STORMWATER DRAINAGE DESIGN REPORT

For:

EGGERTSVILLE HOSE COMPANY
EXTERIOR SITE IMPROVEMENTS
1880 Eggert Road
Amherst, New York 14226
Project No. 23-194A

January 13, 2025

Prepared for:

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TABLE OF CONTENTS

STORMWATER MANAGEMENT SUMMARY----------PG. 1

EXISTING SITE CONDITIONS----------PG. 3

PROPOSED SITE CONDITIONS----------PG. 4

DESIGN PROCEDURES----------PG. 6

STORMWATER POLLUTION PREVENTION----------PG. 7

EXISTING DRAINAGE PLAN----------PG. 8

PROPOSED DRAINAGE PLAN----------PG. 9

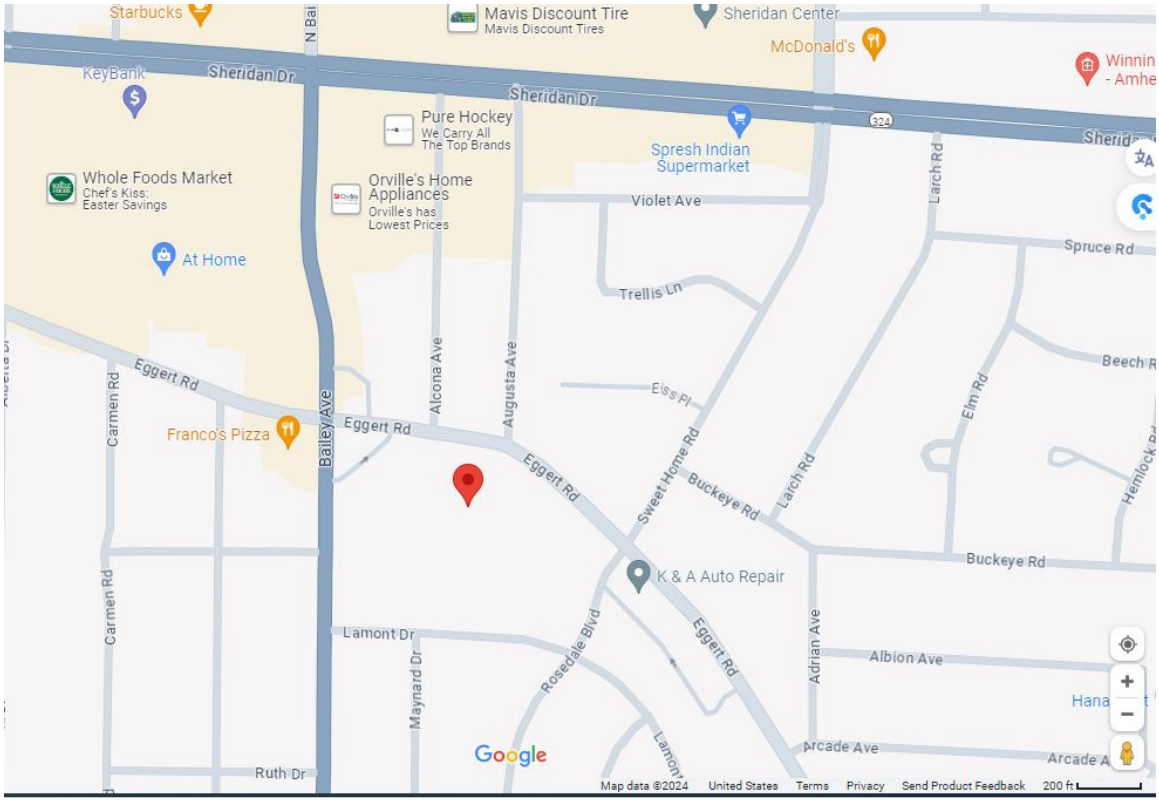
DETENTION BASIN CALCULATIONS & HYDROGRAPHS----------PG. 10

Stormwater Management Summary:

The proposed development consists of a new 499 square foot 1-story antique fire truck addition (Phase 1), several accessibility additions (Phase 1), a new 728 square foot 1-story accessory building addition (Phase 2), and new 3,040 square foot storage building (Phase 3 to the existing Eggertsville Hose Fire Hall). Minor site re-grading, utility connections, drainage structures, landscaping, and temporary and permanent erosion control devices shall also be added. The parcel is zoned "CF" (Community Facilities) and is located on the southern side of Eggert Road between Bailey Avenue and Rosedale Boulevard in the Town of Amherst, New York (see Site Location Map below). This design report is intended to be submitted with Site Plan drawings entitled" Exterior Site Improvements" as prepared by Studio T3 Engineering, PLLC.

The proposed site drainage plan includes the addition of new catch basins, new roof drains, new storm sewers, new grass swales. new landscaping, and three (3) new underground detention systems. These have been designed in order to:

- Efficiently collect runoff from impervious areas and discharge it quickly to alleviate the threat of flooding and nuisance insects;
- Minimize erosion and sedimentation on the proposed site to prevent degradation of water quality in downstream waters receiving discharged runoff;
- Reduce the peak rate of stormwater runoff discharging from the proposed site so that it is less than or equal to the rate of runoff discharging from the existing site



SITE LOCATION MAP

Town of Amherst Criteria

Phase 1

- **Reduce 25-year peak outflow from post-developed site to be less than or equal to the 10-year peak outflow from the pre-developed site**
- 10-year peak outflow from pre-developed site = 0.18 CFS
- 25- year peak outflow from post-developed site = **0.18 CFS**

- **Provide enough detention volume on site to meet the above criteria**
- Minimum required detention volume = 175 cubic feet (0.004 acre-feet)
- Actual detention volume provided = **653 cubic feet (0.015 acre-feet)**

Phase 2

- **Reduce 25-year peak outflow from post-developed site to be less than or equal to the 10-year peak outflow from the pre-developed site**
- 10-year peak outflow from pre-developed site = 0.45 CFS
- 25- year peak outflow from post-developed site = **0.26 CFS**

- **Provide enough detention volume on site to meet the above criteria**
- Minimum required detention volume = 348 cubic feet (0.008 acre-feet)
- Actual detention volume provided = **392 cubic feet (0.009 acre-feet)**

Phase 3

- **Reduce 25-year peak outflow from post-developed site to be less than or equal to the 10-year peak outflow from the pre-developed site**
- 10-year peak outflow from pre-developed site = 0.51 CFS
- 25- year peak outflow from post-developed site = **0.28 CFS**

- **Provide enough detention volume on site to meet the above criteria**
- Minimum required detention volume = 634 cubic feet (0.015 acre-feet)
- Actual detention volume provided = **653 cubic feet (0.015 acre-feet)**

Existing Site Conditions

The project area is partially developed and can be considered to be one (1) drainage area based on existing site topography (see Existing Drainage Plan on page 8). The existing site area consists of an existing building with surrounding asphalt pavement parking and landscaping. The landscaped vegetation areas consist of existing lawn and some trees and woody shrubs.

The Federal Insurance Rate Map for the Town of Amherst, Erie County, New York prepared by the Federal Emergency Management Act (F.E.M.A.) shows that no portions of the site are located within the 100-Year Floodplain.

The Erie County Soil Survey lists 98% of the site area as having Urban Land Odessa Complex (Ut) soil rated Type D, and the remaining 2% of the site area as having Urban Land Schoharie Complex (Uu) soil rated Type D. The soil ratings are based on the classification system of the U.S.D.A. Natural Resources Conservation Service. Soil boring samples show bedrock elevations approximately 21 feet below existing grade and evidence of high groundwater table depths approximately 19 feet below existing grade on average (see Geotechnical Report by Buffalo Drilling Company, Inc. dated July, 1994 and identified as Project No. 94-208).

Descriptions, peak runoff, and discharge points of each of the drainage subareas on the existing site are summarized below:

EXISTING SITE								
PHASE 1 AREA								
AREA	0.05 ACRES							
% OFFSITE/ONSITE	100% ONSITE							
DEVELOPED OR UNDEVELOPED			PARTIALLY DEVELOPED					
DESCRIPTION OF GROUND COVERS			LANDSCAPED AREA WITH TREES, LAWN, & VEGETATION					
IMPERVIOUS AREA AND %		0.002 AC. (4%)						
RUNOFF FLOW PATTERN AND DIRECTION				SOUTHWEST TO NORTHEAST				
AVERAGE DROP AND SLOPE		2.3% AVERAGE SLOPE						
C	0.30							
CN	83							
Tc	5.0	MIN						
PEAK RUNOFF FLOW RATE		0.18 CFS						
PEAK RUNOFF VOLUME		348	CUBIC FEET					
FREQ/DEPTH/DURATION AND TYPE OF DESIGN STORM					10-YR / 24-HR			
RAINFALL DEPTH:	3.44 INCHES							
TIE IN POINT	EXISTING CATCH BASINS							
DRAINAGE DISCHARGES TO	EXISTING DRAINAGE SYSTEM BENEATH PARKING LOT							
OVERLAND, PIPE, OR DITCH	OVERLAND SHEET FLOW							

PHASE 2 AREA									
AREA	0.10 ACRES								
% OFFSITE/ONSITE	100% ONSITE								
DEVELOPED OR UNDEVELOPED			PARTIALLY DEVELOPED						
DESCRIPTION OF GROUND COVERS			EXISTING STORAGE BUILDING & SURROUNDING LAWN						
IMPERVIOUS AREA AND %		0.05 AC. (50%)							
RUNOFF FLOW PATTERN AND DIRECTION				NORTH TO SOUTH					
AVERAGE DROP AND SLOPE		2.3% AVERAGE SLOPE							
C	0.61								
CN	90								
Tc	5.0	MIN							
PEAK RUNOFF FLOW RATE		0.45 CFS							
PEAK RUNOFF VOLUME		871	CUBIC FEET						
FREQ/DEPTH/DURATION AND TYPE OF DESIGN STORM					10-YR / 24-HR				
RAINFALL DEPTH:	3.44 INCHES								
TIE IN POINT	EXISTING LAWN DRAINS								
DRAINAGE DISCHARGES TO	EXISTING DRAINAGE SYSTEM BENEATH PARKING LOT								
OVERLAND, PIPE, OR DITCH	OVERLAND SHEET FLOW								

PHASE 3 AREA								
AREA	0.15 ACRES							
% OFFSITE/ONSITE	100% ONSITE							
DEVELOPED OR UNDEVELOPED			PARTIALLY DEVELOPED					
DESCRIPTION OF GROUND COVERS			LAWN AREA					
IMPERVIOUS AREA AND %		0 AC. (0%)						
RUNOFF FLOW PATTERN AND DIRECTION				NORTH TO SOUTH				
AVERAGE DROP AND SLOPE		2.3% AVERAGE SLOPE						
C	0.27							
CN	82							
Tc	5.0	MIN						
PEAK RUNOFF FLOW RATE		0.51 CFS						
PEAK RUNOFF VOLUME		958	CUBIC FEET					
FREQ/DEPTH/DURATION AND TYPE OF DESIGN STORM					10-YR / 24-HR			
RAINFALL DEPTH:	3.44 INCHES							
TIE IN POINT	EXISTING LAWN DRAINS							
DRAINAGE DISCHARGES TO	EXISTING DRAINAGE SYSTEM BENEATH PARKING LOT							
OVERLAND, PIPE, OR DITCH	OVERLAND SHEET FLOW							

Existing Drainage Summary

No drainage problems have been reported on the existing site or any of the adjacent parcels as of the time this report was written (January, 2025). The hydraulic capacities and performance of the existing storm sewer within the Eggert Road right-of-way is outside the scope of this report and can be determined by the Town of Amherst Engineering Department and the Hydraulic Engineer of the Erie County Highway Department.

