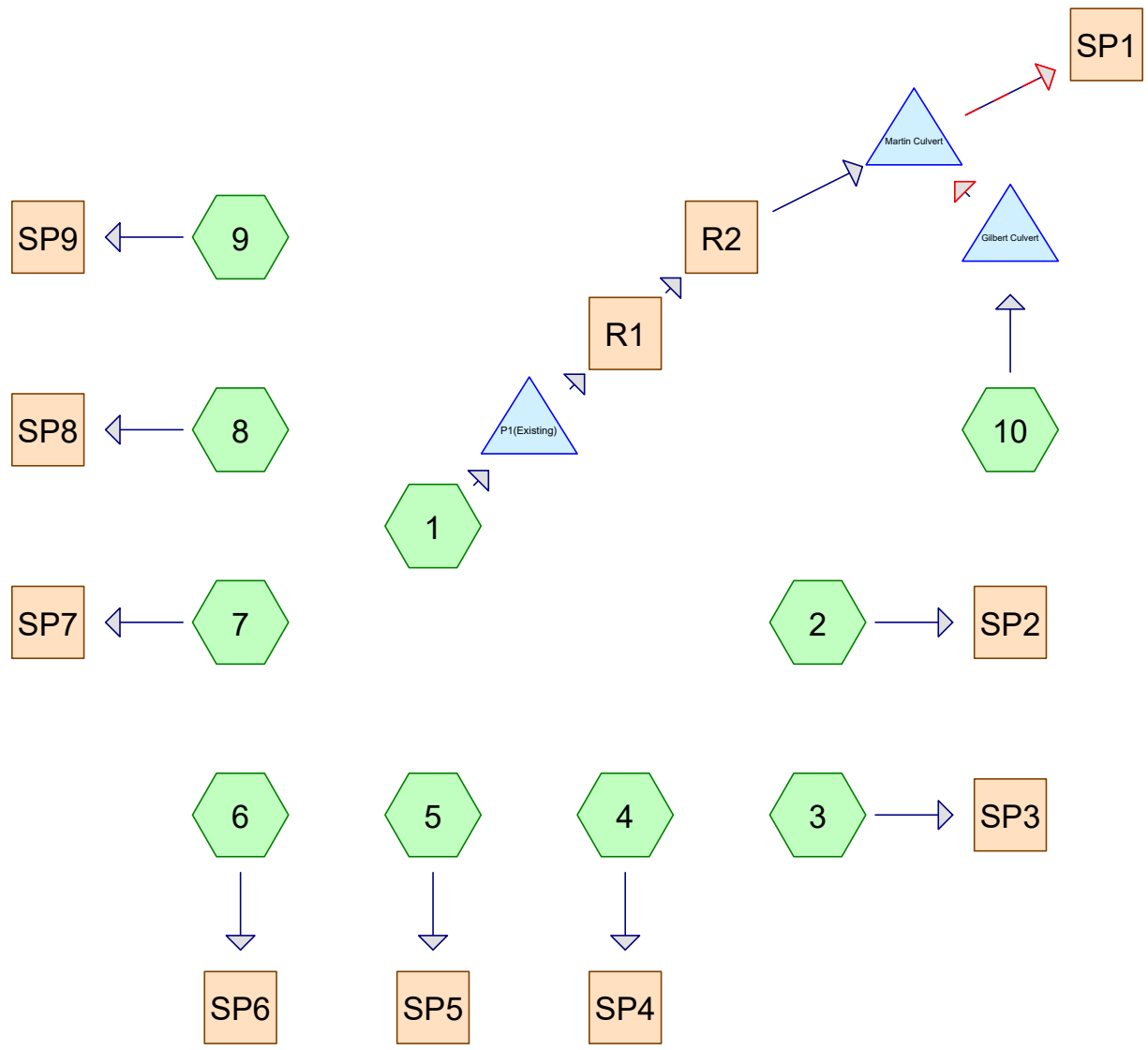
Average Length = 600'

Average Width = 120'

Length : Width Ratio = 5.00

Appendix 2A

Existing Conditions HydroCAD Summary



Subcat Reach Pond Link

Routing Diagram for 05159PRE5
Prepared by Sebago Technics, Inc., Printed 1/8/2024

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
7.550	91	Gravel roads, HSG D (1, 2)
13.390	71	Meadow, non-grazed, HSG C (2, 3, 4, 5)
12.669	78	Meadow, non-grazed, HSG D (1, 2, 3, 4, 10)
2.532	98	Paved parking & roofs (1, 2, 3, 10)
20.083	55	Woods, Good, HSG B (1, 5, 6, 7, 8, 9, 10)
71.780	70	Woods, Good, HSG C (1, 2, 3, 4, 5, 6, 7, 8, 9)
7.440	77	Woods, Good, HSG D (1, 3, 4, 6, 8)
135.444	**71**	**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

Subcatchment1: (new node) Runoff Area=33.400 ac 0.33% Impervious Runoff Depth>0.72"
Flow Length=2,070' Tc=52.9 min CN=71 Runoff=12.14 cfs 2.010 af

Subcatchment2: (new node) Runoff Area=16.550 ac 11.78% Impervious Runoff Depth>1.48"
Flow Length=990' Tc=26.7 min CN=84 Runoff=18.40 cfs 2.035 af

Subcatchment3: (new node) Runoff Area=8.530 ac 4.22% Impervious Runoff Depth>0.87"
Flow Length=1,380' Tc=35.6 min CN=74 Runoff=4.76 cfs 0.621 af

Subcatchment4: (new node) Runoff Area=7.840 ac 0.00% Impervious Runoff Depth>0.88"
Flow Length=680' Tc=19.8 min CN=74 Runoff=5.63 cfs 0.575 af

Subcatchment5: (new node) Runoff Area=28.390 ac 0.00% Impervious Runoff Depth>0.59"
Flow Length=2,195' Tc=59.9 min CN=68 Runoff=7.47 cfs 1.396 af

Subcatchment6: (new node) Runoff Area=16.310 ac 0.00% Impervious Runoff Depth>0.47"
Flow Length=1,655' Tc=62.0 min CN=65 Runoff=3.15 cfs 0.643 af

Subcatchment7: (new node) Runoff Area=5.290 ac 0.00% Impervious Runoff Depth>0.56"
Flow Length=460' Tc=22.3 min CN=67 Runoff=2.07 cfs 0.248 af

Subcatchment8: (new node) Runoff Area=11.720 ac 0.00% Impervious Runoff Depth>0.52"
Flow Length=800' Tc=37.0 min CN=66 Runoff=3.35 cfs 0.506 af

Subcatchment9: (new node) Runoff Area=5.670 ac 0.00% Impervious Runoff Depth>0.48"
Flow Length=1,040' Tc=25.9 min CN=65 Runoff=1.71 cfs 0.229 af

Subcatchment10: (new node) Runoff Area=1.744 ac 6.42% Impervious Runoff Depth>0.88"
Flow Length=530' Tc=25.7 min CN=74 Runoff=1.13 cfs 0.128 af

Reach R1: (new node) Avg. Flow Depth=0.25' Max Vel=0.40 fps Inflow=11.96 cfs 1.879 af
n=0.150 L=380.0' S=0.0105 '/' Capacity=349.08 cfs Outflow=10.38 cfs 1.808 af

Reach R2: (new node) Avg. Flow Depth=0.73' Max Vel=0.93 fps Inflow=10.38 cfs 1.808 af
n=0.150 L=150.0' S=0.0200 '/' Capacity=190.93 cfs Outflow=10.33 cfs 1.797 af

Reach SP1: (new node) Inflow=8.63 cfs 1.923 af
Outflow=8.63 cfs 1.923 af

Reach SP2: (new node) Inflow=18.40 cfs 2.035 af
Outflow=18.40 cfs 2.035 af

Reach SP3: (new node) Inflow=4.76 cfs 0.621 af
Outflow=4.76 cfs 0.621 af

Reach SP4: (new node) Inflow=5.63 cfs 0.575 af
Outflow=5.63 cfs 0.575 af

Reach SP5: (new node) Inflow=7.47 cfs 1.396 af
Outflow=7.47 cfs 1.396 af

Reach SP6: (new node) Inflow=3.15 cfs 0.643 af
Outflow=3.15 cfs 0.643 af

Reach SP7: (new node) Inflow=2.07 cfs 0.248 af
Outflow=2.07 cfs 0.248 af

Reach SP8: (new node) Inflow=3.35 cfs 0.506 af
Outflow=3.35 cfs 0.506 af

Reach SP9: (new node) Inflow=1.71 cfs 0.229 af
Outflow=1.71 cfs 0.229 af

Pond Gilbert Culvert: (new node) Peak Elev=94.33' Storage=570 cf Inflow=1.13 cfs 0.128 af
Primary=0.92 cfs 0.127 af Secondary=0.00 cfs 0.000 af Outflow=0.92 cfs 0.127 af

Pond Martin Culvert: (new node) Peak Elev=92.61' Storage=4,852 cf Inflow=10.65 cfs 1.924 af
Primary=8.63 cfs 1.923 af Secondary=0.00 cfs 0.000 af Outflow=8.63 cfs 1.923 af

Pond P1(Existing): (new node) Peak Elev=100.26' Storage=0.212 af Inflow=12.14 cfs 2.010 af
Outflow=11.96 cfs 1.879 af

Total Runoff Area = 135.444 ac Runoff Volume = 8.389 af Average Runoff Depth = 0.74"
98.13% Pervious = 132.912 ac 1.87% Impervious = 2.532 ac

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

Subcatchment1: (new node) Runoff Area=33.400 ac 0.33% Impervious Runoff Depth>1.64"
Flow Length=2,070' Tc=52.9 min CN=71 Runoff=29.37 cfs 4.565 af

Subcatchment2: (new node) Runoff Area=16.550 ac 11.78% Impervious Runoff Depth>2.71"
Flow Length=990' Tc=26.7 min CN=84 Runoff=33.48 cfs 3.734 af

Subcatchment3: (new node) Runoff Area=8.530 ac 4.22% Impervious Runoff Depth>1.87"
Flow Length=1,380' Tc=35.6 min CN=74 Runoff=10.55 cfs 1.331 af

Subcatchment4: (new node) Runoff Area=7.840 ac 0.00% Impervious Runoff Depth>1.88"
Flow Length=680' Tc=19.8 min CN=74 Runoff=12.54 cfs 1.231 af

Subcatchment5: (new node) Runoff Area=28.390 ac 0.00% Impervious Runoff Depth>1.43"
Flow Length=2,195' Tc=59.9 min CN=68 Runoff=19.99 cfs 3.380 af

Subcatchment6: (new node) Runoff Area=16.310 ac 0.00% Impervious Runoff Depth>1.23"
Flow Length=1,655' Tc=62.0 min CN=65 Runoff=9.51 cfs 1.676 af

Subcatchment7: (new node) Runoff Area=5.290 ac 0.00% Impervious Runoff Depth>1.39"
Flow Length=460' Tc=22.3 min CN=67 Runoff=5.77 cfs 0.611 af

Subcatchment8: (new node) Runoff Area=11.720 ac 0.00% Impervious Runoff Depth>1.31"
Flow Length=800' Tc=37.0 min CN=66 Runoff=9.67 cfs 1.282 af

Subcatchment9: (new node) Runoff Area=5.670 ac 0.00% Impervious Runoff Depth>1.26"
Flow Length=1,040' Tc=25.9 min CN=65 Runoff=5.19 cfs 0.593 af

Subcatchment10: (new node) Runoff Area=1.744 ac 6.42% Impervious Runoff Depth>1.88"
Flow Length=530' Tc=25.7 min CN=74 Runoff=2.50 cfs 0.273 af

Reach R1: (new node) Avg. Flow Depth=0.46' Max Vel=0.58 fps Inflow=29.16 cfs 4.425 af
n=0.150 L=380.0' S=0.0105 '/' Capacity=349.08 cfs Outflow=27.79 cfs 4.327 af

Reach R2: (new node) Avg. Flow Depth=1.21' Max Vel=1.23 fps Inflow=27.79 cfs 4.327 af
n=0.150 L=150.0' S=0.0200 '/' Capacity=190.93 cfs Outflow=27.70 cfs 4.311 af

Reach SP1: (new node) Inflow=28.36 cfs 4.581 af
Outflow=28.36 cfs 4.581 af

Reach SP2: (new node) Inflow=33.48 cfs 3.734 af
Outflow=33.48 cfs 3.734 af

Reach SP3: (new node) Inflow=10.55 cfs 1.331 af
Outflow=10.55 cfs 1.331 af

Reach SP4: (new node) Inflow=12.54 cfs 1.231 af
Outflow=12.54 cfs 1.231 af

Reach SP5: (new node) Inflow=19.99 cfs 3.380 af
Outflow=19.99 cfs 3.380 af

Reach SP6: (new node) Inflow=9.51 cfs 1.676 af
Outflow=9.51 cfs 1.676 af

Reach SP7: (new node) Inflow=5.77 cfs 0.611 af
Outflow=5.77 cfs 0.611 af

Reach SP8: (new node) Inflow=9.67 cfs 1.282 af
Outflow=9.67 cfs 1.282 af

Reach SP9: (new node) Inflow=5.19 cfs 0.593 af
Outflow=5.19 cfs 0.593 af

Pond Gilbert Culvert: (new node) Peak Elev=94.69' Storage=1,205 cf Inflow=2.50 cfs 0.273 af
Primary=2.26 cfs 0.273 af Secondary=0.00 cfs 0.000 af Outflow=2.26 cfs 0.273 af

Pond Martin Culvert: (new node) Peak Elev=93.66' Storage=13,710 cf Inflow=28.51 cfs 4.584 af
Primary=10.55 cfs 3.552 af Secondary=17.81 cfs 1.030 af Outflow=28.36 cfs 4.581 af

Pond P1(Existing): (new node) Peak Elev=100.47' Storage=0.286 af Inflow=29.37 cfs 4.565 af
Outflow=29.16 cfs 4.425 af

Total Runoff Area = 135.444 ac Runoff Volume = 18.676 af Average Runoff Depth = 1.65"
98.13% Pervious = 132.912 ac 1.87% Impervious = 2.532 ac

Summary for Subcatchment 1: (new node)

Runoff = 45.04 cfs @ 12.74 hrs, Volume= 6.935 af, Depth> 2.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=5.80"

Area (ac)	CN	Description
1.100	91	Gravel roads, HSG D
5.130	78	Meadow, non-grazed, HSG D
0.110	98	Paved parking & roofs
4.600	55	Woods, Good, HSG B
19.500	70	Woods, Good, HSG C
2.960	77	Woods, Good, HSG D
33.400	71	Weighted Average
33.290		99.67% Pervious Area
0.110		0.33% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.1	150	0.0300	0.10		**Sheet Flow, A to B** Woods: Light underbrush n= 0.400 P2= 3.00"
5.7	545	0.1000	1.58		**Shallow Concentrated Flow, B to C** Woodland Kv= 5.0 fps
17.8	825	0.0240	0.77		**Shallow Concentrated Flow, C to D** Woodland Kv= 5.0 fps
3.3	550	0.0500	2.81	9.64	**Trap/Vee/Rect Channel Flow, D to E** Bot.W=10.00' D=0.25' Z= 15.0 '/' Top.W=17.50' n= 0.040 Winding stream, pools & shoals
52.9	2,070	Total			

