MarksEngineering
42 Beeman St.
Canandaigua, NY 14424

Engineer's Report

Prepared for:

SUNSET RIDGE ESTATES / LAKEWOOD CUSTOM HOMES

3535 STATE ROUTE 364

TOWN OF CANANDAIGUA, NY 14424

Date:

February 1, 2022

Prepared by:

MarksEngineering

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SUNSET RIDGE ESTATES / LAKEWOOD CUSTOM HOMES

RESIDENTIAL DEVELOPMENT:

February 1, 2022

Marks Engineering, P.C. (Marks Engineering) has prepared this Engineer's Report for the new facility noted above located:

Tax Map # 98.19-1-20.10
3535 State Route 364
Town of Canandaigua
Ontario County
New York

Project Description/Intent:

The subject property(s) as outlined above shall consist of the "project site" or "site". The "project" is proposed 31 single family home development within the Town of Canandaigua and 9 single family residential lots in the Town of Hopewell. The project will include the development of approximately 1581 and 1742 linear feet of new dedicated road in Canandaigua and Hopewell, respectively.

The property is zoned R-1-20 with scenic viewshed overlay district present. Nineteen (19) lots will be located within the R-1-20 zoning and will include 20,000 square feet minimum size lots. Twelve (12) lots will be located within the scenic viewshed overlay district and will include 1-acre minimum size lots. The single family lots will be marketed for sale to be developed by the developer or the purchaser of the lot.

Access to the project will be provided via connection to both New York State Route 364 and to Ontario County Road18 (CR18). All public roads, sanitary sewers and watermains will be dedicated to the Town upon completion. Sidewalks will be installed along both sides of the dedicated road throughout the development for pedestrian circulation. The proposed sanitary sewer will connect to the existing gravity sanitary sewer within the project site. The water supply will be provided via connection to the existing 12" main located along New York State Route 364. Stormwater drainage will be managed through installation of a storm sewer network, open swales and ponding areas. Two stormwater management facilities will be constructed to manage runoff from the developed areas of the project.

In total this development will provide housing for more than 120 people. This is broken down by 93 people in Canandaigua and 27 people in Hopewell.

The following report provides the technical data to support the proposed action, The report includes discussion on the water, sanitary sewer services, stormwater management, construction erosion control and other site components.

Permits:

This project will require several permits and approvals from various agencies. The following is a preliminary list of required permits and approvals:

- SEQR Review – Completed type 1 action – Lead agency Town of Canandaigua Planning Board.
- The project will be required to receive approval for site plan & subdivision from the Town of Canandaigua & Town of Hopewell
- The project will require an approval for sanitary sewer utility extension and sanitary sewer district extension (Hopewell) to the Canandaigua Lake County Sewer District.
- The project will require an approval to connect to extend the Town of Canandaigua & Town of Hopewell Watermains.
- The project will require a NYSDEC permit to extend the Public Sewer System.
- The project will require a permit for a new NYSDOT entrance on to Route 364.
- The project will require a permit for a new entrance onto County Rd 18.

- The project will require a permit from the NYSDEC SPDES stormwater discharge.

Existing Conditions:

Currently the site is vacant brush land and a fallow field. There are few mature hardwood trees at the northeast corner of the Canandaigua property. The site is adjacent to the Town of Gorham and agricultural lands on the south side as well as residential properties on the east, west, and north side. A mobile home park borders the property along the northside at the State Route. The site slopes from east to west with most slopes less than 15%. There is a section near the center of the site with 18-25% slopes. The site is zoned asR-1-20 with Mixed Use and Scenic Viewshed Overlays in Canandaigua. The site does not occupy any jurisdictional State wetlands or any FEMA floodplains.

Water Supply:

The Town of Canandaigua operates Water District WD248 and a 12" water main that runs down State Route 364 (SR364). This watermain is supplied by a connection to the City of Canandaigua water distribution system at the corner of Lakeshore Drive and SR364.

Water Improvements:

The Canandaigua development will include +/- 2356' L.F. 12" PVC DR-14 watermain. The watermain installation will be completed by the developer and will include individual lot water services up to the dedicated right of way limits, fire hydrants, valves and other required watermain appurtenances. The system will be constructed to the Town's standards and will be offered in dedication upon competition of construction. The lower portion of the site will be looped by a 12" main. A 12" branch extends off the looped portion of the main and extends up the hill until lot 28, where the minimum pressure of 35 psi will be met at the house. Each residential building will be supplied by a 1.5" HDPE (200PSI CTS), tap and curb stop off the new watermain the estimated average daily demand for this project (Canandaigua side) is 6,200 gallons per day (based on 200 gpd per unit).

Flow test information was provided by the Town, which has been utilized for the water supply calculations. A domestic and fire scenario was modeled to show the approximate pressures available. Hydraulic calculations for the system have been included in Appendix 1.

Domestic demand 155 gpm (31 units at 5 gpm per unit)

Lowest domestic pressure = +/- 58 psi at lot #28

Fire demand = 593 gpm (500 gpm at hydrant 4 an 31 units at 3 gpm)

Lowest Fire Pressure=43 psi at hydrant lot#28

Lots above Lot #28 do not have the minimum 35 PSI required under fire flow demands so they will not be connected to the public main. Instead, these lots will be supplied by private wells or possible out of district connections to the Hopewell Water District.

Sanitary Sewers:

The site is serviced by an existing 18" ACP Sanitary Sewer that passes through the site from the south to north approximately 300 feet east of State Route 364, which is currently located within an easement. The sewer is owned and operated by the Canandaigua Lake County Sewer District (CLCSD) and it is part of the G1 Area 1 District as identified in the Town of Canandaigua's Sewer Master Plan dated Feb. 2016. Per this report the SR364 corridor sewer has the reserve capacity for this area of the town. The 18" sewer flows north form this site to the City of Canandaigua interceptor sewer located on Lakeshore Drive.

Plans call for addition of approximately 1950 linear feet of 8" PVC sewer main and manholes. A doghouse manhole is proposed near existing manhole No. 205, where it will extend east, turn south and then tun east to head up the hill to serve the upper lots and extend into Hopewell to serve those lots. Proposed connection to manhole No. 207 will extend east around the loop to serve the ret of the buildings. Lots numbers 1, 2, 3, 6, 18 & 19 sanitary services will connect directly into the existing 18" main line.

Sanitary Sewer Analysis:

Total sewer flows – 6,200 GPD
Peak Factor – 4 (Ten States Standards)
Peak Hour Wastewater Flows – 6,200 GPD/24 hrs. x 4 = 1,033 GPH
Instantaneous Peak – 1,033GPH/60 mins = 17.2GPM

The most restrictive section of this branch of the CLCSD has been identified between MH #194 & 195, where the sewer crosses under County Rd 18 and enters the FLCC parking lot. This section of sewer is 381 feet of 18" ACP at 0.11% grade. Marks Engineering witnessed this invert in MH 194 on 3/25/21 at 4:00PM and recorded the pipe flow to be at approximately 50% of the pipe diameter. Using manning's equation, we calculate base flows to be approximately 510 GPM (9" flow depth) at this time. If we add 17.2 GPM to this the flow depth will increase to 9.3" or 52% of pipe capacity. These figures are preliminary and based on recorded measurement on 3/25/21.

Stormwater Management:

Stormwater runoff associated with the proposed project will be treated during and after construction to meet the New York State Department of Environment Conservation (NYSDEC) water quality and quantity requirements. Two permanent stormwater management facilities will be constructed to capture and detain runoff from the developed areas of the property, then release the runoff to a downstream area at a controlled rate. The stormwater management plan for the project is designed in accordance with the current rules and regulations set in the NYSDEC Stormwater Management Design Manual (January 2015) and the Town of Canandaigua requirements.

The NYSDEC Stormwater Management Design Manual provides specification and sizing criteria for the stormwater management practices for stormwater discharges. The proposed stormwater management for this project has been designed to meet the five key criteria outlines in the design manual:

- Water Quality volume (WQv) to meet pollutant removal goals
- Runoff reduction volume (RRv) by application of runoff reduction practices to replicate pre-development flows.
- Channel protection volume (Cpv) to reduce channel erosion
- Overbank flood protection (Qp) to prevent overbank flooding
- Extreme storm protection (Qf) to help control extreme floods

The existing and proposed drainage conditions at the project site were analyzed following the methods outlines in Soil Conservation Service Technical Release No. 20 & 55. Peak runoff rates for existing and post-development conditions were modeled for the 1, 10, and 100-year storm events using the HydroCAD V10 software. Runoff rates were determined based on the hydrologic characteristics of the site (soil conditions, existing and proposed land cover, time of concentration for contributing drainage areas). Appendix 2 contains the SWPPP which contains the stormwater hydrographs and sub area information, These stormwater hydrographs reports show the subarea routings, subarea data, stormwater management facility ad outlet structure sizing, estimated detention times storage volumes, peak ponding elevations, and discharge rates.

Site development will include installation of a storm sewer system to convey site runoff from the proposed areas to the SWMF. Storm sewers have been designed to convey for the 10-year design flows. Storm sewer sizing calculations are included in Appendix 3 of this report.

Erosion Control:

The proposed stormwater management facility and comprehensive erosion control plan have been designed to control sediment runoff and provide water quality treatment during and after the site construction, As required by the NYSDEC the project will include a Stormwater Pollution Prevention Plan (SWPPP) that will combine the design presented in the report and on the plans with the requirements of NYSDEC GP 0-20-001 to outline how the owner will address the construction and post construction stormwater conditions. The construction erosion control plan has been designed per the New York Standards and Specifications for Erosion and Sediment Control.

Erosion control measures will be implemented during construction to control silt and minimize disturbance to the existing swales and drainage conditions. Typical practices include the installation and maintenance of silt fence, stone check dams, rip rap outlet protection, and filter fabric inlet protection. The disturbed areas will be seeded and mulches as soon as possible to control the erosion. Pipe outlet control rip-rap measures are also provided with the storm sewer system. Appropriate sediment and erosion control facilities will be provided at the right of way disturbances to include stabilized construction entrance and silt fence as appropriate.

The final component of the erosion control plan will be maintenance. The contractor will be responsible for installing the erosion control features, as well as maintaining and replacing them as necessary throughout the construction. An owners representative and the Town of Canandaigua will review the erosion control measures to determine their efficiency, need for replacement, or need for additional measures. A SWPPP will be prepared for the project and is to be kept on-site throughout the soil disturbing activities and until groundcover is established, please refer to Appendix 2 for the project SWPPP.

Landscaping:

The overall landscape plan incorporates native plant material to be used as street trees, ornamental accents for the proposed houses, and screening along SR364 and certain adjacent parcels. The plant materials were chosen based on their hardiness in the build environment and their ornamental characteristics. Seed mixes were chosen to be used within the green infrastructure throughout the site. These mixes incorporate native plant species that are well suited for places inundated with water or have year long standing water (i.e. stormwater pond.)

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Lighting:

The light fixture chosen for this project is the Lumina series by Greenshine. The Lumina is a solar powered LED light fixture that houses its own internal battery and does not have to be hooked up to an external electrical grid. The light fixtures have been placed at all driveway entrances and around the mail kiosk. These light fixtures are all dark sky compliant and do not provide light to any adjoining parcels.

Traffic Analysis:

The site will be accessed by two new intersections on adjoining public roads. At the west side of the site there will be a new intersection to the NYSDOT Route 364 (SR364). At the east side of the site there will be a new intersection to Ontario County Road18 (CR18). Per the International Transportation Engineering Trip Generation Manual, 10th Edition each new residential unit will generate 0.99 trips during PM peak hour. Therefore, it is expected that the SR364 entrance will generate and additional 19 cars during PM peak hour traffic and the CR18 entrance will generate and additional 21 cars per PM peak hour. These few cars during peak hour traffic does not merit the need for a Traffic Impact Study per the NYSDOT PERM 33-COM permit requirements.

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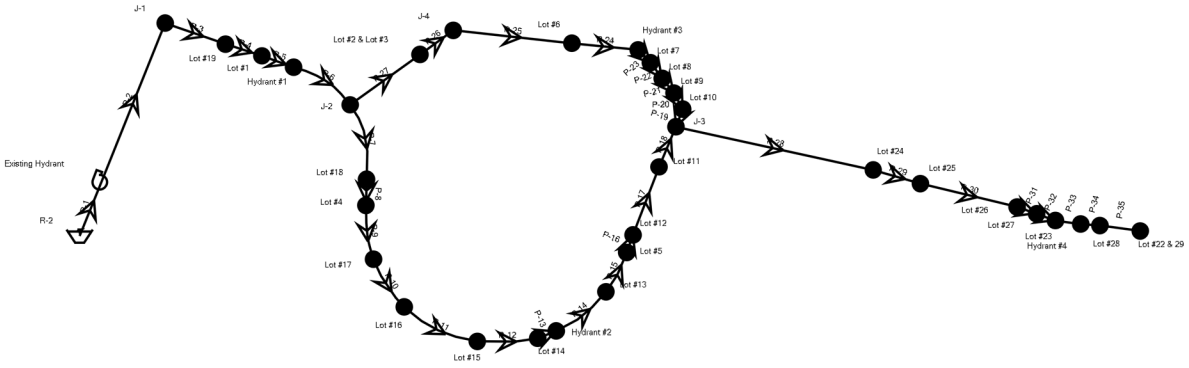
Appendix 1

Water Supply Calculations

Scenario: Domestic



Scenario: Domestic
Current Time Step: 0.000 h
FlexTable: Pipe Table

ID	Label	Length (Scaled) (ft)	Start Node	Stop Node	Diameter (in)	Material	Hazen-Williams C	Has Check Valve?	Minor Loss Coefficient (Local)	Flow (gpm)	Velocity (ft/s)	Headloss Gradient (ft/ft)	H
195	P-1	81	R-2	Existing Hydrant	48.0	Ductile Iron	130.0	False	0.000	135	0.02	0.000	
196	P-2	233	Existing Hydrant	J-1	12.0	Ductile Iron	130.0	False	0.000	135	0.38	0.000	
201	P-3	87	J-1	Lot #19	8.0	Ductile Iron	130.0	False	0.000	135	0.86	0.000	
202	P-4	52	Lot #19	Lot #1	8.0	Ductile Iron	130.0	False	0.000	130	0.83	0.000	
203	P-5	46	Lot #1	Hydrant #1	8.0	Ductile Iron	130.0	False	0.000	125	0.80	0.000	
240	P-6	95	Hydrant #1	J-2	8.0	Ductile Iron	130.0	False	0.000	125	0.80	0.000	
241	P-7	107	J-2	Lot #18	8.0	Ductile Iron	130.0	False	0.000	62	0.40	0.000	
207	P-8	36	Lot #18	Lot #4	8.0	Ductile Iron	130.0	False	0.000	57	0.37	0.000	
208	P-9	75	Lot #4	Lot #17	8.0	Ductile Iron	130.0	False	0.000	52	0.33	0.000	
209	P-10	78	Lot #17	Lot #16	8.0	Ductile Iron	130.0	False	0.000	47	0.30	0.000	
210	P-11	112	Lot #16	Lot #15	8.0	Ductile Iron	130.0	False	0.000	42	0.27	0.000	
211	P-12	83	Lot #15	Lot #14	8.0	Ductile Iron	130.0	False	0.000	37	0.24	0.000	
212	P-13	27	Lot #14	Hydrant #2	8.0	Ductile Iron	130.0	False	0.000	32	0.21	0.000	
213	P-14	88	Hydrant #2	Lot #13	8.0	Ductile Iron	130.0	False	0.000	32	0.21	0.000	
214	P-15	61	Lot #13	Lot #5	8.0	Ductile Iron	130.0	False	0.000	27	0.17	0.000	
215	P-16	25	Lot #5	Lot #12	8.0	Ductile Iron	130.0	False	0.000	22	0.14	0.000	
246	P-17	100	Lot #12	Lot #11	8.0	Ductile Iron	130.0	False	0.000	17	0.11	0.000	
217	P-18	59	Lot #11	J-3	8.0	Ductile Iron	130.0	False	0.000	12	0.08	0.000	
218	P-19	26	J-3	Lot #10	8.0	Ductile Iron	130.0	False	0.000	-28	0.18	0.000	
219	P-20	25	Lot #10	Lot #9	8.0	Ductile Iron	130.0	False	0.000	-33	0.21	0.000	
220	P-21	25	Lot #9	Lot #8	8.0	Ductile Iron	130.0	False	0.000	-38	0.24	0.000	
221	P-22	27	Lot #8	Lot #7	8.0	Ductile Iron	130.0	False	0.000	-43	0.27	0.000	
222	P-23	24	Lot #7	Hydrant #3	8.0	Ductile Iron	130.0	False	0.000	-48	0.30	0.000	
242	P-24	91	Hydrant #3	Lot #6	8.0	Ductile Iron	130.0	False	0.000	-48	0.30	0.000	
243	P-25	163	Lot #6	J-4	8.0	Ductile Iron	130.0	False	0.000	-53	0.34	0.000	
244	P-26	56	J-4	Lot #2 & Lot #3	8.0	Ductile Iron	130.0	False	0.000	-53	0.34	0.000	
245	P-27	118	Lot #2 & Lot #3	J-2	8.0	Ductile Iron	130.0	False	0.000	-63	0.40	0.000	
228	P-28	276	J-3	Lot #24	8.0	Ductile Iron	130.0	False	0.000	40	0.26	0.000	
229	P-29	67	Lot #24	Lot #25	8.0	Ductile Iron	130.0	False	0.000	35	0.22	0.000	
230	P-30	136	Lot #25	Lot #26	8.0	Ductile Iron	130.0	False	0.000	30	0.19	0.000	
231	P-31	28	Lot #26	Lot #27	8.0	Ductile Iron	130.0	False	0.000	25	0.16	0.000	
232	P-32	27	Lot #27	Lot #23	8.0	Ductile Iron	130.0	False	0.000	20	0.13	0.000	
255	P-33	35	Lot #23	Hydrant #4	8.0	Ductile Iron	130.0	False	0.000	15	0.10	0.000	
256	P-34	26	Hydrant #4	Lot #28	8.0	Ductile Iron	130.0	False	0.000	15	0.10	0.000	
254	P-35	55	Lot #28	Lot #22 & 29	8.0	Ductile Iron	130.0	False	0.000	10	0.06	0.000	

Scenario: Domestic
Current Time Step: 0.000 h
FlexTable: Junction Table

ID	Label	Elevation (ft)	Zone	Demand Collection	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
167	Hydrant #1	712.50	<None>	<Collection: 0 items>	0	883.67	74
168	Hydrant #2	709.00	<None>	<Collection: 0 items>	0	883.60	76
169	Hydrant #3	707.30	<None>	<Collection: 0 items>	0	883.60	76
170	Hydrant #4	748.00	<None>	<Collection: 0 items>	0	883.57	59
164	J-1	716.00	<None>	<Collection: 0 items>	0	883.75	73
234	J-2	709.50	<None>	<Collection: 0 items>	0	883.63	75
189	J-3	707.50	<None>	<Collection: 0 items>	0	883.59	76
187	J-4	705.50	<None>	<Collection: 1 item>	0	883.61	77
165	Lot #1	715.00	<None>	<Collection: 1 item>	5	883.69	73
238	Lot #2 & Lot #3	708.00	<None>	<Collection: 1 item>	10	883.62	76
188	Lot #4	707.00	<None>	<Collection: 1 item>	5	883.62	76
181	Lot #5	709.00	<None>	<Collection: 1 item>	5	883.59	76
239	Lot #6	706.00	<None>	<Collection: 1 item>	5	883.60	77
186	Lot #7	707.50	<None>	<Collection: 1 item>	5	883.59	76
185	Lot #8	707.50	<None>	<Collection: 1 item>	5	883.59	76
184	Lot #9	707.50	<None>	<Collection: 1 item>	5	883.59	76
183	Lot #10	707.50	<None>	<Collection: 1 item>	5	883.59	76
182	Lot #11	708.00	<None>	<Collection: 1 item>	5	883.59	76
180	Lot #12	709.00	<None>	<Collection: 1 item>	5	883.59	76
179	Lot #13	709.00	<None>	<Collection: 1 item>	5	883.59	76
178	Lot #14	709.00	<None>	<Collection: 1 item>	5	883.60	76
177	Lot #15	708.50	<None>	<Collection: 1 item>	5	883.60	76
175	Lot #16	708.00	<None>	<Collection: 1 item>	5	883.61	76
174	Lot #17	708.00	<None>	<Collection: 1 item>	5	883.61	76
173	Lot #18	707.00	<None>	<Collection: 1 item>	5	883.62	76
166	Lot #19	715.00	<None>	<Collection: 1 item>	5	883.71	73
247	Lot #22 & 29	758.00	<None>	<Collection: 1 item>	10	883.57	54
194	Lot #23	745.00	<None>	<Collection: 1 item>	5	883.57	60
190	Lot #24	738.00	<None>	<Collection: 1 item>	5	883.58	63
191	Lot #25	740.00	<None>	<Collection: 1 item>	5	883.57	62
192	Lot #26	745.00	<None>	<Collection: 1 item>	5	883.57	60
193	Lot #27	745.00	<None>	<Collection: 1 item>	5	883.57	60
253	Lot #28	750.00	<None>	<Collection: 1 item>	5	883.57	58

C:\Dropbox (Marks Engineering)\2020 PROJECTS\20-243 Licciardello, Angelo - 3535 East Lake Rd. - To Cdga To Hopewell\Calcs\20-243 WaterCAD 1-7-22.wtg

Scenario: Domestic
Current Time Step: 0.000 h
FlexTable: Reservoir Table

ID	Label	Elevation (ft)	Zone	Flow (Out net) (gpm)	Hydraulic Grade (ft)
162	R-2	711.00	<None>	120	711.00

C:\Dropbox (Marks Engineering)\2020 PROJECTS\20-243 Licciardello, Angelo - 3535 East Lake Rd. - To Cdga To Hopewell\Calcs\20-243 WaterCAD 1-7-22.wtg

Scenario: Domestic
Current Time Step: 0.000 h
FlexTable: Pump Table

ID	Label	Elevation (ft)	Pump Definition	Status (Initial)	Hydraulic Grade (Suction) (ft)	Hydraulic Grade (Discharge) (ft)	Flow (Total) (gpm)	Pump Head (ft)
163	Existing Hydrant	711.00	Ex. hydrant	On	711.00	885.72	120	174.72

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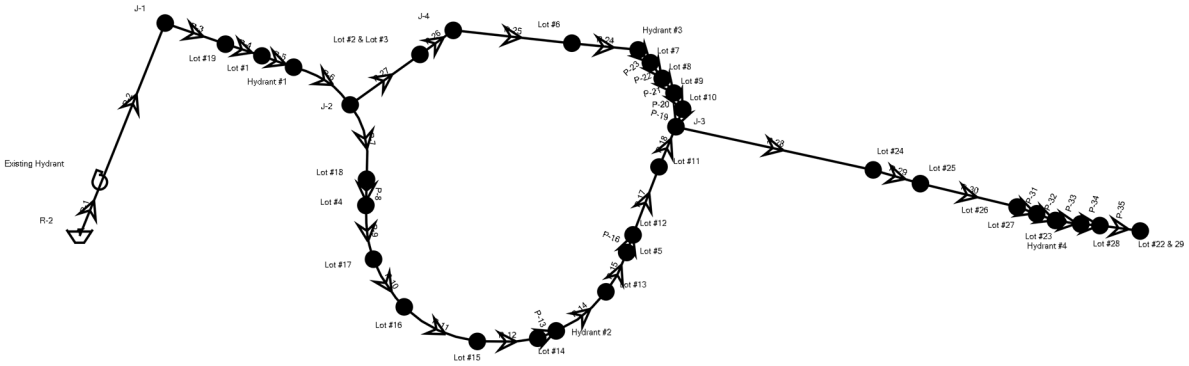
Scenario: Fire



Scenario: Fire
Current Time Step: 0.000 h
FlexTable: Pipe Table

ID	Label	Length (Scaled) (ft)	Start Node	Stop Node	Diameter (in)	Material	Hazen-Williams C	Has Check Valve?	Minor Loss Coefficient (Local)	Flow (gpm)	Velocity (ft/s)	Headloss Gradient (ft/ft)	H
195	P-1	81	R-2	Existing Hydrant	48.0	Ductile Iron	130.0	False	0.000	578	0.10	0.000	
196	P-2	233	Existing Hydrant	J-1	12.0	Ductile Iron	130.0	False	0.000	578	1.64	0.001	
201	P-3	87	J-1	Lot #19	8.0	Ductile Iron	130.0	False	0.000	578	3.69	0.007	
202	P-4	52	Lot #19	Lot #1	8.0	Ductile Iron	130.0	False	0.000	575	3.67	0.007	
203	P-5	46	Lot #1	Hydrant #1	8.0	Ductile Iron	130.0	False	0.000	572	3.65	0.006	
240	P-6	95	Hydrant #1	J-2	8.0	Ductile Iron	130.0	False	0.000	572	3.65	0.006	
241	P-7	107	J-2	Lot #18	8.0	Ductile Iron	130.0	False	0.000	258	1.65	0.001	
207	P-8	36	Lot #18	Lot #4	8.0	Ductile Iron	130.0	False	0.000	255	1.63	0.001	
208	P-9	75	Lot #4	Lot #17	8.0	Ductile Iron	130.0	False	0.000	252	1.61	0.001	
209	P-10	78	Lot #17	Lot #16	8.0	Ductile Iron	130.0	False	0.000	249	1.59	0.001	
210	P-11	112	Lot #16	Lot #15	8.0	Ductile Iron	130.0	False	0.000	246	1.57	0.001	
211	P-12	83	Lot #15	Lot #14	8.0	Ductile Iron	130.0	False	0.000	243	1.55	0.001	
212	P-13	27	Lot #14	Hydrant #2	8.0	Ductile Iron	130.0	False	0.000	240	1.53	0.001	
213	P-14	88	Hydrant #2	Lot #13	8.0	Ductile Iron	130.0	False	0.000	240	1.53	0.001	
214	P-15	61	Lot #13	Lot #5	8.0	Ductile Iron	130.0	False	0.000	237	1.51	0.001	
215	P-16	25	Lot #5	Lot #12	8.0	Ductile Iron	130.0	False	0.000	234	1.49	0.001	
246	P-17	100	Lot #12	Lot #11	8.0	Ductile Iron	130.0	False	0.000	231	1.47	0.001	
217	P-18	59	Lot #11	J-3	8.0	Ductile Iron	130.0	False	0.000	228	1.46	0.001	
218	P-19	26	J-3	Lot #10	8.0	Ductile Iron	130.0	False	0.000	-293	1.87	0.002	
219	P-20	25	Lot #10	Lot #9	8.0	Ductile Iron	130.0	False	0.000	-296	1.89	0.002	
220	P-21	25	Lot #9	Lot #8	8.0	Ductile Iron	130.0	False	0.000	-299	1.91	0.002	
221	P-22	27	Lot #8	Lot #7	8.0	Ductile Iron	130.0	False	0.000	-302	1.93	0.002	
222	P-23	24	Lot #7	Hydrant #3	8.0	Ductile Iron	130.0	False	0.000	-305	1.95	0.002	
242	P-24	91	Hydrant #3	Lot #6	8.0	Ductile Iron	130.0	False	0.000	-305	1.95	0.002	
243	P-25	163	Lot #6	J-4	8.0	Ductile Iron	130.0	False	0.000	-308	1.97	0.002	
244	P-26	56	J-4	Lot #2 & Lot #3	8.0	Ductile Iron	130.0	False	0.000	-308	1.97	0.002	
245	P-27	118	Lot #2 & Lot #3	J-2	8.0	Ductile Iron	130.0	False	0.000	-314	2.00	0.002	
228	P-28	276	J-3	Lot #24	8.0	Ductile Iron	130.0	False	0.000	521	3.33	0.005	
229	P-29	67	Lot #24	Lot #25	8.0	Ductile Iron	130.0	False	0.000	518	3.31	0.005	
230	P-30	136	Lot #25	Lot #26	8.0	Ductile Iron	130.0	False	0.000	515	3.29	0.005	
231	P-31	28	Lot #26	Lot #27	8.0	Ductile Iron	130.0	False	0.000	512	3.27	0.005	
232	P-32	27	Lot #27	Lot #23	8.0	Ductile Iron	130.0	False	0.000	509	3.25	0.005	
255	P-33	35	Lot #23	Hydrant #4	8.0	Ductile Iron	130.0	False	0.000	506	3.23	0.005	
256	P-34	26	Hydrant #4	Lot #28	8.0	Ductile Iron	130.0	False	0.000	6	0.04	0.000	
254	P-35	55	Lot #28	Lot #22 & 29	8.0	Ductile Iron	130.0	False	0.000	3	0.02	0.000	

Scenario: Fire
Current Time Step: 0.000 h
FlexTable: Junction Table

ID	Label	Elevation (ft)	Zone	Demand Collection	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
167	Hydrant #1	712.50	<None>	<Collection: 0 items>	0	854.28	61
168	Hydrant #2	709.00	<None>	<Collection: 0 items>	0	852.94	62
169	Hydrant #3	707.30	<None>	<Collection: 0 items>	0	852.78	63
170	Hydrant #4	748.00	<None>	<Collection: 1 item>	500	849.46	44
164	J-1	716.00	<None>	<Collection: 0 items>	0	855.50	60
234	J-2	709.50	<None>	<Collection: 0 items>	0	853.67	62
189	J-3	707.50	<None>	<Collection: 0 items>	0	852.53	63
187	J-4	705.50	<None>	<Collection: 1 item>	0	853.30	64
165	Lot #1	715.00	<None>	<Collection: 1 item>	3	854.58	60
238	Lot #2 & Lot #3	708.00	<None>	<Collection: 1 item>	6	853.42	63
188	Lot #4	707.00	<None>	<Collection: 1 item>	3	853.46	63
181	Lot #5	709.00	<None>	<Collection: 1 item>	3	852.75	62
239	Lot #6	706.00	<None>	<Collection: 1 item>	3	852.96	64
186	Lot #7	707.50	<None>	<Collection: 1 item>	3	852.73	63
185	Lot #8	707.50	<None>	<Collection: 1 item>	3	852.68	63
184	Lot #9	707.50	<None>	<Collection: 1 item>	3	852.63	63
183	Lot #10	707.50	<None>	<Collection: 1 item>	3	852.58	63
182	Lot #11	708.00	<None>	<Collection: 1 item>	3	852.60	63
180	Lot #12	709.00	<None>	<Collection: 1 item>	3	852.72	62
179	Lot #13	709.00	<None>	<Collection: 1 item>	3	852.83	62
178	Lot #14	709.00	<None>	<Collection: 1 item>	3	852.98	62
177	Lot #15	708.50	<None>	<Collection: 1 item>	3	853.09	63
175	Lot #16	708.00	<None>	<Collection: 1 item>	3	853.24	63
174	Lot #17	708.00	<None>	<Collection: 1 item>	3	853.35	63
173	Lot #18	707.00	<None>	<Collection: 1 item>	3	853.51	63
166	Lot #19	715.00	<None>	<Collection: 1 item>	3	854.92	61
247	Lot #22 & 29	758.00	<None>	<Collection: 1 item>	3	849.46	40
194	Lot #23	745.00	<None>	<Collection: 1 item>	3	849.64	45
190	Lot #24	738.00	<None>	<Collection: 1 item>	3	851.03	49
191	Lot #25	740.00	<None>	<Collection: 1 item>	3	850.66	48
192	Lot #26	745.00	<None>	<Collection: 1 item>	3	849.94	45
193	Lot #27	745.00	<None>	<Collection: 1 item>	3	849.79	45
253	Lot #28	750.00	<None>	<Collection: 1 item>	3	849.46	43

C:\Dropbox (Marks Engineering)\2020 PROJECTS\20-243 Licciardello, Angelo - 3535 East Lake Rd. - To Cdga To Hopewell\Calcs\20-243 WaterCAD 1-7-22.wtg

Scenario: Fire
Current Time Step: 0.000 h
FlexTable: Reservoir Table

ID	Label	Elevation (ft)	Zone	Flow (Out net) (gpm)	Hydraulic Grade (ft)
162	R-2	711.00	<None>	578	711.00

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Scenario: Fire
Current Time Step: 0.000 h
FlexTable: Pump Table

ID	Label	Elevation (ft)	Pump Definition	Status (Initial)	Hydraulic Grade (Suction) (ft)	Hydraulic Grade (Discharge) (ft)	Flow (Total) (gpm)	Pump Head (ft)
163	Existing Hydrant	711.00	Ex. hydrant	On	711.00	855.72	578	144.72

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Lot #	Road Elevation	House Elevation	Delta	elevation headloss	Public portion	Owners portion	friction headloss	PSI in main	PSI at house
1	715	719.33	4.33	1.87489	52	59	0.7437	60	57.38141
2	708	715.33	7.33	3.17389	52	59	0.7437	63	59.08241
3	708	713.33	5.33	2.30789	52	59	0.7437	63	59.94841
4	707	715.33	8.33	3.60689	52	59	0.7437	63	58.64941
5	709	716.33	7.33	3.17389	52	59	0.7437	62	58.08241
6	706	711.33	5.33	2.30789	0	60	0.402	64	61.29011
7	707.5	714.33	6.83	2.95739	0	60	0.402	63	59.64061
8	707.5	718.33	10.83	4.68939	20	278	1.9966	63	56.31401
9	707.5	723.33	15.83	6.85439	20	166	1.2462	63	54.89941
10	707.5	721.33	13.83	5.98839	0	40	0.268	63	56.74361
11	708	721.33	13.33	5.77189	5	65	0.469	63	56.75911
12	709	722.33	13.33	5.77189	5	65	0.469	62	55.75911
13	709	724.33	15.33	6.63789	5	65	0.469	62	54.89311
14	709	717.33	8.33	3.60689	5	65	0.469	62	57.92411
15	708.5	715.33	6.83	2.95739	5	65	0.469	63	59.57361
16	708	715.33	7.33	3.17389	5	65	0.469	63	59.35711
17	708	712.33	4.33	1.87489	5	65	0.469	63	60.65611
18	707	711.33	4.33	1.87489	5	65	0.469	64	61.65611
19	715	718.33	3.33	1.44189	5	65	0.469	61	59.08911
23	745	757.33	12.33	5.33889	117	119	1.5812	45	38.07991
24	738	754.33	16.33	7.07089	10	104	0.7638	49	41.16531
25	740	746.33	6.33	2.74089	10	5	0.1005	48	45.15861
26	745	743.33	-1.67	0.72311	20	280	2.01	46	43.26689
27	745	743.33	-1.67	0.72311	20	460	3.216	45	41.06089
28	750	756.33	6.33	2.74089	10	250	1.742	43	38.51711
22	758	766.33	8.33	3.60689	51	137	1.2596	40	35.13351
29	759	768.33	9.33	4.03989	10	130	0.938	40	35.02211

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Appendix 2

Stormwater Pollution Prevention Plan

SWPPP

STORMWATER POLLUTION PREVENTION PLAN (SWPPP)

Prepared for:

SUNSET RIDGE ESTATES & LAKEWOOD CUSTOM HOMES

3535 STATE ROUTE 364
TOWN OF CANANDAIGUA, NY 14424

Date:

February 1, 2022

Prepared by:

MarksEngineering

42 Beeman St
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Erosion & Sediment Control Plan & Details

LIST OF APPENDICES

1. 0 INTRODUCTION

This SWPPP is prepared in accordance with the requirements of Article 17, Titles 7, 8, and Article 70 of the New York State Environmental Conservation Law to obtain coverage by the SPDES General Permit for Stormwater Discharge from Construction Activities (GP-0-20-001). A Construction Notice of Intent (NOI) has been filed with the NYSDEC (APPENDIX D), and the Town of Canandaigua will review the SWPPP and indicate its approval through signature on the MS4 Stormwater Pollution Prevention Plan Acceptance Form (APPENDIX E).

The design standards and practices outlined herein are in accordance with the New York Standards and Specifications for Erosion and Sediment Control and the New York State Stormwater Management Design Manual (SWDM).

The SWPPP includes the following:

- Identification of the SWPPP coordinator with a description of this person's duties.
- Description of the existing site conditions including existing land use of the site (i.e., wooded areas, open grassed areas, pavement, buildings, etc.), soil types at the site, as well as the location of surface waters which are located on or next to the site (wetlands, streams, rivers, lakes, ponds, etc.).
- Identification of the body of water(s) which will receive runoff from the construction site, including the ultimate body of water that receives the stormwater.
- Identification of drainage areas and potential stormwater contaminants.
- Description of construction stormwater management controls necessary to reduce erosion, sediment, and pollutants in stormwater discharge.
- Description of the facility's monitoring plan and how controls will be coordinated with construction activities.
- Description of post-construction stormwater management practices for runoff quality and quantity control.

2.0 FACILITIES DESCRIPTION

2.1 Site Location

The proposed project is in the Town of Canandaigua located east of the corner of Otetiana Point and NYS State Route 364 (East Lake Road). The subject property of this project extends up to the Canandaigua-Hopewell Townline between State Route 364 and County Road 18 (FIGURE 1). The site is bounded by neighboring vacant rural, and early/mid-successional lands.

We have reviewed the project with The State Historic Preservation Office (SHPO) and they have notified us that it is an archeological sensitive site. The owner has completed an Archeological Phase 1 survey and a no impact letter from SHPO has been recieved. The site is not within a 100 year floodplain as mapped by FEMA. A small wetland has been mapped on the site and we are working with NYSDEC and USACE on a jurisdictional determination.

2.2. Project Description

Existing:

The area of the subject property is 33.1798 acres in Canandaigua. The lots directly to the north of the proposed development are vacant early/mid successional land and a residential mobile home adjacent to East Lake Road. The lots directly to the west currently contain vacant land and residential homes. Land to the south and east are early/mid successional vacant lands as well as some agricultural fields. This community is a mixture of residential, vacant, and agricultural land uses. The site is not in a NYS DEC Brownfield remediation program and no know contamination is present.

Proposed:

The proposed project will include the new development of thirty one single-family homes and roads and sidewalks to provide access to dwellings. The remaining lands will be used for private drives, driveway parking, stormwater management and/or maintained as lawn.

2.3 Type of Construction

The development construction activities will generally consist of the following:

- Stripping of topsoil
- Earthwork (regrading of earth with cuts and fills)
- Rough grading of site
- Excavations for the installation of underground utilities
- Building construction
- Driveway installation
- Construction of stormwater management facilities
- Final grading
- Landscaping, topsoil, and seeding of disturbed areas

2.4 Existing Site Hydrology

In general, the site drains west toward East Lake Road. The site ultimately drains to Canandaigua Lake after collecting in a low area in the northwestern region of the property and entering an unclassified stream that flows around Lakeview Mobile Home Park. The unclassified stream crosses underneath East Lake Road via a cross culvert along Sandy Beach Drive prior to flowing into Canandaigua Lake. The site as it exists consists of just one main drainage area however, we have modeled the site as two separate drainage areas for Canandaigua and Hopewell. As it exists, the Hopewell drainage area flows into the Canandaigua drainage area.

Drainage Area 1 (DA-1) (FIGURE 5A) is currently vacant early/ mid-successional lands. DA-1 flow from stormwater ultimately discharges into the Canandaigua Lake, which is not a TMDL water body or a 303d stream segment.

Drainage Area 2 (DA-2) (FIGURE 5B) is currently vacant early/ mid-successional lands. DA-2 flow from stormwater ultimately discharges into the Canandaigua Lake.

DA-1 consists of the entire parcel located within the Town of Canandaigua and

DA-2 consists of the entire parcel located within the Town of Hopewell.

2.4 Proposed Site Hydrology

The purpose of the Stormwater Management Plan is to safely control and convey all runoff from the site and to effectively reduce post-development runoff flows from new impervious areas while providing treatment of water quality.

The sites proposed drainage patterns will ultimately remain consistent with existing patterns. Runoff from new disconnected rooftops and new impervious roads and parking areas in the lower portion of the site (Phase 1) will be directed to dry swales or vegetative filter strips prior to collection in one of two proposed stormwater management ponds in the northwest and northern-central region of the Canandaigua parcel. Storm water from the dry swales will be conveyed to the stormwater management ponds or safely diverted through the site via a subsurface 250 linear foot 36" HDPE pipe that outlets at the existing low point in the northwestern region of the parcel.

Runoff from new impervious roads and parking areas in the upper portion (Phase 2) of the site will be directed to stormwater management ponds via grassy dry swales allowing for filtration prior to collection in a proposed stormwater management pond in the northwestern region of the Canandaigua parcel. All storm sewers have been designed to convey the 10-year design flows. 100-year storm flows will result in controlled overland flow to the detention basin.

As the ponds will be placed in existing low regions, this will allow for minimal changes in drainage patterns. Stormwater will continue to undergo treatment in the ponds and retention for larger storms is provided. In the event of any overflow, stormwater from the ponds will flow north towards the unnamed unclassified stream via an existing vegetative channel. Existing DA-1 (Figure 5) has been

broken up into 3 proposed subcatchments (Figure 6) each of which contains a varying degree of new impervious surfaces. Drainage areas 1, 2, and 3 propose 24%, 22%, and 9% impervious surfaces respectively.

Two proposed stormwater management ponds have been designed as a Wet Ponds (P-2), a stormwater management practice that is intended to provide storage for the entire water quality volume in a permanent pool.

The site development provides Green Infrastructure (GI) design as required by chapter 5 of the SWDM. See Appendix C for GI information and design. The first part of GI is consideration low impact planning of the proposed site development. We have considered and applied the following planning principles in this design: reduction of clearing, locating development in less sensitive areas, soil restoration, roadway, sidewalk, parking, and driveway reduction. Additionally, we have provided GI practices before runoff drains to a wet pond. Runoff from new impervious areas is filtered through an approximate total of 6,300 linear feet of dry swales, as well as many various sized vegetative filter strips prior to conveyance to the wet ponds. This network of filter strips and swales is intended to provide channel protection volume by providing filtration prior to conveyance to the wet pond.

3.0 CONSTRUCTION STORMWATER MANAGEMENT

3.1 Stormwater Management Controls

The purpose of this section is to identify the types of temporary and permanent erosion and sediment controls that will be used on the site. The controls will provide soil stabilization for disturbed areas and structural controls to divert runoff and remove sediment. This section will also address control of other potential stormwater pollutant sources such as epoxy, concrete dust, grease, fuel oil, waste disposal, and sanitary waste disposal.

a. Temporary and Permanent Erosion Control Practices

To limit soil migration, the following measures will be implemented:

- Silt fencing will be placed along the perimeter of the area to be cleared and graded before any work takes place.
- Where soil disturbance activities have temporarily or permanently ceased, soil stabilization measures shall be initiated by the end of the next business day and completed within 14 days (7 days if over 5-acres of disturbance, or 3 days if between November 15th and April 1st).
- Within 14 days after clearing and grading, ground agricultural limestone, 5-0-10 fertilizer will be applied to each acre to be stabilized by vegetation. The limestone should be at a pH of 6.0, and the fertilizer should be added at a rate of 600 pounds per acre. Phosphorus shall not be applied unless soil test by horticultural lab indicates it is necessary. Such lab paperwork shall be provided to the Town. If required it shall be applied at a minimum.
- After fertilizer, all areas which will not be impacted by further construction shall be permanently seeded. The permanent seed mix shall be 65% Kentucky Blue Grass blend at 85-114 pounds per acre, 20% perennial rye grass at 26-35 pounds per acre, and 15% fine fescue at 19-26 pounds per acre. An alternative seed would be 100% tall fescue, turf type fine leaf at 150-200 pounds per acre.
- After seeding, disturbed areas will be mulched with 4,000 pounds per acre of straw or hydroseeded with an appropriate tackifier.
- Topsoil stockpiles will be stabilized with temporary seed and mulch no later than 7 days from placement of the stockpile. The temporary seed shall be rye (grain) applied at the rate of 120 pounds per acre.
- Areas of the site which are to be paved will be temporarily stabilized by applying geotextile and stone sub-base until asphalt is applied.
- Stabilized construction entrances will be placed at the entrances to the site.
- All catch basins will be will have at least 1.0-foot sumps which will trap sediment from parking lot runoff following completion and

stabilizations of the project. During construction, each basin will be protected from sediment laden inflow in accordance with the New York Standards and Specifications for Erosion and Sediment Control.

b. Control Structure Design

All erosion and sediment control structures are designed and shall be installed in accordance with the New York Standards and Specifications for Erosion and Sediment Control.

c. Construction Practices to Minimize Stormwater Contamination

All waste materials will be collected and stored in a secure metal dumpster supplied by a waste handler which is a licensed solid waste management company. All trash and construction debris from the site shall be deposited in the dumpster. The dumpster will be emptied on an as-needed basis and the trash will be hauled to an approved landfill. No construction materials will be buried on-site. All personnel will be instructed regarding the correct procedure for waste disposal. All sanitary waste will be collected from the portable units by a licensed sanitary sewer waste management contractor. Good housekeeping and spill control practices will be followed during construction to minimize stormwater contamination from petroleum products, fertilizers, paints, and concrete. To prevent stormwater contamination from the site, good housekeeping practices are listed below:

- Fertilizers will be applied only in the minimum amounts recommended by the manufacturer, unless specified otherwise by the engineer and will be worked into the soil to limit exposure to stormwater.

- Fertilizers and hazardous materials/waste shall be stored in a covered shed or a sealable bin to avoid spills.

- All construction vehicles on site shall be monitored for leaks and receive regular preventative maintenance to reduce the chance of leakage.

- Petroleum products shall be stored in tightly sealed containers which are clearly labeled. Storage shall comply w/ NYSDEC standard requirements for the material(s) contained.

- Sanitary waste shall be collected from portable units as needed to avoid overfilling.

- All curing compounds shall be tightly sealed and stored when not required for use. Excess compounds shall not be discharged to the storm system and shall be properly disposed according to the manufacturer's instructions.

- Materials and equipment necessary for spill cleanup shall be kept in the temporary material storage trailer onsite. Equipment shall include, but not be limited to, brooms, dust pans, mops, rags, gloves, goggles, fast absorbent material, sand, saw dust, and plastic and metal trash containers.

- Petroleum spills must be reported to the DEC. Consult NYDEC regulations for spills.

  All reportable petroleum spills and most hazardous spills must be reported to the DEC hotline (1-800-457-7362) and the National Response Center (1-800-424-8802). Report the spill to local authorities, if required. For spills not deemed reportable, facts concerning the incident shall be documented by the spiller and a record maintained for one year.

- Concrete trucks shall only be allowed to wash out or discharge surplus concrete or drum wash water to a correctly installed and maintained concrete wash-out area.

- When testing/cleaning of water supply lines occurs, the discharge from the tested pipe will be collected and conveyed to a completed stormwater collection system for ultimate discharge into the stormwater management facility.

- Stabilized construction entrances shall be constructed to reduce vehicle tracking of sediments onto public roadways.

- The paved roads at the site entrances shall be swept daily to remove excess mud, dirt, or rock tracked from the site.

- Dump trucks hauling fine and dusty material from the construction site shall be covered with a tarpaulin.

- All ruts caused by equipment used for site clearing and grading shall be eliminated by re-grading.

d. Coordination of Stormwater Management Control Structures with Construction Activities

Stormwater Management Control Structures shall be coordinated with construction activities, so the control plan is in place before construction begins. The following control structures will be coordinated with construction activities:

- The temporary perimeter controls (silt fences, stabilized construction entrance, sediment basins and check dams) shall be installed before any work begins.
- Clearing and grading shall not occur in an area until it is necessary for construction to proceed.
- Once construction activity ceases permanently in an area, that area will be immediately stabilized with permanent seed and mulch.
- The proposed detention basin shall initially be constructed as a sediment trap during construction (See Construction Documents).
- The temporary perimeter controls (silt fencing) shall not be removed until all construction activities at the site are complete and soils have been stabilized.

e. Certification of Compliance with Federal, State, and Local Regulation

This SWPPP reflects local, state, and federal requirements for stormwater management and erosion and sediment control, as established in SPDES General Permit for Stormwater Discharge from Construction Activity, Permit No. GP-0-20-001. There are no other applicable State or Federal requirements for sediment and erosion site plans (or permits), or stormwater management site plans (or permits).

3.2 Maintenance/Inspection Procedures

a. Inspections

Visual inspections of all cleared and graded areas of the construction site will be performed weekly as required by the SPDES General Permit for Stormwater Discharge from Construction Activities (GP-0-20-001). Inspection Reports will be submitted to the developer, the construction contractor(s), and the Town of Canandaigua.

The site inspections will be conducted by a qualified professional whom the DEC defines as a person knowledgeable in principals and practice of erosion and sediment controls, such as a licensed professional engineer, Certified Professional in Erosion and Sediment Control (CPESC), or soil scientist. The inspections will verify that the control structures described in Section 3 of this SWPPP are being utilized correctly to control erosion and sedimentation. The inspector shall also have the capacity to require additional controls as required to control erosion and sediment on the site. The inspection will also verify that the procedures used to prevent stormwater contamination from construction materials and petroleum products are effective.

The Inspection Report will be completed after each inspection. A copy of the report form to be completed by the SWPPP coordinator is provided in APPENDIX A of this SWPPP. Completed forms will be maintained on-site during the entire construction project. A copy shall also be submitted to the governing agency. The developer will be responsible for reviewing each report and making all necessary repairs to the stormwater management facilities as indicated in the report. Following construction, the completed forms shall be retained at the owner's office for a minimum of one year.

If construction activities change or design modifications are made to the site plan which could impact stormwater, this SWPPP will be amended appropriately by recommendations and requirements set forth by the

inspector. The inspection report shall serve as an amendment to this SWPPP.

b. <u>Maintenance</u>

1. Construction

During construction and until such time as the site is stabilized, all erosion/sediment control measures shall be maintained as specified in the New York Standards and Specifications for Erosion and Sediment Control and as summarized below:

- Silt Fence - Remove accumulated sediment when bulges appear in the fencing or when sediment is one-foot deep.
- Sediment Trap - Remove sediment and restore trap to original dimensions when sediment has accumulated to one-half of the design depth of the trap.
- Stabilized Construction Entrance - Periodic top dressing with stone is required to help prevent tracking of sediment onto public roads.

2. Post-Construction

APPENDIX F includes the recommended Maintenance and Management Inspection Checklists taken from the New York State Stormwater Management Design Manual for the stormwater management facility.

Maintenance of the site by the owner will also include but not be limited to the following:

- Periodic sweeping of the pavement to remove accumulated sediment.
- Periodic mowing of the banks of the pond area and maintenance of the vegetation.

3. 3. Employee Training

An employee training program shall be developed and implemented by the owner(s) and contractors to educate employees about the requirements of the SWPPP. This education program will include background on the components and goals of the SWPPP and hands-on training in erosion controls, spill prevention and response, good housekeeping, proper material handling, disposal and control of waste, equipment fueling, and proper storage, washing, and inspection procedures. All employees shall be trained prior to their first day on the site.

3.4 SWPPP COORDINATOR AND DUTIES

A construction site SWPPP coordinator for the facility shall be appointed by the developer and/or contractor. The duties of the construction site SWPPP coordinator include the following:

- Implement the SWPPP plan with the aid of the SWPPP team; Oversee maintenance practices identified in the SWPPP
- Implement and oversee employee training
- Conduct or provide for inspection and monitoring activities
- Identify other potential pollutant sources and make sure they are added to the plan
- Identify any deficiencies in the SWPPP and make sure they are corrected, and ensure that any changes in construction plans are addressed in the SWPPP
- Ensure that all housekeeping and monitoring procedures are implemented

4.0 POST-CONSTRUCTION STORMWATER MANAGEMENT

4.1 Collection and Conveyance Facilities

Permanent stormwater collection and conveyance facilities are designed to control the developed, post-construction stormwater runoff from the proposed development, employing the following standards:

Facilities	Design Standard
Underground storm sewer and catch basins	- developed 10-year storm
Swales	- developed 10-year storm
Major culverts	- developed 25-year storm
Overland stabilized flood routes	- developed 100-year storm

(1) Pipe velocity <15 fps, rip-rap aprons provided at outlets in accordance with New York Standards and Specifications for Erosion and Sediment Control.

(2) If calculated channel velocity exceeds 6 fps, then erosion protection (i.e. stone lining, pavement, staked mesh) will be provided in accordance with New York Standards and Specifications for Erosion and Sediment Control.

4.2 Stormwater Peak Runoff Rates and Water Quality Management

Due to the construction of additional impervious surfaces, peak stormwater runoff rates, volumes, and pollutant loads will increase when the new areas are developed. Mitigation of this impact is achieved through employment of stormwater management measures that achieve pollutant removal goals, reduce channel erosion, prevent overbank flooding, and help control extreme floods. This project will meet all NYSDEC Water quality treatment requirements for the improvements. In addition, this project will meet the Town of Canandaigua required Enhanced Phosphorous Removal as outlined in Chapter 10 of the SWDM.

Green infrastructure has been implemented (Appendix C) to reduce, infiltrate and treat the required water quality volume. The proposed wet pond has been designed using the unified stormwater sizing criteria in accordance with the New York State Stormwater Design Manual, Detail P-2 (“Wet Pond”). The following is a summary of how the design standards have been met.

Water Quality/Runoff Reduction- Green Infrastructure (APPENDIX C).

Channel Protection	-	Provided in the P-2 Pond above permanent pool.
Overbank Flood	-	Provided in the P-2 Pond above bottom. Use catch basin to safely outlet these flows.
Extreme Storm	-	Provided in the P-2 Pond. Use 10' wide emergency spillway to convey these flows out of the pond.

Computations for the design are included in APPENDICES B and C. FIGURES 5 and 6 show existing and proposed tributary drainage areas.

5.0 GREEN INFRASTRUCTURE TECHNIQUES

This project has incorporated several of the required practices outlined by the SWDM as "Green Infrastructure Techniques and Practices". The intent of these practices is to preserve natural areas and features as well as promote infiltration and groundwater recharge. Appendix C explains the design and implementation of these practices.

Dry swales are applied to receive runoff from newly impervious areas. This practice is a total of approximately 6,300 linear feet of grass channel totaling approximately 86,741 cubic feet of storage capacity. Runoff will be collected in these swales and filtered through a vegetative and soil media before conveyance to the wet pond. Overflow from the pond will flow into a vegetative channel and discharge north to the unnamed unclassified stream.

6.0 NOTICE OF TERMINATION

Following the completion of construction, the owner/operator shall file a Notice of Termination (NOT) with the DEC (APPENDIX H). Prior to filing the NOT, the operator shall have the qualified professional perform a final site inspection, at which time the qualified professional shall certify that the site has undergone final stabilization. "Final Stabilization" means that all soil-disturbing activities at the site have been completed and a uniform, perennial vegetative cover with a density of 80% has been established or equivalent stabilization measures (such as the use of mulches or geotextile) have been employed on all unpaved areas and areas not covered by permanent structures.