Proposed Site Conditions

The phased project site areas shall be cleared, grubbed, and re-graded. A new 499 square foot 1-story antique fire truck addition (Phase 1), several accessibility additions (Phase 1), a new 728 square foot 1-story accessory building addition (Phase 2), and new 3,040 square foot storage building (Phase 3) shall be added to the existing facility. No new driveways shall be added. No existing driveways shall be modified, removed, or relocated.

The proposed drainage plan can be divided into three (3) separate drainage subareas

corresponding to each project phase, based on proposed site topography (see Proposed Drainage Plan on page 9). All of the 3 drainage subareas shall be tributary to the existing drainage system beneath the existing parking lot which discharges into the existing storm sewer within the adjacent Eggert Road right-of-way. Descriptions, peak runoff, and discharge points of each of the drainage subareas on the existing site are summarized below:

PROPOSED SITE								
PHASE 1 AREA								
AREA	0.05 ACRES							
% OFFSITE/ONSITE	100% ONSITE							
DEVELOPED OR UNDEVELOPED			FULLY DEVELOPED					
DESCRIPTION OF GROUND COVERS			NEW BLDG ADDITION W/ADJ SIDEWALK & LSCP.					
IMPERVIOUS AREA AND %		0.03 AC. (60%)						
RUNOFF FLOW PATTERN AND DIRECTION				SOUTHWEST TO NORTHEAST				
AVERAGE DROP AND SLOPE		2.3% AVERAGE SLOPE						
C	0.68							
CN	92							
Tc	5.0	MIN						
PEAK RUNOFF FLOW RATE		0.30 CFS	**DETAIND PEAK RUNOFF FLOW RATE**				0.18 CFS	
PEAK RUNOFF VOLUME		610	CUBIC FEET		**DETAINED VOLUME**		523	CUBIC FEET
FREQ/DEPTH/DURATION AND TYPE OF DESIGN STORM					25-YR / 24-HR			
RAINFALL DEPTH:	4.15 INCHES							
TIE IN POINT	NEW U.G. DETENTION SYSTEM							
DRAINAGE DISCHARGES TO	EXISTING DRAINAGE SYSTEM BENEATH PARKING LOT							
OVERLAND, PIPE, OR DITCH	OVERLAND SHEET & PIPE FLOW							

PHASE 2 AREA								
AREA	0.10 ACRES							
% OFFSITE/ONSITE	100% ONSITE							
DEVELOPED OR UNDEVELOPED			FULLY DEVELOPED					
DESCRIPTION OF GROUND COVERS			NEW BLDG ADDITION & SURROUNDING LSCP.					
IMPERVIOUS AREA AND %		0.07 AC. (70%)						
RUNOFF FLOW PATTERN AND DIRECTION				NORTH TO SOUTH				
AVERAGE DROP AND SLOPE		2.3% AVERAGE SLOPE						
C	0.75							
CN	93							
Tc	5.0	MIN						
PEAK RUNOFF FLOW RATE		0.61 CFS	**DETAIND PEAK RUNOFF FLOW RATE**				0.26 CFS	
PEAK RUNOFF VOLUME		1220	CUBIC FEET		**DETAINED VOLUME**		1176	CUBIC FEET
FREQ/DEPTH/DURATION AND TYPE OF DESIGN STORM					25-YR / 24-HR			
RAINFALL DEPTH:	4.15 INCHES							
TIE IN POINT	NEW U.G. DETENTION SYSTEM							
DRAINAGE DISCHARGES TO	EXISTING DRAINAGE SYSTEM BENEATH PARKING LOT							
OVERLAND, PIPE, OR DITCH	OVERLAND SHEET & PIPE FLOW							

PHASE 3 AREA								
AREA	0.15 ACRES							
% OFFSITE/ONSITE	100% ONSITE							
DEVELOPED OR UNDEVELOPED			FULLY DEVELOPED					
DESCRIPTION OF GROUND COVERS			NEW STORAGE BLDG. & SURROUNDING LSCP.					
IMPERVIOUS AREA AND %		0.10 AC. (67%)						
RUNOFF FLOW PATTERN AND DIRECTION				NORTH TO SOUTH				
AVERAGE DROP AND SLOPE		2.3% AVERAGE SLOPE						
C	0.72							
CN	93							
Tc	5.0	MIN						
PEAK RUNOFF FLOW RATE		0.91 CFS	**DETAIND PEAK RUNOFF FLOW RATE**				0.28 CFS	
PEAK RUNOFF VOLUME		1830	CUBIC FEET		**DETAINED VOLUME**		1742	CUBIC FEET
FREQ/DEPTH/DURATION AND TYPE OF DESIGN STORM					10-YR / 24-HR			
RAINFALL DEPTH:		3.44 INCHES						
TIE IN POINT		EXISTING LAWN DRAINS						
DRAINAGE DISCHARGES TO		EXISTING DRAINAGE SYSTEM BENEATH PARKING LOT						
OVERLAND, PIPE, OR DITCH		OVERLAND SHEET FLOW						

Proposed Drainage Summary

All 3 phased project areas shall be graded to drain all surface stormwater runoff from the new roof areas into a new storm sewer system via new roof drain laterals. The new roof drains shall convey all stormwater runoff to 3 new underground detention systems located within each of the three project phase areas. For Phase 1, during the 25-year storm event it is estimated that the peak runoff rate from the site shall be approximately 0.18 CFS. This shall be the same as the peak runoff rate under existing conditions during a 10-year storm event. For Phase 2, during the 25-year storm event it is estimated that the peak runoff rate from the site shall be approximately 0.26 CFS. This shall be 0.19 CFS (42%) less than the peak runoff rate under existing conditions during a 10-year storm (0.45 CFS). For Phase 3, during the 25-year storm event it is estimated that the peak runoff rate from the site shall be approximately 0.28 CFS. This shall be 0.23 CFS (45%) less than the peak runoff rate under existing conditions during a 10-year storm (0.51 CFS). Therefore, the detention basin shall reduce the peak runoff rate to an acceptable peak flow as required by the Town of Amherst and the Erie County Highway Department. None of the future site area shall discharge stormwater runoff to adjacent residential parcels. Therefore the off-site impact from this development on the adjacent storm sewer system shall be negligible.

Operation & Maintenance

Regular maintenance of the detention basin shall be the responsibility of the property owner to ensure that:

- The outlet is kept free of debris and sediment
- The interior of the new underground detention systems are maintained per manufacturer's instructions.

Design Procedures

Calculations were based on the following:

- Concentration times were calculated using the SCS Lag Method
- The peak runoff rates for the existing site were calculated by the N.R.C.S. TR-20 Unit Hydrograph Method, assuming a 24-hour 10-year design storm which discharges a total of 3.44 inches of rainfall. A Type II storm distribution was assumed.
- The peak runoff rates for the existing site were calculated by the N.R.C.S. TR-20 Unit Hydrograph Method, assuming a 24-hour 25-year design storm which discharges a total of 4.15 inches of rainfall. A Type II storm distribution was

assumed.

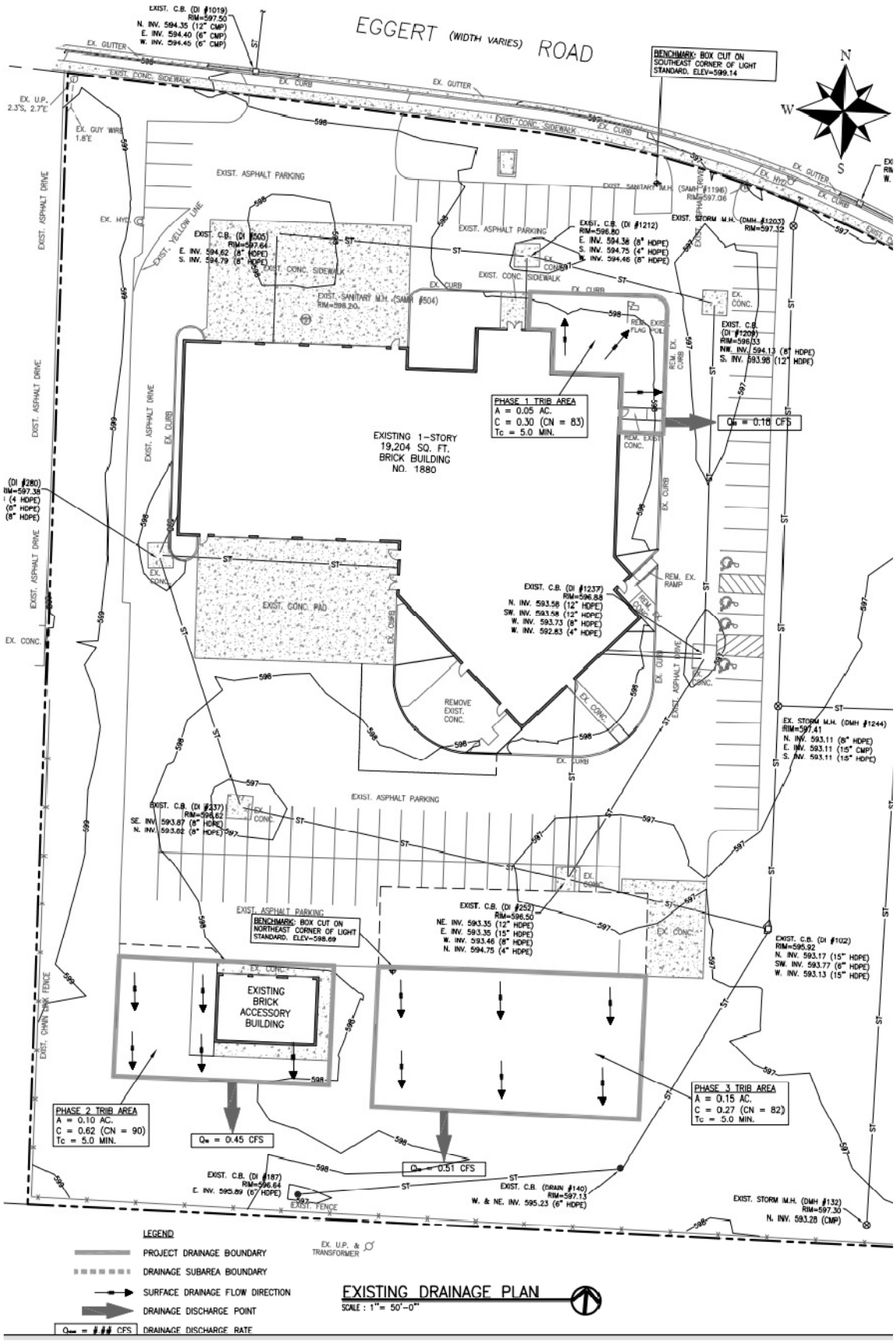
- The storm sewers were sized and sloped using the Bernoulli Energy Equation and the Rational Method assuming a 10-year storm frequency
- The detention area elevation-volume relationship was calculated by average contour area
- The detention basin elevation-discharge relationship was calculated using the inlet/outlet control equations given in HDS-5 (F.H.W.A.).
- Runoff was routed through the detention basins using the Storage Indication Method