Summary for Subcatchment 2: (new node)

Runoff = 45.85 cfs @ 12.36 hrs, Volume= 5.172 af, Depth> 3.75"

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=5.80"

Area (ac)	CN	Description
6.450	91	Gravel roads, HSG D
1.950	98	Paved parking & roofs
1.580	70	Woods, Good, HSG C
2.220	71	Meadow, non-grazed, HSG C
4.350	78	Meadow, non-grazed, HSG D
16.550	84	Weighted Average
14.600		88.22% Pervious Area
1.950		11.78% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.5	150	0.1100	0.16		**Sheet Flow, A to B** Woods: Light underbrush n= 0.400 P2= 3.00"
4.3	430	0.1100	1.66		**Shallow Concentrated Flow, B to C** Woodland Kv= 5.0 fps
6.9	410	0.0200	0.99		**Shallow Concentrated Flow, C to D** Short Grass Pasture Kv= 7.0 fps
26.7	990	Total			

Summary for Subcatchment 3: (new node)

Runoff = 15.68 cfs @ 12.50 hrs, Volume= 1.974 af, Depth> 2.78"

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=5.80"

Area (ac)	CN	Description
0.360	98	Paved parking & roofs
3.830	71	Meadow, non-grazed, HSG C
1.450	78	Meadow, non-grazed, HSG D
2.210	70	Woods, Good, HSG C
0.680	77	Woods, Good, HSG D
8.530	74	Weighted Average
8.170		95.78% Pervious Area
0.360		4.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0	150	0.1200	0.25		**Sheet Flow, A to B** Grass: Dense n= 0.240 P2= 3.00"
1.7	210	0.0900	2.10		**Shallow Concentrated Flow, B to C** Short Grass Pasture Kv= 7.0 fps
12.5	390	0.0500	0.52	3.56	**Trap/Vee/Rect Channel Flow, C to D** Bot.W=25.00' D=0.25' Z= 10.0 '/' Top.W=30.00' n= 0.240 Sheet flow over Dense Grass
6.0	375	0.0500	1.04	7.13	**Trap/Vee/Rect Channel Flow, D to E** Bot.W=25.00' D=0.25' Z= 10.0 '/' Top.W=30.00' n= 0.120
5.4	255	0.0300	0.79	8.92	**Trap/Vee/Rect Channel Flow, E to F** Bot.W=40.00' D=0.25' Z= 20.0 '/' Top.W=50.00' n= 0.120
35.6	1,380	Total			

Summary for Subcatchment 4: (new node)

Runoff = 18.66 cfs @ 12.28 hrs, Volume= 1.825 af, Depth> 2.79"

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=5.80"

Area (ac)	CN	Description
0.650	71	Meadow, non-grazed, HSG C
0.490	78	Meadow, non-grazed, HSG D
3.230	70	Woods, Good, HSG C
3.470	77	Woods, Good, HSG D
7.840	74	Weighted Average
7.840		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.1	150	0.0500	0.18		**Sheet Flow, A to B** Grass: Dense n= 0.240 P2= 3.00"
0.6	75	0.0800	1.98		**Shallow Concentrated Flow, B to C** Short Grass Pasture Kv= 7.0 fps
5.1	455	0.0900	1.50		**Shallow Concentrated Flow, C to D** Woodland Kv= 5.0 fps
19.8	680	Total			

Summary for Subcatchment 5: (new node)

Runoff = 31.77 cfs @ 12.84 hrs, Volume= 5.269 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 25-year Rainfall=5.80"

Area (ac)	CN	Description
3.520	55	Woods, Good, HSG B
18.180	70	Woods, Good, HSG C
6.690	71	Meadow, non-grazed, HSG C
28.390	68	Weighted Average
28.390		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.3	150	0.0500	0.12		**Sheet Flow, A to B** Woods: Light underbrush n= 0.400 P2= 3.00"
7.3	660	0.0900	1.50		**Shallow Concentrated Flow, B to C** Woodland Kv= 5.0 fps
31.3	1,385	0.0260	0.74	4.15	**Trap/Vee/Rect Channel Flow, C to D** Bot.W=20.00' D=0.25' Z= 10.0 '/' Top.W=25.00' n= 0.120
59.9	2,195	Total			

Summary for Subcatchment 6: (new node)

Runoff = 15.73 cfs @ 12.89 hrs, Volume= 2.688 af, Depth> 1.98"

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=5.80"

Area (ac)	CN	Description
5.690	55	Woods, Good, HSG B
10.390	70	Woods, Good, HSG C
0.230	77	Woods, Good, HSG D
16.310	65	Weighted Average
16.310		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
40.5	150	0.0100	0.06		**Sheet Flow, A to B** Woods: Light underbrush n= 0.400 P2= 3.00"
11.3	585	0.0300	0.87		**Shallow Concentrated Flow, B to C** Woodland Kv= 5.0 fps
10.2	920	0.0900	1.50		**Shallow Concentrated Flow, C to D** Woodland Kv= 5.0 fps
62.0	1,655	Total			

Summary for Subcatchment 7: (new node)

Runoff = 9.29 cfs @ 12.32 hrs, Volume= 0.960 af, Depth> 2.18"

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=5.80"

Area (ac)	CN	Description
0.970	55	Woods, Good, HSG B
4.320	70	Woods, Good, HSG C
5.290	67	Weighted Average
5.290		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.6	150	0.0700	0.13		**Sheet Flow, A to B** Woods: Light underbrush n= 0.400 P2= 3.00"
3.7	310	0.0800	1.41		**Shallow Concentrated Flow, B to C** Woodland Kv= 5.0 fps
22.3	460	Total			

Summary for Subcatchment 8: (new node)

Runoff = 15.73 cfs @ 12.54 hrs, Volume= 2.033 af, Depth> 2.08"

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=5.80"

Area (ac)	CN	Description
3.160	55	Woods, Good, HSG B
8.460	70	Woods, Good, HSG C
0.100	77	Woods, Good, HSG D
11.720	66	Weighted Average
11.720		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
25.1	150	0.0330	0.10		**Sheet Flow, A to B** Woods: Light underbrush n= 0.400 P2= 3.00"
5.0	415	0.0770	1.39		**Shallow Concentrated Flow, B to C** Woodland Kv= 5.0 fps
6.9	235	0.0130	0.57		**Shallow Concentrated Flow, C to D** Woodland Kv= 5.0 fps
37.0	800	Total			

Summary for Subcatchment 9: (new node)

Runoff = 8.57 cfs @ 12.38 hrs, Volume= 0.950 af, Depth> 2.01"

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=5.80"

Area (ac)	CN	Description
1.760	55	Woods, Good, HSG B
3.910	70	Woods, Good, HSG C
5.670	65	Weighted Average
5.670		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.5	150	0.1100	0.16		**Sheet Flow, A to B** Woods: Light underbrush n= 0.400 P2= 3.00"
2.2	150	0.0500	1.12		**Shallow Concentrated Flow, B to C** Woodland Kv= 5.0 fps
8.2	740	0.0900	1.50		**Shallow Concentrated Flow, C to D** Woodland Kv= 5.0 fps
25.9	1,040	Total			

Summary for Subcatchment 10: (new node)

Runoff = 3.73 cfs @ 12.36 hrs, Volume= 0.405 af, Depth> 2.79"

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=5.80"

Area (ac)	CN	Description
0.112	98	Paved parking & roofs
0.383	55	Woods, Good, HSG B
1.249	78	Meadow, non-grazed, HSG D
1.744	74	Weighted Average
1.632		93.58% Pervious Area
0.112		6.42% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.5	150	0.0100	0.14		**Sheet Flow, A to B** Grass: Short n= 0.150 P2= 3.00"
7.0	295	0.0100	0.70		**Shallow Concentrated Flow, B to C** Short Grass Pasture Kv= 7.0 fps
0.2	85	0.0200	6.78	325.55	**Trap/Vee/Rect Channel Flow, C to D** Bot.W=10.00' D=3.00' Z= 2.0 '/' Top.W=22.00' n= 0.050
25.7	530	Total			

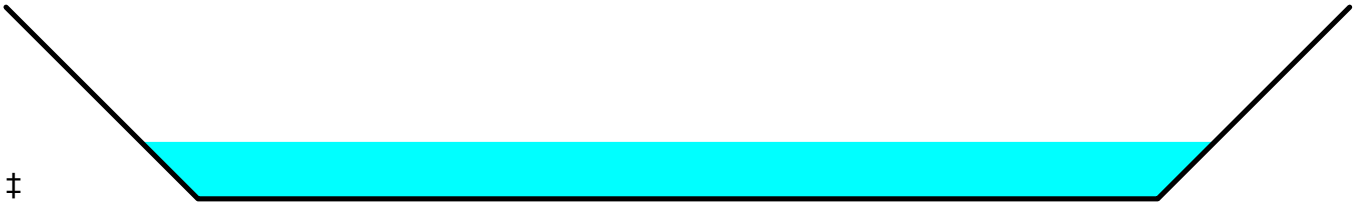
Summary for Reach R1: (new node)

Inflow Area = 33.400 ac, 0.33% Impervious, Inflow Depth > 2.44" for 25-year event
Inflow = 44.80 cfs @ 12.78 hrs, Volume= 6.789 af
Outflow = 43.41 cfs @ 13.04 hrs, Volume= 6.670 af, Atten= 3%, Lag= 15.4 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.69 fps, Min. Travel Time= 9.2 min
Avg. Velocity = 0.34 fps, Avg. Travel Time= 18.8 min

Peak Storage= 23,864 cf @ 12.88 hrs
Average Depth at Peak Storage= 0.59'
Bank-Full Depth= 2.00' Flow Area= 240.0 sf, Capacity= 349.08 cfs

100.00' x 2.00' deep channel, n= 0.150
Side Slope Z-value= 10.0 '/' Top Width= 140.00'
Length= 380.0' Slope= 0.0105 '/'
Inlet Invert= 100.00', Outlet Invert= 96.00'



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Summary for Reach R2: (new node)

Inflow Area = 33.400 ac, 0.33% Impervious, Inflow Depth > 2.40" for 25-year event
Inflow = 43.41 cfs @ 13.04 hrs, Volume= 6.670 af
Outflow = 43.27 cfs @ 13.09 hrs, Volume= 6.651 af, Atten= 0%, Lag= 3.2 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.39 fps, Min. Travel Time= 1.8 min
Avg. Velocity = 0.80 fps, Avg. Travel Time= 3.1 min

Peak Storage= 4,668 cf @ 13.06 hrs
Average Depth at Peak Storage= 1.51'
Bank-Full Depth= 3.00' Flow Area= 93.0 sf, Capacity= 190.93 cfs

10.00' x 3.00' deep channel, n= 0.150
Side Slope Z-value= 7.0 '/' Top Width= 52.00'
Length= 150.0' Slope= 0.0200 '/'
Inlet Invert= 96.00', Outlet Invert= 93.00'

‡

Summary for Reach SP1: (new node)

Inflow Area = 35.144 ac, 0.63% Impervious, Inflow Depth > 2.41" for 25-year event
Inflow = 44.37 cfs @ 13.11 hrs, Volume= 7.053 af
Outflow = 44.37 cfs @ 13.11 hrs, Volume= 7.053 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: (new node)

Inflow Area = 16.550 ac, 11.78% Impervious, Inflow Depth > 3.75" for 25-year event
Inflow = 45.85 cfs @ 12.36 hrs, Volume= 5.172 af
Outflow = 45.85 cfs @ 12.36 hrs, Volume= 5.172 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 SP3: (new node)

Inflow Area = 8.530 ac, 4.22% Impervious, Inflow Depth > 2.78" for 25-year event
Inflow = 15.68 cfs @ 12.50 hrs, Volume= 1.974 af
Outflow = 15.68 cfs @ 12.50 hrs, Volume= 1.974 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 SP4: (new node)

Inflow Area = 7.840 ac, 0.00% Impervious, Inflow Depth > 2.79" for 25-year event
Inflow = 18.66 cfs @ 12.28 hrs, Volume= 1.825 af
Outflow = 18.66 cfs @ 12.28 hrs, Volume= 1.825 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 SP5: (new node)

Inflow Area = 28.390 ac, 0.00% Impervious, Inflow Depth > 2.23" for 25-year event
Inflow = 31.77 cfs @ 12.84 hrs, Volume= 5.269 af
Outflow = 31.77 cfs @ 12.84 hrs, Volume= 5.269 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 SP6: (new node)

Inflow Area = 16.310 ac, 0.00% Impervious, Inflow Depth > 1.98" for 25-year event
Inflow = 15.73 cfs @ 12.89 hrs, Volume= 2.688 af
Outflow = 15.73 cfs @ 12.89 hrs, Volume= 2.688 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 SP7: (new node)

Inflow Area = 5.290 ac, 0.00% Impervious, Inflow Depth > 2.18" for 25-year event
Inflow = 9.29 cfs @ 12.32 hrs, Volume= 0.960 af
Outflow = 9.29 cfs @ 12.32 hrs, Volume= 0.960 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 SP8: (new node)

Inflow Area = 11.720 ac, 0.00% Impervious, Inflow Depth > 2.08" for 25-year event
Inflow = 15.73 cfs @ 12.54 hrs, Volume= 2.033 af
Outflow = 15.73 cfs @ 12.54 hrs, Volume= 2.033 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 SP9: (new node)

Inflow Area = 5.670 ac, 0.00% Impervious, Inflow Depth > 2.01" for 25-year event
Inflow = 8.57 cfs @ 12.38 hrs, Volume= 0.950 af
Outflow = 8.57 cfs @ 12.38 hrs, Volume= 0.950 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 Gilbert Culvert: (new node)

Inflow Area = 1.744 ac, 6.42% Impervious, Inflow Depth > 2.79" for 25-year event
Inflow = 3.73 cfs @ 12.36 hrs, Volume= 0.405 af
Outflow = 3.46 cfs @ 12.46 hrs, Volume= 0.405 af, Atten= 7%, Lag= 6.0 min
Primary = 3.46 cfs @ 12.46 hrs, Volume= 0.405 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= 94.92' @ 12.46 hrs Surf.Area= 3,223 sf Storage= 1,612 cf

Plug-Flow detention time= 7.1 min calculated for 0.405 af (100% of inflow)
Center-of-Mass det. time= 6.8 min (816.2 - 809.4)

Volume	Invert	Avail.Storage	Storage Description
#1	94.00'	6,700 cf	**Custom Stage Data (Prismatic)** Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
94.00	0	0	0
95.00	3,500	1,750	1,750
95.60	13,000	4,950	6,700

Device	Routing	Invert	Outlet Devices
#1	Primary	94.38'	**15.0" Round Culvert** L= 25.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 94.38' / 93.95' S= 0.0172 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Primary	93.70'	**12.0" Round Culvert** L= 32.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 93.70' / 93.56' S= 0.0044 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#3	Secondary	95.50'	**15.0' long x 25.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=3.45 cfs @ 12.46 hrs HW=94.92' (Free Discharge)
└**1=Culvert** (Inlet Controls 1.00 cfs @ 1.97 fps)
└**2=Culvert** (Barrel Controls 2.45 cfs @ 3.25 fps)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=94.00' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond Martin Culvert: (new node)