6.0 Certification

Engineer's Certification

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manages the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that false statements made herein are punishable as a Class A misdemeanor pursuant to Section 210.45 of the Penal Law."

_____

Name

Project Engineer

Title

_____

Date

Corporate Certification (Owner)

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manages the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that false statements made herein are punishable as a Class A misdemeanor pursuant to Section 210.45 of the Penal Law."

_____

Name

_____

Title

_____

Date

The General Contractor shall be responsible for the coordination of the installation and maintenance of all erosion and sediment controls for the project, including the work of all subcontractors. Final stabilization of the site, including removal of temporary controls and placement of permanent stormwater management practices shall also be coordinated by the General Contractor.

Contractor Certification (General Contractor)

"I hereby certify that I understand and agree to comply with the terms and conditions of the SWPPP and agree to implement any corrective actions identified by the qualified inspector during a site inspection. I also understand that the *owner or operator* must comply with the terms and conditions of the New York State Pollutant Discharge Eliminate System ("SPDES") general permit for stormwater discharges from construction activities and that it is unlawful for any person to cause or contribute to a violation of water quality standards. Furthermore, I understand that certifying false, incorrect, or inaccurate information is a violation of the referenced permit and the laws of the State of New York and subject me to criminal, civil, and/or administrative proceedings."

_____

Name

_____

Title

_____

Date

The excavation and grading subcontractor shall be responsible for erosion and sediment control during all aspects of general excavation and grading including, but not limited to; clearing and grubbing, installation of temporary stabilization controls (silt fence, sediment traps, diversion swales, temporary seeding, etc.) earthwork, utility installations, paving, and other permanent, non-vegetative cover.

Contractor Certification (Excavations and Grading Subcontractor)

"I hereby certify that I understand and agree to comply with the terms and conditions of the SWPPP and agree to implement any corrective actions identified by the qualified inspector during a site inspection. I also understand that the *owner or operator* must comply with the terms and conditions of the New York State Pollutant Discharge Eliminate System ("SPDES") general permit for stormwater discharges from construction activities and that it is unlawful for any person to cause or contribute to a violation of water quality standards. Furthermore, I understand that certifying false, incorrect, or inaccurate information is a violation of the referenced permit and the laws of the State of New York and subject me to criminal, civil, and/or administrative proceedings."

_____

Name

_____

Title

_____

Date

The Landscaping Contractor shall be responsible for erosion and sediment control practices, including permanent vegetative cover, during and directly related to all landscaping for the project.

Contractor Certification (Landscaping Subcontractor)

"I hereby certify that I understand and agree to comply with the terms and conditions of the SWPPP and agree to implement any corrective actions identified by the qualified inspector during a site inspection. I also understand that the *owner or operator* must comply with the terms and conditions of the New York State Pollutant Discharge Eliminate System ("SPDES") general permit for stormwater discharges from construction activities and that it is unlawful for any person to cause or contribute to a violation of water quality standards. Furthermore, I understand that certifying false, incorrect, or inaccurate information is a violation of the referenced permit and the laws of the State of New York and subject me to criminal, civil, and/or administrative proceedings."

_____

Name

_____

Title

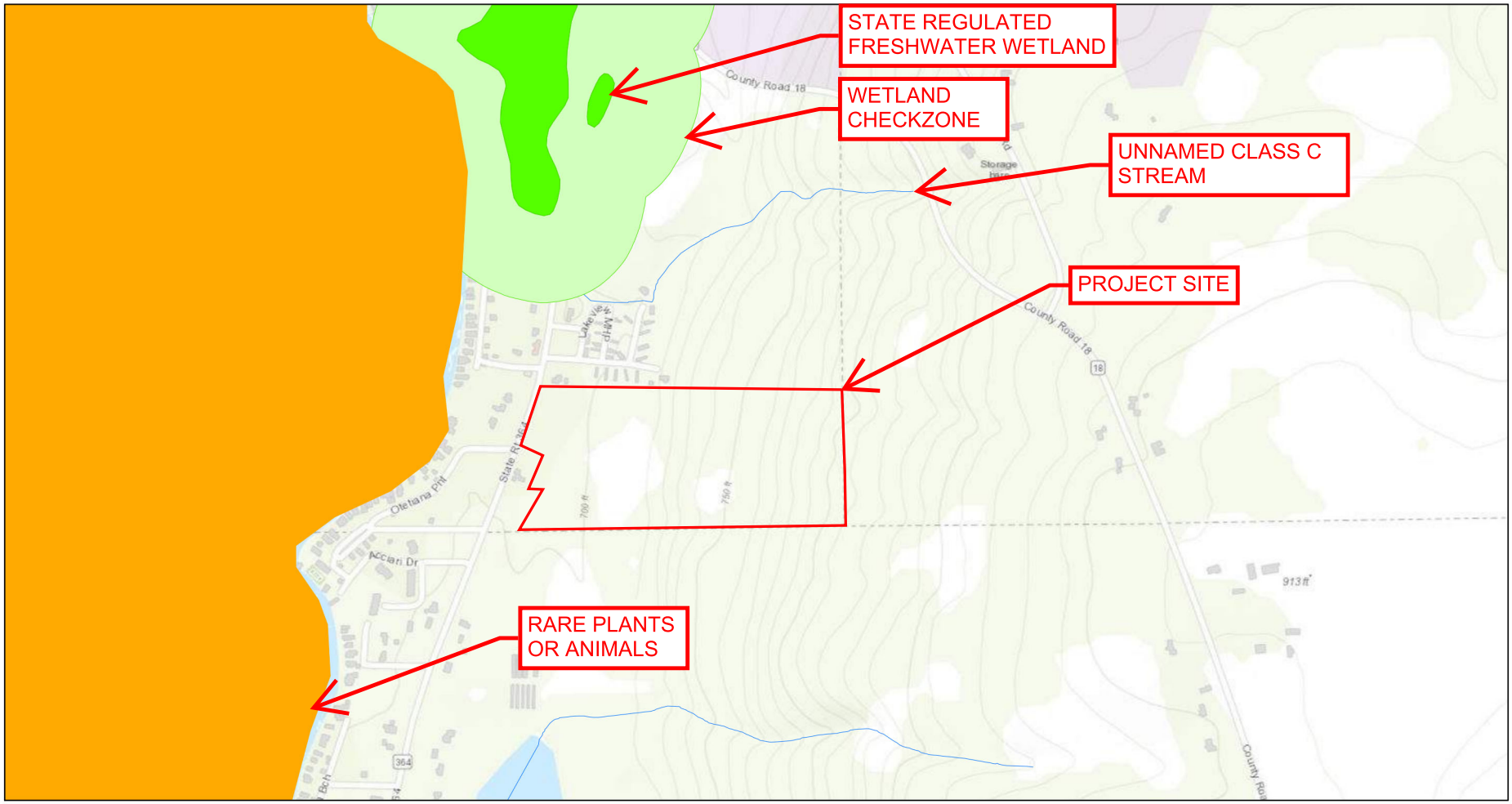
_____

Date

FIGURE 1

LOCATION MAP

Figure-1 LOCATION MAP



April 19, 2021

1:9,028

0 0.07 0.15 0.3 mi

0 0.13 0.25 0.5 km

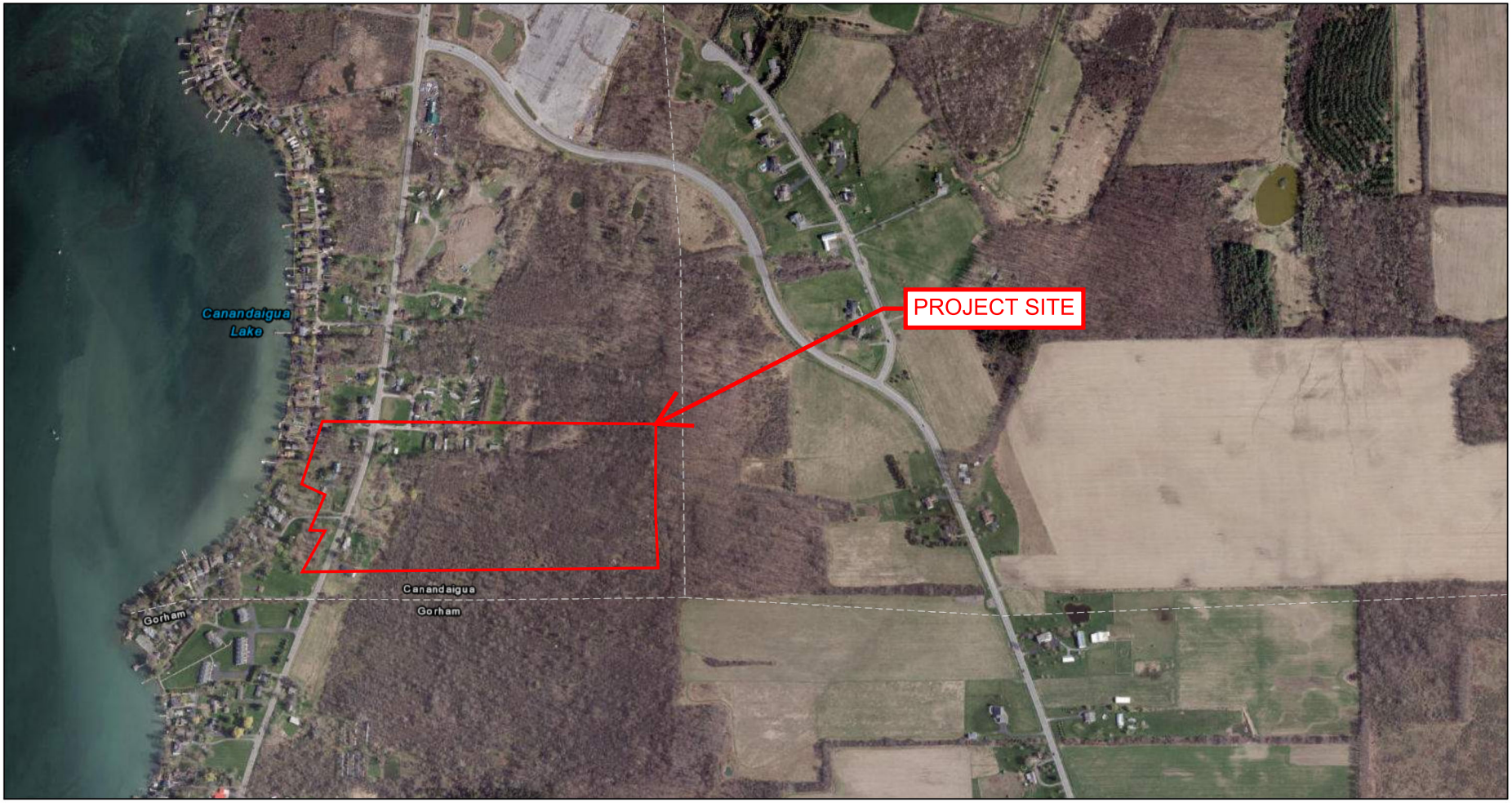
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

Author: Marks Engineering
Not a legal document

FIGURE 2

AERIAL PHOTO

Figure-2 AERIAL MAP



April 6, 2021

1:9,028

0 0.07 0.15 0.3 mi

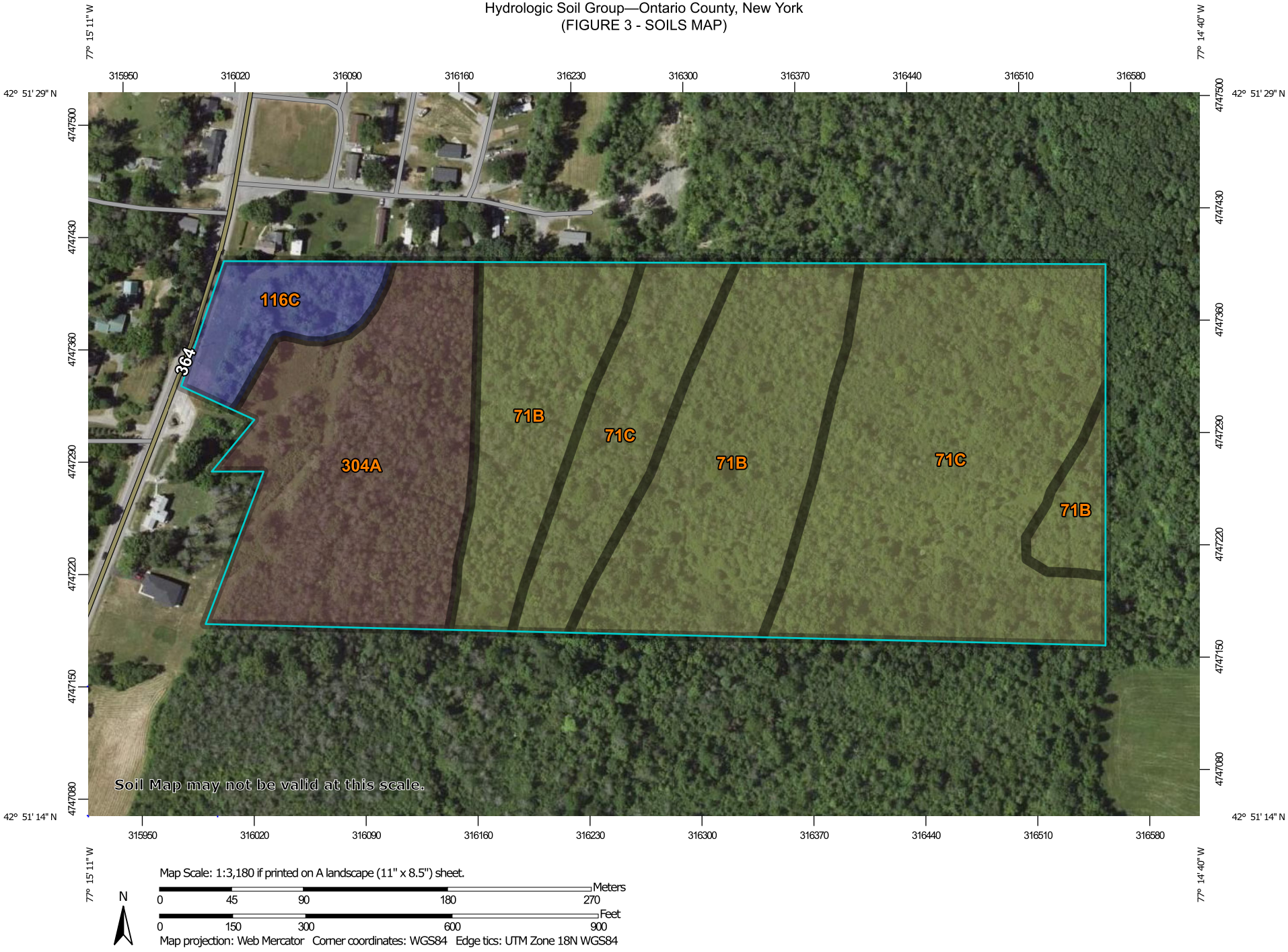
0 0.13 0.25 0.5 km

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community, Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community

Author: Marks Engineering
Not a legal document

FIGURE 3

SOIL MAP



Map Scale: 1:3,180 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 45 90 180 270

Feet
0 150 300 600 900

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

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

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: Ontario County, New York
Survey Area Data: Version 18, Jun 11, 2020

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

Date(s) aerial images were photographed: Jun 4, 2020—Jun 17, 2020

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
71B	Darien silt loam, 3 to 8 percent slopes	C/D	10.4	32.6%
71C	Darien silt loam, 8 to 15 percent slopes	C/D	12.6	39.7%
116C	Ontario loam, 8 to 15 percent slopes	B	1.7	5.2%
304A	Kendaia loam, 0 to 3 percent slopes	B/D	7.1	22.4%
Totals for Area of Interest			**31.8**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

FIGURE 4

NYS DEC STORMWATER MAPPER MAP

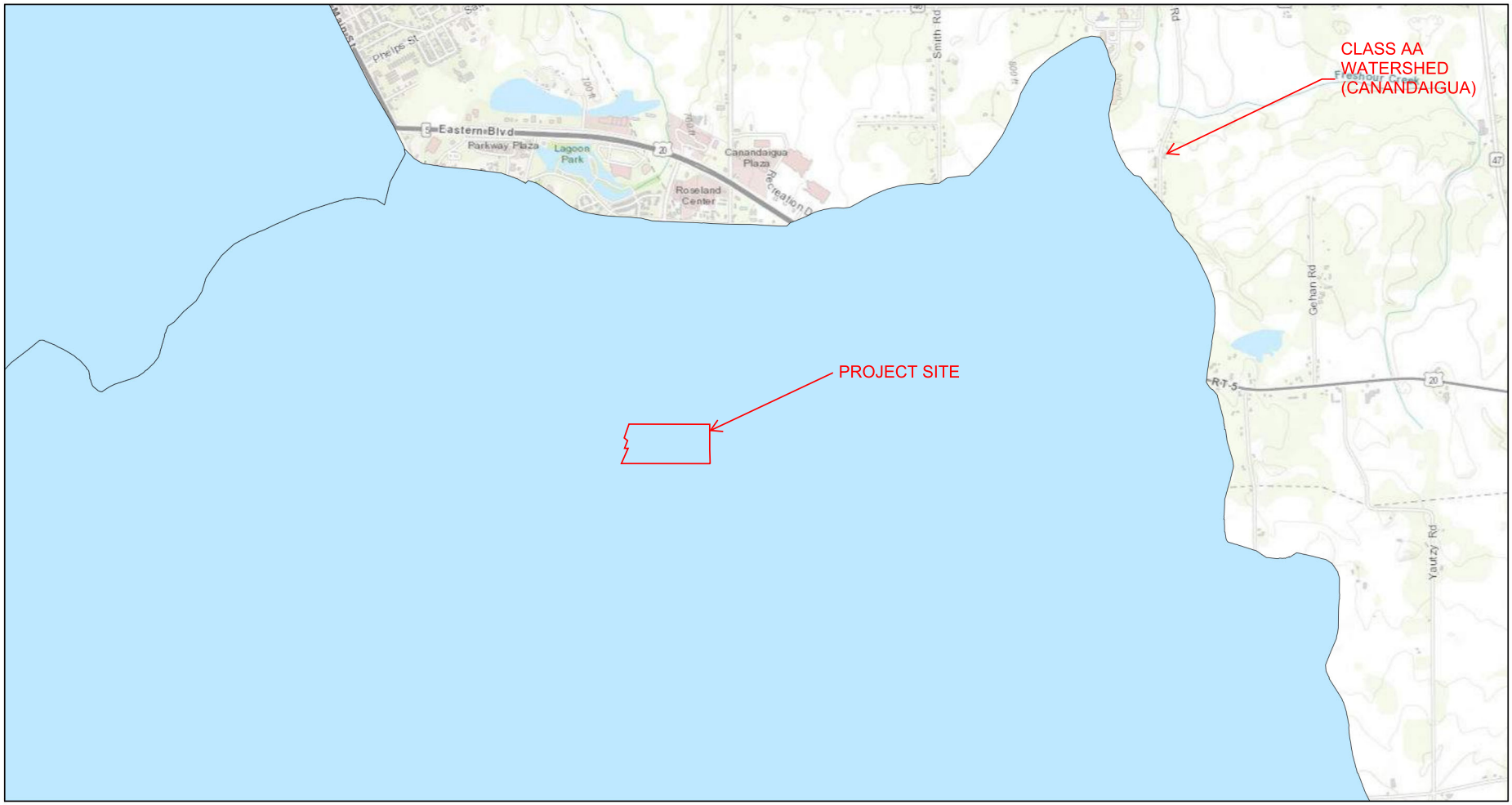

CLASS AA
WATERSHED
(CANANDAIGUA)
PROJECT SITE
Eastern Blvd
Parkway Plaza
Lagoon
Park
Canandaigua
Plaza
Roseland
Center
Phelps St
Smith Rd
Gehan Rd
RT 5
Yaussy Rd
20
47

FIGURE 5

EXISTING DRAINAGE MAP

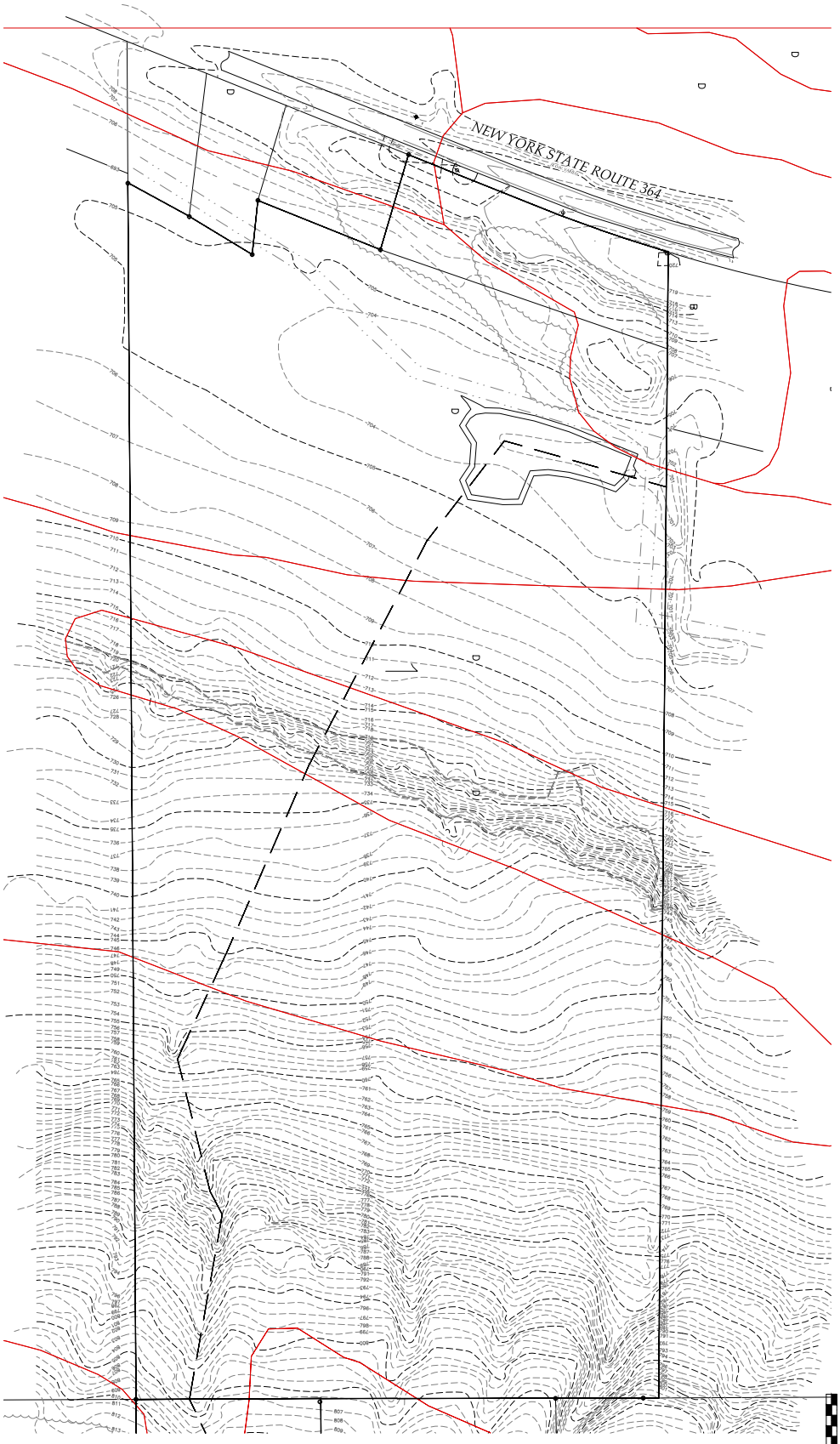


FIGURE 5A – EXISTING DRAINAGE AREA MAP
1"=80'

PROGRESS PRINT
NOT FOR CONSTRUCTION

FIG. 6A

5

DRAWING TITLE
SWPPP FIGURE

DRAWN BY:	XXX
DESIGNED BY:	XXX
CHECKED BY:	BMM
SCALE:	AS NOTED
JOB NO.:	20-343
DATE:	02/01/2022
APPROVED:	
DATE:	

SITE DEVELOPMENT PLANS PREPARED FOR:
CANANDAIGUA SHORES
TOWNHOME / RESIDENTIAL DEVELOPMENT
SHOWING LAND IN:
3535 STATE ROUTE 364 /0000 COUNTY ROAD 18
TOWN OF CANANDAIGUA/HOPEWELL
COUNTY OF ONTARIO STATE OF NEW YORK

REVISIONS

NO.	DATE	DESCRIPTION OF REVISION	BY

STAMP

STATE OF NEW YORK
BRIAN M. MARKS
LICENSED PROFESSIONAL ENGINEER
STAMP

MarksEngineering
4 2 BEEMAN ST
CANANDAIGUA, NY 14424
Phone 585-905-0360
Fax: 585-485-6205
www.marksengineering.com bmarks@marksengineering.com

FIGURE 6

PROPOSED DRAINAGE MAP

1 FIGURE 6A – PROPOSED DRAINAGE AREA MAP
1"=80'

PRELIMINARY
NOT FOR CONSTRUCTION

Marks Engineering
42 BEDMAN ST
CANANDAIGUA, NY 14424
Phone: 585-905-0360
Fax: 585-485-4205
www.marksengineering.com bmarks@marksengineering.com

STAMP

REVISIONS

NO.	DATE	DESCRIPTION OF REVISION	BY

SITE DEVELOPMENT PLANS PREPARED FOR:
CANANDAIGUA SHORES
RESIDENTIAL DEVELOPMENT
SHOWING LAND IN:
3535 STATE ROUTE 364 / 0000 COUNTY ROAD 18
TOWN OF CANANDAIGUA/ HOPEWELL
COUNTY OF ONTARIO
STATE OF NEW YORK

DRAWING TITLE:
SWPPP FIGURE

DRAWN BY:	XXX
DESIGNED BY:	XXX
CHECKED BY:	BAM
SCALE:	AS NOTED
JOB NO.:	20-243
DATE:	02/01/2022
TAX MAP#:	98.18-1-20.10

FIG. 6A

APPENDIX A

Inspection Report Form

MARKS ENGINEERING, P.C.

42 BEEMAN STREET, CANANDAIGUA, NY 14424 phone 585.329.6138 fax 585.486.6205

SWPPP INSPECTION REPORT

PROJECT:	SPDES PERMIT NO. :
PROJECT NO.:	WEATHER:
CONSTRUCTION STAGE:	LASTSIGNINFICANT PERCIPITATION EVENT:

	COMPONENT	CONDITION		DEFICIENCIES AND RECOMMENDATIONS
1	GENERAL HOUSEKEEPING	ACCEPT		
		DEFICIENT	N/A	
2	SILT FENCE/ PERIMETER CONTROLS	ACCEPT		
		DEFICIENT	N/A	
3	SEDIMENT BASINS, TRAPS & PONDS	ACCEPT		
		DEFICIENT	N/A	
4	INLET PROTECTION	ACCEPT		
		DEFICIENT	N/A	
5	PAVEMENT/ ROADWAY/ OFF-SITE	ACCEPT		
		DEFICIENT	N/A	
6	CONSTRUCTION ACCESS	ACCEPT		
		DEFICIENT	N/A	
7	STABILIZATION (SEED/MULCH)	ACCEPT		
		DEFICIENT	N/A	
8	CHECK DAMS	ACCEPT		
		DEFICIENT	N/A	
9	SWALES & DIKES	ACCEPT		
		DEFICIENT	N/A	
10	STOCKPILES & MATERIAL MANAGEMENT	ACCEPT		
		DEFICIENT	N/A	
11	STABLIZED OUTLET PROTECTION & LEVEL SPREADERS	ACCEPT		
		DEFICIENT	N/A	
12	DEWATERING	ACCEPT		
		DEFICIENT	N/A	
13	CONCRETE WASH-OUT	ACCEPT		
		DEFICIENT	N/A	
14	RECORD KEEPING & POSTINGS	ACCEPT		
		DEFICIENT	N/A	
	CRITICAL / REPORT			
	SOIL CONDITIONS:	DRY	WET	none

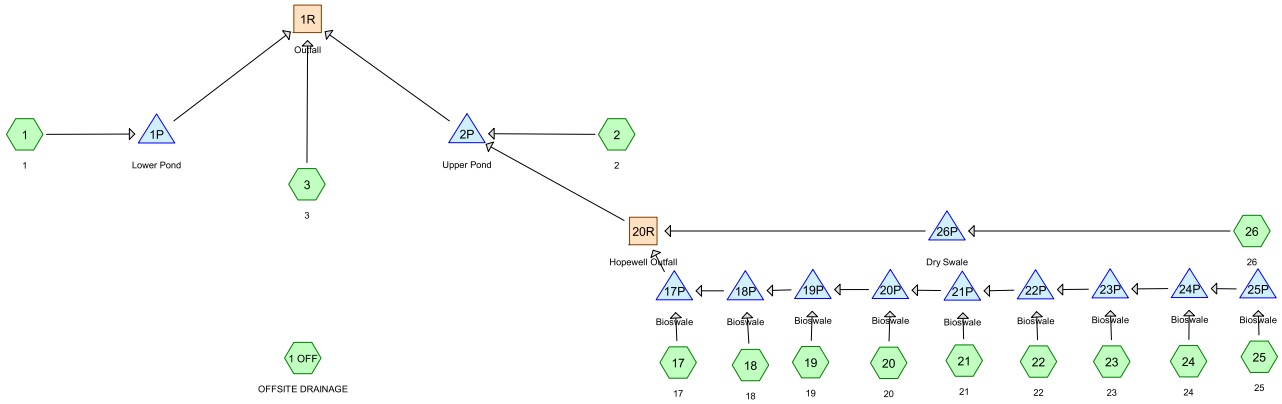
ADDITIONAL COMMENTS:

INSPECTION BY: TIME: DATE OF INSPECTION:

SIGNATURE OF INSPECTOR: J.P.S. INSPECTIONS FREQUENCY Weekly

APPENDIX B

Existing and Proposed Peak Runoff Computations



Subcat Reach Pond Link

Routing Diagram for 20-243 SWPPPBASE PRO 1.19.22 Canandaigua
Prepared by Marks Engineering, Printed 1/27/2022

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
9.182	80	>75% Grass cover, Good, HSG D (17, 18, 19, 20, 21, 22, 23, 24, 25, 26)
18.414	56	Brush, Fair HSG B (1, 1 OFF, 3)
54.096	70	Brush, Fair HSG C (1, 1 OFF, 2, 3)
0.298	77	Brush, Fair HSG D (2)
1.745	98	Paved parking HSG B (1, 3)
5.280	98	Paved parking HSG C (1, 2, 3, 18, 19, 20, 21, 22, 23, 24, 25, 26)
0.087	98	Paved parking HSG D (2)
0.122	98	Paved parking, HSG D (17)
0.633	98	Roofs HSG C (18, 19, 20, 21, 22, 23, 24, 25)
0.079	98	Roofs, HSG D (17)
28.538	81	Row crops, C + CR, Good HSG C (1 OFF)
0.260	98	Water Surface HSG B (1)
0.436	98	Water Surface HSG C (2)
119.170	**73**	**TOTAL AREA**

Summary for Subcatchment 1: 1

CarlsonPlanXYPos|641307.9585|1041455.1221|
CarlsonSurface||

Runoff = 2.11 cfs @ 12.22 hrs, Volume= 0.223 af, Depth> 0.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
NRCC 24-hr A 1-Year Rainfall=1.89"

Area (sf)	CN	Description
11,325	98	Water Surface HSG B
74,761	98	Paved parking HSG B
51,292	98	Paved parking HSG C
281,913	56	Brush, Fair HSG B
162,629	70	Brush, Fair HSG C
581,920	70	Weighted Average
444,542		76.39% Pervious Area
137,378		23.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	100	0.1000	0.27		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.19"
1.5	200	0.1000	2.21		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
7.7	300	Total			

Summary for Subcatchment 1 OFF: OFFSITE DRAINAGE

CarlsonPlanXYPos|642280.8804|1040430.0233|
CarlsonSurface||

Runoff = 7.81 cfs @ 12.83 hrs, Volume= 1.508 af, Depth> 0.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
NRCC 24-hr A 1-Year Rainfall=1.89"

Area (sf)	CN	Description
1,243,094	81	Row crops, C + CR, Good HSG C
446,533	56	Brush, Fair HSG B
1,552,738	70	Brush, Fair HSG C
3,242,365	72	Weighted Average
3,242,365		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.2	150		2.00		**Direct Entry, Sheet Flow**
24.7	1,795	0.0300	1.21		**Shallow Concentrated Flow, Shallow Conc.** Short Grass Pasture Kv= 7.0 fps
20.6	1,748	0.0800	1.41		**Shallow Concentrated Flow, Shallow** Woodland Kv= 5.0 fps
46.6	3,693	Total			

Summary for Subcatchment 2: 2

CarlsonPlanXYPos|642014.4586|1041354.4458|
CarlsonSurface||

Runoff = 4.03 cfs @ 12.20 hrs, Volume= 0.307 af, Depth> 0.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
NRCC 24-hr A 1-Year Rainfall=1.89"

Area (sf)	CN	Description
18,974	98	Water Surface HSG C
75,132	98	Paved parking HSG C
3,786	98	Paved parking HSG D
337,119	70	Brush, Fair HSG C
12,968	77	Brush, Fair HSG D
447,979	76	Weighted Average
350,087		78.15% Pervious Area
97,892		21.85% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	100	0.1000	0.27		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.19"
2.6	350	0.1000	2.21		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
8.8	450	Total			

Summary for Subcatchment 3: 3

CarlsonPlanXYPos|641681.4005|1041128.2504|
CarlsonSurface||

Runoff = 1.24 cfs @ 12.29 hrs, Volume= 0.159 af, Depth> 0.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
NRCC 24-hr A 1-Year Rainfall=1.89"

Area (sf)	CN	Description
1,237	98	Paved parking HSG B
36,893	98	Paved parking HSG C
73,657	56	Brush, Fair HSG B
303,939	70	Brush, Fair HSG C
415,726	70	Weighted Average
377,596		90.83% Pervious Area
38,130		9.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	100	0.1000	0.27		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.19"
5.3	700	0.1000	2.21		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
11.5	800	Total			

Summary for Subcatchment 17: 17

CarlsonPlanXYPos|642702.7045|1040980.9144|
CarlsonSurface|C:\Users\Office 2\Dropbox (Marks Engineering)\2020 PROJECTS\20-243 Licciardello, Angelo - 3535 East Lake Rd. - To Cdga To Hopewell\Carlson Files\ex topo.tin|

Runoff = 0.92 cfs @ 12.13 hrs, Volume= 0.058 af, Depth> 0.62"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
NRCC 24-hr A 1-Year Rainfall=1.89"

Area (sf)	CN	Description
5,322	98	Paved parking, HSG D
3,449	98	Roofs, HSG D
40,152	80	>75% Grass cover, Good, HSG D
48,923	83	Weighted Average
40,152		82.07% Pervious Area
8,771		17.93% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.0		0.0866			**Lag/CN Method,**
6.0					**Direct Entry,**
6.0	0	Total			

Summary for Subcatchment 18: 18

CarlsonPlanXYPos|642920.0895|1040980.2941|
CarlsonSurface|C:\Users\Office 2\Dropbox (Marks Engineering)\2020 PROJECTS\20-243 Licciardello, Angelo - 3535 East Lake Rd. - To Cdga To Hopewell\Carlson Files\ex topo.tin|

Runoff = 0.92 cfs @ 12.13 hrs, Volume= 0.058 af, Depth> 0.62"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
NRCC 24-hr A 1-Year Rainfall=1.89"

Area (sf)	CN	Description
5,326	98	Paved parking HSG C
3,449	98	Roofs HSG C
40,237	80	>75% Grass cover, Good, HSG D
49,012	83	Weighted Average
40,237		82.10% Pervious Area
8,775		17.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.0		0.0953			**Lag/CN Method,**
6.0					**Direct Entry,**
6.0	0	Total			

Summary for Subcatchment 19: 19

CarlsonPlanXYPos|643107.1559|1040981.5048|
CarlsonSurface|C:\Users\Office 2\Dropbox (Marks Engineering)\2020 PROJECTS\20-243 Licciardello, Angelo - 3535 East Lake Rd. - To Cdga To Hopewell\Carlson Files\ex topo.tin|

Runoff = 0.92 cfs @ 12.13 hrs, Volume= 0.058 af, Depth> 0.62"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
NRCC 24-hr A 1-Year Rainfall=1.89"

Area (sf)	CN	Description
5,329	98	Paved parking HSG C
3,449	98	Roofs HSG C
40,270	80	>75% Grass cover, Good, HSG D
49,048	83	Weighted Average
40,270		82.10% Pervious Area
8,778		17.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.0		0.0933			**Lag/CN Method,**
6.0					**Direct Entry,**
6.0	0	Total			

Summary for Subcatchment 20: 20

CarlsonPlanXYPos|643312.2303|1040980.2663|
CarlsonSurface|C:\Users\Office 2\Dropbox (Marks Engineering)\2020 PROJECTS\20-243 Licciardello, Angelo - 3535 East Lake Rd. - To Cdga To Hopewell\Carlson Files\ex topo.tin|

Runoff = 0.92 cfs @ 12.13 hrs, Volume= 0.058 af, Depth> 0.62"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
NRCC 24-hr A 1-Year Rainfall=1.89"

Area (sf)	CN	Description
5,322	98	Paved parking HSG C
3,449	98	Roofs HSG C
40,204	80	>75% Grass cover, Good, HSG D
48,975	83	Weighted Average
40,204		82.09% Pervious Area
8,771		17.91% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.0		0.0759			**Lag/CN Method,**
6.0					**Direct Entry,**
6.0	0	Total			

Summary for Subcatchment 21: 21

CarlsonPlanXYPos|643492.4579|1040982.7482|
CarlsonSurface|C:\Users\Office 2\Dropbox (Marks Engineering)\2020 PROJECTS\20-243 Licciardello, Angelo - 3535 East Lake Rd. - To Cdga To Hopewell\Carlson Files\ex topo.tin|

Runoff = 0.92 cfs @ 12.13 hrs, Volume= 0.058 af, Depth> 0.62"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
NRCC 24-hr A 1-Year Rainfall=1.89"

Area (sf)	CN	Description
5,326	98	Paved parking HSG C
3,449	98	Roofs HSG C
40,237	80	>75% Grass cover, Good, HSG D
49,012	83	Weighted Average
40,237		82.10% Pervious Area
8,775		17.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.0		0.0663			**Lag/CN Method,**
6.0					**Direct Entry,**
6.0	0	Total			

Summary for Subcatchment 22: 22

CarlsonPlanXYPos|643706.8551|1040983.3562|
CarlsonSurface|C:\Users\Office 2\Dropbox (Marks Engineering)\2020 PROJECTS\20-243 Licciardello, Angelo - 3535 East Lake Rd. - To Cdga To Hopewell\Carlson Files\ex topo.tin|

Runoff = 0.92 cfs @ 12.13 hrs, Volume= 0.058 af, Depth> 0.62"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
NRCC 24-hr A 1-Year Rainfall=1.89"

Area (sf)	CN	Description
5,326	98	Paved parking HSG C
3,449	98	Roofs HSG C
40,237	80	>75% Grass cover, Good, HSG D
49,012	83	Weighted Average
40,237		82.10% Pervious Area
8,775		17.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.0		0.0589			**Lag/CN Method,**
6.0					**Direct Entry,**
6.0	0	Total			

Summary for Subcatchment 23: 23

CarlsonPlanXYPos|643896.4054|1040980.2593|
CarlsonSurface|C:\Users\Office 2\Dropbox (Marks Engineering)\2020 PROJECTS\20-243 Licciardello, Angelo - 3535 East Lake Rd. - To Cdga To Hopewell\Carlson Files\ex topo.tin|

Runoff = 0.92 cfs @ 12.13 hrs, Volume= 0.058 af, Depth> 0.62"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
NRCC 24-hr A 1-Year Rainfall=1.89"

Area (sf)	CN	Description
5,323	98	Paved parking HSG C
3,449	98	Roofs HSG C
40,207	80	>75% Grass cover, Good, HSG D
48,979	83	Weighted Average
40,207		82.09% Pervious Area
8,772		17.91% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.0		0.0568			**Lag/CN Method,**
6.0					**Direct Entry,**
6.0	0	Total			

Summary for Subcatchment 24: 24

CarlsonPlanXYPos|644102.7886|1040984.5776|
CarlsonSurface|C:\Users\Office 2\Dropbox (Marks Engineering)\2020 PROJECTS\20-243 Licciardello, Angelo - 3535 East Lake Rd. - To Cdga To Hopewell\Carlson Files\ex topo.tin|

Runoff = 0.88 cfs @ 12.13 hrs, Volume= 0.056 af, Depth> 0.62"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
NRCC 24-hr A 1-Year Rainfall=1.89"

Area (sf)	CN	Description
5,289	98	Paved parking HSG C
3,449	98	Roofs HSG C
38,140	80	>75% Grass cover, Good, HSG D
46,878	83	Weighted Average
38,140		81.36% Pervious Area
8,738		18.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.0		0.0563			**Lag/CN Method,**
6.0					**Direct Entry,**
6.0	0	Total			

Summary for Subcatchment 25: 25

CarlsonPlanXYPos|644284.7705|1040971.5435|
CarlsonSurface|C:\Users\Office 2\Dropbox (Marks Engineering)\2020 PROJECTS\20-243 Licciardello, Angelo - 3535 East Lake Rd. - To Cdga To Hopewell\Carlson Files\ex topo.tin|

Runoff = 1.04 cfs @ 12.20 hrs, Volume= 0.070 af, Depth> 0.67"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
NRCC 24-hr A 1-Year Rainfall=1.89"

Area (sf)	CN	Description
8,025	98	Paved parking HSG C
3,449	98	Roofs HSG C
43,529	80	>75% Grass cover, Good, HSG D
55,003	84	Weighted Average
43,529		79.14% Pervious Area
11,474		20.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Summary for Subcatchment 26: 26

CarlsonPlanXYPos|644192.3159|1041141.7328|
CarlsonSurface|C:\Users\Office 2\Dropbox (Marks Engineering)\2020 PROJECTS\20-243 Licciardello, Angelo - 3535 East Lake Rd. - To Cdga To Hopewell\Carlson Files\ex topo.tin|

Runoff = 1.37 cfs @ 12.17 hrs, Volume= 0.091 af, Depth> 0.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
NRCC 24-hr A 1-Year Rainfall=1.89"

Area (sf)	CN	Description
21,418	98	Paved parking HSG C
36,775	80	>75% Grass cover, Good, HSG D
58,193	87	Weighted Average
36,775		63.19% Pervious Area
21,418		36.81% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.0		0.0650			**Lag/CN Method,**
8.0					**Direct Entry,**
8.0	0	Total			

Summary for Reach 1R: Outfall

Inflow Area = 44.735 ac, 19.32% Impervious, Inflow Depth > 0.13" for 1-Year event
Inflow = 1.34 cfs @ 12.31 hrs, Volume= 0.477 af
Outflow = 1.34 cfs @ 12.31 hrs, Volume= 0.477 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Summary for Reach 20R: Hopewell Outfall

Inflow Area = 11.548 ac, 20.49% Impervious, Inflow Depth = 0.00" for 1-Year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Summary for Pond 1P: Lower Pond

Inflow Area = 13.359 ac, 23.61% Impervious, Inflow Depth > 0.20" for 1-Year event
Inflow = 2.11 cfs @ 12.22 hrs, Volume= 0.223 af
Outflow = 0.15 cfs @ 16.76 hrs, Volume= 0.118 af, Atten= 93%, Lag= 272.1 min
Primary = 0.15 cfs @ 16.76 hrs, Volume= 0.118 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Starting Elev= 700.50' Surf.Area= 0 sf Storage= 0 cf
Peak Elev= 701.45' @ 16.76 hrs Surf.Area= 12,513 sf Storage= 5,328 cf

Plug-Flow detention time= 338.4 min calculated for 0.118 af (53% of inflow)
Center-of-Mass det. time= 191.4 min (1,101.8 - 910.4)

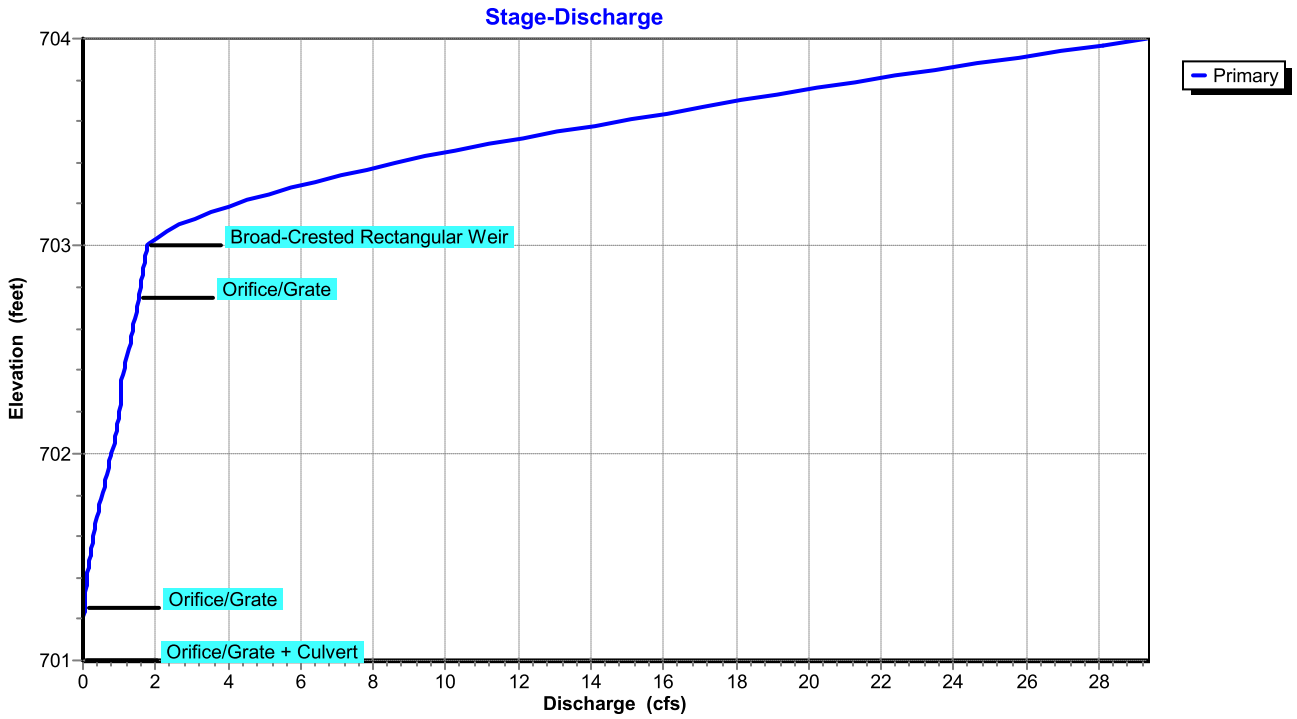
Volume	Invert	Avail.Storage	Storage Description
#1	701.00'	51,996 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
701.00	11,309	0	0
702.00	14,000	12,655	12,655
703.00	18,223	16,112	28,766
704.00	28,237	23,230	51,996

Device	Routing	Invert	Outlet Devices
#1	Primary	703.00'	**10.0' 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
#2	Device 4	702.75'	**48.0" x 48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 4	701.00'	**4.0" Vert. Orifice/Grate** C= 0.600
#4	Primary	701.00'	**12.0" Round Culvert** L= 143.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 701.00' / 701.00' S= 0.0000 '/' Cc= 0.900 n= 0.020 Corrugated PE, corrugated interior, Flow Area= 0.79 sf
#5	Device 4	701.25'	**12.0" W x 6.0" H Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.15 cfs @ 16.76 hrs HW=701.45' (Free Discharge)
- **1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
- **4=Culvert** (Barrel Controls 0.15 cfs @ 0.64 fps)
  - **2=Orifice/Grate** (Controls 0.00 cfs)
  - **3=Orifice/Grate** (Passes < 0.22 cfs potential flow)
  - **5=Orifice/Grate** (Passes < 0.28 cfs potential flow)

Pond 1P: Lower Pond



Summary for Pond 2P: Upper Pond

Inflow Area = 21.832 ac, 21.13% Impervious, Inflow Depth > 0.17" for 1-Year event
Inflow = 4.03 cfs @ 12.20 hrs, Volume= 0.307 af
Outflow = 0.23 cfs @ 14.99 hrs, Volume= 0.200 af, Atten= 94%, Lag= 167.4 min
Primary = 0.23 cfs @ 14.99 hrs, Volume= 0.200 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Starting Elev= 705.00' Surf.Area= 0 sf Storage= 0 cf
Peak Elev= 739.48' @ 14.99 hrs Surf.Area= 15,593 sf Storage= 7,216 cf

Plug-Flow detention time= 312.7 min calculated for 0.199 af (65% of inflow)
Center-of-Mass det. time= 198.2 min (1,074.6 - 876.5)

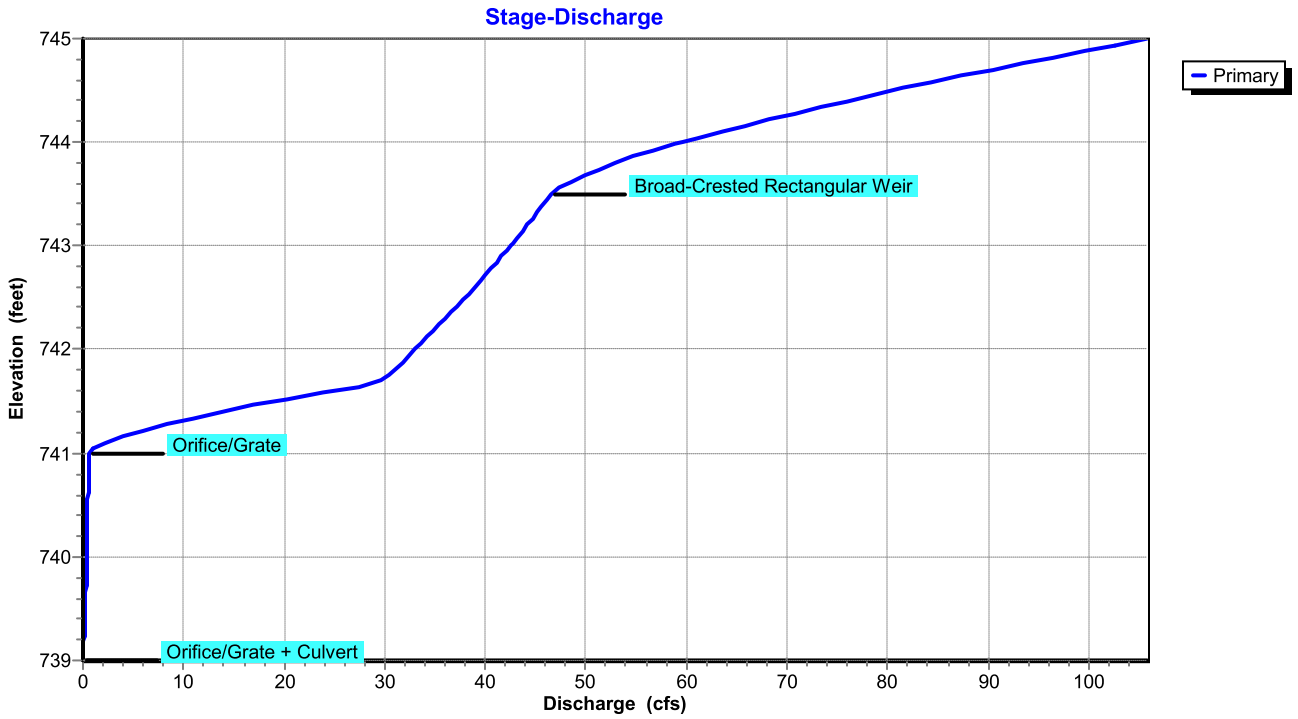
Volume	Invert	Avail.Storage	Storage Description
#1	739.00'	129,172 cf	**prop (Conic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
739.00	14,602	0	0	14,602
740.00	16,711	15,645	15,645	16,757
741.00	18,984	17,835	33,480	19,079
742.00	21,350	20,155	53,635	21,498
743.00	23,873	22,600	76,235	24,076
744.00	26,452	25,151	101,387	26,716
745.00	29,140	27,785	129,172	29,468

Device	Routing	Invert	Outlet Devices
#1	Primary	743.50'	**10.0' 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
#2	Device 4	741.00'	**48.0" x 48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 4	739.00'	**4.0" Vert. Orifice/Grate** C= 0.600
#4	Primary	739.00'	**36.0" Round Culvert** L= 150.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 739.00' / 735.00' S= 0.0267 '/' Cc= 0.900 n= 0.020 Corrugated PE, corrugated interior, Flow Area= 7.07 sf

Primary OutFlow Max=0.23 cfs @ 14.99 hrs HW=739.48' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
└**4=Culvert** (Passes 0.23 cfs of 1.35 cfs potential flow)
└**2=Orifice/Grate** (Controls 0.00 cfs)
└**3=Orifice/Grate** (Orifice Controls 0.23 cfs @ 2.69 fps)

Pond 2P: Upper Pond



Summary for Pond 17P: Bioswale

Inflow Area = 10.212 ac, 18.35% Impervious, Inflow Depth > 0.07" for 1-Year event
Inflow = 0.92 cfs @ 12.13 hrs, Volume= 0.058 af
Outflow = 0.06 cfs @ 13.87 hrs, Volume= 0.050 af, Atten= 94%, Lag= 104.6 min
Discarded = 0.06 cfs @ 13.87 hrs, Volume= 0.050 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Peak Elev= 806.32' @ 13.87 hrs Surf.Area= 2,218 sf Storage= 1,345 cf

Plug-Flow detention time= 268.3 min calculated for 0.049 af (85% of inflow)
Center-of-Mass det. time= 203.6 min (1,048.4 - 844.9)

Volume	Invert	Avail.Storage	Storage Description
#1	805.00'	3,491 cf	**SWALE STORAGE ABOVE BOTTOM (Conic)** Listed below
#2	803.00'	195 cf	**BIORETENTION MEDIA (Conic)** Listed below (Recalc) 974 cf Overall x 20.0% Voids
		3,686 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
805.00	0	0	0	0
806.00	1,520	507	507	1,522
807.50	2,500	2,985	3,491	2,530