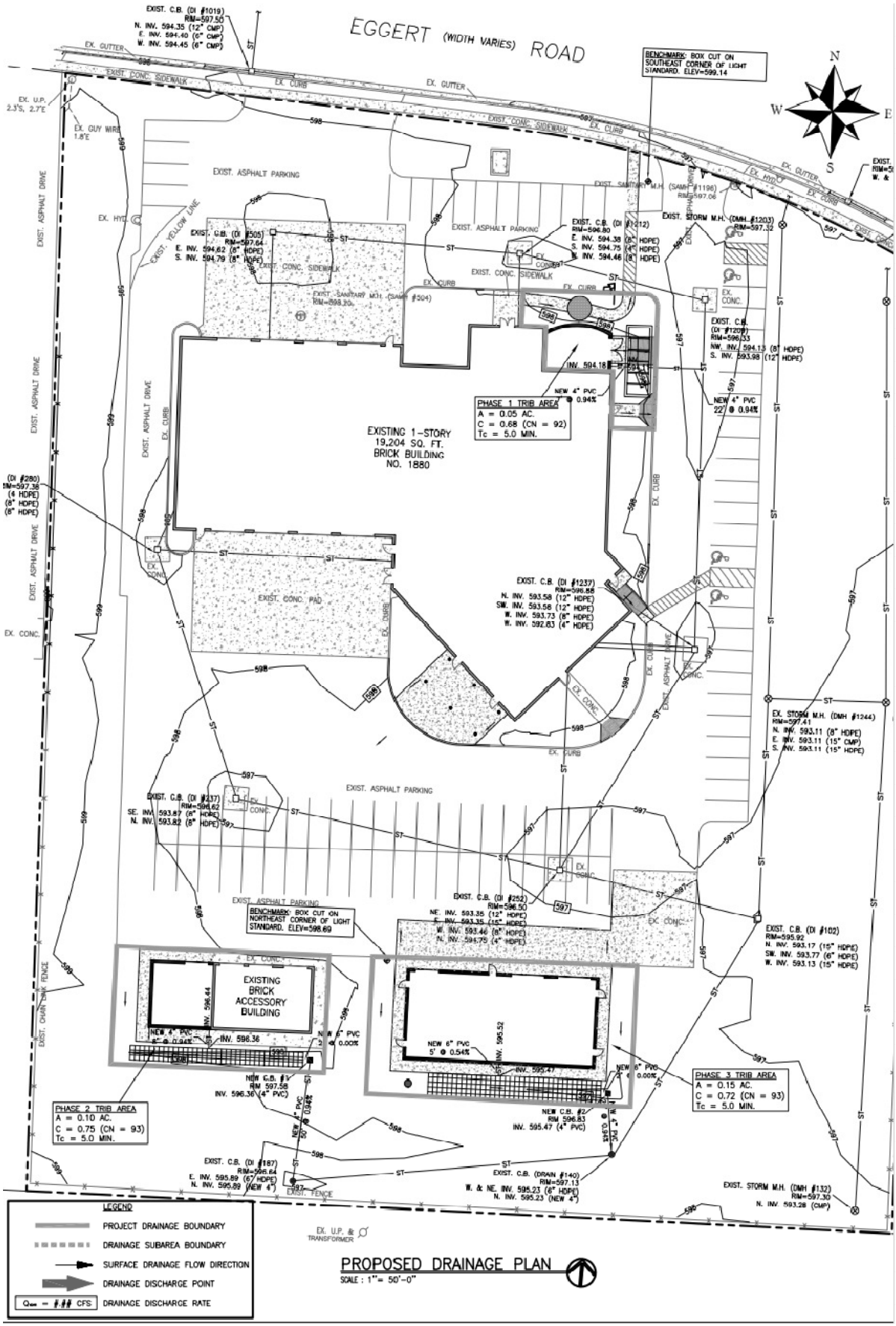
Drainage calculations are given starting on page 10.

Stormwater Pollution Prevention:

In order to prevent contamination and degradation of downstream water bodies being discharged into, the contractor shall maintain adequate soil erosion and sedimentation control measures throughout construction as shown on the Erosion Control in the design drawing set. All erosion control procedures shall comply with Town of Amherst requirements and Best Management Practices as set forth by the National Pollution Discharge Elimination System (N.P.D.E.S.). Temporary sedimentation and erosion control devices include temporary catch basin inlet protection during construction. Vegetation stabilization measures shall be implemented within 24 hours of final grading and seeding operations. Turf reinforcement mat shall also be added. Landscaping and seeding, sodding, or hydroseeding operations shall begin as soon as final grade is established in order to minimize or eliminate the exposure of loose soil particles to rain and wind erosion. The contractor shall ensure the site is graded such that stormwater runoff is directed to the sedimentation and erosion control devices throughout all phases of the construction. Each device shall also be inspected and maintained after rainstorms and on a daily basis. All sedimentation and erosion control devices shall remain in place until sufficient vegetation is established to prevent soil particle migration. Any temporary stockpiles shall not block drainage flows during construction. The perimeter of all stockpile bases shall be protected with silt fencing. Stockpiles should also not be located near slopes, roadways, or drainage structures if possible. Any dewatering operations shall discharge directly into a sediment filter structure or basin. All catch basin sumps shall be cleaned out and soil sediments shall be deposited at lawn areas before seeding operations begin. While sod is not required it is recommended. If sod is not used it is recommended that all lawn areas be hydroseeded and hydromulched, else burlap mesh shall be used on slope embankments steep enough to temporarily impede the establishment of lawn areas.

The contractor shall also obtain all necessary clearing, stripping, and debris disposal permits before beginning any excavation or construction on site. Methods of dust control shall also be employed as necessary. The Town of Amherst Plumbing Inspector shall inspect all storm drainage systems. The Town of Amherst Engineering Department shall approve these calculations and plans before a building permit can be issued. Since the total area of disturbance is less than one (1) acre, a SPDES Permit GP-0-25-001 for Stormwater Discharge During Construction Activities shall not be required by the New York State Department of Environmental Conservation (NYSDEC).


EGGERT (WIDTH VARIES) ROAD
BENCHMARK: BOX CUT ON SOUTHEAST CORNER OF LIGHT STANDARD. ELEV=599.14
EXIST. C.B. (DI #1019) RIM=597.50 N. INV. 594.35 (12" CMP) E. INV. 594.40 (6" CMP) W. INV. 594.45 (6" CMP)
EX. GUTTER
EXIST. CONC. SIDEWALK
EX. CURB
EX. U.P. 2.3'S, 2.7'E
EX. GUY WIRE 1.8'E
EXIST. ASPHALT PARKING
EXIST. SANITARY M.H. (SAMH #1196) RIM=597.06
EXIST. STORM M.H. (DMH #1203) RIM=597.32
EX. HYD.
EXIST. YELLOW LINE
EXIST. C.B. (DI #1505) RIM=597.64 E. INV. 594.62 (8" HDPE) S. INV. 594.79 (8" HDPE)
EXIST. C.B. (DI #1212) RIM=596.80 E. INV. 594.36 (8" HDPE) S. INV. 594.75 (4" HDPE) W. INV. 594.46 (8" HDPE)
EXIST. SANITARY M.H. (SAMH #504) RIM=598.20
EX. CONC.
REM. EXIST. FLAG POLE
EXIST. C.B. (DI #1209) RIM=596.53 NW. INV. 594.13 (8" HDPE) S. INV. 593.98 (12" HDPE)
EXIST. ASPHALT DRIVE
PHASE 1 TRIB AREA A = 0.05 AC. C = 0.30 (CN = 83) Tc = 5.0 MIN.
Q = 0.18 CFS
EXISTING 1-STORY 19,204 SQ. FT. BRICK BUILDING NO. 1880
REM. EXIST. CONC.
REM. EX. CURB
(DI #280) RIM=597.36 (4" HDPE) (8" HDPE) (8" HDPE)
EXIST. CONC. PAD
EXIST. C.B. (DI #1237) RIM=596.88 N. INV. 593.58 (12" HDPE) SW. INV. 593.58 (12" HDPE) W. INV. 593.73 (8" HDPE) W. INV. 592.83 (4" HDPE)
REM. EX. RAMP
REMOVE EXIST. CONC.
EX. STORM M.H. (DMH #1244) RIM=597.41 N. INV. 593.11 (8" HDPE) E. INV. 593.11 (15" CMP) S. INV. 593.11 (15" HDPE)
EXIST. C.B. (DI #237) RIM=596.62 SE. INV. 593.87 (8" HDPE) N. INV. 593.82 (8" HDPE)
EXIST. C.B. (DI #252) RIM=596.50 NE. INV. 593.35 (12" HDPE) E. INV. 593.35 (15" HDPE) W. INV. 593.46 (8" HDPE) N. INV. 594.75 (4" HDPE)
EXIST. C.B. (DI #102) RIM=595.92 N. INV. 593.17 (15" HDPE) SW. INV. 593.77 (6" HDPE) W. INV. 593.13 (15" HDPE)
BENCHMARK: BOX CUT ON NORTHEAST CORNER OF LIGHT STANDARD. ELEV=598.69
EXISTING BRICK ACCESSORY BUILDING
EXIST. CHAIN LINK FENCE
PHASE 2 TRIB AREA A = 0.10 AC. C = 0.62 (CN = 90) Tc = 5.0 MIN.
Q = 0.45 CFS
Q = 0.51 CFS
PHASE 3 TRIB AREA A = 0.15 AC. C = 0.27 (CN = 82) Tc = 5.0 MIN.
EXIST. C.B. (DI #187) RIM=596.64 E. INV. 595.89 (6" HDPE)
EXIST. C.B. (DRAIN #140) RIM=597.13 W. & NE. INV. 595.23 (6" HDPE)
EXIST. FENCE
EXIST. STORM M.H. (DMH #132) RIM=597.30 N. INV. 593.28 (CMP)
EX. U.P. & TRANSFORMER
LEGEND
PROJECT DRAINAGE BOUNDARY
DRAINAGE SUBAREA BOUNDARY
SURFACE DRAINAGE FLOW DIRECTION
DRAINAGE DISCHARGE POINT
Q = ### CFS DRAINAGE DISCHARGE RATE
EXISTING DRAINAGE PLAN
SCALE : 1"= 50'-0"
N
S
W