Inflow Area = 35.144 ac, 0.63% Impervious, Inflow Depth > 2.41" for 25-year event
Inflow = 44.48 cfs @ 13.08 hrs, Volume= 7.056 af
Outflow = 44.37 cfs @ 13.11 hrs, Volume= 7.053 af, Atten= 0%, Lag= 1.9 min
Primary = 10.86 cfs @ 13.11 hrs, Volume= 4.488 af
Secondary = 33.50 cfs @ 13.11 hrs, Volume= 2.565 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 93.85' @ 13.11 hrs Surf.Area= 11,847 sf Storage= 15,663 cf

Plug-Flow detention time= 7.7 min calculated for 7.029 af (100% of inflow)
Center-of-Mass det. time= 7.6 min (869.0 - 861.4)

Volume	Invert	Avail.Storage	Storage Description
#1	90.00'	17,150 cf	**Custom Stage Data (Prismatic)** Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
90.00	0	0	0
91.00	400	200	200
92.00	2,500	1,450	1,650
93.00	8,000	5,250	6,900
94.00	12,500	10,250	17,150

Device	Routing	Invert	Outlet Devices
#1	Primary	89.85'	**15.0" Round Culvert** L= 30.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 89.85' / 89.42' S= 0.0143 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Secondary	93.30'	**30.0' long x 15.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=10.86 cfs @ 13.11 hrs HW=93.85' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 10.86 cfs @ 8.85 fps)

Secondary OutFlow Max=33.42 cfs @ 13.11 hrs HW=93.85' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 33.42 cfs @ 2.01 fps)

Summary for Pond P1(Existing): (new node)

Inflow Area = 33.400 ac, 0.33% Impervious, Inflow Depth > 2.49" for 25-year event
Inflow = 45.04 cfs @ 12.74 hrs, Volume= 6.935 af
Outflow = 44.80 cfs @ 12.78 hrs, Volume= 6.789 af, Atten= 1%, Lag= 2.2 min
Primary = 44.80 cfs @ 12.78 hrs, Volume= 6.789 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 100.61' @ 12.78 hrs Surf.Area= 0.312 ac Storage= 0.337 af

Plug-Flow detention time= 14.3 min calculated for 6.766 af (98% of inflow)

Center-of-Mass det. time= 7.2 min (843.3 - 836.1)

Volume	Invert	Avail.Storage	Storage Description
#1	99.00'	0.845 af	**Custom Stage Data (Prismatic)** Listed below

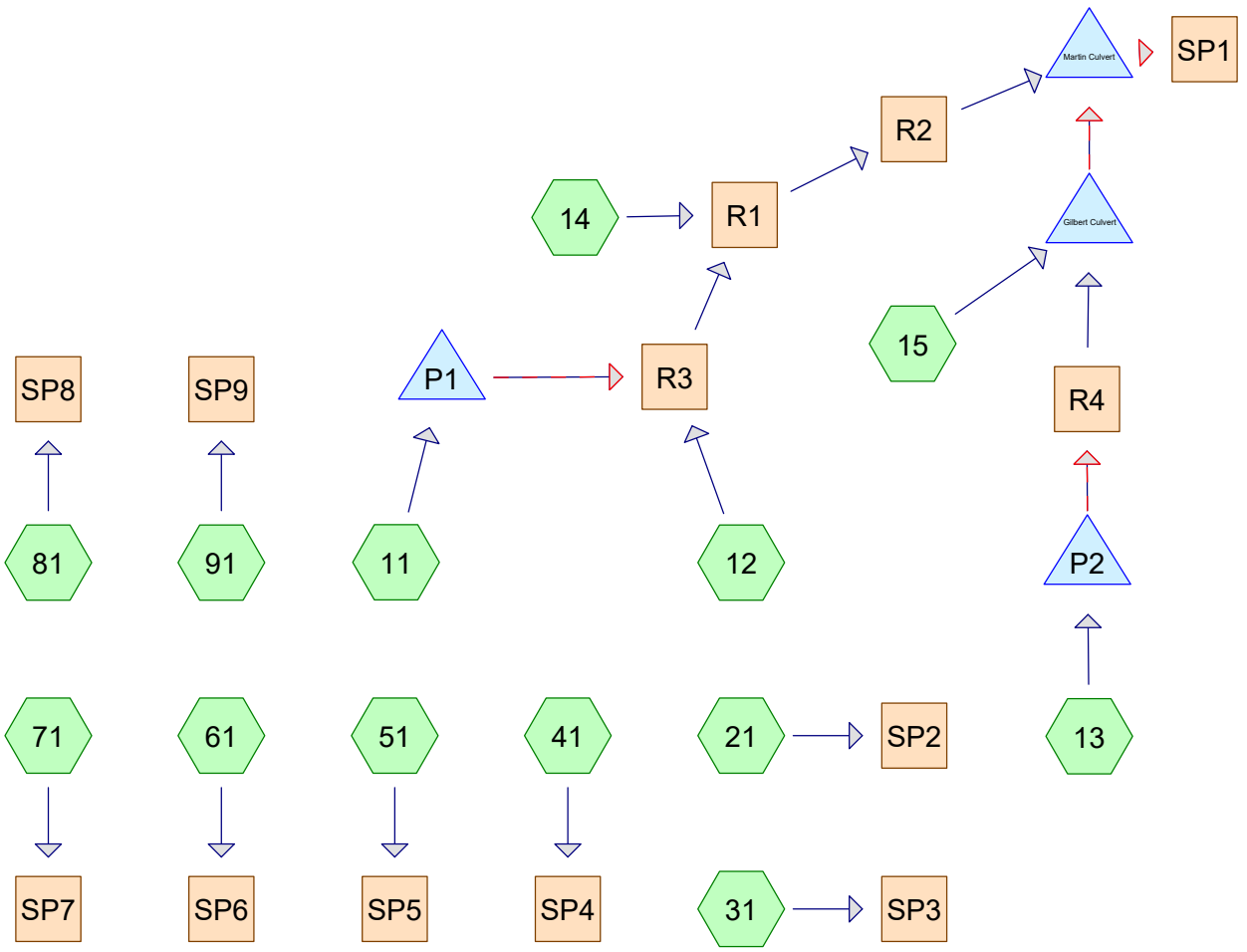
Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
99.00	0.000	0.000	0.000
100.00	0.230	0.115	0.115
102.00	0.500	0.730	0.845

Device	Routing	Invert	Outlet Devices
#1	Primary	100.00'	**35.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=44.76 cfs @ 12.78 hrs HW=100.61' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 44.76 cfs @ 2.10 fps)

Appendix 2B

Proposed Conditions
HydroCAD Summary



Subcat Reach Pond Link

Routing Diagram for 05159POST5
Prepared by Sebago Technics, Inc., Printed 1/8/2024

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.321	65	Brush, Good, HSG C (15)
0.970	73	Brush, Good, HSG D (15)
2.690	98	Expanded area of quarry (11)
7.790	91	Gravel roads, HSG D (11, 12, 13, 21, 51)
0.218	58	Meadow, non-grazed, HSG B (61)
15.779	71	Meadow, non-grazed, HSG C (13, 14, 21, 31, 41, 51, 61)
20.766	78	Meadow, non-grazed, HSG D (11, 13, 14, 21, 31, 41)
37.690	98	Paved parking & roofs (11, 12, 13, 21, 31)
2.230	98	Pond (11, 13)
9.897	55	Woods, Good, HSG B (51, 61, 71, 81)
32.803	70	Woods, Good, HSG C (12, 21, 31, 41, 51, 61, 71, 81, 91)
4.290	77	Woods, Good, HSG D (11, 12, 41, 61, 81)
135.444	**80**	**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

Subcatchment11: Runoff Area=47.350 ac 78.33% Impervious Runoff Depth>2.28"
Flow Length=1,065' Slope=0.0050 '/' Tc=66.3 min CN=94 Runoff=49.04 cfs 8.980 af

Subcatchment12: Runoff Area=8.460 ac 0.35% Impervious Runoff Depth>0.77"
Flow Length=1,690' Tc=50.1 min CN=72 Runoff=3.42 cfs 0.543 af

Subcatchment13: Runoff Area=10.420 ac 32.92% Impervious Runoff Depth>1.59"
Flow Length=1,065' Tc=81.9 min CN=86 Runoff=6.89 cfs 1.378 af

Subcatchment14: Runoff Area=1.685 ac 0.00% Impervious Runoff Depth>0.93"
Flow Length=715' Tc=29.0 min CN=75 Runoff=1.10 cfs 0.130 af

Subcatchment15: Runoff Area=1.291 ac 0.00% Impervious Runoff Depth>0.72"
Flow Length=265' Slope=0.0050 '/' Tc=58.8 min CN=71 Runoff=0.44 cfs 0.077 af

Subcatchment21: Runoff Area=14.280 ac 12.75% Impervious Runoff Depth>1.34"
Flow Length=975' Tc=26.1 min CN=82 Runoff=14.55 cfs 1.595 af

Subcatchment31: Runoff Area=8.400 ac 2.86% Impervious Runoff Depth>0.82"
Flow Length=1,380' Tc=35.6 min CN=73 Runoff=4.38 cfs 0.577 af

Subcatchment41: Runoff Area=7.700 ac 0.00% Impervious Runoff Depth>0.88"
Flow Length=605' Tc=19.2 min CN=74 Runoff=5.60 cfs 0.565 af

Subcatchment51: Runoff Area=16.000 ac 0.00% Impervious Runoff Depth>0.68"
Flow Length=1,375' Tc=49.1 min CN=70 Runoff=5.62 cfs 0.905 af

Subcatchment61: Runoff Area=10.928 ac 0.00% Impervious Runoff Depth>0.38"
Flow Length=575' Slope=0.0900 '/' Tc=21.5 min CN=62 Runoff=2.46 cfs 0.346 af

Subcatchment71: Runoff Area=3.930 ac 0.00% Impervious Runoff Depth>0.52"
Flow Length=220' Slope=0.0800 '/' Tc=31.5 min CN=66 Runoff=1.21 cfs 0.170 af

Subcatchment81: Runoff Area=3.777 ac 0.00% Impervious Runoff Depth>0.31"
Flow Length=260' Slope=0.0130 '/' Tc=39.6 min CN=60 Runoff=0.51 cfs 0.098 af

Subcatchment91: Runoff Area=1.223 ac 0.00% Impervious Runoff Depth>0.69"
Flow Length=240' Tc=18.9 min CN=70 Runoff=0.67 cfs 0.070 af

Reach R1: Avg. Flow Depth=0.17' Max Vel=0.31 fps Inflow=5.20 cfs 3.035 af
n=0.150 L=380.0' S=0.0105 '/' Capacity=349.08 cfs Outflow=5.19 cfs 2.796 af

Reach R2: Avg. Flow Depth=0.50' Max Vel=0.76 fps Inflow=5.19 cfs 2.796 af
n=0.150 L=150.0' S=0.0200 '/' Capacity=190.93 cfs Outflow=5.18 cfs 2.758 af

Reach R3: Avg. Flow Depth=0.91' Max Vel=4.53 fps Inflow=5.10 cfs 2.908 af
18.0" Round Pipe n=0.013 L=90.0' S=0.0050 '/' Capacity=7.43 cfs Outflow=5.10 cfs 2.904 af

Reach R4: Avg. Flow Depth=0.07' Max Vel=0.13 fps Inflow=0.50 cfs 0.296 af
n=0.150 L=160.0' S=0.0070 '/' Capacity=63.25 cfs Outflow=0.50 cfs 0.269 af

Reach SP1: Inflow=5.75 cfs 3.090 af
Outflow=5.75 cfs 3.090 af

Reach SP2: Inflow=14.55 cfs 1.595 af
Outflow=14.55 cfs 1.595 af

Reach SP3: Inflow=4.38 cfs 0.577 af
Outflow=4.38 cfs 0.577 af

Reach SP4: Inflow=5.60 cfs 0.565 af
Outflow=5.60 cfs 0.565 af

Reach SP5: Inflow=5.62 cfs 0.905 af
Outflow=5.62 cfs 0.905 af

Reach SP6: Inflow=2.46 cfs 0.346 af
Outflow=2.46 cfs 0.346 af

Reach SP7: Inflow=1.21 cfs 0.170 af
Outflow=1.21 cfs 0.170 af

Reach SP8: Inflow=0.51 cfs 0.098 af
Outflow=0.51 cfs 0.098 af

Reach SP9: Inflow=0.67 cfs 0.070 af
Outflow=0.67 cfs 0.070 af

Pond Gilbert Culvert: Peak Elev=94.20' Storage=358 cf Inflow=0.64 cfs 0.346 af
Primary=0.63 cfs 0.340 af Secondary=0.00 cfs 0.000 af Outflow=0.63 cfs 0.340 af

Pond Martin Culvert: Peak Elev=91.42' Storage=810 cf Inflow=5.75 cfs 3.098 af
Primary=5.75 cfs 3.090 af Secondary=0.00 cfs 0.000 af Outflow=5.75 cfs 3.090 af

Pond P1: Peak Elev=106.73' Storage=526,828 cf Inflow=49.04 cfs 8.980 af
Primary=4.64 cfs 2.365 af Secondary=0.00 cfs 0.000 af Outflow=4.64 cfs 2.365 af

Pond P2: Peak Elev=99.56' Storage=188,631 cf Inflow=6.89 cfs 1.378 af
Primary=0.50 cfs 0.296 af Secondary=0.00 cfs 0.000 af Outflow=0.50 cfs 0.296 af

Total Runoff Area = 135.444 ac Runoff Volume = 15.436 af Average Runoff Depth = 1.37"
68.54% Pervious = 92.834 ac 31.46% Impervious = 42.610 ac

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

Subcatchment11: Runoff Area=47.350 ac 78.33% Impervious Runoff Depth>3.65"
Flow Length=1,065' Slope=0.0050 '/' Tc=66.3 min CN=94 Runoff=76.74 cfs 14.397 af

Subcatchment12: Runoff Area=8.460 ac 0.35% Impervious Runoff Depth>1.71"
Flow Length=1,690' Tc=50.1 min CN=72 Runoff=8.02 cfs 1.208 af

Subcatchment13: Runoff Area=10.420 ac 32.92% Impervious Runoff Depth>2.84"
Flow Length=1,065' Tc=81.9 min CN=86 Runoff=12.17 cfs 2.465 af

Subcatchment14: Runoff Area=1.685 ac 0.00% Impervious Runoff Depth>1.95"
Flow Length=715' Tc=29.0 min CN=75 Runoff=2.39 cfs 0.274 af

Subcatchment15: Runoff Area=1.291 ac 0.00% Impervious Runoff Depth>1.64"
Flow Length=265' Slope=0.0050 '/' Tc=58.8 min CN=71 Runoff=1.06 cfs 0.176 af

Subcatchment21: Runoff Area=14.280 ac 12.75% Impervious Runoff Depth>2.53"
Flow Length=975' Tc=26.1 min CN=82 Runoff=27.38 cfs 3.011 af