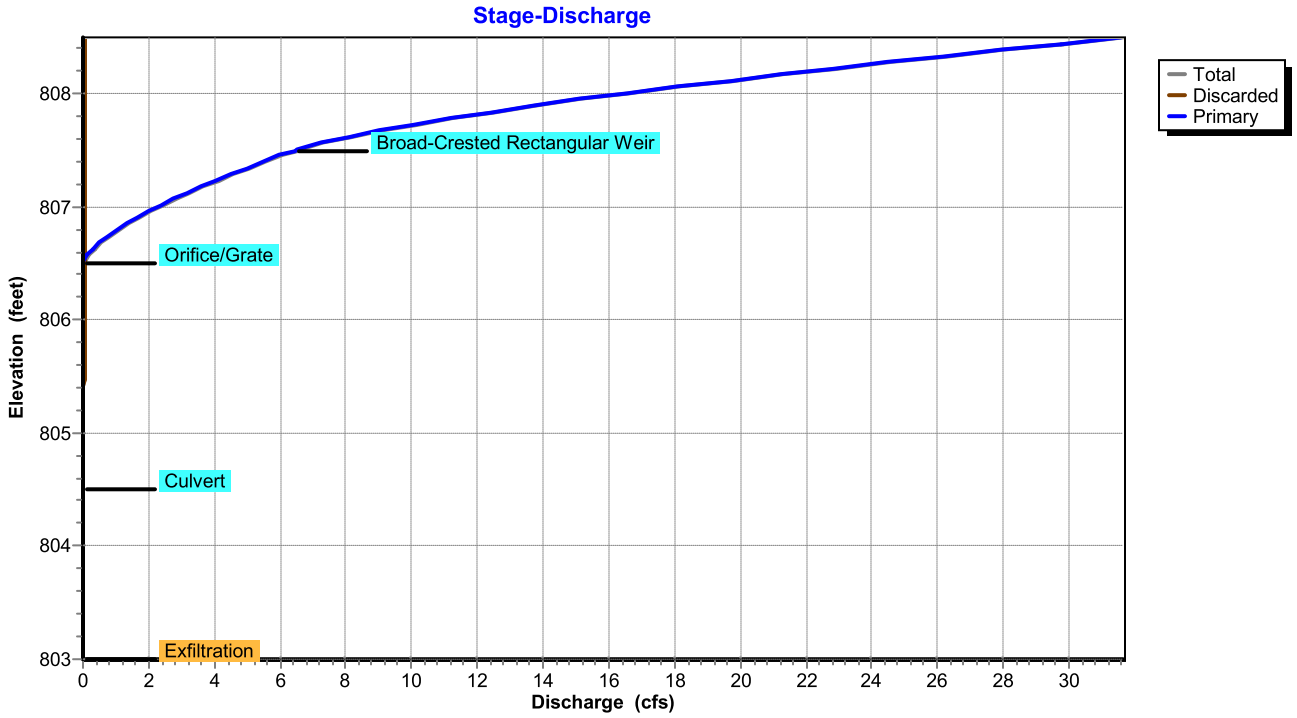
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
803.00	487	0	0	487
805.00	487	974	974	643

Device	Routing	Invert	Outlet Devices
#1	Discarded	803.00'	**1.000 in/hr Exfiltration over Wetted area** Conductivity to Groundwater Elevation = 750.00'
#2	Device 3	806.50'	**24.0" W x 24.0" H Vert. Orifice/Grate** C= 0.600
#3	Primary	804.50'	**24.0" Round Culvert** L= 100.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 804.50' / 800.00' S= 0.0450 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 3.14 sf
#4	Primary	807.50'	**5.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.06 cfs @ 13.87 hrs HW=806.32' (Free Discharge)
└**1=Exfiltration** (Controls 0.06 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=803.00' (Free Discharge)
└**3=Culvert** (Controls 0.00 cfs)
└**2=Orifice/Grate** (Controls 0.00 cfs)
└**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 17P: Bioswale



Summary for Pond 18P: Bioswale

Inflow Area = 9.089 ac, 18.40% Impervious, Inflow Depth > 0.08" for 1-Year event
Inflow = 0.92 cfs @ 12.13 hrs, Volume= 0.058 af
Outflow = 0.06 cfs @ 13.87 hrs, Volume= 0.050 af, Atten= 94%, Lag= 104.8 min
Discarded = 0.06 cfs @ 13.87 hrs, Volume= 0.050 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Peak Elev= 814.32' @ 13.87 hrs Surf.Area= 2,227 sf Storage= 1,347 cf

Plug-Flow detention time= 268.2 min calculated for 0.050 af (85% of inflow)
Center-of-Mass det. time= 203.1 min (1,047.9 - 844.9)

Volume	Invert	Avail.Storage	Storage Description
#1	813.00'	3,451 cf	**SWALE STORAGE (Conic)** Listed below
#2	811.00'	195 cf	**BIO-RET MEDIA (Conic)** Listed below (Recalc) 974 cf Overall x 20.0% Voids
		3,646 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
813.00	0	0	0	0
814.00	1,570	523	523	1,572
815.50	2,360	2,927	3,451	2,396

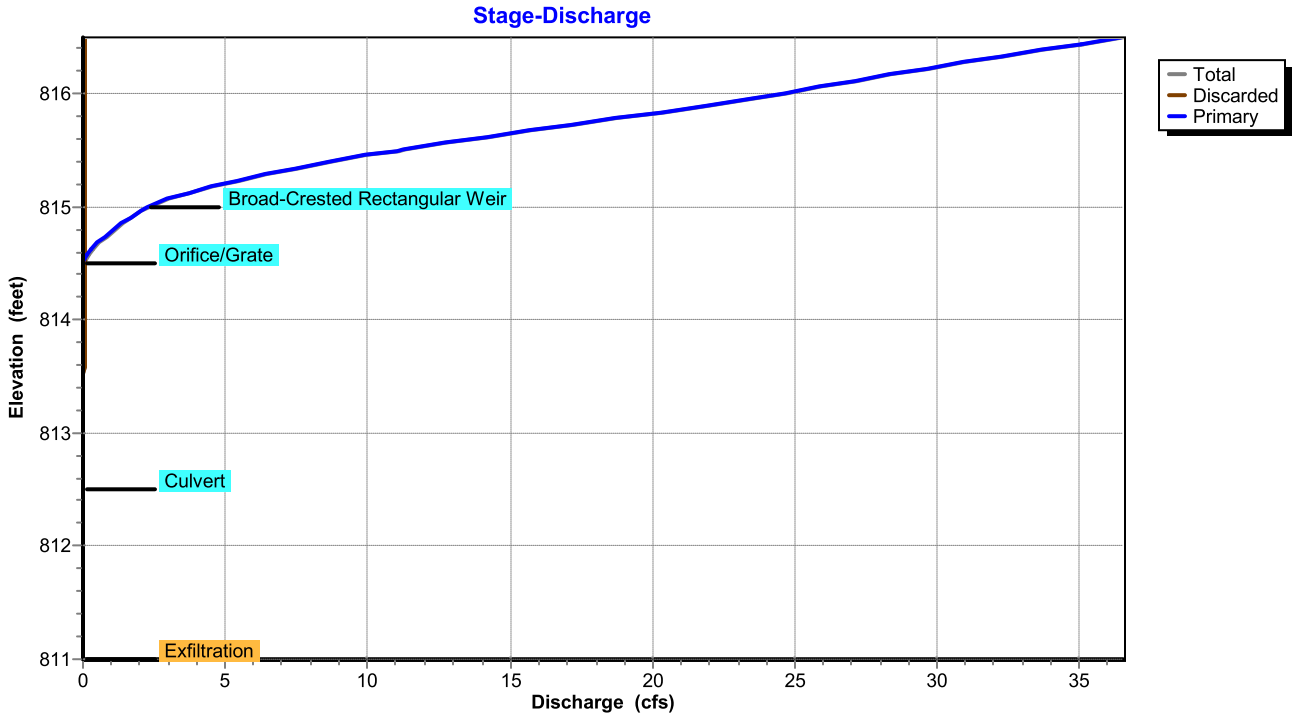
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
811.00	487	0	0	487
813.00	487	974	974	643

Device	Routing	Invert	Outlet Devices
#1	Discarded	811.00'	**1.000 in/hr Exfiltration over Wetted area** Conductivity to Groundwater Elevation = 750.00'
#2	Device 3	814.50'	**24.0" W x 24.0" H Vert. Orifice/Grate** C= 0.600
#3	Primary	812.50'	**18.0" Round Culvert** L= 46.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 812.50' / 812.00' S= 0.0109 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.77 sf
#4	Primary	815.00'	**5.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.06 cfs @ 13.87 hrs HW=814.32' (Free Discharge)
└**1=Exfiltration** (Controls 0.06 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=811.00' (Free Discharge)
└**3=Culvert** (Controls 0.00 cfs)
└**2=Orifice/Grate** (Controls 0.00 cfs)
└**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 18P: Bioswale



Summary for Pond 19P: Bioswale

Inflow Area = 7.964 ac, 18.47% Impervious, Inflow Depth > 0.09" for 1-Year event
Inflow = 0.92 cfs @ 12.13 hrs, Volume= 0.058 af
Outflow = 0.06 cfs @ 13.93 hrs, Volume= 0.049 af, Atten= 94%, Lag= 108.2 min
Discarded = 0.06 cfs @ 13.93 hrs, Volume= 0.049 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Peak Elev= 829.32' @ 13.93 hrs Surf.Area= 2,233 sf Storage= 1,355 cf

Plug-Flow detention time= 271.9 min calculated for 0.049 af (84% of inflow)
Center-of-Mass det. time= 205.5 min (1,050.4 - 844.9)

Volume	Invert	Avail.Storage	Storage Description
#1	828.00'	3,459 cf	**SWALE STORAGE (Conic)** Listed below
#2	826.00'	195 cf	**BIO-RET MEDIA (Conic)** Listed below (Recalc) 974 cf Overall x 20.0% Voids
		3,654 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
828.00	0	0	0	0
829.00	1,575	525	525	1,577
830.50	2,364	2,934	3,459	2,400

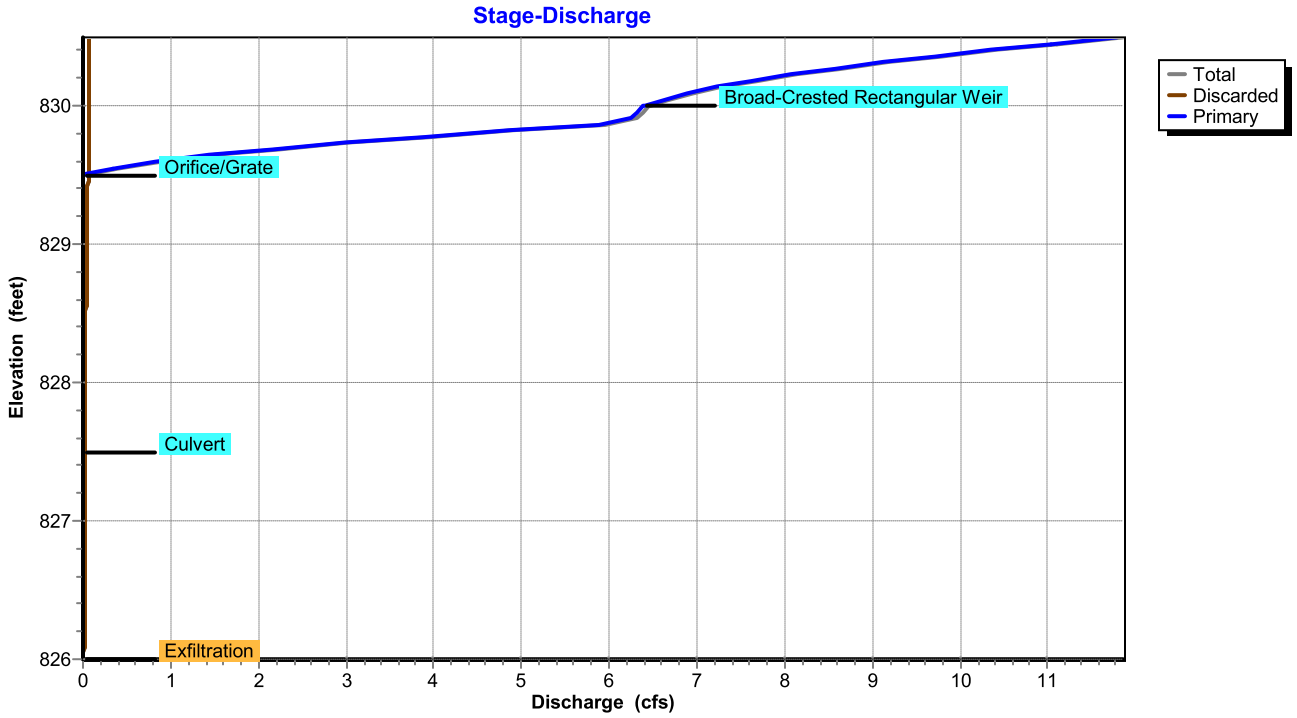
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
826.00	487	0	0	487
828.00	487	974	974	643

Device	Routing	Invert	Outlet Devices
#1	Discarded	826.00'	**1.000 in/hr Exfiltration over Wetted area** Conductivity to Groundwater Elevation = 0.01'
#2	Device 3	829.50'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Primary	827.50'	**15.0" Round Culvert** L= 46.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 827.50' / 827.00' S= 0.0109 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.23 sf
#4	Primary	830.00'	**5.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.06 cfs @ 13.93 hrs HW=829.32' (Free Discharge)
└**1=Exfiltration** (Controls 0.06 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=826.00' (Free Discharge)
└**3=Culvert** (Controls 0.00 cfs)
└**2=Orifice/Grate** (Controls 0.00 cfs)
└**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 19P: Bioswale



Summary for Pond 20P: Bioswale

Inflow Area = 6.838 ac, 18.57% Impervious, Inflow Depth > 0.10" for 1-Year event
Inflow = 0.92 cfs @ 12.13 hrs, Volume= 0.058 af
Outflow = 0.06 cfs @ 13.84 hrs, Volume= 0.050 af, Atten= 94%, Lag= 102.8 min
Discarded = 0.06 cfs @ 13.84 hrs, Volume= 0.050 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Peak Elev= 844.32' @ 13.84 hrs Surf.Area= 2,225 sf Storage= 1,342 cf

Plug-Flow detention time= 265.6 min calculated for 0.050 af (86% of inflow)
Center-of-Mass det. time= 201.5 min (1,046.4 - 844.9)

Volume	Invert	Avail.Storage	Storage Description
#1	843.00'	3,449 cf	**SWALE STORAGE (Conic)** Listed below
#2	841.00'	195 cf	**BIO-RET MEDIA (Conic)** Listed below (Recalc) 974 cf Overall x 20.0% Voids
		3,643 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
843.00	0	0	0	0
844.00	1,570	523	523	1,572
845.50	2,357	2,925	3,449	2,393

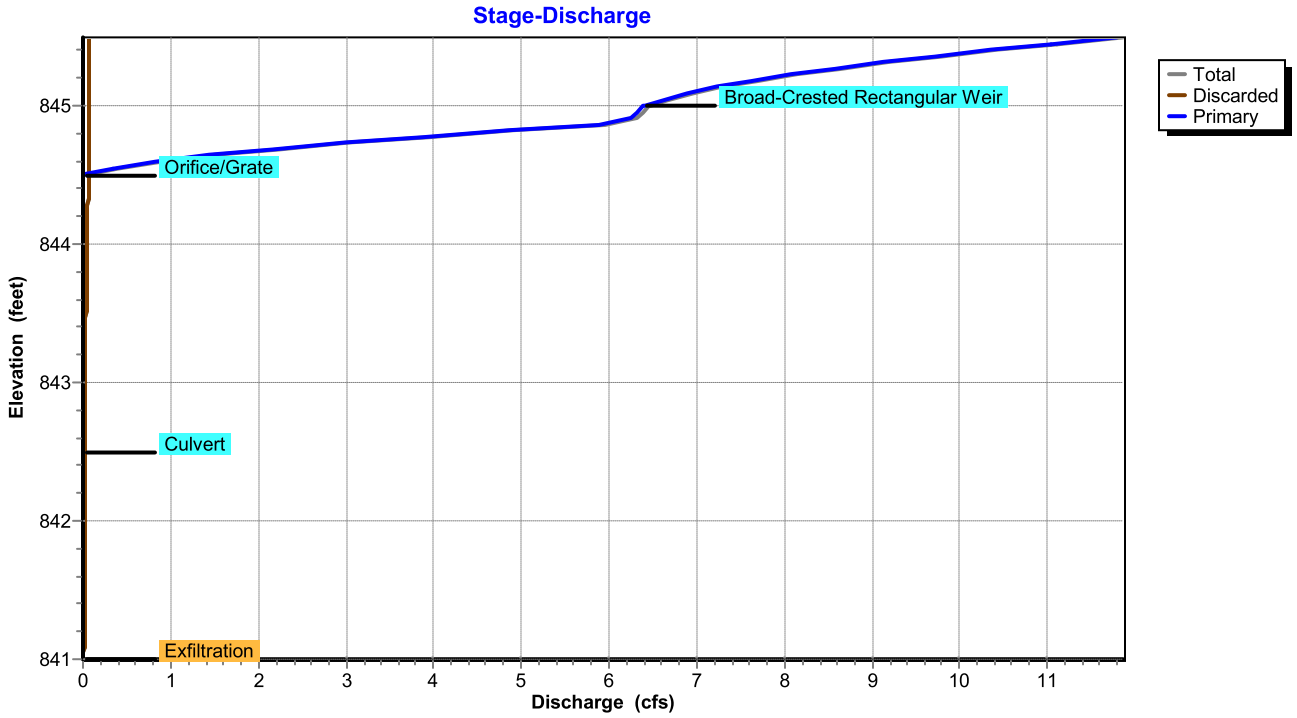
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
841.00	487	0	0	487
843.00	487	974	974	643

Device	Routing	Invert	Outlet Devices
#1	Discarded	841.00'	**1.000 in/hr Exfiltration over Wetted area** Conductivity to Groundwater Elevation = 800.00'
#2	Device 3	844.50'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Primary	842.50'	**15.0" Round Culvert** L= 46.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 842.50' / 842.00' S= 0.0109 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.23 sf
#4	Primary	845.00'	**5.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.06 cfs @ 13.84 hrs HW=844.32' (Free Discharge)
└**1=Exfiltration** (Controls 0.06 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=841.00' (Free Discharge)
└**3=Culvert** (Controls 0.00 cfs)
└**2=Orifice/Grate** (Controls 0.00 cfs)
└**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 20P: Bioswale



Summary for Pond 21P: Bioswale

Inflow Area = 5.714 ac, 18.70% Impervious, Inflow Depth > 0.12" for 1-Year event
Inflow = 0.92 cfs @ 12.13 hrs, Volume= 0.058 af
Outflow = 0.06 cfs @ 13.90 hrs, Volume= 0.049 af, Atten= 94%, Lag= 106.4 min
Discarded = 0.06 cfs @ 13.90 hrs, Volume= 0.049 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Peak Elev= 858.32' @ 13.90 hrs Surf.Area= 2,227 sf Storage= 1,350 cf

Plug-Flow detention time= 270.2 min calculated for 0.049 af (85% of inflow)
Center-of-Mass det. time= 204.2 min (1,049.1 - 844.9)

Volume	Invert	Avail.Storage	Storage Description
#1	857.00'	3,449 cf	**SWALE STORAGE (Conic)** Listed below
#2	855.00'	195 cf	**BIO-RET MEDIA (Conic)** Listed below (Recalc) 974 cf Overall x 20.0% Voids
		3,643 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
857.00	0	0	0	0
858.00	1,570	523	523	1,572
859.50	2,357	2,925	3,449	2,393

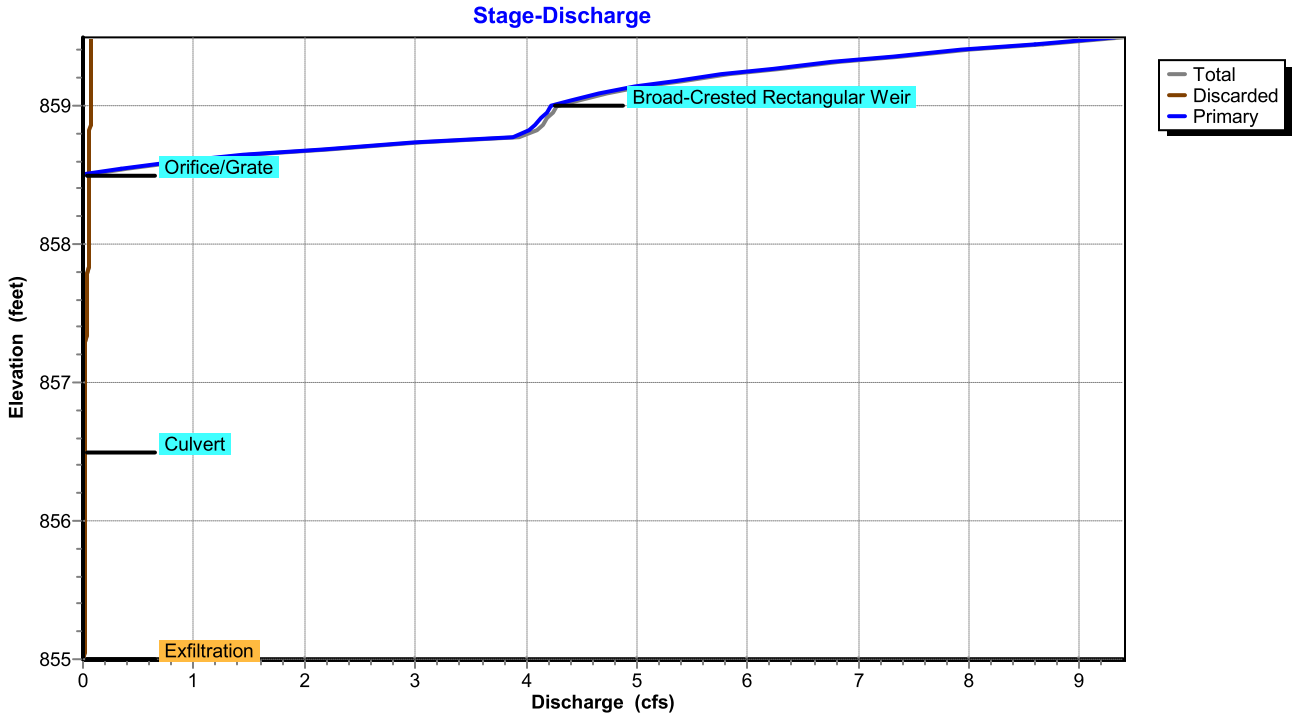
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
855.00	487	0	0	487
857.00	487	974	974	643

Device	Routing	Invert	Outlet Devices
#1	Device 3	858.50'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Discarded	855.00'	**1.000 in/hr Exfiltration over Wetted area** Conductivity to Groundwater Elevation = 750.00'
#3	Primary	856.50'	**12.0" Round Culvert** L= 47.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 856.50' / 856.00' S= 0.0106 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#4	Primary	859.00'	**5.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.06 cfs @ 13.90 hrs HW=858.32' (Free Discharge)
└**2=Exfiltration** (Controls 0.06 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=855.00' (Free Discharge)
└**3=Culvert** (Controls 0.00 cfs)
└**1=Orifice/Grate** (Controls 0.00 cfs)
└**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 21P: Bioswale



Summary for Pond 22P: Bioswale

Inflow Area = 4.588 ac, 18.89% Impervious, Inflow Depth > 0.15" for 1-Year event
Inflow = 0.92 cfs @ 12.13 hrs, Volume= 0.058 af
Outflow = 0.06 cfs @ 13.89 hrs, Volume= 0.050 af, Atten= 94%, Lag= 105.9 min
Discarded = 0.06 cfs @ 13.89 hrs, Volume= 0.050 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Peak Elev= 869.32' @ 13.89 hrs Surf.Area= 2,236 sf Storage= 1,349 cf

Plug-Flow detention time= 269.0 min calculated for 0.049 af (85% of inflow)
Center-of-Mass det. time= 203.8 min (1,048.6 - 844.9)

Volume	Invert	Avail.Storage	Storage Description
#1	868.00'	3,472 cf	**SWALE STORAGE (Conic)** Listed below
#2	866.00'	195 cf	**BIO-RET MEDIA (Conic)** Listed below (Recalc) 974 cf Overall x 20.0% Voids
		3,667 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
868.00	0	0	0	0
869.00	1,580	527	527	1,582
870.50	2,374	2,945	3,472	2,410

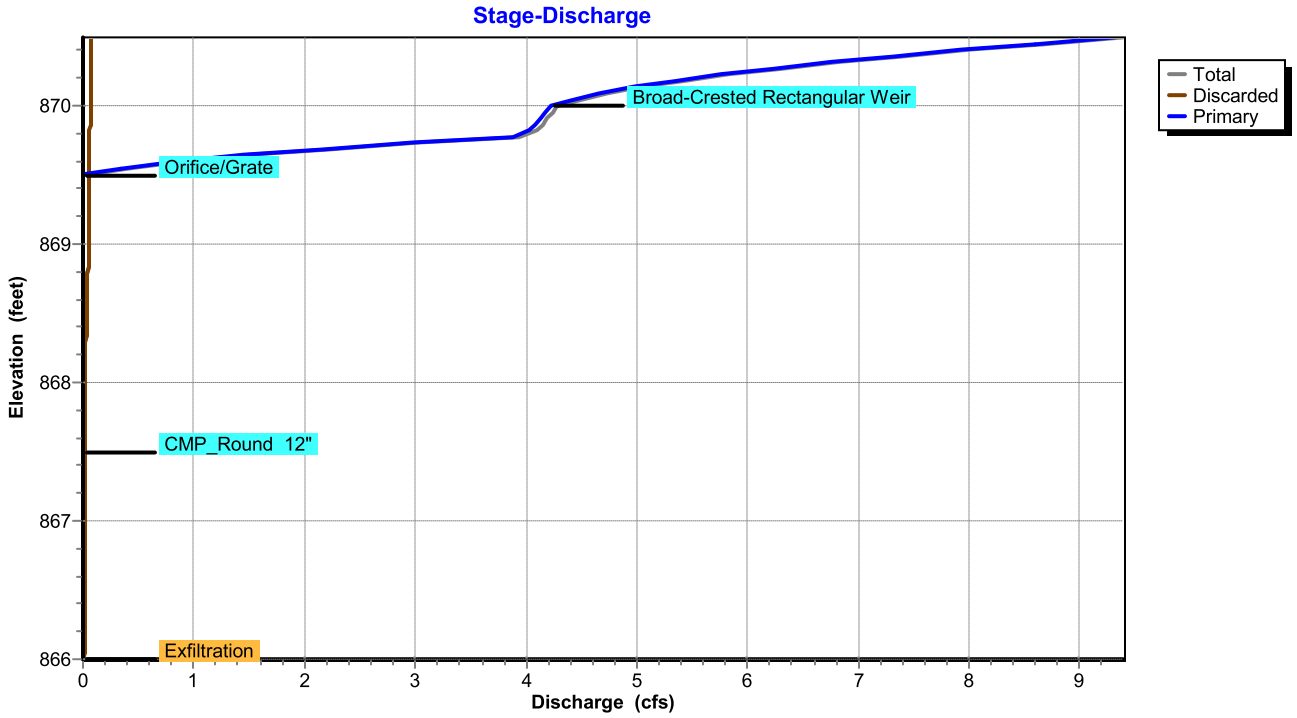
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
866.00	487	0	0	487
868.00	487	974	974	643

Device	Routing	Invert	Outlet Devices
#1	Discarded	866.00'	**1.000 in/hr Exfiltration over Wetted area** Conductivity to Groundwater Elevation = 750.00'
#2	Device 3	869.50'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Primary	867.50'	**12.0" Round CMP_Round 12"** L= 47.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 867.50' / 867.00' S= 0.0106 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#4	Primary	870.00'	**5.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.06 cfs @ 13.89 hrs HW=869.32' (Free Discharge)
└**1=Exfiltration** (Controls 0.06 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=866.00' (Free Discharge)
└**3=CMP_Round 12"** (Controls 0.00 cfs)
└**2=Orifice/Grate** (Controls 0.00 cfs)
└**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 22P: Bioswale



Summary for Pond 23P: Bioswale

Inflow Area = 3.463 ac, 19.21% Impervious, Inflow Depth > 0.21" for 1-Year event
Inflow = 0.92 cfs @ 12.13 hrs, Volume= 0.062 af
Outflow = 0.06 cfs @ 14.37 hrs, Volume= 0.052 af, Atten= 94%, Lag= 134.6 min
Discarded = 0.06 cfs @ 14.37 hrs, Volume= 0.052 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Peak Elev= 880.38' @ 14.37 hrs Surf.Area= 2,281 sf Storage= 1,481 cf

Plug-Flow detention time= 279.1 min calculated for 0.052 af (84% of inflow)
Center-of-Mass det. time= 212.5 min (1,056.0 - 843.5)

Volume	Invert	Avail.Storage	Storage Description
#1	879.00'	3,495 cf	**SWALE STORAGE (Conic)** Listed below
#2	877.00'	195 cf	**BIO-RET MEDIA (Conic)** Listed below (Recalc) 974 cf Overall x 20.0% Voids
		3,689 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
879.00	0	0	0	0
880.00	1,590	530	530	1,592
881.50	2,390	2,965	3,495	2,426

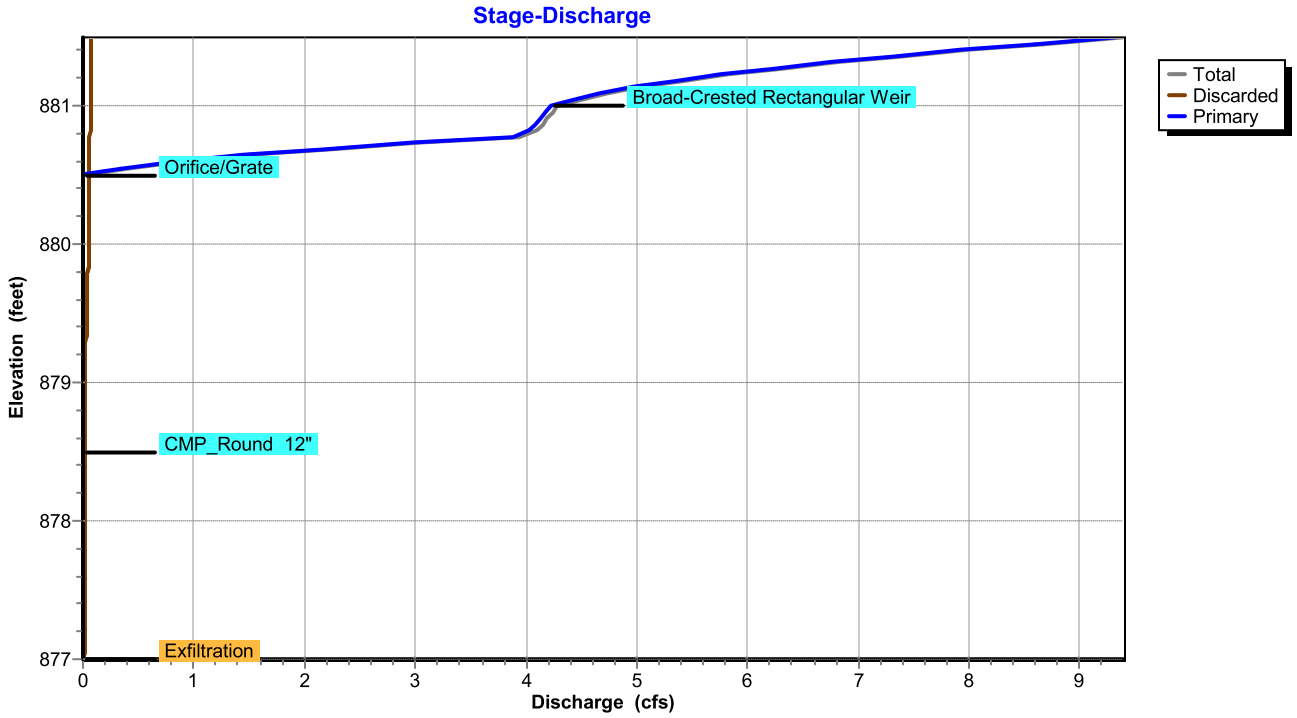
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
877.00	487	0	0	487
879.00	487	974	974	643

Device	Routing	Invert	Outlet Devices
#1	Discarded	877.00'	**1.000 in/hr Exfiltration over Wetted area** Conductivity to Groundwater Elevation = 800.00'
#2	Device 3	880.50'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Primary	878.50'	**12.0" Round CMP_Round 12"** L= 45.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 878.50' / 878.00' S= 0.0111 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#4	Primary	881.00'	**5.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.06 cfs @ 14.37 hrs HW=880.38' (Free Discharge)
└**1=Exfiltration** (Controls 0.06 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=877.00' (Free Discharge)
└**3=CMP_Round 12"** (Controls 0.00 cfs)
└**2=Orifice/Grate** (Controls 0.00 cfs)
└**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 23P: Bioswale



Summary for Pond 24P: Bioswale

Inflow Area = 2.339 ac, 19.84% Impervious, Inflow Depth > 0.35" for 1-Year event
Inflow = 0.88 cfs @ 12.13 hrs, Volume= 0.069 af
Outflow = 0.13 cfs @ 13.43 hrs, Volume= 0.057 af, Atten= 85%, Lag= 78.4 min
Discarded = 0.06 cfs @ 13.43 hrs, Volume= 0.054 af
Primary = 0.08 cfs @ 13.43 hrs, Volume= 0.003 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Peak Elev= 903.52' @ 13.43 hrs Surf.Area= 2,301 sf Storage= 1,704 cf

Plug-Flow detention time= 283.4 min calculated for 0.057 af (82% of inflow)
Center-of-Mass det. time= 218.5 min (1,051.2 - 832.6)

Volume	Invert	Avail.Storage	Storage Description
#1	902.00'	3,398 cf	**SWALE STORAGE (Conic)** Listed below
#2	900.00'	195 cf	**BIO-RET MEDIA (Conic)** Listed below (Recalc) 974 cf Overall x 20.0% Voids
		3,592 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
902.00	0	0	0	0
903.00	1,548	516	516	1,550
904.50	2,320	2,882	3,398	2,356

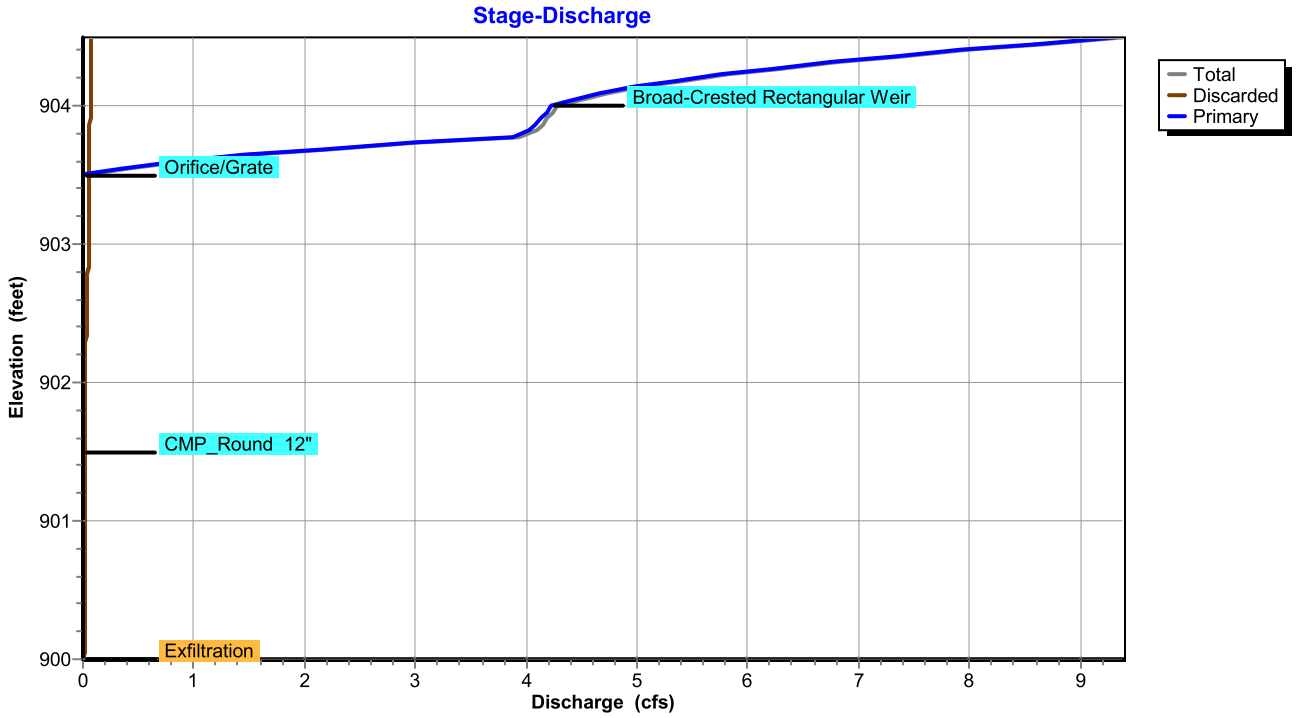
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
900.00	487	0	0	487
902.00	487	974	974	643

Device	Routing	Invert	Outlet Devices
#1	Discarded	900.00'	**1.000 in/hr Exfiltration over Wetted area** Conductivity to Groundwater Elevation = 800.00'
#2	Device 3	903.50'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Primary	901.50'	**12.0" Round CMP_Round 12"** L= 50.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 901.50' / 901.00' S= 0.0100 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#4	Primary	904.00'	**5.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.06 cfs @ 13.43 hrs HW=903.52' (Free Discharge)
└**1=Exfiltration** (Controls 0.06 cfs)

Primary OutFlow Max=0.06 cfs @ 13.43 hrs HW=903.52' (Free Discharge)
└**3=CMP_Round 12"** (Passes 0.06 cfs of 3.68 cfs potential flow)
└**2=Orifice/Grate** (Weir Controls 0.06 cfs @ 0.42 fps)
└**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 24P: Bioswale



Summary for Pond 25P: Bioswale

Inflow Area = 1.263 ac, 20.86% Impervious, Inflow Depth > 0.67" for 1-Year event
Inflow = 1.04 cfs @ 12.20 hrs, Volume= 0.070 af
Outflow = 0.31 cfs @ 12.61 hrs, Volume= 0.058 af, Atten= 70%, Lag= 24.9 min
Discarded = 0.05 cfs @ 12.61 hrs, Volume= 0.044 af
Primary = 0.26 cfs @ 12.61 hrs, Volume= 0.014 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Peak Elev= 907.04' @ 12.61 hrs Surf.Area= 1,770 sf Storage= 1,291 cf

Plug-Flow detention time= 232.0 min calculated for 0.058 af (82% of inflow)
Center-of-Mass det. time= 158.6 min (1,002.7 - 844.1)

Volume	Invert	Avail.Storage	Storage Description
#1	905.50'	2,385 cf	**SWALE STORAGE (Conic)** Listed below
#2	903.50'	195 cf	**BIO-RET MEDIA (Conic)** Listed below (Recalc) 974 cf Overall x 20.0% Voids
		2,579 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
905.50	0	0	0	0
906.50	1,086	362	362	1,088
908.00	1,629	2,023	2,385	1,664

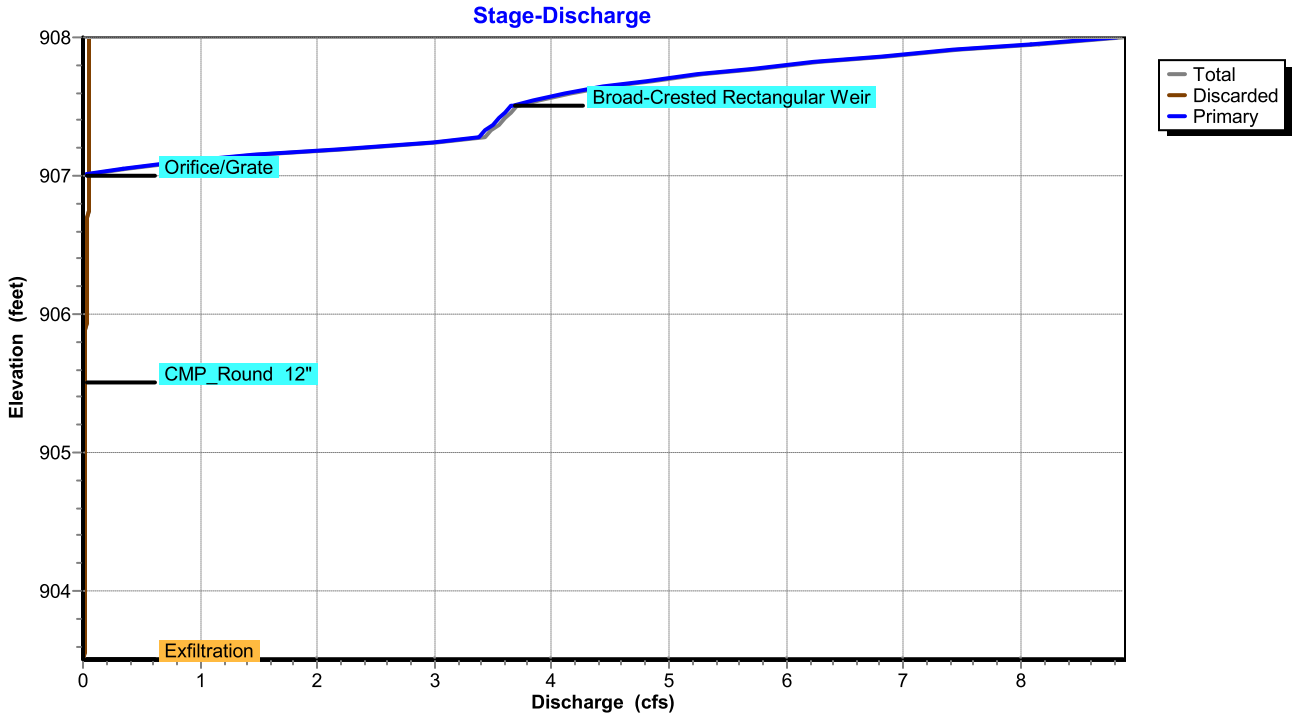
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
903.50	487	0	0	487
905.50	487	974	974	643

Device	Routing	Invert	Outlet Devices
#1	Discarded	903.50'	**1.000 in/hr Exfiltration over Wetted area** Conductivity to Groundwater Elevation = 800.00'
#2	Device 3	907.00'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Primary	905.50'	**12.0" Round CMP_Round 12"** L= 58.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 905.50' / 905.00' S= 0.0086 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#4	Primary	907.50'	**5.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.05 cfs @ 12.61 hrs HW=907.04' (Free Discharge)
└**1=Exfiltration** (Controls 0.05 cfs)

Primary OutFlow Max=0.24 cfs @ 12.61 hrs HW=907.04' (Free Discharge)
└**3=CMP_Round 12"** (Passes 0.24 cfs of 3.05 cfs potential flow)
└**2=Orifice/Grate** (Weir Controls 0.24 cfs @ 0.68 fps)
└**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 25P: Bioswale



Summary for Pond 26P: Dry Swale

Inflow Area = 1.336 ac, 36.81% Impervious, Inflow Depth > 0.82" for 1-Year event
Inflow = 1.37 cfs @ 12.17 hrs, Volume= 0.091 af
Outflow = 0.14 cfs @ 13.16 hrs, Volume= 0.081 af, Atten= 90%, Lag= 59.9 min
Discarded = 0.14 cfs @ 13.16 hrs, Volume= 0.081 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Peak Elev= 800.98' @ 13.16 hrs Surf.Area= 3,085 sf Storage= 2,057 cf

Plug-Flow detention time= 212.7 min calculated for 0.080 af (88% of inflow)
Center-of-Mass det. time= 160.0 min (991.1 - 831.1)

Volume	Invert	Avail.Storage	Storage Description
#1	800.00'	6,825 cf	**Custom Stage Data (Conic)** Listed below

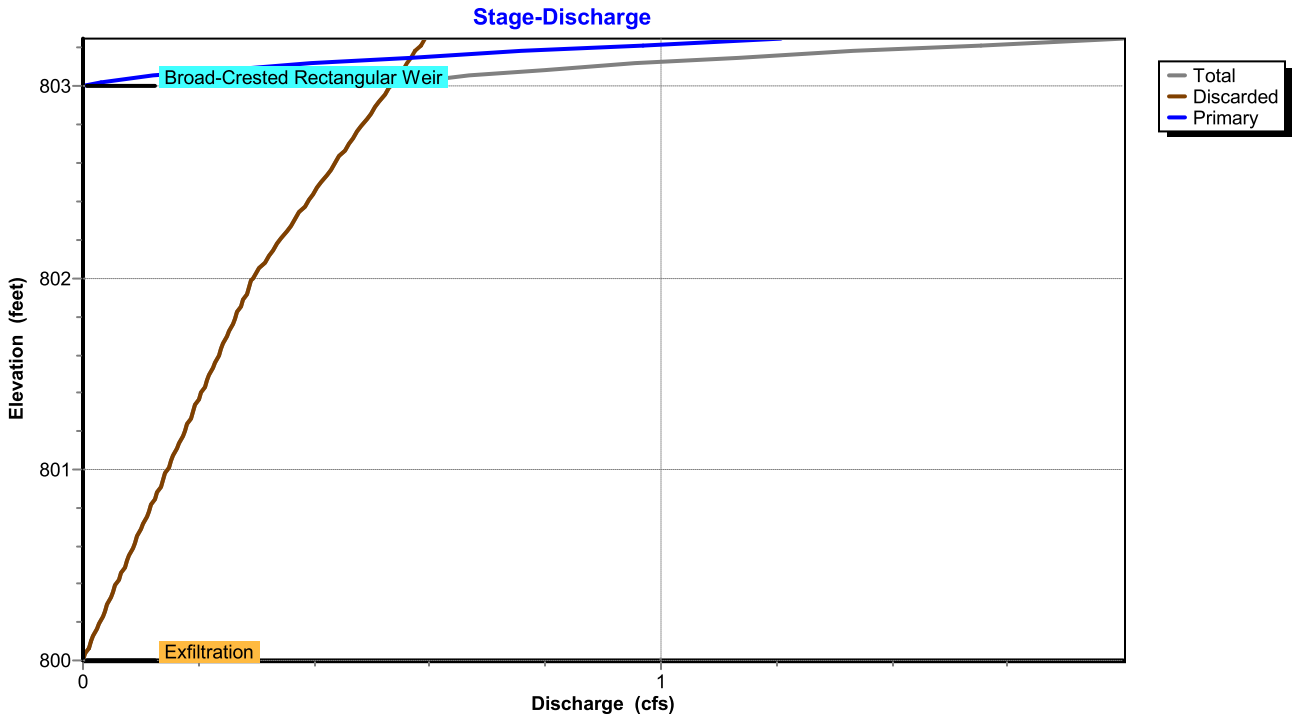
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
800.00	0	0	0	0
802.00	6,300	4,200	4,200	6,306
803.25	0	2,625	6,825	12,609

Device	Routing	Invert	Outlet Devices
#1	Primary	803.00'	**4.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32
#2	Discarded	800.00'	**2.000 in/hr Exfiltration over Wetted area** Conductivity to Groundwater Elevation = 700.00'

Discarded OutFlow Max=0.14 cfs @ 13.16 hrs HW=800.98' (Free Discharge)
↑—**2=Exfiltration** (Controls 0.14 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=800.00' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 26P: Dry Swale



Summary for Subcatchment 1: 1

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CarlsonSurface||

Runoff = 12.52 cfs @ 12.18 hrs, Volume= 0.882 af, Depth> 0.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
NRCC 24-hr A 10-Year Rainfall=3.14"

Area (sf)	CN	Description
11,325	98	Water Surface HSG B
74,761	98	Paved parking HSG B
51,292	98	Paved parking HSG C
281,913	56	Brush, Fair HSG B
162,629	70	Brush, Fair HSG C
581,920	70	Weighted Average
444,542		76.39% Pervious Area
137,378		23.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	100	0.1000	0.27		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.19"
1.5	200	0.1000	2.21		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
7.7	300	Total			

Summary for Subcatchment 1 OFF: OFFSITE DRAINAGE

CarlsonPlanXYPos|642280.8804|1040430.0233|
CarlsonSurface||

Runoff = 37.60 cfs @ 12.71 hrs, Volume= 5.469 af, Depth> 0.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
NRCC 24-hr A 10-Year Rainfall=3.14"

Area (sf)	CN	Description
1,243,094	81	Row crops, C + CR, Good HSG C
446,533	56	Brush, Fair HSG B
1,552,738	70	Brush, Fair HSG C
3,242,365	72	Weighted Average
3,242,365		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.2	150		2.00		**Direct Entry, Sheet Flow**
24.7	1,795	0.0300	1.21		**Shallow Concentrated Flow, Shallow Conc.**
					Short Grass Pasture Kv= 7.0 fps
20.6	1,748	0.0800	1.41		**Shallow Concentrated Flow, Shallow**
					Woodland Kv= 5.0 fps
46.6	3,693	Total			

Summary for Subcatchment 2: 2

CarlsonPlanXYPos|642014.4586|1041354.4458|
CarlsonSurface||

Runoff = 14.19 cfs @ 12.18 hrs, Volume= 0.950 af, Depth> 1.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
NRCC 24-hr A 10-Year Rainfall=3.14"

Area (sf)	CN	Description
18,974	98	Water Surface HSG C
75,132	98	Paved parking HSG C
3,786	98	Paved parking HSG D
337,119	70	Brush, Fair HSG C
12,968	77	Brush, Fair HSG D
447,979	76	Weighted Average
350,087		78.15% Pervious Area
97,892		21.85% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	100	0.1000	0.27		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.19"
2.6	350	0.1000	2.21		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
8.8	450	Total			

Summary for Subcatchment 3: 3

CarlsonPlanXYPos|641681.4005|1041128.2504|
CarlsonSurface||

Runoff = 8.43 cfs @ 12.22 hrs, Volume= 0.629 af, Depth> 0.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
NRCC 24-hr A 10-Year Rainfall=3.14"

Area (sf)	CN	Description
1,237	98	Paved parking HSG B
36,893	98	Paved parking HSG C
73,657	56	Brush, Fair HSG B
303,939	70	Brush, Fair HSG C
415,726	70	Weighted Average
377,596		90.83% Pervious Area
38,130		9.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	100	0.1000	0.27		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.19"
5.3	700	0.1000	2.21		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
11.5	800	Total			

Summary for Subcatchment 17: 17

CarlsonPlanXYPos|642702.7045|1040980.9144|
CarlsonSurface|C:\Users\Office 2\Dropbox (Marks Engineering)\2020 PROJECTS\20-243 Licciardello, Angelo - 3535 East Lake Rd. - To Cdga To Hopewell\Carlson Files\ex topo.tin|

Runoff = 2.39 cfs @ 12.12 hrs, Volume= 0.146 af, Depth> 1.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
NRCC 24-hr A 10-Year Rainfall=3.14"

Area (sf)	CN	Description
5,322	98	Paved parking, HSG D
3,449	98	Roofs, HSG D
40,152	80	>75% Grass cover, Good, HSG D
48,923	83	Weighted Average
40,152		82.07% Pervious Area
8,771		17.93% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.0		0.0866			**Lag/CN Method,**
6.0					**Direct Entry,**
6.0	0	Total			

Summary for Subcatchment 18: 18

CarlsonPlanXYPos|642920.0895|1040980.2941|
CarlsonSurface|C:\Users\Office 2\Dropbox (Marks Engineering)\2020 PROJECTS\20-243 Licciardello, Angelo - 3535 East Lake Rd. - To Cdga To Hopewell\Carlson Files\ex topo.tin|

Runoff = 2.40 cfs @ 12.12 hrs, Volume= 0.146 af, Depth> 1.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
NRCC 24-hr A 10-Year Rainfall=3.14"

Area (sf)	CN	Description
5,326	98	Paved parking HSG C
3,449	98	Roofs HSG C
40,237	80	>75% Grass cover, Good, HSG D
49,012	83	Weighted Average
40,237		82.10% Pervious Area
8,775		17.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.0		0.0953			**Lag/CN Method,**
6.0					**Direct Entry,**
6.0	0	Total			

Summary for Subcatchment 19: 19

CarlsonPlanXYPos|643107.1559|1040981.5048|
CarlsonSurface|C:\Users\Office 2\Dropbox (Marks Engineering)\2020 PROJECTS\20-243 Licciardello, Angelo - 3535 East Lake Rd. - To Cdga To Hopewell\Carlson Files\ex topo.tin|

Runoff = 2.40 cfs @ 12.12 hrs, Volume= 0.146 af, Depth> 1.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
NRCC 24-hr A 10-Year Rainfall=3.14"

Area (sf)	CN	Description
5,329	98	Paved parking HSG C
3,449	98	Roofs HSG C
40,270	80	>75% Grass cover, Good, HSG D
49,048	83	Weighted Average
40,270		82.10% Pervious Area
8,778		17.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.0		0.0933			**Lag/CN Method,**
6.0					**Direct Entry,**
6.0	0	Total			

Summary for Subcatchment 20: 20

CarlsonPlanXYPos|643312.2303|1040980.2663|
CarlsonSurface|C:\Users\Office 2\Dropbox (Marks Engineering)\2020 PROJECTS\20-243 Licciardello, Angelo - 3535 East Lake Rd. - To Cdga To Hopewell\Carlson Files\ex topo.tin|

Runoff = 2.40 cfs @ 12.12 hrs, Volume= 0.146 af, Depth> 1.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
NRCC 24-hr A 10-Year Rainfall=3.14"

Area (sf)	CN	Description
5,322	98	Paved parking HSG C
3,449	98	Roofs HSG C
40,204	80	>75% Grass cover, Good, HSG D
48,975	83	Weighted Average
40,204		82.09% Pervious Area
8,771		17.91% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.0		0.0759			**Lag/CN Method,**
6.0					**Direct Entry,**
6.0	0	Total			

Summary for Subcatchment 21: 21

CarlsonPlanXYPos|643492.4579|1040982.7482|
CarlsonSurface|C:\Users\Office 2\Dropbox (Marks Engineering)\2020 PROJECTS\20-243 Licciardello, Angelo - 3535 East Lake Rd. - To Cdga To Hopewell\Carlson Files\ex topo.tin|