EGGERT (WIDTH VARIES) ROAD
BENCHMARK: BOX CUT ON SOUTHEAST CORNER OF LIGHT STANDARD. ELEV=599.14
BENCHMARK: BOX CUT ON NORTHEAST CORNER OF LIGHT STANDARD. ELEV=598.69
EXISTING 1-STORY 19,204 SQ. FT. BRICK BUILDING NO. 1880
EXISTING BRICK ACCESSORY BUILDING
PHASE 1 TRIB AREA
A = 0.05 AC.
C = 0.68 (CN = 92)
Tc = 5.0 MIN.
PHASE 2 TRIB AREA
A = 0.10 AC.
C = 0.75 (CN = 93)
Tc = 5.0 MIN.
PHASE 3 TRIB AREA
A = 0.15 AC.
C = 0.72 (CN = 93)
Tc = 5.0 MIN.
EXIST. ASPHALT PARKING
EXIST. ASPHALT DRIVE
EXIST. CONC. SIDEWALK
EXIST. CONC. PAD
EXIST. CURB
EXIST. GUTTER
EXIST. FENCE
EXIST. C.B. (DI #1019) RIM=597.50 N. INV. 594.35 (12" CMP) E. INV. 594.40 (6" CMP) W. INV. 594.45 (6" CMP)
EXIST. C.B. (DI #505) RIM=597.64 E. INV. 594.62 (8" HDPE) S. INV. 594.79 (8" HDPE)
EXIST. C.B. (DI #1212) RIM=596.80 E. INV. 594.38 (8" HDPE) S. INV. 594.75 (8" HDPE) W. INV. 594.46 (8" HDPE)
EXIST. C.B. (DI #1208) RIM=596.33 NW. INV. 594.13 (8" HDPE) S. INV. 593.98 (12" HDPE)
EXIST. C.B. (DI #1239) RIM=596.85 N. INV. 593.58 (12" HDPE) SW. INV. 593.58 (12" HDPE) W. INV. 593.73 (8" HDPE) W. INV. 592.83 (4" HDPE)
EXIST. C.B. (DI #280) RIM=597.38 (4 HDPE) (8" HDPE) (8" HDPE)
EXIST. C.B. (DI #237) RIM=596.62 SE. INV. 593.87 (8" HDPE) N. INV. 593.87 (8" HDPE)
EXIST. C.B. (DI #252) RIM=596.50 NE. INV. 593.35 (12" HDPE) E. INV. 593.35 (15" HDPE) W. INV. 593.46 (8" HDPE) N. INV. 594.75 (4" HDPE)
EXIST. C.B. (DI #102) RIM=595.92 N. INV. 593.17 (15" HDPE) SW. INV. 593.77 (6" HDPE) W. INV. 593.13 (15" HDPE)
EXIST. STORM M.H. (DMH #1203) RIM=597.32
EXIST. STORM M.H. (DMH #1244) RIM=597.41 N. INV. 593.11 (8" HDPE) E. INV. 593.11 (15" CMP) S. INV. 593.11 (15" HDPE)
EXIST. STORM M.H. (DMH #132) RIM=597.30 N. INV. 593.28 (CMP)
EXIST. SANITARY M.H. (SAMH #1196) RIM=597.06
EXIST. SANITARY M.H. (SAMH #304) RIM=598.20
EXIST. C.B. (DRAIN #140) RIM=597.13 W. & NE. INV. 595.23 (8" HDPE) N. INV. 595.23 (NEW 4")
EXIST. C.B. (DI #187) RIM=596.64 E. INV. 595.89 (6" HDPE) N. INV. 595.89 (NEW 4")
INV. 594.18
NEW 4" PVC @ 0.94%
NEW 4" PVC 22' @ 0.94%
NEW 4" PVC 8' @ 0.94%
INV. 596.36
INV. 596.44
NEW 6" PVC 5' @ 0.54%
INV. 595.52
INV. 595.47
NEW 6" PVC @ 0.00%
NEW C.B. #1 RIM 597.58 INV. 596.36 (4" PVC)
NEW C.B. #2 RIM 596.83 INV. 595.47 (4" PVC)
EX. U.P. 2.3'S, 2.7'E
EX. GUY WIRE 1.8'E
EX. HYD.
EX. U.P. & TRANSFORMER
LEGEND
PROJECT DRAINAGE BOUNDARY
DRAINAGE SUBAREA BOUNDARY
SURFACE DRAINAGE FLOW DIRECTION
DRAINAGE DISCHARGE POINT
Q= - #.## CFS: DRAINAGE DISCHARGE RATE
PROPOSED DRAINAGE PLAN
SCALE : 1"= 50'-0"
N
S
E
W

DRAINAGE AREA SUMMARY / CALCULATIONS

			EXISTING					
TRIB AREA	C	CN	AREA (AC)	PERV	IMP.	% IMP.	C x A	CN x A
PHASE 1	0.30	83	0.05	0.05	0.002	4%	0.015	4.15
		TOTAL	**0.05**	**0.048**	**0.00**	**4%**	**0.015**	**4.15**
						AVERAGE	**0.30**	**83**

			EXISTING					
TRIB AREA	C	CN	AREA (AC)	PERV	IMP.	% IMP.	C x A	CN x A
PHASE 2	0.61	90	0.10	0.05	0.05	50%	0.061	9
vice.		**TOTAL**	**0.10**	**0.05**	**0.05**	**50%**	**0.061**	**9**
						AVERAGE	**0.61**	**90**

			EXISTING					
NON-TRIB AREA	C	CN	AREA (AC)	PERV	IMP.	% IMP.	C x A	CN x A
PHASE 3	0.27	82	0.15	0.15	0	0%	0.0405	12.3
		TOTAL	**0.15**	**0.15**	**0.00**	0%	0.04	12
vice.						**AVERAGE**	**0.27**	**82**

			PROPOSED					
TRIB AREA	C	CN	AREA (AC)	PERV	IMP.	% IMP.	C x A	CN x A
PHASE 1	0.68	92	0.05	0.02	0.03	60%	0.034	4.6
		TOTAL	**0.05**	**0.02**	**0.03**	**60%**	**0.034**	**4.6**
						AVERAGE	**0.68**	**92**

			PROPOSED					
TRIB AREA	C	CN	AREA (AC)	PERV	IMP.	% IMP.	C x A	CN x A
PHASE 2	0.75	93	0.10	0.03	0.07	70%	0.075	9.3
		TOTAL	**0.10**	**0.03**	**0.07**	**70%**	**0.075**	**9.3**
						AVERAGE	**0.75**	**93**

			PROPOSED					
NON-TRIB AREA	C	CN	AREA (AC)	PERV	IMP.	% IMP.	C x A	CN x A
PHASE 3	0.72	93	0.15	0.05	0.1	67%	0.108	13.95
		TOTAL	**0.15**	**0.05**	**0.10**	67%	0.11	14
						AVERAGE	**0.72**	**93**

TIME OF CONCENTRATION CALCAULATIONS								
SCS LAG METHOD								
EXISTING PHASE 1 AREA								
Tc =	1.67 x	L^0.8 (S+1) ^ 0.7		0.021416	HRS OR	**5.0**	**MINUTES**	
		1900Y^0.5						
A =	0.05	AC						
L =	35	FT (MAX HYDRAULIC LENGTH = 209 x A ^0.6)						
CN =	83							
S =	2.048193							
Y =	2.33	% (AVERAGE SLOPE)						
EXISTING PHASE 2 AREA								
Tc =	1.67 x	L^0.8 (S+1) ^ 0.7		0.023097	HRS OR	**5.0**	**MINUTES**	
		1900Y^0.5						
A =	0.10	AC						
L =	52	FT (MAX HYDRAULIC LENGTH = 209 x A ^0.6)						
CN =	90							
S =	1.111111							
Y =	2.33	% (AVERAGE SLOPE)						
EXISTING PHASE 3 AREA								
Tc =	1.67 x	L^0.8 (S+1) ^ 0.7		0.037503	HRS OR	**5.0**	**MINUTES**	
		1900Y^0.5						
A =	0.15	AC						
L =	67	FT (MAX HYDRAULIC LENGTH = 209 x A ^0.6)						
CN =	82							
S =	2.195122							
Y =	2.33	% (AVERAGE SLOPE)						

PROPOSED PHASE 1 AREA							
Tc =	1.67 x	L^0.8 (S+1) ^ 0.7	0.01521	HRS OR	**5.0**	**MINUTES**	
		1900Y^0.5					
A =	0.05	AC					
L =	35	FT (MAX HYDRAULIC LENGTH = 209 x A ^0.6)					
CN =	92						
S =	0.869565						
Y =	2.33	% (AVERAGE SLOPE)					
PROPOSED PHASE 2 AREA							
Tc =	1.67 x	L^0.8 (S+1) ^ 0.7	0.020277	HRS OR	**5.0**	**MINUTES**	
		1900Y^0.5					
A =	0.10	AC					
L =	52	FT (MAX HYDRAULIC LENGTH = 209 x A ^0.6)					
CN =	93						
S =	0.752688						
Y =	2.33	% (AVERAGE SLOPE)					
PROPOSED PHASE 3 AREA							
Tc =	1.67 x	L^0.8 (S+1) ^ 0.7	0.024633	HRS OR	**5.0**	**MINUTES**	
		1900Y^0.5					
A =	0.15	AC					
L =	67	FT (MAX HYDRAULIC LENGTH = 209 x A ^0.6)					
CN =	93						
S =	0.752688						
Y =	2.33	% (AVERAGE SLOPE)					