Subcatchment31: Runoff Area=8.400 ac 2.86% Impervious Runoff Depth>1.80"
Flow Length=1,380' Tc=35.6 min CN=73 Runoff=9.95 cfs 1.259 af

Subcatchment41: Runoff Area=7.700 ac 0.00% Impervious Runoff Depth>1.88"
Flow Length=605' Tc=19.2 min CN=74 Runoff=12.50 cfs 1.209 af

Subcatchment51: Runoff Area=16.000 ac 0.00% Impervious Runoff Depth>1.57"
Flow Length=1,375' Tc=49.1 min CN=70 Runoff=13.99 cfs 2.097 af

Subcatchment61: Runoff Area=10.928 ac 0.00% Impervious Runoff Depth>1.07"
Flow Length=575' Slope=0.0900 '/' Tc=21.5 min CN=62 Runoff=8.92 cfs 0.978 af

Subcatchment71: Runoff Area=3.930 ac 0.00% Impervious Runoff Depth>1.32"
Flow Length=220' Slope=0.0800 '/' Tc=31.5 min CN=66 Runoff=3.50 cfs 0.431 af

Subcatchment81: Runoff Area=3.777 ac 0.00% Impervious Runoff Depth>0.95"
Flow Length=260' Slope=0.0130 '/' Tc=39.6 min CN=60 Runoff=2.04 cfs 0.298 af

Subcatchment91: Runoff Area=1.223 ac 0.00% Impervious Runoff Depth>1.59"
Flow Length=240' Tc=18.9 min CN=70 Runoff=1.66 cfs 0.162 af

Reach R1: Avg. Flow Depth=0.23' Max Vel=0.37 fps Inflow=9.81 cfs 5.344 af
n=0.150 L=380.0' S=0.0105 '/' Capacity=349.08 cfs Outflow=8.59 cfs 4.982 af

Reach R2: Avg. Flow Depth=0.66' Max Vel=0.88 fps Inflow=8.59 cfs 4.982 af
n=0.150 L=150.0' S=0.0200 '/' Capacity=190.93 cfs Outflow=8.59 cfs 4.922 af

Reach R3: Avg. Flow Depth=1.50' Max Vel=4.79 fps Inflow=14.59 cfs 7.832 af
18.0" Round Pipe n=0.013 L=90.0' S=0.0050 '/' Capacity=7.43 cfs Outflow=7.69 cfs 5.069 af

Reach R4: Avg. Flow Depth=0.14' Max Vel=0.21 fps Inflow=1.75 cfs 0.823 af
n=0.150 L=160.0' S=0.0070 '/' Capacity=63.25 cfs Outflow=1.74 cfs 0.777 af

Reach SP1: Inflow=9.41 cfs 5.721 af
Outflow=9.41 cfs 5.721 af

Reach SP2: Inflow=27.38 cfs 3.011 af
Outflow=27.38 cfs 3.011 af

Reach SP3: Inflow=9.95 cfs 1.259 af
Outflow=9.95 cfs 1.259 af

Reach SP4: Inflow=12.50 cfs 1.209 af
Outflow=12.50 cfs 1.209 af

Reach SP5: Inflow=13.99 cfs 2.097 af
Outflow=13.99 cfs 2.097 af

Reach SP6: Inflow=8.92 cfs 0.978 af
Outflow=8.92 cfs 0.978 af

Reach SP7: Inflow=3.50 cfs 0.431 af
Outflow=3.50 cfs 0.431 af

Reach SP8: Inflow=2.04 cfs 0.298 af
Outflow=2.04 cfs 0.298 af

Reach SP9: Inflow=1.66 cfs 0.162 af
Outflow=1.66 cfs 0.162 af

Pond Gilbert Culvert: Peak Elev=94.61' Storage=1,061 cf Inflow=1.87 cfs 0.953 af
Primary=1.87 cfs 0.934 af Secondary=0.00 cfs 0.000 af Outflow=1.87 cfs 0.934 af

Pond Martin Culvert: Peak Elev=93.01' Storage=6,995 cf Inflow=9.88 cfs 5.856 af
Primary=9.41 cfs 5.721 af Secondary=0.00 cfs 0.000 af Outflow=9.41 cfs 5.721 af

Pond P1: Peak Elev=107.68' Storage=650,323 cf Inflow=76.74 cfs 14.397 af
Primary=13.13 cfs 6.623 af Secondary=0.00 cfs 0.000 af Outflow=13.13 cfs 6.623 af

Pond P2: Peak Elev=100.43' Storage=219,412 cf Inflow=12.17 cfs 2.465 af
Primary=1.75 cfs 0.823 af Secondary=0.00 cfs 0.000 af Outflow=1.75 cfs 0.823 af

Total Runoff Area = 135.444 ac Runoff Volume = 27.966 af Average Runoff Depth = 2.48"
68.54% Pervious = 92.834 ac 31.46% Impervious = 42.610 ac

Summary for Subcatchment 11:

Runoff = 98.68 cfs @ 12.86 hrs, Volume= 18.750 af, Depth> 4.75"

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=5.80"

	Area (ac)	CN	Description
*	1.600	98	Pond
	32.800	98	Paved parking & roofs
	1.900	91	Gravel roads, HSG D
	8.310	78	Meadow, non-grazed, HSG D
	0.050	77	Woods, Good, HSG D
*	2.690	98	Expanded area of quarry
	47.350	94	Weighted Average
	10.260		21.67% Pervious Area
	37.090		78.33% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
35.5	150	0.0050	0.07		**Sheet Flow, A to B** Grass: Dense n= 0.240 P2= 3.00"
30.8	915	0.0050	0.49		**Shallow Concentrated Flow, B to C** Short Grass Pasture Kv= 7.0 fps
66.3	1,065	Total			

Summary for Subcatchment 12:

Runoff = 12.16 cfs @ 12.70 hrs, Volume= 1.821 af, Depth> 2.58"

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=5.80"

Area (ac)	CN	Description
0.030	98	Paved parking & roofs
0.410	91	Gravel roads, HSG D
7.500	70	Woods, Good, HSG C
0.520	77	Woods, Good, HSG D
8.460	72	Weighted Average
8.430		99.65% Pervious Area
0.030		0.35% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.3	150	0.0500	0.12		**Sheet Flow, A to B** Woods: Light underbrush n= 0.400 P2= 3.00"
3.2	195	0.0400	1.00		**Shallow Concentrated Flow, B to C** Woodland Kv= 5.0 fps
13.3	620	0.0240	0.77		**Shallow Concentrated Flow, C to D** Woodland Kv= 5.0 fps
0.2	50	0.0050	4.97	8.78	**Pipe Channel, D to E** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.011
12.0	675	0.0500	0.94	3.21	**Trap/Vee/Rect Channel Flow, E to F** Bot.W=10.00' D=0.25' Z= 15.0 '/' Top.W=17.50' n= 0.120
50.1	1,690	Total			

Summary for Subcatchment 13:

Runoff = 16.48 cfs @ 13.06 hrs, Volume= 3.375 af, Depth> 3.89"

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 25-year Rainfall=5.80"

	Area (ac)	CN	Description
	2.800	98	Paved parking & roofs
	1.700	91	Gravel roads, HSG D
	4.500	78	Meadow, non-grazed, HSG D
	0.790	71	Meadow, non-grazed, HSG C
*	0.630	98	Pond
	10.420	86	Weighted Average
	6.990		67.08% Pervious Area
	3.430		32.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.8	150	0.0600	0.13		**Sheet Flow, A to B** Woods: Light underbrush n= 0.400 P2= 3.00"
1.6	120	0.0600	1.22		**Shallow Concentrated Flow, B to C** Woodland Kv= 5.0 fps
60.4	725	0.0100	0.20	0.07	**Trap/Vee/Rect Channel Flow, C to D** Bot.W=3.00' D=0.10' Z= 3.0 '/' Top.W=3.60' n= 0.150 Sheet flow over Short Grass
0.1	70	0.0290	12.26	38.52	**Pipe Channel, D to E** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.013 Corrugated PE, smooth interior
81.9	1,065	Total			

Summary for Subcatchment 14:

Runoff = 3.52 cfs @ 12.41 hrs, Volume= 0.404 af, Depth> 2.88"

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 25-year Rainfall=5.80"

Area (ac)	CN	Description
0.719	71	Meadow, non-grazed, HSG C
0.966	78	Meadow, non-grazed, HSG D
1.685	75	Weighted Average
1.685		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.7	70	0.0600	0.11		**Sheet Flow, A to B** Woods: Light underbrush n= 0.400 P2= 3.00"
3.2	195	0.0400	1.00		**Shallow Concentrated Flow, B to C** Woodland Kv= 5.0 fps
15.0	450	0.0100	0.50		**Shallow Concentrated Flow, C to D** Woodland Kv= 5.0 fps
29.0	715	Total			

Summary for Subcatchment 15:

Runoff = 1.63 cfs @ 12.82 hrs, Volume= 0.267 af, Depth> 2.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=5.80"

Area (ac)	CN	Description
0.321	65	Brush, Good, HSG C
0.970	73	Brush, Good, HSG D
1.291	71	Weighted Average
1.291		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
53.4	150	0.0050	0.05		**Sheet Flow, A to B** Woods: Light underbrush n= 0.400 P2= 3.00"
5.4	115	0.0050	0.35		**Shallow Concentrated Flow, B to C** Woodland Kv= 5.0 fps
58.8	265	Total			

Summary for Subcatchment 21:

Runoff = 38.06 cfs @ 12.36 hrs, Volume= 4.224 af, Depth> 3.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=5.80"

Area (ac)	CN	Description
1.820	98	Paved parking & roofs
3.350	91	Gravel roads, HSG D
2.010	71	Meadow, non-grazed, HSG C
5.290	78	Meadow, non-grazed, HSG D
1.810	70	Woods, Good, HSG C
14.280	82	Weighted Average
12.460		87.25% Pervious Area
1.820		12.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.5	150	0.1100	0.16		**Sheet Flow, A to B** Woods: Light underbrush n= 0.400 P2= 3.00"
3.7	415	0.1370	1.85		**Shallow Concentrated Flow, B to C** Woodland Kv= 5.0 fps
6.9	410	0.0200	0.99		**Shallow Concentrated Flow, C to D** Short Grass Pasture Kv= 7.0 fps
26.1	975	Total			

Summary for Subcatchment 31:

Runoff = 14.94 cfs @ 12.50 hrs, Volume= 1.881 af, Depth> 2.69"

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=5.80"

Area (ac)	CN	Description
2.640	70	Woods, Good, HSG C
4.180	71	Meadow, non-grazed, HSG C
1.340	78	Meadow, non-grazed, HSG D
0.240	98	Paved parking & roofs
8.400	73	Weighted Average
8.160		97.14% Pervious Area
0.240		2.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0	150	0.1200	0.25		**Sheet Flow, A to B** Grass: Dense n= 0.240 P2= 3.00"
1.7	210	0.0900	2.10		**Shallow Concentrated Flow, B to C** Short Grass Pasture Kv= 7.0 fps
12.5	390	0.0500	0.52	3.56	**Trap/Vee/Rect Channel Flow, C to D** Bot.W=25.00' D=0.25' Z= 10.0 '/' Top.W=30.00' n= 0.240
6.0	375	0.0500	1.04	7.13	**Trap/Vee/Rect Channel Flow, D to E** Bot.W=25.00' D=0.25' Z= 10.0 '/' Top.W=30.00' n= 0.120
5.4	255	0.0300	0.79	8.92	**Trap/Vee/Rect Channel Flow, E to F** Bot.W=40.00' D=0.25' Z= 20.0 '/' Top.W=50.00' n= 0.120
35.6	1,380	Total			

Summary for Subcatchment 41:

Runoff = 18.61 cfs @ 12.27 hrs, Volume= 1.793 af, Depth> 2.79"

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=5.80"

Area (ac)	CN	Description
0.640	71	Meadow, non-grazed, HSG C
0.360	78	Meadow, non-grazed, HSG D
3.230	70	Woods, Good, HSG C
3.470	77	Woods, Good, HSG D
7.700	74	Weighted Average
7.700		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.1	150	0.0500	0.18		**Sheet Flow, A to B** Grass: Dense n= 0.240 P2= 3.00"
5.1	455	0.0900	1.50		**Shallow Concentrated Flow, B to C** Woodland Kv= 5.0 fps
19.2	605	Total			

Summary for Subcatchment 51:

Runoff = 21.68 cfs @ 12.69 hrs, Volume= 3.211 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=5.80"

Area (ac)	CN	Description
0.430	91	Gravel roads, HSG D
1.000	55	Woods, Good, HSG B
8.380	70	Woods, Good, HSG C
6.190	71	Meadow, non-grazed, HSG C
16.000	70	Weighted Average
16.000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.2	150	0.0400	0.11		**Sheet Flow, A to B** Woods: Light underbrush n= 0.400 P2= 3.00"
0.8	50	0.0400	1.00		**Shallow Concentrated Flow, B to C** Woodland Kv= 5.0 fps
0.3	75	0.0050	4.97	8.78	**Pipe Channel, C to D** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.011
24.8	1,100	0.0260	0.74	4.15	**Trap/Vee/Rect Channel Flow, D to E** Bot.W=20.00' D=0.25' Z= 10.0 '/' Top.W=25.00' n= 0.120
49.1	1,375	Total			

Summary for Subcatchment 61:

Runoff = 15.52 cfs @ 12.32 hrs, Volume= 1.615 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 25-year Rainfall=5.80"

Area (ac)	CN	Description
5.520	55	Woods, Good, HSG B
3.730	70	Woods, Good, HSG C
0.210	77	Woods, Good, HSG D
0.218	58	Meadow, non-grazed, HSG B
1.250	71	Meadow, non-grazed, HSG C
10.928	62	Weighted Average
10.928		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.8	150	0.0900	0.15		**Sheet Flow, A to B** Woods: Light underbrush n= 0.400 P2= 3.00"
4.7	425	0.0900	1.50		**Shallow Concentrated Flow, B to C** Woodland Kv= 5.0 fps
21.5	575	Total			

Summary for Subcatchment 71:

Runoff = 5.69 cfs @ 12.46 hrs, Volume= 0.683 af, Depth> 2.09"

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=5.80"

Area (ac)	CN	Description
0.960	55	Woods, Good, HSG B
2.970	70	Woods, Good, HSG C
3.930	66	Weighted Average
3.930		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.7	150	0.0800	0.08		**Sheet Flow, A to B** Woods: Dense underbrush n= 0.800 P2= 3.00"
0.8	70	0.0800	1.41		**Shallow Concentrated Flow, B to C** Woodland Kv= 5.0 fps
31.5	220	Total			

Summary for Subcatchment 81:

Runoff = 3.67 cfs @ 12.60 hrs, Volume= 0.505 af, Depth> 1.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=5.80"

Area (ac)	CN	Description
2.417	55	Woods, Good, HSG B
1.320	70	Woods, Good, HSG C
0.040	77	Woods, Good, HSG D
3.777	60	Weighted Average
3.777		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
36.4	150	0.0130	0.07		**Sheet Flow, A to B** Woods: Light underbrush n= 0.400 P2= 3.00"
3.2	110	0.0130	0.57		**Shallow Concentrated Flow, B to C** Woodland Kv= 5.0 fps
39.6	260	Total			