Runoff = 2.40 cfs @ 12.12 hrs, Volume= 0.146 af, Depth> 1.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
NRCC 24-hr A 10-Year Rainfall=3.14"

Area (sf)	CN	Description
5,326	98	Paved parking HSG C
3,449	98	Roofs HSG C
40,237	80	>75% Grass cover, Good, HSG D
49,012	83	Weighted Average
40,237		82.10% Pervious Area
8,775		17.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.0		0.0663			**Lag/CN Method,**
6.0					**Direct Entry,**
6.0	0	Total			

Summary for Subcatchment 22: 22

CarlsonPlanXYPos|643706.8551|1040983.3562|
CarlsonSurface|C:\Users\Office 2\Dropbox (Marks Engineering)\2020 PROJECTS\20-243 Licciardello, Angelo - 3535 East Lake Rd. - To Cdga To Hopewell\Carlson Files\ex topo.tin|

Runoff = 2.40 cfs @ 12.12 hrs, Volume= 0.146 af, Depth> 1.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
NRCC 24-hr A 10-Year Rainfall=3.14"

Area (sf)	CN	Description
5,326	98	Paved parking HSG C
3,449	98	Roofs HSG C
40,237	80	>75% Grass cover, Good, HSG D
49,012	83	Weighted Average
40,237		82.10% Pervious Area
8,775		17.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.0		0.0589			**Lag/CN Method,**
6.0					**Direct Entry,**
6.0	0	Total			

Summary for Subcatchment 23: 23

CarlsonPlanXYPos|643896.4054|1040980.2593|
CarlsonSurface|C:\Users\Office 2\Dropbox (Marks Engineering)\2020 PROJECTS\20-243 Licciardello, Angelo - 3535 East Lake Rd. - To Cdga To Hopewell\Carlson Files\ex topo.tin|

Runoff = 2.40 cfs @ 12.12 hrs, Volume= 0.146 af, Depth> 1.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
NRCC 24-hr A 10-Year Rainfall=3.14"

Area (sf)	CN	Description
5,323	98	Paved parking HSG C
3,449	98	Roofs HSG C
40,207	80	>75% Grass cover, Good, HSG D
48,979	83	Weighted Average
40,207		82.09% Pervious Area
8,772		17.91% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.0		0.0568			**Lag/CN Method,**
6.0					**Direct Entry,**
6.0	0	Total			

Summary for Subcatchment 24: 24

CarlsonPlanXYPos|644102.7886|1040984.5776|
CarlsonSurface|C:\Users\Office 2\Dropbox (Marks Engineering)\2020 PROJECTS\20-243 Licciardello, Angelo - 3535 East Lake Rd. - To Cdga To Hopewell\Carlson Files\ex topo.tin|

Runoff = 2.29 cfs @ 12.12 hrs, Volume= 0.140 af, Depth> 1.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
NRCC 24-hr A 10-Year Rainfall=3.14"

Area (sf)	CN	Description
5,289	98	Paved parking HSG C
3,449	98	Roofs HSG C
38,140	80	>75% Grass cover, Good, HSG D
46,878	83	Weighted Average
38,140		81.36% Pervious Area
8,738		18.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.0		0.0563			**Lag/CN Method,**
6.0					**Direct Entry,**
6.0	0	Total			

Summary for Subcatchment 25: 25

CarlsonPlanXYPos|644284.7705|1040971.5435|
CarlsonSurface|C:\Users\Office 2\Dropbox (Marks Engineering)\2020 PROJECTS\20-243 Licciardello, Angelo - 3535 East Lake Rd. - To Cdga To Hopewell\Carlson Files\ex topo.tin|

Runoff = 2.57 cfs @ 12.19 hrs, Volume= 0.171 af, Depth> 1.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
NRCC 24-hr A 10-Year Rainfall=3.14"

Area (sf)	CN	Description
8,025	98	Paved parking HSG C
3,449	98	Roofs HSG C
43,529	80	>75% Grass cover, Good, HSG D
55,003	84	Weighted Average
43,529		79.14% Pervious Area
11,474		20.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Summary for Subcatchment 26: 26

CarlsonPlanXYPos|644192.3159|1041141.7328|
CarlsonSurface|C:\Users\Office 2\Dropbox (Marks Engineering)\2020 PROJECTS\20-243 Licciardello, Angelo - 3535 East Lake Rd. - To Cdga To Hopewell\Carlson Files\ex topo.tin|

Runoff = 3.09 cfs @ 12.16 hrs, Volume= 0.207 af, Depth> 1.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
NRCC 24-hr A 10-Year Rainfall=3.14"

Area (sf)	CN	Description
21,418	98	Paved parking HSG C
36,775	80	>75% Grass cover, Good, HSG D
58,193	87	Weighted Average
36,775		63.19% Pervious Area
21,418		36.81% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.0		0.0650			**Lag/CN Method,**
8.0					**Direct Entry,**
8.0	0	Total			

Summary for Reach 1R: Outfall

Inflow Area = 44.735 ac, 19.32% Impervious, Inflow Depth > 0.61" for 10-Year event
Inflow = 9.19 cfs @ 12.23 hrs, Volume= 2.264 af
Outflow = 9.19 cfs @ 12.23 hrs, Volume= 2.264 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Summary for Reach 20R: Hopewell Outfall

Inflow Area = 11.548 ac, 20.49% Impervious, Inflow Depth = 0.60" for 10-Year event
Inflow = 9.39 cfs @ 12.41 hrs, Volume= 0.573 af
Outflow = 9.39 cfs @ 12.41 hrs, Volume= 0.573 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Summary for Pond 1P: Lower Pond

Inflow Area = 13.359 ac, 23.61% Impervious, Inflow Depth > 0.79" for 10-Year event
Inflow = 12.52 cfs @ 12.18 hrs, Volume= 0.882 af
Outflow = 1.14 cfs @ 13.56 hrs, Volume= 0.711 af, Atten= 91%, Lag= 82.8 min
Primary = 1.14 cfs @ 13.56 hrs, Volume= 0.711 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Starting Elev= 700.50' Surf.Area= 0 sf Storage= 0 cf
Peak Elev= 702.41' @ 13.56 hrs Surf.Area= 15,717 sf Storage= 18,695 cf

Plug-Flow detention time= 228.0 min calculated for 0.708 af (80% of inflow)
Center-of-Mass det. time= 148.9 min (1,009.0 - 860.1)

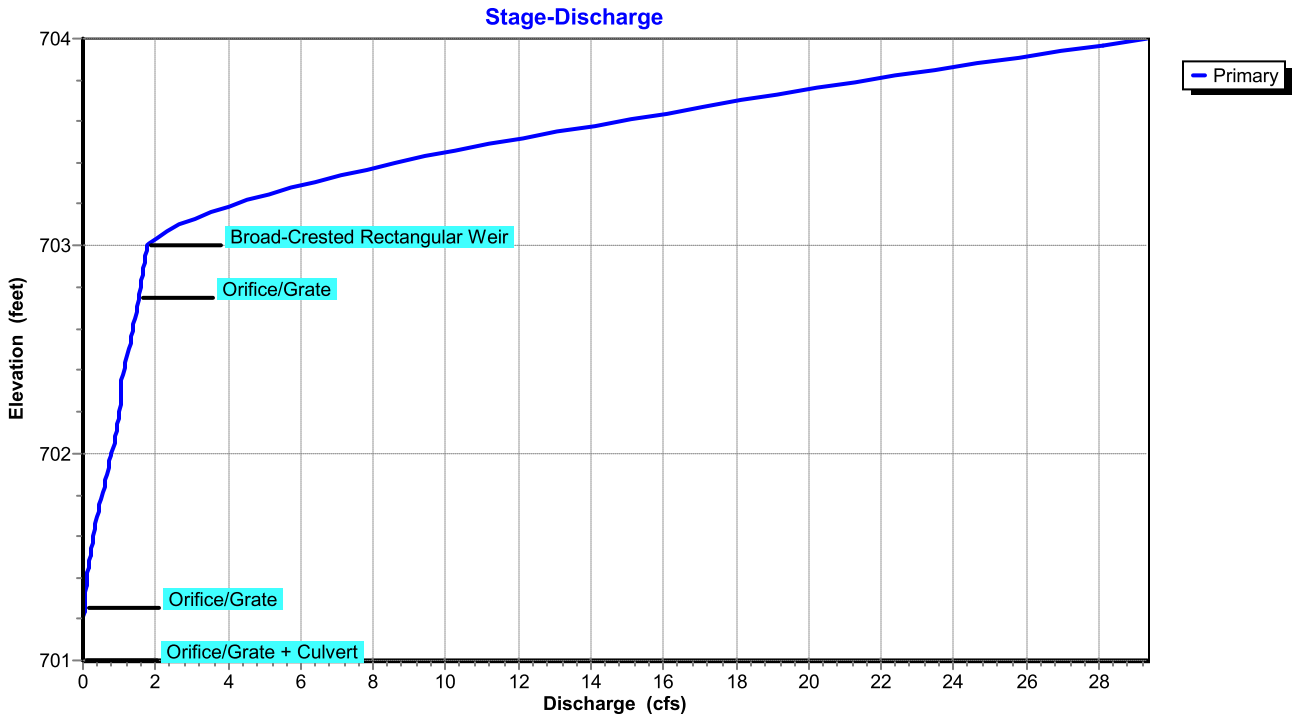
Volume	Invert	Avail.Storage	Storage Description
#1	701.00'	51,996 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
701.00	11,309	0	0
702.00	14,000	12,655	12,655
703.00	18,223	16,112	28,766
704.00	28,237	23,230	51,996

Device	Routing	Invert	Outlet Devices
#1	Primary	703.00'	**10.0' 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
#2	Device 4	702.75'	**48.0" x 48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 4	701.00'	**4.0" Vert. Orifice/Grate** C= 0.600
#4	Primary	701.00'	**12.0" Round Culvert** L= 143.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 701.00' / 701.00' S= 0.0000 '/' Cc= 0.900 n= 0.020 Corrugated PE, corrugated interior, Flow Area= 0.79 sf
#5	Device 4	701.25'	**12.0" W x 6.0" H Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=1.14 cfs @ 13.56 hrs HW=702.41' (Free Discharge)
- **1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
- **4=Culvert** (Barrel Controls 1.14 cfs @ 1.45 fps)
  - **2=Orifice/Grate** (Controls 0.00 cfs)
  - **3=Orifice/Grate** (Passes < 0.47 cfs potential flow)
  - **5=Orifice/Grate** (Passes < 2.28 cfs potential flow)

Pond 1P: Lower Pond



Summary for Pond 2P: Upper Pond

Inflow Area = 21.832 ac, 21.13% Impervious, Inflow Depth > 0.84" for 10-Year event
Inflow = 15.52 cfs @ 12.20 hrs, Volume= 1.523 af
Outflow = 4.62 cfs @ 13.04 hrs, Volume= 0.924 af, Atten= 70%, Lag= 50.5 min
Primary = 4.62 cfs @ 13.04 hrs, Volume= 0.924 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Starting Elev= 705.00' Surf.Area= 0 sf Storage= 0 cf
Peak Elev= 741.18' @ 13.04 hrs Surf.Area= 19,399 sf Storage= 36,929 cf

Plug-Flow detention time= 228.2 min calculated for 0.920 af (60% of inflow)
Center-of-Mass det. time= 152.8 min (972.8 - 820.0)

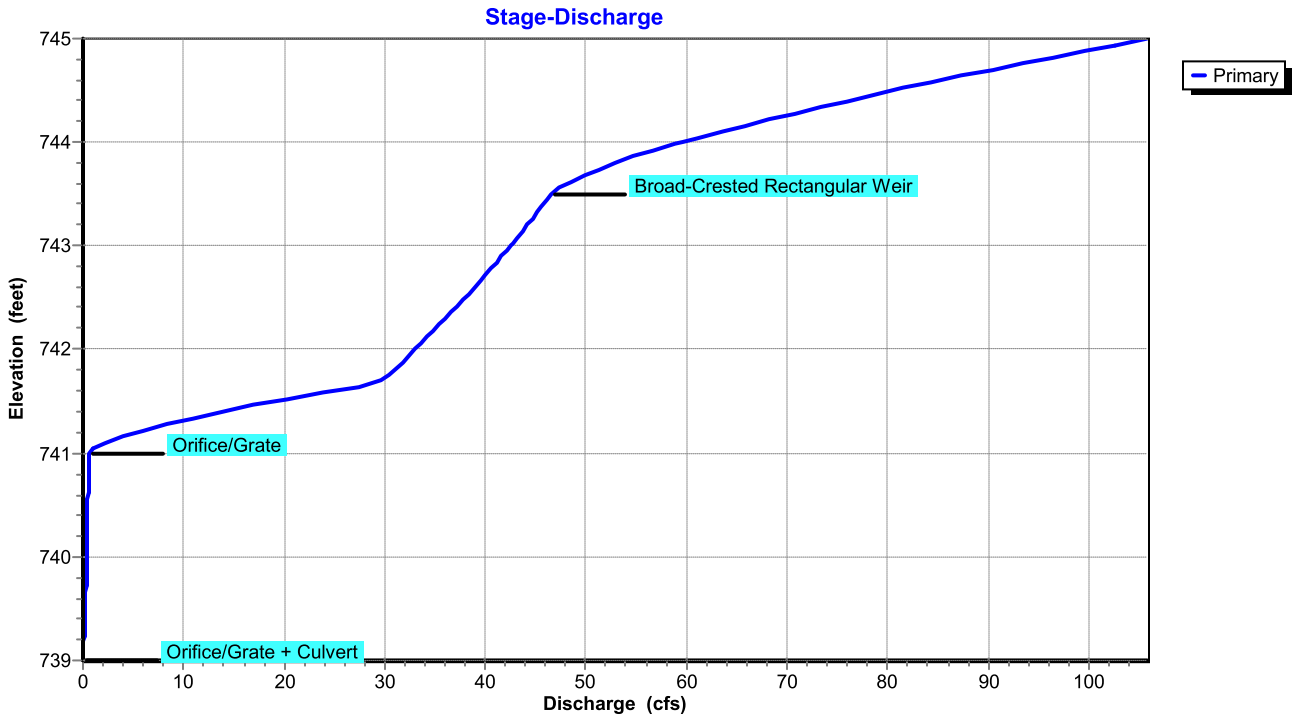
Volume	Invert	Avail.Storage	Storage Description
#1	739.00'	129,172 cf	**prop (Conic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
739.00	14,602	0	0	14,602
740.00	16,711	15,645	15,645	16,757
741.00	18,984	17,835	33,480	19,079
742.00	21,350	20,155	53,635	21,498
743.00	23,873	22,600	76,235	24,076
744.00	26,452	25,151	101,387	26,716
745.00	29,140	27,785	129,172	29,468

Device	Routing	Invert	Outlet Devices
#1	Primary	743.50'	**10.0' 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
#2	Device 4	741.00'	**48.0" x 48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 4	739.00'	**4.0" Vert. Orifice/Grate** C= 0.600
#4	Primary	739.00'	**36.0" Round Culvert** L= 150.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 739.00' / 735.00' S= 0.0267 '/' Cc= 0.900 n= 0.020 Corrugated PE, corrugated interior, Flow Area= 7.07 sf

Primary OutFlow Max=4.49 cfs @ 13.04 hrs HW=741.18' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
└**4=Culvert** (Passes 4.49 cfs of 21.79 cfs potential flow)
└**2=Orifice/Grate** (Weir Controls 3.89 cfs @ 1.38 fps)
└**3=Orifice/Grate** (Orifice Controls 0.60 cfs @ 6.83 fps)

Pond 2P: Upper Pond



Summary for Pond 17P: Bioswale

Inflow Area = 10.212 ac, 18.35% Impervious, Inflow Depth > 0.78" for 10-Year event
Inflow = 8.72 cfs @ 12.34 hrs, Volume= 0.661 af
Outflow = 9.46 cfs @ 12.41 hrs, Volume= 0.636 af, Atten= 0%, Lag= 4.0 min
Discarded = 0.08 cfs @ 12.40 hrs, Volume= 0.063 af
Primary = 9.39 cfs @ 12.41 hrs, Volume= 0.573 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Peak Elev= 807.70' @ 12.41 hrs Surf.Area= 2,987 sf Storage= 3,686 cf

Plug-Flow detention time= 35.7 min calculated for 0.636 af (96% of inflow)
Center-of-Mass det. time= 21.0 min (808.2 - 787.2)

Volume	Invert	Avail.Storage	Storage Description
#1	805.00'	3,491 cf	**SWALE STORAGE ABOVE BOTTOM (Conic)** Listed below
#2	803.00'	195 cf	**BIORETENTION MEDIA (Conic)** Listed below (Recalc) 974 cf Overall x 20.0% Voids
		3,686 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
805.00	0	0	0	0
806.00	1,520	507	507	1,522
807.50	2,500	2,985	3,491	2,530

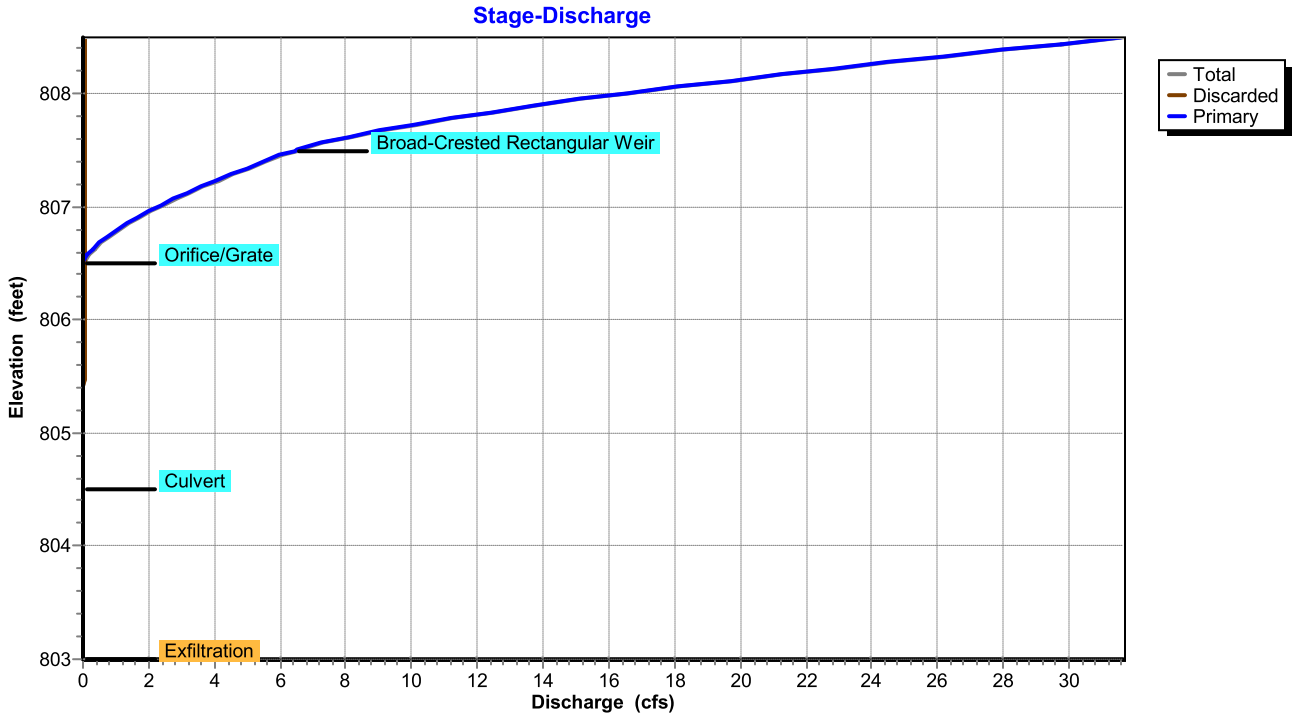
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
803.00	487	0	0	487
805.00	487	974	974	643

Device	Routing	Invert	Outlet Devices
#1	Discarded	803.00'	**1.000 in/hr Exfiltration over Wetted area** Conductivity to Groundwater Elevation = 750.00'
#2	Device 3	806.50'	**24.0" W x 24.0" H Vert. Orifice/Grate** C= 0.600
#3	Primary	804.50'	**24.0" Round Culvert** L= 100.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 804.50' / 800.00' S= 0.0450 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 3.14 sf
#4	Primary	807.50'	**5.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.08 cfs @ 12.40 hrs HW=807.69' (Free Discharge)
└**1=Exfiltration** (Controls 0.08 cfs)

Primary OutFlow Max=9.13 cfs @ 12.41 hrs HW=807.68' (Free Discharge)
└**3=Culvert** (Passes 8.23 cfs of 17.63 cfs potential flow)
└**2=Orifice/Grate** (Orifice Controls 8.23 cfs @ 3.49 fps)
└**4=Broad-Crested Rectangular Weir** (Weir Controls 0.90 cfs @ 0.99 fps)

Pond 17P: Bioswale



Summary for Pond 18P: Bioswale

Inflow Area = 9.089 ac, 18.40% Impervious, Inflow Depth > 0.80" for 10-Year event
Inflow = 7.46 cfs @ 12.33 hrs, Volume= 0.602 af
Outflow = 7.99 cfs @ 12.35 hrs, Volume= 0.577 af, Atten= 0%, Lag= 0.8 min
Discarded = 0.07 cfs @ 12.30 hrs, Volume= 0.062 af
Primary = 7.92 cfs @ 12.35 hrs, Volume= 0.515 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Peak Elev= 815.34' @ 12.30 hrs Surf.Area= 2,763 sf Storage= 3,333 cf

Plug-Flow detention time= 38.2 min calculated for 0.577 af (96% of inflow)
Center-of-Mass det. time= 22.0 min (807.0 - 785.0)

Volume	Invert	Avail.Storage	Storage Description
#1	813.00'	3,451 cf	**SWALE STORAGE (Conic)** Listed below
#2	811.00'	195 cf	**BIO-RET MEDIA (Conic)** Listed below (Recalc) 974 cf Overall x 20.0% Voids
		3,646 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
813.00	0	0	0	0
814.00	1,570	523	523	1,572
815.50	2,360	2,927	3,451	2,396

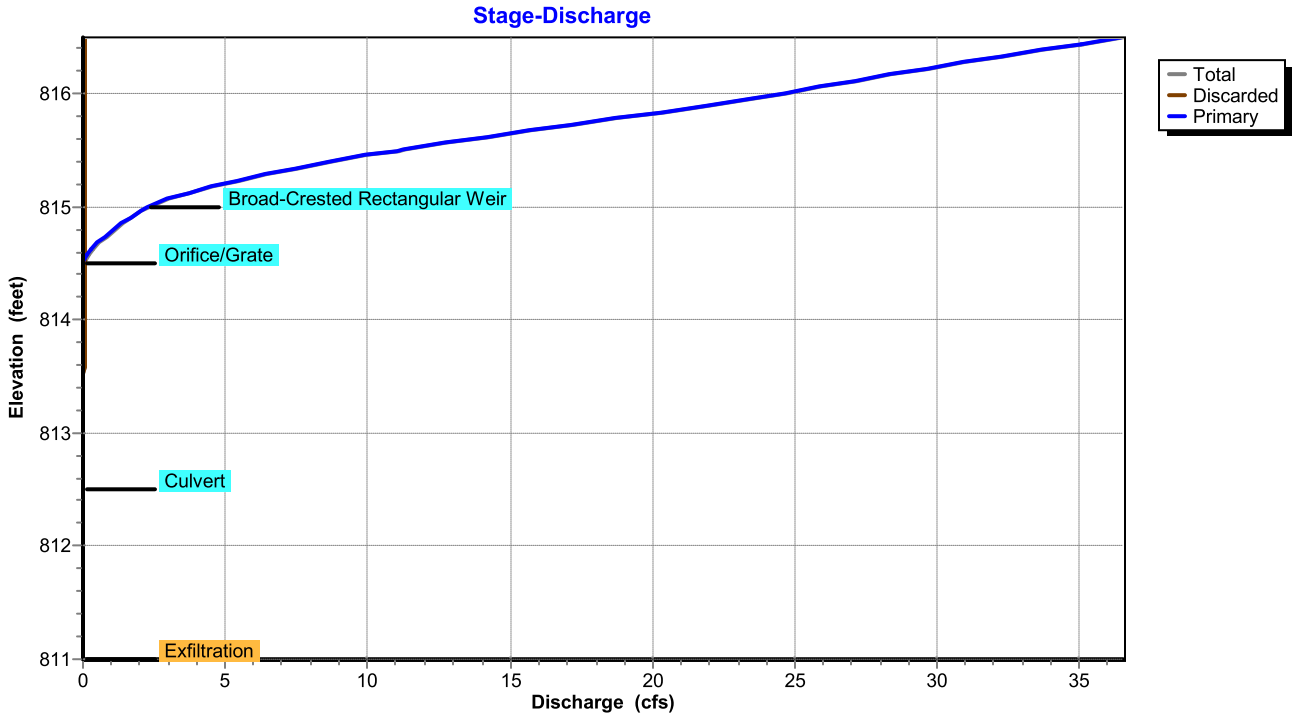
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
811.00	487	0	0	487
813.00	487	974	974	643

Device	Routing	Invert	Outlet Devices
#1	Discarded	811.00'	**1.000 in/hr Exfiltration over Wetted area** Conductivity to Groundwater Elevation = 750.00'
#2	Device 3	814.50'	**24.0" W x 24.0" H Vert. Orifice/Grate** C= 0.600
#3	Primary	812.50'	**18.0" Round Culvert** L= 46.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 812.50' / 812.00' S= 0.0109 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.77 sf
#4	Primary	815.00'	**5.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.07 cfs @ 12.30 hrs HW=815.34' (Free Discharge)
└**1=Exfiltration** (Controls 0.07 cfs)

Primary OutFlow Max=7.25 cfs @ 12.35 hrs HW=815.33' (Free Discharge)
└**3=Culvert** (Passes 4.89 cfs of 9.70 cfs potential flow)
└**2=Orifice/Grate** (Orifice Controls 4.89 cfs @ 2.93 fps)
└**4=Broad-Crested Rectangular Weir** (Weir Controls 2.36 cfs @ 1.41 fps)

Pond 18P: Bioswale



Summary for Pond 19P: Bioswale

Inflow Area = 7.964 ac, 18.47% Impervious, Inflow Depth > 0.82" for 10-Year event
Inflow = 6.97 cfs @ 12.30 hrs, Volume= 0.542 af
Outflow = 6.50 cfs @ 12.38 hrs, Volume= 0.516 af, Atten= 7%, Lag= 4.5 min
Discarded = 0.06 cfs @ 12.37 hrs, Volume= 0.060 af
Primary = 6.43 cfs @ 12.38 hrs, Volume= 0.456 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Peak Elev= 830.01' @ 12.37 hrs Surf.Area= 2,596 sf Storage= 2,704 cf

Plug-Flow detention time= 37.0 min calculated for 0.514 af (95% of inflow)
Center-of-Mass det. time= 20.6 min (806.1 - 785.6)

Volume	Invert	Avail.Storage	Storage Description
#1	828.00'	3,459 cf	**SWALE STORAGE (Conic)** Listed below
#2	826.00'	195 cf	**BIO-RET MEDIA (Conic)** Listed below (Recalc) 974 cf Overall x 20.0% Voids
		3,654 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
828.00	0	0	0	0
829.00	1,575	525	525	1,577
830.50	2,364	2,934	3,459	2,400

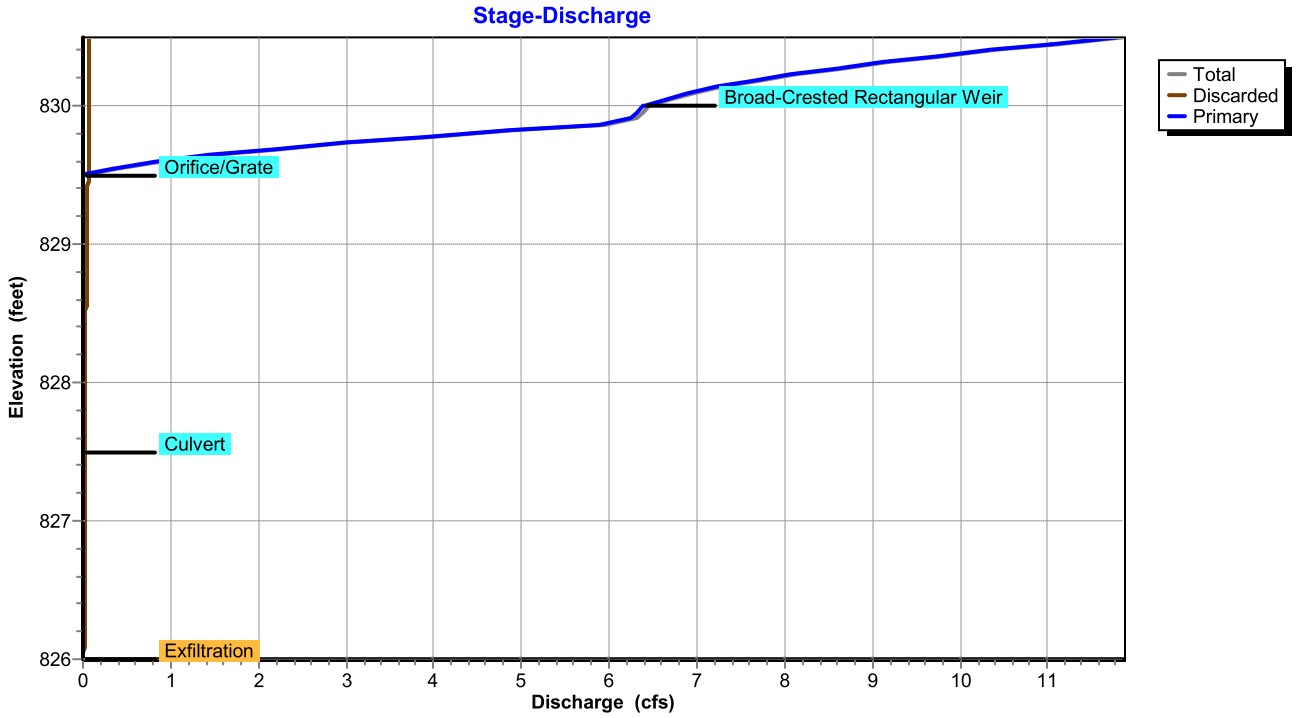
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
826.00	487	0	0	487
828.00	487	974	974	643

Device	Routing	Invert	Outlet Devices
#1	Discarded	826.00'	**1.000 in/hr Exfiltration over Wetted area** Conductivity to Groundwater Elevation = 0.01'
#2	Device 3	829.50'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Primary	827.50'	**15.0" Round Culvert** L= 46.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 827.50' / 827.00' S= 0.0109 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.23 sf
#4	Primary	830.00'	**5.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.06 cfs @ 12.37 hrs HW=830.01' (Free Discharge)
└**1=Exfiltration** (Controls 0.06 cfs)

Primary OutFlow Max=6.41 cfs @ 12.38 hrs HW=830.01' (Free Discharge)
└**3=Culvert** (Inlet Controls 6.40 cfs @ 5.22 fps)
└**2=Orifice/Grate** (Passes 6.40 cfs of 9.50 cfs potential flow)
└**4=Broad-Crested Rectangular Weir** (Weir Controls 0.01 cfs @ 0.22 fps)

Pond 19P: Bioswale



Summary for Pond 20P: Bioswale

Inflow Area = 6.838 ac, 18.57% Impervious, Inflow Depth > 0.85" for 10-Year event
Inflow = 5.83 cfs @ 12.20 hrs, Volume= 0.482 af
Outflow = 6.05 cfs @ 12.30 hrs, Volume= 0.457 af, Atten= 0%, Lag= 6.0 min
Discarded = 0.07 cfs @ 12.30 hrs, Volume= 0.062 af
Primary = 5.98 cfs @ 12.30 hrs, Volume= 0.395 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Peak Elev= 844.88' @ 12.30 hrs Surf.Area= 2,520 sf Storage= 2,439 cf

Plug-Flow detention time= 42.0 min calculated for 0.455 af (95% of inflow)
Center-of-Mass det. time= 23.7 min (810.5 - 786.8)

Volume	Invert	Avail.Storage	Storage Description
#1	843.00'	3,449 cf	**SWALE STORAGE (Conic)** Listed below
#2	841.00'	195 cf	**BIO-RET MEDIA (Conic)** Listed below (Recalc) 974 cf Overall x 20.0% Voids
		3,643 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
843.00	0	0	0	0
844.00	1,570	523	523	1,572
845.50	2,357	2,925	3,449	2,393

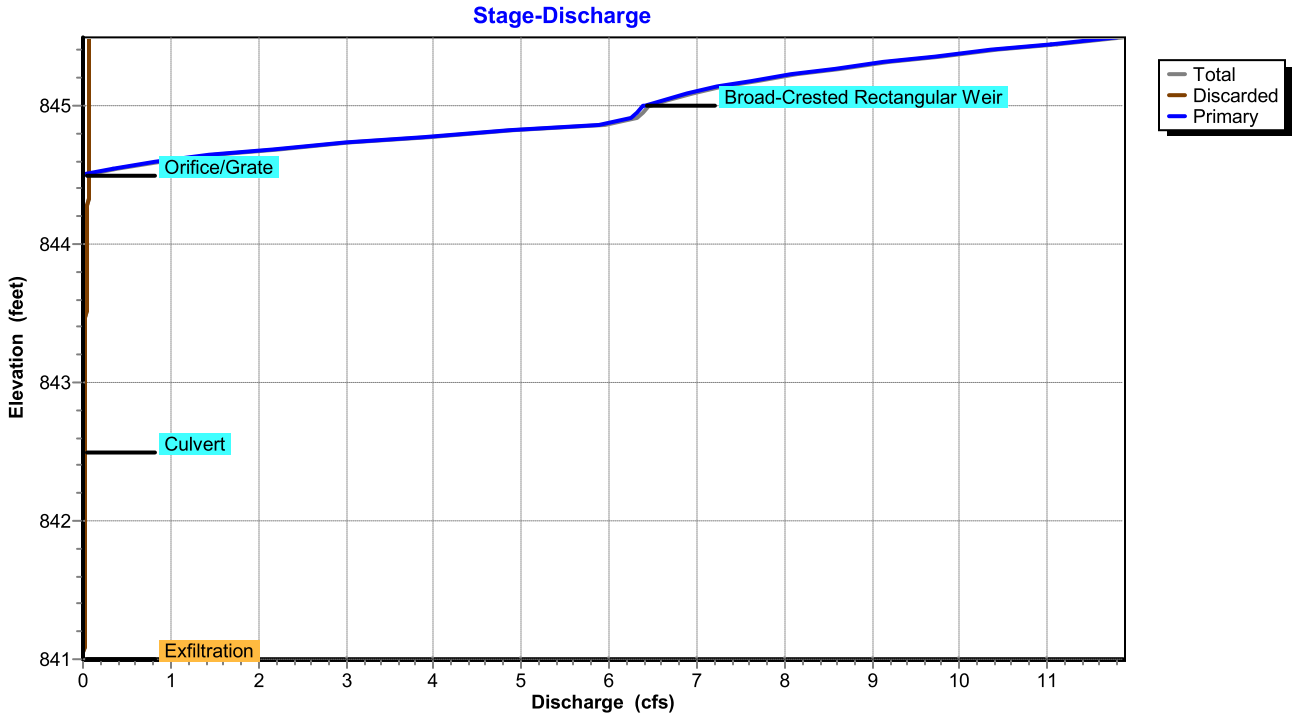
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
841.00	487	0	0	487
843.00	487	974	974	643

Device	Routing	Invert	Outlet Devices
#1	Discarded	841.00'	**1.000 in/hr Exfiltration over Wetted area** Conductivity to Groundwater Elevation = 800.00'
#2	Device 3	844.50'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Primary	842.50'	**15.0" Round Culvert** L= 46.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 842.50' / 842.00' S= 0.0109 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.23 sf
#4	Primary	845.00'	**5.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.07 cfs @ 12.30 hrs HW=844.88' (Free Discharge)
└**1=Exfiltration** (Controls 0.07 cfs)

Primary OutFlow Max=6.18 cfs @ 12.30 hrs HW=844.88' (Free Discharge)
└**3=Culvert** (Passes 6.18 cfs of 6.18 cfs potential flow)
└**2=Orifice/Grate** (Weir Controls 6.18 cfs @ 2.02 fps)
└**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 20P: Bioswale



Summary for Pond 21P: Bioswale

Inflow Area = 5.714 ac, 18.70% Impervious, Inflow Depth > 0.88" for 10-Year event
Inflow = 6.09 cfs @ 12.24 hrs, Volume= 0.421 af
Outflow = 5.21 cfs @ 12.44 hrs, Volume= 0.396 af, Atten= 14%, Lag= 12.2 min
Discarded = 0.07 cfs @ 12.44 hrs, Volume= 0.061 af
Primary = 5.15 cfs @ 12.44 hrs, Volume= 0.335 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Peak Elev= 859.16' @ 12.44 hrs Surf.Area= 2,667 sf Storage= 2,986 cf

Plug-Flow detention time= 48.8 min calculated for 0.394 af (94% of inflow)
Center-of-Mass det. time= 27.2 min (815.1 - 787.9)

Volume	Invert	Avail.Storage	Storage Description
#1	857.00'	3,449 cf	**SWALE STORAGE (Conic)** Listed below
#2	855.00'	195 cf	**BIO-RET MEDIA (Conic)** Listed below (Recalc) 974 cf Overall x 20.0% Voids
		3,643 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
857.00	0	0	0	0
858.00	1,570	523	523	1,572
859.50	2,357	2,925	3,449	2,393

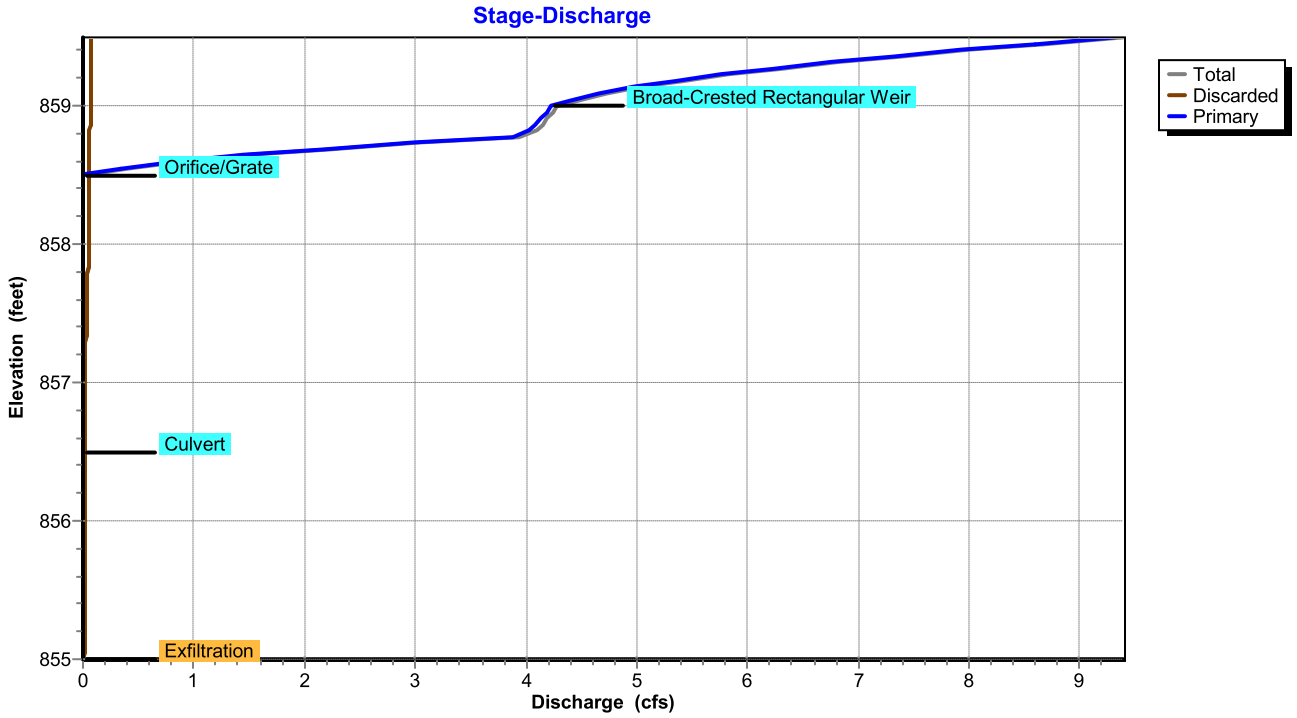
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
855.00	487	0	0	487
857.00	487	974	974	643

Device	Routing	Invert	Outlet Devices
#1	Device 3	858.50'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Discarded	855.00'	**1.000 in/hr Exfiltration over Wetted area** Conductivity to Groundwater Elevation = 750.00'
#3	Primary	856.50'	**12.0" Round Culvert** L= 47.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 856.50' / 856.00' S= 0.0106 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#4	Primary	859.00'	**5.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.07 cfs @ 12.44 hrs HW=859.15' (Free Discharge)
└**2=Exfiltration** (Controls 0.07 cfs)

Primary OutFlow Max=5.05 cfs @ 12.44 hrs HW=859.15' (Free Discharge)
└**3=Culvert** (Inlet Controls 4.38 cfs @ 5.57 fps)
└**1=Orifice/Grate** (Passes 4.38 cfs of 13.69 cfs potential flow)
└**4=Broad-Crested Rectangular Weir** (Weir Controls 0.68 cfs @ 0.90 fps)

Pond 21P: Bioswale



Summary for Pond 22P: Bioswale

Inflow Area = 4.588 ac, 18.89% Impervious, Inflow Depth > 0.94" for 10-Year event
Inflow = 6.03 cfs @ 12.24 hrs, Volume= 0.361 af
Outflow = 4.79 cfs @ 12.39 hrs, Volume= 0.336 af, Atten= 21%, Lag= 9.4 min
Discarded = 0.07 cfs @ 12.38 hrs, Volume= 0.061 af
Primary = 4.72 cfs @ 12.39 hrs, Volume= 0.275 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Peak Elev= 870.11' @ 12.38 hrs Surf.Area= 2,652 sf Storage= 2,892 cf

Plug-Flow detention time= 59.2 min calculated for 0.336 af (93% of inflow)
Center-of-Mass det. time= 31.7 min (821.7 - 790.0)

Volume	Invert	Avail.Storage	Storage Description
#1	868.00'	3,472 cf	**SWALE STORAGE (Conic)** Listed below
#2	866.00'	195 cf	**BIO-RET MEDIA (Conic)** Listed below (Recalc) 974 cf Overall x 20.0% Voids
		3,667 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
868.00	0	0	0	0
869.00	1,580	527	527	1,582
870.50	2,374	2,945	3,472	2,410

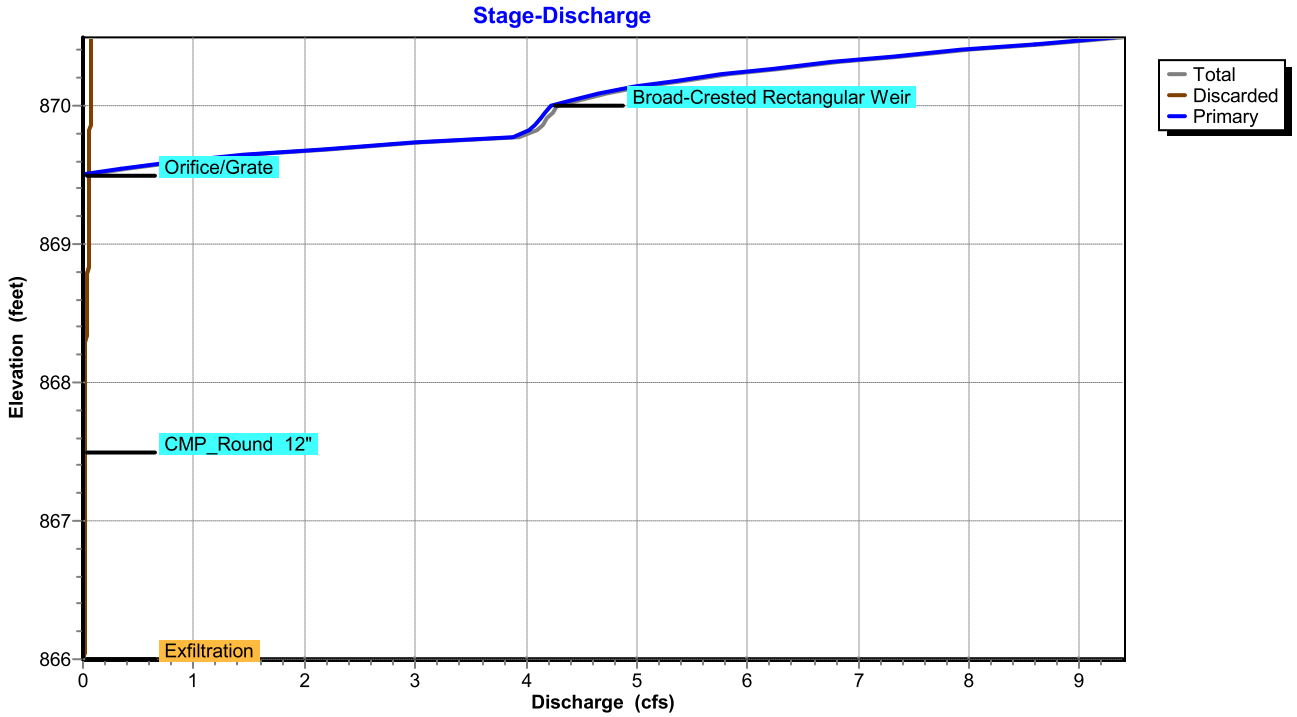
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
866.00	487	0	0	487
868.00	487	974	974	643

Device	Routing	Invert	Outlet Devices
#1	Discarded	866.00'	**1.000 in/hr Exfiltration over Wetted area** Conductivity to Groundwater Elevation = 750.00'
#2	Device 3	869.50'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Primary	867.50'	**12.0" Round CMP_Round 12"** L= 47.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 867.50' / 867.00' S= 0.0106 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#4	Primary	870.00'	**5.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.07 cfs @ 12.38 hrs HW=870.09' (Free Discharge)
└**1=Exfiltration** (Controls 0.07 cfs)

Primary OutFlow Max=4.67 cfs @ 12.39 hrs HW=870.10' (Free Discharge)
└**3=CMP_Round 12"** (Inlet Controls 4.32 cfs @ 5.50 fps)
└**2=Orifice/Grate** (Passes 4.32 cfs of 12.04 cfs potential flow)
└**4=Broad-Crested Rectangular Weir** (Weir Controls 0.35 cfs @ 0.73 fps)

Pond 22P: Bioswale



Summary for Pond 23P: Bioswale

Inflow Area = 3.463 ac, 19.21% Impervious, Inflow Depth > 1.04" for 10-Year event
Inflow = 5.89 cfs @ 12.22 hrs, Volume= 0.301 af
Outflow = 4.27 cfs @ 12.32 hrs, Volume= 0.276 af, Atten= 28%, Lag= 5.7 min
Discarded = 0.07 cfs @ 12.31 hrs, Volume= 0.061 af
Primary = 4.20 cfs @ 12.32 hrs, Volume= 0.215 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Peak Elev= 880.98' @ 12.31 hrs Surf.Area= 2,599 sf Storage= 2,660 cf

Plug-Flow detention time= 69.9 min calculated for 0.275 af (91% of inflow)
Center-of-Mass det. time= 38.5 min (832.4 - 793.9)

Volume	Invert	Avail.Storage	Storage Description
#1	879.00'	3,495 cf	**SWALE STORAGE (Conic)** Listed below
#2	877.00'	195 cf	**BIO-RET MEDIA (Conic)** Listed below (Recalc) 974 cf Overall x 20.0% Voids
		3,689 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
879.00	0	0	0	0
880.00	1,590	530	530	1,592
881.50	2,390	2,965	3,495	2,426

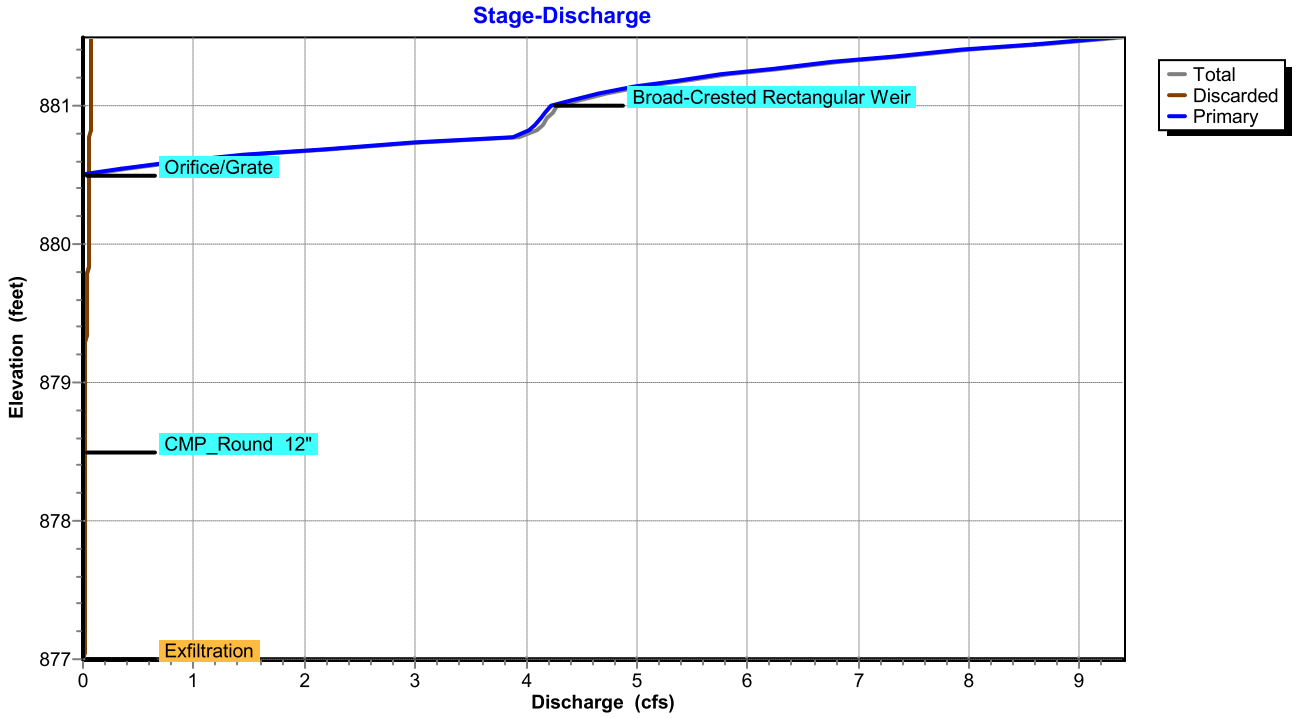
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
877.00	487	0	0	487
879.00	487	974	974	643

Device	Routing	Invert	Outlet Devices
#1	Discarded	877.00'	**1.000 in/hr Exfiltration over Wetted area** Conductivity to Groundwater Elevation = 800.00'
#2	Device 3	880.50'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Primary	878.50'	**12.0" Round CMP_Round 12"** L= 45.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 878.50' / 878.00' S= 0.0111 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#4	Primary	881.00'	**5.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.07 cfs @ 12.31 hrs HW=880.97' (Free Discharge)
└**1=Exfiltration** (Controls 0.07 cfs)

Primary OutFlow Max=4.18 cfs @ 12.32 hrs HW=880.96' (Free Discharge)
└**3=CMP_Round 12"** (Inlet Controls 4.18 cfs @ 5.32 fps)
└**2=Orifice/Grate** (Passes 4.18 cfs of 8.05 cfs potential flow)
└**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 23P: Bioswale



Summary for Pond 24P: Bioswale

Inflow Area = 2.339 ac, 19.84% Impervious, Inflow Depth > 1.23" for 10-Year event
Inflow = 4.54 cfs @ 12.20 hrs, Volume= 0.240 af
Outflow = 4.33 cfs @ 12.24 hrs, Volume= 0.215 af, Atten= 5%, Lag= 2.6 min
Discarded = 0.06 cfs @ 12.24 hrs, Volume= 0.060 af
Primary = 4.27 cfs @ 12.24 hrs, Volume= 0.155 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Peak Elev= 903.82' @ 12.24 hrs Surf.Area= 2,457 sf Storage= 2,287 cf

Plug-Flow detention time= 88.8 min calculated for 0.215 af (90% of inflow)
Center-of-Mass det. time= 48.1 min (848.3 - 800.1)

Volume	Invert	Avail.Storage	Storage Description
#1	902.00'	3,398 cf	**SWALE STORAGE (Conic)** Listed below
#2	900.00'	195 cf	**BIO-RET MEDIA (Conic)** Listed below (Recalc)
			974 cf Overall x 20.0% Voids
		3,592 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
902.00	0	0	0	0
903.00	1,548	516	516	1,550
904.50	2,320	2,882	3,398	2,356

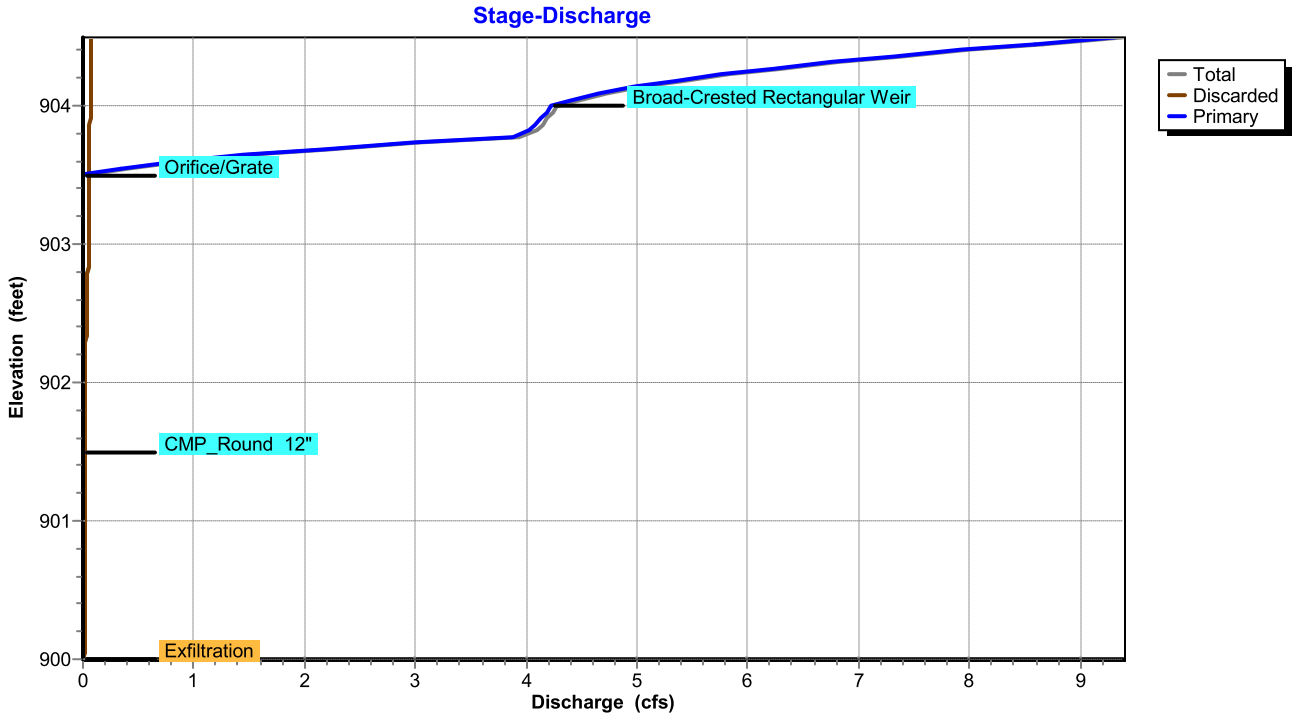
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
900.00	487	0	0	487
902.00	487	974	974	643