Full Flow Pipe Size Calculator

Q = 1.49 * R^(2/3) * S^(1/2) * A / N

PHASE 1 ROOF DRAIN

		OVERT	RIM	COVER
Enter Pipe diameter (ft)====>	0.33			
Enter total length (ft) ======>	7	OVERT	RIM	COVER
Enter Elevation upstream ===>	594.18	594.51	598.40	3.89
Enter Elevation Downstream =>	594.11	594.44	598.26	3.82
Enter Manning's n value=====>	0.011			
PIPE DIAMETER =	4	INCHES	26.12	
TOTAL PIPE VOLUME =	1	CU FT		
FULL Pwet = CIRCUM =	1.05	FT		
AREA =	0.09	SQ FT		
Rhyd =	0.08	FT		
SLOPE =	0.94%			
RADIUS =	0.1665	FT		
PIPE TIME =	3	SEC. =	0.0	MIN.
Q =	0.22	c.f.s. =	98.65	GPM)
V =	2.50	FT/SEC		

(VELOCITY SHOULD BE ≥ 2.5 ft/sec FOR SELF-CLEANING)

AUTO PIPE SLOPER (LANDSCAPED & PAVED AREA)

AREA =	499	SQ FT	
SLOPE =	2.33	%	
DISTANCE =	76.87088	FT	
C =	0.95		
Tc =	1.79	MIN	
I =	7.0	in./hr.	
A =	0.01	AC	
Q =	**0.08**	**cfs**	

DESC.	C
GRASS	0.27
PAVED	0.95

PHASE 2 ROOF DRAIN			TOP		
Enter Pipe diameter (ft)====>	0.33				
Enter total length (ft) ======>	8	OVERT	RIM	COVER	
Enter Elevation upstream ===>	596.44	596.77	598.40	1.63	
Enter Elevation Downstream =>	596.36	596.69	598.10	1.41	
Enter Manning's n value=====>	0.011				
PIPE DIAMETER =	4	INCHES	26.12		
TOTAL PIPE VOLUME =	1	CU FT			
FULL Pwet = CIRCUM =	1.05	FT			
AREA =	0.09	SQ FT			
Rhyd =	0.08	FT			
SLOPE =	0.94%				
RADIUS =	0.1665	FT			
PIPE TIME =	3	SEC. =	0.1	MIN.	
Q =	0.22	c.f.s. =	98.65	GPM)	
V =	2.50	FT/SEC			

(VELOCITY SHOULD BE ≥ 2.5 ft/sec FOR SELF-CLEANING)

AUTO PIPE SLOPER (LANDSCAPED & PAVED AREA)

				DESC.	C
AREA =	728	SQ FT			
SLOPE =	2.33	%		GRASS	0.27
DISTANCE =	924.71587	FT		PAVED	0.95
C =	0.95				
Tc =	6.19	MIN			
I =	5.0	in./hr.			
A =	0.02	AC			
Q =	**0.08**	**cfs**			

PHASE 3 ROOF DRAIN

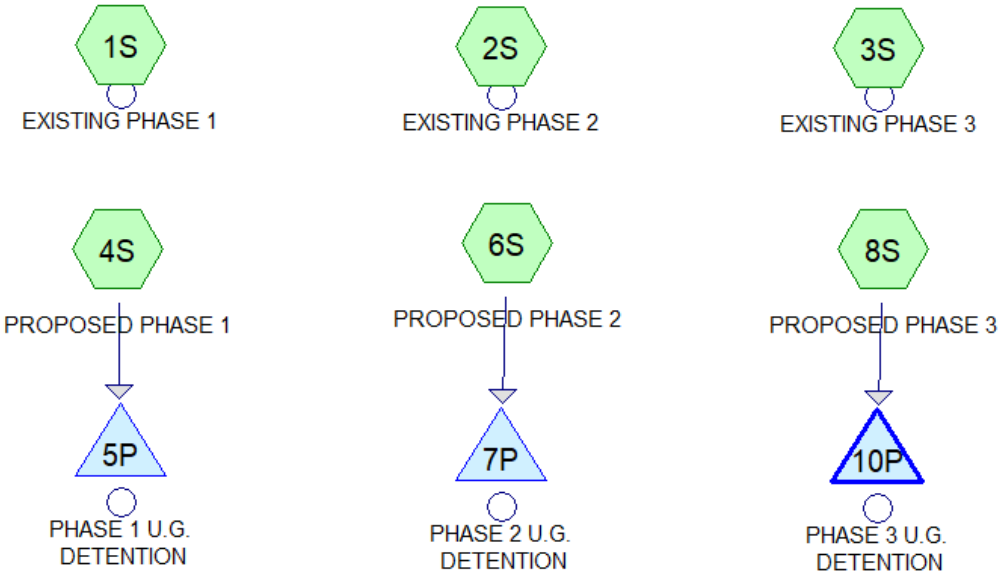
			TOP		
Enter Pipe diameter (ft)====>	0.50				
Enter total length (ft) ======>	10	OVERT	RIM	COVER	
Enter Elevation upstream ===>	595.52	596.02	597.75	1.73	
Enter Elevation Downstream =>	595.47	595.97	597.80	1.83	
Enter Manning's n value=====>	0.011				
PIPE DIAMETER =	6	INCHES	26.12		
TOTAL PIPE VOLUME =	2	CU FT			
FULL Pwet = CIRCUM =	1.57	FT			
AREA =	0.20	SQ FT			
Rhyd =	0.13	FT			
SLOPE =	0.54%				
RADIUS =	0.25	FT			
PIPE TIME =	4	SEC. =	0.1	MIN.	
Q =	0.49	c.f.s. =	221.05	GPM)	
V =	2.49	FT/SEC			

(VELOCITY SHOULD BE ≥ 2.5 ft/sec FOR SELF-CLEANING)

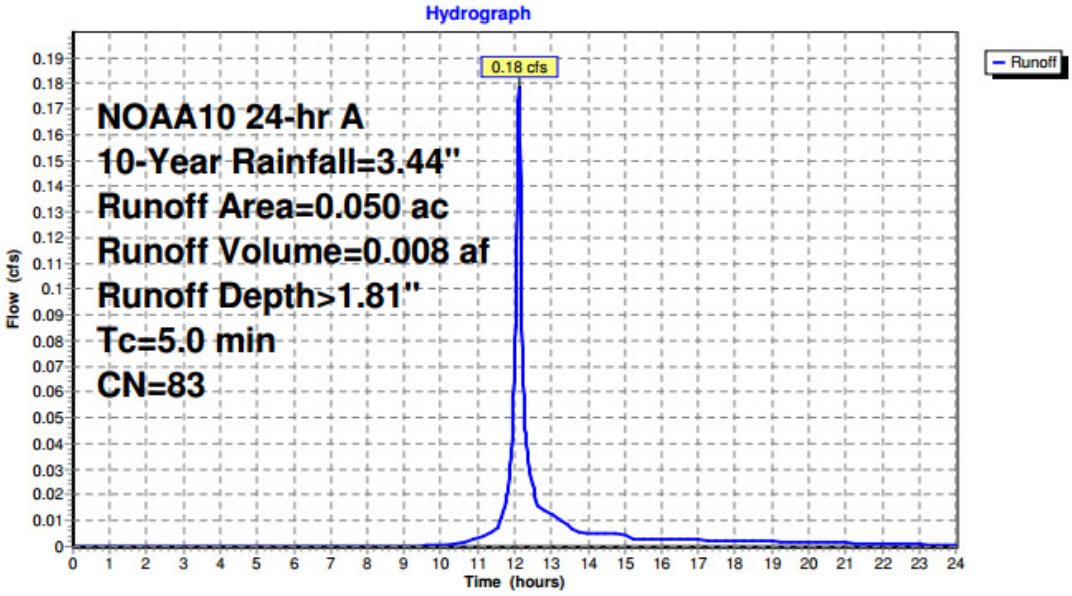
AUTO PIPE SLOPER (LANDSCAPED & PAVED AREA)

AREA =	3040	SQ FT		DESC.	C
SLOPE =	2.33	%		GRASS	0.27
DISTANCE =	602.7297	FT		PAVED	0.95
C =	0.95				
Tc =	5.00	MIN			
I =	5.4	in./hr.			
A =	0.07	AC			
Q =	**0.36**	**cfs**			