Summary for Subcatchment 91:

Runoff = 2.59 cfs @ 12.27 hrs, Volume= 0.248 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=5.80"

Area (ac)	CN	Description
1.223	70	Woods, Good, HSG C
1.223		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.8	150	0.0900	0.15		**Sheet Flow, A to B** Woods: Light underbrush n= 0.400 P2= 3.00"
2.1	90	0.0200	0.71		**Shallow Concentrated Flow, B to C** Woodland Kv= 5.0 fps
18.9	240	Total			

Summary for Reach R1:

Inflow Area = 57.495 ac, 64.56% Impervious, Inflow Depth > 1.17" for 25-year event
Inflow = 11.22 cfs @ 12.37 hrs, Volume= 5.617 af
Outflow = 9.85 cfs @ 12.96 hrs, Volume= 5.263 af, Atten= 12%, Lag= 35.1 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.39 fps, Min. Travel Time= 16.1 min
Avg. Velocity = 0.25 fps, Avg. Travel Time= 25.6 min

Peak Storage= 9,553 cf @ 12.68 hrs
Average Depth at Peak Storage= 0.25'
Bank-Full Depth= 2.00' Flow Area= 240.0 sf, Capacity= 349.08 cfs

100.00' x 2.00' deep channel, n= 0.150
Side Slope Z-value= 10.0 '/' Top Width= 140.00'
Length= 380.0' Slope= 0.0105 '/'
Inlet Invert= 100.00', Outlet Invert= 96.00'

‡

Summary for Reach R2:

Inflow Area = 57.495 ac, 64.56% Impervious, Inflow Depth > 1.10" for 25-year event
Inflow = 9.85 cfs @ 12.96 hrs, Volume= 5.263 af
Outflow = 9.83 cfs @ 13.04 hrs, Volume= 5.204 af, Atten= 0%, Lag= 4.9 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.92 fps, Min. Travel Time= 2.7 min
Avg. Velocity = 0.61 fps, Avg. Travel Time= 4.1 min

Peak Storage= 1,603 cf @ 12.99 hrs
Average Depth at Peak Storage= 0.71'
Bank-Full Depth= 3.00' Flow Area= 93.0 sf, Capacity= 190.93 cfs

10.00' x 3.00' deep channel, n= 0.150
Side Slope Z-value= 7.0 '/' Top Width= 52.00'
Length= 150.0' Slope= 0.0200 '/'
Inlet Invert= 96.00', Outlet Invert= 93.00'

‡

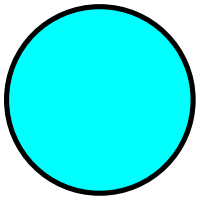
Summary for Reach R3:

Inflow Area = 55.810 ac, 66.51% Impervious, Inflow Depth > 2.50" for 25-year event
Inflow = 25.56 cfs @ 14.26 hrs, Volume= 11.636 af
Outflow = 7.74 cfs @ 12.37 hrs, Volume= 5.213 af, Atten= 70%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.77 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 3.41 fps, Avg. Travel Time= 0.4 min

Peak Storage= 159 cf @ 12.40 hrs
Average Depth at Peak Storage= 1.50'
Bank-Full Depth= 1.50' Flow Area= 1.8 sf, Capacity= 7.43 cfs

18.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 90.0' Slope= 0.0050 '/'
Inlet Invert= 100.45', Outlet Invert= 100.00'



Summary for Reach R4:

Inflow Area = 10.420 ac, 32.92% Impervious, Inflow Depth > 1.79" for 25-year event
Inflow = 3.56 cfs @ 15.11 hrs, Volume= 1.552 af
Outflow = 3.54 cfs @ 15.40 hrs, Volume= 1.493 af, Atten= 1%, Lag= 17.5 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.27 fps, Min. Travel Time= 9.9 min
Avg. Velocity = 0.21 fps, Avg. Travel Time= 12.5 min

Peak Storage= 2,112 cf @ 15.24 hrs
Average Depth at Peak Storage= 0.22'
Bank-Full Depth= 1.00' Flow Area= 100.0 sf, Capacity= 63.25 cfs

50.00' x 1.00' deep channel, n= 0.150
Side Slope Z-value= 50.0 '/' Top Width= 150.00'
Length= 160.0' Slope= 0.0070 '/'
Inlet Invert= 95.50', Outlet Invert= 94.38'

‡

Summary for Reach SP1:

Inflow Area = 69.206 ac, 58.59% Impervious, Inflow Depth > 1.16" for 25-year event
Inflow = 11.54 cfs @ 15.53 hrs, Volume= 6.718 af
Outflow = 11.54 cfs @ 15.53 hrs, Volume= 6.718 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:

Inflow Area = 14.280 ac, 12.75% Impervious, Inflow Depth > 3.55" for 25-year event
Inflow = 38.06 cfs @ 12.36 hrs, Volume= 4.224 af
Outflow = 38.06 cfs @ 12.36 hrs, Volume= 4.224 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 SP3:

Inflow Area = 8.400 ac, 2.86% Impervious, Inflow Depth > 2.69" for 25-year event
Inflow = 14.94 cfs @ 12.50 hrs, Volume= 1.881 af
Outflow = 14.94 cfs @ 12.50 hrs, Volume= 1.881 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 SP4:

Inflow Area = 7.700 ac, 0.00% Impervious, Inflow Depth > 2.79" for 25-year event
Inflow = 18.61 cfs @ 12.27 hrs, Volume= 1.793 af
Outflow = 18.61 cfs @ 12.27 hrs, Volume= 1.793 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 SP5:

Inflow Area = 16.000 ac, 0.00% Impervious, Inflow Depth > 2.41" for 25-year event
Inflow = 21.68 cfs @ 12.69 hrs, Volume= 3.211 af
Outflow = 21.68 cfs @ 12.69 hrs, Volume= 3.211 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 SP6:

Inflow Area = 10.928 ac, 0.00% Impervious, Inflow Depth > 1.77" for 25-year event
Inflow = 15.52 cfs @ 12.32 hrs, Volume= 1.615 af
Outflow = 15.52 cfs @ 12.32 hrs, Volume= 1.615 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 SP7:

Inflow Area = 3.930 ac, 0.00% Impervious, Inflow Depth > 2.09" for 25-year event
Inflow = 5.69 cfs @ 12.46 hrs, Volume= 0.683 af
Outflow = 5.69 cfs @ 12.46 hrs, Volume= 0.683 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 SP8:

Inflow Area = 3.777 ac, 0.00% Impervious, Inflow Depth > 1.61" for 25-year event
Inflow = 3.67 cfs @ 12.60 hrs, Volume= 0.505 af
Outflow = 3.67 cfs @ 12.60 hrs, Volume= 0.505 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 SP9:

Inflow Area = 1.223 ac, 0.00% Impervious, Inflow Depth > 2.44" for 25-year event
Inflow = 2.59 cfs @ 12.27 hrs, Volume= 0.248 af
Outflow = 2.59 cfs @ 12.27 hrs, Volume= 0.248 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 Gilbert Culvert:

Inflow Area = 11.711 ac, 29.29% Impervious, Inflow Depth > 1.80" for 25-year event
Inflow = 3.79 cfs @ 15.37 hrs, Volume= 1.760 af
Outflow = 3.77 cfs @ 15.48 hrs, Volume= 1.734 af, Atten= 0%, Lag= 6.6 min
Primary = 3.77 cfs @ 15.48 hrs, Volume= 1.734 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= 94.98' @ 15.48 hrs Surf.Area= 3,444 sf Storage= 1,722 cf

Plug-Flow detention time= 8.2 min calculated for 1.728 af (98% of inflow)
Center-of-Mass det. time= 4.8 min (976.2 - 971.4)

Volume	Invert	Avail.Storage	Storage Description
#1	94.00'	6,700 cf	**Custom Stage Data (Prismatic)** Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
94.00	0	0	0
95.00	3,500	1,750	1,750
95.60	13,000	4,950	6,700

Device	Routing	Invert	Outlet Devices
#1	Primary	94.38'	**15.0" Round Culvert** L= 25.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 94.38' / 93.95' S= 0.0172 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Primary	93.70'	**12.0" Round Culvert** L= 32.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 93.70' / 93.56' S= 0.0044 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#3	Secondary	95.50'	**15.0' long x 25.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=3.77 cfs @ 15.48 hrs HW=94.98' (Free Discharge)
└**1=Culvert** (Inlet Controls 1.23 cfs @ 2.09 fps)
└**2=Culvert** (Barrel Controls 2.55 cfs @ 3.28 fps)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=94.00' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond Martin Culvert:

Inflow Area = 69.206 ac, 58.59% Impervious, Inflow Depth > 1.20" for 25-year event
Inflow = 11.87 cfs @ 13.02 hrs, Volume= 6.938 af
Outflow = 11.54 cfs @ 15.53 hrs, Volume= 6.718 af, Atten= 3%, Lag= 150.8 min
Primary = 10.05 cfs @ 15.53 hrs, Volume= 6.400 af
Secondary = 1.48 cfs @ 15.53 hrs, Volume= 0.318 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 93.37' @ 15.53 hrs Surf.Area= 9,660 sf Storage= 10,681 cf

Plug-Flow detention time= 14.2 min calculated for 6.718 af (97% of inflow)
Center-of-Mass det. time= 6.4 min (961.9 - 955.5)

Volume	Invert	Avail.Storage	Storage Description
#1	90.00'	17,150 cf	**Custom Stage Data (Prismatic)** Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
90.00	0	0	0
91.00	400	200	200
92.00	2,500	1,450	1,650
93.00	8,000	5,250	6,900
94.00	12,500	10,250	17,150

Device	Routing	Invert	Outlet Devices
#1	Primary	89.85'	**15.0" Round Culvert** L= 30.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 89.85' / 89.42' S= 0.0143 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Secondary	93.30'	**30.0' long x 15.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=10.05 cfs @ 15.53 hrs HW=93.37' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 10.05 cfs @ 8.19 fps)

Secondary OutFlow Max=1.45 cfs @ 15.53 hrs HW=93.37' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 1.45 cfs @ 0.70 fps)

Summary for Pond P1:

Inflow Area = 47.350 ac, 78.33% Impervious, Inflow Depth > 4.75" for 25-year event
Inflow = 98.68 cfs @ 12.86 hrs, Volume= 18.750 af
Outflow = 23.15 cfs @ 14.32 hrs, Volume= 9.815 af, Atten= 77%, Lag= 87.7 min
Primary = 17.19 cfs @ 14.32 hrs, Volume= 9.138 af
Secondary = 5.96 cfs @ 14.32 hrs, Volume= 0.677 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Starting Elev= 103.65' Surf.Area= 62,918 sf Storage= 223,484 cf
Peak Elev= 108.42' @ 14.32 hrs Surf.Area= 144,893 sf Storage= 754,732 cf (531,248 cf above start)

Plug-Flow detention time= 440.2 min calculated for 4.682 af (25% of inflow)
Center-of-Mass det. time= 163.6 min (955.9 - 792.3)

Volume	Invert	Avail.Storage	Storage Description
#1	99.00'	993,495 cf	**Custom Stage Data (Prismatic)** Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
99.00	38,202	0	0
100.00	42,040	40,121	40,121
101.00	45,939	43,990	84,111
102.00	49,898	47,919	132,029
103.00	53,919	51,909	183,938
104.00	67,764	60,842	244,779
106.00	119,149	186,913	431,692
108.00	140,355	259,504	691,196
110.00	161,944	302,299	993,495

Device	Routing	Invert	Outlet Devices
#1	Primary	106.00'	**18.0" Round Culvert** L= 50.0' CMP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 106.00' / 104.00' S= 0.0400 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Primary	106.00'	**15.0" Round Culvert** L= 50.0' CMP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 106.00' / 104.00' S= 0.0400 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#3	Primary	103.65'	**0.50 cfs Exfiltration when above 103.65'**
#4	Secondary	108.20'	**21.0' long x 25.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=17.19 cfs @ 14.32 hrs HW=108.42' (Free Discharge)
- **1=Culvert** (Inlet Controls 9.70 cfs @ 5.49 fps)
- **2=Culvert** (Inlet Controls 6.99 cfs @ 5.69 fps)
- **3=Exfiltration** (Exfiltration Controls 0.50 cfs)

Secondary OutFlow Max=5.82 cfs @ 14.32 hrs HW=108.42' (Free Discharge)
- **4=Broad-Crested Rectangular Weir** (Weir Controls 5.82 cfs @ 1.26 fps)

Summary for Pond P2:

Inflow Area = 10.420 ac, 32.92% Impervious, Inflow Depth > 3.89" for 25-year event
Inflow = 16.48 cfs @ 13.06 hrs, Volume= 3.375 af
Outflow = 3.56 cfs @ 15.11 hrs, Volume= 1.552 af, Atten= 78%, Lag= 123.2 min
Primary = 3.16 cfs @ 15.11 hrs, Volume= 1.525 af
Secondary = 0.40 cfs @ 15.11 hrs, Volume= 0.026 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Starting Elev= 98.00' Surf.Area= 27,500 sf Storage= 141,300 cf
Peak Elev= 100.94' @ 15.11 hrs Surf.Area= 39,752 sf Storage= 238,690 cf (97,390 cf above start)

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= 153.5 min (981.9 - 828.4)

Volume	Invert	Avail.Storage	Storage Description
#1	90.00'	283,050 cf	**Custom Stage Data (Prismatic)** Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
90.00	0	0	0
92.00	15,000	15,000	15,000
94.00	18,900	33,900	48,900
96.00	23,000	41,900	90,800
98.00	27,500	50,500	141,300
99.00	30,000	28,750	170,050
100.00	36,000	33,000	203,050
101.00	40,000	38,000	241,050
102.00	44,000	42,000	283,050

Device	Routing	Invert	Outlet Devices
#1	Primary	98.40'	**0.50 cfs Exfiltration when above 98.40'**
#2	Primary	99.80'	**12.0" Round Culvert** L= 24.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 99.80' / 99.00' S= 0.0333 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#3	Secondary	100.90'	**16.0' long x 28.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=3.16 cfs @ 15.11 hrs HW=100.94' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.50 cfs)
└**2=Culvert** (Inlet Controls 2.66 cfs @ 3.39 fps)

Secondary OutFlow Max=0.32 cfs @ 15.11 hrs HW=100.94' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Weir Controls 0.32 cfs @ 0.52 fps)

Appendix 3

Stormwater Management Plans

1/8/08, 10

LEGEND

EXISTING	DESCRIPTION	PROPOSED
	BOUNDARY LINE/ROW	
	ABUTTER LINE/ROW	
	SETBACK	
	BUILDING	
	WETLANDS	
	EDGE WETLAND GPS	
	EDGE WETLAND SURVEY	
	EDGE WETLAND OTHERS	
	SIGN	
	STREAM	
	EDGE PAVEMENT	
	GRAVEL ROAD	
	TREELINE	
--122-- --120--	CONTOURS	
30.20	SPOT GRADE	
	WIRE FENCE	
	DECIDUOUS TREE	
	CONIFEROUS TREE	
	GUARDRAIL	
	BOLLARD	
	CULVERT	
OHE	OVERHEAD ELEC. & TEL.	
	UTILITY POLE	