Device	Routing	Invert	Outlet Devices
#1	Discarded	900.00'	**1.000 in/hr Exfiltration over Wetted area**
			Conductivity to Groundwater Elevation = 800.00'
#2	Device 3	903.50'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600
			Limited to weir flow at low heads
#3	Primary	901.50'	**12.0" Round CMP_Round 12"**
			L= 50.0' CMP, projecting, no headwall, Ke= 0.900
			Inlet / Outlet Invert= 901.50' / 901.00' S= 0.0100 '/' Cc= 0.900
			n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#4	Primary	904.00'	**5.0' long x 5.0' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50
			Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.06 cfs @ 12.24 hrs HW=903.78' (Free Discharge)
└**1=Exfiltration** (Controls 0.06 cfs)

Primary OutFlow Max=3.84 cfs @ 12.24 hrs HW=903.78' (Free Discharge)
└**3=CMP_Round 12"** (Passes 3.84 cfs of 3.98 cfs potential flow)
└**2=Orifice/Grate** (Weir Controls 3.84 cfs @ 1.72 fps)
└**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 24P: Bioswale



Summary for Pond 25P: Bioswale

Inflow Area = 1.263 ac, 20.86% Impervious, Inflow Depth > 1.63" for 10-Year event
Inflow = 2.57 cfs @ 12.19 hrs, Volume= 0.171 af
Outflow = 2.86 cfs @ 12.22 hrs, Volume= 0.148 af, Atten= 0%, Lag= 1.8 min
Discarded = 0.05 cfs @ 12.22 hrs, Volume= 0.048 af
Primary = 2.81 cfs @ 12.22 hrs, Volume= 0.100 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Peak Elev= 907.23' @ 12.22 hrs Surf.Area= 1,836 sf Storage= 1,537 cf

Plug-Flow detention time= 98.2 min calculated for 0.147 af (86% of inflow)
Center-of-Mass det. time= 40.0 min (861.9 - 821.9)

Volume	Invert	Avail.Storage	Storage Description
#1	905.50'	2,385 cf	**SWALE STORAGE (Conic)** Listed below
#2	903.50'	195 cf	**BIO-RET MEDIA (Conic)** Listed below (Recalc) 974 cf Overall x 20.0% Voids
		2,579 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
905.50	0	0	0	0
906.50	1,086	362	362	1,088
908.00	1,629	2,023	2,385	1,664

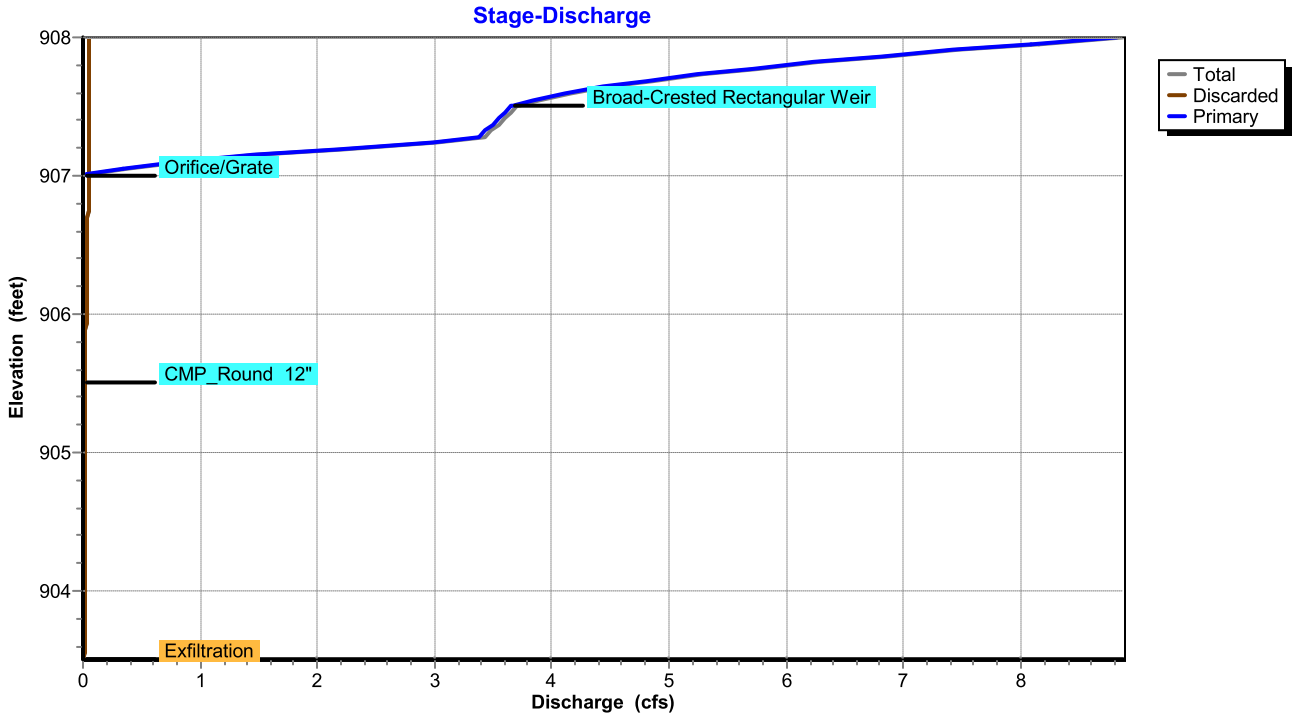
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
903.50	487	0	0	487
905.50	487	974	974	643

Device	Routing	Invert	Outlet Devices
#1	Discarded	903.50'	**1.000 in/hr Exfiltration over Wetted area** Conductivity to Groundwater Elevation = 800.00'
#2	Device 3	907.00'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Primary	905.50'	**12.0" Round CMP_Round 12"** L= 58.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 905.50' / 905.00' S= 0.0086 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#4	Primary	907.50'	**5.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.05 cfs @ 12.22 hrs HW=907.21' (Free Discharge)
└**1=Exfiltration** (Controls 0.05 cfs)

Primary OutFlow Max=2.56 cfs @ 12.22 hrs HW=907.21' (Free Discharge)
└**3=CMP_Round 12"** (Passes 2.56 cfs of 3.29 cfs potential flow)
└**2=Orifice/Grate** (Weir Controls 2.56 cfs @ 1.51 fps)
└**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 25P: Bioswale



Summary for Pond 26P: Dry Swale

Inflow Area = 1.336 ac, 36.81% Impervious, Inflow Depth > 1.86" for 10-Year event
Inflow = 3.09 cfs @ 12.16 hrs, Volume= 0.207 af
Outflow = 0.37 cfs @ 12.96 hrs, Volume= 0.186 af, Atten= 88%, Lag= 48.3 min
Discarded = 0.37 cfs @ 12.96 hrs, Volume= 0.186 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Peak Elev= 802.30' @ 12.96 hrs Surf.Area= 4,767 sf Storage= 4,839 cf

Plug-Flow detention time= 210.6 min calculated for 0.186 af (90% of inflow)
Center-of-Mass det. time= 162.3 min (973.6 - 811.3)

Volume	Invert	Avail.Storage	Storage Description
#1	800.00'	6,825 cf	**Custom Stage Data (Conic)** Listed below

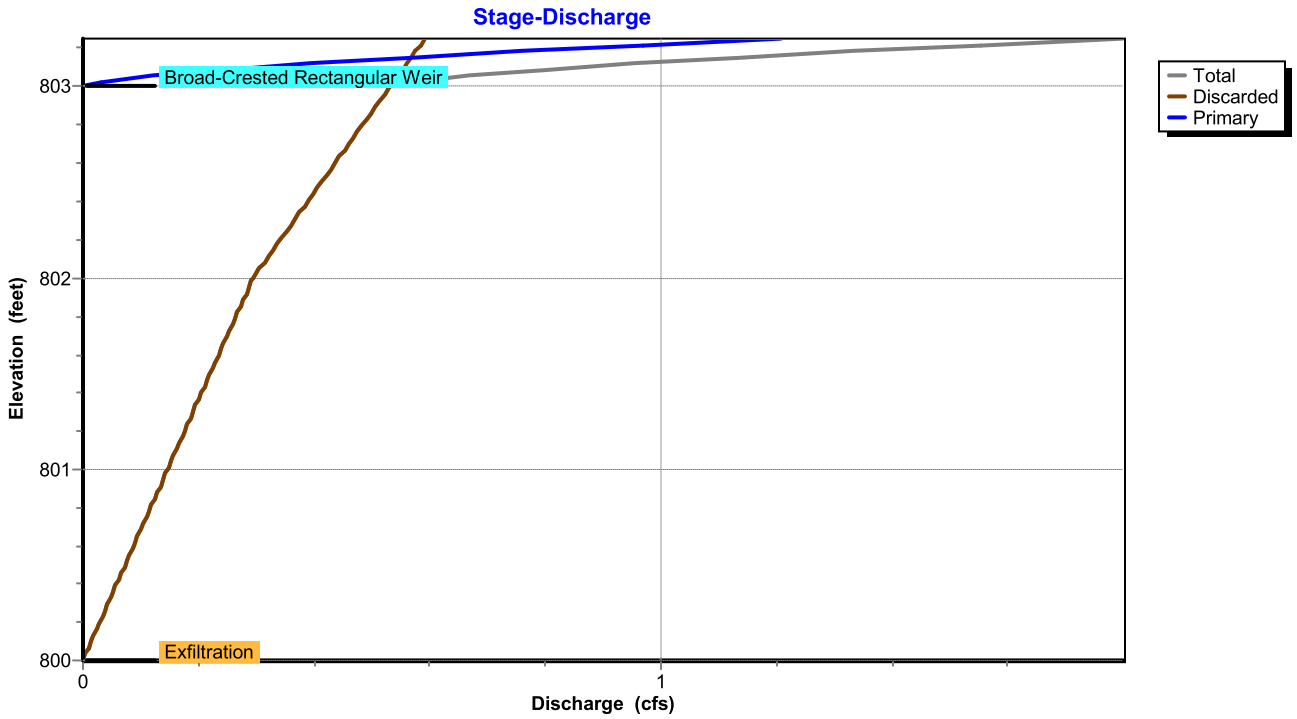
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
800.00	0	0	0	0
802.00	6,300	4,200	4,200	6,306
803.25	0	2,625	6,825	12,609

Device	Routing	Invert	Outlet Devices
#1	Primary	803.00'	**4.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32
#2	Discarded	800.00'	**2.000 in/hr Exfiltration over Wetted area** Conductivity to Groundwater Elevation = 700.00'

Discarded OutFlow Max=0.37 cfs @ 12.96 hrs HW=802.30' (Free Discharge)
↑—**2=Exfiltration** (Controls 0.37 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=800.00' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 26P: Dry Swale



Summary for Subcatchment 1: 1

CarlsonPlanXYPos|641307.9585|1041455.1221|
CarlsonSurface||

Runoff = 37.66 cfs @ 12.16 hrs, Volume= 2.506 af, Depth> 2.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
NRCC 24-hr A 100-Year Rainfall=5.29"

Area (sf)	CN	Description
11,325	98	Water Surface HSG B
74,761	98	Paved parking HSG B
51,292	98	Paved parking HSG C
281,913	56	Brush, Fair HSG B
162,629	70	Brush, Fair HSG C
581,920	70	Weighted Average
444,542		76.39% Pervious Area
137,378		23.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	100	0.1000	0.27		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.19"
1.5	200	0.1000	2.21		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
7.7	300	Total			

Summary for Subcatchment 1 OFF: OFFSITE DRAINAGE

CarlsonPlanXYPos|642280.8804|1040430.0233|
CarlsonSurface||

Runoff = 110.23 cfs @ 12.67 hrs, Volume= 14.887 af, Depth> 2.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
NRCC 24-hr A 100-Year Rainfall=5.29"

Area (sf)	CN	Description
1,243,094	81	Row crops, C + CR, Good HSG C
446,533	56	Brush, Fair HSG B
1,552,738	70	Brush, Fair HSG C
3,242,365	72	Weighted Average
3,242,365		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.2	150		2.00		**Direct Entry, Sheet Flow**
24.7	1,795	0.0300	1.21		**Shallow Concentrated Flow, Shallow Conc.**
					Short Grass Pasture Kv= 7.0 fps
20.6	1,748	0.0800	1.41		**Shallow Concentrated Flow, Shallow**
					Woodland Kv= 5.0 fps
46.6	3,693	Total			

Summary for Subcatchment 2: 2

CarlsonPlanXYPos|642014.4586|1041354.4458|
CarlsonSurface||

Runoff = 35.82 cfs @ 12.17 hrs, Volume= 2.376 af, Depth> 2.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
NRCC 24-hr A 100-Year Rainfall=5.29"

Area (sf)	CN	Description
18,974	98	Water Surface HSG C
75,132	98	Paved parking HSG C
3,786	98	Paved parking HSG D
337,119	70	Brush, Fair HSG C
12,968	77	Brush, Fair HSG D
447,979	76	Weighted Average
350,087		78.15% Pervious Area
97,892		21.85% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	100	0.1000	0.27		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.19"
2.6	350	0.1000	2.21		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
8.8	450	Total			

Summary for Subcatchment 3: 3

CarlsonPlanXYPos|641681.4005|1041128.2504|
CarlsonSurface||

Runoff = 25.89 cfs @ 12.21 hrs, Volume= 1.789 af, Depth> 2.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
NRCC 24-hr A 100-Year Rainfall=5.29"

Area (sf)	CN	Description
1,237	98	Paved parking HSG B
36,893	98	Paved parking HSG C
73,657	56	Brush, Fair HSG B
303,939	70	Brush, Fair HSG C
415,726	70	Weighted Average
377,596		90.83% Pervious Area
38,130		9.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	100	0.1000	0.27		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.19"
5.3	700	0.1000	2.21		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
11.5	800	Total			

Summary for Subcatchment 17: 17

CarlsonPlanXYPos|642702.7045|1040980.9144|
CarlsonSurface|C:\Users\Office 2\Dropbox (Marks Engineering)\2020 PROJECTS\20-243 Licciardello, Angelo - 3535 East Lake Rd. - To Cdga To Hopewell\Carlson Files\ex topo.tin|

Runoff = 5.22 cfs @ 12.11 hrs, Volume= 0.322 af, Depth> 3.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
NRCC 24-hr A 100-Year Rainfall=5.29"

Area (sf)	CN	Description
5,322	98	Paved parking, HSG D
3,449	98	Roofs, HSG D
40,152	80	>75% Grass cover, Good, HSG D
48,923	83	Weighted Average
40,152		82.07% Pervious Area
8,771		17.93% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.0		0.0866			**Lag/CN Method,**
6.0					**Direct Entry,**
6.0	0	Total			

Summary for Subcatchment 18: 18

CarlsonPlanXYPos|642920.0895|1040980.2941|
CarlsonSurface|C:\Users\Office 2\Dropbox (Marks Engineering)\2020 PROJECTS\20-243 Licciardello, Angelo - 3535 East Lake Rd. - To Cdga To Hopewell\Carlson Files\ex topo.tin|

Runoff = 5.23 cfs @ 12.11 hrs, Volume= 0.322 af, Depth> 3.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
NRCC 24-hr A 100-Year Rainfall=5.29"

Area (sf)	CN	Description
5,326	98	Paved parking HSG C
3,449	98	Roofs HSG C
40,237	80	>75% Grass cover, Good, HSG D
49,012	83	Weighted Average
40,237		82.10% Pervious Area
8,775		17.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.0		0.0953			**Lag/CN Method,**
6.0					**Direct Entry,**
6.0	0	Total			

Summary for Subcatchment 19: 19

CarlsonPlanXYPos|643107.1559|1040981.5048|
CarlsonSurface|C:\Users\Office 2\Dropbox (Marks Engineering)\2020 PROJECTS\20-243 Licciardello, Angelo - 3535 East Lake Rd. - To Cdga To Hopewell\Carlson Files\ex topo.tin|

Runoff = 5.24 cfs @ 12.11 hrs, Volume= 0.322 af, Depth> 3.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
NRCC 24-hr A 100-Year Rainfall=5.29"

Area (sf)	CN	Description
5,329	98	Paved parking HSG C
3,449	98	Roofs HSG C
40,270	80	>75% Grass cover, Good, HSG D
49,048	83	Weighted Average
40,270		82.10% Pervious Area
8,778		17.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.0		0.0933			**Lag/CN Method,**
6.0					**Direct Entry,**
6.0	0	Total			

Summary for Subcatchment 20: 20

CarlsonPlanXYPos|643312.2303|1040980.2663|
CarlsonSurface|C:\Users\Office 2\Dropbox (Marks Engineering)\2020 PROJECTS\20-243 Licciardello, Angelo - 3535 East Lake Rd. - To Cdga To Hopewell\Carlson Files\ex topo.tin|

Runoff = 5.23 cfs @ 12.11 hrs, Volume= 0.322 af, Depth> 3.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
NRCC 24-hr A 100-Year Rainfall=5.29"

Area (sf)	CN	Description
5,322	98	Paved parking HSG C
3,449	98	Roofs HSG C
40,204	80	>75% Grass cover, Good, HSG D
48,975	83	Weighted Average
40,204		82.09% Pervious Area
8,771		17.91% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.0		0.0759			**Lag/CN Method,**
6.0					**Direct Entry,**
6.0	0	Total			

Summary for Subcatchment 21: 21

CarlsonPlanXYPos|643492.4579|1040982.7482|
CarlsonSurface|C:\Users\Office 2\Dropbox (Marks Engineering)\2020 PROJECTS\20-243 Licciardello, Angelo - 3535 East Lake Rd. - To Cdga To Hopewell\Carlson Files\ex topo.tin|

Runoff = 5.23 cfs @ 12.11 hrs, Volume= 0.322 af, Depth> 3.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
NRCC 24-hr A 100-Year Rainfall=5.29"

Area (sf)	CN	Description
5,326	98	Paved parking HSG C
3,449	98	Roofs HSG C
40,237	80	>75% Grass cover, Good, HSG D
49,012	83	Weighted Average
40,237		82.10% Pervious Area
8,775		17.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.0		0.0663			**Lag/CN Method,**
6.0					**Direct Entry,**
6.0	0	Total			

Summary for Subcatchment 22: 22

CarlsonPlanXYPos|643706.8551|1040983.3562|
CarlsonSurface|C:\Users\Office 2\Dropbox (Marks Engineering)\2020 PROJECTS\20-243 Licciardello, Angelo - 3535 East Lake Rd. - To Cdga To Hopewell\Carlson Files\ex topo.tin|

Runoff = 5.23 cfs @ 12.11 hrs, Volume= 0.322 af, Depth> 3.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
NRCC 24-hr A 100-Year Rainfall=5.29"

Area (sf)	CN	Description
5,326	98	Paved parking HSG C
3,449	98	Roofs HSG C
40,237	80	>75% Grass cover, Good, HSG D
49,012	83	Weighted Average
40,237		82.10% Pervious Area
8,775		17.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.0		0.0589			**Lag/CN Method,**
6.0					**Direct Entry,**
6.0	0	Total			

Summary for Subcatchment 23: 23

CarlsonPlanXYPos|643896.4054|1040980.2593|
CarlsonSurface|C:\Users\Office 2\Dropbox (Marks Engineering)\2020 PROJECTS\20-243 Licciardello, Angelo - 3535 East Lake Rd. - To Cdga To Hopewell\Carlson Files\ex topo.tin|

Runoff = 5.23 cfs @ 12.11 hrs, Volume= 0.322 af, Depth> 3.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
NRCC 24-hr A 100-Year Rainfall=5.29"

Area (sf)	CN	Description
5,323	98	Paved parking HSG C
3,449	98	Roofs HSG C
40,207	80	>75% Grass cover, Good, HSG D
48,979	83	Weighted Average
40,207		82.09% Pervious Area
8,772		17.91% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.0		0.0568			**Lag/CN Method,**
6.0					**Direct Entry,**
6.0	0	Total			

Summary for Subcatchment 24: 24

CarlsonPlanXYPos|644102.7886|1040984.5776|
CarlsonSurface|C:\Users\Office 2\Dropbox (Marks Engineering)\2020 PROJECTS\20-243 Licciardello, Angelo - 3535 East Lake Rd. - To Cdga To Hopewell\Carlson Files\ex topo.tin|

Runoff = 5.00 cfs @ 12.11 hrs, Volume= 0.308 af, Depth> 3.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
NRCC 24-hr A 100-Year Rainfall=5.29"

Area (sf)	CN	Description
5,289	98	Paved parking HSG C
3,449	98	Roofs HSG C
38,140	80	>75% Grass cover, Good, HSG D
46,878	83	Weighted Average
38,140		81.36% Pervious Area
8,738		18.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.0		0.0563			**Lag/CN Method,**
6.0					**Direct Entry,**
6.0	0	Total			

Summary for Subcatchment 25: 25

CarlsonPlanXYPos|644284.7705|1040971.5435|
CarlsonSurface|C:\Users\Office 2\Dropbox (Marks Engineering)\2020 PROJECTS\20-243 Licciardello, Angelo - 3535 East Lake Rd. - To Cdga To Hopewell\Carlson Files\ex topo.tin|

Runoff = 5.45 cfs @ 12.18 hrs, Volume= 0.372 af, Depth> 3.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
NRCC 24-hr A 100-Year Rainfall=5.29"

Area (sf)	CN	Description
8,025	98	Paved parking HSG C
3,449	98	Roofs HSG C
43,529	80	>75% Grass cover, Good, HSG D
55,003	84	Weighted Average
43,529		79.14% Pervious Area
11,474		20.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Summary for Subcatchment 26: 26

CarlsonPlanXYPos|644192.3159|1041141.7328|
CarlsonSurface|C:\Users\Office 2\Dropbox (Marks Engineering)\2020 PROJECTS\20-243 Licciardello, Angelo - 3535 East Lake Rd. - To Cdga To Hopewell\Carlson Files\ex topo.tin|

Runoff = 6.18 cfs @ 12.15 hrs, Volume= 0.427 af, Depth> 3.84"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
NRCC 24-hr A 100-Year Rainfall=5.29"

Area (sf)	CN	Description
21,418	98	Paved parking HSG C
36,775	80	>75% Grass cover, Good, HSG D
58,193	87	Weighted Average
36,775		63.19% Pervious Area
21,418		36.81% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.0		0.0650			**Lag/CN Method,**
8.0					**Direct Entry,**
8.0	0	Total			

Summary for Reach 1R: Outfall

Inflow Area = 44.735 ac, 19.32% Impervious, Inflow Depth > 2.08" for 100-Year event
Inflow = 68.97 cfs @ 12.30 hrs, Volume= 7.753 af
Outflow = 68.97 cfs @ 12.30 hrs, Volume= 7.753 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Summary for Reach 20R: Hopewell Outfall

Inflow Area = 11.548 ac, 20.49% Impervious, Inflow Depth = 2.18" for 100-Year event
Inflow = 44.61 cfs @ 12.18 hrs, Volume= 2.097 af
Outflow = 44.61 cfs @ 12.18 hrs, Volume= 2.097 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Summary for Pond 1P: Lower Pond

Inflow Area = 13.359 ac, 23.61% Impervious, Inflow Depth > 2.25" for 100-Year event
Inflow = 37.66 cfs @ 12.16 hrs, Volume= 2.506 af
Outflow = 14.61 cfs @ 12.41 hrs, Volume= 2.229 af, Atten= 61%, Lag= 15.2 min
Primary = 14.61 cfs @ 12.41 hrs, Volume= 2.229 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Starting Elev= 700.50' Surf.Area= 0 sf Storage= 0 cf
Peak Elev= 703.59' @ 12.41 hrs Surf.Area= 24,181 sf Storage= 41,380 cf

Plug-Flow detention time= 148.8 min calculated for 2.219 af (89% of inflow)
Center-of-Mass det. time= 97.5 min (929.5 - 832.0)

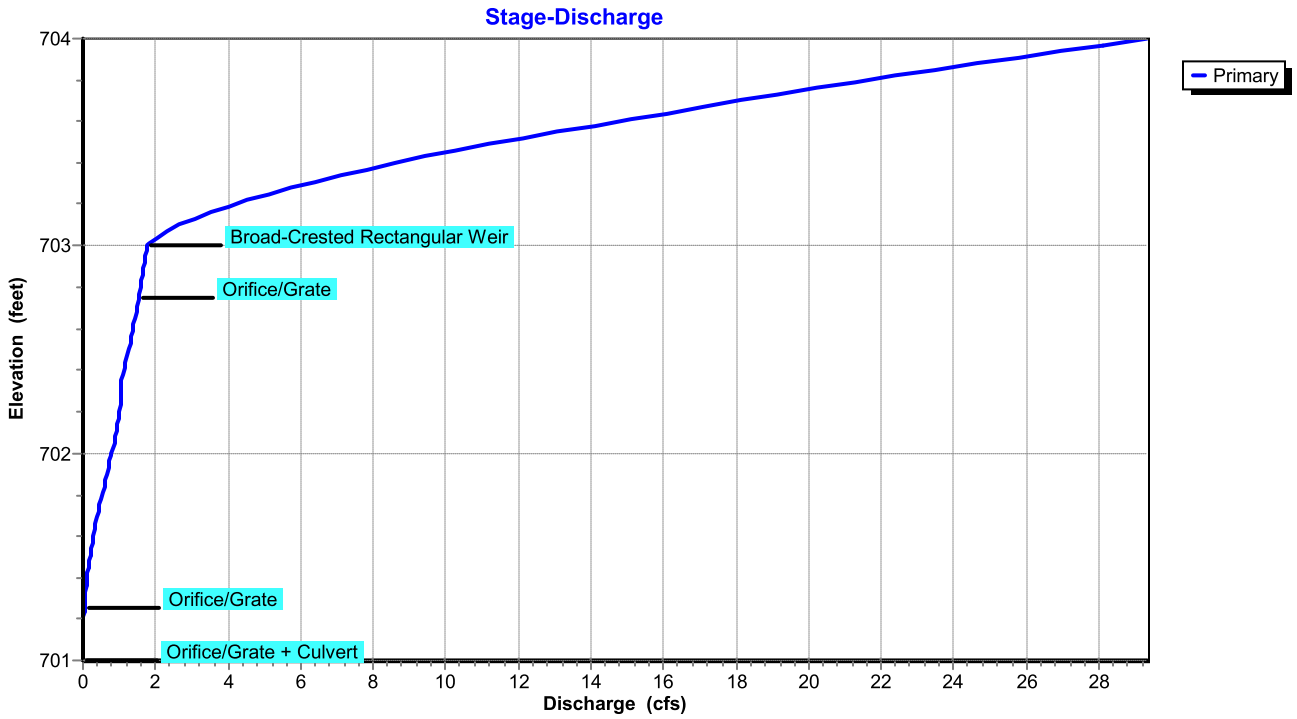
Volume	Invert	Avail.Storage	Storage Description
#1	701.00'	51,996 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
701.00	11,309	0	0
702.00	14,000	12,655	12,655
703.00	18,223	16,112	28,766
704.00	28,237	23,230	51,996

Device	Routing	Invert	Outlet Devices
#1	Primary	703.00'	**10.0' 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
#2	Device 4	702.75'	**48.0" x 48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 4	701.00'	**4.0" Vert. Orifice/Grate** C= 0.600
#4	Primary	701.00'	**12.0" Round Culvert** L= 143.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 701.00' / 701.00' S= 0.0000 '/' Cc= 0.900 n= 0.020 Corrugated PE, corrugated interior, Flow Area= 0.79 sf
#5	Device 4	701.25'	**12.0" W x 6.0" H Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=14.48 cfs @ 12.41 hrs HW=703.59' (Free Discharge)
- **1=Broad-Crested Rectangular Weir** (Weir Controls 12.24 cfs @ 2.07 fps)
- **4=Culvert** (Barrel Controls 2.25 cfs @ 2.86 fps)
  - **2=Orifice/Grate** (Passes < 40.35 cfs potential flow)
  - **3=Orifice/Grate** (Passes < 0.65 cfs potential flow)
  - **5=Orifice/Grate** (Passes < 3.48 cfs potential flow)

Pond 1P: Lower Pond



Summary for Pond 2P: Upper Pond

Inflow Area = 21.832 ac, 21.13% Impervious, Inflow Depth > 2.46" for 100-Year event
Inflow = 80.38 cfs @ 12.18 hrs, Volume= 4.473 af
Outflow = 36.72 cfs @ 12.30 hrs, Volume= 3.736 af, Atten= 54%, Lag= 7.2 min
Primary = 36.72 cfs @ 12.30 hrs, Volume= 3.736 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Starting Elev= 705.00' Surf.Area= 0 sf Storage= 0 cf
Peak Elev= 742.42' @ 12.35 hrs Surf.Area= 22,391 sf Storage= 62,809 cf

Plug-Flow detention time= 83.6 min calculated for 3.720 af (83% of inflow)
Center-of-Mass det. time= 34.1 min (835.2 - 801.1)

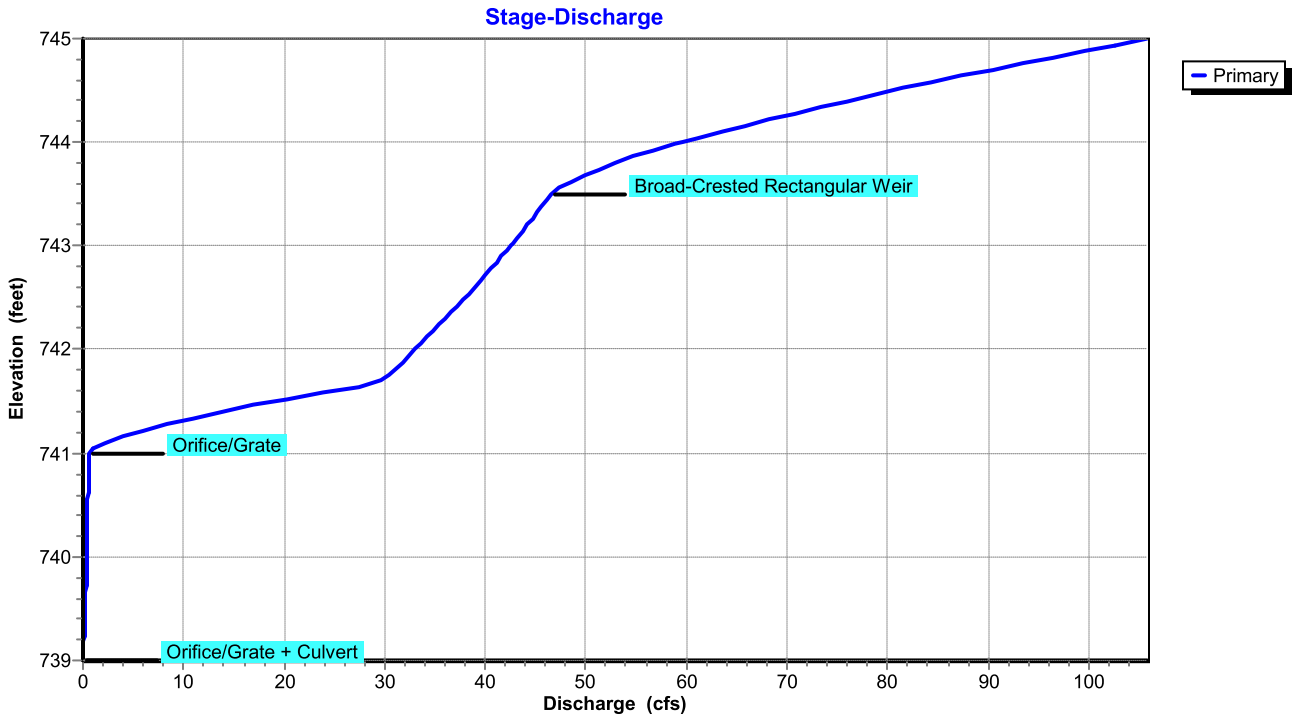
Volume	Invert	Avail.Storage	Storage Description
#1	739.00'	129,172 cf	**prop (Conic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
739.00	14,602	0	0	14,602
740.00	16,711	15,645	15,645	16,757
741.00	18,984	17,835	33,480	19,079
742.00	21,350	20,155	53,635	21,498
743.00	23,873	22,600	76,235	24,076
744.00	26,452	25,151	101,387	26,716
745.00	29,140	27,785	129,172	29,468

Device	Routing	Invert	Outlet Devices
#1	Primary	743.50'	**10.0' 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
#2	Device 4	741.00'	**48.0" x 48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 4	739.00'	**4.0" Vert. Orifice/Grate** C= 0.600
#4	Primary	739.00'	**36.0" Round Culvert** L= 150.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 739.00' / 735.00' S= 0.0267 '/' Cc= 0.900 n= 0.020 Corrugated PE, corrugated interior, Flow Area= 7.07 sf

Primary OutFlow Max=36.72 cfs @ 12.30 hrs HW=742.37' (Free Discharge)
- **1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
- **4=Culvert** (Inlet Controls 36.72 cfs @ 5.19 fps)
  - **2=Orifice/Grate** (Passes < 83.68 cfs potential flow)
  - **3=Orifice/Grate** (Passes < 0.75 cfs potential flow)

Pond 2P: Upper Pond



Summary for Pond 17P: Bioswale

Inflow Area = 10.212 ac, 18.35% Impervious, Inflow Depth > 2.48" for 100-Year event
Inflow = 45.91 cfs @ 12.18 hrs, Volume= 2.109 af
Outflow = 42.70 cfs @ 12.17 hrs, Volume= 2.072 af, Atten= 7%, Lag= 0.0 min
Discarded = 0.08 cfs @ 12.17 hrs, Volume= 0.072 af
Primary = 42.62 cfs @ 12.17 hrs, Volume= 2.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Peak Elev= 808.85' @ 12.17 hrs Surf.Area= 2,987 sf Storage= 3,686 cf

Plug-Flow detention time= 13.8 min calculated for 2.063 af (98% of inflow)
Center-of-Mass det. time= 6.3 min (789.2 - 782.9)

Volume	Invert	Avail.Storage	Storage Description
#1	805.00'	3,491 cf	**SWALE STORAGE ABOVE BOTTOM (Conic)** Listed below
#2	803.00'	195 cf	**BIORETENTION MEDIA (Conic)** Listed below (Recalc) 974 cf Overall x 20.0% Voids
		3,686 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
805.00	0	0	0	0
806.00	1,520	507	507	1,522
807.50	2,500	2,985	3,491	2,530

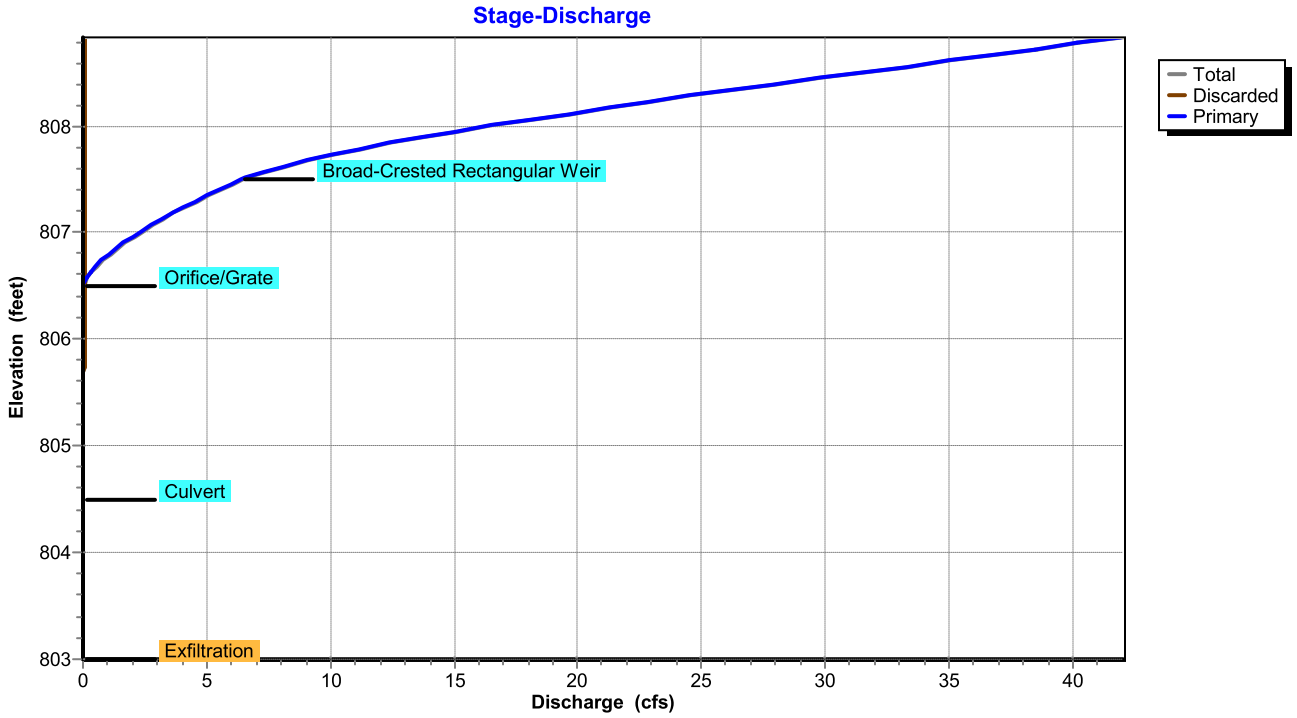
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
803.00	487	0	0	487
805.00	487	974	974	643

Device	Routing	Invert	Outlet Devices
#1	Discarded	803.00'	**1.000 in/hr Exfiltration over Wetted area** Conductivity to Groundwater Elevation = 750.00'
#2	Device 3	806.50'	**24.0" W x 24.0" H Vert. Orifice/Grate** C= 0.600
#3	Primary	804.50'	**24.0" Round Culvert** L= 100.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 804.50' / 800.00' S= 0.0450 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 3.14 sf
#4	Primary	807.50'	**5.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.08 cfs @ 12.17 hrs HW=808.76' (Free Discharge)
└**1=Exfiltration** (Controls 0.08 cfs)

Primary OutFlow Max=39.67 cfs @ 12.17 hrs HW=808.76' (Free Discharge)
└**3=Culvert** (Passes 20.94 cfs of 21.55 cfs potential flow)
└**2=Orifice/Grate** (Orifice Controls 20.94 cfs @ 5.23 fps)
└**4=Broad-Crested Rectangular Weir** (Weir Controls 18.73 cfs @ 2.98 fps)

Pond 17P: Bioswale



Summary for Pond 18P: Bioswale

Inflow Area = 9.089 ac, 18.40% Impervious, Inflow Depth > 2.50" for 100-Year event
Inflow = 42.35 cfs @ 12.19 hrs, Volume= 1.896 af
Outflow = 41.83 cfs @ 12.19 hrs, Volume= 1.858 af, Atten= 1%, Lag= 0.0 min
Discarded = 0.07 cfs @ 12.19 hrs, Volume= 0.070 af
Primary = 41.76 cfs @ 12.19 hrs, Volume= 1.788 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Peak Elev= 816.70' @ 12.19 hrs Surf.Area= 2,847 sf Storage= 3,646 cf

Plug-Flow detention time= 16.0 min calculated for 1.858 af (98% of inflow)
Center-of-Mass det. time= 6.6 min (788.4 - 781.7)

Volume	Invert	Avail.Storage	Storage Description
#1	813.00'	3,451 cf	**SWALE STORAGE (Conic)** Listed below
#2	811.00'	195 cf	**BIO-RET MEDIA (Conic)** Listed below (Recalc) 974 cf Overall x 20.0% Voids
		3,646 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
813.00	0	0	0	0
814.00	1,570	523	523	1,572
815.50	2,360	2,927	3,451	2,396

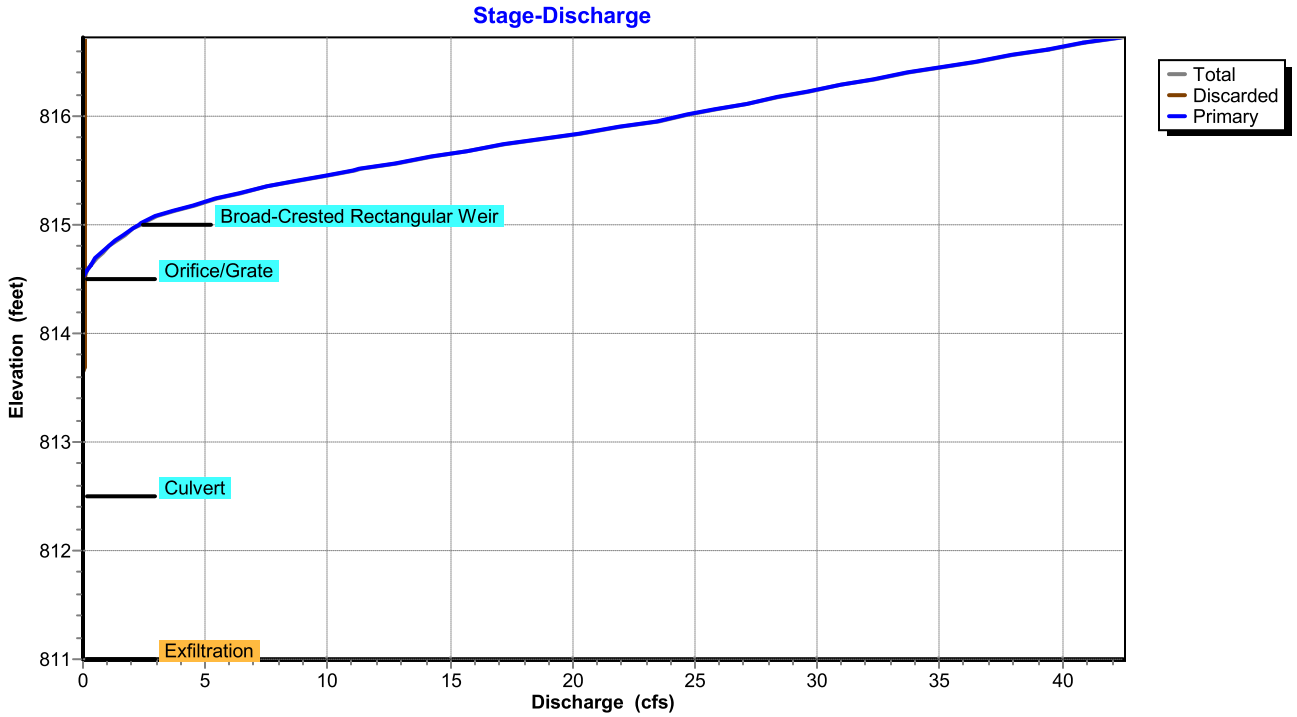
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
811.00	487	0	0	487
813.00	487	974	974	643

Device	Routing	Invert	Outlet Devices
#1	Discarded	811.00'	**1.000 in/hr Exfiltration over Wetted area** Conductivity to Groundwater Elevation = 750.00'
#2	Device 3	814.50'	**24.0" W x 24.0" H Vert. Orifice/Grate** C= 0.600
#3	Primary	812.50'	**18.0" Round Culvert** L= 46.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 812.50' / 812.00' S= 0.0109 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.77 sf
#4	Primary	815.00'	**5.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.07 cfs @ 12.19 hrs HW=816.59' (Free Discharge)
└**1=Exfiltration** (Controls 0.07 cfs)

Primary OutFlow Max=38.83 cfs @ 12.19 hrs HW=816.59' (Free Discharge)
└**3=Culvert** (Inlet Controls 12.28 cfs @ 6.95 fps)
└**2=Orifice/Grate** (Passes 12.28 cfs of 19.22 cfs potential flow)
└**4=Broad-Crested Rectangular Weir** (Weir Controls 26.56 cfs @ 3.34 fps)

Pond 18P: Bioswale



Summary for Pond 19P: Bioswale

Inflow Area = 7.964 ac, 18.47% Impervious, Inflow Depth > 2.53" for 100-Year event
Inflow = 36.35 cfs @ 12.19 hrs, Volume= 1.679 af
Outflow = 38.32 cfs @ 12.19 hrs, Volume= 1.641 af, Atten= 0%, Lag= 0.2 min
Discarded = 0.07 cfs @ 12.20 hrs, Volume= 0.068 af
Primary = 38.25 cfs @ 12.19 hrs, Volume= 1.574 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Peak Elev= 831.71' @ 12.19 hrs Surf.Area= 2,851 sf Storage= 3,654 cf

Plug-Flow detention time= 16.2 min calculated for 1.641 af (98% of inflow)
Center-of-Mass det. time= 5.6 min (787.4 - 781.8)

Volume	Invert	Avail.Storage	Storage Description
#1	828.00'	3,459 cf	**SWALE STORAGE (Conic)** Listed below
#2	826.00'	195 cf	**BIO-RET MEDIA (Conic)** Listed below (Recalc) 974 cf Overall x 20.0% Voids
		3,654 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
828.00	0	0	0	0
829.00	1,575	525	525	1,577
830.50	2,364	2,934	3,459	2,400

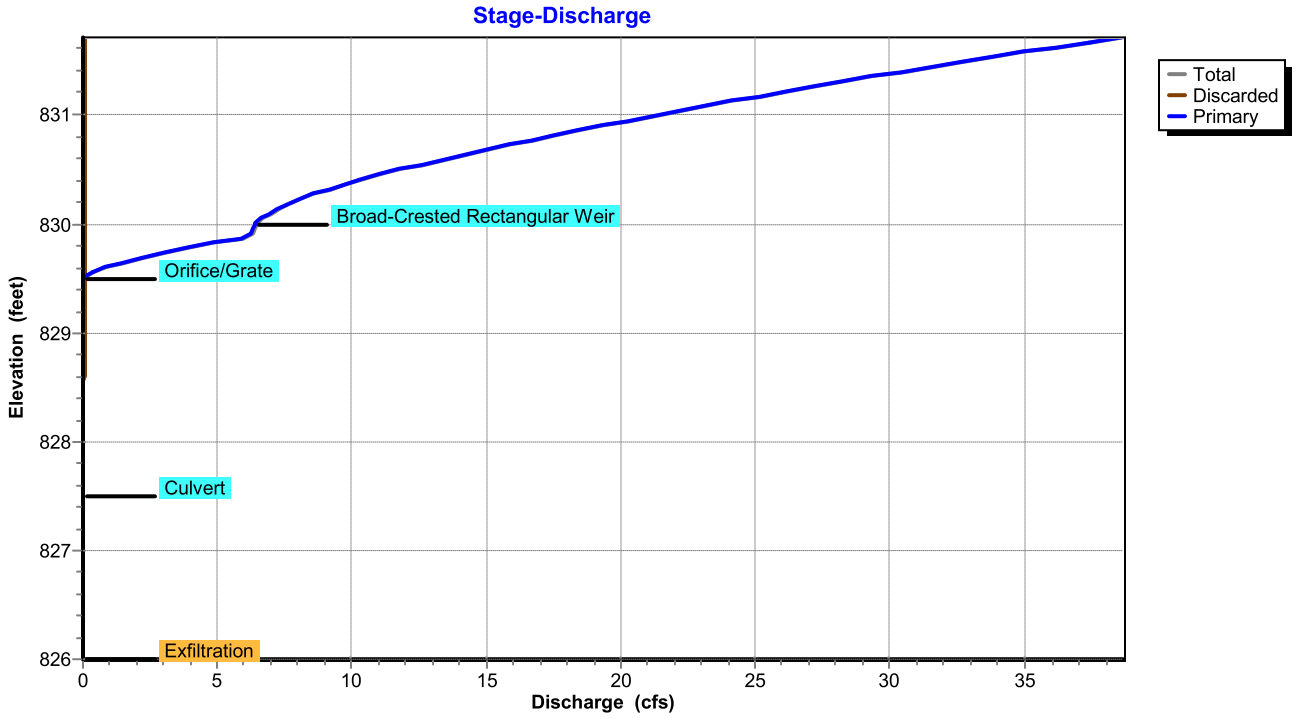
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
826.00	487	0	0	487
828.00	487	974	974	643

Device	Routing	Invert	Outlet Devices
#1	Discarded	826.00'	**1.000 in/hr Exfiltration over Wetted area** Conductivity to Groundwater Elevation = 0.01'
#2	Device 3	829.50'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Primary	827.50'	**15.0" Round Culvert** L= 46.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 827.50' / 827.00' S= 0.0109 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.23 sf
#4	Primary	830.00'	**5.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.07 cfs @ 12.20 hrs HW=831.69' (Free Discharge)
└**1=Exfiltration** (Controls 0.07 cfs)

Primary OutFlow Max=35.89 cfs @ 12.19 hrs HW=831.61' (Free Discharge)
└**3=Culvert** (Inlet Controls 8.71 cfs @ 7.10 fps)
└**2=Orifice/Grate** (Passes 8.71 cfs of 28.01 cfs potential flow)
└**4=Broad-Crested Rectangular Weir** (Weir Controls 27.18 cfs @ 3.37 fps)

Pond 19P: Bioswale



Summary for Pond 20P: Bioswale

Inflow Area = 6.838 ac, 18.57% Impervious, Inflow Depth > 2.57" for 100-Year event
Inflow = 28.66 cfs @ 12.18 hrs, Volume= 1.463 af
Outflow = 32.33 cfs @ 12.19 hrs, Volume= 1.426 af, Atten= 0%, Lag= 0.5 min
Discarded = 0.08 cfs @ 12.17 hrs, Volume= 0.070 af
Primary = 32.25 cfs @ 12.19 hrs, Volume= 1.356 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Peak Elev= 846.48' @ 12.19 hrs Surf.Area= 2,844 sf Storage= 3,643 cf

Plug-Flow detention time= 17.1 min calculated for 1.420 af (97% of inflow)
Center-of-Mass det. time= 6.3 min (788.7 - 782.4)

Volume	Invert	Avail.Storage	Storage Description
#1	843.00'	3,449 cf	**SWALE STORAGE (Conic)** Listed below
#2	841.00'	195 cf	**BIO-RET MEDIA (Conic)** Listed below (Recalc) 974 cf Overall x 20.0% Voids
		3,643 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
843.00	0	0	0	0
844.00	1,570	523	523	1,572
845.50	2,357	2,925	3,449	2,393

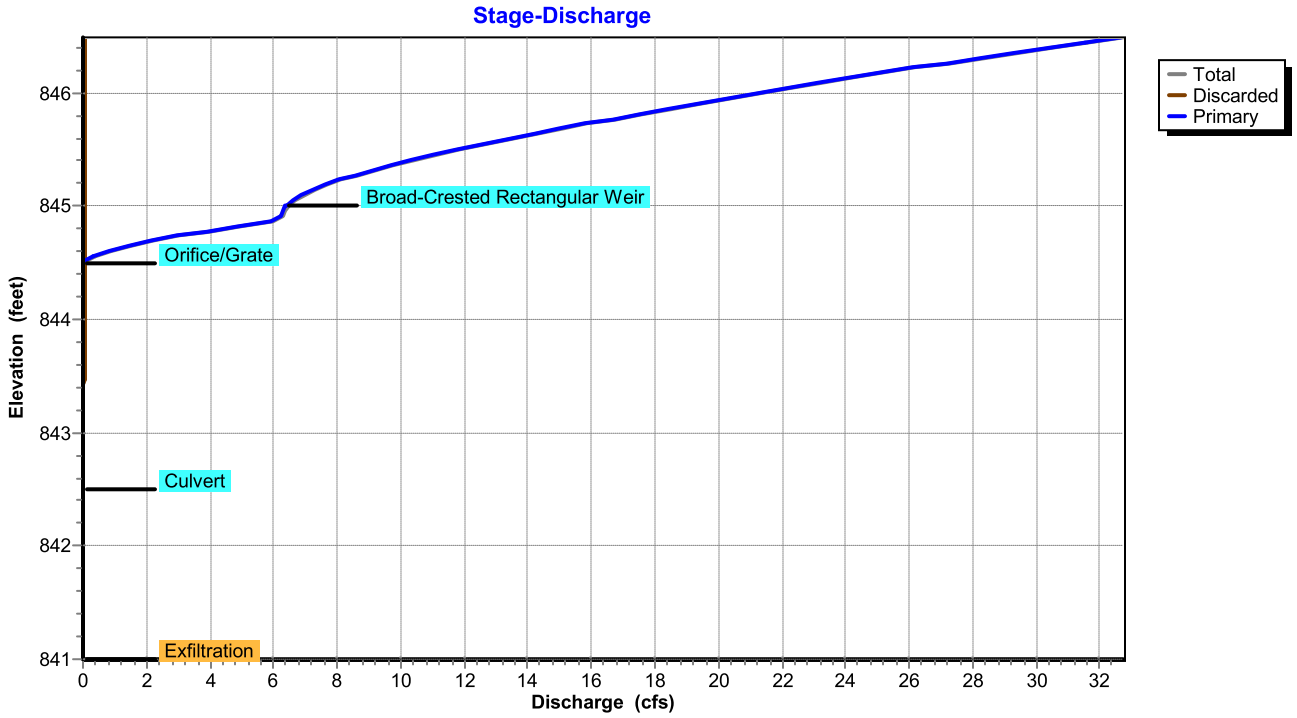
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
841.00	487	0	0	487
843.00	487	974	974	643