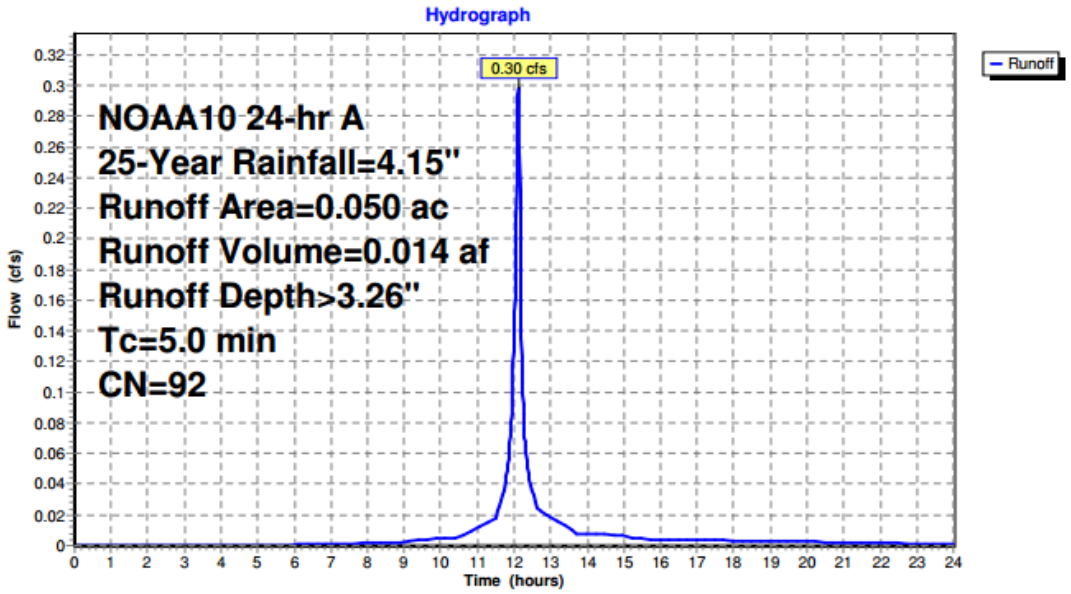
HYDROCAD MODEL DIAGRAM



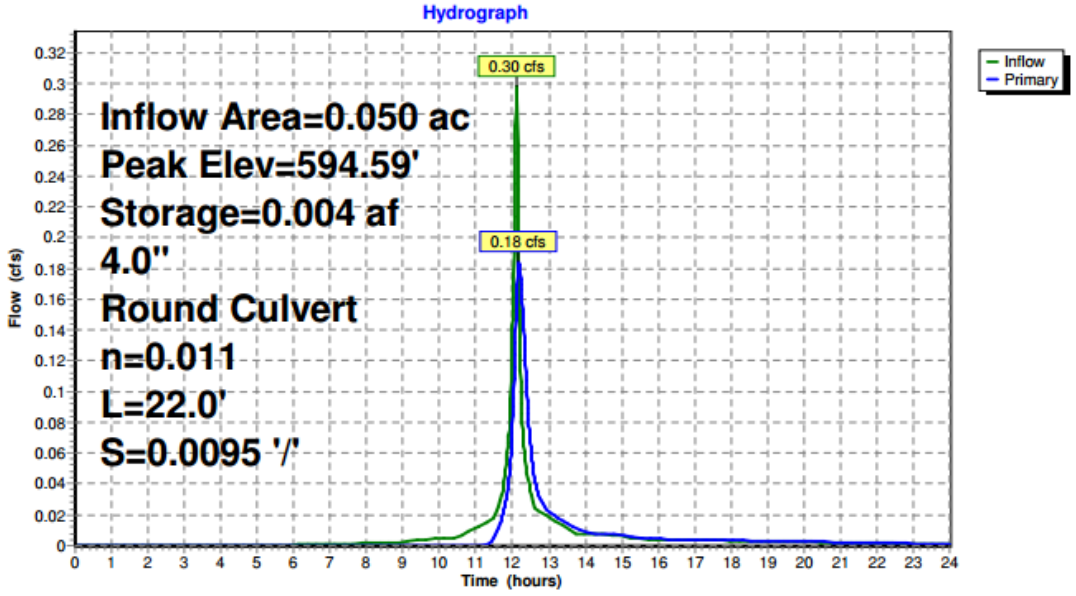
Subcatchment 1S: EXISTING PHASE 1



Subcatchment 4S: PROPOSED PHASE 1



Pond 5P: PHASE 1 U.G. DETENTION



Summary for Pond 5P: PHASE 1 U.G. DETENTION

Inflow Area = 0.050 ac, 60.00% Impervious, Inflow Depth > 3.26" for 25-Year event
Inflow = 0.30 cfs @ 12.12 hrs, Volume= 0.014 af
Outflow = 0.18 cfs @ 12.18 hrs, Volume= 0.012 af, Atten= 38%, Lag= 3.3 min
Primary = 0.18 cfs @ 12.18 hrs, Volume= 0.012 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 594.59' @ 12.18 hrs Surf.Area= 0.007 ac Storage= 0.004 af

Plug-Flow detention time= 86.4 min calculated for 0.012 af (88% of inflow)
Center-of-Mass det. time= 37.4 min (817.0 - 779.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	593.61'	0.008 af	**30.00'W x 10.74'L x 3.50'H Field A** 0.026 af Overall - 0.007 af Embedded = 0.019 af x 40.0% Voids
#2A	594.11'	0.007 af	**ADS_StormTech SC-740 b +Cap** x 6 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 6 Chambers in 6 Rows Cap Storage= 2.7 cf x 2 x 6 rows = 31.9 cf
		0.015 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	594.11'	**4.0" Round 4" OUTLET** L= 22.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 594.11' / 593.90' S= 0.0095 '/' Cc= 0.900 n= 0.011, Flow Area= 0.09 sf

Primary OutFlow Max=0.18 cfs @ 12.18 hrs HW=594.59' (Free Discharge)
↑—**1=4" OUTLET** (Inlet Controls 0.18 cfs @ 2.11 fps)

Pond 5P: PHASE 1 U.G. DETENTION - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-740 b +Cap (ADS StormTech® SC-740 with cap storage)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
Cap Storage= 2.7 cf x 2 x 6 rows = 31.9 cf

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

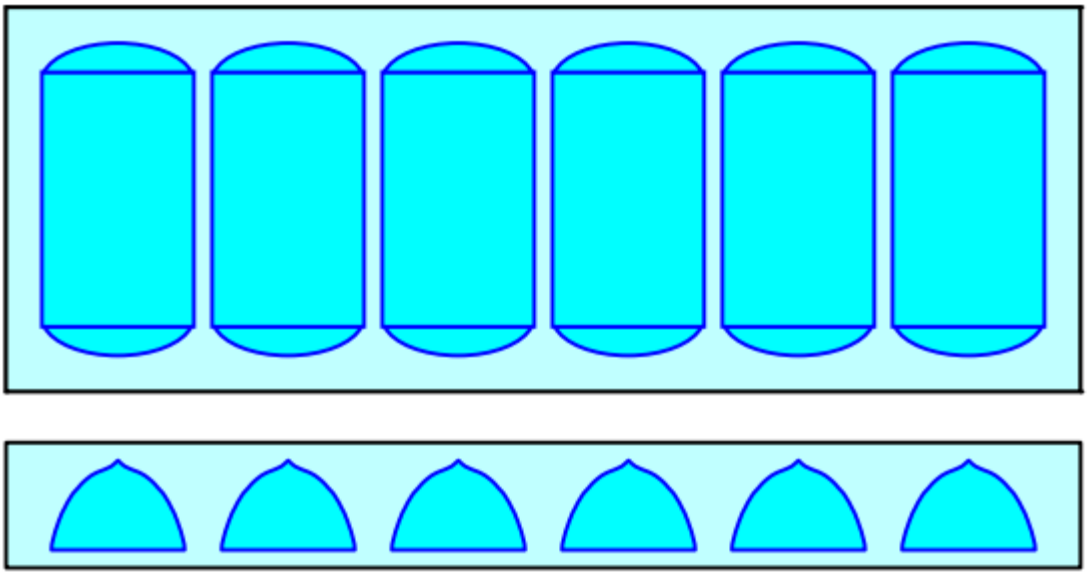
1 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 8.74' Row Length +12.0" End Stone x 2 = 10.74' Base Length
6 Rows x 51.0" Wide + 6.0" Spacing x 5 + 12.0" Side Stone x 2 = 30.00' Base Width
6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

6 Chambers x 45.9 cf + 2.7 cf Cap Volume x 2 x 6 Rows = 307.5 cf Chamber Storage

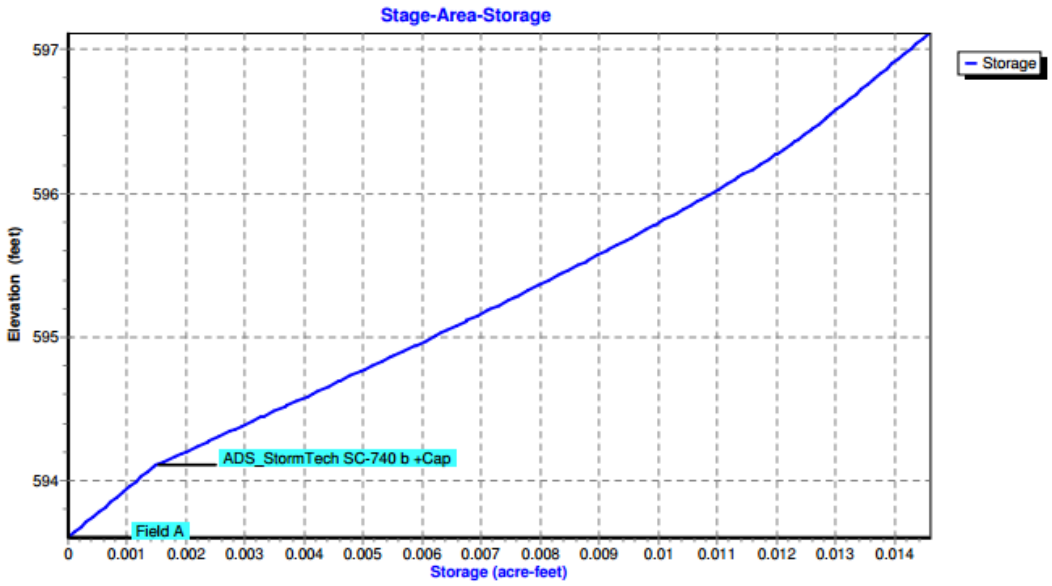
1,127.3 cf Field - 307.5 cf Chambers = 819.8 cf Stone x 40.0% Voids = 327.9 cf Stone Storage

Chamber Storage + Stone Storage = 635.4 cf = 0.015 af
Overall Storage Efficiency = 56.4%
Overall System Size = 10.74' x 30.00' x 3.50'

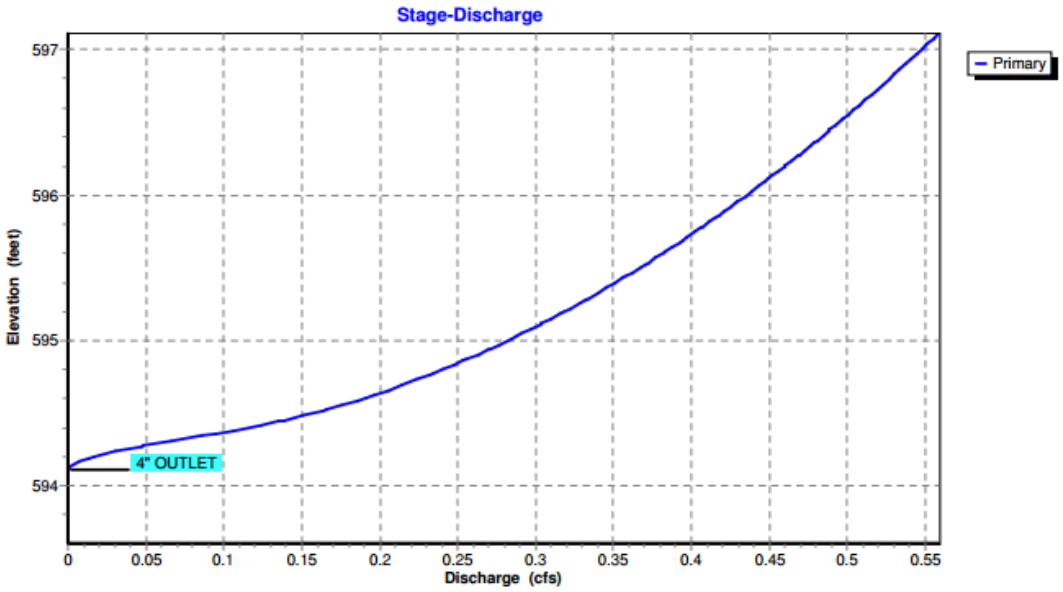
6 Chambers
41.8 cy Field
30.4 cy Stone



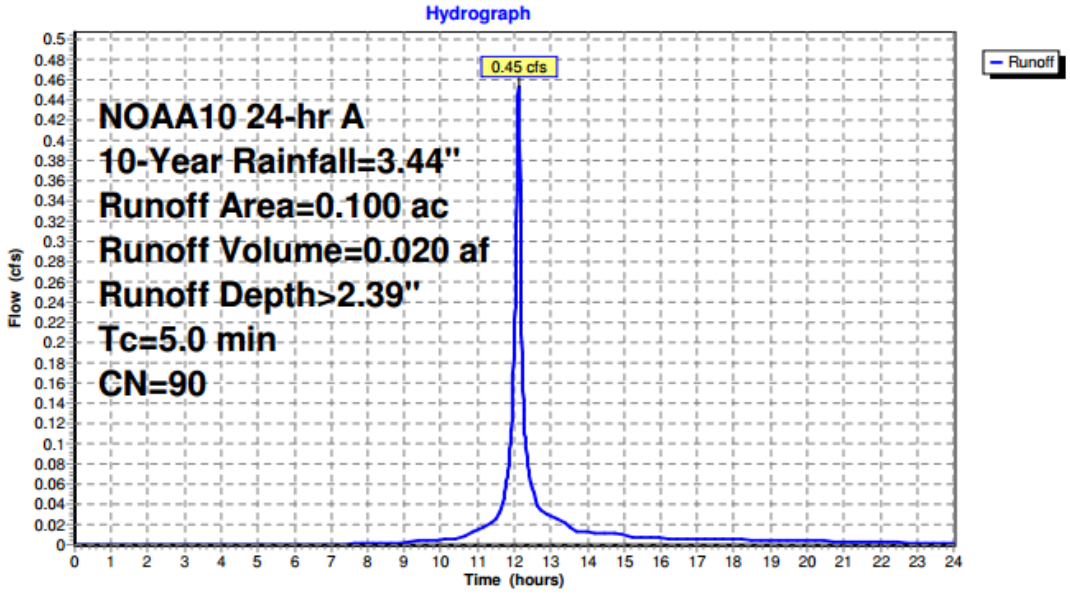
Pond 5P: PHASE 1 U.G. DETENTION



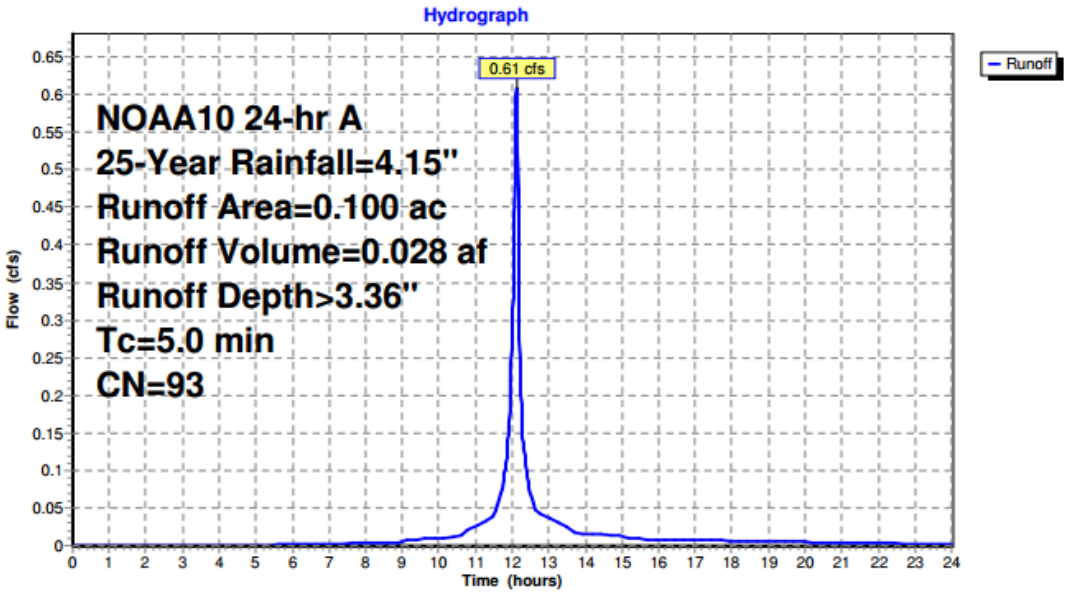
Pond 5P: PHASE 1 U.G. DETENTION



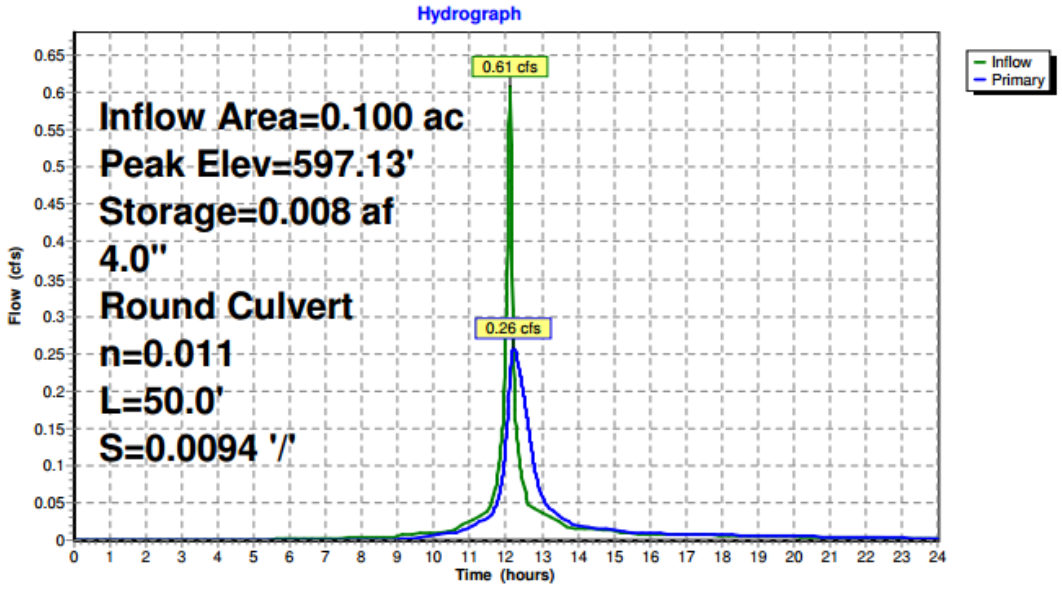
Subcatchment 2S: EXISTING PHASE 2



Subcatchment 6S: PROPOSED PHASE 2



Pond 7P: PHASE 2 U.G. DETENTION



Summary for Pond 7P: PHASE 2 U.G. DETENTION

Inflow Area = 0.100 ac, 70.00% Impervious, Inflow Depth > 3.36" for 25-Year event
Inflow = 0.61 cfs @ 12.12 hrs, Volume= 0.028 af
Outflow = 0.26 cfs @ 12.21 hrs, Volume= 0.027 af, Atten= 58%, Lag= 5.2 min
Primary = 0.26 cfs @ 12.21 hrs, Volume= 0.027 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 597.13' @ 12.21 hrs Surf.Area= 0.010 ac Storage= 0.008 af

Plug-Flow detention time= 48.9 min calculated for 0.027 af (97% of inflow)
Center-of-Mass det. time= 30.1 min (805.9 - 775.8)

Volume	Invert	Avail.Storage	Storage Description
#1	596.29'	0.009 af	**6.00'W x 72.00'L x 1.00'H PHASE 2 U.G. DETENTION** 0.010 af Overall x 93.0% Voids

Device	Routing	Invert	Outlet Devices
#1	Primary	596.36'	**4.0" Round 4" OUTLET** L= 50.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 596.36' / 595.89' S= 0.0094 '/' Cc= 0.900 n= 0.011, Flow Area= 0.09 sf

Primary OutFlow Max=0.26 cfs @ 12.21 hrs HW=597.13' (Free Discharge)
↑**1=4" OUTLET** (Barrel Controls 0.26 cfs @ 2.94 fps)

25-1-6-HYDROGRAPHS *NOAA10 24-hr A 25-Year Rainfall=4.15"*
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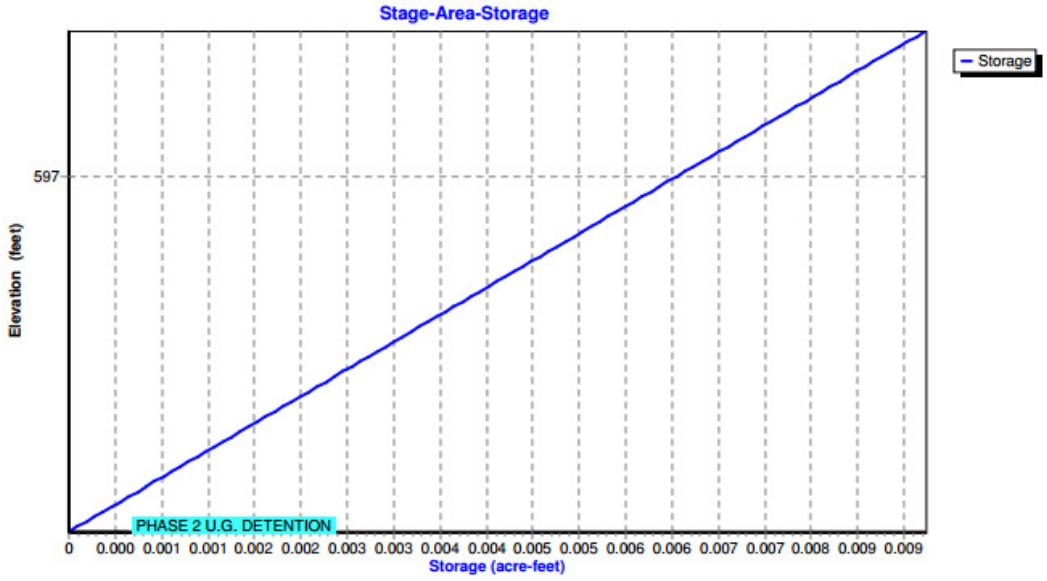
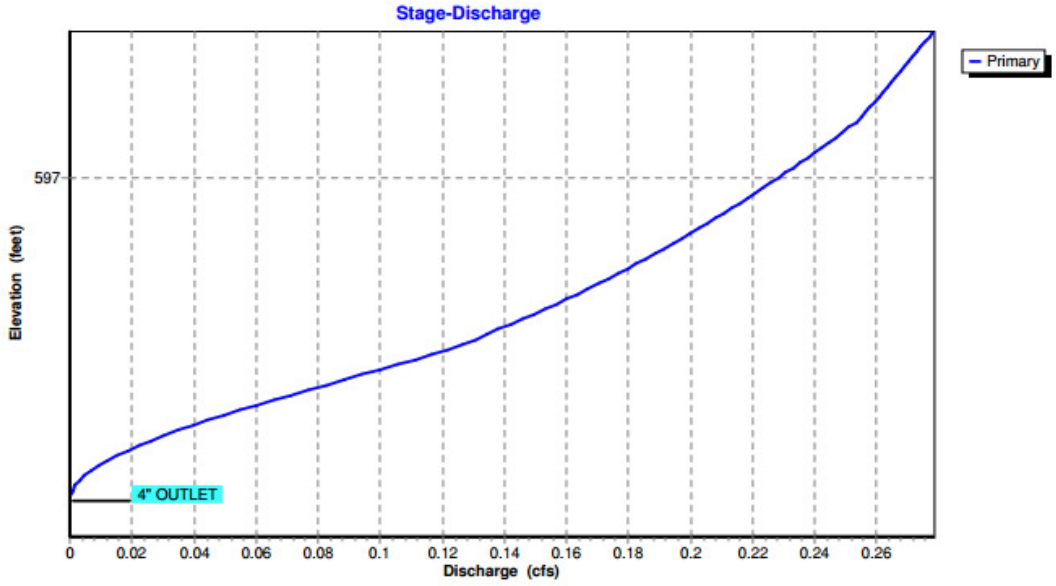
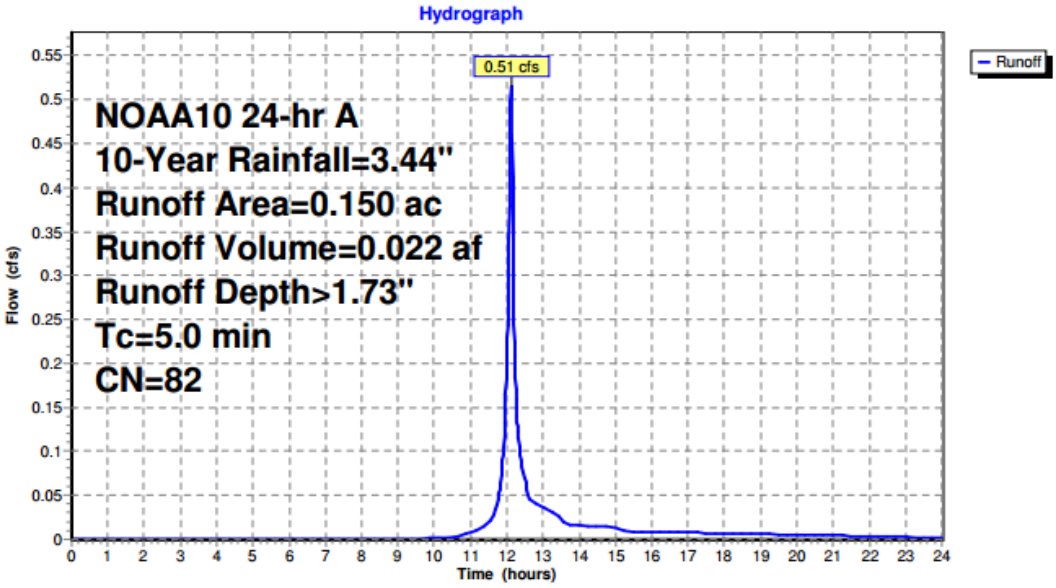
Pond 7P: PHASE 2 U.G. DETENTION