N

GRID

TIME OF CONCENTRATION

WATERSHED	Tc SEGMENT	LENGTH	SLOPE	FLOW TYPE
1	A TO B B TO C C TO D D TO E	150 545 325 550	0.03 0.10 0.014 0.05	SF SCF SCF TCF
2	A TO B B TO C C TO D	150 430 410	0.11 0.11 0.02	SF SCF SCF
3	A TO B B TO C C TO D D TO E E TO F	150 210 380 375 255	0.12 0.09 0.05 0.05 0.03	SF SCF TCF TCF TCF
4	A TO B B TO C C TO D	150 75 350	0.5 0.08 0.09	SF SCF SCF
5	A TO B B TO C C TO D	150 640 1,385	0.05 0.03 0.16	SF SCF TCF
6	A TO B B TO C C TO D	150 585 920	0.01 0.03 0.09	SF SCF SCF
7	A TO B B TO C	150 310	0.07 0.08	SF SCF
8	A TO B B TO C C TO D	150 415 85	0.033 0.011 0.013	SF SCF SCF
9	A TO B B TO C C TO D	150 150 640	0.11 0.05 0.09	SF SCF SCF
10	A TO B B TO C C TO D	150 295 85	0.013 0.025 0.09	SF SCF TCF

TIME OF CONCENTRATION KEY
SF=SHEET FLOW
SCF=SHALLOW CONCENTRATED FLOW
TCF=TRAPEZOIDAL CHANNEL FLOW
CC=CIRCULAR CHANNEL

SOILS LEGEND

SOILS TYPE		HSG
BgB	BELGRADE, VERY FINE, SANDY LOAM - 3 TO 8 % SLOPES	B
BgC2	BELGRADE, VERY FINE, SANDY LOAM - 8 TO 15 % SLOPES	B
BuB	BUXTON, SILT LOAM - 3 TO 8 % SLOPES	C
BuC2	BUXTON, SILT LOAM - 8 TO 15 % SLOPES	C
Gp	GRAVEL PIT	-
PbC	PAXTON, FINE SANDY LOAM	C
Sn	SCANTIC, SILT LOAM	D

LEGEND

- WATERSHED BOUNDARY
- TIME OF CONCENTRATION (B, C)
- REACH
- 1 — WATERSHED LABEL
- 1 — REACH
- 1 — DETENTION POND
- SOILS BOUNDARY

PRESUMPSCOT RIVER

MARTIN CULVERT

GILBERT CULVERT

ROUTE 237/ MOSHER ROAD

24" CULVERT

18" CULVERT

GRAPHIC SCALE
200 0 100 200 400 800
(IN FEET)
1 inch = 200 ft.

STATE OF MAINE
SHAWN M. FRANK
NO. 8386
REGISTERED PROFESSIONAL ENGINEER

REV:	BY:	DATE:	STATUS:
D	SMF	5-30-07	RESUBMIT TO MDEP PER REVIEW COMMENTS
C	SMF	2-13-07	SUBMIT TO MDEP
B	SMF	1-25-07	REVISED GRADES
A	SMF	12-6-06	SUBMIT TO TOWN FOR REVIEW

Sebago Technics
Engineering Expertise You Can Build On
One Chabot Street
Westbrook, Me 04092-1339
Tel (207) 856-0277

PRE-DEVELOPMENT WATERSHED MAP
OF:
BRICKYARD QUARRY
RT 237 (AKA MOSHER RD)
GORHAM, MAINE
FOR:
SHAW BROTHERS CONSTRUCTION INC.
511 MAIN STREET
GORHAM, MAINE 04038

DATE	SCALE
10/30/06	1"=200'
PROJ. NO.	DWG NAME
05159	05159SWP
FIELD BOOK	DESIGN BY
-	ASB
DRAWN BY	CHECKED BY
ASB	SMF

SHEET 1 OF 2

LEGEND

EXISTING	DESCRIPTION	PROPOSED
	BOUNDARY LINE/R.O.W.	
	ABUTTER LINE/R.O.W.	
	SETBACK	
	EASEMENT	
	BUFFER	
	CENTERLINE	
	BENCHMARK	
	BUILDING	
	WETLANDS	
	EDGE WETLAND GPS	
	EDGE WETLAND SURVEY	
	EDGE WETLAND OTHERS	
	SIGN	
	EDGE PAVEMENT	
	PAVEMENT PAINT	
	GRAVEL ROAD	
	TREELINE	
--122-- --120--	CONTOURS	
30.20	SPOT GRADE	
	CHAIN LINK FENCE	
	RETAINING WALL	
	DECIDUOUS TREE	
	CONIFEROUS TREE	
	BOLLARD	
G	GAS	
W	WATER	
	GATE VALVE	
	HYDRANT	
S	SEWER	
	SEWER MH	
	CATCH BASIN	
	CULVERT	
OHE	OVERHEAD ELEC. & TEL.	
T	TRANSFORMER PAD	
	LIGHT POLE/WALL	
	UTILITY POLE	

N

GRID

PRESUMPSCOT RIVER

MARTEN CULVERT

GILBERT CULVERT

ROUTE 237 / MOSHER ROAD

24" CULVERT

18" CULVERT

SEE GRADING AND UTILITY PLAN FOR STORM DRAIN CALLOUTS

TIME OF CONCENTRATION

WATERSHED	Tc SEGMENT	LENGTH	SLOPE	FLOW TYPE
11	A TO B B TO C	150 915	0.005 0.005	SF SCF
12	A TO B B TO C C TO D D TO E E TO F	150 155 620 50 690	0.05 0.04 0.014 0.005 0.05	SF SCF SCF CC (PIPE) TCF
13	A TO B B TO C C TO D D TO E	20 20 1070 70	0.02 0.10 0.06 0.01	SF SF TCF CC (PIPE)
14	A TO B B TO C C TO D	70 155 405	0.06 0.04 0.01	SF SCF SCF
15	A TO B B TO C C TO D	50 100 260	0.33 0.01 0.01	SF SCF TCF
21	A TO B B TO C C TO D	150 415 410	0.11 0.137 0.02	SF SCF SCF
31	A TO B B TO C C TO D D TO E E TO F	150 210 390 375 255	0.12 0.09 0.09 0.05 0.03	SF SCF TCF TCF TCF
41	A TO B B TO C	150 350	0.05 0.09	SF SCF
51	A TO B B TO C C TO D D TO E	150 100 80 1,100	0.04 0.04 0.005 0.016	SF SCF CC (PIPE) TCF
61	A TO B B TO C	150 425	0.09 0.09	SF SCF
71	A TO B B TO C	150 70	0.08 0.08	SF SCF
81	A TO B	100	0.013	SF
91	A TO B B TO C	150 30	0.09 0.01	SF SCF

TIME OF CONCENTRATION KEY
SF = SHEET FLOW
SCF = SHALLOW CONCENTRATED FLOW
TCF = TRAPEZOIDAL CHANNEL FLOW
CC = CHANNEL FLOW

GRAPHIC SCALE

200 0 100 200 400 800

(IN FEET)
1 inch = 200 ft.

SOILS LEGEND

SOILS TYPE		HSG
BgB	BELGRADE, VERY FINE, SANDY LOAM - 3 TO 8 % SLOPES	B
BgC2	BELGRADE, VERY FINE, SANDY LOAM - 8 TO 15 % SLOPES	B
BuB	BUXTON, SILT LOAM - 3 TO 8 % SLOPES	C
BuC2	BUXTON, SILT LOAM - 8 TO 15 % SLOPES	C
Gp	GRAVEL PIT	-
PbC	PAXTON, FINE SANDY LOAM	C
Sn	SCANTIC, SILT LOAM	D

LEGEND

- WATERSHED BOUNDARY
- TIME OF CONCENTRATION (B — C)
- REACH
- WATERSHED LABEL (1)
- REACH (1)
- DETENTION POND (1)
- SOILS BOUNDARY

STATE OF MAINE — SHAWN M. FRANK No. 6396 — REGISTERED PROFESSIONAL ENGINEER — 11-30-23

REV.	BY:	DATE:	ISSUED FOR VARIANCE APPLICATION
F	SMF	11-30-23	
E	SMF	8-17-07	RESUBMIT TO MDEP PER REVIEW COMMENTS
D	SMF	5-30-07	RESUBMIT TO MDEP PER REVIEW COMMENTS
C	SMF	2-13-07	SUBMIT TO MDEP
B	SMF	1-25-07	REVISED GRADES
A	SMF	12-6-06	SUBMIT TO TOWN FOR REVIEW

THIS PLAN SHALL NOT BE MODIFIED WITHOUT WRITTEN PERMISSION FROM SEBAGO TECHNICS, INC. ANY ALTERATIONS, AUTHORIZED OR OTHERWISE, SHALL BE AT THE USER'S SOLE RISK AND WITHOUT LIABILITY TO SEBAGO TECHNICS, INC.

SEBAGO TECHNICS
75 John Roberts Rd.
Suite 4A
South Portland, ME 04106
Tel. 207-200-2100

POST-DEVELOPMENT WATERSHED MAP

OF

BRICKYARD QUARRY

RT 237 (AKA MOSHER RD)
GORHAM, MAINE
FOR:

SHAW BROTHERS CONSTRUCTION INC.
511 MAIN STREET
GORHAM, MAINE 04038

DATE	SCALE
10/30/06	1"=200'
PROJ. NO.	DWG NAME
05159	05159SWP
FIELD BOOK	DESIGN BY
–	ASB
DRAWN BY	CHECKED BY
ASB	SMF

SHEET 2 OF 2

Appendix 4

Inspection, Maintenance, and Housekeeping Plan

INSPECTION, MAINTENANCE, AND HOUSEKEEPING PLAN

For:
BRICKYARD QUARRY
GORHAM, MAINE

By:
Sebago Technics, Inc.
75 John Roberts Road, Suite 4A
South Portland, Maine

Introduction

The following plan outlines the anticipated inspection and maintenance procedures for the erosion and sedimentation control measures as well as stormwater management facilities for the project. This plan also outlines several housekeeping requirements that shall be followed during and after construction. These procedures shall be followed in order to ensure the intended function of the designed measures and to prevent unreasonably adverse impacts to the surrounding environment.

The procedures outlined in this Inspection, Maintenance and Housekeeping Plan are provided as an overview of the anticipated practices to be used on this site. In some instances, additional measures may be required due to unexpected conditions. For additional detail on any of the erosion and sedimentation control measures or stormwater management devices to be utilized on this project, refer to the most recently revised edition of the "Maine Erosion and Sedimentation Control BMP" manual and/or the "Stormwater Management for Maine: Best Management Practices" manual as published by the Maine Department of Environmental Protection (MDEP).

During Construction

1. **Inspection:** During the construction process, it is the Contractor's responsibility to comply with the inspection and maintenance procedures outlined in this section. These responsibilities include inspecting disturbed and impervious areas, erosion control measures, materials storage areas that are exposed to precipitation, and locations where vehicles enter or exit the site. These areas shall be inspected at least once a week as well as before and after a storm event (0.5" of rainfall), and prior to completing permanent stabilization measures. A person with knowledge of erosion and stormwater control, including the standards and conditions in any applicable permits, shall conduct the inspections.

2. **Maintenance:** All measures shall be maintained in an effective operating condition until areas are permanently stabilized. If Best Management Practices (BMPs) need to be maintained or modified, additional BMPs are necessary, or other corrective action is needed, implementation must be completed within 7 calendar days and prior to any storm event (0.5" of rainfall).

3. **Documentation:** A log summarizing the inspections and any corrective action taken must be maintained on-site. The log must include the name(s) and qualifications of the person making the inspections, the date(s) of the inspections, and major observations about the operation and maintenance of erosion and sedimentation controls, material storage areas, and vehicle access points to the site. Major observations must include BMPs that need maintenance, BMPs that failed

to operate as designed or proved inadequate for a particular location, and locations where additional BMPs are needed. For each BMP requiring maintenance, BMP needing replacement, and location needing additional BMPs, note in the log the corrective action taken and when it was taken. The log must be made accessible to the appropriate regulatory agency upon request. The permittee shall retain a copy of the log for a period of at least three years from the completion of permanent stabilization.

4. **Specific Inspection and Maintenance Tasks:** The following is a list of erosion control and stormwater management measures and the specific inspection and maintenance tasks to be performed during construction.

A. Sediment Barriers:

- Hay bale barriers, silt fences, and filter berms shall be inspected immediately after each rainfall and at least daily during prolonged rainfall.
- If the fabric on a silt fence or filter barrier should decompose or become ineffective prior to the end of the expected usable life and the barrier is still necessary, it shall be replaced.
- Sediment deposits should be removed after each storm event (0.5" of rainfall). They must be removed before deposits reach approximately one-half the height of the barrier.
- Filter berms shall be reshaped as needed.
- Any sediment deposits remaining in place after the silt fence or filter barrier is no longer required should be dressed to conform to the existing grade, prepared, and seeded.

B. Riprap Materials:

- Once a riprap installation has been completed, it should require very little maintenance. It shall, however, be inspected periodically to determine if high flows have caused scour beneath the riprap or dislodged any of the stone.

C. Erosion Control Blankets:

- Inspect these reinforced areas semi-annually and after significant rainfall events for slumping, sliding, seepage, and scour. Pay close attention to unreinforced areas adjacent to the erosion control blankets, which may experience accelerated erosion.
- Review all applicable inspection and maintenance procedures recommended by the specific blanket manufacturer. These tasks shall be included in addition to the requirements of this plan.

D. Stabilized Construction Entrances/Exits:

- The exit shall be maintained in a condition that will prevent tracking of sediment onto public rights-of-way.
- When the control pad becomes ineffective, the stone shall be removed along with the collected soil material. The entrance should then be reconstructed.
- Areas that have received mud-tracking or sediment deposits shall be swept or washed. Washing shall be done on an area stabilized with aggregate, which drains

into an approved sediment-trapping device (not into storm drains, ditches, or waterways).

E. Temporary Seed and Mulch:

- Mulched areas should be inspected after rain events to check for rill erosion.
- If less than 90% of the soil surface is covered by mulch, additional mulch shall be applied in bare areas.
- In applications where seeding and mulch have been applied in conjunction with erosion control blankets, the blankets must be inspected after rain events for dislocation or undercutting.
- Mulch shall continue to be reapplied until 95% of the soil surface has established temporary vegetative cover.

F. Stabilized Temporary Drainage Swales:

- Sediment accumulation in the swale shall be removed once the cross section of the swale is reduced by 25%.
- The swales shall be inspected after rainfall events. Any evidence of sloughing of the side slopes or channel erosion shall be repaired and corrective action should be taken to prevent reoccurrence of the problem.
- In addition to the stabilized lining of the channel (i.e. erosion control blankets), stone check dams may be needed to further reduce channel velocity.

5. **Housekeeping:** The following general performance standards apply to the proposed project.

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

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

C. Fugitive sediment and dust: Actions must be taken to ensure that activities do not result in noticeable erosion of soils or fugitive dust emissions during or after construction. Oil may not be used for dust control.

D. Debris and other materials: Litter, construction debris, and chemicals exposed to stormwater must be prevented from becoming a pollutant source.