Device	Routing	Invert	Outlet Devices
#1	Discarded	841.00'	**1.000 in/hr Exfiltration over Wetted area** Conductivity to Groundwater Elevation = 800.00'
#2	Device 3	844.50'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Primary	842.50'	**15.0" Round Culvert** L= 46.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 842.50' / 842.00' S= 0.0109 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.23 sf
#4	Primary	845.00'	**5.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.08 cfs @ 12.17 hrs HW=846.27' (Free Discharge)
└**1=Exfiltration** (Controls 0.08 cfs)

Primary OutFlow Max=30.40 cfs @ 12.19 hrs HW=846.40' (Free Discharge)
└**3=Culvert** (Inlet Controls 8.44 cfs @ 6.88 fps)
└**2=Orifice/Grate** (Passes 8.44 cfs of 26.55 cfs potential flow)
└**4=Broad-Crested Rectangular Weir** (Weir Controls 21.95 cfs @ 3.14 fps)

Pond 20P: Bioswale



Summary for Pond 21P: Bioswale

Inflow Area = 5.714 ac, 18.70% Impervious, Inflow Depth > 2.62" for 100-Year event
Inflow = 23.32 cfs @ 12.18 hrs, Volume= 1.247 af
Outflow = 24.58 cfs @ 12.19 hrs, Volume= 1.209 af, Atten= 0%, Lag= 0.2 min
Discarded = 0.07 cfs @ 12.19 hrs, Volume= 0.068 af
Primary = 24.51 cfs @ 12.19 hrs, Volume= 1.141 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Peak Elev= 860.28' @ 12.19 hrs Surf.Area= 2,844 sf Storage= 3,643 cf

Plug-Flow detention time= 21.5 min calculated for 1.209 af (97% of inflow)
Center-of-Mass det. time= 7.4 min (790.4 - 783.0)

Volume	Invert	Avail.Storage	Storage Description
#1	857.00'	3,449 cf	**SWALE STORAGE (Conic)** Listed below
#2	855.00'	195 cf	**BIO-RET MEDIA (Conic)** Listed below (Recalc) 974 cf Overall x 20.0% Voids
		3,643 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
857.00	0	0	0	0
858.00	1,570	523	523	1,572
859.50	2,357	2,925	3,449	2,393

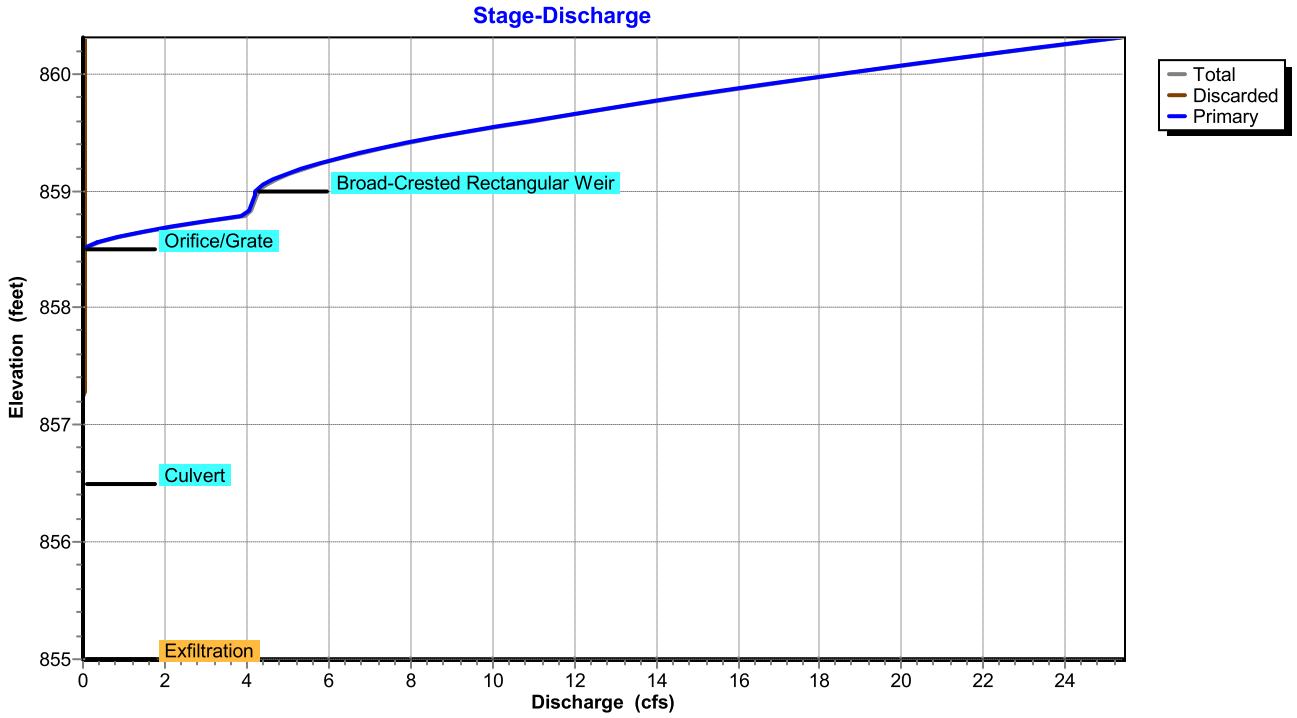
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
855.00	487	0	0	487
857.00	487	974	974	643

Device	Routing	Invert	Outlet Devices
#1	Device 3	858.50'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Discarded	855.00'	**1.000 in/hr Exfiltration over Wetted area** Conductivity to Groundwater Elevation = 750.00'
#3	Primary	856.50'	**12.0" Round Culvert** L= 47.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 856.50' / 856.00' S= 0.0106 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#4	Primary	859.00'	**5.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.07 cfs @ 12.19 hrs HW=860.21' (Free Discharge)
└**2=Exfiltration** (Controls 0.07 cfs)

Primary OutFlow Max=23.11 cfs @ 12.19 hrs HW=860.21' (Free Discharge)
└**3=Culvert** (Inlet Controls 5.35 cfs @ 6.81 fps)
└**1=Orifice/Grate** (Passes 5.35 cfs of 25.21 cfs potential flow)
└**4=Broad-Crested Rectangular Weir** (Weir Controls 17.76 cfs @ 2.93 fps)

Pond 21P: Bioswale



Summary for Pond 22P: Bioswale

Inflow Area = 4.588 ac, 18.89% Impervious, Inflow Depth > 2.69" for 100-Year event
Inflow = 17.47 cfs @ 12.19 hrs, Volume= 1.030 af
Outflow = 19.29 cfs @ 12.19 hrs, Volume= 0.993 af, Atten= 0%, Lag= 0.4 min
Discarded = 0.07 cfs @ 12.17 hrs, Volume= 0.068 af
Primary = 19.22 cfs @ 12.19 hrs, Volume= 0.924 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Peak Elev= 871.03' @ 12.19 hrs Surf.Area= 2,861 sf Storage= 3,667 cf

Plug-Flow detention time= 24.6 min calculated for 0.988 af (96% of inflow)
Center-of-Mass det. time= 8.7 min (792.9 - 784.3)

Volume	Invert	Avail.Storage	Storage Description
#1	868.00'	3,472 cf	**SWALE STORAGE (Conic)** Listed below
#2	866.00'	195 cf	**BIO-RET MEDIA (Conic)** Listed below (Recalc) 974 cf Overall x 20.0% Voids
		3,667 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
868.00	0	0	0	0
869.00	1,580	527	527	1,582
870.50	2,374	2,945	3,472	2,410

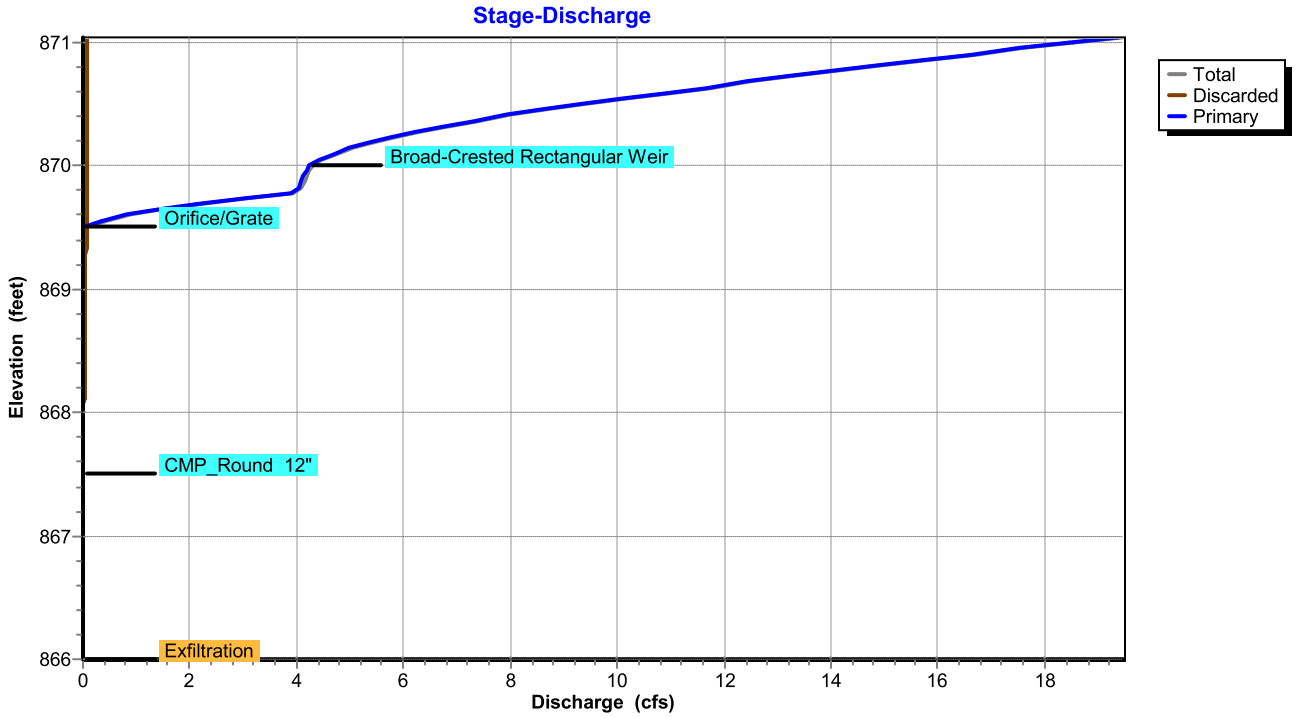
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
866.00	487	0	0	487
868.00	487	974	974	643

Device	Routing	Invert	Outlet Devices
#1	Discarded	866.00'	**1.000 in/hr Exfiltration over Wetted area** Conductivity to Groundwater Elevation = 750.00'
#2	Device 3	869.50'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Primary	867.50'	**12.0" Round CMP_Round 12"** L= 47.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 867.50' / 867.00' S= 0.0106 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#4	Primary	870.00'	**5.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.07 cfs @ 12.17 hrs HW=870.92' (Free Discharge)
└**1=Exfiltration** (Controls 0.07 cfs)

Primary OutFlow Max=18.52 cfs @ 12.19 hrs HW=871.00' (Free Discharge)
└**3=CMP_Round 12"** (Inlet Controls 5.17 cfs @ 6.58 fps)
└**2=Orifice/Grate** (Passes 5.17 cfs of 23.57 cfs potential flow)
└**4=Broad-Crested Rectangular Weir** (Weir Controls 13.35 cfs @ 2.68 fps)

Pond 22P: Bioswale



Summary for Pond 23P: Bioswale

Inflow Area = 3.463 ac, 19.21% Impervious, Inflow Depth > 2.82" for 100-Year event
Inflow = 12.22 cfs @ 12.18 hrs, Volume= 0.815 af
Outflow = 13.51 cfs @ 12.20 hrs, Volume= 0.777 af, Atten= 0%, Lag= 0.9 min
Discarded = 0.07 cfs @ 12.20 hrs, Volume= 0.069 af
Primary = 13.43 cfs @ 12.20 hrs, Volume= 0.708 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Peak Elev= 881.74' @ 12.20 hrs Surf.Area= 2,877 sf Storage= 3,689 cf

Plug-Flow detention time= 31.2 min calculated for 0.774 af (95% of inflow)
Center-of-Mass det. time= 10.5 min (797.6 - 787.1)

Volume	Invert	Avail.Storage	Storage Description
#1	879.00'	3,495 cf	**SWALE STORAGE (Conic)** Listed below
#2	877.00'	195 cf	**BIO-RET MEDIA (Conic)** Listed below (Recalc) 974 cf Overall x 20.0% Voids
		3,689 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
879.00	0	0	0	0
880.00	1,590	530	530	1,592
881.50	2,390	2,965	3,495	2,426

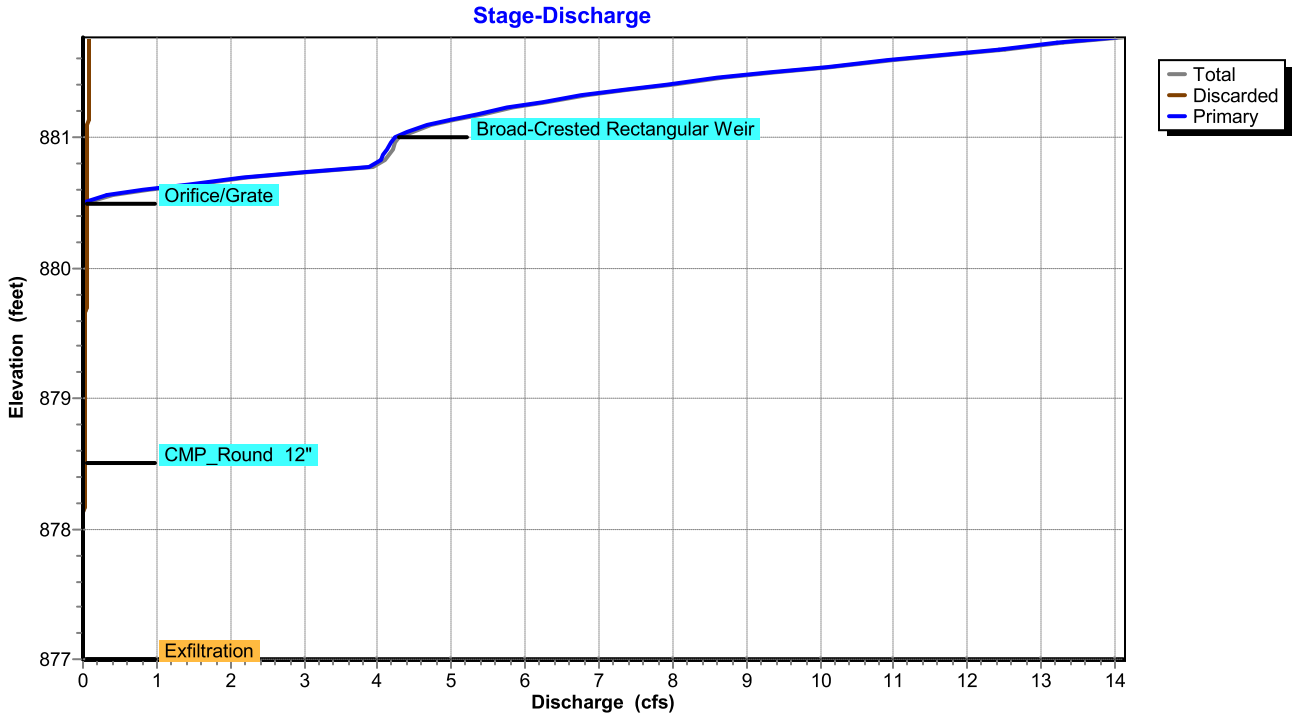
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
877.00	487	0	0	487
879.00	487	974	974	643

Device	Routing	Invert	Outlet Devices
#1	Discarded	877.00'	**1.000 in/hr Exfiltration over Wetted area** Conductivity to Groundwater Elevation = 800.00'
#2	Device 3	880.50'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Primary	878.50'	**12.0" Round CMP_Round 12"** L= 45.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 878.50' / 878.00' S= 0.0111 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#4	Primary	881.00'	**5.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.07 cfs @ 12.20 hrs HW=881.73' (Free Discharge)
└**1=Exfiltration** (Controls 0.07 cfs)

Primary OutFlow Max=13.41 cfs @ 12.20 hrs HW=881.74' (Free Discharge)
└**3=CMP_Round 12"** (Inlet Controls 4.94 cfs @ 6.29 fps)
└**2=Orifice/Grate** (Passes 4.94 cfs of 21.41 cfs potential flow)
└**4=Broad-Crested Rectangular Weir** (Weir Controls 8.47 cfs @ 2.30 fps)

Pond 23P: Bioswale



Summary for Pond 24P: Bioswale

Inflow Area = 2.339 ac, 19.84% Impervious, Inflow Depth > 3.06" for 100-Year event
Inflow = 8.73 cfs @ 12.14 hrs, Volume= 0.597 af
Outflow = 8.40 cfs @ 12.22 hrs, Volume= 0.560 af, Atten= 4%, Lag= 4.8 min
Discarded = 0.07 cfs @ 12.22 hrs, Volume= 0.067 af
Primary = 8.33 cfs @ 12.22 hrs, Volume= 0.493 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Peak Elev= 904.44' @ 12.22 hrs Surf.Area= 2,777 sf Storage= 3,479 cf

Plug-Flow detention time= 42.9 min calculated for 0.560 af (94% of inflow)
Center-of-Mass det. time= 12.6 min (806.2 - 793.6)

Volume	Invert	Avail.Storage	Storage Description
#1	902.00'	3,398 cf	**SWALE STORAGE (Conic)** Listed below
#2	900.00'	195 cf	**BIO-RET MEDIA (Conic)** Listed below (Recalc) 974 cf Overall x 20.0% Voids
		3,592 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
902.00	0	0	0	0
903.00	1,548	516	516	1,550
904.50	2,320	2,882	3,398	2,356

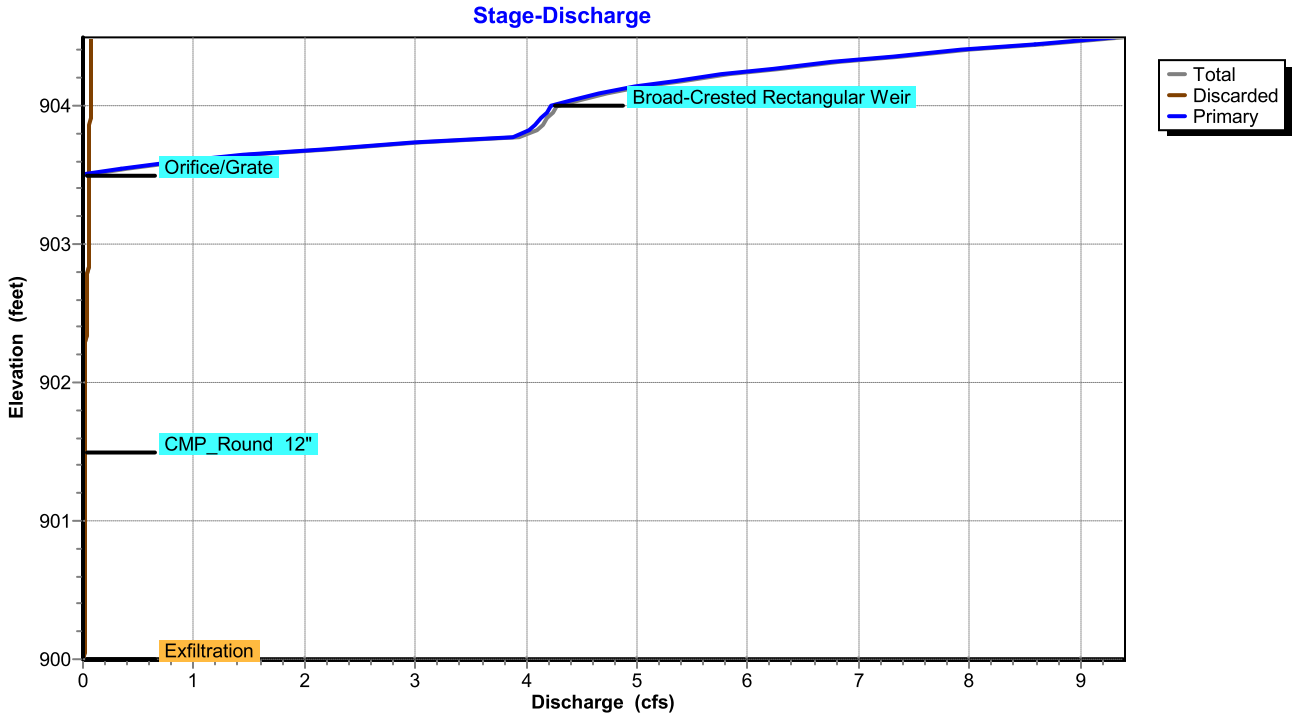
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
900.00	487	0	0	487
902.00	487	974	974	643

Device	Routing	Invert	Outlet Devices
#1	Discarded	900.00'	**1.000 in/hr Exfiltration over Wetted area** Conductivity to Groundwater Elevation = 800.00'
#2	Device 3	903.50'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Primary	901.50'	**12.0" Round CMP_Round 12"** L= 50.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 901.50' / 901.00' S= 0.0100 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#4	Primary	904.00'	**5.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.07 cfs @ 12.22 hrs HW=904.41' (Free Discharge)
└**1=Exfiltration** (Controls 0.07 cfs)

Primary OutFlow Max=7.97 cfs @ 12.22 hrs HW=904.41' (Free Discharge)
└**3=CMP_Round 12"** (Inlet Controls 4.64 cfs @ 5.90 fps)
└**2=Orifice/Grate** (Passes 4.64 cfs of 18.40 cfs potential flow)
└**4=Broad-Crested Rectangular Weir** (Weir Controls 3.33 cfs @ 1.61 fps)

Pond 24P: Bioswale



Summary for Pond 25P: Bioswale

Inflow Area = 1.263 ac, 20.86% Impervious, Inflow Depth > 3.53" for 100-Year event
Inflow = 5.45 cfs @ 12.18 hrs, Volume= 0.372 af
Outflow = 4.47 cfs @ 12.26 hrs, Volume= 0.343 af, Atten= 18%, Lag= 4.6 min
Discarded = 0.05 cfs @ 12.25 hrs, Volume= 0.054 af
Primary = 4.42 cfs @ 12.26 hrs, Volume= 0.289 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Peak Elev= 907.66' @ 12.25 hrs Surf.Area= 1,993 sf Storage= 2,121 cf

Plug-Flow detention time= 53.0 min calculated for 0.342 af (92% of inflow)
Center-of-Mass det. time= 15.6 min (819.0 - 803.4)

Volume	Invert	Avail.Storage	Storage Description
#1	905.50'	2,385 cf	**SWALE STORAGE (Conic)** Listed below
#2	903.50'	195 cf	**BIO-RET MEDIA (Conic)** Listed below (Recalc) 974 cf Overall x 20.0% Voids
		2,579 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
905.50	0	0	0	0
906.50	1,086	362	362	1,088
908.00	1,629	2,023	2,385	1,664

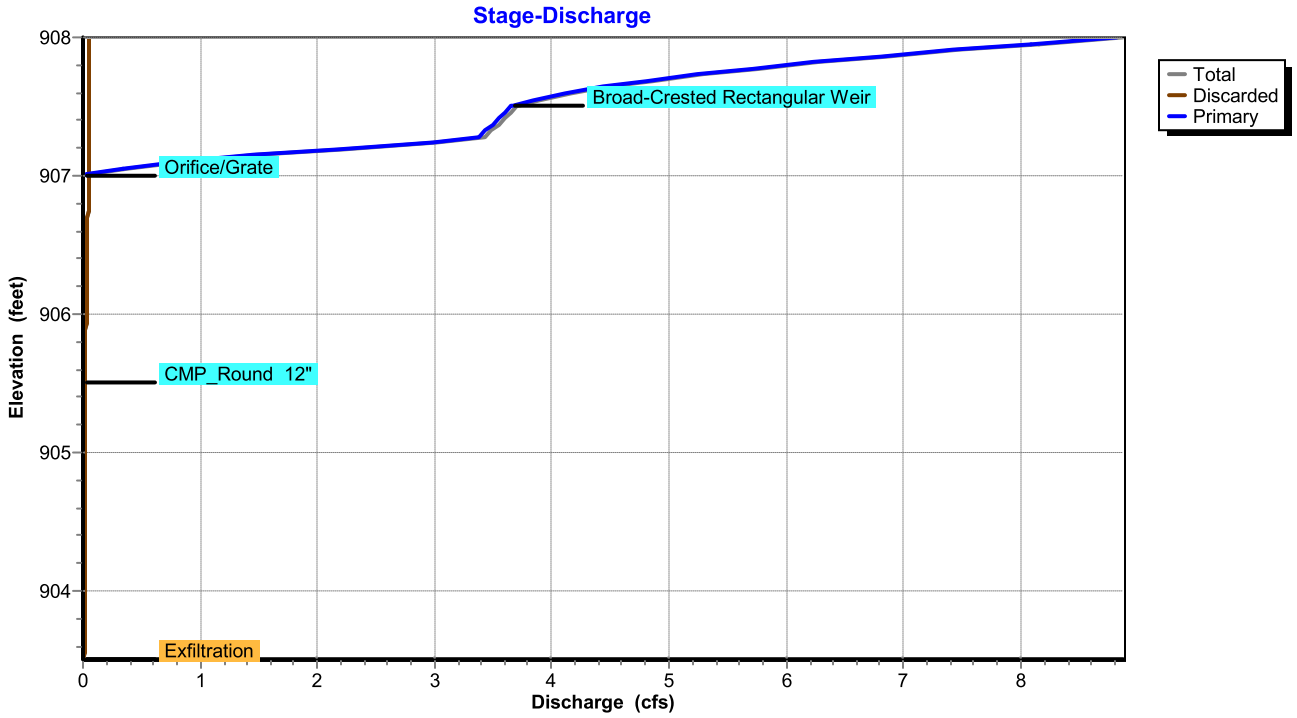
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
903.50	487	0	0	487
905.50	487	974	974	643

Device	Routing	Invert	Outlet Devices
#1	Discarded	903.50'	**1.000 in/hr Exfiltration over Wetted area** Conductivity to Groundwater Elevation = 800.00'
#2	Device 3	907.00'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Primary	905.50'	**12.0" Round CMP_Round 12"** L= 58.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 905.50' / 905.00' S= 0.0086 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#4	Primary	907.50'	**5.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.05 cfs @ 12.25 hrs HW=907.62' (Free Discharge)
└**1=Exfiltration** (Controls 0.05 cfs)

Primary OutFlow Max=4.29 cfs @ 12.26 hrs HW=907.62' (Free Discharge)
└**3=CMP_Round 12"** (Inlet Controls 3.80 cfs @ 4.84 fps)
└**2=Orifice/Grate** (Passes 3.80 cfs of 12.78 cfs potential flow)
└**4=Broad-Crested Rectangular Weir** (Weir Controls 0.49 cfs @ 0.81 fps)

Pond 25P: Bioswale



Summary for Pond 26P: Dry Swale

Inflow Area = 1.336 ac, 36.81% Impervious, Inflow Depth > 3.84" for 100-Year event
Inflow = 6.18 cfs @ 12.15 hrs, Volume= 0.427 af
Outflow = 5.94 cfs @ 12.29 hrs, Volume= 0.393 af, Atten= 4%, Lag= 8.2 min
Discarded = 0.60 cfs @ 12.25 hrs, Volume= 0.296 af
Primary = 5.34 cfs @ 12.29 hrs, Volume= 0.097 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Peak Elev= 803.63' @ 12.28 hrs Surf.Area= 0 sf Storage= 6,825 cf

Plug-Flow detention time= 148.7 min calculated for 0.391 af (92% of inflow)
Center-of-Mass det. time= 109.6 min (903.7 - 794.1)

Volume	Invert	Avail.Storage	Storage Description
#1	800.00'	6,825 cf	**Custom Stage Data (Conic)** Listed below

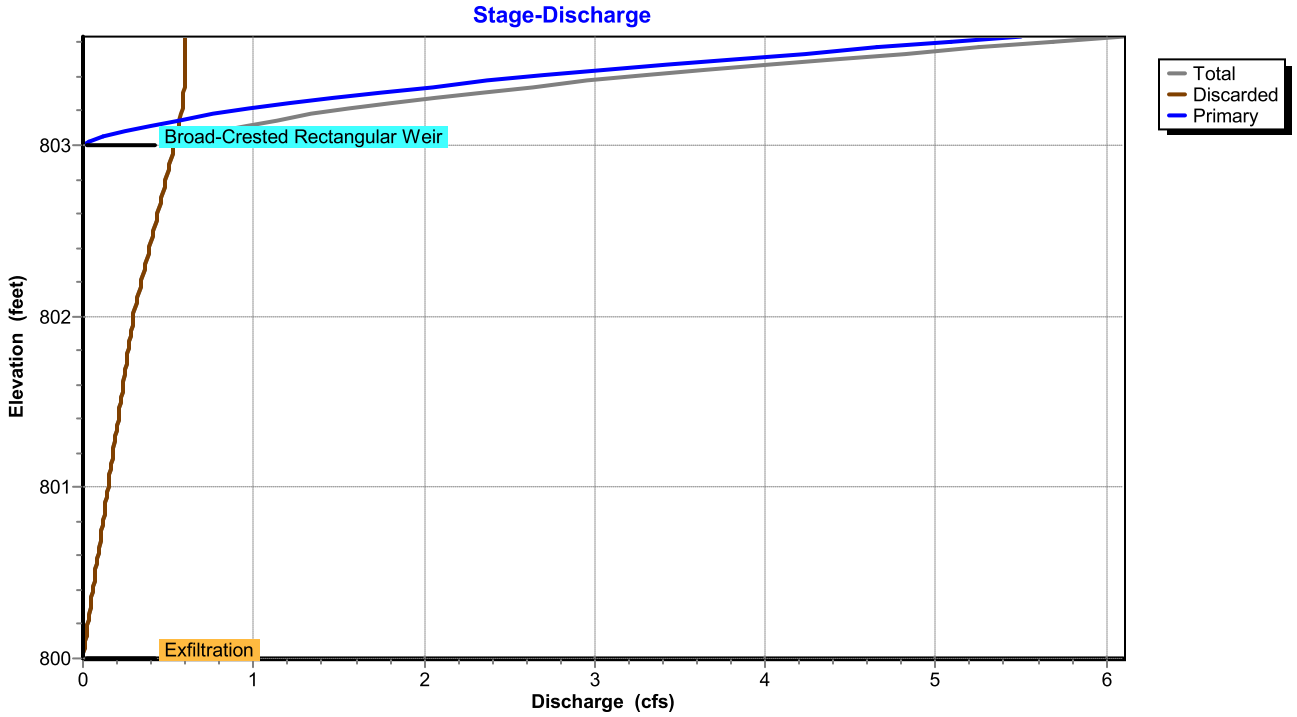
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
800.00	0	0	0	0
802.00	6,300	4,200	4,200	6,306
803.25	0	2,625	6,825	12,609

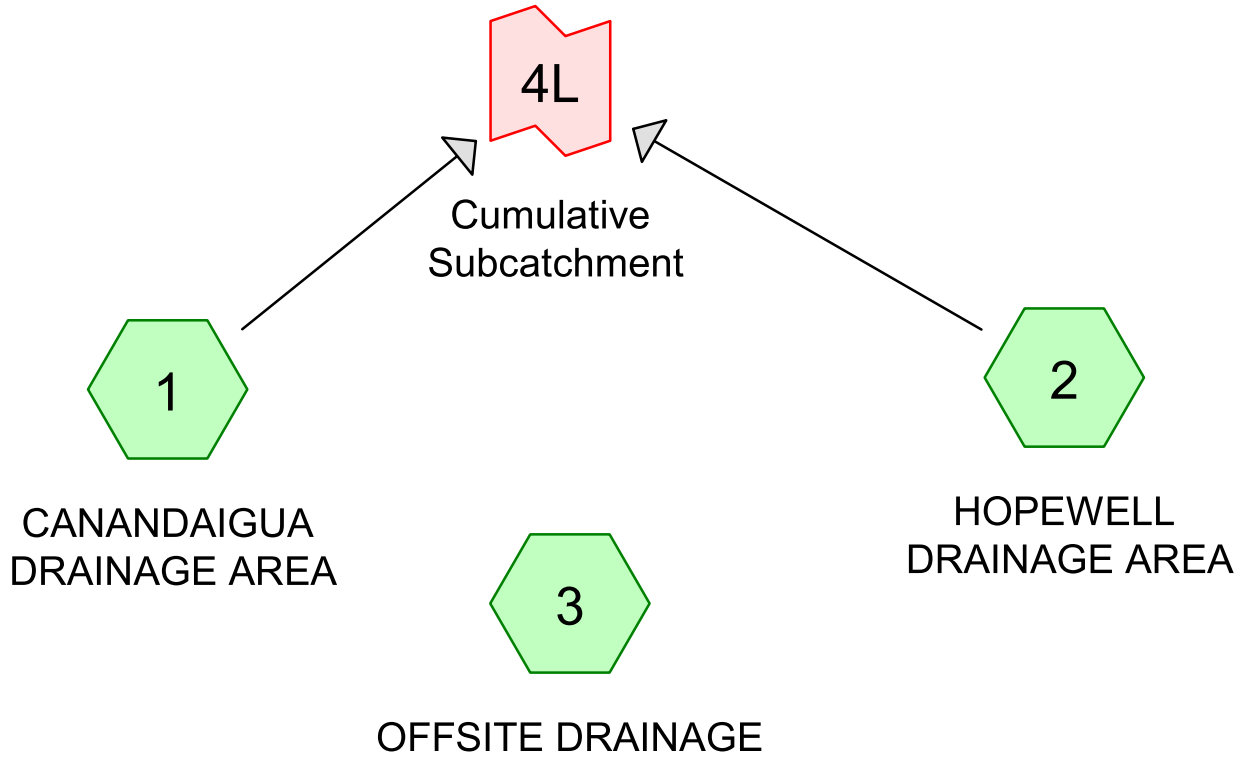
Device	Routing	Invert	Outlet Devices
#1	Primary	803.00'	**4.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32
#2	Discarded	800.00'	**2.000 in/hr Exfiltration over Wetted area** Conductivity to Groundwater Elevation = 700.00'

Discarded OutFlow Max=0.59 cfs @ 12.25 hrs HW=803.52' (Free Discharge)
↑—**2=Exfiltration** (Controls 0.59 cfs)

Primary OutFlow Max=4.85 cfs @ 12.29 hrs HW=803.59' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 4.85 cfs @ 2.06 fps)

Pond 26P: Dry Swale





Subcat Reach Pond Link

Routing Diagram for 20-243 SWPPPBASE EX 9.1
Prepared by Marks Engineering, Printed 1/27/2022

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
1.425	69	50-75% Grass cover, Fair HSG B (1)
4.647	79	50-75% Grass cover, Fair HSG C (2)
18.998	56	Brush, Fair HSG B (1, 3)
65.333	70	Brush, Fair HSG C (1, 2, 3)
28.538	81	Row crops, C + CR, Good HSG C (3)
118.941	**71**	**TOTAL AREA**

Summary for Subcatchment 1: CANANDAIGUA DRAINAGE AREA

CarlsonPlanXYPos|641529.7843|1041282.6220|
CarlsonSurface||

Runoff = 1.75 cfs @ 12.34 hrs, Volume= 0.339 af, Depth> 0.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
NRCC 24-hr A 1-Year Rainfall=1.89"

Area (sf)	CN	Description
62,065	69	50-75% Grass cover, Fair HSG B
381,039	56	Brush, Fair HSG B
1,002,615	70	Brush, Fair HSG C
1,445,719	66	Weighted Average
1,445,719		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.7					**Direct Entry,**

Summary for Subcatchment 2: HOPEWELL DRAINAGE AREA

CarlsonPlanXYPos|643493.3751|1041037.2443|
CarlsonSurface||

Runoff = 3.32 cfs @ 12.22 hrs, Volume= 0.282 af, Depth> 0.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
NRCC 24-hr A 1-Year Rainfall=1.89"

Area (sf)	CN	Description
202,434	79	50-75% Grass cover, Fair HSG C
290,557	70	Brush, Fair HSG C
492,991	74	Weighted Average
492,991		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.1					**Direct Entry,**

Summary for Subcatchment 3: OFFSITE DRAINAGE

CarlsonPlanXYPos|642280.8804|1040430.0233|
CarlsonSurface||

Runoff = 7.81 cfs @ 12.83 hrs, Volume= 1.508 af, Depth> 0.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
NRCC 24-hr A 1-Year Rainfall=1.89"

Area (sf)	CN	Description
1,243,094	81	Row crops, C + CR, Good HSG C
446,533	56	Brush, Fair HSG B
1,552,738	70	Brush, Fair HSG C
3,242,365	72	Weighted Average
3,242,365		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.2	150		2.00		**Direct Entry, Sheet Flow**
24.7	1,795	0.0300	1.21		**Shallow Concentrated Flow, Shallow Conc.**
					Short Grass Pasture Kv= 7.0 fps
20.6	1,748	0.0800	1.41		**Shallow Concentrated Flow, Shallow**
					Woodland Kv= 5.0 fps
46.6	3,693	Total			

Summary for Link 4L: Cumulative Subcatchment

Inflow Area = 44.507 ac, 0.00% Impervious, Inflow Depth > 0.17" for 1-Year event
Inflow = 4.85 cfs @ 12.24 hrs, Volume= 0.621 af
Primary = 4.85 cfs @ 12.24 hrs, Volume= 0.621 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Summary for Subcatchment 1: CANANDAIGUA DRAINAGE AREA

CarlsonPlanXYPos|641529.7843|1041282.6220|
CarlsonSurface||

Runoff = 22.50 cfs @ 12.19 hrs, Volume= 1.692 af, Depth> 0.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
NRCC 24-hr A 10-Year Rainfall=3.14"

Area (sf)	CN	Description
62,065	69	50-75% Grass cover, Fair HSG B
381,039	56	Brush, Fair HSG B
1,002,615	70	Brush, Fair HSG C
1,445,719	66	Weighted Average
1,445,719		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.7					**Direct Entry,**

Summary for Subcatchment 2: HOPEWELL DRAINAGE AREA

CarlsonPlanXYPos|643493.3751|1041037.2443|
CarlsonSurface||

Runoff = 13.70 cfs @ 12.20 hrs, Volume= 0.940 af, Depth> 1.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
NRCC 24-hr A 10-Year Rainfall=3.14"

Area (sf)	CN	Description
202,434	79	50-75% Grass cover, Fair HSG C
290,557	70	Brush, Fair HSG C
492,991	74	Weighted Average
492,991		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.1					**Direct Entry,**

Summary for Subcatchment 3: OFFSITE DRAINAGE

CarlsonPlanXYPos|642280.8804|1040430.0233|
CarlsonSurface||

Runoff = 37.60 cfs @ 12.71 hrs, Volume= 5.469 af, Depth> 0.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
NRCC 24-hr A 10-Year Rainfall=3.14"

Area (sf)	CN	Description
1,243,094	81	Row crops, C + CR, Good HSG C
446,533	56	Brush, Fair HSG B
1,552,738	70	Brush, Fair HSG C
3,242,365	72	Weighted Average
3,242,365		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.2	150		2.00		**Direct Entry, Sheet Flow**
24.7	1,795	0.0300	1.21		**Shallow Concentrated Flow, Shallow Conc.** Short Grass Pasture Kv= 7.0 fps
20.6	1,748	0.0800	1.41		**Shallow Concentrated Flow, Shallow** Woodland Kv= 5.0 fps
46.6	3,693	Total			

Summary for Link 4L: Cumulative Subcatchment

Inflow Area = 44.507 ac, 0.00% Impervious, Inflow Depth > 0.71" for 10-Year event
Inflow = 36.18 cfs @ 12.19 hrs, Volume= 2.632 af
Primary = 36.18 cfs @ 12.19 hrs, Volume= 2.632 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

Summary for Subcatchment 1: CANANDAIGUA DRAINAGE AREA

CarlsonPlanXYPos|641529.7843|1041282.6220|
CarlsonSurface||

Runoff = 79.36 cfs @ 12.16 hrs, Volume= 5.326 af, Depth> 1.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
NRCC 24-hr A 100-Year Rainfall=5.29"

Area (sf)	CN	Description
62,065	69	50-75% Grass cover, Fair HSG B
381,039	56	Brush, Fair HSG B
1,002,615	70	Brush, Fair HSG C
1,445,719	66	Weighted Average
1,445,719		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.7					**Direct Entry,**

Summary for Subcatchment 2: HOPEWELL DRAINAGE AREA

CarlsonPlanXYPos|643493.3751|1041037.2443|
CarlsonSurface||

Runoff = 36.67 cfs @ 12.19 hrs, Volume= 2.446 af, Depth> 2.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
NRCC 24-hr A 100-Year Rainfall=5.29"

Area (sf)	CN	Description
202,434	79	50-75% Grass cover, Fair HSG C
290,557	70	Brush, Fair HSG C
492,991	74	Weighted Average
492,991		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.1					**Direct Entry,**

Summary for Subcatchment 3: OFFSITE DRAINAGE

CarlsonPlanXYPos|642280.8804|1040430.0233|
CarlsonSurface||

Runoff = 110.23 cfs @ 12.67 hrs, Volume= 14.887 af, Depth> 2.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
NRCC 24-hr A 100-Year Rainfall=5.29"

Area (sf)	CN	Description
1,243,094	81	Row crops, C + CR, Good HSG C
446,533	56	Brush, Fair HSG B
1,552,738	70	Brush, Fair HSG C
3,242,365	72	Weighted Average
3,242,365		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.2	150		2.00		**Direct Entry, Sheet Flow**
24.7	1,795	0.0300	1.21		**Shallow Concentrated Flow, Shallow Conc.**
					Short Grass Pasture Kv= 7.0 fps
20.6	1,748	0.0800	1.41		**Shallow Concentrated Flow, Shallow**
					Woodland Kv= 5.0 fps
46.6	3,693	Total			

Summary for Link 4L: Cumulative Subcatchment

Inflow Area = 44.507 ac, 0.00% Impervious, Inflow Depth > 2.10" for 100-Year event
Inflow = 115.58 cfs @ 12.17 hrs, Volume= 7.772 af
Primary = 115.58 cfs @ 12.17 hrs, Volume= 7.772 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs

APPENDIX C

Stormwater Design Calculations

Version 1.7
Last Updated: 10/02/2015

Total Water Quality Volume Calculation
WQv(acre-feet) = [(P)(Rv)(A)] /12

Is this project subject to Chapter 10 of the NYS Design Manual (i.e. WQv is equal to post-development 1 year runoff volume)?.....	No

Design Point:	storm	
P=	1.89	*inch*

Manually enter P, Total Area and Impervious Cover.

Breakdown of Subcatchments

Catchment Number	Total Area *(Acres)*	Impervious Area *(Acres)*	Percent Impervious *%*	Rv	WQv *(ft^3)*	Description
1	13.36	3.15	24%	0.26	24,058	Dry Swale
2	10.28	2.25	22%	0.25	17,402	Dry Swale
3	9.54	0.88	9%	0.13	8,678	Dry Swale
4						
5						
6						
7						
8						
9						
10						
Subtotal (1-30)	33.19	6.28	19%	0.22	**50,139**	**Subtotal 1**
Total	33.19	6.28	19%	0.22	**50,139**	**Initial WQv**

Identify Runoff Reduction Techniques By Area

Technique	Total Contributing Area *(Acre)*	Contributing Impervious Area *(Acre)*	Notes
Conservation of Natural Areas	0.00	0.00	*minimum 10,000 sf*
Riparian Buffers	0.00	0.00	*maximum contributing length 75 feet to 150 feet*
Filter Strips	0.00	0.00	
Tree Planting	0.00	0.00	*Up to 100 sf directly connected impervious area may be subtracted per tree*
Total	**0.00**	**0.00**	

Recalculate WQv after application of Area Reduction Techniques

	Total Area *(Acres)*	Impervious Area *(Acres)*	Percent Impervious *%*	Runoff Coefficient Rv	WQv *(ft^3)*
"<<Initial WQv"	33.19	6.28	19%	0.22	50,139
Subtract Area	0.00	0.00			
WQv adjusted after Area Reductions	**33.19**	**6.28**	19%	0.22	50,139
Disconnection of Rooftops		0.00			
Adjusted WQv after Area Reduction and Rooftop Disconnect	33.19	6.28	19%	0.22	**50,139**
WQv reduced by Area Reduction techniques					0

Total Water Quality Volume Calculation

WQv(acre-feet) = [(P)(Rv)(A)] /12

All Subcatchments						
Catchment	**Total Area** *(Acres)*	**Impervious Cover** *(Acres)*	**Percent Impervious** *%*	**Runoff Coefficient** *Rv*	**WQv** *(ft^3)*	**Description**
1	13.36	3.15	0.24	0.26	24057.76	Dry Swale
2	10.28	2.25	0.22	0.25	17,402	Dry Swale
3	9.54	0.88	0.09	0.13	8678.32	Dry Swale
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						

Runoff Reduction Volume and Treated volumes						
	Runoff Reduction Techiques/Standard SMPs		**Total Contributing Area**	**Total Contributing Impervious Area**	**WQv Reduced (RRv)**	**WQv Treated**
			(acres)	**(acres)**	**cf**	**cf**
Area/Volume Reduction	Conservation of Natural Areas	RR-1	0.00	0.00		
	Sheetflow to Riparian Buffers/Filter Strips	RR-2	0.00	0.00		
	Tree Planting/Tree Pit	RR-3	0.00	0.00		
	Disconnection of Rooftop Runoff	RR-4		0.00		
	Vegetated Swale	RR-5	0.00	0.00	0	
	Rain Garden	RR-6	0.00	0.00	0	
	Stormwater Planter	RR-7	0.00	0.00	0	
	Rain Barrel/Cistern	RR-8	0.00	0.00	0	
	Porous Pavement	RR-9	0.00	0.00	0	
	Green Roof (Intensive & Extensive)	RR-10	0.00	0.00	0	
Standard SMPs w/RRv Capacity	Infiltration Trench	I-1	0.00	0.00	0	0
	Infiltration Basin	I-2	0.00	0.00	0	0
	Dry Well	I-3	0.00	0.00	0	0
	Underground Infiltration System	I-4	0.00			
	Bioretention & Infiltration Bioretention	F-5	0.00	0.00	0	0
	Dry swale	O-1	33.19	6.28	26924	23214
Standard SMPs	Micropool Extended Detention (P-1)	P-1				
	Wet Pond (P-2)	P-2				
	Wet Extended Detention (P-3)	P-3				
	Multiple Pond system (P-4)	P-4				
	Pocket Pond (p-5)	P-5				
	Surface Sand filter (F-1)	F-1				
	Underground Sand filter (F-2)	F-2				
	Perimeter Sand Filter (F-3)	F-3				
	Organic Filter (F-4	F-4				
	Shallow Wetland (W-1)	W-1				
	Extended Detention Wetland (W-2	W-2				
	Pond/Wetland System (W-3)	W-3				
	Pocket Wetland (W-4)	W-4				
	Wet Swale (O-2)	O-2				
Totals by Area Reduction →			0.00	0.00	0	
Totals by Volume Reduction →			0.00	0.00	0	
Totals by Standard SMP w/RRV →			33.19	6.28	26924	23214
Totals by Standard SMP →			0.00	0.00		0
Totals (Area + Volume + all SMPs) →			33.19	6.28	26,924	23,214
	Impervious Cover √	okay				

Minimum RRv

Enter the Soils Data for the site		
Soil Group	Acres	S
A	0.00	55%
B	10.13	40%
C	23.01	30%
D	**0.00**	20%
Total Area	33.14	
Calculate the Minimum RRv		
S =	**0.33**	
Impervious =	6.28	*acre*
Precipitation	1.89	*in*
Rv	0.95	
Minimum RRv	**13,523**	***ft3***
	0.31	af

NOI QUESTIONS

#	NOI Question	Reported Value	
		cf	af
28	Total Water Quality Volume (WQv) Required	50139	*1.151*
30	Total RRV Provided	26924	*0.618*
31	Is RRv Provided ≥WQv Required?	No	
32	Minimum RRv	13523	*0.310*
32a	Is RRv Provided ≥ Minimum RRv Required?	Yes	
33a	Total WQv Treated	23214	*0.533*
34	Sum of Volume Reduced & Treated	50139	*1.151*
34	Sum of Volume Reduced and Treated	50139	*1.151*
35	Is Sum RRv Provided and WQv Provided ≥WQv Required?	Yes	

Apply Peak Flow Attenuation			
36	Channel Protection	*Cpv*	
37	Overbank	*Qp*	
37	Extreme Flood Control	*Qf*	
	Are Quantity Control requirements met?	*Yes*	Plan Completed

Planning

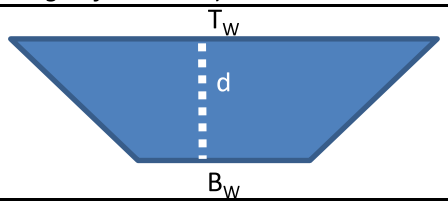
Practice	Description	Application
Preservation of Undisturbed Areas	Delineate and place into permanent conservation undisturbed forests, native vegetated areas, riparian corridors, wetlands, and natural terrain.	Considered & Applied
Preservation of Buffers	Define, delineate and preserve naturally vegetated buffers along perennial streams, rivers, shorelines and wetlands.	N/A
Reduction of Clearing and Grading	Limit clearing and grading to the minimum amount needed for roads, driveways, foundations, utilities and stormwater management facilities.	Considered & Applied
Locating Development in Less Sensitive Areas	Avoid sensitive resource areas such as floodplains, steep slopes, erodible soils, wetlands, mature forests and critical habitats by locating development to fit the terrain in areas that will create the least impact.	Considered & Applied
Open Space Design	Use clustering, conservation design or open space design to reduce impervious cover, preserve more open space and protect water resources.	Considered & Applied
Soil Restoration	Restore the original properties and porosity of the soil by deep till and amendment with compost to reduce the generation of runoff and enhance the runoff reduction performance of post construction practices.	Considered & Not Applied
Roadway Reduction	Minimize roadway widths and lengths to reduce site impervious area	Considered & Applied
Sidewalk Reduction	Minimize sidewalk lengths and widths to reduce site impervious area	Considered & Applied
Driveway Reduction	Minimize driveway lengths and widths to reduce site impervious area	Considered & Applied
Cul-de-sac Reduction	Minimize the number of cul-de-sacs and incorporate landscaped areas to reduce their impervious cover.	N/A
Building Footprint Reduction	Reduce the impervious footprint of residences and commercial buildings by using alternate or taller buildings while maintaining the same floor to area ratio.	Considered & Applied
Parking Reduction	Reduce imperviousness on parking lots by eliminating unneeded spaces, providing compact car spaces and efficient parking lanes, minimizing stall dimensions, using porous pavement surfaces in overflow parking areas, and using multi-storied parking decks where appropriate.	Considered & Applied

Dry Swale Worksheet

Design Point:	storm

Enter Site Data For Drainage Area to be Treated by Practice							
Catchment Number	**Total Area** *(Acres)*	**Impervious Area** *(Acres)*	**Percent Impervious** *%*	**Rv**	**WQv** *(ft^3)*	**Precipitation** *(in)*	**Description**
1	13.36	3.15	0.24	0.26	24057.76	1.89	Dry Swale
Enter Impervious Area Reduced by Disconnection of Rooftops		0.00	24%	0.26	24,058	<<WQv after adjusting for Disconnected Rooftops	

Pretreatment Provided			Pretreatment Technique
Pretreatment (10% of WQv)	2,406	ft^3	

Calculate Available Storage Capacity			
Bottom Width	7.5	*ft*	Design with a bottom width no greater than eight feet to avoid potential gullying and channel braiding, but no less than two feet
Side Slope (X:1)	3	*Okay*	Channels shall be designed with moderate side slopes (flatter than 3:1) for most conditions. 2:1 is the absolute maximum side slope
Longitudinal Slope	3%	*Okay*	*Maximum longitudinal slope shall be 4%*
Flow Depth	1.2	*ft*	*Maximum ponding depth of one foot at the mid-point of the channel, and a maximum depth of 18" at the end point of the channel (for storage of the WQv)*
Top Width	14.7	*ft*	
Area	13.32	*sf*	
Minimum Length	1626	*ft*	
Actual Length	2291	*ft*	
End Point Depth check	1.00	*Okay*	*A maximum depth of 18" at the end point of the channel (for storage of the WQv)*
Storage Capacity	32,922	ft^3	
Soil Group (HSG)		B	

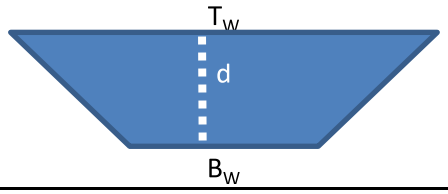
Runoff Reduction				
Is the Dry Swale contributing flow to another practice?		No	Select Practice	N/A
RRv	**13,169**	ft^3	**Runnoff Reduction equals 40% in HSG A and B and 20% in HSG C and D up to the WQv**	
Volume Treated	10,889	ft^3	This is the difference between the WQv calculated and the runoff reduction achieved in the swale	
Volume Directed	0	ft^3	This volume is directed another practice	
Volume √	*Okay*		Check to be sure that channel is long enough to store WQv	

Dry Swale Worksheet

Design Point:	storm

Enter Site Data For Drainage Area to be Treated by Practice							
Catchment Number	**Total Area** *(Acres)*	**Impervious Area** *(Acres)*	**Percent Impervious** *%*	**Rv**	**WQv** *(ft^3)*	**Precipitation** *(in)*	**Description**
2	10.28	2.25	0.22	0.25	17402.50	1.89	Dry Swale
Enter Impervious Area Reduced by Disconnection of Rooftops		0.00	22%	0.25	17,402	<<WQv after adjusting for Disconnected Rooftops	

Pretreatment Provided			Pretreatment Technique
Pretreatment (10% of WQv)	1,740	ft^3	Veg Buffer

Calculate Available Storage Capacity			
Bottom Width	7	*ft*	Design with a bottom width no greater than eight feet to avoid potential gullying and channel braiding, but no less than two feet
Side Slope (X:1)	3	*Okay*	Channels shall be designed with moderate side slopes (flatter than 3:1) for most conditions. 2:1 is the absolute maximum side slope
Longitudinal Slope	4%	*Okay*	*Maximum longitudinal slope shall be 4%*
Flow Depth	1.2	*ft*	*Maximum ponding depth of one foot at the mid-point of the channel, and a maximum depth of 18" at the end point of the channel (for storage of the WQv)*
Top Width	14.2	*ft*	
Area	12.72	*sf*	
Minimum Length	1231	*ft*	
Actual Length	1859	*ft*	
End Point Depth check	1.00	*Okay*	*A maximum depth of 18" at the end point of the channel (for storage of the WQv)*
Storage Capacity	25,387	ft^3	
Soil Group (HSG)		C	

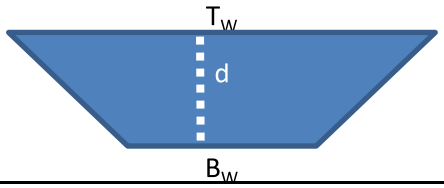
Runoff Reduction				
Is the Dry Swale contributing flow to another practice?		No	Select Practice	N/A
RRv	**5,077**	**ft^3**	**Runnoff Reduction equals 40% in HSG A and B and 20% in HSG C and D up to the WQv**	
Volume Treated	12,325	ft^3	This is the difference between the WQv calculated and the runoff reduction achieved in the swale	
Volume Directed	0	ft^3	This volume is directed another practice	
Volume √	*Okay*		Check to be sure that channel is long enough to store WQv	

Dry Swale Worksheet

Design Point:	storm

Enter Site Data For Drainage Area to be Treated by Practice							
Catchment Number	**Total Area** *(Acres)*	**Impervious Area** *(Acres)*	**Percent Impervious** *%*	**Rv**	**WQv** *(ft^3)*	**Precipitation** *(in)*	**Description**
3	9.54	0.88	0.09	0.13	8678.32	1.89	Dry Swale
Enter Impervious Area Reduced by Disconnection of Rooftops		0.00	9%	0.13	8,678	<<WQv after adjusting for Disconnected Rooftops	

Pretreatment Provided			Pretreatment Technique
Pretreatment (10% of WQv)	868	*ft^3*	

Calculate Available Storage Capacity			
Bottom Width	7	*ft*	Design with a bottom width no greater than eight feet to avoid potential gullying and channel braiding, but no less than two feet
Side Slope (X:1)	3	*Okay*	Channels shall be designed with moderate side slopes (flatter than 3:1) for most conditions. 2:1 is the absolute maximum side slope
Longitudinal Slope	0%	*Okay*	*Maximum longitudinal slope shall be 4%*
Flow Depth	1.2	*ft*	*Maximum ponding depth of one foot at the mid-point of the channel, and a maximum depth of 18" at the end point of the channel (for storage of the WQv)*
Top Width	14.2	*ft*	
Area	12.72	*sf*	
Minimum Length	614	*ft*	
Actual Length	2167	*ft*	
End Point Depth check	1.00	*Okay*	*A maximum depth of 18" at the end point of the channel (for storage of the WQv)*
Storage Capacity	28,432	*ft^3*	
Soil Group (HSG)		B	

Runoff Reduction				
Is the Dry Swale contributing flow to another practice?		No	Select Practice	N/A
RRv	**8,678**	***ft^3***	**Runnoff Reduction equals 40% in HSG A and B and 20% in HSG C and D up to the WQv**	
Volume Treated	0	*ft^3*	This is the difference between the WQv calculated and the runoff reduction achieved in the swale	
Volume Directed	0	*ft^3*	This volume is directed another practice	
Volume √	*Okay*		Check to be sure that channel is long enough to store WQv	

Dry Swale Worksheet

Total RRV	26,924.43
Total Area	33.19
Total Impervious Area	6.28
Total Volume Treated	23,214.15
Rooftop Disconnect Impervious Area Total	0.00

SUNSET RIDGE ESTATES &
LAKEWOOD CUSTOM HOMES

	1-year	10-year	100-year
Rainfall Type II	**1.89**	**3.17**	**5.32**

Runoff Summary Table

Subcatchement	DA (ACRES)	RCN	TC (mins)	PEAK RUNOFF (cfs)		
				1-year	10-year	100-year
Existing 1	33.17	66	26.2	1.75	22.50	79.36
Total Exisitng	33.17	NA	NA	1.75	22.50	79.36
Proposed 1	33.17	73	15.0	0.00	0.98	23.65

1. Water Quality Volume DA-1A

Drainage Area A = **33.171** acres
90% Rainfall Event P = 1

Percent Impervious I = 341147 (FT^2) Imperveous / Total Area (FT^2) 1E+06 = 0.236
Total = 23.61 %

$Rv = 0.05 + 0.009(I)$

$Rv = 0.262$

$WQ_v = (A \times Rv \times P)/12$

WQ_v = 0.73 ac-ft
31606.56 cubic feet

Provided: 26924 Cubic Feet **DRY SWALE STOARE VOLUME**

4. Channel Protection Volume (1-year Storm For 24 hours)

Developed Tributary DA = **33.17** acres
RCN = **73**
Rainfall (1-yr) = **1.89** in.