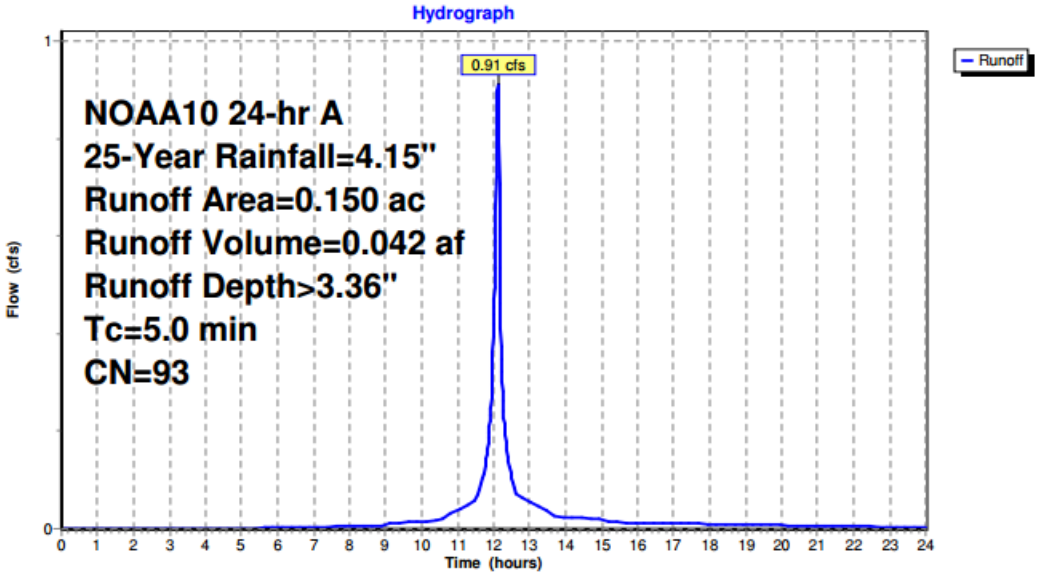
Pond 7P: PHASE 2 U.G. DETENTION



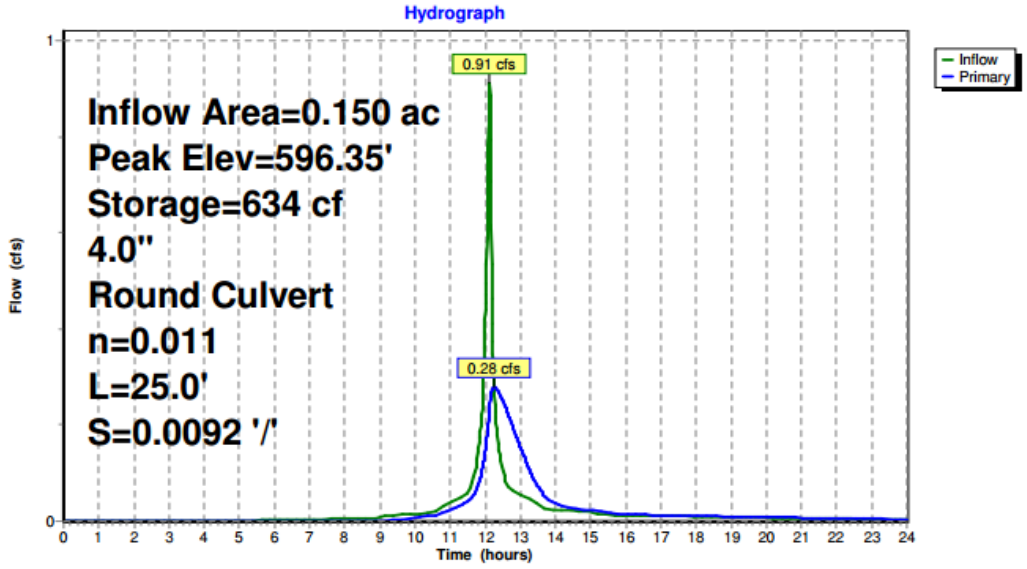
Subcatchment 3S: EXISTING PHASE 3



Subcatchment 8S: PROPOSED PHASE 3



Pond 10P: PHASE 3 U.G. DETENTION



Summary for Pond 10P: PHASE 3 U.G. DETENTION

Inflow Area = 0.150 ac, 66.67% Impervious, Inflow Depth > 3.36" for 25-Year event
Inflow = 0.91 cfs @ 12.12 hrs, Volume= 0.042 af
Outflow = 0.28 cfs @ 12.25 hrs, Volume= 0.040 af, Atten= 69%, Lag= 7.8 min
Primary = 0.28 cfs @ 12.25 hrs, Volume= 0.040 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 596.35' @ 12.25 hrs Surf.Area= 720 sf Storage= 634 cf

Plug-Flow detention time= 63.8 min calculated for 0.040 af (96% of inflow)
Center-of-Mass det. time= 41.6 min (817.4 - 775.8)

Volume	Invert	Avail.Storage	Storage Description
#1	595.40'	670 cf	**10.00'W x 72.00'L x 1.00'H PHASE 3 U.G. DETENTION** 720 cf Overall x 93.0% Voids

Device	Routing	Invert	Outlet Devices
#1	Primary	595.47'	**4.0" Round 4" OUTLET** L= 25.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 595.47' / 595.24' S= 0.0092 '/' Cc= 0.900 n= 0.011, Flow Area= 0.09 sf

Primary OutFlow Max=0.28 cfs @ 12.25 hrs HW=596.35' (Free Discharge)
↑**1=4" OUTLET** (Inlet Controls 0.28 cfs @ 3.20 fps)

25-1-6-HYDROGRAPHS *NOAA10 24-hr A 25-Year Rainfall=4.15"*
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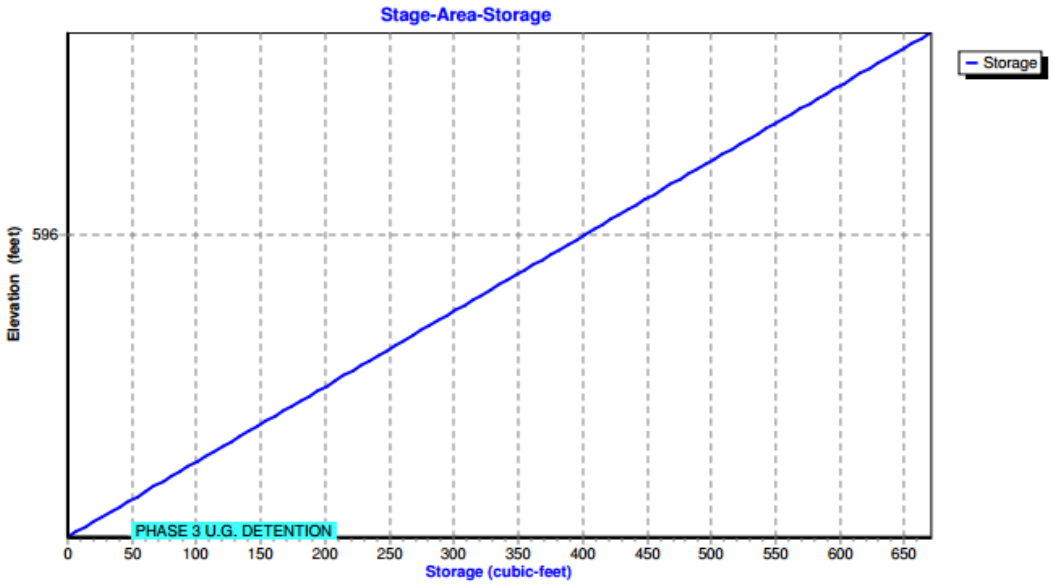
Pond 10P: PHASE 3 U.G. DETENTION



Pond 10P: PHASE 3 U.G. DETENTION