E. Trench or foundation dewatering: Trench dewatering is the removal of water from trenches, foundations, cofferdams, ponds, and other areas within the construction area that retain water after excavation. In most cases, the collected water is heavily silted

and hinders correct and safe construction practices. The collected water must be removed from the ponded area, either through gravity or pumping, and must be spread through natural wooded buffers or removed to areas that are specifically designed to collect the maximum amount of sediment possible, like a cofferdam sedimentation basin. Avoid allowing the water to flow over disturbed areas of the site. Equivalent measures may be taken if approved.

Post-Construction

1. **Inspection:** After construction, it is the responsibility of the owner or assigned heirs to comply with the inspection and maintenance procedures outlined in this section. All measures must be maintained in effective operating condition. The owner shall inspect and maintain the BMPs, including but not limited to any parking areas, catch basins, drainage swales, detention basins and ponds, pipes and related structures, in accordance with all municipal and state inspection, cleaning and maintenance requirements of the approved post-construction stormwater management plan.

2. **Specific Inspection and Maintenance Tasks:** The following is a list of permanent erosion control and stormwater management measures and the inspection and maintenance tasks to be performed after construction. If the BMP requires maintenance, repair or replacement to function as intended by the approved post-construction stormwater management plan, the owner or operator of the BMP shall take corrective action(s) to address the deficiency or deficiencies as soon as possible after the deficiency is discovered and shall provide a record of the deficiency and corrective action(s) to the local municipality in the annual report.

   A. Vegetated Areas:

   - Inspect vegetated areas, particularly slopes and embankments, early in the growing season or after heavy rains (>0.5”) to identify active or potential erosion problems.
   - Replant bare areas or areas with sparse growth. Where rill erosion is evident, armor the area with an appropriate lining or divert the erosive flows to on-site areas able to withstand the concentrated flows.

   B. Ditches, Swales and Other Open Channels:

   - Inspect ditches, swales, level spreaders and other open stormwater channels in the spring, in the late fall, and after heavy rains to remove any obstructions to flow. Remove accumulated sediments and debris, remove woody vegetative growth that could obstruct flow, and repair any erosion of the ditch lining.
   - Vegetated ditches must be mowed at least annually or otherwise maintained to control the growth of woody vegetation and maintain flow capacity.
   - Any woody vegetation growing through riprap linings must also be removed. Repair any slumping side slopes as soon as practicable.
   - If the ditch has a riprap lining, replace riprap in areas where any underlying filter fabric or underdrain gravel is showing through the stone or where stones have dislodged.

C. Culverts:

- Inspect culverts in the spring, in the late fall, and after heavy rains (>0.5") to remove any obstructions to flow.
- Remove accumulated sediments and debris at the inlet, at the outlet, and within the conduit.
- Inspect and repair any erosion damage at the culvert's inlet and outlet.

D. Removal of Winter Sand:

- Clear accumulations of winter sand in parking lots and along roadways at least once a year, preferably in the spring.
- Accumulations on pavement may be removed by pavement sweeping.
- Accumulations of sand along road shoulders may be removed by grading excess sand to the pavement edge and removing it manually or by a front-end loader or other acceptable method.

E. Wet Pond:

- The pond outlet structure and outlet of the pond should be checked periodically to ensure that flow structures are not blocked by debris. All ditches or pipes connecting ponds in series should be checked for debris that may obstruct flow. Inspections should be conducted monthly during wet weather conditions from March to November.
- The wet pond and outlet should be inspected annually for erosion, destabilization of side slopes, embankment settling and other signs of structural failure. Any signs of erosion shall be immediately repaired to assure stability and proper function.
- The wet pond will be inspected on an annual basis to assure that significant sediment accumulation has not occurred in the pond outlet structure. Whenever the sump is 25% inundated with sediment, the accumulated sediment shall be removed and property disposed of.
- The underdrained gravel trench shall be inspected after every major storm in the first few months to ensure proper function. Thereafter, the gravel trench should be inspected at least once every six months. Inspection consists of verifying that the pond is slowly emptying thorough the gravel filter for short time (12-24 hours) after a storm and that potential clogging material such as accumulations of decaying leaves are removed.
- The top several inches of the gravel in the underdrained trench must be replaced with fresh material when water ponds above the permanent pool for more than 72 hours. The removed sediments shall be disposed of in an acceptable manner.
- Wet ponds lose 0.5-1.0% of their volume annually due to sediment accumulation. Dredging is required when accumulated volume loss reaches 15%, or approximately every 15-20 years.

3. Documentation:

A. The owner or operator of a BMP or a qualified post-construction stormwater inspector hired by that person, shall, as required by the local municipality, provide a completed and signed certification on a form provided by the local municipality, certifying that the person has inspected the BMP(s) and that they are adequately maintained and functioning as intended by the approved post-construction stormwater management plan, or that they required maintenance or repair, including the record of the deficiency and corrective action(s) taken.

B. A log summarizing the inspections and any corrective action taken must be maintained. The log must include the name(s) and qualifications of the person making the inspections, the date(s) of the inspections, and major observations about the operation and maintenance of controls. Major observations must include BMPs that need maintenance, BMPs that failed to operate as designed or proved inadequate for a particular location, and locations where additional BMPs are needed. For each BMP requiring maintenance, BMP needing replacement, and location needing additional BMPs, note in the log the corrective action taken and when it was taken. The log must be made accessible to the appropriate regulatory agency upon request. A sample "Stormwater Inspection and Maintenance Form" has been included as Attachment 1 of this Inspection, Maintenance, and Housekeeping Plan.

4. Duration of Maintenance: Perform maintenance as described and required for any associated permits unless and until the system is formally accepted by a municipality or quasi-municipal district, or is placed under the jurisdiction of a legally created association that will be responsible for the maintenance of the system. If a municipality or quasi-municipal district chooses to accept a stormwater management system, or a component of a stormwater system, it must provide a letter to the MDEP stating that it assumes responsibility for the system. The letter must specify the components of the system for which the municipality or district will assume responsibility, and that the municipality or district agrees to maintain those components of the system in compliance with MDEP standards. Upon such assumption of responsibility, and approval by the MDEP, the municipality, quasi-municipal district, or association becomes a co-permittee for this purpose only and must comply with all terms and conditions of the permit.

ATTACHMENT 1 – STORMWATER INSPECTION AND MAINTENANCE LOG

BRICKYARD QUARRY
341 MOSHER ROAD
GORHAM, MAINE

This log is intended to accompany the Inspection, Maintenance, and Housekeeping Plan for the Shaw Brothers Brickyard Quarry in the Town of Gorham. The following items shall be checked, cleaned, and maintained on a regular basis as specified in the Maintenance Plan and as described in the sections below. This log shall be kept on file for a minimum of five (5) years and shall be available for review by the Town of Gorham and the Maine DEP. Qualified personnel familiar with the drainage systems and soils shall perform all inspections. A copy of the construction and post-construction maintenance logs are provided.

INSPECTION MAINTENANCE AND HOUSEKEEPING FORM			
General Information			
Project Name:		**Inspection Date:**	
Project Location:		**Current Weather:**	
		Date / Amount Last Precip:	
BMP Owner:		**Company conducting inspection:**	
Owner Mailing Address:		**Company Mailing Address**	
Owner Phone #:		**Company Phone #:**	
Owner Email:		**Inspector Name:**	
		Inspector Email:	
Site Element	**Suggested Maintenance (recm'd frequency)**	**Observations**	**Inspection Notes/Recommended Action**
Vegetated Areas	Inspect Slopes/Embankments for erosion (annually)		
	Replant bare areas or areas of sparse growth (annually)		
Ditches/Swales	Remove obstructions/debris/sediment (monthly)		
	Inspect for erosion/repair as needed (annually)		
	Remove woody vegetation (annually)		
	Mow vegetated ditches (annually)		
Catch Basins	Remove sediment/debris from sump (annually)		
	Remove accumulated debris from inlet grate		
Culverts	Remove sediment/debris from inlet/outlet aprons (annually)		
	Inspect inlet/outlet aprons for erosion, repair as needed (annually)		
	Inspect, repair as needed, riprap aprons for dislodged/sparse coverage (annually)		
Pipe Outlets	Remove sediment/debris from outlet aprons (annually)		
	Inspect outlet aprons for erosion, repair as needed (annually)		
	Inspect, repair as needed, riprap aprons for dislodged/sparse coverage (annually)		
Additional Notes/Observations:			

INSPECTION MAINTENANCE AND HOUSEKEEPING FORM			
General Information			
Project Name:		**Inspection Date:**	
Project Location:		**Current Weather:**	
		Date / Amount Last Precip:	
BMP Owner:		**Company conducting inspection:**	
Owner Mailing Address:		**Company Mailing Address**	
Owner Phone #:		**Company Phone #:**	
Owner Email:		**Inspector Name:**	
		Inspector Email:	

BMP Element	Suggested Maintenance (recm'd frequency)	Observations	Inspection Notes/Recommended Action
Forebay/Pretreatment	Sediment/Debris Removal (Twice Annually)		
	Inspect for bare areas or rill erosion (Twice Annually)		
Outlet Control Structure	Sediment Depth (Twice Annually)		
	Floatables/Debris (Twice Annually)		
Inlet Pipe	Sediment/Debris Removal (Twice Annually)		
Discharge Pipe	Ground Stabilized (>1" rain, Twice Annually)		
Emergency Spillway	Review for signs of erosion (Twice Annually)		
	Review for signs of discharge (>1" rain, Twice Annually)		
Embankments	Review for signs of erosion (Twice Annually)		
Gravel Bench	Remove debris/leaf litter (Annually) Inspect for signs of significant ponding (Twice Annually). Top several inches of the bench layer to be replaced when water ponds above the permanent pool elevation longer than 72 hours.		

Additional Notes/Observations:

05159

EROSION & SEDIMENTATION CONTROL PLAN
Brickyard Quarry
Route 237 (Mosher Road)
Gorham, Maine

Pre-Construction Phase

Prior to the beginning of any construction, sediment barriers (silt fence) shall be staked across the slope(s), on the contour, at or just below the limits of clearing or grubbing, and/or just above any adjacent property line or watercourse to protect against construction related erosion. The placement of silt fences and hay bales shall be completed in accordance with guidelines established in Best Management Practices and in accordance with the Erosion Control Plan and Details in the plan set. This network is to be provided, installed and maintained by the contractor until all exposed slopes have at least 85%-90% vigorous perennial vegetative cover to prevent erosion. Temporary erosion control measures shall be removed within 30 days after permanent stabilization in attained.

Prior to any clearing or grubbing, a construction entrance shall be constructed at the intersection with the proposed access drive and the existing roadway to avoid tracking of mud, dust and debris from the site.

Prior to construction, the contractor shall prepare a detailed schedule and marked up site plan indicating areas and components of the work and key dates showing date of disturbance and completion of the work. The contractor shall schedule a pre-construction meeting with the municipal staff. Three copies of the schedule and marked up plan shall be provided to the municipality three days prior to the scheduled pre-construction meeting. Special attention shall be given to the 14-day limit of disturbance in the schedule addressing temporary and permanent vegetation measures.

Construction and Post-Construction Phase

Areas undergoing actual construction shall only expose that amount of mineral soil necessary for progressive and efficient site construction. An area considered open is any area not stabilized with pavement, vegetation, mulching, erosion control mats, riprap or gravel base on a road. Open areas shall be anchored with temporary erosion control as shown on the design plans and as described within this Erosion Control Plan within fourteen (14) days of disturbance. Areas located within 100 feet of streams shall be anchored with temporary erosion control within seven (7) days. Refer to winter erosion control notes for the treatment of open areas after October 1st of the construction year.

The contractor must install any added measures that may be necessary to control erosion/sedimentation from the site dependent upon the actual site and weather conditions.

Continuation of earthwork operations on additional areas shall not begin until the exposed surface on the area being worked has been stabilized, in order to minimize areas without erosion control protection.

Erosion Control Applications and Sedimentation Control Measures

The placement of erosion control measures shall be completed in accordance with guidelines established in Best Management Practices and in accordance with the Erosion Control Plan and Details in the plan set.

1. Temporary Mulching:

   All disturbed areas shall be mulched with materials specified below prior to any storm event. All disturbed areas not final graded within 14 days shall be mulched. Also, areas that have been temporarily or permanently seeded shall be mulched immediately following seeding. Erosion control blankets are recommended to be used at the base of grassed waterways and on slopes greater than 15%. Mulch anchoring shall be used on slopes greater than 5% after September 15th of the construction year (see Winter Erosion Control Notes).

   Hay or straw: Shall be applied at a rate of 75-lbs./1,000 square feet (1.5 tons per acre).

   Erosion control mix: Shall be placed evenly and must provide 100% soil coverage. Erosion control mix shall be applied such that the thickness on slopes 3:1 or less is 2 inches plus ½ inch per 20 feet of slope up to 100 feet. The thickness on slopes between 3:1 and 2:1 is 4 inches plus ½ inch per 20 feet of slope up to 100 feet. This shall not be used on slopes greater that 2:1.

   Erosion control blanket: Shall be installed such that continuous contact between the mat and the soil is obtained. Install blankets and staple in accordance with the manufacturer's recommendations.

2. Soil Stockpiles:

   Stockpiles of soil or subsoil shall be mulched with hay or straw at a rate of 75-lbs./1,000 square feet (1.5 tons per acre) or with a four-inch layer of wood waste erosion control mix. This will be done within 24 hours of stocking and re-established prior to any rainfall. Any soil stockpile will not be placed (even covered with hay or straw) within 100 feet from any natural resources.

3. Natural Resources Protection:

   Any areas within 100 feet from any natural resources, if not stabilized with a minimum of 75 % mature vegetation catch, shall be mulched using temporary mulching (as described in Part 1 of this section) within seven (7) days of exposure or prior to any storm event. Sediment barriers (as described in Part 4 of this section) shall be placed between any natural resource and the disturbed area. Projects crossing the natural resource shall be protected a minimum distance of 100 feet on either side of the resource.

4. Sediment Barriers:

Prior to the beginning of any construction, sediment barriers (silt fence) shall be staked across the slope(s), on the contour, at or just below the limits of clearing or grubbing, and/or just above any adjacent property line or watercourse to protect against construction related erosion. Sediment barriers shall be maintained by the contractor until all exposed slopes have at least 85%-90% vigorous perennial vegetative cover to prevent erosion.

Silt fence: Shall be installed per the detail on the plans. The effective height of the fence shall not exceed 36 inches. It is recommended that silt fence be removed by cutting the fence materials at ground level so as to avoid additional soil disturbance.

Hay bales: Shall be installed per the detail on the plans. Bales shall be wire-bound or string-tied and these bindings must remain parallel with the ground surface during installation to prevent deterioration of the bindings. Bales shall be installed within a minimum four (4) inch deep trench line with ends of adjacent bales tightly abutting another.

Erosion control mix: Shall be installed per the detail on the plans. The mix shall consist primarily of organic material and contain a well-graded mixture of particle sizes and may contain rocks less than 4 inches in diameter. The mix composition shall meet the standards described within the MDEP Best Management Practices. No trenching is required for installation of this barrier.

Continuous Contained Berm: Shall be installed per the detail on the plans. This sediment barrier is erosion control mix placed within a synthetic tubular netting and performs as a sturdy sediment barrier that works well on hard ground such as frozen conditions, traveled areas or pavement. No trenching is required for installation of this barrier.

5. Temporary Check Dams:

Shall be installed per the detail on the plans. Check dams are to be placed within ditches/swales as specified on the design plans immediately after final grading. Check dams shall be 2 feet high. Temporary check dams may be removed only after the roadways are paved and the vegetated swale are established with at least 80-90% of vigorous perennial growth. The are beneath the check dam must be seeded and mulched immediately after removal of the check dam.Prior to the beginning of any construction, sediment barriers (silt fence) shall be staked across the slope(s), on the contour, at or just below the limits of clearing or grubbing, and/or just above any adjacent property line or watercourse to protect against construction related erosion. Sediment barriers shall be maintained by the contractor until all exposed slopes have at least 85%-90% vigorous perennial vegetative cover to prevent erosion.

6. Stormdrain Inlet Protection:

Inlet protection shall be placed around a storm drain drop inlet or curb inlet prior to permanent stabilization of the immediate and upstream disturbed areas. They shall be

constructed in a manner that will facilitate clean out and disposal of trapped sediments and minimize interference with construction activities. Any resultant ponding of water from the protection method must not cause excessive inconvenience or damage to adjacent areas or structures.

Hay bale drop inlet protection: We do not recommend the use of hay bales as inlet protection.

Concrete block and stone inlet sediment filter (drop or curb inlet): Shall be installed per the detail on the plans. The height of the concrete block barrier can vary but must be between 12 and 24 inches tall. A minimum of 1 inch crushed stone shall be used.

Manufactured sediment barriers and filter (drop or curb inlet): Manufactured filters, as specified in the detail on the plans, may be used if installed in accordance with the manufacturer's recommendations.

7. Stabilized Construction Entrance/Exit:

Prior to any clearing or grubbing, a stabilized construction entrance/exit shall be constructed wherever traffic will exit the construction site onto a paved roadway in order to minimize the tracking of sediment and debris from the construction site onto public roadways. The entrances and adjacent roadway areas shall be periodically swept or washed to further minimize the tracking of mud, dust or debris from the construction area. Stabilized construction exits shall be constructed in areas specified on the plans and as detailed on the plans.

8. Trench Dewatering and Temporary Stream Diversion:

Water from construction trench dewatering or temporary stream diversion will pass first through a filter bag or secondary containment structure (e.g. hay bale lined pool) prior to discharge. The discharge site shall be selected to avoid flooding, icing and sediment discharges to a protected resource. In no case shall the filter or containment structure be located within 100 feet of a protected natural resource.

9. Dust Control:

Dust control during construction shall be achieved by the use of a watering truck to periodically sprinkle the exposed roadway areas as necessary to reduce dust during the dry months. Applying other dust control products such as calcium chloride or other manufactured products are allowed if authorized by the proper local, state and/or federal regulating agencies. However, it is the contractor's ultimate responsibility to mitigate dust and soil loss from the site.

10. Temporary Vegetation:

Temporary vegetation shall be applied to disturbed areas that will not receive final grading for periods up to 12 months. This procedure should be used extensively in areas adjacent to natural resources. Seedbed preparation and application of seed shall be conducted as indicated in the Permanent Vegetation Section of this narrative. Specific

seeds (fast-growing and short living) shall; be selected from the Maine Erosion and Sediment Control BMP Manual dated 3/2003 or later. Alternative erosion control measures should be used if seeding cannot be done before September 15th of the construction year.

11. Permanent Vegetation:

Revegetation measures shall commence immediately upon completion of final grading of areas to be loamed and seeded. The application of seed shall be conducted between April 1st and October 1st of the construction year. Please refer to the Winter Erosion Control Notes for more detail. Revegetation measures shall consist of the following:

Seedbed Preparation

A. Four (4) inches of loam will be spread over disturbed areas and smoothed to a uniform surface. Loam shall be free of subsoil, clay lumps, stones and other objects over 1" in diameter, and without weeds, roots or other objectionable material.

B. Soil tests shall be taken at the time of soil stripping to determine fertilization requirements. Soil tests shall be taken promptly as to not interfere with the 14-day limit on soil exposure. Based upon test results, soil amendments shall be incorporated into the soil prior to final seeding. In lieu of soil tests, soil amendments may be applied as follows:

Item	Application Rate
10-20-20 Fertilizer (N-P205-K20 or equal)	18.4lbs./1,000 s.f.
Ground Limestone (50% calcium and magnesium oxide)	138-lbs./1,000 s.f.

C. Work lime and fertilizer into the soil as nearly as practical to a depth of four (4) inches with proper equipment. Roll the area to firm the seedbed except on clay, silty soils or coarse sand.

Application of Seed

A. Seeding: Shall be conducted between April 1st and October 1st of the construction year. Generally, a seed mixture may be applied as follows: (MDEP Seed Mix 2 is displayed)

Seed type		Application Rate
Creeping Red Fescue		0.46 lbs/1,000 s.f. (20 lbs/acre)
Red Top		0.05 lbs/1,000 s.f. (2 lbs/acre)
Tall Fescue		0.46 lbs/1,000 s.f. (20 lbs/acre)
	Total:	0.97 lbs/1,000 s.f. (20 lbs/acre)

B. Hydroseeding: Shall be conducted on prepared areas with slopes less than 2:1. Lime and fertilizer may be applied simultaneously with the seed. Recommended seeding rates must be increased by 10% when hydroseeding.

C. Mulching: Shall commence immediately after seed is applied. Refer to the temporary mulching section of this narrative for details.

Sodding

Following seedbed preparation, sod can be applied in lieu of seeding in areas where immediate vegetation is most beneficial such as ditches, around stormwater drop inlets and areas of aesthetic value. Sod should be laid at right angles to the direction of flow starting at the lowest elevation. Sod should be rolled or tamped down to even out the joints once laid down. Where flow is prevalent the sod must be properly anchored down. Irrigate the sod immediately after installation. In most cases, sod can be best established between April 1st and November 15th of the construction year, however, refer to the Winter Erosion Control Notes for any activities after October 1st.

Construction Sequence

Site improvements will most likely begin in the spring of 2008, depending on final approval. The following sequence is recommended for the construction of the site:

1. Install construction entrance and perimeter sediment barriers. If possible, an undisturbed vegetated strip (5 feet to 10 feet wide) will be left along the up-gradient side of the silt fence.
2. Clear areas necessary for access drives
3. Demolish existing structures
4. Prepare and stabilize temporary storm drain inlets.
5. Prepare and stabilize stormwater pond and associated appurtenances.
6. Clear and grub work area for the development pad using caution not to over expose the site.
7. Commence earthwork operations.
8. As the site is being cleared, grubbed, and brought to sub grade elevations, shape the temporary swales to control stormwater runoff in a stabilized manner. Place erosion control blankets or riprap along the centerline of the temporary swales as necessary.
9. Install temporary stone check dams at any evident concentrated flow discharge points and along the temporary drainage swales as necessary.
10. Commence Utility Construction
11. As areas of earthwork operations are completed, all associated side slopes and finished pad surfaces shall be stabilized as indicated on the development plans.
12. Commence foundation preparation
13. Complete utility construction
14. Complete earthwork operations to sub-grade
15. Commence installation of pavement gravels
16. Commence installation of curbing
17. Commence loam and seed
18. Commence landscaping

19. Install base course pavement
20. Complete stabilization of all disturbed areas and all landscaping operations.
21. Touch up loam and seed as necessary
22. Remove accumulated sediments from all sediment barriers and the storm drain system
23. Install surface course pavement
24. Once a 90% catch of vegetation is established, remove all temporary erosion and sedimentation control measures

Inspections/Monitoring

Maintenance measures shall be applied as needed during the entire construction cycle. After each rainfall, the site contractor shall perform a visual inspection of all installed erosion control measures. The contractor shall perform repairs as needed to allow continued proper functioning of the erosion control measures. The contractor shall provide the municipality with written documentation describing dates of inspection and necessary follow-up work to maintain erosion control measures meeting the requirements of this plan.

Following the temporary and/or final seedings, the contractor shall inspect the site semimonthly until the seedings have been established. Established means a minimum of 85%-90% of areas vegetated with vigorous growth. Reseeding shall be carrier out by the contractor with follow-up inspections in the event of any failures until vegetation is adequately established.

Winter Erosion Control Measures

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

Winter excavation and earthwork shall be completed such that no more than 1 acre of the site is without stabilization at any one time. Limit the exposed area to those areas in which work is expected to be under taken during the proceeding 15 days and that can be mulched in one day prior to any snow event. All areas shall be considered to be denuded until the subbase gravel is installed in roadway areas or the areas of future loam and seed have been loamed, seeded and mulched. Hay and straw mulch rate shall be a minimum of 150-lbs./1,000 s.f. (3 tons/acre) and shall be properly anchored.

The contractor must install any added measures, which may be necessary to control erosion/sedimentation from the site dependent upon the actual site and weather conditions. Continuation of earthwork operations on additional areas shall not begin until the exposed soil surface on the area being worked has been stabilized, in order to minimize areas without erosion control protection.

1. Soil Stockpiles:

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

2. Natural Resources Protection:

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

3. Sediments Barriers:

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

4. Mulching:

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

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

5. Mulching on Slopes and Ditches:

Slopes shall not be left exposed for any extended time of work suspension unless fully mulched and anchored with peg and netting or with erosion control blankets. Mulching shall be applied at a rate of 230-lbs/1,000 square feet on all slopes greater that 8%. Mulch netting shall be used to anchor mulch in all drainage ways with a slope greater that 3% for slopes exposed to direct winds and for all other slopes greater than 8%. Erosion control blankets shall be used in lieu of mulch in all drainage ways with slopes 8%. Erosion control mix can be used to substitute erosion control blankets on all slopes except ditches.

6. Seeding:

Between the dates of October 15 and April 1st, loam or seed will not be required. During periods of above freezing temperatures finished areas shall be fine graded and either protected with mulch or temporarily seeded and mulched until such time as the final treatment can be applied. If the date is after November 1st and if the exposed area has been loamed, final graded with a uniform surface, then the area may be dormant seeded at a rate of 3 times higher than specified for permanent seed and then mulched.

Dormant seeding may be selected to be placed prior to the placement of mulch and fabric netting anchored with staples. If dormant seeding is used for the site, all disturbed areas shall receive 4" of loam and seed at an application rate of 5-lbs/1000 square feet. All areas seeded during the winter will be inspected in the spring for adequate catch. All areas sufficiently vegetated (less than 75% catch) shall be revegetated by replacing loam, seed and mulch. If dormant seeding is not used for the site, all disturbed areas shall be revegetated in the spring.

7. Trench Dewatering and Temporary Stream Diversion:

Water from construction trench dewatering or temporary stream diversion will pass first through a filter bag or secondary containment structure (e.g. hay bale lined pool) prior to discharge. The discharge site shall be selected to avoid flooding, icing and sediment discharges to a protected resource. In no case shall the filter or containment structure be located within 100 feet of a protected natural resource.

8. Inspections and Monitoring:

Maintenance measures shall be applied as needed during the entire construction season. After each rainfall, snow storm or period of thawing and runoff, the site contractor shall perform a visual inspection of all installed erosion control measures and perform repairs as needed to insure their continuous function. Following the temporary and/or final seeding and mulching, the contractor shall in the spring inspect and repair any damages and/or un-established spots. Established vegetative cover means a minimum of 85 to 90% of areas with vigorous vegetative growth.

Standards for the Timely Stabilization of Construction Sites

1. Standard for the timely stabilization of ditches and channels:

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

Install a sod lining in the ditch: The contractor will line the ditch with properly installed sod by October 1. Proper installation includes the contractor pinning the sod onto the soil with wire pins, rolling the sod to guarantee contact between the sod and underlying soil, watering the sod to promote root growth into the disturbed soil, and anchoring the sod with jute or plastic mesh to prevent the sod strips from sloughing during flow conditions.

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

2. Standard for the timely stabilization of disturbed slopes:

The contractor will construct and stabilize stone-covered slopes by November 15. The contractor will seed and mulch all slopes to be vegetated by September 15. The MDEP will consider any area having a grade greater than 15% (10H:1V) to the slope. If the contractor fails to stabilize any slope to be vegetated by September 15, then the contractor will take one of the following actions to stabilize the slope for late fall and winter.

Stabilize the soil with temporary vegetation and erosion control mats: By October 1 the contractor will seed the disturbed slope with winter rye at a seeding rate of 3 pounds per 1,999 square feet and apply erosion control mats over the mulched slope. The contractor will monitor growth of the rye over the next 30 days. If the rye fails to grow at least three inches or cover at least 75% of the disturbed slope by November 1, then the applicant will cover the slope with a layer of wood waste compost as described in item 2(c.) of this standard or with stone riprap as described in item 2(d.) of this standard.

Stabilize the slope with sod: The contractor will stabilize the disturbed slope with properly installed sod by October 1. Proper installation includes the applicant pinning the sod onto the slope with wire pins, rolling the sod to guarantee contact between the sod and underlying soil, and watering the sod to promote root growth into the disturbed soil. The applicant will not use late-season sod installation to stabilize slopes having a grade greater than 33% (3H:1V).

Stabilize the slope with wood waste compost: The contractor will place a six-inch layer of wood waste compost on the slope by November 15. Prior to placing the wood waste compost, the applicant will remove any snow accumulation on the disturbed slope. The applicant will not use wood waste compost to stabilize slopes having grades greater than 50% (2H:1V) or having groundwater seeps on the slope face.

Stabilize the slope with stone riprap: The contractor will place a layer of stone riprap on the slope by November 15. The applicant will hire a registered professional engineer to determine the stone size needed for stability and to design a filter layer for underneath the riprap.

3. Standard for the Timely Stabilization of Disturbed Soils:

By September 15 the contractor will seed and mulch all disturbed soils on areas having a slope less than 15%. If the contractor fails to stabilize these soils by this date, then the contractor will take one of the following actions to stabilize the soil for late fall and winter.

Stabilize the soil with temporary vegetation: By October 1 the contractor will seed the disturbed soil with winter rye at a seeding rate of 3 pounds per 1,000 square feet, lightly mulch the seeded soil with hay or straw at 75 pounds per 1000 square feet, and anchor the mulch with plastic netting. The applicant will monitor growth of the rye over the next 30 days. If the rye fails to grow at least three inches or cover at least 75% of the disturbed soil before November 15, then the applicant will mulch the area for over-winter protection as described in item 3(C.) of this standard.

Stabilize the soil with sod: The applicant will stabilize the disturbed soil with properly installed sod by October 1. Proper installation includes the applicant pinning the sod onto the soil with wire pins, rolling the sod to guarantee contact between the sod and underlying soil, and watering the sod to promote root growth into the disturbed soil.

Stabilize the soil with mulch: By November 15 the applicant will mulch the disturbed soil by spreading hay or straw at a rate of at least 150 pounds per 1000 square feet on the area so that no soil is visible through the mulch. Prior to applying the mulch, the applicant will remove any snow accumulation on the disturbed area. Immediately after applying the mulch, the applicant will anchor the mulch with plastic netting to prevent wind from moving the mulch off the disturbed soil.

Prepared by,

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