Runoff 1-yr (Qd) = **0.2** (from TR-55 FIGURE 2.1)

Time of Concentration (Tc) = **0.20** hours

Ia =0.2(1000/RCN - 10) = 0.74

Ia/P = 0.39

Form EXHIBIT 4-II (TR-55) Unit Peak Discharge for Type II Rainfall:

Qu = **575** csm/in

From FIGURE B.1 (NYS Stormwater Design Manual) (for 24 hours)

Qo/Qi = **0.03**

Eq. 2.1.16 (NYS Stormwater Design Manual)

$$Vs/Vr = 0.682 - 1.43(Qo/Qi) + 1.64(Qo/Qi)^2 - 0.804(Qo/Qi)^3$$

Vs/Vr = 0.641

Equation 2.1.17 (NYS Stormwater Design Manual)

$$Vs = (Vs/Vr \times Qd \times A)/12$$

Vs = 0.35 ac-ft
15426 Cubic Feet

5A. Channel Protection Orfice - Lower Pond

Channel Protecetion Volume Provided = **0.35** ac-ft

Head: From elevation: **701.25** to **702.75** = 1.5 feet

Average h = 0.75 feet

For 24-hour release:

Q = Volume/24hours/60minutes/60seconds

Q = 0.1765 cfs (average)

Orfice Equation:

$Q = 0.6A(64.4H)^{0.5}$

$A = Q/(0.6(64.4h)^{0.5})$

$A =$ 0.04 ft^2

$D = (A/\pi)^{0.5} \times 2$

D = **0.23** feet = 2.8 inches

Use: 4 -inch orfice
At elevation: 701.25 feet

***Do not use a Channel Orfice, smaller than a minimum of 3"

5B. Channel Protection Orfice - Upper Pond

Channel Protecetion Volume Provided = **0.35** ac-ft

Head: From elevation: **739** to **741** = 2 feet

Average h = 1 feet

For 24-hour release:

Q = Volume/24hours/60minutes/60seconds

Q = 0.1765 cfs (average)

Orfice Equation:

$Q = 0.6A(64.4H)^{0.5}$

$A = Q/(0.6(64.4h)^{0.5})$

$A =$ 0.04 ft^2

$D = (A/\pi)^{0.5} \times 2$

D = **0.22** feet = 2.6 inches

Use: 4 -inch orfice
At elevation: 739 feet

***Do not use a Channel Orfice, smaller than a minimum of 3"

APPENDIX D

Notice of Intent
(NOI)

0644089821

NOTICE OF INTENT

New York State Department of Environmental Conservation
Division of Water
625 Broadway, 4th Floor
Albany, New York 12233-3505

NYR _____ (for DEC use only)

Stormwater Discharges Associated with Construction Activity Under State Pollutant Discharge Elimination System (SPDES) General Permit # GP-0-20-001

All sections must be completed unless otherwise noted. Failure to complete all items may result in this form being returned to you, thereby delaying your coverage under this General Permit. Applicants must read and understand the conditions of the permit and prepare a Stormwater Pollution Prevention Plan prior to submitting this NOI. Applicants are responsible for identifying and obtaining other DEC permits that may be required.

-IMPORTANT-
RETURN THIS FORM TO THE ADDRESS ABOVE

OWNER/OPERATOR MUST SIGN FORM

Owner/Operator Information

Owner/Operator (Company Name/Private Owner Name/Municipality Name)
ATL Contractors

Owner/Operator Contact Person Last Name (NOT CONSULTANT)
Liccciardello

Owner/Operator Contact Person First Name
Angelo

Owner/Operator Mailing Address
8242 East Bluff

City
Penn Yan

State: NY Zip: 14527 -

Phone (Owner/Operator): 585 - 820 - 0930

Fax (Owner/Operator): ___ - ___ - ____

Email (Owner/Operator)
alhunter@rochester.rr.com

FED TAX ID
__ - _____ (not required for individuals)

Project Site Information

Project/Site Name
Sunset Rdg. Estates/Lakewood Cust. Homes

Street Address (NOT P.O. BOX)
3535 East Lake Road

Side of Street
○ **North** ● **South** ○ **East** ○ **West**

City/Town/Village (THAT ISSUES BUILDING PERMIT)
Canandaigua

State: NY
Zip: 14424 -
County: Ontario
DEC Region: 8

Name of Nearest Cross Street
Otetiana Point

Distance to Nearest Cross Street (Feet)
100

Project In Relation to Cross Street
○ **North** ○ **South** ● **East** ○ **West**

Tax Map Numbers
Section-Block-Parcel
98.19-1-20.100

Tax Map Numbers

1. Provide the Geographic Coordinates for the project site. To do this, go to the NYSDEC Stormwater Interactive Map on the DEC website at:

https://gisservices.dec.ny.gov/gis/stormwater/

Zoom into your Project Location such that you can accurately click on the centroid of your site. Once you have located the centroid of your project site, go to the bottom right hand corner of the map for the X, Y coordinates. Enter the coordinates into the boxes below. For problems with the interactive map use the help function.

X Coordinates (Easting)
-77.24921
Ex. -73.749

Y Coordinates (Northing)
42.85644
Ex. 42.652

2. What is the nature of this construction project?

● **New Construction**

○ **Redevelopment with increase in impervious area**

○ **Redevelopment with no increase in impervious area**

3. Select the predominant land use for both pre and post development conditions.
SELECT ONLY ONE CHOICE FOR EACH

Pre-Development Existing Land Use	Post-Development Future Land Use
● FOREST	○ SINGLE FAMILY HOME
○ PASTURE/OPEN LAND	● SINGLE FAMILY SUBDIVISION — Number of Lots: 31
○ CULTIVATED LAND	○ TOWN HOME RESIDENTIAL
○ SINGLE FAMILY HOME	○ MULTIFAMILY RESIDENTIAL
○ SINGLE FAMILY SUBDIVISION	○ INSTITUTIONAL/SCHOOL
○ TOWN HOME RESIDENTIAL	○ INDUSTRIAL
○ MULTIFAMILY RESIDENTIAL	○ COMMERCIAL
○ INSTITUTIONAL/SCHOOL	○ MUNICIPAL
○ INDUSTRIAL	○ ROAD/HIGHWAY
○ COMMERCIAL	○ RECREATIONAL/SPORTS FIELD
○ ROAD/HIGHWAY	○ BIKE PATH/TRAIL
○ RECREATIONAL/SPORTS FIELD	○ LINEAR UTILITY (water, sewer, gas, etc.)
○ BIKE PATH/TRAIL	○ PARKING LOT
○ LINEAR UTILITY	○ CLEARING/GRADING ONLY
○ PARKING LOT	○ DEMOLITION, NO REDEVELOPMENT
○ OTHER	○ WELL DRILLING ACTIVITY *(Oil, Gas, etc.)
	○ OTHER

***Note:** for gas well drilling, non-high volume hydraulic fractured wells only

4. In accordance with the larger common plan of development or sale, enter the total project site area; the total area to be disturbed; existing impervious area to be disturbed (for redevelopment activities); and the future impervious area constructed within the disturbed area. (Round to the nearest tenth of an acre.)

Total Site Area	Total Area To Be Disturbed	Existing Impervious Area To Be Disturbed	Future Impervious Area Within Disturbed Area
33.2	28.0	0.	6.3

5. Do you plan to disturb more than 5 acres of soil at any one time? ● **Yes** ○ **No**

6. Indicate the percentage of each Hydrologic Soil Group(HSG) at the site.

A	B	C	D
0 %	40 %	60 %	0 %

7. Is this a phased project? ○ **Yes** ● **No**

8. Enter the planned start and end dates of the disturbance activities.

Start Date	End Date
10/01/2022	10/01/2025

9. Identify the nearest surface waterbody(ies) to which construction site runoff will discharge.

Name

Unnamed Class C Stream

9a. Type of waterbody identified in Question 9?

- ○ Wetland / State Jurisdiction On Site (Answer 9b)
- ○ Wetland / State Jurisdiction Off Site
- ○ Wetland / Federal Jurisdiction On Site (Answer 9b)
- ○ Wetland / Federal Jurisdiction Off Site
- ○ Stream / Creek On Site
- ● Stream / Creek Off Site
- ○ River On Site
- ○ River Off Site
- ○ Lake On Site
- ○ Lake Off Site
- ○ Other Type On Site
- ○ Other Type Off Site

9b. How was the wetland identified?

- ● Regulatory Map
- ○ Delineated by Consultant
- ○ Delineated by Army Corps of Engineers
- ○ Other (identify)

10. Has the surface waterbody(ies) in question 9 been identified as a 303(d) segment in Appendix E of GP-0-20-001? ○ **Yes** ● **No**

11. Is this project located in one of the Watersheds identified in Appendix C of GP-0-20-001? ○ **Yes** ● **No**

12. Is the project located in one of the watershed areas associated with AA and AA-S classified waters? ● **Yes** ○ **No**
If no, skip question 13.

13. Does this construction activity disturb land with no existing impervious cover and where the Soil Slope Phase is identified as an E or F on the USDA Soil Survey? ○ **Yes** ● **No**
If Yes, what is the acreage to be disturbed?

.

14. Will the project disturb soils within a State regulated wetland or the protected 100 foot adjacent area? ○ **Yes** ● **No**

15. Does the site runoff enter a separate storm sewer system (including roadside drains, swales, ditches, culverts, etc)? ◉ **Yes** ○ **No** ○ **Unknown**

16. What is the name of the municipality/entity that owns the separate storm sewer system?

Town of Canandaigua

17. Does any runoff from the site enter a sewer classified as a Combined Sewer? ○ **Yes** ◉ **No** ○ **Unknown**

18. Will future use of this site be an agricultural property as defined by the NYS Agriculture and Markets Law? ○ **Yes** ◉ **No**

19. Is this property owned by a state authority, state agency, federal government or local government? ○ **Yes** ◉ **No**

20. Is this a remediation project being done under a Department approved work plan? (i.e. CERCLA, RCRA, Voluntary Cleanup Agreement, etc.) ○ **Yes** ◉ **No**

21. Has the required Erosion and Sediment Control component of the SWPPP been developed in conformance with the current NYS Standards and Specifications for Erosion and Sediment Control (aka Blue Book)? ◉ **Yes** ○ **No**

22. Does this construction activity require the development of a SWPPP that includes the post-construction stormwater management practice component (i.e. Runoff Reduction, Water Quality and Quantity Control practices/techniques)? ◉ **Yes** ○ **No**
If No, skip questions 23 and 27-39.

23. Has the post-construction stormwater management practice component of the SWPPP been developed in conformance with the current NYS Stormwater Management Design Manual? ◉ **Yes** ○ **No**

24. The Stormwater Pollution Prevention Plan (SWPPP) was prepared by:

- ● **Professional Engineer (P.E.)**
- ○ **Soil and Water Conservation District (SWCD)**
- ○ **Registered Landscape Architect (R.L.A)**
- ○ **Certified Professional in Erosion and Sediment Control (CPESC)**
- ○ **Owner/Operator**
- ○ **Other**

SWPPP Preparer: Marks Engineering, P.C.

Contact Name (Last, Space, First): Marks, Brenan

Mailing Address: 42 Beeman St.

City: Canandaigua

State: NY Zip: 14424-

Phone: 585-905-0360 Fax: - -

Email: bmarks@markseengineering.com

SWPPP Preparer Certification

I hereby certify that the Stormwater Pollution Prevention Plan (SWPPP) for this project has been prepared in accordance with the terms and conditions of the GP-0-20-001. Furthermore, I understand that certifying false, incorrect or inaccurate information is a violation of this permit and the laws of the State of New York and could subject me to criminal, civil and/or administrative proceedings.

First Name: Brenan **MI**: A

Last Name: Marks

Signature

Date: 04/21/2021

25. Has a construction sequence schedule for the planned management practices been prepared? ● Yes ○ No

26. Select **all** of the erosion and sediment control practices that will be employed on the project site:

Temporary Structural

- ● Check Dams
- ● Construction Road Stabilization
- ● Dust Control
- ○ Earth Dike
- ○ Level Spreader
- ○ Perimeter Dike/Swale
- ○ Pipe Slope Drain
- ○ Portable Sediment Tank
- ○ Rock Dam
- ○ Sediment Basin
- ● Sediment Traps
- ● Silt Fence
- ● Stabilized Construction Entrance
- ● Storm Drain Inlet Protection
- ○ Straw/Hay Bale Dike
- ○ Temporary Access Waterway Crossing
- ○ Temporary Stormdrain Diversion
- ○ Temporary Swale
- ○ Turbidity Curtain
- ○ Water bars

Biotechnical

- ○ Brush Matting
- ○ Wattling

Vegetative Measures

- ○ Brush Matting
- ○ Dune Stabilization
- ● Grassed Waterway
- ● Mulching
- ● Protecting Vegetation
- ● Recreation Area Improvement
- ● Seeding
- ○ Sodding
- ○ Straw/Hay Bale Dike
- ○ Streambank Protection
- ○ Temporary Swale
- ● Topsoiling
- ● Vegetating Waterways

Permanent Structural

- ○ Debris Basin
- ○ Diversion
- ○ Grade Stabilization Structure
- ● Land Grading
- ○ Lined Waterway (Rock)
- ○ Paved Channel (Concrete)
- ○ Paved Flume
- ● Retaining Wall
- ○ Riprap Slope Protection
- ● Rock Outlet Protection
- ○ Streambank Protection

Other

Post-construction Stormwater Management Practice (SMP) Requirements

Important: Completion of Questions 27-39 is not required if response to Question 22 is No.

27. Identify all site planning practices that were used to prepare the final site plan/layout for the project.

- ● **Preservation of Undisturbed Areas**
- ● **Preservation of Buffers**
- ● **Reduction of Clearing and Grading**
- ● **Locating Development in Less Sensitive Areas**
- ○ **Roadway Reduction**
- ● **Sidewalk Reduction**
- ● **Driveway Reduction**
- ○ **Cul-de-sac Reduction**
- ● **Building Footprint Reduction**
- ● **Parking Reduction**

27a. Indicate which of the following soil restoration criteria was used to address the requirements in Section 5.1.6("Soil Restoration") of the Design Manual (2010 version).

- ● All disturbed areas will be restored in accordance with the Soil Restoration requirements in Table 5.3 of the Design Manual (see page 5-22).
- ○ Compacted areas were considered as impervious cover when calculating the **WQv Required**, and the compacted areas were assigned a post-construction Hydrologic Soil Group (HSG) designation that is one level less permeable than existing conditions for the hydrology analysis.

28. Provide the total Water Quality Volume (WQv) required for this project (based on final site plan/layout).

Total WQv Required

		1	.	1	5	1

acre-feet

29. Identify the RR techniques (Area Reduction), RR techniques(Volume Reduction) and Standard SMPs with RRv Capacity in Table 1 (See Page 9) that were used to reduce the Total WQv Required(#28).

Also, provide in Table 1 the total impervious area that contributes runoff to each technique/practice selected. For the Area Reduction Techniques, provide the total contributing area (includes pervious area) and, if applicable, the total impervious area that contributes runoff to the technique/practice.

Note: Redevelopment projects shall use Tables 1 and 2 to identify the SMPs used to treat and/or reduce the WQv required. If runoff reduction techniques will not be used to reduce the required WQv, skip to question 33a after identifying the SMPs.

Table 1 - Runoff Reduction (RR) Techniques and Standard Stormwater Management Practices (SMPs)

	Total Contributing Area (acres)		Total Contributing Impervious Area(acres)
RR Techniques (Area Reduction)			
● Conservation of Natural Areas (RR-1)	4.5	and/or	
● Sheetflow to Riparian Buffers/Filters Strips (RR-2)	3.8	and/or	
○ Tree Planting/Tree Pit (RR-3)		and/or	
○ Disconnection of Rooftop Runoff (RR-4)		and/or	
RR Techniques (Volume Reduction)			
○ Vegetated Swale (RR-5)			
○ Rain Garden (RR-6)			
○ Stormwater Planter (RR-7)			
○ Rain Barrel/Cistern (RR-8)			
○ Porous Pavement (RR-9)			
○ Green Roof (RR-10)			
Standard SMPs with RRv Capacity			
○ Infiltration Trench (I-1)			
○ Infiltration Basin (I-2)			
○ Dry Well (I-3)			
○ Underground Infiltration System (I-4)			
○ Bioretention (F-5)			
● Dry Swale (O-1)			6.28
Standard SMPs			
○ Micropool Extended Detention (P-1)			
● Wet Pond (P-2)			5.4
○ Wet Extended Detention (P-3)			
○ Multiple Pond System (P-4)			
○ Pocket Pond (P-5)			
○ Surface Sand Filter (F-1)			
○ Underground Sand Filter (F-2)			
○ Perimeter Sand Filter (F-3)			
○ Organic Filter (F-4)			
○ Shallow Wetland (W-1)			
○ Extended Detention Wetland (W-2)			
○ Pond/Wetland System (W-3)			
○ Pocket Wetland (W-4)			
○ Wet Swale (O-2)			

Table 2 - Alternative SMPs (DO NOT INCLUDE PRACTICES BEING USED FOR PRETREATMENT ONLY)

Alternative SMP	Total Contributing Impervious Area(acres)
○ **Hydrodynamic**	
○ **Wet Vault**	
○ **Media Filter**	
○ **Other**	

Provide the name and manufacturer of the Alternative SMPs (i.e. proprietary practice(s)) being used for WQv treatment.

Name

Manufacturer

Note: Redevelopment projects which do not use RR techniques, shall use questions 28, 29, 33 and 33a to provide SMPs used, total WQv required and total WQv provided for the project.

30. Indicate the Total RRv provided by the RR techniques (Area/Volume Reduction) and Standard SMPs with RRv capacity identified in question 29.

Total RRv provided

0.618 **acre-feet**

31. Is the Total RRv provided (#30) greater than or equal to the total WQv required (#28).

○ **Yes** ● **No**

If Yes, go to question 36.
If No, go to question 32.

32. Provide the Minimum RRv required based on HSG.
[Minimum RRv Required = (P)(0.95)(Ai)/12, Ai=(S)(Aic)]

Minimum RRv Required

0.310 **acre-feet**

32a. Is the Total RRv provided (#30) greater than or equal to the Minimum RRv Required (#32)?

● **Yes** ○ **No**

If Yes, go to question 33.
Note: Use the space provided in question #39 to summarize the specific site limitations and justification for not reducing 100% of WQv required (#28). A detailed evaluation of the specific site limitations and justification for not reducing 100% of the WQv required (#28) must also be included in the SWPPP.
If No, sizing criteria has not been met, so NOI can not be processed. SWPPP preparer must modify design to meet sizing criteria.

33. Identify the Standard SMPs in Table 1 and, if applicable, the Alternative SMPs in Table 2 that were used to treat the remaining total WQv(=Total WQv Required in 28 - Total RRv Provided in 30).

Also, provide in Table 1 and 2 the total impervious area that contributes runoff to each practice selected.

Note: Use Tables 1 and 2 to identify the SMPs used on Redevelopment projects.

33a. Indicate the Total WQv provided (i.e. WQv treated) by the SMPs identified in question #33 and Standard SMPs with RRv Capacity identified in question 29.

WQv Provided

0.053 **acre-feet**

Note: For the standard SMPs with RRv capacity, the WQv provided by each practice = the WQv calculated using the contributing drainage area to the practice - RRv provided by the practice. (See Table 3.5 in Design Manual)

34. Provide the sum of the Total RRv provided (#30) and the WQv provided (#33a).

1.151

35. Is the sum of the RRv provided (#30) and the WQv provided (#33a) greater than or equal to the total WQv required (#28)? ● **Yes** ○ **No**

If Yes, go to question 36.
If No, sizing criteria has not been met, so NOI can not be processed. SWPPP preparer must modify design to meet sizing criteria.

36. Provide the total Channel Protection Storage Volume (CPv) required and provided or select waiver (36a), if applicable.

CPv Required

0.35 **acre-feet**

CPv Provided

0.35 **acre-feet**

36a. The need to provide channel protection has been waived because:

○ Site discharges directly to tidal waters or a fifth order or larger stream.

○ Reduction of the total CPv is achieved on site through runoff reduction techniques or infiltration systems.

37. Provide the Overbank Flood (Qp) and Extreme Flood (Qf) control criteria or select waiver (37a), if applicable.

Total Overbank Flood Control Criteria (Qp)

Pre-Development

44.51 **CFS**

Post-development

9.19 **CFS**

Total Extreme Flood Control Criteria (Qf)

Pre-Development

115.58 **CFS**

Post-development

68.97 **CFS**

37a. The need to meet the Qp and Qf criteria has been waived because:

- ○ Site discharges directly to tidal waters or a fifth order or larger stream.
- ○ Downstream analysis reveals that the Qp and Qf controls are not required

38. Has a long term Operation and Maintenance Plan for the post-construction stormwater management practice(s) been developed? ● **Yes** ○ **No**

If Yes, Identify the entity responsible for the long term Operation and Maintenance

ATL Contractors

39. Use this space to summarize the specific site limitations and justification for not reducing 100% of WQv required(#28). (See question 32a) This space can also be used for other pertinent project information.

40. Identify other DEC permits, existing and new, that are required for this project/facility.

- ○ Air Pollution Control
- ○ Coastal Erosion
- ○ Hazardous Waste
- ○ Long Island Wells
- ○ Mined Land Reclamation
- ○ Solid Waste
- ○ Navigable Waters Protection / Article 15
- ○ Water Quality Certificate
- ○ Dam Safety
- ○ Water Supply
- ○ Freshwater Wetlands/Article 24
- ○ Tidal Wetlands
- ○ Wild, Scenic and Recreational Rivers
- ○ Stream Bed or Bank Protection / Article 15
- ○ Endangered or Threatened Species(Incidental Take Permit)
- ○ Individual SPDES
- ○ SPDES Multi-Sector GP [N][Y][R][ ][ ][ ][ ][ ][ ]
- ○ Other [ ]
- ● None

41. Does this project require a US Army Corps of Engineers Wetland Permit? ○ **Yes** ● **No**
If Yes, Indicate Size of Impact. [ ][ ][ ][ ][ ].[ ]

42. Is this project subject to the requirements of a regulated, traditional land use control MS4? ● **Yes** ○ **No**
(If No, skip question 43)

43. Has the "MS4 SWPPP Acceptance" form been signed by the principal executive officer or ranking elected official and submitted along with this NOI? ● **Yes** ○ **No**

44. If this NOI is being submitted for the purpose of continuing or transferring coverage under a general permit for stormwater runoff from construction activities, please indicate the former SPDES number assigned. [N][Y][R][ ][ ][ ][ ][ ][ ]

Owner/Operator Certification

I have read or been advised of the permit conditions and believe that I understand them. I also understand that, under the terms of the permit, there may be reporting requirements. I hereby certify that this document and the corresponding documents were prepared under my direction or supervision. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. I further understand that coverage under the general permit will be identified in the acknowledgment that I will receive as a result of submitting this NOI and can be as long as sixty (60) business days as provided for in the general permit. I also understand that, by submitting this NOI, I am acknowledging that the SWPPP has been developed and will be implemented as the first element of construction, and agreeing to comply with all the terms and conditions of the general permit for which this NOI is being submitted.

Print First Name: Angelo

MI:

Print Last Name: Liccciardello

Owner/Operator Signature:

Date: 02/01/2021

APPENDIX E

MS4 Stormwater Pollution Prevention Plan (SWPPP)
Acceptance Form -

APPENDIX F

MAINTENANCE AGREEMENT

and

Management Inspection Checklist

Stormwater Ponds

Description: Constructed stormwater retention basin that has a permanent pool (or micropool). Runoff from each rain event is detained and treated in the pool through settling and biological uptake mechanisms.

Design Options: Micropool Extended Detention (P-1), Wet Pond (P-2), Wet Extended Detention (P-3), Multiple Pond (P-4), Pocket Pond (P-5)

KEY CONSIDERATIONS

FEASIBILITY

- Contributing drainage area greater than 10 acres for P-1, 25 acres for P-2 to P-4.
- Follow DEC Guidelines for Design of Dams.
- Provide a minimum 2' separation from the groundwater in sole source aquifers.
- Do not locate ponds in jurisdictional wetlands.
- Avoid directing hotspot runoff to design P-5.

CONVEYANCE

- Forebay at each inlet, unless the inlet contributes less than 10% of the total inflow, 4' to 6' deep.
- Stabilize the channel below the pond to prevent erosion.
- Stilling basin at the outlet to reduce velocities.

PREATREATMENT

- Forebay volume at least 10% of the WQ_v
- Forebay shall be designed with non-erosive outlet conditions.
- Provide direct access to the forebay for maintenance equipment
- In sole source aquifers, provide 100% pretreatment for hotspot runoff.

TREATMENT

- Provide the water quality volume in a combination of permanent pool and extended detention (Table 6.1 in manual provides limitations on storage breakdown)
- Minimum length to width ratio of 1.5:1
- Minimum surface area to drainage area ratio of 1:100

LANDSCAPING

STORMWATER MANAGEMENT SUITABILITY

X	Water Quality
X	Channel Protection
X	Overbank Flood Protection
X	Extreme Flood Protection

Accepts Hotspot Runoff: *Yes*

(2 feet minimum separation distance required to water table)

FEASIBILITY CONSIDERATIONS

L	Cost
L	Maintenance Burden

Key: L=Low **M**=Moderate **H**=High

Residential Subdivision Use: Yes

High Density/Ultra-Urban: *No*

Soils: *Hydrologic group 'A' soils may require pond liner*

Hydrologic group 'D' soils may have compaction constraints

Other Considerations:

- *Thermal effects*

- Provide a minimum 10’ and preferably 15’ safety bench extending from the high water mark, with a maximum slope of 6%.
- Provide an aquatic bench extending 15 feet outward from the shoreline, and a maximum depth of 18" below normal water elevation.
- Develop a landscaping plan.
- Provide a 25’pond buffer.
- No woody vegetation within 15 feet of the toe of the embankment, or 25 feet from the principal spillway.

MAINTENANCE REQUIREMENTS

- Legally binding maintenance agreement
- Sediment removal from forebay every five to six years or when 50% full.
- Provide a maintenance easement and right-of-way.
- Removable trash rack on the principal spillway.
- Non-clogging low flow orifice
- Riser in the embankment.
- Pond drain required, capable of drawing down the pond in 24 hours.
- Notification required for pond drainage.
- Provide an adjustable gate valve on both the WQ_v-ED pipe, and the pond drain.
- Side Slopes less than 3:1, and terminate at a safety bench.
- Principal spillway shall not permit access by small children, and endwalls above pipes greater than 48” in diameter shall be fenced.

- *Outlet clogging*
- *Safety bench*

POLLUTANT REMOVAL

G	Phosphorus
G	Nitrogen
G	Metals - Cadmium, Copper,Lead, and Zinc removal
G	Pathogens Coliform, E.Coli, Streptococci removal

Key: G=Good **F**=Fair **P**=Poor

STANDARD AND SPECIFICATIONS FOR TEMPORARY CRITICAL AREA PLANTINGS

Definition

Providing erosion control protection to a critical area for an interim period. A critical area is any disturbed, denuded slope subject to erosion.

Purpose

To provide temporary erosion and sediment control. Temporary control is achieved by covering all bare ground areas that exist as a result of construction or a natural event.

Conditions Where Practice Applies

Temporary seedings may be necessary on construction sites to protect an area, or section, where final grading is complete, when preparing for winter work shutdown, or to provide cover when permanent seedings are likely to fail due to mid-summer heat and drought. The intent is to provide temporary protective cover during temporary shutdown of construction and/or while waiting for optimal planting time.

Criteria

Water management practices must be installed as appropriate for site conditions. The area must be rough graded and slopes physically stable. Large debris and rocks are usually removed. Seedbed must be seeded within 24 hours of disturbance or scarification of the soil surface will be necessary prior to seeding.

Fertilizer or lime are not typically used for temporary seedings.

IF: Spring or summer or early fall, then seed the area with ryegrass (annual or perennial) at 30 lbs. per acre (Approximately 0.7 lb./1000 sq. ft. or use 1 lb./1000 sq. ft.).
IF: Late fall or early winter, then seed Certified 'Aroostook' winter rye (cereal rye) at 100 lbs. per acre (2.5 lbs./1000 sq. ft.).

Any seeding method may be used that will provide uniform application of seed to the area and result in relatively good soil to seed contact.

Mulch the area with hay or straw at 2 tons/acre (approx. 90 lbs./1000 sq. ft. or 2 bales). Quality of hay or straw mulch allowable will be determined based on long term use and visual concerns. Mulch anchoring will be required where wind or areas of concentrated water are of concern. Wood fiber hydromulch or other sprayable products approved for erosion control (nylon web or mesh) may be used if applied according to manufacturers' specification. Caution is advised when using nylon or other synthetic products. They may be difficult to remove prior to final seeding.

STANDARD AND SPECIFICATIONS FOR PERMANENT CRITICAL AREA PLANTINGS

Definition

Establishing grasses with other forbs and/or shrubs to provide perennial vegetative cover on disturbed, denuded, slopes subject to erosion.

Purpose

To reduce erosion and sediment transport.

Conditions Where Practice Applies

This practice applies to all disturbed areas void of, or having insufficient, cover to prevent erosion and sediment transport. See additional standards for special situations such as sand dunes and sand and gravel pits.

Criteria

All water control measures will be installed as needed prior to final grading and seedbed preparation. Any severely compacted sections will require chiseling or disking to provide an adequate rooting zone, to a minimum depth of 12". The seedbed must be prepared to allow good soil to seed contact, with the soil not too soft and not too compact. Adequate soil moisture must be present to accomplish this. If surface is powder dry or sticky wet, postpone operations until moisture changes to a favorable condition. If seeding is accomplished within 24 hours of final grading, additional scarification is generally not needed, especially on ditch or stream banks. Remove all stones and other debris from the surface that are greater than 4 inches, or that will interfere with future mowing or maintenance.

Soil amendments should be incorporated into the upper 2 inches of soil when feasible. **The soil should be tested to determine the amounts of amendments needed.** Apply ground agricultural limestone to attain a pH of 6.0 in the upper 2 inches of soil. If soil must be fertilized before results of a soil test can be obtained to determine fertilizer needs, apply commercial fertilizer at 600 lbs. per acre of 5-10-10 or equivalent. If manure is used, apply a quantity to meet the nutrients of the above fertilizer. This requires an appropriate manure analysis prior to applying to the site. Do not use manure on sites to be planted with birdsfoot trefoil or in the path of concentrated water flow.

Seed mixtures may vary depending on location within the state and time of seeding. Generally, warm season grasses should only be seeded during early spring, April to May. These grasses are primarily used for vegetating excessively drained sands and gravels. See Standard and Specification for Sand and Gravel Mine Reclamation. Other grasses may be seeded any time of the year when the soil is not frozen and is workable. When legumes such as birdsfoot trefoil are included, spring seedings are preferred. See Table 3.1 "Permanent Critical Area Planting Mixture Recommendations" for additional seed mixtures.

General Seed Mix:
[1] add inoculant immediately prior to seeding

	Variety	lbs./acre	lbs/1000 sq. ft.
Birdsfoot trefoil[1] OR	Empire/Pardee	8[2]	0.20
Common white clover[1]	Common	8	0.20
PLUS			
Tall fescue	KY-31/Rebel	20	0.45
PLUS			
Redtop OR	Common	2	0.05
Ryegrass (perennial)	Pennfine/Linn	5	0.10

[2] Mix 4 lbs each of Empire and Pardee OR 4 lbs of Birdsfoot and 4 lbs white clover per acre.

Time of Seeding: The optimum timing for the general seed mixture is early spring. Permanent seedings may be made any time of year if properly mulched and adequate moisture is provided. Late June through early August is not a good time to seed, but may facilitate covering the land without additional disturbance if construction is completed. Portions of the seeding may fail due to drought and heat. These areas may need reseeding in late summer/fall or the following spring.

Method of seeding: Broadcasting, drilling, cultipack type

seeding, or hydroseeding are acceptable methods. Proper soil to seed contact is key to successful seedings.

Mulching: Mulching is essential to obtain a uniform stand of seeded plants. Optimum benefits of mulching new seedings are obtained with the use of small grain straw applied at a rate of 2 tons per acre, and anchored with a netting or tackifier. See the mulch standard and specification for choices and requirements.

Irrigation: Watering may be essential to establish a new seeding when a drought condition occurs shortly after a new seeding emerges. Irrigation is a specialized practice and care must be taken not to exceed the application rate for the soil or subsoil. When disconnecting irrigation pipe, be sure pipes are drained in a safe manor, not creating an erosion concern.

Table 3.1
Permanent Critical Area Planting Mixture Recommendations

Seed mixture	Variety	Rate in lbs. per acre	Rate in lbs. Per 1000 sq. ft.
Mix #1			
Creeping red fescue	Ensylva, Pennlawn, Boreal	10	.25
Perennial ryegrass	Pennfine, Linn	10	.25

*This mix is used extensively for shaded areas.

Mix #2			
Switchgrass	Shelter, Pathfinder, Trailblazer, or Blackwell	20	.5

*This rate is in pure live seed, this would be an excellent choice along the upland edge of a wetland to filter runoff and provide wildlife benefits. In areas where erosion may be a problem, a companion seeding of sand lovegrass should be added to provide quick cover at a rate of 2 lbs. per acre (0.05 lbs. per 1000 sq. ft.).

Mix #3			
Switchgrass	Shelter, Pathfinder, Trailblazer, or Blackwell	4	.1
Big bluestem	Niagara	4	.1
Little bluestem	Aldous or Camper	2	.05
Indiangrass	Rumsey	4	.1
Coastal panicgrass	Atlantic	2	.05
Sideoats grama	El Reno or Trailway	2	.05
Wildflower mix		.5	.01

*This mix has been successful on sand and gravel plantings. It is very difficult to seed without a warm season grass seeder such as a Truax seed drill. Broadcasting this seed is very difficult due to the fluffy nature of some of the seed, such as bluestems and indiangrass.

Mix #4			
Switchgrass	Shelter, Pathfinder Trailblazer, or Blackwell	10	.25
Coastal panicgrass	Atlantic	10	.25

*This mix is salt tolerant, a good choice along the upland edge of tidal areas and roadsides.

Mix #5

Saltmeadow cordgrass (Spartina patens)—This grass is used for tidal shoreline protection and tidal marsh restoration. It is planted by vegetative stem divisions.

'Cape' American beachgrass can be planted for sand dune stabilization above the saltmeadow cordgrass zone.

Mix #6			
Creeping red fescue	Ensylva, Pennlawn, Boreal	20	.45
Tall fescue	KY 31, Rebel	20	.45
Perennial ryegrass	Pennfine, Linn	5	.10
Birdsfoot trefoil	Empire, Pardee	10	.45

*General purpose erosion control mix. Not to be used for a turf planting or play grounds.

STANDARD AND SPECIFICATIONS FOR MULCHING

Definition

Applying coarse plant residue or chips, or other suitable materials, to cover the soil surface.

Purpose

The primary purpose is to provide initial erosion control while a seeding or shrub planting is establishing. Mulch will conserve moisture and modify the surface soil temperature and reduce fluctuation of both. Mulch will prevent soil surface crusting and aid in weed control. Mulch is also used alone for temporary stabilization in non-growing months.

Conditions Where Practice Applies

On soils subject to erosion and on new seedings and shrub plantings. Mulch is useful on soils with low infiltration rates by retarding runoff.

Criteria

Site preparation prior to mulching requires the installation of necessary erosion control or water management practices and drainage systems.

Slope, grade and smooth the site to fit needs of selected mulch products.

Remove all undesirable stones and other debris to meet the needs of the anticipated land use and maintenance required.

Apply mulch after soil amendments and planting is accomplished or simultaneously if hydroseeding is used.

Select appropriate mulch material and application rate or material needs. Determine local availability.

Select appropriate mulch anchoring material.

NOTE: The best combination for grass/legume establishment is straw (cereal grain) mulch applied at 2 ton/ acre (90 lbs./1000sq.ft.) and anchored with wood fiber mulch (hydromulch) at 500 – 750 lbs./acre (11 – 17 lbs./1000 sq. ft.). The wood fiber mulch must be applied through a hydroseeder immediately after mulching.

STANDARD AND SPECIFICATIONS FOR SILT FENCE

Definition

A temporary barrier of geotextile fabric installed on the contours across a slope used to intercept sediment laden runoff from small drainage areas of disturbed soil.

Purpose

The purpose of a silt fence is to reduce runoff velocity and effect deposition of transported sediment load. Limits imposed by ultraviolet stability of the fabric will dictate the maximum period the silt fence may be used (approximately one year).

Conditions Where Practice Applies

A silt fence may be used subject to the following conditions:

1. Maximum allowable slope lengths contributing runoff to a silt fence placed on a slope are:

Slope Steepness	Maximum Length (ft.)
2:1	25
3:1	50
4:1	75
5:1 or flatter	100

2. Maximum drainage area for overland flow to a silt fence shall not exceed ¼ acre per 100 feet of fence, with maximum ponding depth of 1.5 feet behind the fence; and

3. Erosion would occur in the form of sheet erosion; and

4. There is no concentration of water flowing to the barrier.

Design Criteria

Design computations are not required for installations of 1 month or less. Longer installation periods should be designed for expected runoff. All silt fences shall be placed as close to the areas as possible, but at least 10 feet from the toe of a slope to allow for maintenance and roll down. The area beyond the fence must be undisturbed or stabilized.

Sensitive areas to be protected by silt fence may need to be reinforced by using heavy wire fencing for added support to prevent collapse.

Where ends of filter cloth come together, they shall be overlapped, folded and stapled to prevent sediment bypass. A detail of the silt fence shall be shown on the plan.
See Figure 5A.8 on page 5A.21 for details.

Criteria for Silt Fence Materials

1. Silt Fence Fabric: The fabric shall meet the following specifications unless otherwise approved by the appropriate erosion and sediment control plan approval authority. Such approval shall not constitute statewide acceptance.

Fabric Properties	Minimum Acceptable Value	Test Method
Grab Tensile Strength (lbs)	90	ASTM D1682
Elongation at Failure (%)	50	ASTM D1682

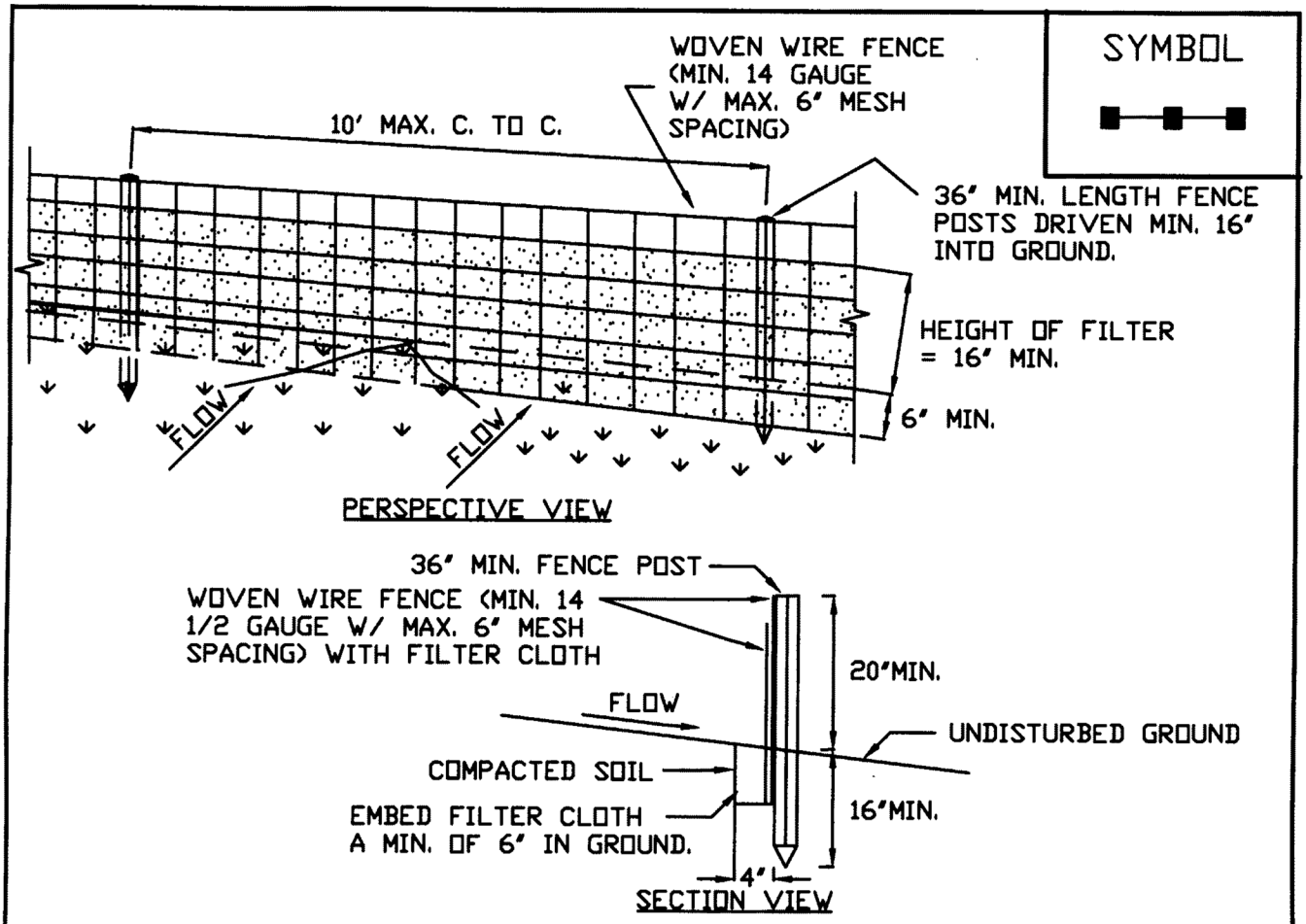
Mullen Burst Strength (PSI)	190	ASTM D3786
Puncture Strength (lbs)	40	ASTM D751 (modified)
Slurry Flow Rate (gal/min/sf)	0.3	
Equivalent Opening Size	40-80	US Std Sieve CW-02215
Ultraviolet Radiation Stability (%)	90	ASTM G-26

2. Fence Posts (for fabricated units): The length shall be a minimum of 36 inches long. Wood posts will be of sound quality hardwood with a minimum cross sectional area of 3.0 square inches. Steel posts will be standard T and U section weighing not less than 1.00 pound per linear foot.

3. Wire Fence (for fabricated units): Wire fencing shall be a minimum 14 gage with a maximum 6 in. mesh opening, or as approved.

4. Prefabricated Units: Envirofence, Geofab, or approved equal, may be used in lieu of the above method providing the unit is installed per details shown in Figure 5A.8.

Figure 5A.8
Silt Fence



CONSTRUCTION SPECIFICATIONS

1. WOVEN WIRE FENCE TO BE FASTENED SECURELY TO FENCE POSTS WITH WIRE TIES OR STAPLES. POSTS SHALL BE STEEL EITHER "T" OR "U" TYPE OR HARDWOOD.
2. FILTER CLOTH TO BE TO BE FASTENED SECURELY TO WOVEN WIRE FENCE WITH TIES SPACED EVERY 24" AT TOP AND MID SECTION. FENCE SHALL BE WOVEN WIRE, 6" MAXIMUM MESH OPENING.
3. WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER THEY SHALL BE OVER-LAPPED BY SIX INCHES AND FOLDED. FILTER CLOTH SHALL BE EITHER FILTER X, MIRAFI 100X, STABILINKA T140N, OR APPROVED EQUIVALENT.
4. PREFABRICATED UNITS SHALL BE GEOFAB, ENVIROFENCE, OR APPROVED EQUIVALENT.
5. MAINTENANCE SHALL BE PERFORMED AS NEEDED AND MATERIAL REMOVED WHEN "BULGES" DEVELOP IN THE SILT FENCE.

ADAPTED FROM DETAILS PROVIDED BY: USDA – NRCS, NEW YORK STATE DEPARTMENT OF TRANSPORTATION, NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION, NEW YORK STATE SOIL & WATER CONSERVATION COMMITTEE	SILT FENCE

STANDARD AND SPECIFICATIONS
FOR
CHECK DAM

Definition

Small barriers or dams constructed of stone, bagged sand or gravel, or other durable material across a drainage way.

Purpose

To reduce erosion in a drainage channel by restricting the velocity of flow in the channel.

Condition Where Practice Applies

This practice is used as a temporary or emergency measure to limit erosion by reducing velocities in small open channels that are degrading or subject to erosion and where permanent stabilization is impractical due to short period of usefulness and time constraints of construction.

Design Criteria

Drainage Area: Maximum drainage area above the check dam shall not exceed two (2) acres.

Height: Not greater than 2 feet. Center shall be maintained 9 inches lower than abutments at natural ground elevation.

Side Slopes: Shall be 2:1 or flatter.

Spacing: The check dams shall be spaced as necessary in the channel so that the crest of the downstream dam is at the elevation of the toe of the upstream dam. This spacing is equal to the height of the check dam divided by the channel slope.

Therefore:

$$S = h/s$$

Where:

S = spacing interval (ft.)
h = height of check dam (ft.)
s = channel slope (ft./ft.)

Example:

For a channel with a 4% slope and 2 ft. high stone check dams, they are spaced as follows:

$$S = \frac{2 \text{ ft.}}{.04 \text{ ft/ft.}} = 50 \text{ ft.}$$

Stone size: Use a well graded stone matrix 2 to 9 inches in size (NYS – DOT Light Stone Fill meets these requirements).

The overflow of the check dams will be stabilized to resist erosion that might be caused by the check dam. See Figure 5A.9 on page 5A.24 for details.

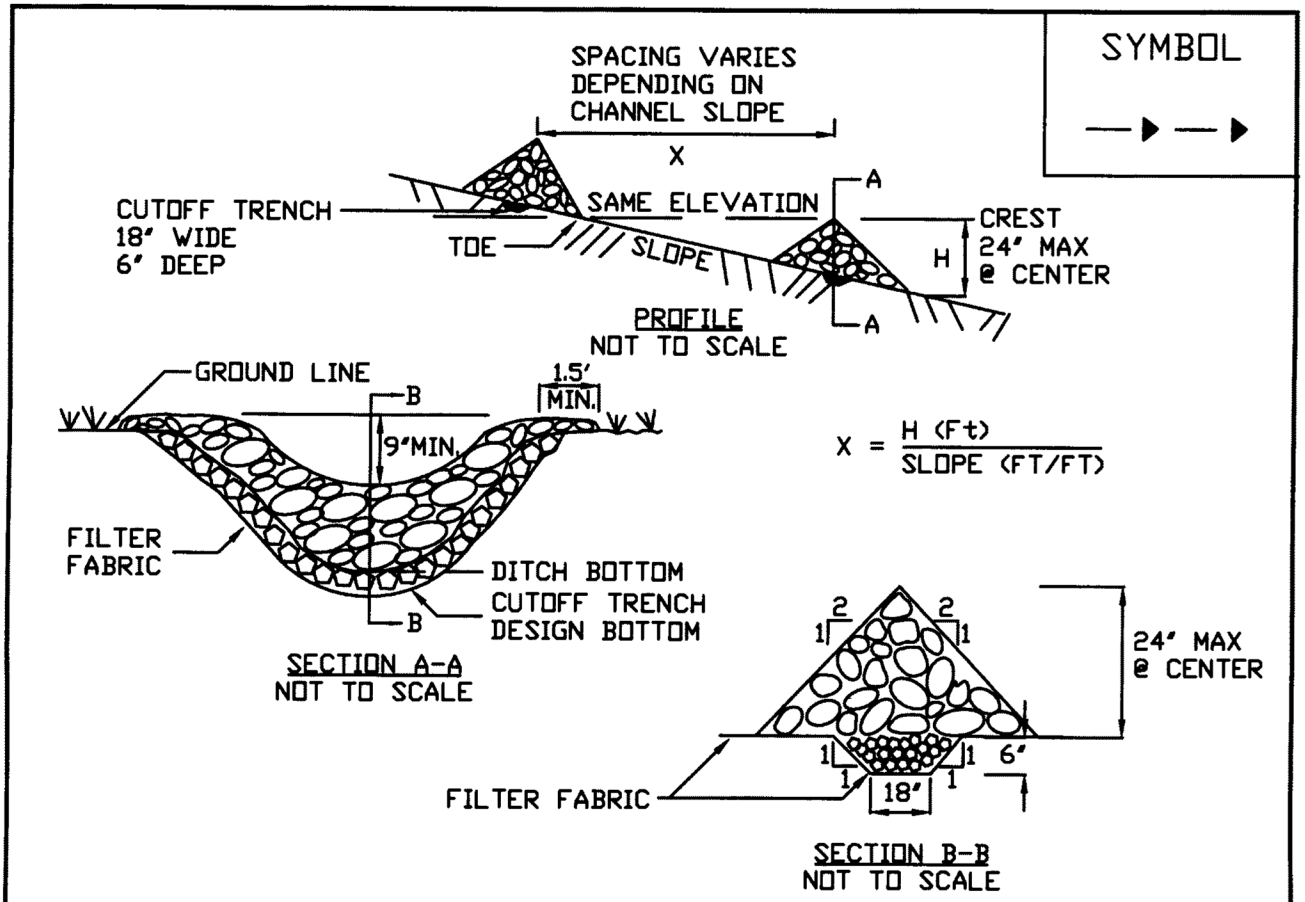
Check dams should be anchored in the channel by a cutoff trench 1.5 ft. wide and 0.5 ft. deep and lined with filter fabric to prevent soil migration.

Maintenance

The check dams should be inspected after each runoff event. Correct all damage immediately. If significant erosion has occurred between structures, a liner of stone or other suitable material should be installed in that portion of the channel.

Remove sediment accumulated behind the dam as needed to allow channel to drain through the stone check dam and prevent large flows from carrying sediment over the dam. Replace stones as needed to maintain the design cross section of the structures.

Figure 5A.9
Check Dam



CONSTRUCTION SPECIFICATIONS

1. STONE WILL BE PLACED ON A FILTER FABRIC FOUNDATION TO THE LINES, GRADES AND LOCATIONS SHOWN IN THE PLAN.
2. SET SPACING OF CHECK DAMS TO ASSUME THAT THE ELEVATIONS OF THE CREST OF THE DOWNSTREAM DAM IS AT THE SAME ELEVATION OF THE TOE OF THE UPSTREAM DAM.
3. EXTEND THE STONE A MINIMUM OF 1.5 FEET BEYOND THE DITCH BANKS TO PREVENT CUTTING AROUND THE DAM.
4. PROTECT THE CHANNEL DOWNSTREAM OF THE LOWEST CHECK DAM FROM SCOUR AND EROSION WITH STONE OR LINER AS APPROPRIATE.
5. ENSURE THAT CHANNEL APPURTENANCES SUCH AS CULVERT ENTRANCES BELOW CHECK DAMS ARE NOT SUBJECT TO DAMAGE OR BLOCKAGE FROM DISPLACED STONE.

MAXIMUM DRAINAGE AREA 2 ACRES.

ADAPTED FROM DETAILS PROVIDED BY: USDA - NRCS, NEW YORK STATE DEPARTMENT OF TRANSPORTATION, NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION, NEW YORK STATE SOIL & WATER CONSERVATION COMMITTEE	CHECK DAM

STANDARD AND SPECIFICATIONS FOR STORM DRAIN INLET PROTECTION

Definition

A temporary, somewhat permeable barrier, installed around inlets in the form of a fence, berm or excavation around an opening, trapping water and thereby reducing the sediment content of sediment laden water by settling.

Purpose

To prevent heavily sediment laden water from entering a storm drain system through inlets.

Conditions Where Practice Applies

This practice shall be used where the drainage area to an inlet is disturbed, it is not possible to temporarily divert the storm drain outfall into a trapping device, and watertight blocking of inlets is not advisable. **It is not to be used in place of sediment trapping devices.** This may be used in conjunction with storm drain diversion to help prevent siltation of pipes installed with low slope angle.

Types of Storm Drain Inlet Practices

There are four (4) specific types of storm drain inlet protection practices that vary according to their function, location, drainage area, and availability of materials:

I. Excavated Drop Inlet Protection
II. Fabric Drop Inlet Protection
III. Stone & Block Drop Inlet Protection
IV. Curb Drop Inlet Protection

Design Criteria

Drainage Area – The drainage area for storm drain inlets shall not exceed one acre. The crest elevations of these practices shall provide storage and minimize bypass flow.

Type I – Excavated Drop Inlet Protection

See details for Excavated Drop Inlet Protection in Figure 5A.11 on page 5A.29.

Limit the drainage area to the inlet device to 1 acre. Excavated side slopes shall be no steeper than 2:1. The minimum depth shall be 1 foot and the maximum depth 2 feet as measured from the crest of the inlet structure. Shape the excavated basin to fit conditions with the longest dimension oriented toward the longest inflow area to provide maximum trap efficiency. The capacity of the excavated basin should be established to contain 900 cubic feet per acre of disturbed area. Weep holes, protected by fabric and stone, should be provided for draining the temporary pool.

Inspect and clean the excavated basin after every storm. Sediment should be removed when 50 percent of the storage volume is achieved This material should be incorporated into the site in a stabilized manner.

Type II – Fabric Drop Inlet Protection

See Figure 5A.12 for details on Filter Fabric Drop Inlet Protection on page 5A.30.

Limit the drainage area to 1 acre per inlet device. Land area slope immediately surrounding this device should not exceed 1 percent. The maximum height of the fabric above the inlet crest shall not exceed 1.5 feet unless reinforced.

The top of the barrier should be maintained to allow overflow to drop into the drop inlet and not bypass the inlet to unprotected lower areas. Support stakes for fabric shall be a minimum of 3 feet long, spaced a maximum 3 feet apart. They should be driven close to the inlet so any overflow drops into the inlet and not on the unprotected soil. Improved performance and sediment storage volume can be obtained by excavating the area.

Inspect the fabric barrier after each rain event and make repairs as needed. Remove sediment from the pool area as

necessary with care not to undercut or damage the filter fabric. Upon stabilization of the drainage area, remove all materials and unstable sediment and dispose of properly. Bring the adjacent area of the drop inlet to grade, smooth and compact and stabilize in the appropriate manner to the site.

If straw bales are used in lieu of filter fabric, they should be placed tight with the cut edge adhering to the ground at least 3 inches below the elevation of the drop inlet. Two anchor stakes per bale shall be driven flush to bale surface. Straw bales will be replaced every 4 months until the area is stabilized.

Type III – Stone and Block Drop Inlet Protection

See Figure 5A.13 for details on Stone and Block Drop Inlet Protection on page 5A.31.

Limit the drainage area to 1 acre at the drop inlet. The stone barrier should have a minimum height of 1 foot and a maximum height of 2 feet. Do not use mortar. The height should be limited to prevent excess ponding and bypass flow.

Recess the first course of blocks at least 2 inches below the crest opening of the storm drain for lateral support. Subsequent courses can be supported laterally if needed by placing a 2x4 inch wood stud through the block openings perpendicular to the course. The bottom row should have a few blocks oriented so flow can drain through the block to dewater the basin area.

The stone should be placed just below the top of the blocks on slopes of 2:1 or flatter. Place hardware cloth of wire mesh with ½ inch openings over all block openings to hold stone in place.

As an optional design, the concrete blocks may be omitted and the entire structure constructed of stone, ringing the outlet ("doughnut"). The stone should be kept at a 3:1 slope toward the inlet to keep it from being washed into the inlet. A level area 1 foot wide and four inches below the crest will further prevent wash. Stone on the slope toward the inlet should be at least 3 inches in size for stability and 1 inch or smaller away from the inlet to control flow rate. The elevation of the top of the stone crest must be maintained 6 inches lower than the ground elevation down slope from the inlet to ensure that all storm flows pass over the stone into the storm drain and not past the structure. Temporary diking should be used as necessary to prevent bypass flow.

The barrier should be inspected after each rain event and repairs made where needed. Remove sediment as necessary to provide for accurate storage volume for subsequent rains. Upon stabilization of contributing drainage area, remove all materials and any unstable soil and dispose of properly.

Bring the disturbed area to proper grade, smooth, compact and stabilized in a manner appropriate to the site.

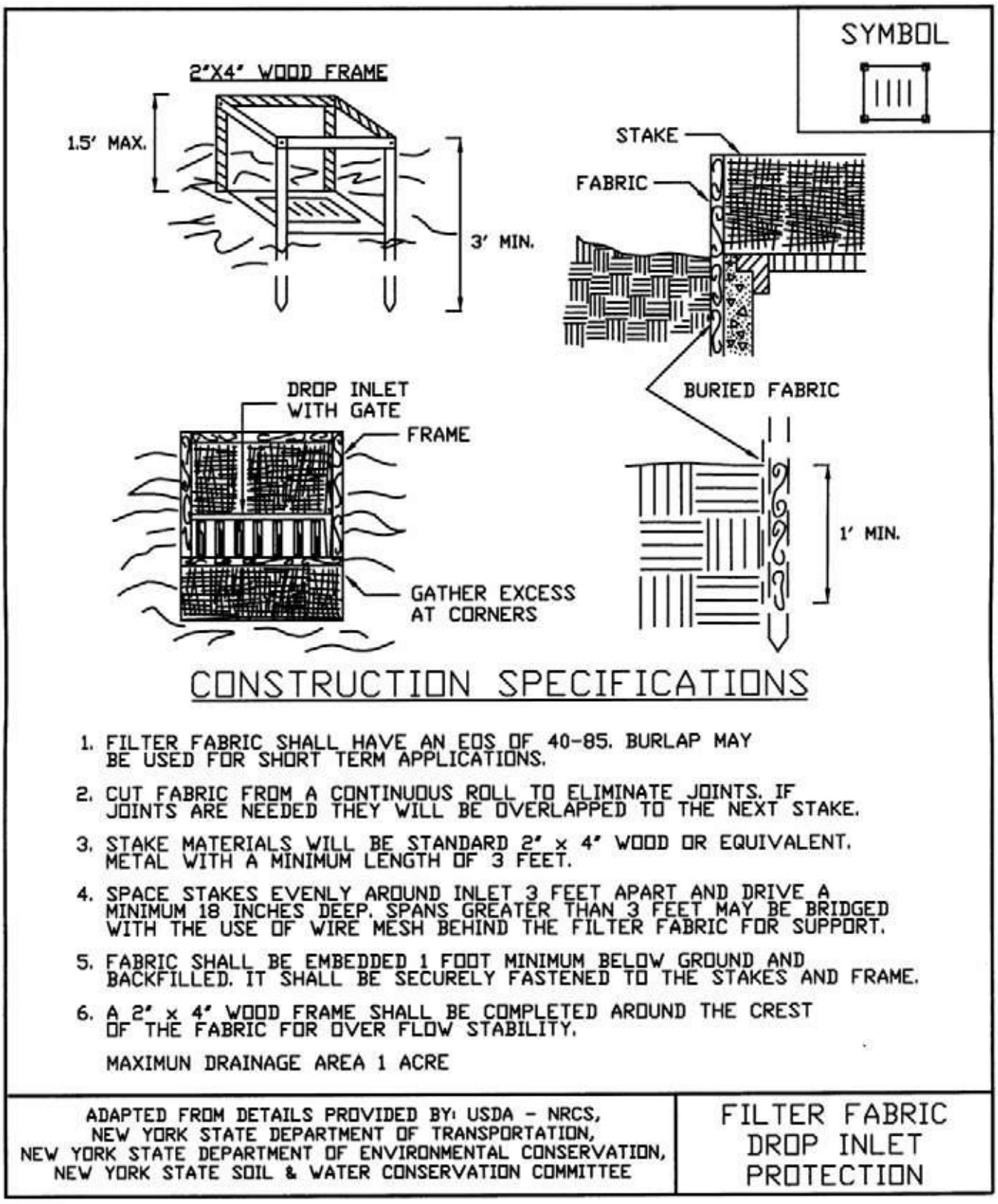
Type IV – Curb Drop Inlet Protection

See Figure 5A. 14 for details on Curb Drop Inlet Protection on page 5A.32.

The drainage area should be limited to 1 acre at the drop inlet. The wire mesh must be of sufficient strength to support the filter fabric and stone with the water fully impounded against it. Stone is to be 2 inches in size and clean. The filter fabric must be of a type approved for this purpose with an equivalent opening size (EOS) of 40-85. The protective structure will be constructed to extend beyond the inlet 2 feet in both directions. Assure that storm flow does not bypass the inlet by installing temporary dikes (such as sand bags) directing flow into the inlet. Make sure that the overflow weir is stable. Traffic safety shall be integrated with the use of this practice.

The structure should be inspected after every storm event. Any sediment should be removed and disposed of on the site. Any stone missing should be replaced. Check materials for proper anchorage and secure as necessary.

Figure 5A.12
Filter Fabric Drop Inlet Protection



CONSTRUCTION SPECIFICATIONS

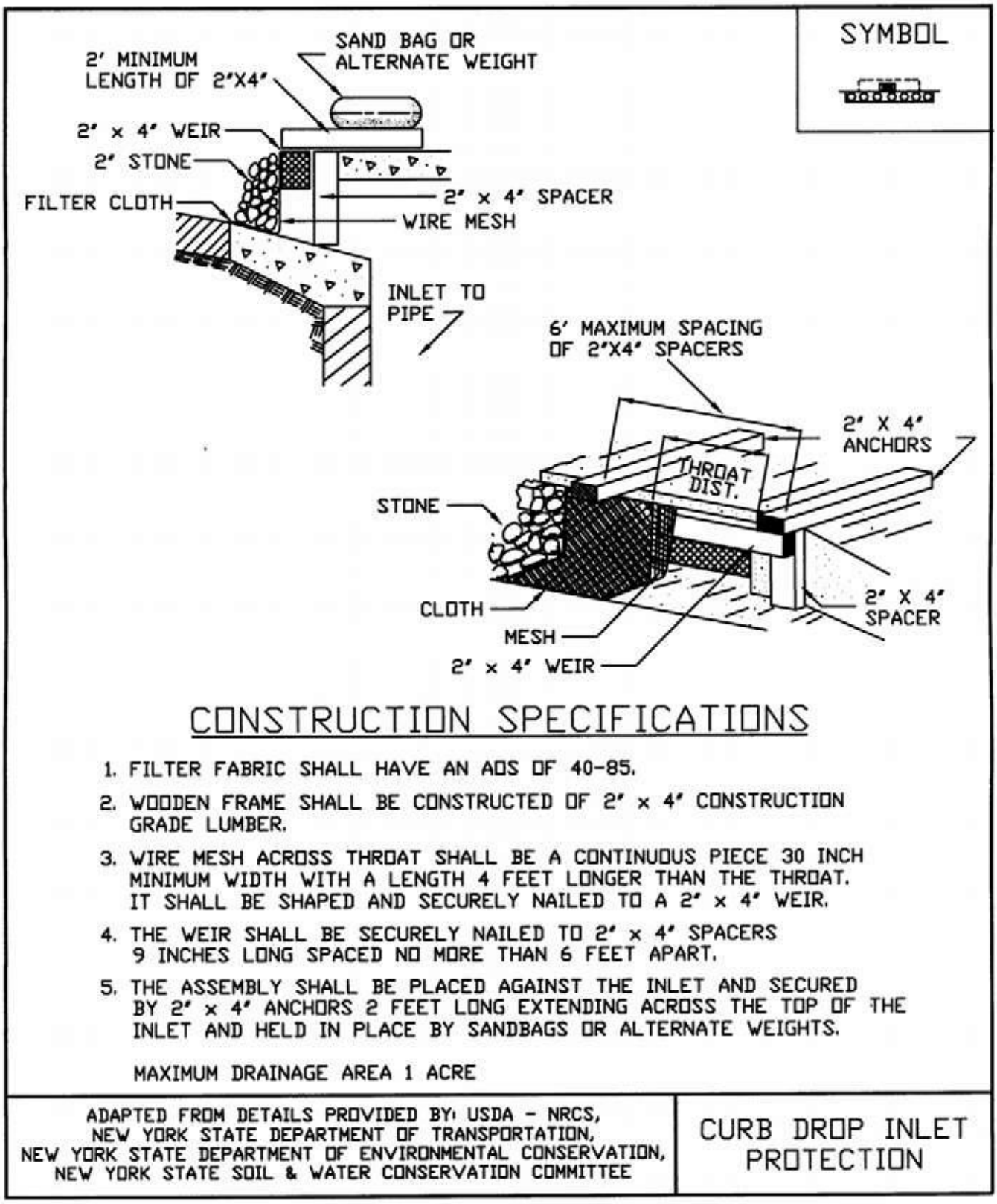
1. FILTER FABRIC SHALL HAVE AN EOS OF 40-85. BURLAP MAY BE USED FOR SHORT TERM APPLICATIONS.
2. CUT FABRIC FROM A CONTINUOUS ROLL TO ELIMINATE JOINTS. IF JOINTS ARE NEEDED THEY WILL BE OVERLAPPED TO THE NEXT STAKE.
3. STAKE MATERIALS WILL BE STANDARD 2" x 4" WOOD OR EQUIVALENT. METAL WITH A MINIMUM LENGTH OF 3 FEET.
4. SPACE STAKES EVENLY AROUND INLET 3 FEET APART AND DRIVE A MINIMUM 18 INCHES DEEP. SPANS GREATER THAN 3 FEET MAY BE BRIDGED WITH THE USE OF WIRE MESH BEHIND THE FILTER FABRIC FOR SUPPORT.
5. FABRIC SHALL BE EMBEDDED 1 FOOT MINIMUM BELOW GROUND AND BACKFILLED. IT SHALL BE SECURELY FASTENED TO THE STAKES AND FRAME.
6. A 2" x 4" WOOD FRAME SHALL BE COMPLETED AROUND THE CREST OF THE FABRIC FOR OVER FLOW STABILITY.

MAXIMUN DRAINAGE AREA 1 ACRE

ADAPTED FROM DETAILS PROVIDED BY: USDA - NRCS, NEW YORK STATE DEPARTMENT OF TRANSPORTATION, NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION, NEW YORK STATE SOIL & WATER CONSERVATION COMMITTEE

FILTER FABRIC DROP INLET PROTECTION

Figure 5A.14
Curb Drop Inlet Protection



CONSTRUCTION SPECIFICATIONS

1. FILTER FABRIC SHALL HAVE AN AOS OF 40-85.
2. WOODEN FRAME SHALL BE CONSTRUCTED OF 2" x 4" CONSTRUCTION GRADE LUMBER.
3. WIRE MESH ACROSS THROAT SHALL BE A CONTINUOUS PIECE 30 INCH MINIMUM WIDTH WITH A LENGTH 4 FEET LONGER THAN THE THROAT. IT SHALL BE SHAPED AND SECURELY NAILED TO A 2" x 4" WEIR.
4. THE WEIR SHALL BE SECURELY NAILED TO 2" x 4" SPACERS 9 INCHES LONG SPACED NO MORE THAN 6 FEET APART.
5. THE ASSEMBLY SHALL BE PLACED AGAINST THE INLET AND SECURED BY 2" x 4" ANCHORS 2 FEET LONG EXTENDING ACROSS THE TOP OF THE INLET AND HELD IN PLACE BY SANDBAGS OR ALTERNATE WEIGHTS.

MAXIMUM DRAINAGE AREA 1 ACRE

ADAPTED FROM DETAILS PROVIDED BY: USDA - NRCS,
NEW YORK STATE DEPARTMENT OF TRANSPORTATION,
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION,
NEW YORK STATE SOIL & WATER CONSERVATION COMMITTEE

CURB DROP INLET PROTECTION

STANDARD AND SPECIFICATIONS FOR ROCK OUTLET PROTECTION

Definition

A section of rock protection placed at the outlet end of the culverts, conduits, or channels.

Purpose

The purpose of the rock outlet protection is to reduce the depth, velocity, and energy of water, such that the flow will not erode the receiving downstream reach.

Scope

This standard applies to the planning, design, and construction of rock riprap and gabions for protection of downstream areas. It does not apply to rock lining of channels or streams.

Conditions Where Practice Applies

This practice applies where discharge velocities and energies at the outlets of culverts, conduits, or channels are sufficient to erode the next downstream reach. This applies to:

1. Culvert outlets of all types.

2. Pipe conduits from all sediment basins, dry storm water ponds, and permanent type ponds.

3. New channels constructed as outlets for culverts and conduits.

Design Criteria

The design of rock outlet protection depends entirely on the location. Pipe outlet at the top of cuts or on slopes steeper than 10 percent, cannot be protected by rock aprons or riprap sections due to re-concentration of flows and high velocities encountered after the flow leaves the apron.

Many counties and state agencies have regulations and design procedures already established for dimensions, type and size of materials, and locations where outlet protection is required. Where these requirements exist, they shall be followed.

Tailwater Depth

The depth of tailwater immediately below the pipe outlet must be determined for the design capacity of the pipe. If the tailwater depth is less than half the diameter of the outlet pipe, and the receiving stream is wide enough to accept divergence of the flow, it shall be classified as a Minimum Tailwater Condition; see Figure 5B.12 on page 5B.25 as an example. If the tailwater depth is greater than half the pipe diameter and the receiving stream will continue to confine the flow, it shall be classified as a Maximum Tailwater Condition; see Figure 5B.13 on page 5B.26 as an example. Pipes which outlet onto flat areas with no defined channel may be assumed to have a Minimum Tailwater Condition; see Figure 5B.12 on page 5B.25 as an example.

Apron Size

The apron length and width shall be determined from the curves according to the tailwater conditions:

Minimum Tailwater – Use Figure 5B.12 on page 5B.25
Maximum Tailwater – Use Figure 5B.13 on page 5B.26

If the pipe discharges directly into a well defined channel, the apron shall extend across the channel bottom and up the channel banks to an elevation one foot above the maximum tailwater depth or to the top of the bank, whichever is less.

The upstream end of the apron, adjacent to the pipe, shall have a width two (2) times the diameter of the outlet pipe, or conform to pipe end section if used.

Bottom Grade

The outlet protection apron shall be constructed with no slope along its length. There shall be no overfall at the end of the apron. The elevation of the downstream end of the apron shall be equal to the elevation of the receiving channel or adjacent ground.

Alignment

The outlet protection apron shall be located so that there are no bends in the horizontal alignment.

Materials

The outlet protection may be done using rock riprap, grouted riprap, or gabions.

Riprap shall be composed of a well-graded mixture of stone size so that 50 percent of the pieces, by weight, shall be larger than the d_{50} size determined by using the charts. A well-graded mixture, as used herein, is defined as a mixture composed primarily of larger stone sizes, but with a sufficient mixture of other sizes to fill the smaller voids between the stones. The diameter of the largest stone size in such a mixture shall be 1.5 times the d_{50} size.

Thickness

The minimum thickness of the riprap layer shall be 1.5 times the maximum stone diameter for d_{50} of 15 inches or less; and 1.2 times the maximum stone size for d_{50} greater than 15 inches. The following chart lists some examples:

D_{50} (inches)	d_{max} (inches)	Minimum Blanket Thickness (inches)
4	6	9
6	9	14
9	14	20
12	18	27
15	22	32
18	27	32
21	32	38
24	36	43

Stone Quality

Stone for riprap shall consist of field stone or rough unhewn quarry stone. The stone shall be hard and angular and of a quality that will not disintegrate on exposure to water or weathering. The specific gravity of the individual stones shall be at least 2.5.

Recycled concrete equivalent may be used provided it has a density of at least 150 pounds per cubic foot, and does not have any exposed steel or reinforcing bars.

Filter

A filter is a layer of material placed between the riprap and the underlying soil surface to prevent soil movement into and through the riprap. Riprap shall have a filter placed under it in all cases.

A filter can be of two general forms: a gravel layer or a plastic filter cloth. The plastic filter cloth can be woven or non-woven monofilament yarns, and shall meet these base requirements: thickness 20-60 mils, grab strength 90-120 lbs; and shall conform to ASTM D-1777 and ASTM D-1682.

Gravel filter blanket, when used, shall be designed by comparing particle sizes of the overlying material and the base material. Design criteria are available in Standard and Specification for Riprap Slope Protection on page 5B.57.

Gabions

Gabions shall be made of hexagonal triple twist mesh with heavily galvanized steel wire. The maximum linear dimension of the mesh opening shall not exceed 4 ½ inches and the area of the mesh opening shall not exceed 10 square inches.

Gabions shall be fabricated in such a manner that the sides, ends, and lid can be assembled at the construction site into a rectangular basket of the specified sizes. Gabions shall be of single unit construction and shall be installed according to manufacturers recommendations.

The area on which the gabion is to be installed shall be graded as shown on the drawings. Foundation conditions shall be the same as for placing rock riprap, and filter cloth shall be placed under all gabions. Where necessary, key, or tie, the structure into the bank to prevent undermining of the main gabion structure.

Maintenance

Once a riprap outlet has been installed, the maintenance needs are very low. It should be inspected after high flows for evidence of scour beneath the riprap or for dislodged stones. Repairs should be made immediately.

Design Procedure

1. Investigate the downstream channel to assure that nonerosive velocities can be maintained.

2. Determine the tailwater condition at the outlet to establish which curve to use.
3. Enter the appropriate chart with the design discharge to

determine the riprap size and apron length required. It is noted that references to pipe diameters in the charts are based on full flow. For other than full pipe flow, the parameters of depth of flow and velocity must be used to adjust the design discharges.

4. Calculate apron width at the downstream end if a flare section is to be employed.

Examples

Example 1: Pipe Flow (full) with discharge to unconfined section.

Given: A circular conduit flowing full.

Q = 280 cfs, diam. = 66 in., tailwater (surface) is 2 ft. above pipe invert (minimum tailwater condition).

Find: Read d_{50} = 1.2 and apron length (L_a) = 38 ft.

Apron width = diam. + L_a = 5.5 + 38 = 43.5 ft.

Use: d_{50} = 15", d_{max} = 22", blanket thickness = 32"

Example 2: Box Flow (partial) with high tailwater

Given: A box conduit discharging under partial flow conditions. A concrete box 5.5 ft. x 10 ft. flowing 5.0 ft. deep,

Q = 600 cfs and tailwater surface is 5 ft. above invert (max. tailwater condition).

Since this is not full pipe and does not directly fit the nomograph assumptions of Figure 7B.13 substitute depth as the diameter, to find a discharge equal to full pipe flow for that diameter, in this case 60 inches.

Since, $Q = AV$ and $A = \frac{\pi D^2}{4}$

First, compute velocity:

V = (Q/A) = (600/(5) (10)) = 12 fps

Then substituting:

$$Q = \frac{\pi D^2}{4} \times V = \frac{3.14\ (5\ ft)^2}{4} \times 12\ fps = 236\ cfs$$

At the intersection of the curve d = 60 in. and Q = 236 cfs, read d_{50} = 0.4 ft.

Then reading the d = 60 in. curve, read apron length (L_a) = 40 ft.

Apron width, W = conduit width + (6.4)(L_a) = 10 + (0.4) (40) = 26 ft.

Example 3: Open Channel Flow with Discharge to Unconfined Section

Given: A trapezoidal concrete channel 5 ft. wide with 2:1 side slopes is flowing 2 ft. deep, Q = 180 cfs (velocity = 10 fps) and the tailwater surface downstream is 0.8 ft. (minimum tailwater condition).

Find: Using similar principles as Example 2, compute equivalent discharge for a 2 foot, using depth as a diameter, circular pipe flowing full at 10 feet per second.

Velocity:

$$Q = \frac{\pi\ (2ft)^2}{4} \times 10\ fps = 31.4\ cfs$$

At intersection of the curve, d = 24 in. and Q = 32 cfs, read d_{50} = 0.6 ft.

Then reading the d = 24 in. curve, read apron length (L_a) = 20 ft.

Apron width, W = bottom width of channel + L_a = 5 + 20 = 25 ft.

Example 4: Pipe flow (partial) with discharge to a confined section

Given: A 48 in. pipe is discharging with a depth of 3 ft. Q = 100 cfs, and discharge velocity of 10 fps (established from partial flow analysis) to a confined trapezoidal channel with a 2 ft. bottom, 2:1 side slopes, n = .04, and grade of 0.6%.

Calculation of the downstream channel (by Manning's Equation) indicates a normal depth of 3.1 ft. and normal velocity of 3.9 fps.

Since the receiving channel is confined, the maximum tailwater condition controls.

Find: discharge using previous principles:

$$Q = \frac{\pi\ (3ft)^2}{4} \times 10\ fps = 71\ cfs$$

At the intersection of d = 36 in. and Q = 71 cfs, read d_{50} = 0.3 ft.

Reading the d = 36" curve, read apron length (L_a) = 30 ft.

Since the maximum flow depth in this reach is 3.1 ft., that is the minimum depth of riprap to be maintained for the entire length.

Construction Specifications

1. The subgrade for the filter, riprap, or gabion shall be prepared to the required lines and grades. Any fill required in the subgrade shall be compacted to a density of approximately that of the surrounding undisturbed material.

2. The rock or gravel shall conform to the specified grading limits when installed respectively in the riprap or filter.

3. Filter cloth shall be protected from punching, cutting, or tearing. Any damage other than an occasional small hole shall be repaired by placing another piece of cloth over the damaged part or by completely replacing the cloth. All overlaps, whether for repairs or for joining two pieces of cloth shall be a minimum of one foot.

4. Stone for the riprap or gabion outlets may be placed by equipment. Both shall each be constructed to the full course thickness in one operation and in such a manner as to avoid displacement of underlying materials. The stone for riprap or gabion outlets shall be delivered and placed in a manner that will ensure that it is reasonably homogenous with the smaller stones and spalls filling the voids between the larger stones. Riprap shall be placed in a manner to prevent damage to the filter blanket or filter cloth. Hand placement will be required to the extent necessary to prevent damage to the permanent works.

APPENDIX G

Notice of Termination
(NOT)

New York State Department of Environmental Conservation
Division of Water
625 Broadway, 4th Floor
Albany, New York 12233-3505
(NOTE: Submit completed form to address above)

NOTICE OF TERMINATION for Storm Water Discharges Authorized under the SPDES General Permit for Construction Activity

Please indicate your permit identification number: NYR ___ ___ ___ ___ ___ ___

I. Owner or Operator Information

1. Owner/Operator Name:

2. Street Address:

3. City/State/Zip:

4. Contact Person: | 4a.Telephone:

4b. Contact Person E-Mail:

II. Project Site Information

5. Project/Site Name:

6. Street Address:

7. City/Zip:

8. County:

III. Reason for Termination

9a. □ All disturbed areas have achieved final stabilization in accordance with the general permit and SWPPP. ***Date final stabilization completed** (month/year): _____

9b. □ Permit coverage has been transferred to new owner/operator. Indicate new owner/operator's permit identification number: NYR ___ ___ ___ ___ ___ ___
(Note: Permit coverage can not be terminated by owner identified in I.1. above until new owner/operator obtains coverage under the general permit)

9c. □ Other (Explain on Page 2)

IV. Final Site Information:

10a. Did this construction activity require the development of a SWPPP that includes post-construction stormwater management practices? □ yes □ no (If no, go to question 10f.)

10b. Have all post-construction stormwater management practices included in the final SWPPP been constructed? □ yes □ no (If no, explain on Page 2)

10c. Identify the entity responsible for long-term operation and maintenance of practice(s)?

_____

NOTICE OF TERMINATION for Storm Water Discharges Authorized under the SPDES General Permit for Construction Activity - continued

10d. Has the entity responsible for long-term operation and maintenance been given a copy of the operation and maintenance plan required by the general permit? □ yes □ no

10e. Indicate the method used to ensure long-term operation and maintenance of the post-construction stormwater management practice(s):

□ Post-construction stormwater management practice(s) and any right-of-way(s) needed to maintain practice(s) have been deeded to the municipality.

□ Executed maintenance agreement is in place with the municipality that will maintain the post-construction stormwater management practice(s).

□ For post-construction stormwater management practices that are privately owned, a mechanism is in place that requires operation and maintenance of the practice(s) in accordance with the operation and maintenance plan, such as a deed covenant in the owner or operator's deed of record.

□ For post-construction stormwater management practices that are owned by a public or private institution (e.g. school, university or hospital), government agency or authority, or public utility; policy and procedures are in place that ensures operation and maintenance of the practice(s) in accordance with the operation and maintenance plan.

10f. Provide the total area of impervious surface (i.e. roof, pavement, concrete, gravel, etc.) constructed within the disturbance area? _____ (acres)

11. Is this project subject to the requirements of a regulated, traditional land use control MS4? □ yes □ no

(If Yes, complete section VI - "MS4 Acceptance" statement

V. Additional Information/Explanation:

(Use this section to answer questions 9c. and 10b., if applicable)

VI. MS4 Acceptance - MS4 Official (principal executive officer or ranking elected official) or Duly Authorized Representative (Note: Not required when 9b. is checked -transfer of coverage)

I have determined that it is acceptable for the owner or operator of the construction project identified in question 5 to submit the Notice of Termination at this time.

Printed Name:	
Title/Position:	
Signature:	Date:

NOTICE OF TERMINATION for Storm Water Discharges Authorized under the SPDES General Permit for Construction Activity - continued

VII. Qualified Inspector Certification - Final Stabilization:

I hereby certify that all disturbed areas have achieved final stabilization as defined in the current version of the general permit, and that all temporary, structural erosion and sediment control measures have been removed. Furthermore, I understand that certifying false, incorrect or inaccurate information is a violation of the referenced permit and the laws of the State of New York and could subject me to criminal, civil and/or administrative proceedings.

Printed Name:	
Title/Position:	
Signature:	Date:

VIII. Qualified Inspector Certification - Post-construction Stormwater Management Practice(s):

I hereby certify that all post-construction stormwater management practices have been constructed in conformance with the SWPPP. Furthermore, I understand that certifying false, incorrect or inaccurate information is a violation of the referenced permit and the laws of the State of New York and could subject me to criminal, civil and/or administrative proceedings.

Printed Name:	
Title/Position:	
Signature:	Date:

IX. Owner or Operator Certification

I hereby certify that this document was prepared by me or under my direction or supervision. My determination, based upon my inquiry of the person(s) who managed the construction activity, or those persons directly responsible for gathering the information, is that the information provided in this document is true, accurate and complete. Furthermore, I understand that certifying false, incorrect or inaccurate information is a violation of the referenced permit and the laws of the State of New York and could subject me to criminal, civil and/or administrative proceedings.

Printed Name:	
Title/Position:	
Signature:	Date:

(NYS DEC Notice of Termination - January 2015)

APPENDIX H

Environmental Impact Information

NEW YORK STATE OF OPPORTUNITY. Parks, Recreation, and Historic Preservation

ANDREW M. CUOMO
Governor

ERIK KULLESEID
Commissioner

July 29, 2021

Lindsey Tidd
Marks Engineering, P.C.
42 Beeman St.
Canandaigua, NY 14424

Re: DEC
Canandaigua Shores Construction of Residential Development Project
3535 State Route 364, Canandaigua, Ontario County, NY
21PR02254

Dear Lindsey Tidd:

Thank you for requesting the comments of the Division for Historic Preservation of the Office of Parks, Recreation, and Historic Preservation (OPRHP). We have reviewed the Phase I (IA & B) Cultural Resource Investigation report prepared by Powers Archaeology LLC (Powers, July 13, 2021; 21SR00419) in accordance with the New York State Historic Preservation Act of 1980 (section 14.09 of the New York Parks, Recreation, and Historic Preservation Law). These comments are those of the Division for Historic Preservation and relate only to Historic/Cultural resources.

Based on this review, OPRHP understands no archaeological cultural resources were identified during the above-noted investigation, and thus no further archaeological investigations are warranted. It is, therefore, OPRHP's opinion that no properties, including archaeological and/or historic resources, listed in or eligible for the New York State and National Registers of Historic Places will be impacted by this project. Should the project design be changed OPRHP recommends further consultation with this office.

If you have any questions, I can be reached via e-mail at Josalyn.Ferguson@parks.ny.gov.

Sincerely,

Josalyn Ferguson, Ph.D.
Scientist Archaeology

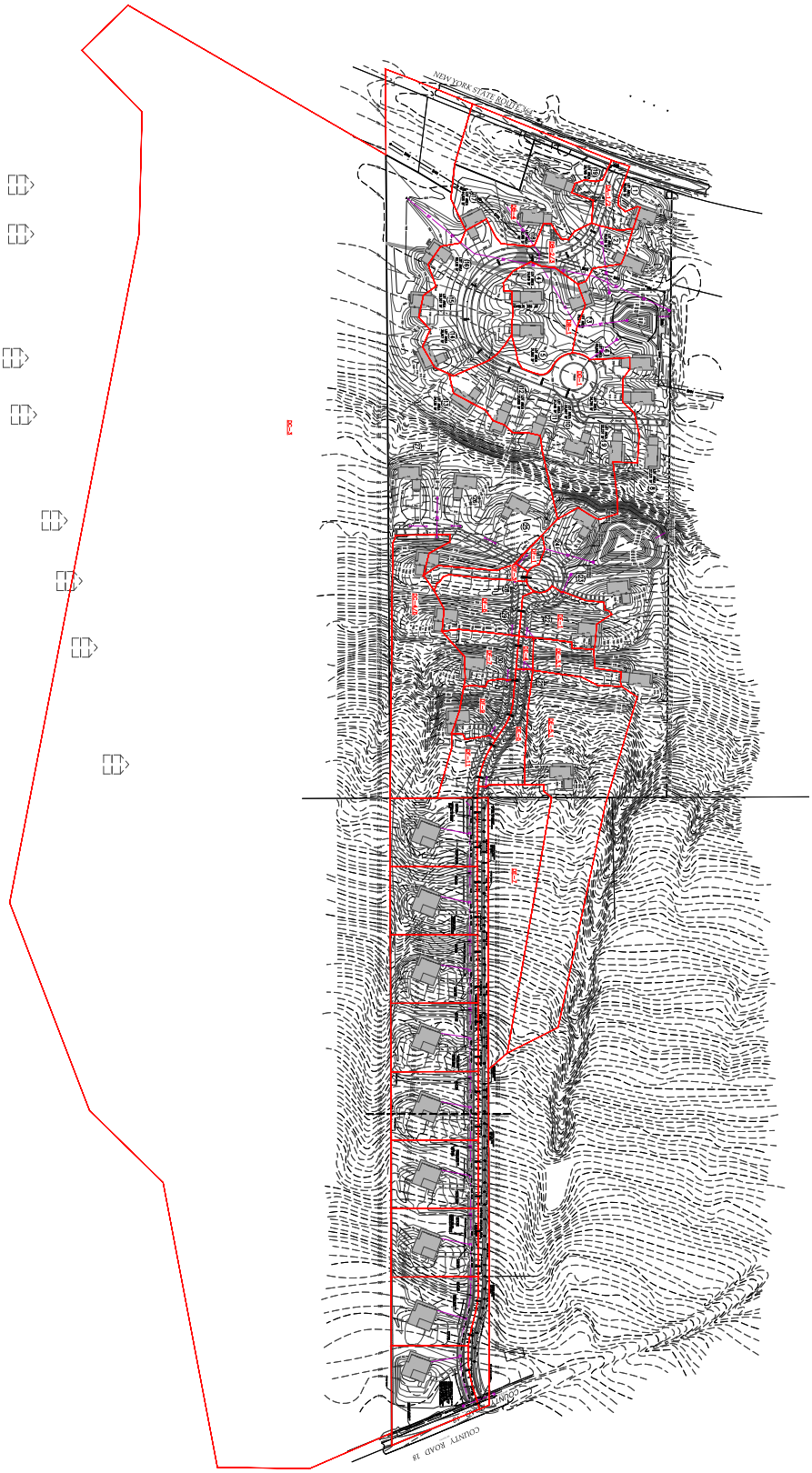
via email only

c.c. Brennan Marks, Marks Engineering
c.c. Charles Vandrei, DEC
c.c. Chris Jensen, Town of Canandaigua
c.c. Justin Bruen, Town of Hopewell

MarksEngineering
42 Beeman St.
Canandaigua, NY 14424

Appendix 3

Storm Sewers



PRELIMINARY
NOT FOR CONSTRUCTION

TAX MAP#	90.4-2-30.0
DATE:	02/01/2022
JOB NO.:	2630
SCALE:	AS NOTED
CHECKED BY:	BAM
DESIGNED BY:	JWJ
DRAWN BY:	JWJ

DRAWING TITLE:
STORM SEWER AREAS

SITE DEVELOPMENT PLANS PREPARED FOR:

CANANDAIGUA SHORES
RESIDENTIAL DEVELOPMENT

SHOWING LAND IN:
3535 STATE ROUTE 364 /0000 COUNTY ROAD 18
TOWN OF CANANDAIGUA/HOPEWELL

COUNTY OF ONTARIO *STATE OF NEW YORK*

REVISIONS

NO.	DATE	DESCRIPTION OF REVISION	BY

STAMP

STATE OF NEW YORK
BRIAN M. MARKS
LICENSED PROFESSIONAL ENGINEER
STAMP

MarksEngineering
4 2 BEEMAN ST
CANANDAIGUA, NY 14424
Phone 585-905-0360
Fax: 585-485-6205
www.marksengineering.com bmarks@marksengineering.com

Project: Canandaigua Shores
Project No: 20-243
Date: 02/01/22
By: JWJ
Sheet 1 of 3

STORM SEWER NETWORK CALCULATIONS

	Drainage Structure		Local				Upstream contribution			Total cA	Controlling Tc	I	Q (cfs)	Pipe			Length of pipe (ft.)	% slope	Diff. In INV	Capacity (cfs)	Ratio of liquid to dia of pipe	velocity (fps)	flow time (min)	Next Point	
	From	To	Tc	c	A	cA	From	Tc	cA					DIA (in)	MATL	n								To	Tc
MH	DC-5	DC-4	20.0	0.2	2.72	0.63				0.63	20.0	3.33	2.08	12	CPP	0.012	104	0.50	0.52	2.74	0.68	3.88	0.4	DC-4	###
INV	737.50	736.98																							
MH	DC-3	DC-2	46.0	0.2	####	####	DC-5	20.4	0.63	####	46.0	2.02	35.96	36	CPP	0.012	247	0.50	1.24	51.20	0.64	7.94	0.5	DC-2	###
INV	704.50	703.27																							
MH	DC-2	DC-1	10.0	0.3	0.68	0.20	DC-3	46.5	####	####	46.5	2.00	36.09	36	CPP	0.012	346	0.50	1.73	51.20	0.64	7.95	0.7	DC-1	###
INV	703.27	701.54																							
MH	DC-1	DC	0.0	0	0.00	0.00	DC-2	47.2	####	####	47.2	1.98	35.70	36	CPP	0.012	233	0.50	1.16	51.20	0.64	7.93	0.5	DC	###
INV	701.54	700.38																							
MH						0.00				0.00	0.0	0.00	0.00		CPP	0.012			0.00	####	#DIV/0!	####	####	0.00	###
INV		0.00																							
MH	DB-4	DB-3	15.0	0.3	2.72	0.82				0.82	15.0	3.80	3.10	15	CPP	0.012	162	0.50	0.81	4.96	0.59	4.31	0.6	DB-3	###
INV	702.00	701.19																							
MH	DB-3	DB-2	10.0	0.4	2.78	1.22	DB-4	15.6	0.82	2.04	15.6	3.73	7.61	18	CPP	0.012	24	0.50	0.12	8.06	0.88	5.16	0.1	DB-2	###
INV	701.19	701.07																							
MH	DB-2	DB-1	0.0	0	0.00	0.00	DB-3	15.7	2.04	2.04	15.7	3.73	7.60	18	CPP	0.012	215	0.50	1.08	8.06	0.88	5.17	0.7	DB-1	###
INV	701.07	700.00																							
MH	DB-1	DB	10.0	0.3	1.20	0.36	DB-2	16.4	2.04	2.40	16.4	3.65	8.77	24	CPP	0.012	105	0.50	0.52	17.37	0.51	5.56	0.3	DB	###
INV	700.00	699.48																							
MH	DA-2	DA-1	10.0	0.6	0.43	0.25				0.25	10.0	4.43	1.12	12	CPP	0.012	24	4.33	1.04	8.05	0.25	7.23	0.1	DA-1	###
INV	709.10	708.06																							
MH	DA-1	DA	0.0	0	0.00	0.00	DA-2	10.1	0.25	0.25	10.1	4.43	1.12	12	CPP	0.012	188	2.00	3.76	5.47	0.30	5.39	0.6	DA	###
INV	708.06	704.30																							
MH	DD-1	DD	15.0	0.4	3.32	1.43				1.43	15.0	3.80	5.42	15	CPP	0.012	92	1.00	0.92	7.01	0.69	6.39	0.2	DD	###
INV	704.10	703.18																							

Project: Canandaigua Shores
Project No: 20-243
Date: 02/01/22
By: JWJ
Sheet 2 of 3

STORM SEWER NETWORK CALCULATIONS

	Drainage Structure		Local				Upstream contribution			Total I cA	Controlling Tc	I	Q (cfs)	Pipe			Length of pipe (ft.)	% slope	Diff. In INV	Capacity (cfs)	Ratio of liquid to dia of pipe	velocity (fps)	flow time (min)	Next Point	
	From	To	Tc	c	A	cA	From	Tc	cA					DIA (in)	MATL	n								To	Tc
MH	DF-11	DF-10	15.0	0.3	0.44	0.13				0.13	15.0	3.80	0.48	12	CPP	0.01	25	8.00	2.00	10.94	0.15	7.17	0.1	DF-10	15.1
INV	790.50	788.50																							
MH	DF-9	DF-8	15.0	0.4	0.52	0.20	DF-11	15.1	0.13	0.33	15.1	3.79	1.25	12	CPP	0.01	25	8.00	2.00	10.94	0.24	9.44	0.0	DF-8	15.1
INV	792.50	790.50																							
MH	DF-7	DF-6	15.0	0.4	0.55	0.21	DF-9	15.1	0.33	0.54	15.1	3.79	2.06	12	CPP	0.01	25	8.00	2.00	10.94	0.29	10.55	0.0	DF-6	15.1
INV	761.00	759.00																							
MH	DF-5	DF-4	15.0	0.3	0.85	0.26	DF-7	15.1	0.54	0.81	15.1	3.78	3.06	12	CPP	0.01	25	6.00	1.50	9.47	0.38	10.61	0.0	DF-4	15.2
INV	748.00	746.50																							
MH	DF-3	DF-2	15.0	0.6	0.21	0.12	DF-5	15.2	0.81	0.93	15.2	3.78	3.51	12	CPP	0.01	40	1.50	0.60	4.74	0.67	6.69	0.1	DF-2	15.3
INV	744.50	743.90																							
MH	DF-1	DF	15.0	0.5	0.09	0.05	DF-3	15.3	0.93	0.97	15.3	3.77	3.68	12	CPP	0.01	147	1.00	1.47	3.87	0.90	5.55	0.4	DF	15.7
INV	743.00	741.53																							
MH						0.00				0.00	0.0	0.00	0.00		CPP	0.01			0.00	#DIV/0!	#DIV/0!	####	####	0.00	###
INV		0.00																							
MH			5.0	0.8	0.10	0.08				0.08	5.0	5.32	0.40		CPP	0.01			0.00	#DIV/0!	#DIV/0!	####	####	0.00	###
INV		0.00																							
MH			0.0	0	0.00	0.00				0.00	0.0	0.00	0.00		CPP	0.01			0.00	#DIV/0!	#DIV/0!	####	####	0.00	###
INV		0.00																							
MH			5.0	0.8	0.49	0.37				0.37	5.0	5.32	1.96		CPP	0.01			0.00	#DIV/0!	#DIV/0!	####	####	0.00	###
INV		0.00																							
MH			0.0	0	0.00	0.00				0.00	0.0	0.00	0.00		CPP	0.01			0.00	#DIV/0!	#DIV/0!	####	####	0.00	###
INV		0.00																							
MH			5.0	0.7	1.03	0.72				0.72	5.0	5.32	3.84		CPP	0.01			0.00	#DIV/0!	#DIV/0!	####	####	0.00	###
INV		0.00																							

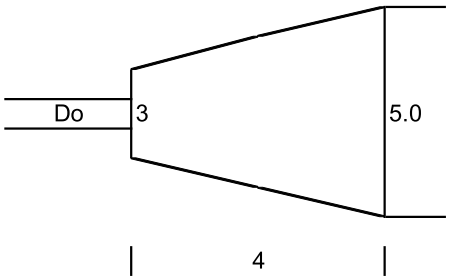
																					Project:	Canandaigua Shores			
																					Project No:	20-243			
																					Date:	02/01/22			
																					By:	JWJ			
																					Sheet	3 of 3			

STORM SEWER NETWORK CALCULATIONS

	Drainage Structure		Local				Upstream contribution			Total cA	Controlling Tc	I	Q (cfs)	Pipe			Length of pipe (ft.)	% slope	Diff. In INV	Capacity (cfs)	Ratio of liquid to dia of pipe	velocity (fps)	flow time (min)	Next Point	
	From	To	Tc	c	A	cA	From	Tc	cA					DIA (in)	MATL	n								To	Tc
MH	DE-7	DE-6	15.0	0.2	2.17	0.43				0.43	15.0	3.80	1.65	12	CPP	0.012	25	8.00	2.00	10.94	0.26	10.00	0.0	DE-6	15.0
INV	801.50	799.50																							
MH	DE-5.1	DE-4	15.0	0.2	4.42	0.97				0.97	15.0	3.80	3.70	12	CPP	0.012	35	2.00	0.70	5.47	0.62	7.57	0.1	DE-4	15.1
INV	768.50	767.80																							
MH	DE-5	DE-4	15.0	0.4	0.59	0.22	DE-5.1	15.1	0.97	1.63	15.1	3.79	6.18	12	CPP	0.012	23	###	2.30	12.23	0.51	15.66	0.0	DE-4	15.1
INV	770.00	767.70					DE-7	15.0	0.43																
MH	DE-3.1	DE-2	15.0	0.4	0.45	0.16				0.16	15.0	3.80	0.60	12	CPP	0.012	34	2.00	0.68	5.47	0.23	4.68	0.1	DE-2	15.1
INV	759.50	758.82																							
MH	DE-3	DE-2	15.0	0.5	0.10	0.05	DE-3.1	15.1	0.16	1.84	15.1	3.79	6.96	12	CPP	0.012	25	###	2.63	12.53	0.54	16.48	0.0	DE-2	15.1
INV	761.50	758.88					DE-5	15.1	1.63																
MH	DE-1	DE	15.0	0.4	0.72	0.30	DE-3	15.1	1.84	2.14	15.1	3.78	8.10	15	CPP	0.012	51	2.00	1.02	9.92	0.72	9.11	0.1	DE	15.2
INV	744.50	743.48																							
MH						0.00				0.00	0.0	0.00	0.00		CPP	0.012			0.00	####	#DIV/0!	#####	####	0.00	####
INV		0.00																							
MH						0.00				0.00	0.0	0.00	0.00		CPP	0.012			0.00	####	#DIV/0!	#####	####	0.00	####
INV		0.00																							
MH						0.00				0.00	0.0	0.00	0.00		CPP	0.012			0.00	####	#DIV/0!	#####	####	0.00	####
INV		0.00																							
MH						0.00				0.00	0.0	0.00	0.00		CPP	0.012			0.00	####	#DIV/0!	#####	####	0.00	####
INV		0.00																							
MH						0.00				0.00	0.0	0.00	0.00		CPP	0.012			0.00	####	#DIV/0!	#####	####	0.00	####
INV		0.00																							
MH						0.00				0.00	0.0	0.00	0.00		CPP	0.012			0.00	####	#DIV/0!	#####	####	0.00	####
INV		0.00																							

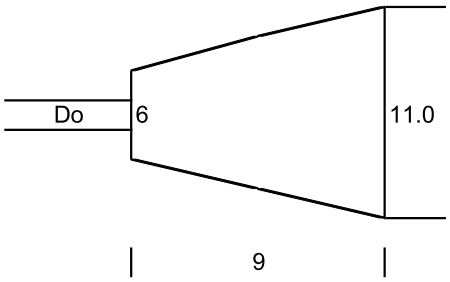
	CALCULATIONS :	Project No.: 20-243
	Project: Rip Rap Calculations	Date: 1/18/2022
		By: JWJ
		Sheet 2 of 2

DESIGNATION	**DA**	
Do-DIA. OF PIPE	12	in
DISCHARGE	1.1	cfs
d50 RIP-RAP SIZE	0.1	ft
La-LENGTH OF APRON	4.0	ft
W=Do+La	5.0	ft
SY OF RIP RAP	5	sy
MIN BLANKET THICKNESS	3	in
AVE WEIGHT	50	lbs



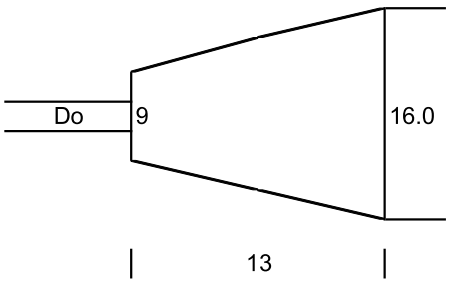
NOTES:

DESIGNATION	**DB**	
Do-DIA. OF PIPE	24	in
DISCHARGE	8.8	cfs
d50 RIP-RAP SIZE	0.1	ft
La-LENGTH OF APRON	9.0	ft
W=Do+La	11.0	ft
SY OF RIP RAP	9	sy
MIN BLANKET THICKNESS	3	in
AVE WEIGHT	50	lbs



NOTES:

DESIGNATION	**DC**	
Do-DIA. OF PIPE	36	in
DISCHARGE	35.7	cfs
d50 RIP-RAP SIZE	0.2	ft
La-LENGTH OF APRON	13.0	ft
W=Do+La	16.0	ft
SY OF RIP RAP	18	sy
MIN BLANKET THICKNESS	5	in
AVE WEIGHT	50	lbs



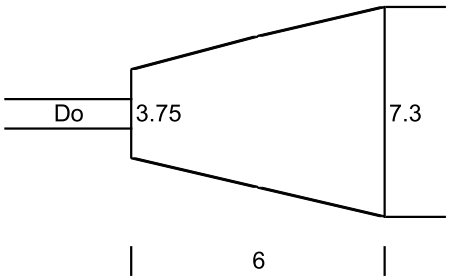
NOTES:

CALCULATIONS :

Project: Rip Rap Calculations

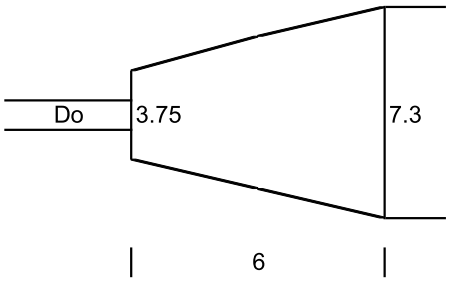
Project No.: 20-243
Date: 1/18/2022
By: JWJ
Sheet 2 of 2

DESIGNATION	**DD**	
Do-DIA. OF PIPE	15	in
DISCHARGE	5.4	cfs
d50 RIP-RAP SIZE	0.1	ft
La-LENGTH OF APRON	6.0	ft
W=Do+La	7.3	ft
SY OF RIP RAP	5	sy
MIN BLANKET THICKNESS	3	in
AVE WEIGHT	50	lbs



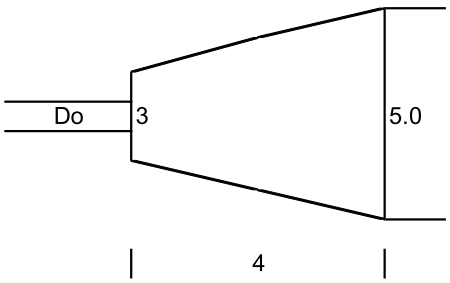
NOTES:

DESIGNATION	**DE**	
Do-DIA. OF PIPE	15	in
DISCHARGE	8.1	cfs
d50 RIP-RAP SIZE	0.1	ft
La-LENGTH OF APRON	6.0	ft
W=Do+La	7.3	ft
SY OF RIP RAP	5	sy
MIN BLANKET THICKNESS	3	in
AVE WEIGHT	50	lbs



NOTES:

DESIGNATION	**DF**	
Do-DIA. OF PIPE	12	in
DISCHARGE	3.7	cfs
d50 RIP-RAP SIZE	0.1	ft
La-LENGTH OF APRON	4.0	ft
W=Do+La	5.0	ft
SY OF RIP RAP	5	sy
MIN BLANKET THICKNESS	3	in
AVE WEIGHT	50	lbs



NOTES: