May 2, 2022

Town of Sudbury Conservation Commission
Attn: Lori Capone
275 Old Lancaster Road
Sudbury, MA 01776

RE: Revised Design Submittal
Mercedes of Sudbury at 141 Boston Post Road
MassDEP # 301-1361

Dear Ms. Capone and Members of the Commission,

On behalf of the Applicant, Herb Chambers 43 Braintree Street, LLC (HC), Crocker Design Group (CDG) has prepared this letter to summarize the updates to the overall site design in response to the feedback provided by Ms. Capone, the Sudbury Conservation Commission (SCC) members, and Horsley Witten's Peer Review.

Enclosed are the following supporting documents:

- One (1) Copy – Site Development Plans with Latest Revision date of 04/29/2022 (24"x36")
- One (1) Copy - Stormwater Report, revised 04/29/2022
- One (1) Copy – Response to Peer Review Comments Letter to Horsley Witten Group (HWG) dated 04/29/2022
- Electronic Submittal Package

Below are the highlights of the proposed revisions and additions that have been made to the Project to address the Commission's feedback, as well as feedback from the Planning Board and ZBA:

1. Revised Demolition and Soil, Sediment and Erosion Control plans (Sheets C-1 and C-2) to show all erosion control barriers outside the Bordering Vegetated Wetlands and to be consistent with the Wetland Replication Plans (Sheets WR-1 and WR-2).

2. Revised Grading and Drainage Plan (Sheet C-4.1) to have the correct elevations for the detention system and clarify grading to satisfy the Horsley Witten peer review.

3. Revised Detail Sheet C-8.2 to have elevations called out in the Precast Concrete Inlet Structure and Level Spreader to be consistent with the Grading and Drainage Plan and Stormwater Report.

4. Revised Layout Plan to call for the location and size of the proposed flagpole and flag to be installed on site.

Crocker Design Group

We appreciate the SCC's feedback and trust you will find this revised site design and accompanying documentation responsive to your requests and feedback. We look forward to presenting these updates to the SCC at the upcoming public hearing on May 9, 2022.

Sincerely,
Crocker Design Group LLC

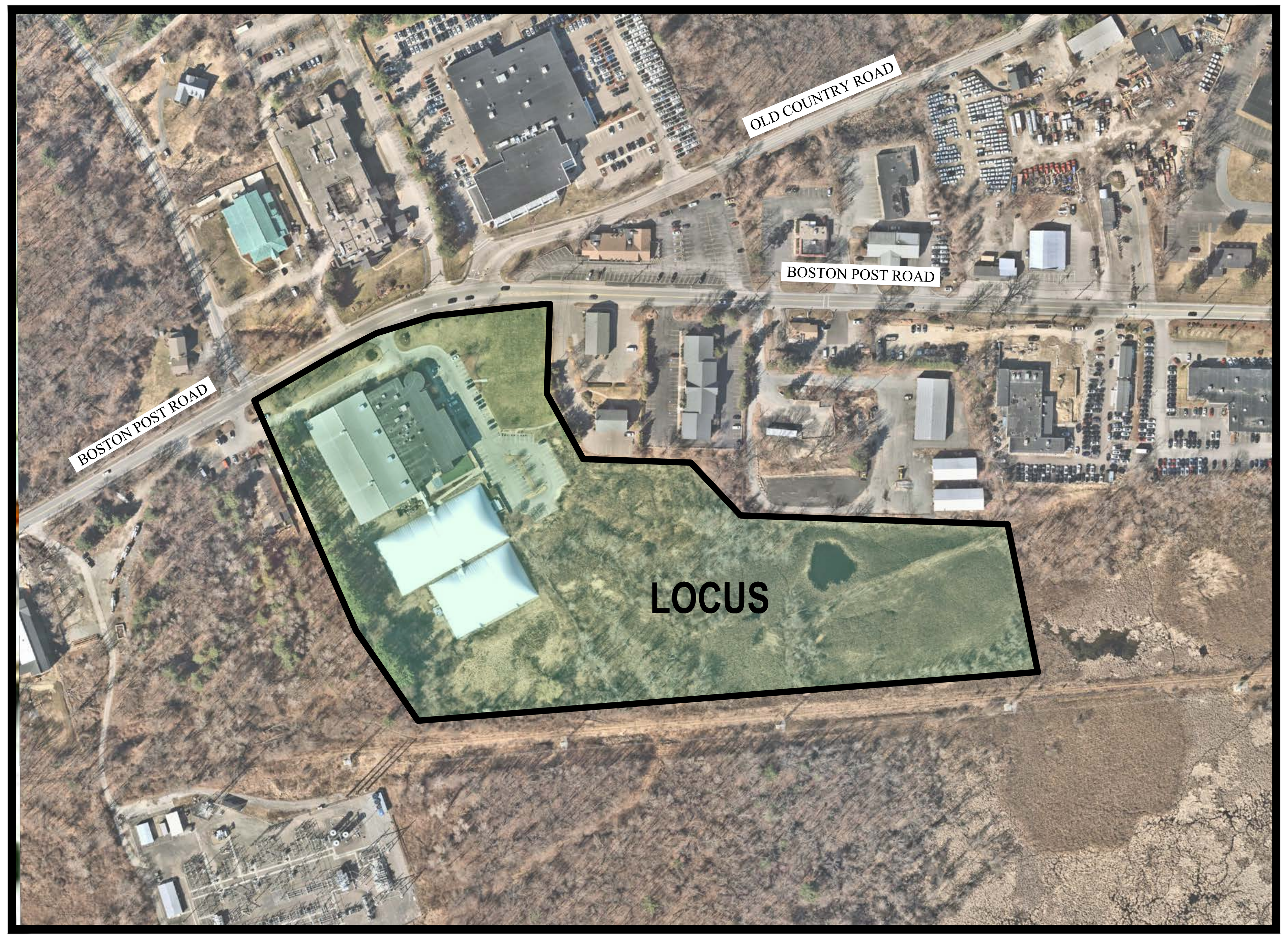
David Newhall, E.I.T.
Senior Project Engineer

PROPOSED SITE DEVELOPMENT PLANS

FOR

MERCEDES OF SUDBURY

141 BOSTON POST ROAD, SUDBURY, MA 01776

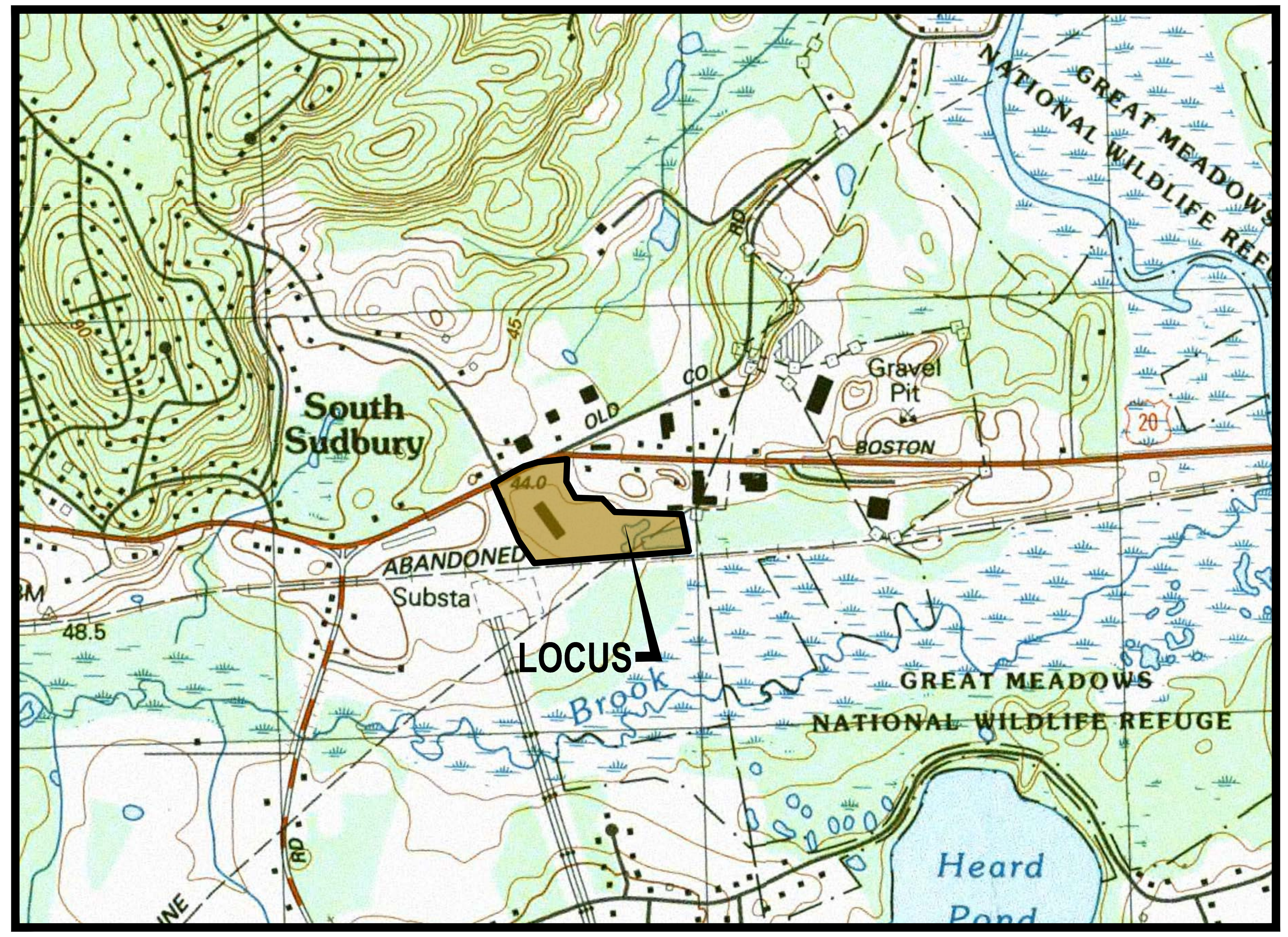


NORTH

AERIAL MAP

SCALE: 1' = 200'

200 100 0 200 4000



NORTH

USGS MAP

SCALE: 1' = 800'

800 400 0 800 1600

APPLICANT:
HERB CHAMBERS 43 BRAINTREE, LLC
83 BOSTON POST ROAD- ROUTE 20,
SUDBURY, MA 01776

SURVEYOR
CHA CONSULTING, INC.
141 LONGWATER DRIVE-SUITE 104
NORWELL, MA 02061

CONSULTING ENGINEER:
DGT ASSOCIATES
1071 WORCESTER ROAD
FRAMINGHAM, MA 01701

LANDSCAPE ARCHITECT:
RYAN ASSOCIATES
144 MOODY STREET, BUILDING 4
WALTHAM, MA 02453

ENGINEER/PERMITTING:
CROCKER DESIGN GROUP, LLC.
2 SHARP STREET, UNIT A,
HINGHAM, MA 02043

ARCHITECT:
THE CURTIS ARCHITECTURAL GROUP
36 BURRAGE ROAD
NEWTON CENTER, MA 02459

ATTORNEY:
ROLLINS, ROLLINS, AND FOX
36 GLEN AVENUE
NEWTON, MA 02459

DRAWING INDEX:

SUPPLEMENTAL PLANS:

EXISTING CONDITIONS PLAN

Date	Description	No.
04/29/22	RESPONSE TO PEER REVIEW COMMENTS	5.
03/28/22	P.B. AND CON.-COM. RESUBMITTAL	4.
02/14/22	P.B. AND CON.-COM. RESUBMITTAL	3.
01/31/22	ZBA RESUBMITTAL	2.
11/15/21	PLANNING BOARD SUBMITTAL	1.

Revisions

COMMONWEALTH OF MASSACHUSETTS
GABRIEL R. CROCKER
CIVIL
No. 47917
REGISTERED PROFESSIONAL ENGINEER

4-29-2022

GABRIEL R. CROCKER
PROFESSIONAL ENGINEER, MA REGISTRATION #47917

Crocker Design Group
2 SHARP STREET, UNIT A
HINGHAM, MA 02043
P: 781-919-0808

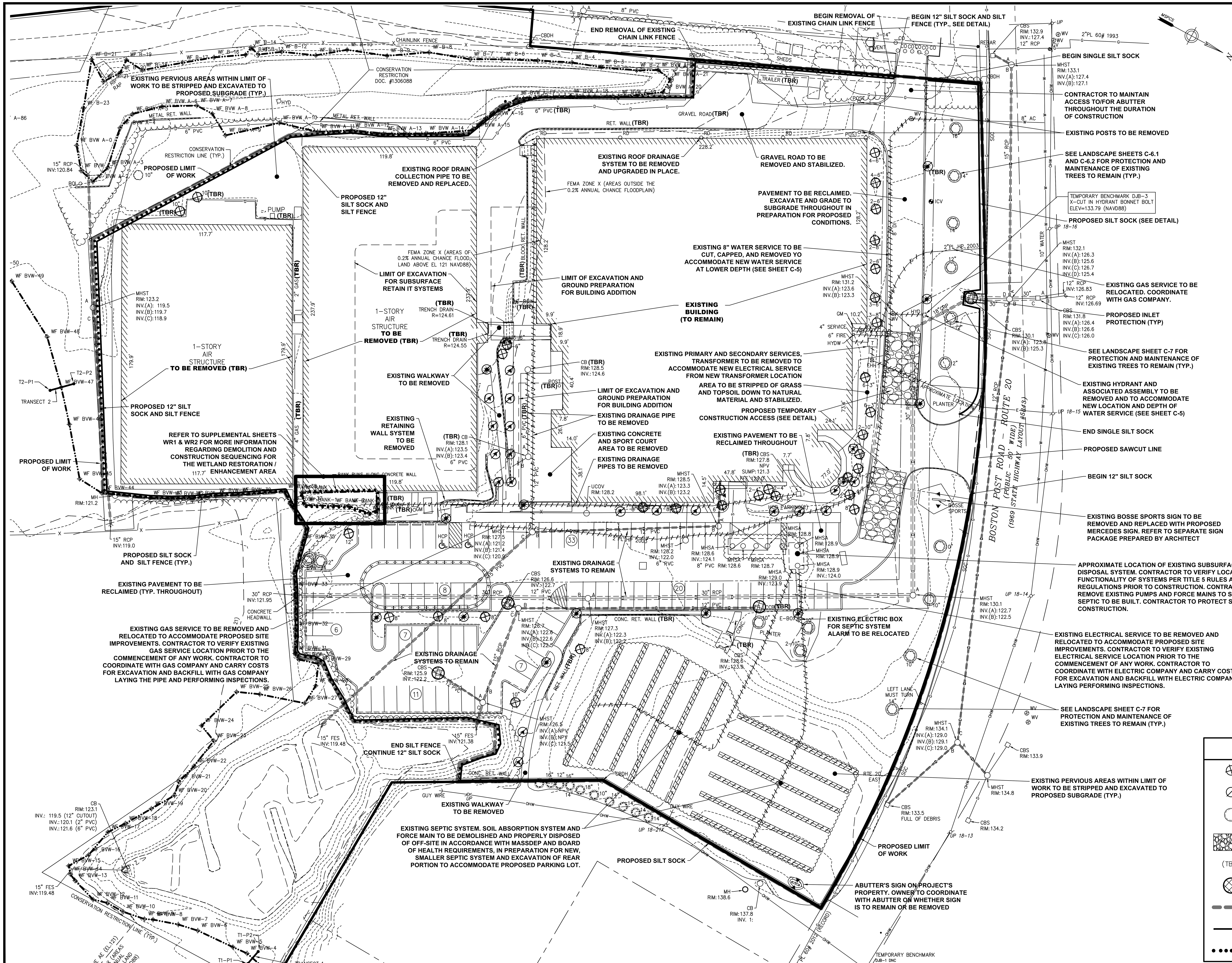
Project
MERCEDES OF SUDBURY
141 BOSTON POST ROAD,
SUDBURY, MA

Prepared for
HERB CHAMBERS 43 BRAINTREE STREET, LLC
#259 McGRATH HIGHWAY - ROUTE 28
SOMERVILLE, MA 02143

Drawing Title
COVER SHEET

Project No.	100-107
Date	11/10/2021
Scale	AS NOTED
Drawn By	DJN / JPM
Approved By	GC

Drawing No.
C-0



GENERAL NOTES

1) PROTECTIONS

A.) PROVIDE PROTECTION NECESSARY TO PREVENT DAMAGE TO EXISTING IMPROVEMENTS, TREES OR VEGETATION.

B.) PROTECT IMPROVEMENTS ON ADJOINING PROPERTIES AND ON OWNER'S PROPERTY.

C.) RESTORE DAMAGED IMPROVEMENTS TO ORIGINAL CONDITION AS ACCEPTABLE TO PARTIES HAVING JURISDICTION.

D.) CONDUCT OPERATIONS TO ENSURE MINIMUM INTERFERENCE WITH OPERATIONS, STREETS, WALKS, AND OTHER ADJACENT FACILITIES. DO NOT CLOSE OR OBSTRUCT STREETS, WALKS, OR OTHER OCCUPIED OR USED FACILITIES WITHOUT PERMISSION FROM AUTHORITIES HAVING JURISDICTION. STREETS AND ROADWAYS SHALL BE THOROUGHLY CLEANED AND/OR SWEPT ON A DAILY BASIS OR MORE FREQUENTLY AS REQUIRED BY THE GOVERNING AUTHORITY.

2.) UNLESS SPECIFIED OTHERWISE ALL MATERIALS AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE MASSACHUSETTS HIGHWAY DEPARTMENT SPECIFICATIONS FOR HIGHWAYS AND BRIDGES AND/OR THE APPROPRIATE LOCAL AUTHORITIES.

3.) ALL SLOPES, UNLESS OTHERWISE SPECIFIED, SHALL BE LOAMED AND SEEDED FOR STABILIZATION AS SOON AS POSSIBLE TO PREVENT EROSION INTO WETLAND RESOURCE AREAS, ABUTTING PROPERTIES, OR PUBLIC WAYS. EROSION CONTROL BLANKETS ARE REQUIRED FOR ALL 2H:1V SLOPES. SLOPES MAY NOT EXCEED 2H:1V. SEE "SEEDING" NOTE 3.

4.) ANY DEVIATIONS, I.E. "FIELD CHANGES" FROM THE DESIGN PLAN(S) MUST BE APPROVED BY THE DESIGN ENGINEER IN WRITING. CONTRACTOR SHOULD BE AWARE THAT LOCAL AND STATE AUTHORITIES HAVE JURISDICTION AND APPROVALS MUST BE OBTAINED FROM THE APPROPRIATE AUTHORITY PRIOR TO THE IMPLEMENTATION OF THE "FIELD CHANGE." COLER & COLANTONIO, INC. ASSUMES NO LIABILITY OR RESPONSIBILITY FOR WORK ASSOCIATED WITH FIELD CHANGES COMPLETED WITHOUT REGARD TO THE "FIELD CHANGE" PROCEDURE.

5.) RELOCATION OF ANY UTILITIES SHALL BE PERFORMED IN ACORDANCE WITH THE PROVISIONS OF THE APPROPRIATE UTILITY COMPANY AND/OR REGULATORY AGENCY.

6.) * * * DIG SAFE NOTE * * *
IN ACCORDANCE WITH MGL. CH. 82, SEC. 40 INCLUDING AMENDMENTS, ALL CONTRACTORS SHALL NOTIFY UTILITY COMPANIES AND GOVERNMENT AGENCIES, IN WRITING, OF THE INTENT TO EXCAVATE, BLAST, DEMOLISH, BORE, OR PERFORM OTHER EARTH MOVING OPERATIONS NO LESS THAN 72 HOURS AND NO MORE THAN 30 DAYS PRIOR TO THE COMMENCEMENT OF SUCH WORK (EXCLUSIVE OF SATURDAYS, SUNDAYS, AND LEGAL HOLIDAYS) OR CALL "DIG SAFE" AT 1-888-DIG-SAFE.

7.) LOCATION OF UNDERGROUND UTILITIES ON THIS PLAN ARE APPROXIMATE ONLY AND ARE BASED ON ACTUAL FIELD LOCATIONS OF VISIBLE STRUCTURES AND PLAN COMPILATIONS. EXISTING UTILITY LOCATIONS AND ELEVATIONS SHOWN SHALL BE VERIFIED BY CONTRACTOR PRIOR TO CONSTRUCTION. TEST PITS SHALL BE PERFORMED BY CONTRACTOR PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL INFORM THE DESIGN ENGINEER OF ANY DISCREPANCIES PRIOR TO THE START OF ANY CONSTRUCTION.

8.) USE OF EXPLOSIVES

A.) COMPLY WITH ALL LAWS, RULES AND REGULATIONS OF FEDERAL, STATE, AND LOCAL AUTHORITIES AND INSURERS WHICH GOVERN STORAGE, USE, MANUFACTURE, SALE, HANDLING, TRANSPORTATION, LICENSING, OR OTHER DISPOSITION OF EXPLOSIVES. UTILIZE SPECIAL PRECAUTIONS FOR PROPER USE OF EXPLOSIVES TO PREVENT HARM TO HUMAN LIFE AND DAMAGE TO SURFACE STRUCTURES, ALL UTILITY LINES OR OTHER SUBSURFACE STRUCTURES. DO NOT CONDUCT BLASTING OPERATIONS UNTIL PERSONS IN VICINITY HAVE HAD AMPLE NOTICE AND HAVE REACHED POSITIONS OF SAFETY.

B.) BLASTING OF ANY ROCK SHALL REQUIRE APPROPRIATE APPROVALS FROM THE LOCAL FIRE DEPARTMENT, PLANNING BOARD, BUILDING INSPECTOR AND OTHER PERTINENT AGENCIES, PRIOR TO COMMENCEMENT OF WORK. ALL BLASTED ROCK OR OTHER EXCESS MATERIALS MUST BE REMOVED FROM THE SITE AND DISPOSED OF AT THE EXPENSE OF THE CONTRACTOR.

9.) ADDITIONAL BENCHMARKS TO BE SET BY CONTRACTOR PRIOR TO CONSTRUCTION TO ENSURE QUALITY WORKMANSHIP.

30 15 0 30 60

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Revisions

4-29-2022
GABRIEL R. CROCKER
PROFESSIONAL ENGINEER, MA REGISTRATION #47917

COMMONWEALTH OF MASSACHUSETTS
GABRIEL R. CROCKER
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LEGEND

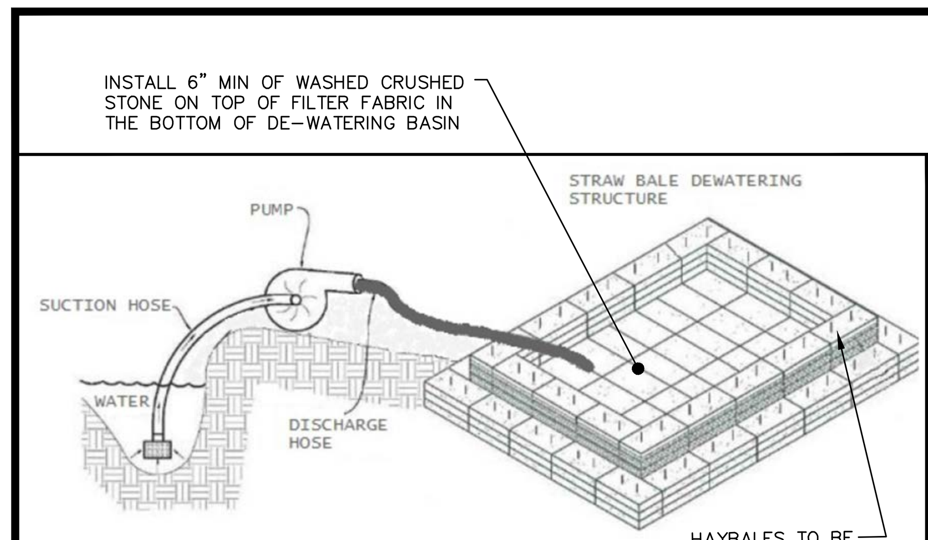
	EXISTING TREE TO BE REMOVED
	EXISTING LIGHT TO BE REMOVED (SEE DEMO NOTE 1)
	EXISTING TREE TO BE PROTECTED
	PROPOSED CONSTRUCTION ENTRANCE
(TBR)	TO BE REMOVED
	CATCH BASIN INLET PROTECTION
	LIMIT OF WORK
	12" SILT SOCK
	WIRED BACKED SILT FENCE

Project
MERCEDES OF SUDBURY
141 BOSTON POST ROAD, SUDBURY, MA

Prepared for
HERB CHAMBERS 43 BRAINTREE STREET, LLC
#259 McGRATH HIGHWAY - ROUTE 28
SOMERVILLE, MA 02143

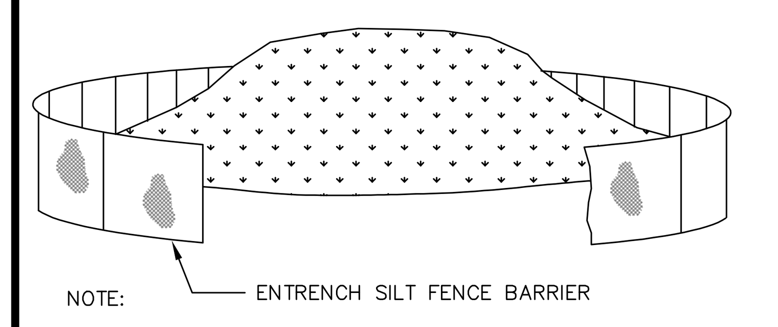
Drawing Title
DEMOLITION PLAN

Project No.	100-107	Drawing No.
Date	11/10/2021	C-1
Scale	1"=30'	
Drawn By	DJN / JPM	
Approved By	GC	



DE-WATERING DETAIL

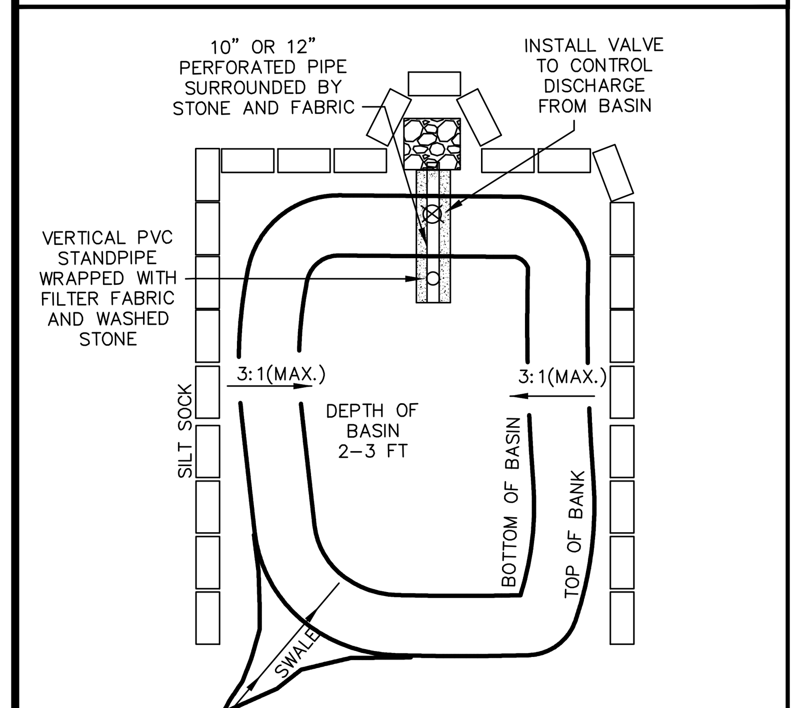
NOT TO SCALE



STABILIZE STOCKPILE WITH ANNUAL RYEGRASS, MULCH OR EROSION CONTROL BLANKETS.

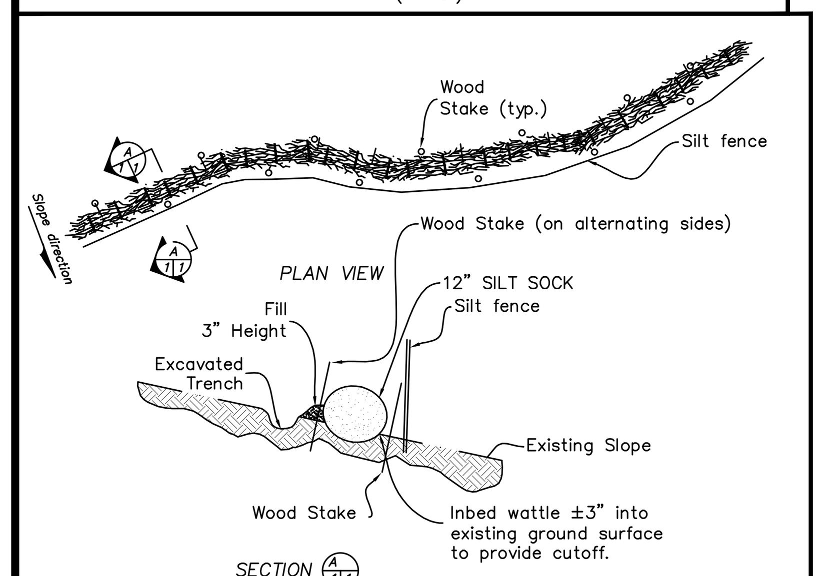
SOIL STOCKPILE

NOT TO SCALE



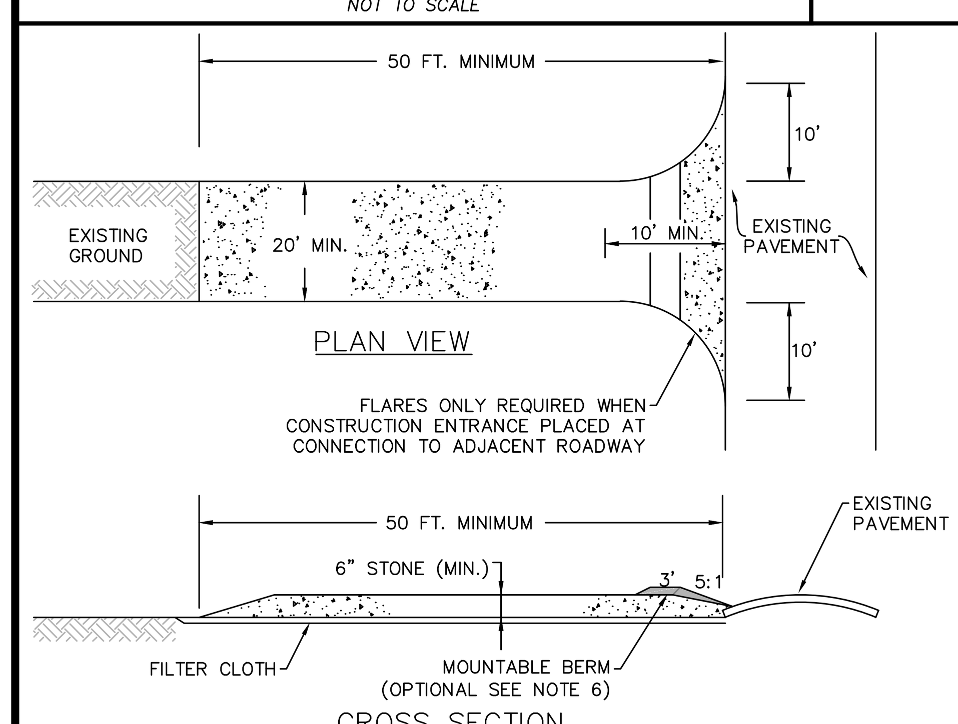
TEMPORARY SEDIMENT BASIN

(N.T.S.)



12" SILT SOCK / SILT FENCE DETAIL

NOT TO SCALE

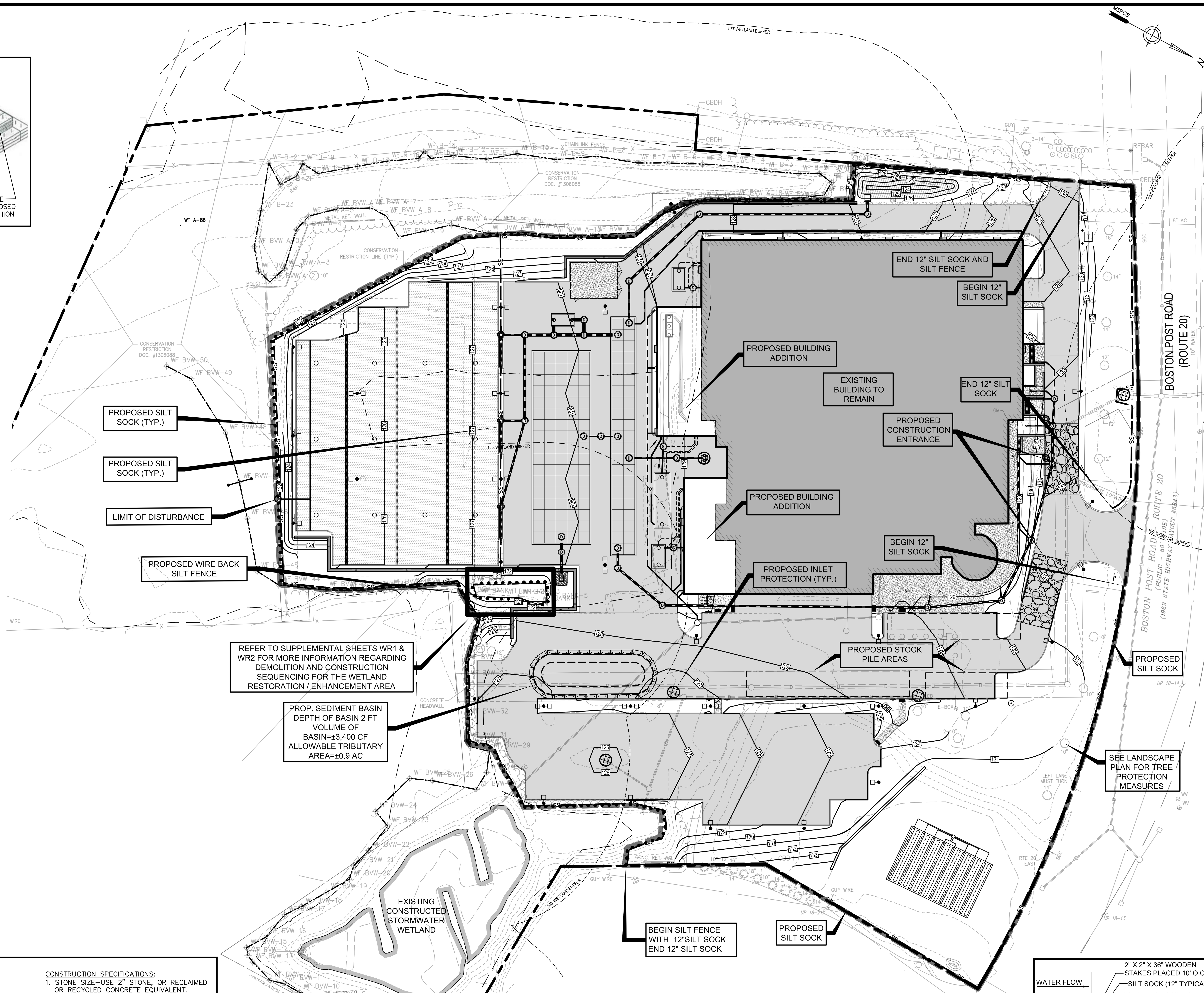


CONSTRUCTION SPECIFICATIONS:

1. STONE SIZE–USE 2" STONE, OR RECLAIMED OR RECYCLED CONCRETE EQUIVALENT.
2. LENGTH–RECOMMEND GREATER THAN OR EQUAL TO 50 FEET WHERE SOILS ARE SANDS AND GRAVELS AND 100 FEET IN SILTS AND CLAYS.
3. THICKNESS–NOT LESS THAN SIX (6) INCHES.
4. WIDTH–FIFTEEN (15) FOOT MINIMUM, BUT NOT LESS THAN THE FULL WIDTH AT POINTS WHERE INGRESS OF EGRESS OCCURS.
5. FILTER CLOTH–SHALL BE PLACED OVER THE ENTIRE AREA PRIOR TO PLACING OF STONE.
6. SUFACE WATER–ALL SURFACE WATER FLOWING OR DIVERTED TOWARD CONSTRUCTION ENTRANCES SHALL BE PIPED ACROSS THE ENTRANCE. IF PIPING IS IMPRACTICAL, A MOUNTABLE BERM SHALL BE INSTALLED.
7. MAINTENANCE– THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH SHALL PREVENT TRACKING OF FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS–OF–WAY. THIS MAY REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL STONE AS CONDITIONS DEMAND AND REPAIR OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT. ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ONTO PUBLIC RIGHTS–OF–WAY MUST BE REMOVED IMMEDIATELY.
8. PERIODIC INSPECTION AND NEEDED MAINTENCE SHALL BE PROVIDED.

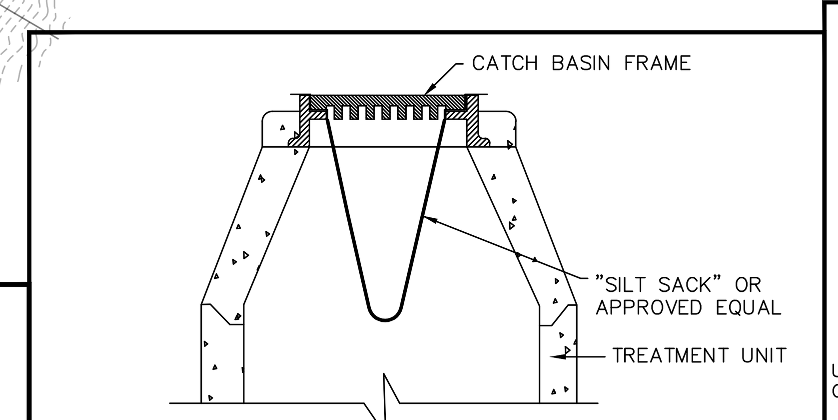
CONSTRUCTION ENTRANCE

NOT TO SCALE



LEGEND

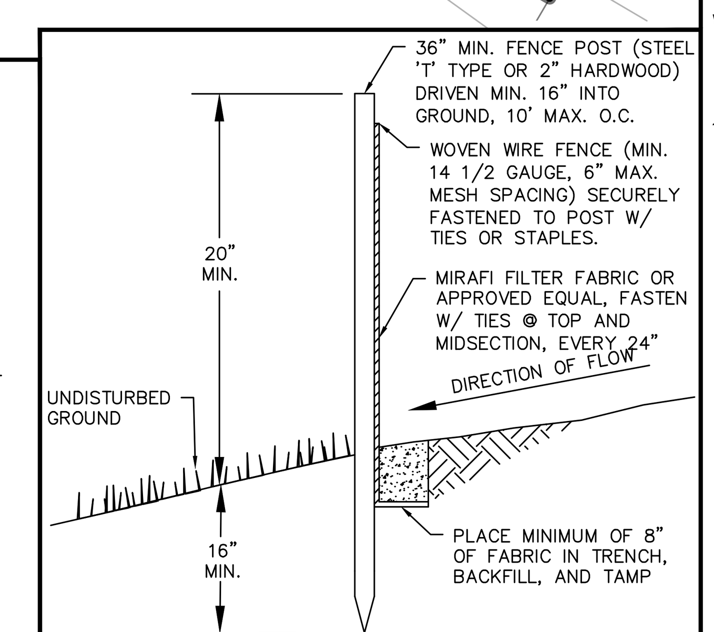
- PROPOSED LIMIT OF DISTURBANCE
- PROPOSED SILT SOCK ROW
- PROPOSED SILT FENCE
- PROPOSED CONSTRUCTION ENTRANCE
- PROPOSED INLET PROTECTION
- PROPOSED STOCK PILE



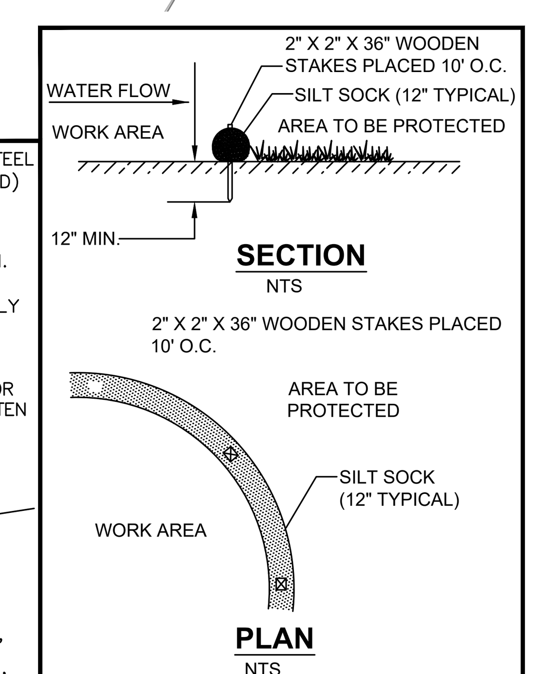
NOTES:
1. TO BE INSTALLED IN ALL GRATED TREATMENT UNITS AFTER INSTALLATION AND UNTIL COMPLETION OF CONSTRUCTION.
2. BOOT ADAPTER MAY BE TRIMMED TO SIZE.

"SILT SACK" FILTER BAG

(N.T.S.)



SILT FENCE



NOTE: REFER TO THE PLAN FOR PROPOSED LOCATION.

12" SILT SOCK DETAIL

NTS

GENERAL NOTES

1. CONTRACTOR TO ABIDE BY PROVISIONS OF EPA NOI NPDES STORMWATER POLLUTION PREVENTION PLAN (SWPPP) AND BY STORMWATER MANAGEMENT OPERATION AND MAINTENANCE PLAN AS PREPARED BY CROCKER DESIGN GROUP, LLC.

2. ALL TEMPORARY STOCKPILE AREAS SHALL HAVE EROSION CONTROLS (SILT SOCK AND SILT FENCE) AROUND THE PERIMETER.

3. UNDERGROUND UTILITIES MAY EXIST THAT ARE NOT SHOWN ON THIS PLAN. DIG SAFE MUST BE NOTIFIED (1-800-344-7233) AT LEAST 72 HOURS PRIOR TO ANY CONSTRUCTION.

4. ALL SEDIMENTATION AND EROSION CONTROL MEASURES SHALL BE MAINTAINED THROUGHOUT THE CONSTRUCTION PERIOD. SEDIMENTATION AND EROSION CONTROL MEASURES SHALL BE IN PLACE AND OBSERVED PRIOR TO ANY WORK STARTING ON THE PROJECT.

5. SITE ENTRY AND EXIT LOCATIONS SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC ROADWAYS. ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ON A PUBLIC ROADWAY MUST BE REMOVED IMMEDIATELY. WHEN WASHING IS REQUIRED TO REMOVE SEDIMENT PRIOR TO ENTRANCE TO A PUBLIC ROADWAY, IT SHALL BE DONE ON AN AREA STABILIZED WITH CRUSHED STONE WHICH DRAINS INTO AN APPROVED SEDIMENT BASIN. ALL FINES IMPOSED FOR TRACKING ONTO PUBLIC ROADS SHALL BE PAID BY THE CONTRACTOR.

6. TEMPORARY SEEDING OR OTHER METHOD OF STABILIZATION SHALL BE INITIATED WITHIN 14 DAYS OF THE LAST DISTURBANCE ON ANY AREA OF THE SITE, UNLESS ADDITIONAL CONSTRUCTION OF THE AREAS IS EXPECTED WITHIN 21 DAYS OF THE LAST DISTURBANCE.

7. UPON COMPLETION OF FINE GRADING, ALL AREAS NOT OTHERWISE PERMANENTLY STABILIZED SHALL BE SEEDED AND MAINTAINED UNTIL A UNIFORM COVERAGE OF 75%± MINIMUM DENSITY, AS DETERMINED BY THE OWNER'S REPRESENTATIVE, IS ACHIEVED.

8. MAINTENANCE - EROSION CONTROLS SHALL BE REPAIRED OR REPLACED AS INSPECTION DEEMS NECESSARY OR AS DIRECTED BY THE ENGINEER OR ARCHITECT. ACCUMULATED SILT AT ANY EROSION CONTROL DEVICE SHALL BE REMOVED WHEN IT REACHES A DEPTH OF 6", AND SHALL BE DISTRIBUTED ON-SITE IN A MANNER NOT CONTRIBUTING TO ADDITIONAL SILTATION.

9. ANY CONTRACTOR IS RESPONSIBLE FOR REESTABLISHING ANY EROSION CONTROL DEVICE

CONSTRUCTION PHASING

1. BELOW IS A GENERAL CONSTRUCTION PHASING. A MORE DETAILED SCHEDULE IS PRESENTED IN THE STORMWATER POLLUTION PREVENTION PLAN (SWPPP).

2. CENTERLINE OF ROAD AND EXTENTS OF CONSTRUCTION TO BE DELINEATED BY CONTRACTOR.

3. EROSION AND SEDIMENTATION CONTROL MEASURES INCLUDING SILT SOCK AND SILT FENCE (OR OPTIONAL FILTER SACK IN LIEU OF SILT SOCK AND SILT FENCE) WILL BE INSTALLED. CONTRACTOR SHALL INSPECT CONTROL MEASURES MONTHLY AND AFTER RAIN EVENTS OF 0.5" OR GREATER.

4. THE PROJECT AREA WILL BE CLEARED OF DEBRIS AND BOULDERS. MATERIAL REMOVED FROM THE SITE WILL BE TRANSPORTED TO AN APPROPRIATE FACILITY OR WILL BE DISPOSED OF ELSEWHERE ACCORDING TO FEDERAL, STATE, AND LOCAL GUIDELINES. INACTIVE STOCKPILES OR AREAS OF GRANULAR MATERIAL OR TOPSOIL SHALL BE TEMPORARILY SEEDED OR MULCHED IN ORDER TO CONTROL SEDIMENT LADEN RUNOFF.

5. CONTRACTOR IS RESPONSIBLE TO SET OUT UTILITIES AND ANY NECESSARY GRADES.

6. GRADING OF SITE INCLUDING BUILDING PADS, PARKING AREAS, AND DETENTION BASINS AND DIGGING OF UTILITY TRENCHES TO DEFINED INVERT LEVELS. MATERIAL TO BE STORED ON AN UNUSED SITE AREA FOR FILL OR PROPERLY REMOVED FROM THE JOB SITE. IF SUITABLE TOPSOIL IS FOUND, IT WILL BE REMOVED AND STOCKPILED IN AN UPLAND AREA AT LEAST 100' FROM WETLANDS TO BE REUSED AS TOPSOIL ON THE PROJECT.

7. PLACING OF FILL OR SUITABLE MATERIAL ON ALL ACCESS ROADS FOR EASY ACCESS. SETTING OUT OF FOUNDATIONS AND SURROUNDING ROADS.

8. LAYING OF ALL UTILITIES INCLUDING DRAINAGE PIPES AND STRUCTURES FOLLOWED BY BACK-FILL, TAKING CARE TO LEAVE ONLY TRENCHES BEING WORKED ON OPEN.

9. FINE GRADING FOR THE PARKING AREAS, ROADWAYS, AND DRAINAGE BASINS TO BE COMPLETED.

10. DRAINAGE BASIN VEGETATION TO BE ESTABLISHED PRIOR TO DISCHARGE FROM CONSTRUCTED DRAINAGE STRUCTURES.

11. ONCE THE DRAINAGE STRUCTURES ARE INSTALLED, PROVIDE PROTECTION AT ALL CATCH BASINS AND INLETS TO PREVENT SEDIMENT FROM ENTERING THE DRAINAGE SYSTEM.

12. INSTALL BINDER COURSE AND SPREAD TOPSOIL AS NEEDED.

13. LIGHT POLES, SIGNAGE, ETC. WILL BE INSTALLED.

14. INSTALL TOP COURSE OF PAVING AND SIDEWALK.

15. THE FINAL PHASE OF CONSTRUCTION IS RESTORATION AND STABILIZATION OF ALL EXPOSED SURFACES. DISTURBED AREAS SHALL BE LANDSCAPED OR SEEDED (SEE ADDITIONAL DISCUSSION IN SWPPP). IN THE EVENT THAT WEATHER CONDITIONS PREVENT FINAL STABILIZATION, TEMPORARY EROSION AND SEDIMENTATION MEASURES WILL BE EMPLOYED UNTIL THE TEMPERATURE AND WEATHER IS SUITABLE FOR GRASS GROWING. A FINAL INSPECTION WILL ENSURE THAT THE SITE IS CLEARED OF ALL PROJECT DEBRIS AND THAT EROSION AND SEDIMENTATION CONTROLS ARE FUNCTIONING PROPERLY. SILT SOCK AND SILT FENCE WILL REMAIN IN PLACE UNTIL THE SITE IS FULLY STABILIZED AND THE SITE HAS PASSED FINAL INSPECTION. VEGETATION IS TO BE OF A UNIFORM DENSITY OF AT LEAST 75% FOR ACCEPTANCE.

EROSION CONTROL NOTE:

EROSION CONTROL MEASURES ARE IDENTIFIED ON BOTH THE DEMOLITION PLAN AND THIS SHEET. THE EROSION CONTROLS ON THE DEMOLITION PLAN ADDRESS THOSE MEASURES REQUIRED TO BE IN PLACE TO PERFORM DEMOLITION OF EXISTING SITE FACILITIES. THE GOAL OF THIS PLAN IS TO IDENTIFY THE ADDITIONAL MINIMUM MEASURES EXPECTED TO BE REQUIRED AS THE PROPOSED SITE COMPONENTS TAKE SHAPE. ALSO REFER TO SWPPP REQUIREMENTS.

(CONTINUATION OF GENERAL NOTES)

WHICH HE DISTURBS. EACH CONTRACTOR SHALL NOTIFY THE ENGINEER/ARCHITECT OF ANY DEFICIENCIES IN THE ESTABLISHED EROSION CONTROL MEASURES WHICH MAY LEAD TO UNAUTHORIZED DISCHARGE OR STORM WATER POLLUTION, SEDIMENTATION OR OTHER POLLUTANTS. UNAUTHORIZED POLLUTANTS INCLUDE, BUT ARE NOT LIMITED TO, EXCESS CONCRETE DUMPING OR CONCRETE RESIDUE, PAINTS, SOLVENTS, GREASE, FUEL AND LUBE OIL, PESTICIDES, ANY SOLID WASTE MATERIALS.

9. ALL SIDE SLOPES SHALL BE SEEDED WITH GRASS OR INSTALL JUTE NETTING TO PREVENT EROSION.

10. INSPECTIONS: INSPECTIONS ARE TO BE PERFORMED BY QUALIFIED PERSONNEL. DISTURBED AREAS THAT HAVE NOT BEEN FINALLY STABILIZED, AREAS USED FOR STORAGE, STRUCTURAL CONTROL MEASURES, AND LOCATIONS WHERE VEHICLES ENTER OR EXIT THE SITE, MUST BE INSPECTED ONCE EVERY 7 DAYS AND WITHIN 24 HOURS OF A STORM EVEN OF 0.5 INCHES OR GREATER. STABILIZED AREAS ARE TO BE INSPECTED ONCE PER MONTH DISTURBED AREAS AND STORAGE AREAS EXPOSED TO PRECIPITATION SHALL BE INSPECTED FOR EVIDENCE OF OR POTENTIAL FOR POLLUTANTS ENTERING THE DRAINAGE SYSTEM. CONTROL MEASURES SHALL BE OBSERVED TO ENSURE THEY ARE WORKING PROPERLY. DISCHARGE LOCATIONS AND POINTS SHALL BE INSPECTED TO ASCERTAIN WHETHER CONTROLS ARE PREVENTING SIGNIFICANT IMPACT. BASED ON THE RESULTS OF THE ABOVE INSPECTIONS, ANY NECESSARY CHANGES TO THE PLAN WILL BE MADE WITHIN 7 DAYS OF THE INSPECTION AND SUBMITTED TO THE TOWN OF SUDBURY PLANNING BOARD. THE CHANGES MUST BE IMPLEMENTED IN THE FIELD BEFORE THE NEXT STORM EVEN IF PRACTICABLE, OTHERWISE AS SOON AS POSSIBLE.

11. INSTALL AND MAINTAIN CATCH BASIN INSERTS IN ALL PROPOSED AND EXISTING CATCH BASINS.

12. PROVIDE TEMPORARY SEDIMENTATION BASINS, SILT SOCK, ETC. AS NECESSARY.

13. STOCKPILES ARE TO BE AT LEAST 100 FEET FROM WETLAND AREAS. STOCKPILES NOT TO BE REUSED WITHIN 30 DAYS ARE TO BE STABILIZED WITH SEED OR MULCH.

14. POTENTIAL STOCK PILE AREA TO BE PROTECTED WITH EROSION CONTROL MEASURES.

15. THE CONTRACTOR SHALL HAVE A WATER TRUCK ON-SITE AT ALL TIMES AND SHALL PROVIDE TEMPORARY PLANTINGS OR OTHER COVERINGS, SUCH AS WOOD CHIPS, TO MINIMIZE THE AMOUNT OF DUST LEAVING THE PREMISES.

40 20 0 40 80

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11/15/21	PLANNING BOARD SUBMITTAL	1.

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COMMONWEALTH OF MASSACHUSETTS
GABRIEL R. CROCKER
CIVIL
No. 47917
REGISTERED PROFESSIONAL ENGINEER

4-29-2022

GABRIEL R. CROCKER
PROFESSIONAL ENGINEER, MA REGISTRATION #47917

Crocker Design Group
2 SHARP STREET, UNIT A
HINGHAM, MA
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P: 781–919–0808

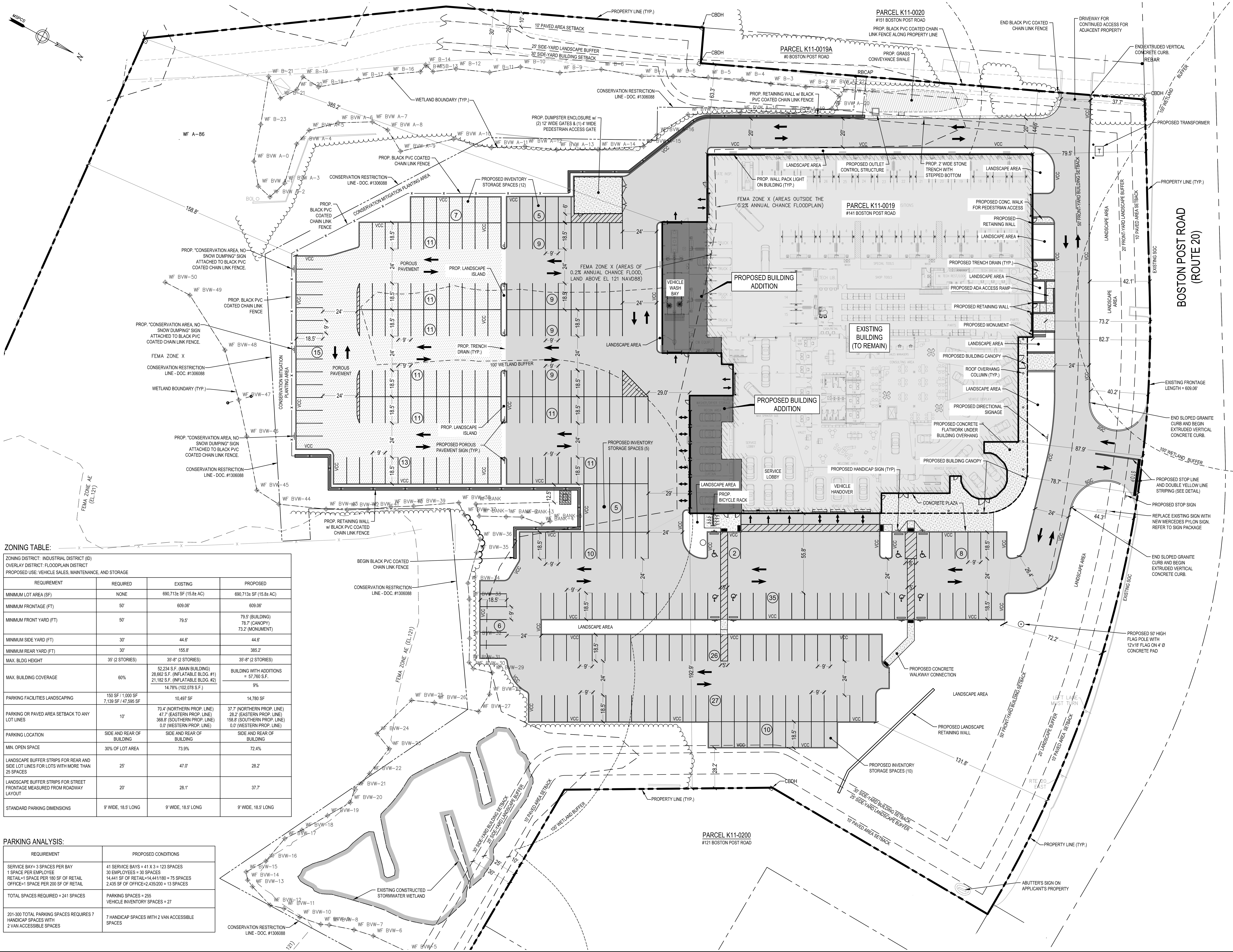
Project
MERCEDES OF SUDBURY
141 BOSTON POST ROAD,
SUDBURY, MA

Prepared for
HERB CHAMBERS 43 BRAINTREE STREET, LLC
#259 McGRATH HIGHWAY - ROUTE 28
SOMERVILLE, MA 02143

Drawing Title
SOIL EROSION AND SEDIMENT CONTROL PLAN

Project No.	100-107
Date	11/10/2021
Scale	1"=40'
Drawn By	DJN / JPM
Approved By	GC

Drawing No. **C-2**



GENERAL NOTES:

1. THIS PLAN REFERENCES A SURVEY PLAN PREPARED BY CHA CONSULTING.
2. ACCESSIBLE CURB RAMPS SHALL BE PER THE MASSACHUSETTS ARCHITECTURAL ACCESS BOARD (AAB) AND THE AMERICANS WITH DISABILITIES ACT (ADA) ACCESSIBILITY GUIDELINES.
3. THE FOLLOWING LAYOUT CRITERIA SHALL CONTROL UNLESS OTHERWISE NOTED ON THE PLAN:
   DIMENSIONS ARE TO FACE OF CURB AT GUTTER LINE.
   DIMENSIONS ARE TO THE CENTER OF PAVEMENT MARKINGS.
   ALL TIES TO PROPERTY LINES ARE PERPENDICULAR TO THE PROPERTY LINE UNLESS OTHERWISE NOTED.
4. ALL LINES AND DIMENSIONS ARE PARALLEL OR PERPENDICULAR TO THE LINES FROM WHICH THEY ARE MEASURED UNLESS OTHERWISE INDICATED.
5. CONTRACTOR SHALL REPORT SIGNIFICANT CONFLICTS TO THE OWNER OR HIS REPRESENTATIVE FOR RESOLUTION.
6. THE CONTRACTOR SHALL FURNISH AND SET ALL LINES AND GRADES REQUIRED AND PROTECT ALL PERMANENT BENCHMARKS OR MONUMENTS. DAMAGED MONUMENTS SHALL BE REPLACED BY A LICENSED SURVEYOR AT NO COST TO THE OWNER.
7. ALL CONCRETE WORK SHALL COMPLY WITH ACI301, "SPECIFICATION FOR STRUCTURAL CONCRETE," AND ACI 316R, UNLESS MODIFIED BY THE CONTRACT DOCUMENTS. COMPLY WITH CRSI'S "MANUAL OF STANDARD PRACTICE" FOR FABRICATING, PLACING, AND SUPPORTING REINFORCEMENT. COMPLY WITH ACI 306.1 FOR COLD WEATHER PROTECTION, AND FOLLOW RECOMMENDATIONS IN ACI 350R FOR HOT WEATHER PROTECTION DURING CURING. COMPLY WITH ACI 304 "GUIDE FOR MEASURING, MIXING, TRANSPORTING, AND PLACING CONCRETE."
8. BITUMINOUS CONCRETE PAVEMENT: CLASS I, TYPE I-1 CONFORMING TO THE STANDARD SPECIFICATIONS, SECTIONS 460 THROUGH 460.02 FOR BINDER COURSE AND TOP COURSE JOB MIX FORMULAS. THE GENERAL CONTRACTOR SHALL SUPPLY THE ENGINEER WITH A CERTIFICATE OF COMPLIANCE SUPPLIED BY THE PAVING CONTRACTOR.
9. SAW-CUT EXISTING PAVEMENT WHERE NEW BITUMINOUS CONCRETE PAVEMENT IS TO COME IN CONTACT. PRIME COAT THE CUT EDGE PRIOR TO PLACEMENT.

ZONING TABLE:

ZONING DISTRICT: INDUSTRIAL DISTRICT (ID)
OVERLAY DISTRICT: FLOODPLAIN DISTRICT
PROPOSED USE: VEHICLE SALES, MAINTENANCE, AND STORAGE

REQUIREMENT	REQUIRED	EXISTING	PROPOSED
MINIMUM LOT AREA (SF)	NONE	690,713± SF (15.8± AC)	690,713± SF (15.8± AC)
MINIMUM FRONTAGE (FT)	50'	609.06'	609.06'
MINIMUM FRONT YARD (FT)	50'	79.5'	79.5' (BUILDING) 78.7' (CANOPY) 73.2' (MONUMENT)
MINIMUM SIDE YARD (FT)	30'	44.6'	44.6'
MINIMUM REAR YARD (FT)	30'	155.8'	385.2'
MAX. BLDG HEIGHT	35' (2 STORIES)	35'-8" (2 STORIES)	35'-8" (2 STORIES)
MAX. BUILDING COVERAGE	60%	52,234 S.F. (MAIN BUILDING) 28,662 S.F. (INFLATABLE BLDG. #1) 21,182 S.F. (INFLATABLE BLDG. #2) 14.78% (102,078 S.F.)	BUILDING WITH ADDITIONS = 57,760 S.F. 9%
PARKING FACILITIES LANDSCAPING	150 SF / 1,000 SF 7,139 SF / 47,595 SF	10,497 SF	14,780 SF
PARKING OR PAVED AREA SETBACK TO ANY LOT LINES	10'	70.4' (NORTHERN PROP. LINE) 47.7' (EASTERN PROP. LINE) 368.8' (SOUTHERN PROP. LINE) 0.0' (WESTERN PROP. LINE)	37.7' (NORTHERN PROP. LINE) 28.2' (EASTERN PROP. LINE) 158.8' (SOUTHERN PROP. LINE) 0.0' (WESTERN PROP. LINE)
PARKING LOCATION	SIDE AND REAR OF BUILDING	SIDE AND REAR OF BUILDING	SIDE AND REAR OF BUILDING
MIN. OPEN SPACE	30% OF LOT AREA	73.9%	72.4%
LANDSCAPE BUFFER STRIPS FOR REAR AND SIDE LOT LINES FOR LOTS WITH MORE THAN 25 SPACES	25'	47.0'	28.2'
LANDSCAPE BUFFER STRIPS FOR STREET FRONTAGE MEASURED FROM ROADWAY LAYOUT	20'	28.1'	37.7'
STANDARD PARKING DIMENSIONS	9' WIDE, 18.5' LONG	9' WIDE, 18.5' LONG	9' WIDE, 18.5' LONG

PARKING ANALYSIS:

REQUIREMENT	PROPOSED CONDITIONS
SERVICE BAY= 3 SPACES PER BAY 1 SPACE PER EMPLOYEE RETAIL=1 SPACE PER 180 SF OF RETAIL OFFICE=1 SPACE PER 200 SF OF RETAIL	41 SERVICE BAYS = 41 X 3 = 123 SPACES 30 EMPLOYEES = 30 SPACES 14,441 SF OF RETAIL=14,441/180 = 75 SPACES 2,435 SF OF OFFICE=2,435/200 = 13 SPACES
TOTAL SPACES REQUIRED = 241 SPACES	PARKING SPACES = 255 VEHICLE INVENTORY SPACES = 27
201-300 TOTAL PARKING SPACES REQUIRES 7 HANDICAP SPACES WITH 2 VAN ACCESSIBLE SPACES	7 HANDICAP SPACES WITH 2 VAN ACCESSIBLE SPACES

30 15 0 30 60

Date	Description	No.
04/29/22	RESPONSE TO PEER REVIEW COMMENTS	5.
03/28/22	P.B. AND CON.-COM. RESUBMITTAL	4.
02/14/22	P.B. AND CON.-COM. RESUBMITTAL	3.
01/31/22	ZBA RESUBMITTAL	2.
11/15/21	PLANNING BOARD SUBMITTAL	1.

Revisions

COMMONWEALTH OF MASSACHUSETTS
GABRIEL R. CROCKER
CIVIL
No. 47917
REGISTERED PROFESSIONAL ENGINEER

4-29-2022

GABRIEL R. CROCKER
PROFESSIONAL ENGINEER, MA REGISTRATION #47917

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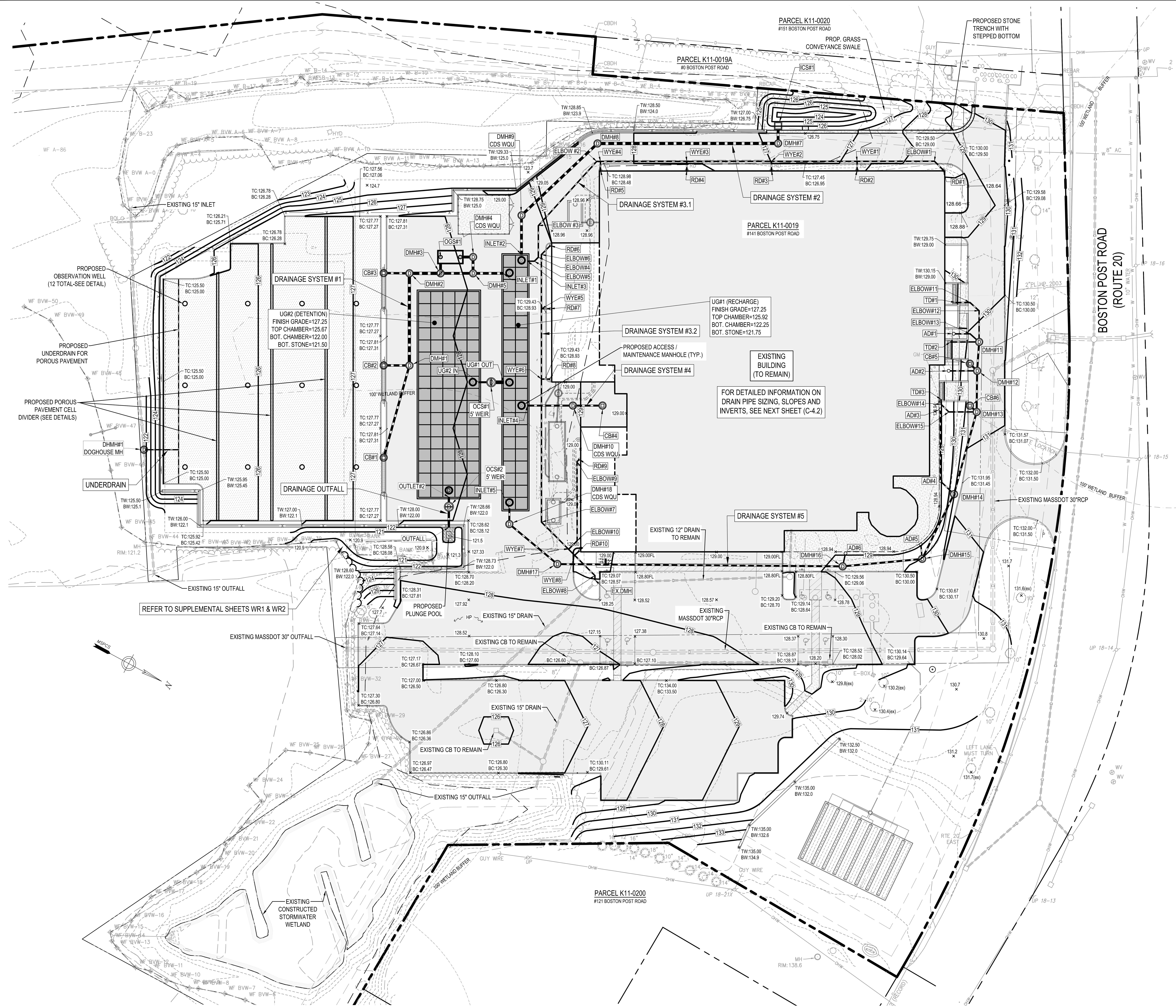
Project
MERCEDES OF SUDBURY
141 BOSTON POST ROAD,
SUDBURY, MA

Prepared for
HERB CHAMBERS 43 BRAINTREE STREET, LLC
#259 McGRATH HIGHWAY - ROUTE 28
SOMERVILLE, MA 02143

Drawing Title
SITE PLAN

Project No.	100-107
Date	11/10/2021
Scale	1"=30'
Drawn By	DJN / JPM
Approved By	GC

Drawing No. **C-3**



GRADING NOTES:

1. THE CONTRACTOR SHALL VERIFY EXISTING GRADES IN THE FIELD AND REPORT ANY DISCREPANCIES IMMEDIATELY TO THE OWNER OR HIS REPRESENTATIVE.
2. EXCAVATION REQUIRED WITHIN THE PROXIMITY OF EXISTING UTILITY LINES SHALL BE DONE BY HAND. CONTRACTOR SHALL REPAIR ANY DAMAGE TO EXISTING UTILITY LINES OR STRUCTURES INCURRED DURING CONSTRUCTION OPERATIONS AT NO COST TO THE OWNER.
3. PITCH EVENLY BETWEEN SPOT GRADES. GRADE ALL AREAS TO DRAIN. ALL PAVED AREAS MUST PITCH TO DRAIN AT A MINIMUM OF 1/8" PER FOOT UNLESS OTHERWISE SPECIFIED. ANY DISCREPANCIES NOT ALLOWING THIS MINIMUM PITCH SHALL BE REPORTED TO THE OWNER OR HIS REPRESENTATIVE PRIOR TO CONTINUING WORK.
4. ALL SITEWORK SHALL CONFORM TO THE CONTRACT DOCUMENTS AND SHALL COMPLY WITH APPLICABLE CODES AND REGULATIONS, AND THE STORMWATER POLLUTION PREVENTION PLAN (SWPPP) PREPARED FOR THE PROJECT.
5. DURING THE PROGRESS OF THE WORK, THE CONTRACTOR MAY BE REQUIRED TO EXCAVATE ADDITIONAL TEST PITS FOR THE PURPOSE OF LOCATING UNDERGROUND UTILITIES OR STRUCTURES AS AN AID IN ESTABLISHING THE PRECISE LOCATION OF NEW WORK. THIS WORK IS TO BE PERFORMED AT NO ADDITIONAL COST TO THE OWNER. TEST PITS SHALL BE BACKFILLED, AS SOON AS THE DESIRED INFORMATION HAS BEEN OBTAINED.
6. PROTECT STRUCTURES, UTILITIES, SIDEWALKS, PAVEMENTS AND OTHER FACILITIES FROM DAMAGE CAUSED BY SETTLEMENT, LATERAL MOVEMENT, UNDERMINING, WASHOUT AND OTHER HAZARDS CREATED BY CONTRACTOR OPERATIONS.
7. UNLESS DIRECTED OTHERWISE, ALL EXISTING TURF OR VEGETATED AREAS WITHIN THE PROPOSED LIMITS OF WORK FOR EXCAVATION, GRADING, OR IMPROVEMENT SHALL BE CLEARED AND GRUBBED. WITHIN THE CLEARING AND GRUBBING AREA, REMOVE ALL TREES, SHRUBS AND ROOTS UNLESS DESIGNATED OTHERWISE. CLEARING SHALL INCLUDE THE FELLING, CUTTING AND OFF-SITE DISPOSAL OF ALL TREES, SHRUBS, STUMPS AND VEGETATIVE DEBRIS PRODUCED THROUGH THE CLEARING OPERATIONS.
8. FILL DEPRESSIONS CAUSED BY TEST PITS AND CLEARING AND GRUBBING OPERATIONS WITH SATISFACTORY SOIL MATERIAL UNLESS FURTHER EXCAVATION OR EARTHWORK IS INDICATED.
9. THE CONTRACTOR SHALL PREVENT SURFACE WATER AND SUBSURFACE OR GROUNDWATER FROM FLOWING INTO EXCAVATIONS OR EARTHWORK AREAS WHICH WOULD CAUSE FLOODING OF THE PROJECT SITE AND SURROUNDING AREA, OR SOFTENING OR LOOSENING OF THE SOIL AT EXCAVATION OR EARTHWORK SUB-GRADES.
10. THE CONTRACTOR SHALL PROVIDE, INSTALL, OPERATE, MAINTAIN AND REMOVE ADEQUATE AND SATISFACTORY DEWATERING SYSTEMS AND DRAINAGE OF EXCAVATIONS TO PERMIT CONSTRUCTION TO PROCEED "IN THE DRY". THE CONTRACTOR SHALL ASSUME ALL RESPONSIBILITY FOR THE ADEQUACY OF THE METHODS, MATERIALS AND EQUIPMENT EMPLOYED. THE CONTRACTOR SHALL BEAR THE FULL COST OF PROVIDING ALL NECESSARY DEWATERING.
11. THE CONTRACTOR SHALL PROHIBIT SEEPAGE, GROUNDWATER FLOW OR SURFACE INFILTRATION AND RUNOFF FROM UNDERMINING OR OTHERWISE DAMAGING ADJACENT STRUCTURES AND UTILITIES.
12. ANY WATER PUMPED FROM EXCAVATIONS WILL BE CONVEYED BY HOSE TO AN UPLAND AREA AND DISCHARGED INTO HAYBALE CORRALS OR SEDIMENTATION BAGS.
13. PAVING, CONCRETE WORK AND BASE COURSE PREPARATION SHALL BE DONE ONLY AFTER EXCAVATION AND CONSTRUCTION WORK WHICH MIGHT INJURE THEM HAS BEEN COMPLETED. DAMAGE CAUSED DURING CONSTRUCTION SHALL BE REPAIRED BEFORE ACCEPTANCE.
14. PAVEMENT OR BASE MATERIALS SHALL NOT BE PLACED ON A MUDDY OR FROZEN SUBGRADE.
15. ESTABLISHMENT OF GRADES, GRADE CONTROL, AND CONFORMANCE TO REQUIRED GRADE TOLERANCES SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.
16. PROTECT GRADED, FINISHED OR PAVED AREAS FROM DAMAGE AND KEEP THEM FREE OF TRASH AND DEBRIS RESULTING FROM CONSTRUCTION OPERATIONS. REPAIR AND RE-ESTABLISH GRADES IN SETTLED, ERODED AND RUTTED AREAS.
17. PAVEMENT EXCAVATED DURING UTILITY CONSTRUCTION, WHETHER ON THE SITE OR ADJACENT PROPERTIES, SHALL BE RESTORED AND MATCHED WITH EXACTLY THE SAME MATERIALS AND TOLERANCES AS PRIOR TO DISRUPTION, AT NO ADDITIONAL COST TO THE OWNER, OR ADJACENT PROPERTY OWNERS.
18. STONE USED FOR MACHINE PLACED RIP-RAP SHALL BE REASONABLY WELL GRADED, HARD, DURABLE, ANGULAR IN SHAPE, RESISTANT TO WEATHERING AND FREE FROM ORGANIC MATERIAL. ROUNDED STONES OR BOULDERS ARE NOT ACCEPTABLE. THE MINIMUM WEIGHT OF THE STONE SHALL BE 155 POUNDS PER CUBIC FOOT. STONE SHALL BE PLACED IN CONFORMANCE WITH THE LINES, GRADES AND THICKNESSES SHOWN ON THE DRAWINGS.
19. AT ALL LOCATIONS WHERE EXISTING CURBING OR PAVEMENT ABUTS NEW CONSTRUCTION, THE EDGE OF THE EXISTING CURB OR PAVEMENT SHALL BE SAW CUT TO A CLEAN, SMOOTH EDGE. BLEND NEW PAVEMENT, CURBS AND EARTHWORK SMOOTHLY INTO EXISTING BY MATCHING LINES, GRADES AND JOINTS.
20. ALL RIP RAP STONE SHALL BE HAND CHINKED AND SHALL CONFORM TO MASSACHUSETTS HIGHWAY DEPARTMENT STANDARDS.

DRAINAGE NOTES:

1. MANHOLES SHALL BE 48-INCH DIAMETER (UNLESS OTHERWISE SPECIFIED). CAST-IN-PLACE BASES SHALL BE USED WHERE MANHOLES ARE CONSTRUCTED OVER EXISTING PIPES.
2. THE CONTRACTOR SHALL FILL ALL PRE-CAST TANKS WITH WATER FOR LEAKAGE OBSERVATIONS BY THE ENGINEER OVER A PERIOD OF 24-HOURS. ANY LEAKS SHALL BE REPAIRED BY THE CONTRACTOR.
3. FOR SPECIFIC INFORMATION OF FRAMES AND COVER FOR DRAINAGE STRUCTURES SEE DETAIL SHEET
4. DRAINAGE STRUCTURE COVERS SHALL HAVE THE WORD "DRAIN" CENTERED ON THE COVER IN 3-INCH HIGH LETTERS.
5. FRAMES, GRATES AND COVERS SHALL BE SET FIRM AND TRUE TO GRADE, ADJUST FOR GRADE WITH BRICK MASONRY.
6. ALL ON-SITE DRAIN LINES SHALL BE SMOOTH INT. WALLED CPE PIPE UNLESS OTHERWISE NOTED.
7. FLARED END SECTIONS SHALL BE PIPE MANUFACTURER STANDARD CONSTRUCTED FROM THE SAME MATERIAL AS THE PIPE.
8. INSTALL PIPE AND FLARED ENDS IN STRICT ACCORDANCE WITH PIPE MANUFACTURER INSTRUCTIONS.
9. PROTECT PROPOSED INFILTRATION BASINS FROM SEDIMENTATION THROUGHOUT CONSTRUCTION OPERATIONS. INFILTRATION BASINS ARE NOT TO BE USED UNTIL DRAINAGE SYSTEM IS INSTALLED AN FUNCTIONAL.

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11/15/21	PLANNING BOARD SUBMITTAL	1.

Revisions

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Project
MERCEDES OF SUDBURY
141 BOSTON POST ROAD, SUDBURY, MA

Prepared for
HERB CHAMBERS 43 BRAINTREE STREET, LLC
#259 McGRATH HIGHWAY - ROUTE 28
SOMERVILLE, MA 02143

Drawing Title
GRADING AND DRAINAGE PLAN

Project No.	100-107
Date	11/10/2021
Scale	1"=30'
Drawn By	DJN / JPM
Approved By	GC

Drawing No.
C-4.1

STRUCTURE TABLE - DRAINAGE SYSTEM #1

STRUCTURE NAME:	DETAILS:	PIPES IN:	PIPES OUT
CB#1 w/ TRENCH	RIM = 127.27		CB1 to DMH1: 12" REINFORCED CONCRETE PIPE - INV OUT =124.18
CB#2 w/ TRENCH	RIM = 127.27		CB2 to DMH1: 12" REINFORCED CONCRETE PIPE - INV OUT =124.03
CB#3 w/ TRENCH	RIM = 127.27		CB3 to DMH2: 12" REINFORCED CONCRETE PIPE - INV OUT =123.73
DMH#1	RIM = 127.51	CB1 to DMH1: 12" REINFORCED CONCRETE PIPE - INV IN =123.86 CB2 to DMH1: 12" REINFORCED CONCRETE PIPE - INV IN =123.86	DMH1 to DMH2: 18" REINFORCED CONCRETE PIPE - INV OUT =123.36
DMH#2	RIM = 127.50	DMH1 to DMH2: 18" REINFORCED CONCRETE PIPE - INV IN =123.06 CB3 to DMH2: 12" REINFORCED CONCRETE PIPE - INV IN =123.56	DMH2 to DMH3: 18" REINFORCED CONCRETE PIPE - INV OUT =123.06
DMH#3 w/WEIR	RIM = 127.80	DMH2 to DMH3: 18" REINFORCED CONCRETE PIPE - INV IN =122.96	DMH3 to OGS1: 18" HDPE - INV OUT =122.96 DMH3 to DMH5: 18" HDPE - INV OUT =122.96
DMH#4 CDS WQU	RIM = 128.16	OGS1 to DMH4: 18" HDPE - INV IN =122.90 , WEIR ELEV. = 123.24	DMH4 to DMH5: 18" HDPE - INV OUT =122.90
DMH#5	RIM = 128.11	DMH3 to DMH5: 18" HDPE - INV IN =122.85 DMH4 to DMH5: 18" HDPE - INV IN =122.85	DMH5 to INLET1: 18" HDPE - INV OUT =122.85
INLET#1		DMH5 to INLET1: 18" HDPE - INV IN =122.75	
OGS1 in		DMH3 to OGS1: 18" HDPE - INV IN =122.93	
OGS1 out			OGS1 to DMH4: 18" HDPE - INV OUT =122.93

PIPE TABLE - DRAINAGE SYSTEM #1

NAME	SIZE	LENGTH	SLOPE	MATERIAL
CB1 to DMH1	12"	60'	0.5%	Reinforced Concrete Pipe
CB2 to DMH1	12"	14'	1.0%	Reinforced Concrete Pipe
CB3 to DMH2	12"	14'	1.0%	Reinforced Concrete Pipe
DMH1 to DMH2	18"	57'	0.5%	Reinforced Concrete Pipe
DMH2 to DMH3	18"	17'	0.5%	Reinforced Concrete Pipe
DMH3 to DMH5	18"	18'	0.5%	HDPE
DMH3 to OGS1	18"	5'	0.4%	HDPE
DMH4 to DMH5	18"	7'	0.5%	HDPE
DMH5 to INLET1	18"	19'	0.5%	HDPE
OGS1 to DMH4	18"	5'	0.5%	HDPE

STRUCTURE TABLE - DRAINAGE SYSTEM #2

STRUCTURE NAME:	DETAILS:	PIPES IN:	PIPES OUT
DMH#7	RIM = 126.92	ICS1 to DMH7: 15" REINFORCED CONCRETE PIPE - INV IN =124.08	DMH7 to DMH8: 18" REINFORCED CONCRETE PIPE - INV OUT =123.83
DMH#8	RIM = 128.32	DMH7 to DMH8: 18" REINFORCED CONCRETE PIPE - INV IN =123.23	DMH8 to DMH9: 18" HDPE - INV OUT =123.23
DMH#9 CDS WQU	RIM = 128.78	DMH8 to DMH9: 18" HDPE - INV IN =122.88	DMH9 to INLET2: 18" HDPE - INV OUT =122.88
ICS#1 w/18" ORIFICE	RIM = 127.00		ICS1 to DMH7: 15" REINFORCED CONCRETE PIPE - INV OUT =124.14
INLET#2		DMH9 to INLET2: 18" HDPE - INV IN =122.75	

PIPE TABLE - DRAINAGE SYSTEM #2

NAME	SIZE	LENGTH	SLOPE	MATERIAL
DMH7 to DMH8	18"	116'	0.5%	Reinforced Concrete Pipe
DMH8 to DMH9	18"	66'	0.5%	HDPE
DMH9 to INLET2	18"	24'	0.5%	HDPE
ICS1 to DMH7	15"	8'	0.5%	Reinforced Concrete Pipe

STRUCTURE TABLE - DRAINAGE SYSTEM #3.1

STRUCTURE NAME:	DETAILS:	PIPES IN:	PIPES OUT
ELBOW #2 45 BEND		WYE4 to ELBOW2: 8" HDPE - INV IN =122.77	ELBOW2 to ELBOW3: 8" HDPE - INV OUT =122.77
ELBOW #3 45 BEND		ELBOW2 to ELBOW3: 8" HDPE - INV IN =122.50	ELBOW3 to ELBOW4: 8" HDPE - INV OUT =122.50
ELBOW#1 45 BEND		RD1 to ELBOW1: 8" HDPE - INV IN =124.14	ELBOW1 to WYE1: 8" HDPE - INV OUT =124.14
ELBOW#4 45 BEND		ELBOW3 to ELBOW4: 8" HDPE - INV IN =122.42	ELBOW4 to ELBOW5: 8" HDPE - INV OUT =122.42
ELBOW#5 45 BEND		ELBOW4 to ELBOW5: 8" HDPE - INV IN =122.40	ELBOW5 to INLET3: 8" HDPE - INV OUT =122.40
INLET#3		ELBOW5 to INLET3: 8" HDPE - INV IN =122.38	
RD#1			RD1 to ELBOW1: 8" HDPE - INV OUT =124.22
RD#2			RD2 to WYE1: 8" HDPE - INV OUT =123.75
RD#3			RD3 to WYE2: 8" HDPE - INV OUT =123.47
RD#4			RD4 to WYE3: 8" HDPE - INV OUT =123.19
RD#5			RD5 to WYE4: 8" HDPE - INV OUT =122.90
WYE#1 8"x8"x8"		ELBOW1 to WYE1: 8" HDPE - INV IN =123.63 RD2 to WYE1: 8" HDPE - INV IN =123.63	WYE1 to WYE2: 8" HDPE - INV OUT =123.63
WYE#2 8"x8"x8"		WYE1 to WYE2: 8" HDPE - INV IN =123.35 RD3 to WYE2: 8" HDPE - INV IN =123.35	WYE2 to WYE3: 8" HDPE - INV OUT =123.35
WYE#3 8"x8"x8"		WYE2 to WYE3: 8" HDPE - INV IN =123.07 RD4 to WYE3: 8" HDPE - INV IN =123.07	WYE3 to WYE4: 8" HDPE - INV OUT =123.07
WYE#4 8"x8"x8"		WYE3 to WYE4: 8" HDPE - INV IN =122.78 RD5 to WYE4: 8" HDPE - INV IN =122.78	WYE4 to ELBOW2: 8" HDPE - INV OUT =122.78

PIPE TABLE - DRAINAGE SYSTEM #3.1

NAME	SIZE	LENGTH	SLOPE	MATERIAL
ELBOW1 to WYE1	8"	52'	1.0%	HDPE
ELBOW2 to ELBOW3	8"	58'	0.5%	HDPE
ELBOW3 to ELBOW4	8"	21'	0.4%	HDPE
ELBOW4 to ELBOW5	8"	4'	0.5%	HDPE
ELBOW5 to INLET3	8"	5'	0.5%	HDPE
RD1 to ELBOW1	8"	9'	1.0%	HDPE
RD2 to WYE1	8"	6'	2.0%	HDPE
RD3 to WYE2	8"	6'	2.0%	HDPE
RD4 to WYE3	8"	6'	2.0%	HDPE
RD5 to WYE4	8"	6'	2.0%	HDPE
WYE1 to WYE2	8"	57'	0.5%	HDPE
WYE2 to WYE3	8"	56'	0.5%	HDPE
WYE3 to WYE4	8"	58'	0.5%	HDPE
WYE4 to ELBOW2	8"	3'	0.5%	HDPE

STRUCTURE TABLE - RETAINIT RECHARGE TO DETENTION

STRUCTURE NAME:	DETAILS:	PIPES IN:	PIPES OUT
OCS#1 5' WEIR	RIM = 128.28	UG1 TO OCS1: 4" HDPE - INV IN =122.25 WEIR ELEV. = 124.75, 4" Ø ORIFICE = 122.50	OCS1 to UG2: 12" HDPE - INV OUT =122.25
UG#1 OUT			UG1 TO OCS1: 24" HDPE - INV OUT =122.25
UG#2 IN		OCS1 to UG2: 12" HDPE - INV IN =122.25	

PIPE TABLE - RETAINIT RECHARGE TO DETENTION

NAME	SIZE	LENGTH	SLOPE	MATERIAL
OCS1 to UG2	12"	6'	0.0%	HDPE
UG1 TO OCS1	24"	6'	0.0%	HDPE

STRUCTURE TABLE - DRAINAGE OUTFALL

STRUCTURE NAME:	DETAILS:	PIPES IN:	PIPES OUT
OCS#2 5' WEIR	RIM = 128.22	OUTLET2 to OCS2: 12" REINFORCED CONCRETE PIPE - INV IN =122.22 WEIR ELEVATION = 124.70, 6" Ø ORIFICE = 122.00	OCS2 to OUTFALL: 12" REINFORCED CONCRETE PIPE - INV OUT =121.50
OUTFALL		OCS2 to OUTFALL: 12" REINFORCED CONCRETE PIPE - INV IN =121.43	
OUTLET#2			OUTLET2 to OCS2: 12" REINFORCED CONCRETE PIPE - INV OUT =122.25

PIPE TABLE - DRAINAGE OUTFALL

NAME	SIZE	LENGTH	SLOPE	MATERIAL
OCS2 to OUTFALL	12"	12'	0.5%	Reinforced Concrete Pipe
OUTLET2 to OCS2	12"	4'	0.5%	Reinforced Concrete Pipe

STRUCTURE TABLE - DRAINAGE SYSTEM #3.2

STRUCTURE NAME:	DETAILS:	PIPES IN:	PIPES OUT
ELBOW#6 45 BEND		RD6 to ELBOW6: 8" HDPE - INV IN =122.42	ELBOW6 to WYE5: 8" HDPE - INV OUT =122.42
ELBOW#7 45 BEND		WYE6 to ELBOW7: 8" HDPE - INV IN =121.51	ELBOW7 to ELBOW10: 8" HDPE - INV OUT =121.51
ELBOW#8 45 BEND		WYE8 to ELBOW8: 8" HDPE - INV IN =121.26	ELBOW8 to EX.DMH: 8" HDPE - INV OUT =121.26
ELBOW#9 45 BEND		RD9 to ELBOW9: 8" HDPE - INV IN =121.68	ELBOW9 to ELBOW10: 8" HDPE - INV OUT =121.68
ELBOW#10 45 BEND		ELBOW9 to ELBOW10: 8" HDPE - INV IN =121.42	ELBOW8 to WYE7: 8" HDPE - INV OUT =121.42
EX.DMH	RIM = 128.95	ELBOW8 to EX.DMH: 8" HDPE - INV IN =121.20	
RD#6			RD6 to ELBOW6: 8" HDPE - INV OUT =122.54
RD#7			RD7 to WYE5: 8" HDPE - INV OUT =122.31
RD#8			RD8 to WYE6: 8" HDPE - INV OUT =122.09
RD#9			RD9 to ELBOW9: 8" HDPE - INV OUT =121.69
RD#10			RD10 to WYE8: 8" HDPE - INV OUT =121.37
WYE#5 8"x8"x8"		ELBOW6 to WYE5: 8" HDPE - INV IN =122.21 RD7 to WYE5: 8" HDPE - INV IN =122.21	WYE5 to WYE6: 8" HDPE - INV OUT =122.21
WYE#6 8"x8"x8"		RD8 to WYE6: 8" HDPE - INV IN =121.98 WYE5 to WYE6: 8" HDPE - INV IN =121.98	WYE6 to ELBOW7: 8" HDPE - INV OUT =121.98
WYE#7 8"x8"x8"		ELBOW7 to ELBOW10: 8" HDPE - INV IN =121.38 ELBOW8 to WYE7: 8" HDPE - INV IN =121.38	ELBOW10 to WYE8: 8" HDPE - INV OUT =121.38
WYE#8 8"x8"x8"		ELBOW10 to WYE8: 8" HDPE - INV IN =121.35 RD10 to WYE8: 8" HDPE - INV IN =121.35	WYE8 to ELBOW8: 8" HDPE - INV OUT =121.35

PIPE TABLE - DRAINAGE SYSTEM #3.2

NAME	SIZE	LENGTH	SLOPE	MATERIAL
ELBOW6 to WYE5	8"	36'	0.6%	HDPE
ELBOW7 to ELBOW10	8"	26'	0.5%	HDPE
ELBOW8 to EX.DMH	8"	3'	2.0%	HDPE
ELBOW8 to WYE7	8"	8'	0.5%	HDPE
ELBOW9 to ELBOW10	8"	53'	0.5%	HDPE
ELBOW10 to WYE8	8"	6'	0.5%	HDPE
RD6 to ELBOW6	8"	9'	1.4%	HDPE
RD7 to WYE5	8"	6'	1.7%	HDPE
RD8 to WYE6	8"	6'	2.0%	HDPE
RD9 to ELBOW9	8"	3'	0.5%	HDPE
RD10 to WYE8	8"	5'	0.5%	HDPE
WYE5 to WYE6	8"	47'	0.5%	HDPE
WYE6 to ELBOW7	8"	95'	0.5%	HDPE
WYE8 to ELBOW8	8"	19'	0.5%	HDPE

STRUCTURE TABLE - DRAINAGE SYSTEM #4

STRUCTURE NAME:	DETAILS:	PIPES IN:	PIPES OUT
CB#4 CDS WQU	RIM = 128.80		CB4 to DMH10: 12" HDPE - INV OUT =124.74
DMH#10 CDS WQU	RIM = 128.94	CB4 to DMH10: 12" HDPE - INV IN =124.64	DMH10 to INLET4: 12" HDPE - INV OUT =124.64
INLET#4		DMH10 to INLET4: 12" HDPE - INV IN =124.15	

PIPE TABLE - DRAINAGE SYSTEM #4

NAME	SIZE	LENGTH	SLOPE	MATERIAL
CB4 to DMH10	12"	16'	0.5%	HDPE
DMH10 to INLET4	12"	28'	1.6%	HDPE

STRUCTURE TABLE - DRAINAGE SYSTEM #5

STRUCTURE NAME:	DETAILS:	PIPES IN:	PIPES OUT
AD#1	RIM = 128.93		AD1 to ELBOW13: 8" HDPE - INV OUT =126.38
AD#2	RIM = 128.74		AD2 to DMH12: 8" HDPE - INV OUT =126.23
AD#3	RIM = 128.94		AD3 to AD4: 8" HDPE - INV OUT =126.39
AD#4	RIM = 128.94	AD3 to AD4: 8" HDPE - INV IN =125.43	AD4 to DMH14: 8" HDPE - INV OUT =125.43
AD#5	RIM = 128.94		AD5 to DMH15: 8" HDPE - INV OUT =125.17
AD#6	RIM = 128.94		AD6 to DMH16: 8" HDPE - INV OUT =126.10
CB#5	RIM = 130.29		CB5 to DMH12: 12" HDPE - INV OUT =125.95
CB#6	RIM = 130.64		CB6 to DMH13: 12" HDPE - INV OUT =125.70
DMH#11	RIM = 130.17	ELBOW13 to DMH11: 8" HDPE - INV IN =126.00 TD2 to DMH11: 8" HDPE - INV IN =126.00 ELBOW12 to DMH11: 8" HDPE - INV IN =125.30	DMH11 to DMH12: 12" HDPE - INV OUT =124.97
DMH#12	RIM = 130.39	DMH11 to DMH12: 12" HDPE - INV IN =124.87 AD2 to DMH12: 8" HDPE - INV IN =125.85 CB5 to DMH12: 12" HDPE - INV IN =125.85	DMH12 to DMH13: 12" HDPE - INV OUT =124.87
DMH#13	RIM = 130.73	DMH12 to DMH13: 12" HDPE - INV IN =124.73 ELBOW15 to DMH13: 8" HDPE - INV IN =125.60 CB6 to DMH13: 12" HDPE - INV IN =125.60	DMH13 to DMH14: 12" HDPE - INV OUT =124.73
DMH#14	RIM = 130.92	DMH13 to DMH14: 12" HDPE - INV IN =124.45 AD4 to DMH14: 8" HDPE - INV IN =125.20	DMH14 to DMH15: 12" HDPE - INV OUT =124.45
DMH#15	RIM = 130.03	DMH14 to DMH15: 12" HDPE - INV IN =124.21 AD5 to DMH15: 8" HDPE - INV IN =125.00	DMH15 to DMH16: 12" HDPE - INV OUT =124.21
DMH#16	RIM = 129.39	DMH15 to DMH16: 12" HDPE - INV IN =123.95 AD6 to DMH16: 8" HDPE - INV IN =125.30	DMH16 to DMH17: 12" HDPE - INV OUT =123.95
DMH#17	RIM = 128.60	DMH16 to DMH17: 12" HDPE - INV IN =123.01	DMH17 to DMH18: 12" HDPE - INV OUT =123.01
DMH#18 CDS WQU	RIM = 128.47	DMH17 to DMH18: 12" HDPE - INV IN =122.80	DMH18 to INLET5: 12" HDPE - INV OUT =122.80
ELBOW#11 45 BEND		TD1 to ELBOW11: 8" HDPE - INV IN =125.87	ELBOW11 to ELBOW12: 8" HDPE - INV OUT =125.87
ELBOW#12 45 BEND		ELBOW11 to ELBOW12: 8" HDPE - INV IN =125.71	ELBOW12 to DMH11: 8" HDPE - INV OUT =125.72
ELBOW#13 45 BEND		AD1 to ELBOW13: 8" HDPE - INV IN =126.16	ELBOW13 to DMH11: 8" HDPE - INV OUT =126.16
ELBOW#14 45 BEND		TD2 to ELBOW14: 8" HDPE - INV IN =126.11	ELBOW14 to ELBOW15: 8" HDPE - INV OUT =126.11
ELBOW#15 45 BEND		ELBOW14 to ELBOW15: 8" HDPE - INV IN =125.97	ELBOW15 to DMH13: 8" HDPE - INV OUT =125.97
INLET#5		DMH18 to INLET5: 12" HDPE - INV IN =122.75	
TD#1	RIM = 128.92		TD1 to ELBOW11: 8" HDPE - INV OUT =126.06
TD#2	RIM = 128.95		TD2 to DMH11: 8" HDPE - INV OUT =126.38
TD#3	RIM = 128.95		TD2 to ELBOW14: 8" HDPE - INV OUT =126.17

PIPE TABLE - DRAINAGE SYSTEM #5

NAME	SIZE	LENGTH	SLOPE	MATERIAL
AD1 to ELBOW13	8"	10'	2.0%	HDPE
AD2 to DMH12	8"	16'	2.0%	HDPE
AD3 to AD4	8"	46'	2.0%	HDPE
AD4 to DMH14	8"	9'	1.9%	HDPE
AD5 to DMH15	8"	7'	1.8%	HDPE
AD6 to DMH16	8"	6'	9.0%	HDPE
CB5 to DMH12	12"	3'	1.5%	HDPE
CB6 to DMH13	12"	3'	1.6%	HDPE
DMH11 to DMH12	12"	16'	0.5%	HDPE
DMH12 to DMH13	12"	24'	0.5%	HDPE
DMH13 to DMH14	12"	53'	0.5%	HDPE
DMH14 to DMH15	12"	44'	0.5%	HDPE
DMH15 to DMH16	12"	49'	0.5%	HDPE
DMH16 to DMH17	12"	185'	0.5%	HDPE
DMH17 to DMH18	12"	38'	0.5%	HDPE
DMH18 to INLET5	12"	9'	0.5%	HDPE
ELBOW11 to ELBOW12	8"	9'	2.0%	HDPE
ELBOW12 to DMH11	8"	19'	2.0%	HDPE
ELBOW13 to DMH11	8"	7'	2.0%	HDPE
ELBOW14 to ELBOW15	8"	8'	2.0%	HDPE
ELBOW15 to DMH13	8"	17'	2.0%	HDPE
TD1 to ELBOW11	8"	10'	2.0%	HDPE
TD2 to DMH11	8"	17'	2.0%	HDPE
TD2 to ELBOW14	8"	4'	2.0%	HDPE

STRUCTURE TABLE - UNDERDRAIN

STRUCTURE NAME:	DETAILS:	PIPES IN:
DHMH#1 DOGHOUSE MH	RIM = 121.54	UNDERDRAIN to DHMH1: 6" HDPE - INV IN =120.50

PIPE TABLE - UNDERDRAIN

NAME	SIZE	LENGTH	SLOPE	MATERIAL
UNDERDRAIN to DHMH1	6"	22'	12.3%	HDPE

Date	Description	No.
04/29/22	RESPONSE TO PEER REVIEW COMMENTS	5.
03/28/22	P.B. AND CON.-COM. RESUBMITTAL	4.
02/14/22	P.B. AND CON.-COM. RESUBMITTAL	3.
01/31/22	ZBA RESUBMITTAL	2.
11/15/21	PLANNING BOARD SUBMITTAL	1.

Revisions

4-29-2022

COMMONWEALTH OF MASSACHUSETTS
GABRIEL R. CROCKER
CIVIL
No. 47917
REGISTERED PROFESSIONAL ENGINEER

GABRIEL R. CROCKER
PROFESSIONAL ENGINEER, MA REGISTRATION #47917

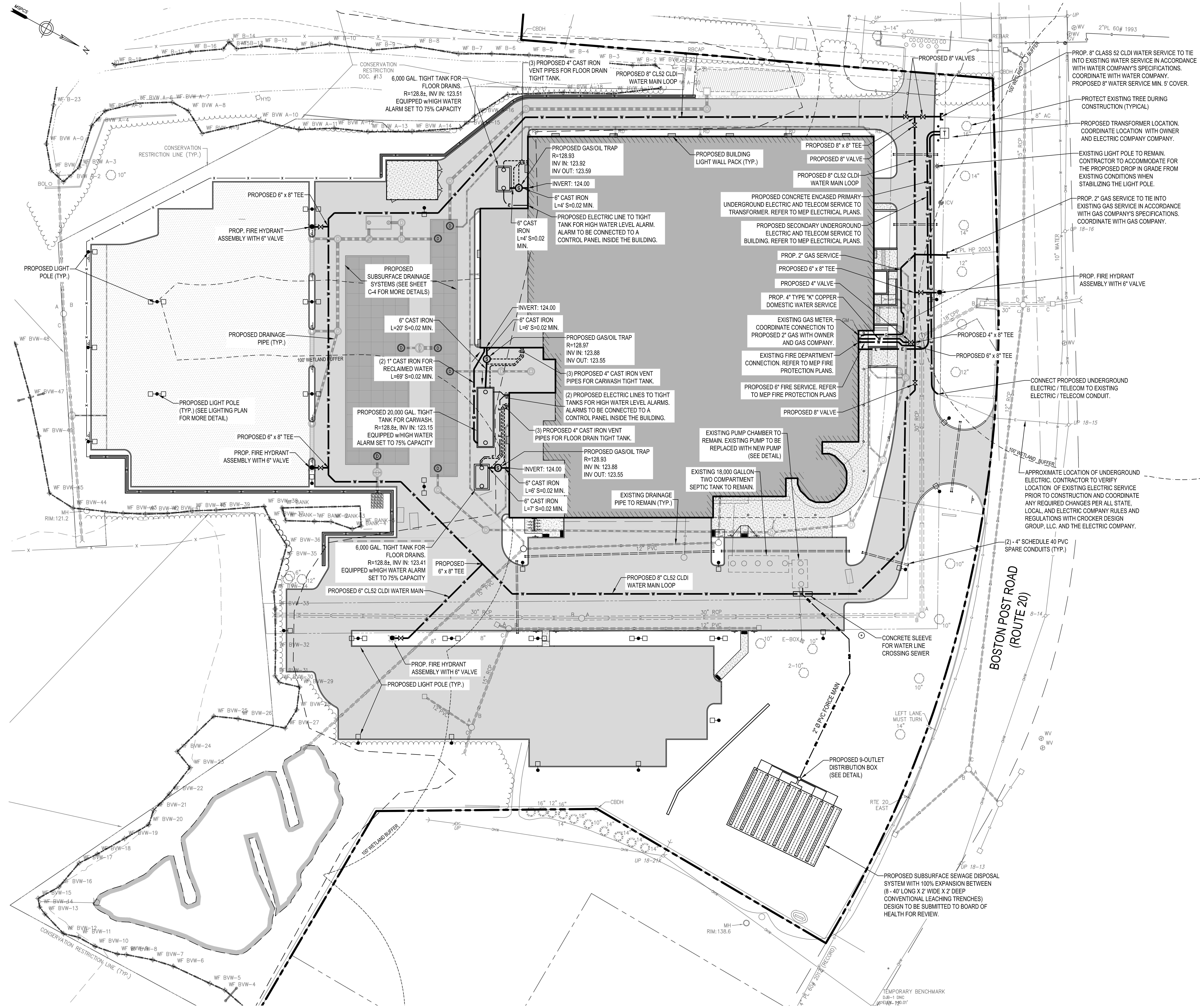
Crocker Design Group
2 SHARP STREET, UNIT A
HINGHAM, MA 02043
P: 781-919-0808

Project
MERCEDES OF SUDBURY
141 BOSTON POST ROAD, SUDBURY, MA

Prepared for
HERB CHAMBERS 43 BRAINTREE STREET, LLC
#259 McGRATH HIGHWAY - ROUTE 28
SOMERVILLE, MA 02143

Drawing Title
GRADING AND DRAINAGE PLAN

Project No.	100-107	Drawing No.	C-4.2
Date	11/10/2021		
Scale	1"=30'		
Drawn By	DJN / JPM		
Approved By	GC		



GENERAL NOTES

1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THAT THE PROPOSED IMPROVEMENTS SHOWN ON THE PLANS DO NOT CONFLICT WITH ANY KNOWN EXISTING OR OTHER PROPOSED IMPROVEMENTS. IF ANY CONFLICTS ARE DISCOVERED, THE CONTRACTOR SHALL NOTIFY THE OWNER AND THE ENGINEER PRIOR TO INSTALLATION OF ANY PORTION OF THE SITE WORK WHICH WOULD BE AFFECTED.

2. AT ALL LOCATIONS WHERE EXISTING CURBING OR PAVEMENT ABUTS NEW CONSTRUCTION, THE EDGE OF THE EXISTING CURB OR PAVEMENT SHALL BE SAW CUT TO A CLEAN, SMOOTH EDGE. BLEND NEW PAVEMENT, CURBS AND EARTHWORK SMOOTHLY INTO EXISTING BY MATCHING LINES, GRADES AND JOINTS.

3. THE CONTRACTOR SHALL MAKE ALL ARRANGEMENTS FOR THE ALTERATION AND ADJUSTMENT OF GAS, ELECTRIC, TELEPHONE AND ANY OTHER PRIVATE UTILITIES BY THE UTILITY COMPANIES, AS REQUIRED. WHERE AN EXISTING UTILITY IS FOUND TO CONFLICT WITH THE PROPOSED WORK, THE LOCATION, ELEVATION AND SIZE OF THE UTILITY SHALL BE ACCURATELY DETERMINED WITHOUT DELAY BY THE CONTRACTOR, AND THE INFORMATION FURNISHED TO THE OWNER AND ARCHITECT FOR RESOLUTION.

4. ALL UTILITY COVERS, GRATES, ETC. SHALL BE ADJUSTED TO BE FLUSH WITH THE PAVEMENT FINISH GRADE UNLESS OTHERWISE NOTED. RIM ELEVATIONS OF DRAINAGE STRUCTURES AND MANHOLES ARE APPROXIMATE.

5. CONTRACTOR SHALL MAINTAIN POSITIVE DRAINAGE AWAY FROM ALL BUILDING FOUNDATIONS, STRUCTURES AND PLANTING BEDS. PITCH EVENLY BETWEEN SPOT GRADES.

6. THE CONTRACTOR SHALL PRESERVE FROM DAMAGE ALL VEGETATION DESIGNATED TO REMAIN AS SHOWN ON THE DRAWINGS, FLAGGED IN THE FIELD OR AS DIRECTED BY THE LANDSCAPE ARCHITECT. THE LIMIT OF CLEARING SHALL BE IN ACCORDANCE WITH LIMIT OF WORK AS SHOWN ON THE DRAWINGS, UNLESS OTHERWISE SPECIFIED. NO TREES SHALL BE CUT, REMOVED, DESTROYED OR TRIMMED OUTSIDE THE LIMIT OF WORK WITHOUT APPROVAL OF THE OWNER AND THE TOWN OF SUDBURY PLANNING BOARD.

7. THE CONTRACTOR SHALL ALTER THE MASONRY OF THE TOP SECTION OF ALL EXISTING DRAINAGE STRUCTURES AS NECESSARY FOR CHANGES IN GRADE, AND RESET ALL WATER AND DRAINAGE FRAMES, GRATES AND BOXES TO THE PROPOSED FINISH SURFACE GRADE.
8. UNDERGROUND UTILITIES WERE COMPILED FROM AVAILABLE RECORD PLANS OF UTILITY COMPANIES AND PUBLIC AGENCIES AND ARE APPROXIMATE AND ASSUMED. BEFORE COMMENCING SITE WORK IN ANY AREA, CONTACT "DIG SAFE" AT 1-888-344-7233 TO ACCURATELY LOCATE UNDERGROUND UTILITIES. ANY DAMAGE TO EXISTING UTILITIES OR STRUCTURES SHALL BE THE CONTRACTOR'S RESPONSIBILITY. NO EXCAVATION SHALL BE DONE UNTIL UTILITY COMPANIES ARE PROPERLY NOTIFIED IN ADVANCE.

9. ALL SITEWORK SHALL CONFORM TO THE CONTRACT DOCUMENTS AND SHALL COMPLY WITH APPLICABLE CODES AND REGULATIONS, AND THE STORMWATER POLLUTION PREVENTION PLAN (SWPPP) PREPARED FOR THE PROJECT. THE CONTRACTOR SHALL MAKE ALL NOTIFICATIONS REQUIRED FOR INSPECTIONS AND TESTING ASSOCIATED WITH SUCH.

10. THE CONTRACTOR SHALL OBTAIN ALL NECESSARY PERMITS AND CONSTRUCTION SHALL COMPLY WITH ALL TOWN OF SUDBURY DEPARTMENT OF PUBLIC WORKS FOR PAVING, PAVEMENT CUTTING, EXCAVATION, UTILITY CONNECTIONS, BACKFILLING, AND PATCHING.

11. ALL RIP RAP STONE SHALL BE HAND CHINKED AND SHALL CONFORM TO MASSACHUSETTS HIGHWAY DEPARTMENT STANDARDS.

12. SIZES OF DOMESTIC AND FIRE WATER SERVICES TO BE DETERMINED BY PROJECT MEP ENGINEER AND FIRE PROTECTION ENGINEER.

13. CONTRACTOR IS CAUTIONED THAT NOT EVERY FITTING ON THE WATER AND FIRE SERVICE ARE LABELED. TYPICAL FITTINGS ARE LABELED FROM TIME TO TIME, HOWEVER THE INTENT OF THESE DRAWINGS IS THAT THE CONTRACTOR PROVIDE A COMPLETE WORKING SYSTEM, INCLUSIVE OF ALL COMPONENTS NECESSARY TO CONSTRUCT , OPERATE AND MAINTAIN BOTH THE FIRE AND WATER SYSTEMS.

14. LOCATION OF ELECTRICAL AND TELECOM SYSTEMS ARE APPROXIMATE. REFER TO FINAL ELECTRICAL SITE PLANS FOR DETAIL INFORMATION AND LOCATION OF ALL ELECTRIC, TELECOM, CABLE AND EQUIPMENTS.

TITLE 5 ANALYSIS

DESIGN FLOW REQUIRED:
RETAIL (50 GPD / 1,000 SF)
13,441 X [50 GPD / 1,000 SF] = 672.1 GPD

OFFICE BUILDING (75 GPD / 1,000 SF)
2,435 X [75 GPD/ 1,000 SF] = 182.6 GPD

SERVICE/PARTS (15 GPD / 1 PERSONS)
30 NON OFFICE/RETAIL EMPLOYEES X 15 GPD = 450 GPD

TOTAL FLOW REQUIRED = 1,305 GPD

SEPTIC TANK REQUIREMENTS:
COMPARTMENT 1
1,305 X 2 DAYS = 2,610 GPD

COMPARTMENT 2
1,305 X 1 DAYS = 1,305 GPD

TOTAL GALLONS REQUIRED FOR STORAGE = 3,915 GPD

SEPTIC TANK PROVIDED:
EXISTING 2 COMPARTMENT SEPTIC TANK

COMPARTMENT 1:
5,737 GPD * 2 DAYS = 11,474 GALLONS

COMPARTMENT 2:
5,737 GPD * 1 DAYS = 5,737 GALLONS

TOTAL GALLONS PROVIDED FOR STORAGE = 17,211 GPD

17,211 GPD > 3,915 GPD

LEACHING FIELD PROVIDED:
8 TRENCHES X 6 SF/LF X 40 LF = 1,920 SF
1,920 SF X 0.74 GPD/SF = 1,598 GPD

1,598 GPD > 1,305 GPD

THE PROPOSED SUB-SURFACE SEWAGE DISPOSAL SYSTEM HAS THE REQUIRED CAPACITY TO SUPPORT THE PROPOSED USE.

NOTES:

1. INTERIOR BUILDING FLOOR DRAINS SHALL DISCHARGE TO NEW INDUSTRIAL WASTE HOLDING TANKS, NOT TO THE EXISTING SEPTIC SYSTEM.
2. THE INTERIOR VEHICLE WASH SYSTEM SHALL DISCHARGE TO A NEW INDUSTRIAL WASTE HOLDING TANK, NOT TO THE EXISTING SEPTIC SYSTEM.

30 15 0 30 60

Date	Description	No.
04/29/22	RESPONSE TO PEER REVIEW COMMENTS	5.
03/28/22	P.B. AND CON.-COM. RESUBMITTAL	4.
02/14/22	P.B. AND CON.-COM. RESUBMITTAL	3.
01/31/22	ZBA RESUBMITTAL	2.
11/15/21	PLANNING BOARD SUBMITTAL	1.

Revisions

COMMONWEALTH OF MASSACHUSETTS GABRIEL R. CROCKER CIVIL No. 47917 REGISTERED PROFESSIONAL ENGINEER

4-29-2022

GABRIEL R. CROCKER
PROFESSIONAL ENGINEER, MA REGISTRATION #47917

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P: 781-919-0808

Project
MERCEDES OF SUDBURY
141 BOSTON POST ROAD,
SUDBURY, MA

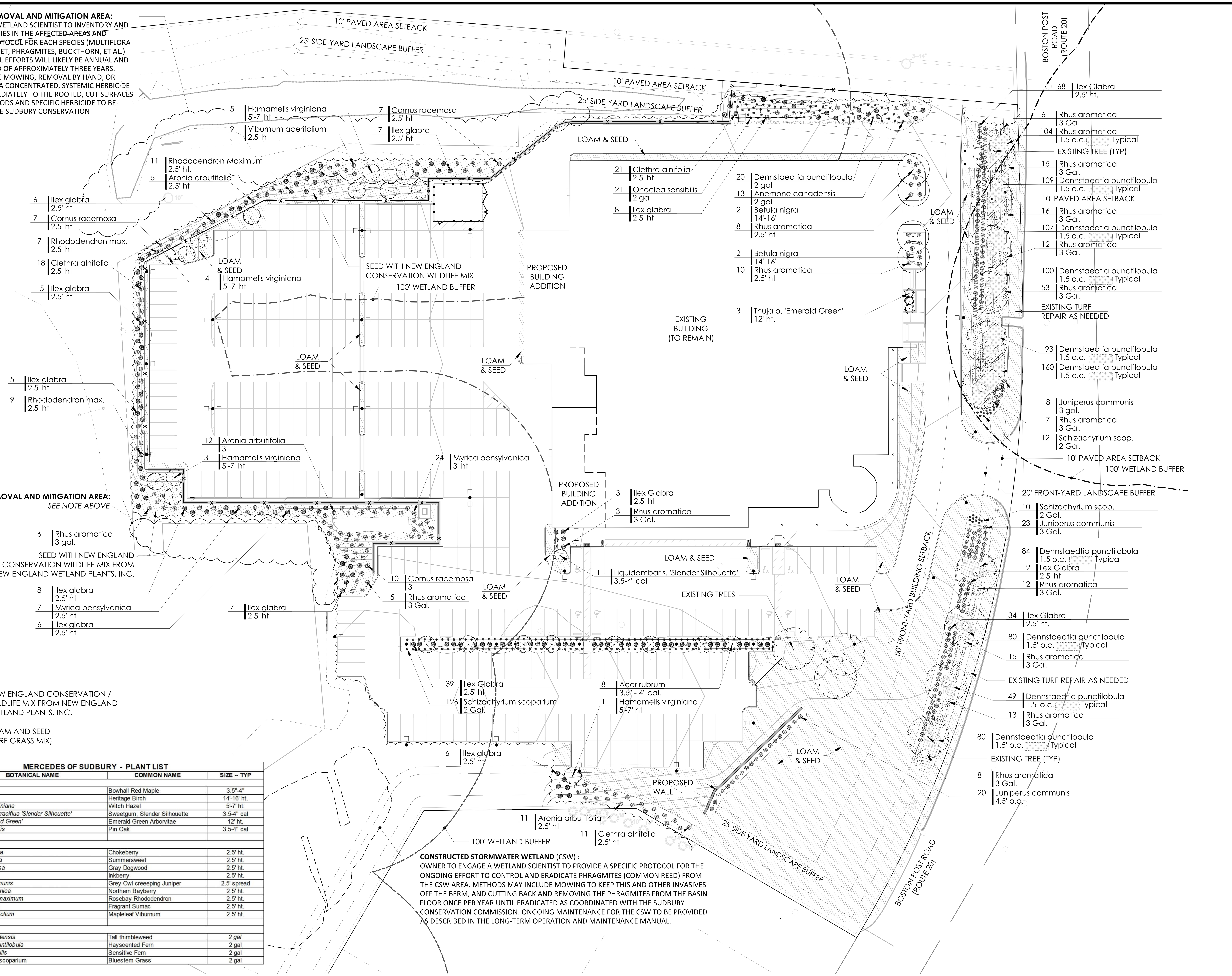
Prepared for
HERB CHAMBERS 43 BRAINTREE STREET, LLC
#259 McGRATH HIGHWAY - ROUTE 28
SOMERVILLE, MA 02143

Drawing Title
UTILITIES PLAN

Project No.	100-107
Date	11/10/2021
Scale	1"=30'
Drawn By	DJN / JPM
Approved By	GC

Drawing No.
C-5

INVASIVE SPECIES REMOVAL AND MITIGATION AREA:
OWNER TO ENGAGE A WETLAND SCIENTIST TO INVENTORY AND MAP THE INVASIVE SPECIES IN THE AFFECTED AREAS AND PROVIDE A SPECIFIC PROTOCOL FOR EACH SPECIES (MULTIFLORA ROSE, ASIAN BITTERSWEET, PHRAGMITES, BUCKTHORN, ET AL.) REMOVAL AND CONTROL EFFORTS WILL LIKELY BE ANNUAL AND ONGOING FOR A PERIOD OF APPROXIMATELY THREE YEARS. METHODS MAY INCLUDE MOWING, REMOVAL BY HAND, OR CUTTING. WHERE CUT, A CONCENTRATED, SYSTEMIC HERBICIDE SHALL BE APPLIED IMMEDIATELY TO THE ROOTED, CUT SURFACES AS DIRECTED. ALL METHODS AND SPECIFIC HERBICIDE TO BE COORDINATED WITH THE SUDBURY CONSERVATION COMMISSION.



NEW ENGLAND CONSERVATION / WILDLIFE MIX FROM NEW ENGLAND WETLAND PLANTS, INC.

LOAM AND SEED (TURF GRASS MIX)

MERCEDES OF SUDBURY - PLANT LIST

	BOTANICAL NAME	COMMON NAME	SIZE -- TYP
*Trees**			
8	*Acer rubrum*	Bowhall Red Maple	3.5"-4"
4	*Betula nigra*	Heritage Birch	14'-16' ht.
13	*Hamamelis virginiana*	Witch Hazel	5'-7' ht.
1	*Liquidambar styraciflua 'Slender Silhouette'*	Sweetgum, Slender Silhouette	3.5-4" cal
3	*Thuja o. Emerald Green'*	Emerald Green Arborvitae	12' ht.
3	*Quercus palustris*	Pin Oak	3.5-4" cal
Shrubs			
28	*Aronia arbutifolia*	Chokeberry	2.5' ht.
50	*Clethera alnifolia*	Summersweet	2.5' ht.
24	*Cornus racemosa*	Gray Dogwood	2.5' ht.
214	*Ilex glabra*	Inkberry	2.5' ht.
51	*Juniperus communis*	Grey Owl creeeping Juniper	2.5' spread
31	*Myrica pensylvanica*	Northern Bayberry	2.5' ht.
27	*Rhododendron maximum*	Rosebay Rhododendron	2.5' ht.
189	*Rhus aromatica*	Fragrant Sumac	2.5' ht.
9	*Viburnum acerifolium*	Mapleleaf Viburnum	2.5' ht.
Perennials and Grasses			
13	*Anemone canadensis*	Tall thimbleweed	2 gal
906	*Dennstaedtia puntilobula*	Hayscented Fern	2 gal
21	*Onoclea sensibilis*	Sensitive Fern	2 gal
148	Schizachyrium scoparium	Bluestem Grass	2 gal

CONSTRUCTED STORMWATER WETLAND (CSW) :
OWNER TO ENGAGE A WETLAND SCIENTIST TO PROVIDE A SPECIFIC PROTOCOL FOR THE ONGOING EFFORT TO CONTROL AND ERADICATE PHRAGMITES (COMMON REED) FROM THE CSW AREA. METHODS MAY INCLUDE MOWING TO KEEP THIS AND OTHER INVASIVES OFF THE BERM, AND CUTTING BACK AND REMOVING THE PHRAGMITES FROM THE BASIN FLOOR ONCE PER YEAR UNTIL ERADICATED AS COORDINATED WITH THE SUDBURY CONSERVATION COMMISSION. ONGOING MAINTENANCE FOR THE CSW TO BE PROVIDED AS DESCRIBED IN THE LONG-TERM OPERATION AND MAINTENANCE MANUAL.

Date	Description	No.
04/29/22	RESPONSE TO PEER REVIEW COMMENTS	5.
03/28/22	P.B. AND CON.COM. RESUBMITTAL	4.
02/14/22	PLANNING BOARD RESUBMITTAL	3.
01/31/22	ZBA RESUBMITTAL	2.
11/15/21	PLANNING BOARD SUBMITTAL	1.

Revisions

THOMAS R. RYAN
LANDSCAPE ARCHITECT, MA REGISTRATION #590

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144 Moody Street, Building 4
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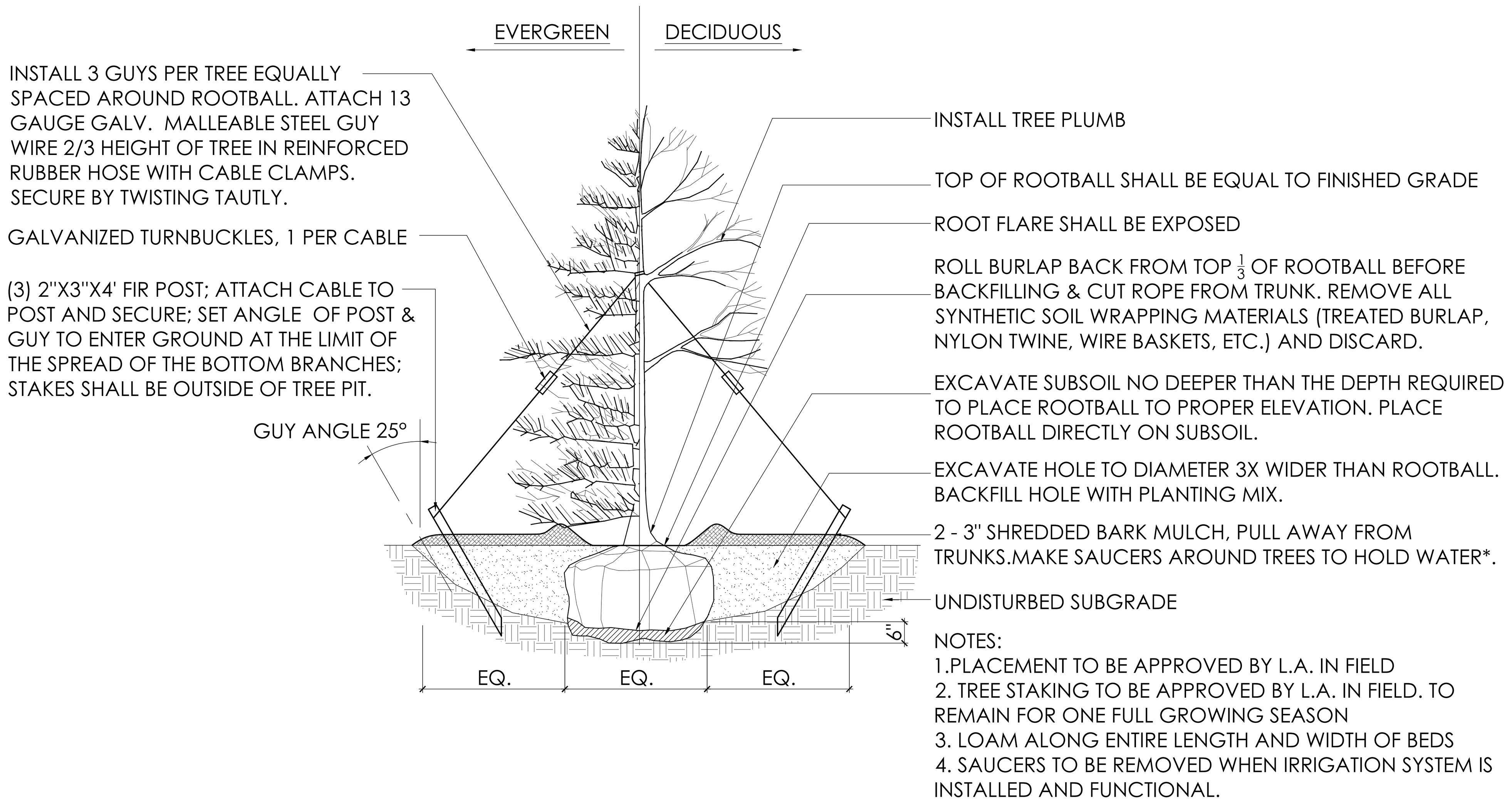
Project
HERB CHAMBERS MERCEDES OF SUDBURY
141 BOSTON POST ROAD, SUDBURY, MA

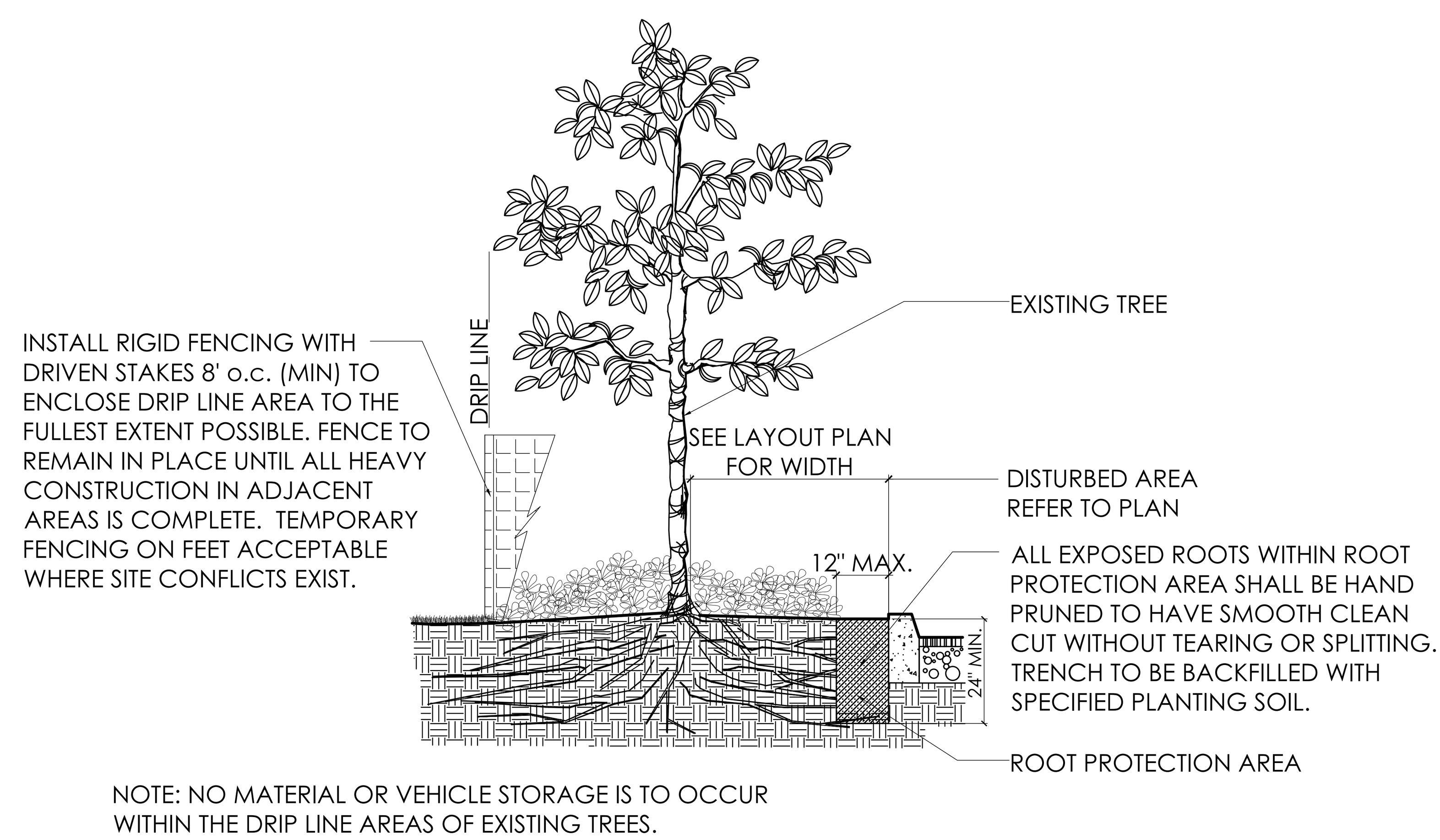
Prepared for
HERB CHAMBERS
#83 BOSTON POST ROAD - ROUTE 20 SUDBURY, MA 01776

Drawing Title
LANDSCAPE PLAN

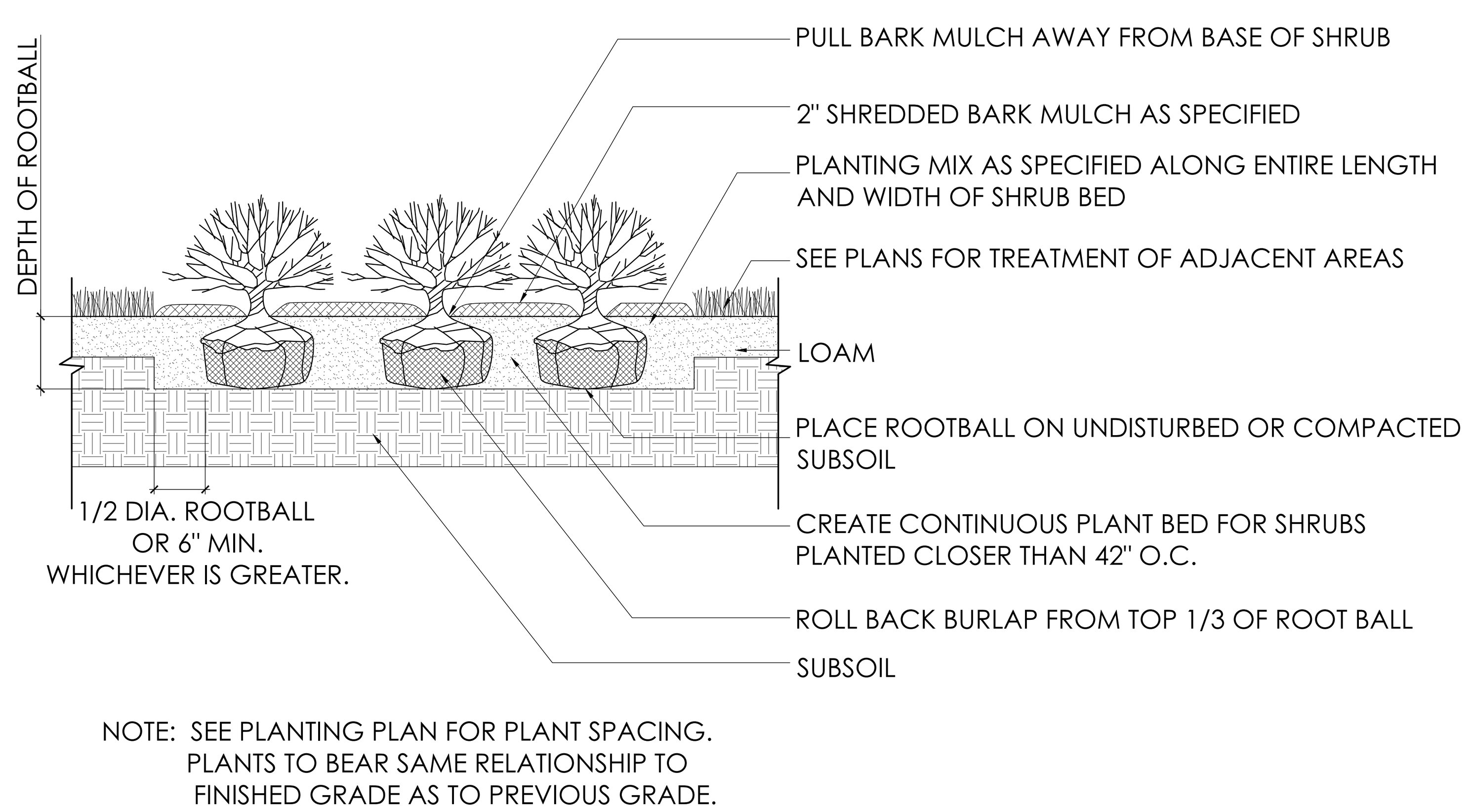
Date 11/15/2021
Scale 1"= 30'
Drawn By AA
Drawing No.
C-6.1



1 | TREE
C-6.2 | SCALE: 3/8" = 1'-0" SECTION

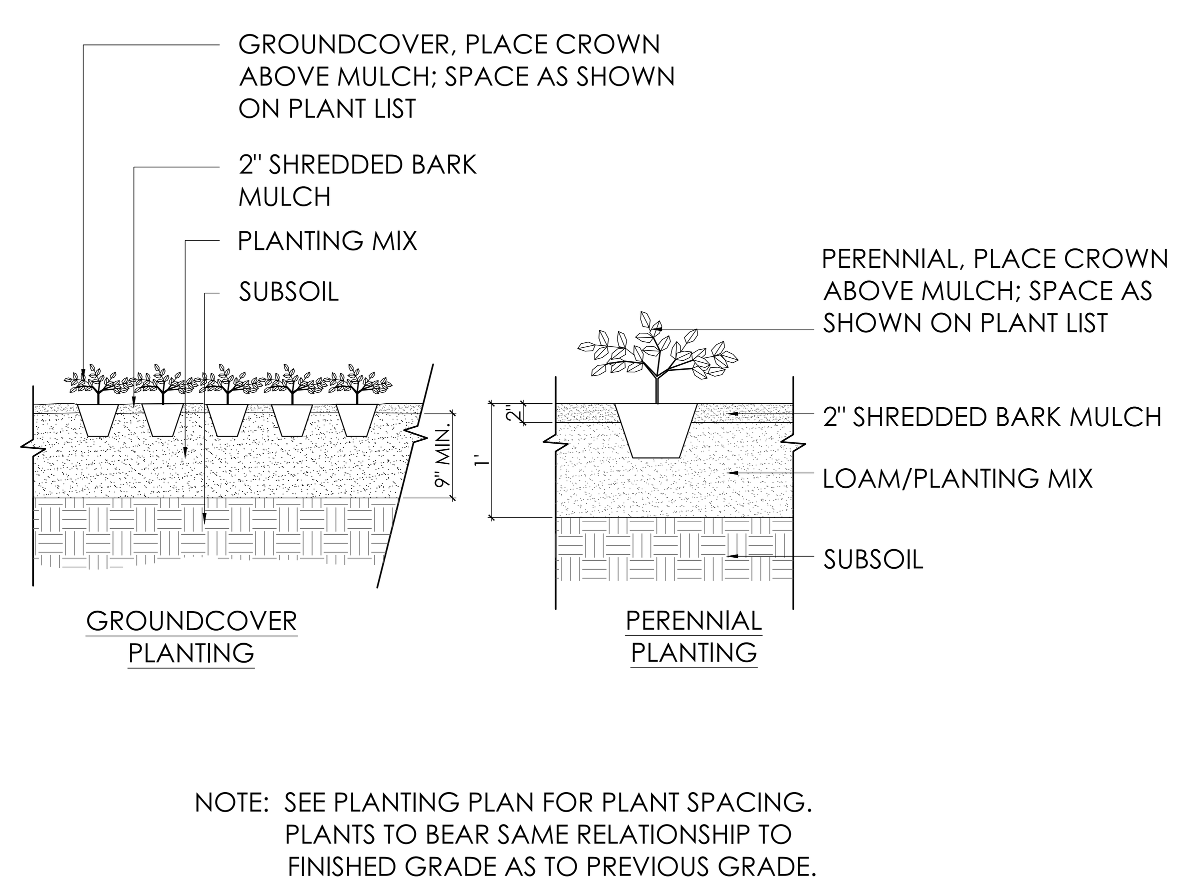


2 | CONSTRUCTION NEAR EXISTING TREE
C-6.2 | SCALE: 3/8" = 1'-0" SECTION



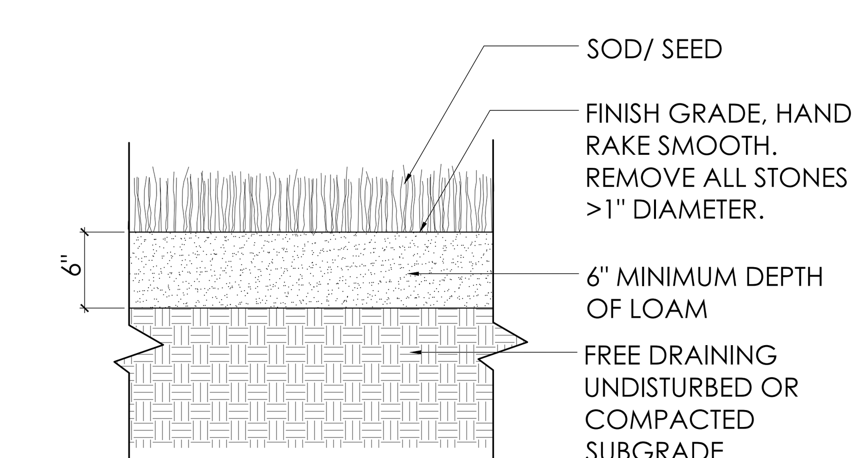
NOTE: SEE PLANTING PLAN FOR PLANT SPACING. PLANTS TO BEAR SAME RELATIONSHIP TO FINISHED GRADE AS TO PREVIOUS GRADE.

3 | SHRUB
C-6.2 | SCALE: 3/8" = 1'-0" SECTION



NOTE: SEE PLANTING PLAN FOR PLANT SPACING. PLANTS TO BEAR SAME RELATIONSHIP TO FINISHED GRADE AS TO PREVIOUS GRADE.

4 | GROUNDCOVER AND PERENNIALS
C-6.2 | SCALE: 3/4" = 1'-0" SECTION



5 | SOD/ SEED
C-6.2 | SCALE: 1" = 1'-0" SECTION

FINAL PLANTING AND FINAL STABILIZATION NOTES

1. ALL PLANT MATERIAL SHALL CONFORM TO THE MINIMUM GUIDELINES ESTABLISHED BY THE AMERICAN STANDARD FOR NURSERY STOCK PUBLISHED BY THE AMERICAN ASSOCIATION OF NURSERYMEN, INC.
2. ALL PLANTING BEDS TO BE MULCHED WITH AGED HARDWOOD BARK MULCH TO A DEPTH OF THREE (3) INCHES. PROVIDE FIVE (5) FOOT DIAMETER MULCH CIRCLE AROUND ALL INDIVIDUAL TREE PLANTINGS.
3. PLANT MATERIALS SHALL BEAR SAME RELATIONSHIP TO FINISH GRADE AS THEY BORE TO GRADE IN THE NURSERY.
4. SPACE PLANTS AT SCALED DISTANCES SHOWN ON DRAWINGS UNLESS OTHERWISE REQUIRED IN FIELD DUE TO UTILITY OR DRIVEWAY CONFLICTS. REVISED LOCATIONS SHALL BE APPROVED BY THE LANDSCAPE ARCHITECT.
5. ALL DECIDUOUS TREES SHALL BE FITTED WITH TREE-WATERING BAGS (TREEGATOR© OR EQUAL) FOLLOWING COMPLETION OF PLANTING.
6. ANY PROPOSED SUBSTITUTION OF PLANT MATERIAL SHALL ONLY BE MADE AFTER PRIOR APPROVAL OF LANDSCAPE ARCHITECT OR OWNER'S REPRESENTATIVE.
7. ALL PLANT MATERIALS SHALL BE GUARANTEED FOR TWO YEARS FOLLOWING DATE OF FINAL WRITTEN ACCEPTANCE FROM THE OWNER OR OWNER'S REPRESENTATIVE.
8. CONTRACTOR SHALL PROTECT ALL EXISTING VEGETATION AT THE SITE THAT IS NOT REQUIRED TO BE REMOVED TO MAKE WAY FOR NEW CONSTRUCTION.

SOIL NOTES

1. ALL AREAS DISTURBED BY CONSTRUCTION NOT DESIGNATED TO RECEIVE OTHER TREATMENT SHALL BE LOAMED A MINIMUM OF 6" AND SEEDED AS SPECIFIED BELOW. TOPSOIL FOR THIS PURPOSE SHALL BE TESTED BY AN APPROVED SOIL TESTING LABORATORY AND SHALL MEET THE FOLLOWING MINIMUM STANDARDS:
   -- TEXTURE: FINE SANDY LOAM OR SANDY LOAM, AS DETERMINED BY MECHANICAL ANALYSIS AND BASED ON THE USDA STANDARD SOIL CLASSIFICATION SYSTEM.
   -- ACIDITY: SOIL REACTION SHALL BE IN THE RANGE OF 5.5 TO 7.6, OR SHALL BE AMENDED TO MEET THIS RANGE.
   -- ORGANIC MATTER: TOPSOIL SHALL HAVE A RANGE BETWEEN 5% AND 10% ORGANIC MATTER CONTENT BASED ON THE LOSS ON IGNITION OF OVEN-DRIED SAMPLES.
2. TREE/SHRUB PLANTING MIX: MIX THE SPECIFIED MATERIALS ON-SITE IN THE FOLLOWING PROPORTIONS:
   -- 3 PARTS TOPSOIL AS SPECIFIED ABOVE, 1 PART PEAT MOSS, 1 PART SAND. IF PLANTS ARE INSTALLED IN SPRING, ADD 5 POUNDS OF SUPERPHOSPHATE/CUBIC YARD OF MIXTURE. ALL AMENDMENTS SHALL BE THOROUGHLY INCORPORATED INTO MIXTURE TO ASSURE UNIFORM DISTRIBUTION. PLANTING MIX SHALL BE USED TO BACKFILL ALL TREE PLANTING HOLES, AS INDICATED IN THE PLANTING DETAIL.

PERMANENT SEED MIX NOTES

SEED/SOD GRASS AREAS: SEED/SODSEED ALL SEED/SODGRASS LAWN AREAS WITH A DROUGHT TOLERANT, HIGH-FESCUE SEED/SODGRASS SEED MIX SUCH AS PEARL'S PREMIUM GRASS SEED BY PEARL'S PREMIUM, WAYLAND, MA; ENVIROSEED/SOD BY BLUESTEM NURSERY, LAURIER, WA; ECO-LAWN BY WILDFLOWER FARM, COLDWATER, ONT, CAN; OR APPROVED EQUAL, APPLIED AT SEED PRODUCER'S RECOMMENDED RATE. SEEDING SHALL BE DONE EITHER BETWEEN APRIL 1 AND JUNE 15, OR BETWEEN AUGUST 15 AND SEPTEMBER 30.

MEADOW MIX AREA: SEED OVER STORMWATER DETENTION AREA WITH "NEW ENGLAND NATIVE WARM SEASON GRASS MIX" BY NEW ENGLAND WETLAND PLANTS, AMHERST, MA, OR APPROVED EQUAL, PER MANUFACTURER'S RECOMMENDATIONS. WARM SEASON SEEDING PROGRAM WILL LIKELY TAKE 2-3 GROWING SEASONS UNTIL GOOD GROWTH IS ESTABLISHED.

MULCH ALL SEEDED AREAS WITH 500-700 LBS. OF SALTMARSH HAY OR WEED-FREE STRAW PER ACRE, SPREAD EVENLY. ALL SLOPES OF 3:1 OR GREATER, AFTER BEING LOAMED, SEEDED, AND MULCHED, SHALL BE COVERED WITH JUTE OR BIODEGRADABLE TOBACCO NETTING SECURELY ANCHORED TO THE SLOPE. OVERLAP A NETTING JOINTS A MINIMUM OF 4" AND SECURE WITH A DOUBLE ROW OF STAPLES.*

MAINTENANCE OF SEED AREAS SHALL CONSIST OF WATERING, WEEDING, CURING, REPAIR OF ALL EROSION, AND RESEEDING AS NECESSARY TO ESTABLISH A UNIFORM STAND OF GRASS. LAWNS SHALL BE WATERED IN A SATISFACTORY MANNER DURING AND IMMEDIATELY AFTER PLANTING, AND NOT LESS THAN TWICE PER WEEK UNTIL FINAL ACCEPTANCE. ALL AREAS WHICH FAIL TO SHOW A UNIFORM STAND OF GRASS FOR ANY REASON SHALL BE RESEEDED REPEATEDLY UNTIL A UNIFORM STAND IS ATTAINED.

HYDROSEEDING IS AN ACCEPTABLE ALTERNATE METHOD OF SEEDING, IF UNDERTAKEN IN ACCORDANCE WITH THE FOLLOWING SPECIFICATIONS:
-- MATERIALS FOR HYDROSEEDING SHALL INCLUDE TACKIFIER, WOOD CELLULOSE FIBER MULCH, FERTILIZER, GROUND LIMESTONE AND WATER.
-- PROVIDE JUTE MATTING OR BIODEGRADABLE TOBACCO NETTING ON ALL SLOPES EQUAL TO OR GREATER THAN 3:1. JUTE MATTING SHALL BE C-JUTE BY CONTECH CONSTRUCTION PRODUCTS, INC, GEOJUTE BY BELTON INDUSTRIES OR APPROVED EQUAL.*
-- IF PROJECT SCHEDULE REQUIRES SEEDING TO BE PERFORMED AFTER OCTOBER 15 UNTIL MARCH 31, THE FOLLOWING IS REQUIRED: AFTER HYDROSEEDING/SEEDING, THOSE VEGETATED AREAS WHICH HAVE A SLOPE EQUAL TO OR STEEPER THAN 4:1 SHALL BE COVERED WITH JUTE MATTING AND STAPLED IN PLACE PER MANUFACTURERS REQUIREMENTS. PRECAUTIONS SHALL BE TAKEN TO MINIMIZE DISTURBANCE OF THE HYDROSEED/SEED WHEN INSTALLING THE JUTE.*

HYDROSEEDING/ SEEDING MIXTURE:
-- TACKIFER: APPLY AT A RATE OF 60 GALLONS PER ACRE.
-- WOOD CELLULOSE FIBER MULCH: APPLY AT A RATE OF 2,000 POUNDS PER ACRE.
-- APPLY FERTILIZER AND LIMESTONE AT RATES DETERMINED BY SOIL ANALYSIS

*STRAW MULCH AND NETTING ON SLOPES 3:1 OR GREATER IS NOT REQUIRED ON HYDROSEEDING OPERATIONS IF SLOPES ARE SPRAYED WITH A BONDED FIBER MATRIX MULCH, SUCH AS FLEXTERRA BY PROFILE PRODUCTS, LLC, OR HYDROSTRAW BFM BY HYDROSTATION, INC., INSTALLED IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS.

Date	Description	No.
04/29/22	RESPONSE TO PEER REVIEW COMMENTS.	5.
03/28/22	P.B. AND CON.COM. RESUBMITTAL	4.
02/14/22	PLANNING BOARD RESUBMITTAL	3.
01/31/22	ZBA RESUBMITTAL	2.
11/15/21	PLANNING BOARD SUBMITTAL	1..

Revisions

MASSACHUSETTS THOMAS R. RYAN NO. 590 REGISTERED LANDSCAPE ARCHITECT

THOMAS R. RYAN
LANDSCAPE ARCHITECT, MA REGISTRATION #590

RYAN ASSOCIATES
LANDSCAPE ARCHITECTURE AND PLANNING
144 Moody Street, Building 4
Waltham, MA 02453-5332
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www.ryan-assoc.com

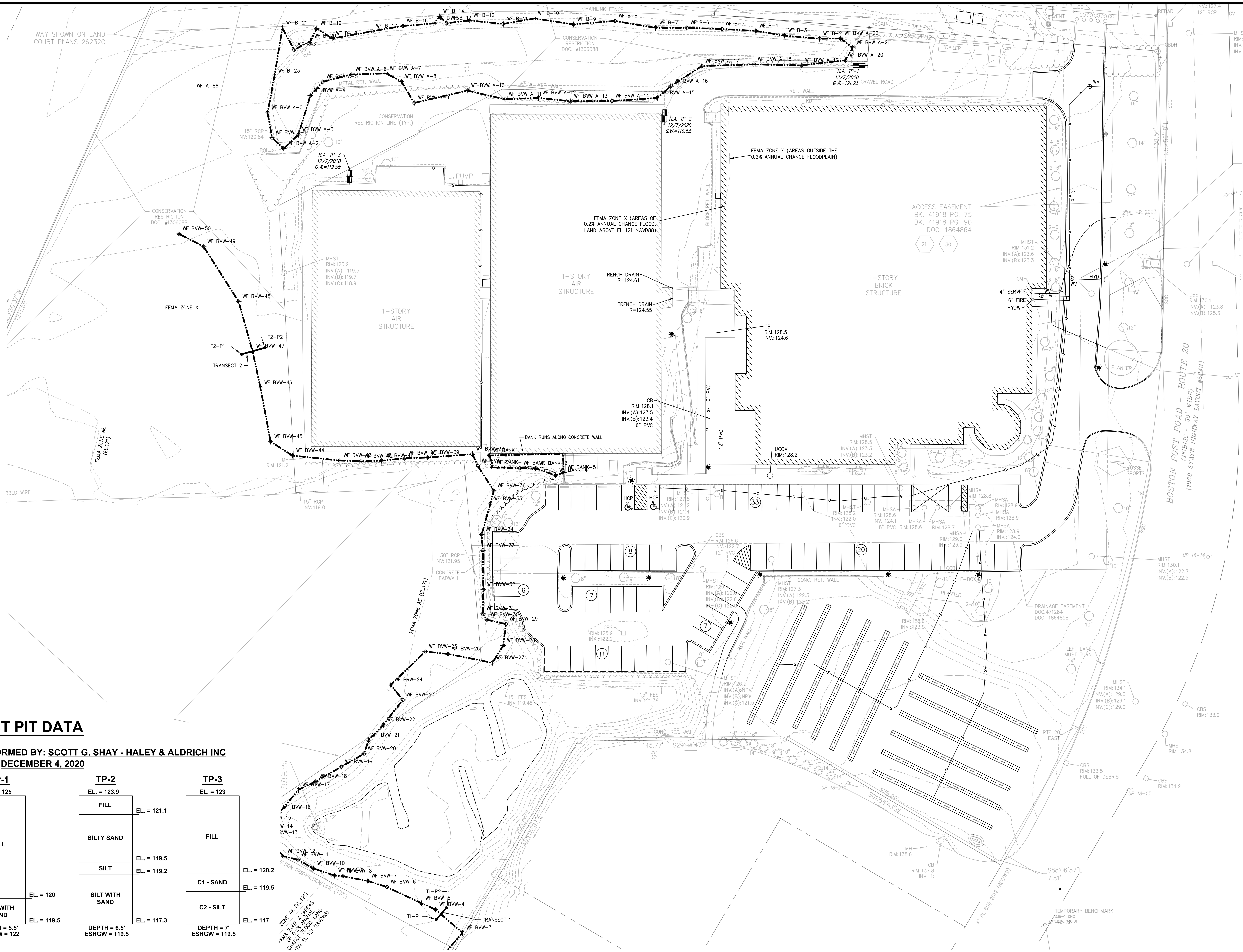
Project
HERB CHAMBERS MERCEDES OF SUDBURY
141 BOSTON POST ROAD, SUDBURY, MA

Prepared for
HERB CHAMBERS
#83 BOSTON POST ROAD - ROUTE 20 SUDBURY, MA 01776

Drawing Title
PLANTING DETAILS

Date	11/15/2021
Scale	AS NOTED
Drawn By	AA

Drawing No.
C-6.2



TEST PIT DATA

PERFORMED BY: SCOTT G. SHAY - HALEY & ALDRICH INC
DATE: DECEMBER 4, 2020

TP-1
EL. = 125
FILL
EL. = 120
SILT WITH SAND
EL. = 119.5
DEPTH = 5.5'
ESHGW = 122

TP-2
EL. = 123.9
FILL
EL. = 121.1
SILTY SAND
EL. = 119.5
SILT
EL. = 119.2
SILT WITH SAND
EL. = 117.3
DEPTH = 6.5'
ESHGW = 119.5

TP-3
EL. = 123
FILL
EL. = 120.2
C1 - SAND
EL. = 119.5
C2 - SILT
EL. = 117
DEPTH = 7'
ESHGW = 119.5

30 15 0 30 60

Date	Description	No.
04/29/22	RESPONSE TO PEER REVIEW COMMENTS	5.
03/28/22	P.B. AND CON.-COM. RESUBMITTAL	4.
02/14/22	P.B. AND CON.-COM. RESUBMITTAL	3.
01/31/22	ZBA RESUBMITTAL	2.
11/15/21	PLANNING BOARD SUBMITTAL	1.

Revisions

4-29-2022
GABRIEL R. CROCKER
PROFESSIONAL ENGINEER, MA REGISTRATION #47917

COMMONWEALTH OF MASSACHUSETTS
GABRIEL R. CROCKER
CIVIL
No. 47917
REGISTERED PROFESSIONAL ENGINEER

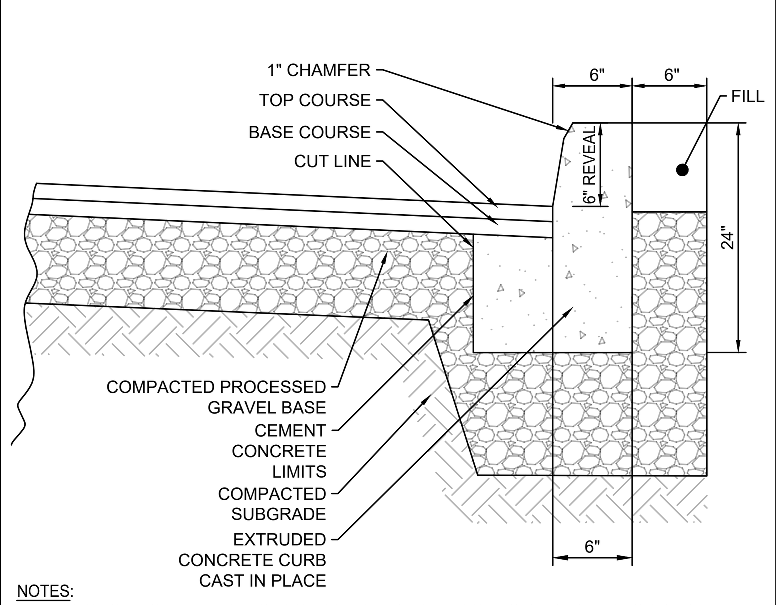
Crocker Design Group
2 SHARP STREET, UNIT A
HINGHAM, MA 02043
P: 781-919-0808

Project
MERCEDES OF SUDBURY
141 BOSTON POST ROAD,
SUDBURY, MA

Prepared for
HERB CHAMBERS 43 BRAINTREE STREET, LLC
#259 McGRATH HIGHWAY - ROUTE 28
SOMERVILLE, MA 02143

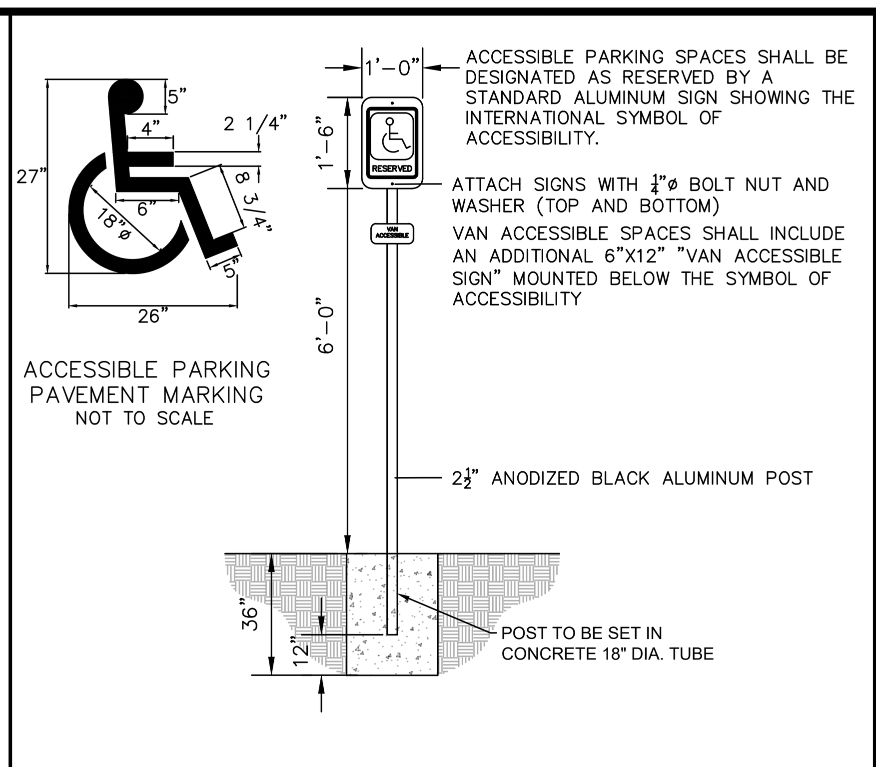
Drawing Title
TEST PIT PLAN

Project No.	100-107	Drawing No.
Date	11/10/2021	**C-7**
Scale	1"=30'	
Drawn By	DJN / JPM	
Approved By	GC	

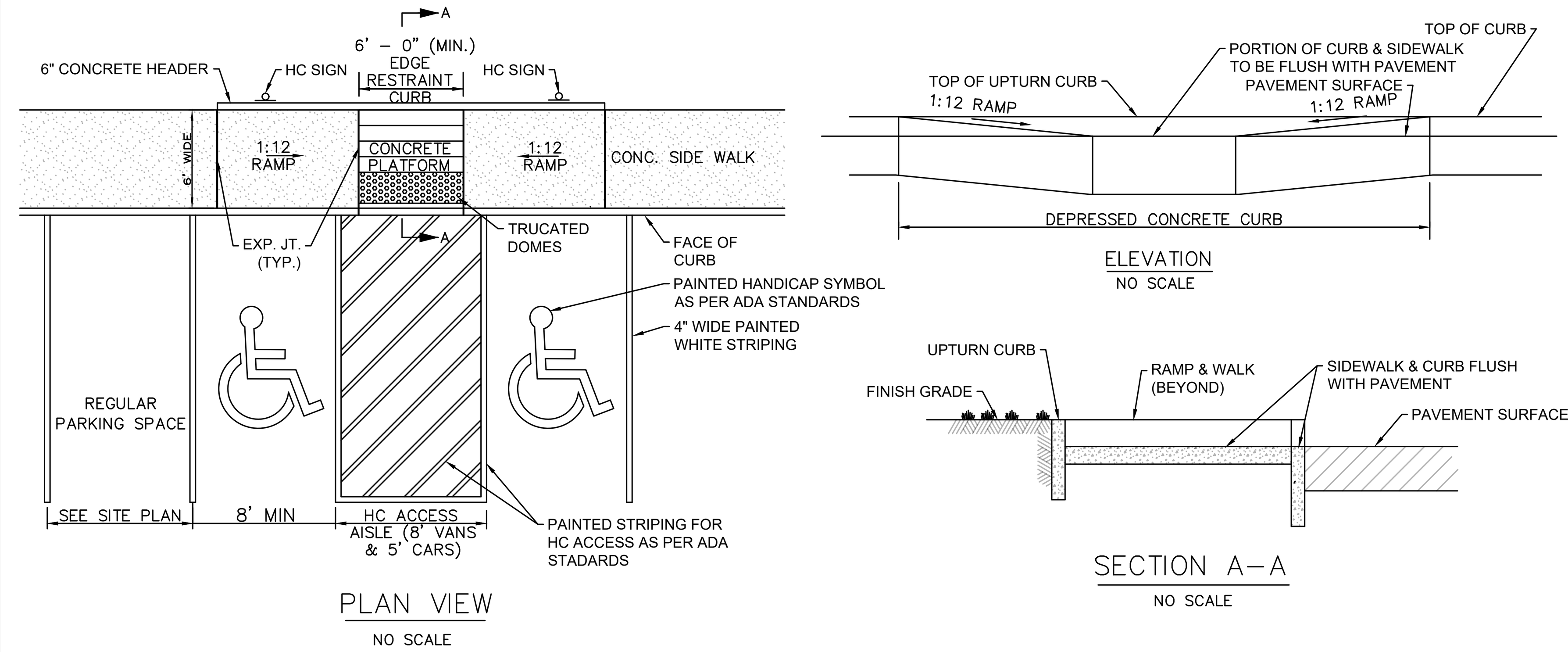


NOTES:
1. CURB IS TO BE SET AFTER BASE COURSE IS IN PLACE PRIOR TO BINDER AND TOP PLACEMENT
2. CUT NEAT LINE 6" FROM CURB LINE AND REMOVE BASE GRAVEL WITH CEMENT CONCRETE.
3. ANY DESIGNATED CEMENT CONCRETE THAT IS ACCEPTABLE UNDER SECTION M4 OF THE "MASSACHUSETTS DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION STANDARD SPECIFICATIONS FOR HIGHWAY AND BRIDGES" BE USED.
4. AS AN ALTERNATE, CONTRACTOR MAY FORM AND POUR SIDEWALK/CURB COMBO AREAS IN MONOLITHIC POUR.

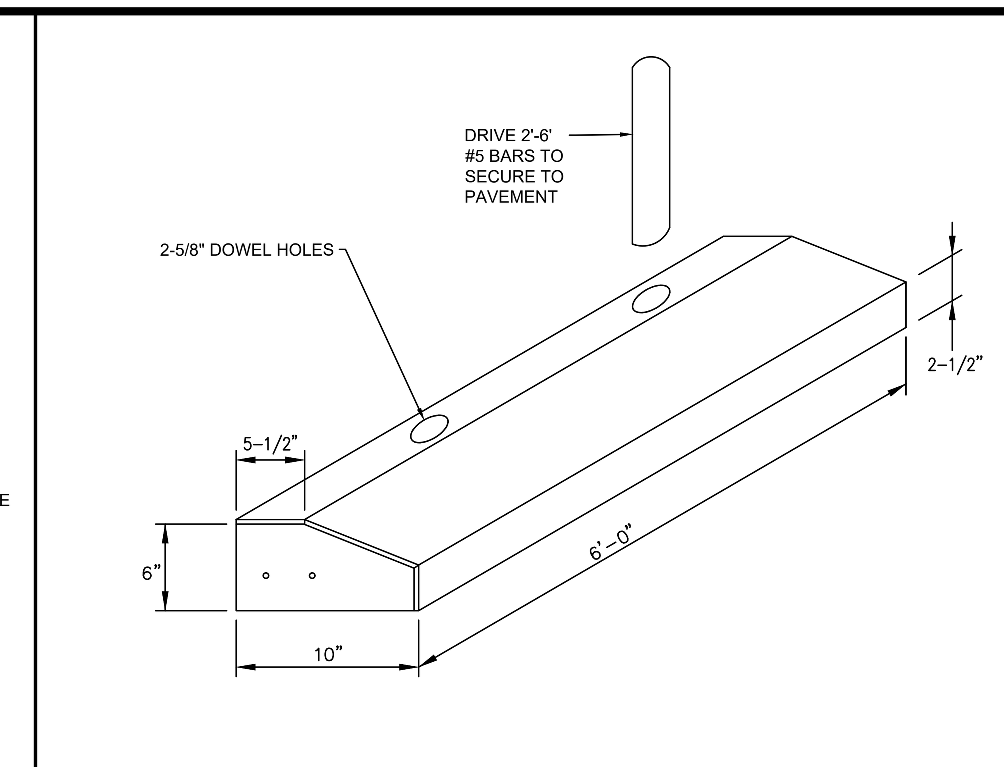
VERTICAL CONCRETE CURB
NOT TO SCALE



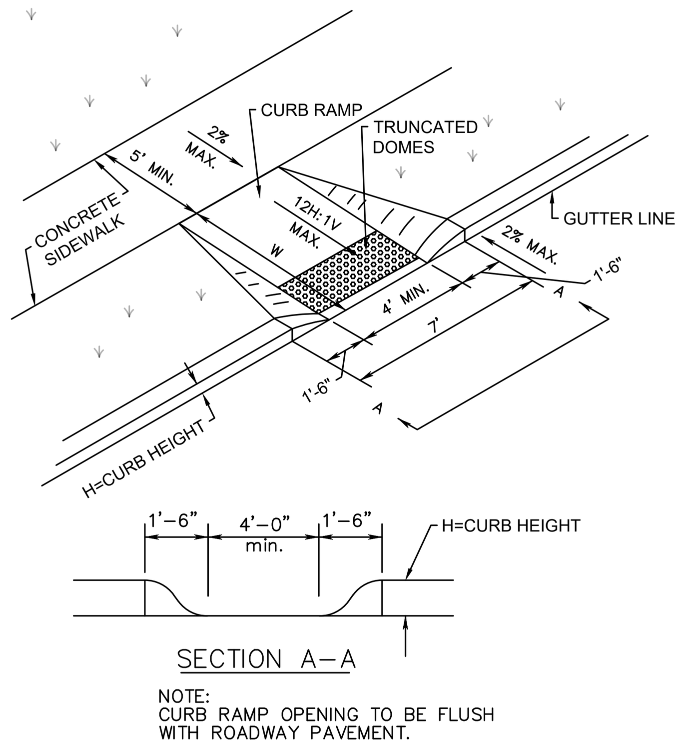
ACCESSIBLE PARKING SIGN
NOT TO SCALE



HANDICAP CURB RAMP WITH PARKING LOT STRIPING AND HC STALLS
NOT TO SCALE



CONCRETE WHEEL STOP FOR HANDICAP PARKING SPACES
NOT TO SCALE



NOTE:
CURB RAMP OPENING TO BE FLUSH WITH ROADWAY PAVEMENT.

GENERAL NOTES:

ALL CONCRETE SHALL BE CLASS "B" 3500 PSI, GREY.

LANDING AREA, APPROACH SIDEWALK TRANSITIONS, AND CURB RAMP SHALL BE KEPT CLEAR OF OBSTRUCTIONS.

DIMENSIONS SHOWN IN TABLES ARE FOR RELATIVELY FLAT SIDEWALK AREAS. CARE SHOULD BE TAKEN WHEN DETERMINING CURB RAMP SIZE BASED ON CURB HEIGHT (H) WHERE ELEVATION OF CURB AND SIDEWALK VARY DRASTICALLY IN AREA OF PROPOSED CURB RAMP.

CURB (DROPPED CURB) GUTTERLINE TO BE FLUSH WITH ROADWAY PAVEMENT A MINIMUM OF 4 FEET AT ALL CURB RAMPS, EXCEPT THAT CURB RAMP TYPE E SHALL BE A MINIMUM OF 5 FEET.

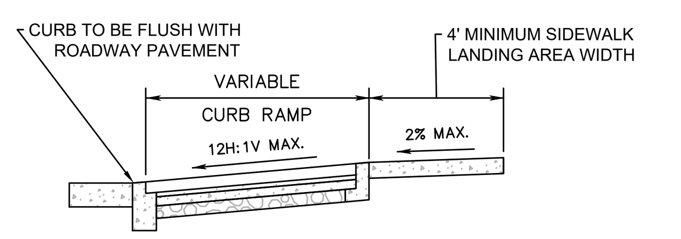
WHERE THE DISTANCE FROM THE GUTTER LINE TO THE OUTSIDE EDGE OF SIDEWALK IS 6 FEET OR LESS, CURB RAMP TYPE E SHOULD BE USED, INSTEAD OF CURB RAMP TYPE A THROUGH D.

CROSSWALKS AND STOP LINES MAY BE MARKED OR UNMARKED, SEE PLANS.

PREFERRED AND ALTERNATE TREATMENTS SHOULD NOT BE INTERMIXED WITHIN THE SAME INTERSECTION.

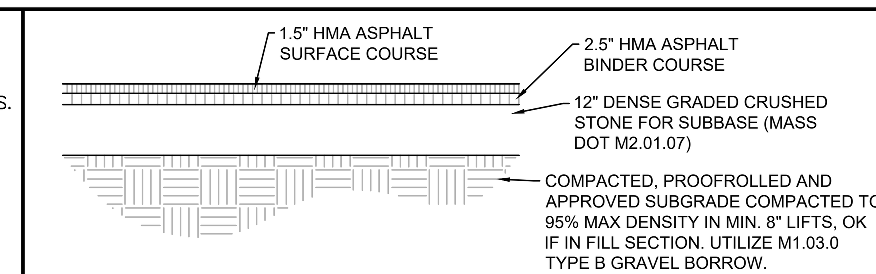
DIMENSIONS SHOWN IN TABLES ARE FOR 3 INCH TO 9 INCH CURB HEIGHTS. WHERE THE CURB HEIGHTS ARE OTHER THAN WHAT IS PROVIDED IN THE TABLES, THE DIMENSIONS OF THE RAMPS WILL HAVE TO BE CALCULATED BASED ON CROSS SLOPES SHOWN.

CURB RAMP	
H INCHES	W FEET
3	3
4	4
5	5
6	6
7	7
8	8
9	9

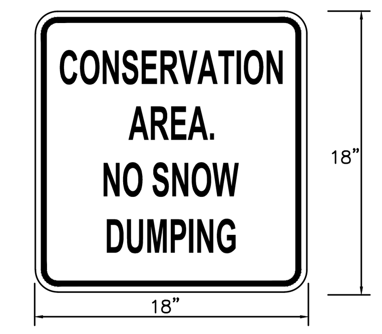


SECTION THROUGH CURB RAMPS

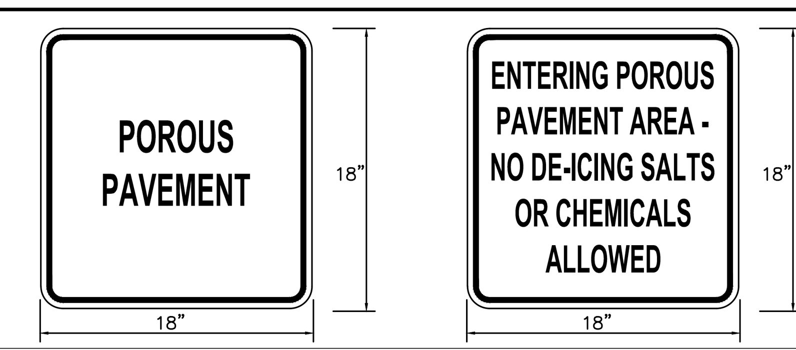
CONCRETE CURB RAMP
NOT TO SCALE



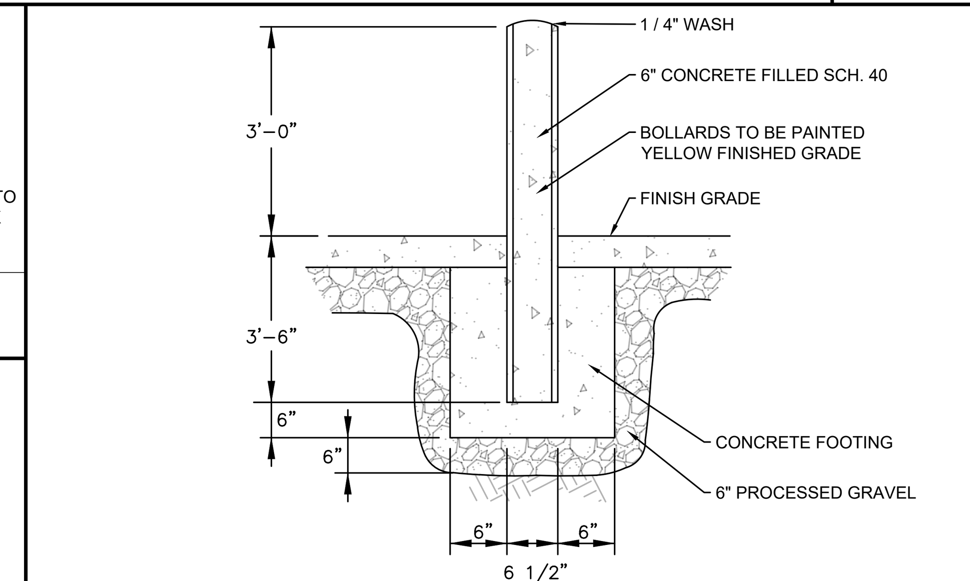
BITUMINOUS PAVEMENT
NOT TO SCALE



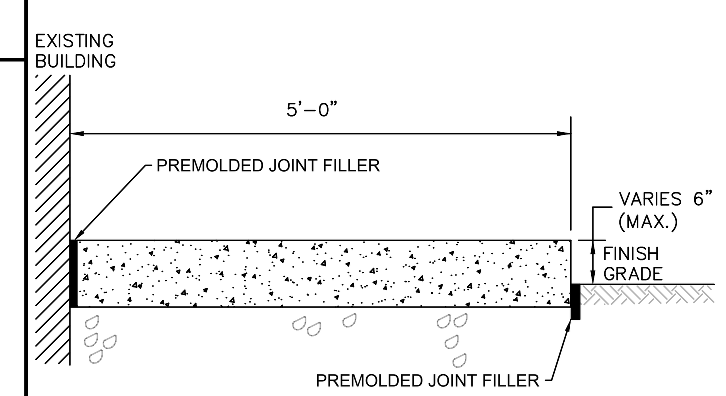
CONSERVATION SIGN DETAIL
NOT TO SCALE



POROUS PAVEMENT SIGN DETAILS
NOT TO SCALE

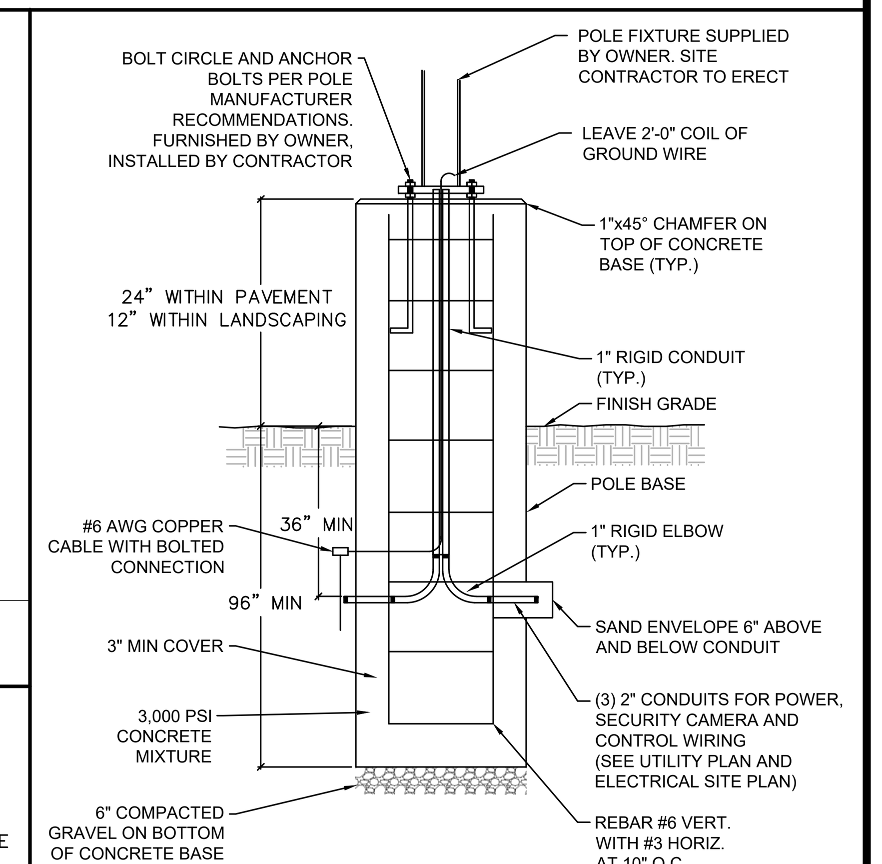


CONCRETE FILLED STEEL BOLLARD
NOT TO SCALE



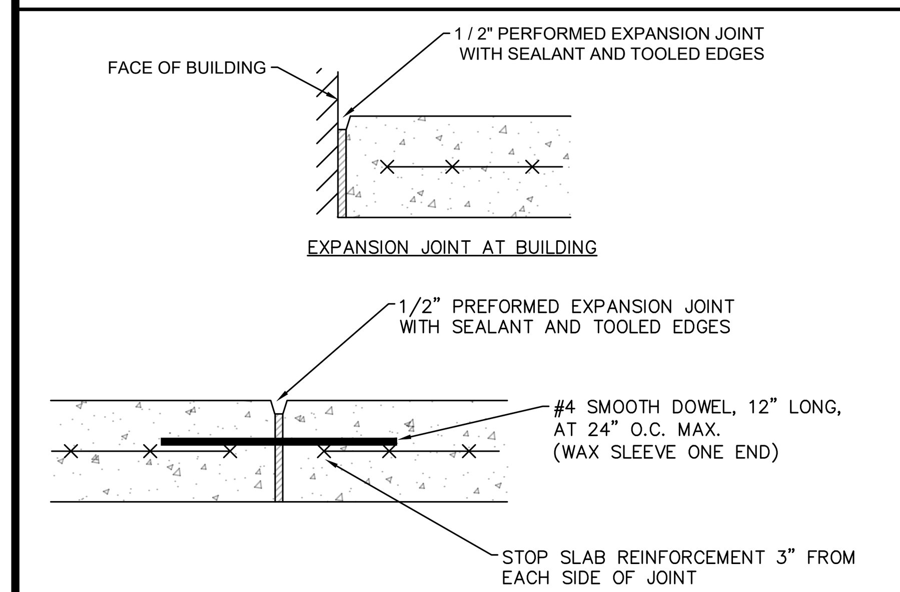
NOTE:
1. PADS AT DOORWAYS TO BE AT LEAST 5' DEEP AND EXTEND 1' BEYOND DOORWAY EACH SIDE. FINAL DIMENSIONS SHALL BE PER THE ARCHITECTURAL DOORS.
2. REFER TO STRUCTURAL DRAWINGS FOR THICKNESS, FOOTING DESIGN AND REINFORCING DETAILS.
3. MATCH WALK TO DOOR PAD GRADE WHERE NEW OR RECONSTRUCTED WALK IS PROPOSED.

CONCRETE DOORPAD
NOT TO SCALE



NOTES:
1. TOTAL MINIMUM LENGTH OF SONOTUBE (BURIED PORTION) IS A 3-1 RATIO WITH RESPECT TO THE TOTAL HEIGHT OF POLE INCLUDING EXTENSION ABOVE FINISHED GRADE.
2. LIGHTING NOTE: CONTRACTOR IS RESPONSIBLE FOR PLANNING/ORIENTATING THE BASE PLATE MOUNTING PATTERN TO FIT THE SELECTED POLE AND ACCOUNT FOR THE ORIENTATION OF THE FIXTURE HEADS. BOLT PATTERNS AND ANCHOR BOLTS TO BE PROVIDED BY OWNER'S LIGHTING REP.
3. CONTRACTOR TO SUBMIT SHOP DRAWINGS FOR APPROVAL PRIOR TO CONSTRUCTION

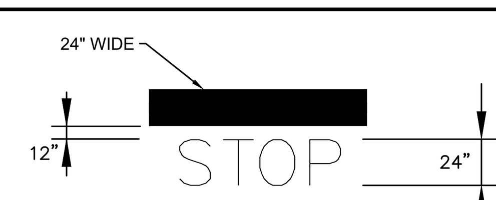
LIGHT POLE EXPOSED BASE DETAIL
NOT TO SCALE



NOTE:
PROVIDE EXPANSION JOINTS AT ALL INTERFACES BETWEEN WALKWAY AND VERTICAL BUILDING SURFACES.

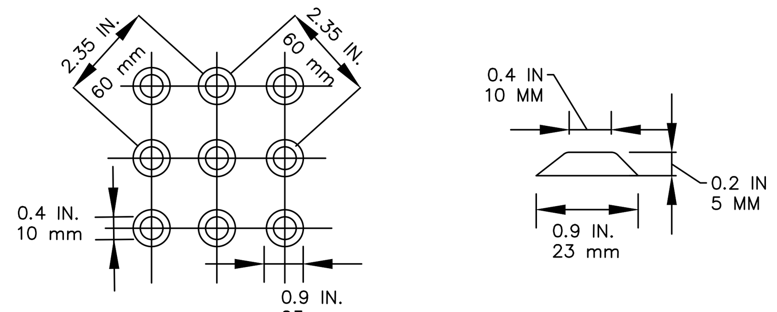
CONCRETE SIDEWALK EXPANSION JOINT

EXPANSION JOINT
NOT TO SCALE

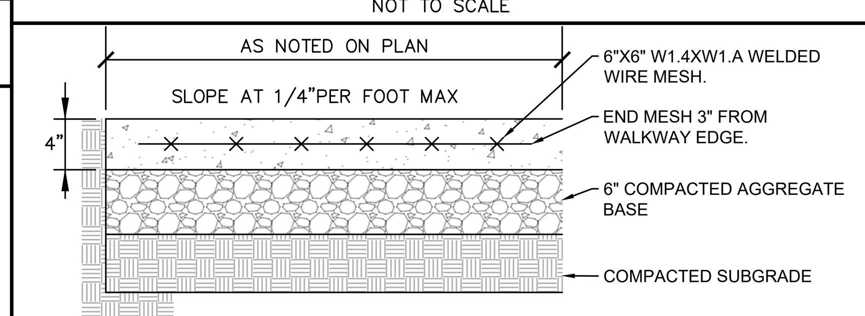


NOTE:
WORDS CAN BE ARRANGED IN OTHER COMBINATIONS THAN THOSE ILLUSTRATED HERE TO ACHIEVE DESIRED RESULT. ALL PAINT TO BE THERMOPLASTIC.

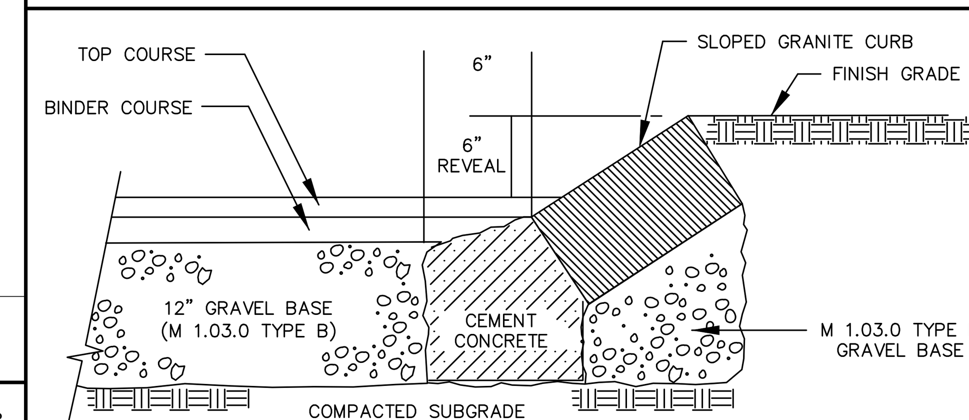
PAINTED MARKING DETAILS
NOT TO SCALE



TRUNCATED DOME PATTERN
NOT TO SCALE

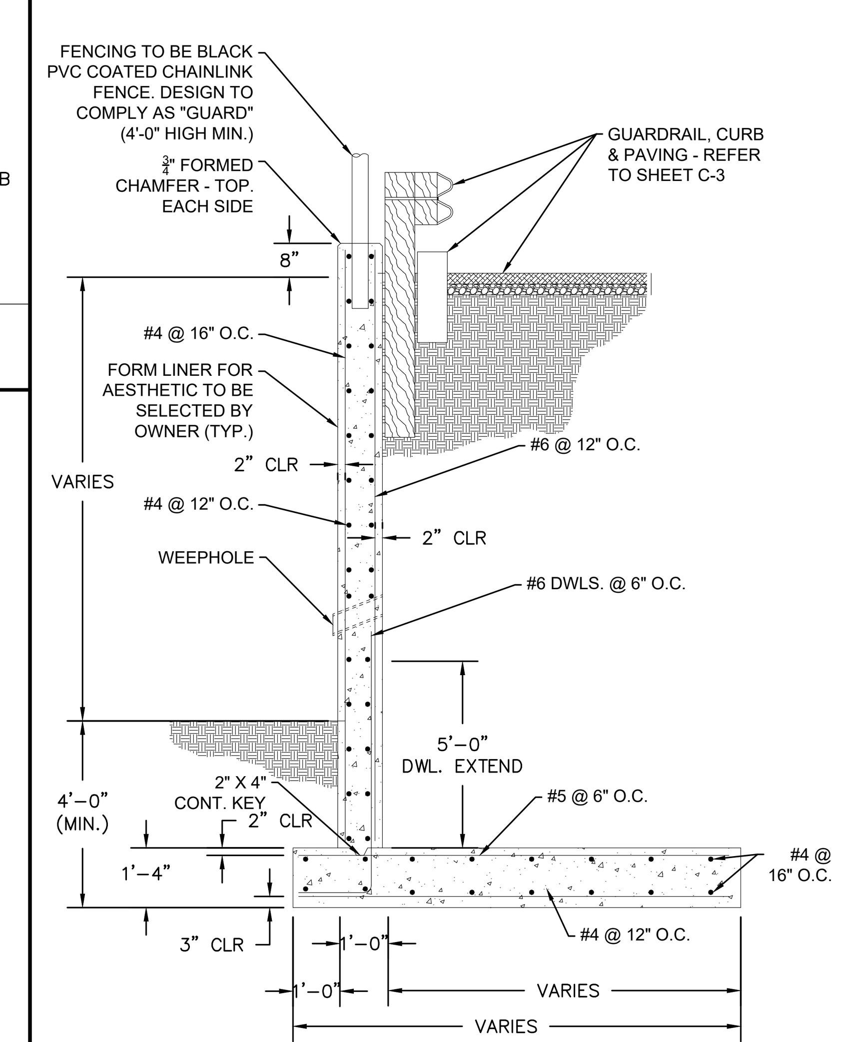


CONCRETE SIDEWALK
NOT TO SCALE

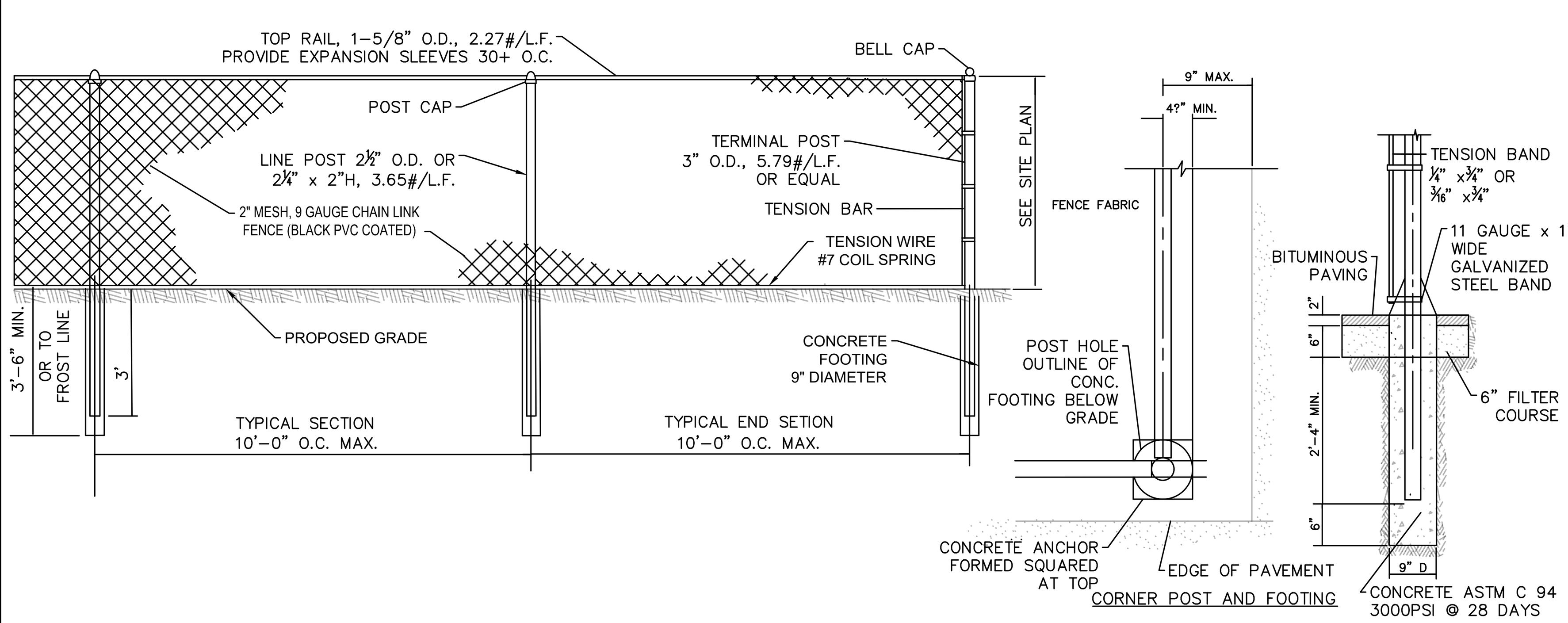


SLOPED GRANITE CURB
NOT TO SCALE

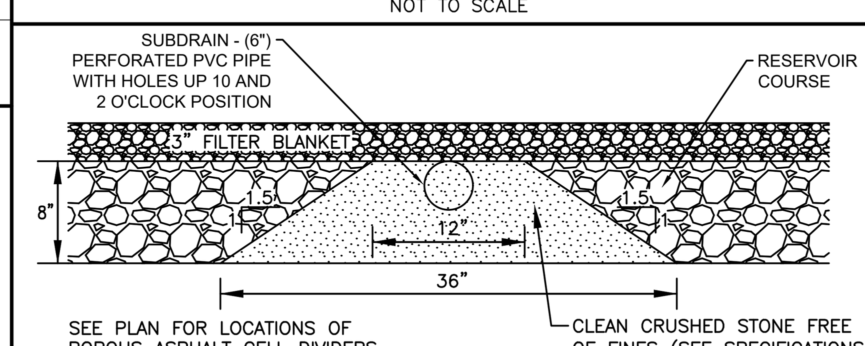
NOTE: SCHEMATIC CONCRETE WALL DESIGN SHOWN IS FOR PERMITTING PURPOSED ONLY. CONTRACTOR TO PROVIDE A WALL DESIGN STAMPED BY A MASSACHUSETTS REGISTERED PROFESSIONAL ENGINEER TO THE BUILDING DEPARTMENT PRIOR TO THE START OF CONSTRUCTION. CONTRACTOR TO FURNISH AND INSTALL A COMPLETE DESIGN-BUILD WALL SYSTEM.



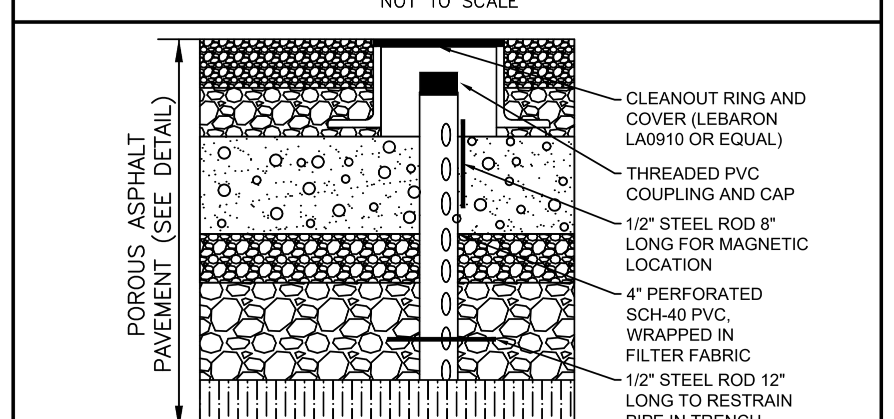
RETAINING WALL DETAIL
NOT TO SCALE



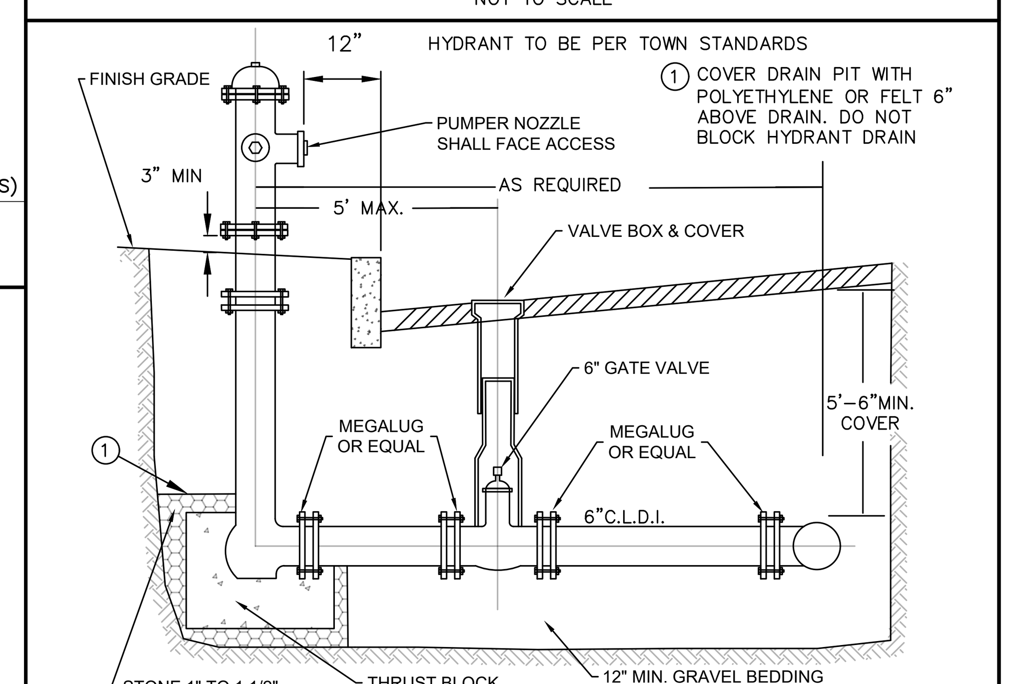
ELEVATION OF TYPICAL CHAIN LINK FENCE
NOT TO SCALE



POROUS ASPHALT PAVEMENT CELL DIVIDER
NOT TO SCALE



POROUS PAVEMENT OBSERVATION WELL DETAIL
NOT TO SCALE



TYPICAL HYDRANT BRANCH ASSEMBLY
NOT TO SCALE

Date	Description	No.
04/29/22	RESPONSE TO PEER REVIEW COMMENTS	5.
03/28/22	P.B. AND CON.–COM. RESUBMITTAL	4.
02/14/22	P.B. AND CON.–COM. RESUBMITTAL	3.
01/31/22	ZBA RESUBMITTAL	2.
11/15/21	PLANNING BOARD SUBMITTAL	1.

Revisions

4-29-2022

COMMONWEALTH OF MASSACHUSETTS GABRIEL R. CROCKER CIVIL No. 47917 REGISTERED PROFESSIONAL ENGINEER

GABRIEL R. CROCKER
PROFESSIONAL ENGINEER, MA REGISTRATION #47917

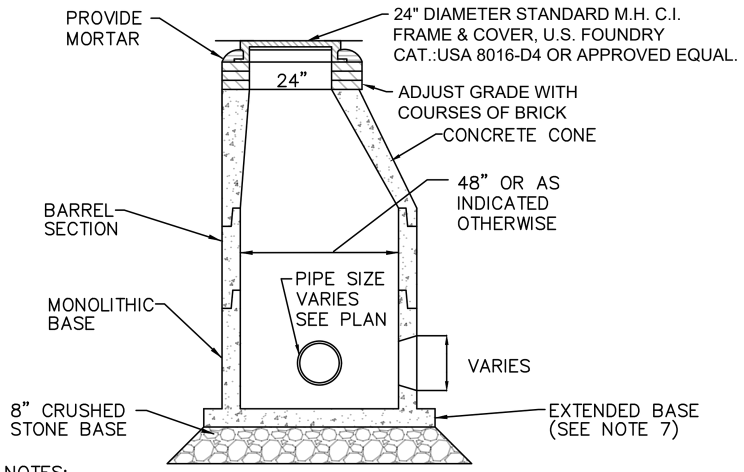
Crocker Design Group
2 SHARP STREET, UNIT A
HINGHAM, MA 02043
P: 781–919–0808

Project
MERCEDES OF SUDBURY
141 BOSTON POST ROAD, SUDBURY, MA

Prepared for
HERB CHAMBERS 43 BRAINTREE STREET, LLC
#259 McGRATH HIGHWAY - ROUTE 28
SOMERVILLE, MA 02143

Drawing Title
DETAIL SHEET

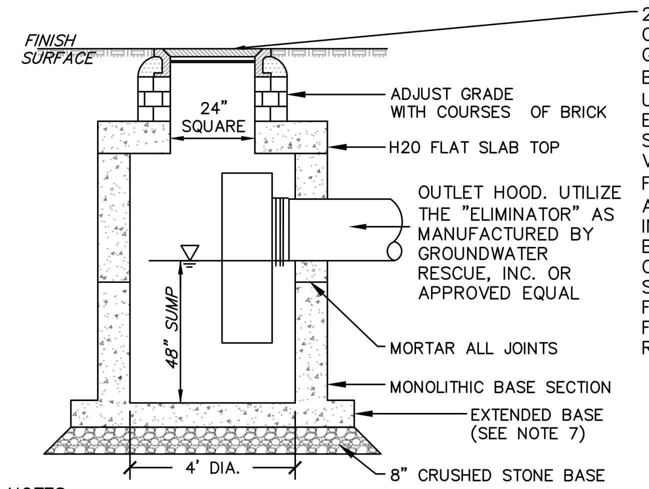
Project No.	100-107	Drawing No.
Date	11/10/2021	C-8.1
Scale	AS NOTED	
Drawn By	DJN / JPM	
Approved By	GC	



NOTES:
1. MANHOLE DESIGN SHALL CONFORM TO LATEST ASTM C478.
2. REINFORCING STEEL SHALL CONFORM TO LATEST ASTM A 185.
3. CONCRETE COMPRESSIVE STRENGTH – 4,000 PSI @ 28 DAYS.
4. ONE POUR MONOLITHIC BASE.
5. BITUMASTIC BUTYL RUBBER FOR JOINTS SHALL CONFORM TO LATEST ASTM C443 AND FED SS–S–201A SPEC.
6. COVERS TO BE STAMPED "DRAIN"
7. CONTRACTOR TO PROVIDE BUOYANCY CALCULATIONS WITH THE PRECAST STRUCTURE SHOP DRAWING PACKAGE. ESTIMATE SEASONAL HIGH GROUNDWATER USING THE TEST PIT PLAN. USE FACTOR OF SAFETY OF 1.5 APPLIED TO UNIT FORCE. PROVIDE ANTI FLOTATION COLLAR WHERE CALCULATIONS REQUIRE TO MEET FACTOR OF SAFETY.

PRECAST CONCRETE DRAIN MANHOLE

NOT TO SCALE

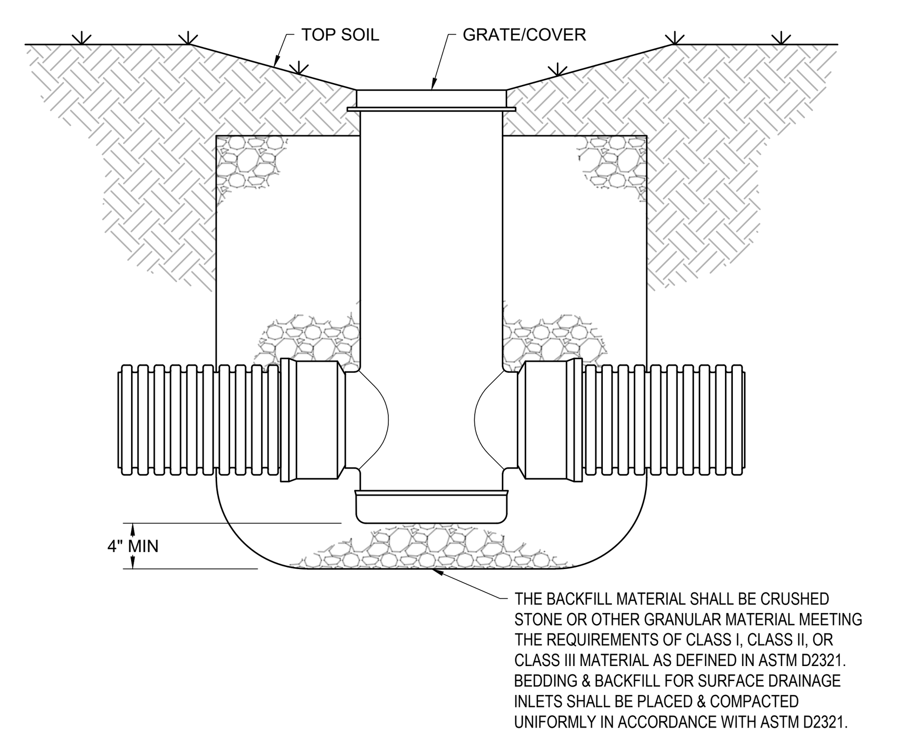


24" SQUARE HEAVY DUTY CAST IRON FRAME AND GRATE AS MANUFACTURED BY U.S. FOUNDRY (CAT. USA 8016) OR APPROVED EQUAL. IN LINE INLETS SHALL UTILIZE CURVED VANE IN DIRECTION OF FLOW (CAT. USA 8017 OR APPROVED EQUAL). INLETS AT SAGS SHALL BE VERTICAL GRATE. CONTRACTOR SHALL SUBMIT SHOP DRAWINGS FOR STRUCTURES, FRAMES AND GRATES FOR REVIEW AND APPROVAL.

NOTES:
1. STRUCTURE DESIGN TO LATEST ASTM C478.
2. REINFORCING STEEL CONFORMS TO LATEST ASTM A 185.
3. CONCRETE COMPRESSIVE STRENGTH – 4,000 PSI @ 28 DAYS.
4. LAT SLAB TOP AASHTO H–20
5. ONE POUR MONOLITHIC BASE.
6. UTILIZE CURVED VANE GRATES WHERE CATCH BASIN IS ON AN INLINE SLOPE CONDITION.
7. CONTRACTOR TO PROVIDE BUOYANCY CALCULATIONS WITH THE PRECAST STRUCTURE SHOP DRAWING PACKAGE. ESTIMATE SEASONAL HIGH GROUNDWATER USING THE TEST PIT PLAN. USE FACTOR OF SAFETY OF 1.5 APPLIED TO UNIT FORCE. PROVIDE ANTI FLOTATION COLLAR WHERE CALCULATIONS REQUIRE TO MEET FACTOR OF SAFETY.

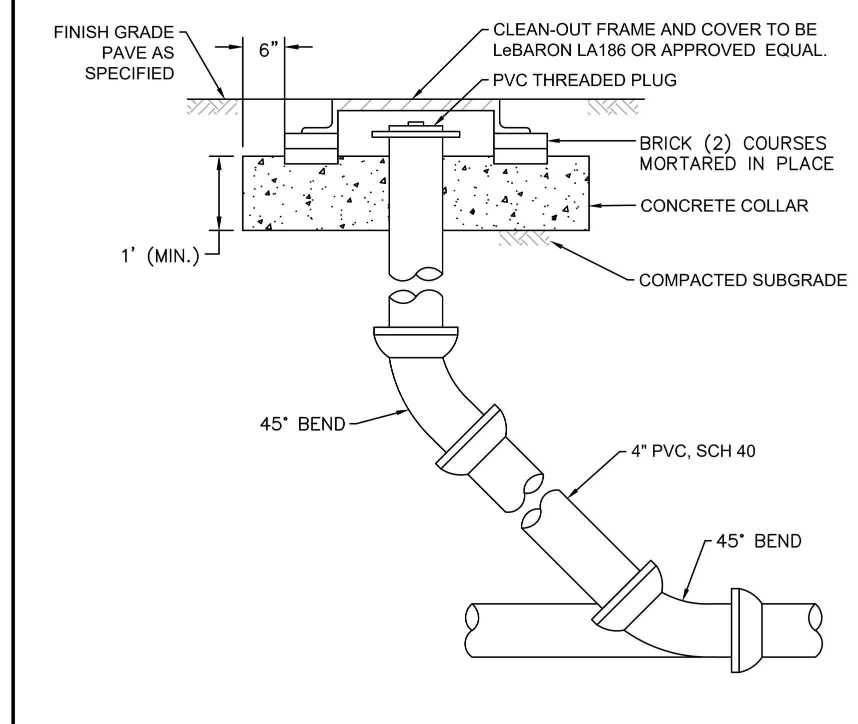
SINGLE GRATE CATCH BASIN

NOT TO SCALE



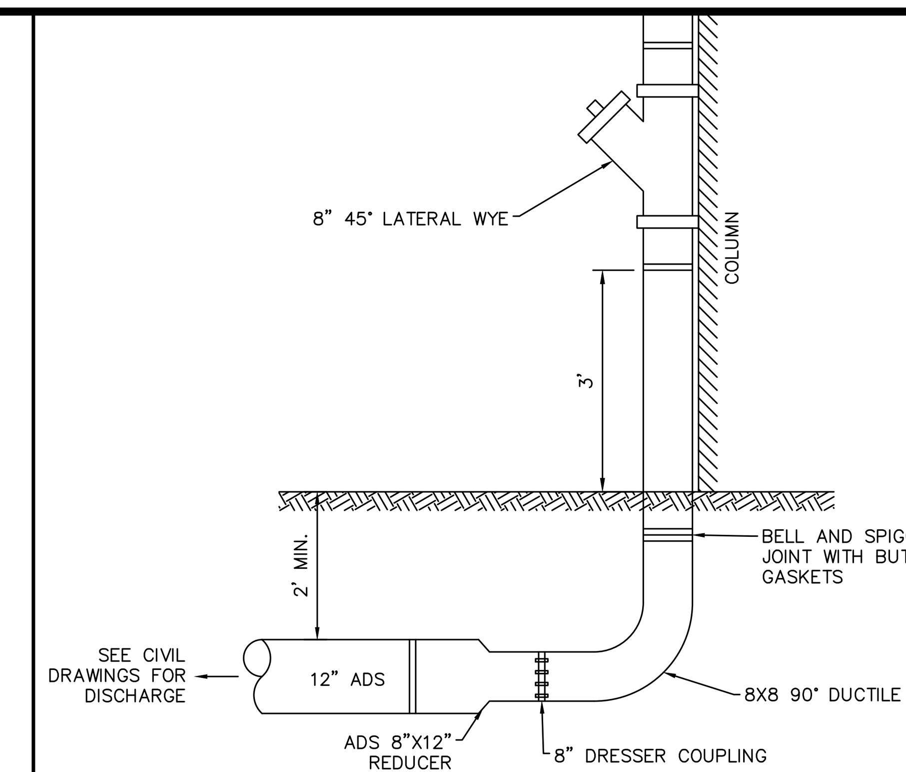
NYOPLAST YARD DRAIN

NOT TO SCALE



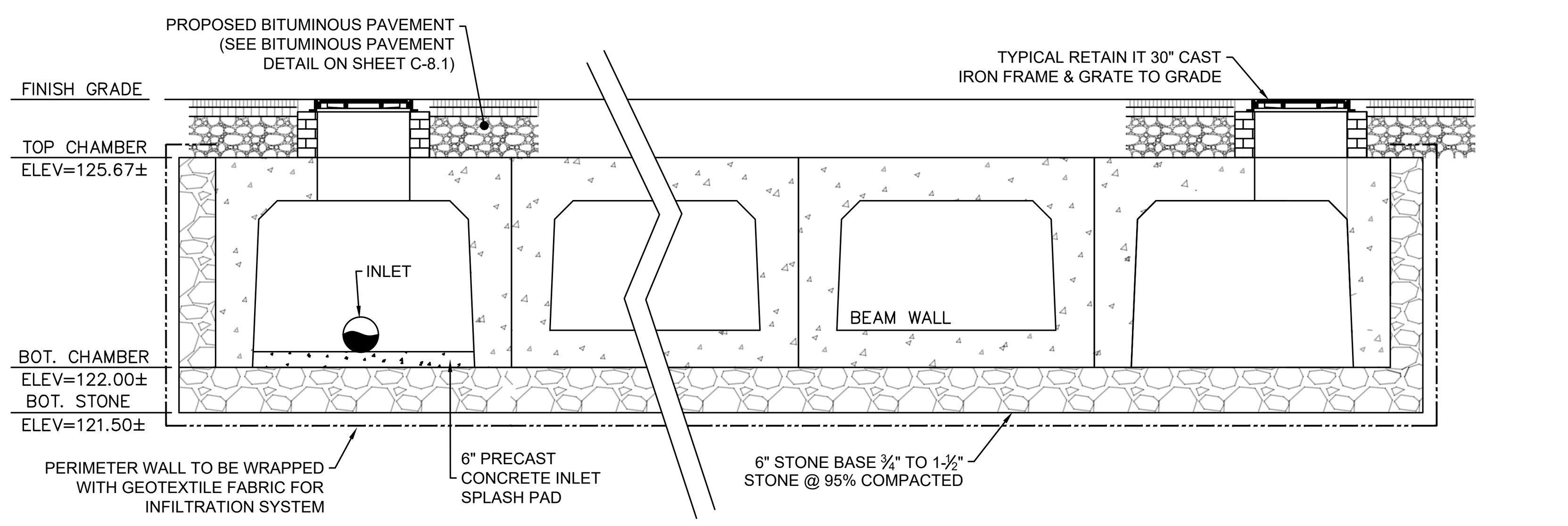
TYPICAL CLEAN-OUT DETAIL

NOT TO SCALE



PARKING DECK DOWNSPOUT CONNECTION

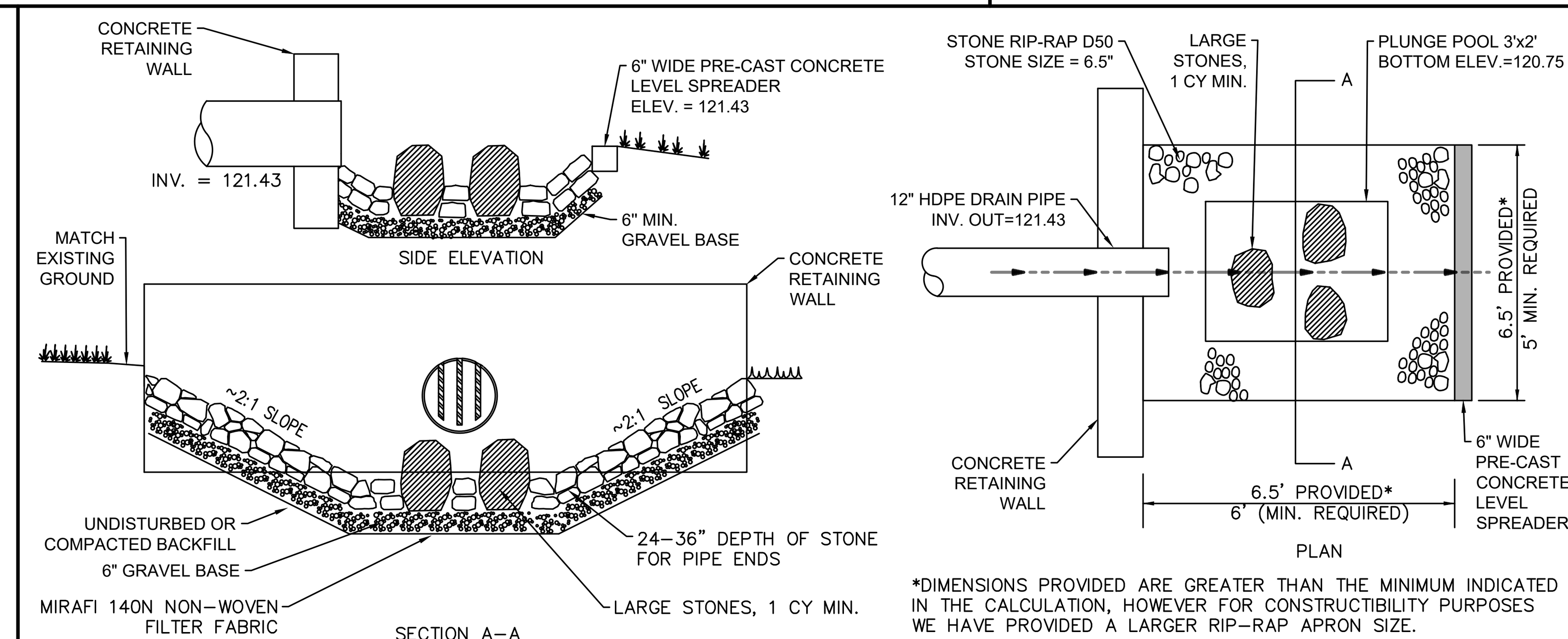
NOT TO SCALE



NOTE:
ELEVATIONS REFER TO A SPECIFIC LOCATION AND VARY THROUGHOUT THE CHAMBER SYSTEM. SEE GRADING AND DRAINAGE PLAN FOR FINISH GRADE ELEVATIONS AT SPECIFIC LOCATIONS.

UG#2: 3 FT RETAIN-IT DETENTION SYSTEM

NOT TO SCALE



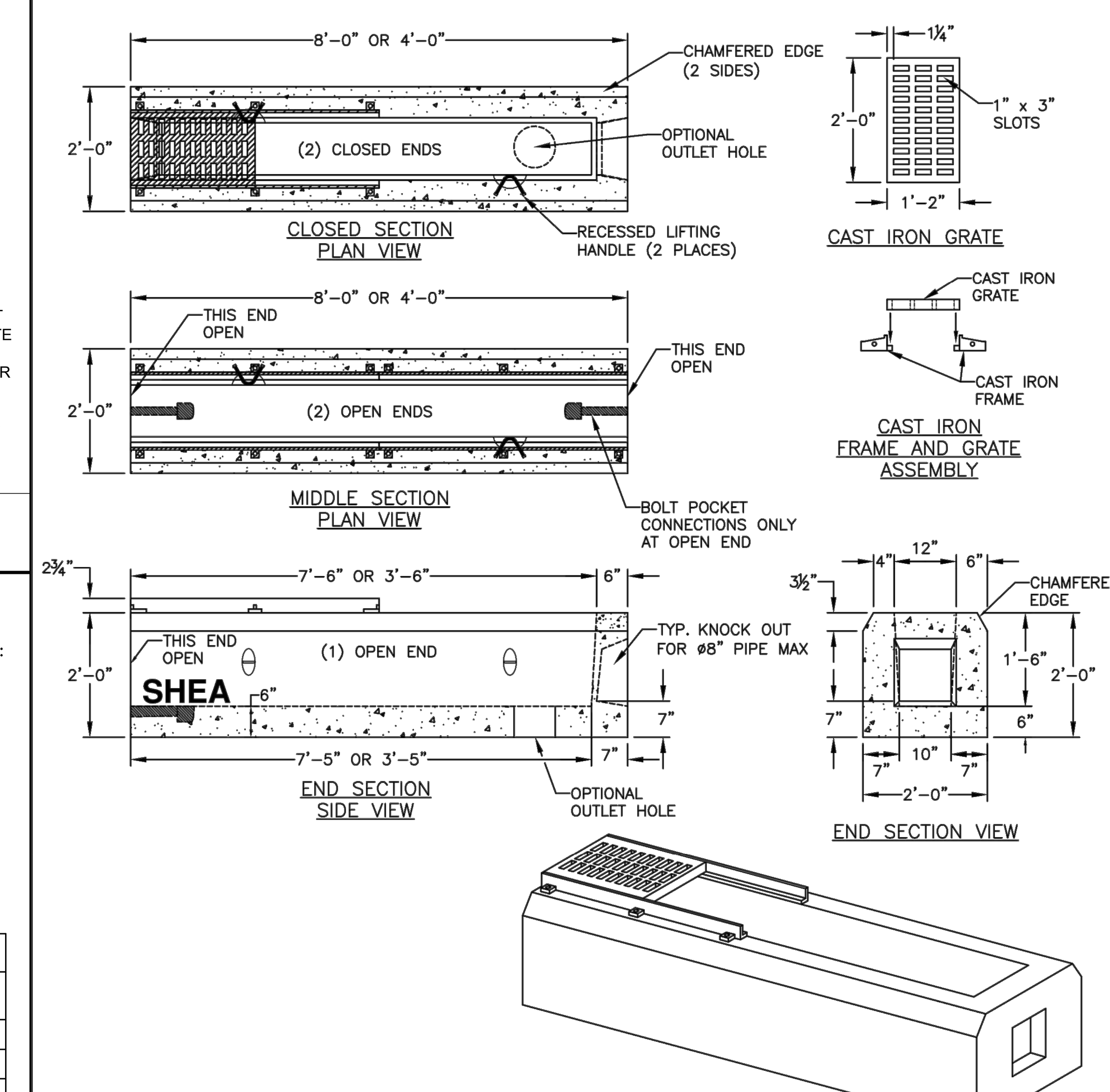
*DIMENSIONS PROVIDED ARE GREATER THAN THE MINIMUM INDICATED IN THE CALCULATION, HOWEVER FOR CONSTRUCTIBILITY PURPOSES WE HAVE PROVIDED A LARGER RIP–RAP APRON SIZE.

LEVEL SPREADER/PLUNGE POOL/ENERGY DISSIPATER

NOT TO SCALE

SHEA CONCRETE PRODUCTS — New England's Premier Precaster 800–696–7432 (SHEA) www.sheaconcrete.com
BILLING ADDRESS: 87 HAVERHILL RD, AMESBURY MA 01913

12" X 18" TRENCH DRAIN



NOTES:
1. MINIMUM CONCRETE COMPRESSIVE STRENGTH: 4,000 PSI AFTER 28 DAYS.
2. REINFORCEING STEEL: A615 GRAD 60 BLACK DEFORMED BARS
3. AVAILABLE IN 4' AND 8' SECTIONS.
4. AVAILABLE IN CENTER, END OR MIDDLE SECTIONS.
5. DESIGNED FOR AASHTO HS–20 LOADING.
6. GRATING TO BE ATTACHED BY CONTRACTOR.
7. END KNOCK OUTS SIZED FOR MAXIMUM ø8" PIPE.
8. SLOPED FLOOR IF REQUIRED TO BE INSTALLED BY OTHERS AFTER INSTALLATION.

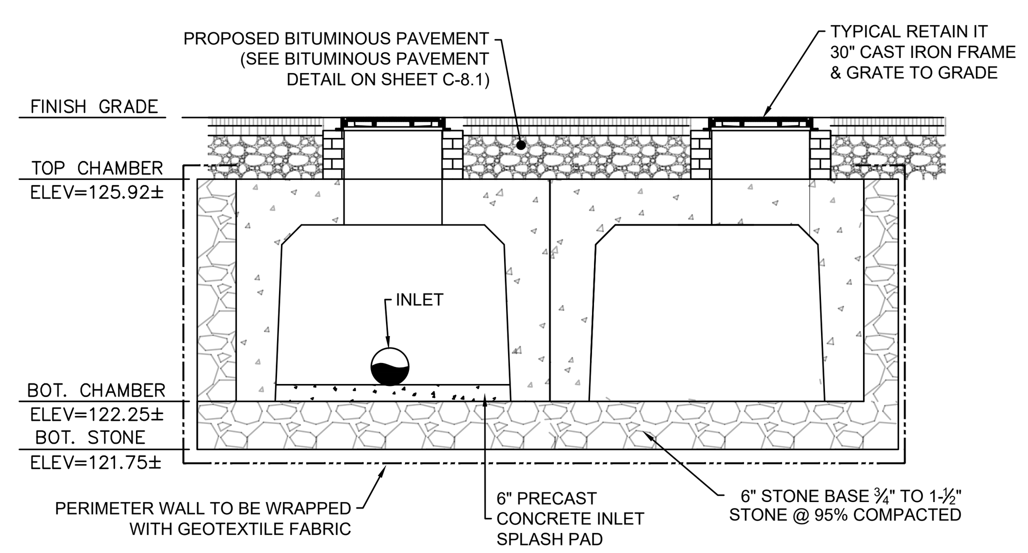
12" x 18" TRENCH DRAIN		
ITEM CODE	SECTION TYPE	WEIGHT
TD–8	CLOSED	3,075#
TD–8	MIDDLE	3,000#
TD–8	END	3,030#
TD–4	CLOSED	1,575#
TD–4	MIDDLE	1,500#
TD–4	END	1,540#

SHEA PRODUCT ID:	PREPARED FOR:	FILE NAME:
SEE TABLE		trenchdrain12x18

WEIGHT (LBS):	DRAWN BY:	DATE:	PAGE:
SEE TABLE	ARO	06/01/18	H6.2

773 Salem Street–Wilmington, MA | 153 Cranberry Hwy–Rochester, MA | 87 Haverhill Road–Amesbury, MA | 160 Old Turnpike Rd–Nottingham, NH

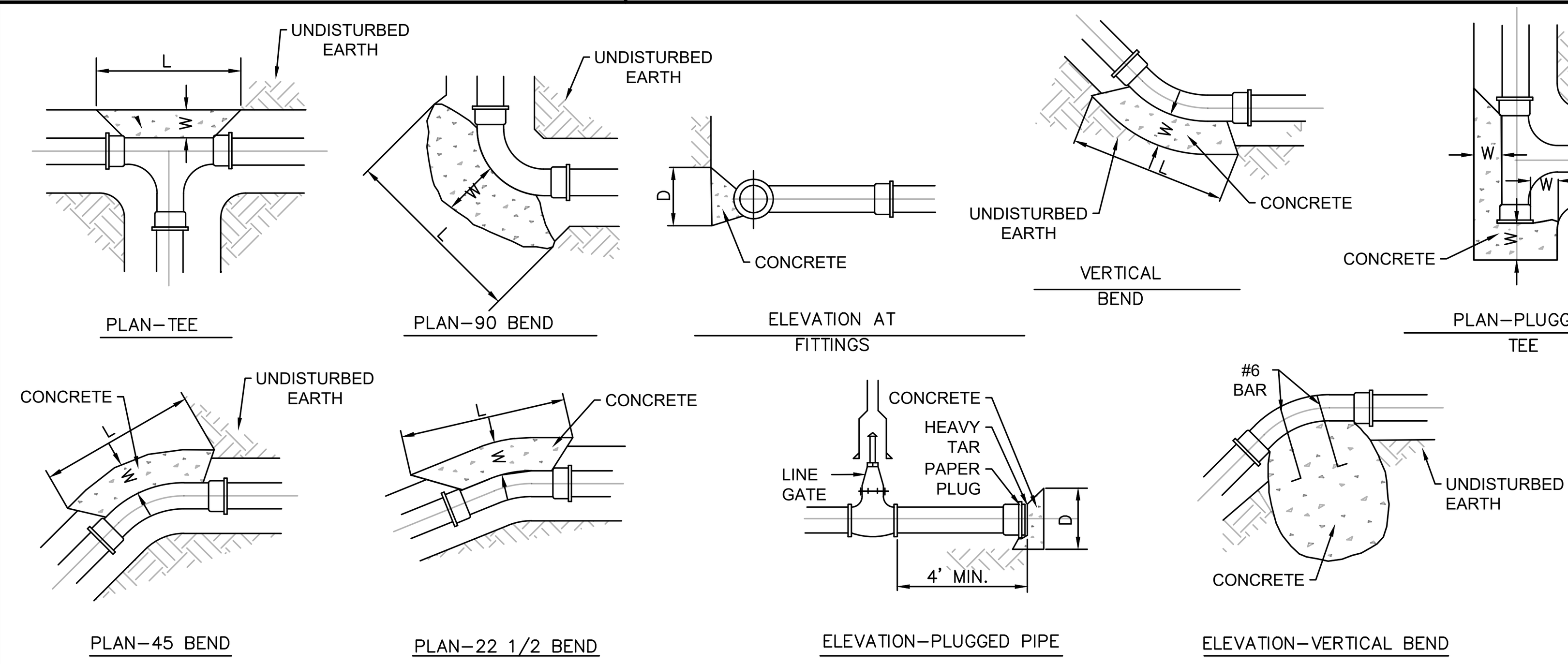
Specifications subject to change without notice



NOTE:
ELEVATIONS REFER TO A SPECIFIC LOCATION AND VARY THROUGHOUT THE CHAMBER SYSTEM. SEE GRADING AND DRAINAGE PLAN FOR FINISH GRADE ELEVATIONS AT SPECIFIC LOCATIONS.

UG#1: 3 FT RETAIN-IT RECHARGE SYSTEM

NOT TO SCALE



BASIS: 2,000 LB/SQ.FT. SOIL RESISTANCE 250 PSI WATER PRESSURE CORRECTION FACTORS FOR OTHER SOILS:

SOFT CLAY	4
SAND	2
SAND & GRAVEL	1.33
SHALE	0.4

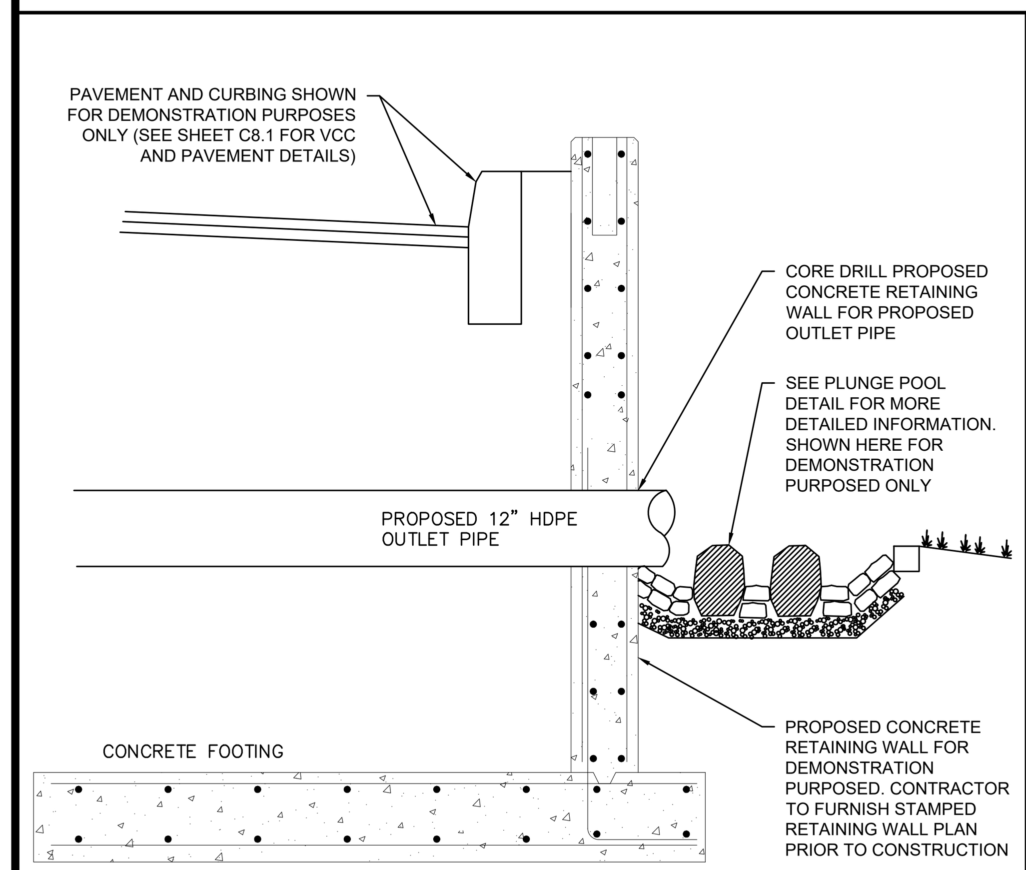
NOTE:
1. IF SOFT MATERIALS ARE ENCOUNTERED, THE THRUST BLOCKS SIZES SHALL BE ADJUSTED ACCORDINGLY.
2. CONCRETE TO BE 3000 PSI.

THRUST BLOCK SCHEDULE

PIPE SIZE	TEE		22 1/2		45		90		W
	L	D	L	D	L	D	L	D	
6"	18"	15"	15"	12"	15"	12"	15"	15"	21"
8"	2'	18"	18"	12"	18"	12"	2'	18"	2'
12"	3'	2'	2'	12"	2'	12"	3'	2'	28"
16"	4'	2.5'	2'	12"	2.33'	15"	4'	2.5'	31"
20"	5.25'	3'	2'	18"	3'	2'	5.25'	3'	33"
24"	7.5'	3'	3'	18"	4'	2.5'	7.5'	3'	3'

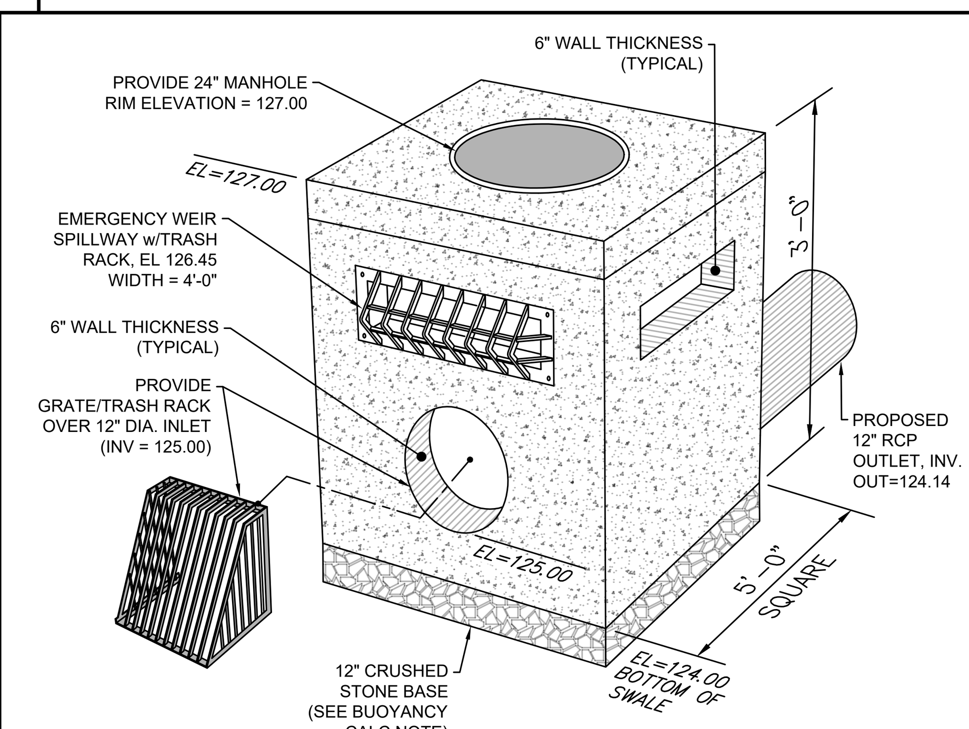
CONCRETE TRUST BLOCK

NOT TO SCALE



PROPOSED OUTFALL PIPE

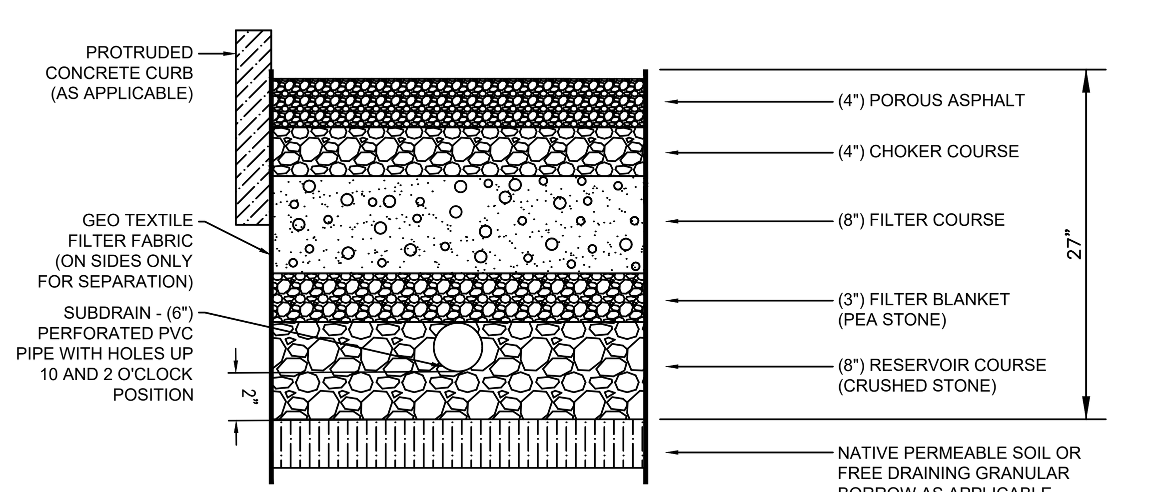
NOT TO SCALE



NOTE:
CONTRACTOR TO PROVIDE BUOYANCY CALCULATIONS WITH THE PRECAST STRUCTURE SHOP DRAWING PACKAGE. ESTIMATE SEASONAL HIGH GROUNDWATER USING THE TEST PIT PLAN. USE FACTOR OF SAFETY OF 1.5 APPLIED TO UNIT FORCE. PROVIDE ANTI FLOTATION COLLAR WHERE CALCULATIONS REQUIRE TO MEET FACTOR OF SAFETY.

PRECAST CONCRETE INLET STRUCTURE (ICS#1)

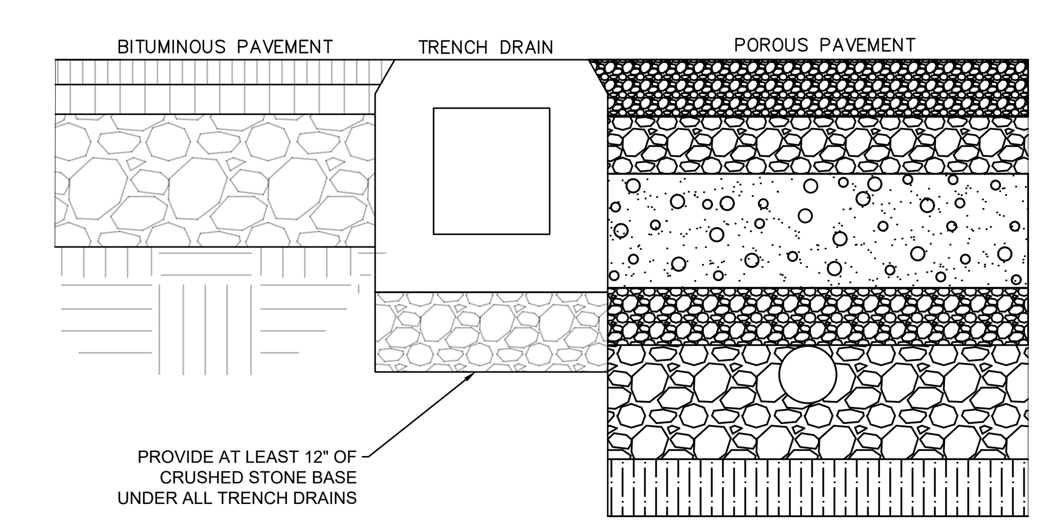
NOT TO SCALE



NOTES:
1. CHOKER COURSE: GRADED CRUSHED STONE (AASHTO NO. 57 STONE).
2. FILTER COURSE: POORLY GRADED SAND (MANUFACTURED) TO MEET NHDOT 304.1 WITH LESS THAN 4 PERCENT FINES.
3. FILTER BLANKET: 3/8" PEA GRAVEL.
4. RESERVOIR COURSE: 3/4" TO 2" WASHED STONE (AASHTO NO. 3).
5. EXCAVATION AND BACKFILL
 – ALL TOPSOIL, SUBSOIL AND DELETERIOUS MATERIAL, IF ANY, MUST BE EXCAVATED AND REMOVED FROM WITHIN FIVE (5) FEET FROM ALL SIDES OF THE INFILTRATION SYSTEM AND TO A DEPTH OF SIX (6) INCHES BELOW THE SURFACE OF THE NATURAL SAND/GRAVEL SOIL (C HORIZON). (NOTE THAT THIS WAS TO BE DONE DURING THE ESP PHASE)
 – GRANULAR FILL: FILL MATERIAL BELOW THE BOTTOM OF THE SYSTEM AND WITHIN FIVE (5) FEET OF THE SIDES OF THE SYSTEM SHALL BE FREE DRAINING GRANULAR FILL CONSISTING OF CLEAN SANDY GRAVELLY MATERIAL FROM NATURAL ON–SITE SOIL, FREE FROM ORGANIC MATTER AND DELETERIOUS MATTER APPROVED BY THE ENGINEER OR IMPORTED SAND MATERIAL MEETING THE SPECIFICATIONS FOR FREE DRAINING GRANULAR FILL. FILL MATERIAL SHALL BE COMPACTED TO 90% DENSITY. NOTE THAT THIS IS TO BE DONE DURING THE ESP PHASE. THE CONTRACTOR SHALL REMOVE AND DELETERIOUS MATERIAL, AND/OR ANY COMPACTED SOIL, IF ANY, AND INSTALL FILL MATERIAL AS DESCRIBED ABOVE AND PER THIS DETAIL.

POROUS PAVEMENT DETAIL

NOT TO SCALE



TRENCH DRAIN

NOT TO SCALE

Date	Description	No.
04/29/22	RESPONSE TO PEER REVIEW COMMENTS	5.
03/28/22	P.B. AND CON.-COM. RESUBMITTAL	4.
02/14/22	P.B. AND CON.-COM. RESUBMITTAL	3.
01/31/22	ZBA RESUBMITTAL	2.
11/15/21	PLANNING BOARD SUBMITTAL	1.

Revisions

4-29-2022
GABRIEL R. CROCKER
PROFESSIONAL ENGINEER, MA REGISTRATION #47917
COMMONWEALTH OF MASSACHUSETTS — GABRIEL R. CROCKER — CIVIL — No. 47917 — REGISTERED PROFESSIONAL ENGINEER

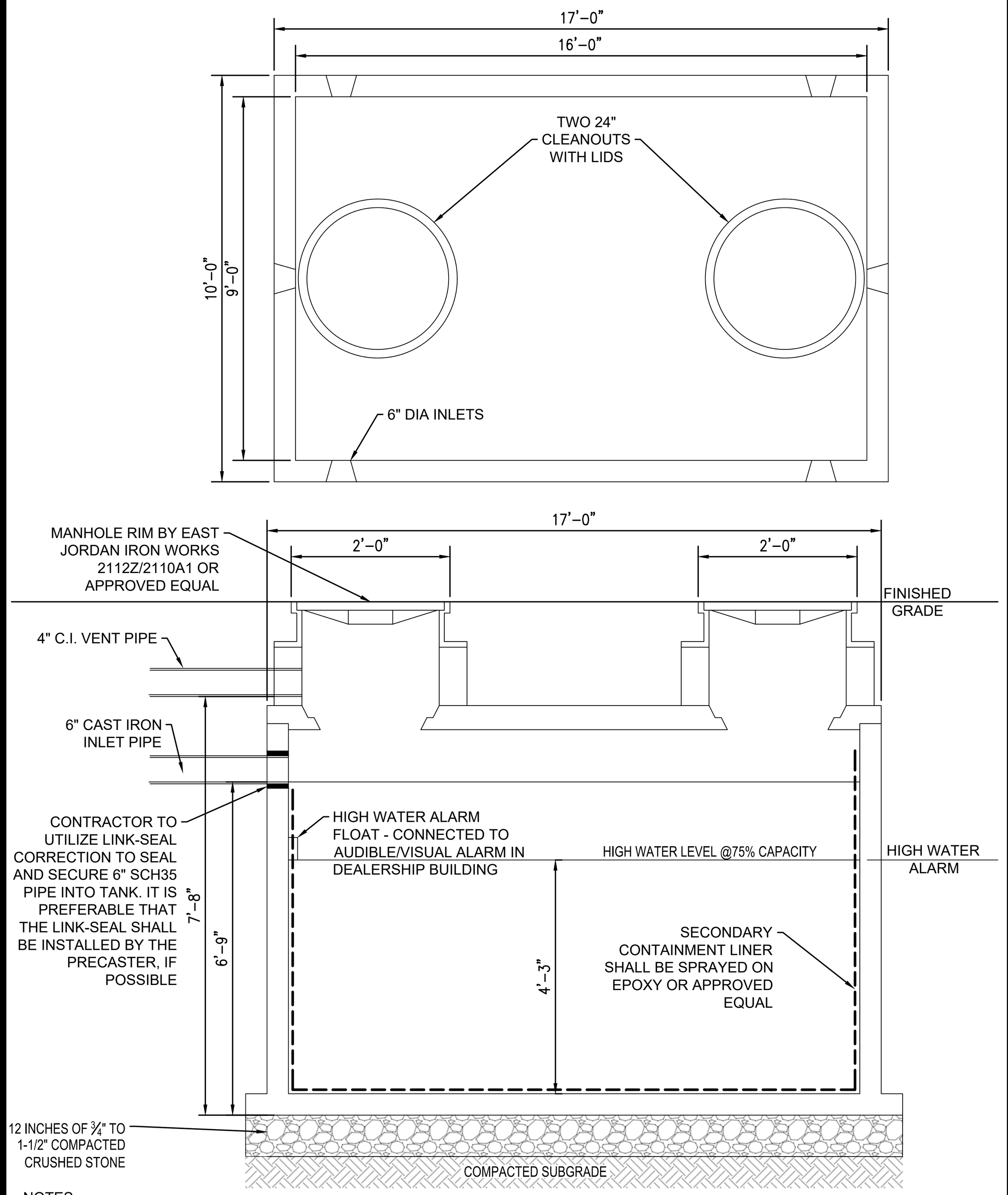
Crocker Design Group
2 SHARP STREET, UNIT A
HINGHAM, MA 02043
P: 781–919–0808

Project
MERCEDES OF SUDBURY
141 BOSTON POST ROAD, SUDBURY, MA

Prepared for
HERB CHAMBERS 43 BRAINTREE STREET, LLC
#259 McGRATH HIGHWAY - ROUTE 28
SOMERVILLE, MA 02143

Drawing Title
DETAIL SHEET

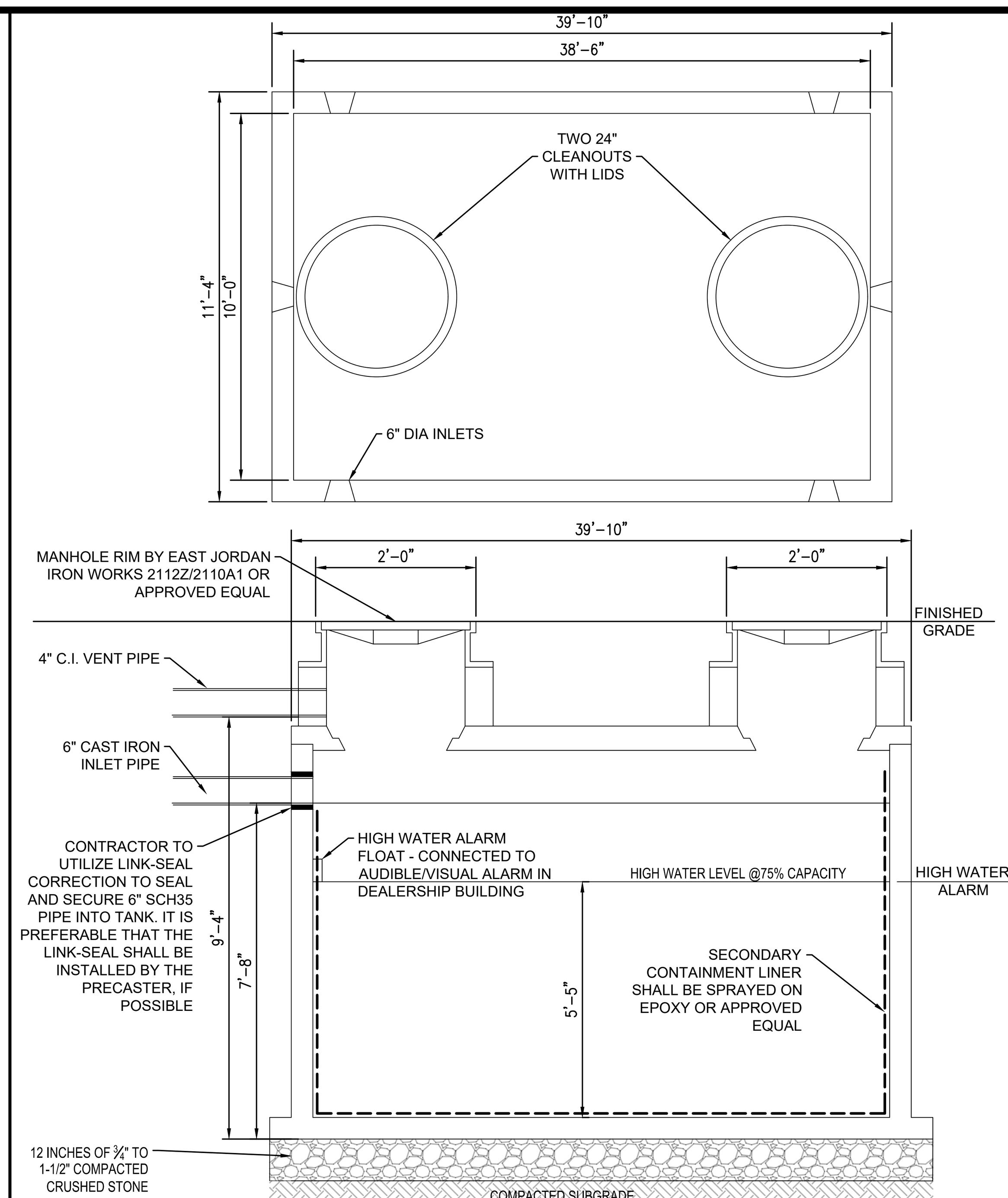
Project No.	100-107	Drawing No.
Date	11/10/2021	C-8.2
Scale	AS NOTED	
Drawn By	DJN / JPM	
Approved By	GC	



NOTES:
1. TIGHT TANK SHALL BE CONSTRUCTED OF PRECAST CONCRETE, FIBERGLASS, OR OTHER MASSDEP APPROVED TANK MATERIALS APPLICABLE FOR INDUSTRIAL WASTE HOLDING REQUIREMENTS.
2. CONCRETE: 4,000 PSI MIN. AFTER 28 DAYS.
3. CEMENT: PORTLAND TYPE I OR III. ASTM C150-81.
4. ADMIXTURES: ASTM C233-82.
5. REINFORCEMENT: ASTM A615.
6. TANK AND FRAMES/COVERS SHALL BE H20 LOADING RATED.
7. JOINTS SEALED WITH BUTYL RUBBER.
8. THE TANK SHALL HAVE A FLOAT SET AT 75% OF TANK CAPACITY (BELOW INVERT CAPACITY). TEH FLOAT WILL BE CONNECTED TO A CONTROL PANEL TO BE MOUNTED INSIDE THE BUILDING THAT WILL HAVE AUDIBLE AND VISUAL ALARM TO NOTIFY THE FACILITY THAT THE TAN K IS TO BE PUMPED.
9. OWNER SHALL ENTER INTO A PUMPING CONTRACT WITH A LOCAL HAULING COMPANY AND WILL NEED TO PROVIDE EVIDENCE OF THAT CONTRACT TO THE ENGINEER TO PROVIDE WITH THE TIGHT TANK CERTIFICATION SUBMISSION TO MASSDEP.
10. CONTRACTOR TO PROVIDE BUOYANCY CALCULATIONS WITH THE PRECAST STRUCTURE SHOP DRAWING PACKAGE. USE FACTOR OF SAFETY OF 1.5 APPLIED TO UNIT FORCE.

6,000 GALLON TIGHT TANK DETAIL

NOT TO SCALE



NOTES:
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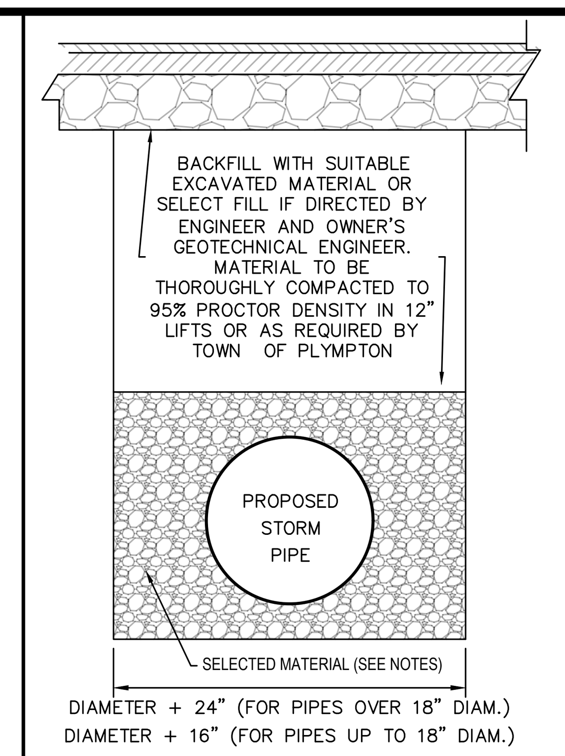
20,000 GALLON TIGHT TANK DETAIL

NOT TO SCALE

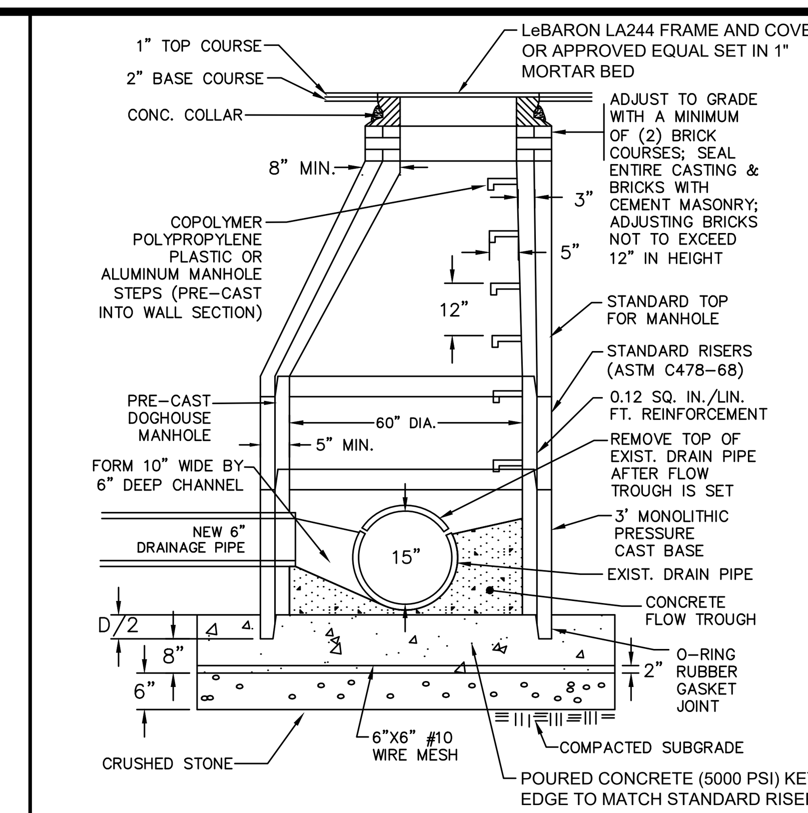


BACKFILLING:

AFTER THE PIPE HAS BEEN LAID AND INSPECTED, THE TRENCH SHALL BE BACKFILLED. THE SPACE UNDER THE PIPE HAUNCHES SHALL BE CAREFULLY FILLED WITH SELECTED MATERIAL, FREE FROM STONES OR FROZEN EARTH, AND COMPACTED CAREFULLY TO PREVENT THE PIPE FROM MOVING. THE LAYER OF BACKFILL UP TO TWELVE (12) INCHES OVER THE TOP OF THE PIPE SHALL ALSO BE OF SELECTED MATERIAL FREE FROM STONES AND FROZEN EARTH, WELL COMPACTED. THE REMAINDER OF THE TRENCH SHALL BE BACKFILLED IN TWELVE (12) INCH LAYERS EXCEPT AS NOTED BELOW, AND EACH LAYER SHALL BE FULLY COMPACTED IN AN APPROVED MANNER. UNDER ROADS OR OTHER TRAFFIC AREAS THE TRENCH SHALL BE BACKFILLED IN SIX (6) INCH LAYERS WITH EACH LAYER COMPACTED TO THE DENSITY OF THE SURROUNDING SOIL. PAVEMENT AND BASE COURSE MATERIALS REMOVED DURING THE EXCAVATION PROCESS SHALL BE REPLACED WITH PAVEMENT AND BASE COURSE TO MATCH THOSE REMOVED. WHEN, IN THE OPINION OF THE PLANNING BOARD OR ITS AGENT, THE EXCAVATION IS DEEP ENOUGH TO WARRANT IT, TEMPORARY PAVEMENT SHALL BE PROVIDED AS DIRECTED. TRENCHES NOT IN PAVEMENT SHALL BE LEFT IN A MOUNDED CONDITION AS DIRECTED BY THE PLANNING BOARD OR ITS AGENT.

STORM PIPE TRENCH

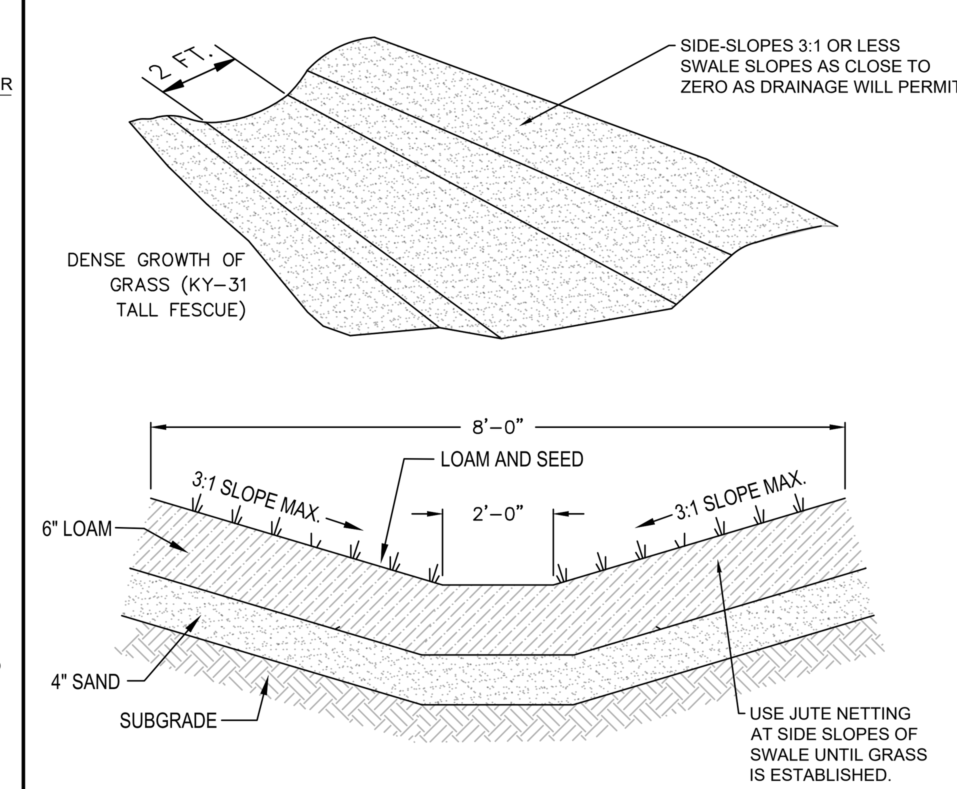
NOT TO SCALE



NOTES:
1. MANHOLE DESIGN SHALL CONFORM TO LATEST ASTM C478.
2. REINFORCING STEEL SHALL CONFORM TO LATEST ASTM A 185.
3. CONCRETE COMPRESSIVE STRENGTH – 4,000 PSI @ 28 DAYS.
4. ONE POUR MONOLITHIC BASE.
5. BITUMASTIC BUTYL RUBBER FOR JOINTS SHALL CONFORM TO LATEST ASTM C443 AND FED SS–S–201A SPEC.
6. COVERS TO BE STAMPED "DRAIN"
7. CONTRACTOR TO PROVIDE BUOYANCY CALCULATIONS WITH THE PRECAST STRUCTURE SHOP DRAWING PACKAGE. USE FACTOR OF SAFETY OF 1.5 APPLIED TO UNIT FORCE.

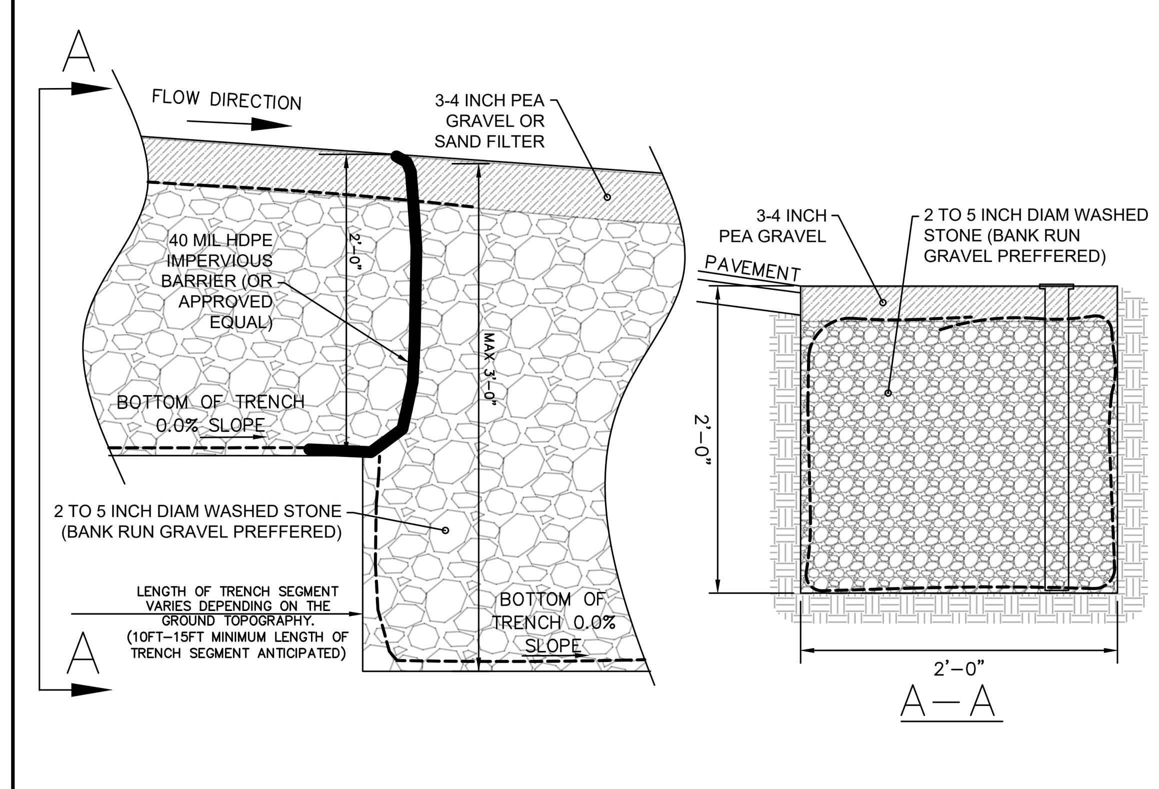
DOGHOUSE MANHOLE w/ CAST IN PLACE BASE (DMH#1)

NOT TO SCALE



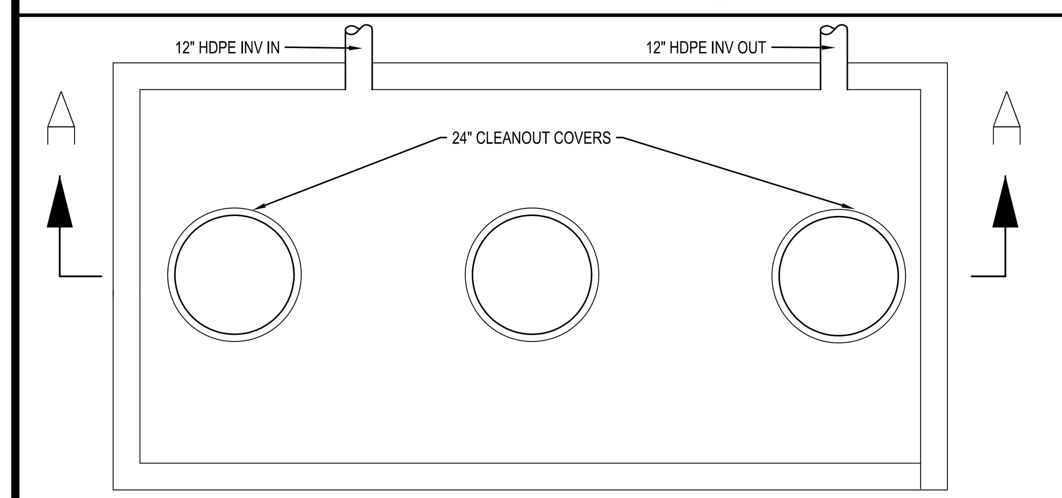
GRASSED SWALE

NOT TO SCALE



STONE TRENCH WITH STEPPED BOTTOM DETAIL

NOT TO SCALE



NOTES:
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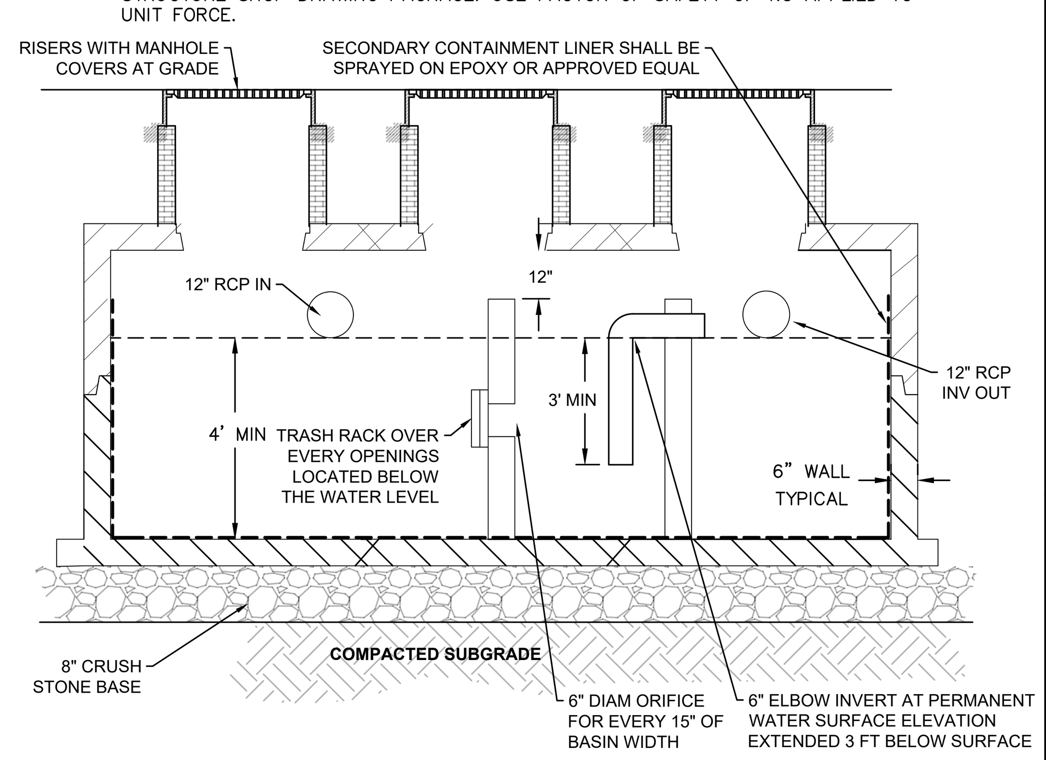
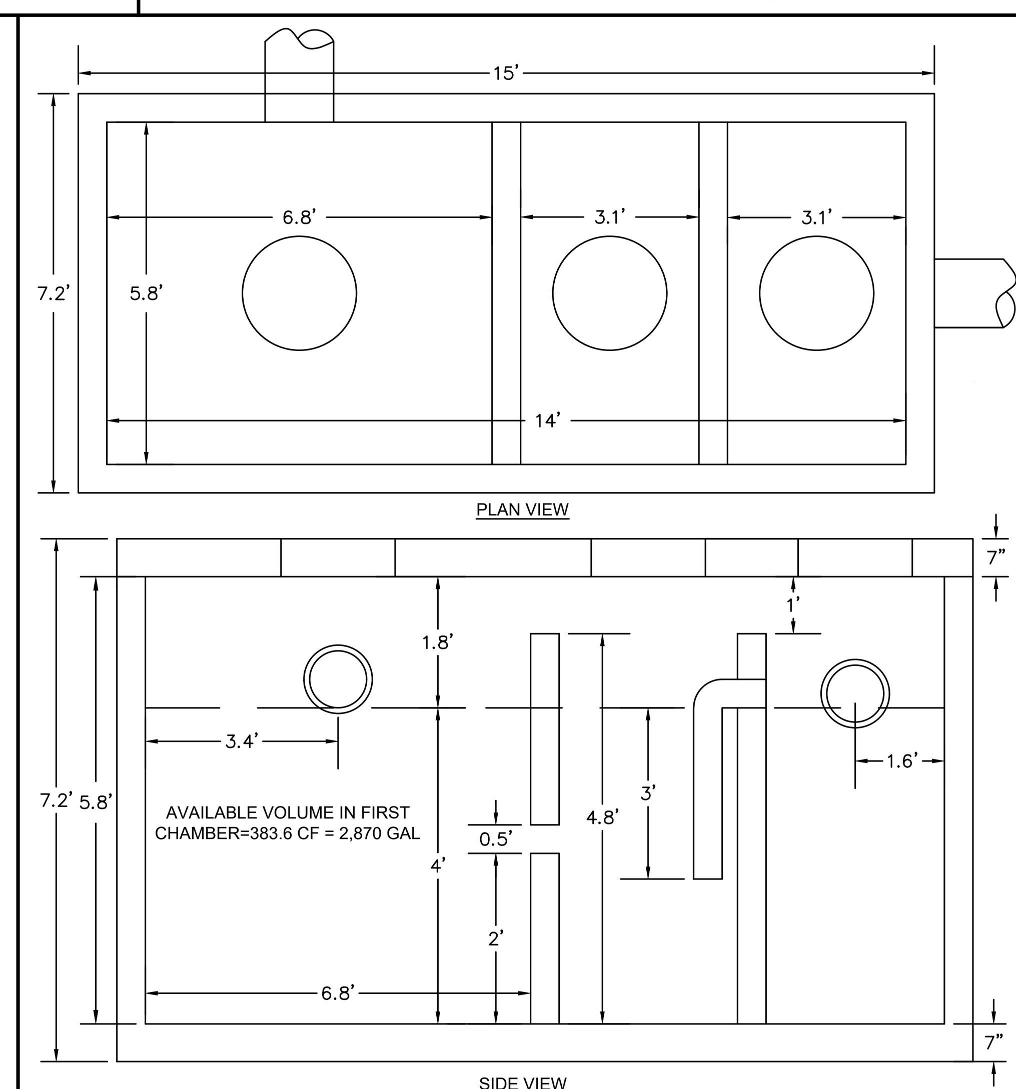
2. REINFORCING STEEL SHALL CONFORM TO LATEST ASTM A 185.
3. CONCRETE COMPRESSIVE STRENGTH – 4,000 PSI @ 28 DAYS.
4. ONE POUR MONOLITHIC BASE.
5. BITUMASTIC BUTYL RUBBER FOR JOINTS SHALL CONFORM TO LATEST ASTM C443 AND FED SS–S–201A SPEC.
6. COVERS TO BE STAMPED "DRAIN"
7. CONTRACTOR TO PROVIDE BUOYANCY CALCULATIONS WITH THE PRECAST STRUCTURE SHOP DRAWING PACKAGE. USE FACTOR OF SAFETY OF 1.5 APPLIED TO UNIT FORCE.



SECTION A-A

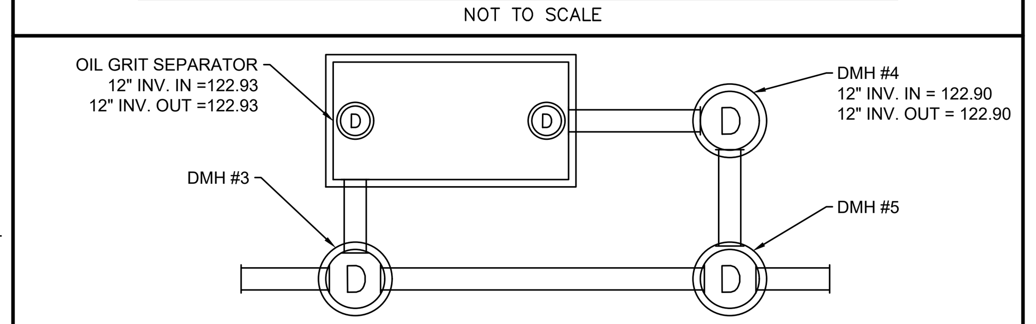
TYPICAL OIL/GRIT SEPARATOR

NOT TO SCALE



OGS#1 3,000 GAS OIL/GRIT SEPARATOR DETAIL

NOT TO SCALE

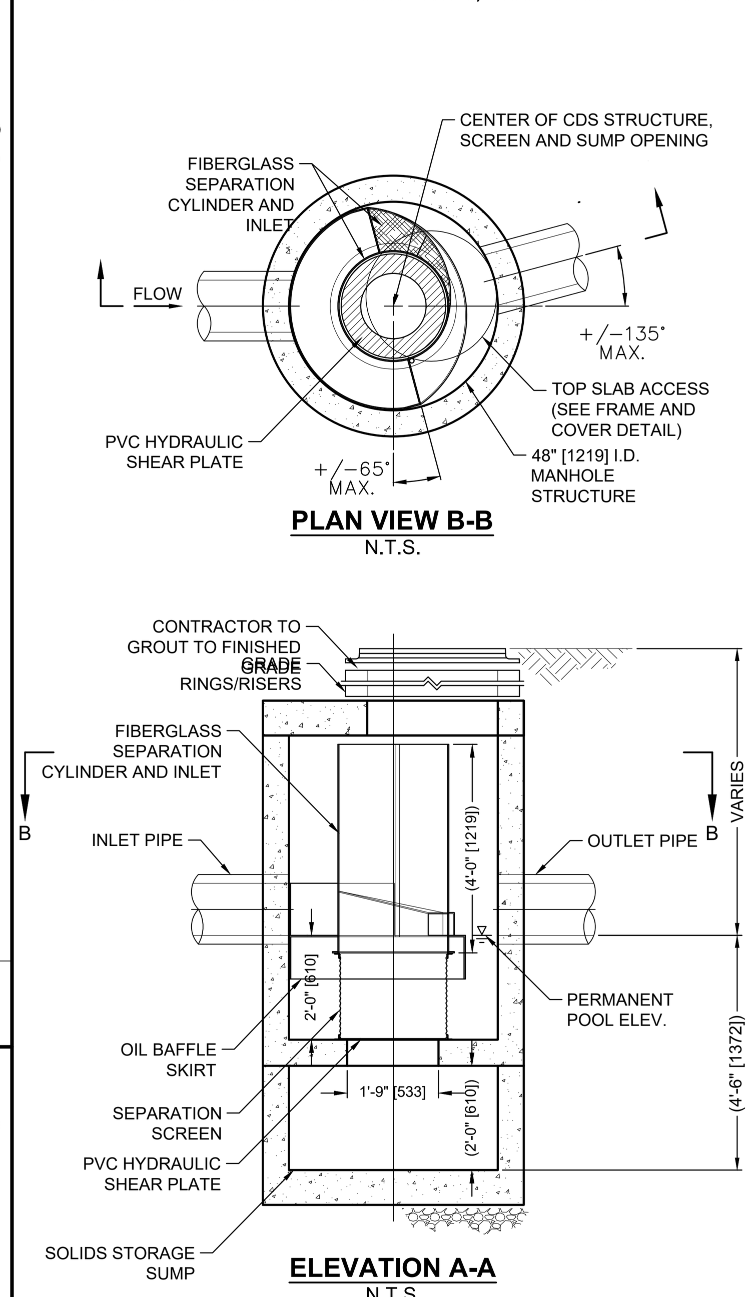


PLAN VIEW OGS#1

NOT TO SCALE

FRAME

24" SQUARE HEAVY DUTY CAST IRON FRAME AND GRATE AS MANUFACTURED BY U.S. FOUNDRY (CAT. USA 8016) OR APPROVED EQUAL. IN LINE INLETS SHALL UTILIZE CURVED VANE IN DIRECTION OF FLOW (CAT. USA 8017 OR APPROVED EQUAL). INLETS AT SAGS SHALL BE VERTICAL GRATE. CONTRACTOR SHALL SUBMIT SHOP DRAWINGS FOR STRUCTURES, FRAMES AND GRATES FOR REVIEW AND APPROVAL.



GENERAL NOTES

1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. DIMENSIONS MARKED WITH ( ) ARE REFERENCE DIMENSIONS. ACTUAL DIMENSIONS MAY VARY.
3. FOR FABRICATION DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHTS, PLEASE CONTACT YOUR CONTECH ENGINEERED SOLUTIONS LLC REPRESENTATIVE. www.ContechES.com
4. CDS WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING.
5. STRUCTURE SHALL MEET AASHTO HS20 AND CASTINGS SHALL MEET HS20 (AASHTO M 306) LOAD RATING, ASSUMING GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION.
6. PVC HYDRAULIC SHEAR PLATE IS PLACED ON SHELF AT BOTTOM OF SCREEN CYLINDER. REMOVE AND REPLACE AS NECESSARY DURING MAINTENANCE CLEANING.
7. CONTRACTOR TO PROVIDE BUOYANCY CALCULATIONS WITH THE PRECAST STRUCTURE SHOP DRAWING PACKAGE. ASSUME ESTIMATED SEASONAL HIGH GROUNDWATER IS 2 FEET BELOW EXISTING GRADE. USE FACTOR OF SAFETY OF 1.5 APPLIED TO UNIT FORCE.

INSTALLATION NOTES

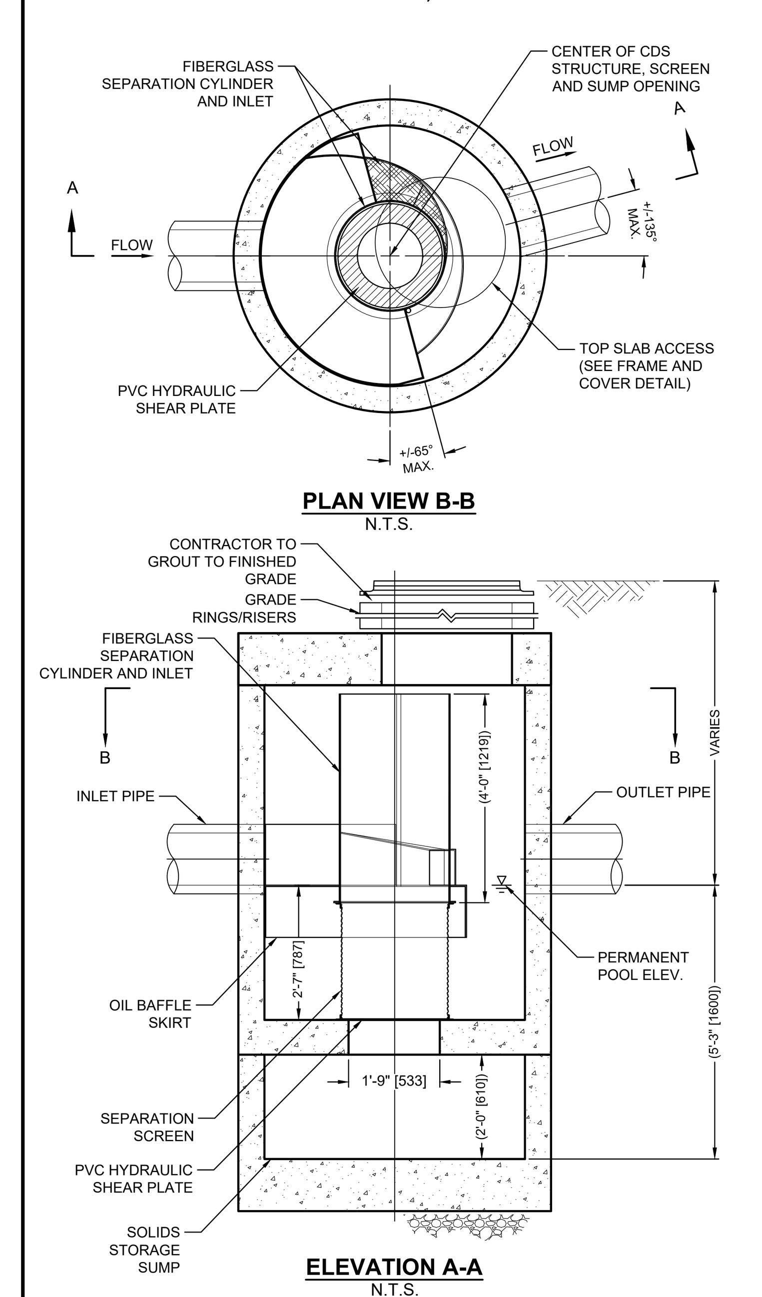
A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE CDS MANHOLE STRUCTURE (LIFTING CLUTCHES PROVIDED).
C. CONTRACTOR TO ADD JOINT SEALANT BETWEEN ALL STRUCTURE SECTIONS, AND ASSEMBLE STRUCTURE.
D. CONTRACTOR TO PROVIDE, INSTALL, AND GROUT PIPES. MATCH PIPE INVERTS WITH ELEVATIONS SHOWN.
E. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO ASSURE UNIT IS WATER TIGHT, HOLDING WATER TO FLOWLINE INVERT MINIMUM. IT IS SUGGESTED THAT ALL JOINTS BELOW PIPE INVERTS ARE GROUTED.

CDS2015 GRATED INLET WATER QUALITY STRUCTURE DETAIL

NOT TO SCALE

FRAME

24" SQUARE HEAVY DUTY CAST IRON FRAME AND GRATE AS MANUFACTURED BY U.S. FOUNDRY (CAT. USA 8016) OR APPROVED EQUAL. IN LINE INLETS SHALL UTILIZE CURVED VANE IN DIRECTION OF FLOW (CAT. USA 8017 OR APPROVED EQUAL). INLETS AT SAGS SHALL BE VERTICAL GRATE. CONTRACTOR SHALL SUBMIT SHOP DRAWINGS FOR STRUCTURES, FRAMES AND GRATES FOR REVIEW AND APPROVAL.



GENERAL NOTES

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5. STRUCTURE SHALL MEET AASHTO HS20 AND CASTINGS SHALL MEET HS20 (AASHTO M 306) LOAD RATING, ASSUMING GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION.
6. PVC HYDRAULIC SHEAR PLATE IS PLACED ON SHELF AT BOTTOM OF SCREEN CYLINDER. REMOVE AND REPLACE AS NECESSARY DURING MAINTENANCE CLEANING.
7. CONTRACTOR TO PROVIDE BUOYANCY CALCULATIONS WITH THE PRECAST STRUCTURE SHOP DRAWING PACKAGE. ASSUME ESTIMATED SEASONAL HIGH GROUNDWATER IS 2 FEET BELOW EXISTING GRADE. USE FACTOR OF SAFETY OF 1.5 APPLIED TO UNIT FORCE.

INSTALLATION NOTES

A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE CDS MANHOLE STRUCTURE (LIFTING CLUTCHES PROVIDED).
C. CONTRACTOR TO ADD JOINT SEALANT BETWEEN ALL STRUCTURE SECTIONS, AND ASSEMBLE STRUCTURE.
D. CONTRACTOR TO PROVIDE, INSTALL, AND GROUT PIPES. MATCH PIPE INVERTS WITH ELEVATIONS SHOWN.
E. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO ASSURE UNIT IS WATER TIGHT, HOLDING WATER TO FLOWLINE INVERT MINIMUM. IT IS SUGGESTED THAT ALL JOINTS BELOW PIPE INVERTS ARE GROUTED.

CDS2020 GRATED INLET WATER QUALITY STRUCTURE DETAIL

NOT TO SCALE

Date	Description	No.
04/29/22	RESPONSE TO PEER REVIEW COMMENTS	5.
03/28/22	P.B. AND CON.–COM. RESUBMITTAL	4.
02/14/22	P.B. AND CON.–COM. RESUBMITTAL	3.
01/31/22	ZBA RESUBMITTAL	2.
11/15/21	PLANNING BOARD SUBMITTAL	1.

Revisions

COMMONWEALTH OF MASSACHUSETTS
GABRIEL R. CROCKER
CIVIL
No. 47917
REGISTERED PROFESSIONAL ENGINEER

4-29-2022

GABRIEL R. CROCKER
PROFESSIONAL ENGINEER, MA REGISTRATION #47917

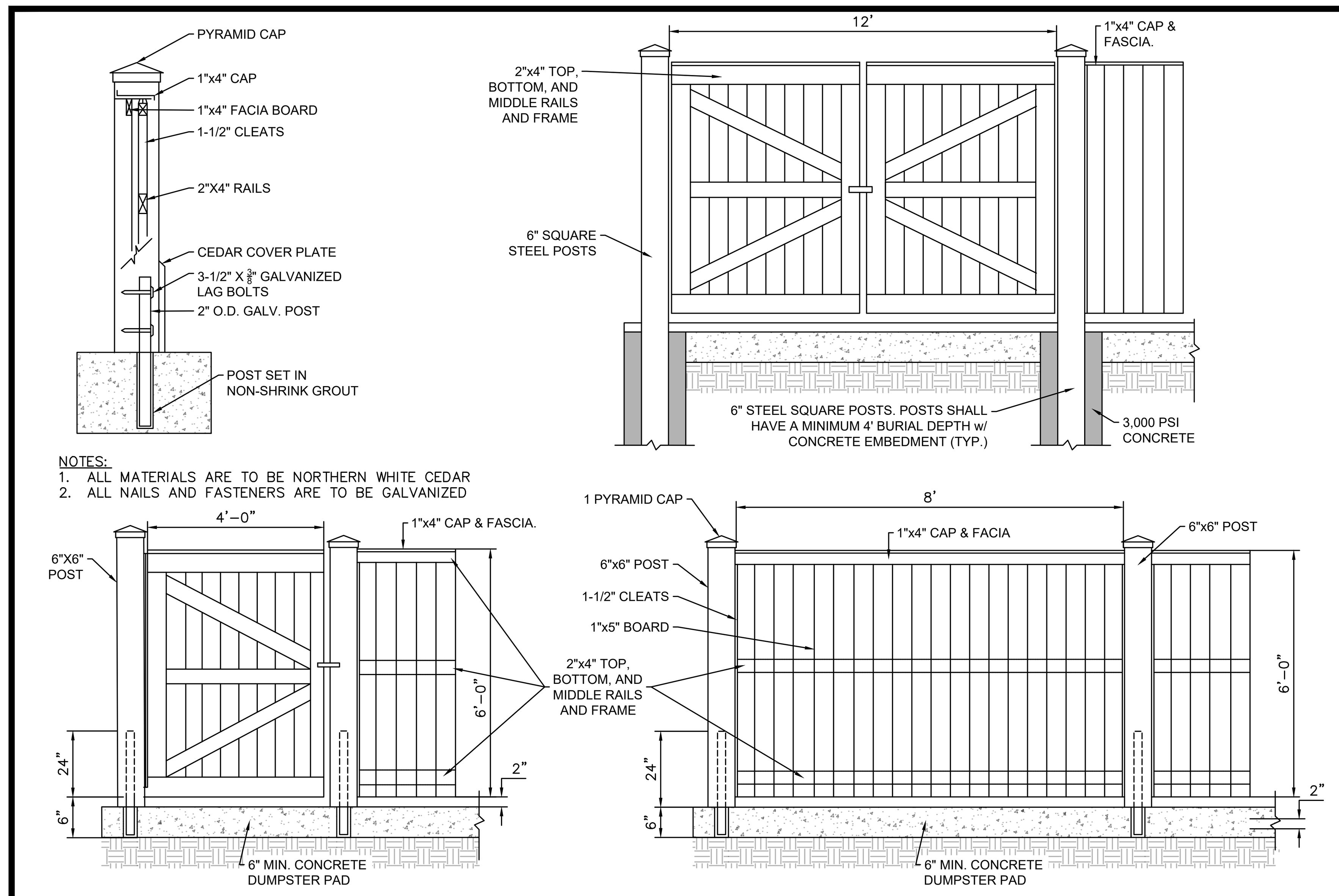
Crocker Design Group
2 SHARP STREET, UNIT A
HINGHAM, MA 02043
P: 781–919–0808

Project
MERCEDES OF SUDBURY
141 BOSTON POST ROAD, SUDBURY, MA

Prepared for
HERB CHAMBERS 43 BRAINTREE STREET, LLC
#259 McGRATH HIGHWAY - ROUTE 28
SOMERVILLE, MA 02143

Drawing Title
DETAIL SHEET

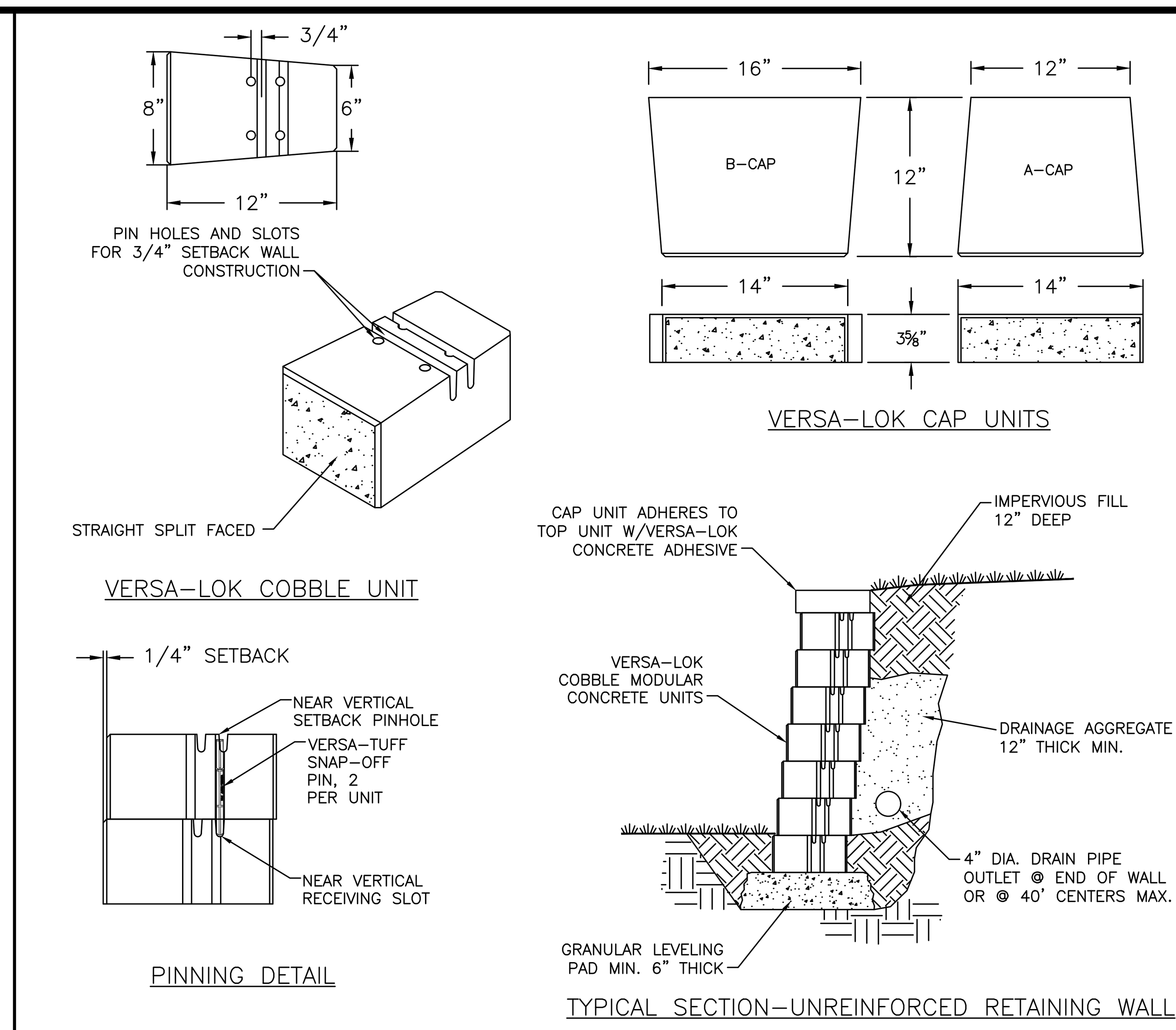
Project No.	100-107	Drawing No.	C-8.3
Date	11/10/2021		
Scale	AS NOTED		
Drawn By	DJN / JPM		
Approved By	GC		



NOTES:
1. ALL MATERIALS ARE TO BE NORTHERN WHITE CEDAR
2. ALL NAILS AND FASTENERS ARE TO BE GALVANIZED

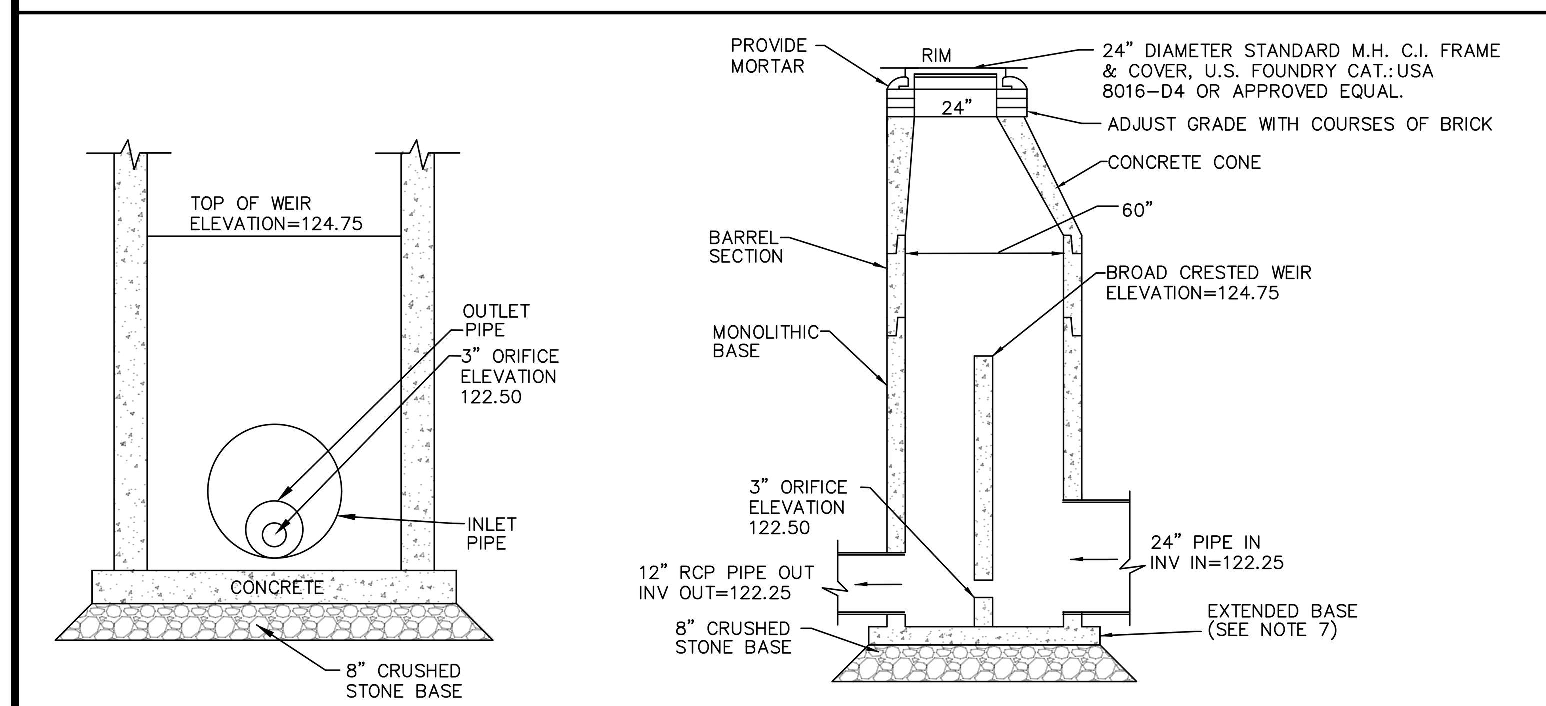
DUMPSTER ENCLOSURE DETAILS

NOT TO SCALE



LANDSCAPE RETAINING WALL DETAILS - VERSA LOK

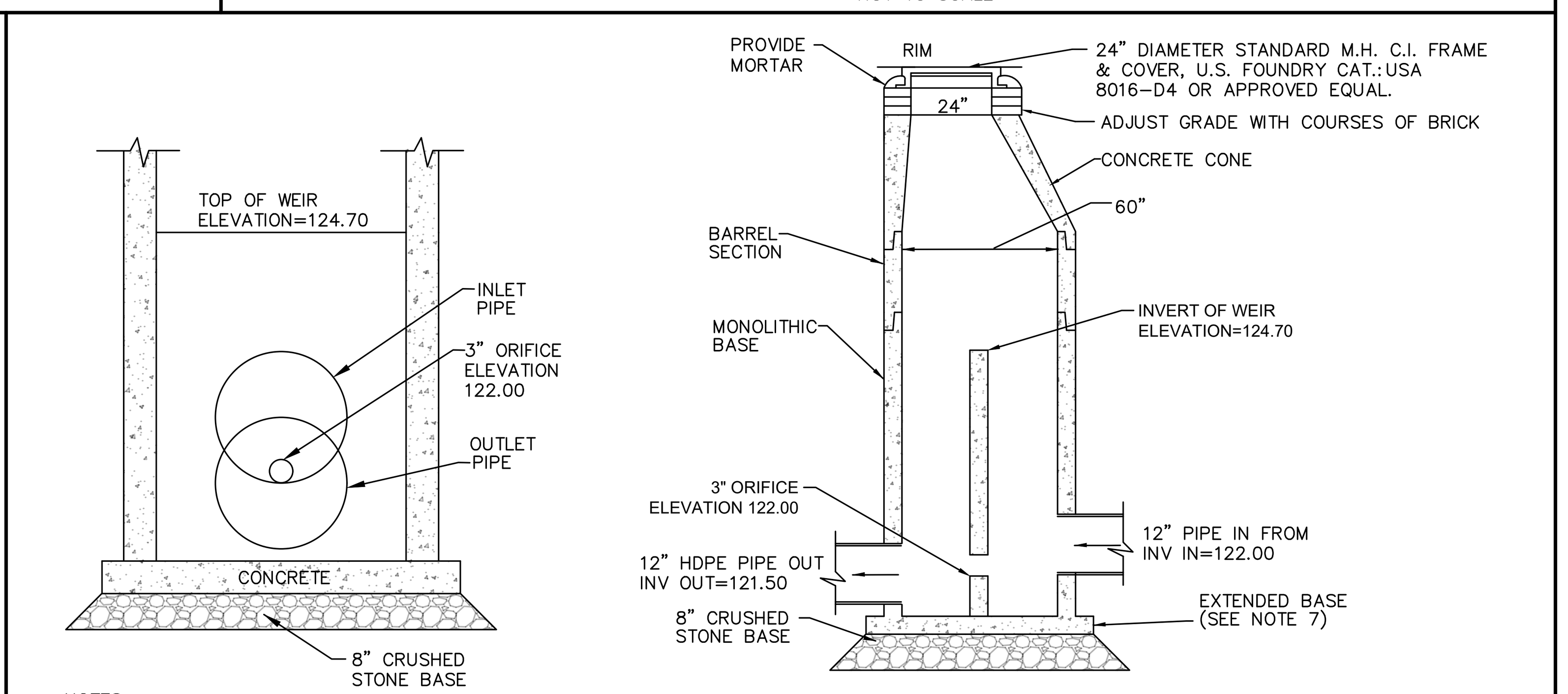
NOT TO SCALE



NOTES:
1. MANHOLE DESIGN SHALL CONFORM TO LATEST ASTM C478.
2. REINFORCING STEEL SHALL CONFORM TO LATEST ASTM A 185.
3. CONCRETE COMPRESSIVE STRENGTH – 4,000 PSI @ 28 DAYS.
4. ONE POUR MONOLITHIC BASE.
5. BITUMASTIC BUTYL RUBBER FOR JOINTS SHALL CONFORM TO LATEST ASTM C443 AND FED SS–S–201A SPEC.
6. COVERS TO BE STAMPED "DRAIN"
7. CONTRACTOR TO PROVIDE BUOYANCY CALCULATIONS WITH THE PRECAST STRUCTURE SHOP DRAWING PACKAGE. USE FACTOR OF SAFETY OF 1.5 APPLIED TO UNIT FORCE.

UNDERGROUND BASIN (UG-1) OUTLET CONTROL STRUCTURE (OCS-1)

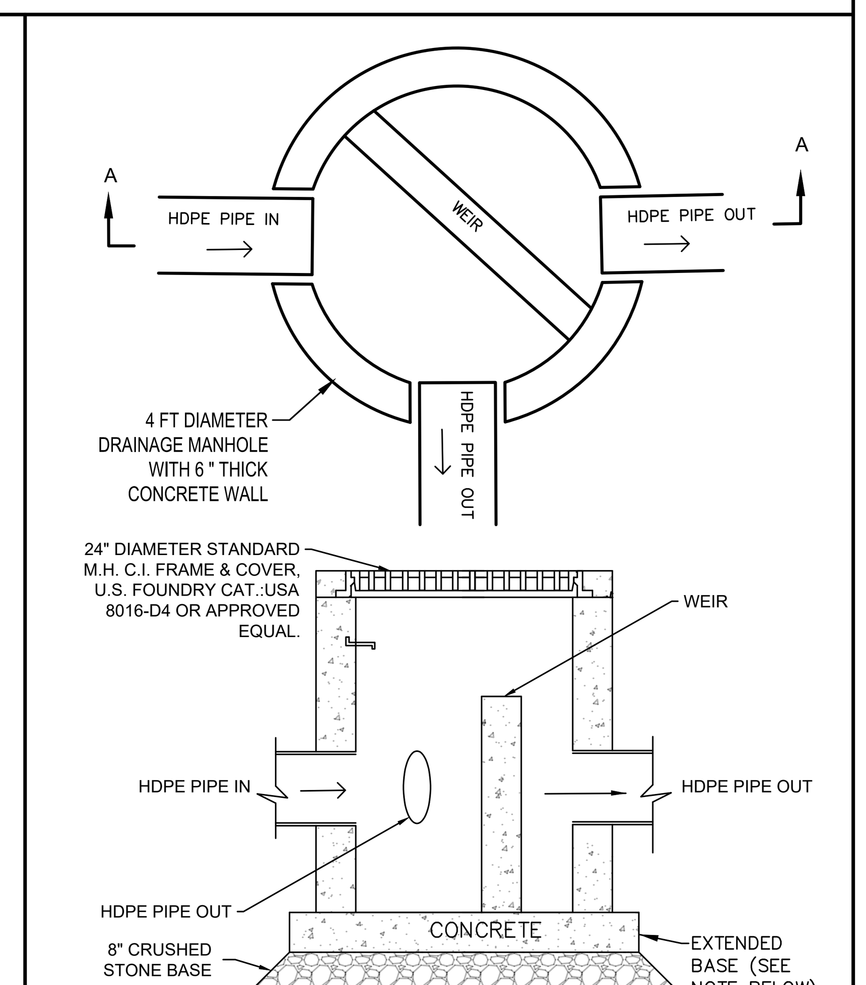
NOT TO SCALE



NOTES:
1. MANHOLE DESIGN SHALL CONFORM TO LATEST ASTM C478.
2. REINFORCING STEEL SHALL CONFORM TO LATEST ASTM A 185.
3. CONCRETE COMPRESSIVE STRENGTH – 4,000 PSI @ 28 DAYS.
4. ONE POUR MONOLITHIC BASE.
5. BITUMASTIC BUTYL RUBBER FOR JOINTS SHALL CONFORM TO LATEST ASTM C443 AND FED SS–S–201A SPEC.
6. COVERS TO BE STAMPED "DRAIN"
7. CONTRACTOR TO PROVIDE BUOYANCY CALCULATIONS WITH THE PRECAST STRUCTURE SHOP DRAWING PACKAGE. USE FACTOR OF SAFETY OF 1.5 APPLIED TO UNIT FORCE.

UNDERGROUND BASIN (UG-2) OUTLET CONTROL STRUCTURE (OCS-2)

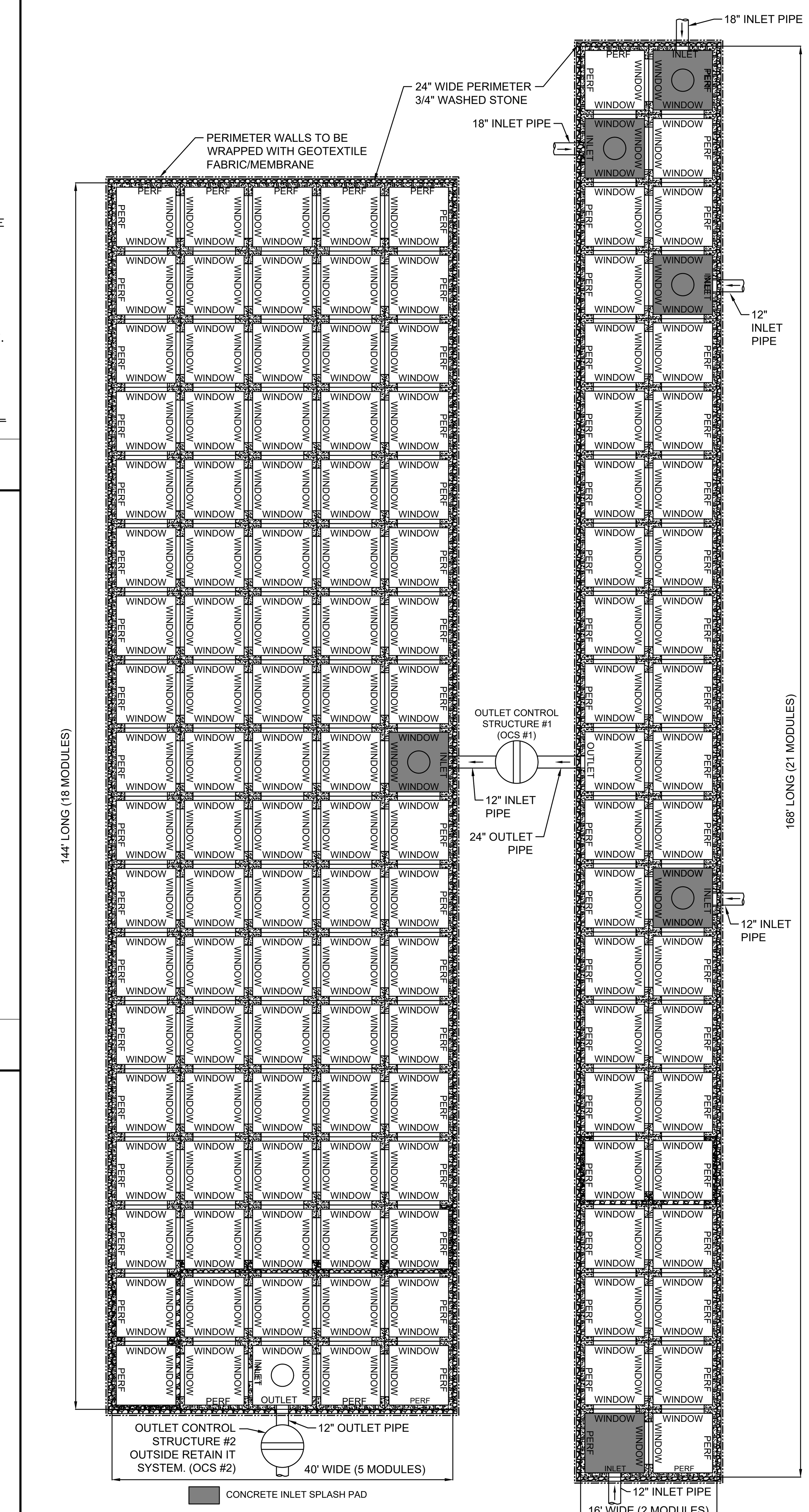
NOT TO SCALE



CONTRACTOR TO PROVIDE BUOYANCY CALCULATIONS WITH THE PRECAST STRUCTURE SHOP DRAWING PACKAGE. USE FACTOR OF SAFETY OF 1.5 APPLIED TO UNIT FORCE.

TYPICAL DIVERSION MANHOLE DETAIL

NOT TO SCALE



RETAIN-IT SYSTEM LAYOUT

NOT TO SCALE

Date	Description	No.
04/29/22	RESPONSE TO PEER REVIEW COMMENTS	5.
03/28/22	P.B. AND CON.-COM. RESUBMITTAL	4.
02/14/22	P.B. AND CON.-COM. RESUBMITTAL	3.
01/31/22	ZBA RESUBMITTAL	2.
11/15/21	PLANNING BOARD SUBMITTAL	1.

Revisions

COMMONWEALTH OF MASSACHUSETTS
GABRIEL R. CROCKER
CIVIL
No. 47917
REGISTERED PROFESSIONAL ENGINEER

4-29-2022

GABRIEL R. CROCKER
PROFESSIONAL ENGINEER, MA REGISTRATION #47917

Crocker Design Group
2 SHARP STREET, UNIT A
HINGHAM, MA 02043
P: 781–919–0808

Project

MERCEDES OF SUDBURY

141 BOSTON POST ROAD, SUDBURY, MA

Prepared for

HERB CHAMBERS 43 BRAINTREE STREET, LLC

#259 McGRATH HIGHWAY - ROUTE 28
SOMERVILLE, MA 02143

Drawing Title

DETAIL SHEET

Project No.	100-107
Date	11/10/2021
Scale	AS NOTED
Drawn By	DJN / JPM
Approved By	GC
Drawing No.	C-8.4

PHOTOMETRIC EVALUATION
NOT FOR CONSTRUCTION

Based on the information provided, all dimensions and luminaire locations shown represent recommended positions. The engineer and/or architect must determine the applicability of the layout to existing or future field conditions.

This lighting plan represents illumination levels calculated from laboratory data taken under controlled conditions in accordance with The Illuminating Engineering Society (IES) approved methods. Actual performance of any manufacturer's luminaires may vary due to changes in electrical voltage, tolerance in lamps/LED's and other variable field conditions. Calculations do not include obstructions such as buildings, curbs, landscaping, or any other architectural elements unless noted. Fixture nomenclature noted does not include mounting hardware or poles. This drawing is for photometric evaluation purposes only and should not be used as a construction document or as a final document for ordering product.

GENERAL NOTES:

1. ALL LIGHT LEVELS ARE TO BE REDUCED TO 50% DURING NON-BUSINESS HOURS.
2. ALL LIGHTS ARE DARK SKY COMPLIANT

30 15 0 30 60

Calculation Summary

Label	CalcType	Units	Avg	Max	Min	Avg/Min	Max/Min
CALC POINTS @ 4' ABOVE GRADE	Illuminance	Fc	2.73	20.7	0.0	N.A.	N.A.
INTERIOR DISPLAY	Illuminance	Fc	13.49	19.6	8.4	1.61	2.33
INTERIOR LOT	Illuminance	Fc	8.91	20.7	1.1	8.10	18.82
SECONDARY DISPLAY	Illuminance	Fc	10.11	16.1	5.0	2.02	3.22

Luminaire Schedule

Symbol	Qty	Label	Arrangement	Description	LLD	LDD	LLF	Arr. Lum. Lumens	Arr. Watts	BUG Rating
	19	A	SINGLE	SLM-LED-30L-SIL-FT-50-70CRI-IL-SINGLE-24' MH	1.000	1.000	1.000	20027	232	B1-U0-G3
	11	B	D180°	SLM-LED-30L-SIL-5W-50-70CRI-D180-24' MH	1.000	1.000	1.000	62474	464	B5-U0-G3
	6	W	SINGLE	XWM-FT-LED-12L-50-16' MH	1.000	1.000	1.000	11838	102.2	B2-U0-G3
	4	WM	SINGLE	SLM-LED-18L-SIL-FT-50-70CRI-WALL MOUNT@19'	1.000	1.000	1.000	18904	135	B3-U0-G3

Revisions

Date	Description	No.
04/29/22	RESPONSE TO PEER REVIEW COMMENTS	5.
03/28/22	P.B. AND CON.-COM. RESUBMITTAL	4.
02/14/22	P.B. AND CON.-COM. RESUBMITTAL	3.
01/31/22	ZBA RESUBMITTAL	2.
11/15/21	PLANNING BOARD SUBMITTAL	1.

COMMONWEALTH OF MASSACHUSETTS
GABRIEL R. CROCKER
CIVIL
No. 47917
REGISTERED PROFESSIONAL ENGINEER

4-29-2022

GABRIEL R. CROCKER
PROFESSIONAL ENGINEER, MA REGISTRATION #47917

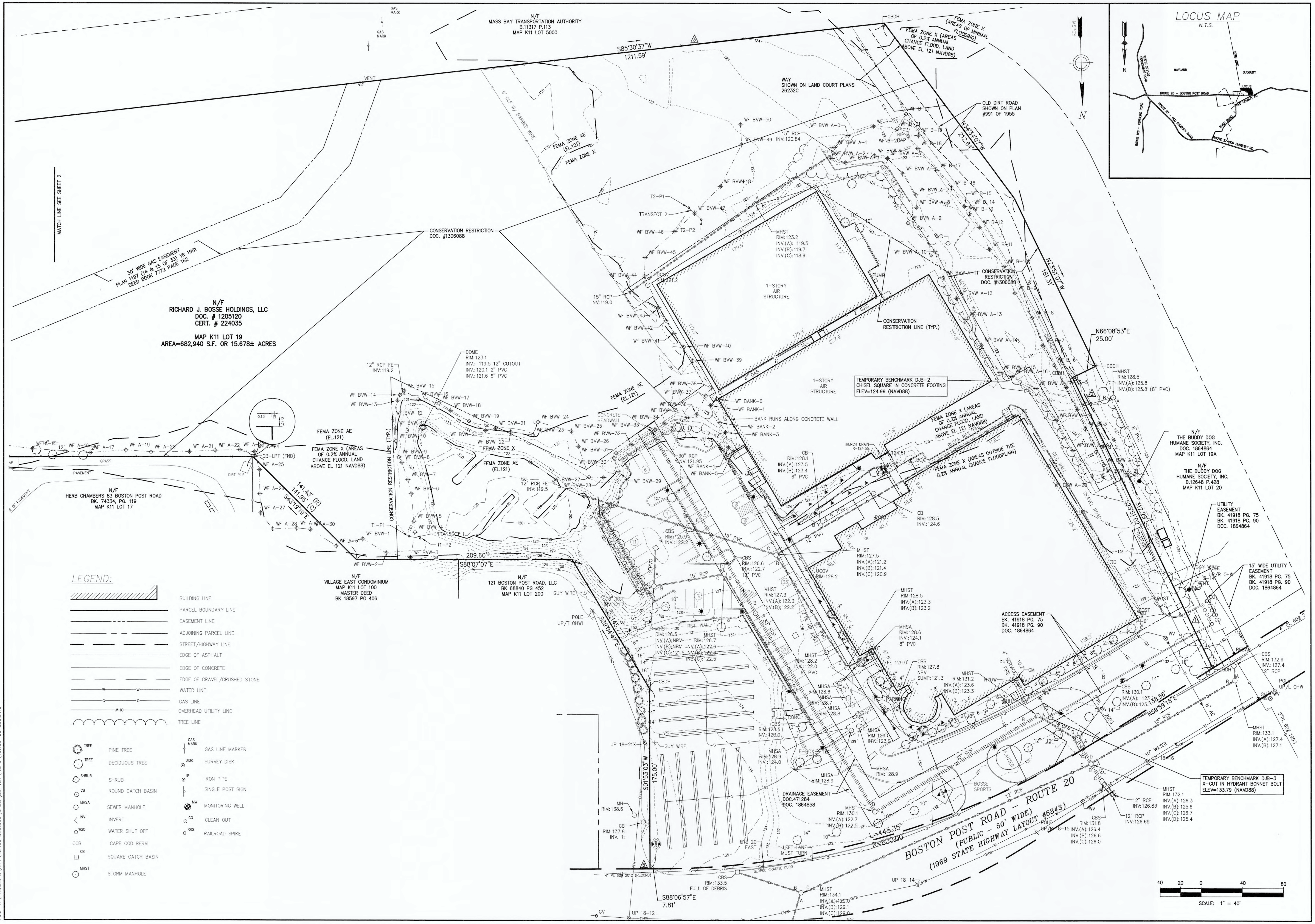
Crocker Design Group
2 SHARP STREET, UNIT A
HINGHAM, MA
02043
P: 781-919-0808

Project
MERCEDES OF SUDBURY
141 BOSTON POST ROAD,
SUDBURY, MA

Prepared for
HERB CHAMBERS 43 BRAINTREE STREET, LLC
#259 McGRATH HIGHWAY - ROUTE 28
SOMERVILLE, MA 02143

Drawing Title
LIGHTING PLAN

Project No.	100-107
Date	11/10/2021
Scale	1"=30'
Drawn By	DJN / JPM
Approved By	GC
Drawing No.	C-9



Drawing Copyright © 2017

CHA

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PREPARED FOR:

HERB CHAMBERS COMPANIES

259 MCGRATH HIGHWAY

SOMERVILLE, MA 02143

COMMONWEALTH OF MASSACHUSETTS
WILLIAM J. DORGAN
No. 49822
PROFESSIONAL LAND SURVEYOR

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT OR LAND SURVEYOR TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

PROJECT LOCATION :

ASSESSORS'S MAP K11 LOT 19

141 BOSTON POST ROAD ROUTE 20

SUDBURY, MA 01778

No.	Submittal / Revision	App'd.	By	Date
0	Issued as Final	WJD	CHA	10/08/2020
1	Additional Detail	WJD	CHA	01/13/2021

EXISTING CONDITIONS PLAN

Designed By:	Drawn By:	Checked By:
	CHA	WJD
Issue Date:	Project No:	Scale:
10-08-2020	061825	1" = 40'

Drawing No.:

SHEET 1 OF 2

File: V:\PROJECTS\ANY\K5\061825.000\CADD\SURVEY\ACAD\VBASE-061825.DWG

GENERAL NOTES

1. THE EXISTING CONDITIONS INFORMATION SHOWN HEREON IS THE RESULT OF AN ON-THE-GROUND SURVEY PERFORMED BY CHA CONSULTING, INC. DURING MARCH OF 2020 AND JANUARY OF 2021.

2. ALL DEED AND MAP REFERENCES ARE TO MIDDLESEX COUNTY SOUTH REGISTRY OF DEEDS UNLESS OTHERWISE NOTED.

3. LOCUS OWNER OF RECORD:

RICHARD J. BOSSE HOLDINGS, LLC
LAND COURT BOOK 1250 PAGE 85
LAND COURT DOC. #1205120
LAND COURT CERT. # 224035
MAP K11 LOT 19

4. TOPOGRAPHY, CONTOURS AND BENCHMARKS ARE BASED ON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) BASED ON GPS OBSERVATIONS. TEMPORARY BENCHMARKS, REFERENCED TO THE DATUM ARE INDICATED ON THE SURVEY.

IN THE EVENT THAT BENCHMARKS (TBM'S), ESTABLISHED FOR THIS PROJECT AND PUBLISHED ON THIS SURVEY ARE DESTROYED, NOT RECOVERABLE OR A DISCREPANCY IS FOUND, THE USER SHOULD NOTIFY THIS FIRM IN WRITING PRIOR TO COMMENCING OR CONTINUING ANY WORK.

5. THE PROJECT AREA LIES WITHIN FEMA ZONES (X & AE) AS SHOWN ON FLOOD INSURANCE RATE MAP FOR MIDDLESEX COUNTY, PANEL NUMBER 25017C0507F, DATED JULY 7, 2014. THE FEMA LINE DEPICTED IS BASED ON GRAPHIC INFORMATION WHERE NO FIELD TOPOGRAPHY WAS COLLECTED.

6. A PORTION OF THE LOCUS PARCEL IS LOCATED IN THE TOWN OF SUDBURY INDUSTRIAL DISTRICT AS DEFINED BY THE TOWN OF SUDBURY ZONING MAP.
MINIMUM SETBACK REQUIREMENTS ARE:

FRONT SETBACK:...............20'
SIDE SETBACK:..................30'
REAR SETBACK:.................30'

7. LOCATION OF SUBSURFACE UTILITIES SHOWN HEREON ARE APPROXIMATE AND ADDITIONAL UTILITIES MAY EXIST THAT ARE NOT SHOWN ON THIS PLAN. LOCATIONS ARE COMPILED FROM UTILITY PLANS OF RECORD AND DIG-SAFE FIELD MARKINGS. RIM AND INVERT INFORMATION HAS BEEN COMPILED AND FIELD VERIFIED WHERE POSSIBLE. THIS INFORMATION IS NOT TO BE USED FOR CONSTRUCTION. PRIOR TO ANY CONSTRUCTION, CONTACT DIG-SAFE (1-800-344-7233) TO FIELD VERIFY LOCATION OF ALL UTILITIES.

8. PLAN REFERENCES:

1. LAND COURT PLAN 26232A, 26232B, 26232C.
2. LAND COURT PLAN 29597B.
3. STATE HIGHWAY LAYOUT PLAN 644-1 DATED OCTOBER 3, 1901.
4. STATE HIGHWAY LAYOUT #5843 DATED NOVEMBER 5, 1969.
5. PLAN NUMBER 173 OF 1931.
6. PLAN NUMBER 961 OF 1949.
7. PLAN NUMBER 1197 (SHEET 15 OF 33) OF 1951.
8. PLAN NUMBER 991 OF 1955.
9. PLAN NUMBER 1681 OF 1955.
10. PLAN NUMBER 159 OF 1959.
11. PLAN NUMBER 63 OF 1960.
12. PLAN NUMBER 189 OF 1980.
13. PLAN NUMBER 799 OF 2000.
14. PLAN NUMBER 1111 OF 2017.

15. TOPOGRAPHIC PLAN OF LAND IN SUDBURY & WAYLAND MASSACHUSETTS PREPARED FOR: FOREIGN MOTORS WEST, AS PREPARED BY SCHOFIELD BROTHERS OF NEW ENGLAND, DATED SEPTEMBER 3, 2003 AND LAST REVISED DECEMBER 5, 2003.

16. AS-BUILT SITE PLAN IN WAYLAND, MASS PREPARED FOR R & S HATCH REALTY TRUST, AS PREPARED BY DRAKE ASSOCIATES, INC. DATED MARCH 2005.

17. AS-BUILT PLAN OF LAND IN SUDBURY, MA, PREPARED FOR BOSSE SPORTS & HEALTH CLUB LLC, PREPARED BY SCHOFIELD BROTHERS OF NEW ENGLAND, INC., DATED JANUARY 15, 2004.

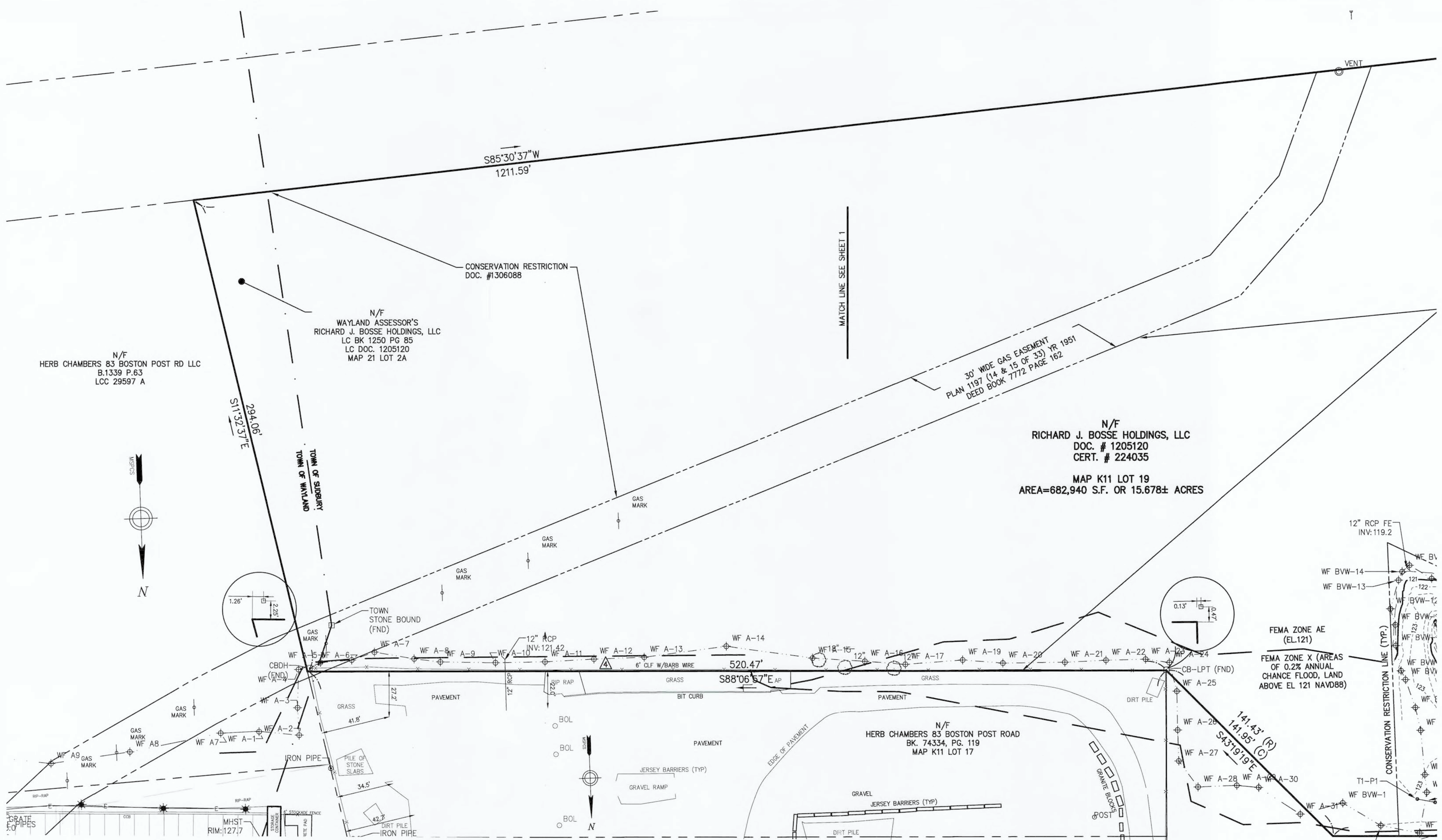
18. ALTA/ACSM LAND TITLE SURVEY IN SUDBURY & WAYLAND MASSACHUSETTS PREPARED FOR: HINKLEY, ALLEN AND SNYDER, LLP, AS PREPARED BY SCHOFIELD BROTHERS OF NEW ENGLAND, DATED MAY 10, 2006.

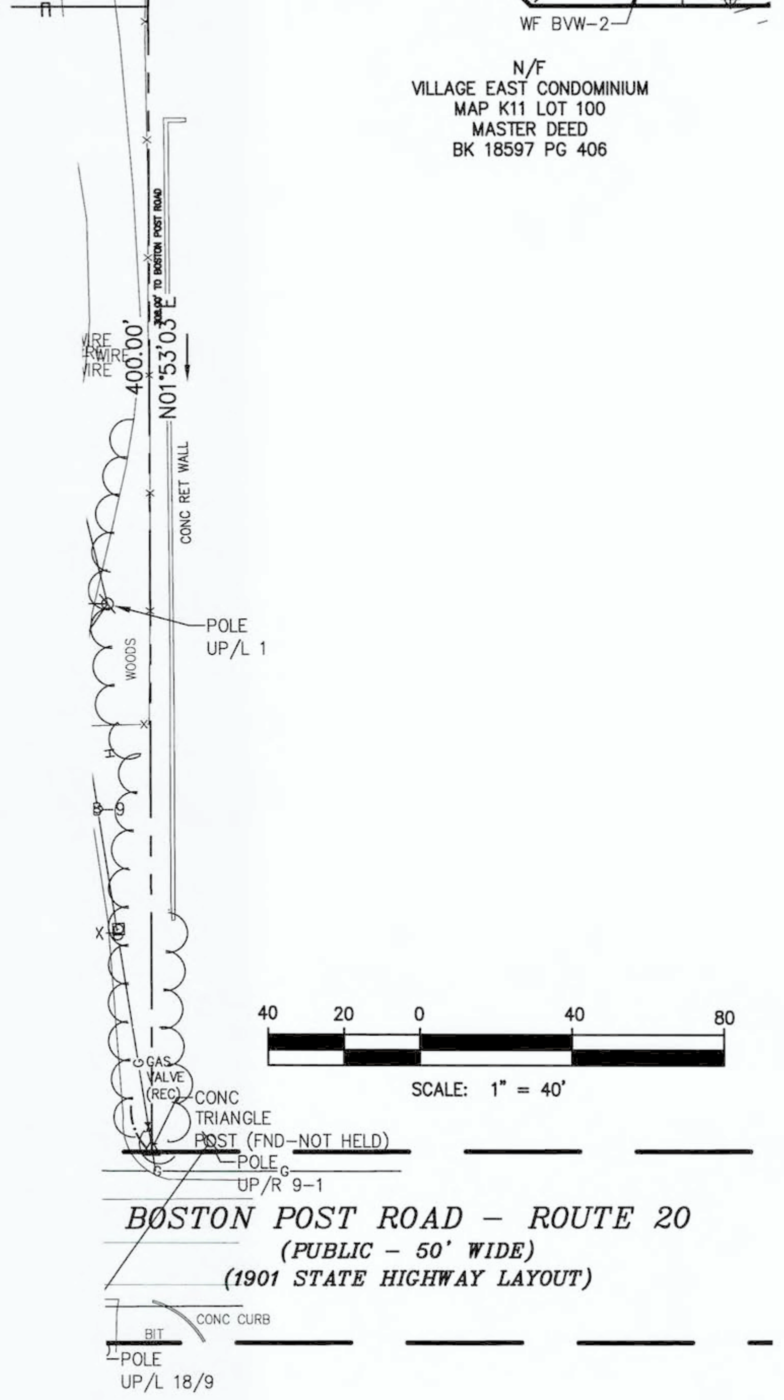
19. PLAN OF LAND IN SUDBURY & WAYLAND MA. PREPARED FOR RICHARD J. BOSSE HOLDINGS, LLC, PREPARED BY SCHOFIELD BROTHERS OF NEW ENGLAND, INC., DATED NOVEMBER 25, 2002.

9. THERE ARE 90 REGULAR PARKING SPACES AND 2 HANDICAP SPACES.

10. (a) WETLAND DELINEATION FLAGS BVW 1 TO BVW 50, BVW A-1 TO BVW A22, AND BANK 1 TO BANK 6 ARE BY DGT ASSOCIATES, INC. ON 9/25/2020.

(b) WETLAND DELINEATION FLAGS WF A-1 TO WF A-31 AND WF B-2 TO WF B-23 ARE BY CHA CONSULTING, INC. IN MARCH OF 2020.





ENCROACHMENTS

1. PAVEMENT CROSSES OVER PROPERTY LINE.
2. CHAIN-LINK FENCE CROSSES OVER PROPERTY LINE.
3. CHAIN-LINK FENCE CROSSES OVER PROPERTY LINE.
4. CHAIN-LINK FENCE CROSSES OVER PROPERTY LINE.
5. PAVEMENT CROSSES OVER PROPERTY LINE.

LEGEND:

BUILDING LINE
PARCEL BOUNDARY LINE
EASEMENT LINE
ADJOINING PARCEL LINE
STREET/HIGHWAY LINE
EDGE OF ASPHALT
EDGE OF CONCRETE
EDGE OF GRAVEL/CRUSHED STONE
WATER LINE
GAS LINE
OVERHEAD UTILITY LINE
TREE LINE

PINE TREE	GAS LINE MARKER
DECIDUOUS TREE	SURVEY DISK
SHRUB	IRON PIPE
ROUND CATCH BASIN	SINGLE POST SIGN
SEWER MANHOLE	MONITORING WELL
INVERT	CLEAN OUT
WATER SHUT OFF	RAILROAD SPIKE
CAPE COD BERM	ENCROACHMENTS
SQUARE CATCH BASIN	
STORM MANHOLE	

PREPARED FOR:

HERB CHAMBERS COMPANIES

259 MCGRATH HIGHWAY

SOMERVILLE, MA 02143

WILLIAM J. DORGAN No. 40622 PROFESSIONAL LAND SURVEYOR

1/13/21

PROJECT LOCATION :

ASSESSORS'S MAP K11 LOT 19

141 BOSTON POST ROAD ROUTE 20

SUDBURY, MA 01778

No.	Submittal / Revision	App'd.	By	Date
0	Issued as Final	WJD	CHA	10/08/2020
1	Additional Detail	WJD	CHA	01/13/2021

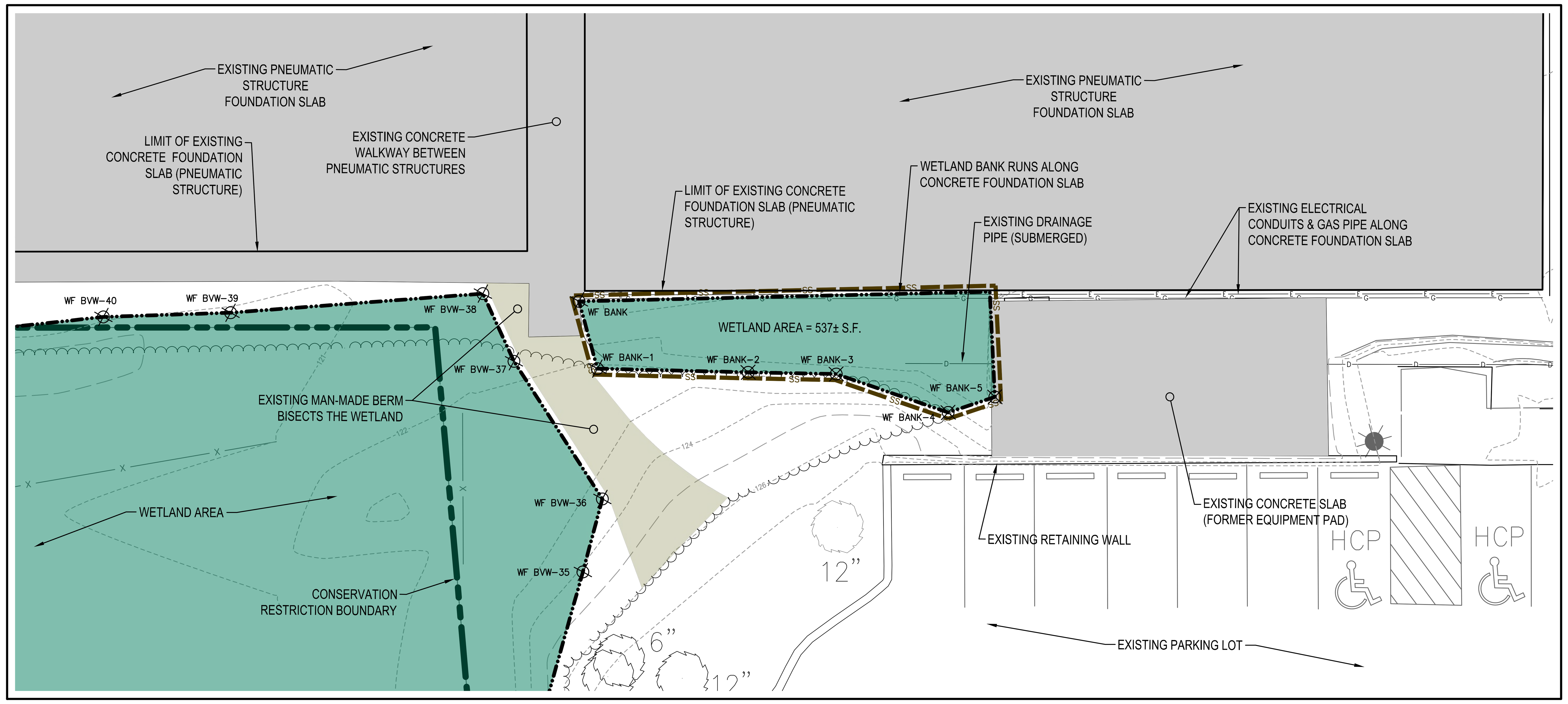
EXISTING CONDITIONS PLAN

Designed By:	Drawn By:	Checked By:
CHA	CHA	WJD
Issue Date:	Project No:	Scale:
10-08-2020	061825	1" = 40'

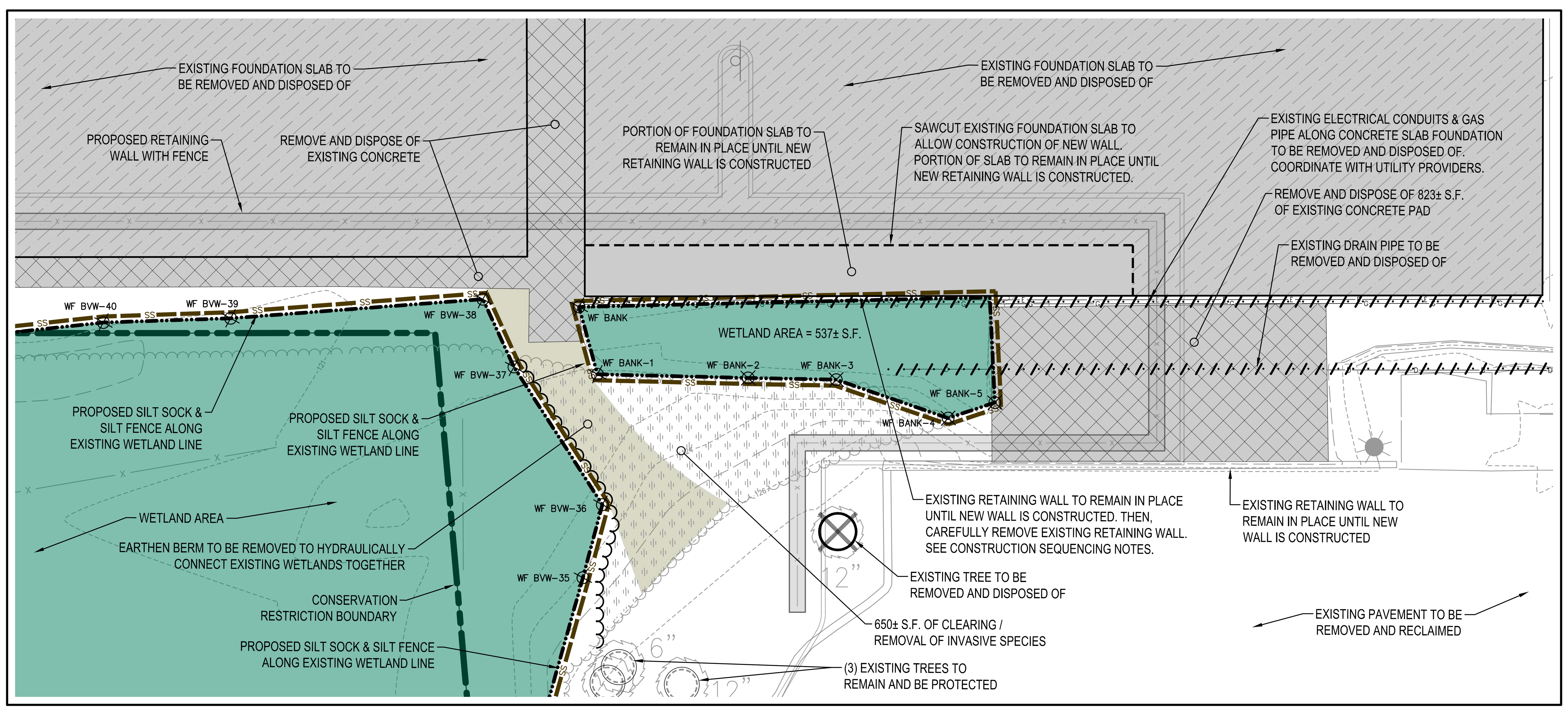
Drawing No.:

SHEET 2 OF 2

File: V:\PROJECTS\ANY\K5\061825.000\CADD\SURVEY\ACAD\VBASE-061825.DWG



EXISTING CONDITIONS



DEMOLITION / EROSION CONTROL PLAN

CONSTRUCTION SEQUENCING

1. INSTALL EROSION CONTROLS ALONG WETLAND LINE AND AT EDGES OF BANK. CONSERVATION COMMISSION SHALL INSPECT AND APPROVE BEFORE WORK COMMENCES.
2. SAWCUT EXISTING CONCRETE FOUNDATION SLAB TO ALLOW FOR DEMOLITION AND REMOVAL. (SEE NOTE 3)
3. MAINTAIN AND PRESERVE EXISTING CONCRETE FOUNDATION SLAB (EDGE OF BANK) UNTIL NEW RETAINING WALLS ARE CONSTRUCTED.
4. CONSTRUCT NEW RETAINING WALLS AND DRAINAGE OUTLET (SEE SHEET WR2)
5. REMOVE UTILITIES ALONG CONCRETE FOUNDATION SLAB AND WITHIN DRAINAGE CHANNEL.
6. DEMOLISH AND REMOVE REMAINING CONCRETE FOUNDATION SLAB / WALLS, CAREFULLY AVOIDING IMPACT TO THE WETLANDS.
7. CLEAR AND REMOVE INVASIVE SPECIES UPLAND OF BANK / WETLANDS. TAKE CARE NOT TO DISTURB OR MODIFY WITHIN THE WETLAND.
8. EARTHEN BERM BETWEEN WETLANDS AND DRAINAGE CHANNEL TO BE EXCAVATED AND REMOVED FOLLOWING THE REMOVAL OF THE INVASIVE SPECIES.

PLEASE REFER TO SHEET WR2 FOR FURTHER DIRECTION ON CONSTRUCTION SEQUENCING.

DEMOLITION LEGEND

EXISTING FOUNDATION SLAB TO BE REMOVED

EXISTING CONCRETE TO BE REMOVED

AREA OF CLEARING / REMOVAL OF INVASIVE SPECIES

SS PROPOSED SILT SOCK / SILT FENCE

10 5 0 10 20

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2 SHARP STREET, UNIT B
HINGHAM, MA 02043
P: 781-919-0808

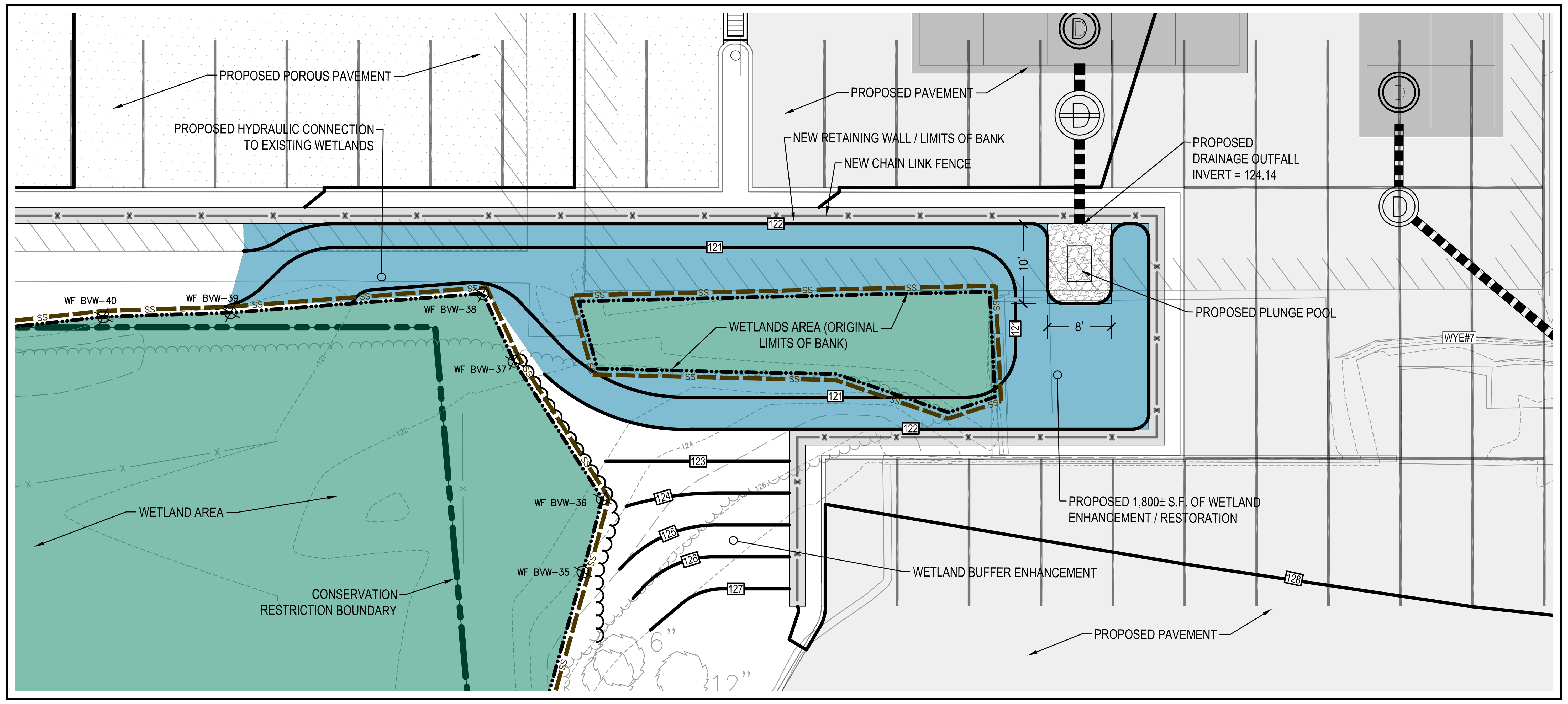
GABRIEL R. CROCKER
PROFESSIONAL ENGINEER, MA REGISTRATION #47917
4-29-2022
COMMONWEALTH OF MASSACHUSETTS GABRIEL R. CROCKER CIVIL No. 47917 REGISTERED PROFESSIONAL ENGINEER

Project	Prepared for	Drawing Title
MERCEDES OF SUDBURY 141 BOSTON POST ROAD, SUDBURY, MA	HERB CHAMBERS 43 BRAINTREE STREET, LLC #259 McGRATH HIGHWAY - ROUTE 28 SOMERVILLE, MA 02143	WETLAND RESTORATION AND ENHANCEMENT EXHIBIT

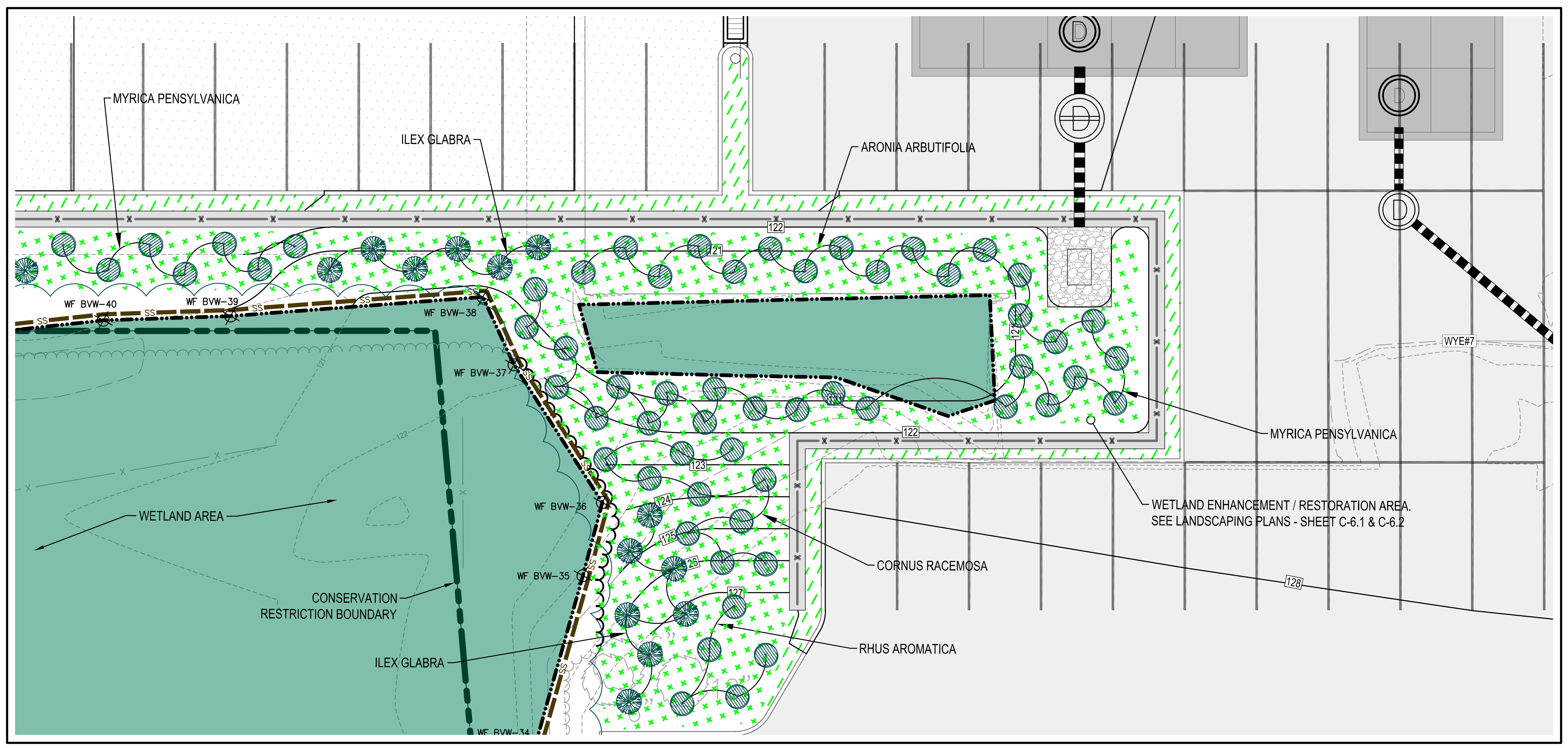
Date	Description	No.
04/29/22	RESPONSE TO PEER REVIEW COMMENTS	1.

Revisions

Project No.	100-107
Date	03 / 28 / 2022
Scale	1" = 10'
Drawn By	JPM
Approved By	GRC
Drawing No.	WR1



LAYOUT / GRADING AND DRAINAGE



LANDSCAPING

CONSTRUCTION SEQUENCING CONTINUED

9. EXCAVATE AREA BETWEEN EXISTING FOUNDATION WALL AND NEW RETAINING WALL.
10. GRADE WITHIN NEW LIMITS OF THE DRAINAGE CHANNEL. WETLANDS SHALL NOT BE DISTURBED AND SHALL REMAIN IN PLACE FOR THE ENTIRETY OF THE PROJECT.
11. INSTALL RIP-RAP PLUNGE POOL AT DRAINAGE OUTFALL.
12. RESTORE HYDRAULIC CONNECTION FROM DRAINAGE CHANNEL TO WETLANDS.
13. INSTALL NEW ENGLAND CONSERVATION / WILDLIFE MIX FROM NEW ENGLAND WETLAND PLANTS, INC., LOAM AND SEED (TURF GRASS MIX)AND WETLAND PLANTINGS PER THE LANDSCAPING PLANS.
14. BEFORE EROSION CONTROL IS REMOVED, AND BEFORE THE OUTFALL BECOMES ACTIVE, THE SUDBURY CONSERVATION AGENT SHALL INSPECT AND AGREE THAT THE AREA HAS BEEN CONSTRUCTED PER THE APPROVED PLANS NOTED WITHIN THE ORDER OF CONDITIONS.

WETLAND ENHANCEMENT / RESTORATION PLANTING LIST

NEW ENGLAND CONSERVATION / WILDLIFE MIX FROM NEW ENGLAND WETLAND PLANTS, INC.

LOAM AND SEED (TURF GRASS MIX)

SHRUBS		
BOTANICAL NAME	COMMON NAME	SIZE - TYP
ARONIA ARBUTIFOLIA	CHOKEBERRY	2.5' HEIGHT
CORNUS RACEMOSA	GRAY DOGWOOD	2.5' HEIGHT
ILEX GLABRA	INKBERRY	2.5' HEIGHT
MYRICA PENSYLVANICA	NORTHERN BAYBERRY	2.5' HEIGHT
RHUS AROMATICA	FRAGRANT SUMAC	2.5' HEIGHT

Crocker Design Group
2 SHARP STREET, UNIT B
HINGHAM, MA 02043
P: 781-919-0808

4-29-2022
GABRIEL R. CROCKER
PROFESSIONAL ENGINEER, MA REGISTRATION #47917
COMMONWEALTH OF MASSACHUSETTS GABRIEL R. CROCKER CIVIL No. 47917 REGISTERED PROFESSIONAL ENGINEER

Project
MERCEDES OF SUDBURY
141 BOSTON POST ROAD, SUDBURY, MA

Prepared for
HERB CHAMBERS 43 BRAINTREE STREET, LLC
#259 McGRATH HIGHWAY - ROUTE 28
SOMERVILLE, MA 02143

Drawing Title
WETLAND RESTORATION AND ENHANCEMENT EXHIBIT

Date	Description	No.
04/29/22	RESPONSE TO PEER REVIEW COMMENTS	1.

Revisions

Project No. 100-107
Date 03 / 28 / 2022
Scale 1" = 10'
Drawn By JPM
Approved By GRC
Drawing No. WR2

Crocker Design Group

May 2, 2022

Attn: Beth Suedmeyer, Environmental Planner
Planning and Community Development
Town of Sudbury
278 Old Lancaster Road
Sudbury, Massachusetts 01776

RE: Response to Second Peer Review
Herb Chambers Mercedes of Sudbury
141 Boston Post Road / Route 20, Sudbury, MA

Dear Ms. Suedmeyer and Board Members,

This letter is being submitted in response to the second peer review comments provided by the Horsley Witten Group, Inc. (HWG) via email on April 24, 2022, regarding the proposed Herb Chambers Mercedes of Sudbury - 141 Boston Post Road / Route 20, Sudbury, Massachusetts. Crocker Design Group, LLC (CDG) offers the following responses to each comment below. The comments that HWG noted as resolved have been removed from this letter. In addition, the following revised and supporting documents are enclosed:

Enclosure 1: Proposed Site Development Plans for Mercedes of Sudbury 4/29/22 (under separate cover)
Enclosure 2: Stormwater Management Report, revised 4/29/22 (Under separate cover)

Original comments provided by HWG indicated below in standard text, their follow up comments are in italic text and CDG's response is in ***bold text***.

1. Standard 1: No new stormwater conveyances (e.g., outfalls) may discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth.
   a. The project proposes a new outfall ("OUTLET" / design point 3) approximately ten feet from wetland flag WF BANK-5. HW recommends that the Applicant clarify and/or provide additional detail for what is being proposed with respect to the following:
      (1) Sheet C-4.1 does not show any grading in the vicinity of the proposed outfall. Please add contours or spot elevations to show how the outlet will grade out beyond the bank delineated by wetland flags WF BANK-1 through 6 and toward wetland flags WF BVW-36 through 38. If no grading is proposed, please provide additional detail to explain how the proposed wall and outfall will grade out without changing the existing grades or impacting the existing bank.

HWG Response 4/22/22: The Applicant has included a description of the proposed modifications in this area as well as Wetland Restoration and Enhancement Exhibits (WR1 and WR2). The modifications to this area are under the jurisdiction of the Sudbury Conservation Commission and will require an Order of Conditions to be issued prior to completing this work.

CDG Response 4/29/22: Acknowledged. CDG is working with the Sudbury Conservation Commission towards an Order of Conditions for the work within the vicinity of the Bank and the BVW Buffer Zone.

(2) Sheet C-4.1 depicts a plunge pool/splash pad to stabilize the flow from what appears to be a 12" pipe out falling through the retaining wall. A detail is shown on Sheet C-8.2 for a "LEVEL SPREADER/PLUNGE POOL/ENERGY DISSIPATER," which calls for a 12" drainpipe with an invert elevation of 124.25. However, a detail is also provided on Sheet C-8.2 for a "PRECAST CONCRETE OUTLET STRUCTURE," which calls for a 12" reinforced concrete pipe with an outlet invert of 124.18. It does not appear that this precast concrete outlet structure is shown on the plans. HW recommends that the Applicant clarify where this structure and/or the headwall is proposed to be installed and clarify the invert elevation(s) for the 12" pipe.

HWG Response 4/22/22: It appears that the invert of the 12" RCP pipe between OCS#2 and the OUTFALL is listed as 121.43 on Sheet C-4.2 and 124.18 on Sheet C-8.2. The OUTFALL is clearly labeled on Sheet C-4.1. The HydroCAD model is consistent with Sheet C-4.2. HW recommends that the Applicant confirm the invert elevation and adjust the plans and or calculations as applicable.

CDG Response 4/29/22: The OUTFALL detail on Sheet C-8.2 has been revised to show the invert elevation at 121.43 which is consistent with Sheet C-4.1 and C-4.2.

(3) The "PRECAST CONCRETE OUTLET STRUCTURE" detail on Sheet C-8.2 shows a proposed 12" outlet pipe with an invert elevation of 124.18, and an 18" inlet with trash rack at an invert elevation of 125.00. There is also an emergency spillway weir shown at an invert elevation of 126.45. It does not appear that these features are shown on the drawings, nor is it clear how the pipes and invert elevations provided for the precast concrete structure will function, i.e., is the 18" pipe with the trash rack really an inlet? How will the weir interface with the retaining wall? HW recommends that the Applicant provide additional detail to clarify these features of the outlet structure and where it will be installed on the plan.

HWG Response 4/22/22: It appears that the outlet of the 12" RCP on the PRECAST CONCRETE INLET STRUCTURE DETAIL (ICS#1) provided on Sheet C-8.2 does not match the HydroCAD model or the inverts listed on Sheet C-4.2. It also appears that there *are additional weirs illustrated on the ICS#1 detail. HW notes that the elevations of these outlet weirs do not appear to impact the HydroCAD model and are higher than the 100-year storm elevation of the Conveyance Swale (Pond 3P). HW recommends that the Applicant confirm that the detail on Sheet C-8.2 is drawn accurately.*

CDG Response 4/29/22: The detail for ICS#1 on Sheet C-8.2 has been updated to match the inverts on Sheet C-4.2 and the HydroCAD model. The additional weirs shown on the detail are for emergency only and do not impact the HydroCAD model.

(4) The "PRECAST CONCRETE OUTLET STRUCTURE" detail on C-8.2 provides dimensions for the width and height of the structure, but not the depth of the structure, the wall thickness, nor any information about what kind of top will be required, i.e., reinforcement and loading specifications. On sheet C-4.2, the structure table "DRAINAGE OUTFALLS" mentions a 4-foot-wide weir, but the structure is shown to be 3 foot wide. HW recommends that the Applicant provide additional detail to clarify these features and ensure that the correct geometry is shown on the plan view, called out on the structure table, and shown correctly on any applicable details.

HWG Response 4/22/22: The Applicant has provided the following information for the structure labeled ICS#1. HW notes there are discrepancy with the height and the Inv. Out. HW recommends that the Applicant adjust the detail as needed:

	Response in March 28, 2022 letter	*ICS#1 Detail Sheet C-8.2*
Depth, Width	*5 FT*	*5 FT*
Height	*3 FT*	*4 FT*
Weir Width	*4 FT*	*4 FT*
Wall Thickness	*0.5 FT*	*0.5 FT*
Inv In	*125.00*	*125.00*
Inv. Out	*124.14*	*124.39*

CDG Response 4/29/22: The ICS#1 detail on Sheet C-8.2 has been revised to match the height (3ft) and invert out (124.14) noted in the Response Letter dated March 28, 2022.

2. Standard 2: Stormwater management systems shall be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates.

   a. To manage the increase in impervious area that will be created, the project proposes an underground Retain-It system. A large parking area will also be constructed of porous pavement, which generates significantly less runoff than traditional bituminous asphalt paving. The peak runoff rate and volume discharged to wetland A is reduced compared to existing conditions.

      HWG Response 4/22/22: The Applicant has reduced the proposed impervious area from the previous design and has reduced the peak flows at the various design points during all storm events. The Applicant has also reduced the peak volume at the wetland resource area (DP-6) located to the southeast of the site that all other Design Points flow towards. HW recommends that the various discrepancies noted in this letter are resolved to confirm the results provided in the Stormwater Report.

      CDG Response 4/29/22: Acknowledged. These items have been corrected and the peak runoff rates remain below the existing, and the peak volume at the wetland resource area (DP-6) also remains less than existing. Please refer to Tables 1.9.1 and 1.9.2 in Section 1.9 of the Stormwater Management Report revised 4/29/22 which reflect the revised HydroCAD model and associated peak flow and peak volume rates.

   b. The project proposes an underground infiltration system, "UG-1," shown in plan view on Sheet C-4.1, in section view on Sheet C-8.2, and a layout plan is provided on Sheet C-8.4. HW recommends that the Applicant clarify the following:

      (1) The relevant elevations (bottom of stone, top of chambers) do not appear to be shown on the drawings. HW recommends that the Applicant provide, at a minimum, the bottom and top elevations of the system. Furthermore, HW recommends that the Applicant include the minimum cover requirements for the infiltration system.

      HWG Response 4/22/22: It appears that the bottom of the chamber elevation on the UG#2 detail provided on Sheet C8.2 is consistent with the HydroCAD model, however the callout on Sheet C-4.1 is not. The detail and plan view for UG#1 appears accurate. HW recommends that the Applicant revise the callout for UG#2 on Sheet C-4.1 and the top of chamber elevation on the UG#2 detail for consistency with the HydroCAD model.

      CDG Response 4/29/22: The callout for UG#2 Sheet C-4.1 has been revised to be consistent with the HyroCAD and UG#2 detail on Sheet C8.2 which has the bottom of chamber/stone invert at elevation 122.50.

Crocker Design Group

(2) The Applicant has labeled the Retain-It system as an infiltration system; however, it has not included exfiltration in the HydroCAD model. For clarity HW recommends that the Applicant label the system as a detention system.

HWG Response 4/22/22: The Applicant has separated the subsurface system into two chamber systems, one that infiltrates and one that is for detention only. HW recommends that the Applicant confirm the soil texture and estimated seasonal high groundwater elevation (ESHGW) beneath the infiltration system. Soil testing may need to be conducted prior to construction because of the existing structures.

CDG Response 4/29/22: Acknowledged. Given the existing presence of the concrete slabs, which will necessitate the mobilization of a contractor to demo the slab in order to perform the additional test pits, the Applicant is amenable to to a condition of the Stormwater Management Permit requiring confirmatory test pits in the locations of the infiltrations systems during the demolition of the pneumatic air structure foundations.

(3) The detail "POROUS PAVEMENT OBSERVATION WELL DETAIL," on Sheet C-8.1, shows cleanout ring/curb box and cover to be installed atop the observation well. HW recommends that the Applicant clarify how many observation wells are proposed and where they are to be installed on the plan.

HWG Response 4/22/22: The Applicant has added a callout for the observation wells within the permeable pavement. The response letter states there are nine observation wells, the callout on Sheet C-4.1 lists 6 total observation wells, however the plan appears to include 12 observation well symbols. HW recommends that the Applicant confirm the total number proposed.

CDG Response 4/29/22: Confirmed. Twelve (12) observation wells are planned to be installed within the permeable pavement and the callout has been corrected on Sheet C-4.1 accordingly.

7. Standard 7 is related to projects considered Redevelopment.

   a. HW recommends that the proposed application be considered new development and is therefore required to fully meet all stormwater standards.

   HWG Response 4/22/22: As stated previously HW concurs that the proposed development may be considered a mix of new and redevelopment. HW recommends that the Applicant document how it is improving existing conditions to comply with Standard 7.

CDG Response 4/29/22: Standard 7 of the Stormwater Standards requires that the Applicant document how the existing conditions are being improved, or how the redeveloped portion of the site to comply with each of the Stormwater Standards. The

bullet points below provide a summary of the project's compliance with Standards 2, 3, 4, 5, and 6 to the maximum extent practicable, and Standards 1, 8 ,9, 10 to the full extent.

- Standard 1: All new stormwater system conveyances are treated prior to discharge and result in no erosion occurring on site. The drainage system has been designed to direct stormwater runoff from impervious areas through various stormwater systems designed to capture, convey, treat, detain, recharge and infiltrate (where appropriate) the runoff prior to discharge. The outfalls are designed to prevent erosion and scour, and the peak rates of runoff will not be increased. Therefore, the project is in full compliance with this standard.
- Standard 2: The peak flows at all design points are reduced from the existing conditions using underground infiltration and detention chambers, permeable pavement and outlet control structures. The project is in full compliance with this standard.
- Standard 3: Please refer to Section 4 of the report. The existing impervious area within limit of work is 172,236 SF (3.95 acres) including pavement, buildings, compacted gravel parking and driveways. The total proposed impervious area within limit of work is 175,198 SF (4.02 Acres) including pavement, buildings and permeable pavement. Therefore, there is an increase in impervious area of only 2,962 SF (0.07 acres). Using the underground infiltration chambers and the permeable pavement, the project is recharging approximately 45,289SF of impervious area and provides a recharge volume of 13,047CF. Given the very small increase in impervious area (2,962 SF), the required water quality volume to be provided is only 62 cubic feet, therefore the project provides significantly more recharge than is required by Standard 3.
- Standard 4: The Stormwater Management Systems have been designed to remove 80% or greater TSS post construction using various BMPS including deep sump hooded catch basins, oil/grit separators, CDS Water Quality Units, subsurface infiltration systems and permeable pavement. Please refer to Section 4.4 for the TSS calculation spreadsheets. The project is in full compliance with this standard.
- Standard 5: This standard is not applicable because the site is not considered a LUHPPL as there is no exterior vehicle service or repair exterior equipment cleaning nor commercial vehicle washing are proposed.
- Standard 6: This standard is not applicable because the project is not located near a critical area, however, the project BMP's have been designed to treat stormwater as if the site were discharging to a critical area, treating the 1-inch WQV.

- **Standard 8: An Erosion and Sedimentation Controls Plan has been incorporated into the Site Plans. The project is in full compliance with this standard.**

- **Standard 9: An Operation and Maintenance Plan has been provided in Section 5. The project is in full compliance with this standard.**

- **Standard 10: An Illicit Discharge Compliance Statement is included as required and is enclosed in Section 2.2. This will be provided prior to occupancy. The project is in full compliance with this standard.**

10. Standard 10 requires an Illicit Discharge Compliance Statement be provided.

    a. The Applicant has provided a signed Illicit Discharge Compliance Statement signed by the Engineer. HW recommends that this document be signed by the property owner and provided to the Planning Board.

    HWG Response 4/22/22: The Applicant has noted that the Illicit Discharge Statement will be signed by the property owner after construction is complete. The Planning Board may choose to include as a Condition of Approval receipt of the signed statement prior to occupancy.

    CDG Response 4/29/22: The applicant is Amenable to the signed Illicit Discharge Statement being included as a condition of approval prior to the certificate of occupancy.

11. HW offers the following additional comments regarding the stormwater and drainage design:

    a. Sheet C-4.2 states that OCS#1 has a rim elevation of 127.30, which appears to be approximately two feet above the bottom of the depression and approximately 6” above the low point on the pavement. HW recommends that the Applicant ensure this elevation is accurate.

    HWG Response 4/22/22: The ICS#1 Detail has been provided on Sheet C-8.2. The location of ICS#1 is clearly labeled on Sheet C-4.1 and appears to be set between elevation 125 and 126. The detail lists the bottom of the 4-foot-high structure at 124.00, there is an 18-inch orifice at elevation 125.0, therefore the top of the orifice is at 126.5. There is an emergency spillway at elevation 126.45, the height of the spillway is not noted. The top of the 4-foot-high ICS#1 is noted at 127.00. The low point in the driveway is at 126.75. As noted previously HW recommends that the Applicant revisit the detail and clarify the elevations and dimensions proposed.

    CDG Response 4/29/22: The detail of ICS#1 on Sheet C-8.2 has been revised, and the orifice has been revised to 12-inches. The HydroCAD model has also been revied

accordingly. Please refer to the revised Stormwater Management Report, enclosed.

b. Sheet C-8.4 includes a detail for a "TYPICAL DIVERSION MANHOLE" with a Rim at 128.58. HW was not able to locate this structure on the plan set.

HWG Response 4/22/22: It appears that the only diversion manhole is DMH#3. HW recommends that they Applicant confirm this.

CDG Response 4/29/22: Confirmed, DMH#3 is the only diversion manhole.

c. It does not appear that the Applicant has included a doghouse manhole as called out on Sheet C-4.1. HW recommends that this detail be included in the plan set.

HWG Response 4/22/22: DMH#1 is labeled as a doghouse manhole. A detail has been provided on Sheet C-8.3. HW has no further comment.

CDG Response 4/29/22: Confirmed, DMH#3 is the only diversion manhole.

d. A 129' contour is shown to the west of the building to remain that does not appear to tie out to anything. HW recommends that the Applicant revisit this contour and adjust accordingly.

HWG Response 4/22/22: The 129' contour near the dumpster appears to not tie back properly. Also, the contour labeled 130 near Elbow #11 on the northwest corner of the building is possibly mislabeled and should be 129. HW recommends that the Applicant confirm the proposed contours are drawn accurately.

CDG Response 4/29/22: The 129 contour near the dumpster and the 130 contour at the northwest corner of the building has been revised. Please refer to Grading and Drainage Sheet C-4.1.

0Should you have any questions or require any further information, please do not hesitate to contact Gabe Crocker, P.E. at gabecrocker@crockerdesigngroup.com or 781-919-0808. We look forward to presenting to the Board at the upcoming hearing on Wednesday May 11, 2022.

Sincerely,
Crocker Design Group LLC

Gabe Crocker P.E.
President

Crocker Design Group

Stormwater Management Report

For

Herb Chambers Mercedes of Sudbury
141 Boston Post Road- Route 20
Sudbury, MA

November 15, 2021
Revised February 14, 2022
Revised March 28, 2022
Revised April 29, 2022

Prepared for:
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4-29-2022

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1.1 EXECUTIVE SUMMARY

In accordance with the provisions of the Town of Sudbury Zoning Bylaws, the Applicant, Herb Chambers 43 Braintree Street, LLC (HC), proposes a new Mercedes of Sudbury dealership at 141 Boston Post Road in Sudbury, MA. The proposed scope includes renovating and converting the existing two-story health club facility (formerly Bosse Sports) into a new automobile dealership for the sales and display of new vehicles as well as vehicle service. Site renovations include reconfigured parking for employees, customers and vehicle inventory storage, as well as upgrades to stormwater management systems, utilities and landscaping.

The site is bound by Boston Post Road (Route 20) to the north, east and west by commercial properties (Frank's Spoke'n Wheel, Seth F Johnson Sales, and Buddy Dog Humane Society). An undeveloped portion of the parcel extends to the South which is mostly comprised of wetlands, and borders the Great Meadows National Wildlife Refuge and the former CSX Railway, which was recently purchased by the Town of Sudbury. The site is located on Parcel K11-0019 and is 15.67 acres. The property is located within the Industrial Zoning District.

1.2 APPROVALS BEING SOUGHT

This Stormwater Report is being filed in conjunction with the Stormwater Management Permit, Notice of Intent (NOI) is being filed with the Sudbury Planning Board, the Sudbury Conservation Commission (SCC) and the Massachusetts Department of Environmental Protection (MA DEP) for the proposed work. The Applicant requests that the permit approvals encompass the entirety of the scope listed below, and as shown in the accompanying plan set:

- Upgrade of the existing parking lot to provide employee parking and vehicle storage
- The renovation of the existing two-story structure to be used for vehicle sales and maintenance
- Stormwater BMP's
- Upgrades to utilities, landscaping and lighting

An Order of Resource Area Delineation (ORAD) (MA DEP# 301-1319) was issued on December 15, 2020 and is still active. The delineation shown in the accompanying plans reflects the ORAD delineation.

This Stormwater Report will also be filed with the Sudbury Planning Board as part of the Site Plan Review submission that requires a Stormwater Management Permit.

1.3 FEMA – FLOODPLAIN SUMMARY

The parcel is shown on FEMA Flood Insurance Rate Map Panel 25017C0507F dated 7/7/2014. A portion of the developed land on the property is located within Zone X, which is defined as areas determined to be outside the 500-year floodplain and determined to be outside the 1% and 0.2% annual chance floodplain. There is a Zone AE within proximity of the work proposed. Zone AE is defined as an area inundated by 1% annual chance flooding, where Base Flood Elevations (BFE's) have been determined. The

BFE of the Zone AE is elevation 121.0. The work proposed is entirely outside the limits of the FEMA Zone AE.

1.4 ON-SITE SOIL INFORMATION

The Natural Resource Conservation Service (NRCS) maps the entirety of on-site soil as Udorthents-Urban land complex, Soil Map Unit 656, which is defined as “excavated and filled land.”

Haley Aldrich performed three (3) test pits on December 4, 2020 within the limit of work. The test pits revealed a subsurface comprised of a brown silty sand. The next layer was comprised of yellow-brown, clayey sand with gravel, which was classified as fill. The subsurface soil conditions in the area of the expanded parking lot and drainage improvements are consistent with a “C” soil. The proposed infiltration area is located fully within the limits of the HSG C soils and an infiltration rate of 0.27 inches per hour was used as this rate is consistent with silty loam.

Depth to groundwater was noted in the upper right corner of each test pit log and appears to vary throughout the site. In the location of the permeable pavement (TP-3), groundwater was noted at 3.8ft below existing grade, or at elevation 119.5±. In the area of the proposed infiltration Retain-It System (TP- 2), groundwater was entering the test pit at 4.4ft below existing grade, or at elevation 119.6±. During the Wetland delineation, a test pit was conducted at the wetland line, adjacent to the proposed permeable pavement location. On the existing conditions plan, this is labeled T2-P1. Groundwater was observed 17 inches below existing grade, or at approximately 120.3±. For more information on the separation of groundwater at each of the infiltration BMP’s, please refer to Section 4, Stormwater Calculations.

Refer to Section 6 for complete soil information.

1.5 CALCULATIONS OF EARTH VOLUMES TO BE REMOVED

Based on the calculations derived from Civil 3D software analysis, we estimate a net import of approximately 10,537± cubic yards of material to the site. Please refer to the Cut & Fill Plan (CF-1) enclosed within this Stormwater Report.

1.6 WETLANDS AND ENVIRONMENTAL RESOURCE AREAS ANALYSIS

The project does contain environmental resource areas, and therefore the project must be permitted through MassDEP and the Sudbury Conservation Commission. Per the ORAD, there is a Bordering Vegetated Wetland (BVW) to the Southeast of the site containing shallow marshes. There is also a Bank within the limit of work. According to the latest Mass. Division of Fisheries and Wildlife – Natural Heritage Program mapping, the southeastern portion of the site is within a Priority Habitat of Rare Species (PHRS) as designated by the Natural Heritage and Endangered Species Program of the Division of Fisheries and Wildlife. There is a potential vernal pool within the PHRS, approximately 515±’ from any proposed work. The limit of work is entirely out of the FEMA 100-year floodplain, however, a portion of the property is within the Zone X. The proposed project area is entirely developed. The priority Habitat Mapping by NHESP shows the boundary of Priority Habitat covering a portion of the property that is not proposed for development and is within the Great Meadows National Wildlife Refuge. The site does not appear to contain any certified vernal pools or areas of critical environmental concern.

The wetland resource areas located to the south of the property were delineated by James Hall, PWS of CHA Consultants in October 2019, and DGT Associates, Inc. performed a review of the delineation boundaries. The Abbreviated Notice of Resource Area Delineation (ANRAD) submission was filed on

December 4, 2020, and an Order of Resource Area Delineation (ORAD) (MA DEP# 301-1319), was issued on December 15, 2020.

The following is a summary of the buffer and protection zones that portions of the project are proposed within:

1) 100’ Bordering Vegetated Wetland (BVW) Buffer (310 CMR 10.55).

   Work within the 100’ Bordering Vegetated Wetland (BVW) Buffer includes but is not limited to sections of the impermeable and permeable pavement parking lots, retaining walls, some of the existing to be renovated building, as well as a portion of the building addition. The proposed scope is an improvement over the existing, which consists of two (2) pneumatic structures and provides far greater pervious surface and stormwater treatment.

2) Bank
   There is a Bank located to the south of the existing gymnasium building where a drainage pipe outlets. The project proposes to restore and enhance the area surrounding the existing drainage ditch. Work included in the modification includes:

   - Remove the existing drainage outlet, and utilities located within the drainage ditch.
   - Pull back the banks of the drainage channel
   - Remove, by hand, the invasive species located between the drainage ditch and the adjacent BVW.
   - Regrade the area between the drainage channel and BVW to restore the hydraulic connection between the jurisdictional areas.
   - Install new retaining walls, in their new locations, further back from the existing limits of the drainage ditch. Excavate the area between the existing and new walls to create a larger wetland area.
   - Install new stormwater outfall pipe through the new retaining wall from the new underground infiltration/detention systems with the rear parking lot. This outfall includes a level spreader/plunge pool. The stormwater discharge has been designed to meet the 80% TSS Removal Water Quality requirements in the Massachusetts Stormwater Handbook.
   - Install Wetland plantings are proposed for the earthen banks of the drainage channel and in the area of the removed berm/hydraulic connection.

   Please refer to the enclosed Wetland Restoration and Enhancement Memorandum to the Sudbury Conservation Commission, date 3/28/2022 as well as the Wetland Restoration and Enhancement Exhibits (WR1 and WR-2) which are enclosed with the revised Site Plans that detail the proposed layout and grading surrounding the drainage ditch, construction sequencing, and landscaping.

3) Bordering Land Subject to Flooding
   The site is located near a BLSF, associated with the Sudbury River. The elevation of the 100 year (1% chance of flooding) has been determined by the FEMA Flood Study Profile

Data as elevation 121.0 (NAVD 88). The boundary of the BLSF is the 121-foot contour and this contour is to the south of the limit of work.

4) Priority Habitat of Rare Species (PHRS)

None of the proposed improvements are proposed within the PHRS. As mentioned above, there is a potential vernal pool located within the PHRS, approximately 500±' to the southeast of the limit of work. A copy of the Notice of Intent Application package including the plans will be submitted to NHESP for review.

1.7 OBJECTIVE OF CALCULATIONS

The purpose of this stormwater analysis is to examine the stormwater runoff from the proposed site based upon the Massachusetts Department of Environmental Protection Stormwater Management Policy and the applicable provisions of the Town of Sudbury Bylaws and regulations.

The goal of the stormwater management system design on this project is to comply with the MA Stormwater Management Requirements as well as the Town of Sudbury's Stormwater Management Permit Regulations and provide improved water quality, reduce post-development peak runoff rates below pre-development peak flow rates, maximize the opportunities for recharge and infiltration, and protect the surrounding area from any potential flooding and/or environmental impacts associated with the unmitigated condition. The following stormwater hydrology calculations were performed using the 1- inch, 1-year, 2-year, 5-year, 10-year, 25-year, and 100-year frequency, Type III, 24-hour SCS design storms and were compared for both pre-development and post-development conditions. The 1, 2, 5, 10, 25 and 100-year storms and 1-inch storm were evaluated to demonstrate the proposed peak rates of discharge and volumes do not exceed pre-development peak rates and volumes.

1.8 METHODOLOGY

We utilized the latest version of Hydro CAD for the overall stormwater hydrology/routing analysis to assess and compare peak rates of runoff and volumes at the various discharge points from the subject property. We then used Hydraflow Storm Sewers Extension Pack through AutoCAD Civil 3D to analyze the pipe design and to select appropriate pipe sizing.

Refer to Section 3 – HydroCAD Model, which includes the detailed print-out of the HydroCAD Model Reports for the 1, 2, 5, 10, 25 and 100-year storms as well as Section 7 – Hydraulic Pipe Analysis / Sizing, which includes reports for the 10, and 100-year storms for pipe capacity analysis and sizing.

1.9 SITE HYDROLOGY

Existing Conditions

Please refer to the attached Existing Conditions Watershed Analysis Plan in Section 3.1. The property has been divided into nine (9) subcatchment areas based on the existing site topography and flow paths. These subcatchment then combine where appropriate from an analysis standpoint where they ultimately discharge toward the wetland resource areas. Each subcatchment area has been analyzed and assigned an appropriate Curve Number to represent the existing vegetative cover and underlying soils conditions. Times of concentration have been computed and the extent of pervious vs. impervious cover computed. This data was then input into HydroCAD to determine peak rates of runoff at the various design points which provide the locations for which to compare existing versus proposed conditions to document compliance that the peak rates have been reduced in the regulatory storm events as required. A summary table is provided in the Hydrology Model Results and Conclusions Section below. For the purposes of this analysis, the pre- and post- development drainage conditions were analyzed at six (6) "design points" or points of discharge where stormwater runoff currently drains to under existing conditions. The design points are described below:

- Design Point #1 (PD-1) is the BVW (flagged as Wetland B) located to the southwest of the proposed work. This BVW ultimately discharges to Wetland A (PD-6).
- Design Point #2 (PD-2) is the outlet of the 15-inch RCP pipe that drains Wetland B to Wetland A. The flow to this design point ultimately discharges to Wetland A (PD-6).
- Design Point #3 (PD-3) is the jurisdictional channel to the east of the existing parking lot. The channel ultimately discharges to Wetland A (PD-6).
- Design Point #4 (PD-4) is the MA DOT 30-inch RCP discharge pipe that discharges drainage from Boston Post Road (Route 20) to Wetland A (DP-6).
- Design Point #5 (PD-5) is the outlet to the Constructed Stormwater Wetland basin. The constructed stormwater wetland does have an overflow to Wetland A (PD-6).
- Design Point #6 (PD-6) is Wetland A, which is where all the design/discharge points ultimately drain to.

The parcel that the proposed project on is approximately 15.7± acres, however the limit of work being analyzed is approximately 5.94 acres of land consisting of an existing two-story building, two (2) pneumatic structures and a bituminous driveway and parking area. The site generally conveys stormwater in a southerly direction towards Wetlands. A more comprehensive description of the existing subcatchment areas is provided below:

- Subcatchment E-1 is approximately 0.753AC (32,801 SF) and is comprised of a portion of one (1) existing air structure building, which appears to shed water to the west. E-1 also includes a portion of the paved drive, some compacted gravel areas, and some undeveloped woodland area. Stormwater from these surfaces flow overland and undetained to Wetland B, or DP-1. This area is a mix of pervious and impervious surfaces (CN: 88) and the minimum time of concentration of
  6.0 minutes is used.
- Subcatchment E-2 is approximately 0.108 AC (4,704 SF) and is comprised of a portion of the landscaped area at the front of the parcel adjacent to Boston Post Road. The surface is assumed to be grass cover, good. The runoff from this area flows into a catchbasin that connects into the MA DOT drainage system, and discharges at DP-4. The area is entirely permeable (CN: 74) and a calculated time of concentration of 7.8 minutes is used.
- Subcatchment E-3 is approximately 0.072 AC (3,142 SF) of the landscaped area, above the existing septic system. The ground surface is considered grass cover, good. The runoff from this area flows into a catchbasin that connects into the MA DOT drainage system, and discharges

at DP-4. The area is entirely permeable (CN: 74) and the minimum time of concentration of 6.0 minutes is used.

- Subcatchment E-4A is approximately 1.199 AC (52,236 SF) of the existing gymnasium building. The roof runoff is collected and drains to PD-5, which is a constructed stormwater wetland with a sediment forebay for pretreatment. This surface is entirely impervious (CN: 98) and a minimum time of concentration of 6.0 minutes is used.
- Subcatchment E-4B is approximately 2.103 AC (91,607 SF) and consists of the existing parking lot, the landscaped area/septic field, and the existing wooded area, which is classified as being in “good” condition. The runoff from this area is collected into a series of catchbasins, and drains to DP-5, or the constructed stormwater wetland. This surface is a mix of pervious and impervious surfaces (CN: 86). The time of concentration was calculated to be 9.5 minutes.
- Subcatchment E-5A is approximately 0.102 AC (4,443 SF) and primarily consists of the landscaped area at the entrance to the gymnasium. The runoff from this location is collected into catchbasins, and then discharges at DP-3, or the jurisdictional channel/bank. The surface is a mix of mulch and grass (CN: 72). The time of concentration was calculated to be 7.4 minutes.
- Subcatchment E-5B is approximately 0.087 AC (3,809 SF) and consists of pavement. The runoff from this location is collected into a catchbasin, and then discharges at DP-3, or the jurisdictional channel/bank. The surface is pavement (CN: 98). The minimum time of concentration of 6.0 minutes is used.
- Subcatchment E-5C is approximately 0.346AC (15,072 SF) and is comprised of a portion of one (1) existing pneumatic building, which appears to shed water to the west. E-1 also includes a portion of the paved drive, and some undeveloped woodland area. Stormwater from these surfaces flow overland and undetained to the jurisdictional channel, or DP-3. This area is impervious (CN: 95) and the minimum time of concentration of 6.0 minutes is used.
- Subcatchment E-6 is approximately 1.094 AC (47,654 SF) and is comprised of the southern air structure, the surrounding impervious surface, a portion of the conservation restriction area (modeled as grass), and a portion of the woods adjacent to wetland A. Stormwater in this subwatershed flows undetained to Wetland A, or Design Point 6. This area is a mix of surfaces (CN: 92) and a calculated time of concentration of 6.8 minutes is used.

Proposed Conditions

The proposed project consists of reconfigured and expanded parking for vehicle inventory, the removal of the two (2) pneumatic structures and the renovation of gymnasium into a car dealership which shall include a vehicle service center and consists of 41 service bays and an internal vehicle wash bay. Construction will also include landscaping upgrades, stormwater treatment, drainage improvements and other associated utilities. The site, including the proposed parking areas, have been designed to drain to deep sump hooded catch basins or trench drains. The catch basins will capture and convey stormwater runoff, via an underground pipe system, to offline oil/grit separators, to proprietary treatment units, to an underground infiltration system that will recharge the required WQV, and then to an underground detention system. The rooftop runoff from the existing building discharges to the existing constructed stormwater wetland, and the rooftop runoff from the building additions has been designed to flow directly into the underground infiltration chambers. Permeable pavement has also been included in the portion of the parking lot closest to environmentally jurisdictional areas.

Please refer to the attached Proposed Conditions Watershed Plan. The proposed project has been divided into ten (10) subcatchment areas and the various stormwater treatment and infiltration BMPs have been modeled. Appropriate Times of Concentration and Curve Numbers have been assigned for each catchment area. A more comprehensive description of the proposed subcatchment areas is provided below:

- Subcatchment P-1A is approximately 0.146 acres (6,357 SF) consisting of the undetained portion of the site to the west of the proposed expanded parking lot. This area consists of woods and grass (CN:72). Stormwater runoff from this area flows overland into Wetland B, or DP-1. The minimum time of concentration of 6.0 minutes is used.
- Subcatchment P-1B is approximately 0.471 acres (20,534 SF) consisting of a portion of the bituminous driveway, landscaped area adjacent to Boston Post Road, a stone trench and a conveyance swale. Stormwater from this location flows overland through the stone trench and then into the conveyance swale. The conveyance swale is proposed to have an outlet control structure that transports water to an in-line proprietary water quality unit before discharging to the infiltration chambers. The area is primarily impervious (CN: 86) and the minimum time of concentration of 6.0 minutes is used.
- Subcatchment P-1C is approximately 0.626 acres (27,261 SF) consisting of permeable pavement and landscaped area. Stormwater in this area drains vertically into the permeable pavement system where it is treated and infiltrated in the underlying base layers. The permeable pavement is modeled with a curve number of 98, and the BMP is then modeled as a pond. This area has a CN: 97 and the minimum time of concentration of 6.0 minutes is used.
- Subcatchment P-2 is approximately 0.299 acres (13,020 SF) is at the southern end of the limit of work, between the edge of the permeable pavement and the wetlands. This area consists of grass/landscaped surface, and woods. Stormwater in this area infiltrates or travels overland to the wetlands. This area has a CN: 73, and a calculated time of concentration of 13.6 minutes is used.
- Subcatchment P-3A is approximately 0.976 acres (42,610 SF) is comprised of a portion of the existing gymnasium building, the two (2) building additions and the new impervious portion of the parking lot. The roof runoff is collected and is piped directly into the infiltration system. The runoff from the impervious pavement flows into trench drains and deep sump catch basins, then to oil grit separators and offline proprietary separator water quality unit before entering the infiltration system. The infiltration system is designed to recharge the required WQV and any additional stormwater flows into the detention system. Stormwater eventually flows out of the detention system and into the existing bank/channel. An oversized rip rap plunge pool is proposed in this location to dissipate flow. This area has a CN: 97 and a minimum time of concentration of 6.0 minutes is used.
- Subcatchment P-3B is approximately 0.990 acres (43,136 SF) consisting of a portion of the

existing gymnasium building. The roof runoff from this portion of the building is collected and flows through an existing series of pipes and manholes, and eventually discharges at the sediment forebay and constructed stormwater wetland (DP-5). This area only includes the roof (CN: 98). A minimum time of concentration of 6.0 minutes is used.

- Subcatchment P-4 is approximately 1.973 acres (85,957 SF) consisting of the existing and expanded parking lot to the east, landscaped area (with the septic system underground in this location) and a portion of the wooded area to the east adjacent to Wetland A, which is considered to be in “good” condition. This watershed is collected by a series of deep sump catch basins and discharges to the constructed stormwater wetland (DP-5). This area is a mixture of pervious and impervious surfaces (CN: 87) and a calculated time of concentration of 7.3 minutes is used.
- Subcatchment P-4A is approximately 0.040 acres (1,753 SF) consisting of a portion of the landscaped area adjacent to Boston Post Road. This area flows into a catch basin that is part of the MA DOT drainage system. The system discharges at the 30-inch RCP at Wetland A (DP-4). This area is primarily pervious and has a CN:74, and a minimum time of concentration of 6.0 minutes is used.
- Subcatchment P-4B is approximately 0.049 acres (2,147 SF) consisting of the northeast corner of the limit of work which is proposed to be a grass surface. The stormwater in this location flows overland to a catch basin that is part of the MA DOT drainage system. The system discharges at the 30-inch RCP at Wetland A (DP-4). This area is primarily pervious and has a CN:74, and a minimum time of concentration of 6.0 minutes is used.
- Subcatchment 5 is approximately 0.291 acres (12,691 SF) consisting of the area surrounding the channel/bank. This area is comprised of grass, impervious walkways and woods, and it has a CN:88. The minimum time of concentration of 6.0 minutes is used.

Hydrology Model Results and Conclusions

The goal of the stormwater design is to comply to the maximum extent practicable with the Massachusetts Stormwater Policy and the Town of Sudbury Stormwater Management Regulations. The existing site contains 172,236 SF (3.95AC) of impervious area. The proposed site contains 175,198 SF (4.02 AC) of impervious area, which is an increase of 2,962 SF. Because the project is a renovation of a previously developed site, because there is a slight increase in impervious area, the project is considered a mix of new and redevelopment. This analysis confirms that the stormwater system is receiving proper treatment and peak rates of runoff have been reduced to below pre-development rates using stormwater Best Management Practices including deep sump hooded catch basins, oil/grit separators, Contech CDS Water Quality Units, underground infiltration and detention systems and permeable pavement. The discharge points from the site have been engineered to employ properly designed rip-rap splash pads to further reduce discharge velocities and to spread out the discharge to prevent scour and point discharge erosion. The water quality units have been properly sized in accordance with MADEP guidance for water quality flows. Please refer to Section 4 of the Stormwater Report for calculations associated with the sizing.

The results of the pre- and post-development hydrology calculations provided in Section 3 are summarized in the following tables:

Table 1.9.1 shows the peak rate of runoff at each design point for the existing site as well as for the developed site at 1, 2, 5, 10, 25, 100-year and 1-inch design storms.

Point of	1-in Storm (cfs)			1-Yr Storm (cfs)			2-Yr Storm (cfs)			5-Yr Storm (cfs)			10-Yr Storm (cfs)			25-Yr Storm (cfs)			100-Yr Storm (cfs)		
Analysis	Pre	Post	Δ	Pre	Post	Δ	Pre	Post	Δ	Pre	Post	Δ	Pre	Post	Δ	Pre	Post	Δ	Pre	Post	Δ
PD-1	0.26	0.00	-0.26	1.39	0.08	-1.31	1.86	0.15	-1.71	2.40	0.23	-2.17	3.09	0.35	-2.74	4.01	0.51	-3.50	5.97	0.89	-5.08
PD-2	0.22	0.00	-0.22	1.19	0.08	-1.11	1.60	0.15	-1.45	2.06	0.23	-1.83	2.66	0.35	-2.31	3.45	0.51	-2.94	5.14	0.89	-4.25
PD-3	0.30	0.01	-0.29	1.06	0.37	-0.69	1.38	0.47	-0.91	1.73	0.61	-1.12	2.20	0.89	-1.31	2.82	1.18	-1.64	4.17	3.29	-0.88
PD-4	0.00	0.00	0.00	0.12	0.06	-0.06	0.20	0.10	-0.10	0.31	0.16	-0.15	0.45	0.23	-0.22	0.65	0.33	-0.32	1.10	0.57	-0.53
PD-5	1.32	1.27	-0.05	5.56	5.46	-0.10	7.38	7.25	-0.13	9.47	9.29	-0.18	12.18	11.93	-0.25	15.81	15.44	-0.37	26.63	23.02	-3.61
PD-6	2.44	1.27	-1.17	10.36	5.70	-4.66	13.73	7.69	-6.04	17.57	10.03	-7.54	22.54	13.11	-9.43	29.16	17.46	-11.70	43.67	26.69	-16.98

Table 1.9.1

As shown in Table 1.9.1, the peak stormwater runoff generated by the development are the same or less in post development conditions versus the existing conditions at all design points, for every storm with the exception of the 1-inch storm at PD-5. All stormwater ultimately discharges to Wetland A (PD-6) In all storms, the peak stormwater runoff to PD-6 is significantly reduced. Refer to Section 3 for the complete HydroCAD Analysis that documents the above results as well as the Existing and Proposed Conditions Watershed Plans, also enclosed in Section 3.

Table 1.9.2 shows the total volume discharge at each design point for the existing site as well as for the developed site at 1, 2, 5, 10, 25, 100-year and 1-inch design storms.

Point of	1-in Storm (ac-ft)			1-Yr Storm (ac-ft)			2-Yr Storm (ac-ft)			5-Yr Storm (ac-ft)			10-Yr Storm (ac-ft)			25-Yr Storm (ac-ft)			100-Yr Storm (ac-ft)		
Analysis	Pre	Post	Δ	Pre	Post	Δ	Pre	Post	Δ	Pre	Post	Δ	Pre	Post	Δ	Pre	Post	Δ	Pre	Post	Δ
PD-1	0.020	0.000	-0.020	0.101	0.007	-0.094	0.137	0.011	-0.126	0.178	0.017	-0.161	0.232	0.025	-0.207	0.306	0.036	-0.270	0.467	0.064	-0.403
PD-2	0.020	0.000	-0.020	0.101	0.007	-0.094	0.137	0.011	-0.126	0.178	0.017	-0.161	0.232	0.025	-0.207	0.306	0.037	-0.269	0.467	0.136	-0.331
PD-3	0.022	0.005	-0.017	0.082	0.189	0.107	0.108	0.271	0.163	0.137	0.365	0.228	0.175	0.490	0.315	0.226	0.658	0.432	0.340	1.027	0.687
PD-4	0.000	0.000	0.000	0.010	0.005	-0.005	0.016	0.008	-0.008	0.024	0.011	-0.013	0.034	0.016	-0.018	0.049	0.024	-0.025	0.083	0.041	-0.042
PD-5	0.114	0.102	-0.012	0.464	0.421	-0.043	0.618	0.560	-0.058	0.796	0.721	-0.075	1.030	0.932	-0.098	1.347	1.218	-0.129	2.046	1.847	-0.199
PD-6	0.198	0.108	-0.090	0.828	0.637	-0.191	1.103	0.874	-0.229	1.422	1.151	-0.271	1.840	1.516	-0.324	2.406	2.014	-0.392	3.650	3.183	-0.467

Table 1.9.2

As shown in Table 1.9.2, the total volume discharge generated by the development are the same or less in post development conditions versus the existing conditions at all design points, for every storm. Refer to Section 3 for the complete HydroCAD Analysis that documents the above results as well as the Existing and Proposed Conditions Watershed Plans, also enclosed in Section 3.

1.10 STORMWATER MANAGEMENT

The following section describes each of the ten (10) Massachusetts Stormwater Management Standards and describes how the project complies with each.

> <u>Standard 1: No New Untreated Discharges</u> – No new stormwater conveyances (e.g. outfalls) may discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth.
>
> **All new stormwater system conveyances are treated prior to discharge and result in no erosion occurring on site. The drainage system has been designed to direct**

stormwater runoff from impervious areas through various stormwater systems designed to capture, convey, treat, detain, recharge and infiltrate (where appropriate) the runoff prior to discharge. The outfalls have no erosion issues and the flows will not be increased.

Standard 2: Peak Rate Attenuation – Stormwater management systems should be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates.

Please refer to Table 1.8.1 above. The stormwater management system reduces peak rates of runoff to below pre-development levels at all design points. All stormwater ultimately discharges to Wetland A (PD-6), and in all storms, the peak stormwater runoff to PD-6 is significantly reduced. This Standard has been met.

Standard 3: Recharge – Loss of annual recharge to groundwater shall be eliminated or minimized through the use of infiltration measures including environmentally sensitive site design, low impact development techniques, stormwater best management practices, and good operation and maintenance. At a minimum, the annual recharge from the post-development site shall approximate the annual recharge from pre- development conditions based on soil type. This standard is met when the stormwater management system is designed to infiltrate the required recharge volume as determined in accordance with the Massachusetts Stormwater Handbook.

The stormwater system includes two (2) infiltration BMP's: permeable pavement and subsurface infiltration chambers. The stormwater system has been designed to comply with the recharge requirements of the MA Stormwater Management Regulations. Refer to Section 4.0 for a summary of the stormwater recharge calculations.

Standard 4: Water Quality – Stormwater management systems shall be designed to remove 80% of the average annual post-construction load of Total Suspended Solids (TSS).

The project utilizes deep sump hooded catch basins, oil/grit separators, CDS Water Quality Units, subsurface infiltration systems and permeable pavement. Please refer to Section 4.4 for the TSS calculation spreadsheets.

Per the Town of Sudbury Stormwater Management Bylaw, water quality volume for sizing of BMP's is based on 1-inch of runoff from the tributary area. Please refer to Section 4 of this report for Stormwater Management Calculations.

Standard 5: Land Uses with Higher Potential Pollutant Loads (LUHPPL) – For land uses with higher potential pollutant loads, source control and pollution prevention shall be implemented in accordance with the Massachusetts Stormwater Handbook to eliminate or reduce the discharge of stormwater runoff from such land uses to the maximum extent practicable.

The proposed project is an automobile dealership and includes new and used vehicle sales, display and inventory storage and service. No exterior vehicle service or repair exterior equipment cleaning nor commercial vehicle washing are proposed. As such, the project is not a LUHPPL.

<u>Standard 6: Critical Areas</u> – Stormwater discharges within the Zone II or Interim Wellhead Protection Area of a public water supply, and stormwater discharges near or to any other critical area, require the use of the specific source control and pollution prevention measures and the specific structural stormwater best management practices determined by the Department to be suitable for managing discharges to such areas, as provided in the Massachusetts Stormwater Handbook.

The project is not located near a critical area, however, the project BMP's have been designed to treat stormwater as if they were discharging to a critical area.

<u>Standard 7: Redevelopment and Other Projects Subject to the Standards only to the maximum extent practicable</u> – A redevelopment project is required to meet the following Stormwater Management Standards only to the maximum extent practicable: Standard 2, Standard 3, and the pretreatment and structural best management practice requirements of Standards 4, 5, and 6. Existing stormwater discharges shall comply with Standard 1 only to the maximum extent practicable. A redevelopment project shall also comply with all other requirements of the Stormwater Management Standards and improve existing conditions.

The existing site contains 172,236 SF (3.95AC) of impervious area. The proposed site contains 175,198 SF (4.02 AC) of impervious area, which is an increase of 2,962 SF. Because the project is a renovation of a previously developed site, because there is a slight increase in impervious area, the project is considered a mix of new and redevelopment. The bullet points below provide a summary of the project's compliance with Standards 2, 3, 4, 5, and 6 to the maximum extent practicable, and Standards 1, 8 ,9, 10 to the full extent.

- **Standard 1: All new stormwater system conveyances are treated prior to discharge and result in no erosion occurring on site. The drainage system has been designed to direct stormwater runoff from impervious areas through various stormwater systems designed to capture, convey, treat, detain, recharge and infiltrate (where appropriate) the runoff prior to discharge. The outfalls are designed to prevent erosion and scour, and the peak rates of runoff will not be increased. Therefore, the project is in full compliance with this standard.**
- **Standard 2: The peak flows at all design points are reduced from the existing**

conditions using underground infiltration and detention chambers, permeable pavement and outlet control structures. The project is in full compliance with this standard.

- **Standard 3: Please refer to Section 4 of the report. The existing impervious area within limit of work is 172,236 SF (3.95 acres) including pavement, buildings, compacted gravel parking and driveways. The total proposed impervious area within limit of work is 175,198 SF (4.02 Acres) including pavement, buildings and permeable pavement. Therefore, there is an increase in impervious area of only 2,962 SF (0.07 acres). Using the underground infiltration chambers and the permeable pavement, the project is recharging approximately 45,289SF of impervious area and provides a recharge volume of 13,047CF. Given the very small increase in impervious area (2,962 SF), the required water quality volume to be provided is only 62 cubic feet, therefore the project provides significantly more recharge than is required by Standard 3.**

- **Standard 4: The Stormwater Management Systems have been designed to remove 80% or greater TSS post construction using various BMPS including deep sump hooded catch basins, oil/grit separators, CDS Water Quality Units, subsurface infiltration systems and permeable pavement. Please refer to Section 4.4 for the TSS calculation spreadsheets. The project is in full compliance with this standard.**

- **Standard 5: This standard is not applicable because the site is not considered a LUHPPL as there is no exterior vehicle service or repair exterior equipment cleaning nor commercial vehicle washing are proposed.**

- **Standard 6: This standard is not applicable because the project is not located near a critical area, however, the project BMP's have been designed to treat stormwater as if the site were discharging to a critical area, treating the 1-inch WQV.**
- **Standard 8: An Erosion and Sedimentation Controls Plan has been incorporated into the Site Plans. The project is in full compliance with this standard.**

- **Standard 9: An Operation and Maintenance Plan has been provided in Section 5. The project is in full compliance with this standard.**

- **Standard 10: An Illicit Discharge Compliance Statement is included as required and is enclosed in Section 2.2. This will be provided prior to occupancy. The project is in full compliance with this standard.**

<u>Standard 8: Construction Period Pollution Prevention Plan and Erosion and Sedimentation</u> <u>Control</u> – A plan to control construction-related impacts including erosion, sedimentation and other pollutant sources during construction and land disturbance activities (construction period erosion, sedimentation, and pollution prevention plan) shall be developed and implemented.

An Erosion and Sedimentation Controls Plan has been incorporated into the Site Plans. A draft SWPPP is also enclosed in Section 8.

Standard 9: Operation and Maintenance Plan – A long-term operation and maintenance plan shall be developed and implemented to ensure that stormwater management systems function as designed.

An Operation and Maintenance Plan has been provided in Section 5 of this Report.

Standard 10: Prohibition of Illicit Discharges – All illicit discharges to the stormwater management system are prohibited.

An Illicit Discharge Compliance Statement is included as required and is enclosed in Section 2.2.

1.11 BEST MANAGEMENT PRACTICES (BMP'S)

Various combinations of deep sump hooded catch basins, oil/grit separators, CDS water quality units, a constructed stormwater subsurface infiltration and detention systems, and permeable pavement will be used to treat stormwater runoff on the site. See Section 4 for stormwater management calculations.

1.12 PIPE SIZING

Refer to Section 7 for the Hydraulic Pipe Analysis/Sizing calculations, which utilizes the Hydraflow Storm Sewers Extension Pack through AutoCAD Civil 3D to analyze the pipe design and to select appropriate pipe sizing. Reports are included for the 10 and 100-year storms for pipe capacity analysis and sizing.

The tributary area for each inlet/subcatchment area has been computed along with pipe length, slope and friction coefficient. This approach was used to size the pipes such that the 10-year storm event is contained within the pipe. The 100-year storm was then checked to confirm the hydraulic grade line for the pipe network does not exceed the rim elevations of the drainage structures. In addition, pipe velocities were checked to be within the range of 2fps to 10 fps flowing 1/3 full. Those calculations are included in Section 7 herein.

1.13 CONCLUSION

In conclusion, the project has been designed in accordance with the requirements of the MA DEP's Stormwater Management Standards and in compliance with the Town of Sudbury's Conservation Commission Wetland Regulations and Stormwater Management Bylaw.

1.14 Figures

Crocker Design Group 2 SHARP STREET, UNIT B HINGHAM, MA 02043	Project **HERB CHAMBERS MERCEDES OF SUDBURY** **141 BOSTON POST ROAD, SUDBURY, MA**	Prepared for **HERB CHAMBERS 43 BRAINTREE STREET, LLC** **#259 MCGRATH HIGHWAY - ROUTE 28** **SOMERVILLE, MA 02143**	Drawing Title **AERIAL MAP** DATE: 11.15.2021 DRAWN: SVP JOB NO.:100-107 CHECK: ML SCALE: 200 100 0 200	**1**

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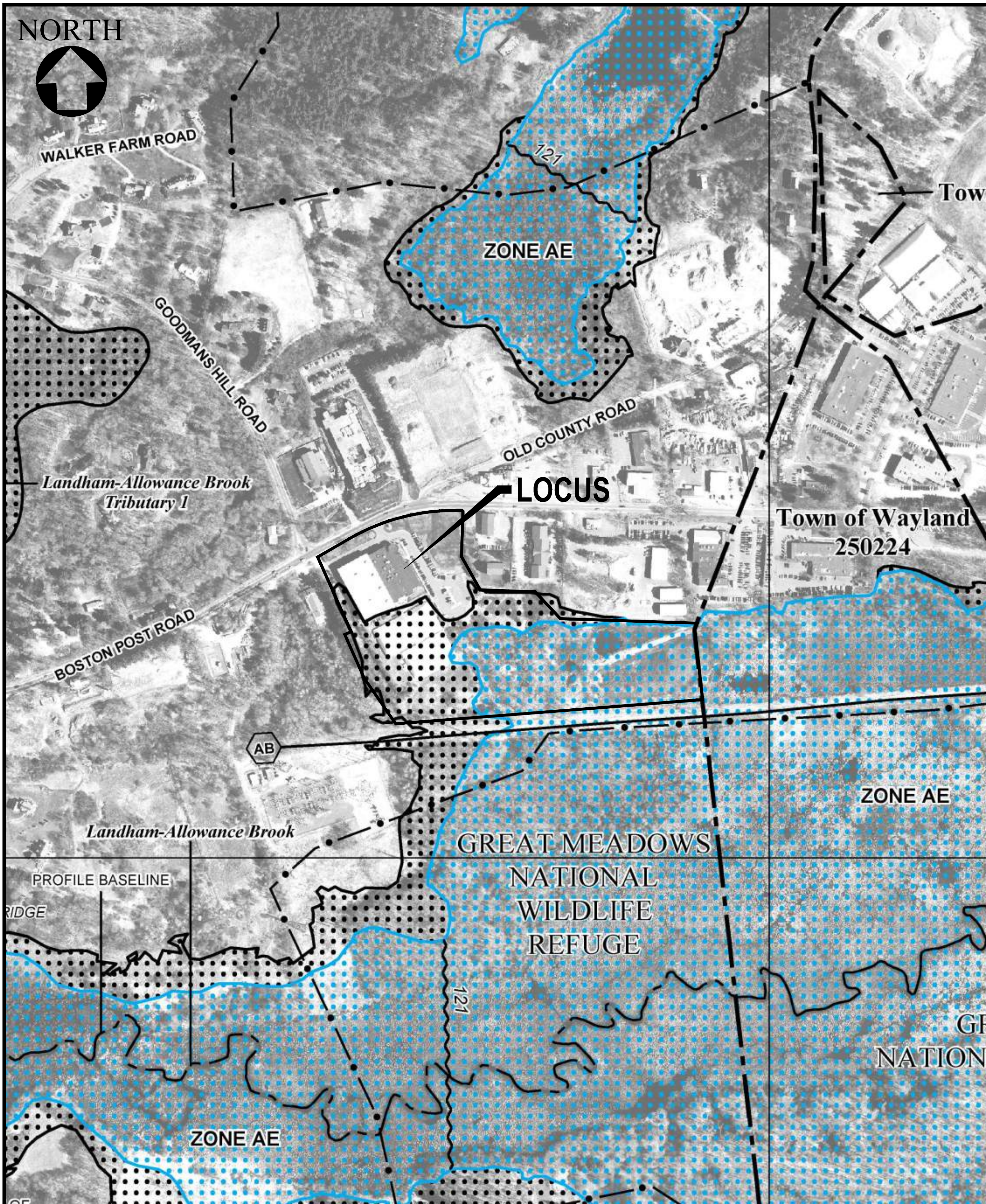

Crocker Design Group 2 SHARP STREET, UNIT B HINGHAM, MA 02043	Project **HERB CHAMBERS MERCEDES OF SUDBURY** 141 BOSTON POST ROAD, SUDBURY, MA	Prepared for **HERB CHAMBERS 43 BRAINTREE STREET, LLC** #259 MCGRATH HIGHWAY - ROUTE 28 SOMERVILLE, MA 02143	Drawing Title **FEMA MAP** **EFFECTIVE PANEL 25017C0507F** DATE: 11.15.2021 DRAWN: SVP JOB NO.:100-107 CHECK: ML SCALE: 500 250 0 500 **3**

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Crocker Design Group

2 SHARP STREET, UNIT B
HINGHAM, MA 02043

Project

HERB CHAMBERS MERCEDES OF SUDBURY

141 BOSTON POST ROAD, SUDBURY, MA

Prepared for

HERB CHAMBERS 43 BRAINTREE STREET, LLC

#259 MCGRATH HIGHWAY - ROUTE 28
SOMERVILLE, MA 02143

Drawing Title

MASSGIS WETLANDS MAP

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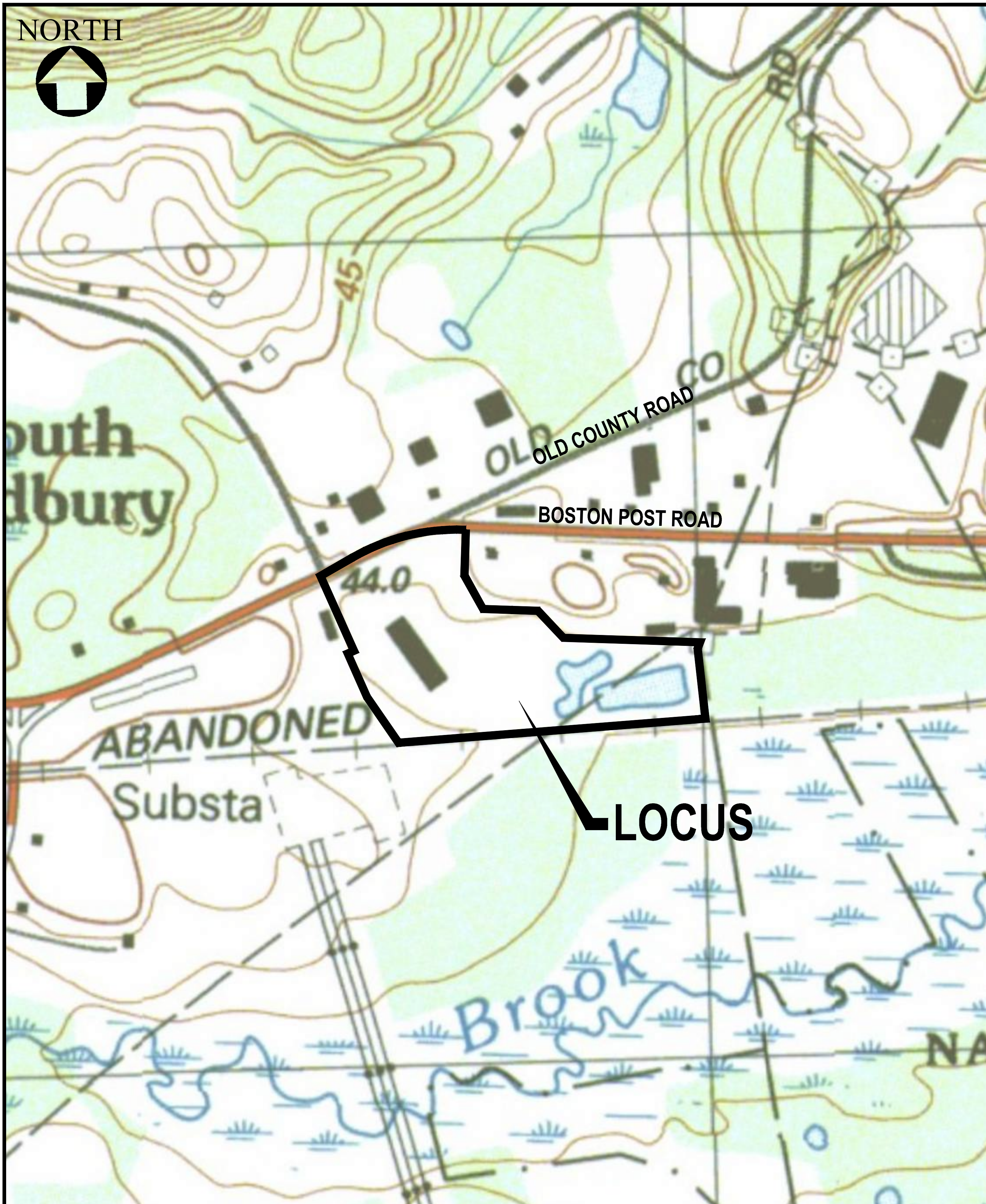

Crocker Design Group
2 SHARP STREET, UNIT B
HINGHAM, MA 02043

Project
HERB CHAMBERS MERCEDES OF SUDBURY
141 BOSTON POST ROAD, SUDBURY, MA

Prepared for
HERB CHAMBERS 43 BRAINTREE STREET, LLC
#259 MCGRATH HIGHWAY - ROUTE 28
SOMERVILLE, MA 02143

Drawing Title
USGS MAP

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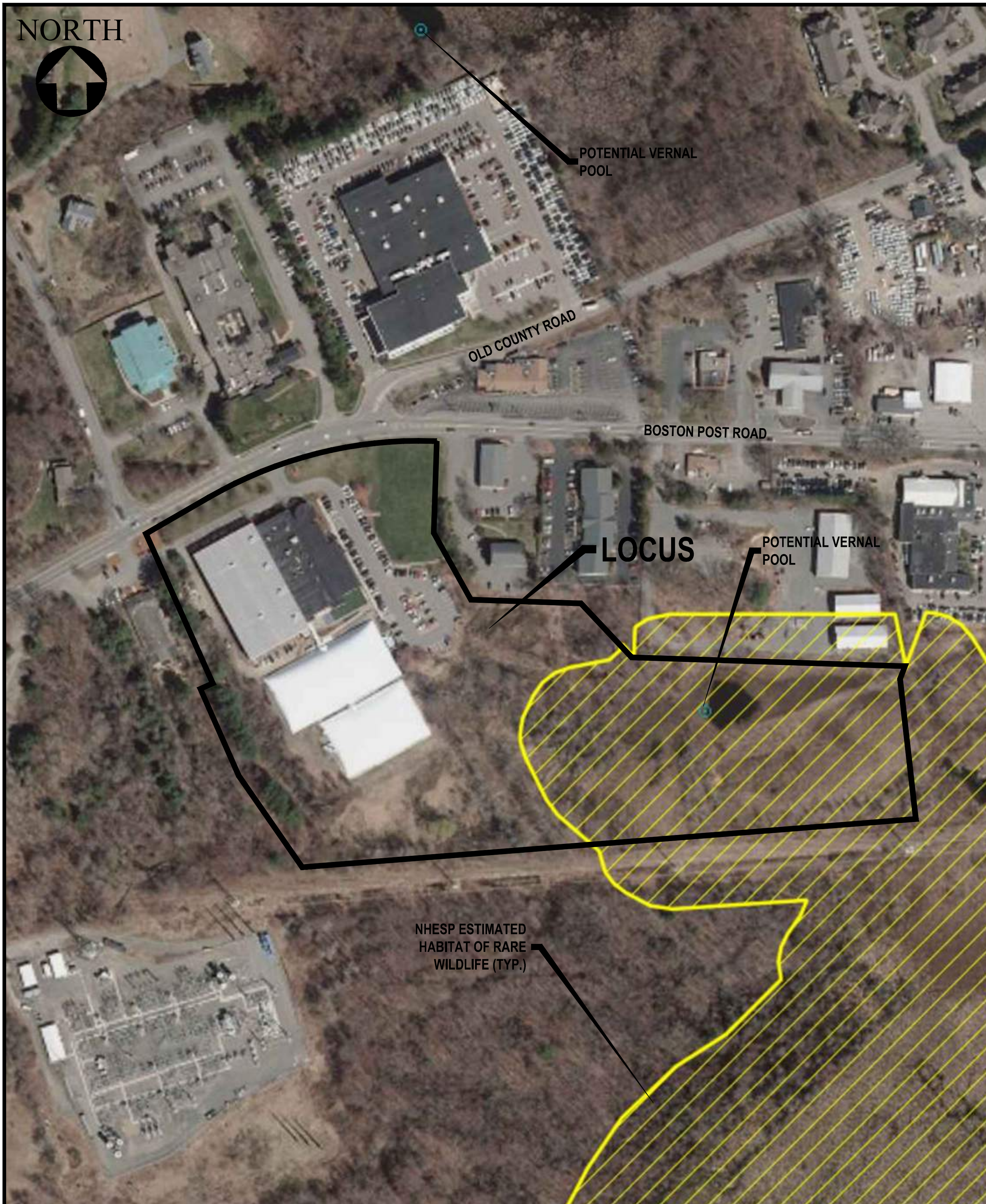

Crocker Design Group
2 SHARP STREET, UNIT B
HINGHAM, MA 02043

Project
HERB CHAMBERS MERCEDES OF SUDBURY
141 BOSTON POST ROAD, SUDBURY, MA

Prepared for
HERB CHAMBERS 43 BRAINTREE STREET, LLC
#259 MCGRATH HIGHWAY - ROUTE 28
SOMERVILLE, MA 02143

Drawing Title
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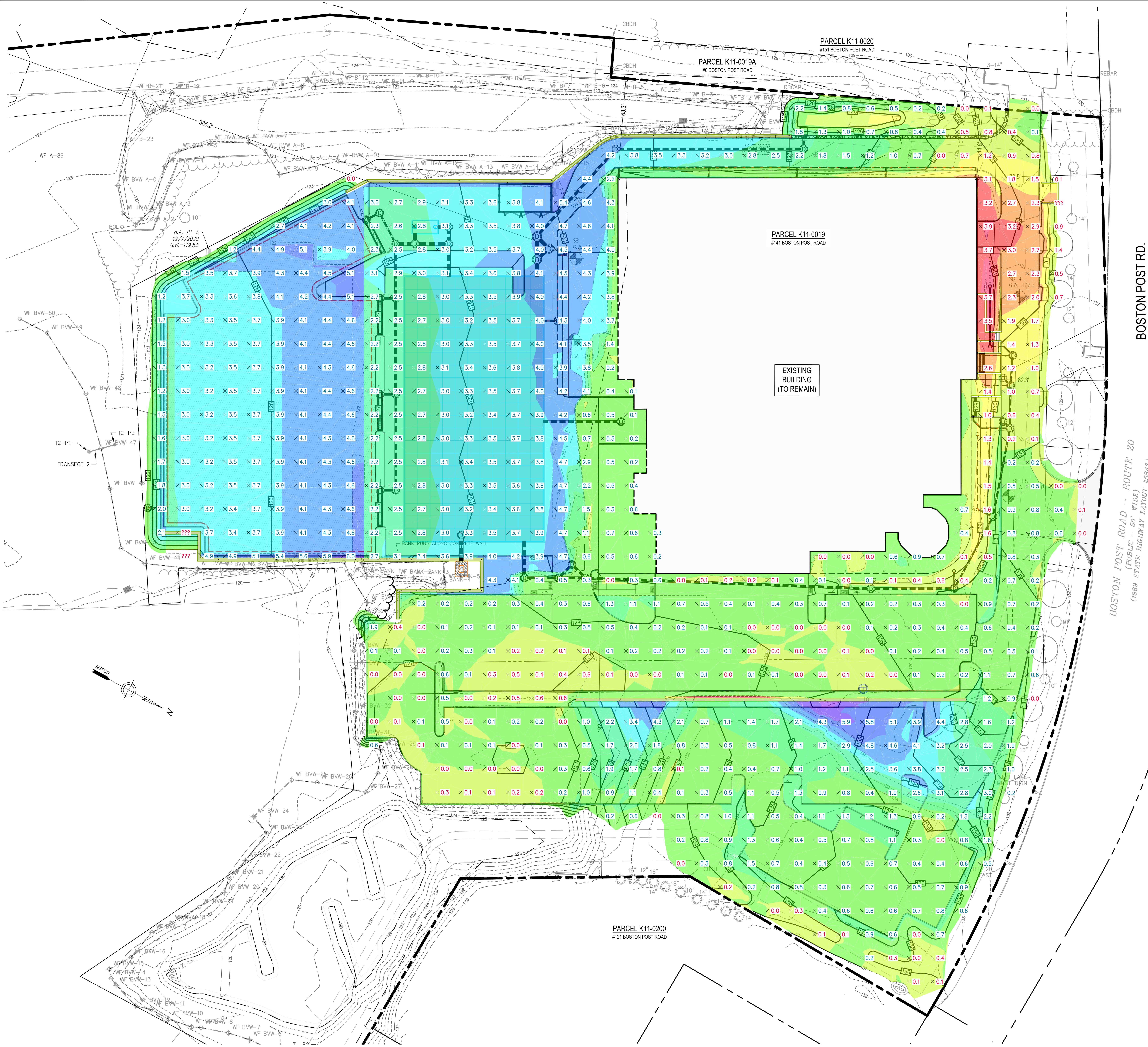


30 15 0 30 60

Volume

Minimum elevation	-4.775'
Maximum elevation	7.261'
Mean elevation	1.643'
Base Surface	Existing surface
Comparison	Proposed surface
Cut Factor	1.000
Fill Factor	1.000
Cut volume	807.44 Cu. Yd.
Fill volume	11,344.90 Cu. Yd.
Net volume	10,537.46 Cu. Yd.<Fill>

Elevations Table

Number	Min. Elevation	Max. Elevation	2D Area	Volume	Color
1	−5.00	−4.00	85.09	0.65	
2	−4.00	−3.00	986.60	16.97	
3	−3.00	−2.00	2,456.34	79.55	
4	−2.00	−1.00	4,832.76	211.39	
5	−1.00	0.00	22,869.69	541.16	
6	0.00	1.00	60,697.06	4,037.96	
7	1.00	2.00	12,412.46	2,898.73	
8	2.00	3.00	15,885.62	2,492.09	
9	3.00	4.00	33,804.68	1,527.80	
10	4.00	5.00	21,049.46	375.38	
11	5.00	6.00	2,335.34	45.21	
12	6.00	7.00	306.61	5.33	
13	7.00	8.00	40.45	0.16	

Date	Description	No.

Revisions

GABRIEL R. CROCKER CIVIL No. 47917 REGISTERED PROFESSIONAL ENGINEER COMMONWEALTH OF MASSACHUSETTS

11-10-2021

GABRIEL R. CROCKER
PROFESSIONAL ENGINEER, MA REGISTRATION #47917

Crocker Design Group
2 SHARP STREET, UNIT B
HINGHAM, MA 02043
P: 781-919-0808

Project
MERCEDES OF SUDBURY
141 BOSTON POST ROAD, SUDBURY, MA

Prepared for
HERB CHAMBERS 43 BRAINTREE STREET, LLC
#259 McGRATH HIGHWAY - ROUTE 28
SOMERVILLE, MA 02143

Drawing Title
CUT & FILL PLAN

Project No.	100-107	Drawing No.
Date	11/10/2021	**CF-1**
Scale	1"=30'	
Drawn By	DJN / JPM	
Approved By	GC	

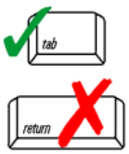
SECTION 2 – STORMWATER CHECKLIST

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

A. Introduction

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



A Stormwater Report must be submitted with the Notice of Intent permit application to document compliance with the Stormwater Management Standards. The following checklist is NOT a substitute for the Stormwater Report (which should provide more substantive and detailed information) but is offered here as a tool to help the applicant organize their Stormwater Management documentation for their Report and for the reviewer to assess this information in a consistent format. As noted in the Checklist, the Stormwater Report must contain the engineering computations and supporting information set forth in Volume 3 of the Massachusetts Stormwater Handbook. The Stormwater Report must be prepared and certified by a Registered Professional Engineer (RPE) licensed in the Commonwealth.

The Stormwater Report must include:

- The Stormwater Checklist completed and stamped by a Registered Professional Engineer (see page 2) that certifies that the Stormwater Report contains all required submittals.[1] This Checklist is to be used as the cover for the completed Stormwater Report.
- Applicant/Project Name
- Project Address
- Name of Firm and Registered Professional Engineer that prepared the Report
- Long-Term Pollution Prevention Plan required by Standards 4-6
- Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan required by Standard 8[2]
- Operation and Maintenance Plan required by Standard 9

In addition to all plans and supporting information, the Stormwater Report must include a brief narrative describing stormwater management practices, including environmentally sensitive site design and LID techniques, along with a diagram depicting runoff through the proposed BMP treatment train. Plans are required to show existing and proposed conditions, identify all wetland resource areas, NRCS soil types, critical areas, Land Uses with Higher Potential Pollutant Loads (LUHPPL), and any areas on the site where infiltration rate is greater than 2.4 inches per hour. The Plans shall identify the drainage areas for both existing and proposed conditions at a scale that enables verification of supporting calculations.

As noted in the Checklist, the Stormwater Management Report shall document compliance with each of the Stormwater Management Standards as provided in the Massachusetts Stormwater Handbook. The soils evaluation and calculations shall be done using the methodologies set forth in Volume 3 of the Massachusetts Stormwater Handbook.

To ensure that the Stormwater Report is complete, applicants are required to fill in the Stormwater Report Checklist by checking the box to indicate that the specified information has been included in the Stormwater Report. If any of the information specified in the checklist has not been submitted, the applicant must provide an explanation. The completed Stormwater Report Checklist and Certification must be submitted with the Stormwater Report.

---

[1] The Stormwater Report may also include the Illicit Discharge Compliance Statement required by Standard 10. If not included in the Stormwater Report, the Illicit Discharge Compliance Statement must be submitted prior to the discharge of stormwater runoff to the post-construction best management practices.

[2] For some complex projects, it may not be possible to include the Construction Period Erosion and Sedimentation Control Plan in the Stormwater Report. In that event, the issuing authority has the discretion to issue an Order of Conditions that approves the project and includes a condition requiring the proponent to submit the Construction Period Erosion and Sedimentation Control Plan before commencing any land disturbance activity on the site.

Checklist for Stormwater Report

B. Stormwater Checklist and Certification

The following checklist is intended to serve as a guide for applicants as to the elements that ordinarily need to be addressed in a complete Stormwater Report. The checklist is also intended to provide conservation commissions and other reviewing authorities with a summary of the components necessary for a comprehensive Stormwater Report that addresses the ten Stormwater Standards.

Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the item is not applicable (N.A.) and provide the reasons for that determination.

A complete checklist must include the Certification set forth below signed by the Registered Professional Engineer who prepared the Stormwater Report.

Registered Professional Engineer's Certification

I have reviewed the Stormwater Report, including the soil evaluation, computations, Long-term Pollution Prevention Plan, the Construction Period Erosion and Sedimentation Control Plan (if included), the Long-term Post-Construction Operation and Maintenance Plan, the Illicit Discharge Compliance Statement (if included) and the plans showing the stormwater management system, and have determined that they have been prepared in accordance with the requirements of the Stormwater Management Standards as further elaborated by the Massachusetts Stormwater Handbook. I have also determined that the information presented in the Stormwater Checklist is accurate and that the information presented in the Stormwater Report accurately reflects conditions at the site as of the date of this permit application.

Registered Professional Engineer Block and Signature

COMMONWEALTH OF MASSACHUSETTS
GABRIEL R
CROCKER
CIVIL
NO. 47917
REGISTERED
PROFESSIONAL ENGINEER

3-28-2022

Signature and Date

Checklist

Project Type: Is the application for new development, redevelopment, or a mix of new and redevelopment?

☐ New development

☐ Redevelopment

☒ Mix of New Development and Redevelopment

Checklist for Stormwater Report

Checklist (continued)

LID Measures: Stormwater Standards require LID measures to be considered. Document what environmentally sensitive design and LID Techniques were considered during the planning and design of the project:

☒ No disturbance to any Wetland Resource Areas

☐ Site Design Practices (e.g. clustered development, reduced frontage setbacks)

☐ Reduced Impervious Area (Redevelopment Only)

☐ Minimizing disturbance to existing trees and shrubs

☐ LID Site Design Credit Requested:

- ☐ Credit 1
- ☐ Credit 2
- ☐ Credit 3

☒ Use of "country drainage" versus curb and gutter conveyance and pipe

☐ Bioretention Cells (includes Rain Gardens)

☐ Constructed Stormwater Wetlands (includes Gravel Wetlands designs)

☐ Treebox Filter

☐ Water Quality Swale

☐ Grass Channel

☐ Green Roof

☒ Other (describe): Permeable pavement

Standard 1: No New Untreated Discharges

☒ No new untreated discharges

☒ Outlets have been designed so there is no erosion or scour to wetlands and waters of the Commonwealth

☐ Supporting calculations specified in Volume 3 of the Massachusetts Stormwater Handbook included.

Checklist (continued)

Standard 2: Peak Rate Attenuation

☐ Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.

☐ Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.

☒ Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

Standard 3: Recharge

☒ Soil Analysis provided.

☒ Required Recharge Volume calculation provided.

☐ Required Recharge volume reduced through use of the LID site Design Credits.

☐ Sizing the infiltration, BMPs is based on the following method: Check the method used.

☐ Static ☒ Simple Dynamic ☐ Dynamic Field[1]

☐ Runoff from all impervious areas at the site discharging to the infiltration BMP.

☒ Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.

☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume.

☒ Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:

☒ Site is comprised solely of C and D soils and/or bedrock at the land surface

☐ M.G.L. c. 21E sites pursuant to 310 CMR 40.0000

☐ Solid Waste Landfill pursuant to 310 CMR 19.000

☐ Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.

☒ Calculations showing that the infiltration BMPs will drain in 72 hours are provided.

☐ Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

[1] 80% TSS removal is required prior to discharge to infiltration BMP if Dynamic Field method is used.

Checklist (continued)

Standard 3: Recharge (continued)

☐ The infiltration BMP is used to attenuate peak flows during storms greater than or equal to the 10-year 24-hour storm and separation to seasonal high groundwater is less than 4 feet and a mounding analysis is provided.

☒ Documentation is provided showing that infiltration BMPs do not adversely impact nearby wetland resource areas.

Standard 4: Water Quality

The Long-Term Pollution Prevention Plan typically includes the following:
- Good housekeeping practices;
- Provisions for storing materials and waste products inside or under cover;
- Vehicle washing controls;
- Requirements for routine inspections and maintenance of stormwater BMPs;
- Spill prevention and response plans;
- Provisions for maintenance of lawns, gardens, and other landscaped areas;
- Requirements for storage and use of fertilizers, herbicides, and pesticides;
- Pet waste management provisions;
- Provisions for operation and management of septic systems;
- Provisions for solid waste management;
- Snow disposal and plowing plans relative to Wetland Resource Areas;
- Winter Road Salt and/or Sand Use and Storage restrictions;
- Street sweeping schedules;
- Provisions for prevention of illicit discharges to the stormwater management system;
- Documentation that Stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from LUHPPL;
- Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan;
- List of Emergency contacts for implementing Long-Term Pollution Prevention Plan.

☒ A Long-Term Pollution Prevention Plan is attached to Stormwater Report and is included as an attachment to the Wetlands Notice of Intent.

☐ Treatment BMPs subject to the 44% TSS removal pretreatment requirement and the one inch rule for calculating the water quality volume are included, and discharge:

- ☐ is within the Zone II or Interim Wellhead Protection Area
- ☐ is near or to other critical areas
- ☐ is within soils with a rapid infiltration rate (greater than 2.4 inches per hour)
- ☐ involves runoff from land uses with higher potential pollutant loads.

☐ The Required Water Quality Volume is reduced through use of the LID site Design Credits.

☒ Calculations documenting that the treatment train meets the 80% TSS removal requirement and, if applicable, the 44% TSS removal pretreatment requirement, are provided.

Checklist (continued)

Standard 4: Water Quality (continued)

☒ The BMP is sized (and calculations provided) based on:

- ☒ The ½" or 1" Water Quality Volume or
- ☒ The equivalent flow rate associated with the Water Quality Volume and documentation is provided showing that the BMP treats the required water quality volume.

☒ The applicant proposes to use proprietary BMPs, and documentation supporting use of proprietary BMP and proposed TSS removal rate is provided. This documentation may be in the form of the propriety BMP checklist found in Volume 2, Chapter 4 of the Massachusetts Stormwater Handbook and submitting copies of the TARP Report, STEP Report, and/or other third party studies verifying performance of the proprietary BMPs.

☐ A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided.

Standard 5: Land Uses With Higher Potential Pollutant Loads (LUHPPLs)

☐ The NPDES Multi-Sector General Permit covers the land use and the Stormwater Pollution Prevention Plan (SWPPP) has been included with the Stormwater Report.

☐ The NPDES Multi-Sector General Permit covers the land use and the SWPPP will be submitted ***prior to*** the discharge of stormwater to the post-construction stormwater BMPs.

☐ The NPDES Multi-Sector General Permit does ***not*** cover the land use.

☐ LUHPPLs are located at the site and industry specific source control and pollution prevention measures have been proposed to reduce or eliminate the exposure of LUHPPLs to rain, snow, snow melt and runoff, and been included in the long term Pollution Prevention Plan.

☐ All exposure has been eliminated.

☐ All exposure has ***not*** been eliminated and all BMPs selected are on MassDEP LUHPPL list.

☐ The LUHPPL has the potential to generate runoff with moderate to higher concentrations of oil and grease (e.g. all parking lots with >1000 vehicle trips per day) and the treatment train includes an oil grit separator, a filtering bioretention area, a sand filter or equivalent.

Standard 6: Critical Areas

☐ The discharge is near or to a critical area and the treatment train includes only BMPs that MassDEP has approved for stormwater discharges to or near that particular class of critical area.

☐ Critical areas and BMPs are identified in the Stormwater Report.

Checklist (continued)

Standard 7: Redevelopments and Other Projects Subject to the Standards only to the maximum extent practicable

☒ The project is subject to the Stormwater Management Standards only to the maximum Extent Practicable as a:

- ☐ Limited Project
- ☐ Small Residential Projects: 5-9 single family houses or 5-9 units in a multi-family development provided there is no discharge that may potentially affect a critical area.
- ☐ Small Residential Projects: 2-4 single family houses or 2-4 units in a multi-family development with a discharge to a critical area
- ☐ Marina and/or boatyard provided the hull painting, service and maintenance areas are protected from exposure to rain, snow, snow melt and runoff
- ☐ Bike Path and/or Foot Path
- ☐ Redevelopment Project
- ☒ Redevelopment portion of mix of new and redevelopment.

☒ Certain standards are not fully met (Standard No. 1, 8, 9, and 10 must always be fully met) and an explanation of why these standards are not met is contained in the Stormwater Report.

☐ The project involves redevelopment and a description of all measures that have been taken to improve existing conditions is provided in the Stormwater Report. The redevelopment checklist found in Volume 2 Chapter 3 of the Massachusetts Stormwater Handbook may be used to document that the proposed stormwater management system (a) complies with Standards 2, 3 and the pretreatment and structural BMP requirements of Standards 4-6 to the maximum extent practicable and (b) improves existing conditions.

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control

A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan must include the following information:

- Narrative;
- Construction Period Operation and Maintenance Plan;
- Names of Persons or Entity Responsible for Plan Compliance;
- Construction Period Pollution Prevention Measures;
- Erosion and Sedimentation Control Plan Drawings;
- Detail drawings and specifications for erosion control BMPs, including sizing calculations;
- Vegetation Planning;
- Site Development Plan;
- Construction Sequencing Plan;
- Sequencing of Erosion and Sedimentation Controls;
- Operation and Maintenance of Erosion and Sedimentation Controls;
- Inspection Schedule;
- Maintenance Schedule;
- Inspection and Maintenance Log Form.

☒ A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan containing the information set forth above has been included in the Stormwater Report.

Checklist (continued)

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control (continued)

☐ The project is highly complex and information is included in the Stormwater Report that explains why it is not possible to submit the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan with the application. A Construction Period Pollution Prevention and Erosion and Sedimentation Control has ***not*** been included in the Stormwater Report but will be submitted ***before*** land disturbance begins.

☐ The project is ***not*** covered by a NPDES Construction General Permit.

☒ The project is covered by a NPDES Construction General Permit and a copy of the SWPPP is in the Stormwater Report.

☐ The project is covered by a NPDES Construction General Permit but no SWPPP been submitted. The SWPPP will be submitted BEFORE land disturbance begins.

Standard 9: Operation and Maintenance Plan

☒ The Post Construction Operation and Maintenance Plan is included in the Stormwater Report and includes the following information:

- ☒ Name of the stormwater management system owners;
- ☒ Party responsible for operation and maintenance;
- ☒ Schedule for implementation of routine and non-routine maintenance tasks;
- ☒ Plan showing the location of all stormwater BMPs maintenance access areas;
- ☒ Description and delineation of public safety features;
- ☒ Estimated operation and maintenance budget; and
- ☒ Operation and Maintenance Log Form.

☐ The responsible party is ***not*** the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:

- ☐ A copy of the legal instrument (deed, homeowner's association, utility trust or other legal entity) that establishes the terms of and legal responsibility for the operation and maintenance of the project site stormwater BMPs;
- ☐ A plan and easement deed that allows site access for the legal entity to operate and maintain BMP functions.

Standard 10: Prohibition of Illicit Discharges

☒ The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;

☒ An Illicit Discharge Compliance Statement is attached;

☐ NO Illicit Discharge Compliance Statement is attached but will be submitted ***prior to*** the discharge of any stormwater to post-construction BMPs.

ILLICIT DISCHARGE COMPLIANCE STATEMENT

Standard 10: Massachusetts Stormwater Standards Handbook

Illicit discharges are defined as discharges into waters of the State or municipal separate stormwater system (MS4) that are not entirely comprised of stormwater. Exclusions for non-stormwater discharges into drainage systems include activities or facilities for firefighting, water line flushing, landscape irrigation, uncontaminated groundwater discharge, potable water sources, foundation drains, air conditioning condensation, footing drains, individual resident car washing, water used to clean residential buildings without detergents, water used for street washing, and flows from riparian habitats/wetlands. These exclusions are subject to change and are under the discretion of the local governing authority.

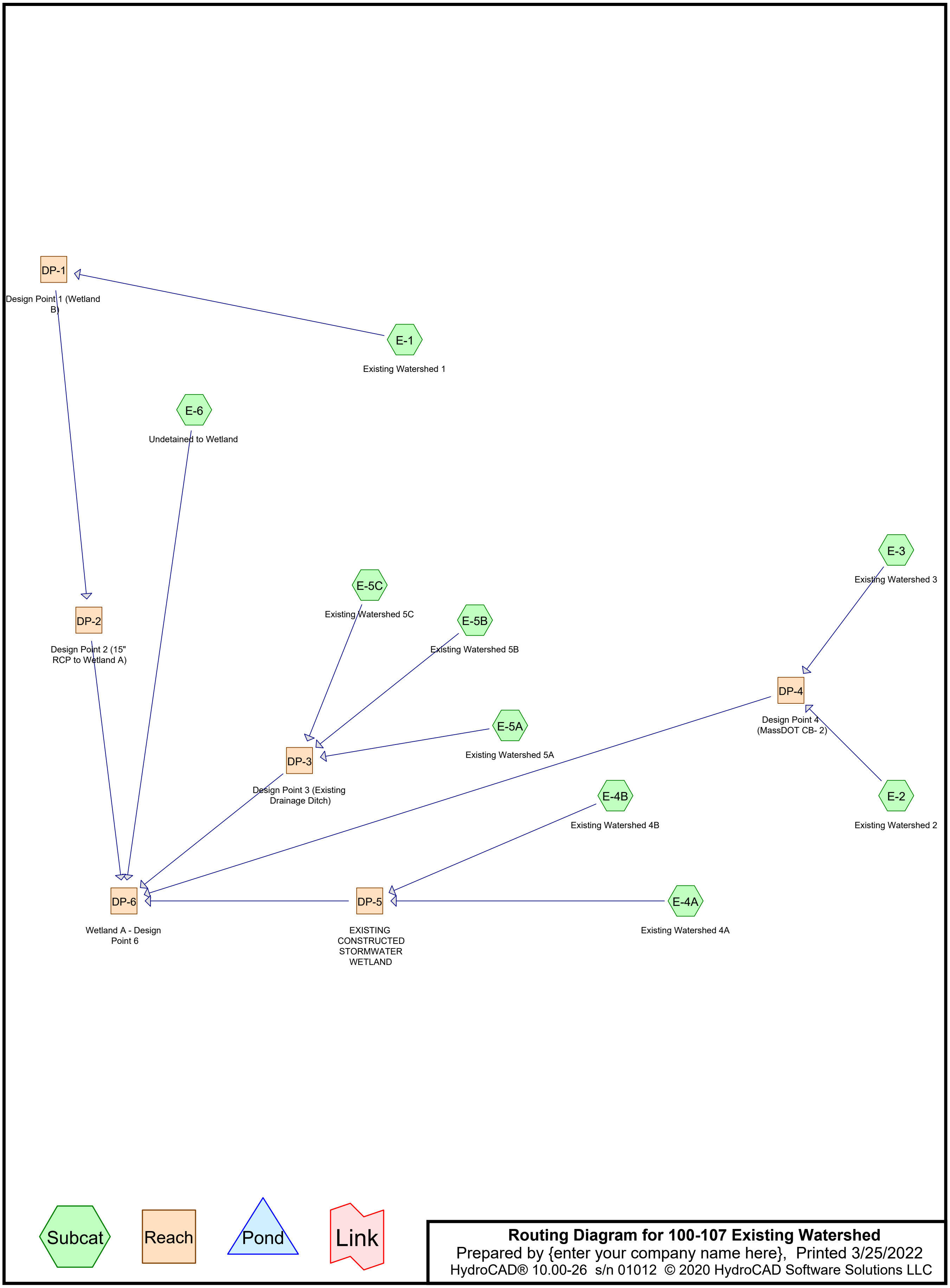
To the best of our knowledge and professional belief no illicit discharges to the stormwater system, surface waters, or wetland resource areas will remain on the site after construction. We will agree to implement a pollution prevention plan to prevent illicit discharges into the stormwater management system. The design of the site based on the plans entitled "Herb Chambers Mercedes of Sudbury" prepared by Crocker Design Group, 2 Sharp Street, Unit A, Hingham, Massachusetts show a separation and no direct connection between the stormwater management systems and the wastewater and/ or groundwater on the site. To the maximum extent practicable, the design prevents entry of illicit discharges into the stormwater management system.

Owner's Name: ______________________________
(please print)

Owner's Signature: ___________________________ Date: ____________________

Company: Herb Chambers, Mercedes of Sudbury

SECTION 3 – STORMATER HYDROLOGY MODEL



Routing Diagram for 100-107 Existing Watershed
Prepared by {enter your company name here}, Printed 3/25/2022
HydroCAD® 10.00-26 s/n 01012 © 2020 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.007	79	50-75% Grass cover, Fair, HSG C (E-5C)
1.593	74	>75% Grass cover, Good, HSG C (E-1, E-2, E-3, E-4B, E-5A, E-6)
0.287	96	Gravel surface, HSG C (E-1, E-4B, E-5C)
0.040	74	Mulch (E-4B)
2.468	98	Paved parking, HSG C (E-1, E-2, E-4B, E-5B, E-5C, E-6)
1.199	98	Roofs, HSG C (E-4A)
0.270	70	Woods, Good, HSG C (E-1, E-4B, E-5A, E-5C, E-6)

Summary for Subcatchment E-1: Existing Watershed 1

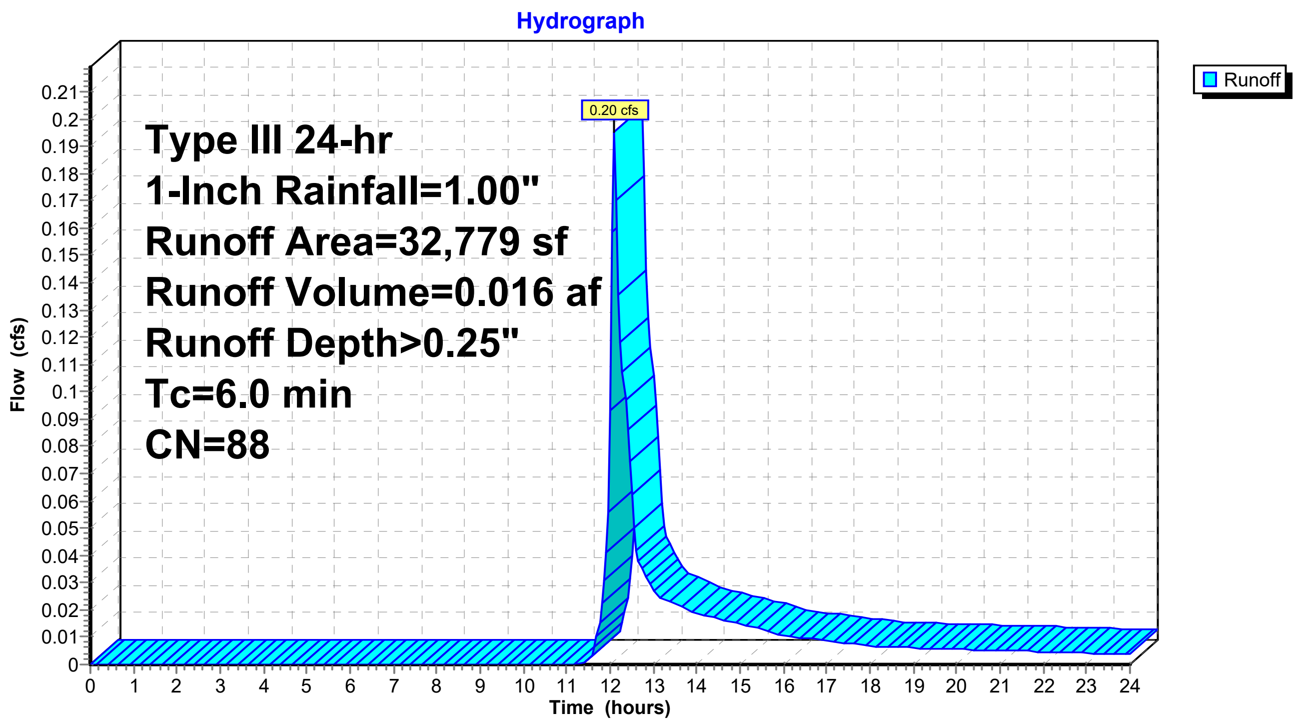
Runoff = 0.20 cfs @ 12.10 hrs, Volume= 0.016 af, Depth> 0.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-Inch Rainfall=1.00"

Area (sf)	CN	Description
11,618	98	Paved parking, HSG C
9,421	96	Gravel surface, HSG C
5,782	74	>75% Grass cover, Good, HSG C
3,103	70	Woods, Good, HSG C
561	70	Woods, Good, HSG C
2,294	74	>75% Grass cover, Good, HSG C
32,779	88	Weighted Average
21,161		64.56% Pervious Area
11,618		35.44% Impervious Area

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

Subcatchment E-1: Existing Watershed 1



Summary for Subcatchment E-2: Existing Watershed 2

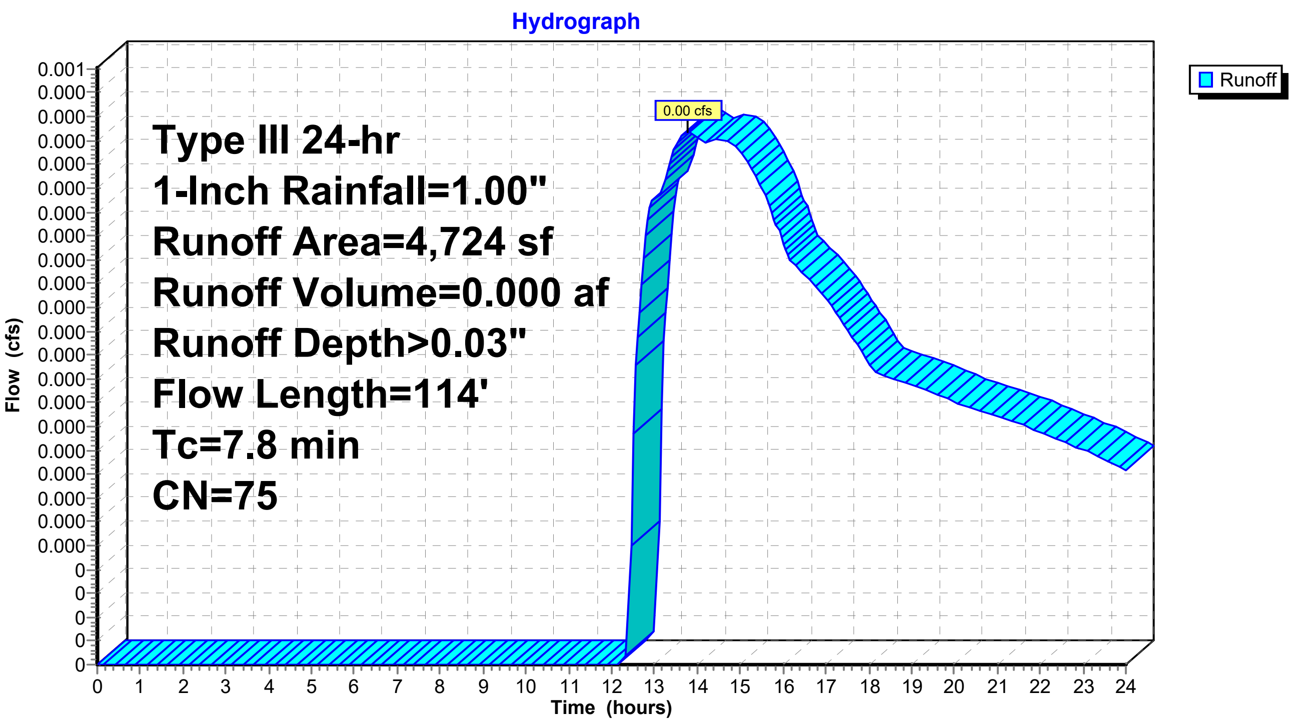
Runoff = 0.00 cfs @ 13.80 hrs, Volume= 0.000 af, Depth> 0.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-Inch Rainfall=1.00"

Area (sf)	CN	Description
4,621	74	>75% Grass cover, Good, HSG C
103	98	Paved parking, HSG C
4,724	75	Weighted Average
4,621		97.82% Pervious Area
103		2.18% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	50	0.0100	0.11		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
0.4	64	0.0312	2.84		**Shallow Concentrated Flow, Shallow Concentrated Flow** Unpaved Kv= 16.1 fps
7.8	114	Total			

Subcatchment E-2: Existing Watershed 2



Summary for Subcatchment E-3: Existing Watershed 3

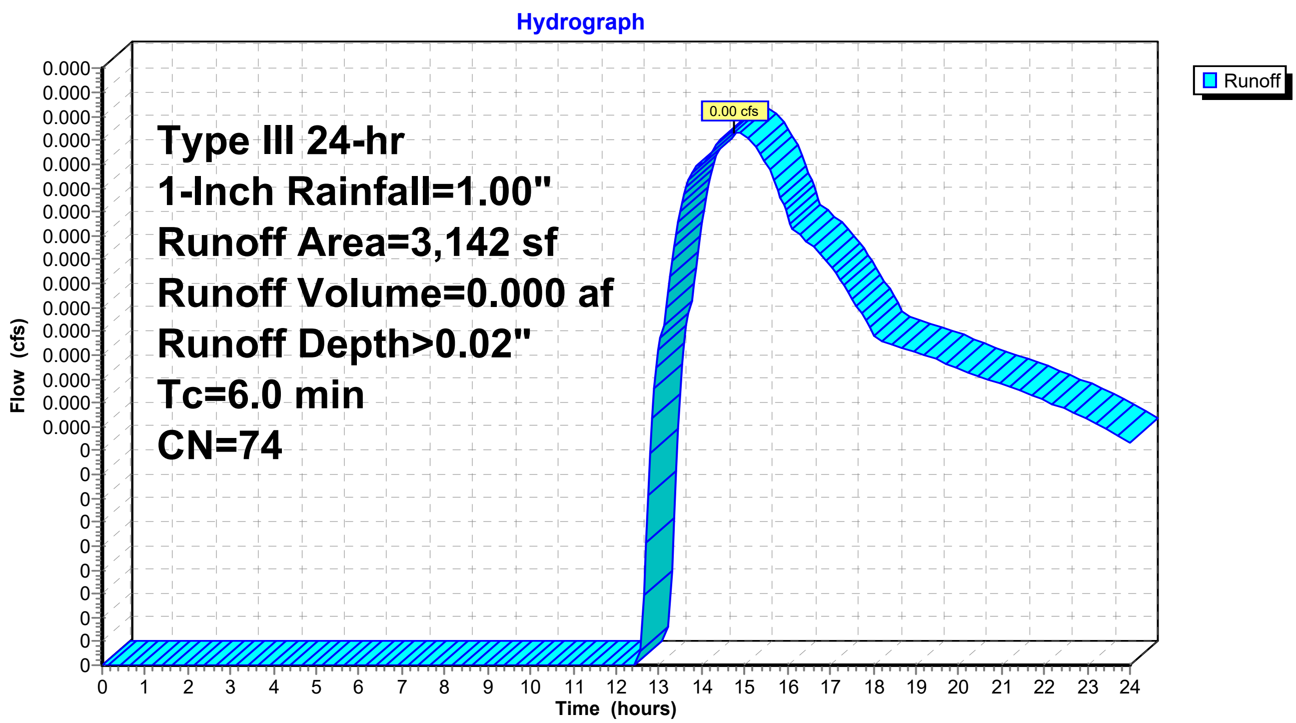
Runoff = 0.00 cfs @ 14.78 hrs, Volume= 0.000 af, Depth> 0.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-Inch Rainfall=1.00"

Area (sf)	CN	Description
3,142	74	>75% Grass cover, Good, HSG C
3,142		100.00% Pervious Area

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

Subcatchment E-3: Existing Watershed 3



Summary for Subcatchment E-4A: Existing Watershed 4A

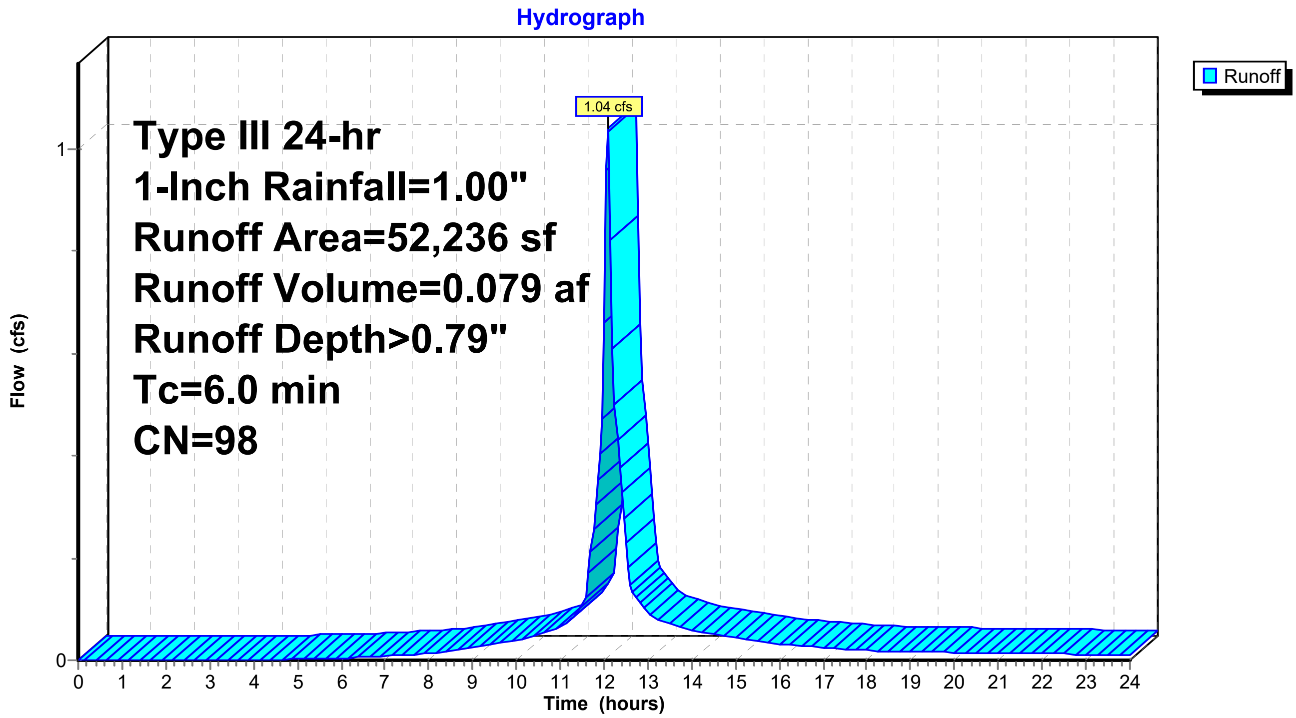
Runoff = 1.04 cfs @ 12.09 hrs, Volume= 0.079 af, Depth> 0.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-Inch Rainfall=1.00"

Area (sf)	CN	Description
52,236	98	Roofs, HSG C
52,236		100.00% Impervious Area

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

Subcatchment E-4A: Existing Watershed 4A



Summary for Subcatchment E-4B: Existing Watershed 4B

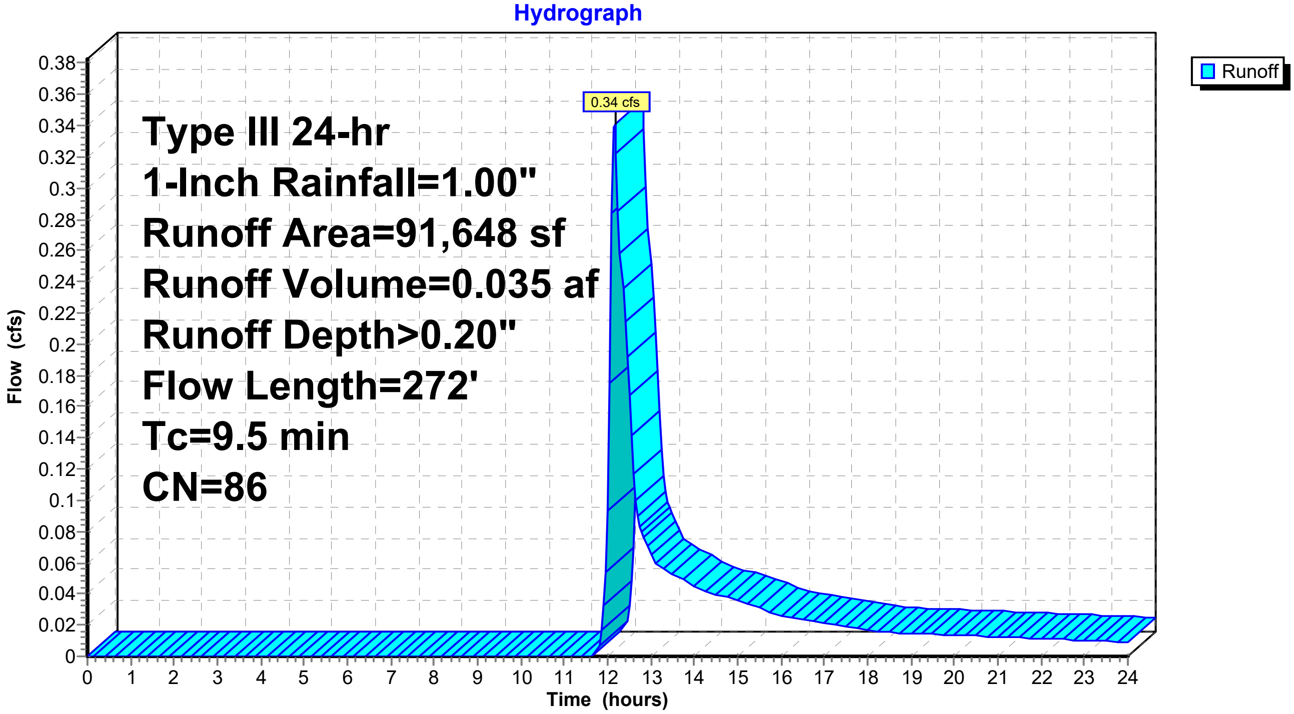
Runoff = 0.34 cfs @ 12.16 hrs, Volume= 0.035 af, Depth> 0.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-Inch Rainfall=1.00"

	Area (sf)	CN	Description
	43,351	98	Paved parking, HSG C
	1,304	96	Gravel surface, HSG C
	42,526	74	>75% Grass cover, Good, HSG C
	2,704	70	Woods, Good, HSG C
*	1,763	74	Mulch
	91,648	86	Weighted Average
	48,297		52.70% Pervious Area
	43,351		47.30% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.1	50	0.0080	0.10		**Sheet Flow, Sheet Flow** Grass: Short n= 0.150 P2= 3.20"
0.8	111	0.0216	2.37		**Shallow Concentrated Flow, Shallow Concentrated Flow** Unpaved Kv= 16.1 fps
0.1	40	0.1500	6.24		**Shallow Concentrated Flow, SHallow** Unpaved Kv= 16.1 fps
0.5	71	0.0150	2.49		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
9.5	272	Total			

Subcatchment E-4B: Existing Watershed 4B



Summary for Subcatchment E-5A: Existing Watershed 5A

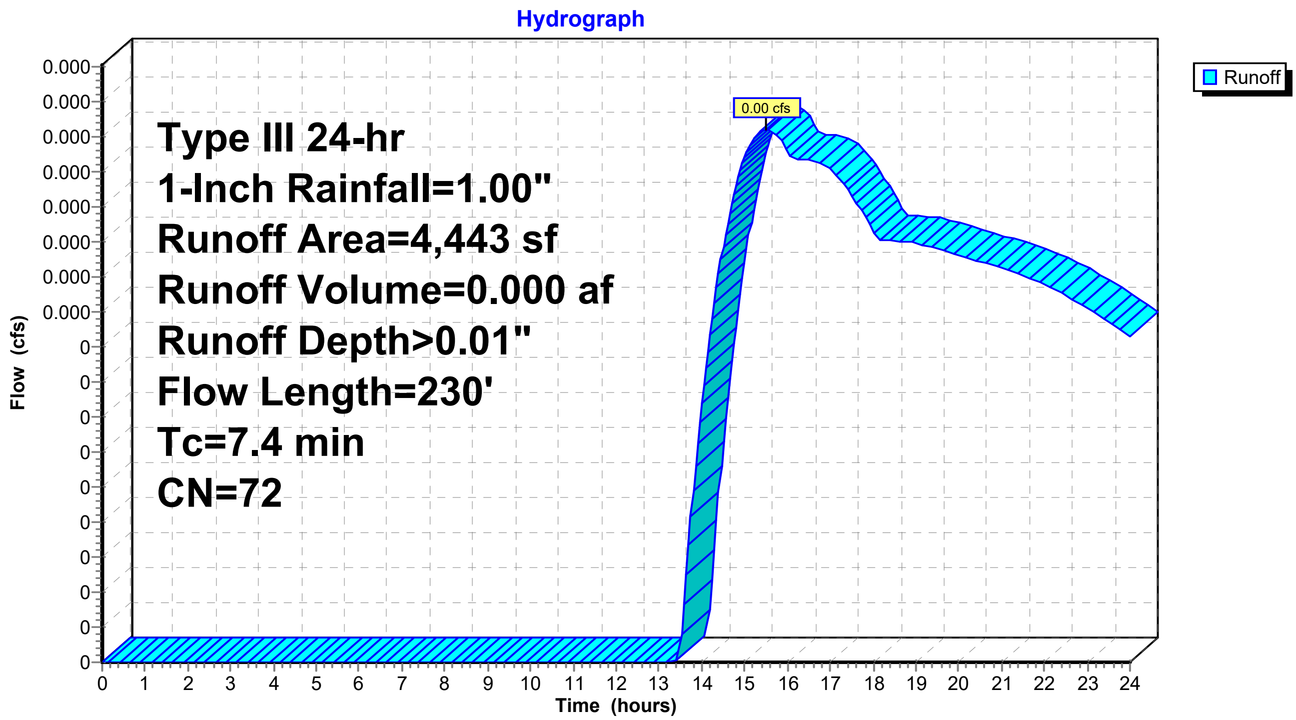
Runoff = 0.00 cfs @ 15.52 hrs, Volume= 0.000 af, Depth> 0.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-Inch Rainfall=1.00"

Area (sf)	CN	Description
1,742	74	>75% Grass cover, Good, HSG C
2,701	70	Woods, Good, HSG C
4,443	72	Weighted Average
4,443		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	50	0.0160	0.14		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
1.2	180	0.0244	2.51		**Shallow Concentrated Flow, Shallow COncentrated Flow** Unpaved Kv= 16.1 fps
7.4	230	Total			

Subcatchment E-5A: Existing Watershed 5A



Summary for Subcatchment E-5B: Existing Watershed 5B

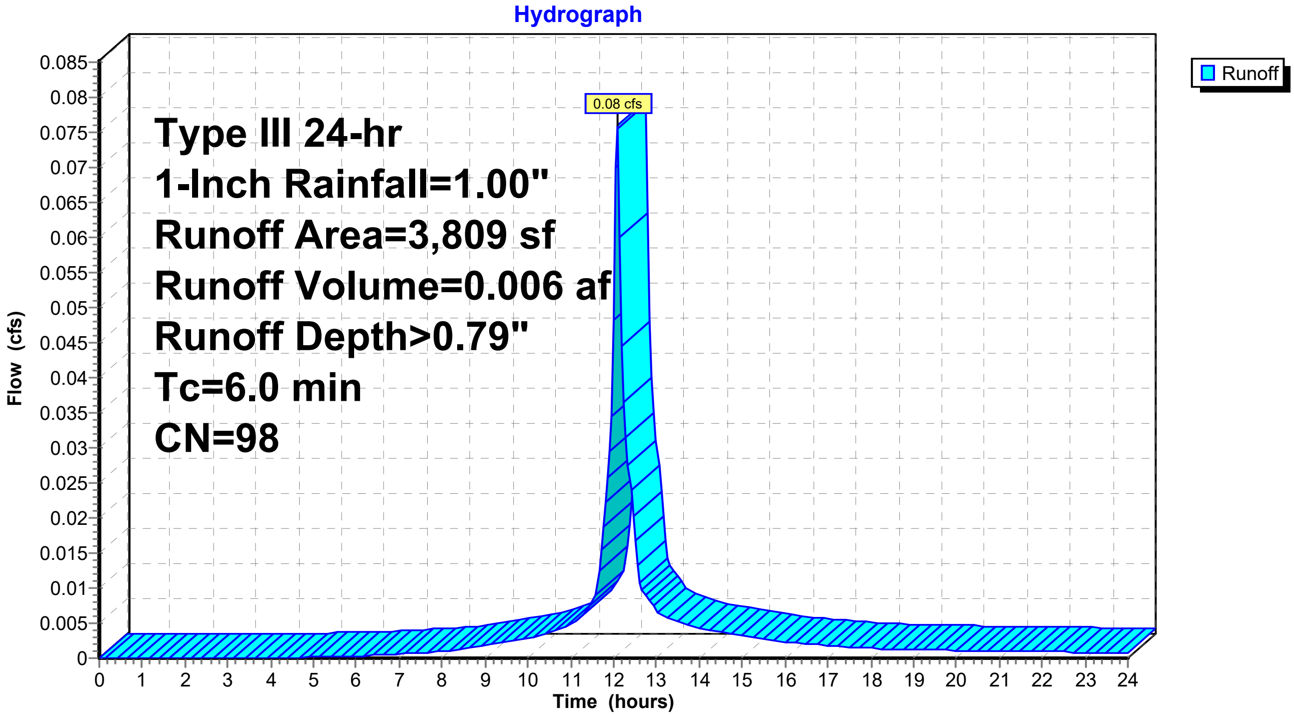
Runoff = 0.08 cfs @ 12.09 hrs, Volume= 0.006 af, Depth> 0.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-Inch Rainfall=1.00"

Area (sf)	CN	Description
3,809	98	Paved parking, HSG C
3,809		100.00% Impervious Area

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

Subcatchment E-5B: Existing Watershed 5B



Summary for Subcatchment E-5C: Existing Watershed 5C

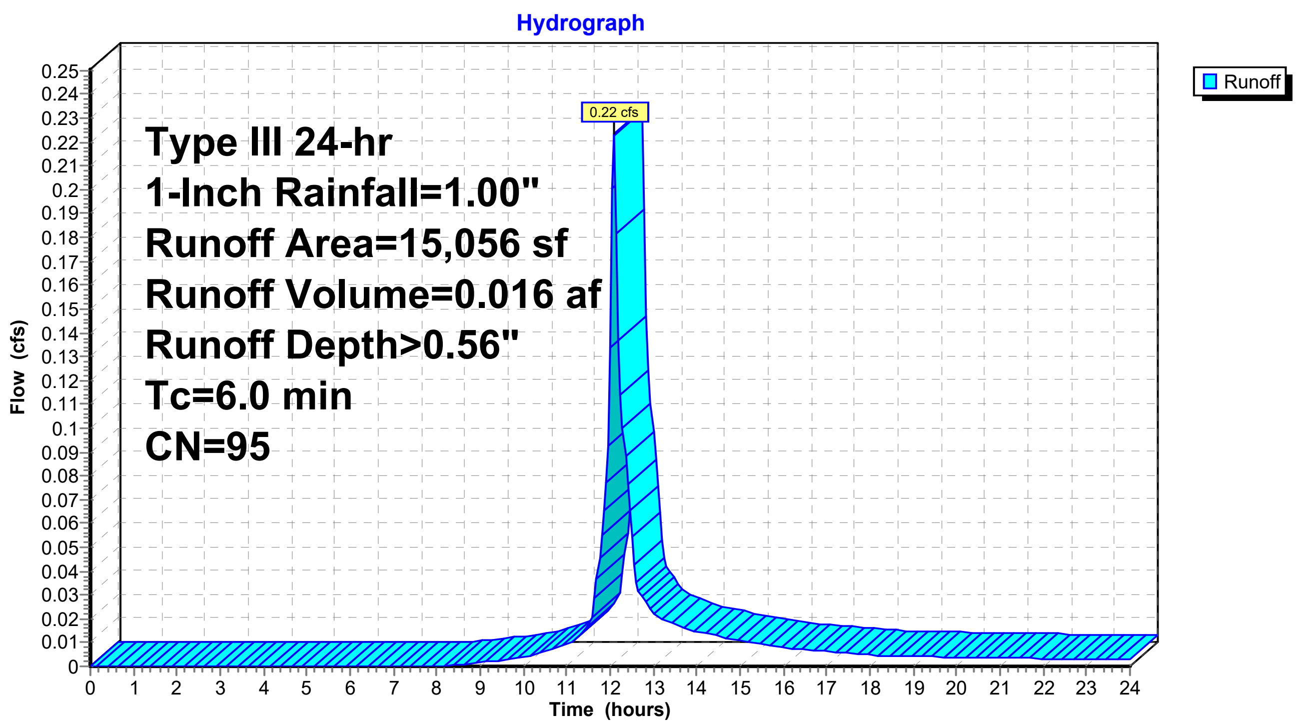
Runoff = 0.22 cfs @ 12.09 hrs, Volume= 0.016 af, Depth> 0.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-Inch Rainfall=1.00"

Area (sf)	CN	Description
11,709	98	Paved parking, HSG C
1,791	96	Gravel surface, HSG C
303	79	50-75% Grass cover, Fair, HSG C
678	70	Woods, Good, HSG C
575	70	Woods, Good, HSG C
15,056	95	Weighted Average
3,347		22.23% Pervious Area
11,709		77.77% Impervious Area

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

Subcatchment E-5C: Existing Watershed 5C



Summary for Subcatchment E-6: Undetained to Wetland

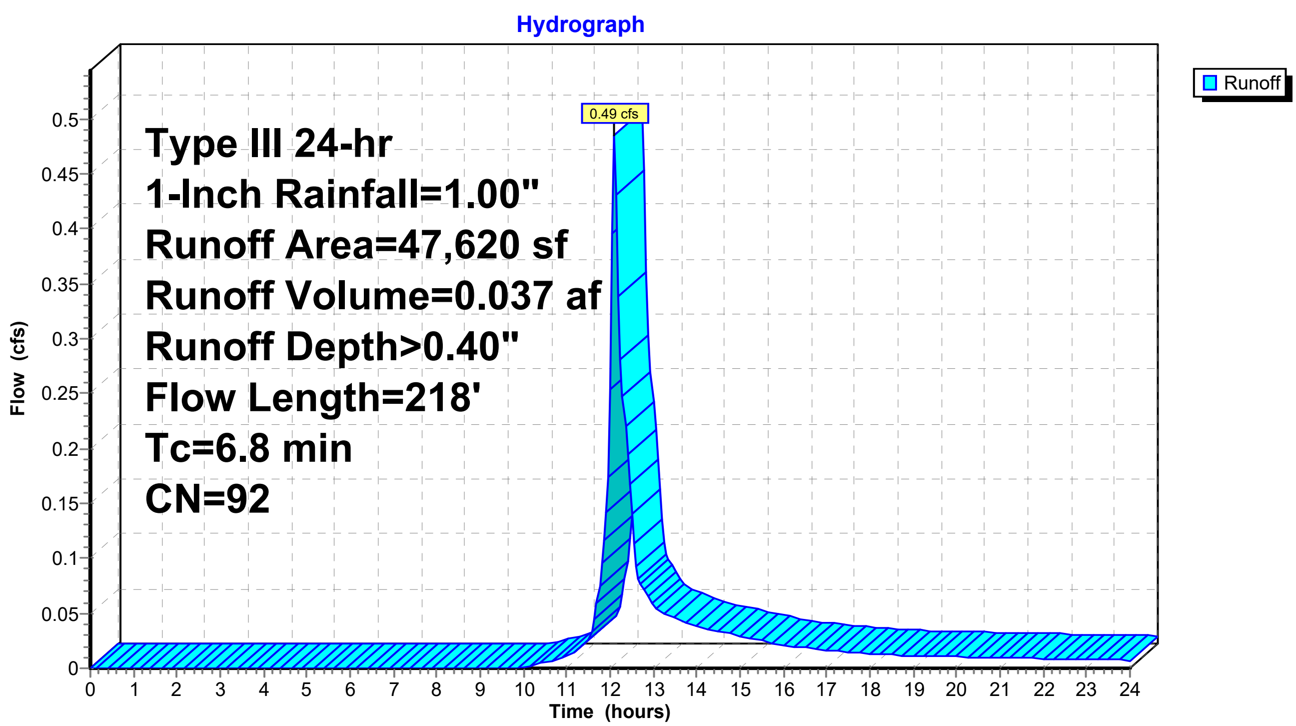
Runoff = 0.49 cfs @ 12.11 hrs, Volume= 0.037 af, Depth> 0.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-Inch Rainfall=1.00"

Area (sf)	CN	Description
36,924	98	Paved parking, HSG C
9,270	74	>75% Grass cover, Good, HSG C
1,426	70	Woods, Good, HSG C
47,620	92	Weighted Average
10,696		22.46% Pervious Area
36,924		77.54% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	50	0.0340	0.18		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
2.2	168	0.0060	1.25		**Shallow Concentrated Flow, SHallow Concentrated Flow** Unpaved Kv= 16.1 fps
6.8	218	Total			

Subcatchment E-6: Undetained to Wetland

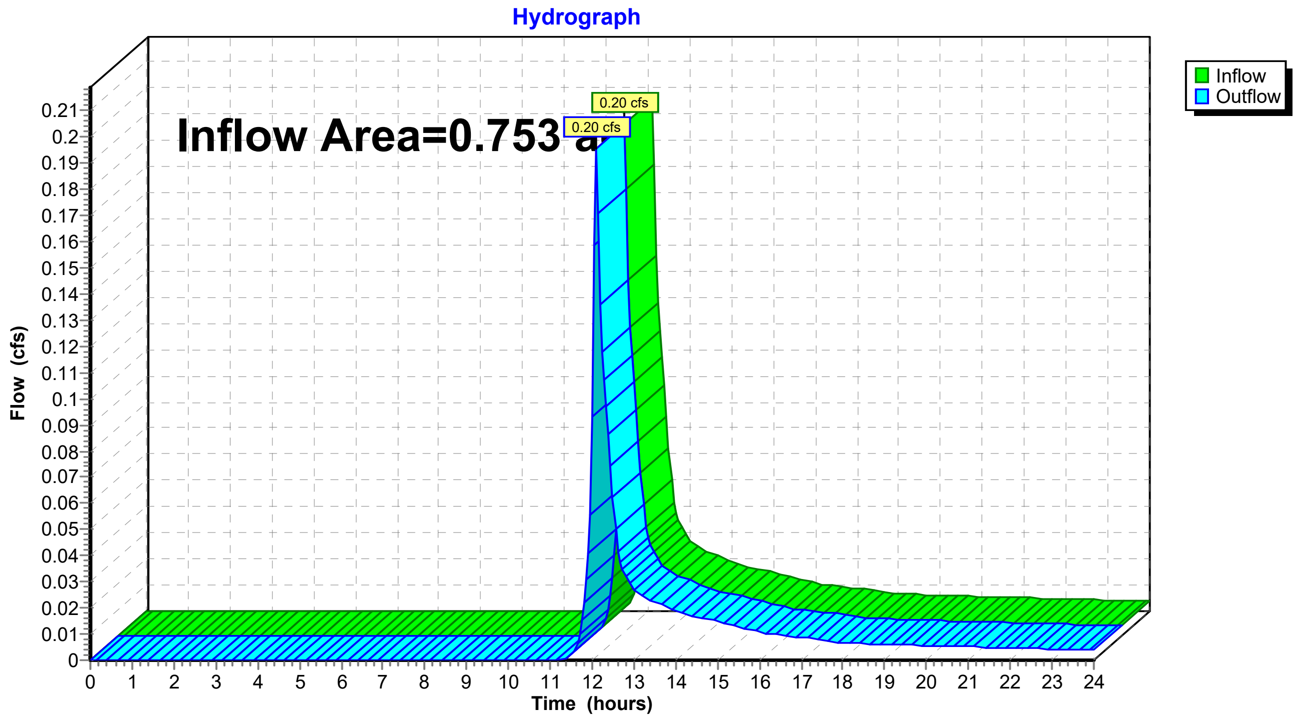


Summary for Reach DP-1: Design Point 1 (Wetland B)

Inflow Area = 0.753 ac, 35.44% Impervious, Inflow Depth > 0.25" for 1-Inch event
Inflow = 0.20 cfs @ 12.10 hrs, Volume= 0.016 af
Outflow = 0.20 cfs @ 12.10 hrs, Volume= 0.016 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach DP-1: Design Point 1 (Wetland B)

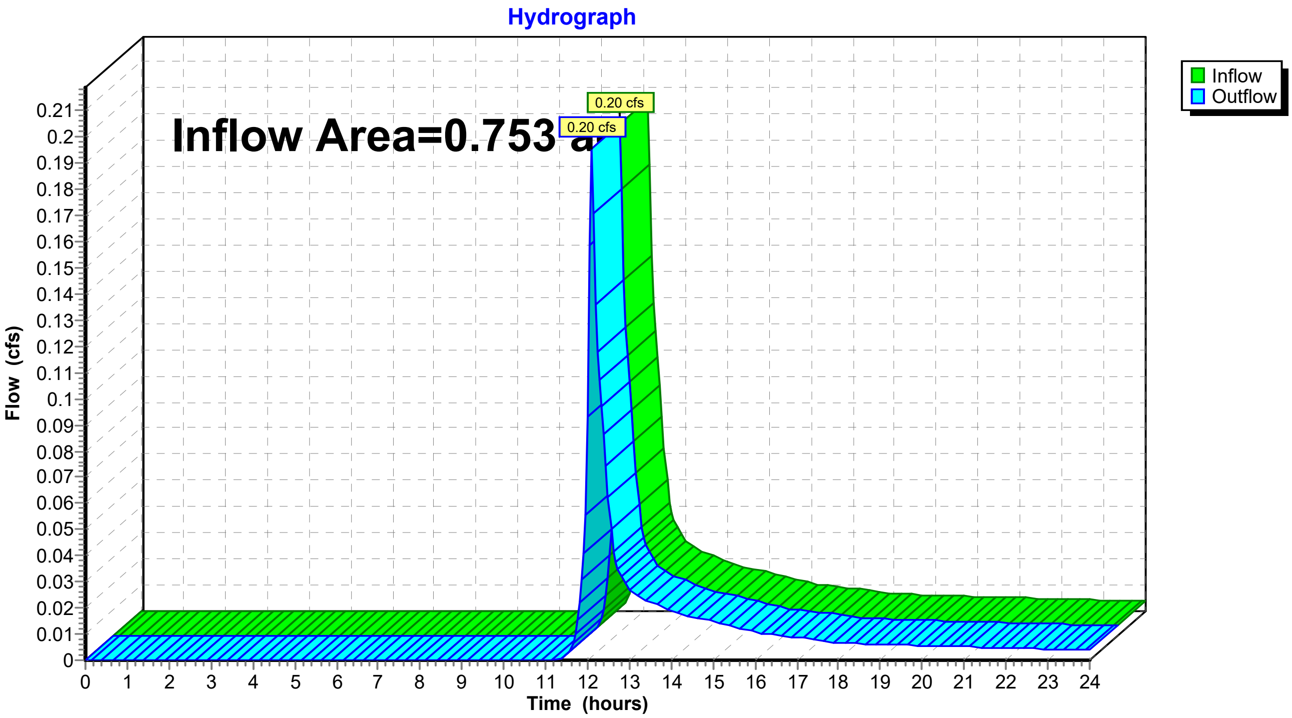


Summary for Reach DP-2: Design Point 2 (15" RCP to Wetland A)

Inflow Area = 0.753 ac, 35.44% Impervious, Inflow Depth > 0.25" for 1-Inch event
Inflow = 0.20 cfs @ 12.10 hrs, Volume= 0.016 af
Outflow = 0.20 cfs @ 12.10 hrs, Volume= 0.016 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach DP-2: Design Point 2 (15" RCP to Wetland A)

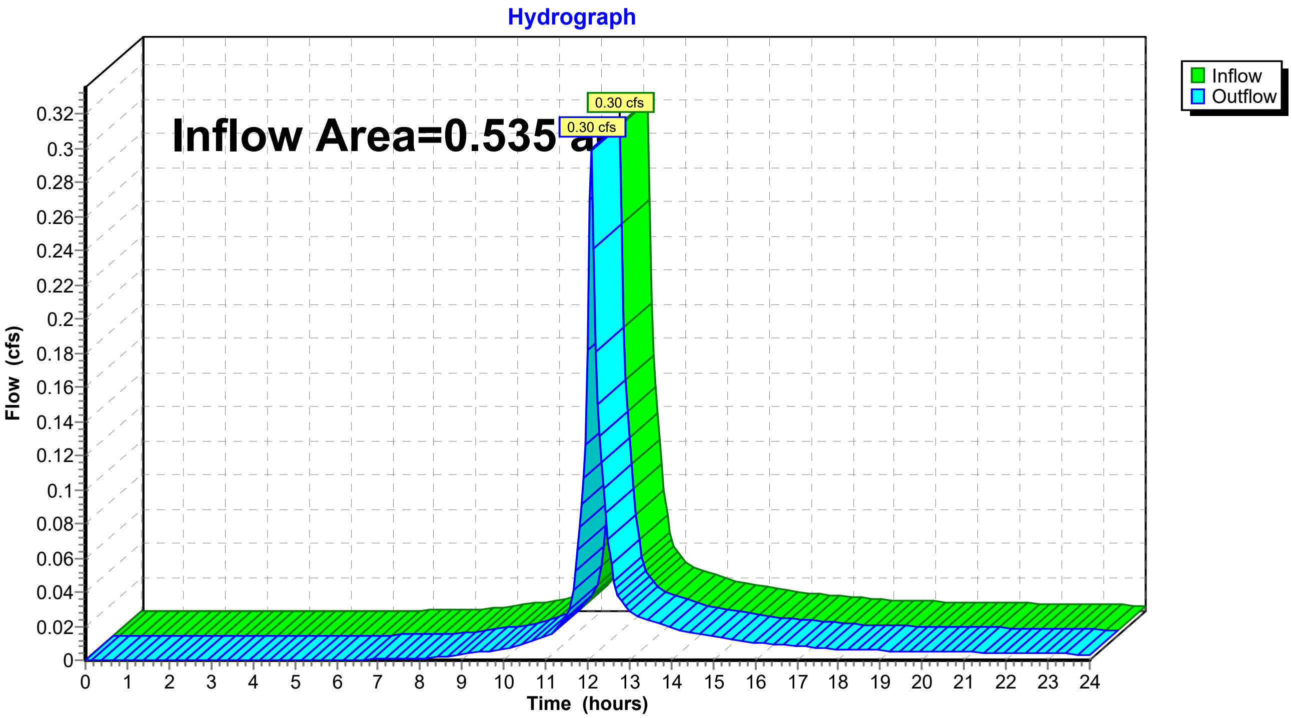


Summary for Reach DP-3: Design Point 3 (Existing Drainage Ditch)

Inflow Area =	0.535 ac,	66.58% Impervious,	Inflow Depth > 0.50"	for 1-Inch event
Inflow =	0.30 cfs @	12.09 hrs, Volume=	0.022 af	
Outflow =	0.30 cfs @	12.09 hrs, Volume=	0.022 af, Atten= 0%, Lag= 0.0 min	

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach DP-3: Design Point 3 (Existing Drainage Ditch)

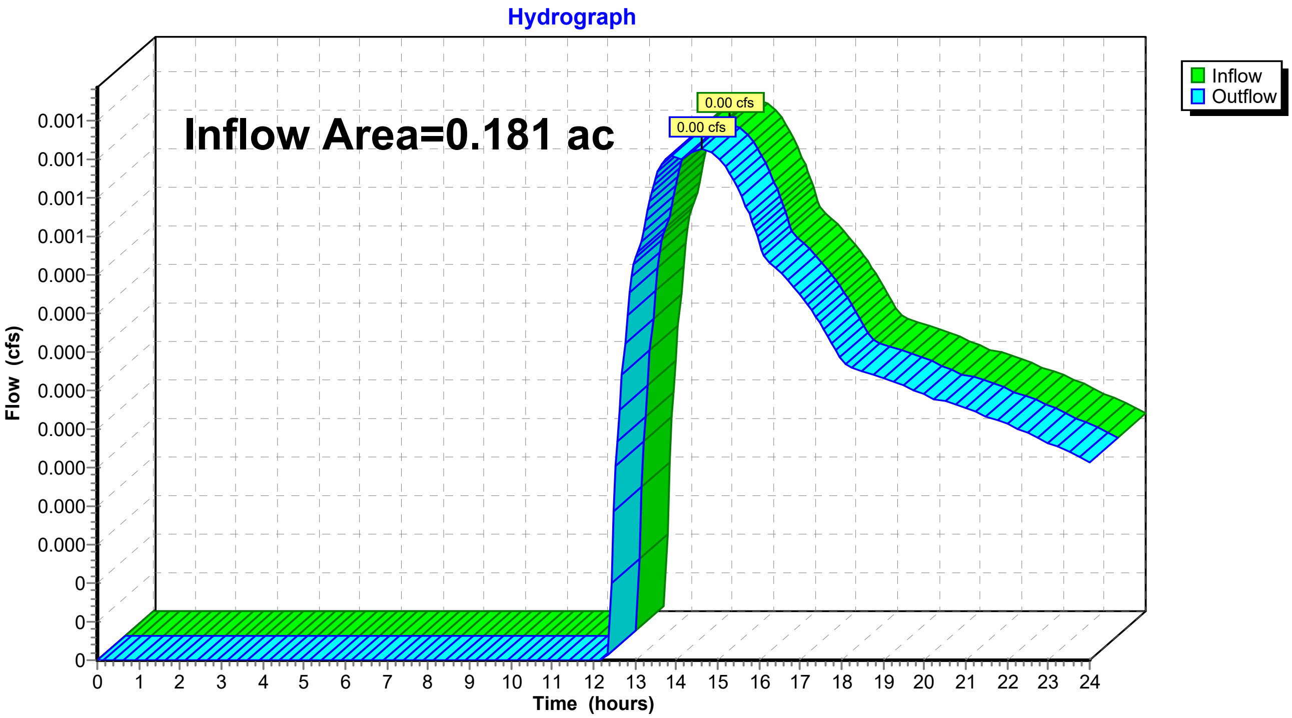


Summary for Reach DP-4: Design Point 4 (MassDOT CB- 2)

Inflow Area = 0.181 ac, 1.31% Impervious, Inflow Depth > 0.03" for 1-Inch event
Inflow = 0.00 cfs @ 14.60 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 14.60 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach DP-4: Design Point 4 (MassDOT CB- 2)

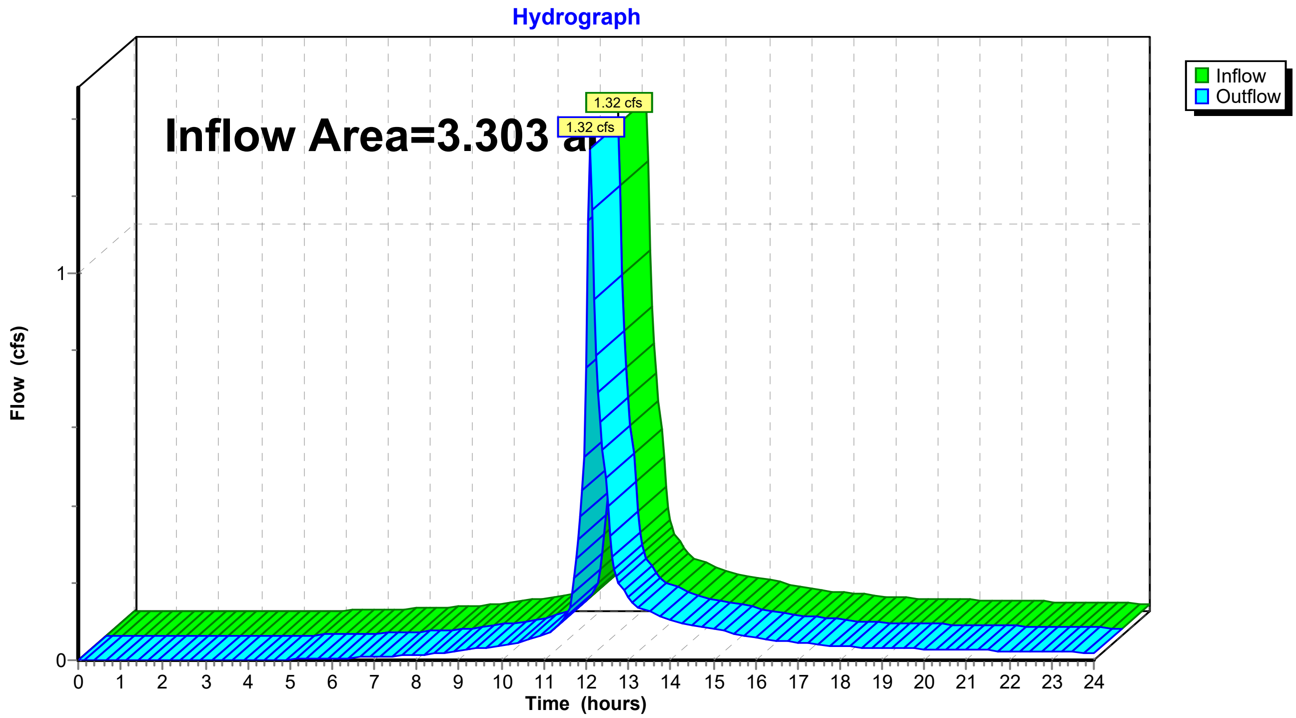


Summary for Reach DP-5: EXISTING CONSTRUCTED STORMWATER WETLAND

Inflow Area = 3.303 ac, 66.43% Impervious, Inflow Depth > 0.41" for 1-Inch event
Inflow = 1.32 cfs @ 12.10 hrs, Volume= 0.114 af
Outflow = 1.32 cfs @ 12.10 hrs, Volume= 0.114 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

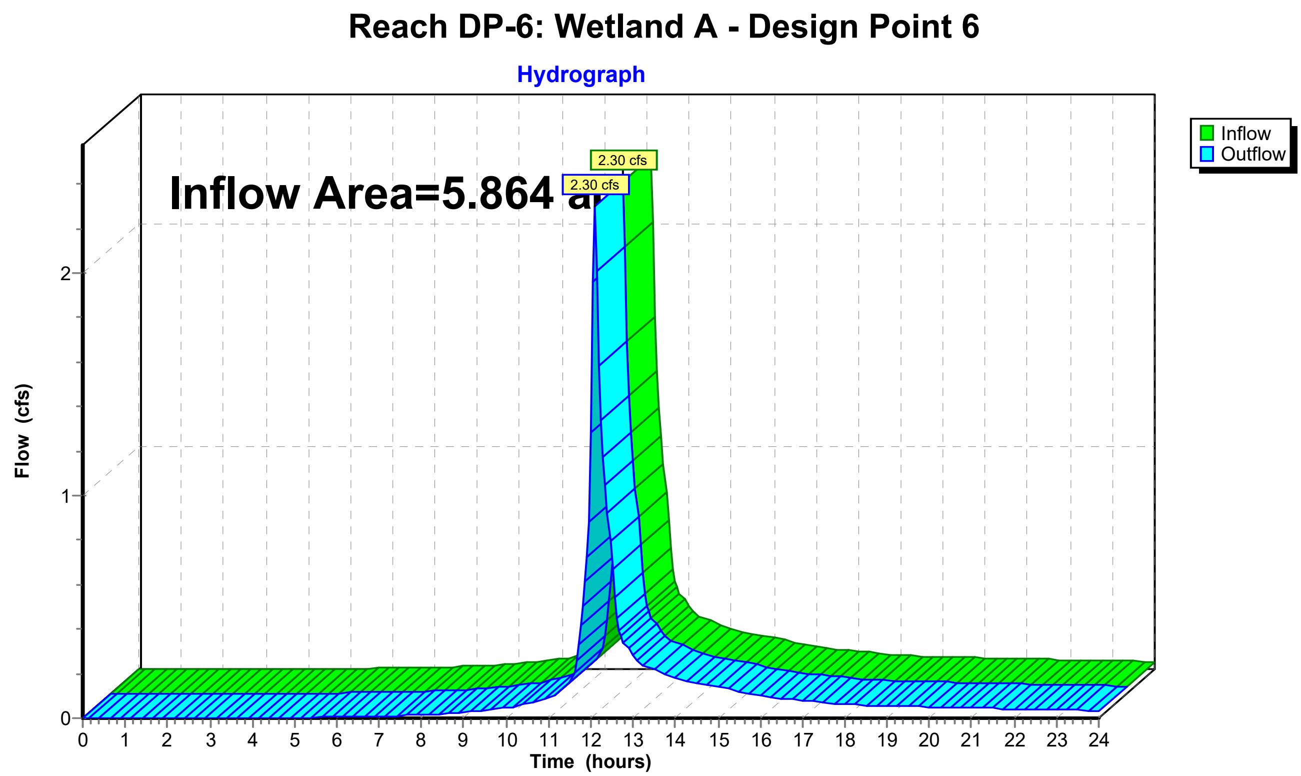
Reach DP-5: EXISTING CONSTRUCTED STORMWATER WETLAND



Summary for Reach DP-6: Wetland A - Design Point 6

Inflow Area = 5.864 ac, 62.53% Impervious, Inflow Depth > 0.39" for 1-Inch event
Inflow = 2.30 cfs @ 12.10 hrs, Volume= 0.188 af
Outflow = 2.30 cfs @ 12.10 hrs, Volume= 0.188 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs



Summary for Subcatchment E-1: Existing Watershed 1

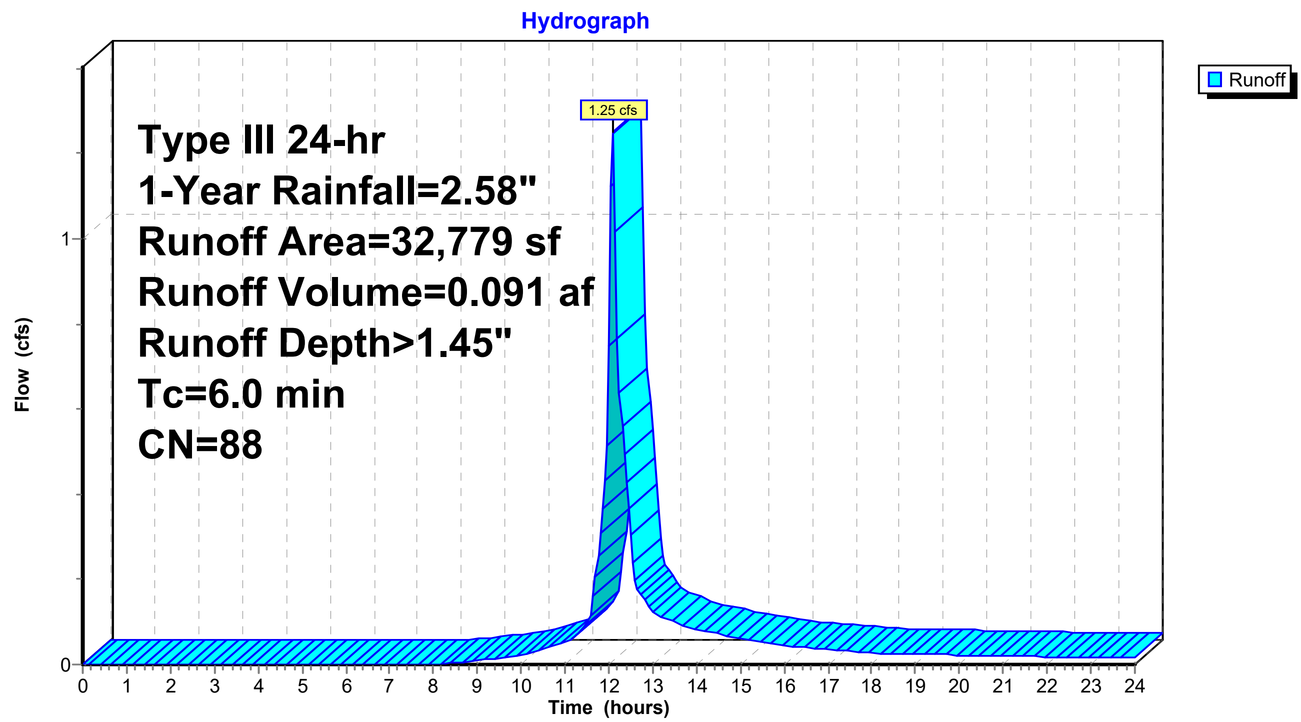
Runoff = 1.25 cfs @ 12.09 hrs, Volume= 0.091 af, Depth> 1.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-Year Rainfall=2.58"

Area (sf)	CN	Description
11,618	98	Paved parking, HSG C
9,421	96	Gravel surface, HSG C
5,782	74	>75% Grass cover, Good, HSG C
3,103	70	Woods, Good, HSG C
561	70	Woods, Good, HSG C
2,294	74	>75% Grass cover, Good, HSG C
32,779	88	Weighted Average
21,161		64.56% Pervious Area
11,618		35.44% Impervious Area

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

Subcatchment E-1: Existing Watershed 1



Summary for Subcatchment E-2: Existing Watershed 2

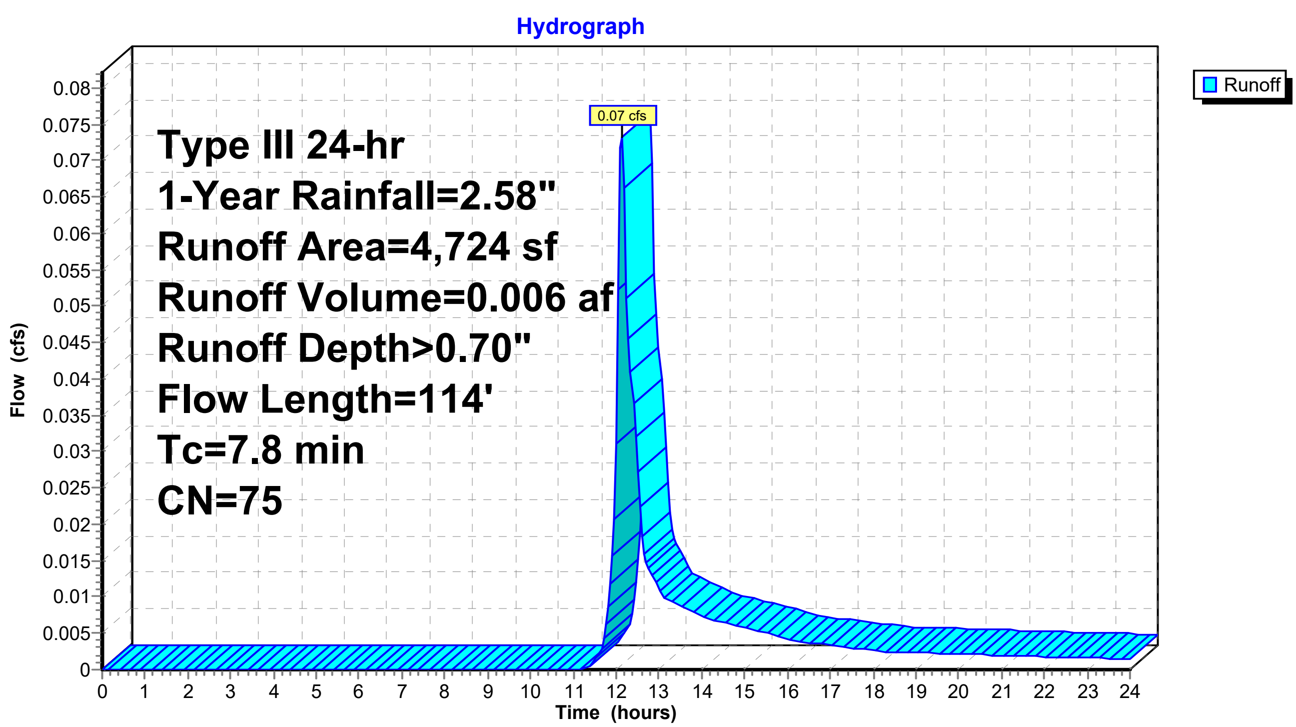
Runoff = 0.07 cfs @ 12.13 hrs, Volume= 0.006 af, Depth> 0.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-Year Rainfall=2.58"

Area (sf)	CN	Description
4,621	74	>75% Grass cover, Good, HSG C
103	98	Paved parking, HSG C
4,724	75	Weighted Average
4,621		97.82% Pervious Area
103		2.18% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	50	0.0100	0.11		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
0.4	64	0.0312	2.84		**Shallow Concentrated Flow, Shallow Concentrated Flow** Unpaved Kv= 16.1 fps
7.8	114	Total			

Subcatchment E-2: Existing Watershed 2



Summary for Subcatchment E-3: Existing Watershed 3

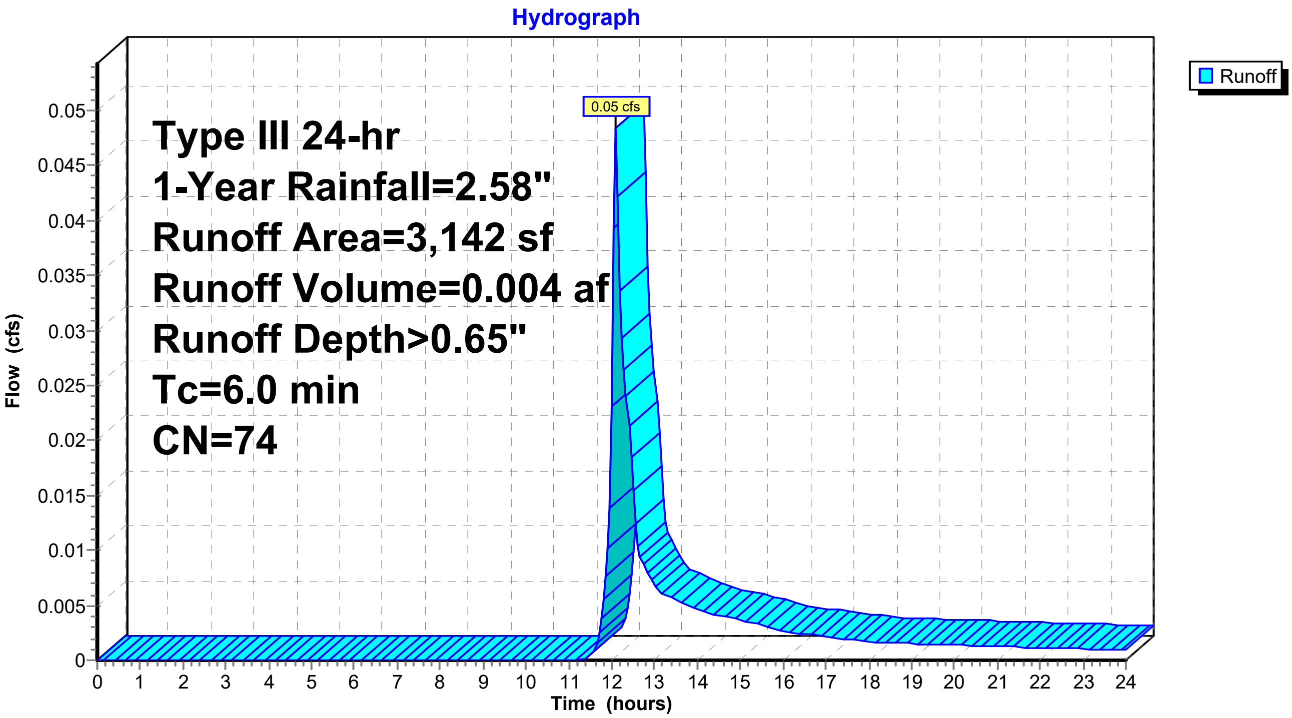
Runoff = 0.05 cfs @ 12.10 hrs, Volume= 0.004 af, Depth> 0.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-Year Rainfall=2.58"

Area (sf)	CN	Description
3,142	74	>75% Grass cover, Good, HSG C
3,142		100.00% Pervious Area

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

Subcatchment E-3: Existing Watershed 3



Summary for Subcatchment E-4A: Existing Watershed 4A

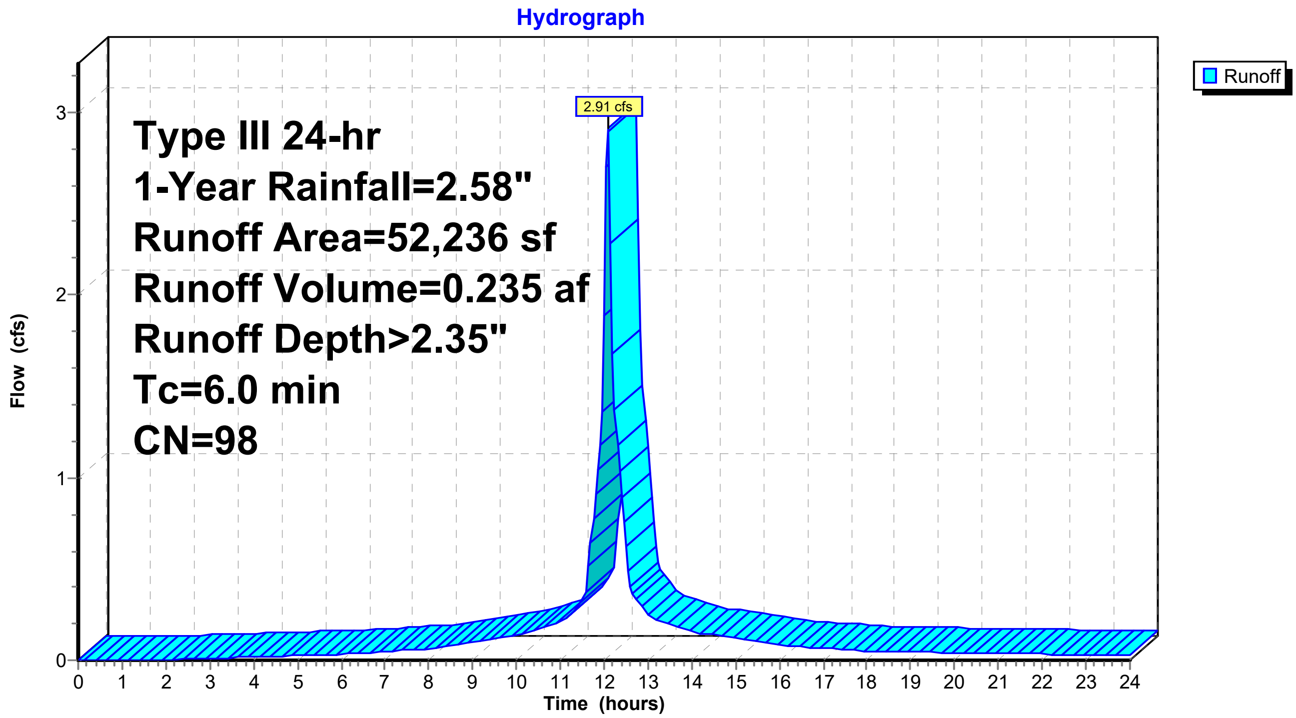
Runoff = 2.91 cfs @ 12.09 hrs, Volume= 0.235 af, Depth> 2.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-Year Rainfall=2.58"

Area (sf)	CN	Description
52,236	98	Roofs, HSG C
52,236		100.00% Impervious Area

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

Subcatchment E-4A: Existing Watershed 4A



Summary for Subcatchment E-4B: Existing Watershed 4B

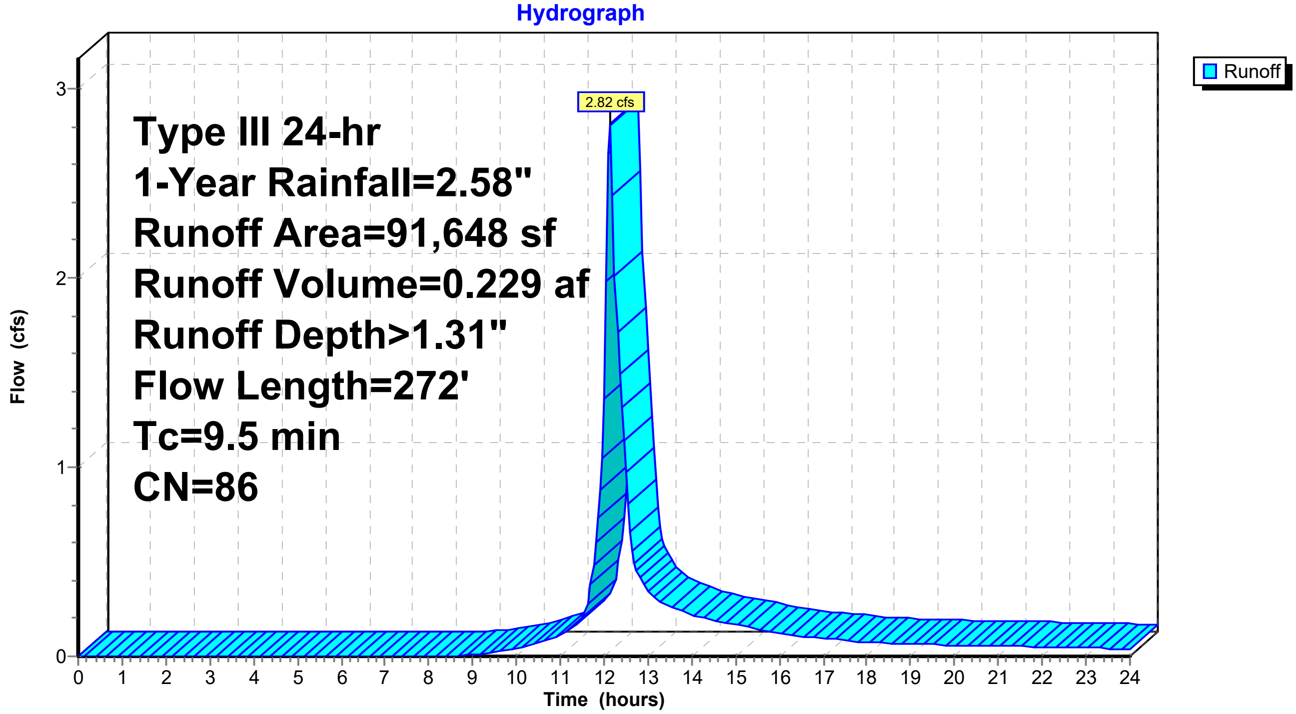
Runoff = 2.82 cfs @ 12.14 hrs, Volume= 0.229 af, Depth> 1.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-Year Rainfall=2.58"

	Area (sf)	CN	Description
	43,351	98	Paved parking, HSG C
	1,304	96	Gravel surface, HSG C
	42,526	74	>75% Grass cover, Good, HSG C
	2,704	70	Woods, Good, HSG C
*	1,763	74	Mulch
	91,648	86	Weighted Average
	48,297		52.70% Pervious Area
	43,351		47.30% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.1	50	0.0080	0.10		**Sheet Flow, Sheet Flow** Grass: Short n= 0.150 P2= 3.20"
0.8	111	0.0216	2.37		**Shallow Concentrated Flow, Shallow Concentrated Flow** Unpaved Kv= 16.1 fps
0.1	40	0.1500	6.24		**Shallow Concentrated Flow, SHallow** Unpaved Kv= 16.1 fps
0.5	71	0.0150	2.49		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
9.5	272	Total			

Subcatchment E-4B: Existing Watershed 4B



Summary for Subcatchment E-5A: Existing Watershed 5A

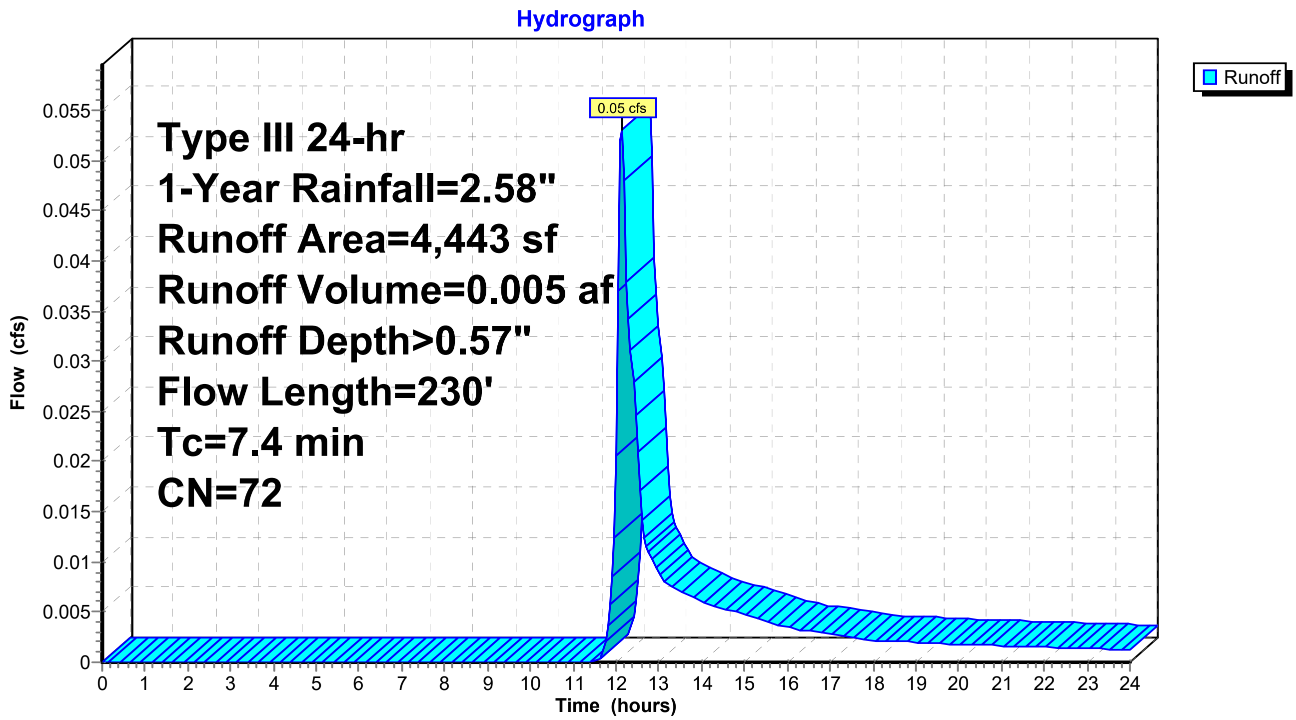
Runoff = 0.05 cfs @ 12.13 hrs, Volume= 0.005 af, Depth> 0.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-Year Rainfall=2.58"

Area (sf)	CN	Description
1,742	74	>75% Grass cover, Good, HSG C
2,701	70	Woods, Good, HSG C
4,443	72	Weighted Average
4,443		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	50	0.0160	0.14		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
1.2	180	0.0244	2.51		**Shallow Concentrated Flow, Shallow COncentrated Flow** Unpaved Kv= 16.1 fps
7.4	230	Total			

Subcatchment E-5A: Existing Watershed 5A



Summary for Subcatchment E-5B: Existing Watershed 5B

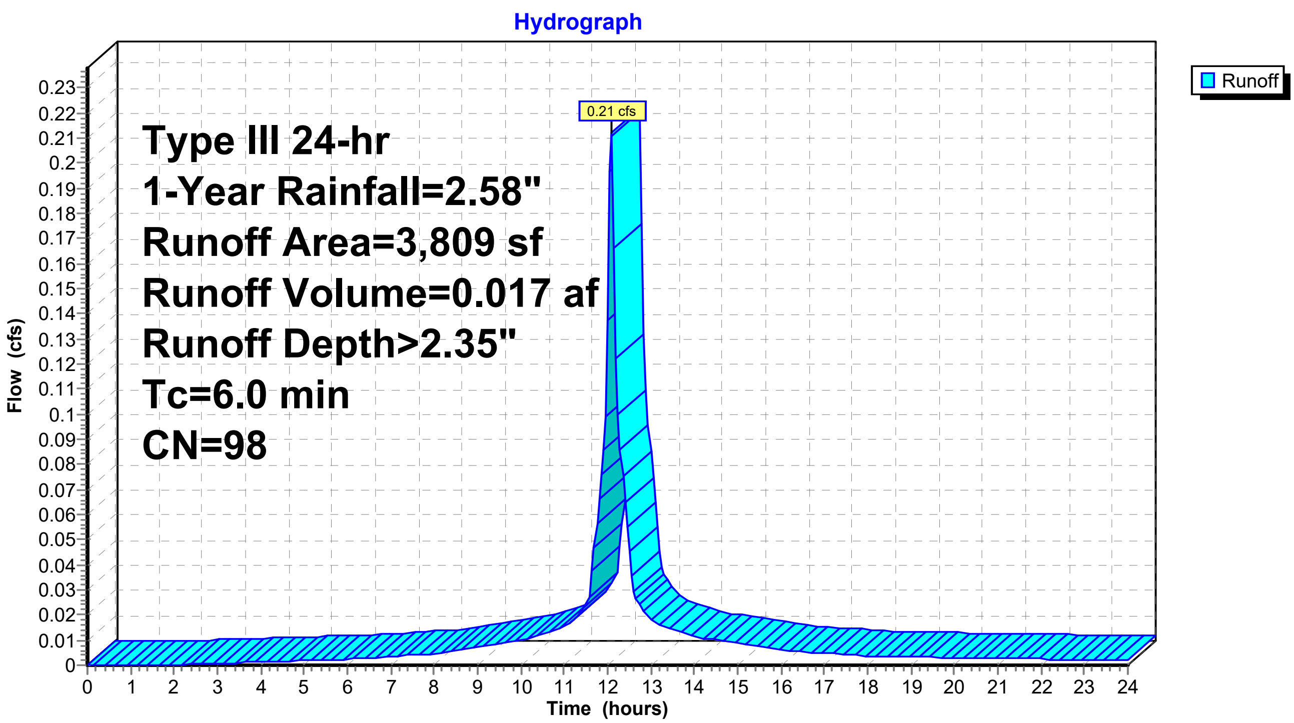
Runoff = 0.21 cfs @ 12.09 hrs, Volume= 0.017 af, Depth> 2.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-Year Rainfall=2.58"

Area (sf)	CN	Description
3,809	98	Paved parking, HSG C
3,809		100.00% Impervious Area

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

Subcatchment E-5B: Existing Watershed 5B



Summary for Subcatchment E-5C: Existing Watershed 5C

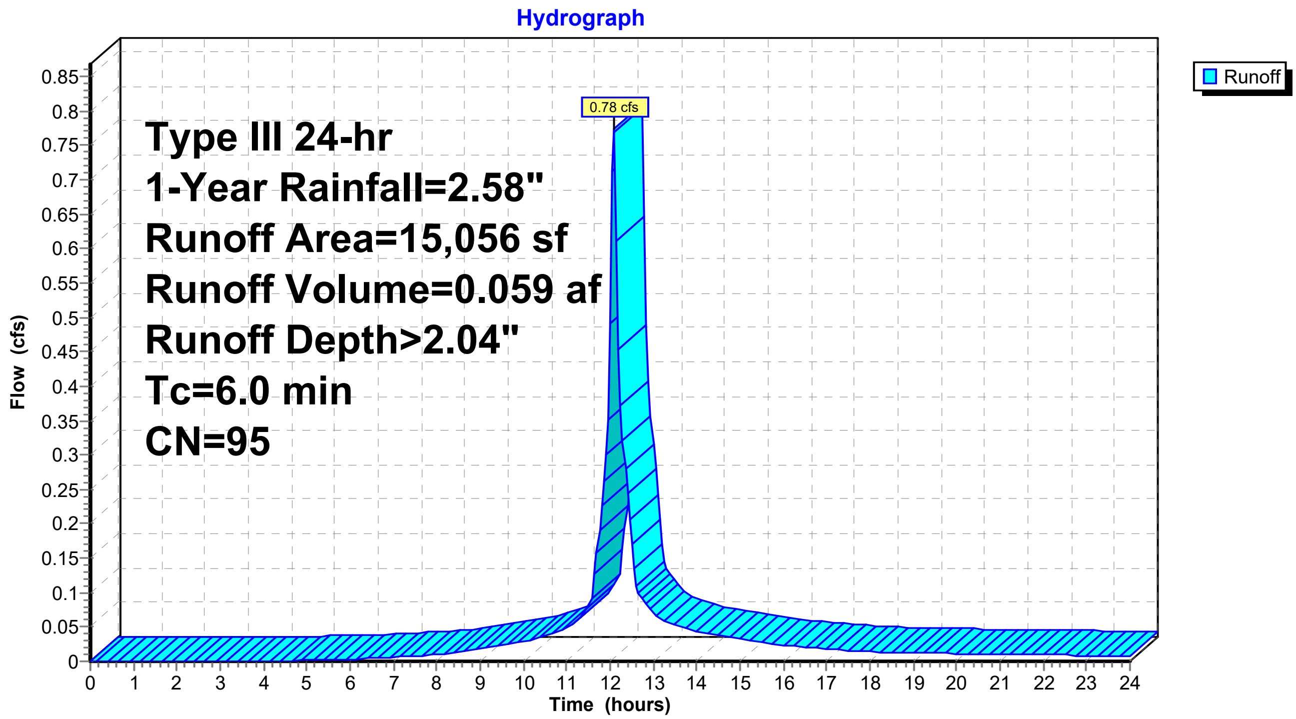
Runoff = 0.78 cfs @ 12.09 hrs, Volume= 0.059 af, Depth> 2.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-Year Rainfall=2.58"

Area (sf)	CN	Description
11,709	98	Paved parking, HSG C
1,791	96	Gravel surface, HSG C
303	79	50-75% Grass cover, Fair, HSG C
678	70	Woods, Good, HSG C
575	70	Woods, Good, HSG C
15,056	95	Weighted Average
3,347		22.23% Pervious Area
11,709		77.77% Impervious Area

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

Subcatchment E-5C: Existing Watershed 5C



Summary for Subcatchment E-6: Undetained to Wetland

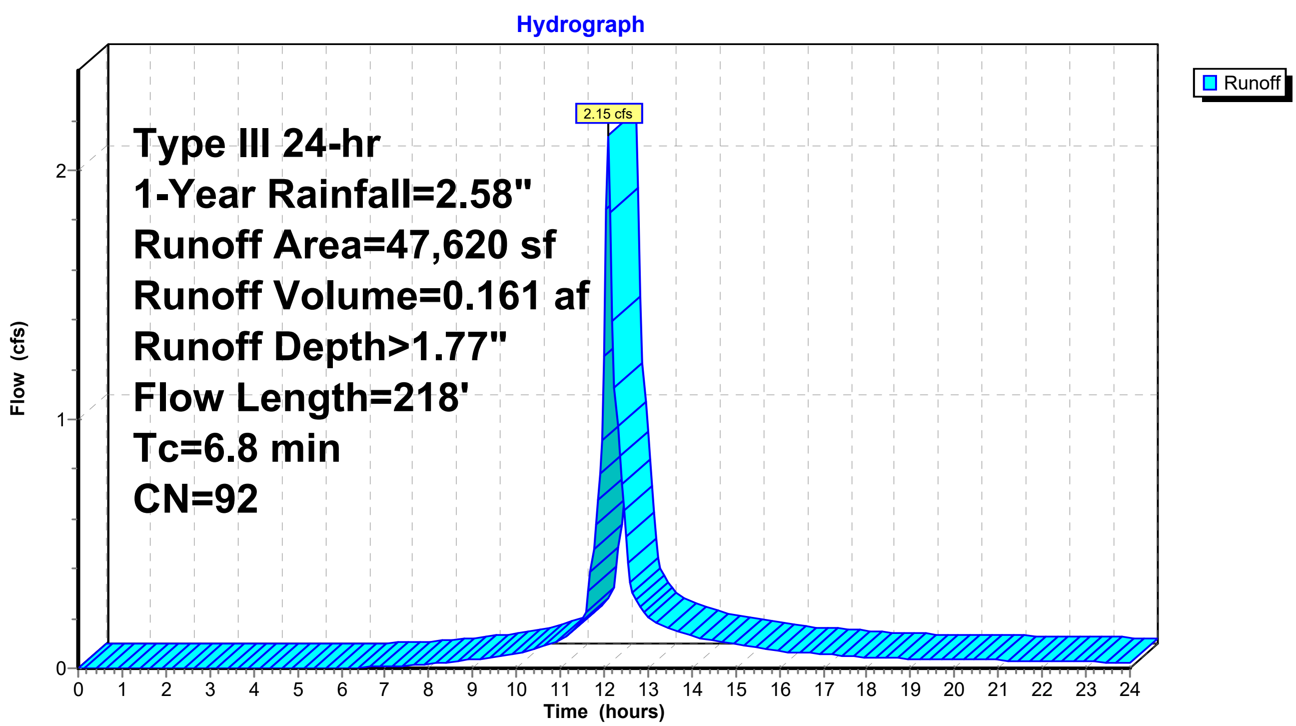
Runoff = 2.15 cfs @ 12.10 hrs, Volume= 0.161 af, Depth> 1.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-Year Rainfall=2.58"

Area (sf)	CN	Description
36,924	98	Paved parking, HSG C
9,270	74	>75% Grass cover, Good, HSG C
1,426	70	Woods, Good, HSG C
47,620	92	Weighted Average
10,696		22.46% Pervious Area
36,924		77.54% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	50	0.0340	0.18		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
2.2	168	0.0060	1.25		**Shallow Concentrated Flow, SHallow Concentrated Flow** Unpaved Kv= 16.1 fps
6.8	218	Total			

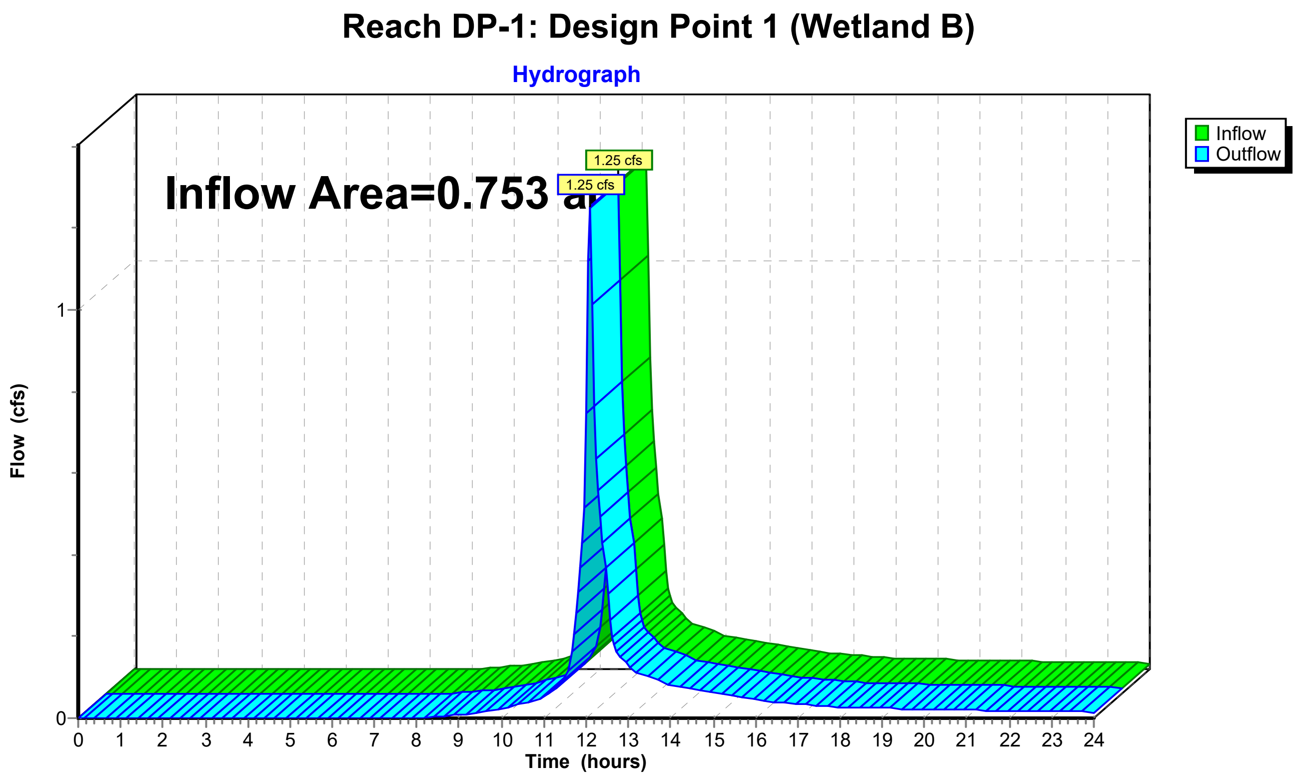
Subcatchment E-6: Undetained to Wetland



Summary for Reach DP-1: Design Point 1 (Wetland B)

Inflow Area = 0.753 ac, 35.44% Impervious, Inflow Depth > 1.45" for 1-Year event
Inflow = 1.25 cfs @ 12.09 hrs, Volume= 0.091 af
Outflow = 1.25 cfs @ 12.09 hrs, Volume= 0.091 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

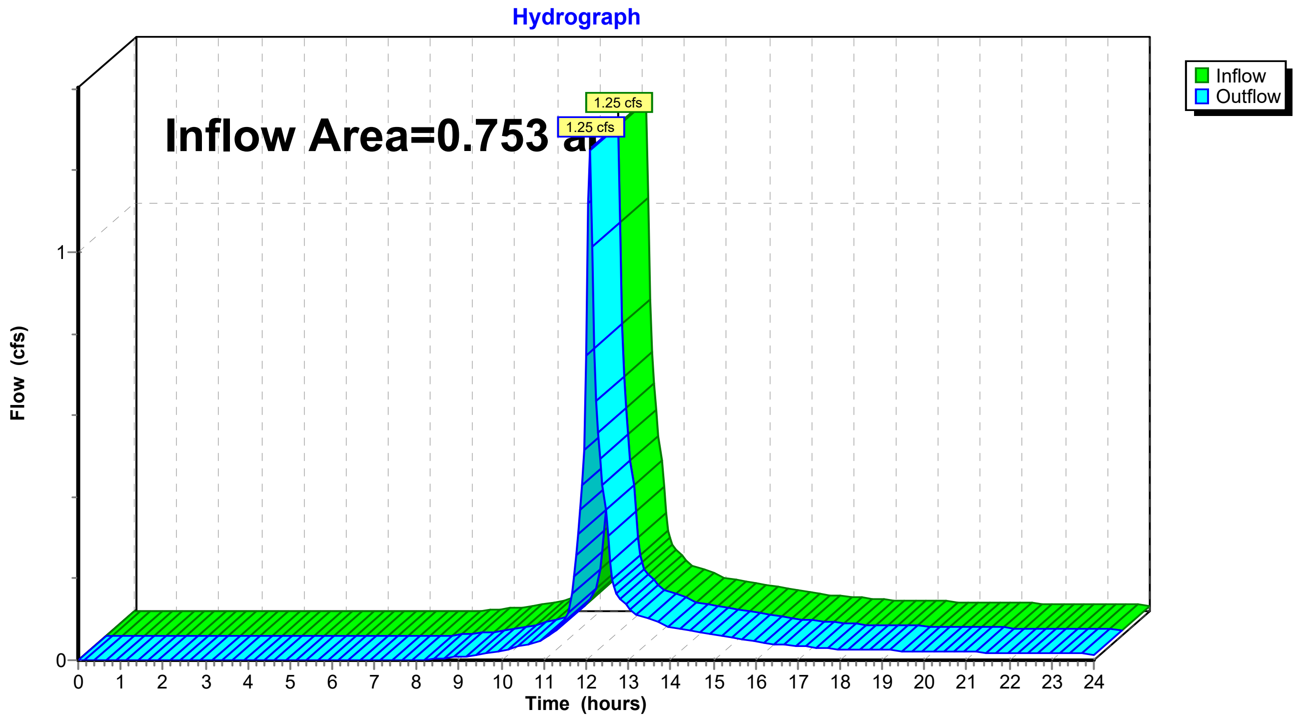


Summary for Reach DP-2: Design Point 2 (15" RCP to Wetland A)

Inflow Area = 0.753 ac, 35.44% Impervious, Inflow Depth > 1.45" for 1-Year event
Inflow = 1.25 cfs @ 12.09 hrs, Volume= 0.091 af
Outflow = 1.25 cfs @ 12.09 hrs, Volume= 0.091 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

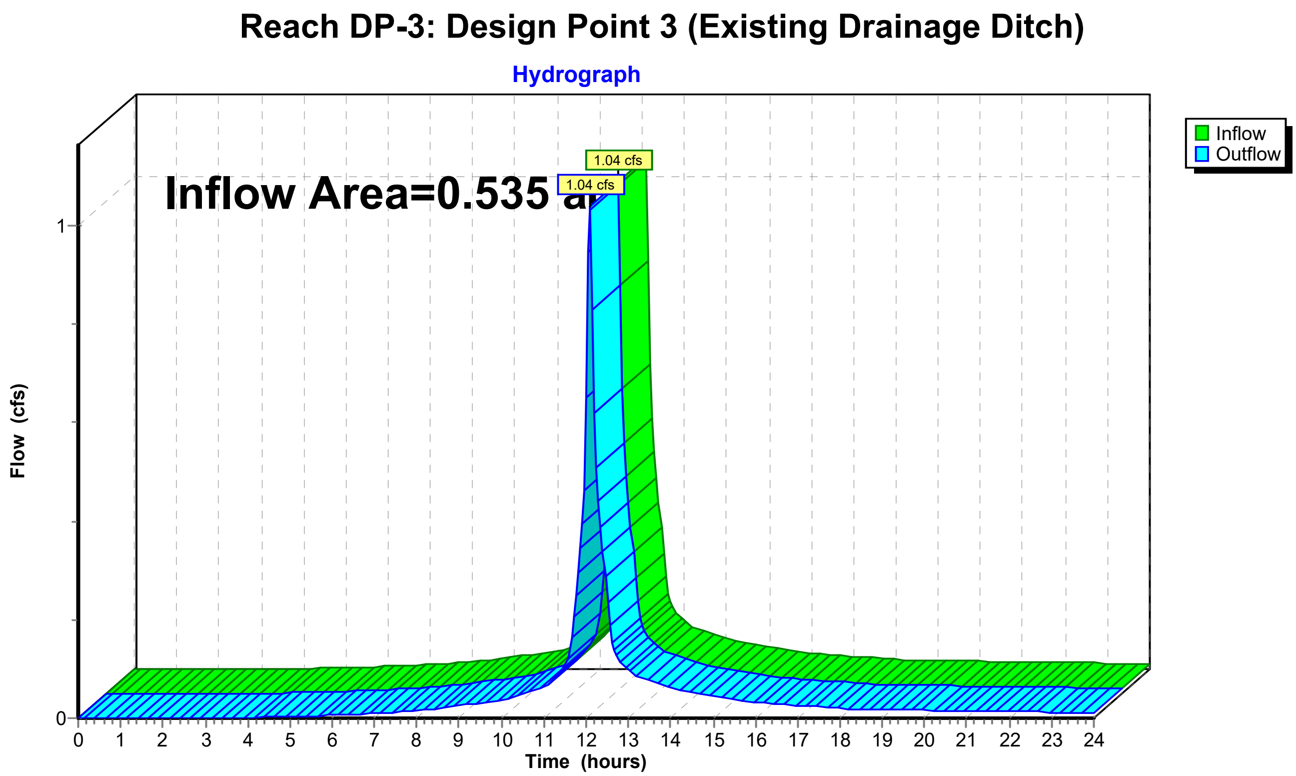
Reach DP-2: Design Point 2 (15" RCP to Wetland A)



Summary for Reach DP-3: Design Point 3 (Existing Drainage Ditch)

Inflow Area =	0.535 ac,	66.58% Impervious,	Inflow Depth > 1.81"	for 1-Year event	
Inflow =	1.04 cfs @	12.09 hrs,	Volume=	0.081 af	
Outflow =	1.04 cfs @	12.09 hrs,	Volume=	0.081 af,	Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

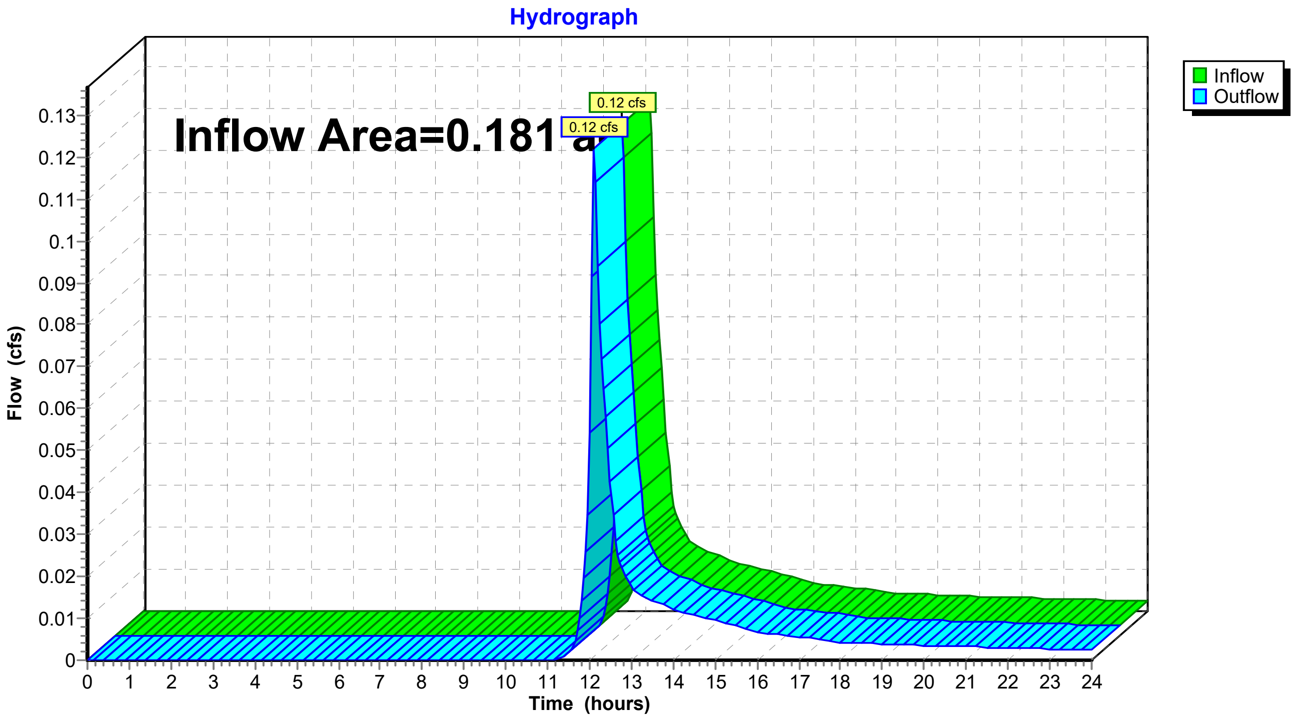


Summary for Reach DP-4: Design Point 4 (MassDOT CB- 2)

Inflow Area =	0.181 ac,	1.31% Impervious,	Inflow Depth > 0.68"	for 1-Year event	
Inflow =	0.12 cfs @	12.12 hrs,	Volume=	0.010 af	
Outflow =	0.12 cfs @	12.12 hrs,	Volume=	0.010 af,	Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach DP-4: Design Point 4 (MassDOT CB- 2)

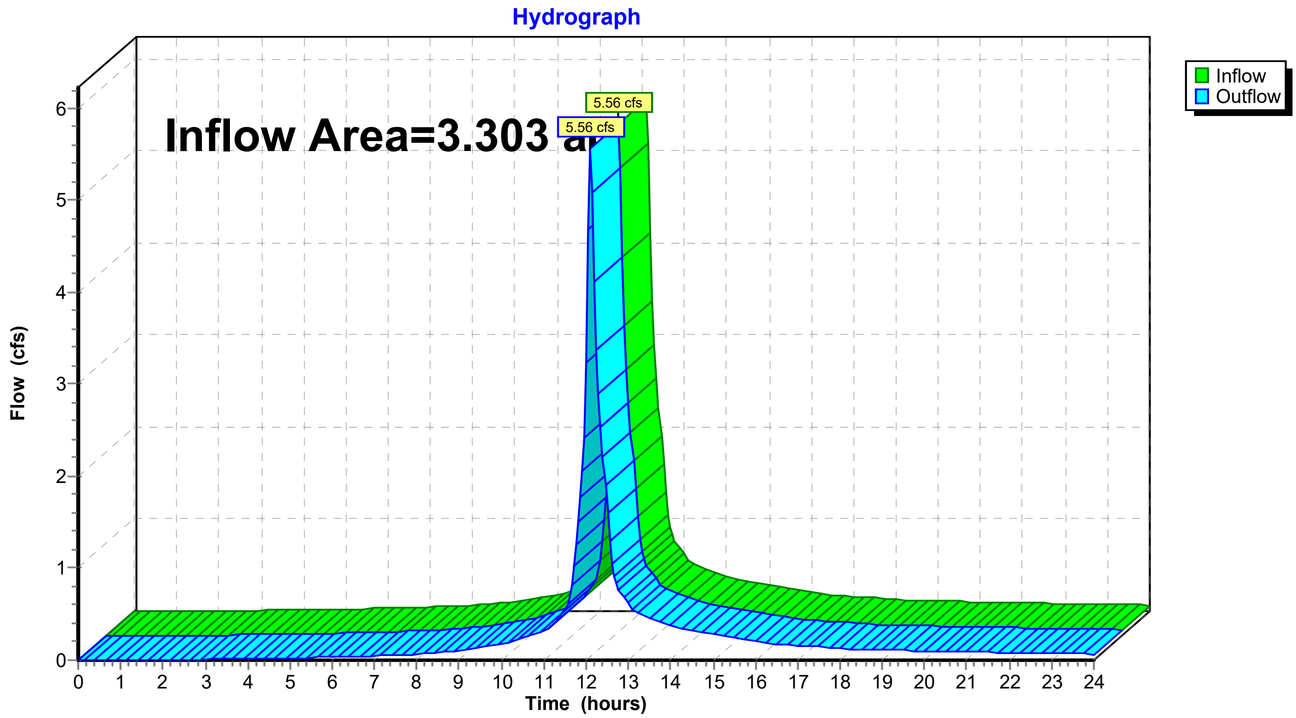


Summary for Reach DP-5: EXISTING CONSTRUCTED STORMWATER WETLAND

Inflow Area = 3.303 ac, 66.43% Impervious, Inflow Depth > 1.69" for 1-Year event
Inflow = 5.56 cfs @ 12.11 hrs, Volume= 0.464 af
Outflow = 5.56 cfs @ 12.11 hrs, Volume= 0.464 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach DP-5: EXISTING CONSTRUCTED STORMWATER WETLAND

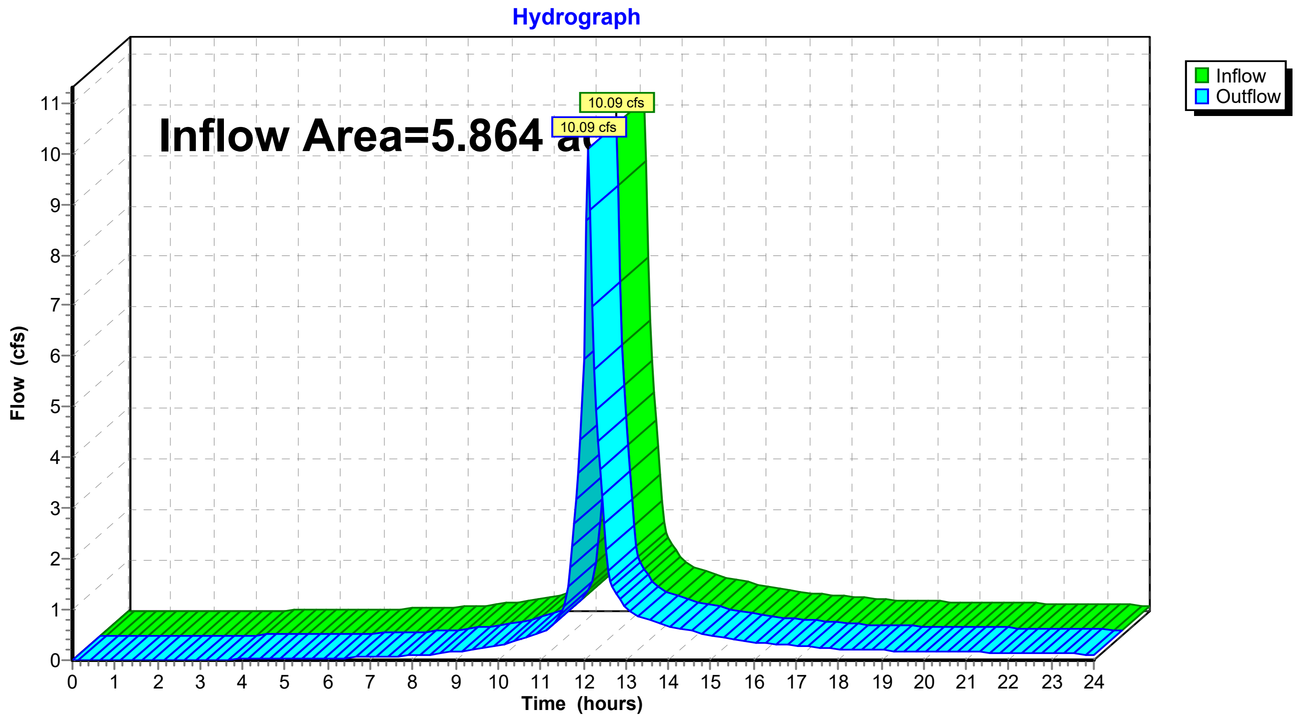


Summary for Reach DP-6: Wetland A - Design Point 6

Inflow Area =	5.864 ac, 62.53% Impervious, Inflow Depth > 1.65" for 1-Year event			
Inflow =	10.09 cfs @	12.10 hrs, Volume=	0.806 af	
Outflow =	10.09 cfs @	12.10 hrs, Volume=	0.806 af,	Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach DP-6: Wetland A - Design Point 6



Summary for Subcatchment E-1: Existing Watershed 1

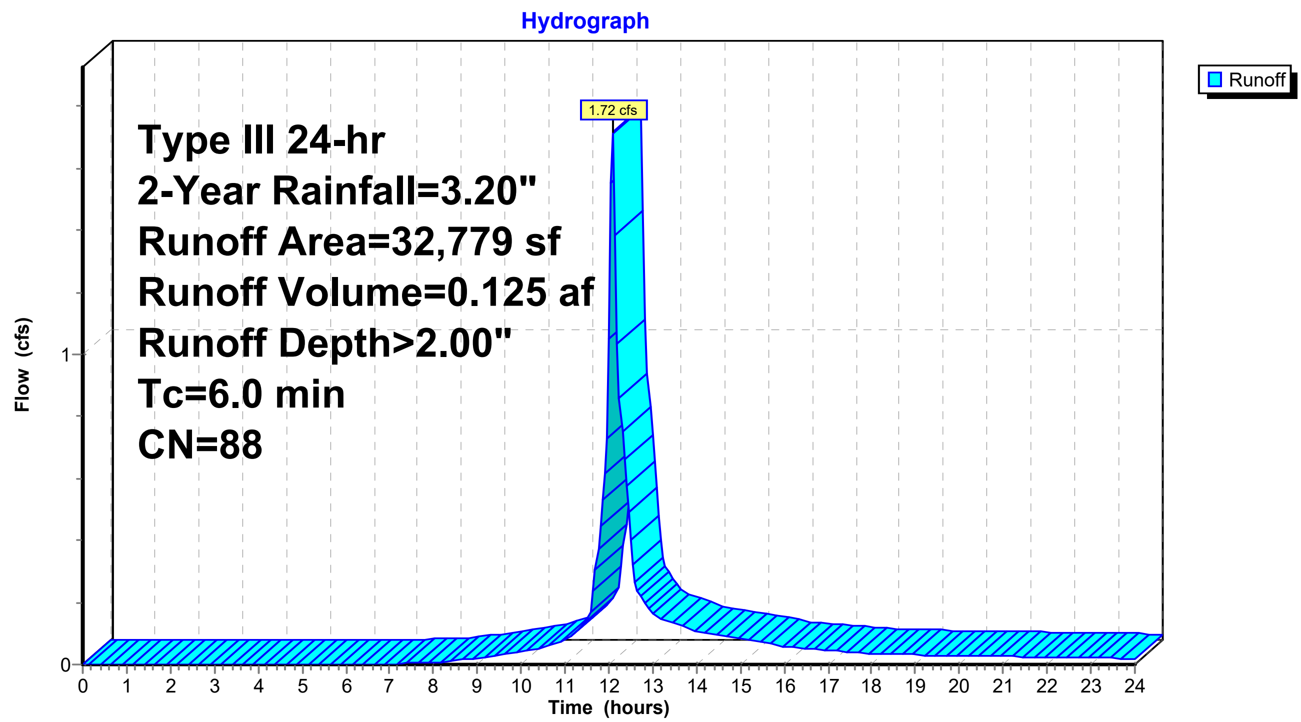
Runoff = 1.72 cfs @ 12.09 hrs, Volume= 0.125 af, Depth> 2.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.20"

Area (sf)	CN	Description
11,618	98	Paved parking, HSG C
9,421	96	Gravel surface, HSG C
5,782	74	>75% Grass cover, Good, HSG C
3,103	70	Woods, Good, HSG C
561	70	Woods, Good, HSG C
2,294	74	>75% Grass cover, Good, HSG C
32,779	88	Weighted Average
21,161		64.56% Pervious Area
11,618		35.44% Impervious Area

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

Subcatchment E-1: Existing Watershed 1



Summary for Subcatchment E-2: Existing Watershed 2

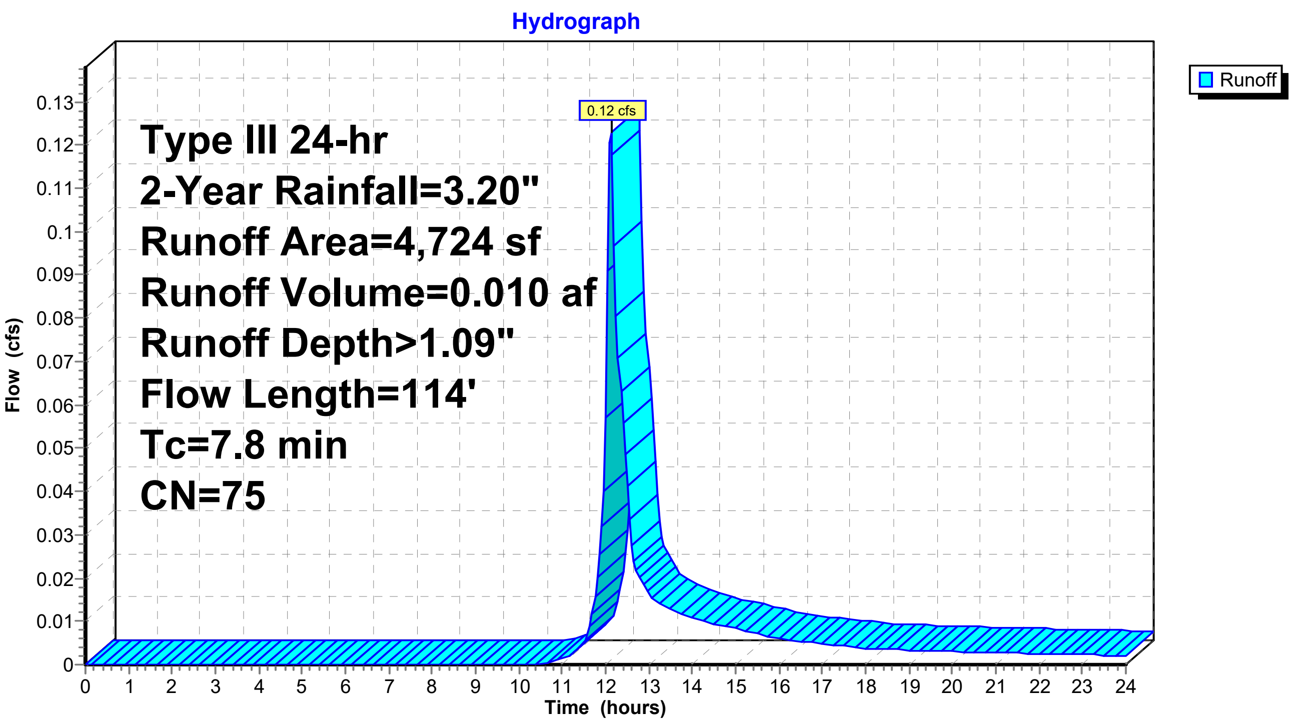
Runoff = 0.12 cfs @ 12.12 hrs, Volume= 0.010 af, Depth> 1.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.20"

Area (sf)	CN	Description
4,621	74	>75% Grass cover, Good, HSG C
103	98	Paved parking, HSG C
4,724	75	Weighted Average
4,621		97.82% Pervious Area
103		2.18% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	50	0.0100	0.11		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
0.4	64	0.0312	2.84		**Shallow Concentrated Flow, Shallow Concentrated Flow** Unpaved Kv= 16.1 fps
7.8	114	Total			

Subcatchment E-2: Existing Watershed 2



Summary for Subcatchment E-3: Existing Watershed 3

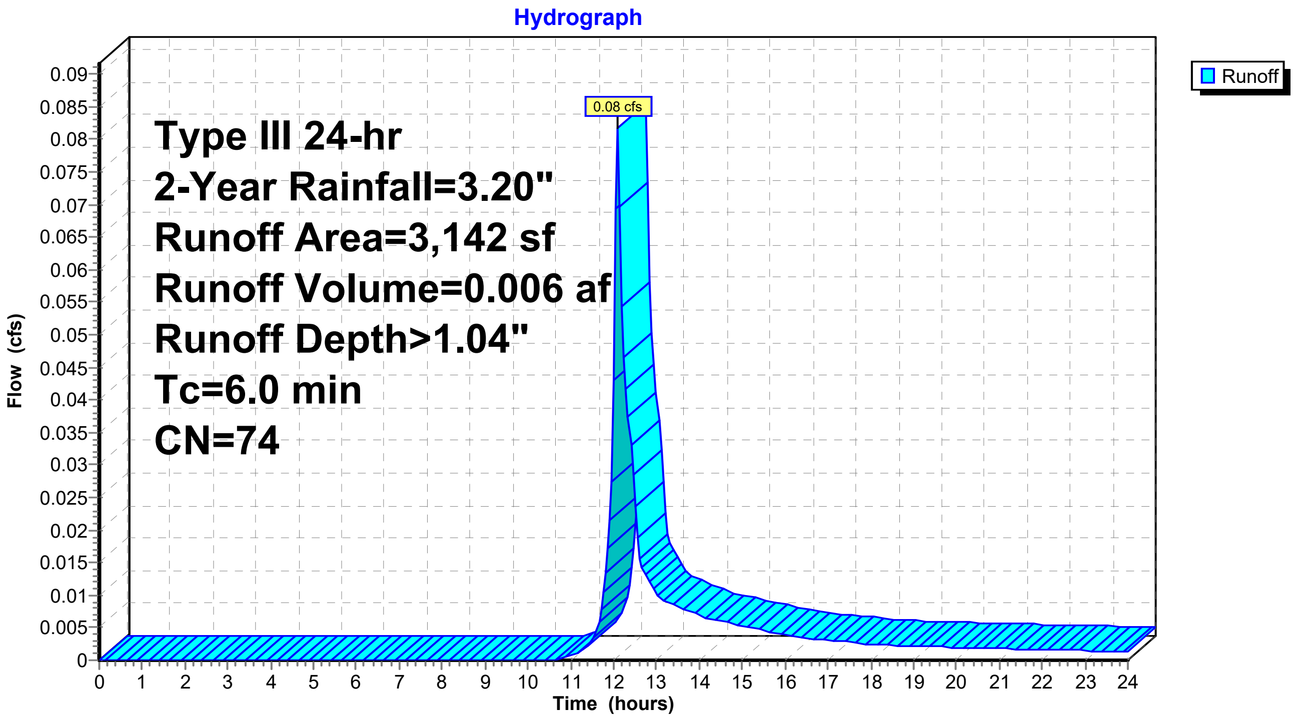
Runoff = 0.08 cfs @ 12.10 hrs, Volume= 0.006 af, Depth> 1.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.20"

Area (sf)	CN	Description
3,142	74	>75% Grass cover, Good, HSG C
3,142		100.00% Pervious Area

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

Subcatchment E-3: Existing Watershed 3



Summary for Subcatchment E-4A: Existing Watershed 4A

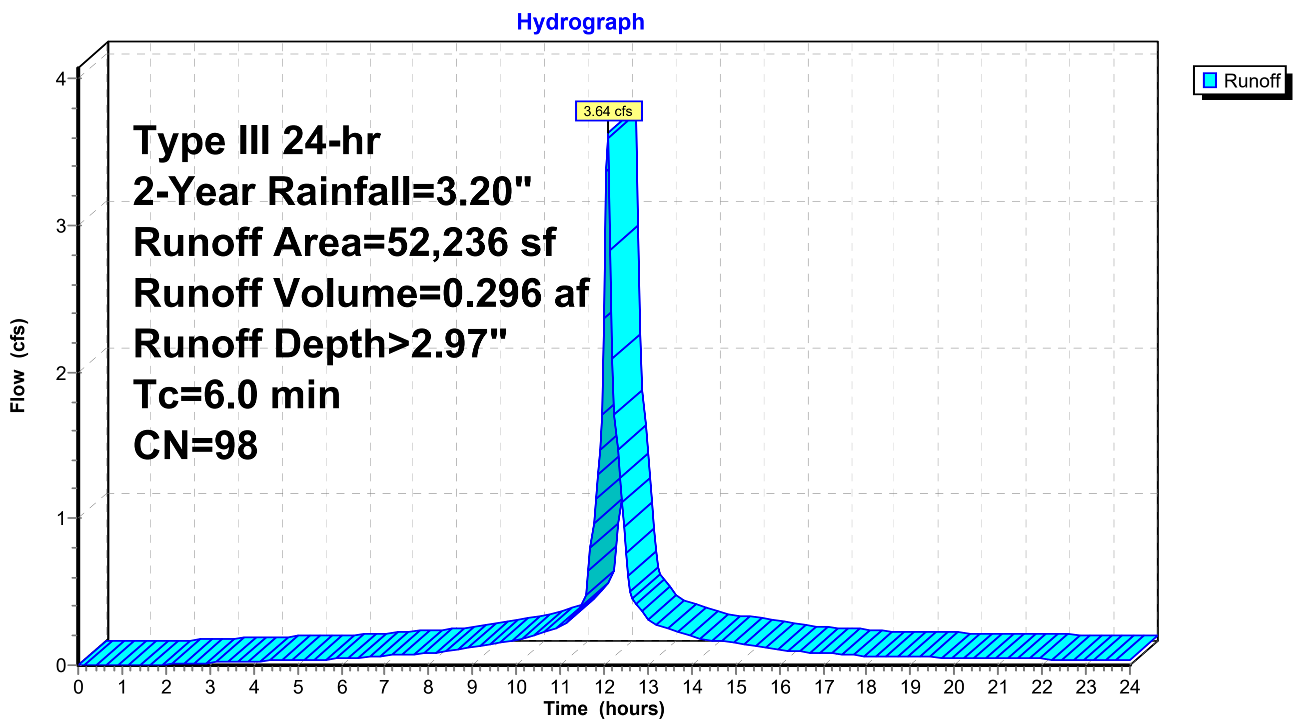
Runoff = 3.64 cfs @ 12.09 hrs, Volume= 0.296 af, Depth> 2.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.20"

Area (sf)	CN	Description
52,236	98	Roofs, HSG C
52,236		100.00% Impervious Area

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

Subcatchment E-4A: Existing Watershed 4A



Summary for Subcatchment E-4B: Existing Watershed 4B

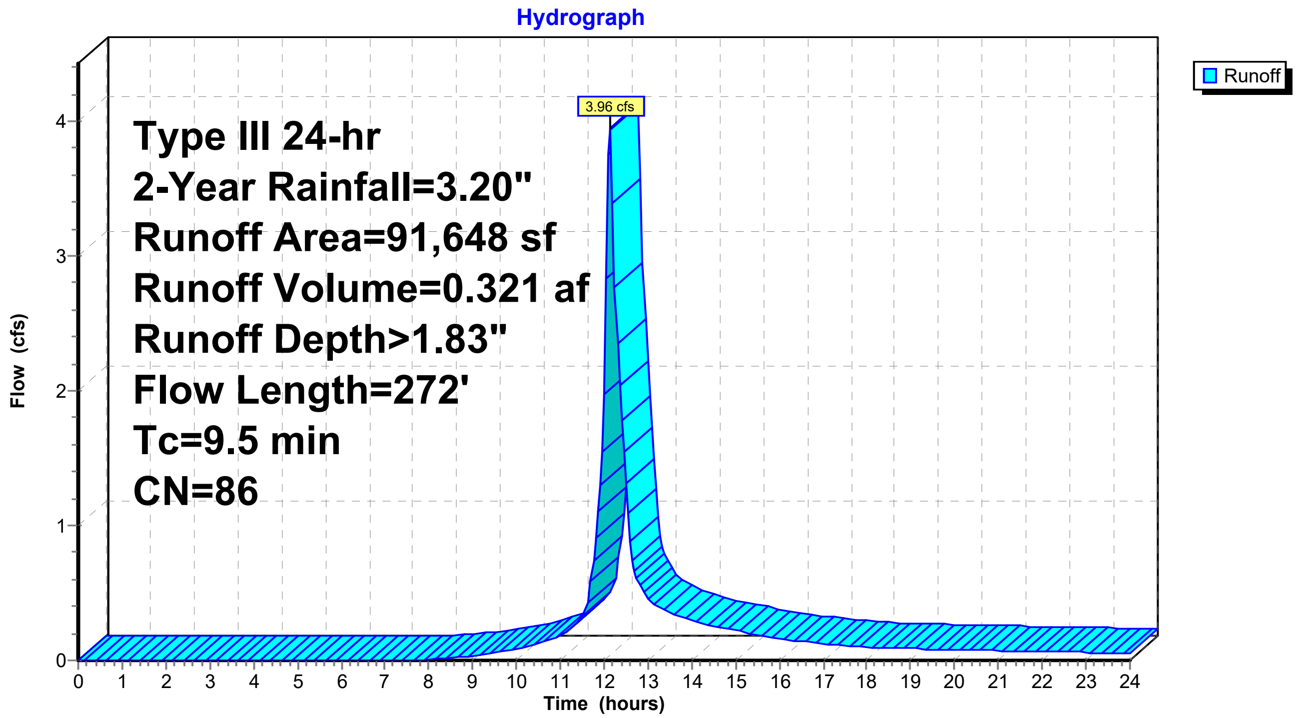
Runoff = 3.96 cfs @ 12.14 hrs, Volume= 0.321 af, Depth> 1.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.20"

	Area (sf)	CN	Description
	43,351	98	Paved parking, HSG C
	1,304	96	Gravel surface, HSG C
	42,526	74	>75% Grass cover, Good, HSG C
	2,704	70	Woods, Good, HSG C
*	1,763	74	Mulch
	91,648	86	Weighted Average
	48,297		52.70% Pervious Area
	43,351		47.30% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.1	50	0.0080	0.10		**Sheet Flow, Sheet Flow** Grass: Short n= 0.150 P2= 3.20"
0.8	111	0.0216	2.37		**Shallow Concentrated Flow, Shallow Concentrated Flow** Unpaved Kv= 16.1 fps
0.1	40	0.1500	6.24		**Shallow Concentrated Flow, SHallow** Unpaved Kv= 16.1 fps
0.5	71	0.0150	2.49		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
9.5	272	Total			

Subcatchment E-4B: Existing Watershed 4B



Summary for Subcatchment E-5A: Existing Watershed 5A

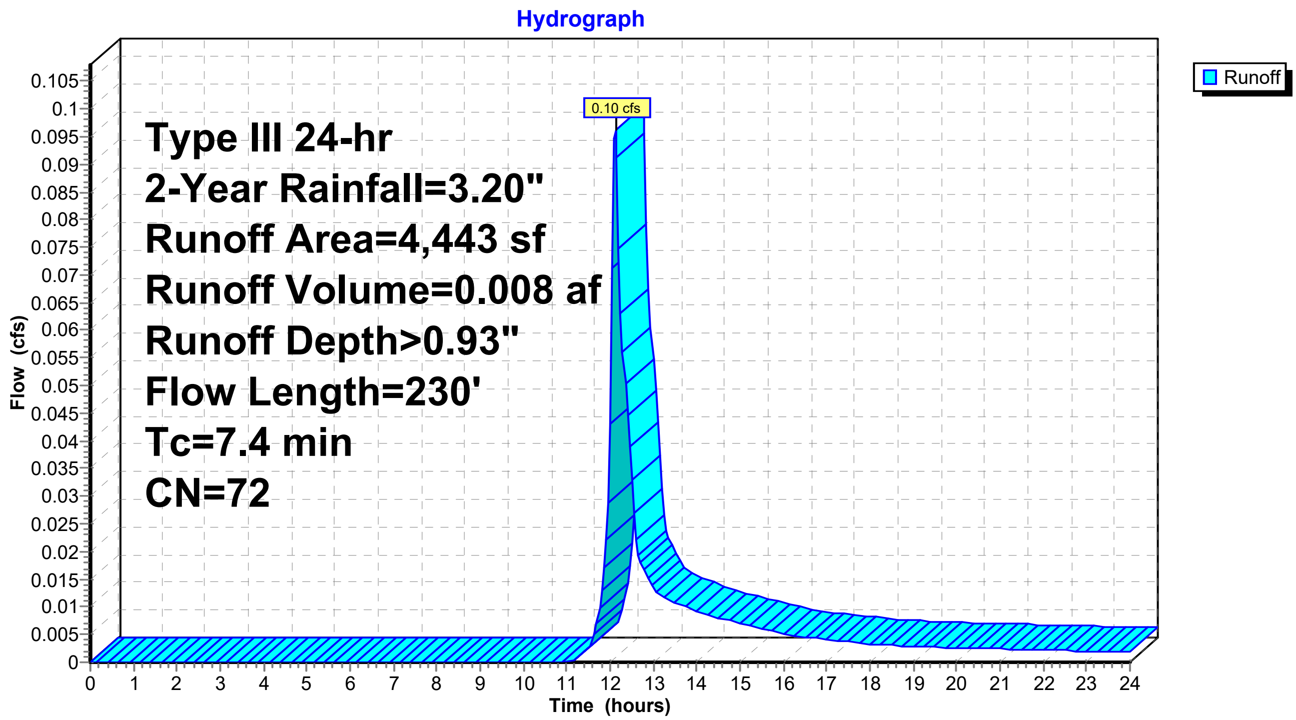
Runoff = 0.10 cfs @ 12.12 hrs, Volume= 0.008 af, Depth> 0.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.20"

Area (sf)	CN	Description
1,742	74	>75% Grass cover, Good, HSG C
2,701	70	Woods, Good, HSG C
4,443	72	Weighted Average
4,443		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	50	0.0160	0.14		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
1.2	180	0.0244	2.51		**Shallow Concentrated Flow, Shallow COncentrated Flow** Unpaved Kv= 16.1 fps
7.4	230	Total			

Subcatchment E-5A: Existing Watershed 5A



Summary for Subcatchment E-5B: Existing Watershed 5B

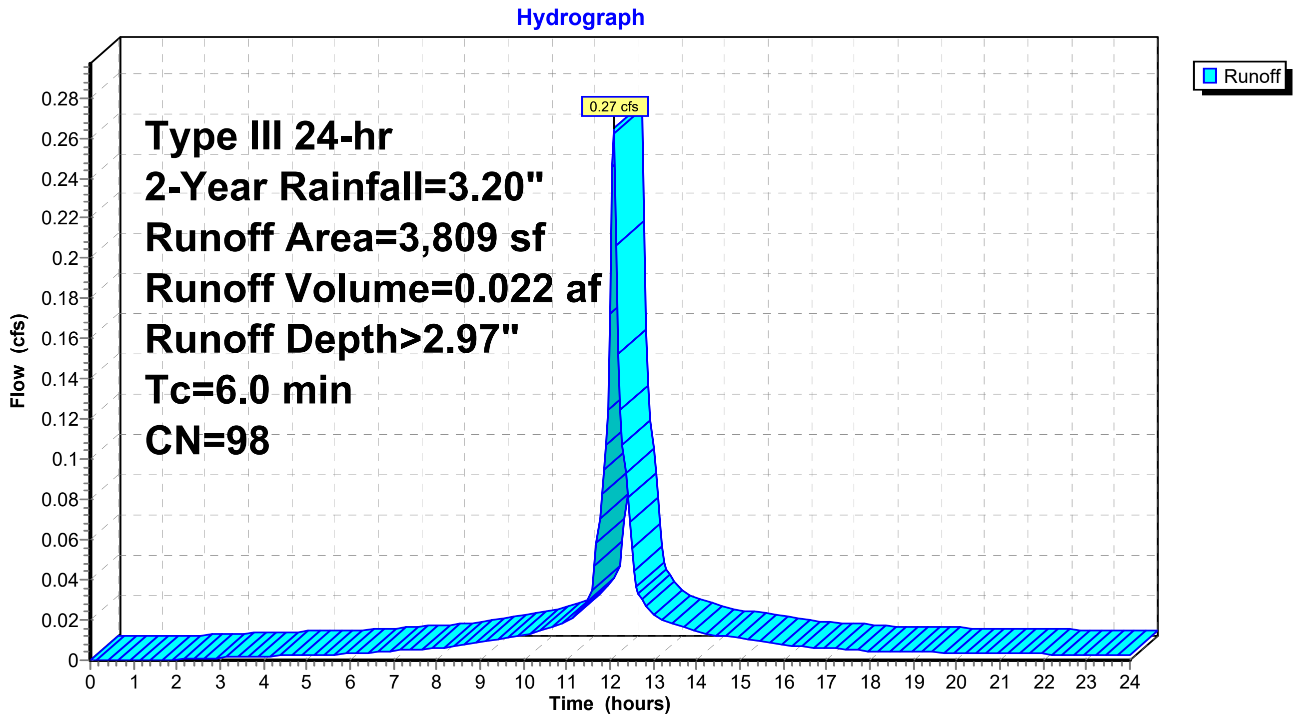
Runoff = 0.27 cfs @ 12.09 hrs, Volume= 0.022 af, Depth> 2.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.20"

Area (sf)	CN	Description
3,809	98	Paved parking, HSG C
3,809		100.00% Impervious Area

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

Subcatchment E-5B: Existing Watershed 5B



Summary for Subcatchment E-5C: Existing Watershed 5C

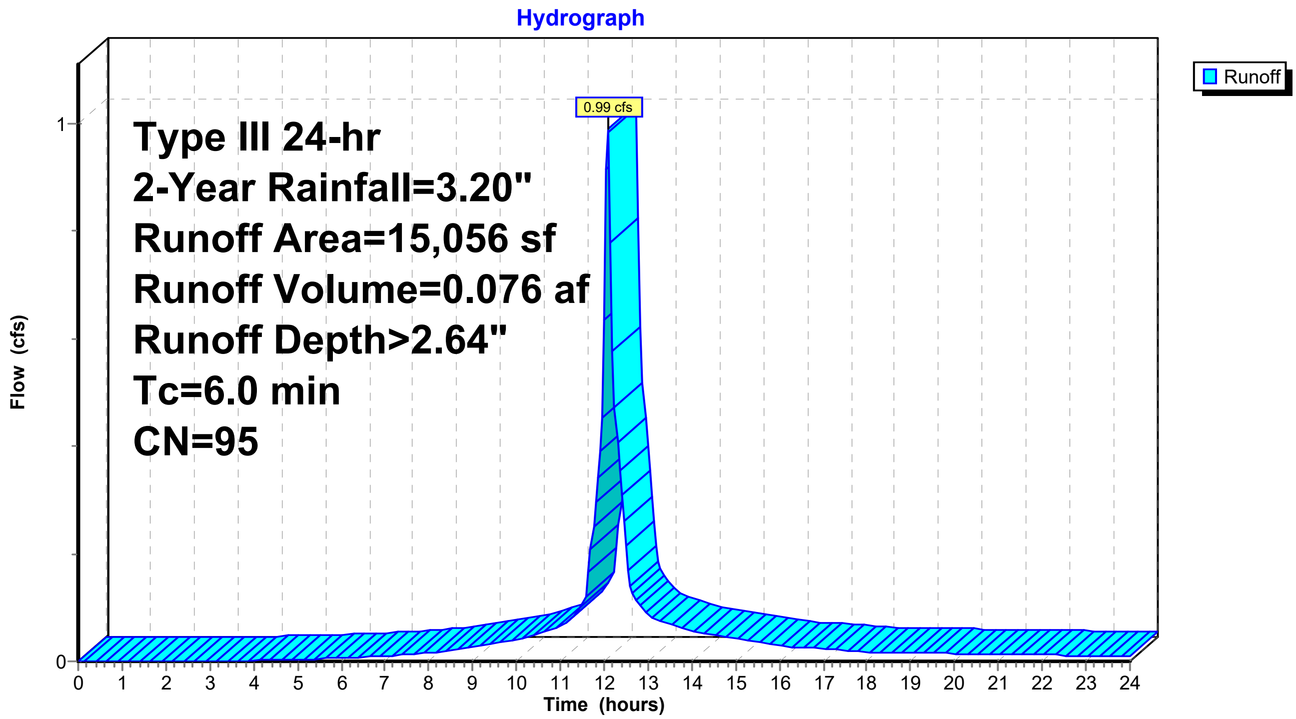
Runoff = 0.99 cfs @ 12.09 hrs, Volume= 0.076 af, Depth> 2.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.20"

Area (sf)	CN	Description
11,709	98	Paved parking, HSG C
1,791	96	Gravel surface, HSG C
303	79	50-75% Grass cover, Fair, HSG C
678	70	Woods, Good, HSG C
575	70	Woods, Good, HSG C
15,056	95	Weighted Average
3,347		22.23% Pervious Area
11,709		77.77% Impervious Area

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

Subcatchment E-5C: Existing Watershed 5C



Summary for Subcatchment E-6: Undetained to Wetland

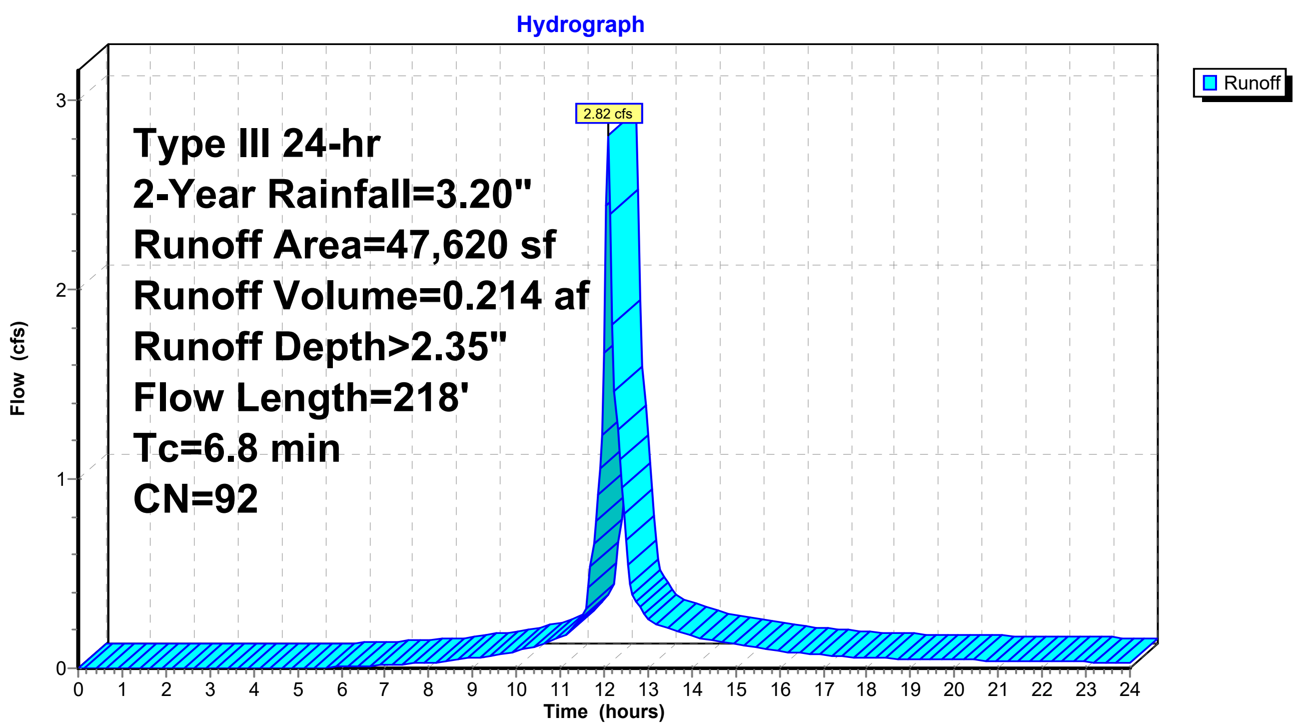
Runoff = 2.82 cfs @ 12.10 hrs, Volume= 0.214 af, Depth> 2.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.20"

Area (sf)	CN	Description
36,924	98	Paved parking, HSG C
9,270	74	>75% Grass cover, Good, HSG C
1,426	70	Woods, Good, HSG C
47,620	92	Weighted Average
10,696		22.46% Pervious Area
36,924		77.54% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	50	0.0340	0.18		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
2.2	168	0.0060	1.25		**Shallow Concentrated Flow, SHallow Concentrated Flow** Unpaved Kv= 16.1 fps
6.8	218	Total			

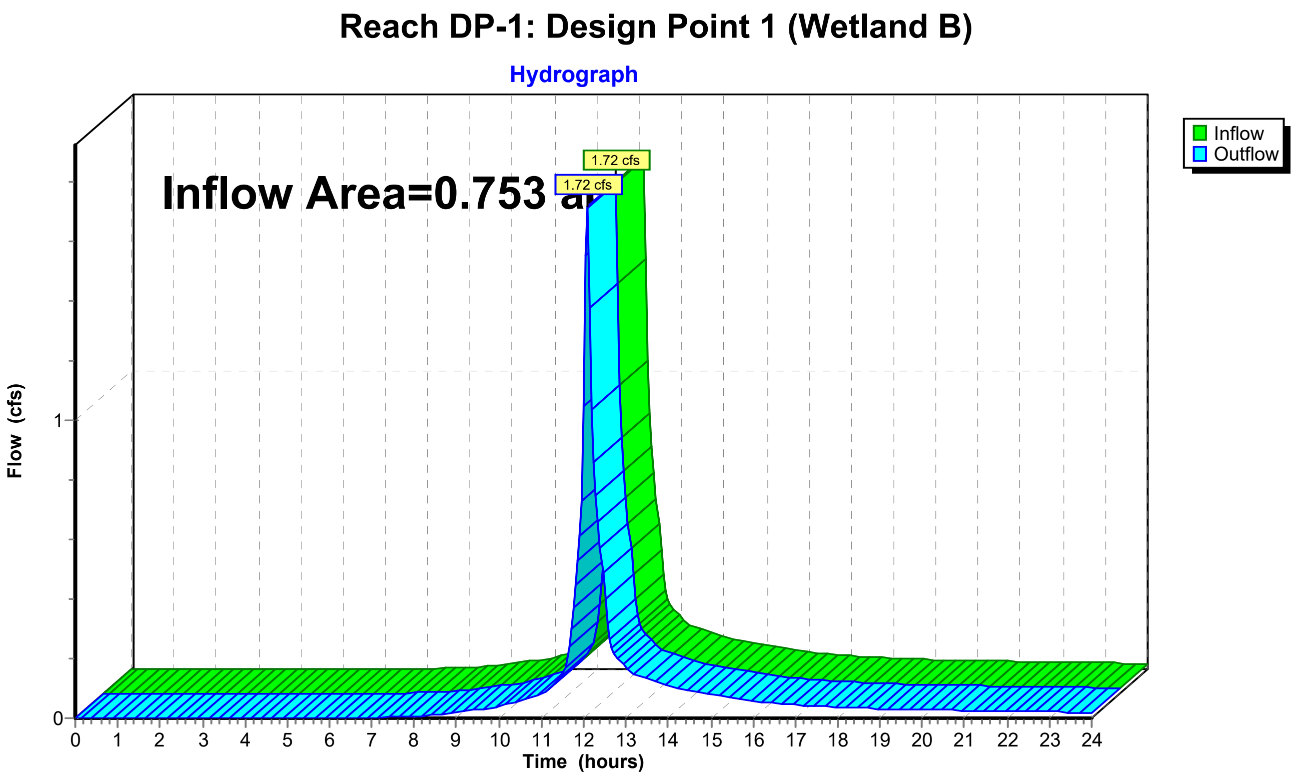
Subcatchment E-6: Undetained to Wetland



Summary for Reach DP-1: Design Point 1 (Wetland B)

Inflow Area =	0.753 ac,	35.44% Impervious,	Inflow Depth > 2.00"	for 2-Year event
Inflow =	1.72 cfs @	12.09 hrs, Volume=	0.125 af	
Outflow =	1.72 cfs @	12.09 hrs, Volume=	0.125 af, Atten= 0%, Lag= 0.0 min	

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

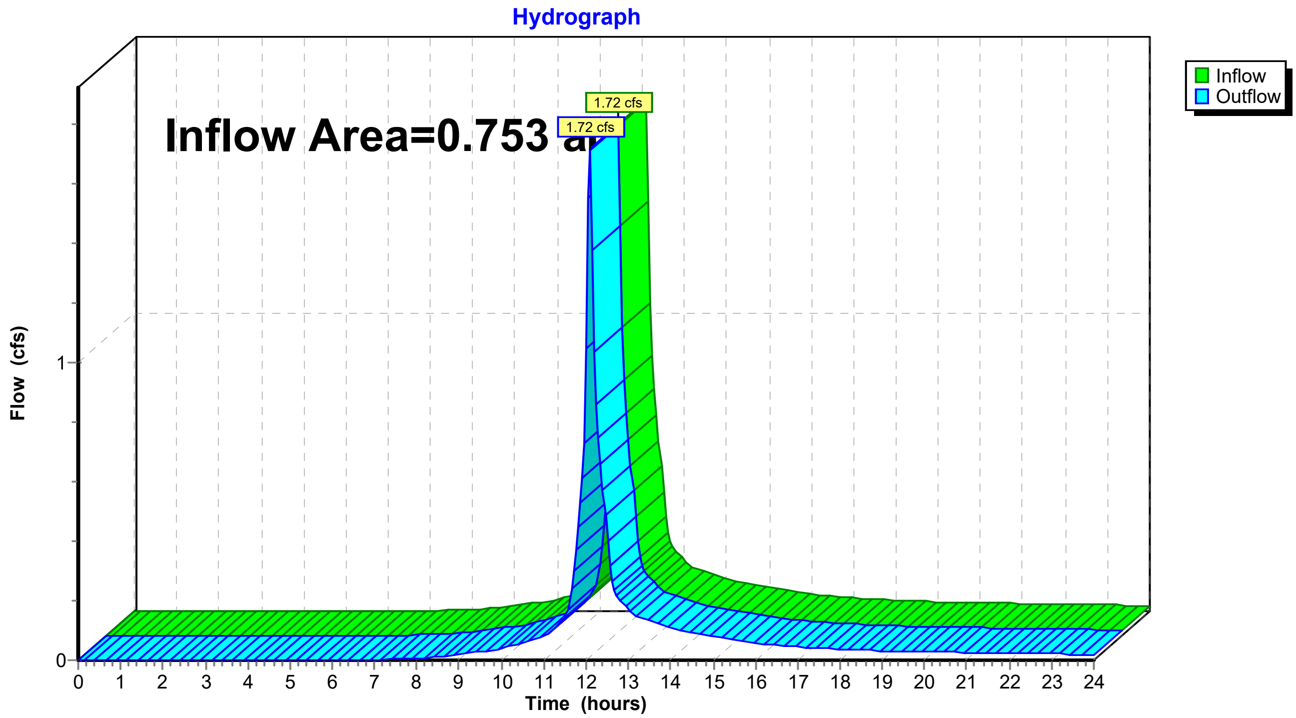


Summary for Reach DP-2: Design Point 2 (15" RCP to Wetland A)

Inflow Area = 0.753 ac, 35.44% Impervious, Inflow Depth > 2.00" for 2-Year event
Inflow = 1.72 cfs @ 12.09 hrs, Volume= 0.125 af
Outflow = 1.72 cfs @ 12.09 hrs, Volume= 0.125 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach DP-2: Design Point 2 (15" RCP to Wetland A)

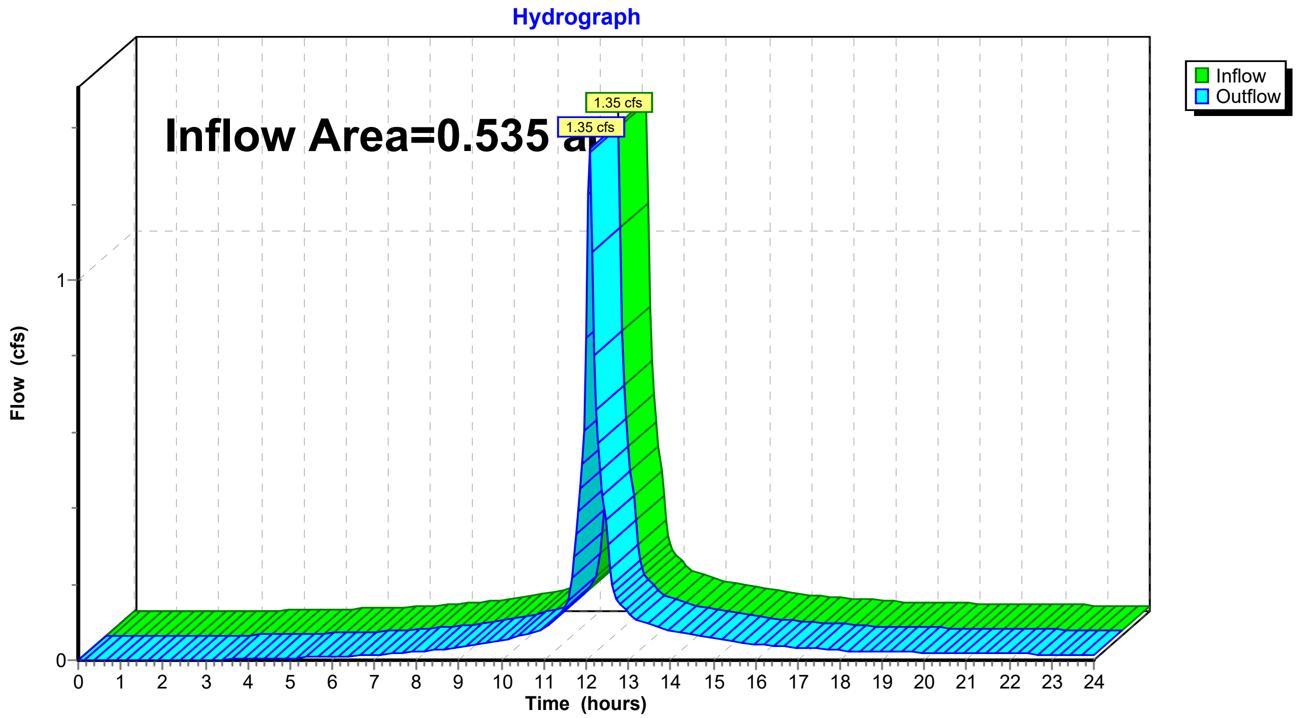


Summary for Reach DP-3: Design Point 3 (Existing Drainage Ditch)

Inflow Area =	0.535 ac, 66.58% Impervious, Inflow Depth > 2.37"	for 2-Year event	
Inflow =	1.35 cfs @ 12.09 hrs, Volume=	0.106 af	
Outflow =	1.35 cfs @ 12.09 hrs, Volume=	0.106 af, Atten= 0%, Lag= 0.0 min	

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach DP-3: Design Point 3 (Existing Drainage Ditch)

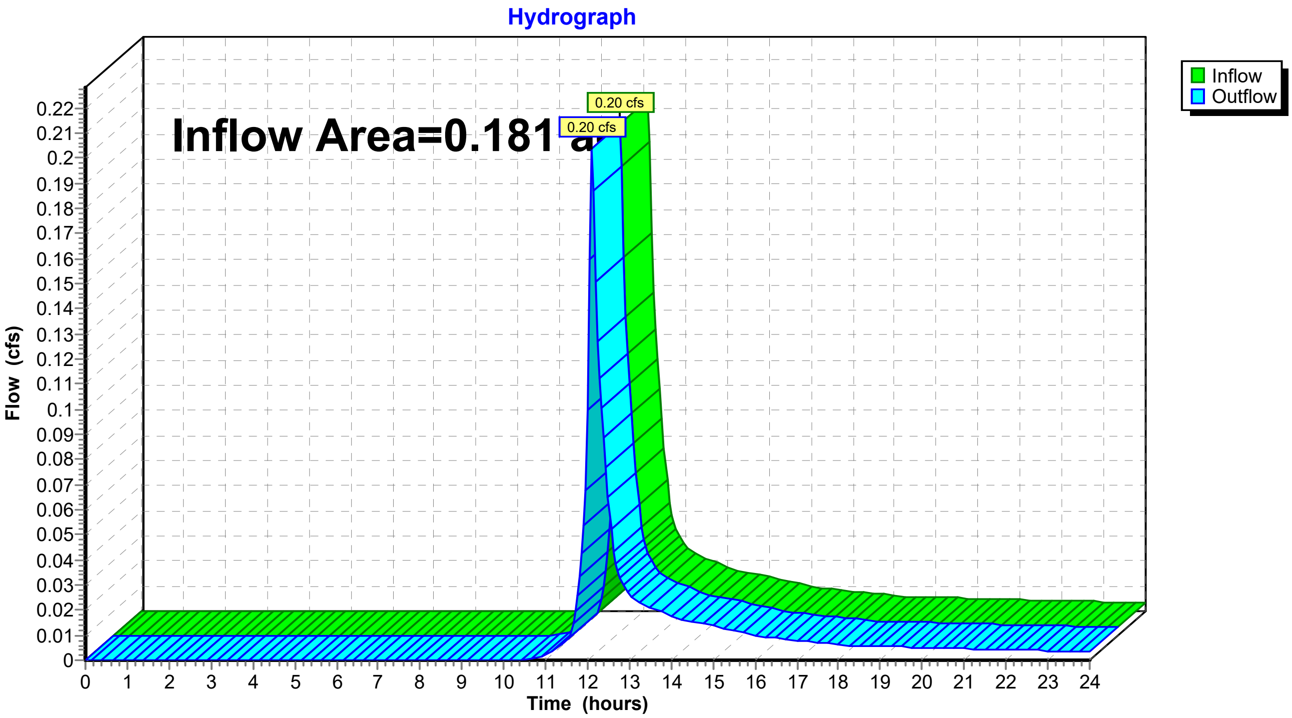


Summary for Reach DP-4: Design Point 4 (MassDOT CB- 2)

Inflow Area =	0.181 ac,	1.31% Impervious, Inflow Depth > 1.07"	for 2-Year event	
Inflow =	0.20 cfs @	12.11 hrs, Volume=	0.016 af	
Outflow =	0.20 cfs @	12.11 hrs, Volume=	0.016 af,	Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach DP-4: Design Point 4 (MassDOT CB- 2)

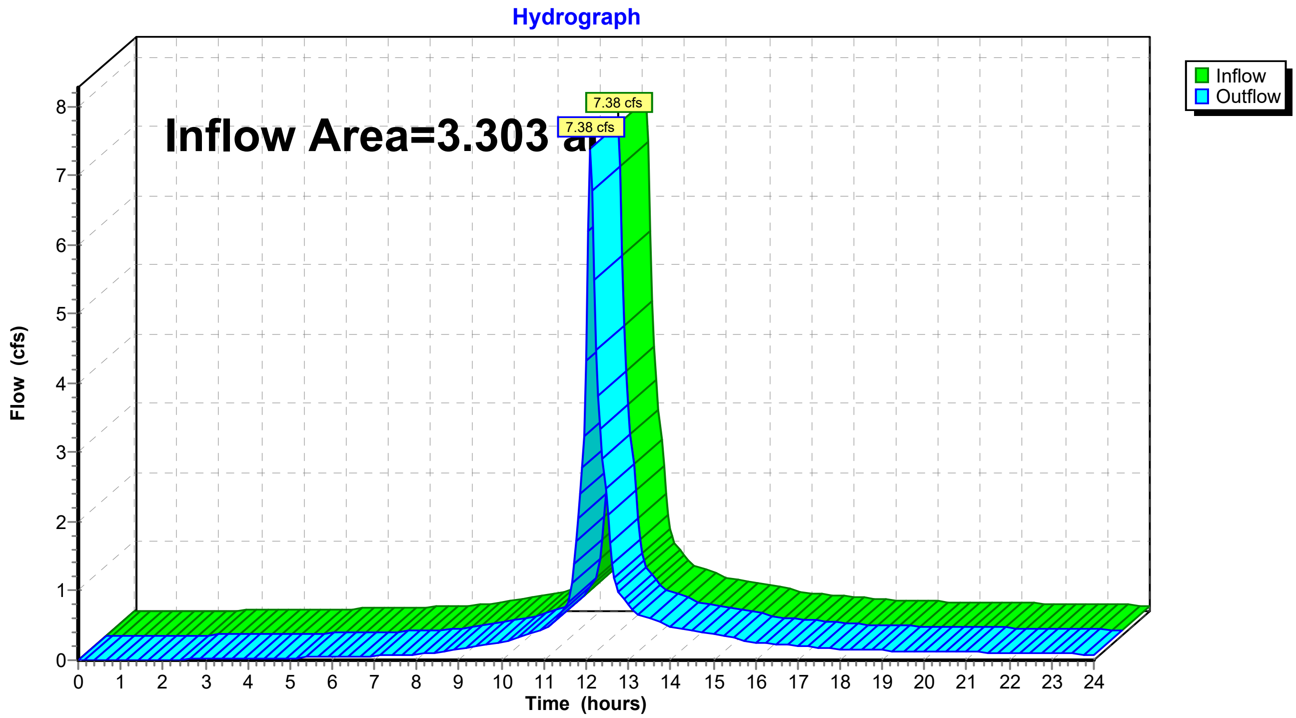


Summary for Reach DP-5: EXISTING CONSTRUCTED STORMWATER WETLAND

Inflow Area = 3.303 ac, 66.43% Impervious, Inflow Depth > 2.24" for 2-Year event
Inflow = 7.38 cfs @ 12.11 hrs, Volume= 0.618 af
Outflow = 7.38 cfs @ 12.11 hrs, Volume= 0.618 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

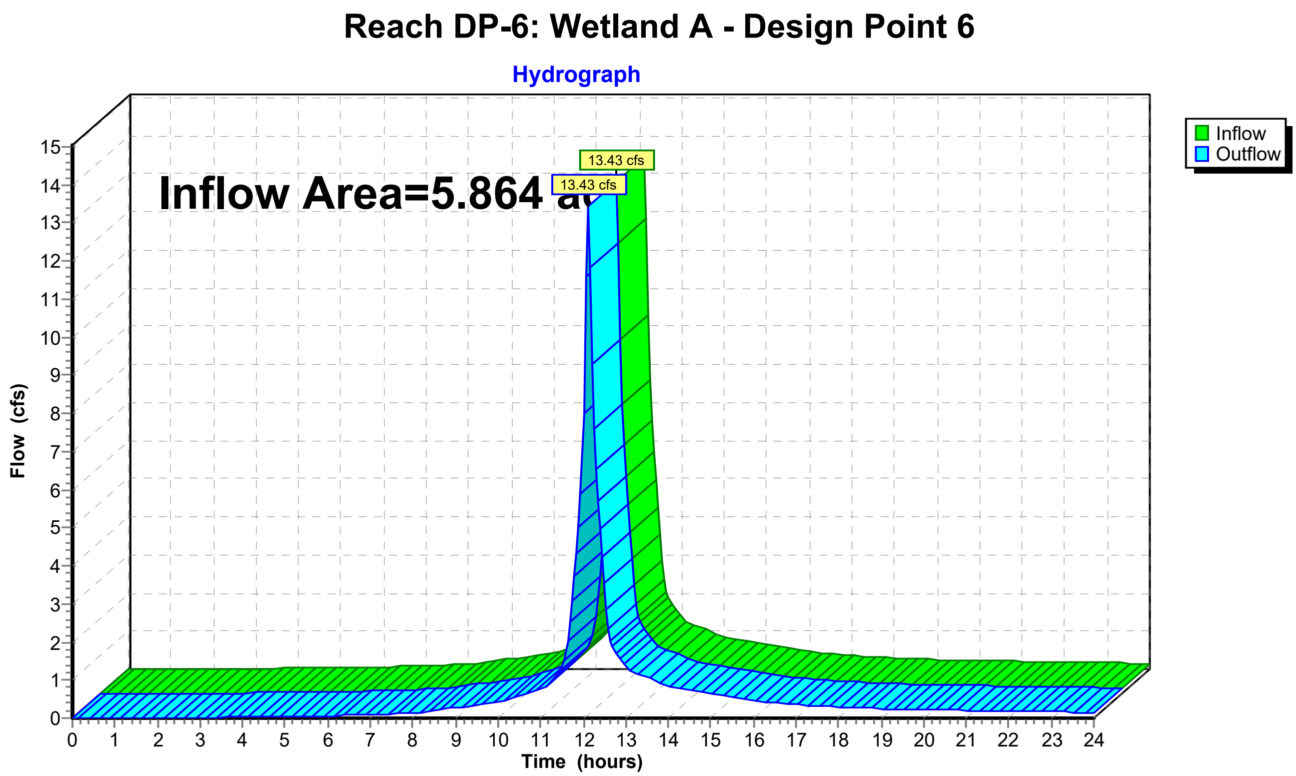
Reach DP-5: EXISTING CONSTRUCTED STORMWATER WETLAND



Summary for Reach DP-6: Wetland A - Design Point 6

Inflow Area =	5.864 ac,	62.53% Impervious,	Inflow Depth > 2.21"	for 2-Year event
Inflow =	13.43 cfs @	12.10 hrs, Volume=	1.078 af	
Outflow =	13.43 cfs @	12.10 hrs, Volume=	1.078 af, Atten= 0%, Lag= 0.0 min	

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs



Summary for Subcatchment E-1: Existing Watershed 1

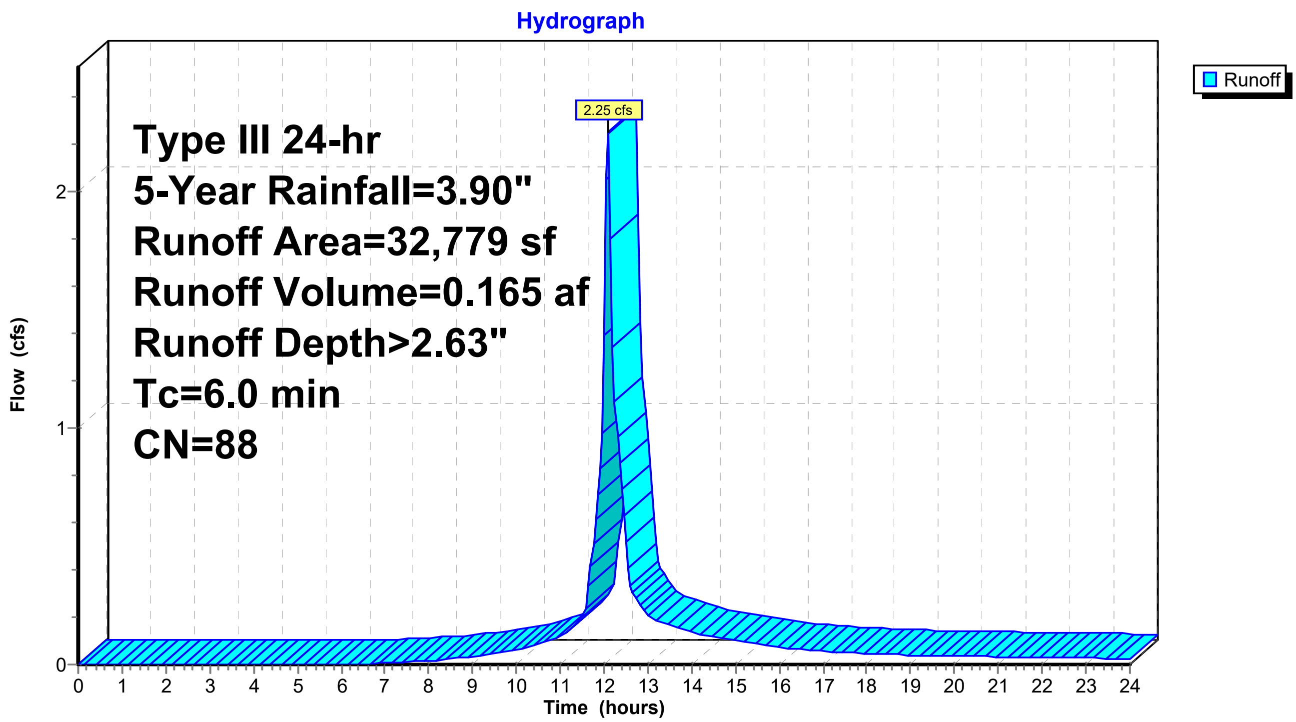
Runoff = 2.25 cfs @ 12.09 hrs, Volume= 0.165 af, Depth> 2.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 5-Year Rainfall=3.90"

Area (sf)	CN	Description
11,618	98	Paved parking, HSG C
9,421	96	Gravel surface, HSG C
5,782	74	>75% Grass cover, Good, HSG C
3,103	70	Woods, Good, HSG C
561	70	Woods, Good, HSG C
2,294	74	>75% Grass cover, Good, HSG C
32,779	88	Weighted Average
21,161		64.56% Pervious Area
11,618		35.44% Impervious Area

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

Subcatchment E-1: Existing Watershed 1



Summary for Subcatchment E-2: Existing Watershed 2

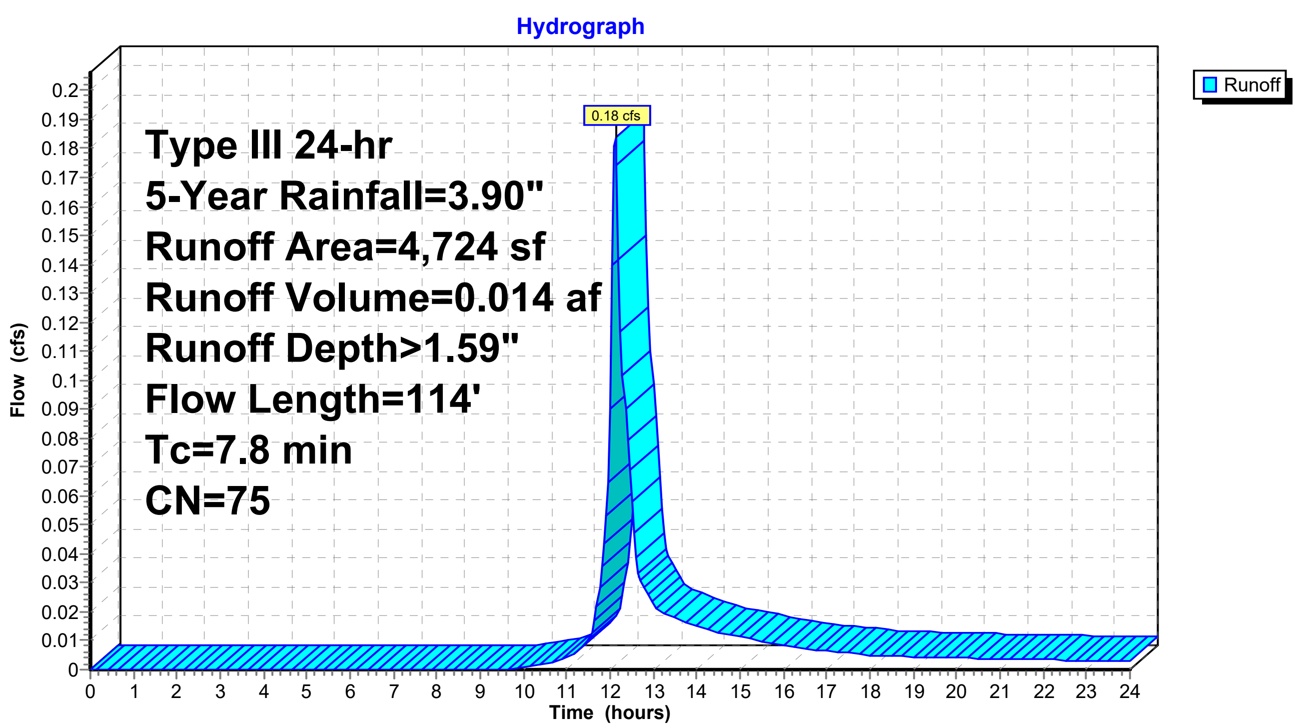
Runoff = 0.18 cfs @ 12.12 hrs, Volume= 0.014 af, Depth> 1.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 5-Year Rainfall=3.90"

Area (sf)	CN	Description
4,621	74	>75% Grass cover, Good, HSG C
103	98	Paved parking, HSG C
4,724	75	Weighted Average
4,621		97.82% Pervious Area
103		2.18% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	50	0.0100	0.11		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
0.4	64	0.0312	2.84		**Shallow Concentrated Flow, Shallow Concentrated Flow** Unpaved Kv= 16.1 fps
7.8	114	Total			

Subcatchment E-2: Existing Watershed 2



Summary for Subcatchment E-3: Existing Watershed 3

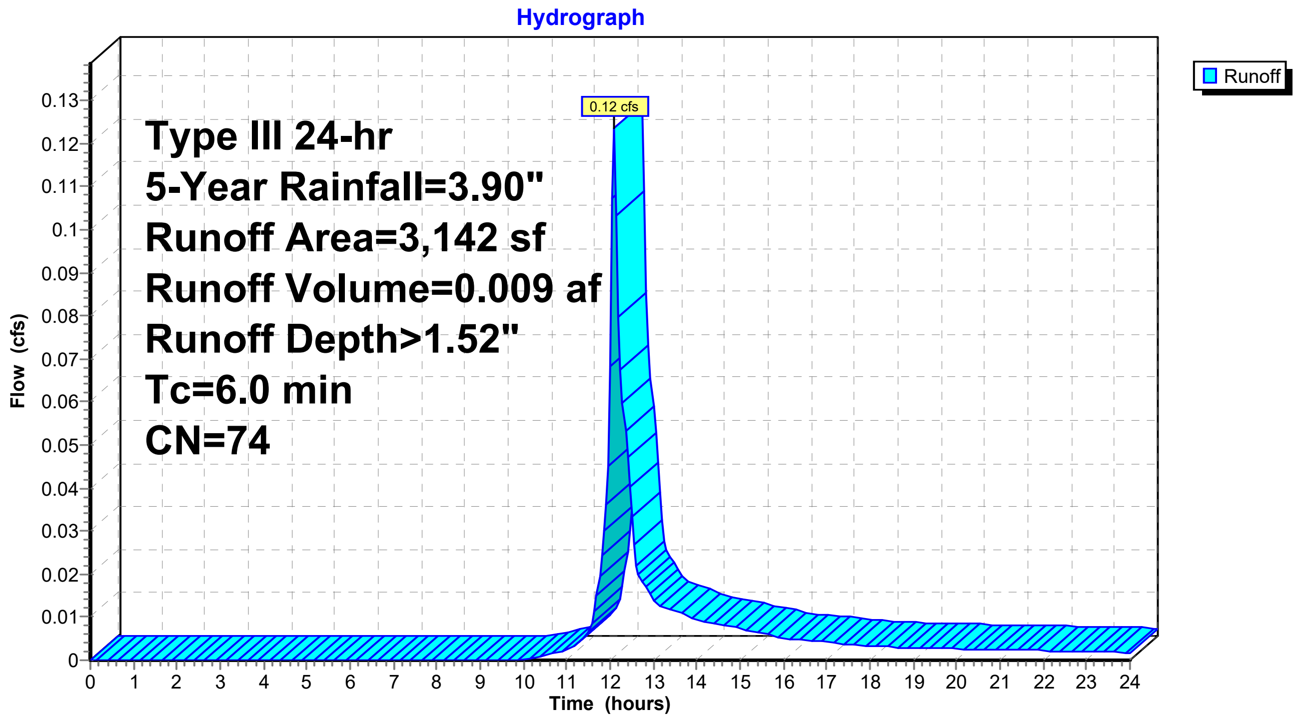
Runoff = 0.12 cfs @ 12.10 hrs, Volume= 0.009 af, Depth> 1.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 5-Year Rainfall=3.90"

Area (sf)	CN	Description
3,142	74	>75% Grass cover, Good, HSG C
3,142		100.00% Pervious Area

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

Subcatchment E-3: Existing Watershed 3



Summary for Subcatchment E-4A: Existing Watershed 4A

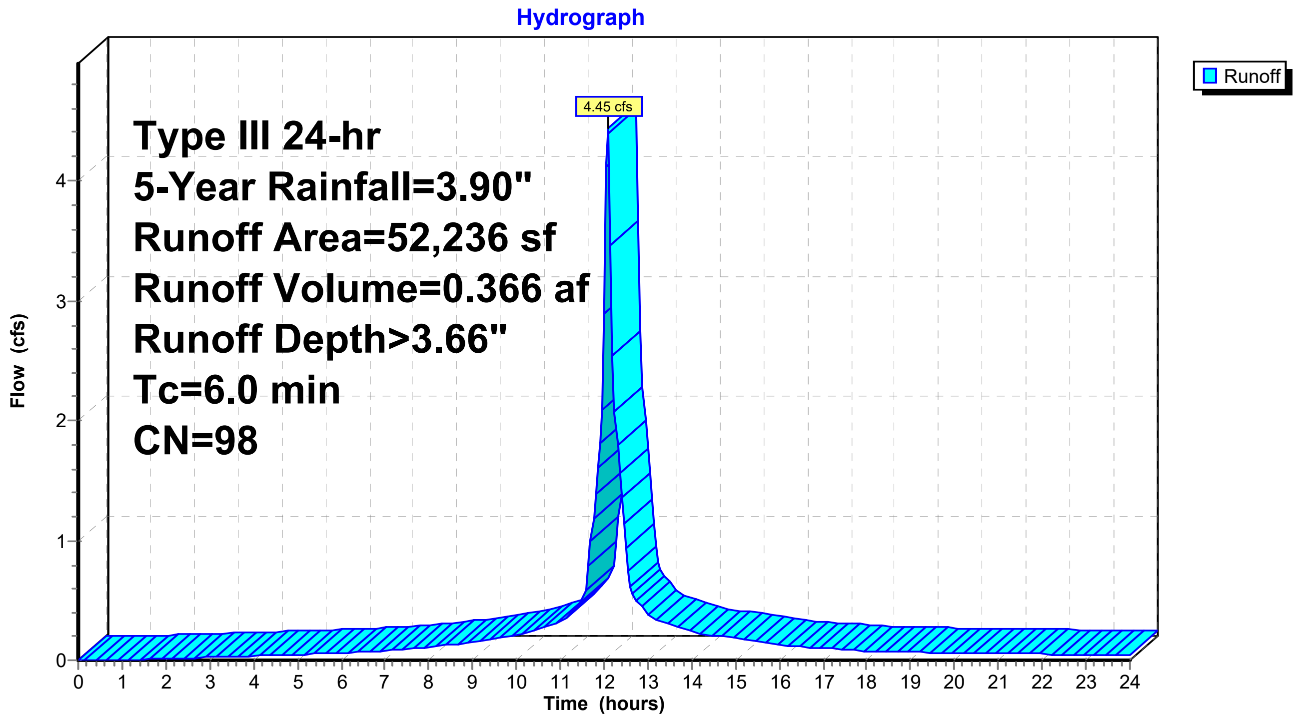
Runoff = 4.45 cfs @ 12.09 hrs, Volume= 0.366 af, Depth> 3.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 5-Year Rainfall=3.90"

Area (sf)	CN	Description
52,236	98	Roofs, HSG C
52,236		100.00% Impervious Area

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

Subcatchment E-4A: Existing Watershed 4A



Summary for Subcatchment E-4B: Existing Watershed 4B

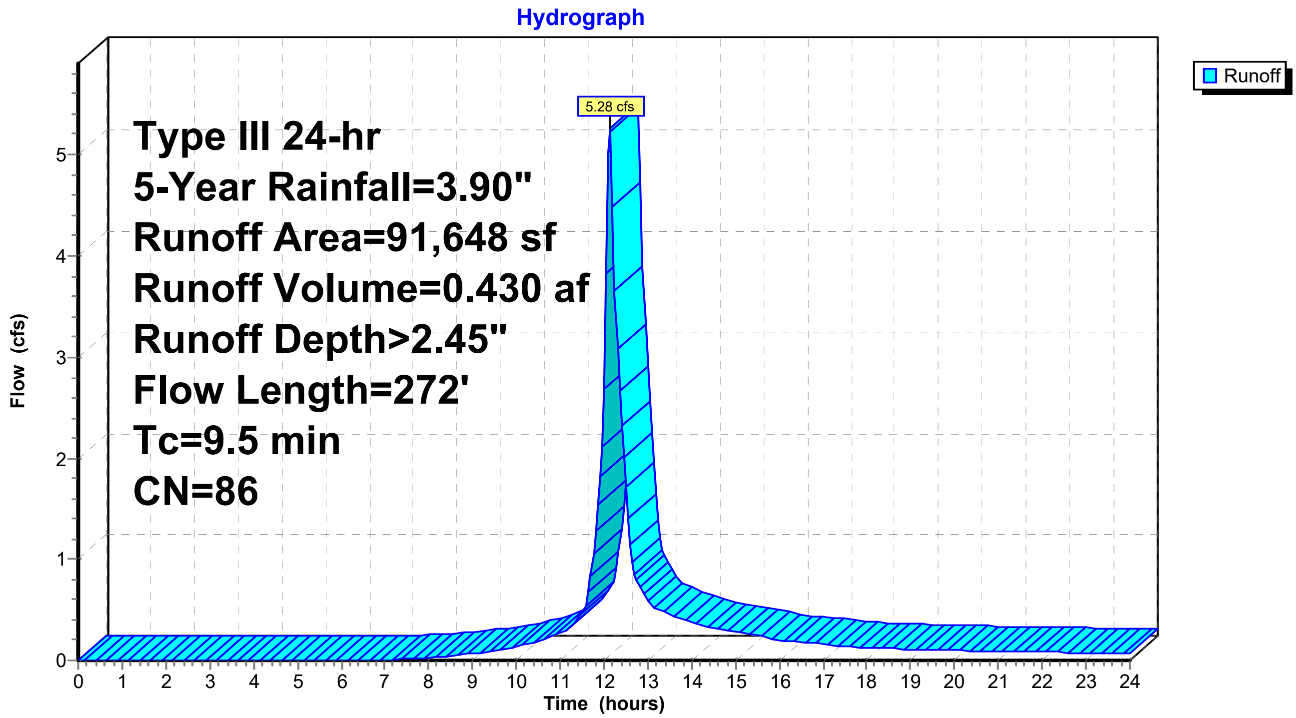
Runoff = 5.28 cfs @ 12.14 hrs, Volume= 0.430 af, Depth> 2.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 5-Year Rainfall=3.90"

	Area (sf)	CN	Description
	43,351	98	Paved parking, HSG C
	1,304	96	Gravel surface, HSG C
	42,526	74	>75% Grass cover, Good, HSG C
	2,704	70	Woods, Good, HSG C
*	1,763	74	Mulch
	91,648	86	Weighted Average
	48,297		52.70% Pervious Area
	43,351		47.30% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.1	50	0.0080	0.10		**Sheet Flow, Sheet Flow** Grass: Short n= 0.150 P2= 3.20"
0.8	111	0.0216	2.37		**Shallow Concentrated Flow, Shallow Concentrated Flow** Unpaved Kv= 16.1 fps
0.1	40	0.1500	6.24		**Shallow Concentrated Flow, SHallow** Unpaved Kv= 16.1 fps
0.5	71	0.0150	2.49		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
9.5	272	Total			

Subcatchment E-4B: Existing Watershed 4B



Summary for Subcatchment E-5A: Existing Watershed 5A

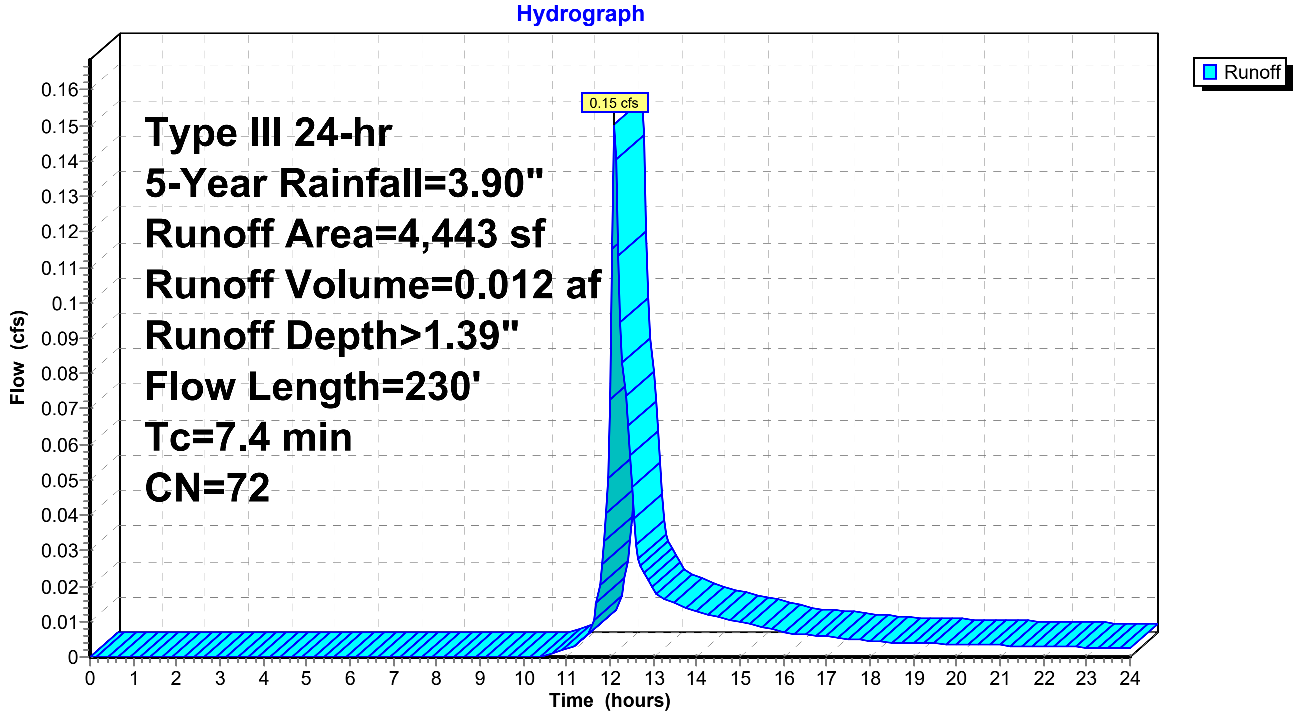
Runoff = 0.15 cfs @ 12.11 hrs, Volume= 0.012 af, Depth> 1.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 5-Year Rainfall=3.90"

Area (sf)	CN	Description
1,742	74	>75% Grass cover, Good, HSG C
2,701	70	Woods, Good, HSG C
4,443	72	Weighted Average
4,443		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	50	0.0160	0.14		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
1.2	180	0.0244	2.51		**Shallow Concentrated Flow, Shallow COncentrated Flow** Unpaved Kv= 16.1 fps
7.4	230	Total			

Subcatchment E-5A: Existing Watershed 5A



Summary for Subcatchment E-5B: Existing Watershed 5B

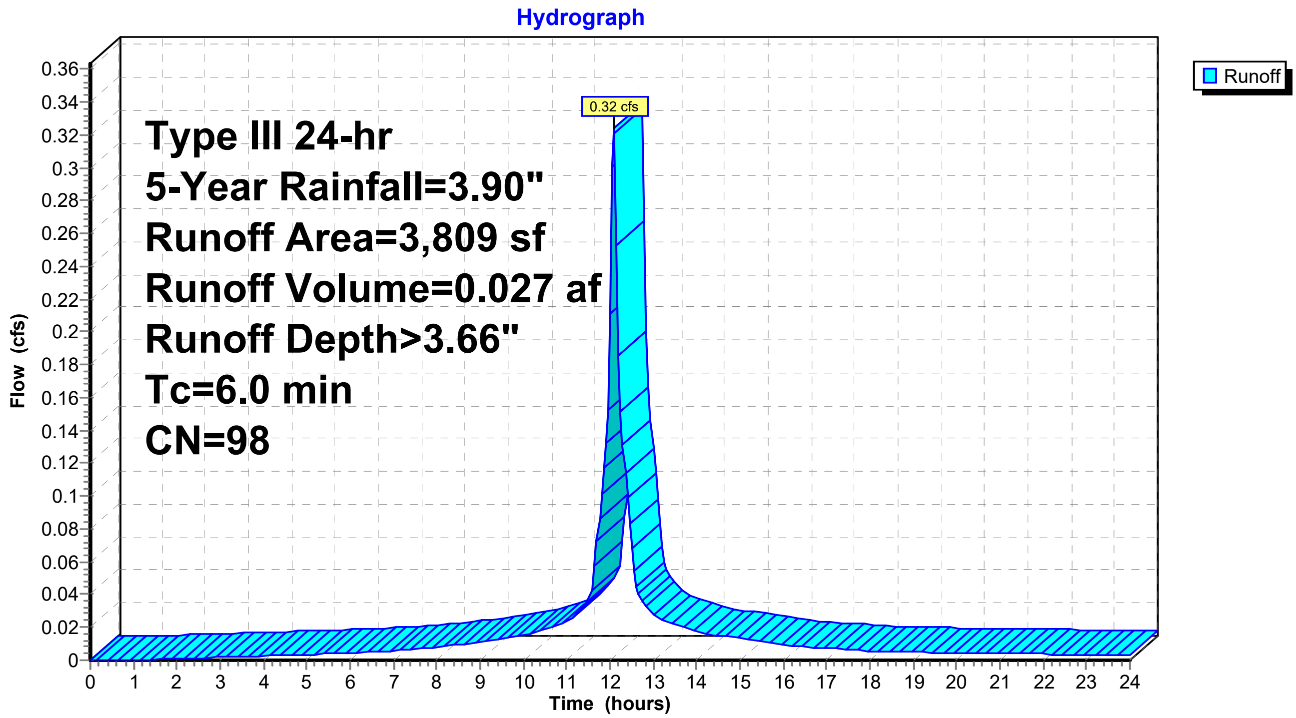
Runoff = 0.32 cfs @ 12.09 hrs, Volume= 0.027 af, Depth> 3.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 5-Year Rainfall=3.90"

Area (sf)	CN	Description
3,809	98	Paved parking, HSG C
3,809		100.00% Impervious Area

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

Subcatchment E-5B: Existing Watershed 5B



Summary for Subcatchment E-5C: Existing Watershed 5C

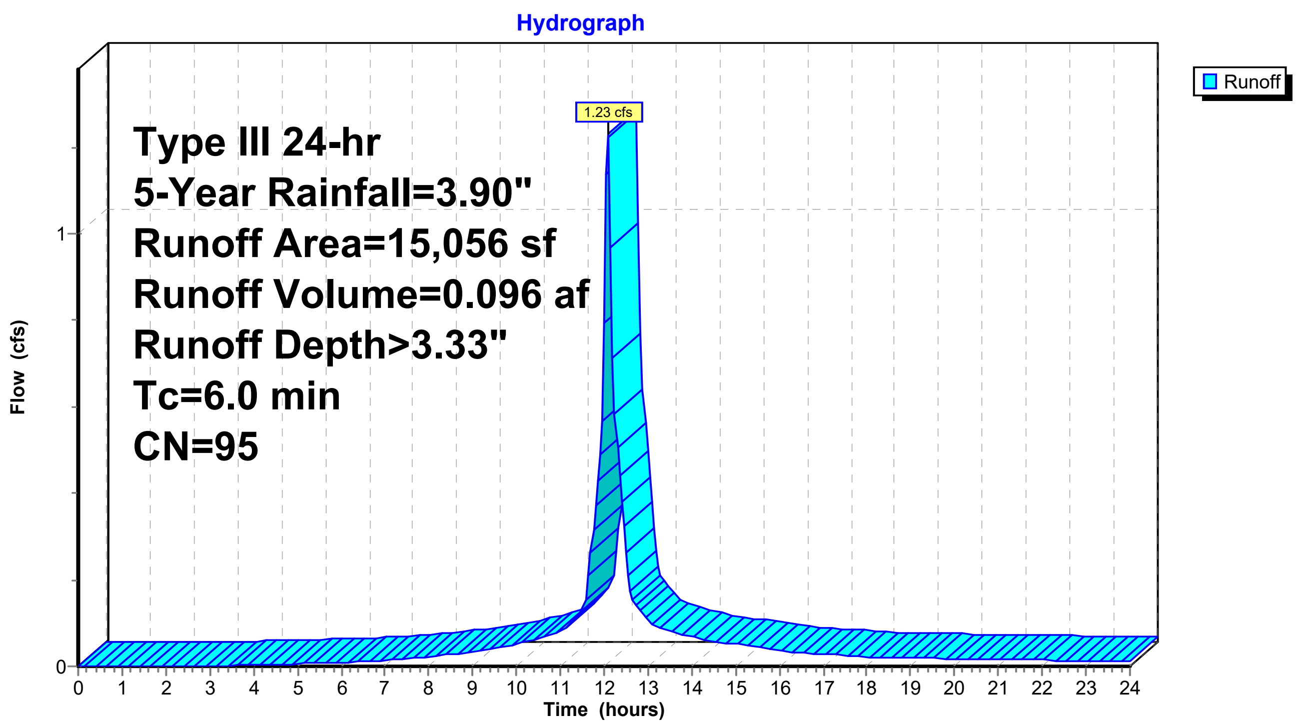
Runoff = 1.23 cfs @ 12.09 hrs, Volume= 0.096 af, Depth> 3.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 5-Year Rainfall=3.90"

Area (sf)	CN	Description
11,709	98	Paved parking, HSG C
1,791	96	Gravel surface, HSG C
303	79	50-75% Grass cover, Fair, HSG C
678	70	Woods, Good, HSG C
575	70	Woods, Good, HSG C
15,056	95	Weighted Average
3,347		22.23% Pervious Area
11,709		77.77% Impervious Area

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

Subcatchment E-5C: Existing Watershed 5C



Summary for Subcatchment E-6: Undetained to Wetland

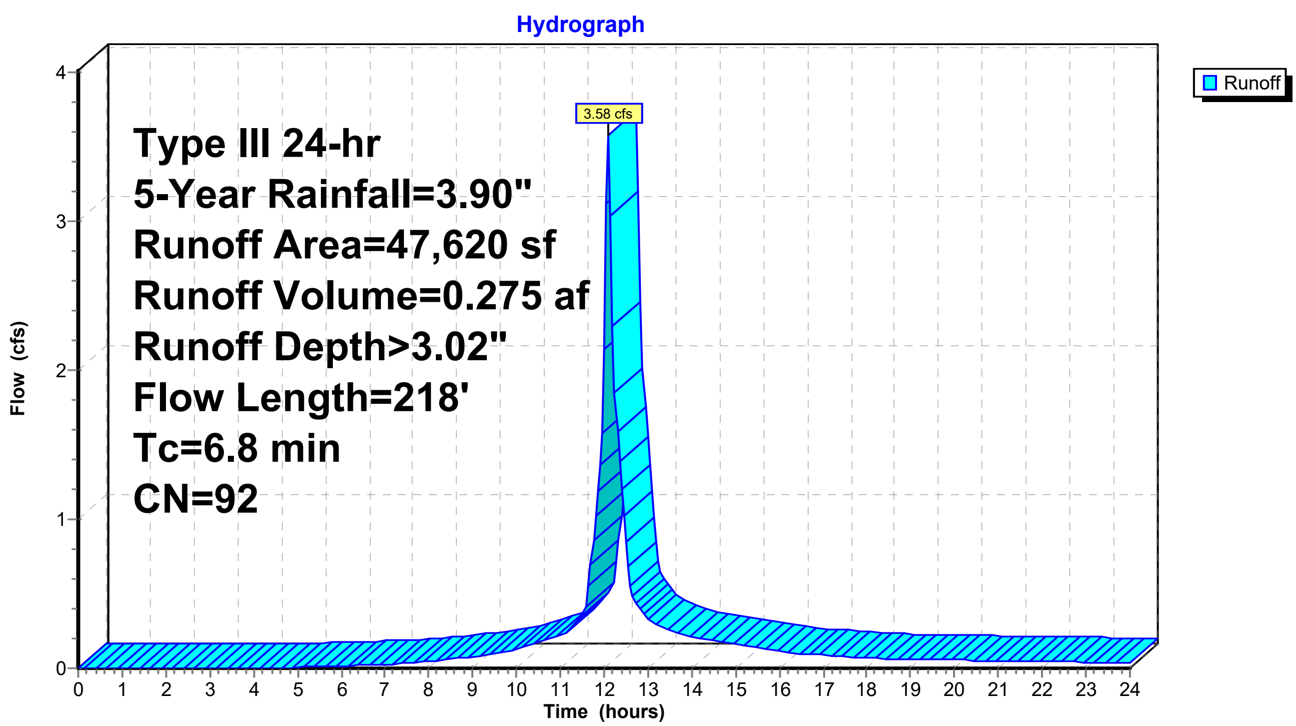
Runoff = 3.58 cfs @ 12.10 hrs, Volume= 0.275 af, Depth> 3.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 5-Year Rainfall=3.90"

Area (sf)	CN	Description
36,924	98	Paved parking, HSG C
9,270	74	>75% Grass cover, Good, HSG C
1,426	70	Woods, Good, HSG C
47,620	92	Weighted Average
10,696		22.46% Pervious Area
36,924		77.54% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	50	0.0340	0.18		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
2.2	168	0.0060	1.25		**Shallow Concentrated Flow, SHallow Concentrated Flow** Unpaved Kv= 16.1 fps
6.8	218	Total			

Subcatchment E-6: Undetained to Wetland

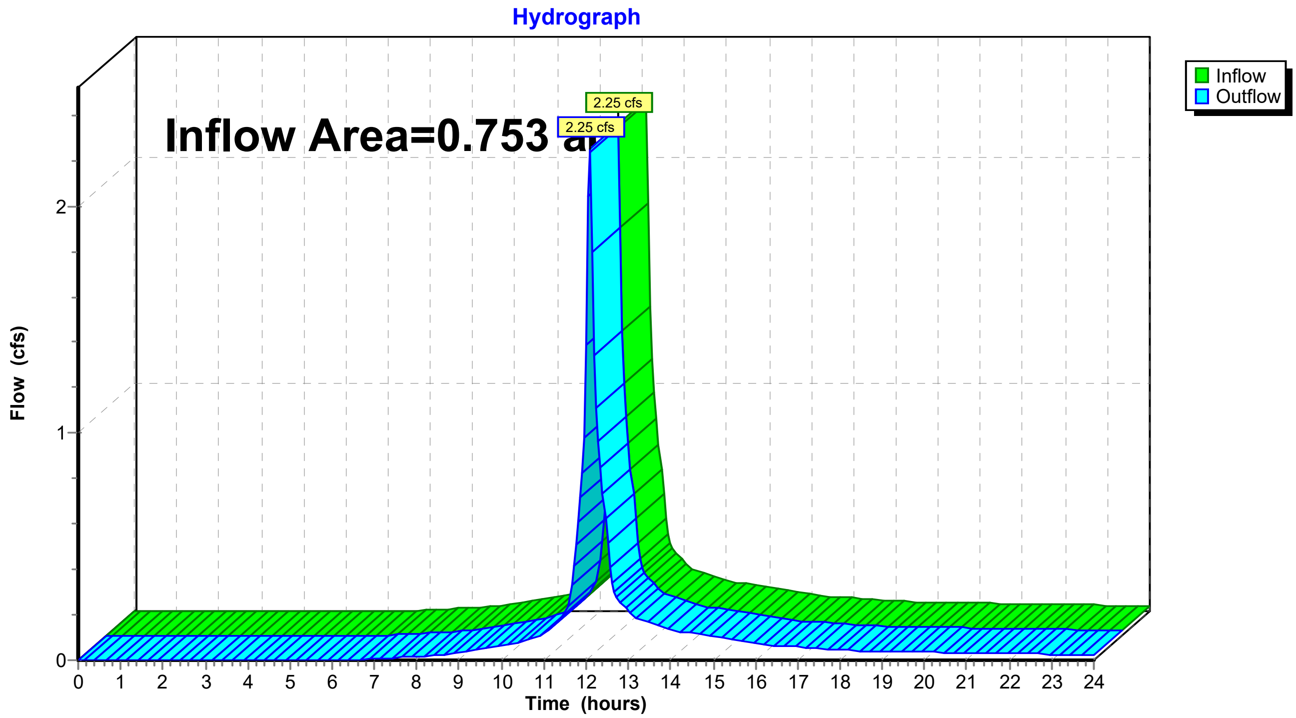


Summary for Reach DP-1: Design Point 1 (Wetland B)

Inflow Area =	0.753 ac,	35.44% Impervious,	Inflow Depth > 2.63"	for 5-Year event
Inflow =	2.25 cfs @	12.09 hrs, Volume=	0.165 af	
Outflow =	2.25 cfs @	12.09 hrs, Volume=	0.165 af,	Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach DP-1: Design Point 1 (Wetland B)

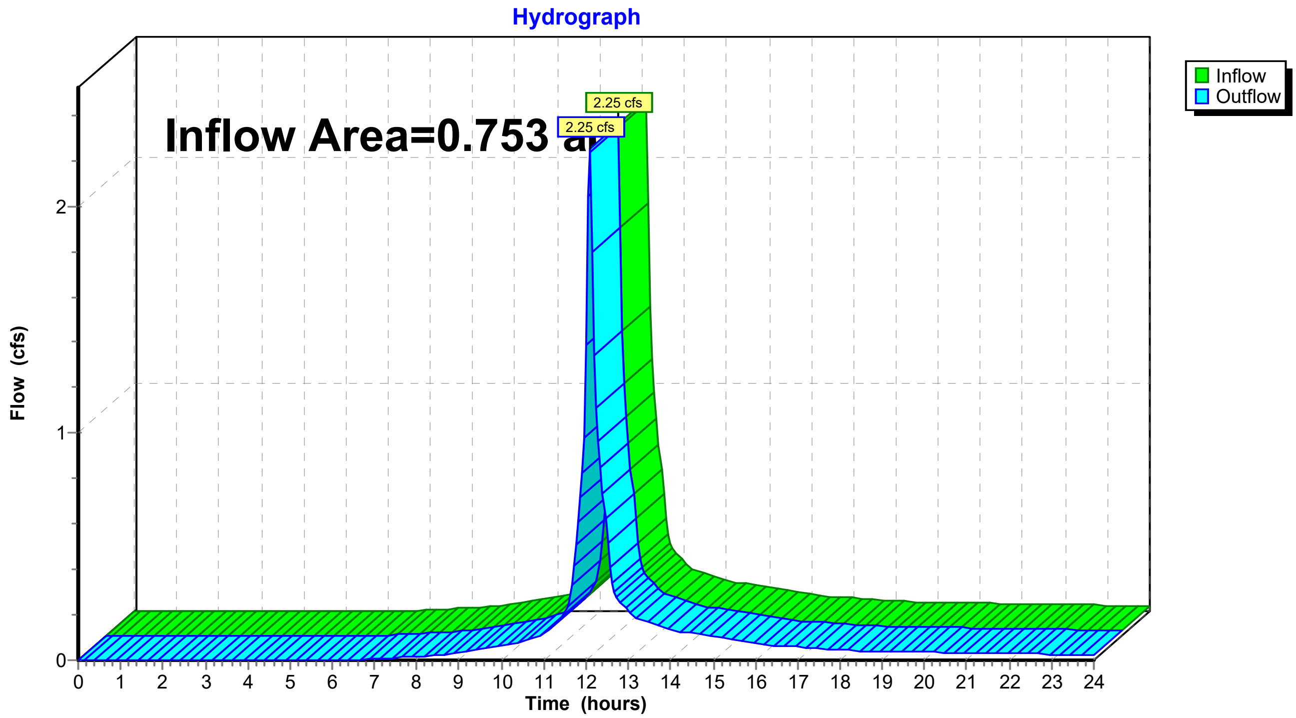


Summary for Reach DP-2: Design Point 2 (15" RCP to Wetland A)

Inflow Area =	0.753 ac,	35.44% Impervious,	Inflow Depth > 2.63"	for 5-Year event
Inflow =	2.25 cfs @	12.09 hrs, Volume=	0.165 af	
Outflow =	2.25 cfs @	12.09 hrs, Volume=	0.165 af, Atten= 0%, Lag= 0.0 min	

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach DP-2: Design Point 2 (15" RCP to Wetland A)

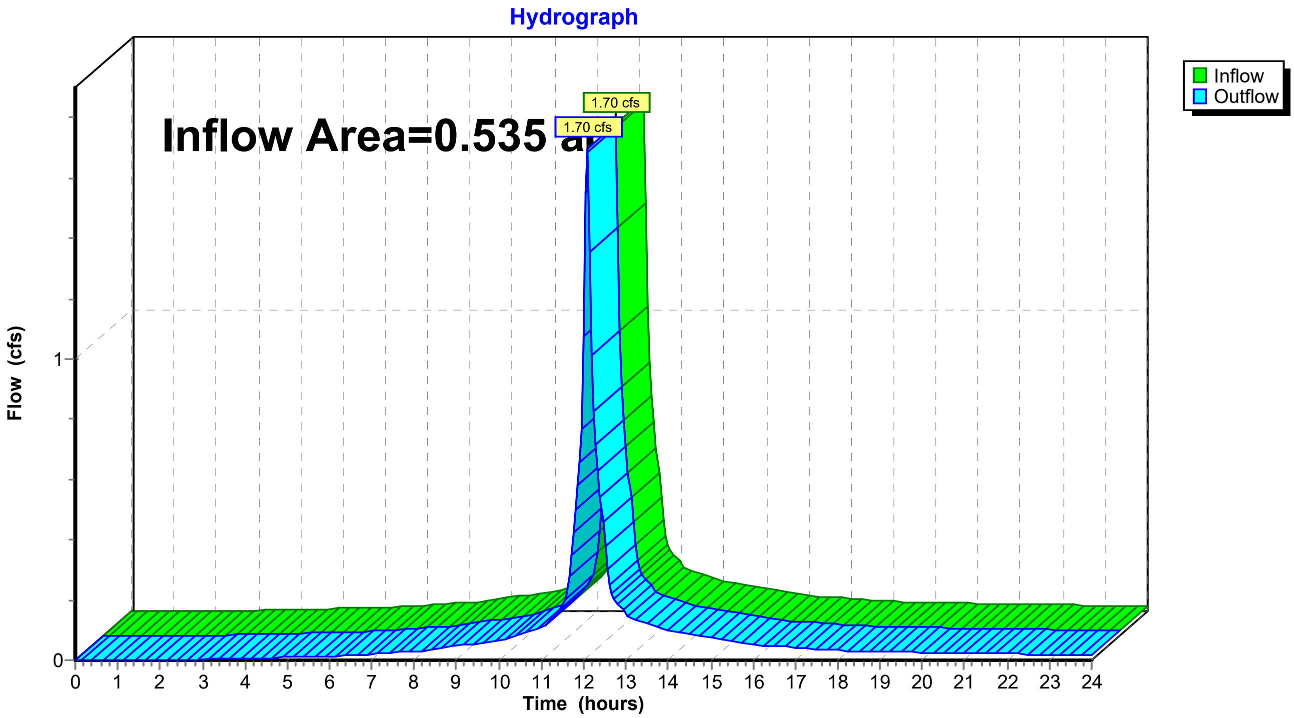


Summary for Reach DP-3: Design Point 3 (Existing Drainage Ditch)

Inflow Area = 0.535 ac, 66.58% Impervious, Inflow Depth > 3.01" for 5-Year event
Inflow = 1.70 cfs @ 12.09 hrs, Volume= 0.134 af
Outflow = 1.70 cfs @ 12.09 hrs, Volume= 0.134 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach DP-3: Design Point 3 (Existing Drainage Ditch)

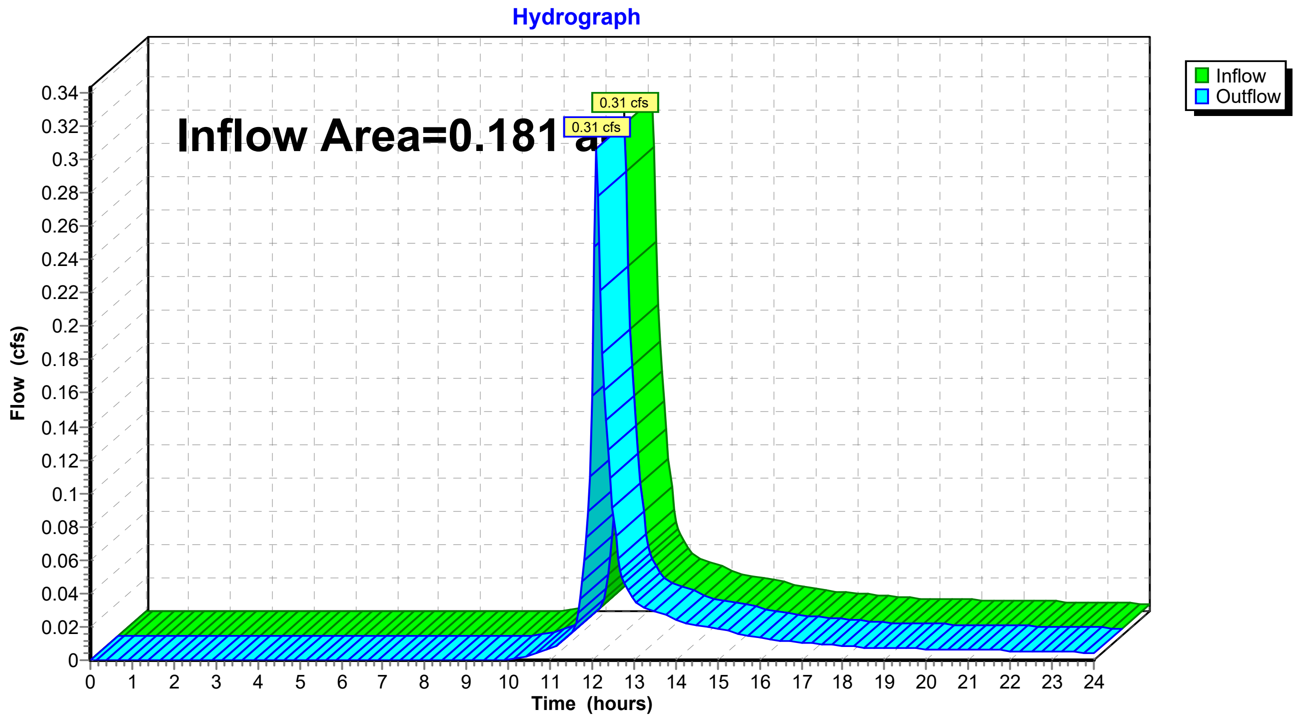


Summary for Reach DP-4: Design Point 4 (MassDOT CB- 2)

Inflow Area =	0.181 ac,	1.31% Impervious, Inflow Depth > 1.56"	for 5-Year event	
Inflow =	0.31 cfs @	12.11 hrs, Volume=	0.024 af	
Outflow =	0.31 cfs @	12.11 hrs, Volume=	0.024 af,	Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach DP-4: Design Point 4 (MassDOT CB- 2)

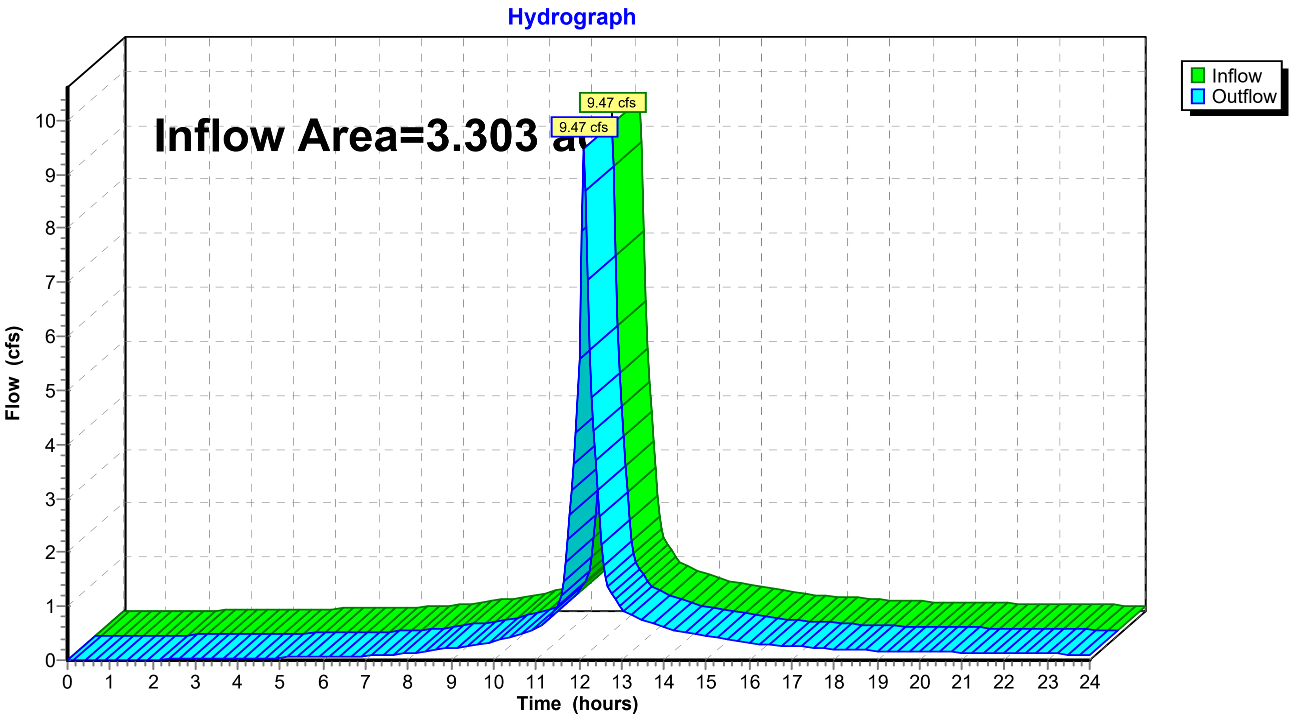


Summary for Reach DP-5: EXISTING CONSTRUCTED STORMWATER WETLAND

Inflow Area = 3.303 ac, 66.43% Impervious, Inflow Depth > 2.89" for 5-Year event
Inflow = 9.47 cfs @ 12.11 hrs, Volume= 0.796 af
Outflow = 9.47 cfs @ 12.11 hrs, Volume= 0.796 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach DP-5: EXISTING CONSTRUCTED STORMWATER WETLAND

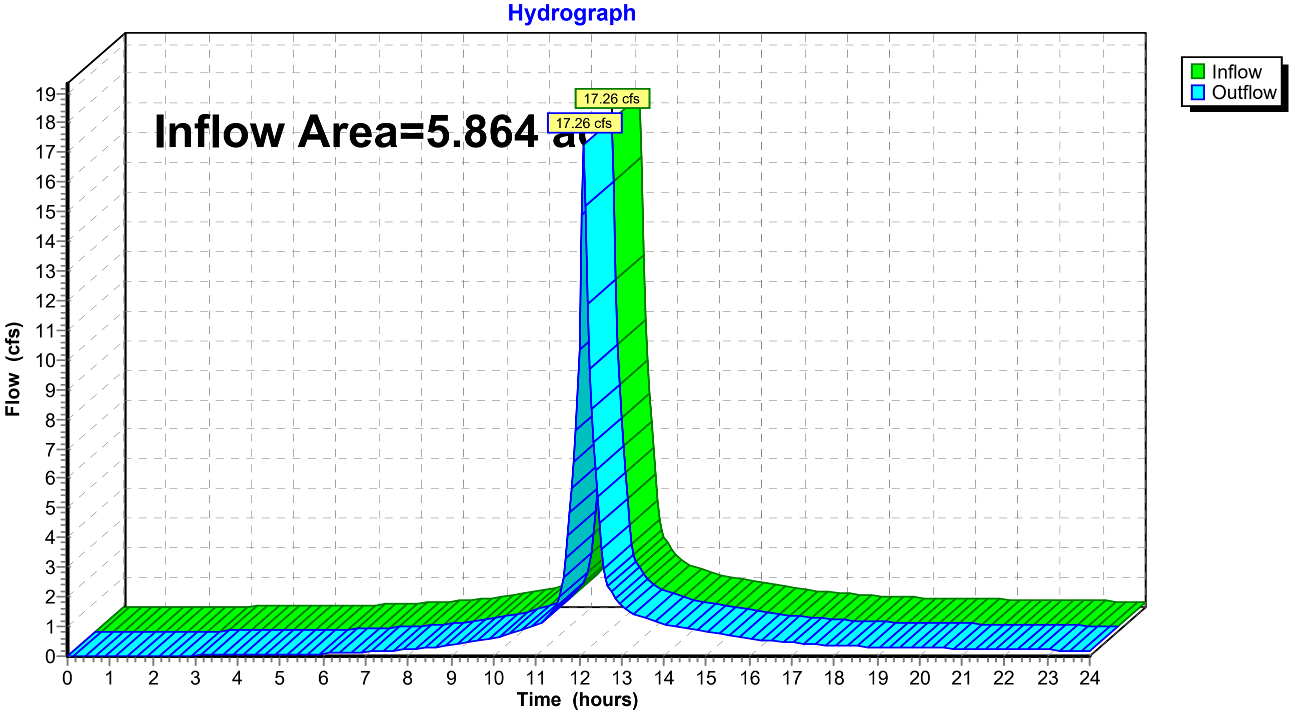


Summary for Reach DP-6: Wetland A - Design Point 6

Inflow Area =	5.864 ac,	62.53% Impervious,	Inflow Depth > 2.85"	for 5-Year event
Inflow =	17.26 cfs @	12.10 hrs, Volume=	1.394 af	
Outflow =	17.26 cfs @	12.10 hrs, Volume=	1.394 af, Atten= 0%, Lag= 0.0 min	

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach DP-6: Wetland A - Design Point 6



Summary for Subcatchment E-1: Existing Watershed 1

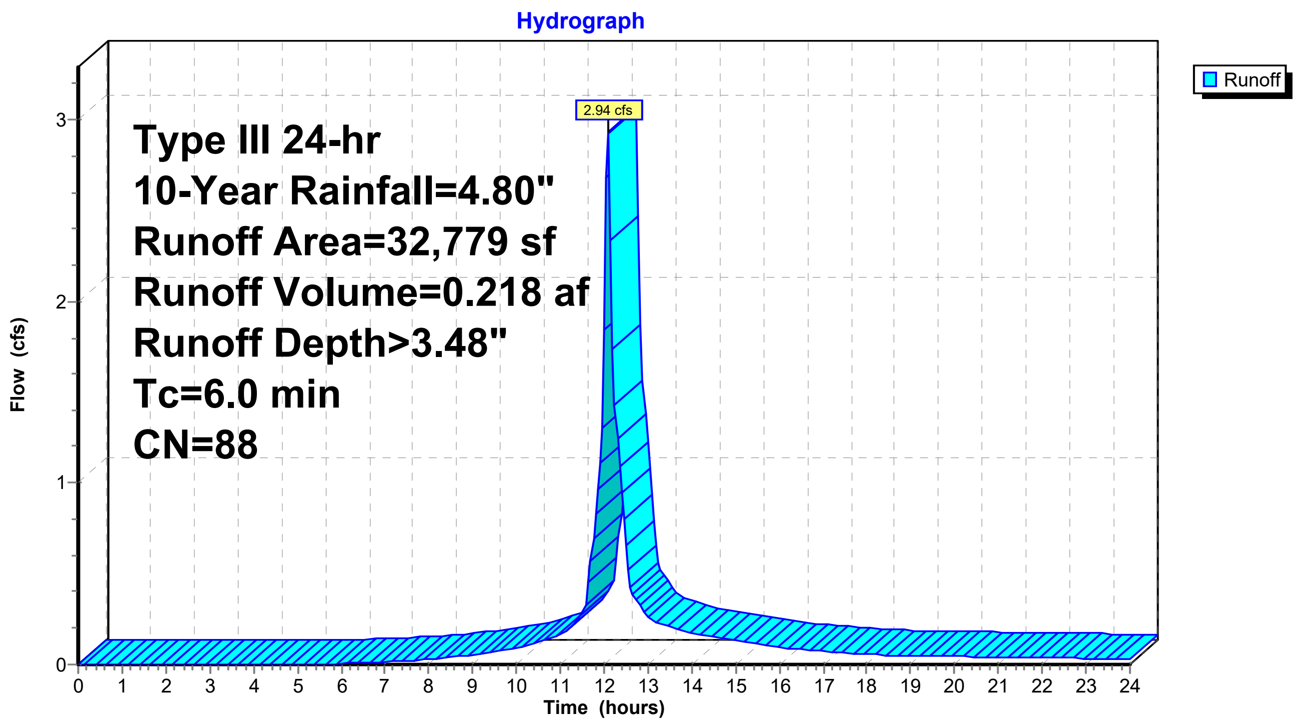
Runoff = 2.94 cfs @ 12.09 hrs, Volume= 0.218 af, Depth> 3.48"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.80"

Area (sf)	CN	Description
11,618	98	Paved parking, HSG C
9,421	96	Gravel surface, HSG C
5,782	74	>75% Grass cover, Good, HSG C
3,103	70	Woods, Good, HSG C
561	70	Woods, Good, HSG C
2,294	74	>75% Grass cover, Good, HSG C
32,779	88	Weighted Average
21,161		64.56% Pervious Area
11,618		35.44% Impervious Area

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

Subcatchment E-1: Existing Watershed 1



Summary for Subcatchment E-2: Existing Watershed 2

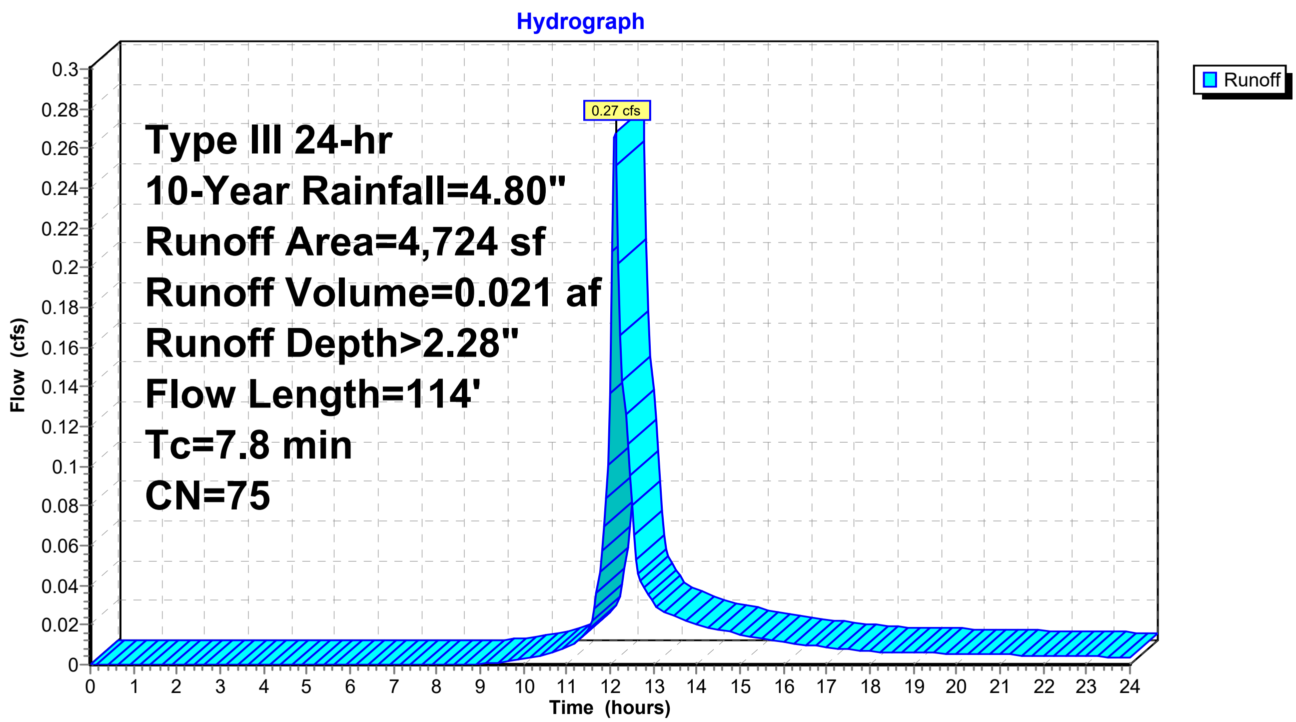
Runoff = 0.27 cfs @ 12.12 hrs, Volume= 0.021 af, Depth> 2.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.80"

Area (sf)	CN	Description
4,621	74	>75% Grass cover, Good, HSG C
103	98	Paved parking, HSG C
4,724	75	Weighted Average
4,621		97.82% Pervious Area
103		2.18% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	50	0.0100	0.11		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
0.4	64	0.0312	2.84		**Shallow Concentrated Flow, Shallow Concentrated Flow** Unpaved Kv= 16.1 fps
7.8	114	Total			

Subcatchment E-2: Existing Watershed 2



Summary for Subcatchment E-3: Existing Watershed 3

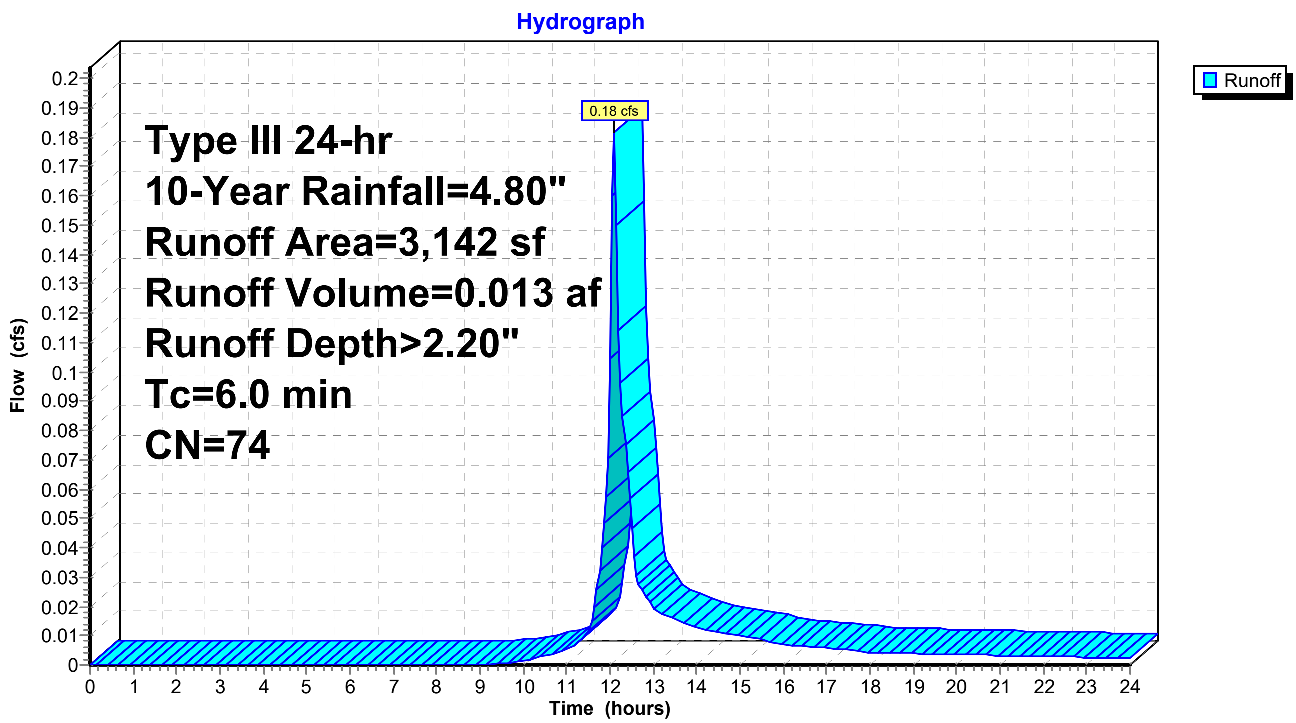
Runoff = 0.18 cfs @ 12.10 hrs, Volume= 0.013 af, Depth> 2.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.80"

Area (sf)	CN	Description
3,142	74	>75% Grass cover, Good, HSG C
3,142		100.00% Pervious Area

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

Subcatchment E-3: Existing Watershed 3



Summary for Subcatchment E-4A: Existing Watershed 4A

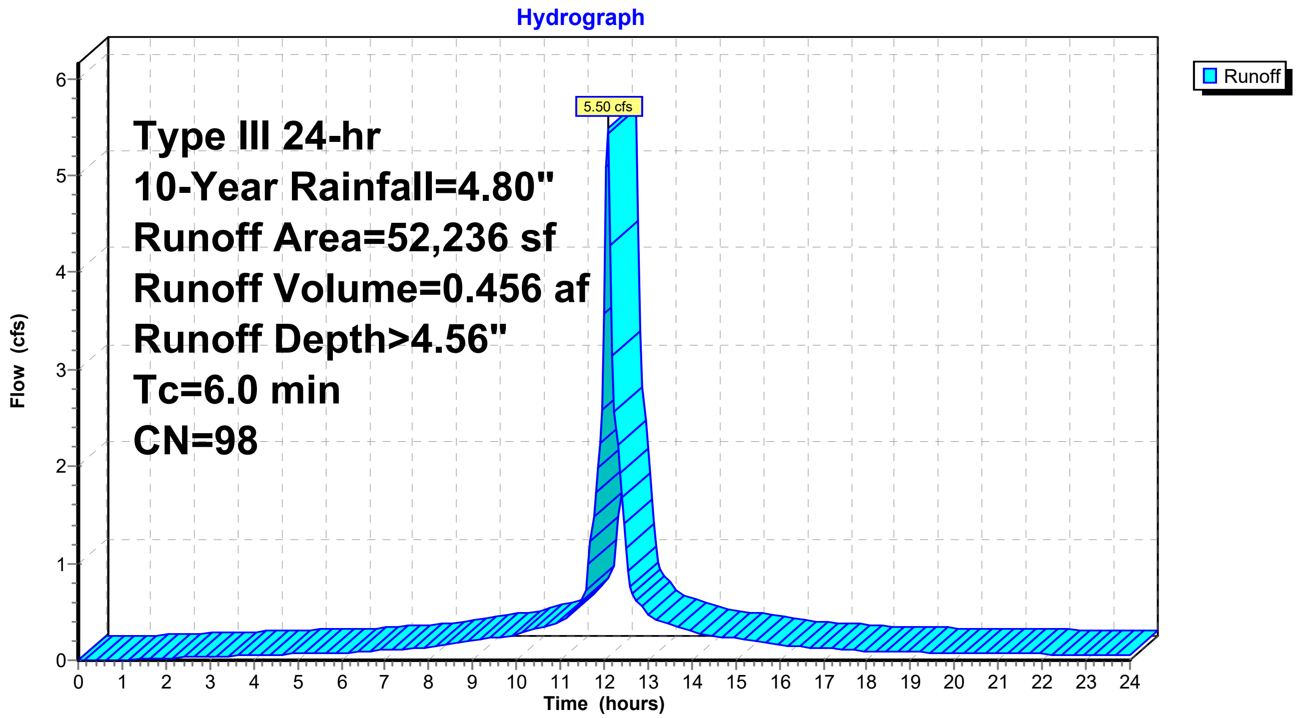
Runoff = 5.50 cfs @ 12.09 hrs, Volume= 0.456 af, Depth> 4.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.80"

Area (sf)	CN	Description
52,236	98	Roofs, HSG C
52,236		100.00% Impervious Area

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

Subcatchment E-4A: Existing Watershed 4A



Summary for Subcatchment E-4B: Existing Watershed 4B

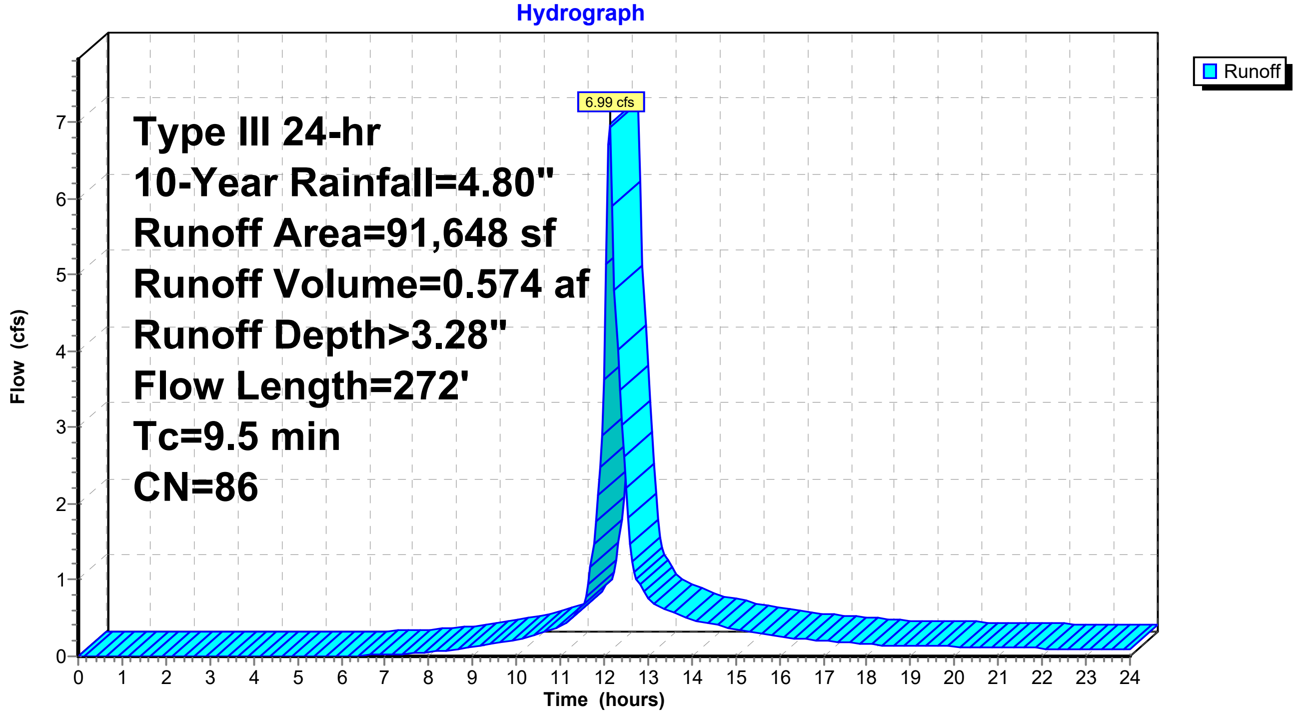
Runoff = 6.99 cfs @ 12.13 hrs, Volume= 0.574 af, Depth> 3.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.80"

	Area (sf)	CN	Description
	43,351	98	Paved parking, HSG C
	1,304	96	Gravel surface, HSG C
	42,526	74	>75% Grass cover, Good, HSG C
	2,704	70	Woods, Good, HSG C
*	1,763	74	Mulch
	91,648	86	Weighted Average
	48,297		52.70% Pervious Area
	43,351		47.30% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.1	50	0.0080	0.10		**Sheet Flow, Sheet Flow** Grass: Short n= 0.150 P2= 3.20"
0.8	111	0.0216	2.37		**Shallow Concentrated Flow, Shallow Concentrated Flow** Unpaved Kv= 16.1 fps
0.1	40	0.1500	6.24		**Shallow Concentrated Flow, SHallow** Unpaved Kv= 16.1 fps
0.5	71	0.0150	2.49		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
9.5	272	Total			

Subcatchment E-4B: Existing Watershed 4B



Summary for Subcatchment E-5A: Existing Watershed 5A

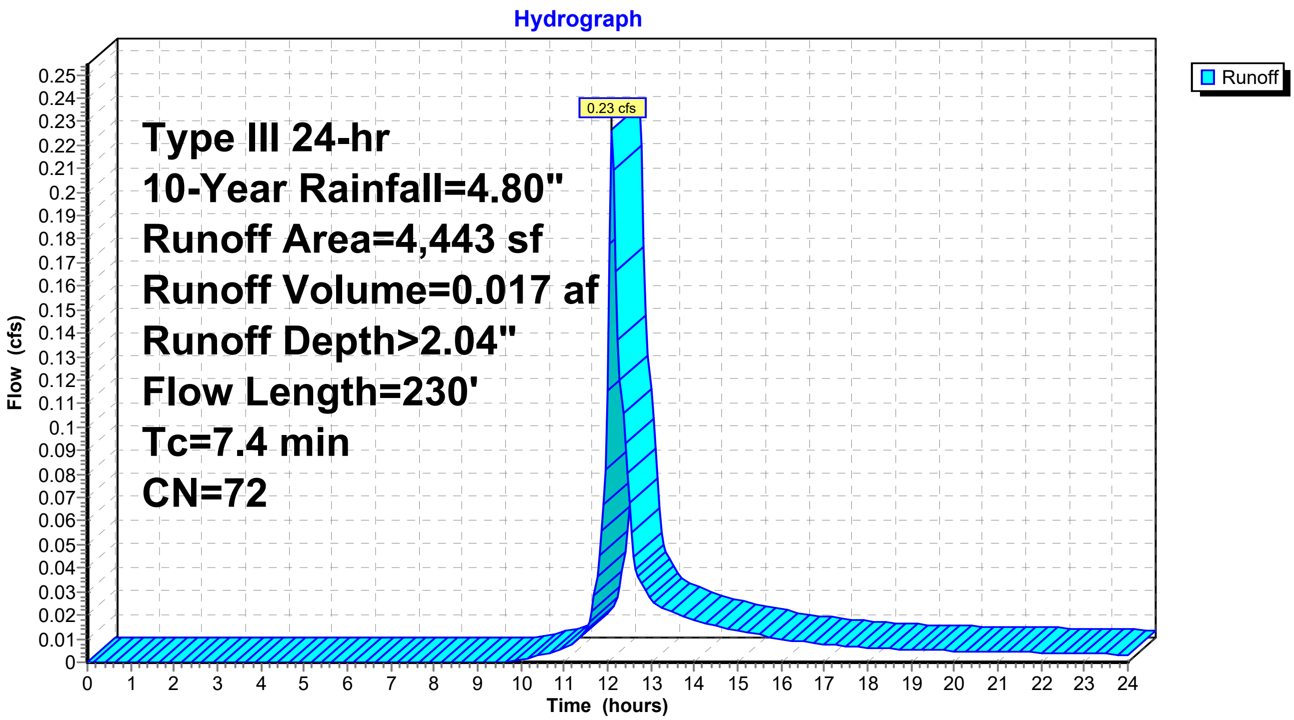
Runoff = 0.23 cfs @ 12.11 hrs, Volume= 0.017 af, Depth> 2.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.80"

Area (sf)	CN	Description
1,742	74	>75% Grass cover, Good, HSG C
2,701	70	Woods, Good, HSG C
4,443	72	Weighted Average
4,443		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	50	0.0160	0.14		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
1.2	180	0.0244	2.51		**Shallow Concentrated Flow, Shallow COncentrated Flow** Unpaved Kv= 16.1 fps
7.4	230	Total			

Subcatchment E-5A: Existing Watershed 5A



Summary for Subcatchment E-5B: Existing Watershed 5B

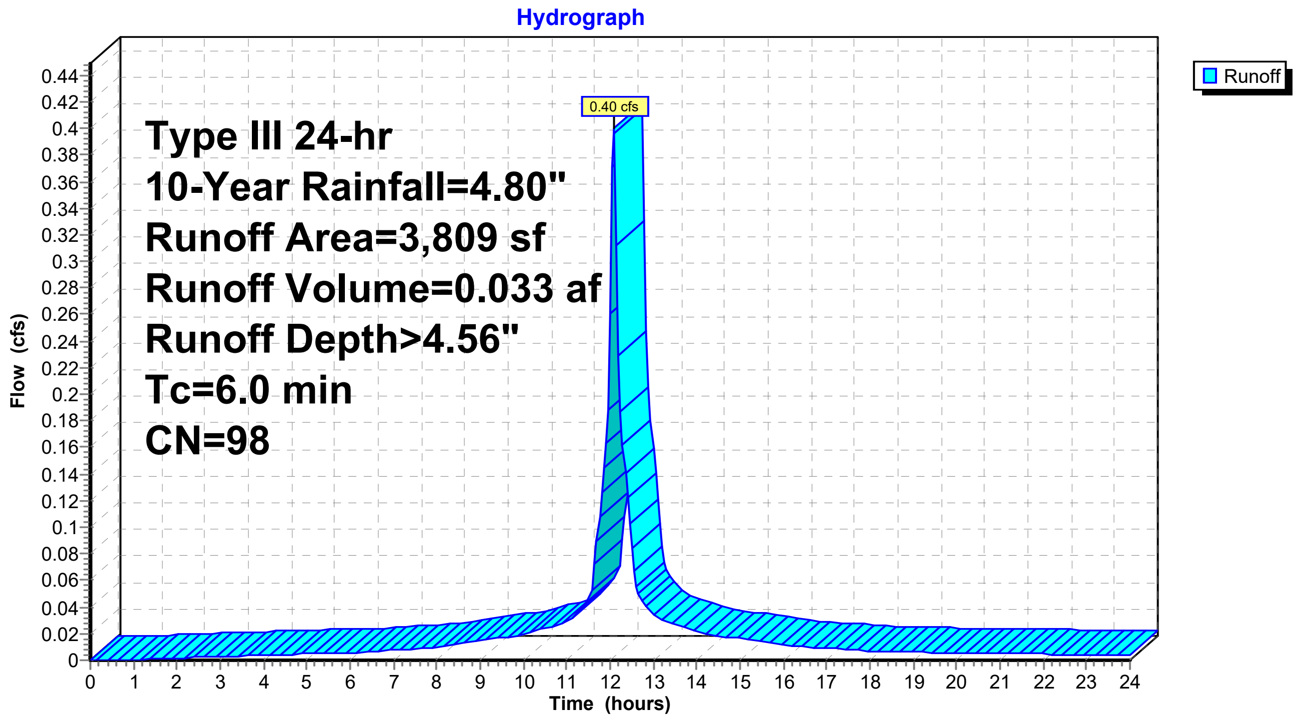
Runoff = 0.40 cfs @ 12.09 hrs, Volume= 0.033 af, Depth> 4.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.80"

Area (sf)	CN	Description
3,809	98	Paved parking, HSG C
3,809		100.00% Impervious Area

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

Subcatchment E-5B: Existing Watershed 5B



Summary for Subcatchment E-5C: Existing Watershed 5C

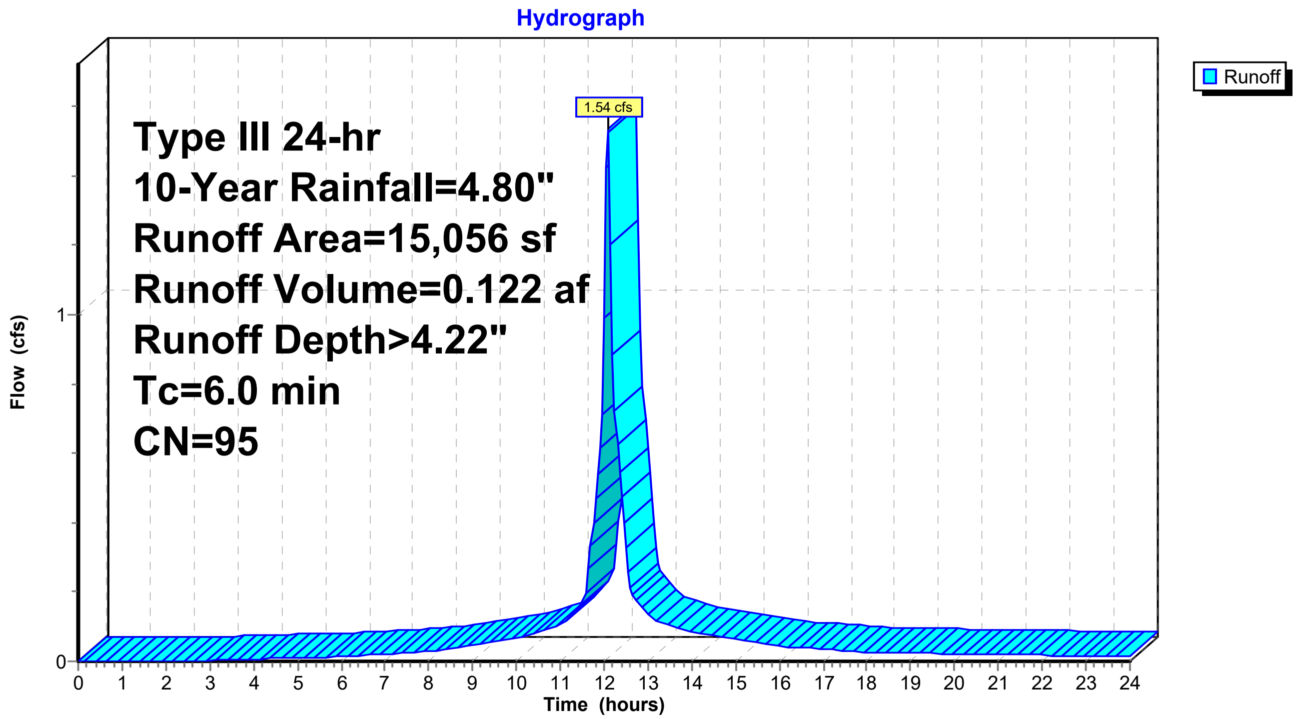
Runoff = 1.54 cfs @ 12.09 hrs, Volume= 0.122 af, Depth> 4.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.80"

Area (sf)	CN	Description
11,709	98	Paved parking, HSG C
1,791	96	Gravel surface, HSG C
303	79	50-75% Grass cover, Fair, HSG C
678	70	Woods, Good, HSG C
575	70	Woods, Good, HSG C
15,056	95	Weighted Average
3,347		22.23% Pervious Area
11,709		77.77% Impervious Area

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

Subcatchment E-5C: Existing Watershed 5C



Summary for Subcatchment E-6: Undetained to Wetland

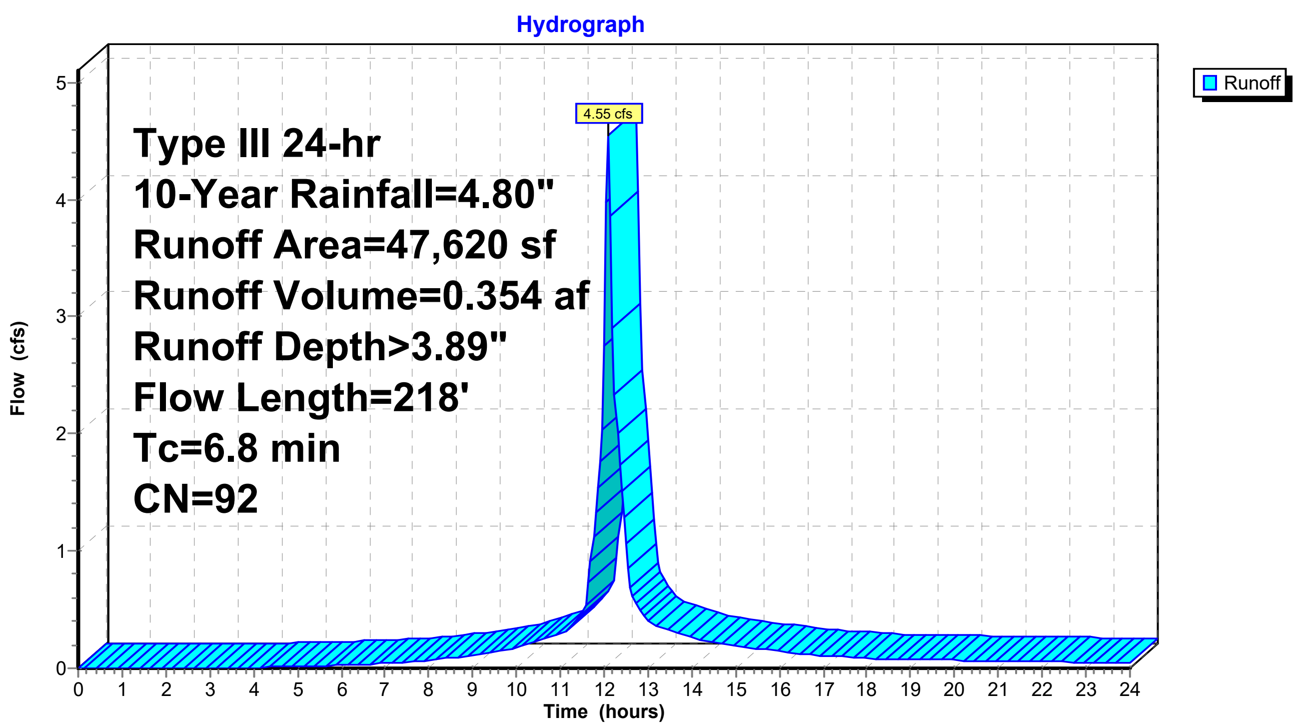
Runoff = 4.55 cfs @ 12.10 hrs, Volume= 0.354 af, Depth> 3.89"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.80"

Area (sf)	CN	Description
36,924	98	Paved parking, HSG C
9,270	74	>75% Grass cover, Good, HSG C
1,426	70	Woods, Good, HSG C
47,620	92	Weighted Average
10,696		22.46% Pervious Area
36,924		77.54% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	50	0.0340	0.18		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
2.2	168	0.0060	1.25		**Shallow Concentrated Flow, SHallow Concentrated Flow** Unpaved Kv= 16.1 fps
6.8	218	Total			

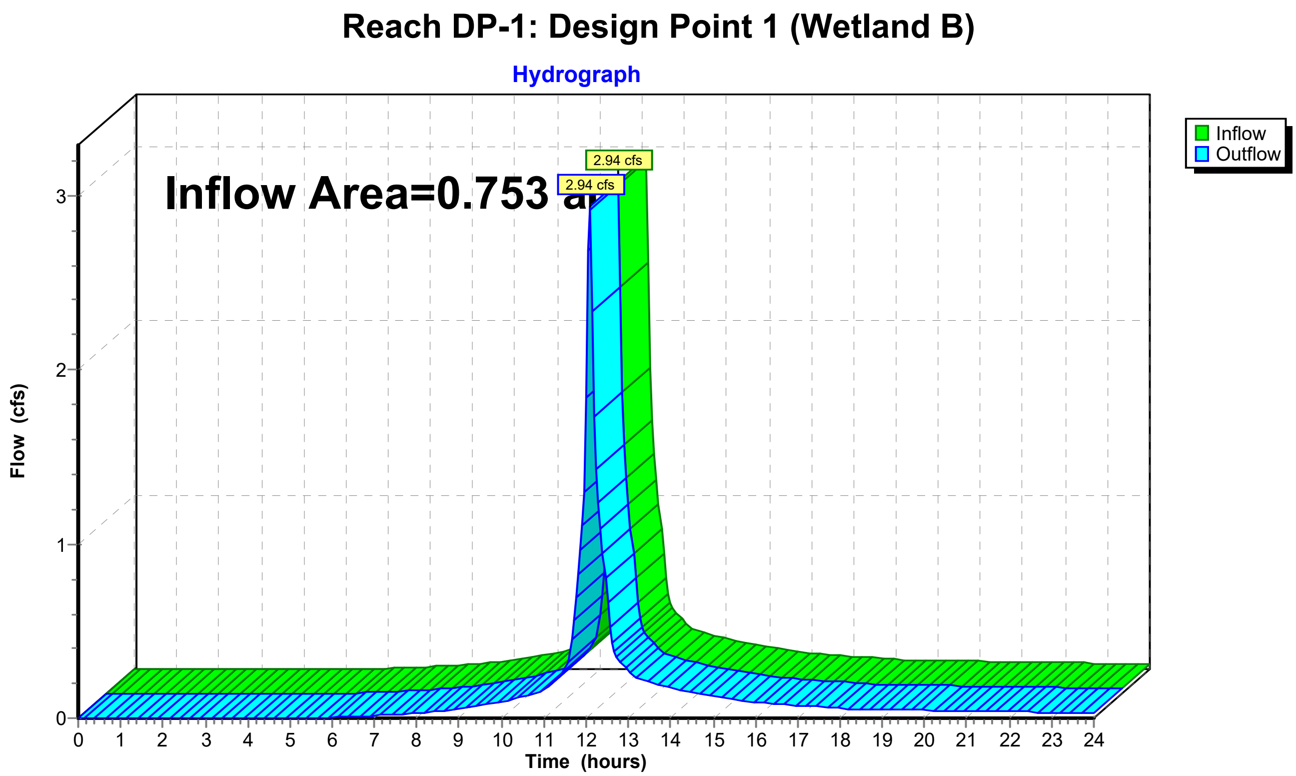
Subcatchment E-6: Undetained to Wetland



Summary for Reach DP-1: Design Point 1 (Wetland B)

Inflow Area = 0.753 ac, 35.44% Impervious, Inflow Depth > 3.48" for 10-Year event
Inflow = 2.94 cfs @ 12.09 hrs, Volume= 0.218 af
Outflow = 2.94 cfs @ 12.09 hrs, Volume= 0.218 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

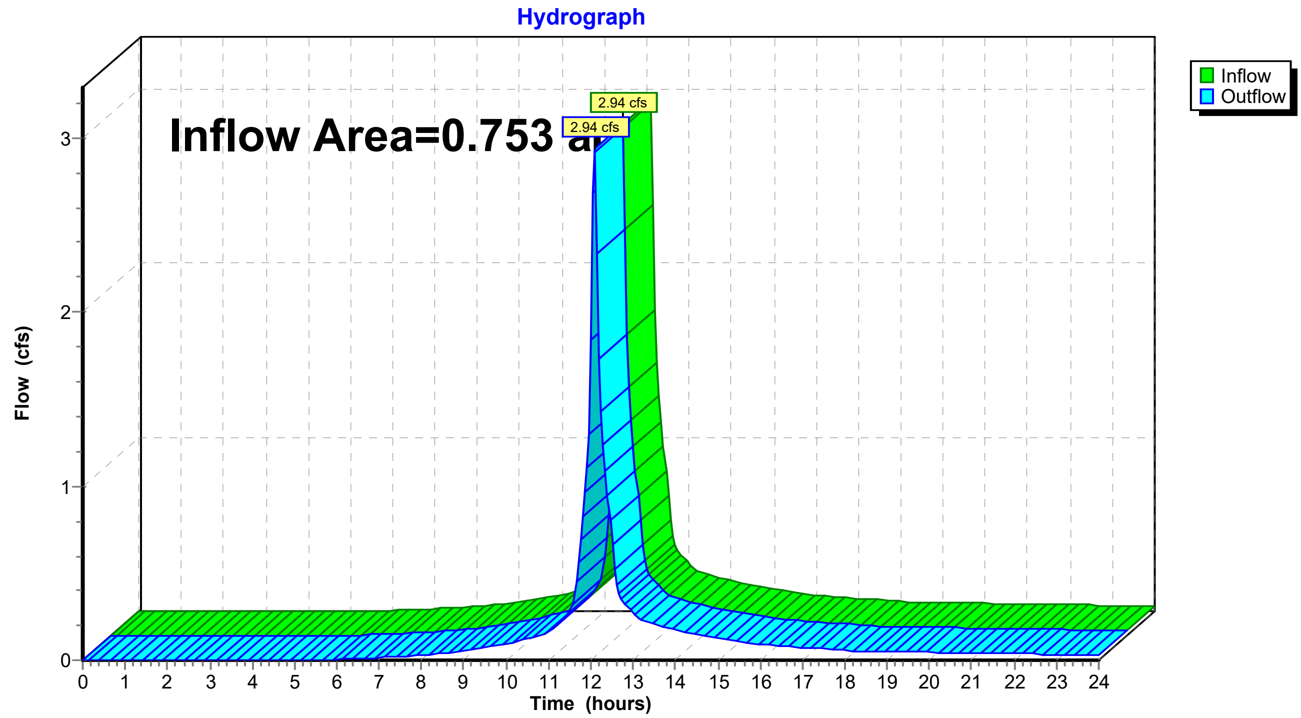


Summary for Reach DP-2: Design Point 2 (15" RCP to Wetland A)

Inflow Area =	0.753 ac,	35.44% Impervious,	Inflow Depth > 3.48"	for 10-Year event
Inflow =	2.94 cfs @	12.09 hrs, Volume=	0.218 af	
Outflow =	2.94 cfs @	12.09 hrs, Volume=	0.218 af, Atten= 0%, Lag= 0.0 min	

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach DP-2: Design Point 2 (15" RCP to Wetland A)

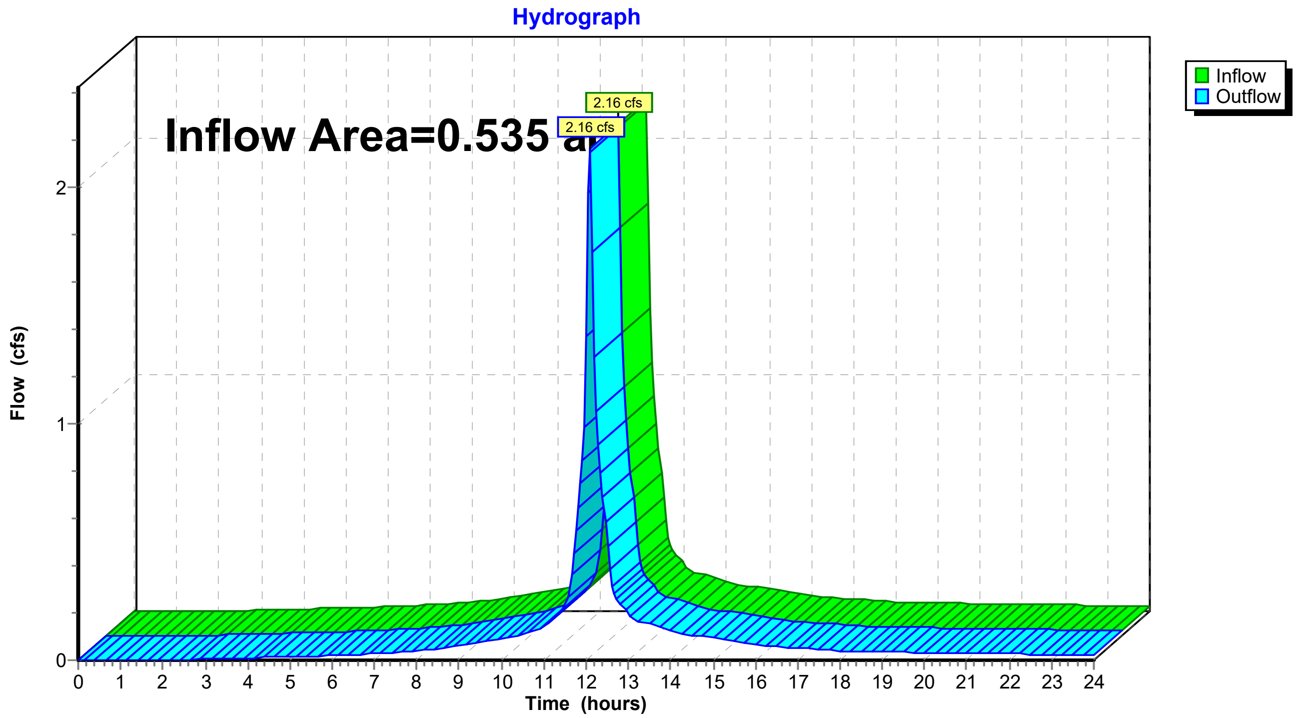


Summary for Reach DP-3: Design Point 3 (Existing Drainage Ditch)

Inflow Area =	0.535 ac, 66.58% Impervious, Inflow Depth > 3.86"	for 10-Year event	
Inflow =	2.16 cfs @ 12.09 hrs, Volume=	0.172 af	
Outflow =	2.16 cfs @ 12.09 hrs, Volume=	0.172 af, Atten= 0%, Lag= 0.0 min	

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach DP-3: Design Point 3 (Existing Drainage Ditch)

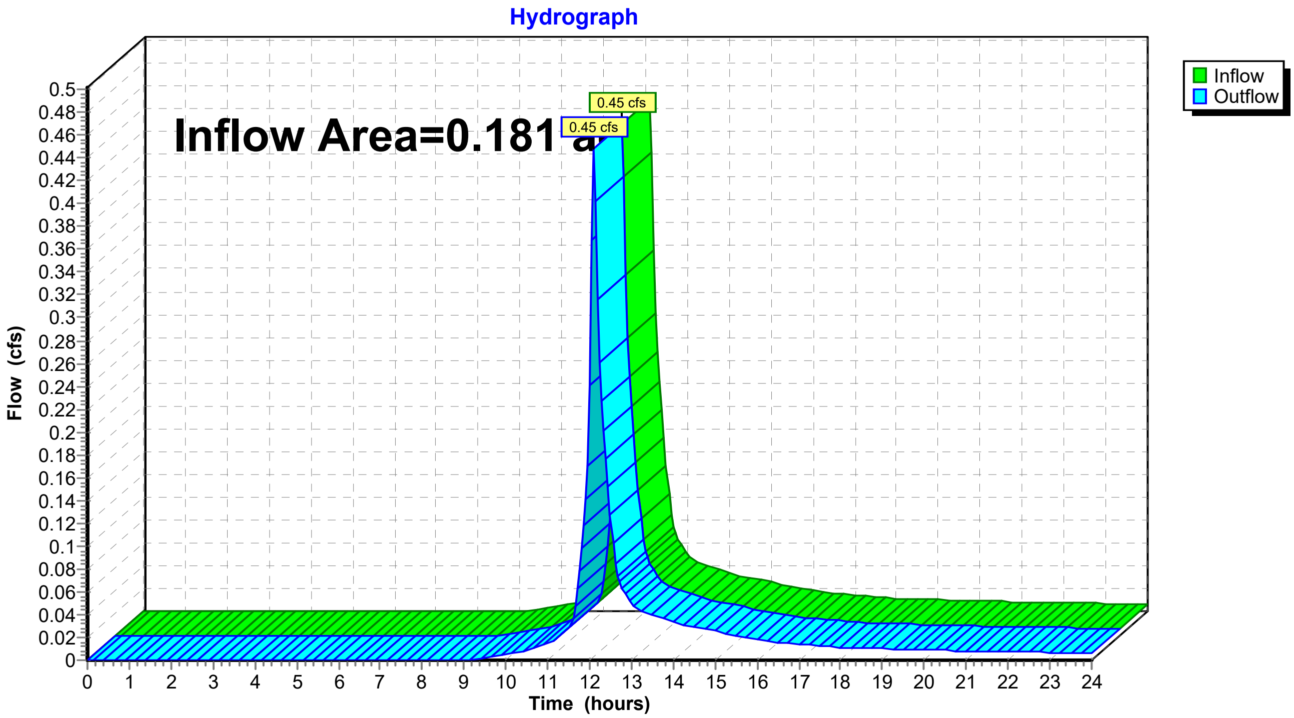


Summary for Reach DP-4: Design Point 4 (MassDOT CB- 2)

Inflow Area =	0.181 ac,	1.31% Impervious, Inflow Depth > 2.25"	for 10-Year event	
Inflow =	0.45 cfs @	12.11 hrs, Volume=	0.034 af	
Outflow =	0.45 cfs @	12.11 hrs, Volume=	0.034 af,	Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach DP-4: Design Point 4 (MassDOT CB- 2)

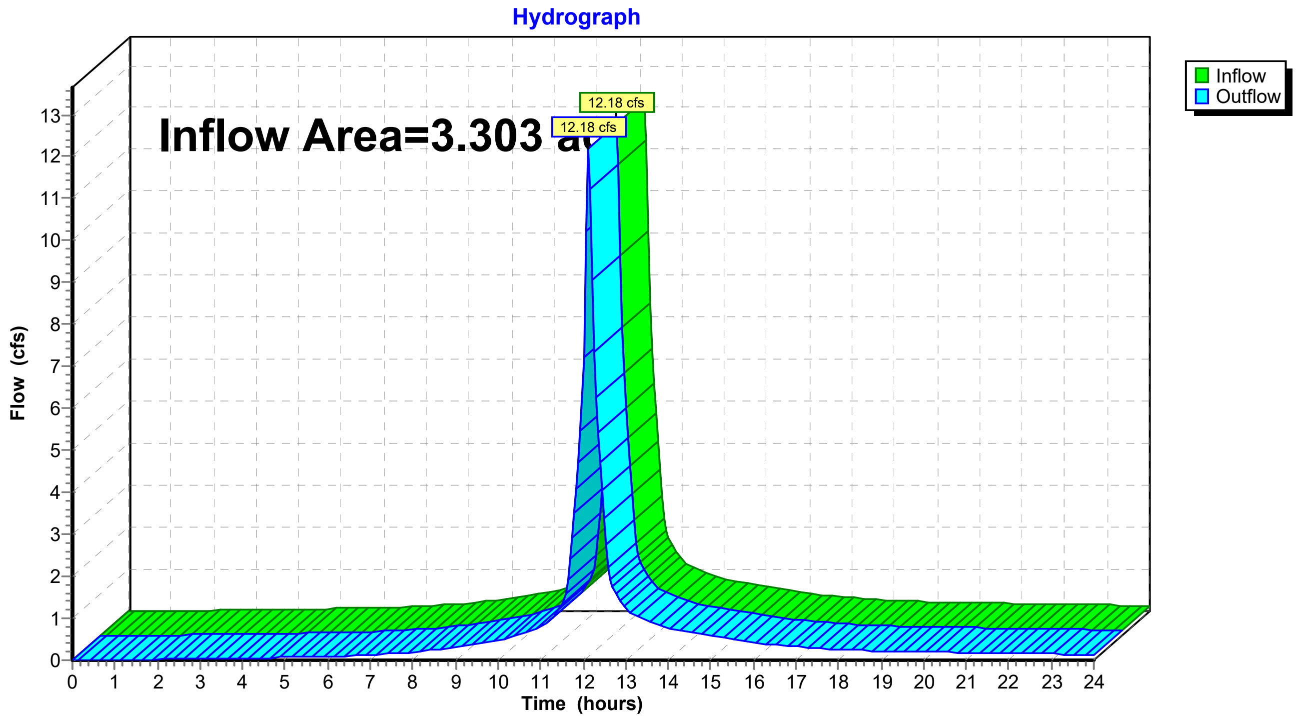


Summary for Reach DP-5: EXISTING CONSTRUCTED STORMWATER WETLAND

Inflow Area = 3.303 ac, 66.43% Impervious, Inflow Depth > 3.74" for 10-Year event
Inflow = 12.18 cfs @ 12.11 hrs, Volume= 1.030 af
Outflow = 12.18 cfs @ 12.11 hrs, Volume= 1.030 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach DP-5: EXISTING CONSTRUCTED STORMWATER WETLAND

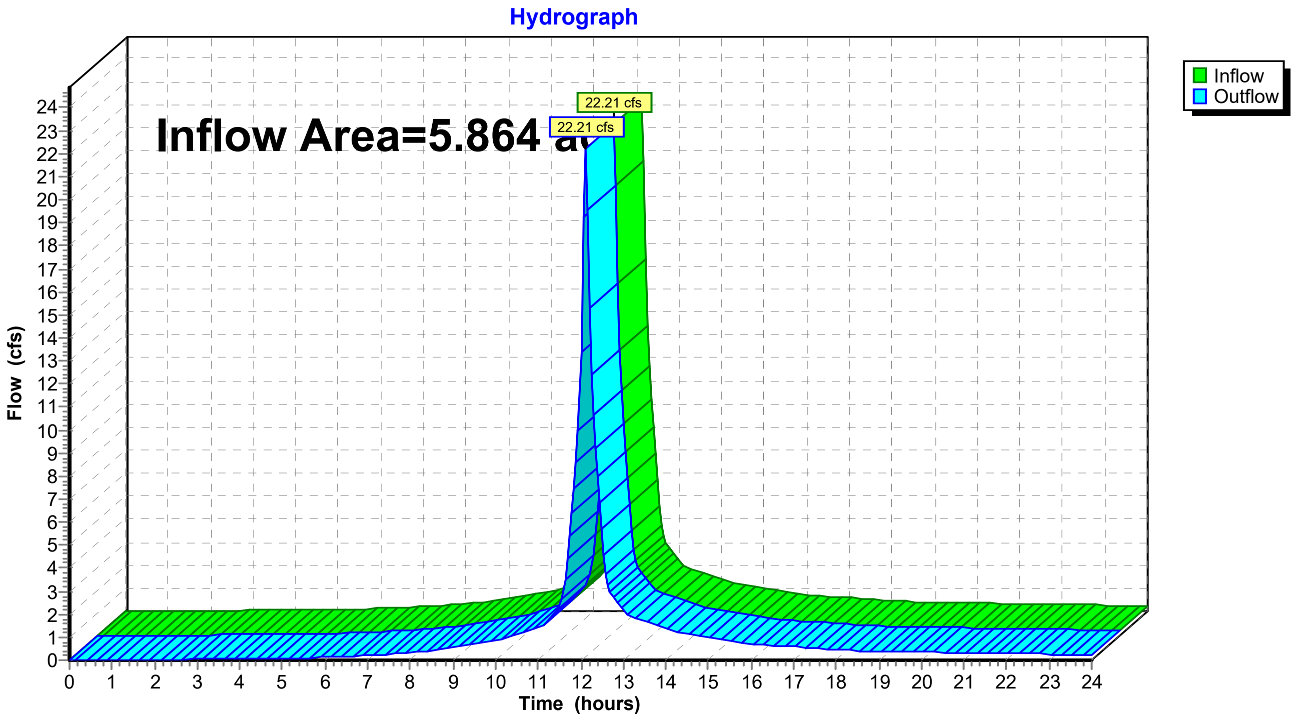


Summary for Reach DP-6: Wetland A - Design Point 6

Inflow Area =	5.864 ac,	62.53% Impervious,	Inflow Depth > 3.70"	for 10-Year event	
Inflow =	22.21 cfs @	12.10 hrs,	Volume=	1.809 af	
Outflow =	22.21 cfs @	12.10 hrs,	Volume=	1.809 af,	Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach DP-6: Wetland A - Design Point 6



Summary for Subcatchment E-1: Existing Watershed 1

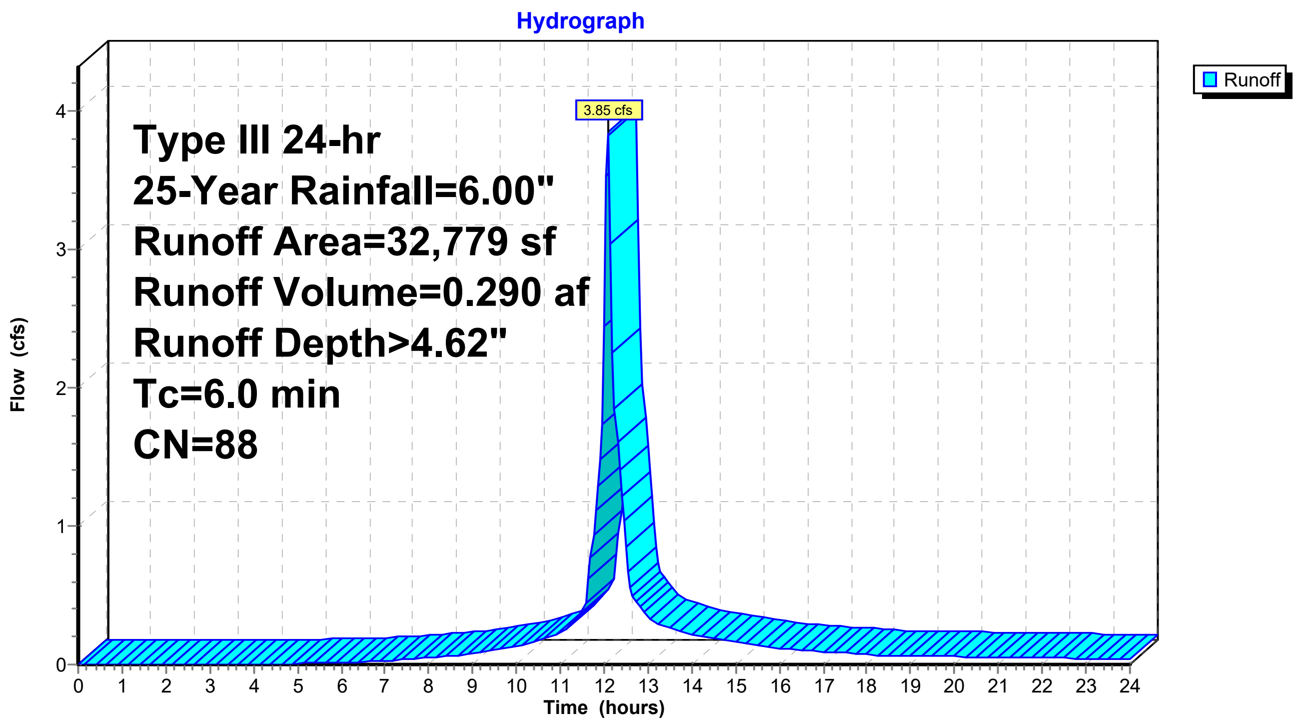
Runoff = 3.85 cfs @ 12.09 hrs, Volume= 0.290 af, Depth> 4.62"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.00"

Area (sf)	CN	Description
11,618	98	Paved parking, HSG C
9,421	96	Gravel surface, HSG C
5,782	74	>75% Grass cover, Good, HSG C
3,103	70	Woods, Good, HSG C
561	70	Woods, Good, HSG C
2,294	74	>75% Grass cover, Good, HSG C
32,779	88	Weighted Average
21,161		64.56% Pervious Area
11,618		35.44% Impervious Area

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

Subcatchment E-1: Existing Watershed 1



Summary for Subcatchment E-2: Existing Watershed 2

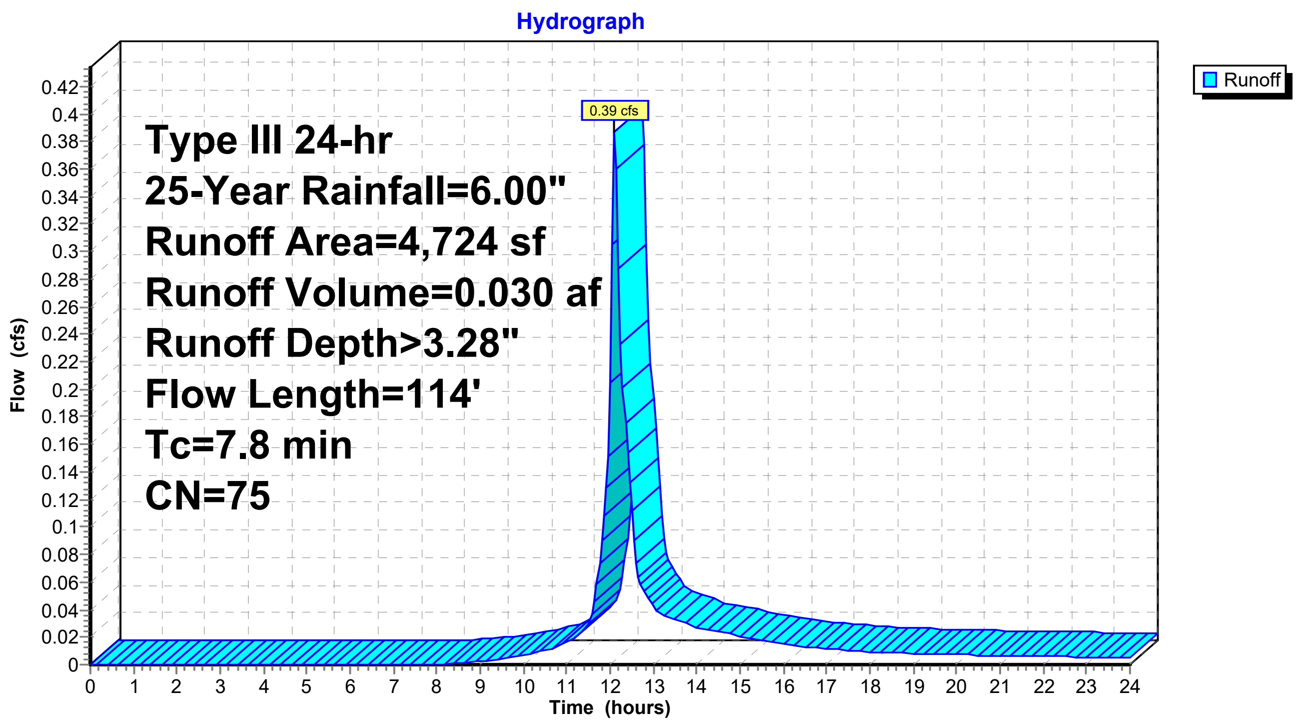
Runoff = 0.39 cfs @ 12.11 hrs, Volume= 0.030 af, Depth> 3.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.00"

Area (sf)	CN	Description
4,621	74	>75% Grass cover, Good, HSG C
103	98	Paved parking, HSG C
4,724	75	Weighted Average
4,621		97.82% Pervious Area
103		2.18% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	50	0.0100	0.11		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
0.4	64	0.0312	2.84		**Shallow Concentrated Flow, Shallow Concentrated Flow** Unpaved Kv= 16.1 fps
7.8	114	Total			

Subcatchment E-2: Existing Watershed 2



Summary for Subcatchment E-3: Existing Watershed 3

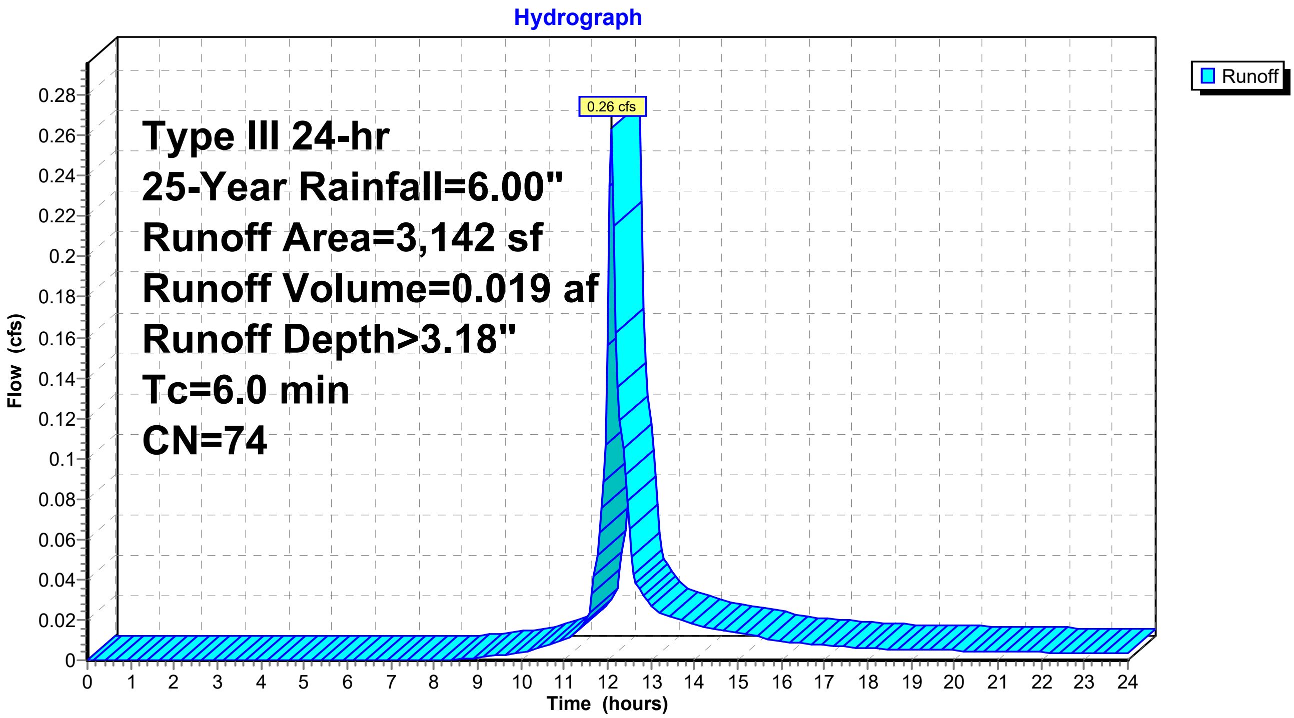
Runoff = 0.26 cfs @ 12.09 hrs, Volume= 0.019 af, Depth> 3.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.00"

Area (sf)	CN	Description
3,142	74	>75% Grass cover, Good, HSG C
3,142		100.00% Pervious Area

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

Subcatchment E-3: Existing Watershed 3



Summary for Subcatchment E-4A: Existing Watershed 4A

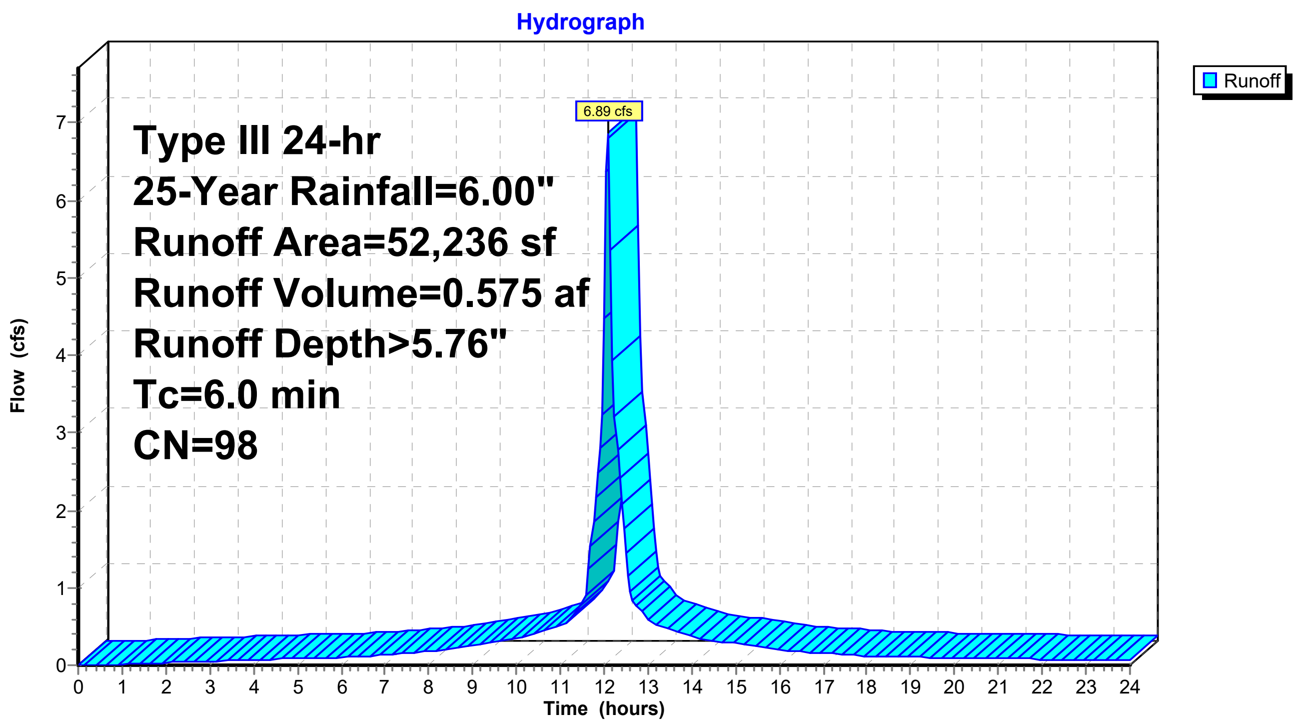
Runoff = 6.89 cfs @ 12.09 hrs, Volume= 0.575 af, Depth> 5.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.00"

Area (sf)	CN	Description
52,236	98	Roofs, HSG C
52,236		100.00% Impervious Area

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

Subcatchment E-4A: Existing Watershed 4A



Summary for Subcatchment E-4B: Existing Watershed 4B

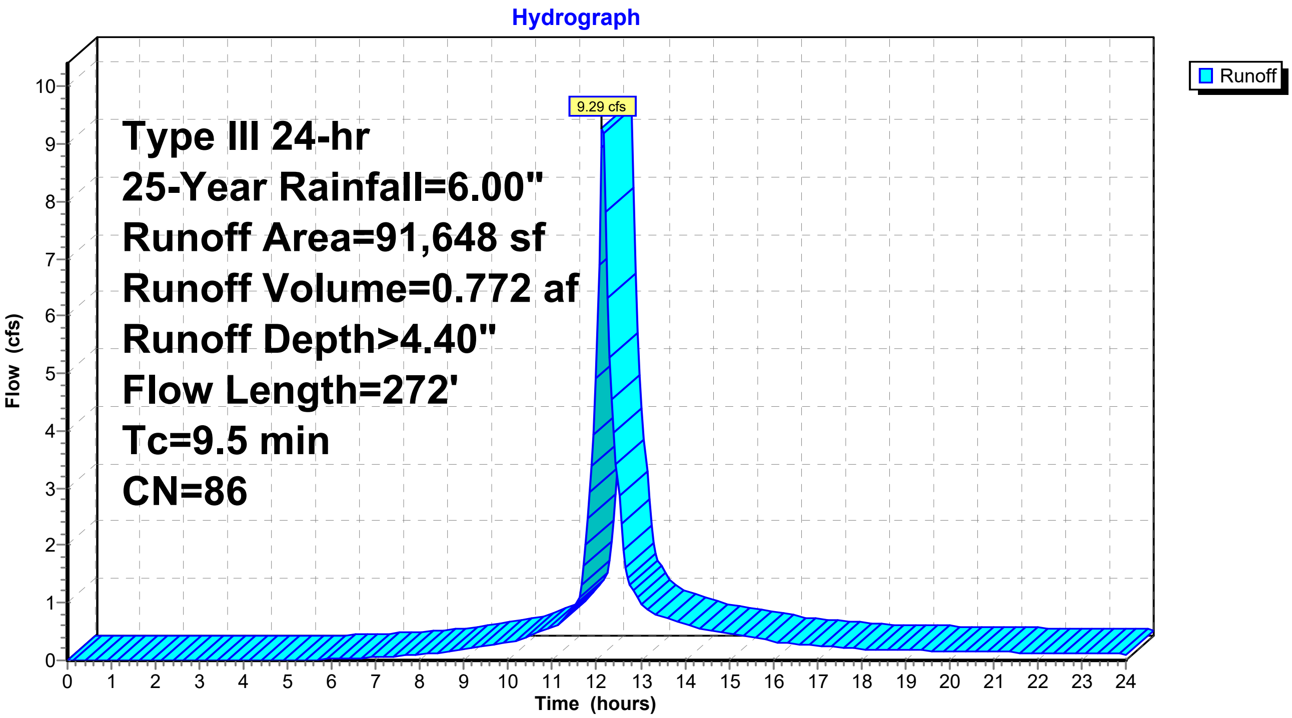
Runoff = 9.29 cfs @ 12.13 hrs, Volume= 0.772 af, Depth> 4.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.00"

	Area (sf)	CN	Description
	43,351	98	Paved parking, HSG C
	1,304	96	Gravel surface, HSG C
	42,526	74	>75% Grass cover, Good, HSG C
	2,704	70	Woods, Good, HSG C
*	1,763	74	Mulch
	91,648	86	Weighted Average
	48,297		52.70% Pervious Area
	43,351		47.30% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.1	50	0.0080	0.10		**Sheet Flow, Sheet Flow** Grass: Short n= 0.150 P2= 3.20"
0.8	111	0.0216	2.37		**Shallow Concentrated Flow, Shallow Concentrated Flow** Unpaved Kv= 16.1 fps
0.1	40	0.1500	6.24		**Shallow Concentrated Flow, SHallow** Unpaved Kv= 16.1 fps
0.5	71	0.0150	2.49		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
9.5	272	Total			

Subcatchment E-4B: Existing Watershed 4B



Summary for Subcatchment E-5A: Existing Watershed 5A

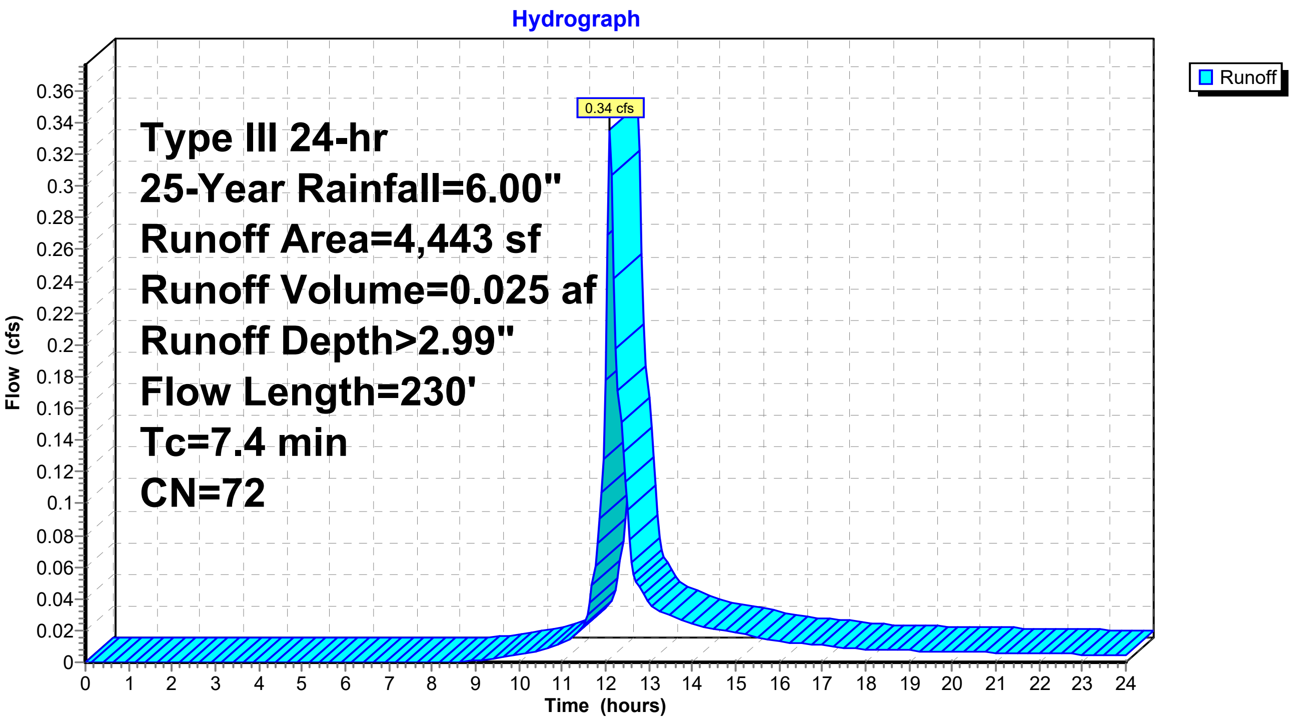
Runoff = 0.34 cfs @ 12.11 hrs, Volume= 0.025 af, Depth> 2.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.00"

Area (sf)	CN	Description
1,742	74	>75% Grass cover, Good, HSG C
2,701	70	Woods, Good, HSG C
4,443	72	Weighted Average
4,443		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	50	0.0160	0.14		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
1.2	180	0.0244	2.51		**Shallow Concentrated Flow, Shallow COncentrated Flow** Unpaved Kv= 16.1 fps
7.4	230	Total			

Subcatchment E-5A: Existing Watershed 5A



Summary for Subcatchment E-5B: Existing Watershed 5B

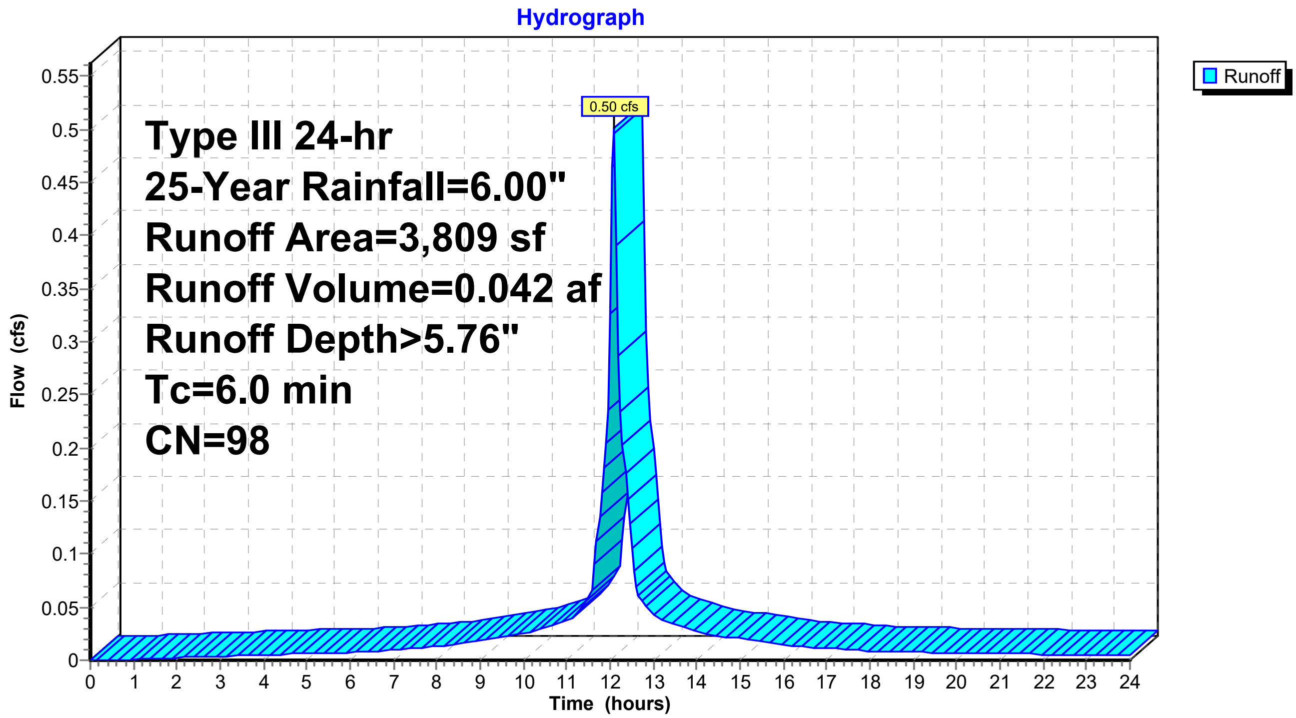
Runoff = 0.50 cfs @ 12.09 hrs, Volume= 0.042 af, Depth> 5.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.00"

Area (sf)	CN	Description
3,809	98	Paved parking, HSG C
3,809		100.00% Impervious Area

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

Subcatchment E-5B: Existing Watershed 5B



Summary for Subcatchment E-5C: Existing Watershed 5C

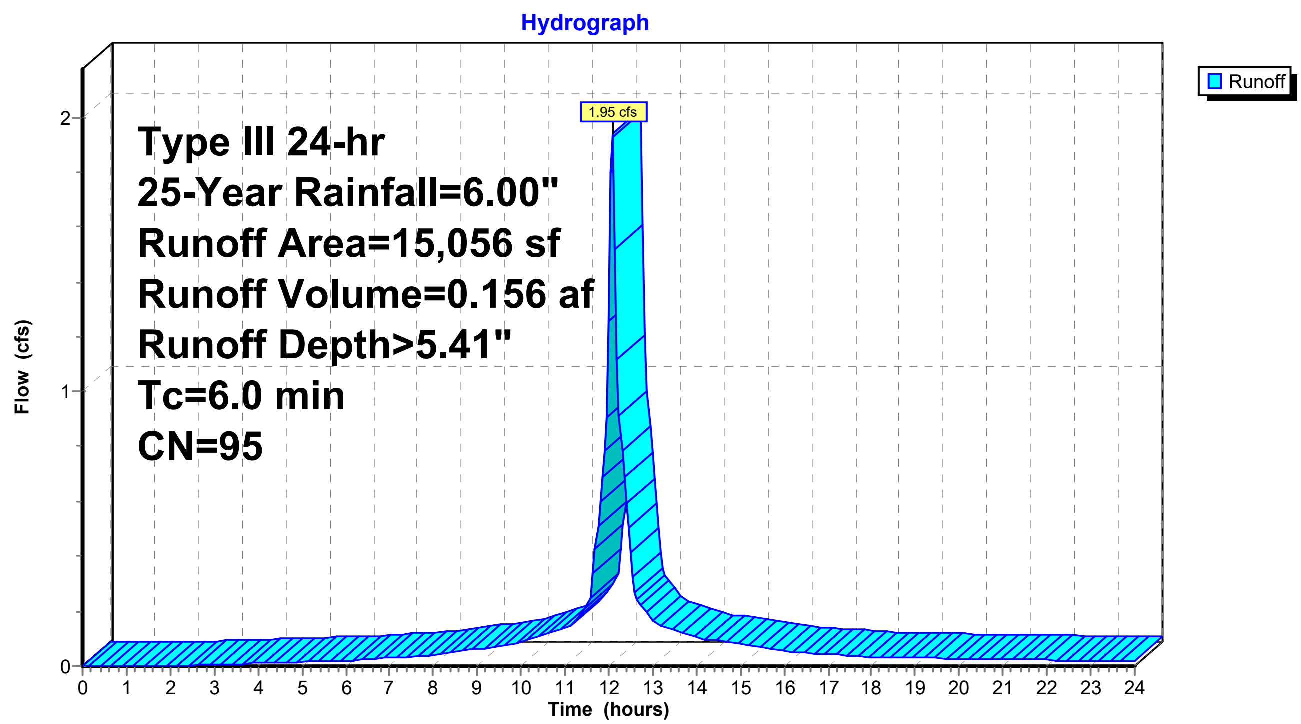
Runoff = 1.95 cfs @ 12.09 hrs, Volume= 0.156 af, Depth> 5.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.00"

Area (sf)	CN	Description
11,709	98	Paved parking, HSG C
1,791	96	Gravel surface, HSG C
303	79	50-75% Grass cover, Fair, HSG C
678	70	Woods, Good, HSG C
575	70	Woods, Good, HSG C
15,056	95	Weighted Average
3,347		22.23% Pervious Area
11,709		77.77% Impervious Area

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

Subcatchment E-5C: Existing Watershed 5C



Summary for Subcatchment E-6: Undetained to Wetland

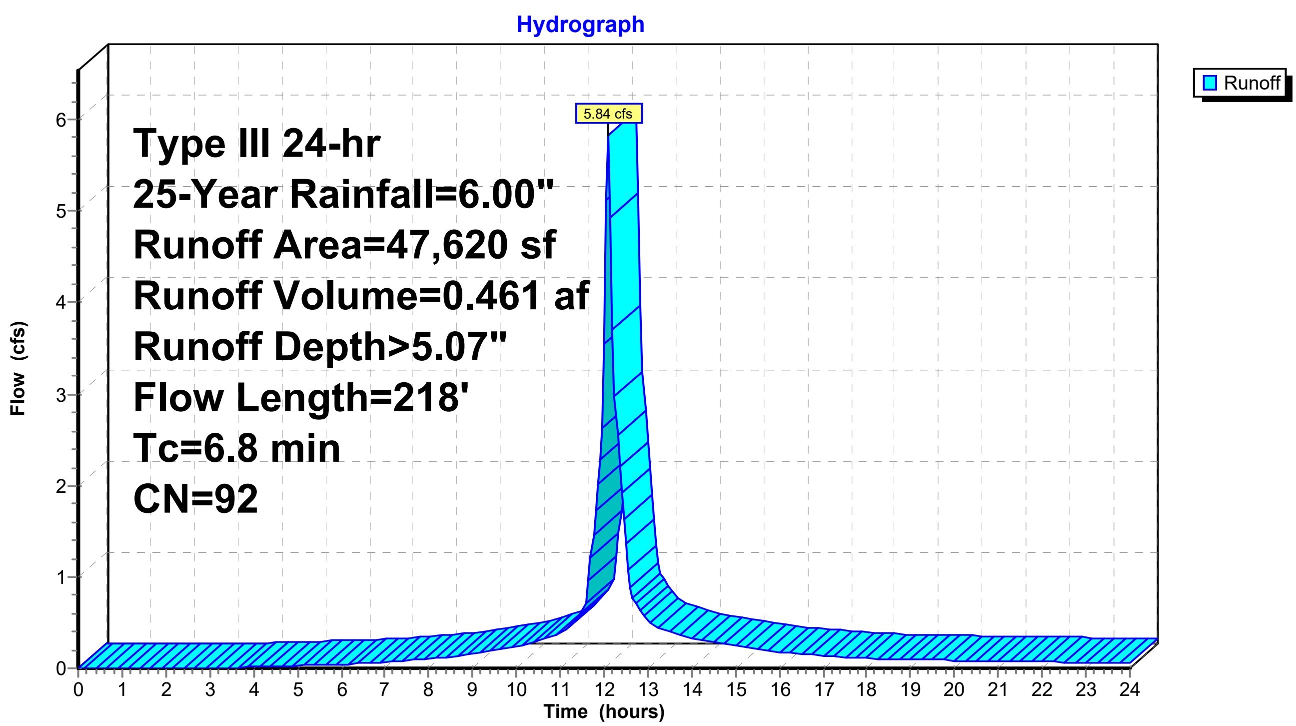
Runoff = 5.84 cfs @ 12.10 hrs, Volume= 0.461 af, Depth> 5.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.00"

Area (sf)	CN	Description
36,924	98	Paved parking, HSG C
9,270	74	>75% Grass cover, Good, HSG C
1,426	70	Woods, Good, HSG C
47,620	92	Weighted Average
10,696		22.46% Pervious Area
36,924		77.54% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	50	0.0340	0.18		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
2.2	168	0.0060	1.25		**Shallow Concentrated Flow, SHallow Concentrated Flow** Unpaved Kv= 16.1 fps
6.8	218	Total			

Subcatchment E-6: Undetained to Wetland

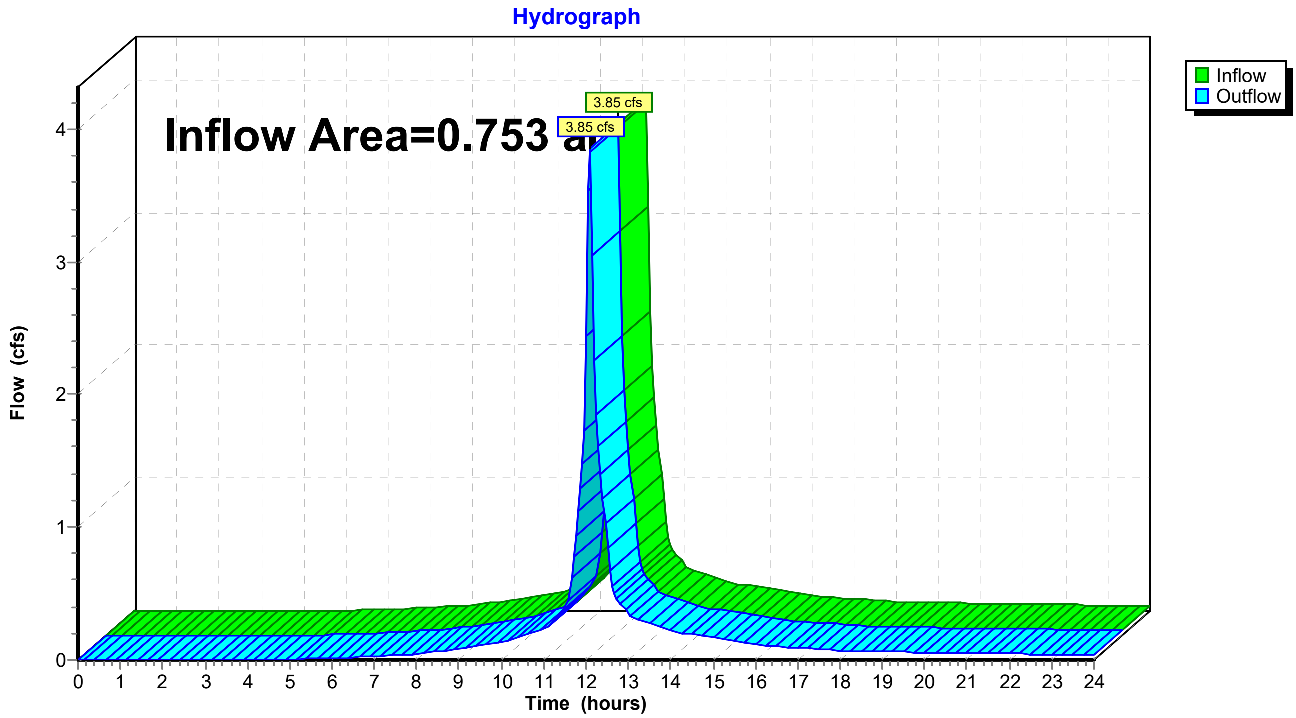


Summary for Reach DP-1: Design Point 1 (Wetland B)

Inflow Area =	0.753 ac,	35.44% Impervious, Inflow Depth > 4.62"	for 25-Year event	
Inflow =	3.85 cfs @	12.09 hrs, Volume=	0.290 af	
Outflow =	3.85 cfs @	12.09 hrs, Volume=	0.290 af,	Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

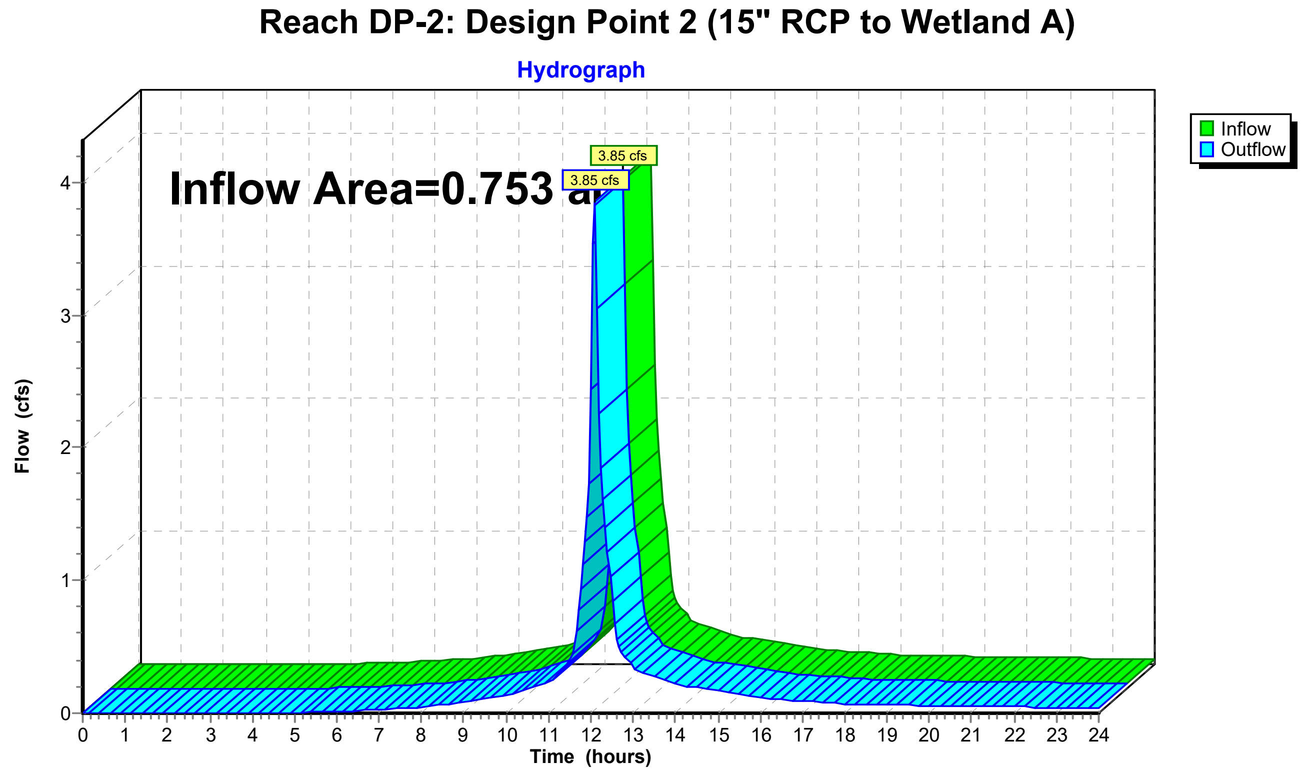
Reach DP-1: Design Point 1 (Wetland B)



Summary for Reach DP-2: Design Point 2 (15" RCP to Wetland A)

Inflow Area =	0.753 ac, 35.44% Impervious,	Inflow Depth > 4.62"	for 25-Year event	
Inflow =	3.85 cfs @	12.09 hrs, Volume=	0.290 af	
Outflow =	3.85 cfs @	12.09 hrs, Volume=	0.290 af,	Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

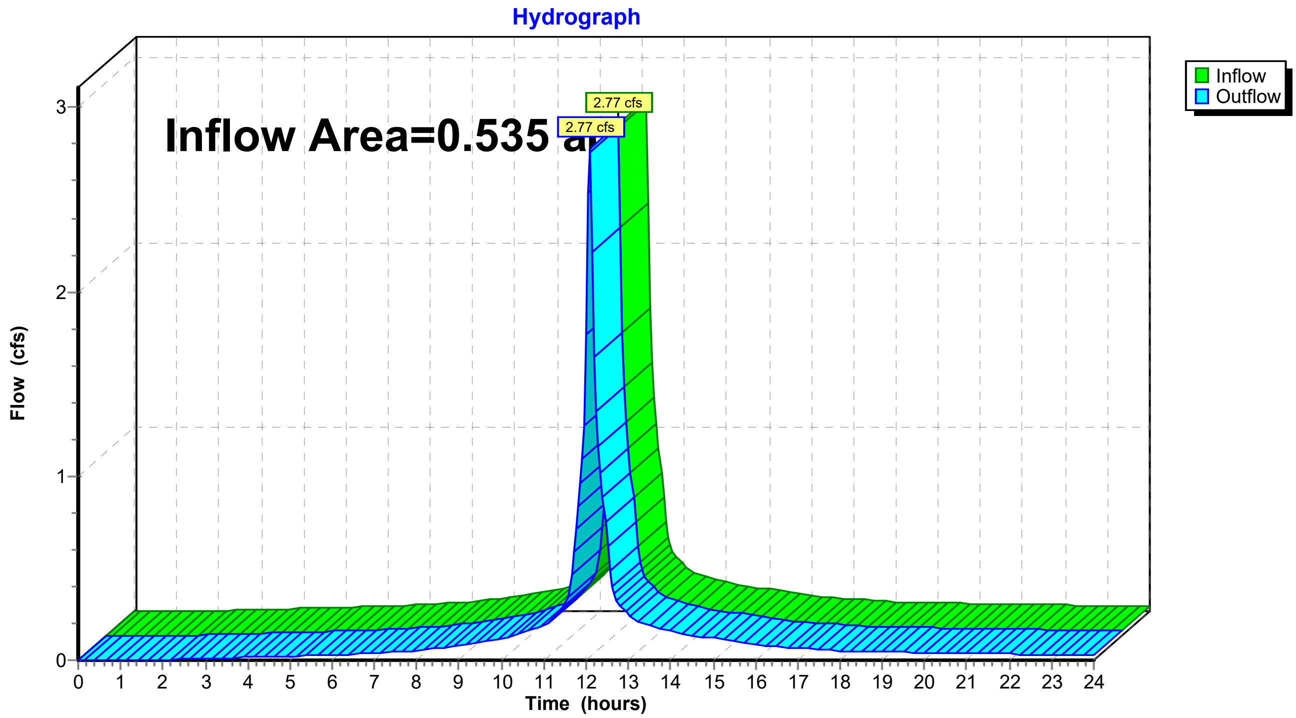


Summary for Reach DP-3: Design Point 3 (Existing Drainage Ditch)

Inflow Area =	0.535 ac,	66.58% Impervious,	Inflow Depth > 5.00"	for 25-Year event
Inflow =	2.77 cfs @	12.09 hrs, Volume=	0.223 af	
Outflow =	2.77 cfs @	12.09 hrs, Volume=	0.223 af,	Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach DP-3: Design Point 3 (Existing Drainage Ditch)

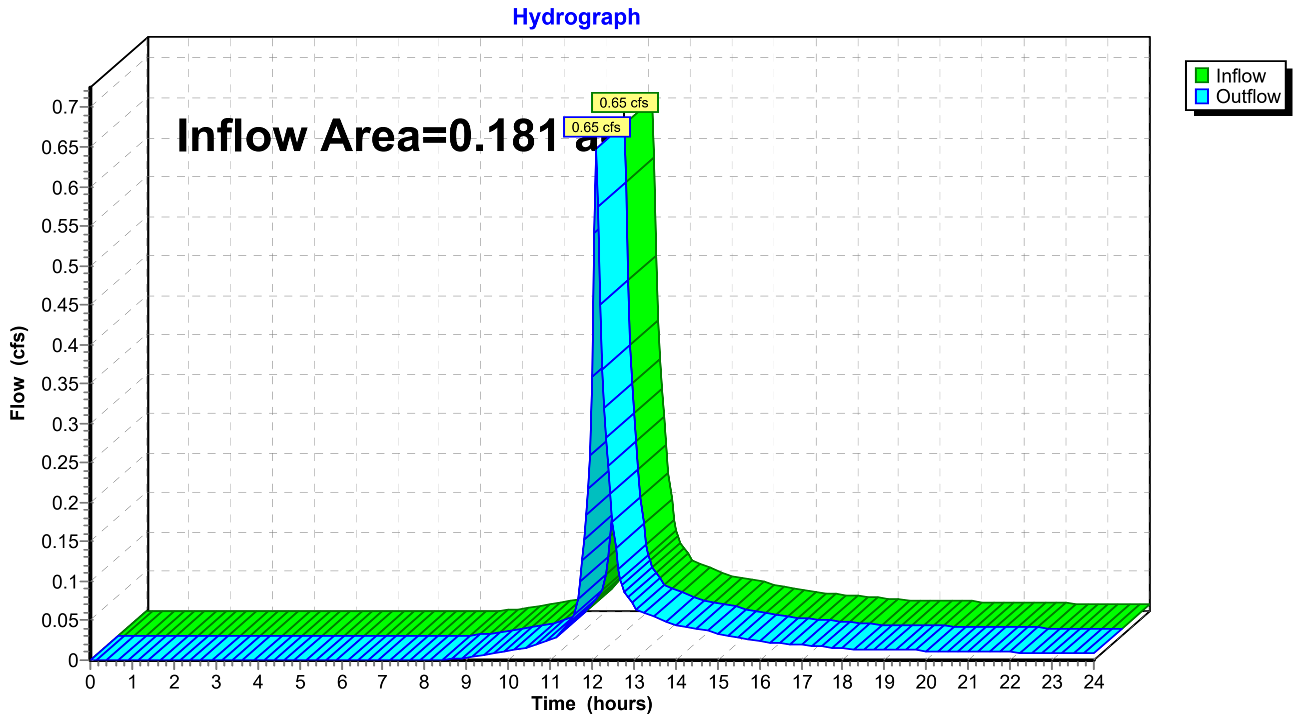


Summary for Reach DP-4: Design Point 4 (MassDOT CB- 2)

Inflow Area = 0.181 ac, 1.31% Impervious, Inflow Depth > 3.24" for 25-Year event
Inflow = 0.65 cfs @ 12.10 hrs, Volume= 0.049 af
Outflow = 0.65 cfs @ 12.10 hrs, Volume= 0.049 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach DP-4: Design Point 4 (MassDOT CB- 2)

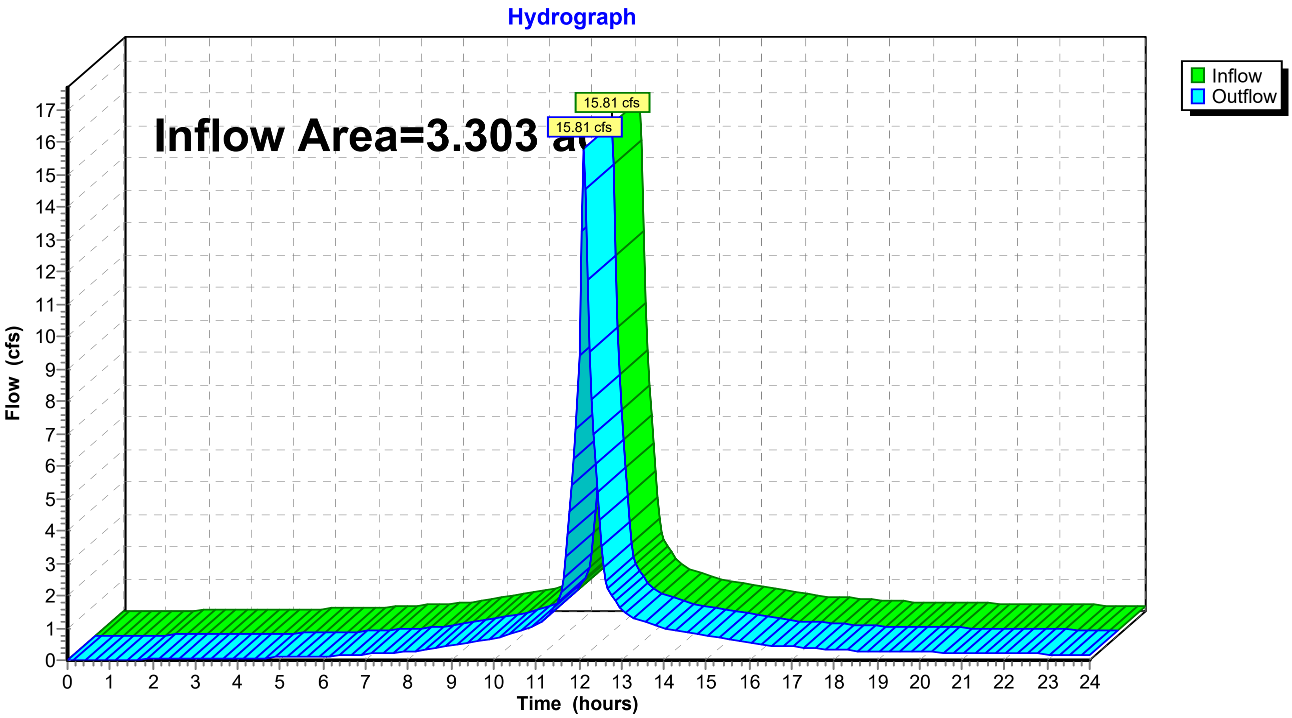


Summary for Reach DP-5: EXISTING CONSTRUCTED STORMWATER WETLAND

Inflow Area = 3.303 ac, 66.43% Impervious, Inflow Depth > 4.90" for 25-Year event
Inflow = 15.81 cfs @ 12.11 hrs, Volume= 1.347 af
Outflow = 15.81 cfs @ 12.11 hrs, Volume= 1.347 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

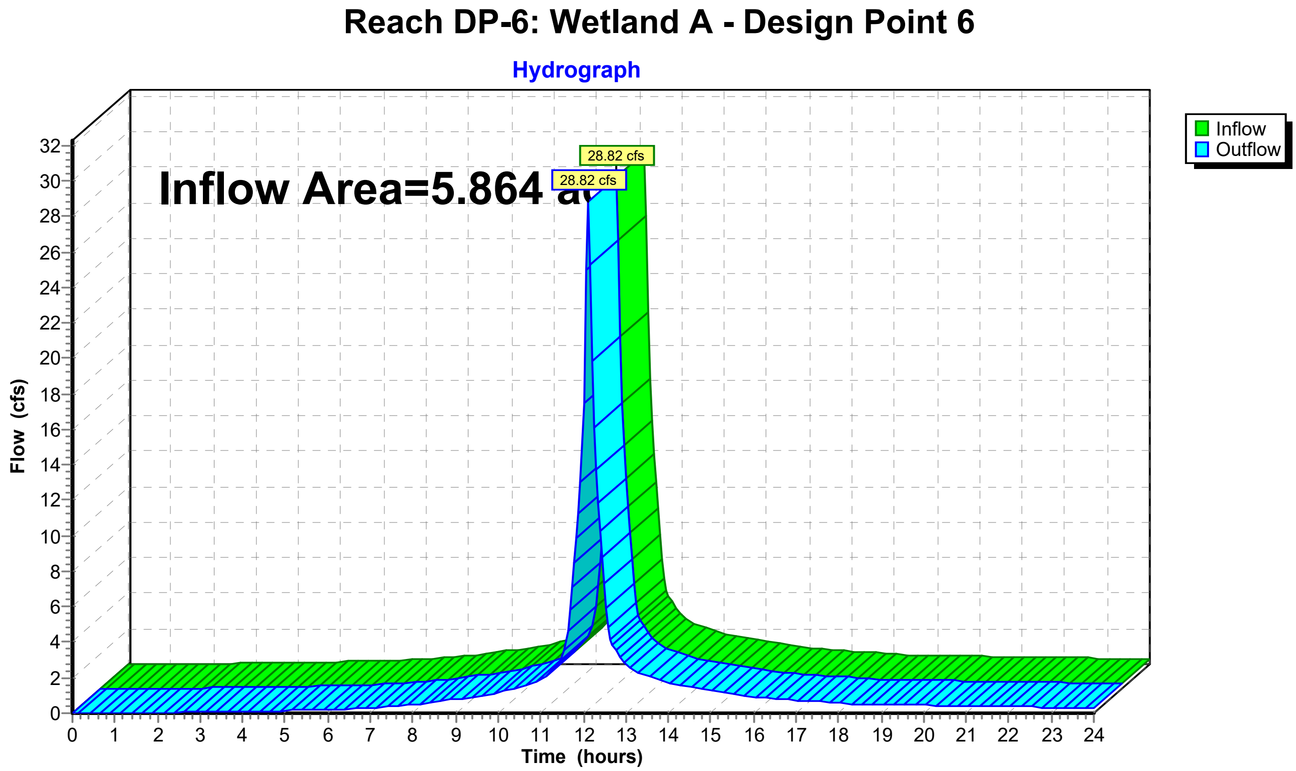
Reach DP-5: EXISTING CONSTRUCTED STORMWATER WETLAND



Summary for Reach DP-6: Wetland A - Design Point 6

Inflow Area = 5.864 ac, 62.53% Impervious, Inflow Depth > 4.85" for 25-Year event
Inflow = 28.82 cfs @ 12.10 hrs, Volume= 2.371 af
Outflow = 28.82 cfs @ 12.10 hrs, Volume= 2.371 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs



Summary for Subcatchment E-1: Existing Watershed 1

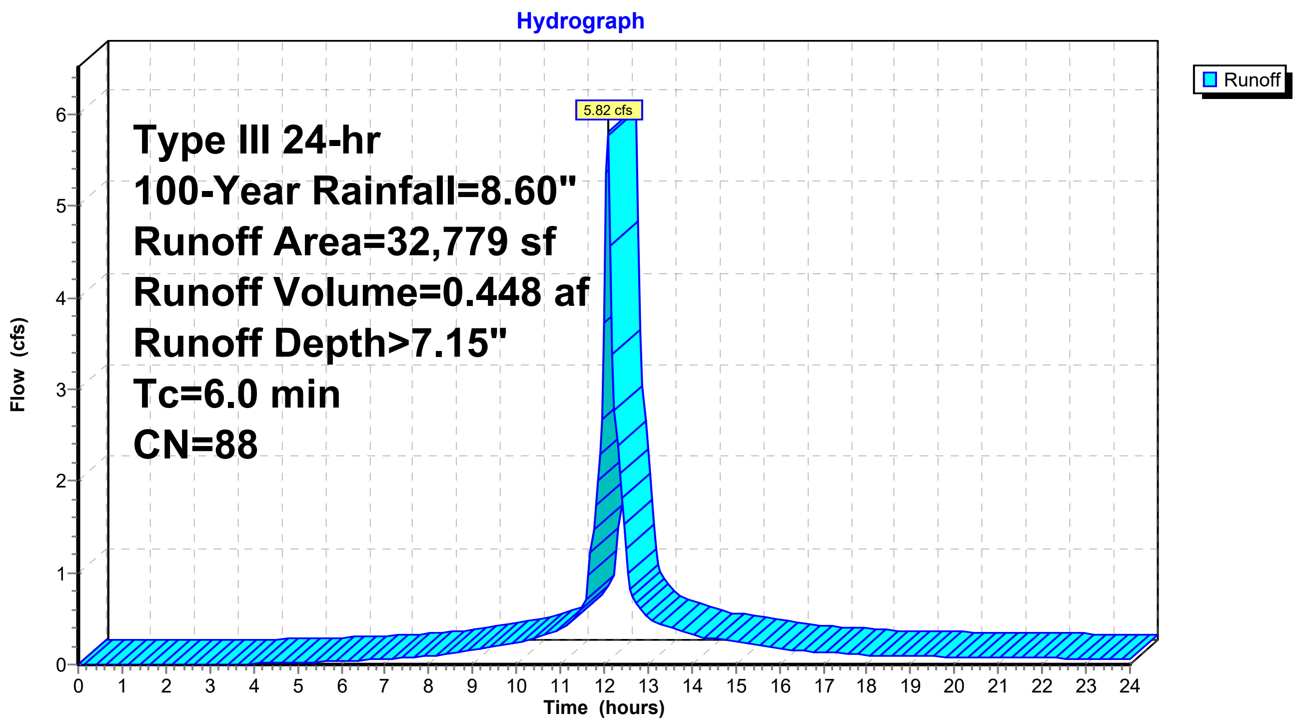
Runoff = 5.82 cfs @ 12.09 hrs, Volume= 0.448 af, Depth> 7.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.60"

Area (sf)	CN	Description
11,618	98	Paved parking, HSG C
9,421	96	Gravel surface, HSG C
5,782	74	>75% Grass cover, Good, HSG C
3,103	70	Woods, Good, HSG C
561	70	Woods, Good, HSG C
2,294	74	>75% Grass cover, Good, HSG C
32,779	88	Weighted Average
21,161		64.56% Pervious Area
11,618		35.44% Impervious Area

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

Subcatchment E-1: Existing Watershed 1



Summary for Subcatchment E-2: Existing Watershed 2

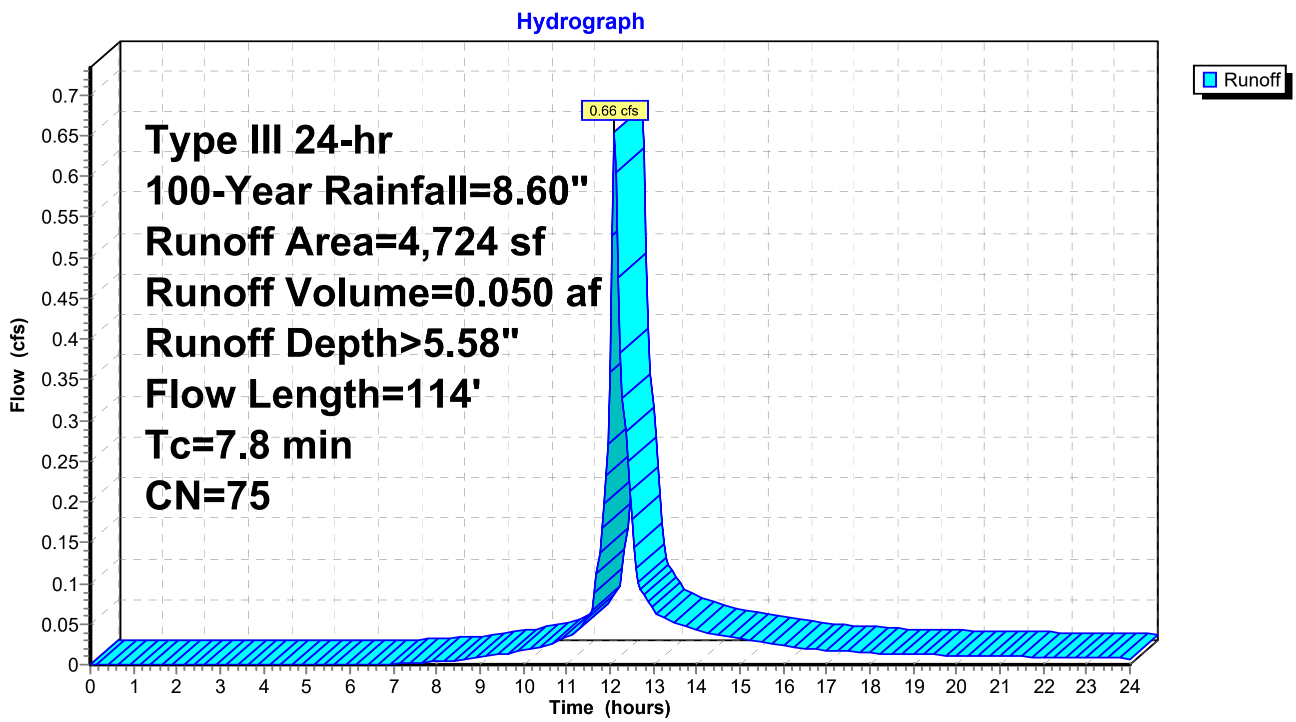
Runoff = 0.66 cfs @ 12.11 hrs, Volume= 0.050 af, Depth> 5.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.60"

Area (sf)	CN	Description
4,621	74	>75% Grass cover, Good, HSG C
103	98	Paved parking, HSG C
4,724	75	Weighted Average
4,621		97.82% Pervious Area
103		2.18% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	50	0.0100	0.11		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
0.4	64	0.0312	2.84		**Shallow Concentrated Flow, Shallow Concentrated Flow** Unpaved Kv= 16.1 fps
7.8	114	Total			

Subcatchment E-2: Existing Watershed 2



Summary for Subcatchment E-3: Existing Watershed 3

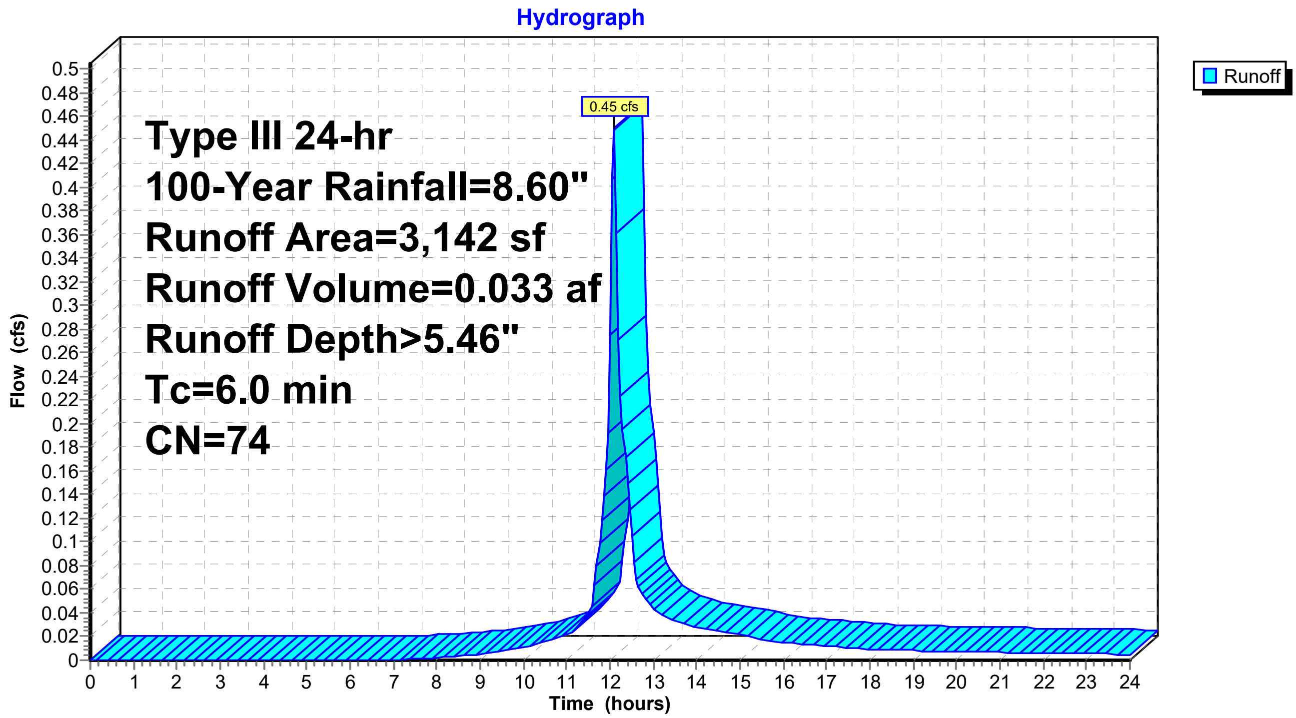
Runoff = 0.45 cfs @ 12.09 hrs, Volume= 0.033 af, Depth> 5.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.60"

Area (sf)	CN	Description
3,142	74	>75% Grass cover, Good, HSG C
3,142		100.00% Pervious Area

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

Subcatchment E-3: Existing Watershed 3



Summary for Subcatchment E-4A: Existing Watershed 4A

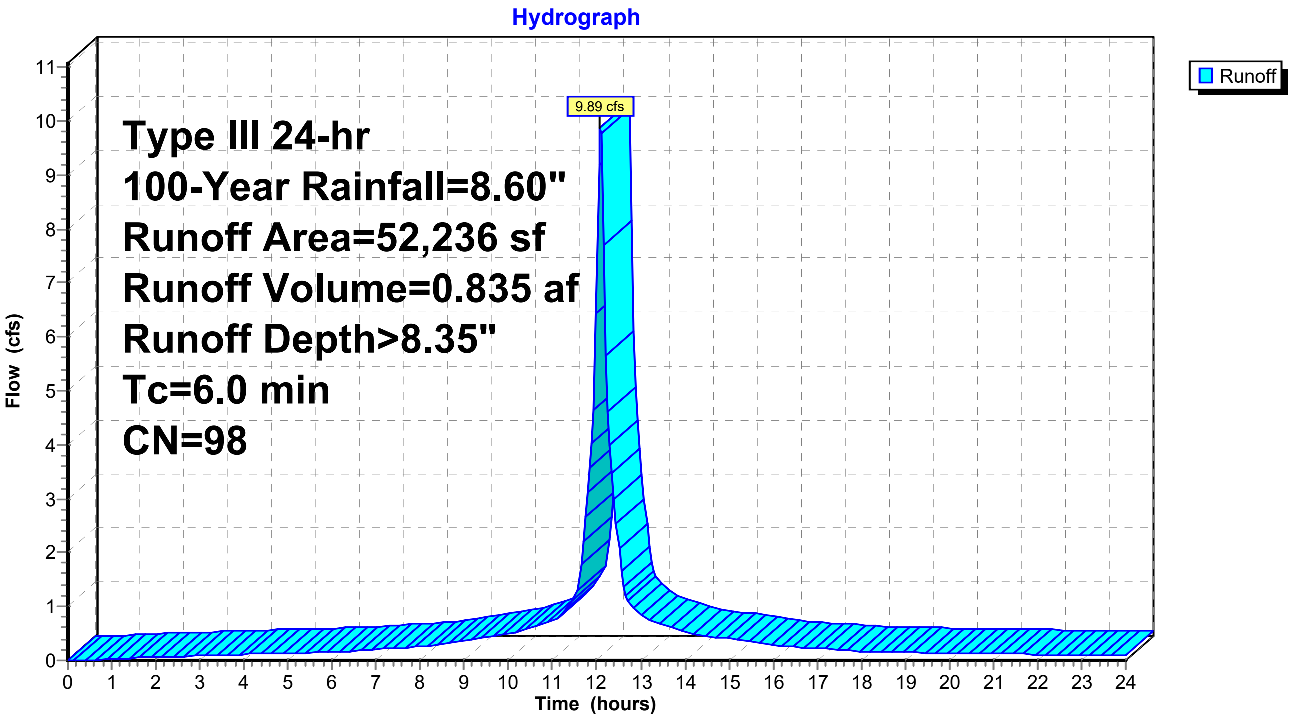
Runoff = 9.89 cfs @ 12.09 hrs, Volume= 0.835 af, Depth> 8.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.60"

Area (sf)	CN	Description
52,236	98	Roofs, HSG C
52,236		100.00% Impervious Area

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

Subcatchment E-4A: Existing Watershed 4A



Summary for Subcatchment E-4B: Existing Watershed 4B

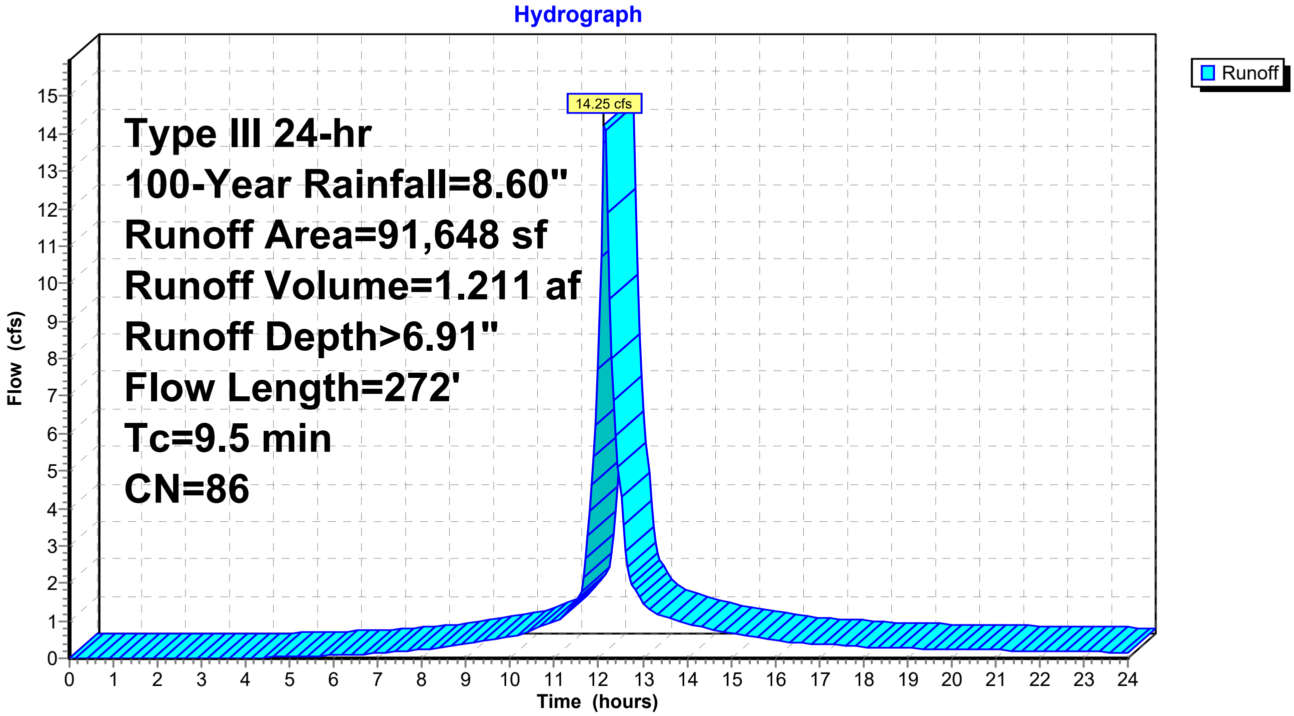
Runoff = 14.25 cfs @ 12.13 hrs, Volume= 1.211 af, Depth> 6.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.60"

	Area (sf)	CN	Description
	43,351	98	Paved parking, HSG C
	1,304	96	Gravel surface, HSG C
	42,526	74	>75% Grass cover, Good, HSG C
	2,704	70	Woods, Good, HSG C
*	1,763	74	Mulch
	91,648	86	Weighted Average
	48,297		52.70% Pervious Area
	43,351		47.30% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.1	50	0.0080	0.10		**Sheet Flow, Sheet Flow** Grass: Short n= 0.150 P2= 3.20"
0.8	111	0.0216	2.37		**Shallow Concentrated Flow, Shallow Concentrated Flow** Unpaved Kv= 16.1 fps
0.1	40	0.1500	6.24		**Shallow Concentrated Flow, SHallow** Unpaved Kv= 16.1 fps
0.5	71	0.0150	2.49		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
9.5	272	Total			

Subcatchment E-4B: Existing Watershed 4B



Summary for Subcatchment E-5A: Existing Watershed 5A

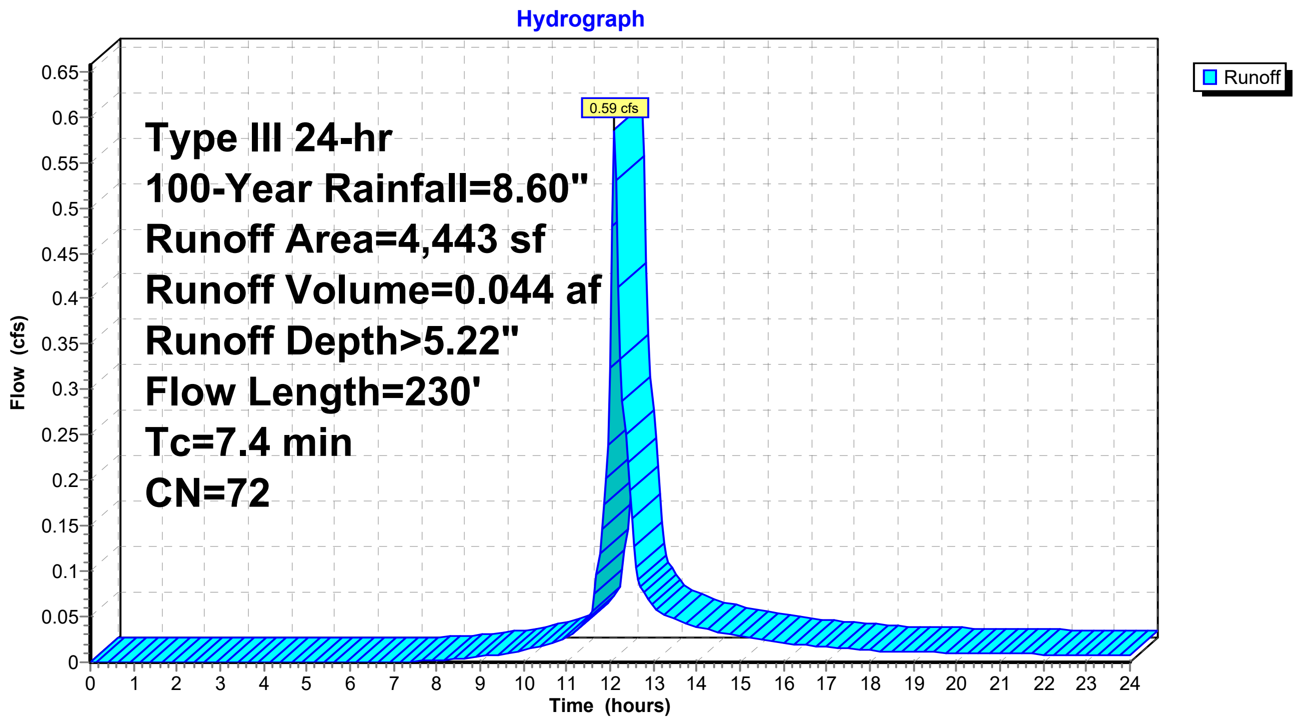
Runoff = 0.59 cfs @ 12.11 hrs, Volume= 0.044 af, Depth> 5.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.60"

Area (sf)	CN	Description
1,742	74	>75% Grass cover, Good, HSG C
2,701	70	Woods, Good, HSG C
4,443	72	Weighted Average
4,443		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	50	0.0160	0.14		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
1.2	180	0.0244	2.51		**Shallow Concentrated Flow, Shallow COncentrated Flow** Unpaved Kv= 16.1 fps
7.4	230	Total			

Subcatchment E-5A: Existing Watershed 5A



Summary for Subcatchment E-5B: Existing Watershed 5B

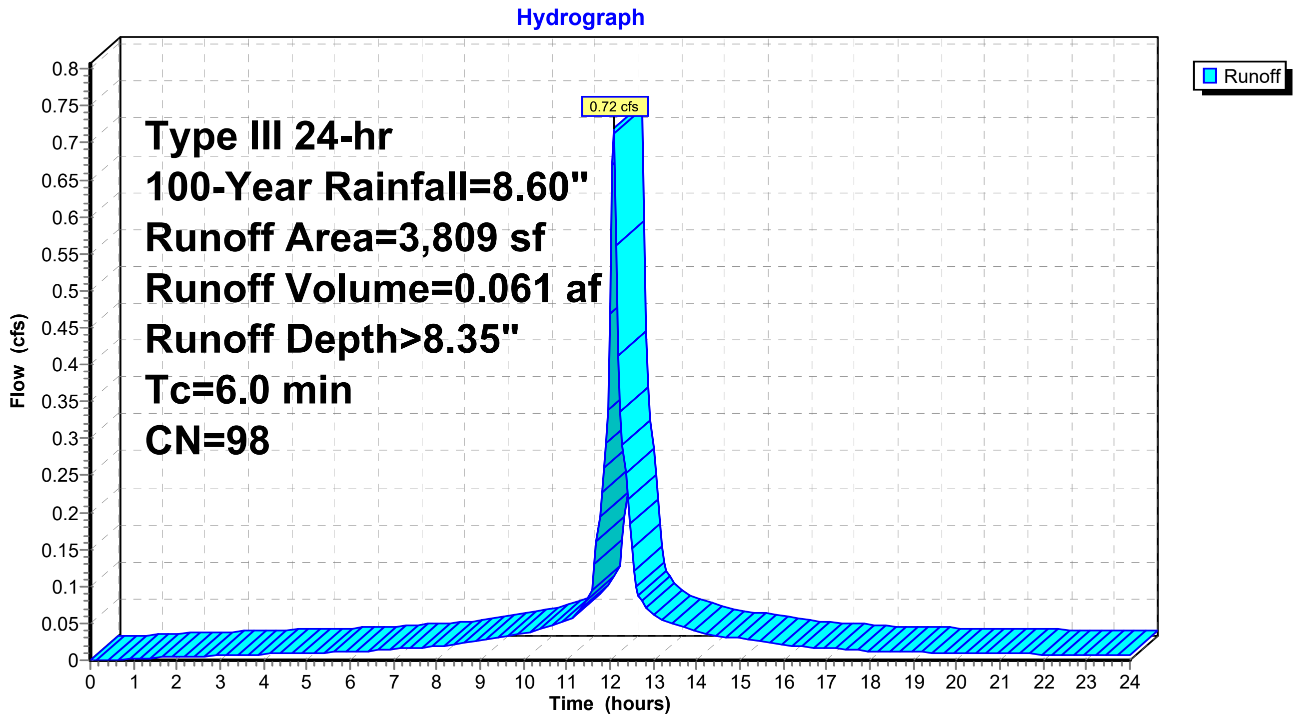
Runoff = 0.72 cfs @ 12.09 hrs, Volume= 0.061 af, Depth> 8.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.60"

Area (sf)	CN	Description
3,809	98	Paved parking, HSG C
3,809		100.00% Impervious Area

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

Subcatchment E-5B: Existing Watershed 5B



Summary for Subcatchment E-5C: Existing Watershed 5C

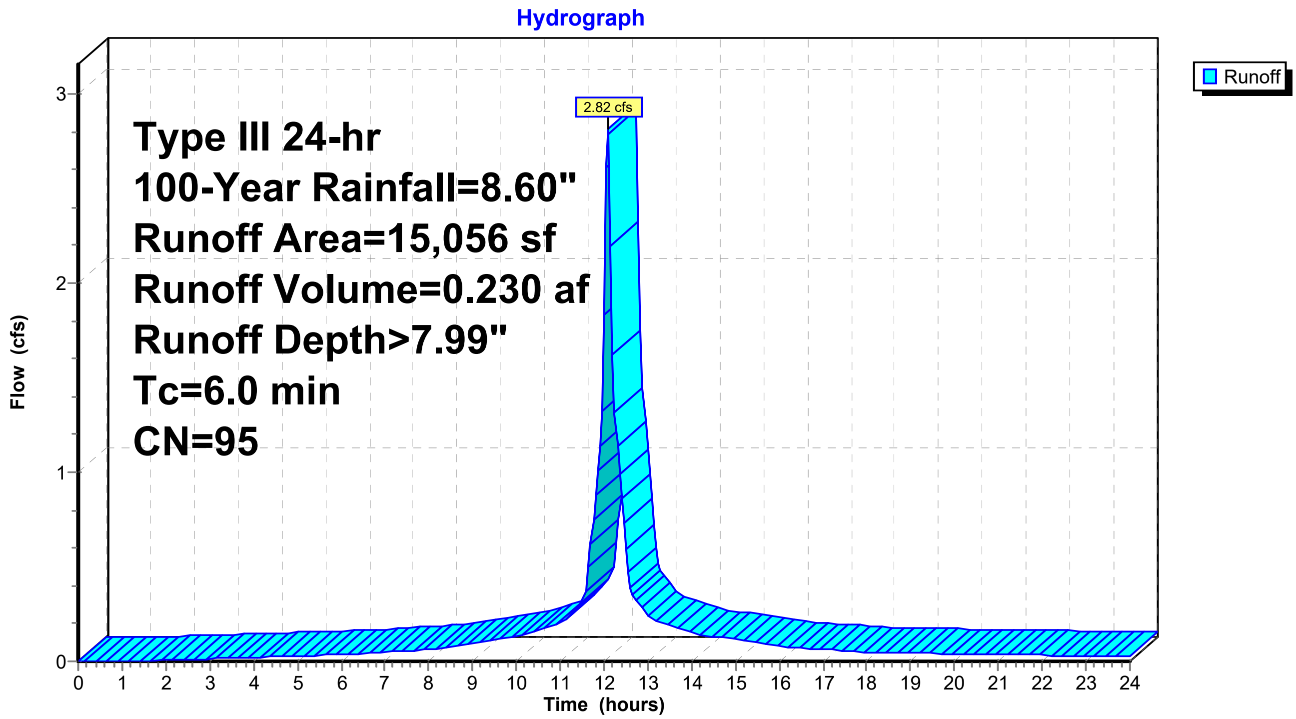
Runoff = 2.82 cfs @ 12.09 hrs, Volume= 0.230 af, Depth> 7.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.60"

Area (sf)	CN	Description
11,709	98	Paved parking, HSG C
1,791	96	Gravel surface, HSG C
303	79	50-75% Grass cover, Fair, HSG C
678	70	Woods, Good, HSG C
575	70	Woods, Good, HSG C
15,056	95	Weighted Average
3,347		22.23% Pervious Area
11,709		77.77% Impervious Area

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

Subcatchment E-5C: Existing Watershed 5C



Summary for Subcatchment E-6: Undetained to Wetland

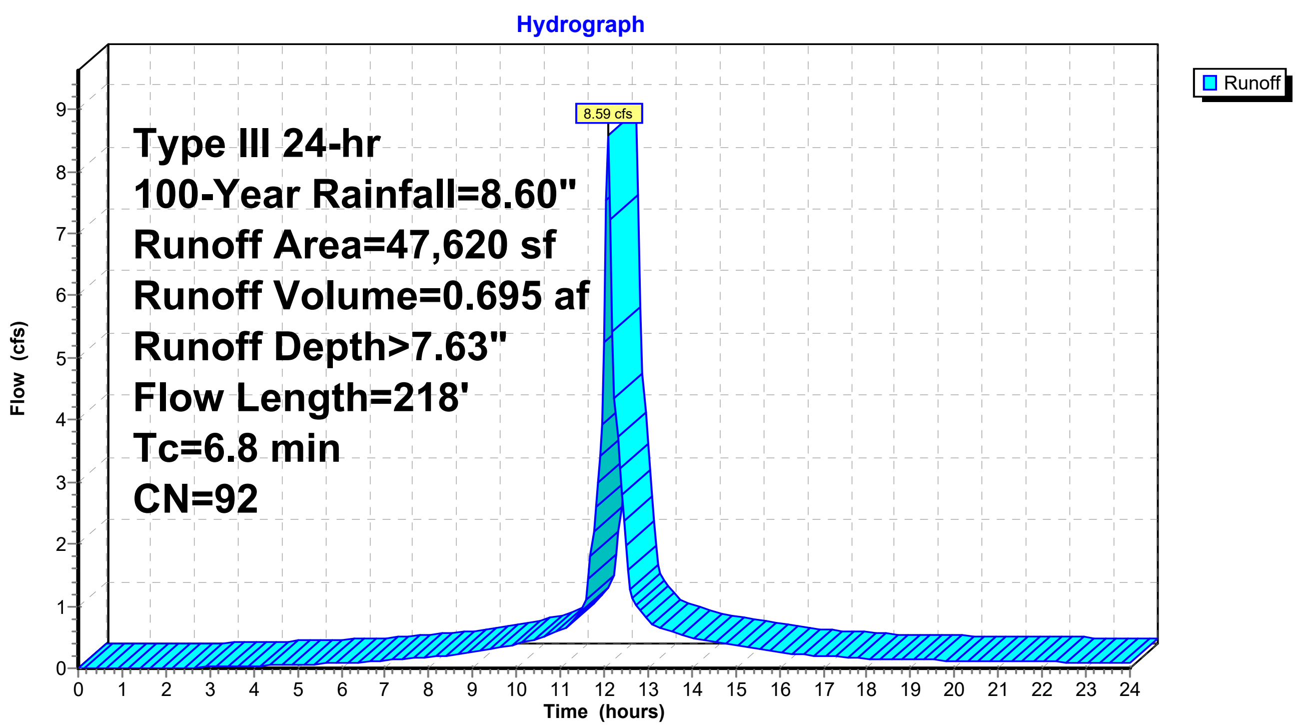
Runoff = 8.59 cfs @ 12.10 hrs, Volume= 0.695 af, Depth> 7.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.60"

Area (sf)	CN	Description
36,924	98	Paved parking, HSG C
9,270	74	>75% Grass cover, Good, HSG C
1,426	70	Woods, Good, HSG C
47,620	92	Weighted Average
10,696		22.46% Pervious Area
36,924		77.54% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	50	0.0340	0.18		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
2.2	168	0.0060	1.25		**Shallow Concentrated Flow, SHallow Concentrated Flow** Unpaved Kv= 16.1 fps
6.8	218	Total			

Subcatchment E-6: Undetained to Wetland

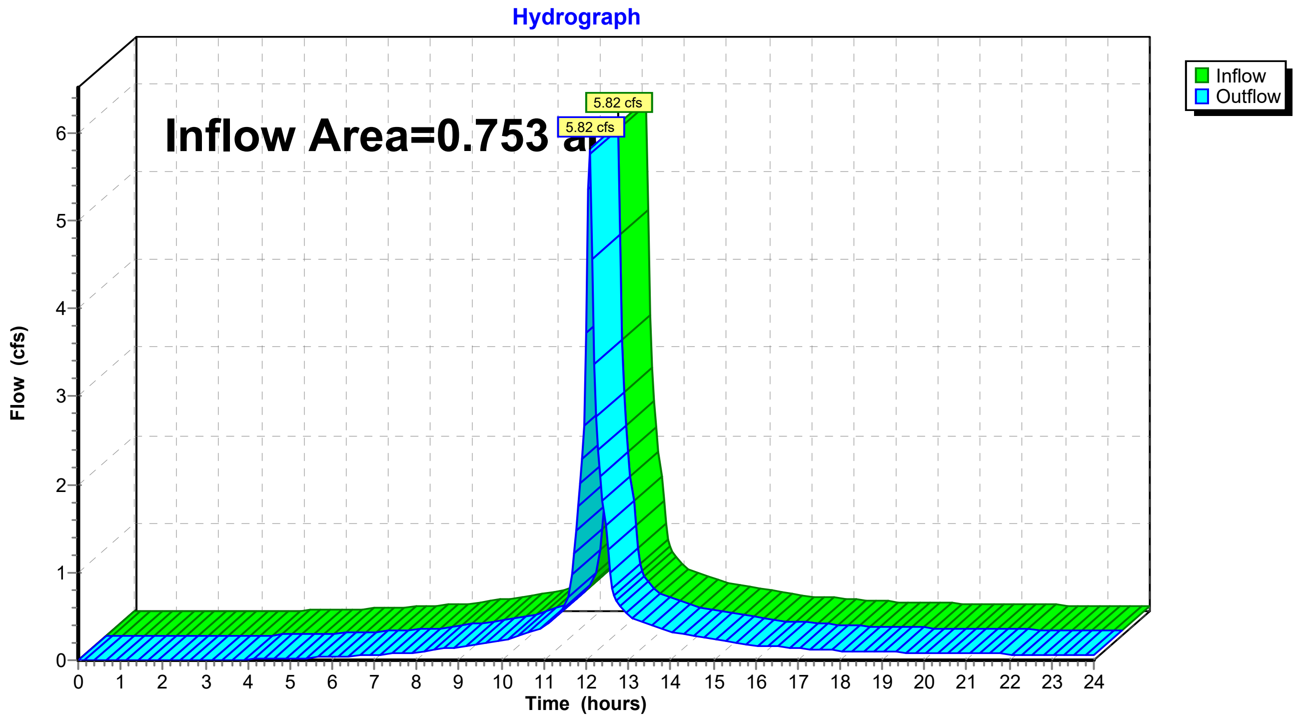


Summary for Reach DP-1: Design Point 1 (Wetland B)

Inflow Area = 0.753 ac, 35.44% Impervious, Inflow Depth > 7.15" for 100-Year event
Inflow = 5.82 cfs @ 12.09 hrs, Volume= 0.448 af
Outflow = 5.82 cfs @ 12.09 hrs, Volume= 0.448 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach DP-1: Design Point 1 (Wetland B)

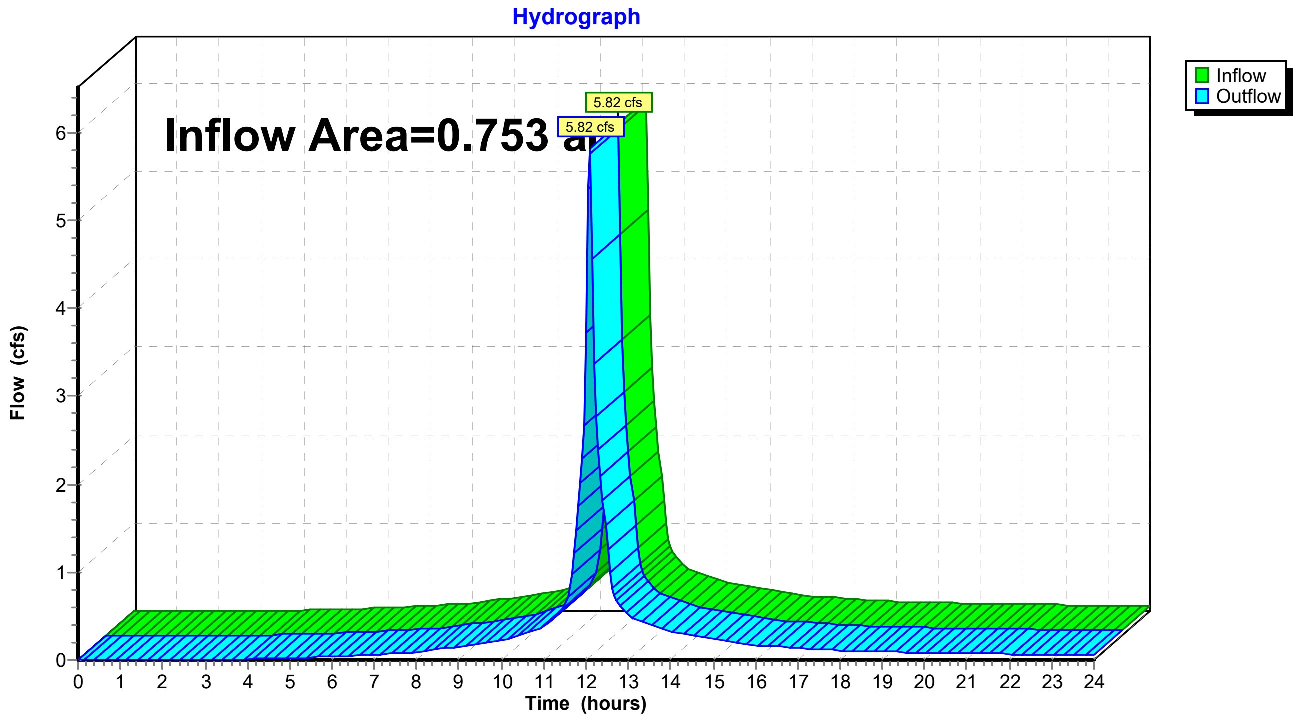


Summary for Reach DP-2: Design Point 2 (15" RCP to Wetland A)

Inflow Area = 0.753 ac, 35.44% Impervious, Inflow Depth > 7.15" for 100-Year event
Inflow = 5.82 cfs @ 12.09 hrs, Volume= 0.448 af
Outflow = 5.82 cfs @ 12.09 hrs, Volume= 0.448 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach DP-2: Design Point 2 (15" RCP to Wetland A)

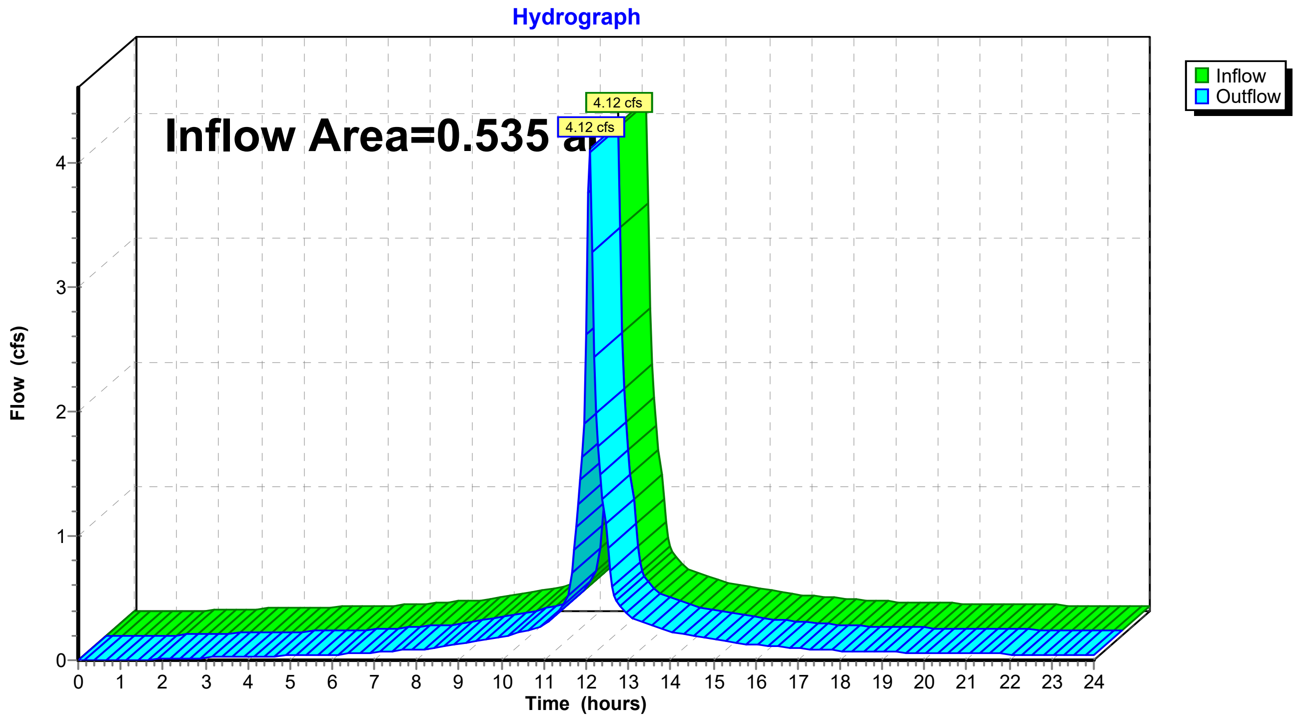


Summary for Reach DP-3: Design Point 3 (Existing Drainage Ditch)

Inflow Area =	0.535 ac,	66.58% Impervious,	Inflow Depth > 7.52"	for 100-Year event
Inflow =	4.12 cfs @	12.09 hrs, Volume=	0.335 af	
Outflow =	4.12 cfs @	12.09 hrs, Volume=	0.335 af,	Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach DP-3: Design Point 3 (Existing Drainage Ditch)

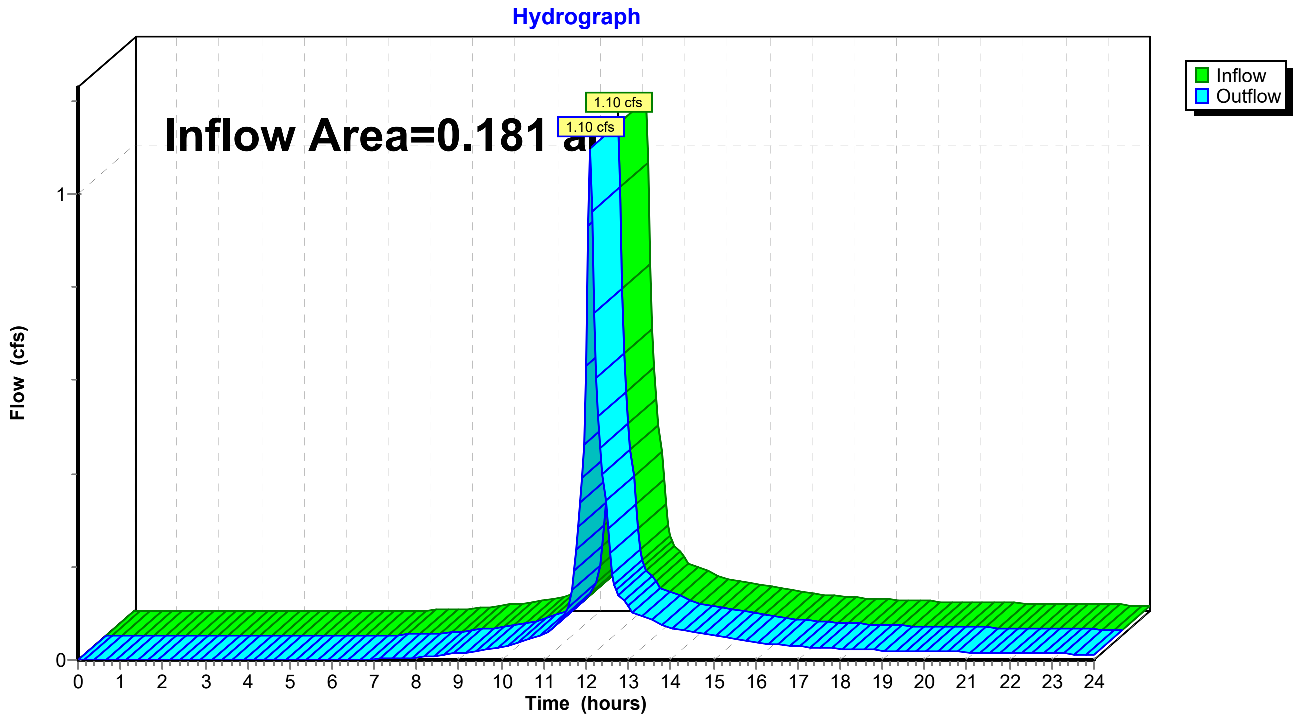


Summary for Reach DP-4: Design Point 4 (MassDOT CB- 2)

Inflow Area =	0.181 ac,	1.31% Impervious, Inflow Depth > 5.53"	for 100-Year event	
Inflow =	1.10 cfs @	12.10 hrs, Volume=	0.083 af	
Outflow =	1.10 cfs @	12.10 hrs, Volume=	0.083 af,	Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach DP-4: Design Point 4 (MassDOT CB- 2)

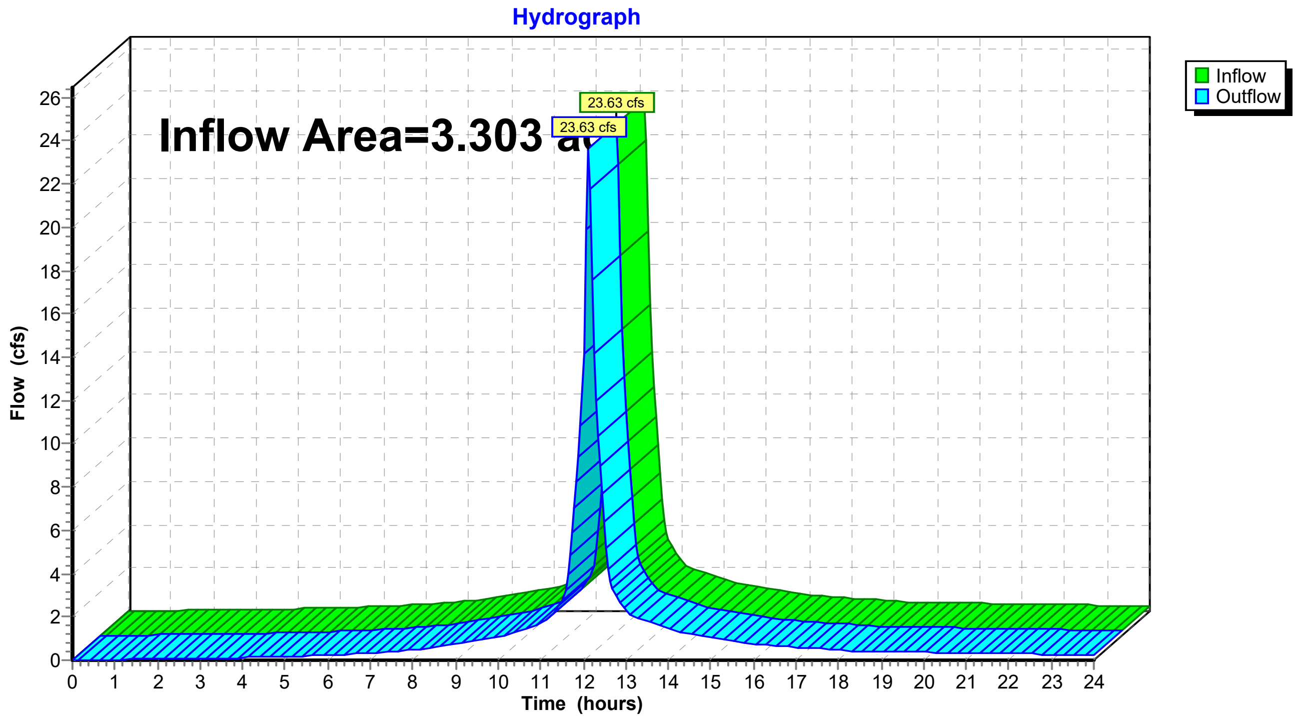


Summary for Reach DP-5: EXISTING CONSTRUCTED STORMWATER WETLAND

Inflow Area =	3.303 ac,	66.43% Impervious,	Inflow Depth > 7.43"	for 100-Year event
Inflow =	23.63 cfs @	12.11 hrs, Volume=	2.046 af	
Outflow =	23.63 cfs @	12.11 hrs, Volume=	2.046 af, Atten= 0%, Lag= 0.0 min	

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach DP-5: EXISTING CONSTRUCTED STORMWATER WETLAND

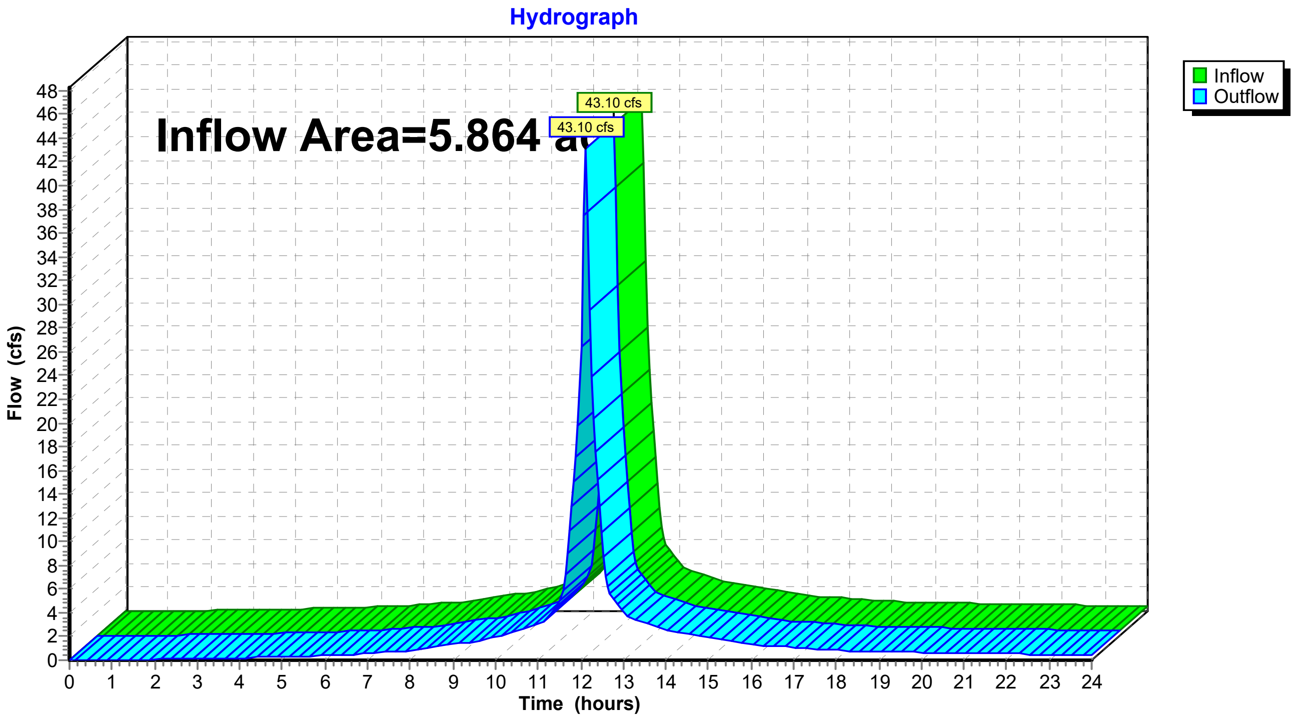


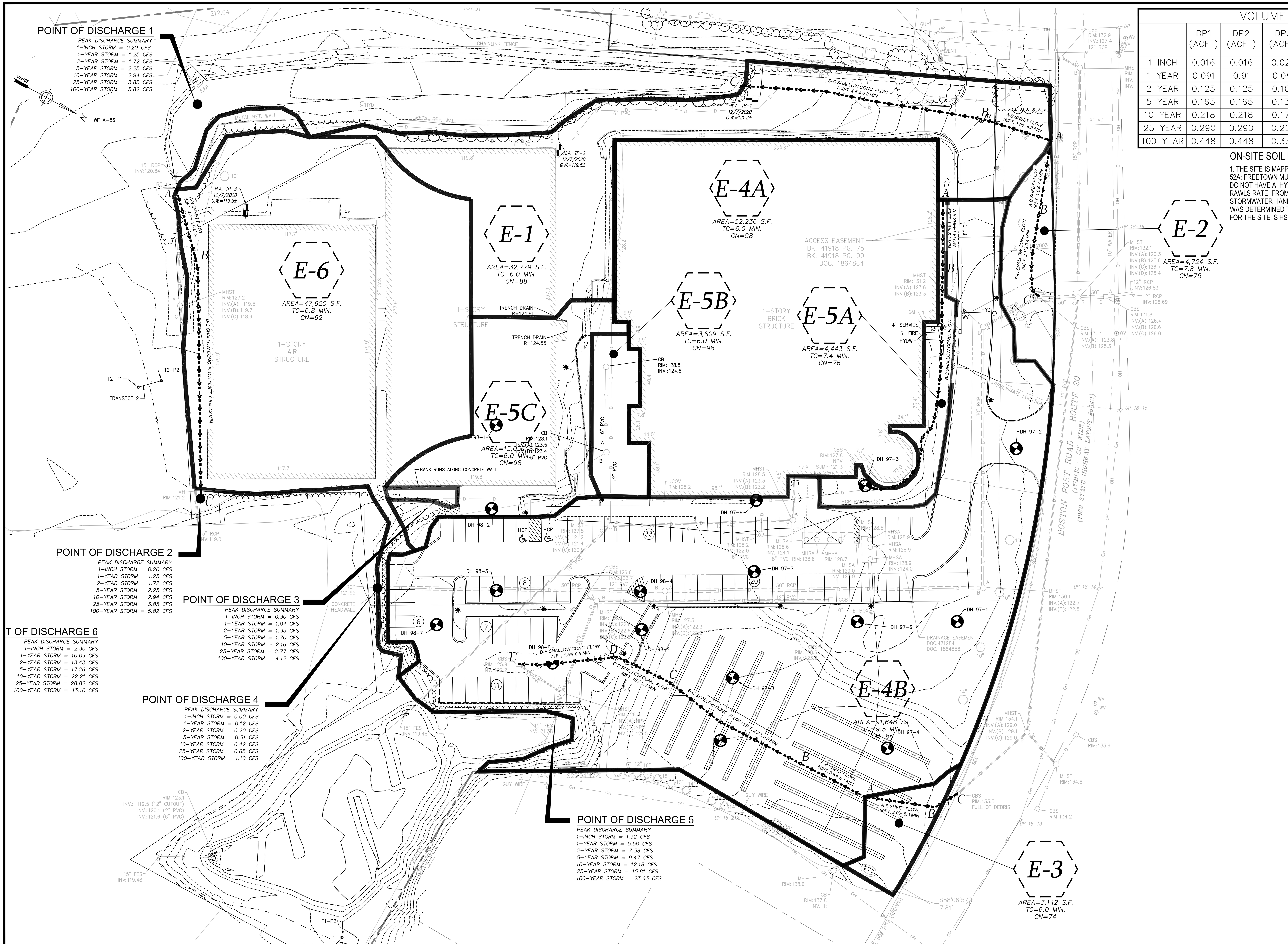
Summary for Reach DP-6: Wetland A - Design Point 6

Inflow Area = 5.864 ac, 62.53% Impervious, Inflow Depth > 7.38" for 100-Year event
Inflow = 43.10 cfs @ 12.10 hrs, Volume= 3.608 af
Outflow = 43.10 cfs @ 12.10 hrs, Volume= 3.608 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach DP-6: Wetland A - Design Point 6





	DP1 (ACFT)	DP2 (ACFT)	DP3 (ACFT)	DP4 (ACFT)	DP5 (ACFT)	DP6 (ACFT)
VOLUME TABLE						
1 INCH	0.016	0.016	0.022	0.000	0.114	0.188
1 YEAR	0.091	0.91	0.081	0.010	0.464	0.806
2 YEAR	0.125	0.125	0.106	0.016	0.618	1.178
5 YEAR	0.165	0.165	0.134	0.024	0.796	1.394
10 YEAR	0.218	0.218	0.172	0.034	1.030	1.809
25 YEAR	0.290	0.290	0.223	0.049	1.347	2.371
100 YEAR	0.448	0.448	0.335	0.083	2.046	3.608

ON-SITE SOIL NOTE:

1. THE SITE IS MAPPED AS 656: UDORTHENTS-URBAN LAND COMPLEX, 52A: FREETOWN MUCK, AND 32B: WAREHAM LOAMY FINE SAND WHICH DO NOT HAVE A HYDRAULIC SOIL RATING. USING TABLE 2.3.3, 1982 RAWLS RATE, FROM VOLUME 3, CHAPTER 1 OF THE MASSACHUSETTS STORMWATER HANDBOOK, THE TEST PITS PERFORMED ON SITE, IT WAS DETERMINED THAT THE NRCS HYDROLOGIC SOIL GROUP (HSG) FOR THE SITE IS HSG-C.

Date	Description	No.
03/28/22	P.B. AND CON.-COM. RESUBMITTAL	4.
02/14/22	P.B. AND CON.-COM. RESUBMITTAL	3.
01/31/22	ZBA RESUBMITTAL	2.
11/15/21	PLANNING BOARD SUBMITTAL	1.

Revisions

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PROFESSIONAL ENGINEER, MA REGISTRATION #47917

Crocker Design Group
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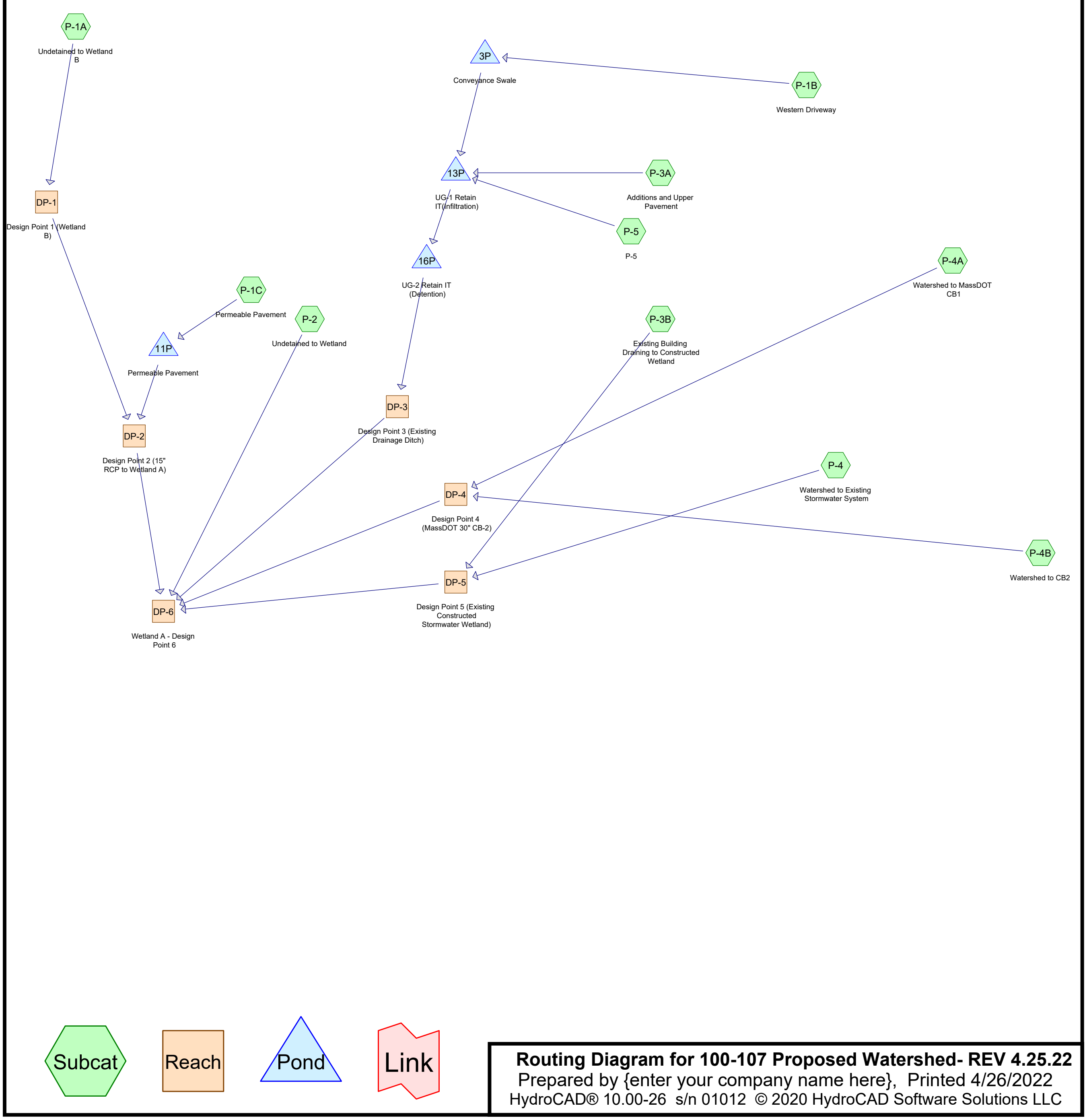
HINGHAM, MA 02043
P: 781-919-0808

Project
MERCEDES OF SUDBURY
141 BOSTON POST ROAD, SUDBURY, MA

Prepared for
HERB CHAMBERS 43 BRAINTREE STREET, LLC
#259 McGRATH HIGHWAY - ROUTE 28
SOMERVILLE, MA 02143

Drawing Title
EXISTING CONDITION WATERSHED MAP

Project No. 100-107
Date 11/10/2021
Scale 1"=30'
Drawn By DJN / JPM
Approved By GC
Drawing No. **EW-1**



Routing Diagram for 100-107 Proposed Watershed- REV 4.25.22
Prepared by {enter your company name here}, Printed 4/26/2022
HydroCAD® 10.00-26 s/n 01012 © 2020 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
1.379	74	>75% Grass cover, Good, HSG C (P-1C, P-2, P-3A, P-4, P-4A, P-4B, P-5)
2.100	98	Paved parking, HSG C (P-1B, P-3A, P-4, P-5)
0.597	98	Permeable Pavement (P-1C)
1.325	98	Roofs, HSG C (P-3A, P-3B)
0.094	70	Woods, Good, HSG C (P-2, P-4)
0.369	72	Woods/grass comb., Good, HSG C (P-1A, P-1B)

Summary for Subcatchment P-1A: Undetained to Wetland B

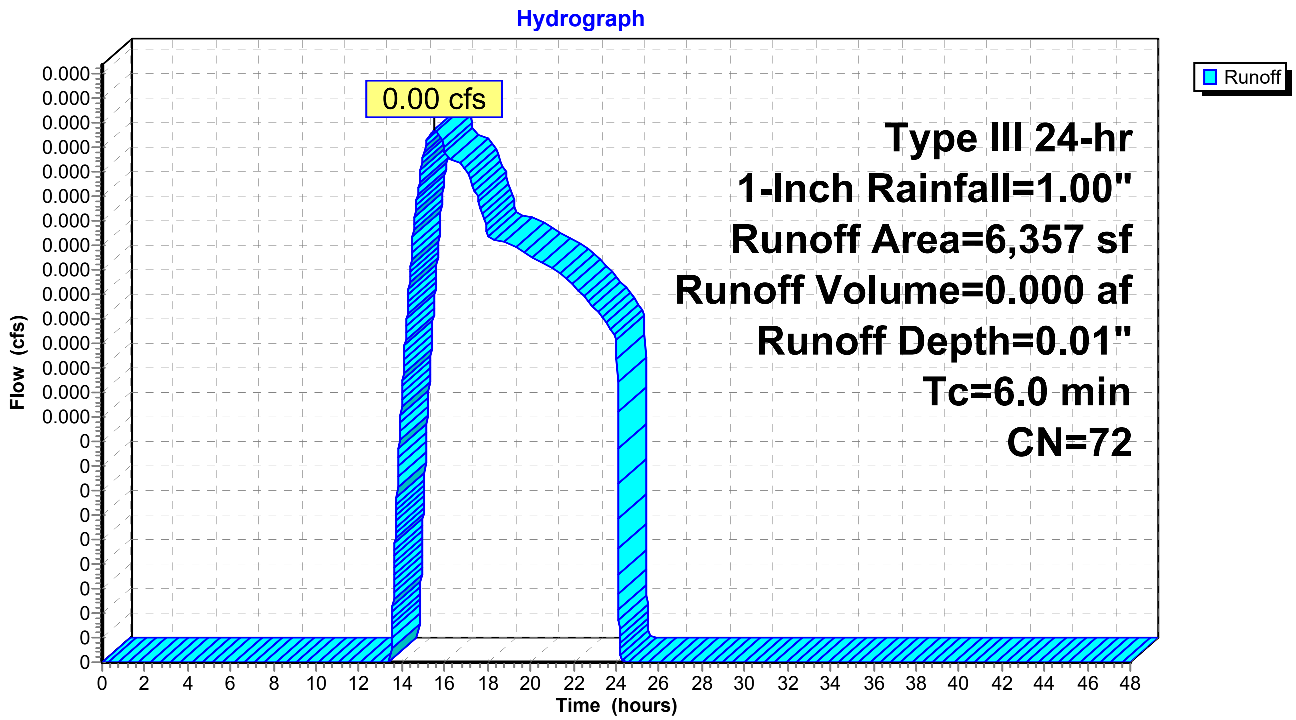
Runoff = 0.00 cfs @ 15.50 hrs, Volume= 0.000 af, Depth= 0.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-Inch Rainfall=1.00"

Area (sf)	CN	Description
6,357	72	Woods/grass comb., Good, HSG C
6,357		100.00% Pervious Area

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

Subcatchment P-1A: Undetained to Wetland B



Summary for Subcatchment P-1B: Western Driveway

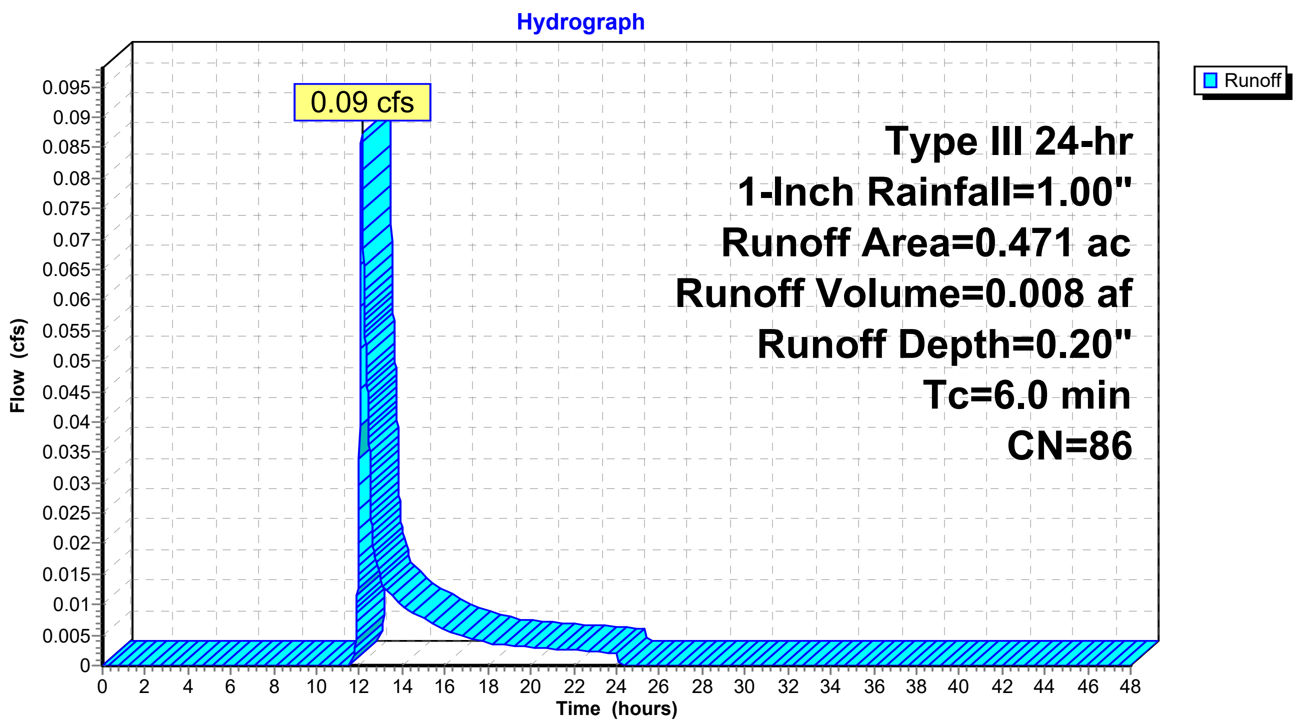
Runoff = 0.09 cfs @ 12.11 hrs, Volume= 0.008 af, Depth= 0.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-Inch Rainfall=1.00"

Area (ac)	CN	Description
0.248	98	Paved parking, HSG C
0.223	72	Woods/grass comb., Good, HSG C
0.471	86	Weighted Average
0.223		47.35% Pervious Area
0.248		52.65% Impervious Area

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

Subcatchment P-1B: Western Driveway



Summary for Subcatchment P-1C: Permeable Pavement

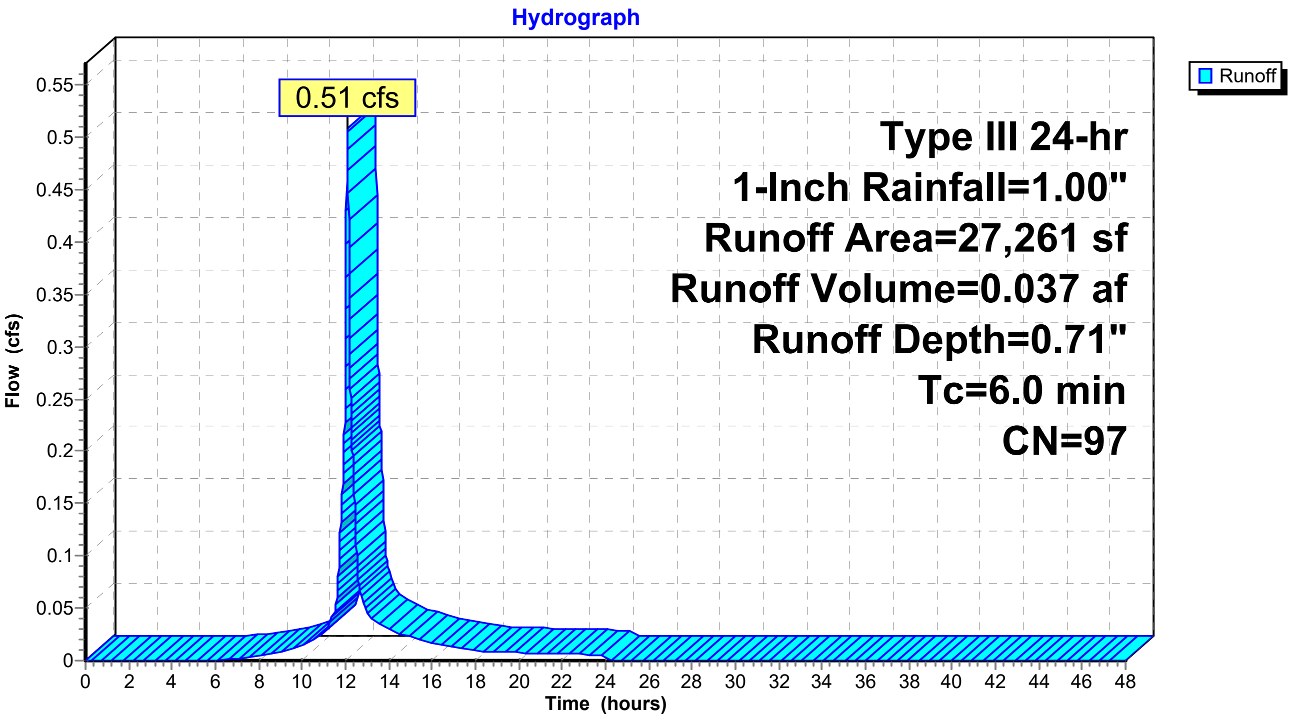
Runoff = 0.51 cfs @ 12.09 hrs, Volume= 0.037 af, Depth= 0.71"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-Inch Rainfall=1.00"

	Area (sf)	CN	Description
*	25,998	98	Permeable Pavement
	1,263	74	>75% Grass cover, Good, HSG C
	27,261	97	Weighted Average
	1,263		4.63% Pervious Area
	25,998		95.37% Impervious Area

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

Subcatchment P-1C: Permeable Pavement



Summary for Subcatchment P-2: Undetained to Wetland

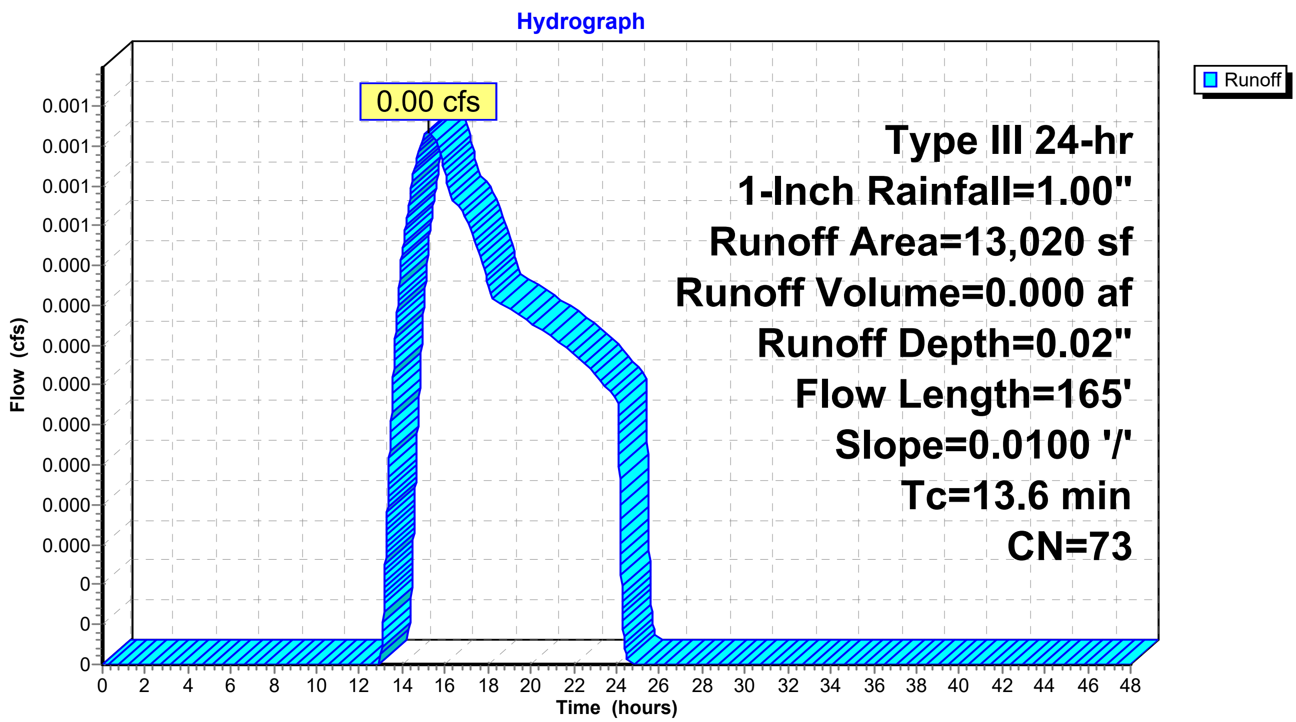
Runoff = 0.00 cfs @ 15.22 hrs, Volume= 0.000 af, Depth= 0.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-Inch Rainfall=1.00"

Area (sf)	CN	Description
10,967	74	>75% Grass cover, Good, HSG C
2,053	70	Woods, Good, HSG C
13,020	73	Weighted Average
13,020		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	100	0.0100	0.13		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
0.7	65	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
13.6	165	Total			

Subcatchment P-2: Undetained to Wetland



Summary for Subcatchment P-3A: Additions and Upper Pavement

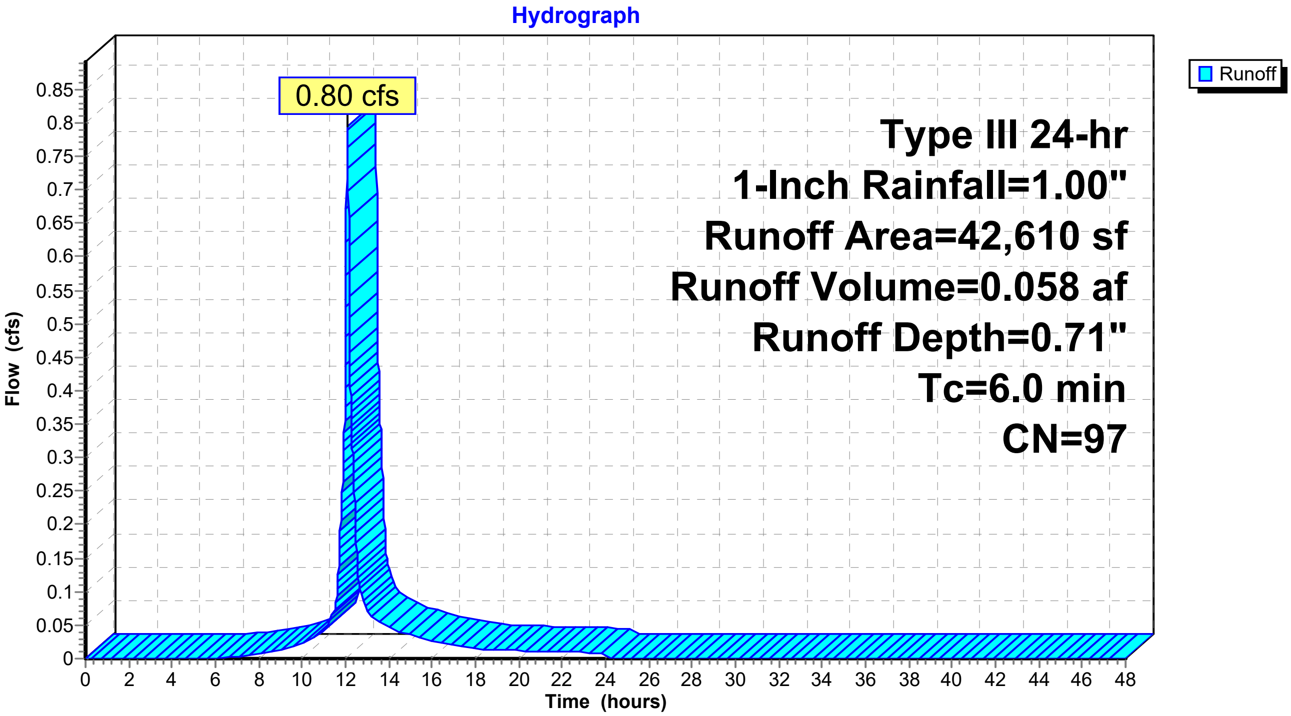
Runoff = 0.80 cfs @ 12.09 hrs, Volume= 0.058 af, Depth= 0.71"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-Inch Rainfall=1.00"

Area (sf)	CN	Description
26,741	98	Paved parking, HSG C
1,277	74	>75% Grass cover, Good, HSG C
14,592	98	Roofs, HSG C
42,610	97	Weighted Average
1,277		3.00% Pervious Area
41,333		97.00% Impervious Area

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

Subcatchment P-3A: Additions and Upper Pavement



Summary for Subcatchment P-3B: Existing Building Draining to Constructed Wetland

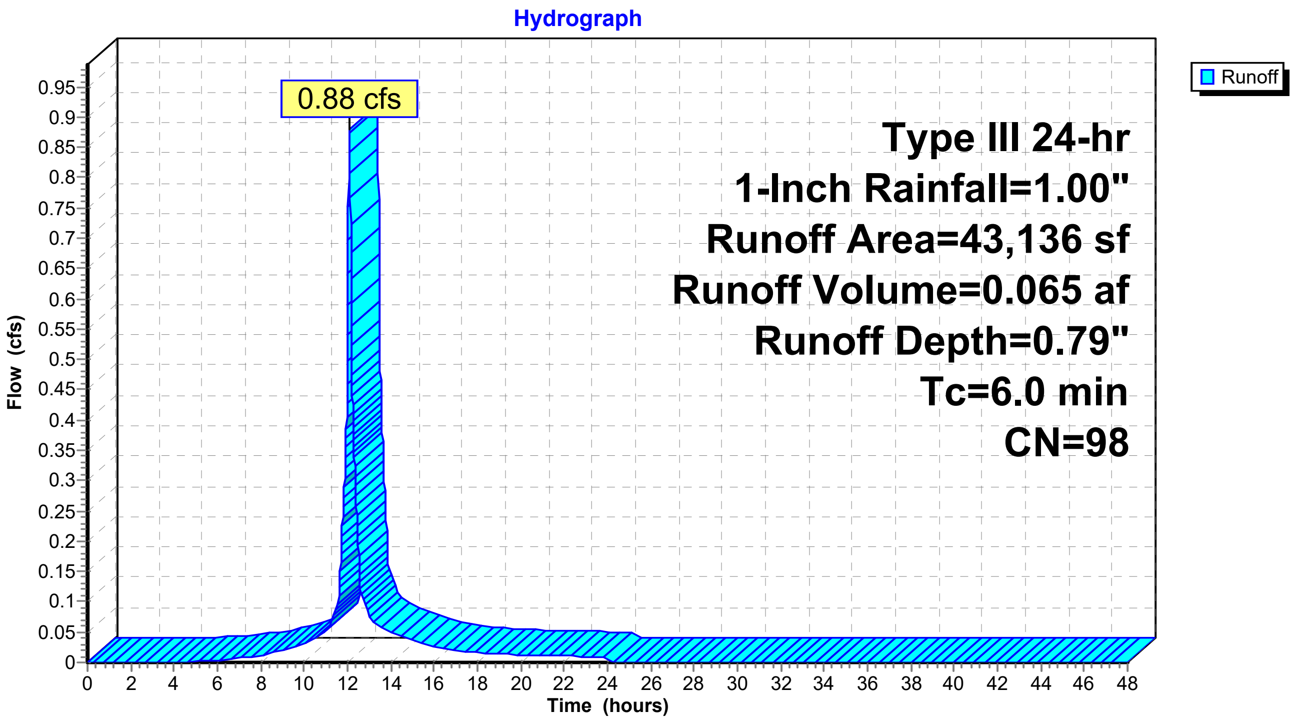
Runoff = 0.88 cfs @ 12.08 hrs, Volume= 0.065 af, Depth= 0.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-Inch Rainfall=1.00"

Area (sf)	CN	Description
43,136	98	Roofs, HSG C
43,136		100.00% Impervious Area

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

Subcatchment P-3B: Existing Building Draining to Constructed Wetland



Summary for Subcatchment P-4: Watershed to Existing Stormwater System

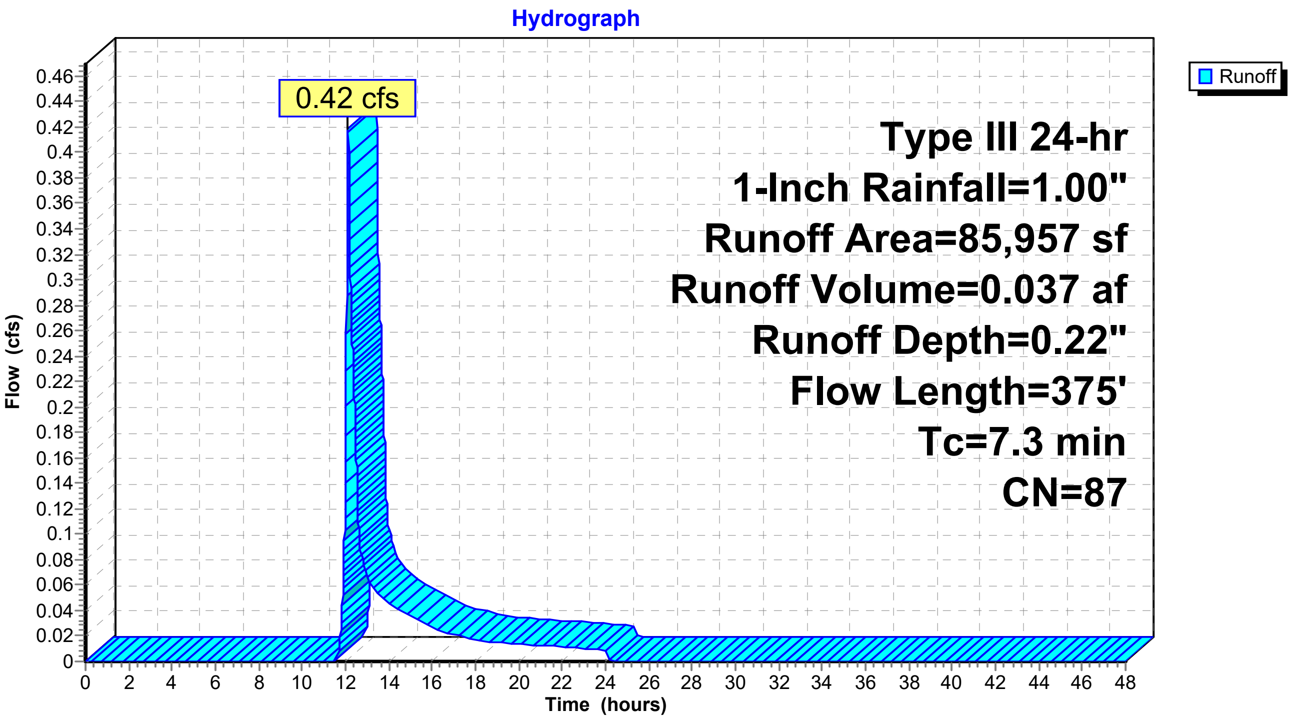
Runoff = 0.42 cfs @ 12.12 hrs, Volume= 0.037 af, Depth= 0.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-Inch Rainfall=1.00"

Area (sf)	CN	Description
46,374	98	Paved parking, HSG C
37,535	74	>75% Grass cover, Good, HSG C
2,048	70	Woods, Good, HSG C
85,957	87	Weighted Average
39,583		46.05% Pervious Area
46,374		53.95% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.2	50	0.0240	0.16		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
1.7	245	0.0220	2.39		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.4	80	0.0287	3.44		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
7.3	375	Total			

Subcatchment P-4: Watershed to Existing Stormwater System



Summary for Subcatchment P-4A: Watershed to MassDOT CB1

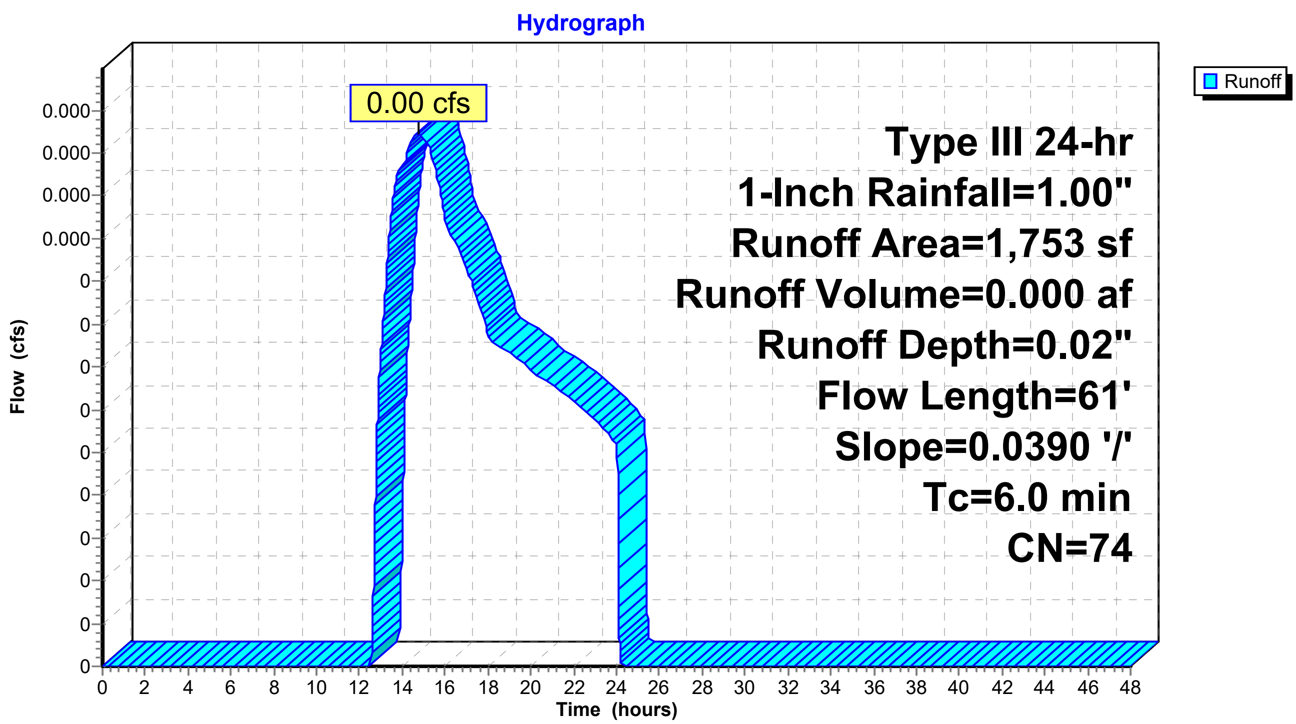
Runoff = 0.00 cfs @ 14.78 hrs, Volume= 0.000 af, Depth= 0.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-Inch Rainfall=1.00"

Area (sf)	CN	Description
1,753	74	>75% Grass cover, Good, HSG C
1,753		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.1	61	0.0390	0.20		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
0.9					**Direct Entry,**
6.0	61	Total			

Subcatchment P-4A: Watershed to MassDOT CB1



Summary for Subcatchment P-4B: Watershed to CB2

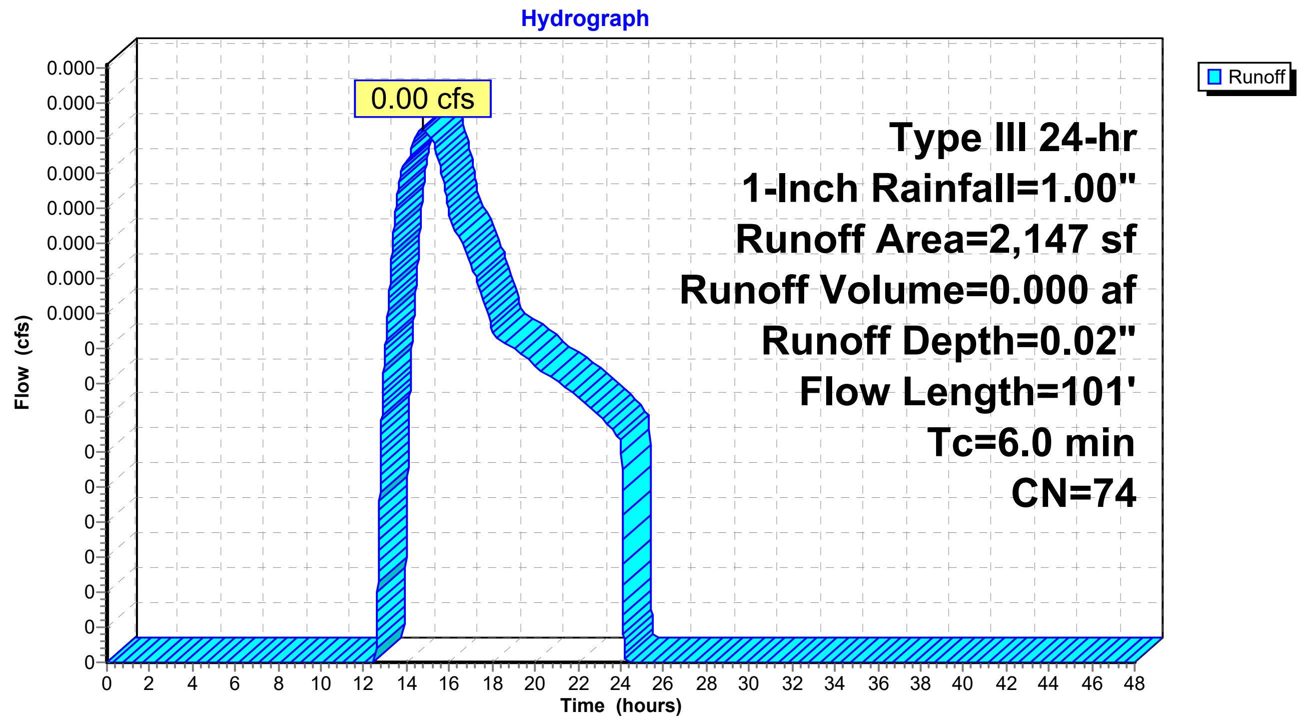
Runoff = 0.00 cfs @ 14.78 hrs, Volume= 0.000 af, Depth= 0.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-Inch Rainfall=1.00"

Area (sf)	CN	Description
2,147	74	>75% Grass cover, Good, HSG C
2,147		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	50	0.0200	0.15		**Sheet Flow, SHeet Flow** Grass: Short n= 0.150 P2= 3.20"
0.3	51	0.0390	3.18		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.1					**Direct Entry, Miniumum**
6.0	101	Total			

Subcatchment P-4B: Watershed to CB2



Summary for Subcatchment P-5: P-5

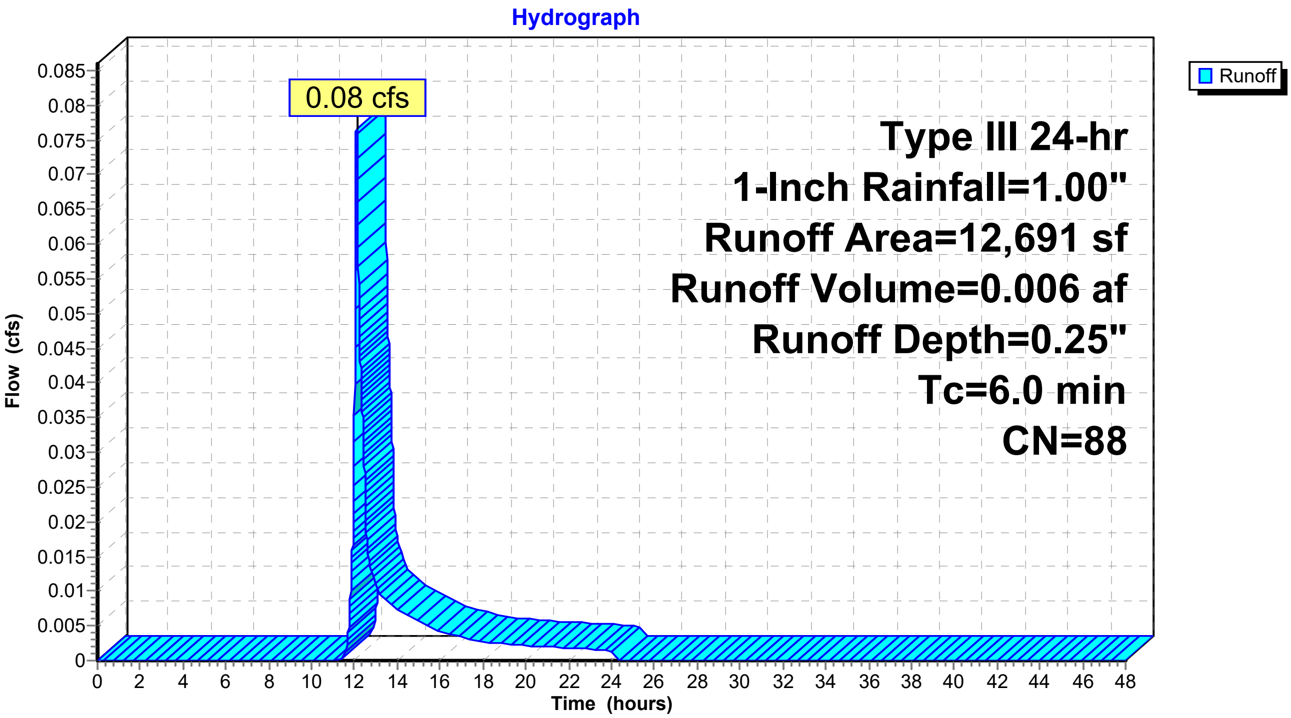
Runoff = 0.08 cfs @ 12.10 hrs, Volume= 0.006 af, Depth= 0.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-Inch Rainfall=1.00"

Area (sf)	CN	Description
5,116	74	>75% Grass cover, Good, HSG C
7,575	98	Paved parking, HSG C
12,691	88	Weighted Average
5,116		40.31% Pervious Area
7,575		59.69% Impervious Area

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

Subcatchment P-5: P-5

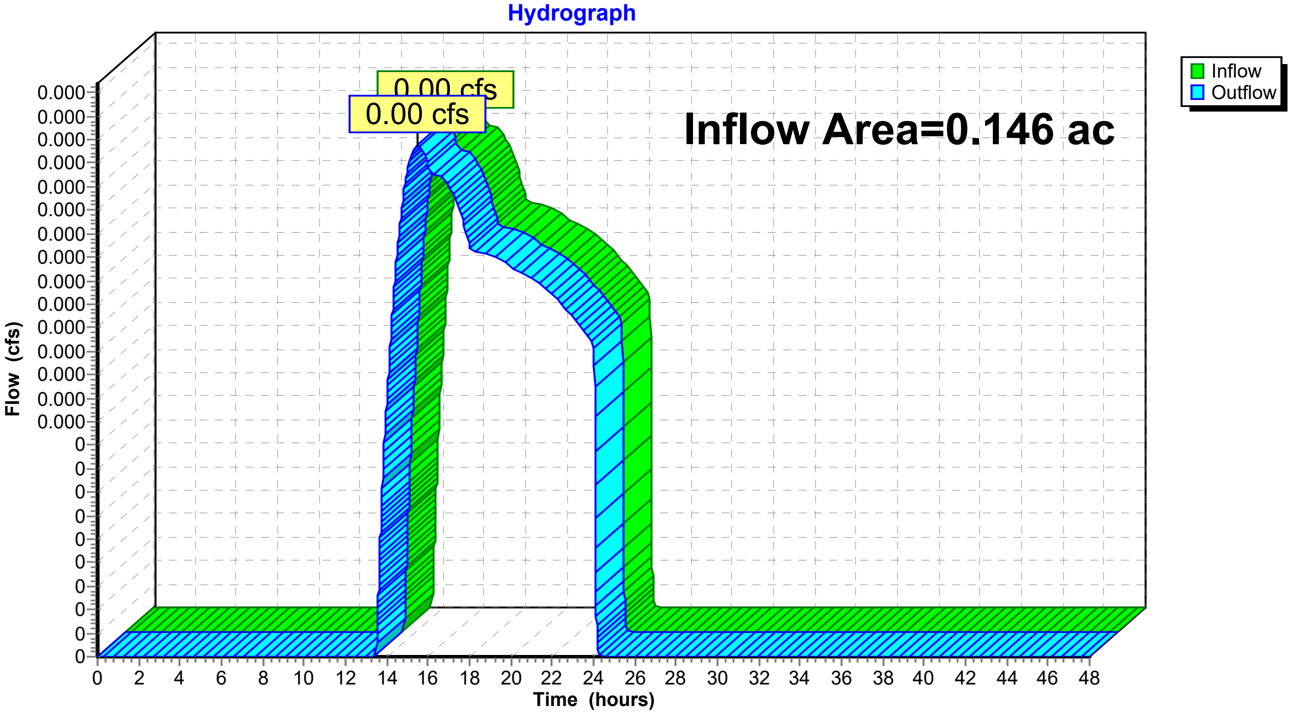


Summary for Reach DP-1: Design Point 1 (Wetland B)

Inflow Area = 0.146 ac, 0.00% Impervious, Inflow Depth = 0.01" for 1-Inch event
Inflow = 0.00 cfs @ 15.50 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 15.50 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Reach DP-1: Design Point 1 (Wetland B)

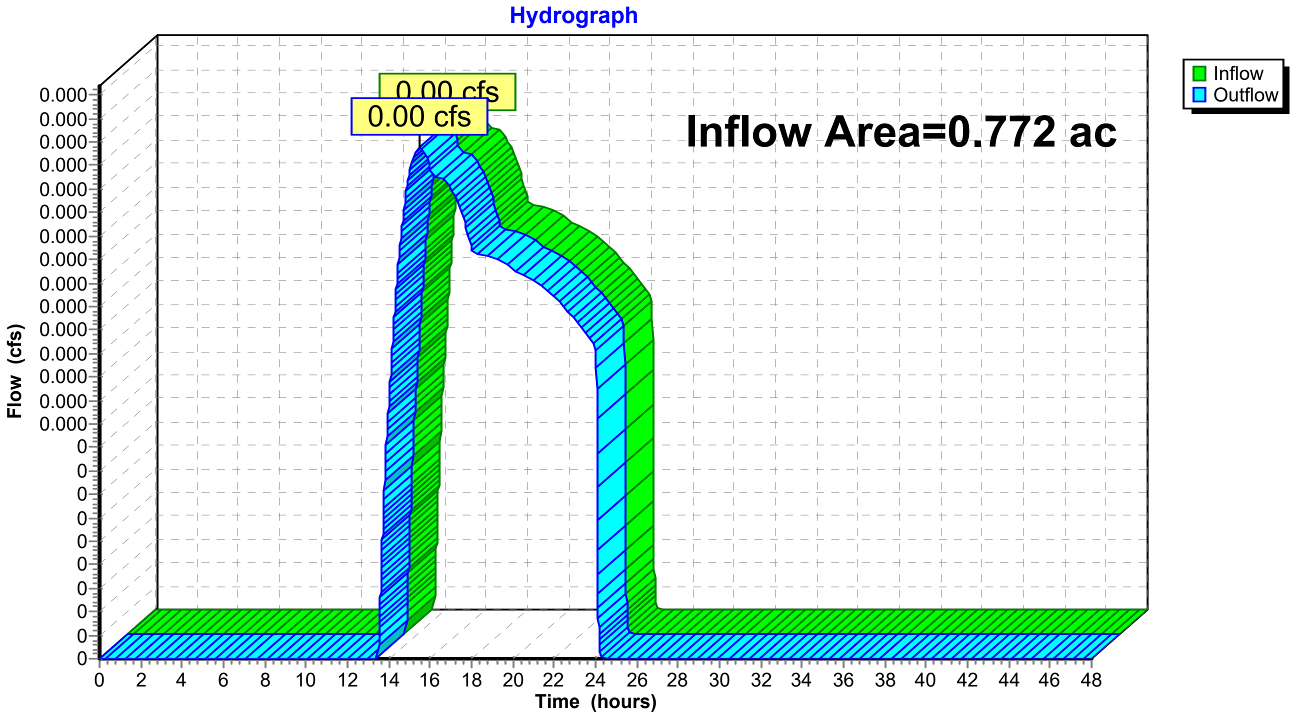


Summary for Reach DP-2: Design Point 2 (15" RCP to Wetland A)

Inflow Area = 0.772 ac, 77.33% Impervious, Inflow Depth = 0.00" for 1-Inch event
Inflow = 0.00 cfs @ 15.50 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 15.50 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Reach DP-2: Design Point 2 (15" RCP to Wetland A)

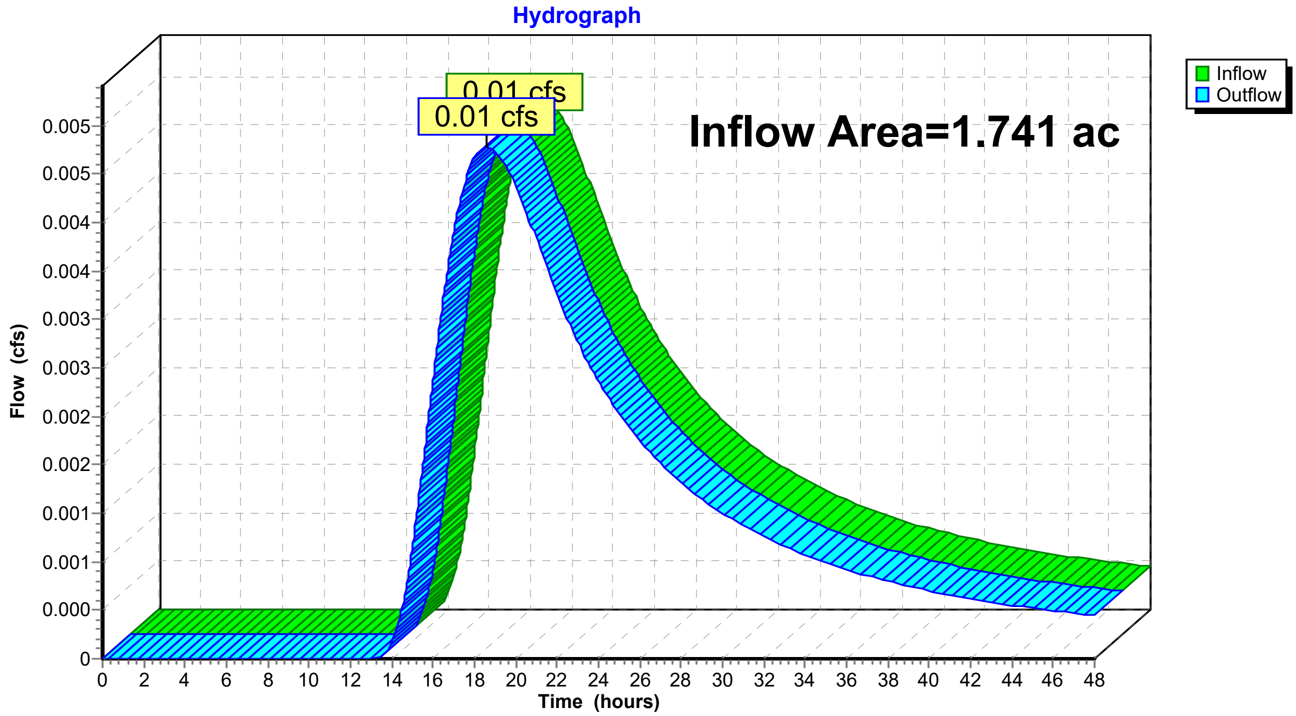


Summary for Reach DP-3: Design Point 3 (Existing Drainage Ditch)

Inflow Area = 1.741 ac, 78.76% Impervious, Inflow Depth > 0.04" for 1-Inch event
Inflow = 0.01 cfs @ 18.60 hrs, Volume= 0.005 af
Outflow = 0.01 cfs @ 18.60 hrs, Volume= 0.005 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Reach DP-3: Design Point 3 (Existing Drainage Ditch)

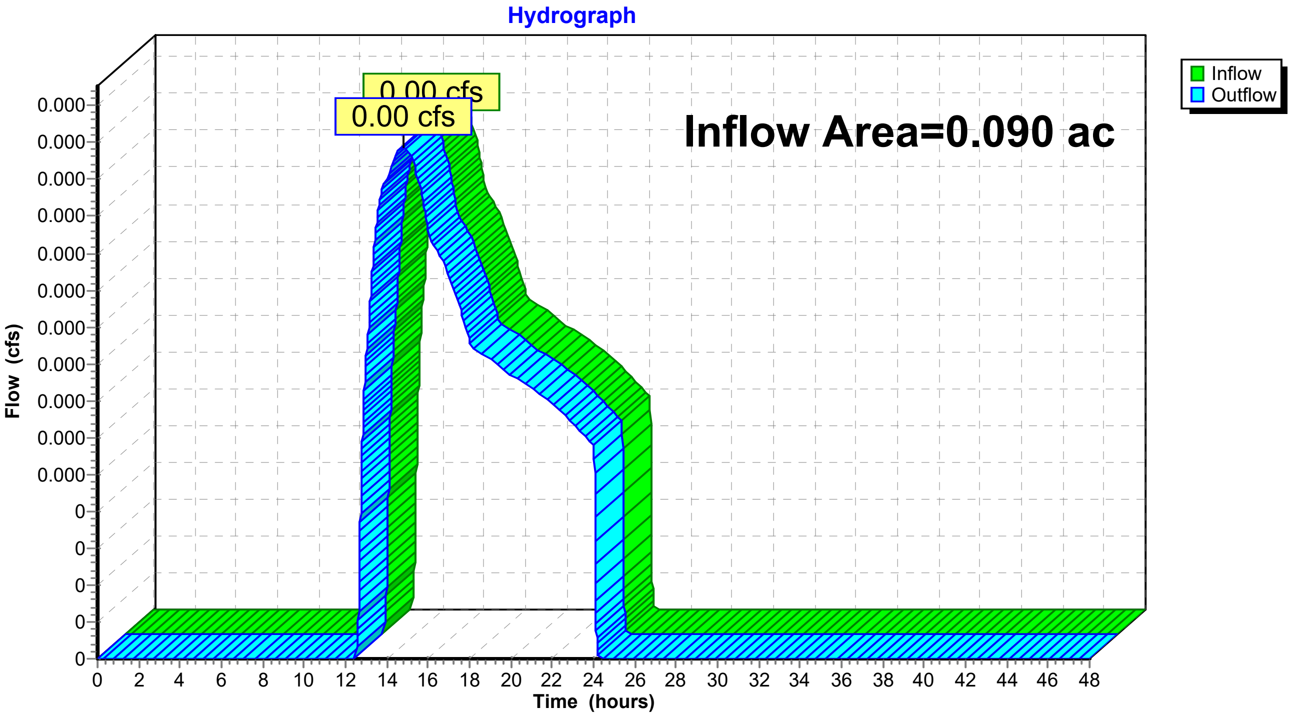


Summary for Reach DP-4: Design Point 4 (MassDOT 30" CB-2)

Inflow Area = 0.090 ac, 0.00% Impervious, Inflow Depth = 0.02" for 1-Inch event
Inflow = 0.00 cfs @ 14.78 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 14.78 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Reach DP-4: Design Point 4 (MassDOT 30" CB-2)

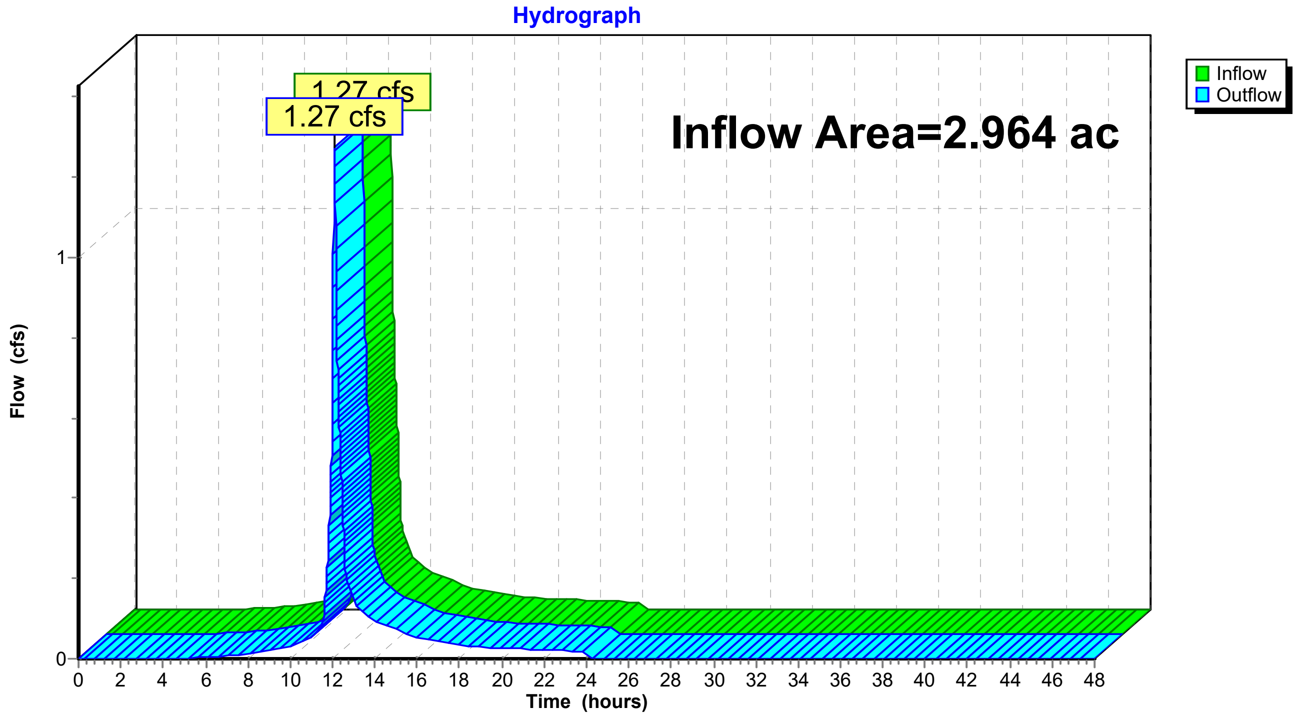


Summary for Reach DP-5: Design Point 5 (Existing Constructed Stormwater Wetland)

Inflow Area = 2.964 ac, 69.34% Impervious, Inflow Depth = 0.41" for 1-Inch event
Inflow = 1.27 cfs @ 12.10 hrs, Volume= 0.102 af
Outflow = 1.27 cfs @ 12.10 hrs, Volume= 0.102 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Reach DP-5: Design Point 5 (Existing Constructed Stormwater Wetland)

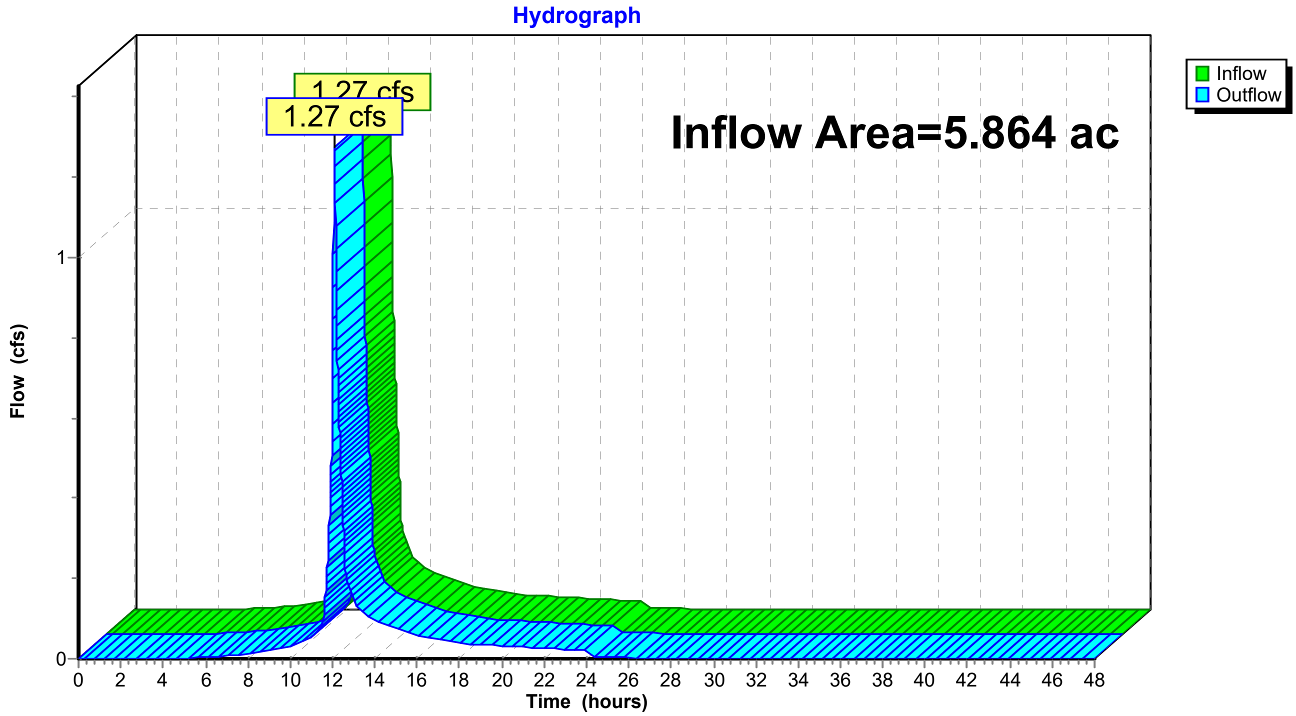


Summary for Reach DP-6: Wetland A - Design Point 6

Inflow Area =	5.864 ac, 68.59% Impervious, Inflow Depth > 0.22"	for 1-Inch event	
Inflow =	1.27 cfs @ 12.10 hrs, Volume=	0.108 af	
Outflow =	1.27 cfs @ 12.10 hrs, Volume=	0.108 af, Atten= 0%, Lag= 0.0 min	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Reach DP-6: Wetland A - Design Point 6



Summary for Pond 3P: Conveyance Swale

Inflow Area = 0.471 ac, 52.65% Impervious, Inflow Depth = 0.20" for 1-Inch event
Inflow = 0.09 cfs @ 12.11 hrs, Volume= 0.008 af
Outflow = 0.00 cfs @ 24.23 hrs, Volume= 0.000 af, Atten= 100%, Lag= 727.6 min
Primary = 0.00 cfs @ 24.23 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 125.00' @ 24.23 hrs Surf.Area= 531 sf Storage= 338 cf

Plug-Flow detention time= 1,218.2 min calculated for 0.000 af (0% of inflow)
Center-of-Mass det. time= 1,033.8 min (1,925.9 - 892.2)

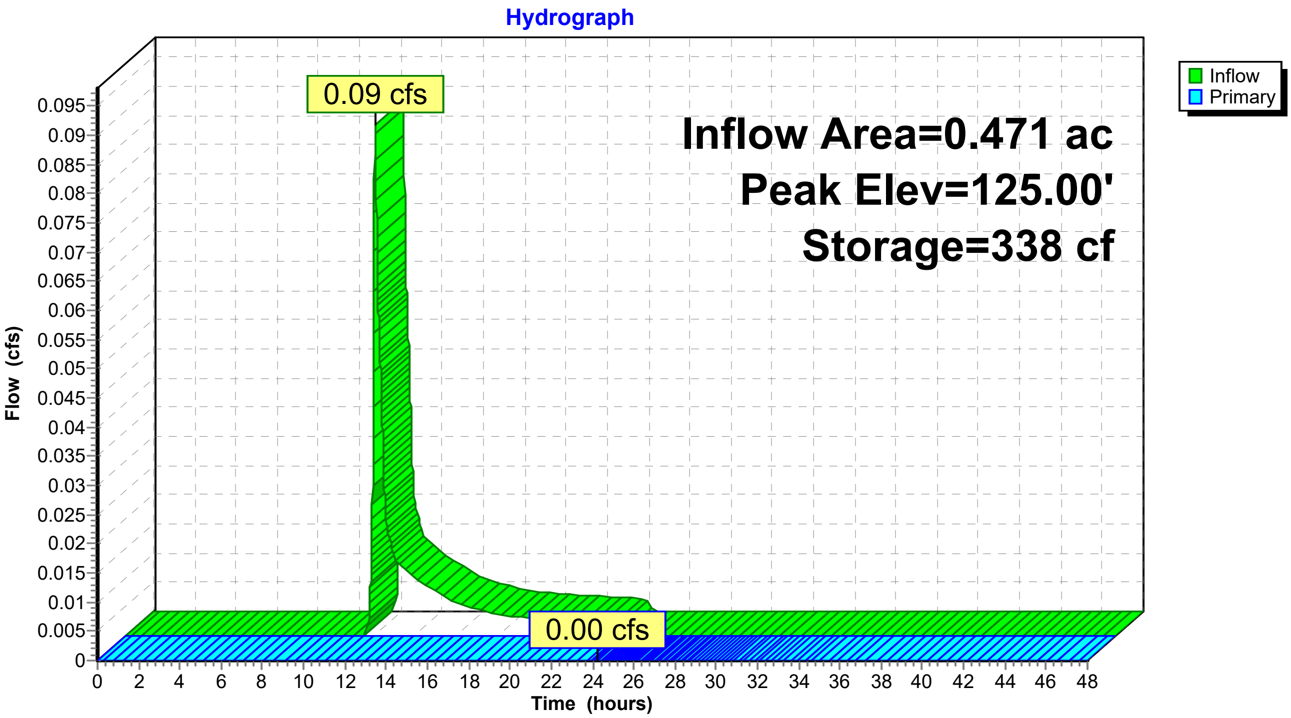
Volume	Invert	Avail.Storage	Storage Description
#1	124.00'	1,645 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
124.00	143	0	0
125.00	530	337	337
126.00	978	754	1,091
126.50	1,241	555	1,645

Device	Routing	Invert	Outlet Devices
#1	Primary	124.18'	**12.0" Round Culvert** L= 10.0' Ke= 0.500 Inlet / Outlet Invert= 124.18' / 124.13' S= 0.0050 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf
#2	Device 1	125.00'	**12.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.00 cfs @ 24.23 hrs HW=125.00' TW=122.47' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.00 cfs of 1.59 cfs potential flow)
  └─**2=Orifice/Grate** (Orifice Controls 0.00 cfs @ 0.17 fps)

Pond 3P: Conveyance Swale



Summary for Pond 11P: Permeable Pavement

Inflow Area = 0.626 ac, 95.37% Impervious, Inflow Depth = 0.71" for 1-Inch event
Inflow = 0.51 cfs @ 12.09 hrs, Volume= 0.037 af
Outflow = 0.16 cfs @ 12.09 hrs, Volume= 0.037 af, Atten= 68%, Lag= 0.2 min
Discarded = 0.16 cfs @ 12.09 hrs, Volume= 0.037 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 122.77' @ 12.40 hrs Surf.Area= 25,998 sf Storage= 248 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 6.8 min (809.3 - 802.5)

Volume	Invert	Avail.Storage	Storage Description
#1	122.75'	8,813 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

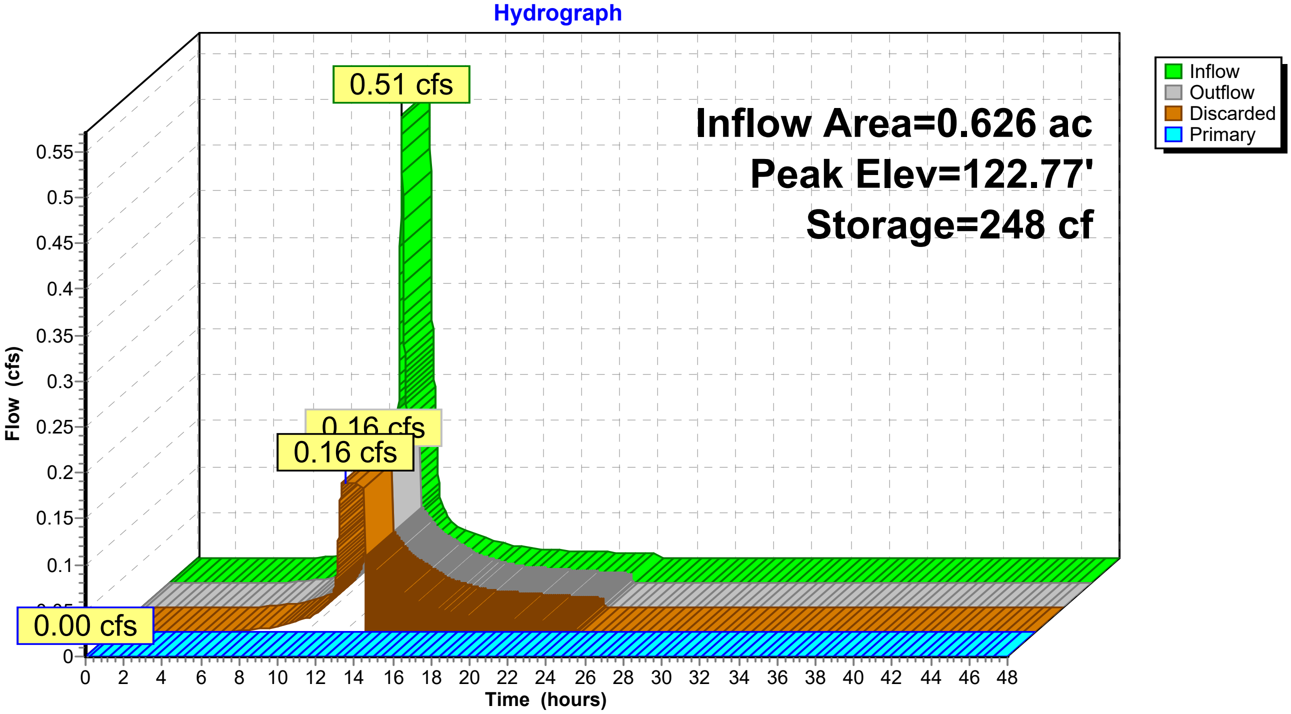
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
122.75	25,998	0.0	0	0
123.41	25,998	40.0	6,863	6,863
123.66	25,998	30.0	1,950	8,813

Device	Routing	Invert	Outlet Devices
#1	Discarded	122.75'	**0.270 in/hr Exfiltration over Surface area**
#2	Primary	123.30'	**6.0" Round Culvert** L= 10.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 123.30' / 119.00' S= 0.4300 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.20 sf

Discarded OutFlow Max=0.16 cfs @ 12.09 hrs HW=122.76' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.16 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=122.75' TW=0.00' (Dynamic Tailwater)
└─**2=Culvert** (Controls 0.00 cfs)

Pond 11P: Permeable Pavement



Summary for Pond 13P: UG-1 Retain IT(Infiltration)

Inflow Area = 1.741 ac, 78.76% Impervious, Inflow Depth = 0.44" for 1-Inch event
Inflow = 0.87 cfs @ 12.09 hrs, Volume= 0.064 af
Outflow = 0.04 cfs @ 14.96 hrs, Volume= 0.064 af, Atten= 95%, Lag= 172.6 min
Discarded = 0.02 cfs @ 11.22 hrs, Volume= 0.057 af
Primary = 0.02 cfs @ 14.96 hrs, Volume= 0.007 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 122.59' @ 14.96 hrs Surf.Area= 3,440 sf Storage= 1,579 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 600.5 min (1,410.5 - 810.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	121.75'	1,791 cf	**20.00'W x 172.00'L x 4.17'H Field A** 14,333 cf Overall - 9,856 cf Embedded = 4,477 cf x 40.0% Voids
#2A	122.25'	6,948 cf	**retain_it retain_it 3.0'** x 42 Inside #1 Inside= 84.0"W x 36.0"H => 21.33 sf x 8.00'L = 170.6 cf Outside= 96.0"W x 44.0"H => 29.33 sf x 8.00'L = 234.7 cf 2 Rows adjusted for 217.2 cf perimeter wall
		8,739 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	124.75'	**3.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#2	Primary	122.50'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Discarded	121.75'	**0.270 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.02 cfs @ 11.22 hrs HW=121.79' (Free Discharge)
└─**3=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.02 cfs @ 14.96 hrs HW=122.59' TW=122.02' (Dynamic Tailwater)
├─**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
└─**2=Orifice/Grate** (Orifice Controls 0.02 cfs @ 1.02 fps)

Pond 13P: UG-1 Retain IT(Infiltration) - Chamber Wizard Field A

Chamber Model = retain_it retain_it 3.0' (retain-it®)
Inside= 84.0"W x 36.0"H => 21.33 sf x 8.00'L = 170.6 cf
Outside= 96.0"W x 44.0"H => 29.33 sf x 8.00'L = 234.7 cf
2 Rows adjusted for 217.2 cf perimeter wall

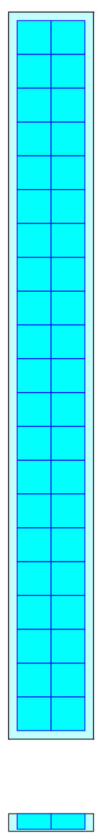
21 Chambers/Row x 8.00' Long = 168.00' Row Length +24.0" End Stone x 2 = 172.00' Base Length
2 Rows x 96.0" Wide + 24.0" Side Stone x 2 = 20.00' Base Width
6.0" Base + 44.0" Chamber Height = 4.17' Field Height

4.7 cf Sidewall x 21 x 2 + 4.7 cf Endwall x 2 x 2 = 217.2 cf Perimeter Wall
42 Chambers x 170.6 cf - 217.2 cf Perimeter wall = 6,948.5 cf Chamber Storage
42 Chambers x 234.7 cf = 9,856.0 cf Displacement

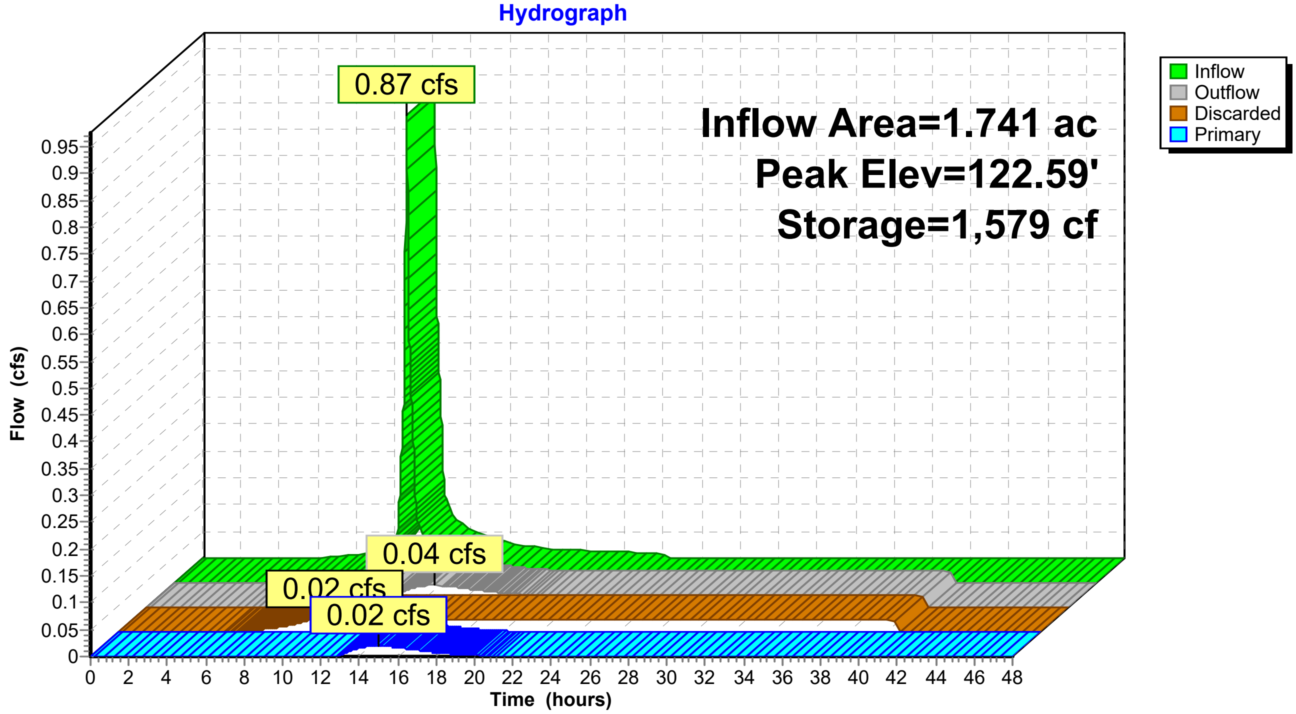
14,333.3 cf Field - 9,856.0 cf Chambers = 4,477.3 cf Stone x 40.0% Voids = 1,790.9 cf Stone Storage

Chamber Storage + Stone Storage = 8,739.4 cf = 0.201 af
Overall Storage Efficiency = 61.0%
Overall System Size = 172.00' x 20.00' x 4.17'

42 Chambers
530.9 cy Field
165.8 cy Stone



Pond 13P: UG-1 Retain IT(Infiltration)



Summary for Pond 16P: UG-2 Retain IT (Detention)

Inflow Area = 1.741 ac, 78.76% Impervious, Inflow Depth = 0.05" for 1-Inch event
Inflow = 0.02 cfs @ 14.96 hrs, Volume= 0.007 af
Outflow = 0.01 cfs @ 18.60 hrs, Volume= 0.005 af, Atten= 73%, Lag= 217.9 min
Primary = 0.01 cfs @ 18.60 hrs, Volume= 0.005 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 122.04' @ 18.60 hrs Surf.Area= 6,512 sf Storage= 220 cf

Plug-Flow detention time= 587.8 min calculated for 0.005 af (78% of inflow)
Center-of-Mass det. time= 546.1 min (1,497.8 - 951.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	122.00'	1,103 cf	**44.00'W x 148.00'L x 3.67'H Field A** 23,877 cf Overall - 21,120 cf Embedded = 2,757 cf x 40.0% Voids
#2A	122.00'	15,138 cf	**retain_it retain_it 3.0'** x 90 Inside #1 Inside= 84.0"W x 36.0"H => 21.33 sf x 8.00'L = 170.6 cf Outside= 96.0"W x 44.0"H => 29.33 sf x 8.00'L = 234.7 cf 5 Rows adjusted for 217.2 cf perimeter wall
		16,241 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	121.50'	**12.0" Round Culvert** L= 10.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 121.50' / 121.40' S= 0.0100 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf
#2	Device 1	124.70'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#3	Device 1	122.00'	**6.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.01 cfs @ 18.60 hrs HW=122.04' TW=0.00' (Dynamic Tailwater)
1=Culvert (Passes 0.01 cfs of 0.89 cfs potential flow)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)
3=Orifice/Grate (Orifice Controls 0.01 cfs @ 0.69 fps)

Pond 16P: UG-2 Retain IT (Detention) - Chamber Wizard Field A

Chamber Model = retain_it retain_it 3.0' (retain-it®)
Inside= 84.0"W x 36.0"H => 21.33 sf x 8.00'L = 170.6 cf
Outside= 96.0"W x 44.0"H => 29.33 sf x 8.00'L = 234.7 cf
5 Rows adjusted for 217.2 cf perimeter wall

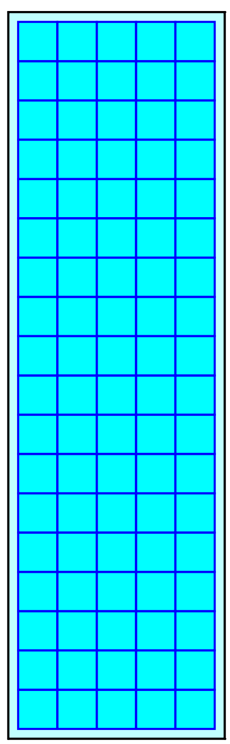
18 Chambers/Row x 8.00' Long = 144.00' Row Length +24.0" End Stone x 2 = 148.00' Base Length
5 Rows x 96.0" Wide + 24.0" Side Stone x 2 = 44.00' Base Width
44.0" Chamber Height = 3.67' Field Height

4.7 cf Sidewall x 18 x 2 + 4.7 cf Endwall x 5 x 2 = 217.2 cf Perimeter Wall
90 Chambers x 170.6 cf - 217.2 cf Perimeter wall = 15,137.8 cf Chamber Storage
90 Chambers x 234.7 cf = 21,120.0 cf Displacement

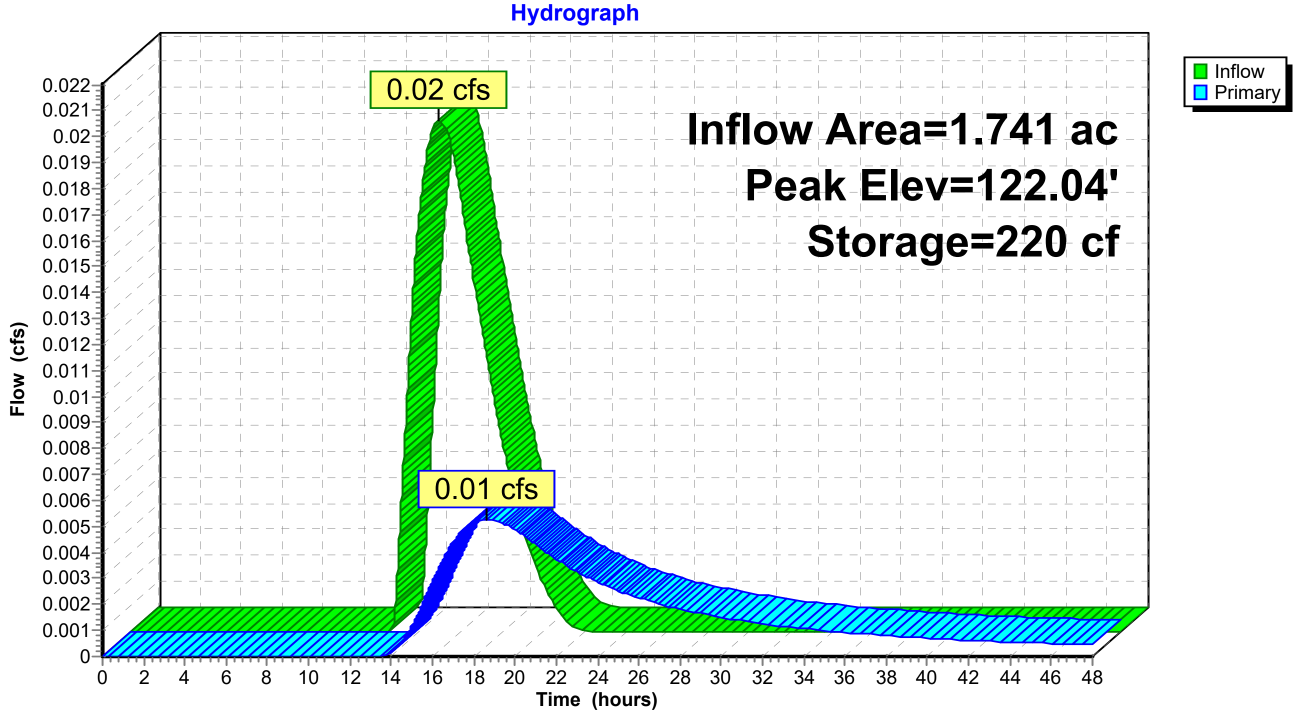
23,877.3 cf Field - 21,120.0 cf Chambers = 2,757.3 cf Stone x 40.0% Voids = 1,102.9 cf Stone Storage

Chamber Storage + Stone Storage = 16,240.7 cf = 0.373 af
Overall Storage Efficiency = 68.0%
Overall System Size = 148.00' x 44.00' x 3.67'

90 Chambers
884.3 cy Field
102.1 cy Stone



Pond 16P: UG-2 Retain IT (Detention)



Summary for Subcatchment P-1A: Undetained to Wetland B

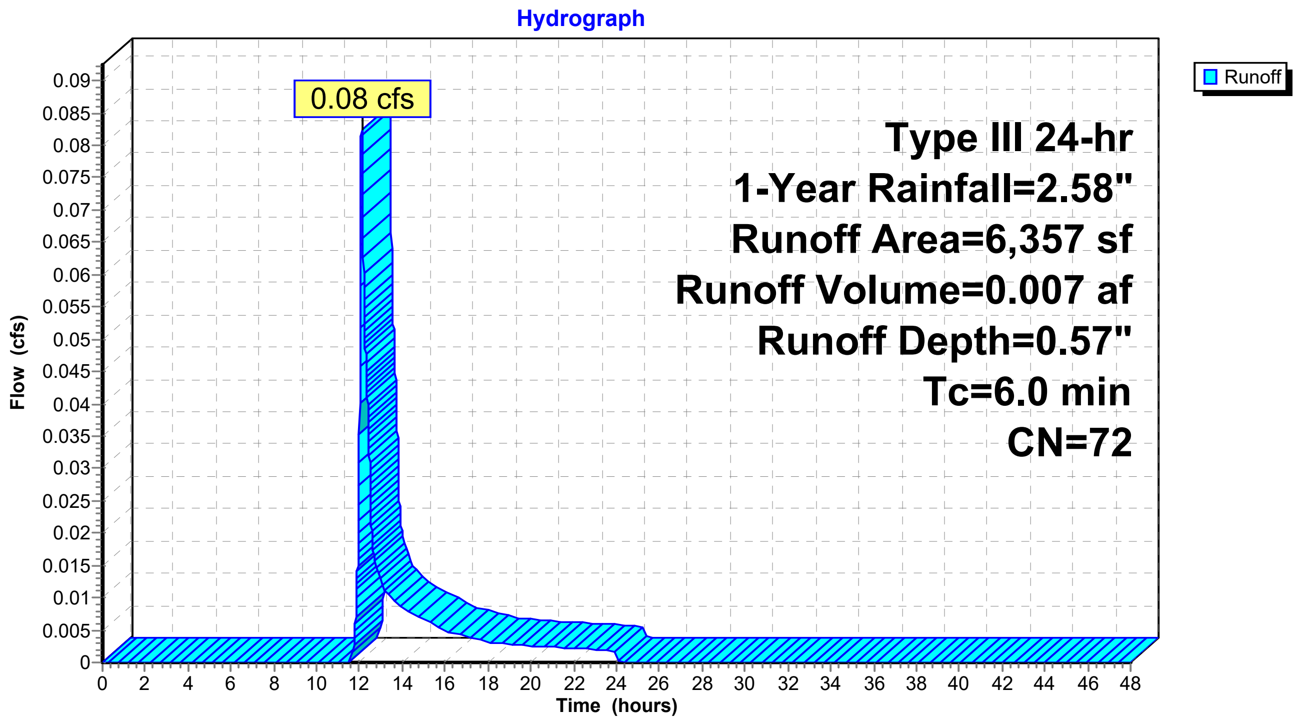
Runoff = 0.08 cfs @ 12.10 hrs, Volume= 0.007 af, Depth= 0.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-Year Rainfall=2.58"

Area (sf)	CN	Description
6,357	72	Woods/grass comb., Good, HSG C
6,357		100.00% Pervious Area

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

Subcatchment P-1A: Undetained to Wetland B



Summary for Subcatchment P-1B: Western Driveway

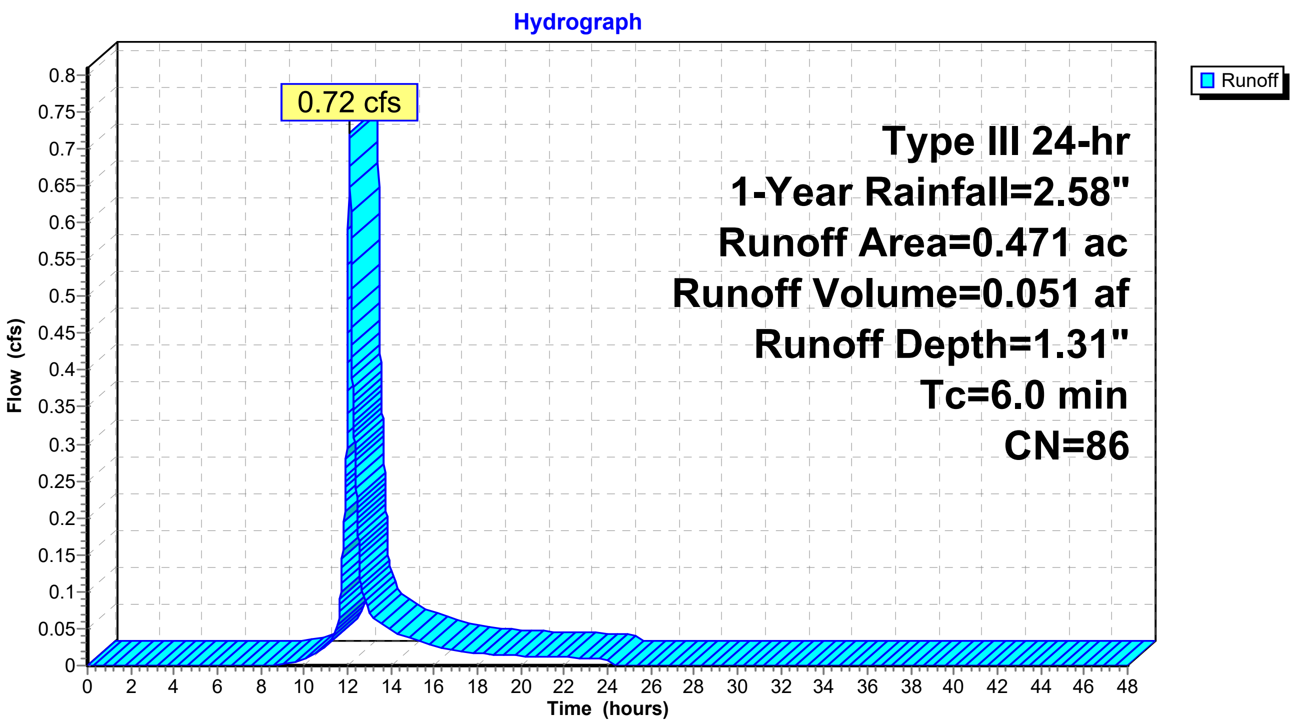
Runoff = 0.72 cfs @ 12.09 hrs, Volume= 0.051 af, Depth= 1.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-Year Rainfall=2.58"

Area (ac)	CN	Description
0.248	98	Paved parking, HSG C
0.223	72	Woods/grass comb., Good, HSG C
0.471	86	Weighted Average
0.223		47.35% Pervious Area
0.248		52.65% Impervious Area

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

Subcatchment P-1B: Western Driveway



Summary for Subcatchment P-1C: Permeable Pavement

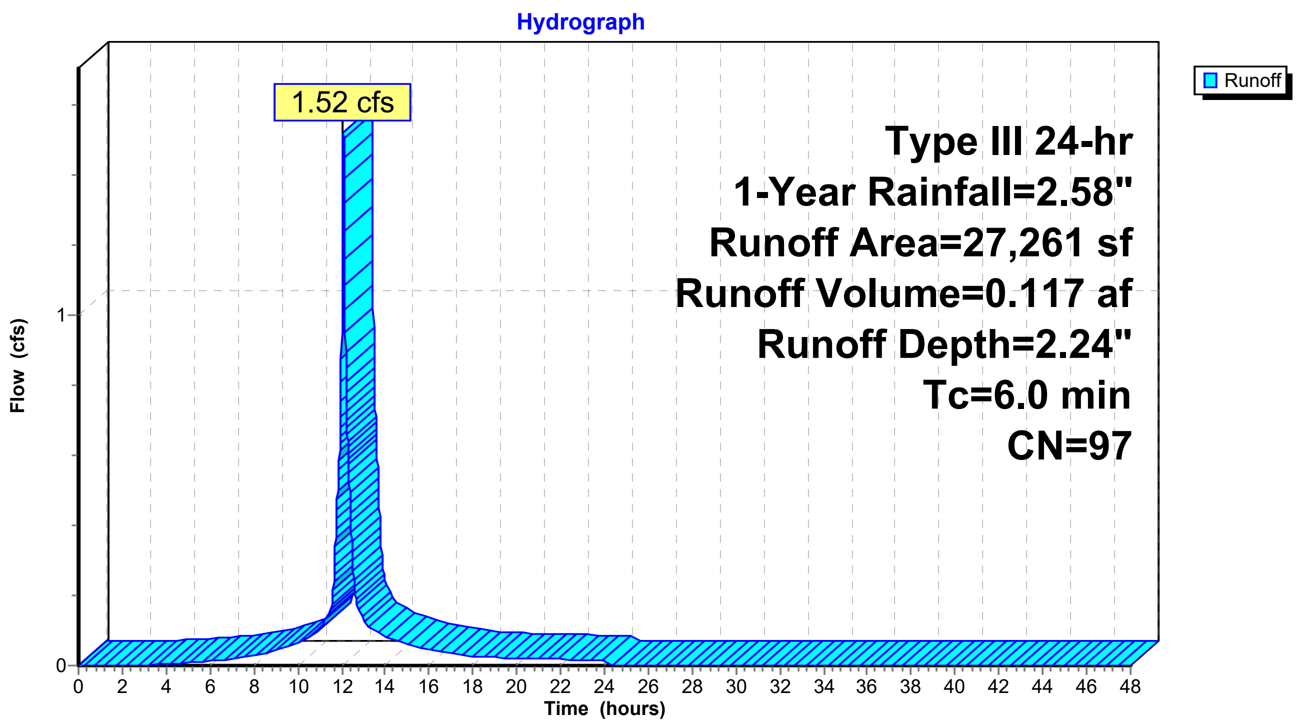
Runoff = 1.52 cfs @ 12.08 hrs, Volume= 0.117 af, Depth= 2.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-Year Rainfall=2.58"

	Area (sf)	CN	Description
*	25,998	98	Permeable Pavement
	1,263	74	>75% Grass cover, Good, HSG C
	27,261	97	Weighted Average
	1,263		4.63% Pervious Area
	25,998		95.37% Impervious Area

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

Subcatchment P-1C: Permeable Pavement



Summary for Subcatchment P-2: Undetained to Wetland

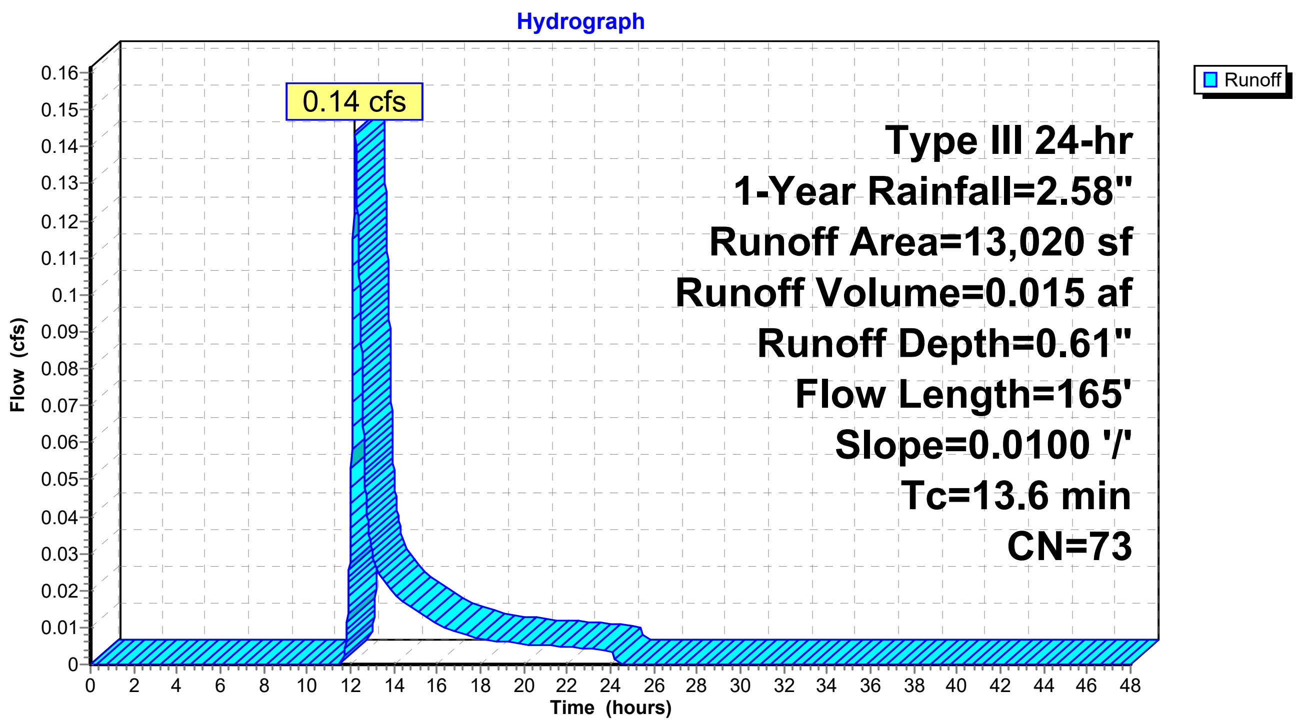
Runoff = 0.14 cfs @ 12.21 hrs, Volume= 0.015 af, Depth= 0.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-Year Rainfall=2.58"

Area (sf)	CN	Description
10,967	74	>75% Grass cover, Good, HSG C
2,053	70	Woods, Good, HSG C
13,020	73	Weighted Average
13,020		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	100	0.0100	0.13		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
0.7	65	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
13.6	165	Total			

Subcatchment P-2: Undetained to Wetland



Summary for Subcatchment P-3A: Additions and Upper Pavement

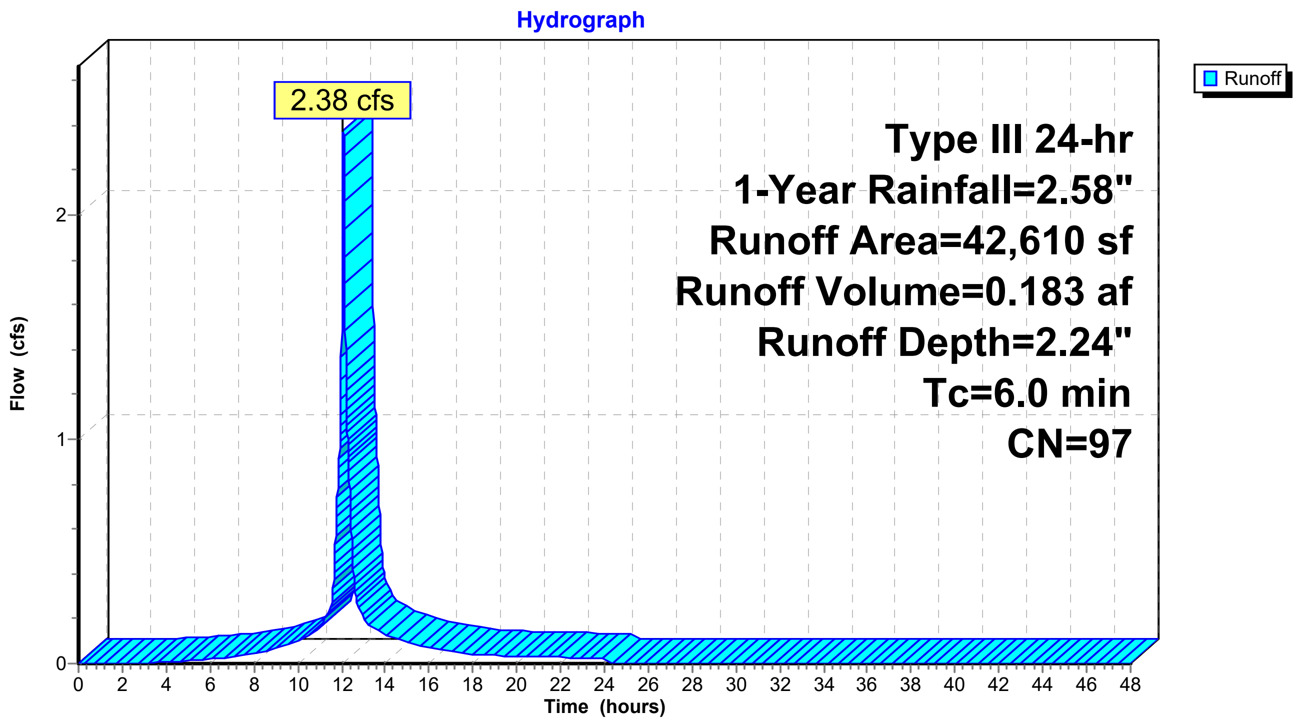
Runoff = 2.38 cfs @ 12.08 hrs, Volume= 0.183 af, Depth= 2.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-Year Rainfall=2.58"

Area (sf)	CN	Description
26,741	98	Paved parking, HSG C
1,277	74	>75% Grass cover, Good, HSG C
14,592	98	Roofs, HSG C
42,610	97	Weighted Average
1,277		3.00% Pervious Area
41,333		97.00% Impervious Area

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

Subcatchment P-3A: Additions and Upper Pavement



Summary for Subcatchment P-3B: Existing Building Draining to Constructed Wetland

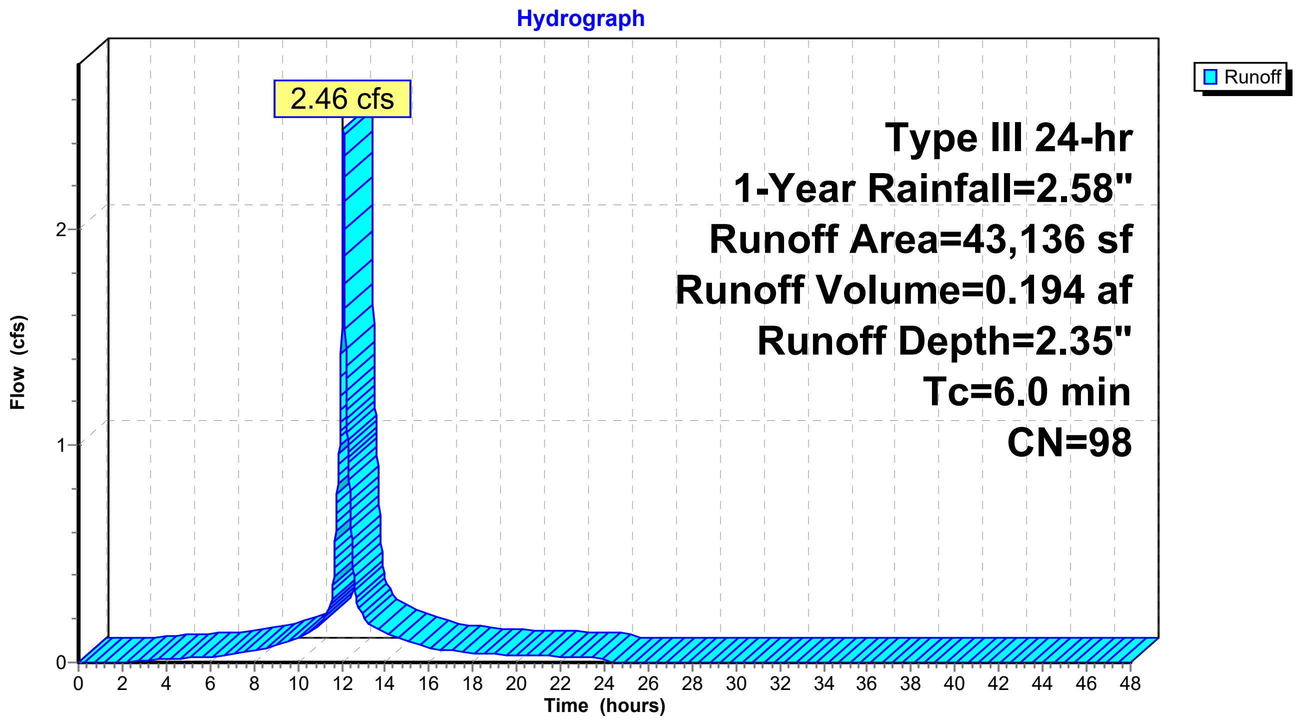
Runoff = 2.46 cfs @ 12.08 hrs, Volume= 0.194 af, Depth= 2.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-Year Rainfall=2.58"

Area (sf)	CN	Description
43,136	98	Roofs, HSG C
43,136		100.00% Impervious Area

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

Subcatchment P-3B: Existing Building Draining to Constructed Wetland



Summary for Subcatchment P-4: Watershed to Existing Stormwater System

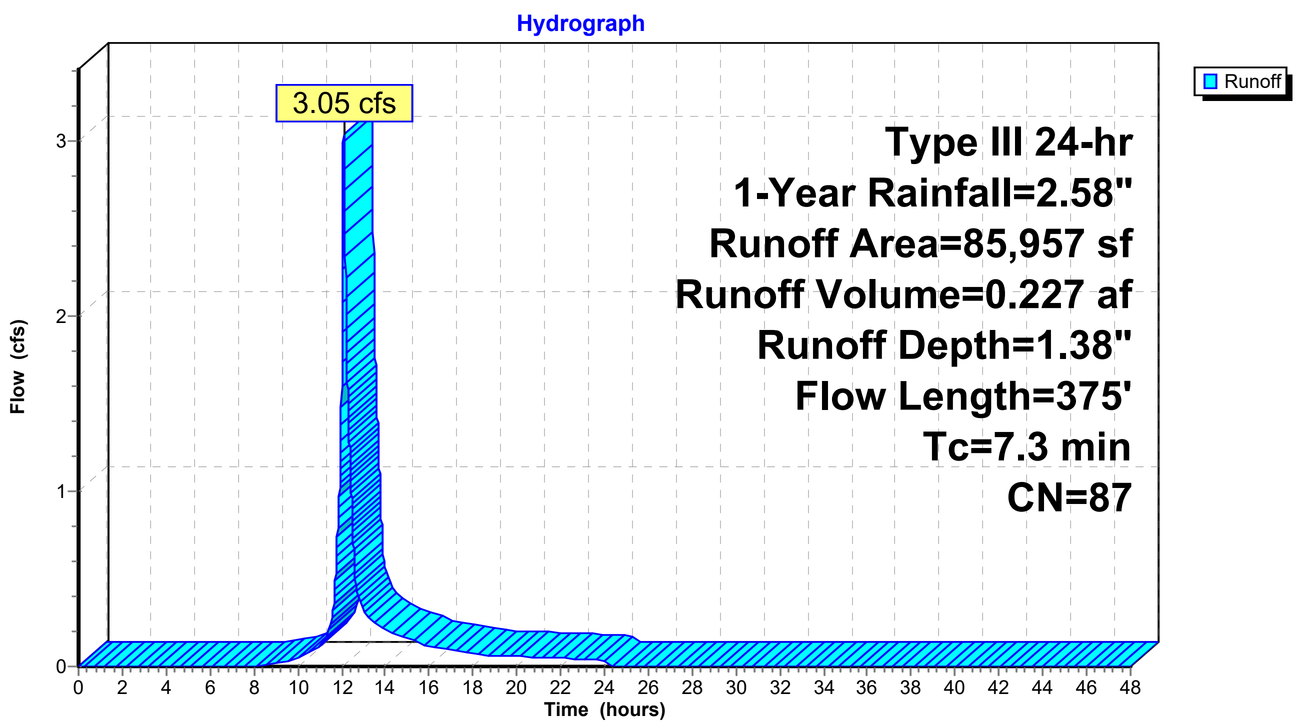
Runoff = 3.05 cfs @ 12.11 hrs, Volume= 0.227 af, Depth= 1.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-Year Rainfall=2.58"

Area (sf)	CN	Description
46,374	98	Paved parking, HSG C
37,535	74	>75% Grass cover, Good, HSG C
2,048	70	Woods, Good, HSG C
85,957	87	Weighted Average
39,583		46.05% Pervious Area
46,374		53.95% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.2	50	0.0240	0.16		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
1.7	245	0.0220	2.39		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.4	80	0.0287	3.44		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
7.3	375	Total			

Subcatchment P-4: Watershed to Existing Stormwater System



Summary for Subcatchment P-4A: Watershed to MassDOT CB1

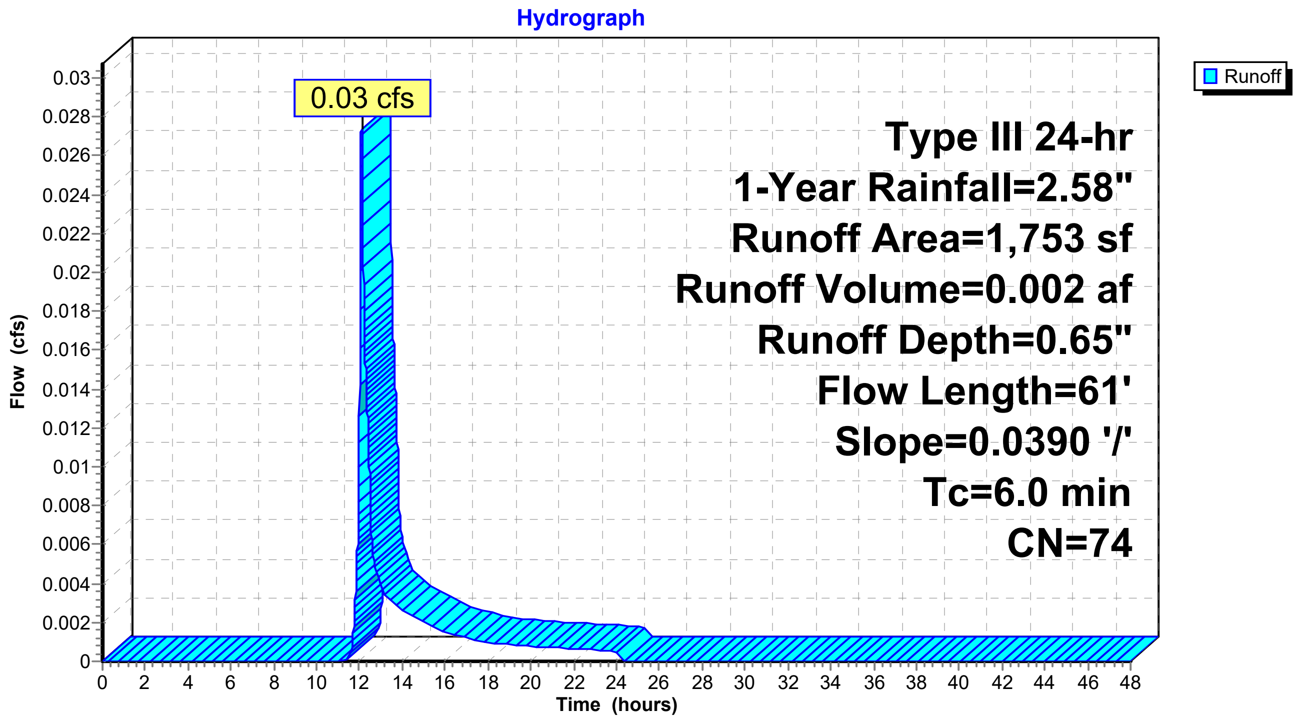
Runoff = 0.03 cfs @ 12.10 hrs, Volume= 0.002 af, Depth= 0.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-Year Rainfall=2.58"

Area (sf)	CN	Description
1,753	74	>75% Grass cover, Good, HSG C
1,753		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.1	61	0.0390	0.20		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
0.9					**Direct Entry,**
6.0	61	Total			

Subcatchment P-4A: Watershed to MassDOT CB1



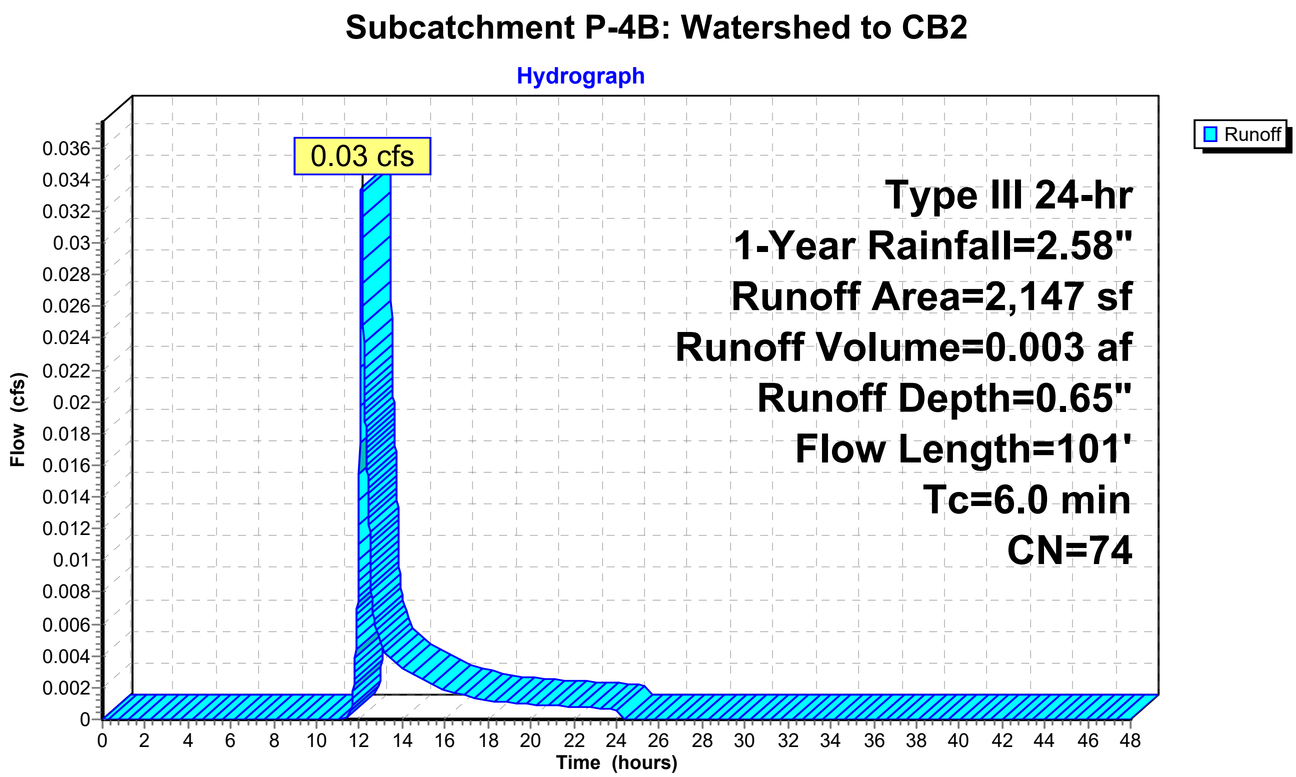
Summary for Subcatchment P-4B: Watershed to CB2

Runoff = 0.03 cfs @ 12.10 hrs, Volume= 0.003 af, Depth= 0.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-Year Rainfall=2.58"

Area (sf)	CN	Description
2,147	74	>75% Grass cover, Good, HSG C
2,147		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	50	0.0200	0.15		**Sheet Flow, SHeet Flow** Grass: Short n= 0.150 P2= 3.20"
0.3	51	0.0390	3.18		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.1					**Direct Entry, Miniumum**
6.0	101	Total			



Summary for Subcatchment P-5: P-5

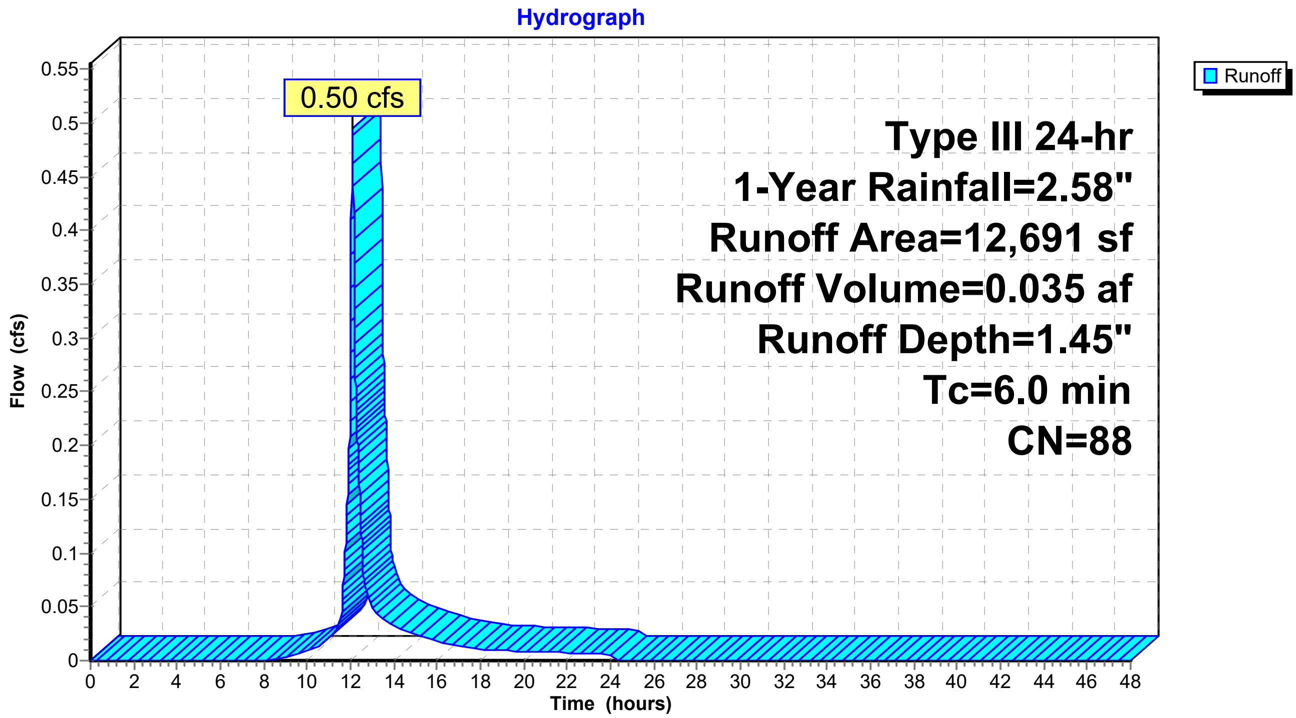
Runoff = 0.50 cfs @ 12.09 hrs, Volume= 0.035 af, Depth= 1.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-Year Rainfall=2.58"

Area (sf)	CN	Description
5,116	74	>75% Grass cover, Good, HSG C
7,575	98	Paved parking, HSG C
12,691	88	Weighted Average
5,116		40.31% Pervious Area
7,575		59.69% Impervious Area

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

Subcatchment P-5: P-5

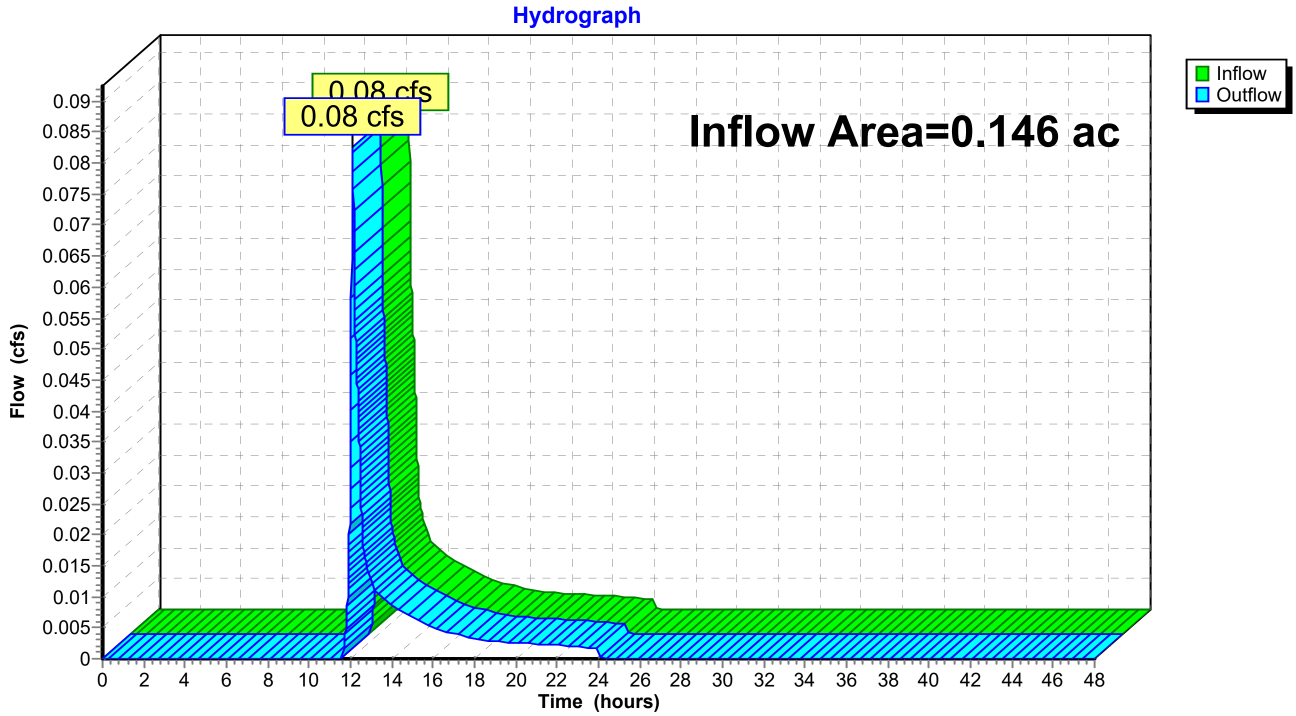


Summary for Reach DP-1: Design Point 1 (Wetland B)

Inflow Area = 0.146 ac, 0.00% Impervious, Inflow Depth = 0.57" for 1-Year event
Inflow = 0.08 cfs @ 12.10 hrs, Volume= 0.007 af
Outflow = 0.08 cfs @ 12.10 hrs, Volume= 0.007 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Reach DP-1: Design Point 1 (Wetland B)

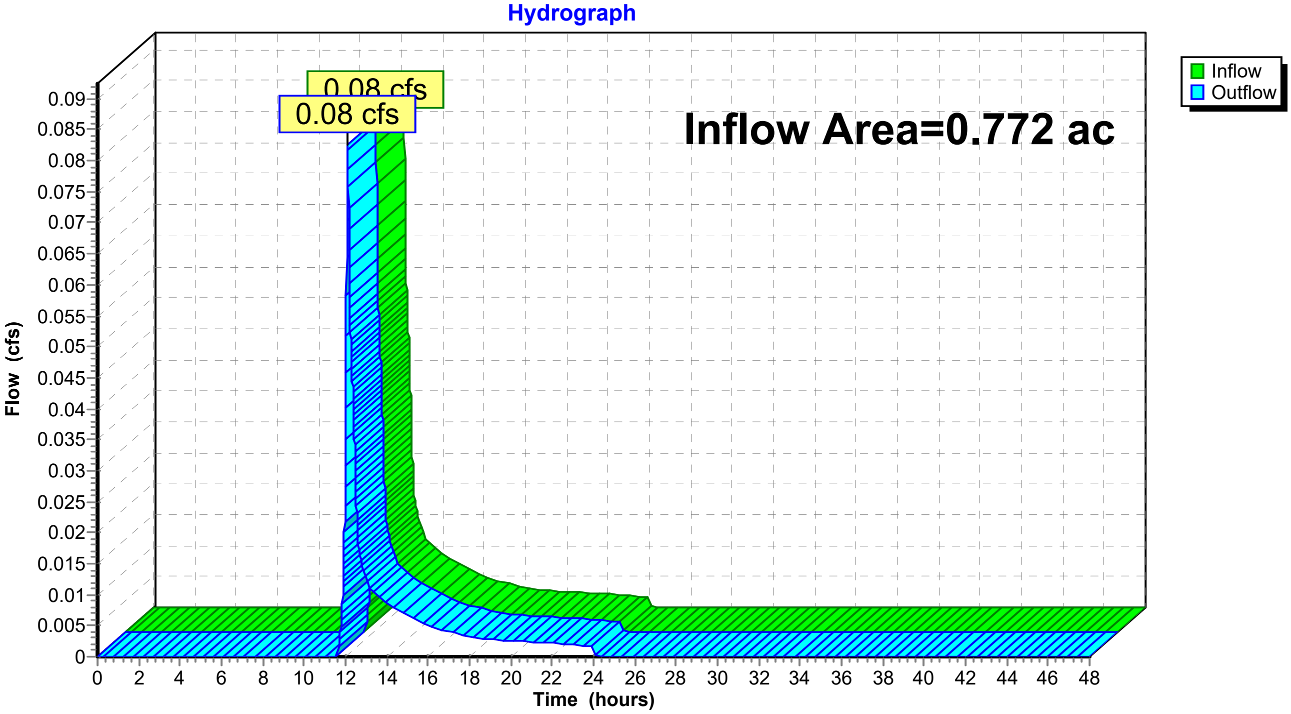


Summary for Reach DP-2: Design Point 2 (15" RCP to Wetland A)

Inflow Area = 0.772 ac, 77.33% Impervious, Inflow Depth = 0.11" for 1-Year event
Inflow = 0.08 cfs @ 12.10 hrs, Volume= 0.007 af
Outflow = 0.08 cfs @ 12.10 hrs, Volume= 0.007 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Reach DP-2: Design Point 2 (15" RCP to Wetland A)

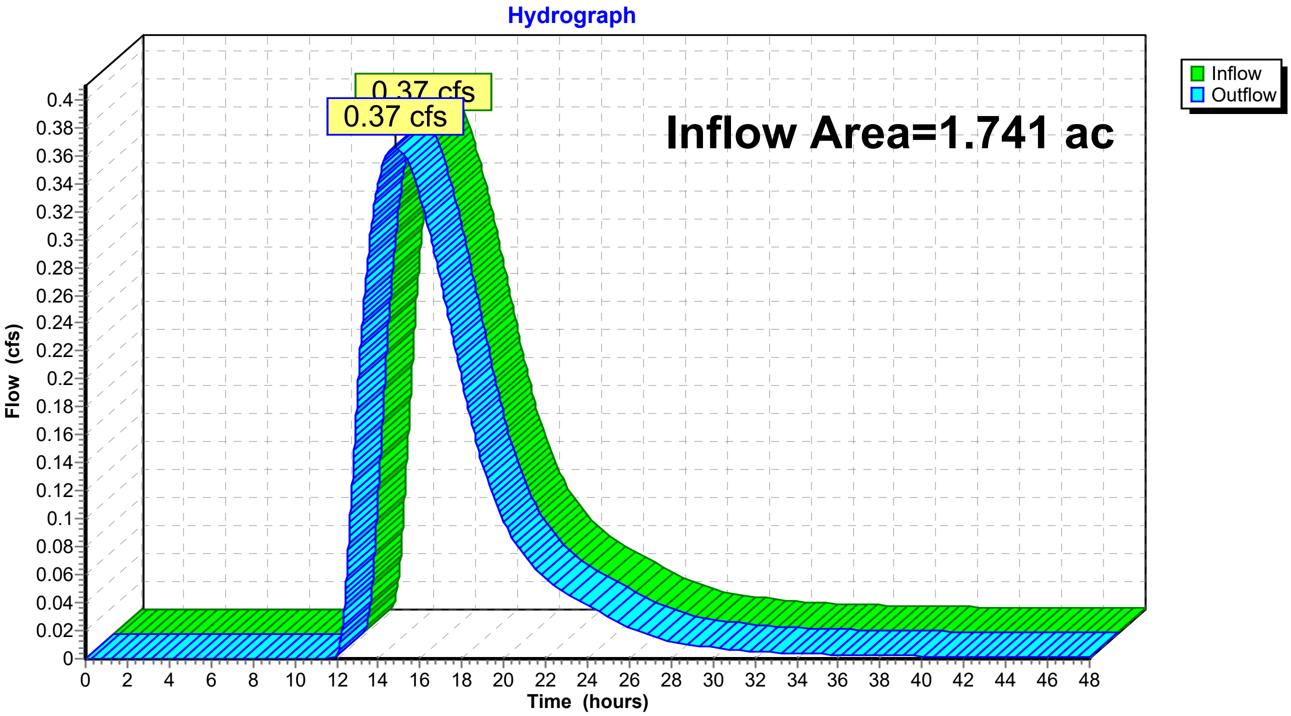


Summary for Reach DP-3: Design Point 3 (Existing Drainage Ditch)

Inflow Area =	1.741 ac, 78.76% Impervious, Inflow Depth > 1.30"	for 1-Year event	
Inflow =	0.37 cfs @ 14.79 hrs, Volume=	0.189 af	
Outflow =	0.37 cfs @ 14.79 hrs, Volume=	0.189 af, Atten= 0%, Lag= 0.0 min	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Reach DP-3: Design Point 3 (Existing Drainage Ditch)

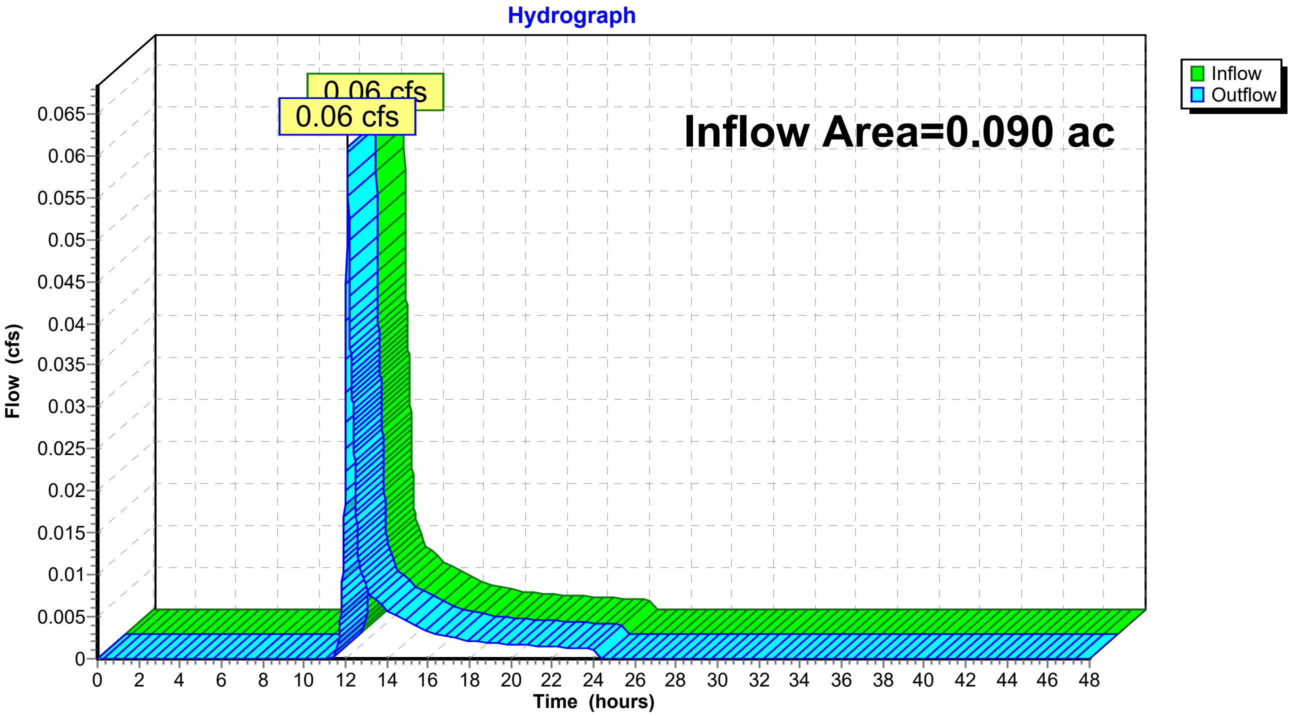


Summary for Reach DP-4: Design Point 4 (MassDOT 30" CB-2)

Inflow Area = 0.090 ac, 0.00% Impervious, Inflow Depth = 0.65" for 1-Year event
Inflow = 0.06 cfs @ 12.10 hrs, Volume= 0.005 af
Outflow = 0.06 cfs @ 12.10 hrs, Volume= 0.005 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Reach DP-4: Design Point 4 (MassDOT 30" CB-2)

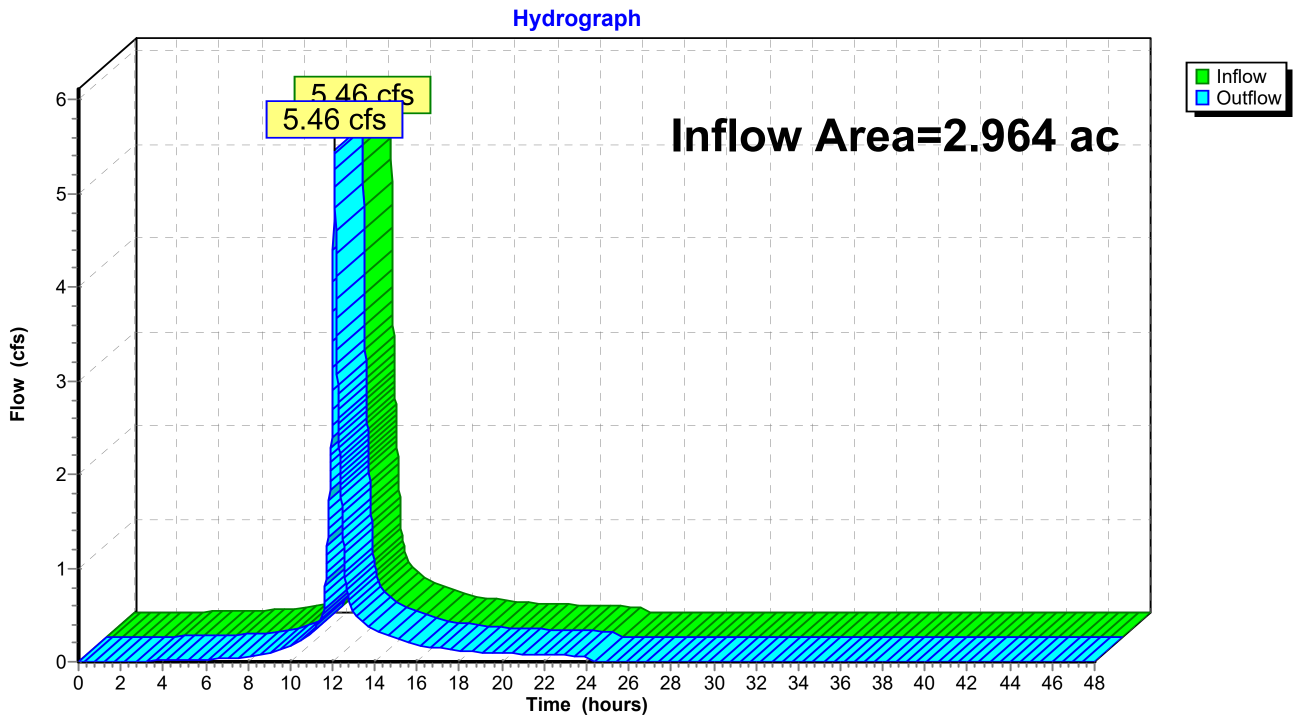


Summary for Reach DP-5: Design Point 5 (Existing Constructed Stormwater Wetland)

Inflow Area = 2.964 ac, 69.34% Impervious, Inflow Depth = 1.70" for 1-Year event
Inflow = 5.46 cfs @ 12.10 hrs, Volume= 0.421 af
Outflow = 5.46 cfs @ 12.10 hrs, Volume= 0.421 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

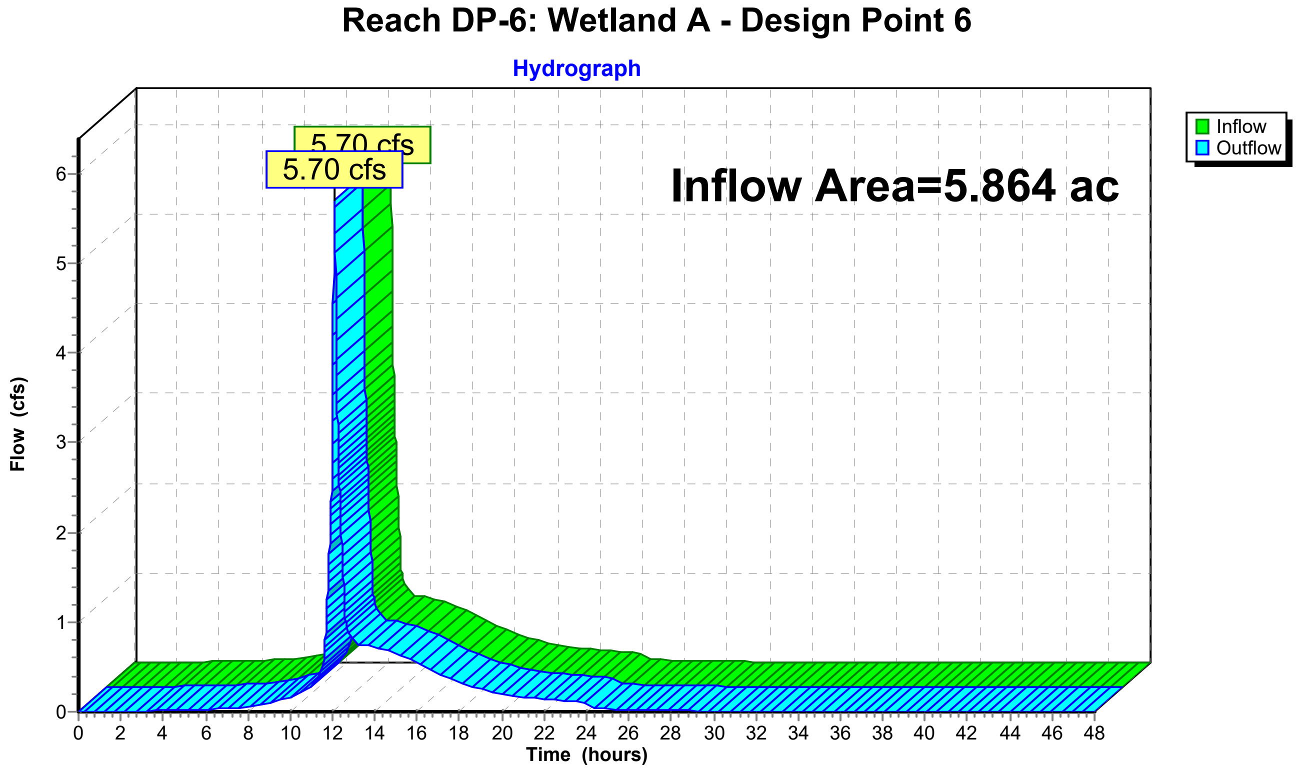
Reach DP-5: Design Point 5 (Existing Constructed Stormwater Wetland)



Summary for Reach DP-6: Wetland A - Design Point 6

Inflow Area =	5.864 ac, 68.59% Impervious, Inflow Depth > 1.30" for 1-Year event			
Inflow =	5.70 cfs @	12.10 hrs, Volume=	0.637 af	
Outflow =	5.70 cfs @	12.10 hrs, Volume=	0.637 af,	Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs



Summary for Pond 3P: Conveyance Swale

Inflow Area = 0.471 ac, 52.65% Impervious, Inflow Depth = 1.31" for 1-Year event
Inflow = 0.72 cfs @ 12.09 hrs, Volume= 0.051 af
Outflow = 0.56 cfs @ 12.16 hrs, Volume= 0.044 af, Atten= 23%, Lag= 4.0 min
Primary = 0.56 cfs @ 12.16 hrs, Volume= 0.044 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 125.37' @ 12.16 hrs Surf.Area= 697 sf Storage= 565 cf

Plug-Flow detention time= 111.6 min calculated for 0.044 af (85% of inflow)
Center-of-Mass det. time= 46.1 min (878.3 - 832.3)

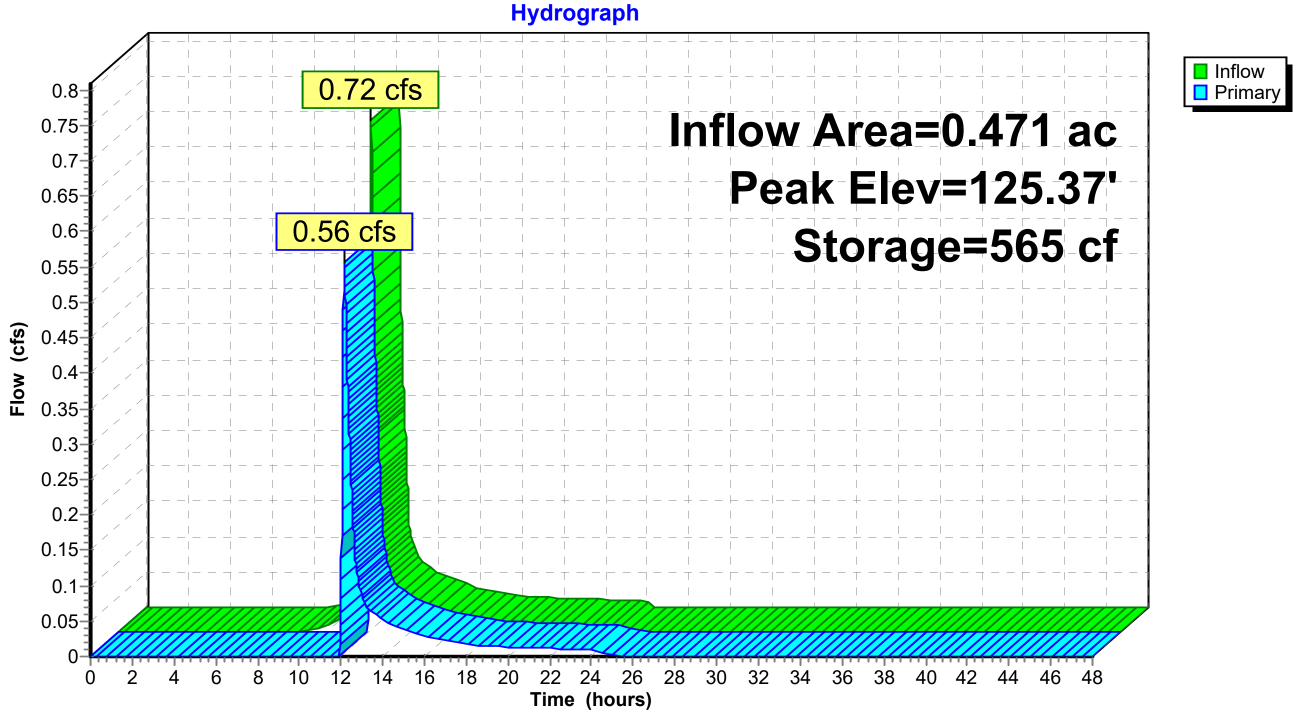
Volume	Invert	Avail.Storage	Storage Description
#1	124.00'	1,645 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
124.00	143	0	0
125.00	530	337	337
126.00	978	754	1,091
126.50	1,241	555	1,645

Device	Routing	Invert	Outlet Devices
#1	Primary	124.18'	**12.0" Round Culvert** L= 10.0' Ke= 0.500 Inlet / Outlet Invert= 124.18' / 124.13' S= 0.0050 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf
#2	Device 1	125.00'	**12.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.55 cfs @ 12.16 hrs HW=125.37' TW=123.47' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.55 cfs of 2.71 cfs potential flow)
  └─**2=Orifice/Grate** (Orifice Controls 0.55 cfs @ 2.08 fps)

Pond 3P: Conveyance Swale



Summary for Pond 11P: Permeable Pavement

Inflow Area =	0.626 ac,	95.37% Impervious,	Inflow Depth = 2.24"	for 1-Year event	
Inflow =	1.52 cfs @	12.08 hrs,	Volume=	0.117 af	
Outflow =	0.16 cfs @	11.79 hrs,	Volume=	0.117 af,	Atten= 89%, Lag= 0.0 min
Discarded =	0.16 cfs @	11.79 hrs,	Volume=	0.117 af	
Primary =	0.00 cfs @	0.00 hrs,	Volume=	0.000 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 122.91' @ 12.78 hrs Surf.Area= 25,998 sf Storage= 1,685 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 69.7 min (841.4 - 771.7)

Volume	Invert	Avail.Storage	Storage Description
#1	122.75'	8,813 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

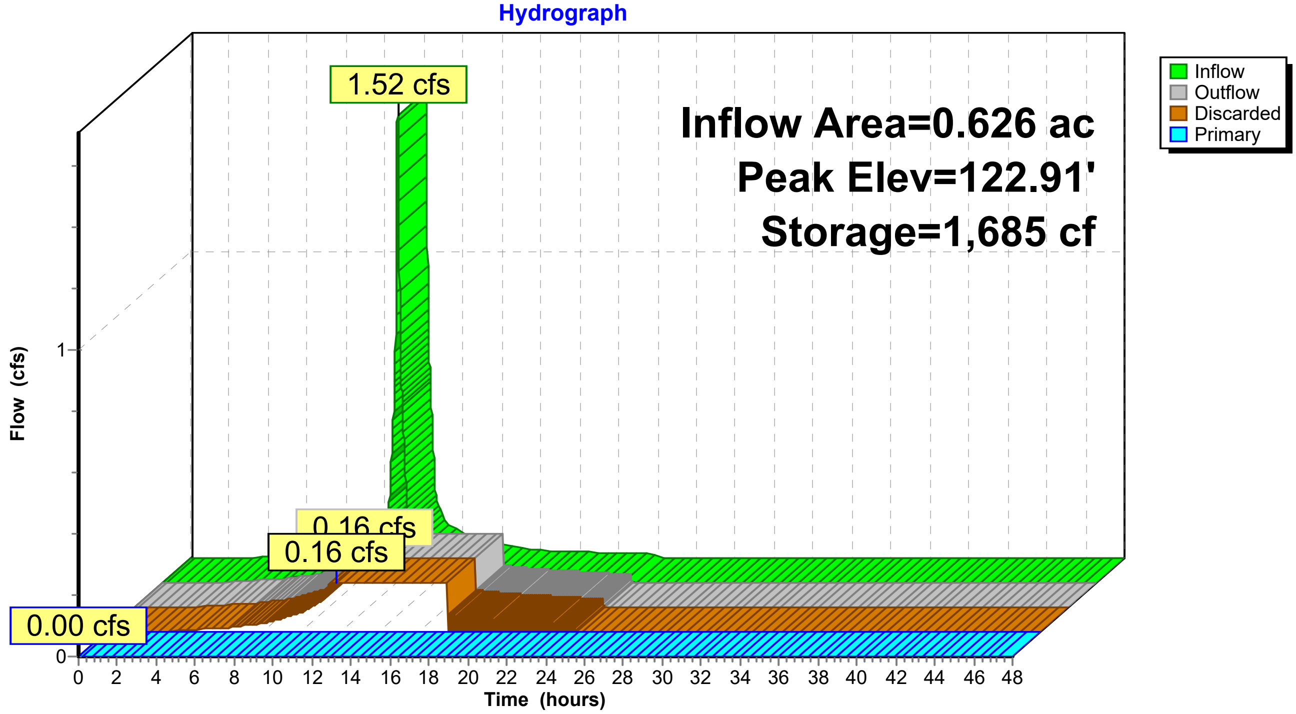
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
122.75	25,998	0.0	0	0
123.41	25,998	40.0	6,863	6,863
123.66	25,998	30.0	1,950	8,813

Device	Routing	Invert	Outlet Devices
#1	Discarded	122.75'	**0.270 in/hr Exfiltration over Surface area**
#2	Primary	123.30'	**6.0" Round Culvert** L= 10.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 123.30' / 119.00' S= 0.4300 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.20 sf

Discarded OutFlow Max=0.16 cfs @ 11.79 hrs HW=122.76' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.16 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=122.75' TW=0.00' (Dynamic Tailwater)
└─**2=Culvert** (Controls 0.00 cfs)

Pond 11P: Permeable Pavement



Summary for Pond 13P: UG-1 Retain IT(Infiltration)

Inflow Area = 1.741 ac, 78.76% Impervious, Inflow Depth = 1.80" for 1-Year event
Inflow = 3.30 cfs @ 12.09 hrs, Volume= 0.262 af
Outflow = 0.51 cfs @ 12.65 hrs, Volume= 0.262 af, Atten= 85%, Lag= 33.5 min
Discarded = 0.02 cfs @ 7.89 hrs, Volume= 0.071 af
Primary = 0.49 cfs @ 12.65 hrs, Volume= 0.191 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 124.01' @ 12.65 hrs Surf.Area= 3,440 sf Storage= 5,283 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 263.3 min (1,059.9 - 796.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	121.75'	1,791 cf	**20.00'W x 172.00'L x 4.17'H Field A** 14,333 cf Overall - 9,856 cf Embedded = 4,477 cf x 40.0% Voids
#2A	122.25'	6,948 cf	**retain_it retain_it 3.0'** x 42 Inside #1 Inside= 84.0"W x 36.0"H => 21.33 sf x 8.00'L = 170.6 cf Outside= 96.0"W x 44.0"H => 29.33 sf x 8.00'L = 234.7 cf 2 Rows adjusted for 217.2 cf perimeter wall
		8,739 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	124.75'	**3.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#2	Primary	122.50'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Discarded	121.75'	**0.270 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.02 cfs @ 7.89 hrs HW=121.79' (Free Discharge)
└─**3=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.49 cfs @ 12.65 hrs HW=124.01' TW=122.19' (Dynamic Tailwater)
├─**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
└─**2=Orifice/Grate** (Orifice Controls 0.49 cfs @ 5.57 fps)

Pond 13P: UG-1 Retain IT(Infiltration) - Chamber Wizard Field A

Chamber Model = retain_it retain_it 3.0' (retain-it®)
Inside= 84.0"W x 36.0"H => 21.33 sf x 8.00'L = 170.6 cf
Outside= 96.0"W x 44.0"H => 29.33 sf x 8.00'L = 234.7 cf
2 Rows adjusted for 217.2 cf perimeter wall

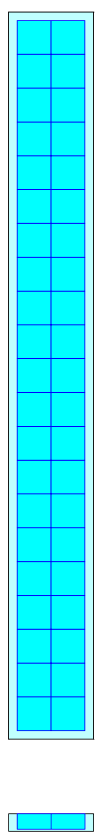
21 Chambers/Row x 8.00' Long = 168.00' Row Length +24.0" End Stone x 2 = 172.00' Base Length
2 Rows x 96.0" Wide + 24.0" Side Stone x 2 = 20.00' Base Width
6.0" Base + 44.0" Chamber Height = 4.17' Field Height

4.7 cf Sidewall x 21 x 2 + 4.7 cf Endwall x 2 x 2 = 217.2 cf Perimeter Wall
42 Chambers x 170.6 cf - 217.2 cf Perimeter wall = 6,948.5 cf Chamber Storage
42 Chambers x 234.7 cf = 9,856.0 cf Displacement

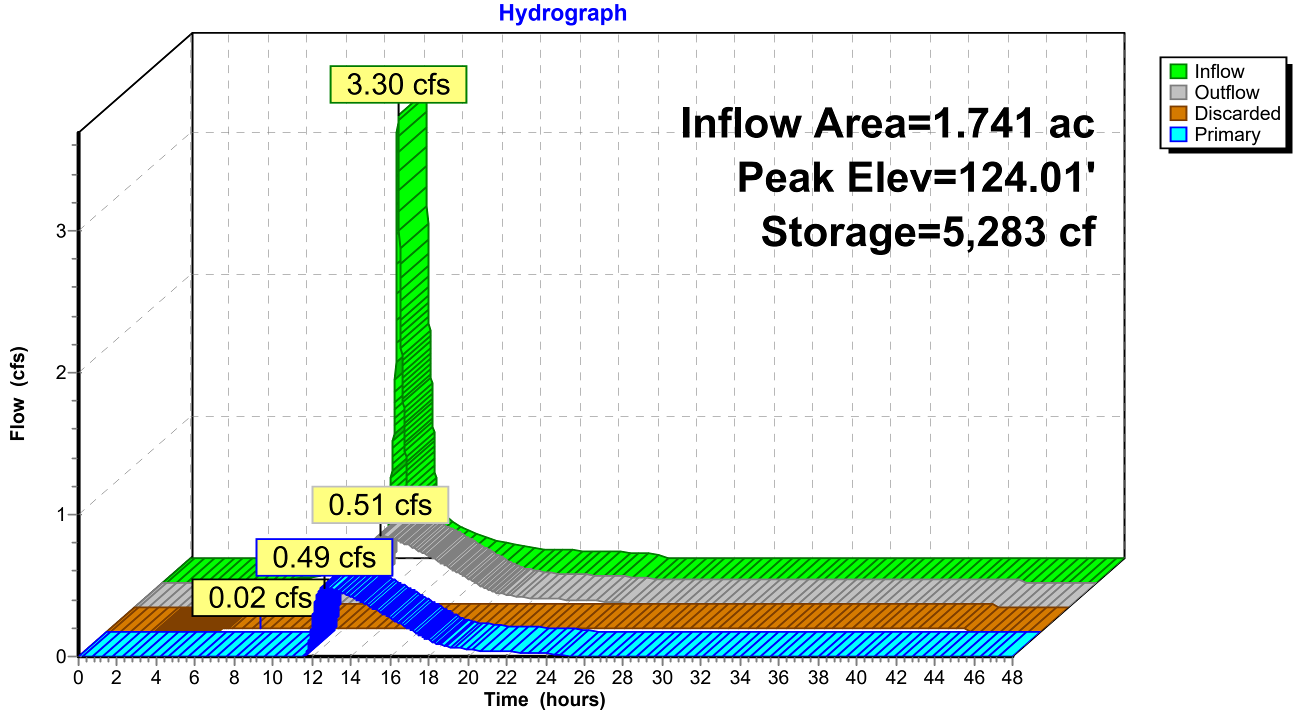
14,333.3 cf Field - 9,856.0 cf Chambers = 4,477.3 cf Stone x 40.0% Voids = 1,790.9 cf Stone Storage

Chamber Storage + Stone Storage = 8,739.4 cf = 0.201 af
Overall Storage Efficiency = 61.0%
Overall System Size = 172.00' x 20.00' x 4.17'

42 Chambers
530.9 cy Field
165.8 cy Stone



Pond 13P: UG-1 Retain IT(Infiltration)



Summary for Pond 16P: UG-2 Retain IT (Detention)

Inflow Area = 1.741 ac, 78.76% Impervious, Inflow Depth = 1.32" for 1-Year event
Inflow = 0.49 cfs @ 12.65 hrs, Volume= 0.191 af
Outflow = 0.37 cfs @ 14.79 hrs, Volume= 0.189 af, Atten= 25%, Lag= 128.1 min
Primary = 0.37 cfs @ 14.79 hrs, Volume= 0.189 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 122.40' @ 14.79 hrs Surf.Area= 6,512 sf Storage= 2,152 cf

Plug-Flow detention time= 136.7 min calculated for 0.189 af (99% of inflow)
Center-of-Mass det. time= 130.8 min (1,043.4 - 912.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	122.00'	1,103 cf	**44.00'W x 148.00'L x 3.67'H Field A**
			23,877 cf Overall - 21,120 cf Embedded = 2,757 cf x 40.0% Voids
#2A	122.00'	15,138 cf	**retain_it retain_it 3.0'** x 90 Inside #1
			Inside= 84.0"W x 36.0"H => 21.33 sf x 8.00'L = 170.6 cf
			Outside= 96.0"W x 44.0"H => 29.33 sf x 8.00'L = 234.7 cf
			5 Rows adjusted for 217.2 cf perimeter wall
		16,241 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	121.50'	**12.0" Round Culvert**
			L= 10.0' CPP, square edge headwall, Ke= 0.500
			Inlet / Outlet Invert= 121.50' / 121.40' S= 0.0100 '/' Cc= 0.900
			n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf
#2	Device 1	124.70'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00
			Coef. (English) 2.80 2.92 3.08 3.30 3.32
#3	Device 1	122.00'	**6.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.37 cfs @ 14.79 hrs HW=122.40' TW=0.00' (Dynamic Tailwater)
1=Culvert (Passes 0.37 cfs of 2.02 cfs potential flow)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)
3=Orifice/Grate (Orifice Controls 0.37 cfs @ 2.16 fps)

Pond 16P: UG-2 Retain IT (Detention) - Chamber Wizard Field A

Chamber Model = retain_it retain_it 3.0' (retain-it®)
Inside= 84.0"W x 36.0"H => 21.33 sf x 8.00'L = 170.6 cf
Outside= 96.0"W x 44.0"H => 29.33 sf x 8.00'L = 234.7 cf
5 Rows adjusted for 217.2 cf perimeter wall

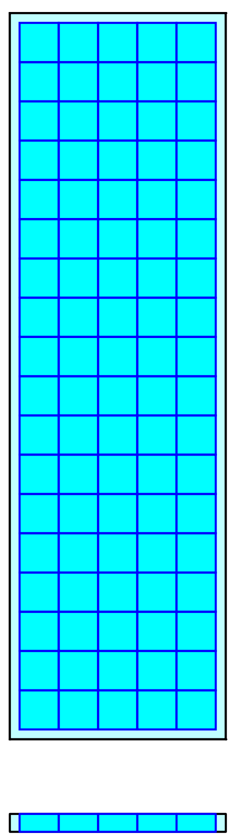
18 Chambers/Row x 8.00' Long = 144.00' Row Length +24.0" End Stone x 2 = 148.00' Base Length
5 Rows x 96.0" Wide + 24.0" Side Stone x 2 = 44.00' Base Width
44.0" Chamber Height = 3.67' Field Height

4.7 cf Sidewall x 18 x 2 + 4.7 cf Endwall x 5 x 2 = 217.2 cf Perimeter Wall
90 Chambers x 170.6 cf - 217.2 cf Perimeter wall = 15,137.8 cf Chamber Storage
90 Chambers x 234.7 cf = 21,120.0 cf Displacement

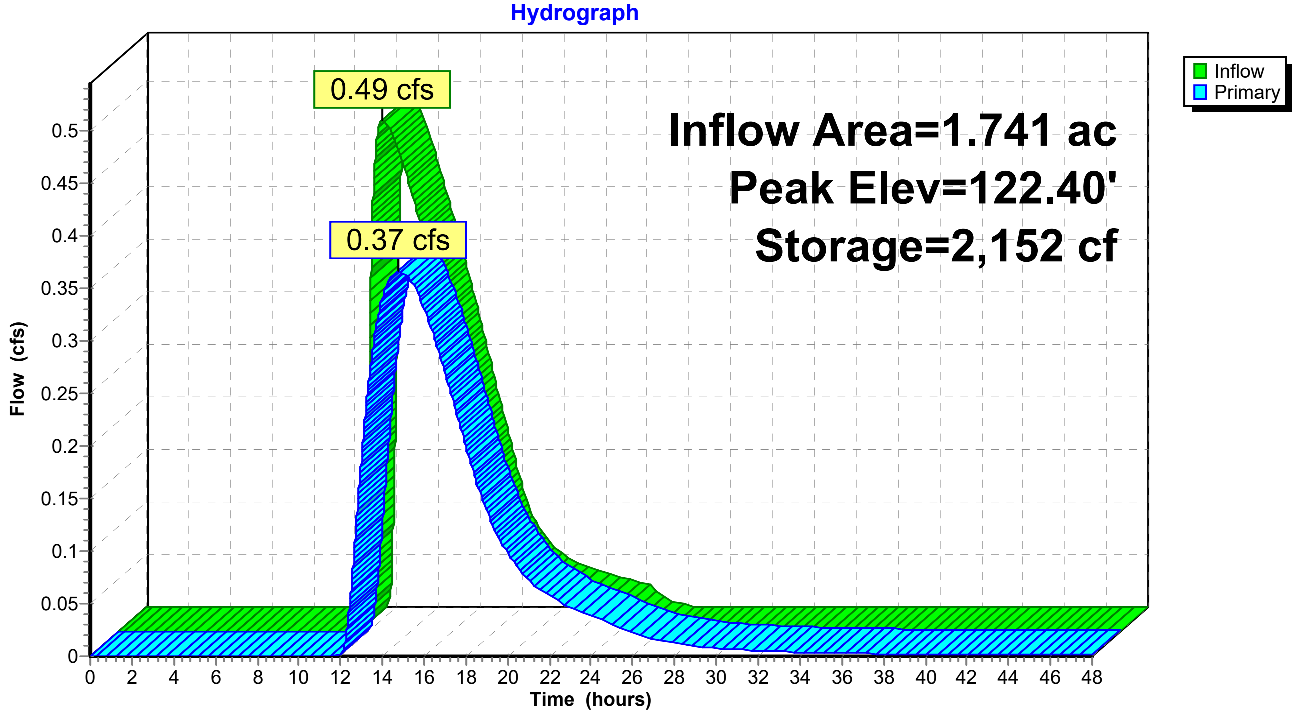
23,877.3 cf Field - 21,120.0 cf Chambers = 2,757.3 cf Stone x 40.0% Voids = 1,102.9 cf Stone Storage

Chamber Storage + Stone Storage = 16,240.7 cf = 0.373 af
Overall Storage Efficiency = 68.0%
Overall System Size = 148.00' x 44.00' x 3.67'

90 Chambers
884.3 cy Field
102.1 cy Stone



Pond 16P: UG-2 Retain IT (Detention)



Summary for Subcatchment P-1A: Undetained to Wetland B

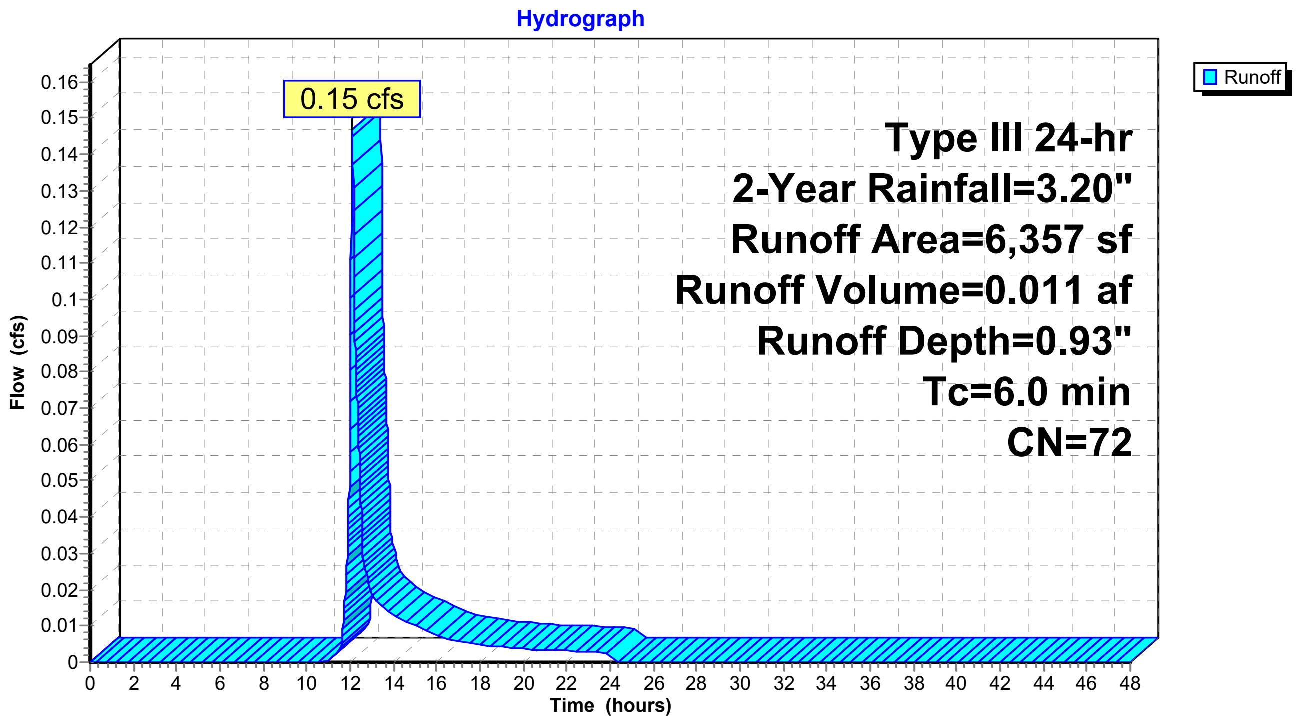
Runoff = 0.15 cfs @ 12.10 hrs, Volume= 0.011 af, Depth= 0.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.20"

Area (sf)	CN	Description
6,357	72	Woods/grass comb., Good, HSG C
6,357		100.00% Pervious Area

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

Subcatchment P-1A: Undetained to Wetland B



Summary for Subcatchment P-1B: Western Driveway

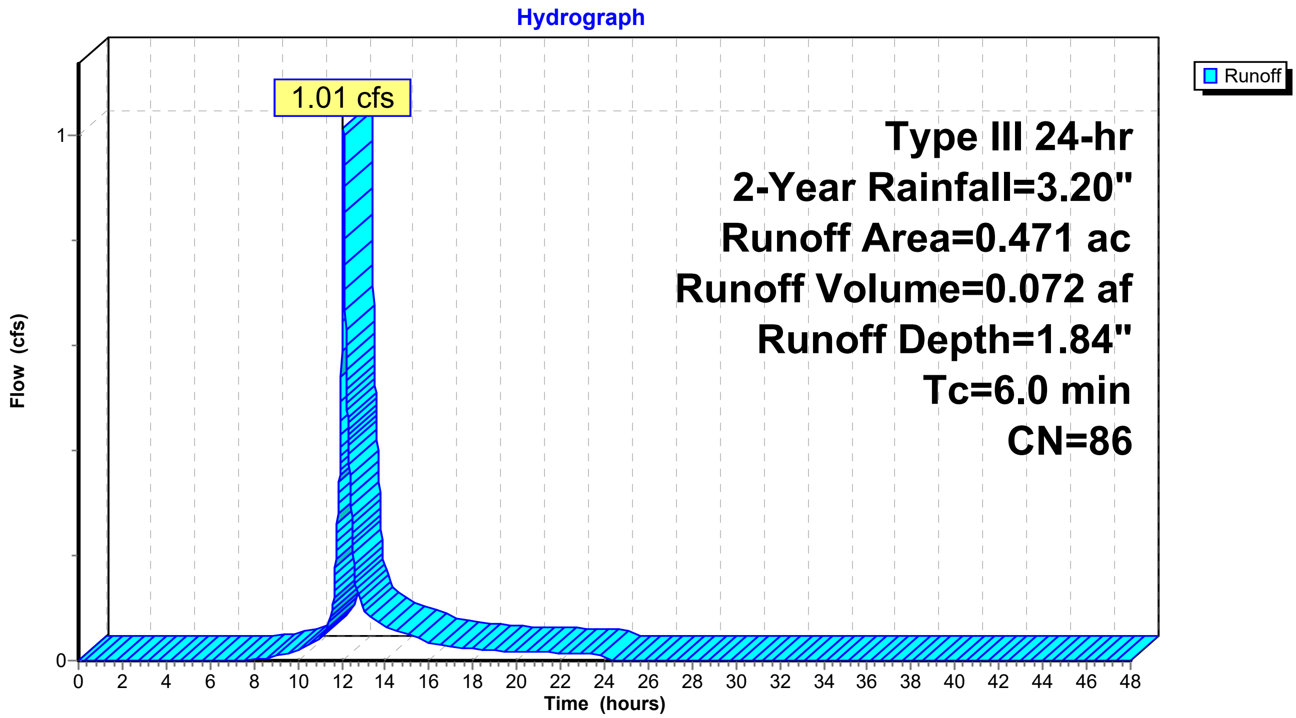
Runoff = 1.01 cfs @ 12.09 hrs, Volume= 0.072 af, Depth= 1.84"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.20"

Area (ac)	CN	Description
0.248	98	Paved parking, HSG C
0.223	72	Woods/grass comb., Good, HSG C
0.471	86	Weighted Average
0.223		47.35% Pervious Area
0.248		52.65% Impervious Area

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

Subcatchment P-1B: Western Driveway



Summary for Subcatchment P-1C: Permeable Pavement

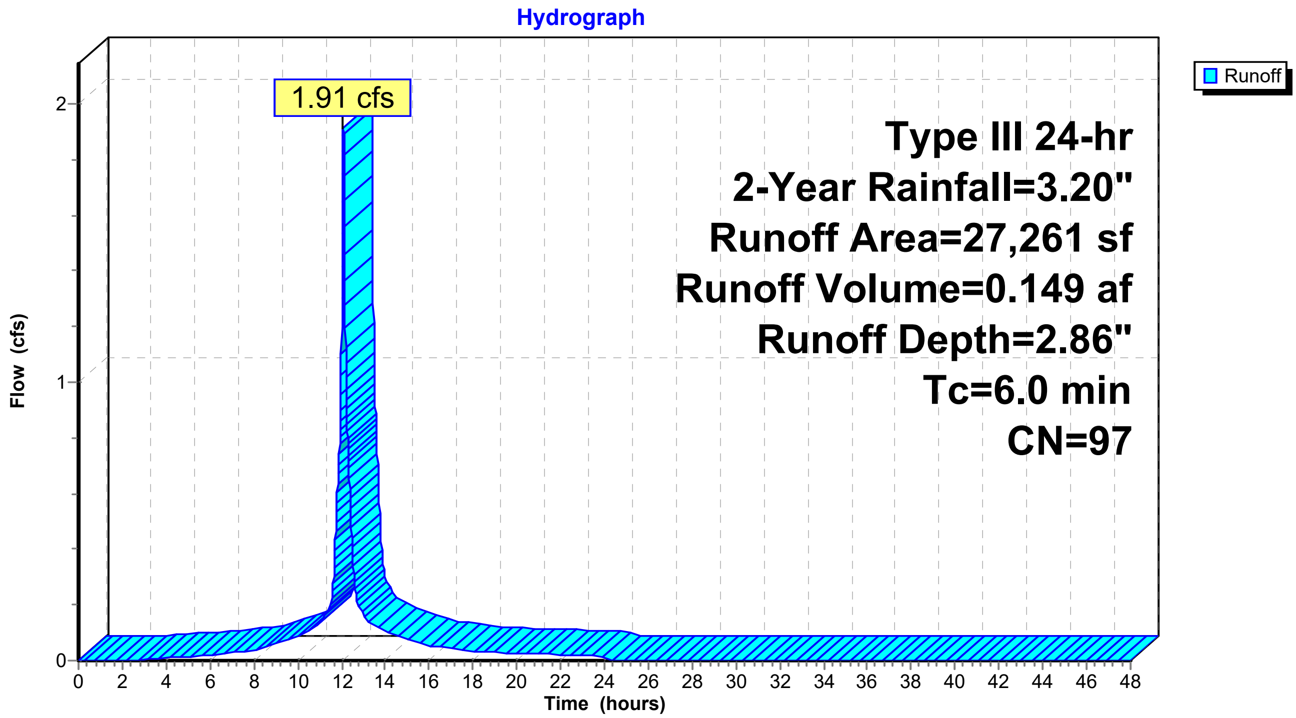
Runoff = 1.91 cfs @ 12.08 hrs, Volume= 0.149 af, Depth= 2.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.20"

	Area (sf)	CN	Description
*	25,998	98	Permeable Pavement
	1,263	74	>75% Grass cover, Good, HSG C
	27,261	97	Weighted Average
	1,263		4.63% Pervious Area
	25,998		95.37% Impervious Area

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

Subcatchment P-1C: Permeable Pavement



Summary for Subcatchment P-2: Undetained to Wetland

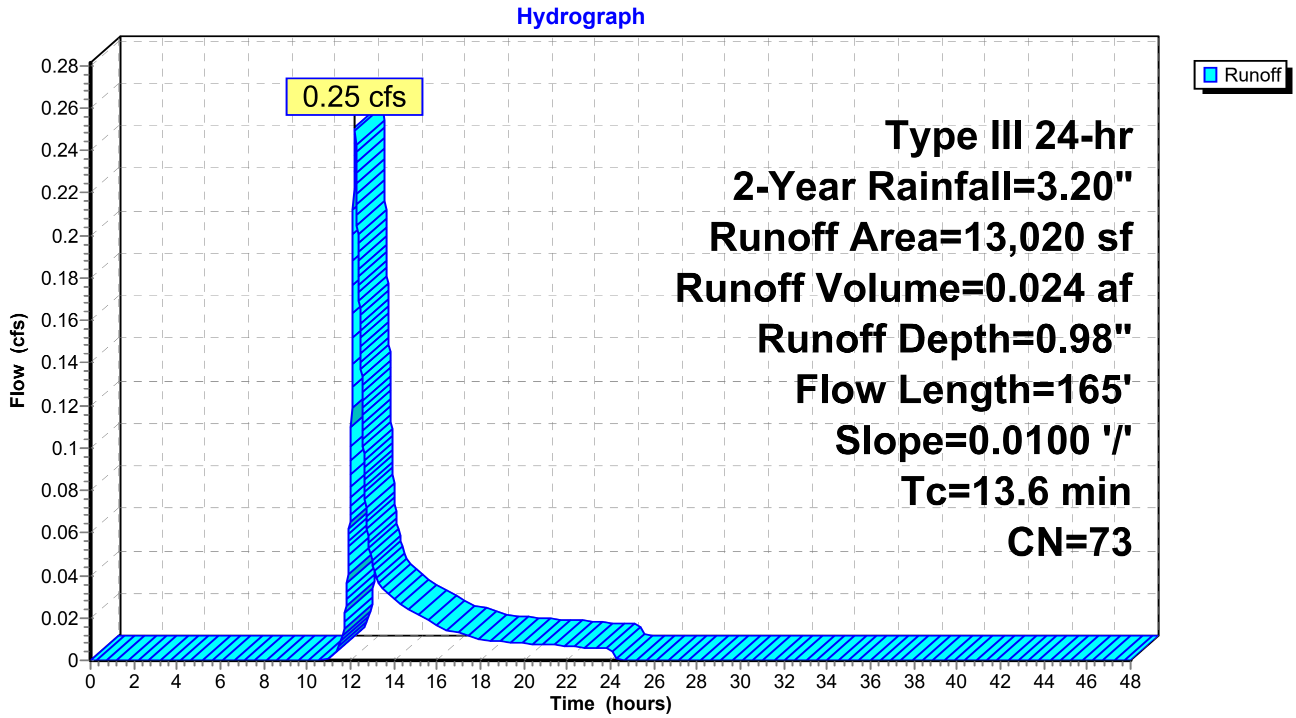
Runoff = 0.25 cfs @ 12.20 hrs, Volume= 0.024 af, Depth= 0.98"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.20"

Area (sf)	CN	Description
10,967	74	>75% Grass cover, Good, HSG C
2,053	70	Woods, Good, HSG C
13,020	73	Weighted Average
13,020		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	100	0.0100	0.13		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
0.7	65	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
13.6	165	Total			

Subcatchment P-2: Undetained to Wetland



Summary for Subcatchment P-3A: Additions and Upper Pavement

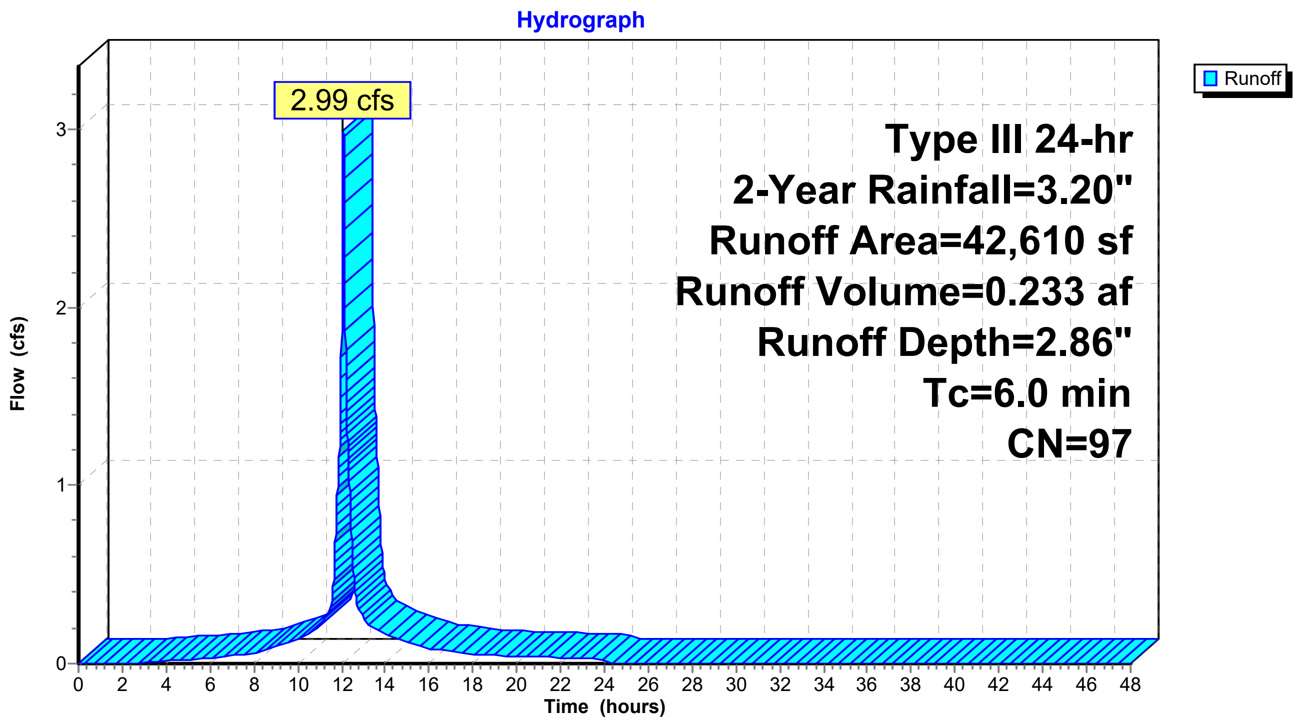
Runoff = 2.99 cfs @ 12.08 hrs, Volume= 0.233 af, Depth= 2.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.20"

Area (sf)	CN	Description
26,741	98	Paved parking, HSG C
1,277	74	>75% Grass cover, Good, HSG C
14,592	98	Roofs, HSG C
42,610	97	Weighted Average
1,277		3.00% Pervious Area
41,333		97.00% Impervious Area

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

Subcatchment P-3A: Additions and Upper Pavement



Summary for Subcatchment P-3B: Existing Building Draining to Constructed Wetland

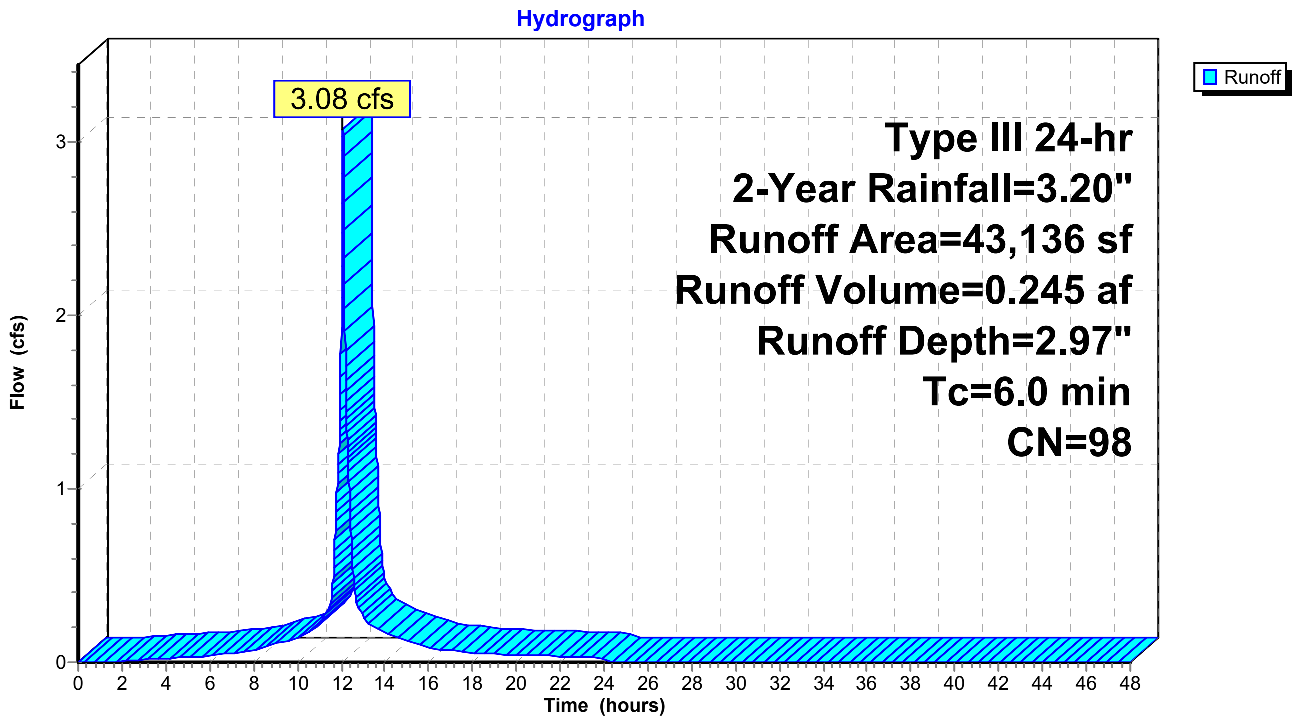
Runoff = 3.08 cfs @ 12.08 hrs, Volume= 0.245 af, Depth= 2.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.20"

Area (sf)	CN	Description
43,136	98	Roofs, HSG C
43,136		100.00% Impervious Area

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

Subcatchment P-3B: Existing Building Draining to Constructed Wetland



Summary for Subcatchment P-4: Watershed to Existing Stormwater System

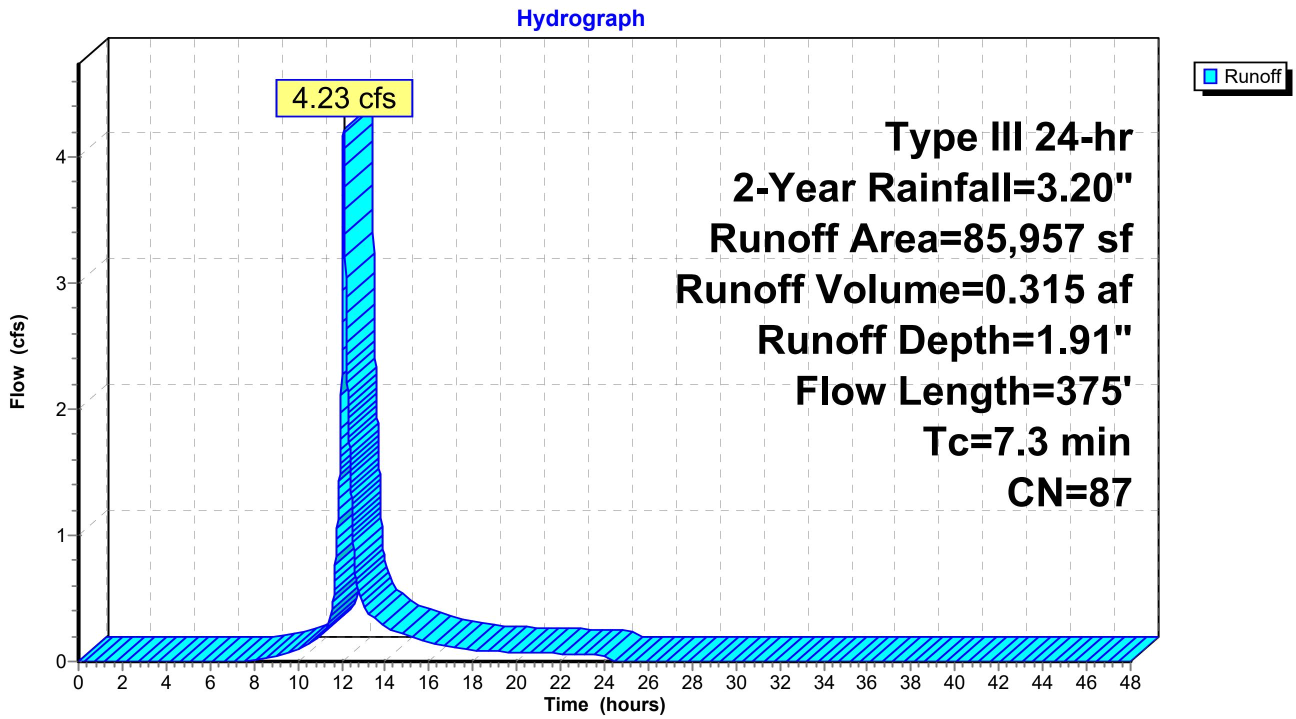
Runoff = 4.23 cfs @ 12.11 hrs, Volume= 0.315 af, Depth= 1.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.20"

Area (sf)	CN	Description
46,374	98	Paved parking, HSG C
37,535	74	>75% Grass cover, Good, HSG C
2,048	70	Woods, Good, HSG C
85,957	87	Weighted Average
39,583		46.05% Pervious Area
46,374		53.95% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.2	50	0.0240	0.16		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
1.7	245	0.0220	2.39		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.4	80	0.0287	3.44		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
7.3	375	Total			

Subcatchment P-4: Watershed to Existing Stormwater System



Summary for Subcatchment P-4A: Watershed to MassDOT CB1

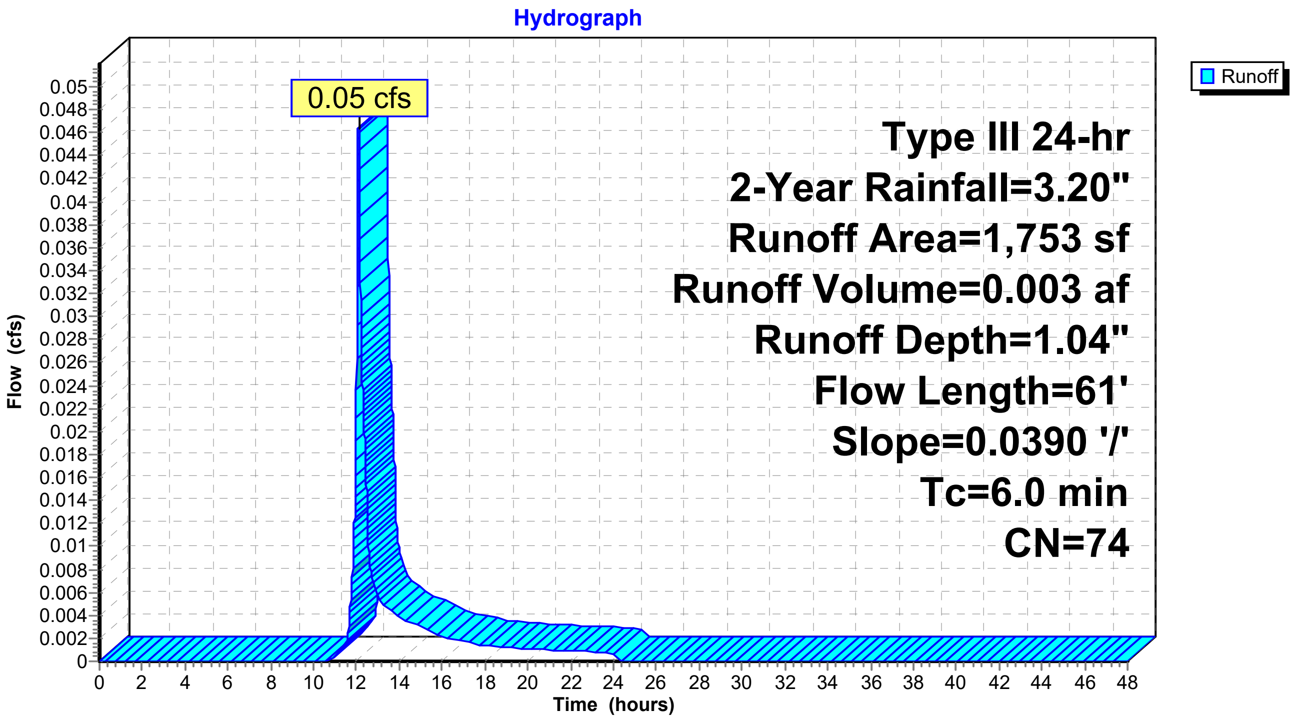
Runoff = 0.05 cfs @ 12.10 hrs, Volume= 0.003 af, Depth= 1.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.20"

Area (sf)	CN	Description
1,753	74	>75% Grass cover, Good, HSG C
1,753		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.1	61	0.0390	0.20		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
0.9					**Direct Entry,**
6.0	61	Total			

Subcatchment P-4A: Watershed to MassDOT CB1



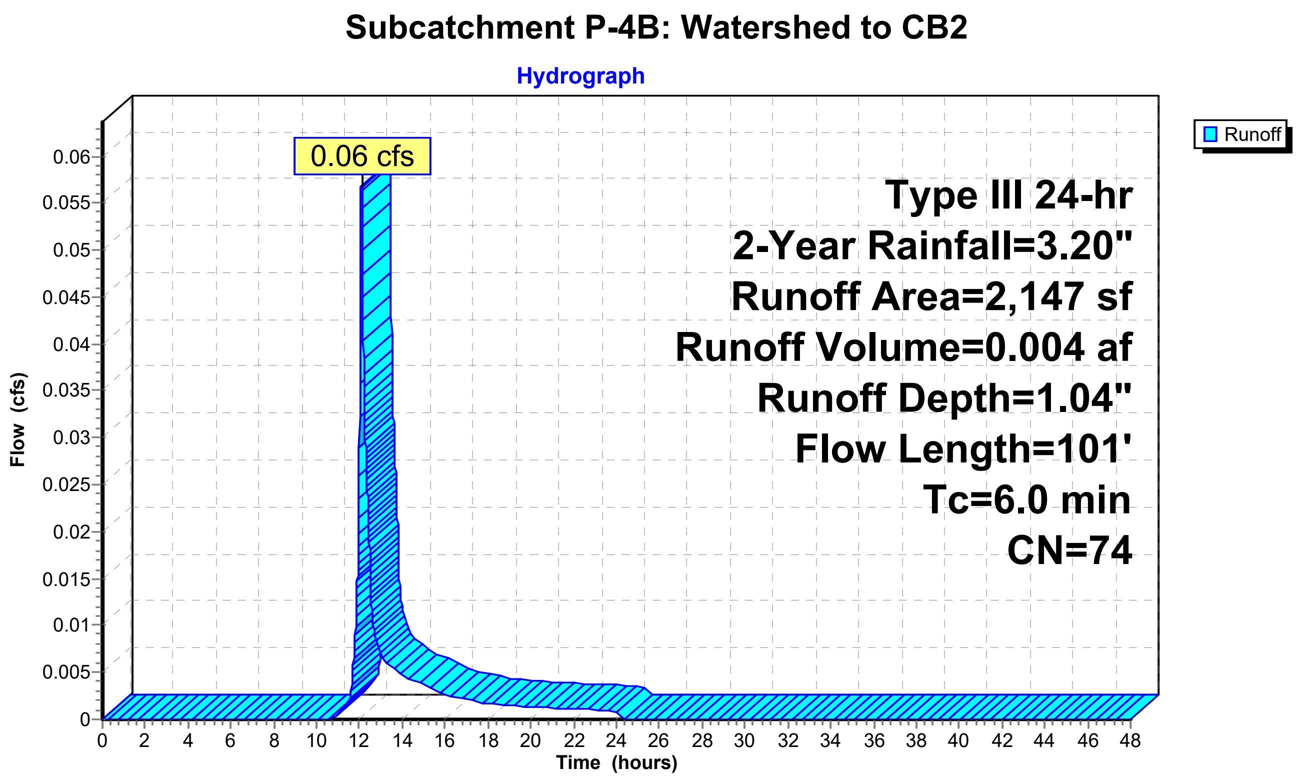
Summary for Subcatchment P-4B: Watershed to CB2

Runoff = 0.06 cfs @ 12.10 hrs, Volume= 0.004 af, Depth= 1.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.20"

Area (sf)	CN	Description
2,147	74	>75% Grass cover, Good, HSG C
2,147		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	50	0.0200	0.15		**Sheet Flow, SHeet Flow** Grass: Short n= 0.150 P2= 3.20"
0.3	51	0.0390	3.18		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.1					**Direct Entry, Miniumum**
6.0	101	Total			



Summary for Subcatchment P-5: P-5

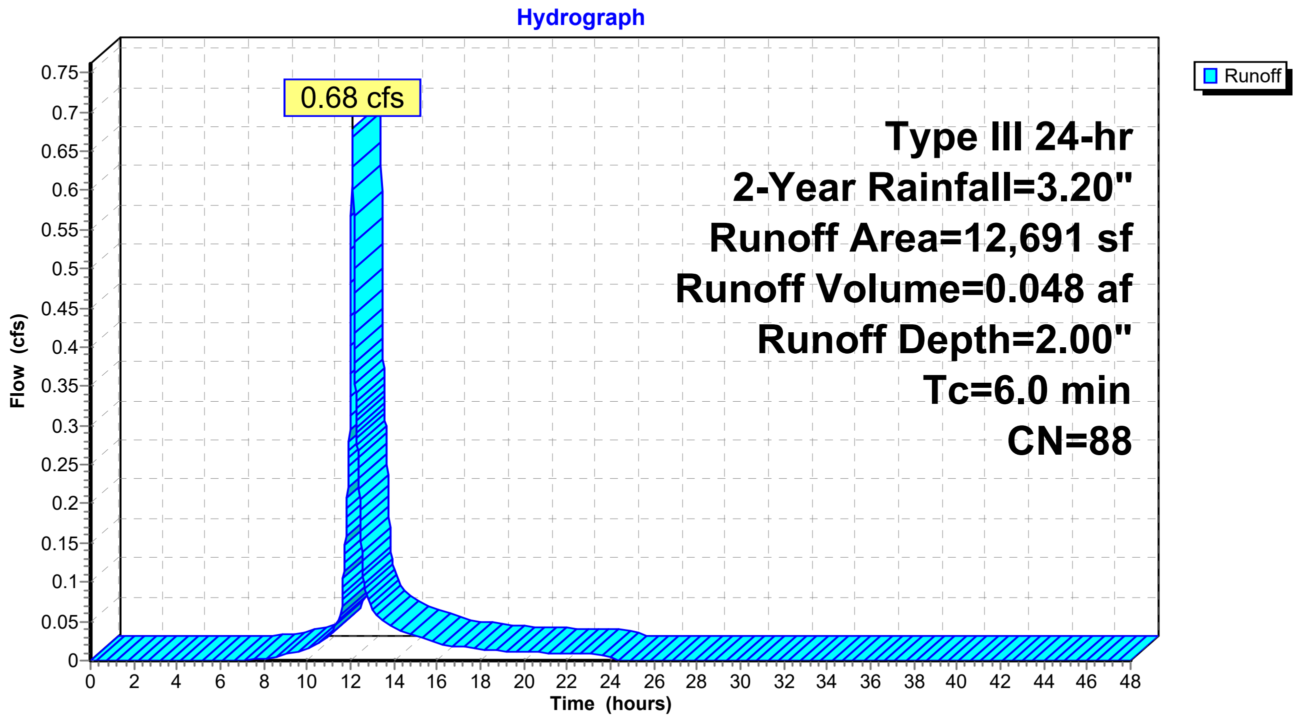
Runoff = 0.68 cfs @ 12.09 hrs, Volume= 0.048 af, Depth= 2.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.20"

Area (sf)	CN	Description
5,116	74	>75% Grass cover, Good, HSG C
7,575	98	Paved parking, HSG C
12,691	88	Weighted Average
5,116		40.31% Pervious Area
7,575		59.69% Impervious Area

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

Subcatchment P-5: P-5

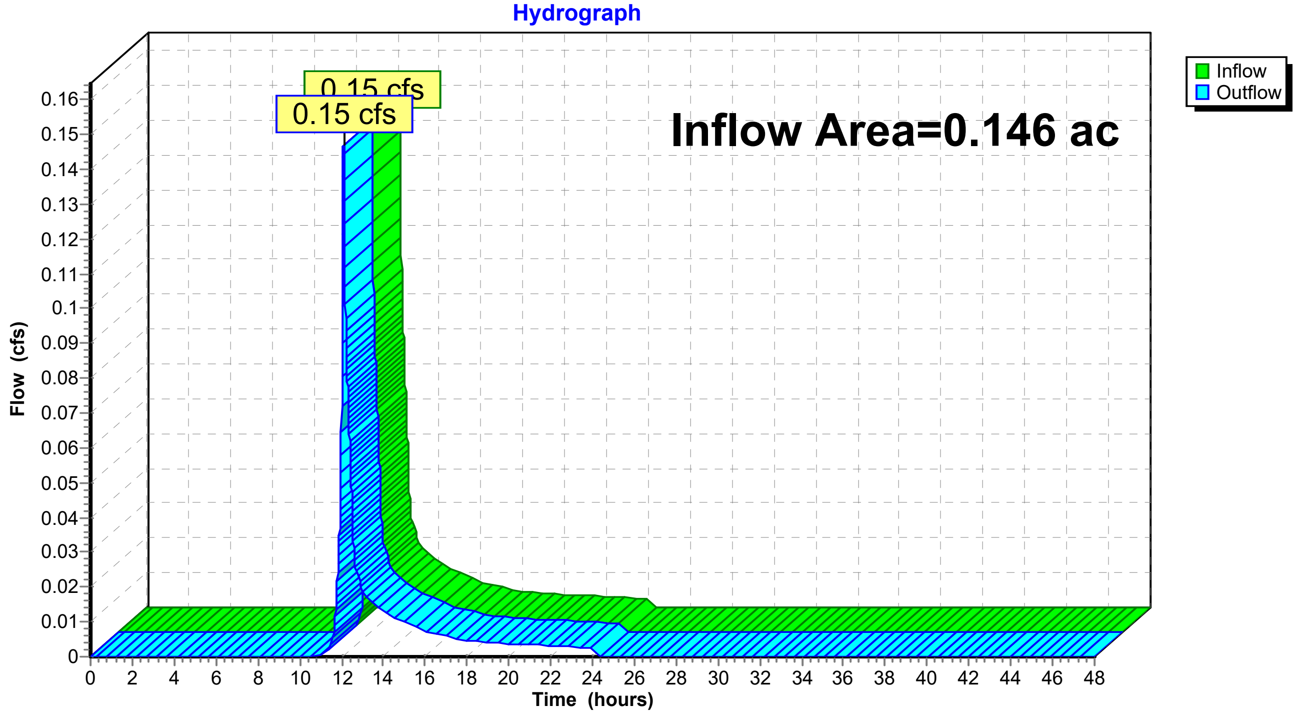


Summary for Reach DP-1: Design Point 1 (Wetland B)

Inflow Area = 0.146 ac, 0.00% Impervious, Inflow Depth = 0.93" for 2-Year event
Inflow = 0.15 cfs @ 12.10 hrs, Volume= 0.011 af
Outflow = 0.15 cfs @ 12.10 hrs, Volume= 0.011 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Reach DP-1: Design Point 1 (Wetland B)

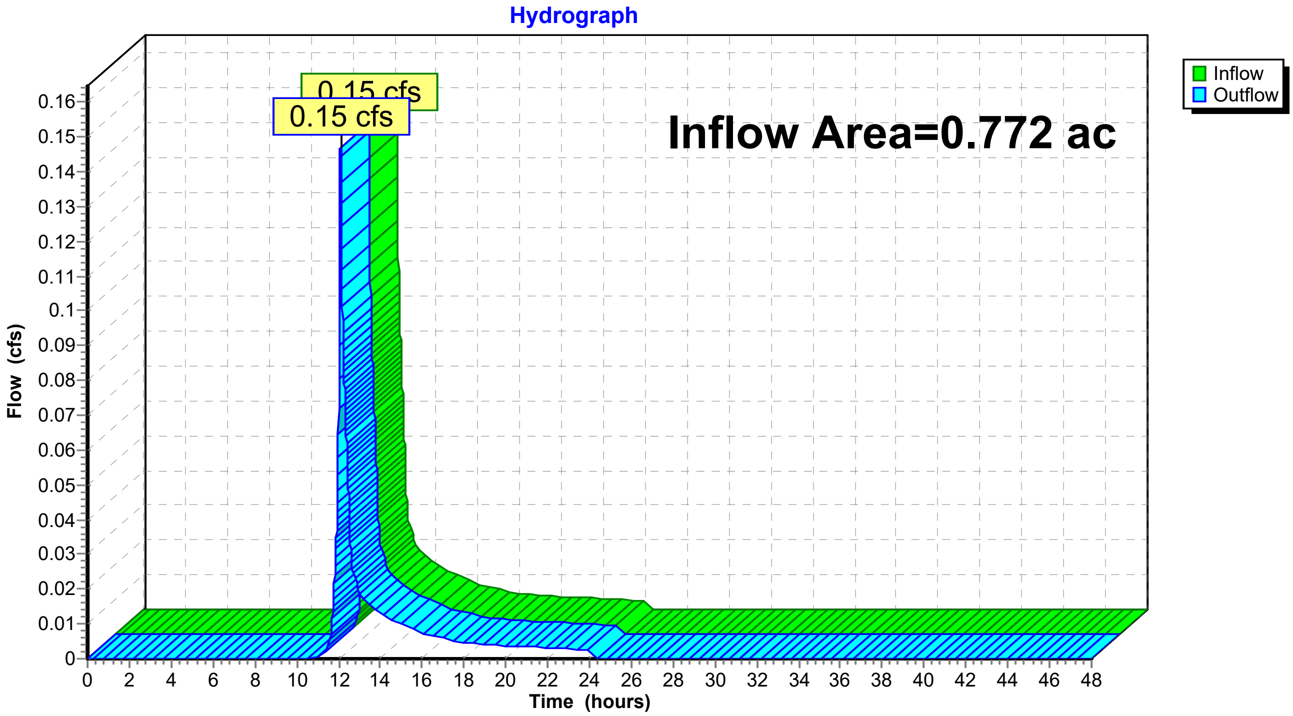


Summary for Reach DP-2: Design Point 2 (15" RCP to Wetland A)

Inflow Area = 0.772 ac, 77.33% Impervious, Inflow Depth = 0.18" for 2-Year event
Inflow = 0.15 cfs @ 12.10 hrs, Volume= 0.011 af
Outflow = 0.15 cfs @ 12.10 hrs, Volume= 0.011 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Reach DP-2: Design Point 2 (15" RCP to Wetland A)

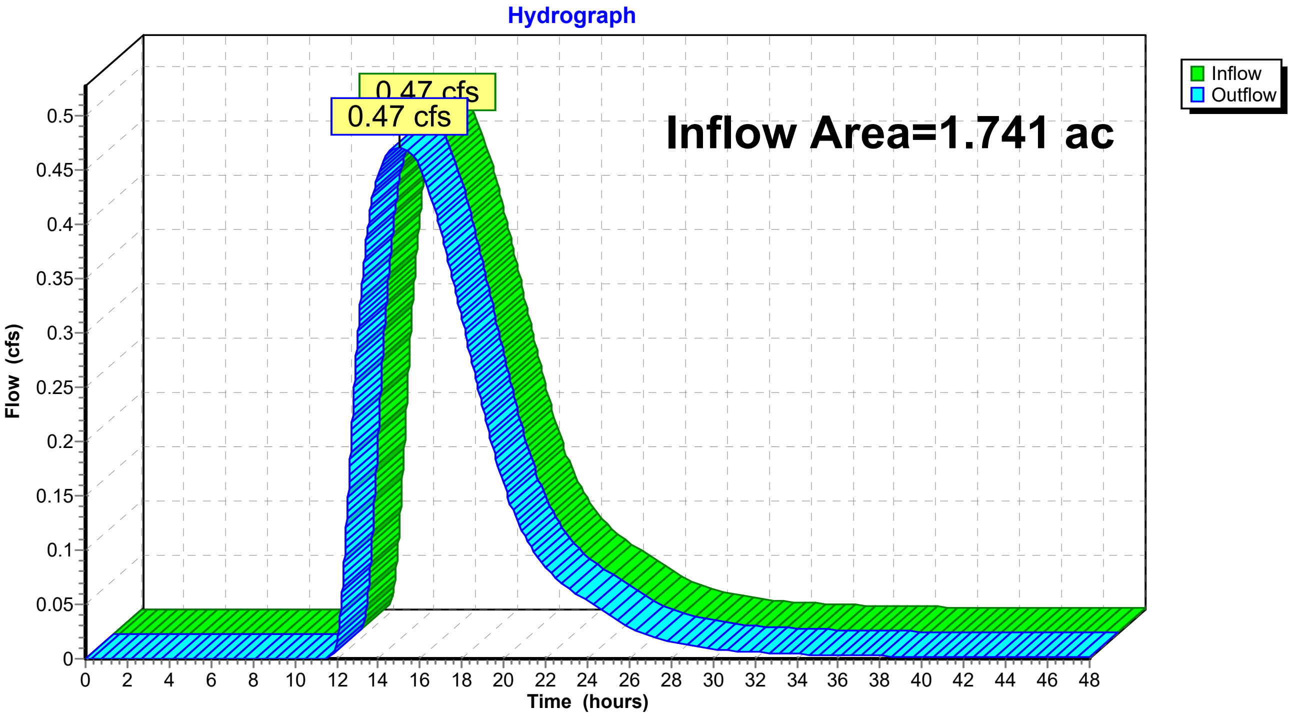


Summary for Reach DP-3: Design Point 3 (Existing Drainage Ditch)

Inflow Area = 1.741 ac, 78.76% Impervious, Inflow Depth > 1.87" for 2-Year event
Inflow = 0.47 cfs @ 14.98 hrs, Volume= 0.271 af
Outflow = 0.47 cfs @ 14.98 hrs, Volume= 0.271 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Reach DP-3: Design Point 3 (Existing Drainage Ditch)

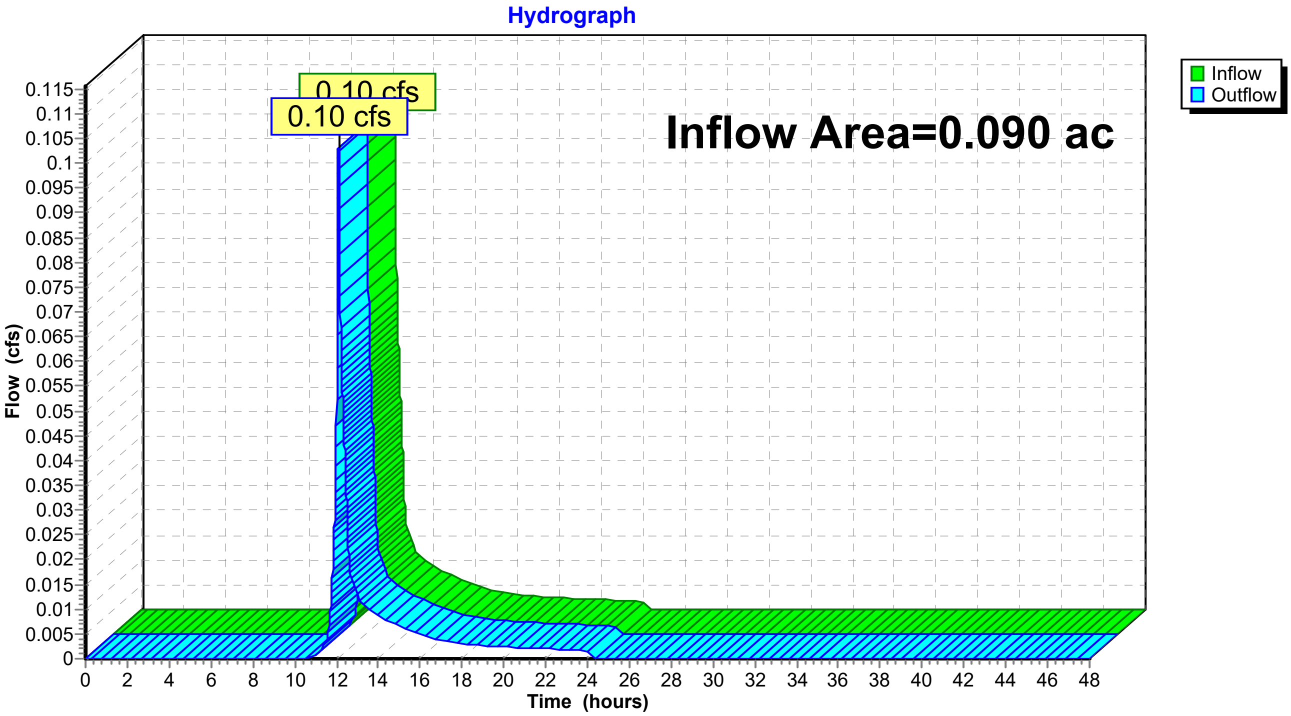


Summary for Reach DP-4: Design Point 4 (MassDOT 30" CB-2)

Inflow Area =	0.090 ac,	0.00% Impervious, Inflow Depth =	1.04"	for 2-Year event
Inflow =	0.10 cfs @	12.10 hrs, Volume=	0.008 af	
Outflow =	0.10 cfs @	12.10 hrs, Volume=	0.008 af,	Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Reach DP-4: Design Point 4 (MassDOT 30" CB-2)

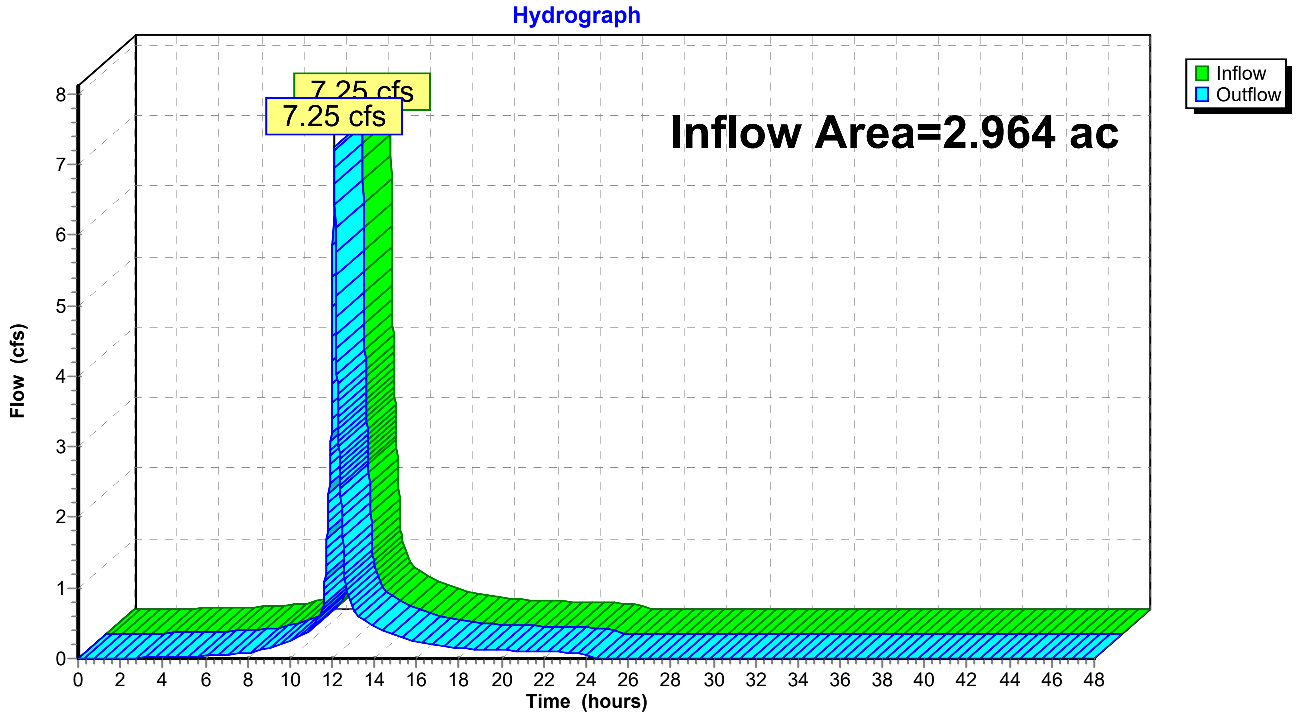


Summary for Reach DP-5: Design Point 5 (Existing Constructed Stormwater Wetland)

Inflow Area = 2.964 ac, 69.34% Impervious, Inflow Depth = 2.27" for 2-Year event
Inflow = 7.25 cfs @ 12.09 hrs, Volume= 0.560 af
Outflow = 7.25 cfs @ 12.09 hrs, Volume= 0.560 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

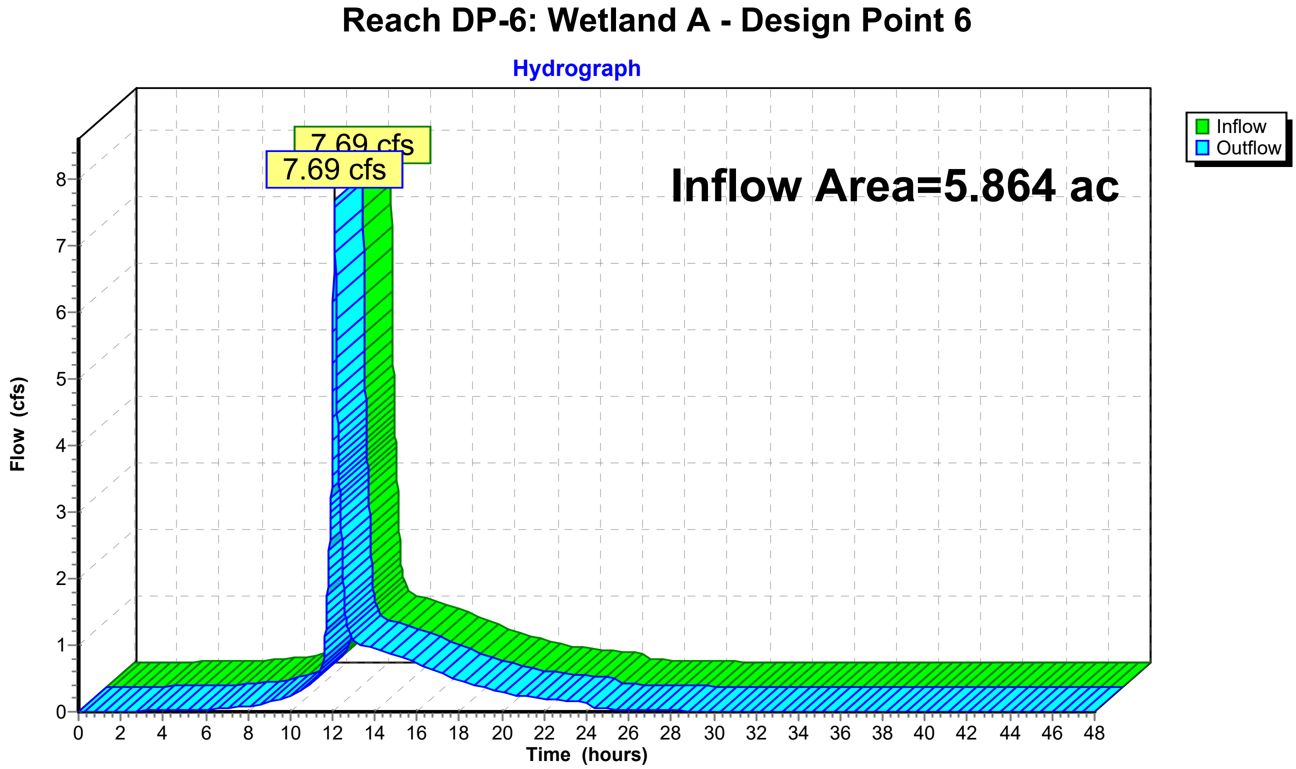
Reach DP-5: Design Point 5 (Existing Constructed Stormwater Wetland)



Summary for Reach DP-6: Wetland A - Design Point 6

Inflow Area = 5.864 ac, 68.59% Impervious, Inflow Depth > 1.79" for 2-Year event
Inflow = 7.69 cfs @ 12.10 hrs, Volume= 0.874 af
Outflow = 7.69 cfs @ 12.10 hrs, Volume= 0.874 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs



Summary for Pond 3P: Conveyance Swale

Inflow Area = 0.471 ac, 52.65% Impervious, Inflow Depth = 1.84" for 2-Year event
Inflow = 1.01 cfs @ 12.09 hrs, Volume= 0.072 af
Outflow = 0.86 cfs @ 12.14 hrs, Volume= 0.064 af, Atten= 16%, Lag= 3.1 min
Primary = 0.86 cfs @ 12.14 hrs, Volume= 0.064 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 125.47' @ 12.14 hrs Surf.Area= 742 sf Storage= 637 cf

Plug-Flow detention time= 88.4 min calculated for 0.064 af (89% of inflow)
Center-of-Mass det. time= 37.0 min (859.6 - 822.5)

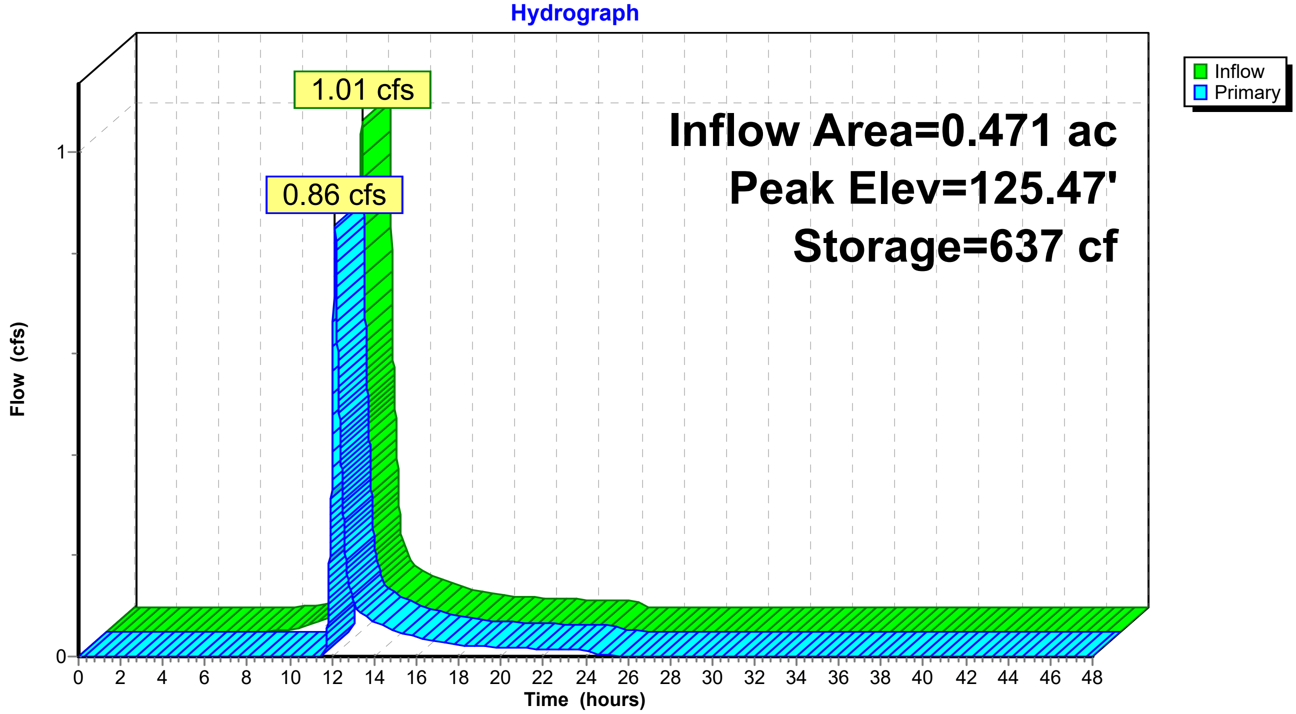
Volume	Invert	Avail.Storage	Storage Description
#1	124.00'	1,645 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
124.00	143	0	0
125.00	530	337	337
126.00	978	754	1,091
126.50	1,241	555	1,645

Device	Routing	Invert	Outlet Devices
#1	Primary	124.18'	**12.0" Round Culvert** L= 10.0' Ke= 0.500 Inlet / Outlet Invert= 124.18' / 124.13' S= 0.0050 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf
#2	Device 1	125.00'	**12.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.85 cfs @ 12.14 hrs HW=125.47' TW=123.94' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.85 cfs of 2.93 cfs potential flow)
  └─**2=Orifice/Grate** (Orifice Controls 0.85 cfs @ 2.34 fps)

Pond 3P: Conveyance Swale



Summary for Pond 11P: Permeable Pavement

Inflow Area = 0.626 ac, 95.37% Impervious, Inflow Depth = 2.86" for 2-Year event
Inflow = 1.91 cfs @ 12.08 hrs, Volume= 0.149 af
Outflow = 0.16 cfs @ 11.71 hrs, Volume= 0.149 af, Atten= 92%, Lag= 0.0 min
Discarded = 0.16 cfs @ 11.71 hrs, Volume= 0.149 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 122.98' @ 13.00 hrs Surf.Area= 25,998 sf Storage= 2,349 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 104.1 min (870.2 - 766.0)

Volume	Invert	Avail.Storage	Storage Description
#1	122.75'	8,813 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

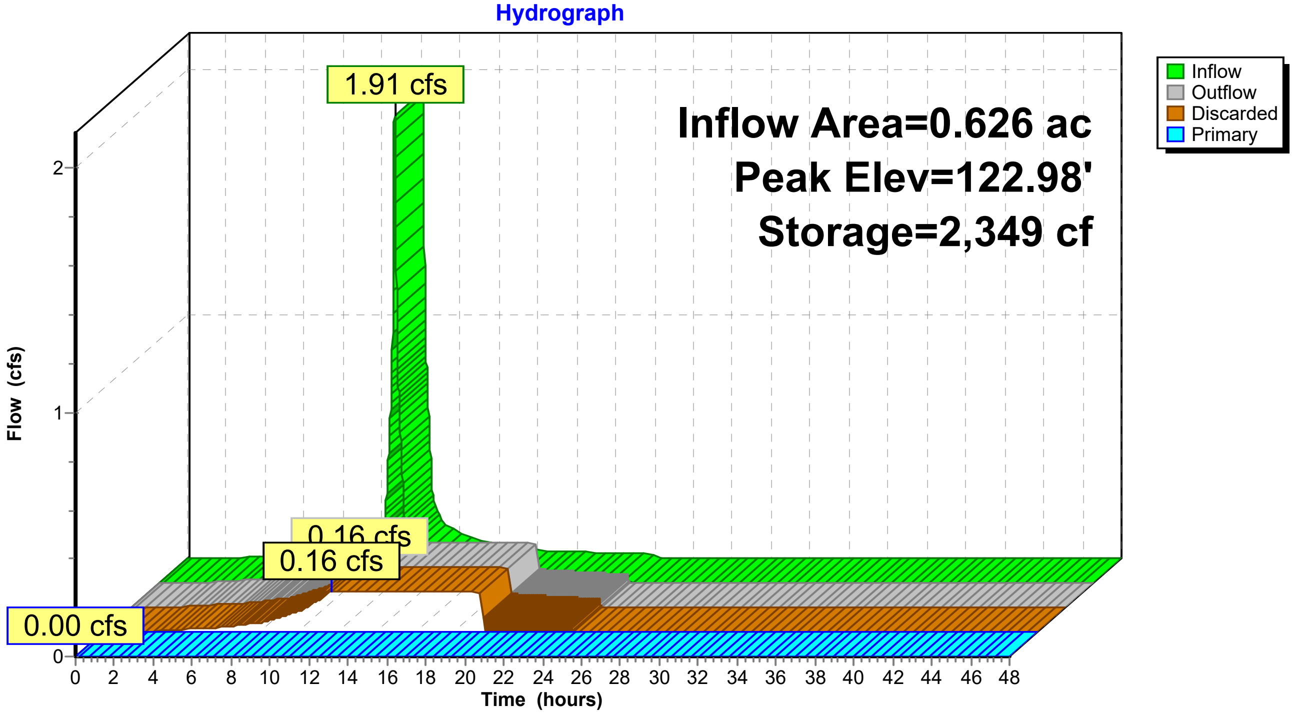
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
122.75	25,998	0.0	0	0
123.41	25,998	40.0	6,863	6,863
123.66	25,998	30.0	1,950	8,813

Device	Routing	Invert	Outlet Devices
#1	Discarded	122.75'	**0.270 in/hr Exfiltration over Surface area**
#2	Primary	123.30'	**6.0" Round Culvert** L= 10.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 123.30' / 119.00' S= 0.4300 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.20 sf

Discarded OutFlow Max=0.16 cfs @ 11.71 hrs HW=122.76' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.16 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=122.75' TW=0.00' (Dynamic Tailwater)
└─**2=Culvert** (Controls 0.00 cfs)

Pond 11P: Permeable Pavement



Summary for Pond 13P: UG-1 Retain IT(Infiltration)

Inflow Area = 1.741 ac, 78.76% Impervious, Inflow Depth = 2.38" for 2-Year event
Inflow = 4.42 cfs @ 12.09 hrs, Volume= 0.346 af
Outflow = 0.62 cfs @ 12.67 hrs, Volume= 0.346 af, Atten= 86%, Lag= 35.0 min
Discarded = 0.02 cfs @ 6.94 hrs, Volume= 0.073 af
Primary = 0.60 cfs @ 12.67 hrs, Volume= 0.273 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 124.72' @ 12.67 hrs Surf.Area= 3,440 sf Storage= 7,158 cf

Plug-Flow detention time= 243.0 min calculated for 0.346 af (100% of inflow)
Center-of-Mass det. time= 243.2 min (1,033.5 - 790.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	121.75'	1,791 cf	**20.00'W x 172.00'L x 4.17'H Field A** 14,333 cf Overall - 9,856 cf Embedded = 4,477 cf x 40.0% Voids
#2A	122.25'	6,948 cf	**retain_it retain_it 3.0'** x 42 Inside #1 Inside= 84.0"W x 36.0"H => 21.33 sf x 8.00'L = 170.6 cf Outside= 96.0"W x 44.0"H => 29.33 sf x 8.00'L = 234.7 cf 2 Rows adjusted for 217.2 cf perimeter wall
		8,739 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	124.75'	**3.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#2	Primary	122.50'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Discarded	121.75'	**0.270 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.02 cfs @ 6.94 hrs HW=121.79' (Free Discharge)
└─**3=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.60 cfs @ 12.67 hrs HW=124.72' TW=122.27' (Dynamic Tailwater)
├─**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
└─**2=Orifice/Grate** (Orifice Controls 0.60 cfs @ 6.90 fps)

Pond 13P: UG-1 Retain IT(Infiltration) - Chamber Wizard Field A

Chamber Model = retain_it retain_it 3.0' (retain-it®)
Inside= 84.0"W x 36.0"H => 21.33 sf x 8.00'L = 170.6 cf
Outside= 96.0"W x 44.0"H => 29.33 sf x 8.00'L = 234.7 cf
2 Rows adjusted for 217.2 cf perimeter wall

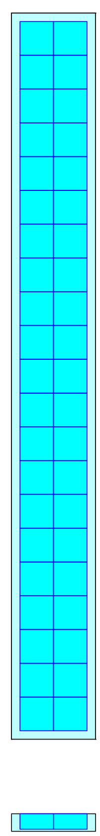
21 Chambers/Row x 8.00' Long = 168.00' Row Length +24.0" End Stone x 2 = 172.00' Base Length
2 Rows x 96.0" Wide + 24.0" Side Stone x 2 = 20.00' Base Width
6.0" Base + 44.0" Chamber Height = 4.17' Field Height

4.7 cf Sidewall x 21 x 2 + 4.7 cf Endwall x 2 x 2 = 217.2 cf Perimeter Wall
42 Chambers x 170.6 cf - 217.2 cf Perimeter wall = 6,948.5 cf Chamber Storage
42 Chambers x 234.7 cf = 9,856.0 cf Displacement

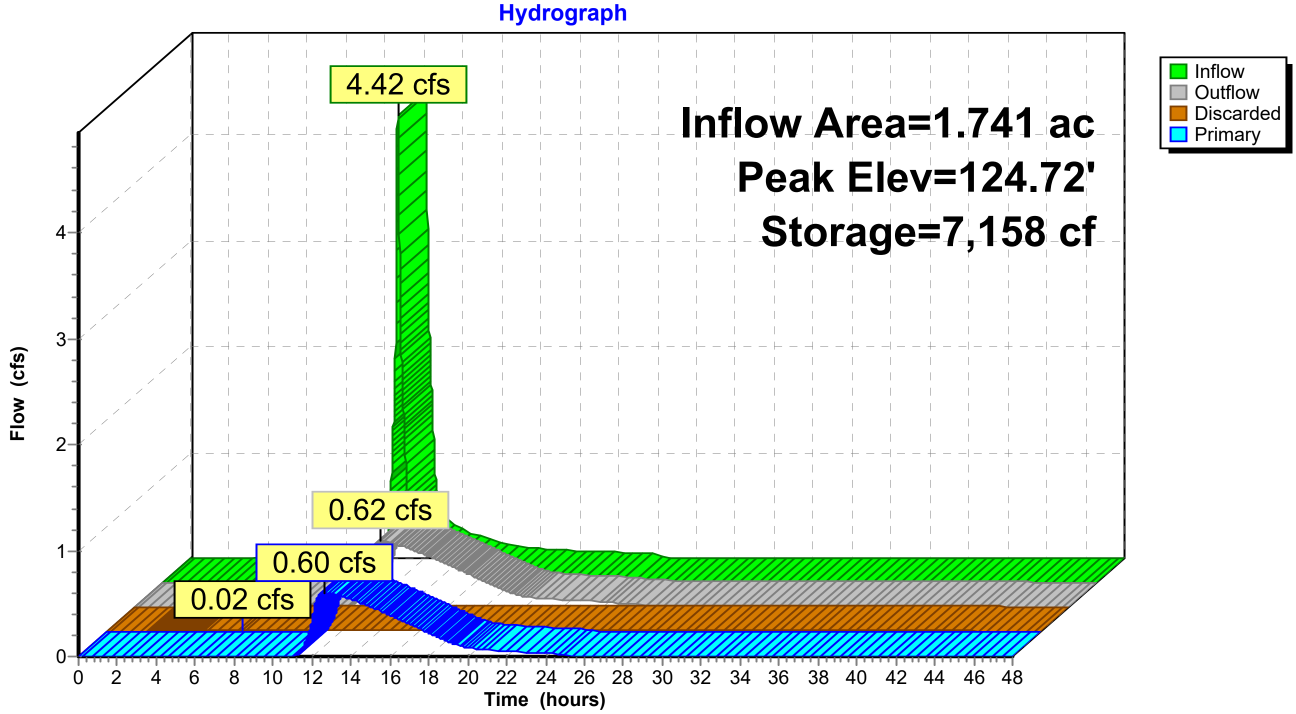
14,333.3 cf Field - 9,856.0 cf Chambers = 4,477.3 cf Stone x 40.0% Voids = 1,790.9 cf Stone Storage

Chamber Storage + Stone Storage = 8,739.4 cf = 0.201 af
Overall Storage Efficiency = 61.0%
Overall System Size = 172.00' x 20.00' x 4.17'

42 Chambers
530.9 cy Field
165.8 cy Stone



Pond 13P: UG-1 Retain IT(Infiltration)



Summary for Pond 16P: UG-2 Retain IT (Detention)

Inflow Area = 1.741 ac, 78.76% Impervious, Inflow Depth = 1.88" for 2-Year event
Inflow = 0.60 cfs @ 12.67 hrs, Volume= 0.273 af
Outflow = 0.47 cfs @ 14.98 hrs, Volume= 0.271 af, Atten= 22%, Lag= 138.2 min
Primary = 0.47 cfs @ 14.98 hrs, Volume= 0.271 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 122.50' @ 14.98 hrs Surf.Area= 6,512 sf Storage= 2,663 cf

Plug-Flow detention time= 120.8 min calculated for 0.271 af (99% of inflow)
Center-of-Mass det. time= 116.2 min (1,040.7 - 924.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	122.00'	1,103 cf	**44.00'W x 148.00'L x 3.67'H Field A** 23,877 cf Overall - 21,120 cf Embedded = 2,757 cf x 40.0% Voids
#2A	122.00'	15,138 cf	**retain_it retain_it 3.0'** x 90 Inside #1 Inside= 84.0"W x 36.0"H => 21.33 sf x 8.00'L = 170.6 cf Outside= 96.0"W x 44.0"H => 29.33 sf x 8.00'L = 234.7 cf 5 Rows adjusted for 217.2 cf perimeter wall
		16,241 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	121.50'	**12.0" Round Culvert** L= 10.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 121.50' / 121.40' S= 0.0100 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf
#2	Device 1	124.70'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#3	Device 1	122.00'	**6.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.47 cfs @ 14.98 hrs HW=122.50' TW=0.00' (Dynamic Tailwater)
1=Culvert (Passes 0.47 cfs of 2.33 cfs potential flow)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)
3=Orifice/Grate (Orifice Controls 0.47 cfs @ 2.40 fps)

Pond 16P: UG-2 Retain IT (Detention) - Chamber Wizard Field A

Chamber Model = retain_it retain_it 3.0' (retain-it®)
Inside= 84.0"W x 36.0"H => 21.33 sf x 8.00'L = 170.6 cf
Outside= 96.0"W x 44.0"H => 29.33 sf x 8.00'L = 234.7 cf
5 Rows adjusted for 217.2 cf perimeter wall

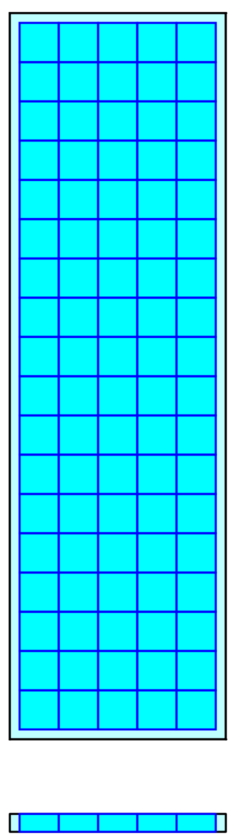
18 Chambers/Row x 8.00' Long = 144.00' Row Length +24.0" End Stone x 2 = 148.00' Base Length
5 Rows x 96.0" Wide + 24.0" Side Stone x 2 = 44.00' Base Width
44.0" Chamber Height = 3.67' Field Height

4.7 cf Sidewall x 18 x 2 + 4.7 cf Endwall x 5 x 2 = 217.2 cf Perimeter Wall
90 Chambers x 170.6 cf - 217.2 cf Perimeter wall = 15,137.8 cf Chamber Storage
90 Chambers x 234.7 cf = 21,120.0 cf Displacement

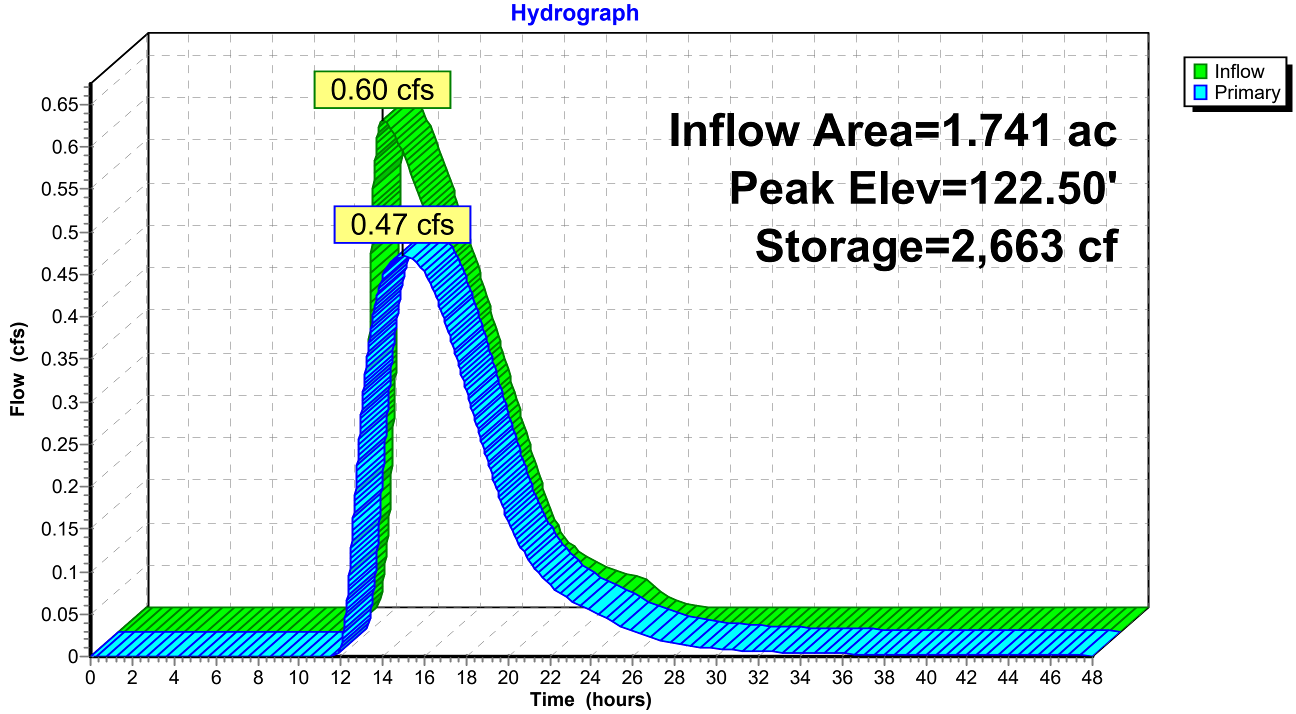
23,877.3 cf Field - 21,120.0 cf Chambers = 2,757.3 cf Stone x 40.0% Voids = 1,102.9 cf Stone Storage

Chamber Storage + Stone Storage = 16,240.7 cf = 0.373 af
Overall Storage Efficiency = 68.0%
Overall System Size = 148.00' x 44.00' x 3.67'

90 Chambers
884.3 cy Field
102.1 cy Stone



Pond 16P: UG-2 Retain IT (Detention)



Summary for Subcatchment P-1A: Undetained to Wetland B

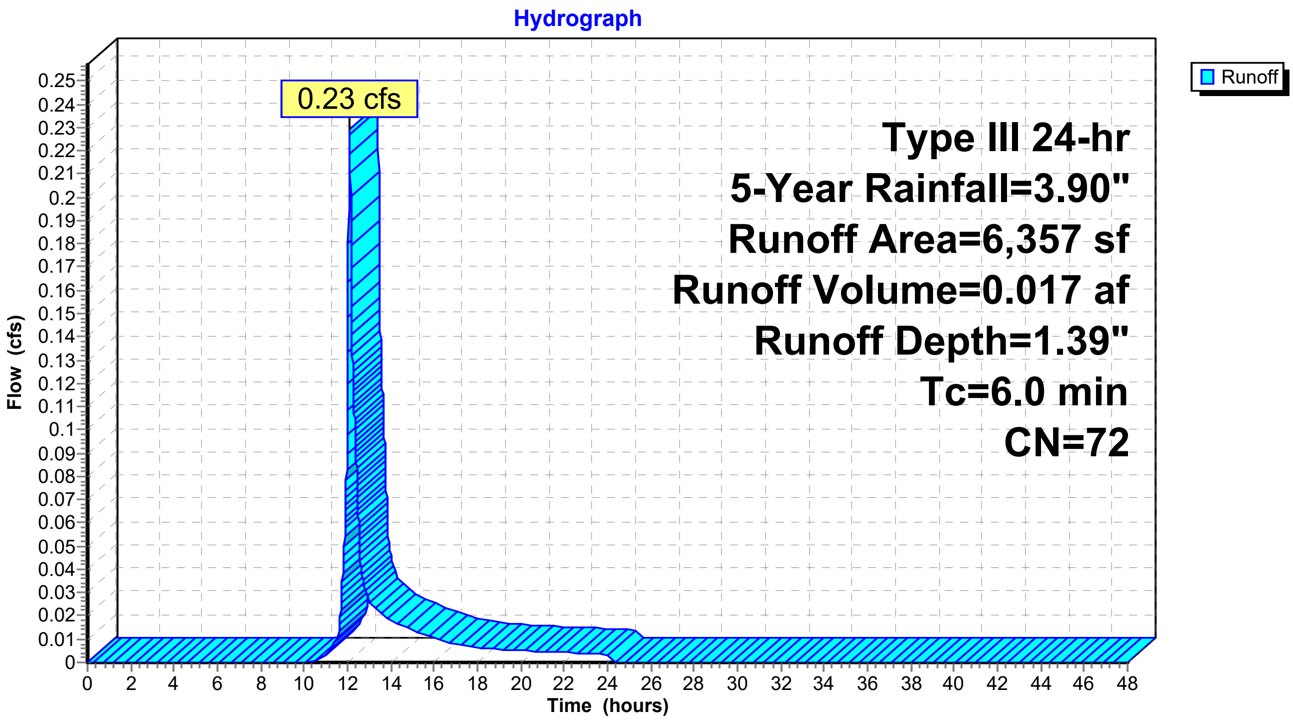
Runoff = 0.23 cfs @ 12.09 hrs, Volume= 0.017 af, Depth= 1.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 5-Year Rainfall=3.90"

Area (sf)	CN	Description
6,357	72	Woods/grass comb., Good, HSG C
6,357		100.00% Pervious Area

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

Subcatchment P-1A: Undetained to Wetland B



Summary for Subcatchment P-1B: Western Driveway

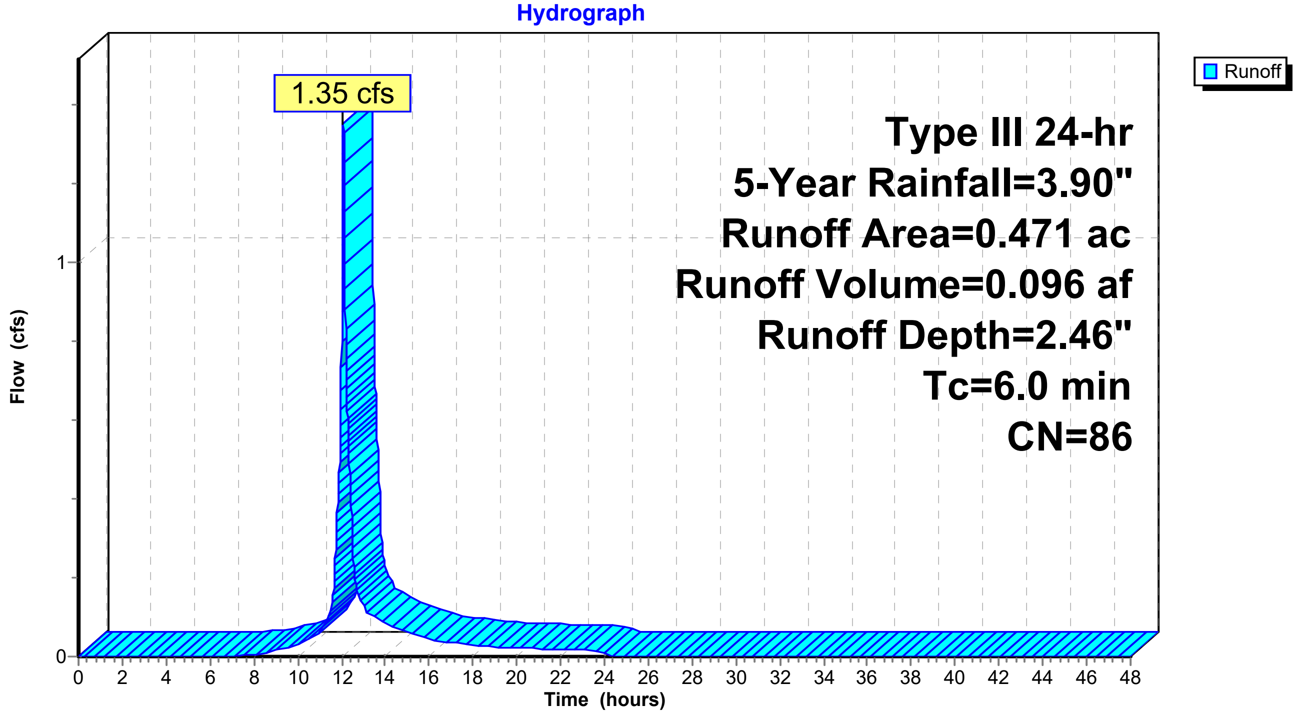
Runoff = 1.35 cfs @ 12.09 hrs, Volume= 0.096 af, Depth= 2.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 5-Year Rainfall=3.90"

Area (ac)	CN	Description
0.248	98	Paved parking, HSG C
0.223	72	Woods/grass comb., Good, HSG C
0.471	86	Weighted Average
0.223		47.35% Pervious Area
0.248		52.65% Impervious Area

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

Subcatchment P-1B: Western Driveway



Summary for Subcatchment P-1C: Permeable Pavement

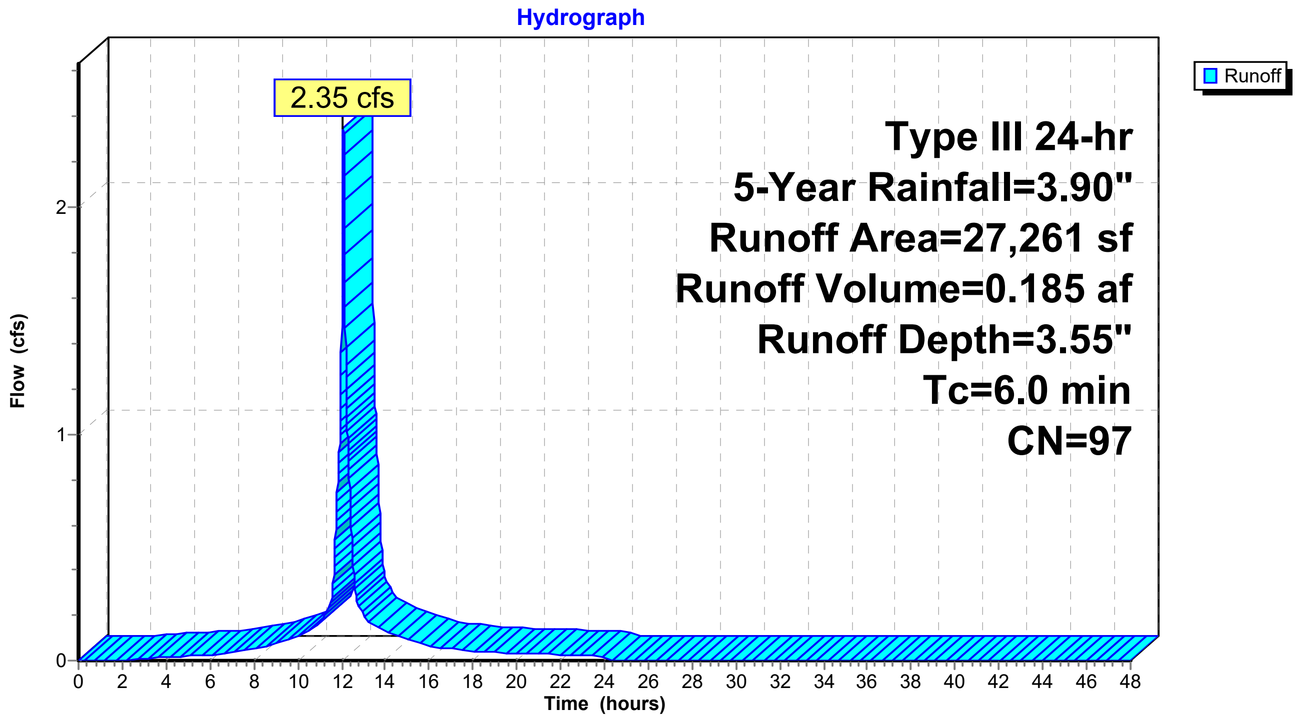
Runoff = 2.35 cfs @ 12.08 hrs, Volume= 0.185 af, Depth= 3.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 5-Year Rainfall=3.90"

	Area (sf)	CN	Description
*	25,998	98	Permeable Pavement
	1,263	74	>75% Grass cover, Good, HSG C
	27,261	97	Weighted Average
	1,263		4.63% Pervious Area
	25,998		95.37% Impervious Area

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

Subcatchment P-1C: Permeable Pavement



Summary for Subcatchment P-2: Undetained to Wetland

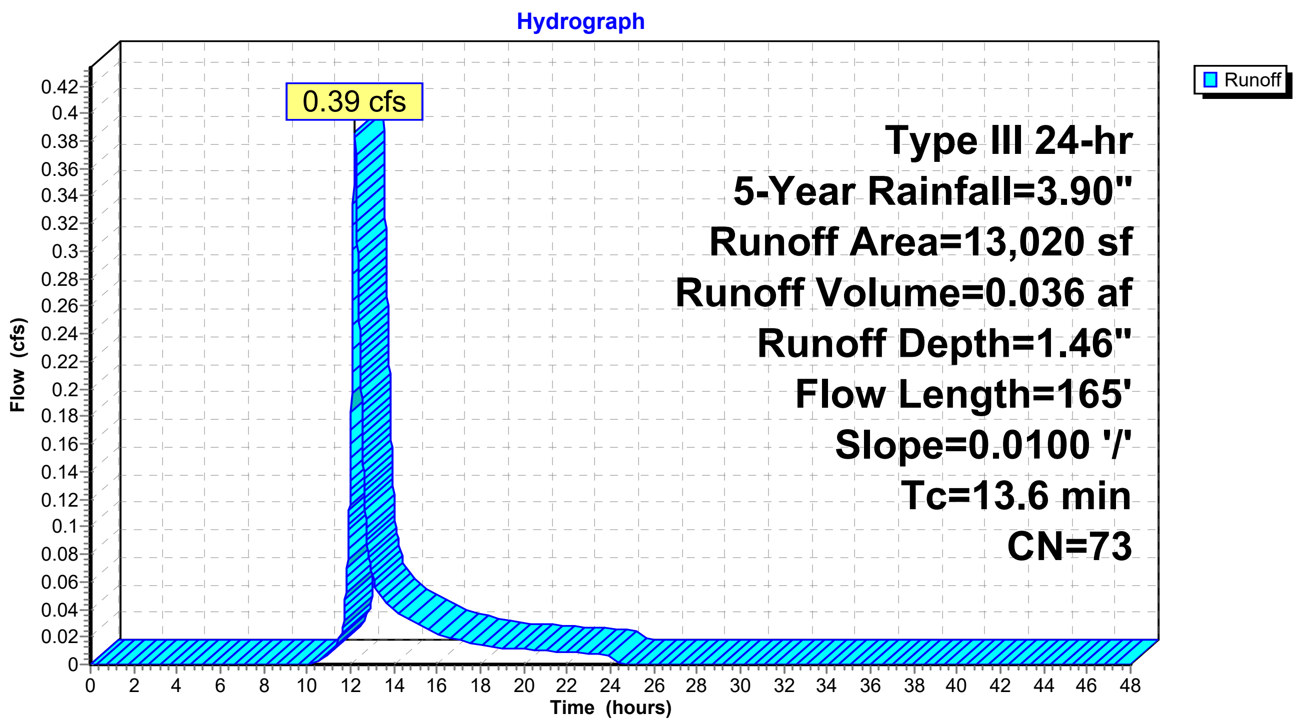
Runoff = 0.39 cfs @ 12.20 hrs, Volume= 0.036 af, Depth= 1.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 5-Year Rainfall=3.90"

Area (sf)	CN	Description
10,967	74	>75% Grass cover, Good, HSG C
2,053	70	Woods, Good, HSG C
13,020	73	Weighted Average
13,020		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	100	0.0100	0.13		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
0.7	65	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
13.6	165	Total			

Subcatchment P-2: Undetained to Wetland



Summary for Subcatchment P-3A: Additions and Upper Pavement

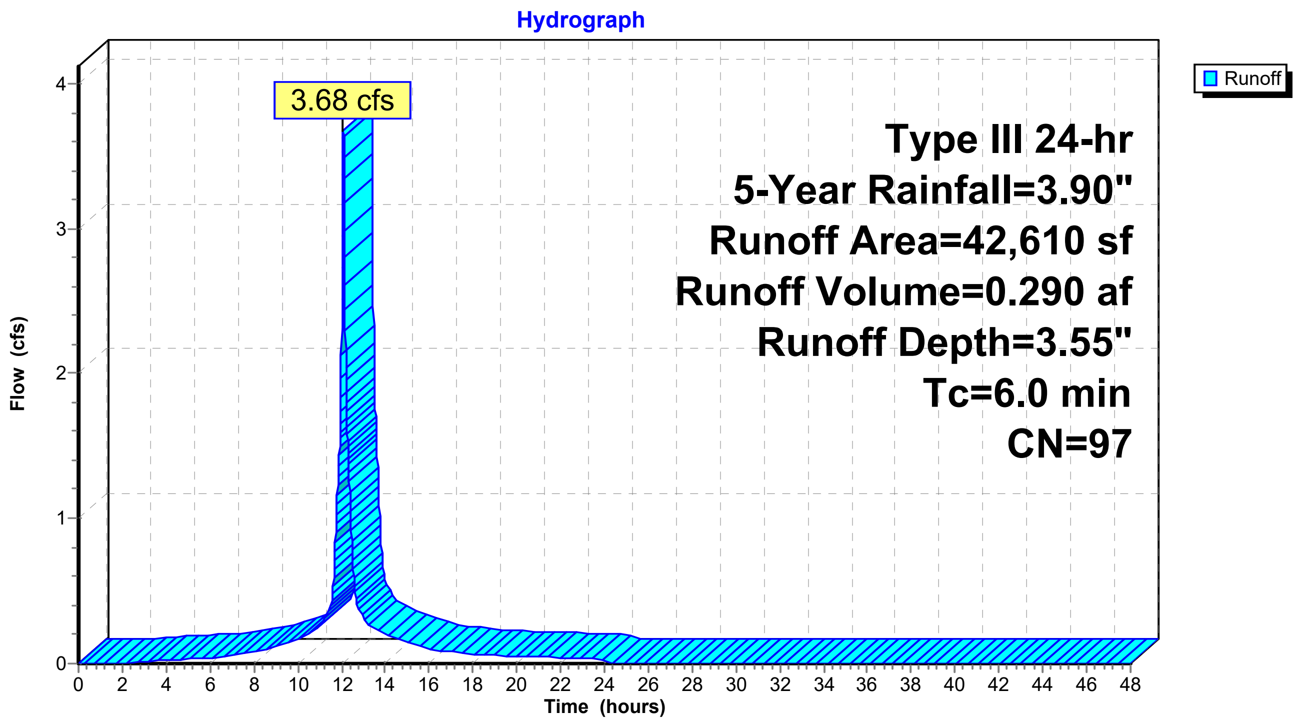
Runoff = 3.68 cfs @ 12.08 hrs, Volume= 0.290 af, Depth= 3.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 5-Year Rainfall=3.90"

Area (sf)	CN	Description
26,741	98	Paved parking, HSG C
1,277	74	>75% Grass cover, Good, HSG C
14,592	98	Roofs, HSG C
42,610	97	Weighted Average
1,277		3.00% Pervious Area
41,333		97.00% Impervious Area

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

Subcatchment P-3A: Additions and Upper Pavement



Summary for Subcatchment P-3B: Existing Building Draining to Constructed Wetland

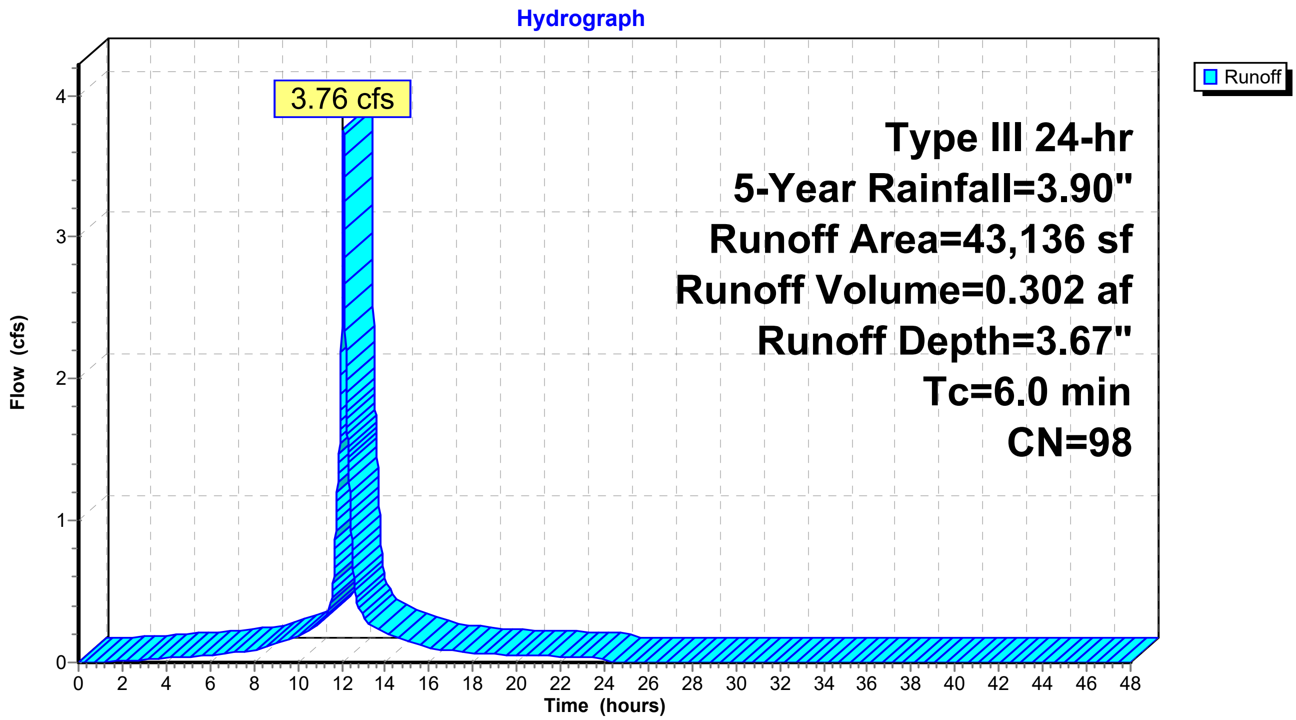
Runoff = 3.76 cfs @ 12.08 hrs, Volume= 0.302 af, Depth= 3.67"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 5-Year Rainfall=3.90"

Area (sf)	CN	Description
43,136	98	Roofs, HSG C
43,136		100.00% Impervious Area

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

Subcatchment P-3B: Existing Building Draining to Constructed Wetland



Summary for Subcatchment P-4: Watershed to Existing Stormwater System

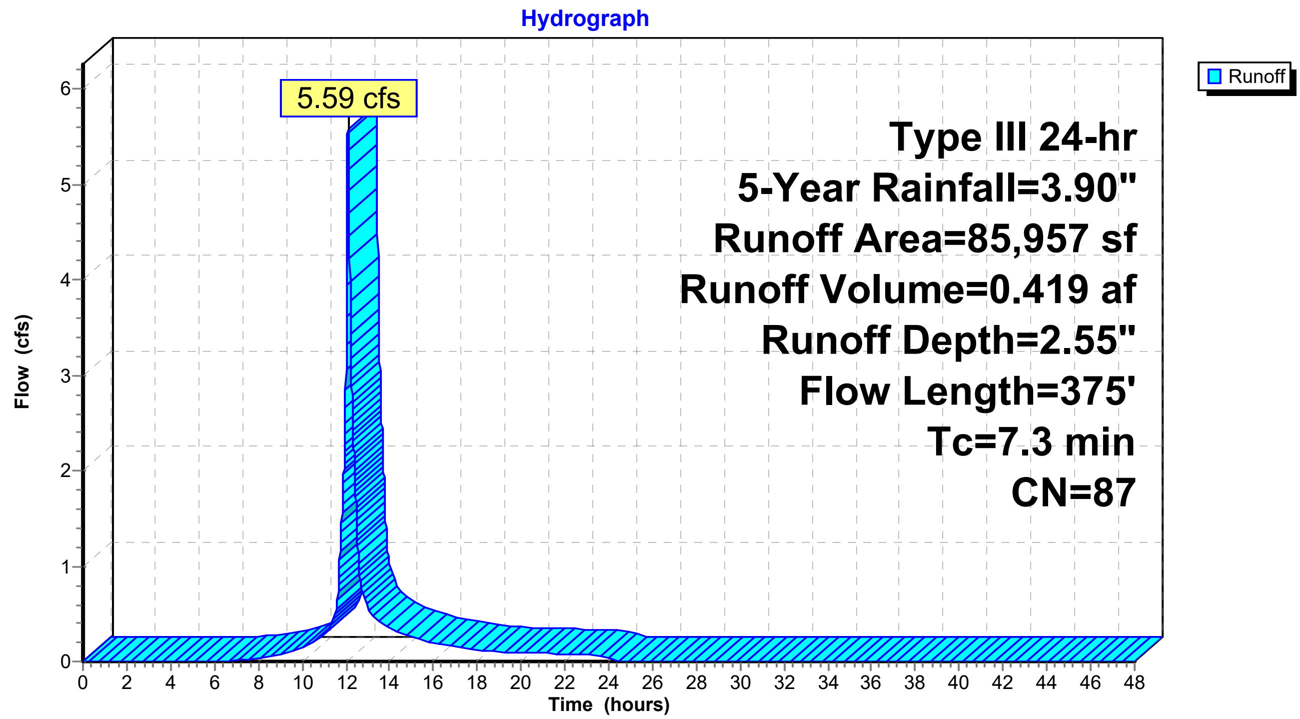
Runoff = 5.59 cfs @ 12.10 hrs, Volume= 0.419 af, Depth= 2.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 5-Year Rainfall=3.90"

Area (sf)	CN	Description
46,374	98	Paved parking, HSG C
37,535	74	>75% Grass cover, Good, HSG C
2,048	70	Woods, Good, HSG C
85,957	87	Weighted Average
39,583		46.05% Pervious Area
46,374		53.95% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.2	50	0.0240	0.16		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
1.7	245	0.0220	2.39		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.4	80	0.0287	3.44		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
7.3	375	Total			

Subcatchment P-4: Watershed to Existing Stormwater System



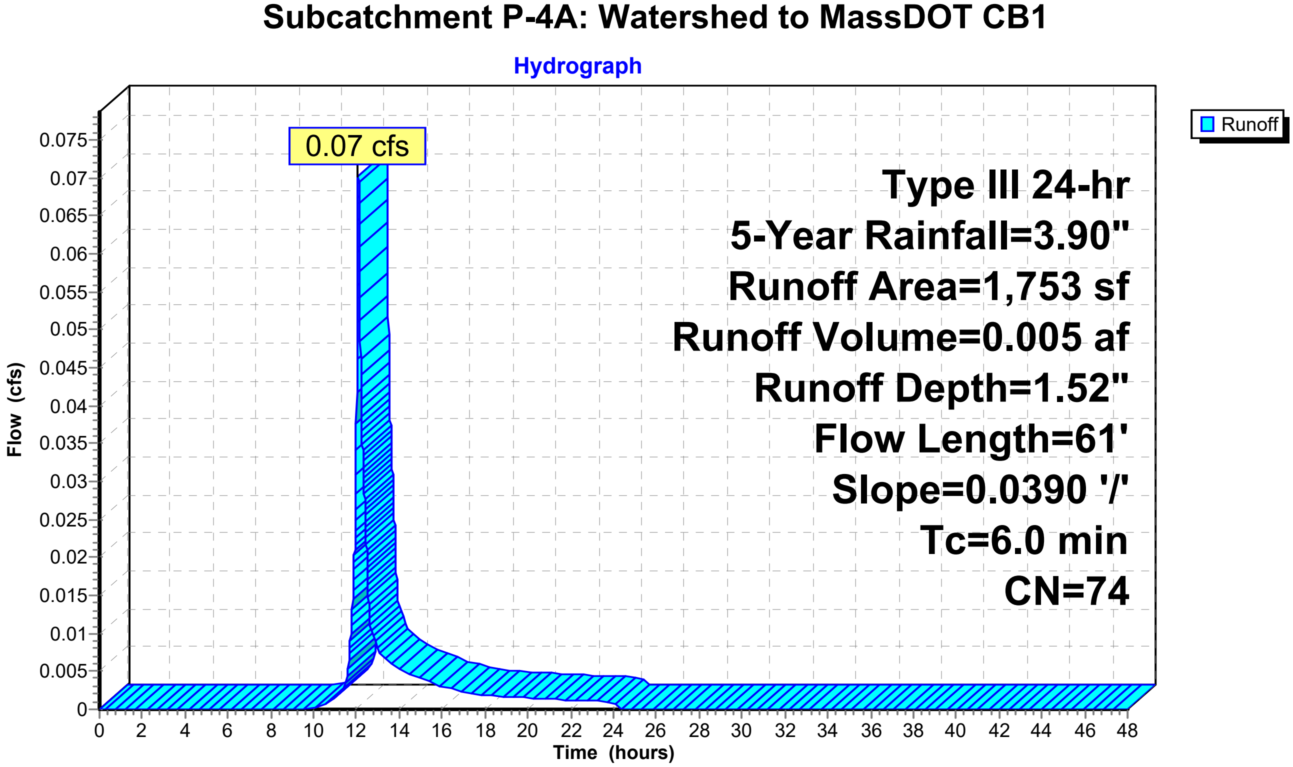
Summary for Subcatchment P-4A: Watershed to MassDOT CB1

Runoff = 0.07 cfs @ 12.09 hrs, Volume= 0.005 af, Depth= 1.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 5-Year Rainfall=3.90"

Area (sf)	CN	Description
1,753	74	>75% Grass cover, Good, HSG C
1,753		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.1	61	0.0390	0.20		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
0.9					**Direct Entry,**
6.0	61	Total			



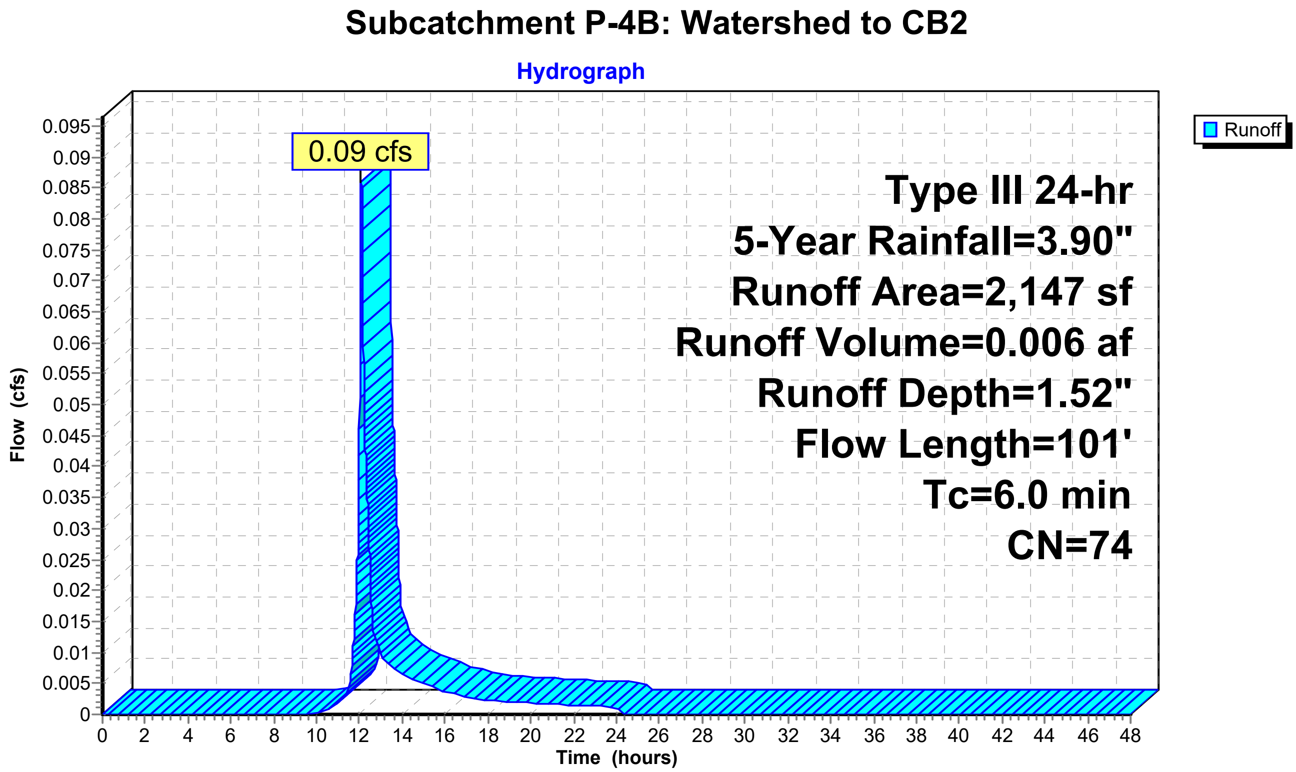
Summary for Subcatchment P-4B: Watershed to CB2

Runoff = 0.09 cfs @ 12.09 hrs, Volume= 0.006 af, Depth= 1.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 5-Year Rainfall=3.90"

Area (sf)	CN	Description
2,147	74	>75% Grass cover, Good, HSG C
2,147		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	50	0.0200	0.15		**Sheet Flow, SHeet Flow** Grass: Short n= 0.150 P2= 3.20"
0.3	51	0.0390	3.18		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.1					**Direct Entry, Miniumum**
6.0	101	Total			



Summary for Subcatchment P-5: P-5

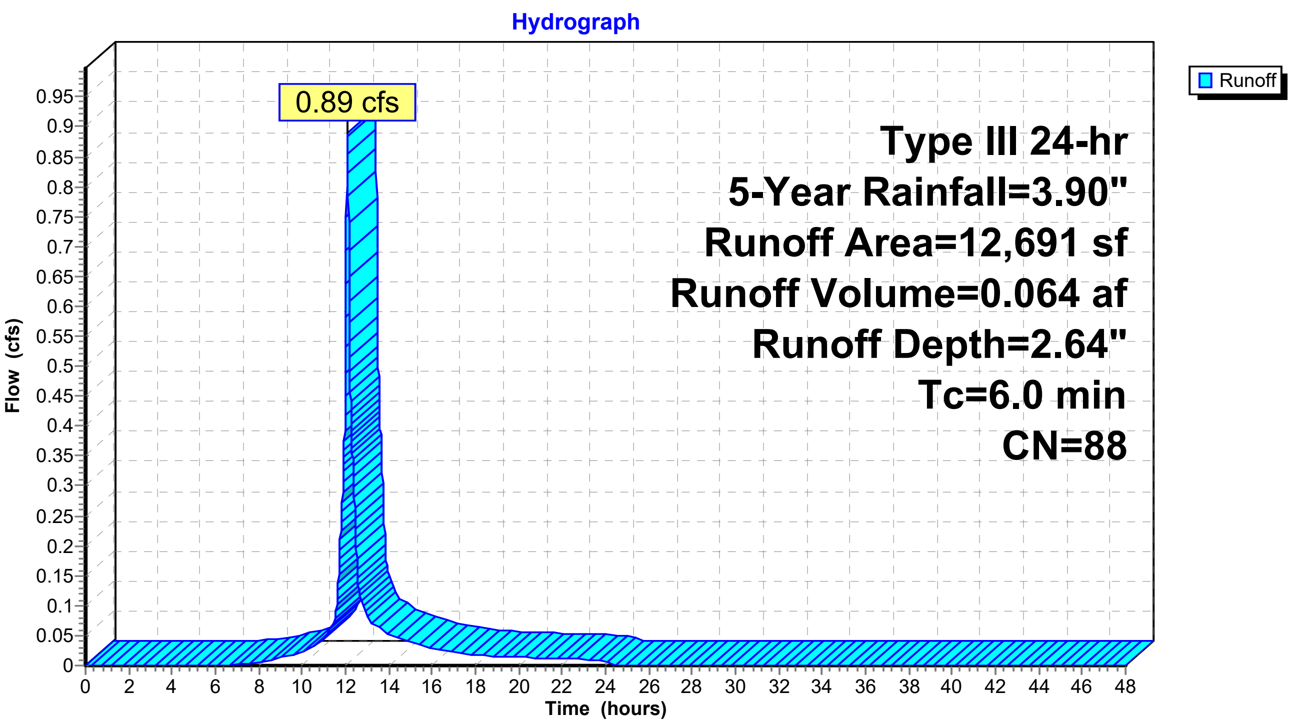
Runoff = 0.89 cfs @ 12.09 hrs, Volume= 0.064 af, Depth= 2.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 5-Year Rainfall=3.90"

Area (sf)	CN	Description
5,116	74	>75% Grass cover, Good, HSG C
7,575	98	Paved parking, HSG C
12,691	88	Weighted Average
5,116		40.31% Pervious Area
7,575		59.69% Impervious Area

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

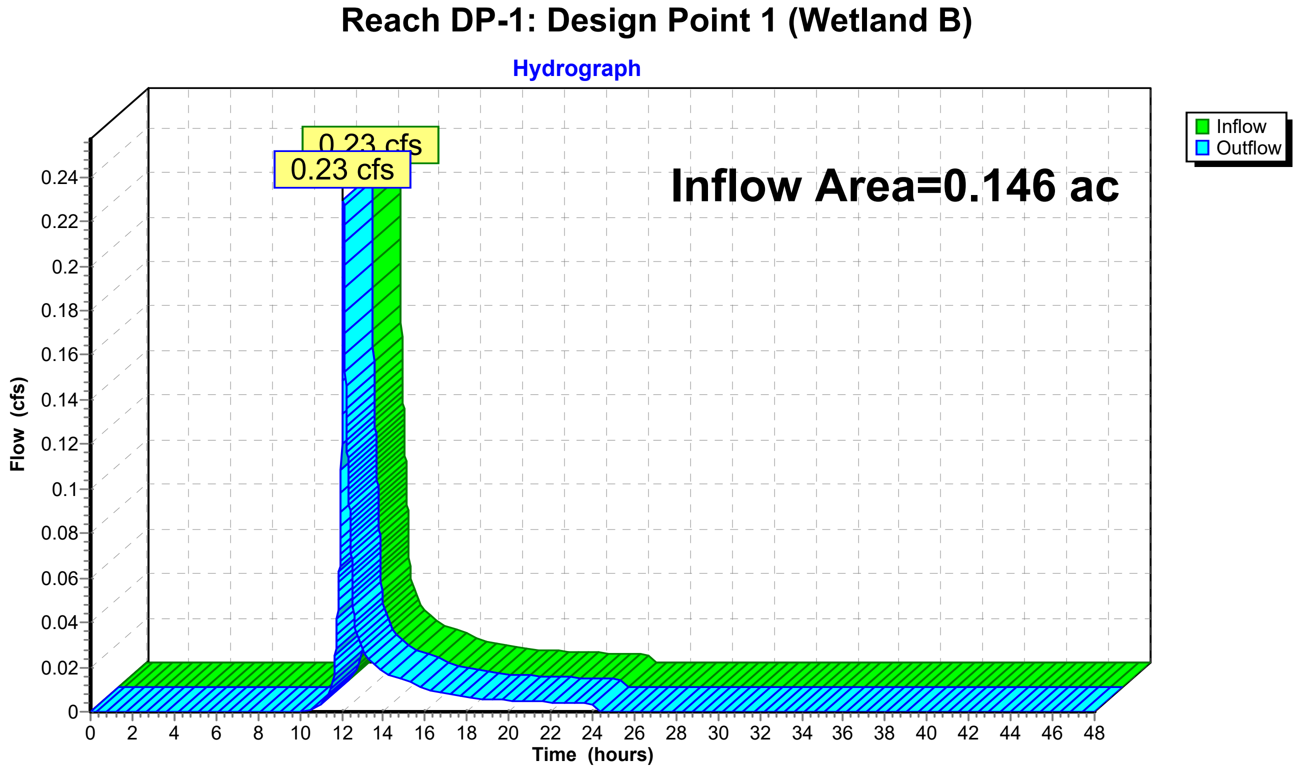
Subcatchment P-5: P-5



Summary for Reach DP-1: Design Point 1 (Wetland B)

Inflow Area =	0.146 ac,	0.00% Impervious,	Inflow Depth = 1.39"	for 5-Year event
Inflow =	0.23 cfs @	12.09 hrs, Volume=	0.017 af	
Outflow =	0.23 cfs @	12.09 hrs, Volume=	0.017 af, Atten= 0%, Lag= 0.0 min	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

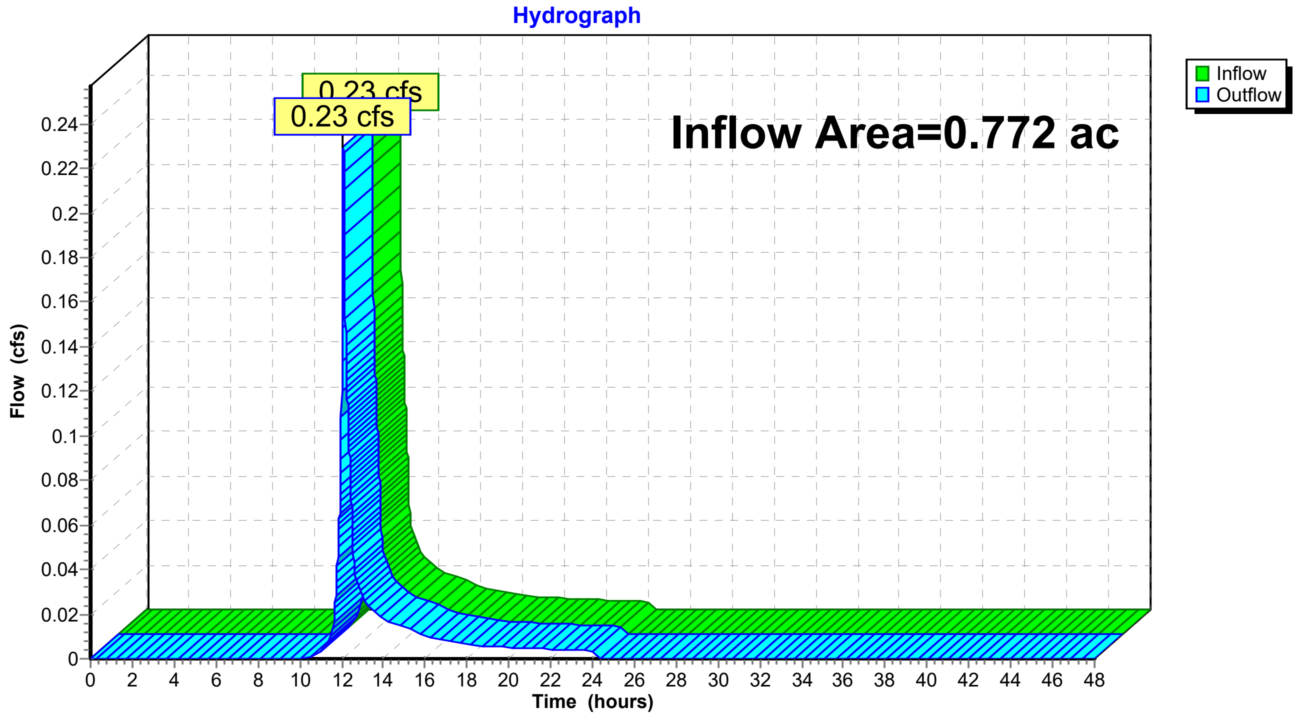


Summary for Reach DP-2: Design Point 2 (15" RCP to Wetland A)

Inflow Area = 0.772 ac, 77.33% Impervious, Inflow Depth = 0.26" for 5-Year event
Inflow = 0.23 cfs @ 12.09 hrs, Volume= 0.017 af
Outflow = 0.23 cfs @ 12.09 hrs, Volume= 0.017 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Reach DP-2: Design Point 2 (15" RCP to Wetland A)

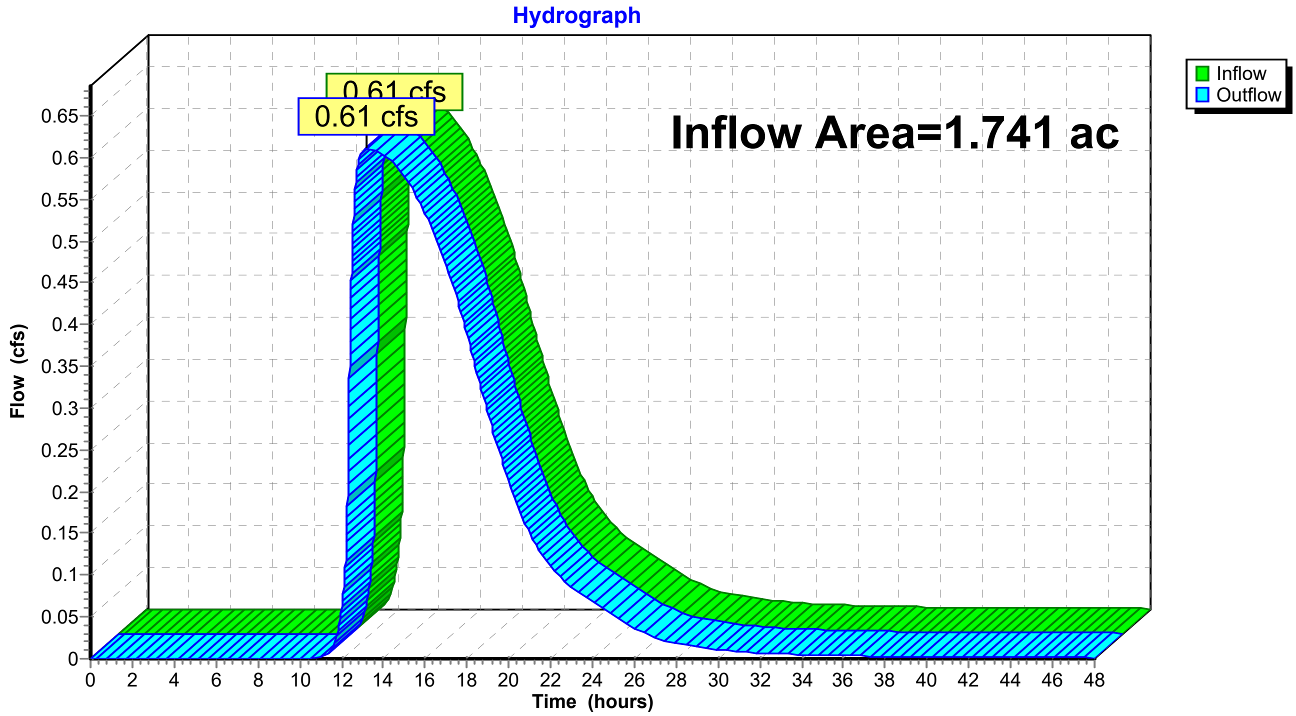


Summary for Reach DP-3: Design Point 3 (Existing Drainage Ditch)

Inflow Area = 1.741 ac, 78.76% Impervious, Inflow Depth > 2.52" for 5-Year event
Inflow = 0.61 cfs @ 13.16 hrs, Volume= 0.365 af
Outflow = 0.61 cfs @ 13.16 hrs, Volume= 0.365 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

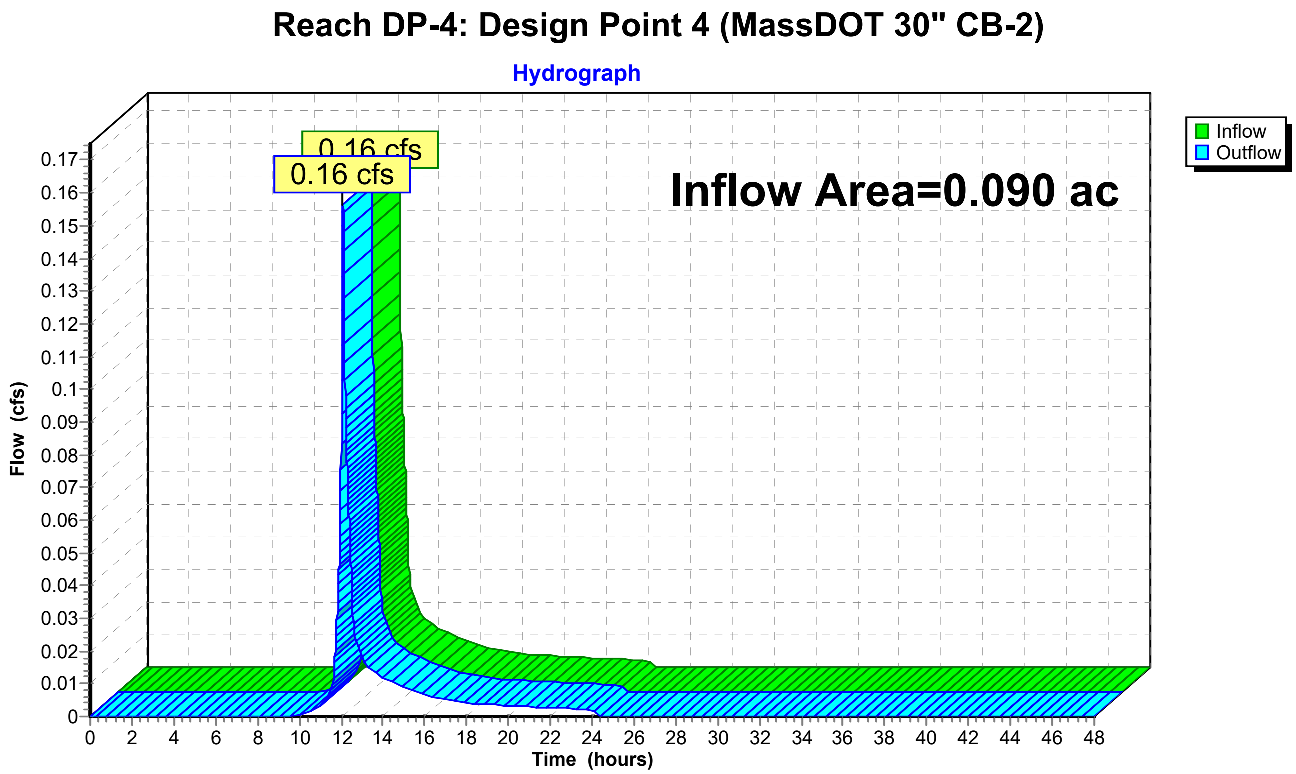
Reach DP-3: Design Point 3 (Existing Drainage Ditch)



Summary for Reach DP-4: Design Point 4 (MassDOT 30" CB-2)

Inflow Area =	0.090 ac,	0.00% Impervious, Inflow Depth = 1.52"	for 5-Year event
Inflow =	0.16 cfs @	12.09 hrs, Volume=	0.011 af
Outflow =	0.16 cfs @	12.09 hrs, Volume=	0.011 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

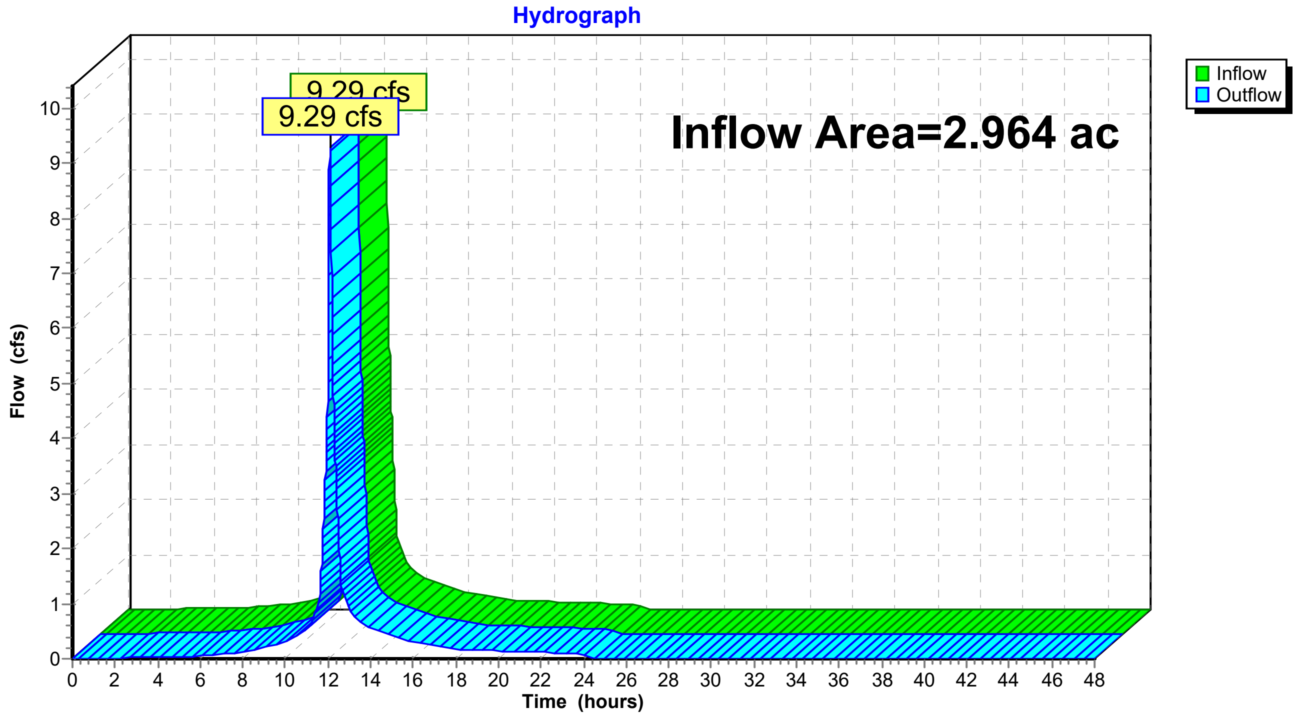


Summary for Reach DP-5: Design Point 5 (Existing Constructed Stormwater Wetland)

Inflow Area =	2.964 ac,	69.34% Impervious,	Inflow Depth = 2.92"	for 5-Year event
Inflow =	9.29 cfs @	12.09 hrs,	Volume=	0.721 af
Outflow =	9.29 cfs @	12.09 hrs,	Volume=	0.721 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Reach DP-5: Design Point 5 (Existing Constructed Stormwater Wetland)

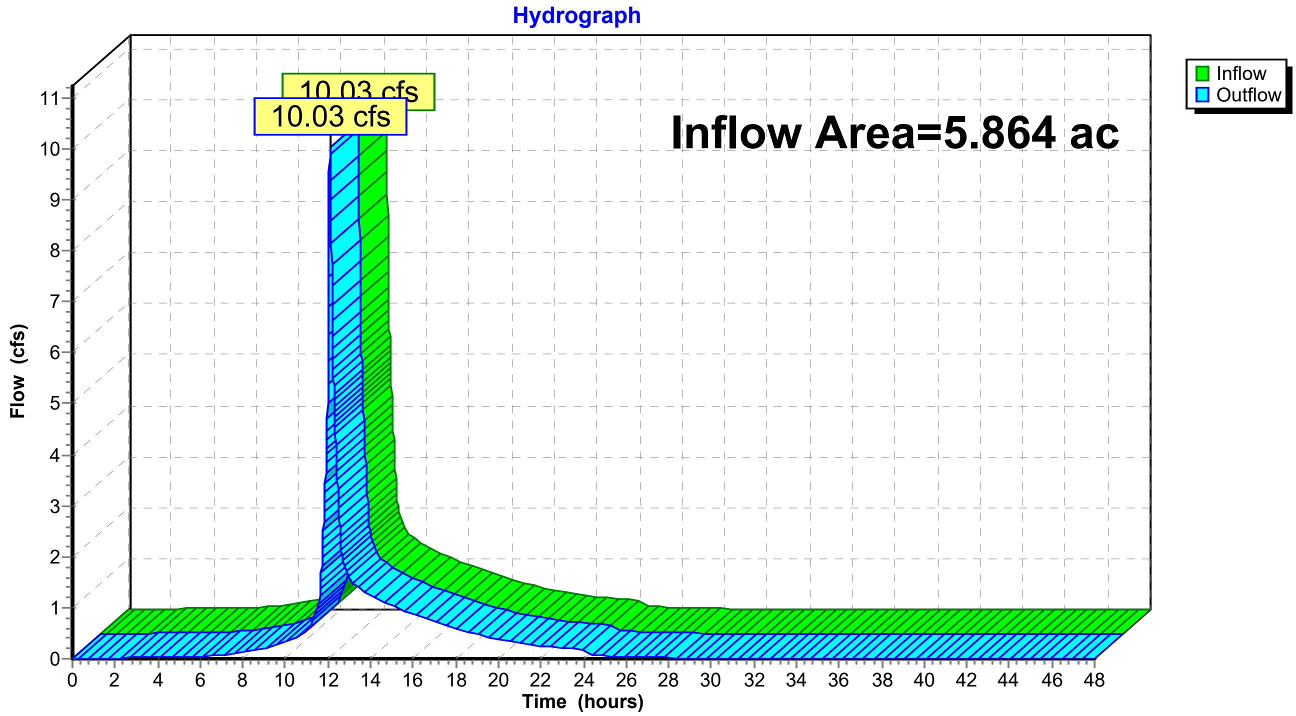


Summary for Reach DP-6: Wetland A - Design Point 6

Inflow Area = 5.864 ac, 68.59% Impervious, Inflow Depth > 2.36" for 5-Year event
Inflow = 10.03 cfs @ 12.10 hrs, Volume= 1.151 af
Outflow = 10.03 cfs @ 12.10 hrs, Volume= 1.151 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Reach DP-6: Wetland A - Design Point 6



Summary for Pond 3P: Conveyance Swale

Inflow Area = 0.471 ac, 52.65% Impervious, Inflow Depth = 2.46" for 5-Year event
Inflow = 1.35 cfs @ 12.09 hrs, Volume= 0.096 af
Outflow = 1.16 cfs @ 12.14 hrs, Volume= 0.089 af, Atten= 14%, Lag= 2.9 min
Primary = 1.16 cfs @ 12.14 hrs, Volume= 0.089 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 125.56' @ 12.14 hrs Surf.Area= 782 sf Storage= 705 cf

Plug-Flow detention time= 73.1 min calculated for 0.089 af (92% of inflow)
Center-of-Mass det. time= 32.0 min (846.2 - 814.2)

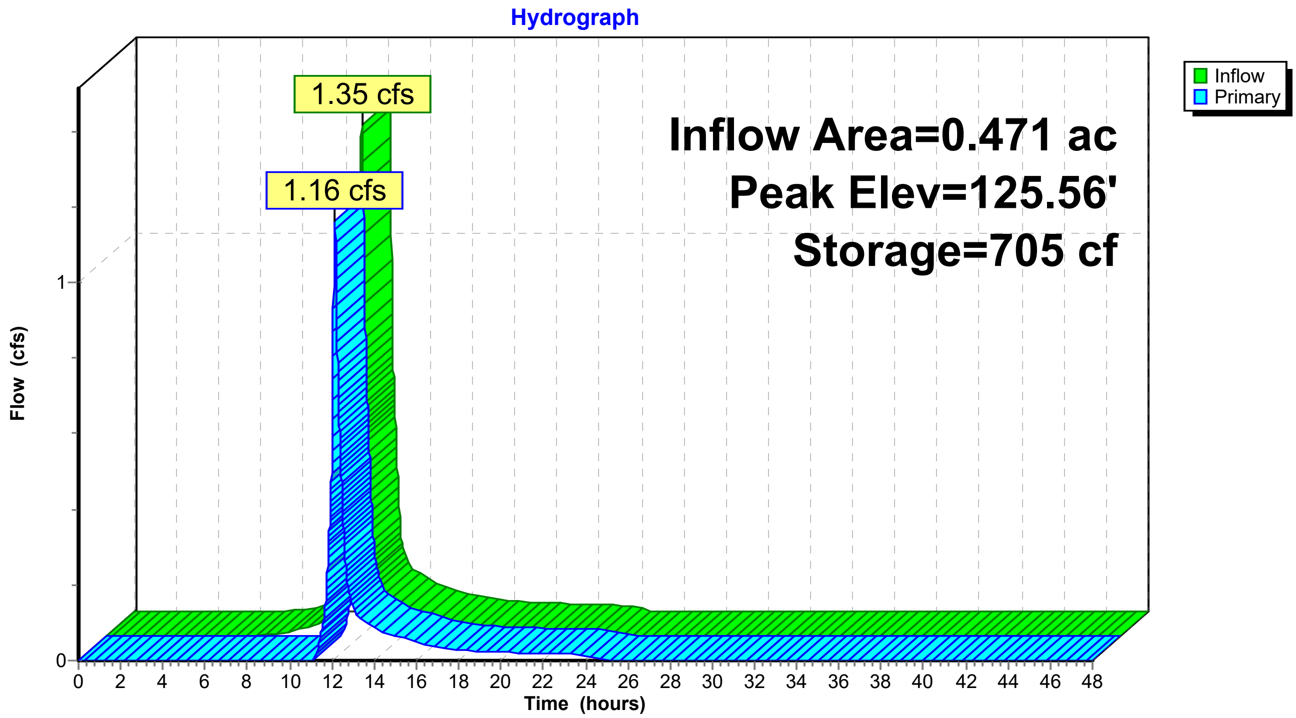
Volume	Invert	Avail.Storage	Storage Description
#1	124.00'	1,645 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
124.00	143	0	0
125.00	530	337	337
126.00	978	754	1,091
126.50	1,241	555	1,645

Device	Routing	Invert	Outlet Devices
#1	Primary	124.18'	**12.0" Round Culvert** L= 10.0' Ke= 0.500 Inlet / Outlet Invert= 124.18' / 124.13' S= 0.0050 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf
#2	Device 1	125.00'	**12.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=1.16 cfs @ 12.14 hrs HW=125.56' TW=124.49' (Dynamic Tailwater)
└─**1=Culvert** (Passes 1.16 cfs of 3.15 cfs potential flow)
  └─**2=Orifice/Grate** (Orifice Controls 1.16 cfs @ 2.55 fps)

Pond 3P: Conveyance Swale



Summary for Pond 11P: Permeable Pavement

Inflow Area = 0.626 ac, 95.37% Impervious, Inflow Depth = 3.55" for 5-Year event
Inflow = 2.35 cfs @ 12.08 hrs, Volume= 0.185 af
Outflow = 0.16 cfs @ 11.59 hrs, Volume= 0.185 af, Atten= 93%, Lag= 0.0 min
Discarded = 0.16 cfs @ 11.59 hrs, Volume= 0.185 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 123.05' @ 13.36 hrs Surf.Area= 25,998 sf Storage= 3,159 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 148.3 min (909.5 - 761.2)

Volume	Invert	Avail.Storage	Storage Description
#1	122.75'	8,813 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

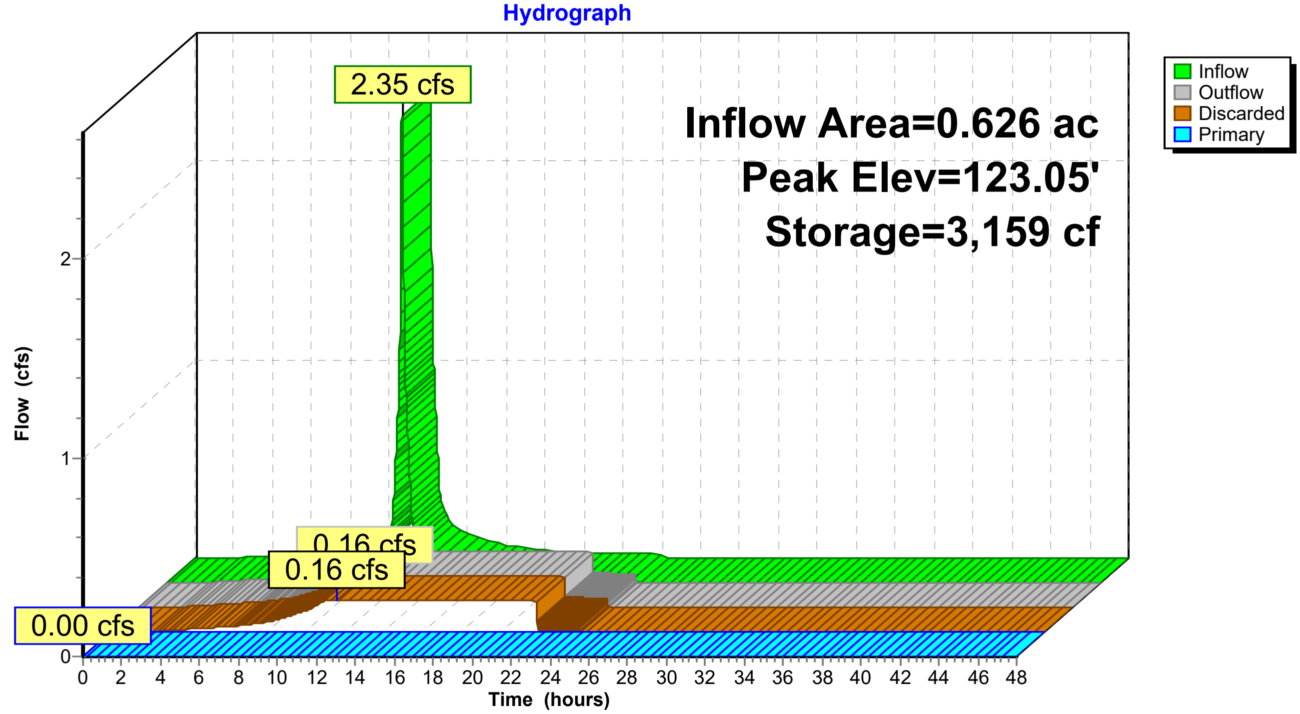
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
122.75	25,998	0.0	0	0
123.41	25,998	40.0	6,863	6,863
123.66	25,998	30.0	1,950	8,813

Device	Routing	Invert	Outlet Devices
#1	Discarded	122.75'	**0.270 in/hr Exfiltration over Surface area**
#2	Primary	123.30'	**6.0" Round Culvert** L= 10.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 123.30' / 119.00' S= 0.4300 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.20 sf

Discarded OutFlow Max=0.16 cfs @ 11.59 hrs HW=122.76' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.16 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=122.75' TW=0.00' (Dynamic Tailwater)
└─**2=Culvert** (Controls 0.00 cfs)

Pond 11P: Permeable Pavement



Summary for Pond 13P: UG-1 Retain IT(Infiltration)

Inflow Area = 1.741 ac, 78.76% Impervious, Inflow Depth = 3.05" for 5-Year event
Inflow = 5.60 cfs @ 12.09 hrs, Volume= 0.442 af
Outflow = 2.10 cfs @ 12.37 hrs, Volume= 0.442 af, Atten= 63%, Lag= 16.7 min
Discarded = 0.02 cfs @ 5.87 hrs, Volume= 0.075 af
Primary = 2.08 cfs @ 12.37 hrs, Volume= 0.368 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 125.05' @ 12.37 hrs Surf.Area= 3,440 sf Storage= 8,022 cf

Plug-Flow detention time= 210.6 min calculated for 0.442 af (100% of inflow)
Center-of-Mass det. time= 210.7 min (995.6 - 784.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	121.75'	1,791 cf	**20.00'W x 172.00'L x 4.17'H Field A** 14,333 cf Overall - 9,856 cf Embedded = 4,477 cf x 40.0% Voids
#2A	122.25'	6,948 cf	**retain_it retain_it 3.0'** x 42 Inside #1 Inside= 84.0"W x 36.0"H => 21.33 sf x 8.00'L = 170.6 cf Outside= 96.0"W x 44.0"H => 29.33 sf x 8.00'L = 234.7 cf 2 Rows adjusted for 217.2 cf perimeter wall
		8,739 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	124.75'	**3.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#2	Primary	122.50'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Discarded	121.75'	**0.270 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.02 cfs @ 5.87 hrs HW=121.79' (Free Discharge)
└─**3=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=2.08 cfs @ 12.37 hrs HW=125.05' TW=122.37' (Dynamic Tailwater)
├─**1=Broad-Crested Rectangular Weir** (Weir Controls 1.43 cfs @ 1.57 fps)
└─**2=Orifice/Grate** (Orifice Controls 0.65 cfs @ 7.44 fps)

Pond 13P: UG-1 Retain IT(Infiltration) - Chamber Wizard Field A

Chamber Model = retain_it retain_it 3.0' (retain-it®)
Inside= 84.0"W x 36.0"H => 21.33 sf x 8.00'L = 170.6 cf
Outside= 96.0"W x 44.0"H => 29.33 sf x 8.00'L = 234.7 cf
2 Rows adjusted for 217.2 cf perimeter wall

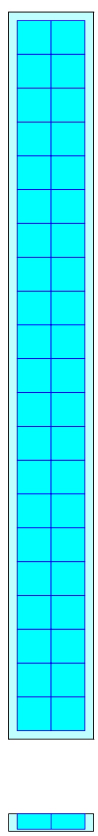
21 Chambers/Row x 8.00' Long = 168.00' Row Length +24.0" End Stone x 2 = 172.00' Base Length
2 Rows x 96.0" Wide + 24.0" Side Stone x 2 = 20.00' Base Width
6.0" Base + 44.0" Chamber Height = 4.17' Field Height

4.7 cf Sidewall x 21 x 2 + 4.7 cf Endwall x 2 x 2 = 217.2 cf Perimeter Wall
42 Chambers x 170.6 cf - 217.2 cf Perimeter wall = 6,948.5 cf Chamber Storage
42 Chambers x 234.7 cf = 9,856.0 cf Displacement

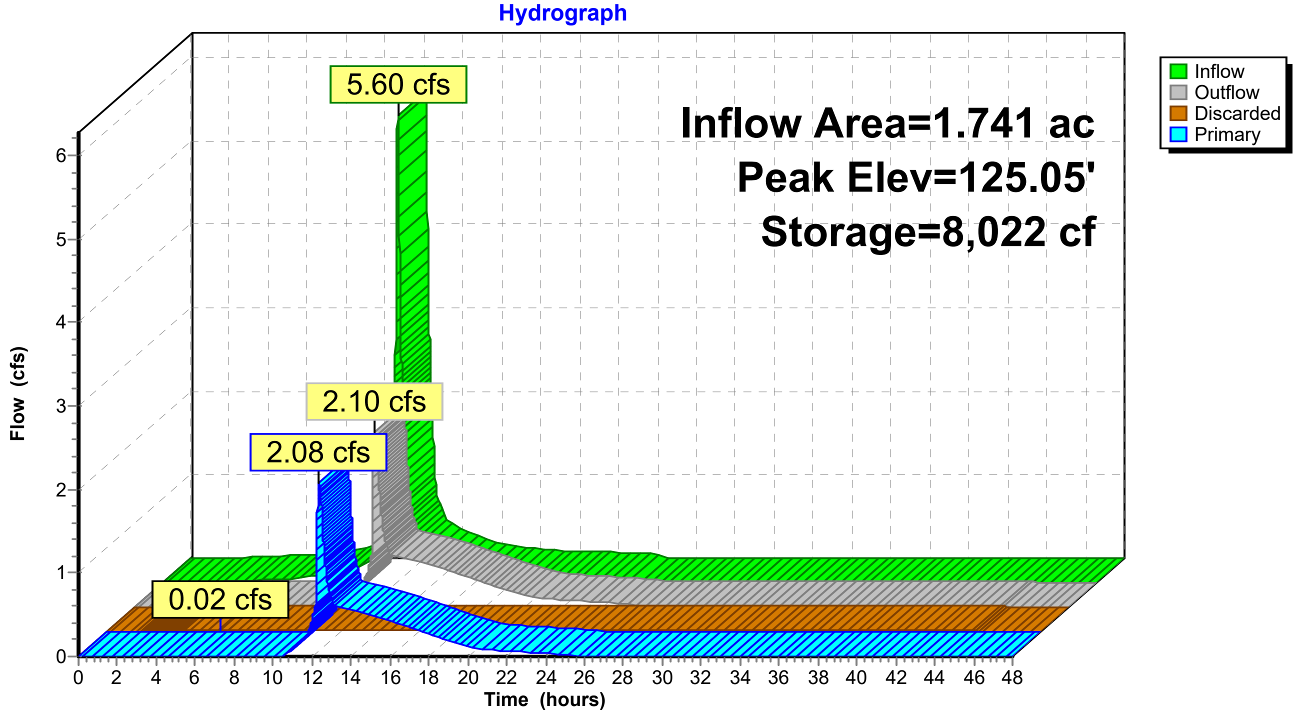
14,333.3 cf Field - 9,856.0 cf Chambers = 4,477.3 cf Stone x 40.0% Voids = 1,790.9 cf Stone Storage

Chamber Storage + Stone Storage = 8,739.4 cf = 0.201 af
Overall Storage Efficiency = 61.0%
Overall System Size = 172.00' x 20.00' x 4.17'

42 Chambers
530.9 cy Field
165.8 cy Stone



Pond 13P: UG-1 Retain IT(Infiltration)



Summary for Pond 16P: UG-2 Retain IT (Detention)

Inflow Area = 1.741 ac, 78.76% Impervious, Inflow Depth = 2.54" for 5-Year event
Inflow = 2.08 cfs @ 12.37 hrs, Volume= 0.368 af
Outflow = 0.61 cfs @ 13.16 hrs, Volume= 0.365 af, Atten= 71%, Lag= 47.4 min
Primary = 0.61 cfs @ 13.16 hrs, Volume= 0.365 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 122.67' @ 13.16 hrs Surf.Area= 6,512 sf Storage= 3,580 cf

Plug-Flow detention time= 113.9 min calculated for 0.365 af (99% of inflow)
Center-of-Mass det. time= 110.5 min (1,018.3 - 907.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	122.00'	1,103 cf	**44.00'W x 148.00'L x 3.67'H Field A** 23,877 cf Overall - 21,120 cf Embedded = 2,757 cf x 40.0% Voids
#2A	122.00'	15,138 cf	**retain_it retain_it 3.0'** x 90 Inside #1 Inside= 84.0"W x 36.0"H => 21.33 sf x 8.00'L = 170.6 cf Outside= 96.0"W x 44.0"H => 29.33 sf x 8.00'L = 234.7 cf 5 Rows adjusted for 217.2 cf perimeter wall
		16,241 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	121.50'	**12.0" Round Culvert** L= 10.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 121.50' / 121.40' S= 0.0100 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf
#2	Device 1	124.70'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#3	Device 1	122.00'	**6.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.61 cfs @ 13.16 hrs HW=122.67' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.61 cfs of 2.86 cfs potential flow)
  ├─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
  └─**3=Orifice/Grate** (Orifice Controls 0.61 cfs @ 3.12 fps)

Pond 16P: UG-2 Retain IT (Detention) - Chamber Wizard Field A

Chamber Model = retain_it retain_it 3.0' (retain-it®)
Inside= 84.0"W x 36.0"H => 21.33 sf x 8.00'L = 170.6 cf
Outside= 96.0"W x 44.0"H => 29.33 sf x 8.00'L = 234.7 cf
5 Rows adjusted for 217.2 cf perimeter wall

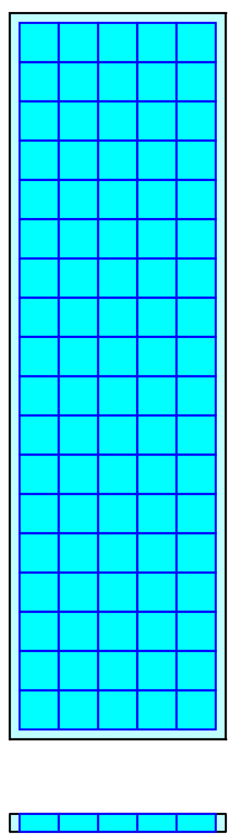
18 Chambers/Row x 8.00' Long = 144.00' Row Length +24.0" End Stone x 2 = 148.00' Base Length
5 Rows x 96.0" Wide + 24.0" Side Stone x 2 = 44.00' Base Width
44.0" Chamber Height = 3.67' Field Height

4.7 cf Sidewall x 18 x 2 + 4.7 cf Endwall x 5 x 2 = 217.2 cf Perimeter Wall
90 Chambers x 170.6 cf - 217.2 cf Perimeter wall = 15,137.8 cf Chamber Storage
90 Chambers x 234.7 cf = 21,120.0 cf Displacement

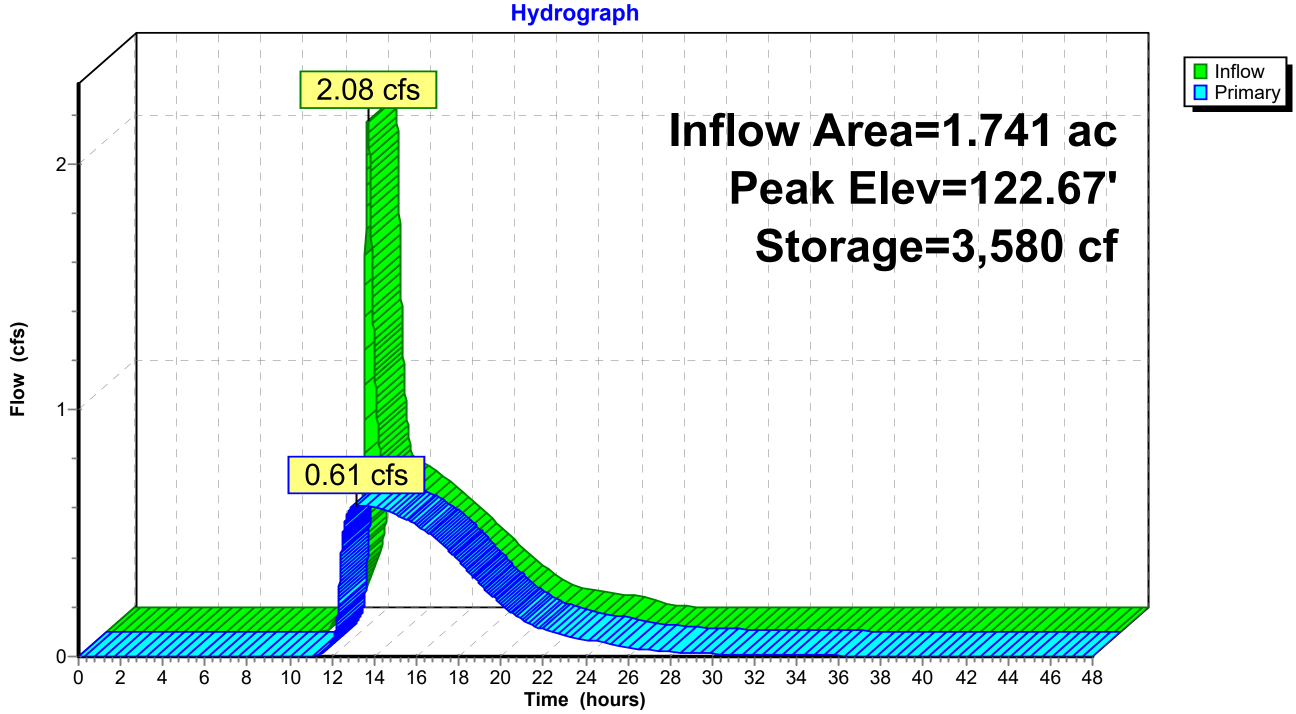
23,877.3 cf Field - 21,120.0 cf Chambers = 2,757.3 cf Stone x 40.0% Voids = 1,102.9 cf Stone Storage

Chamber Storage + Stone Storage = 16,240.7 cf = 0.373 af
Overall Storage Efficiency = 68.0%
Overall System Size = 148.00' x 44.00' x 3.67'

90 Chambers
884.3 cy Field
102.1 cy Stone



Pond 16P: UG-2 Retain IT (Detention)



Summary for Subcatchment P-1A: Undetained to Wetland B

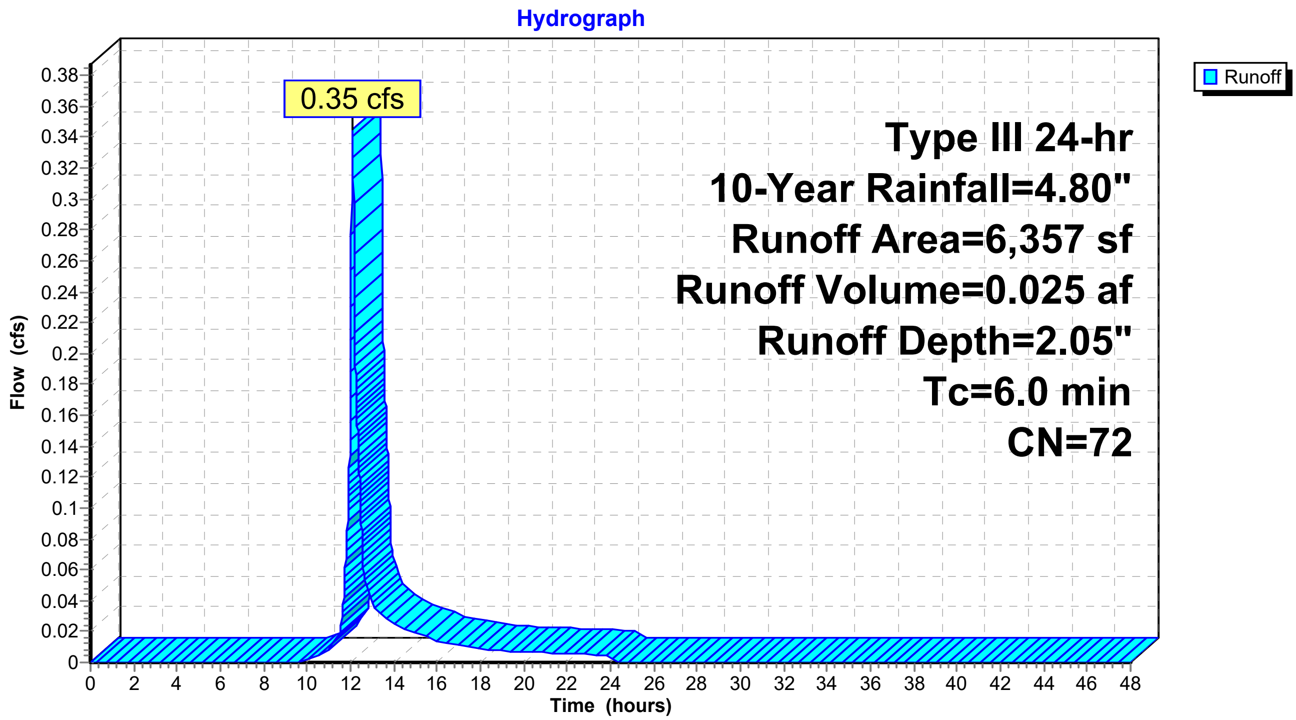
Runoff = 0.35 cfs @ 12.09 hrs, Volume= 0.025 af, Depth= 2.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.80"

Area (sf)	CN	Description
6,357	72	Woods/grass comb., Good, HSG C
6,357		100.00% Pervious Area

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

Subcatchment P-1A: Undetained to Wetland B



Summary for Subcatchment P-1B: Western Driveway

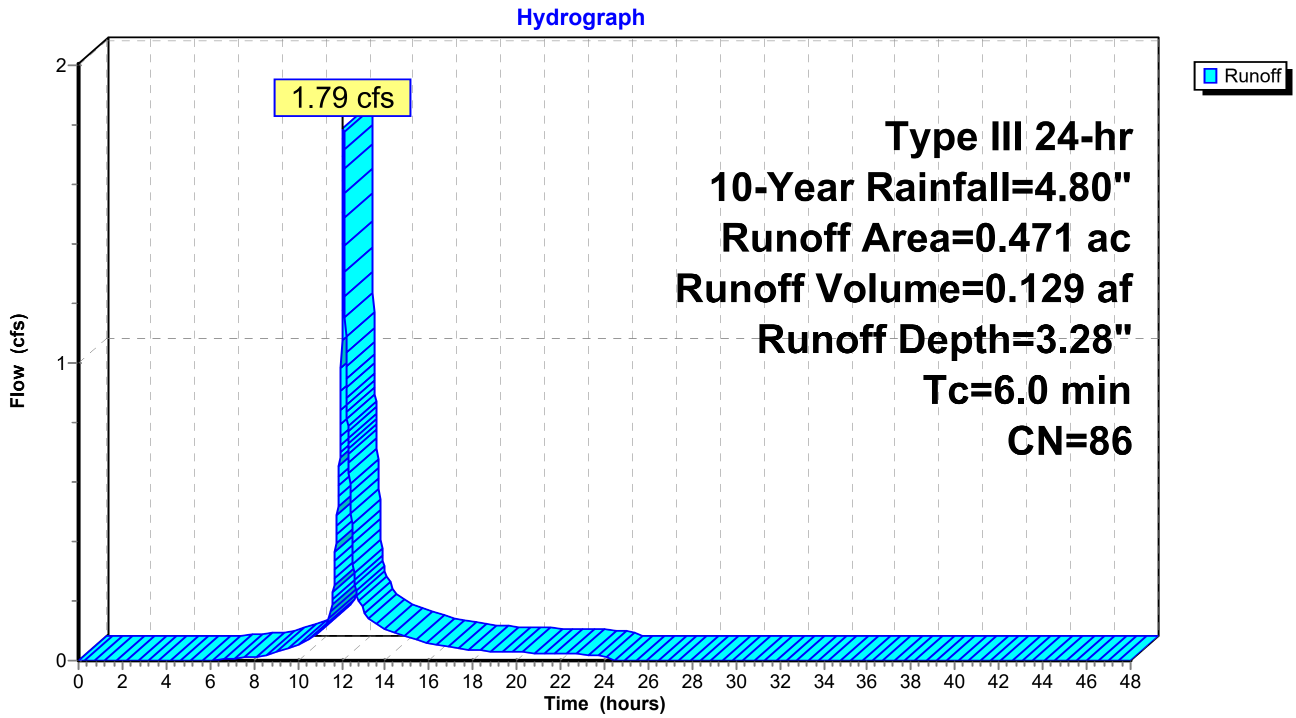
Runoff = 1.79 cfs @ 12.09 hrs, Volume= 0.129 af, Depth= 3.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.80"

Area (ac)	CN	Description
0.248	98	Paved parking, HSG C
0.223	72	Woods/grass comb., Good, HSG C
0.471	86	Weighted Average
0.223		47.35% Pervious Area
0.248		52.65% Impervious Area

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

Subcatchment P-1B: Western Driveway



Summary for Subcatchment P-1C: Permeable Pavement

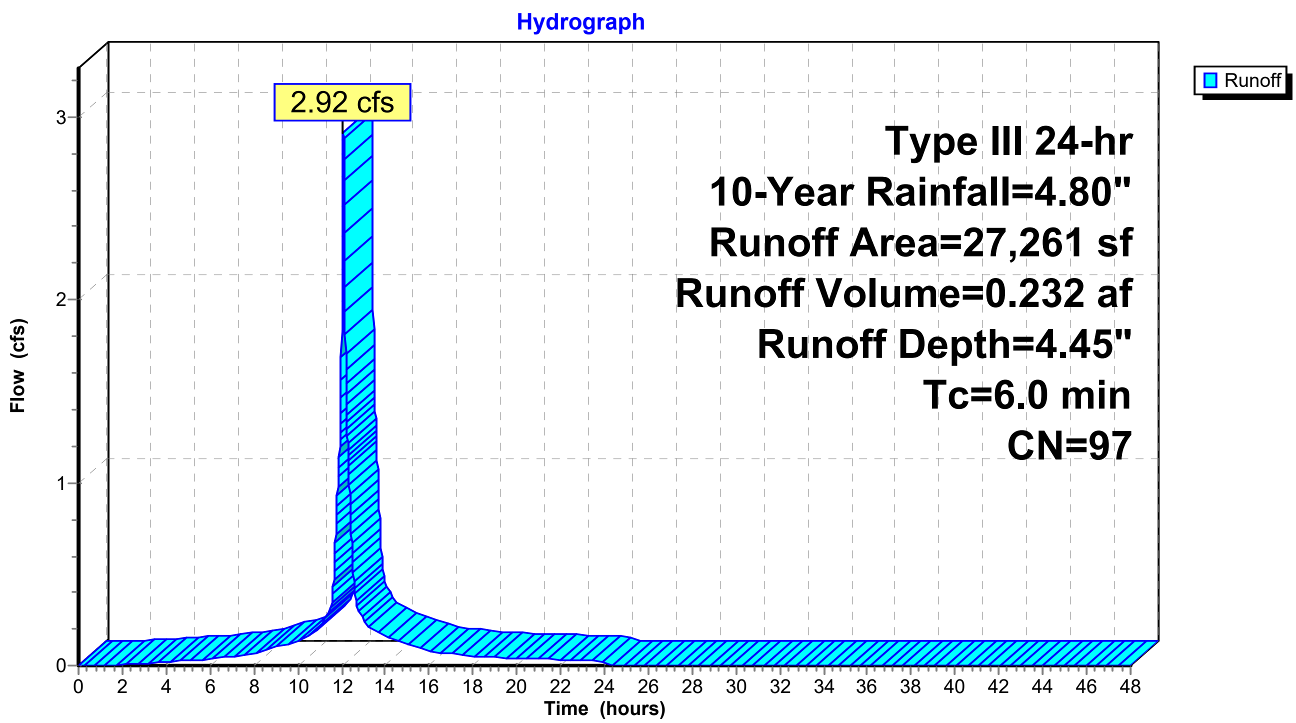
Runoff = 2.92 cfs @ 12.08 hrs, Volume= 0.232 af, Depth= 4.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.80"

	Area (sf)	CN	Description
*	25,998	98	Permeable Pavement
	1,263	74	>75% Grass cover, Good, HSG C
	27,261	97	Weighted Average
	1,263		4.63% Pervious Area
	25,998		95.37% Impervious Area

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

Subcatchment P-1C: Permeable Pavement



Summary for Subcatchment P-2: Undetained to Wetland

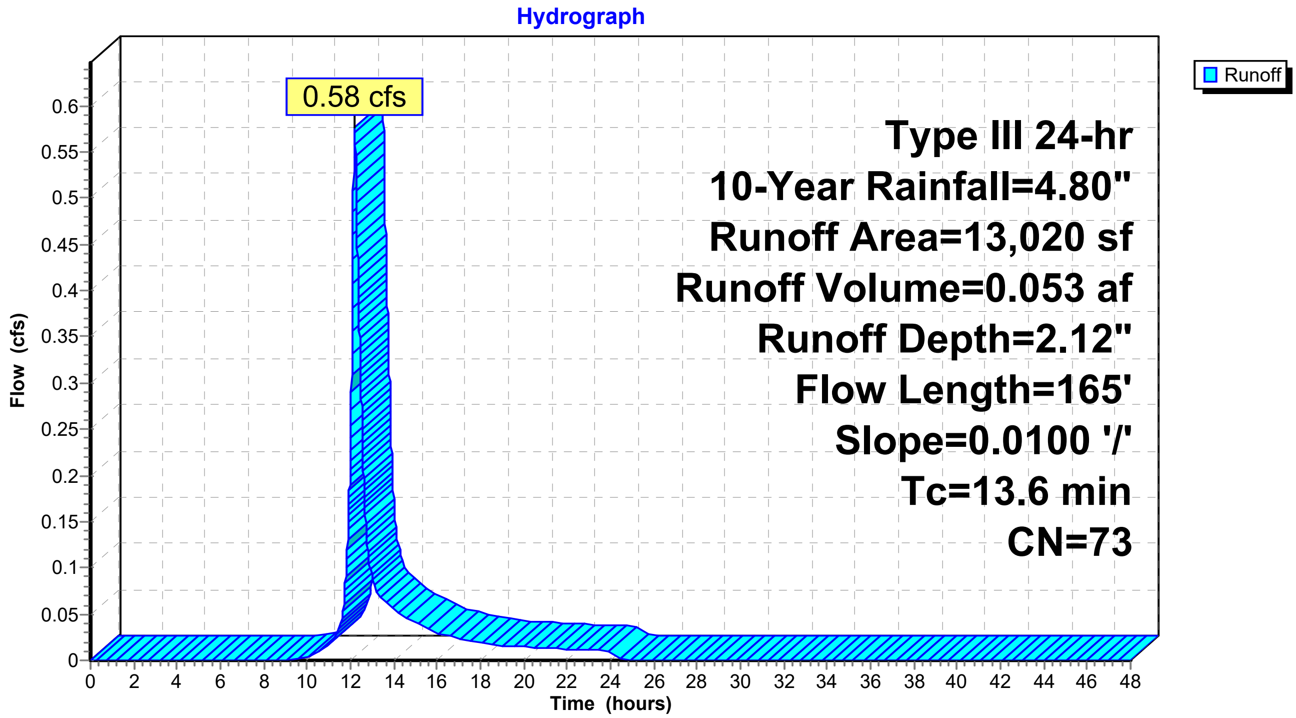
Runoff = 0.58 cfs @ 12.19 hrs, Volume= 0.053 af, Depth= 2.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.80"

Area (sf)	CN	Description
10,967	74	>75% Grass cover, Good, HSG C
2,053	70	Woods, Good, HSG C
13,020	73	Weighted Average
13,020		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	100	0.0100	0.13		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
0.7	65	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
13.6	165	Total			

Subcatchment P-2: Undetained to Wetland



Summary for Subcatchment P-3A: Additions and Upper Pavement

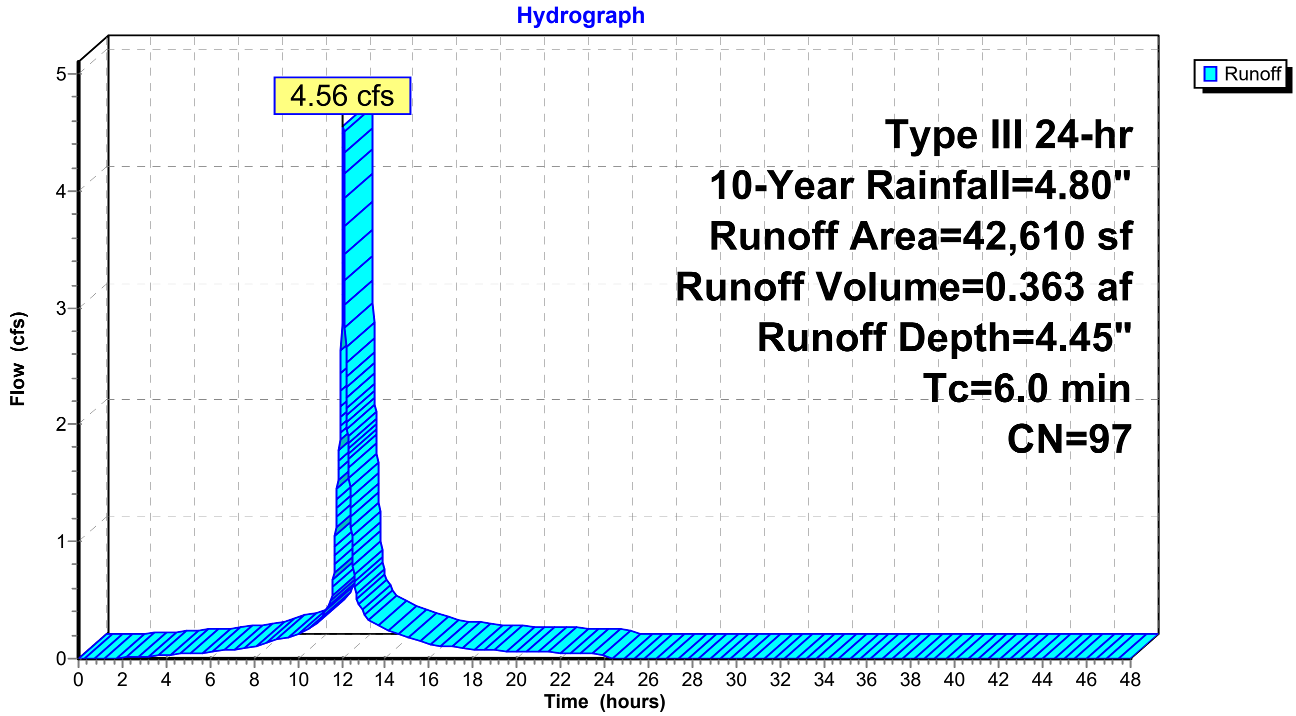
Runoff = 4.56 cfs @ 12.08 hrs, Volume= 0.363 af, Depth= 4.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.80"

Area (sf)	CN	Description
26,741	98	Paved parking, HSG C
1,277	74	>75% Grass cover, Good, HSG C
14,592	98	Roofs, HSG C
42,610	97	Weighted Average
1,277		3.00% Pervious Area
41,333		97.00% Impervious Area

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

Subcatchment P-3A: Additions and Upper Pavement



Summary for Subcatchment P-3B: Existing Building Draining to Constructed Wetland

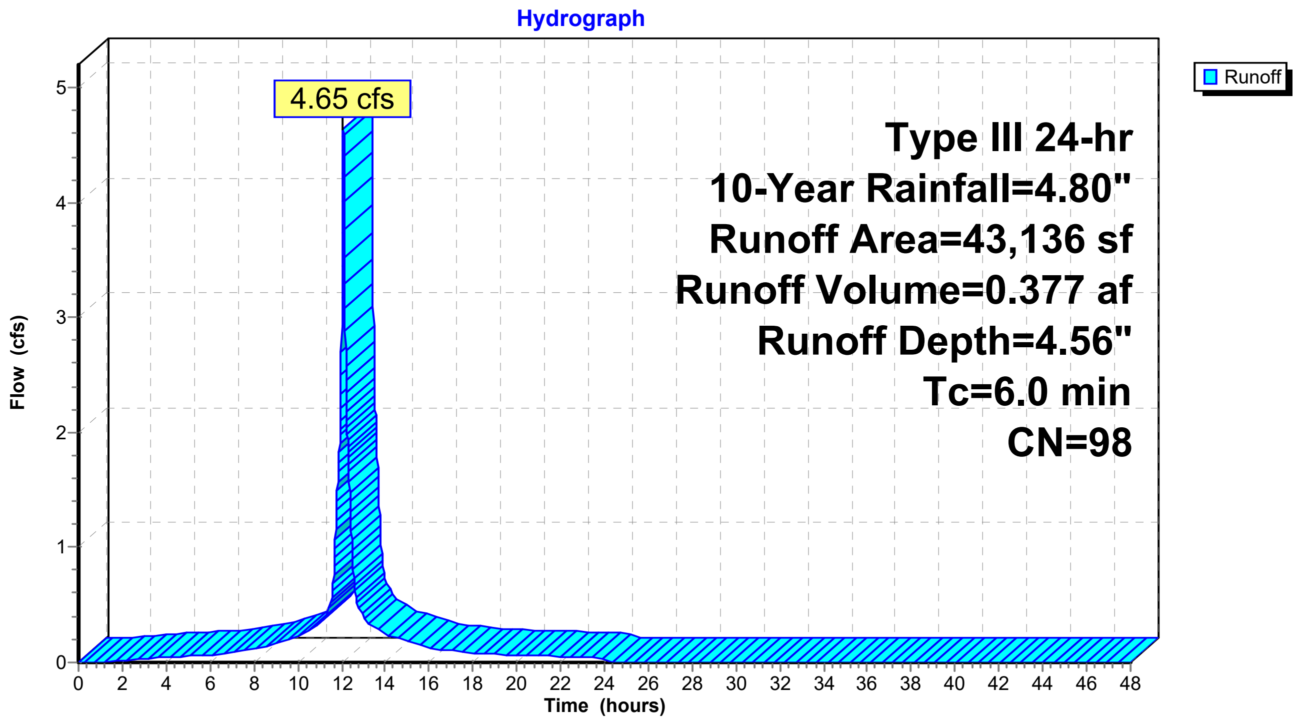
Runoff = 4.65 cfs @ 12.08 hrs, Volume= 0.377 af, Depth= 4.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.80"

Area (sf)	CN	Description
43,136	98	Roofs, HSG C
43,136		100.00% Impervious Area

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

Subcatchment P-3B: Existing Building Draining to Constructed Wetland



Summary for Subcatchment P-4: Watershed to Existing Stormwater System

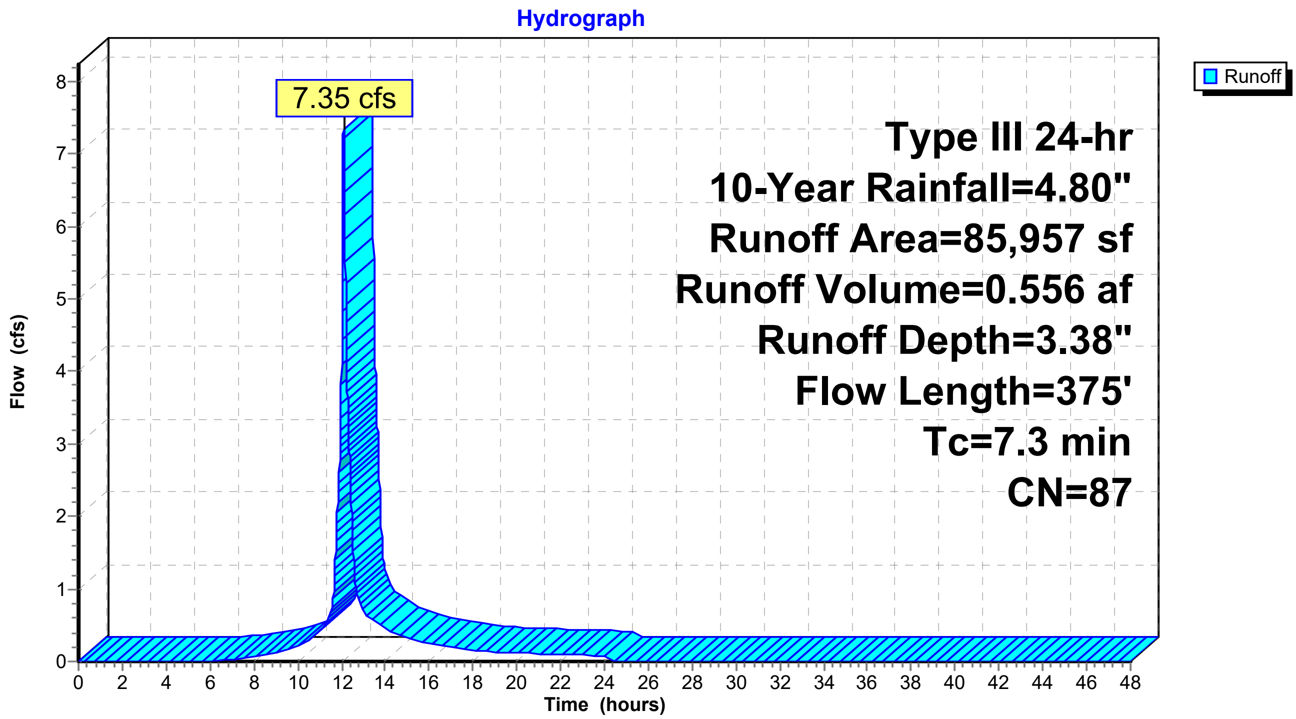
Runoff = 7.35 cfs @ 12.10 hrs, Volume= 0.556 af, Depth= 3.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.80"

Area (sf)	CN	Description
46,374	98	Paved parking, HSG C
37,535	74	>75% Grass cover, Good, HSG C
2,048	70	Woods, Good, HSG C
85,957	87	Weighted Average
39,583		46.05% Pervious Area
46,374		53.95% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.2	50	0.0240	0.16		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
1.7	245	0.0220	2.39		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.4	80	0.0287	3.44		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
7.3	375	Total			

Subcatchment P-4: Watershed to Existing Stormwater System



Summary for Subcatchment P-4A: Watershed to MassDOT CB1

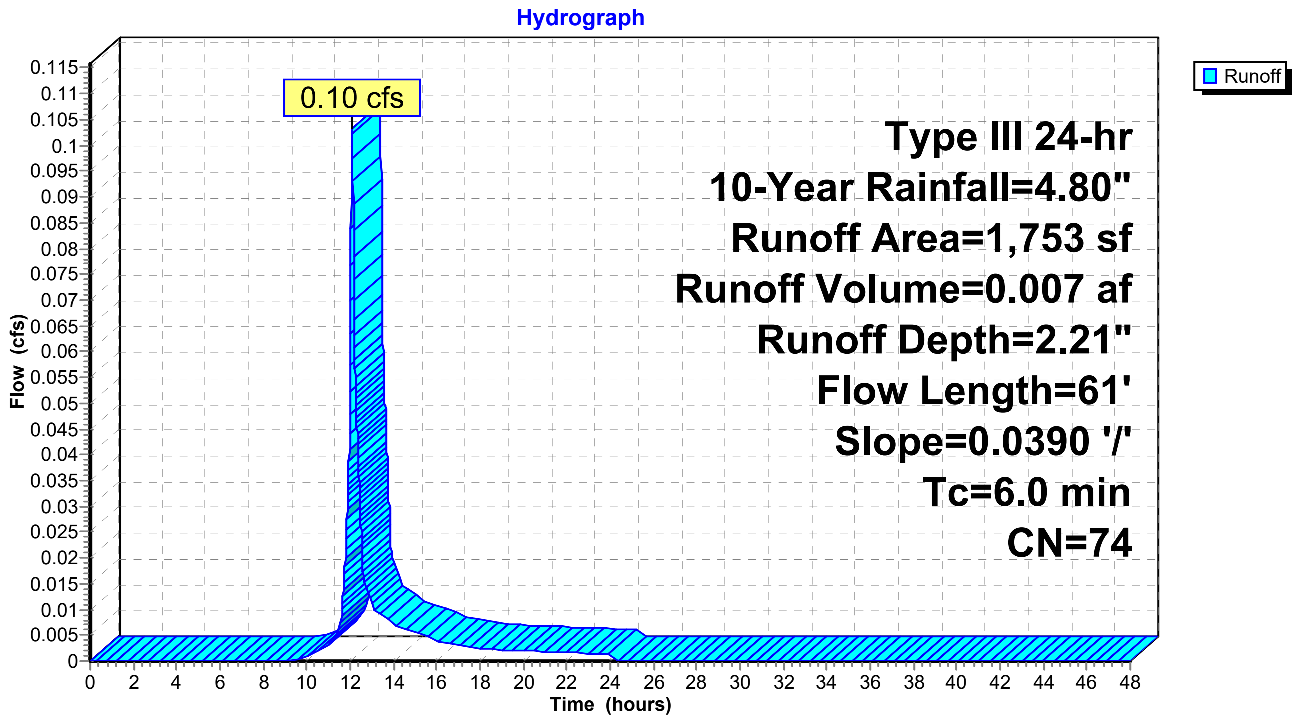
Runoff = 0.10 cfs @ 12.09 hrs, Volume= 0.007 af, Depth= 2.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.80"

Area (sf)	CN	Description
1,753	74	>75% Grass cover, Good, HSG C
1,753		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.1	61	0.0390	0.20		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
0.9					**Direct Entry,**
6.0	61	Total			

Subcatchment P-4A: Watershed to MassDOT CB1



Summary for Subcatchment P-4B: Watershed to CB2

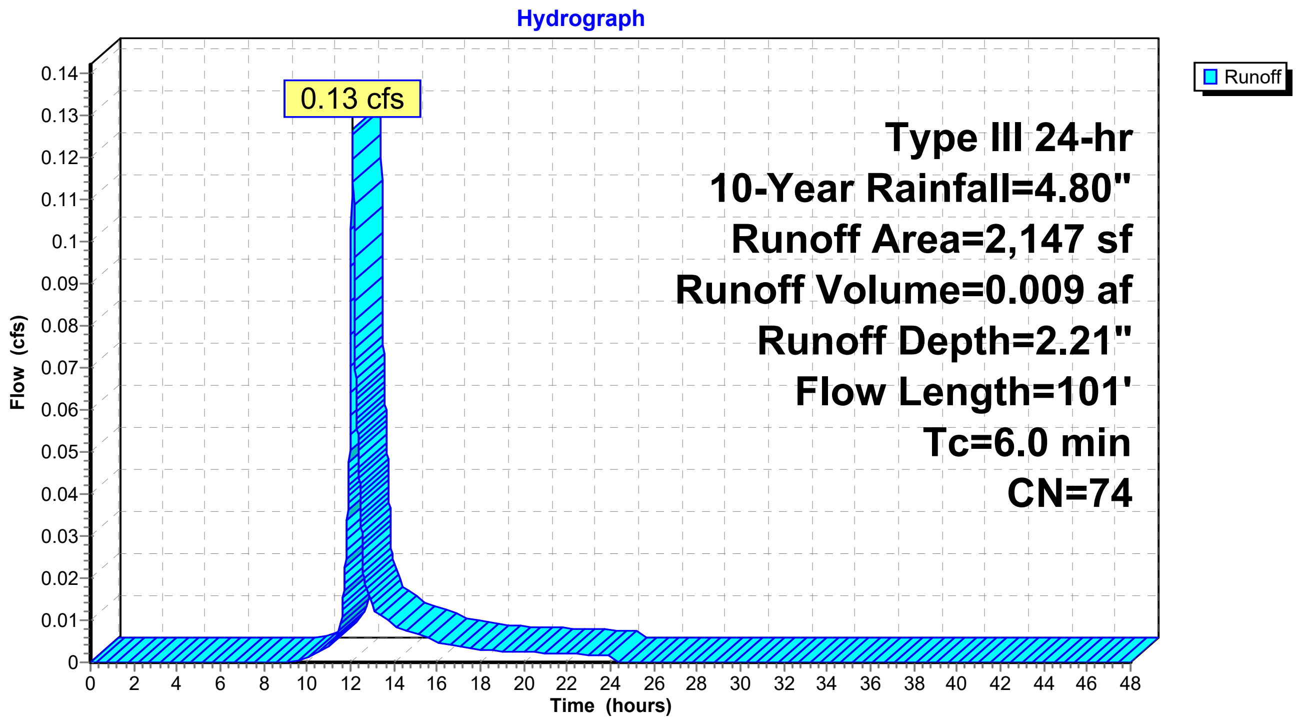
Runoff = 0.13 cfs @ 12.09 hrs, Volume= 0.009 af, Depth= 2.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.80"

Area (sf)	CN	Description
2,147	74	>75% Grass cover, Good, HSG C
2,147		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	50	0.0200	0.15		**Sheet Flow, SHeet Flow** Grass: Short n= 0.150 P2= 3.20"
0.3	51	0.0390	3.18		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.1					**Direct Entry, Miniumum**
6.0	101	Total			

Subcatchment P-4B: Watershed to CB2



Summary for Subcatchment P-5: P-5

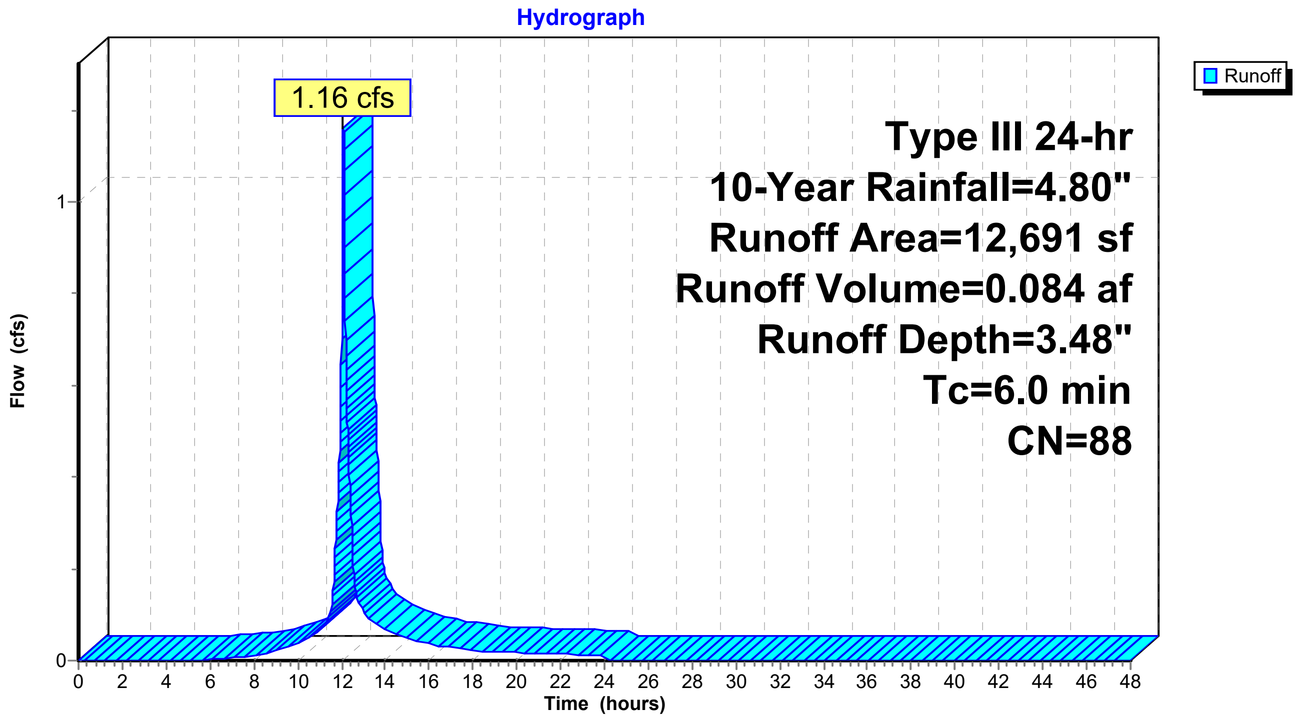
Runoff = 1.16 cfs @ 12.09 hrs, Volume= 0.084 af, Depth= 3.48"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.80"

Area (sf)	CN	Description
5,116	74	>75% Grass cover, Good, HSG C
7,575	98	Paved parking, HSG C
12,691	88	Weighted Average
5,116		40.31% Pervious Area
7,575		59.69% Impervious Area

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

Subcatchment P-5: P-5

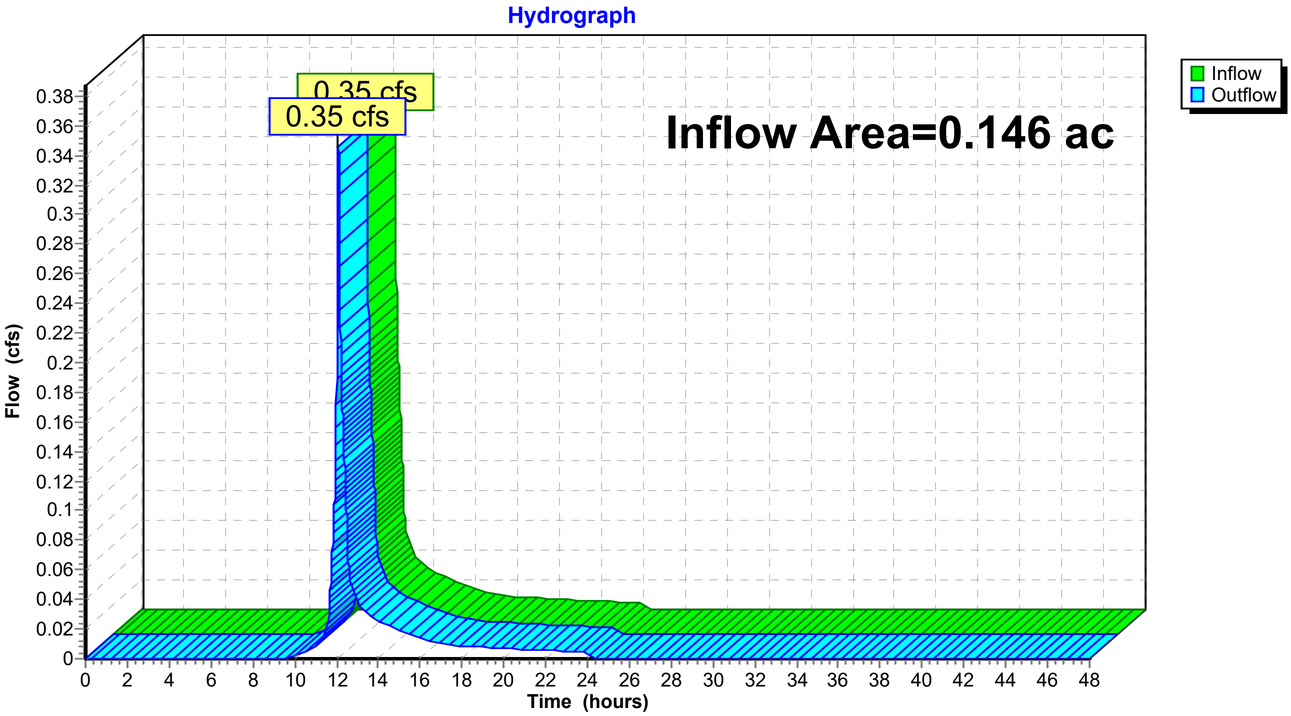


Summary for Reach DP-1: Design Point 1 (Wetland B)

Inflow Area = 0.146 ac, 0.00% Impervious, Inflow Depth = 2.05" for 10-Year event
Inflow = 0.35 cfs @ 12.09 hrs, Volume= 0.025 af
Outflow = 0.35 cfs @ 12.09 hrs, Volume= 0.025 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Reach DP-1: Design Point 1 (Wetland B)

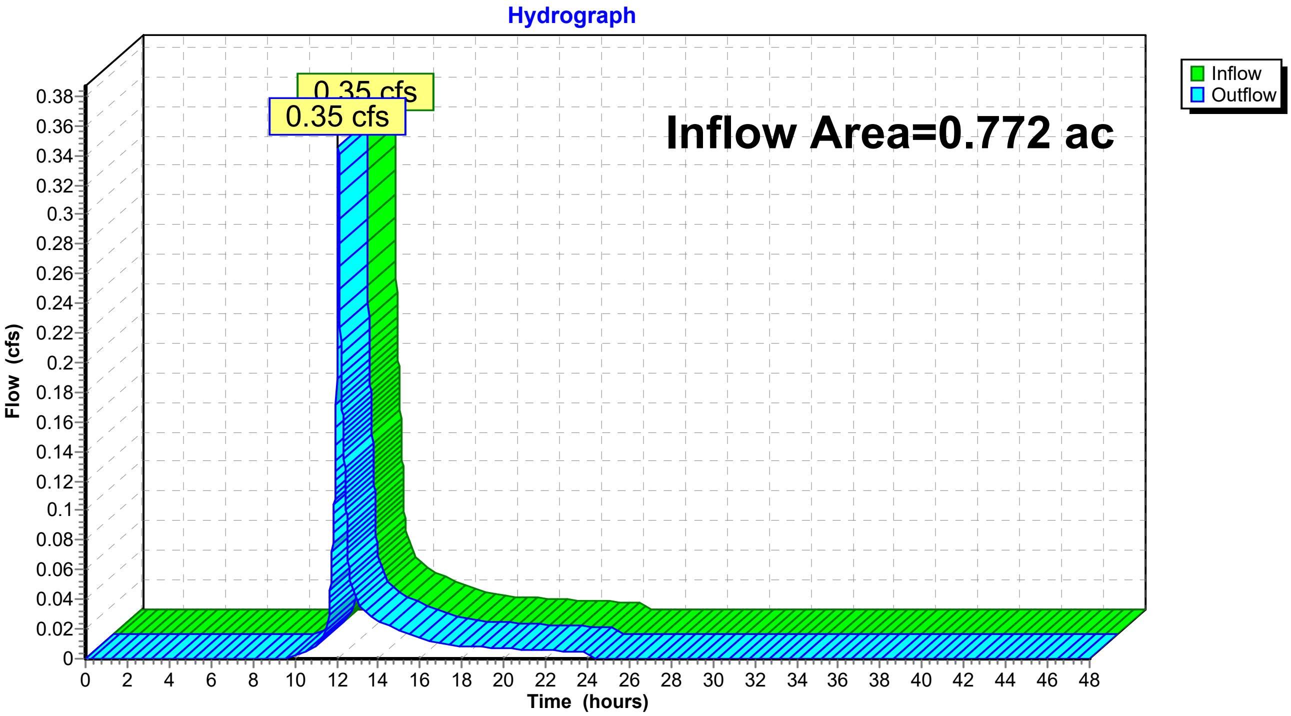


Summary for Reach DP-2: Design Point 2 (15" RCP to Wetland A)

Inflow Area = 0.772 ac, 77.33% Impervious, Inflow Depth = 0.39" for 10-Year event
Inflow = 0.35 cfs @ 12.09 hrs, Volume= 0.025 af
Outflow = 0.35 cfs @ 12.09 hrs, Volume= 0.025 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Reach DP-2: Design Point 2 (15" RCP to Wetland A)

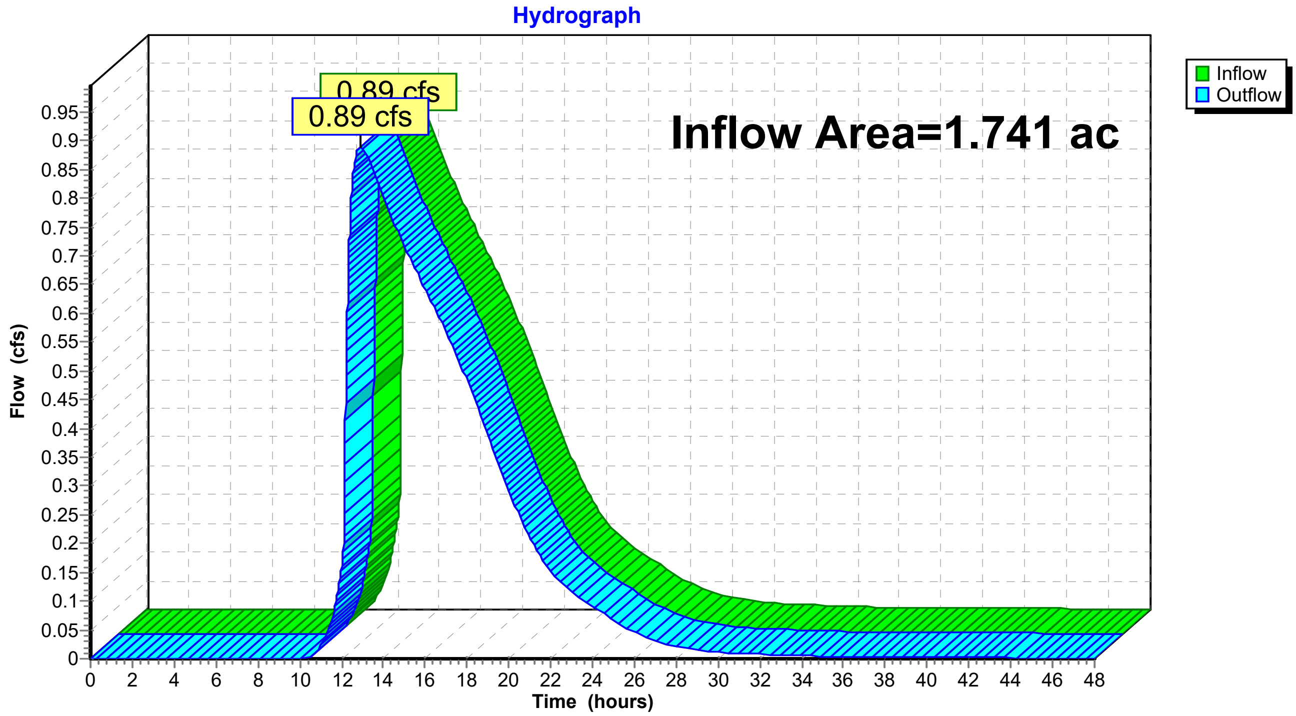


Summary for Reach DP-3: Design Point 3 (Existing Drainage Ditch)

Inflow Area = 1.741 ac, 78.76% Impervious, Inflow Depth > 3.38" for 10-Year event
Inflow = 0.89 cfs @ 12.92 hrs, Volume= 0.490 af
Outflow = 0.89 cfs @ 12.92 hrs, Volume= 0.490 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Reach DP-3: Design Point 3 (Existing Drainage Ditch)

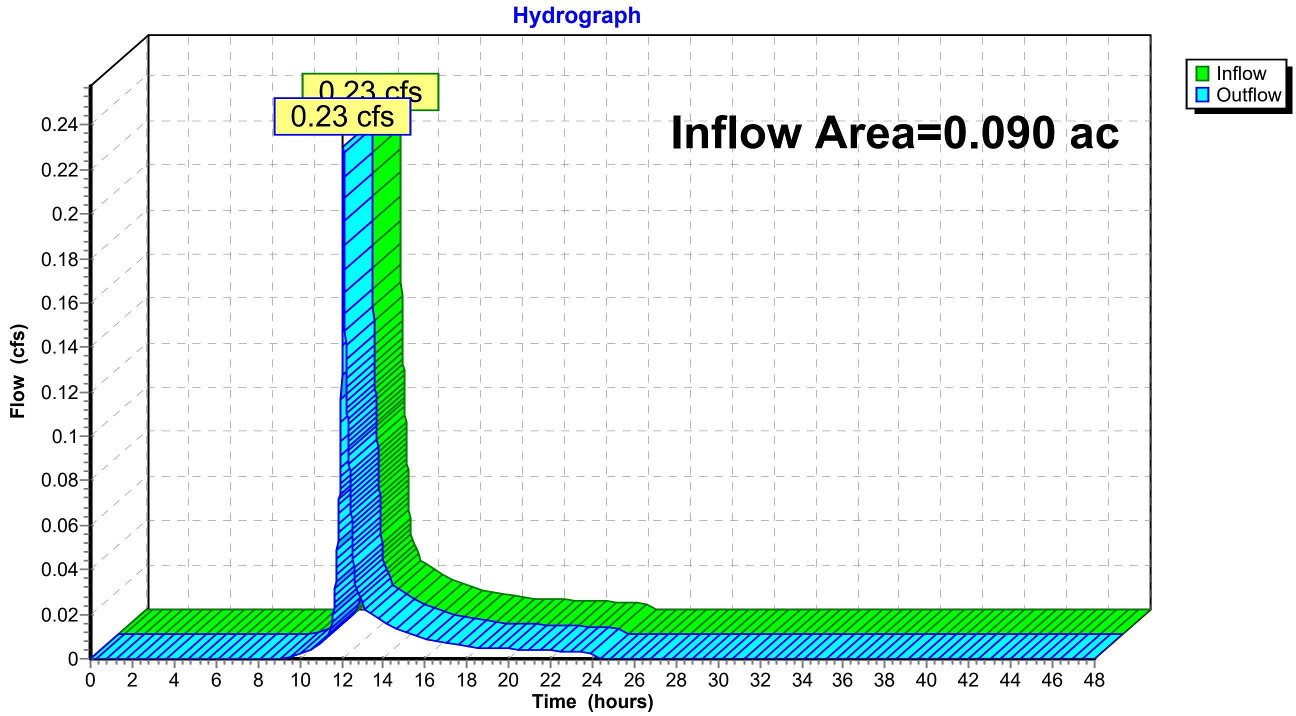


Summary for Reach DP-4: Design Point 4 (MassDOT 30" CB-2)

Inflow Area =	0.090 ac,	0.00% Impervious, Inflow Depth = 2.21"	for 10-Year event	
Inflow =	0.23 cfs @	12.09 hrs, Volume=	0.016 af	
Outflow =	0.23 cfs @	12.09 hrs, Volume=	0.016 af,	Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Reach DP-4: Design Point 4 (MassDOT 30" CB-2)

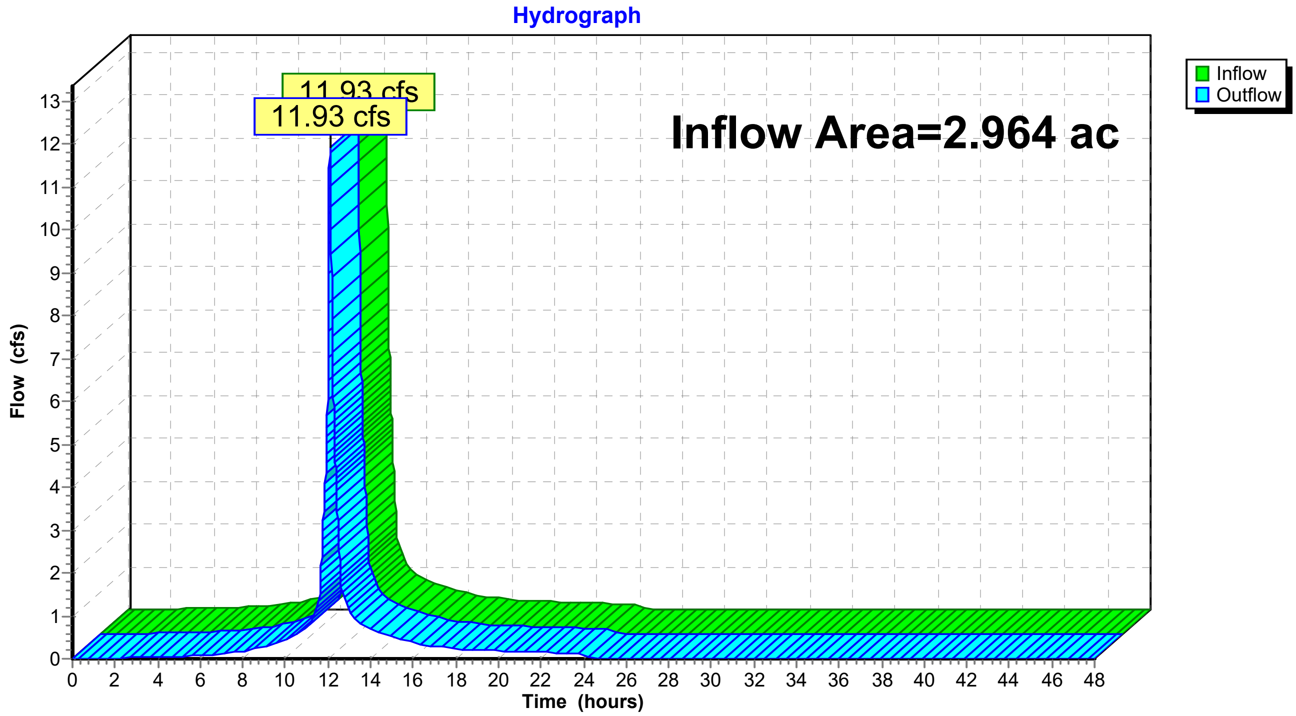


Summary for Reach DP-5: Design Point 5 (Existing Constructed Stormwater Wetland)

Inflow Area = 2.964 ac, 69.34% Impervious, Inflow Depth = 3.78" for 10-Year event
Inflow = 11.93 cfs @ 12.09 hrs, Volume= 0.932 af
Outflow = 11.93 cfs @ 12.09 hrs, Volume= 0.932 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Reach DP-5: Design Point 5 (Existing Constructed Stormwater Wetland)

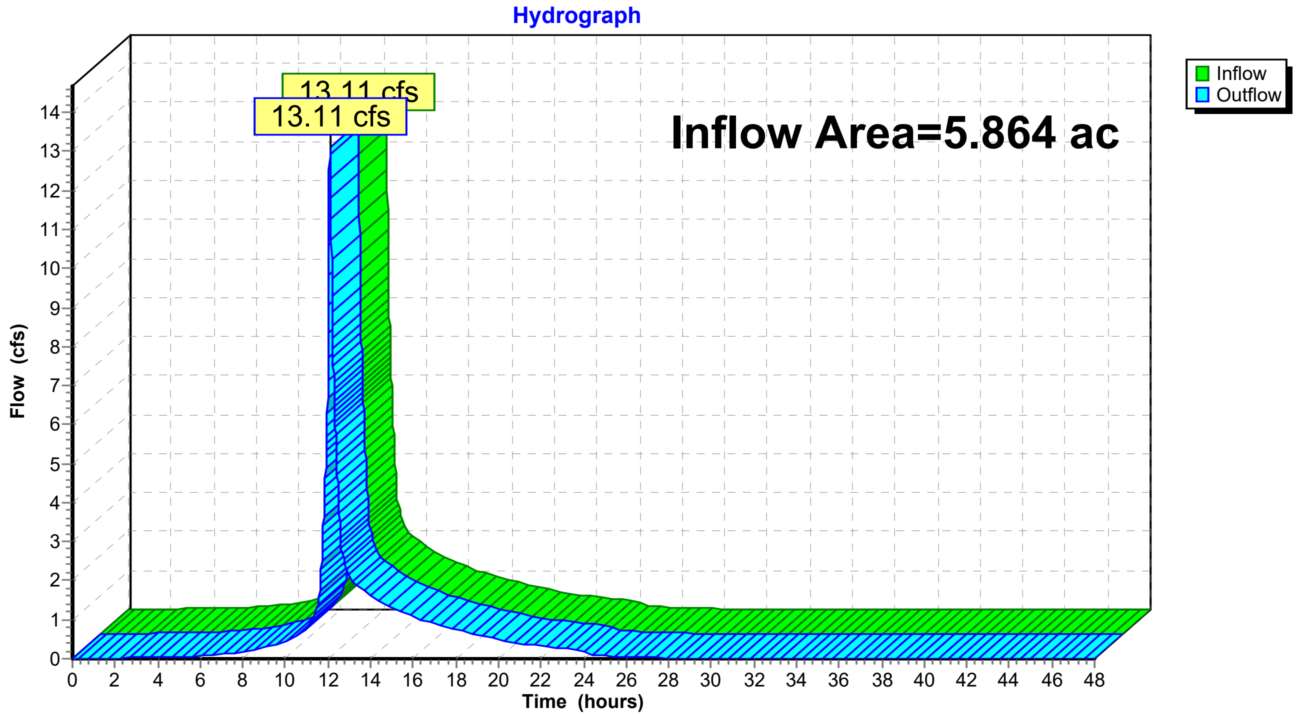


Summary for Reach DP-6: Wetland A - Design Point 6

Inflow Area =	5.864 ac, 68.59% Impervious,	Inflow Depth = 3.10"	for 10-Year event	
Inflow =	13.11 cfs @ 12.10 hrs,	Volume=	1.516 af	
Outflow =	13.11 cfs @ 12.10 hrs,	Volume=	1.516 af,	Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Reach DP-6: Wetland A - Design Point 6



Summary for Pond 3P: Conveyance Swale

Inflow Area = 0.471 ac, 52.65% Impervious, Inflow Depth = 3.28" for 10-Year event
Inflow = 1.79 cfs @ 12.09 hrs, Volume= 0.129 af
Outflow = 1.55 cfs @ 12.13 hrs, Volume= 0.121 af, Atten= 14%, Lag= 2.8 min
Primary = 1.55 cfs @ 12.13 hrs, Volume= 0.121 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 125.67' @ 12.13 hrs Surf.Area= 829 sf Storage= 790 cf

Plug-Flow detention time= 60.6 min calculated for 0.121 af (94% of inflow)
Center-of-Mass det. time= 28.1 min (834.1 - 806.0)

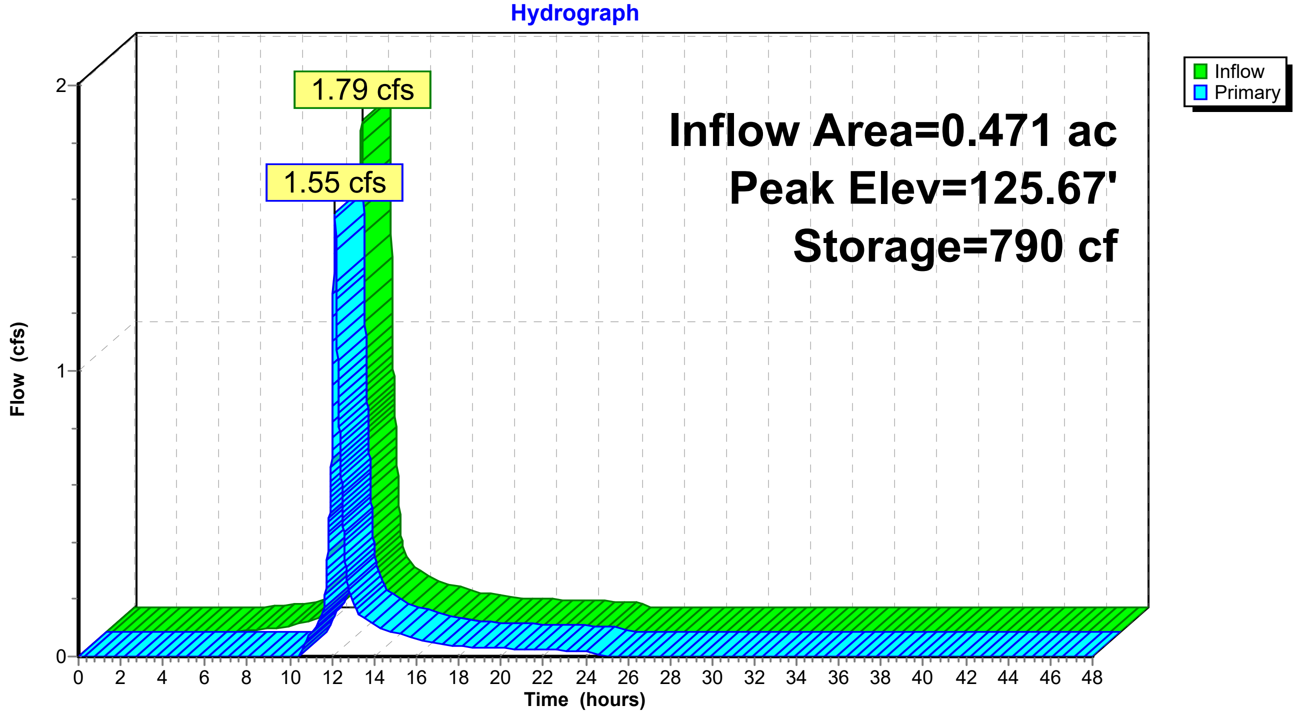
Volume	Invert	Avail.Storage	Storage Description
#1	124.00'	1,645 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
124.00	143	0	0
125.00	530	337	337
126.00	978	754	1,091
126.50	1,241	555	1,645

Device	Routing	Invert	Outlet Devices
#1	Primary	124.18'	**12.0" Round Culvert** L= 10.0' Ke= 0.500 Inlet / Outlet Invert= 124.18' / 124.13' S= 0.0050 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf
#2	Device 1	125.00'	**12.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=1.55 cfs @ 12.13 hrs HW=125.67' TW=125.12' (Dynamic Tailwater)
└─**1=Culvert** (Passes 1.55 cfs of 2.79 cfs potential flow)
  └─**2=Orifice/Grate** (Orifice Controls 1.55 cfs @ 2.78 fps)

Pond 3P: Conveyance Swale



Summary for Pond 11P: Permeable Pavement

Inflow Area = 0.626 ac, 95.37% Impervious, Inflow Depth = 4.45" for 10-Year event
Inflow = 2.92 cfs @ 12.08 hrs, Volume= 0.232 af
Outflow = 0.16 cfs @ 11.29 hrs, Volume= 0.232 af, Atten= 94%, Lag= 0.0 min
Discarded = 0.16 cfs @ 11.29 hrs, Volume= 0.232 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 123.17' @ 13.89 hrs Surf.Area= 25,998 sf Storage= 4,328 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 214.1 min (970.7 - 756.6)

Volume	Invert	Avail.Storage	Storage Description
#1	122.75'	8,813 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

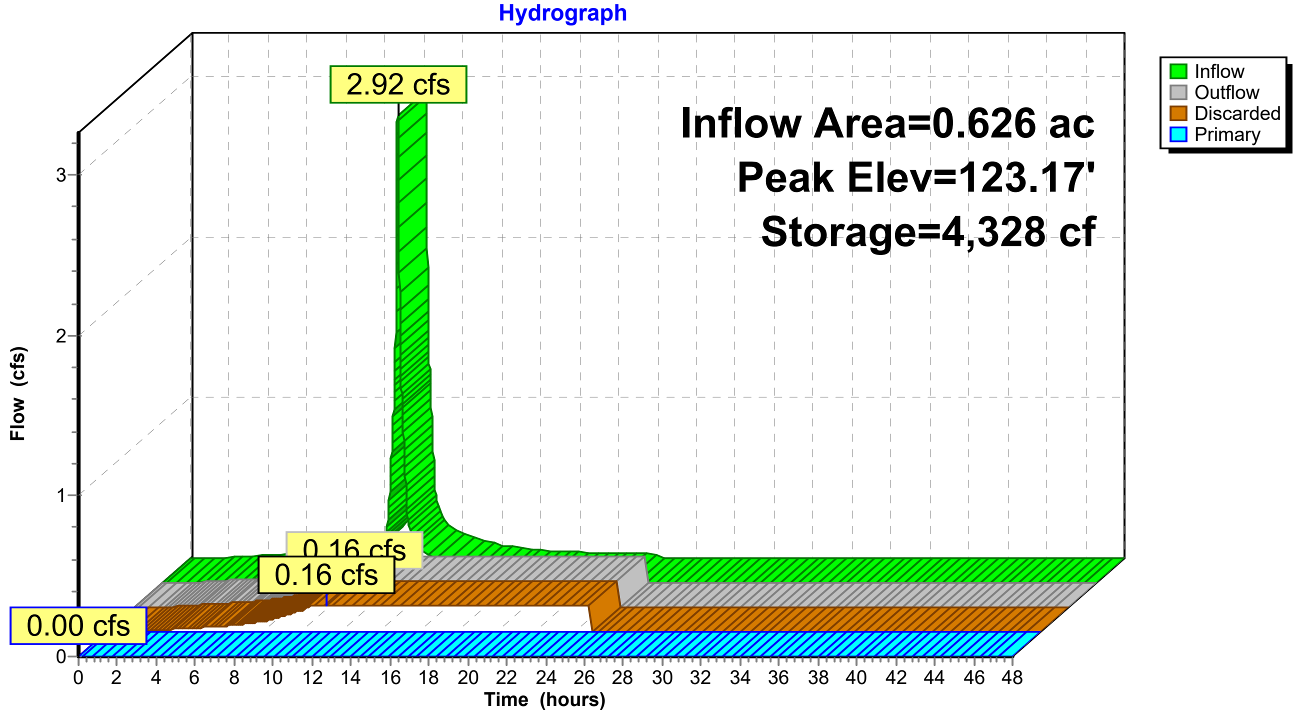
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
122.75	25,998	0.0	0	0
123.41	25,998	40.0	6,863	6,863
123.66	25,998	30.0	1,950	8,813

Device	Routing	Invert	Outlet Devices
#1	Discarded	122.75'	**0.270 in/hr Exfiltration over Surface area**
#2	Primary	123.30'	**6.0" Round Culvert** L= 10.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 123.30' / 119.00' S= 0.4300 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.20 sf

Discarded OutFlow Max=0.16 cfs @ 11.29 hrs HW=122.76' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.16 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=122.75' TW=0.00' (Dynamic Tailwater)
↑—**2=Culvert** (Controls 0.00 cfs)

Pond 11P: Permeable Pavement



Summary for Pond 13P: UG-1 Retain IT(Infiltration)

Inflow Area = 1.741 ac, 78.76% Impervious, Inflow Depth = 3.92" for 10-Year event
Inflow = 7.12 cfs @ 12.09 hrs, Volume= 0.568 af
Outflow = 5.01 cfs @ 12.18 hrs, Volume= 0.568 af, Atten= 30%, Lag= 5.6 min
Discarded = 0.02 cfs @ 4.77 hrs, Volume= 0.076 af
Primary = 4.98 cfs @ 12.18 hrs, Volume= 0.492 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 125.35' @ 12.18 hrs Surf.Area= 3,440 sf Storage= 8,569 cf

Plug-Flow detention time= 183.4 min calculated for 0.568 af (100% of inflow)
Center-of-Mass det. time= 183.6 min (963.1 - 779.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	121.75'	1,791 cf	**20.00'W x 172.00'L x 4.17'H Field A** 14,333 cf Overall - 9,856 cf Embedded = 4,477 cf x 40.0% Voids
#2A	122.25'	6,948 cf	**retain_it retain_it 3.0'** x 42 Inside #1 Inside= 84.0"W x 36.0"H => 21.33 sf x 8.00'L = 170.6 cf Outside= 96.0"W x 44.0"H => 29.33 sf x 8.00'L = 234.7 cf 2 Rows adjusted for 217.2 cf perimeter wall
		8,739 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	124.75'	**3.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#2	Primary	122.50'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Discarded	121.75'	**0.270 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.02 cfs @ 4.77 hrs HW=121.79' (Free Discharge)
└─**3=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=4.86 cfs @ 12.18 hrs HW=125.34' TW=122.42' (Dynamic Tailwater)
├─**1=Broad-Crested Rectangular Weir** (Weir Controls 4.17 cfs @ 2.36 fps)
└─**2=Orifice/Grate** (Orifice Controls 0.69 cfs @ 7.87 fps)

Pond 13P: UG-1 Retain IT(Infiltration) - Chamber Wizard Field A

Chamber Model = retain_it retain_it 3.0' (retain-it®)
Inside= 84.0"W x 36.0"H => 21.33 sf x 8.00'L = 170.6 cf
Outside= 96.0"W x 44.0"H => 29.33 sf x 8.00'L = 234.7 cf
2 Rows adjusted for 217.2 cf perimeter wall

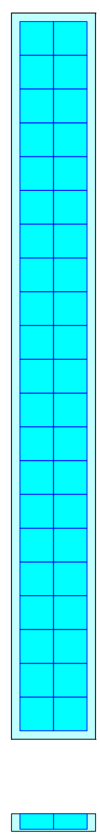
21 Chambers/Row x 8.00' Long = 168.00' Row Length +24.0" End Stone x 2 = 172.00' Base Length
2 Rows x 96.0" Wide + 24.0" Side Stone x 2 = 20.00' Base Width
6.0" Base + 44.0" Chamber Height = 4.17' Field Height

4.7 cf Sidewall x 21 x 2 + 4.7 cf Endwall x 2 x 2 = 217.2 cf Perimeter Wall
42 Chambers x 170.6 cf - 217.2 cf Perimeter wall = 6,948.5 cf Chamber Storage
42 Chambers x 234.7 cf = 9,856.0 cf Displacement

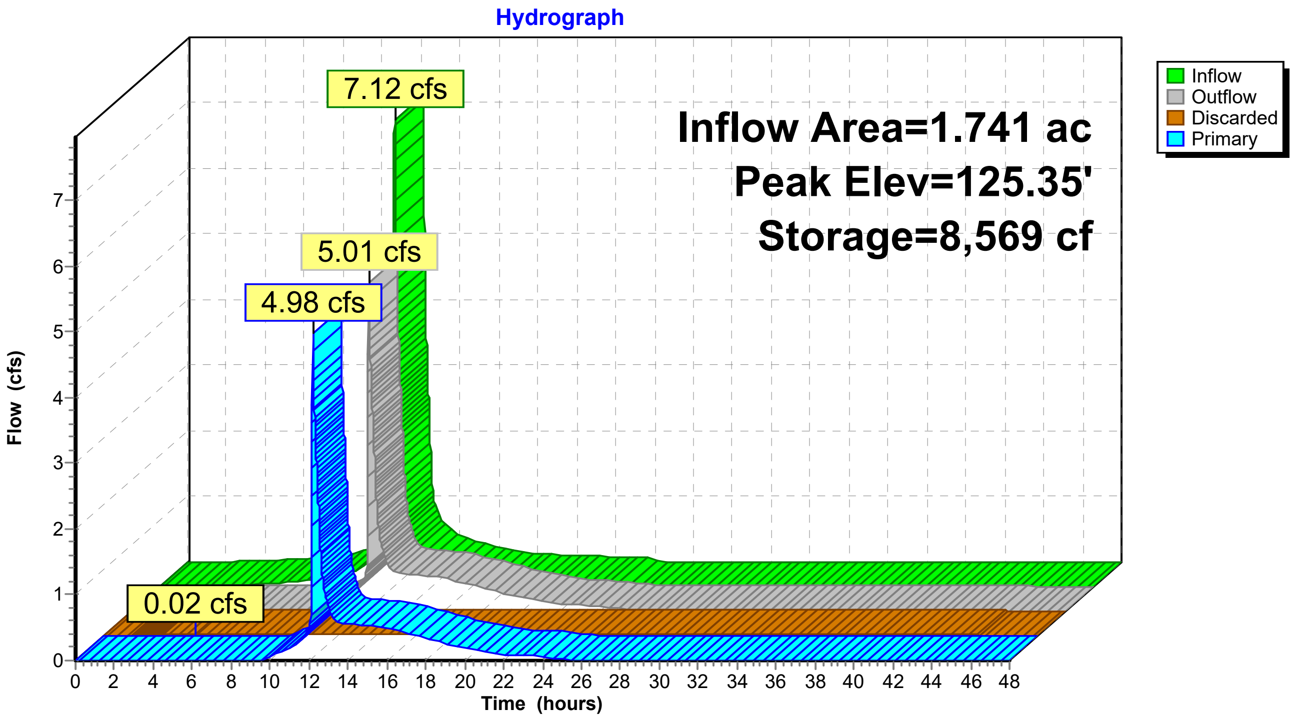
14,333.3 cf Field - 9,856.0 cf Chambers = 4,477.3 cf Stone x 40.0% Voids = 1,790.9 cf Stone Storage

Chamber Storage + Stone Storage = 8,739.4 cf = 0.201 af
Overall Storage Efficiency = 61.0%
Overall System Size = 172.00' x 20.00' x 4.17'

42 Chambers
530.9 cy Field
165.8 cy Stone



Pond 13P: UG-1 Retain IT(Infiltration)



Summary for Pond 16P: UG-2 Retain IT (Detention)

Inflow Area = 1.741 ac, 78.76% Impervious, Inflow Depth = 3.39" for 10-Year event
Inflow = 4.98 cfs @ 12.18 hrs, Volume= 0.492 af
Outflow = 0.89 cfs @ 12.92 hrs, Volume= 0.490 af, Atten= 82%, Lag= 44.1 min
Primary = 0.89 cfs @ 12.92 hrs, Volume= 0.490 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 123.13' @ 12.92 hrs Surf.Area= 6,512 sf Storage= 6,063 cf

Plug-Flow detention time= 114.4 min calculated for 0.490 af (100% of inflow)
Center-of-Mass det. time= 111.8 min (1,004.4 - 892.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	122.00'	1,103 cf	**44.00'W x 148.00'L x 3.67'H Field A** 23,877 cf Overall - 21,120 cf Embedded = 2,757 cf x 40.0% Voids
#2A	122.00'	15,138 cf	**retain_it retain_it 3.0'** x 90 Inside #1 Inside= 84.0"W x 36.0"H => 21.33 sf x 8.00'L = 170.6 cf Outside= 96.0"W x 44.0"H => 29.33 sf x 8.00'L = 234.7 cf 5 Rows adjusted for 217.2 cf perimeter wall
		16,241 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	121.50'	**12.0" Round Culvert** L= 10.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 121.50' / 121.40' S= 0.0100 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf
#2	Device 1	124.70'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#3	Device 1	122.00'	**6.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.89 cfs @ 12.92 hrs HW=123.13' TW=0.00' (Dynamic Tailwater)
1=Culvert (Passes 0.89 cfs of 4.03 cfs potential flow)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)
3=Orifice/Grate (Orifice Controls 0.89 cfs @ 4.53 fps)

Pond 16P: UG-2 Retain IT (Detention) - Chamber Wizard Field A

Chamber Model = retain_it retain_it 3.0' (retain-it®)
Inside= 84.0"W x 36.0"H => 21.33 sf x 8.00'L = 170.6 cf
Outside= 96.0"W x 44.0"H => 29.33 sf x 8.00'L = 234.7 cf
5 Rows adjusted for 217.2 cf perimeter wall

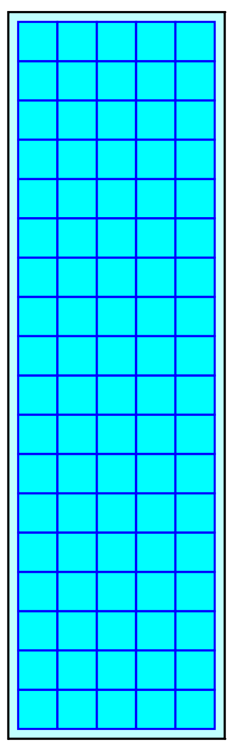
18 Chambers/Row x 8.00' Long = 144.00' Row Length +24.0" End Stone x 2 = 148.00' Base Length
5 Rows x 96.0" Wide + 24.0" Side Stone x 2 = 44.00' Base Width
44.0" Chamber Height = 3.67' Field Height

4.7 cf Sidewall x 18 x 2 + 4.7 cf Endwall x 5 x 2 = 217.2 cf Perimeter Wall
90 Chambers x 170.6 cf - 217.2 cf Perimeter wall = 15,137.8 cf Chamber Storage
90 Chambers x 234.7 cf = 21,120.0 cf Displacement

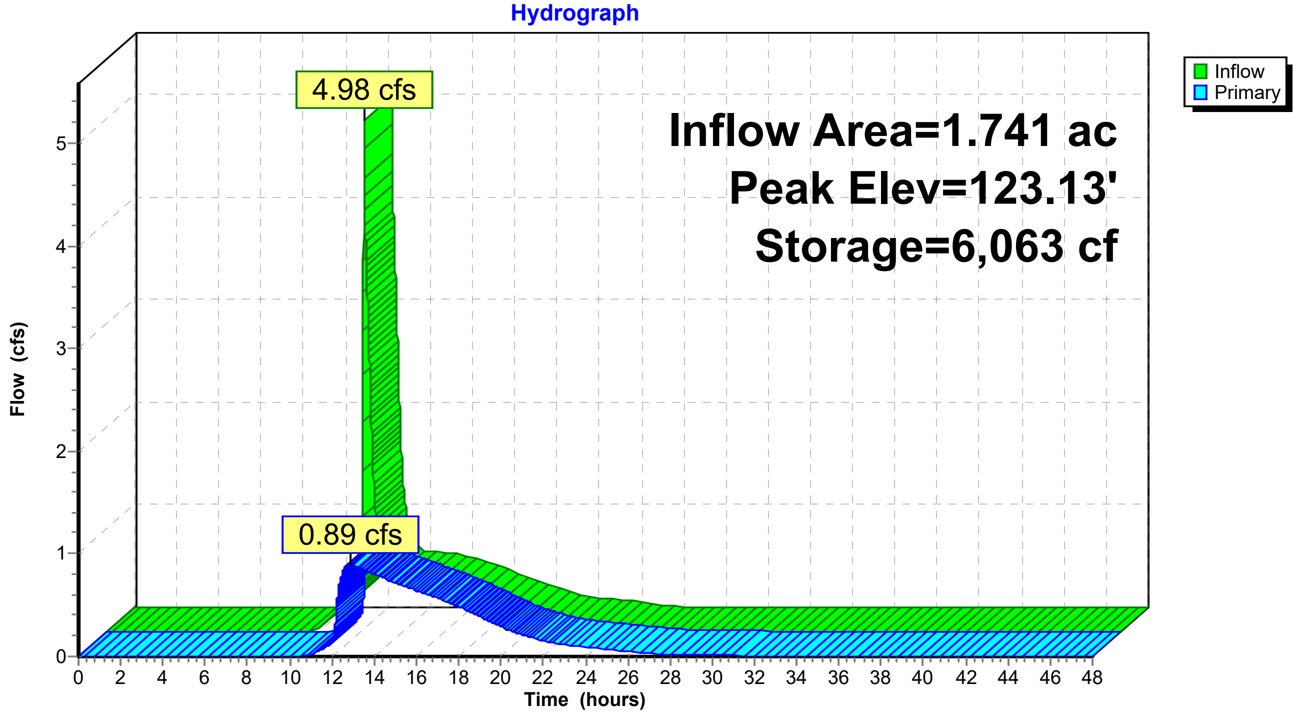
23,877.3 cf Field - 21,120.0 cf Chambers = 2,757.3 cf Stone x 40.0% Voids = 1,102.9 cf Stone Storage

Chamber Storage + Stone Storage = 16,240.7 cf = 0.373 af
Overall Storage Efficiency = 68.0%
Overall System Size = 148.00' x 44.00' x 3.67'

90 Chambers
884.3 cy Field
102.1 cy Stone



Pond 16P: UG-2 Retain IT (Detention)



Summary for Subcatchment P-1A: Undetained to Wetland B

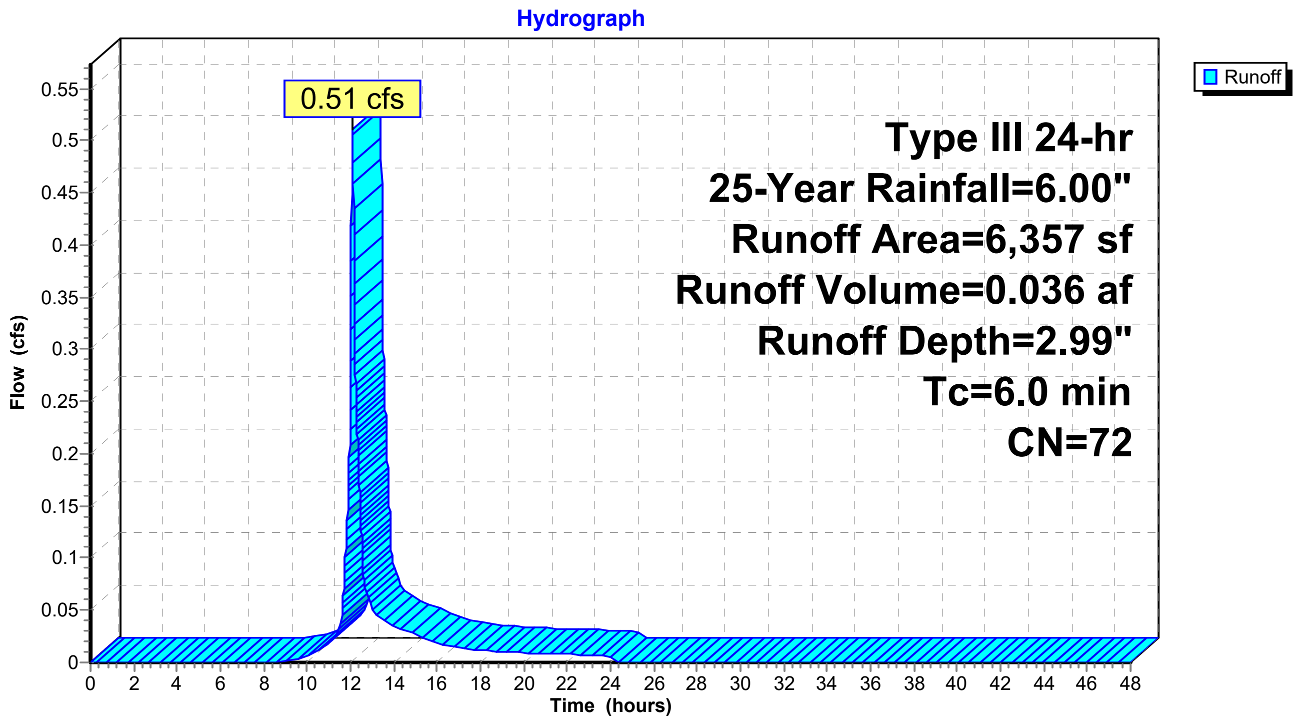
Runoff = 0.51 cfs @ 12.09 hrs, Volume= 0.036 af, Depth= 2.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.00"

Area (sf)	CN	Description
6,357	72	Woods/grass comb., Good, HSG C
6,357		100.00% Pervious Area

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

Subcatchment P-1A: Undetained to Wetland B



Summary for Subcatchment P-1B: Western Driveway

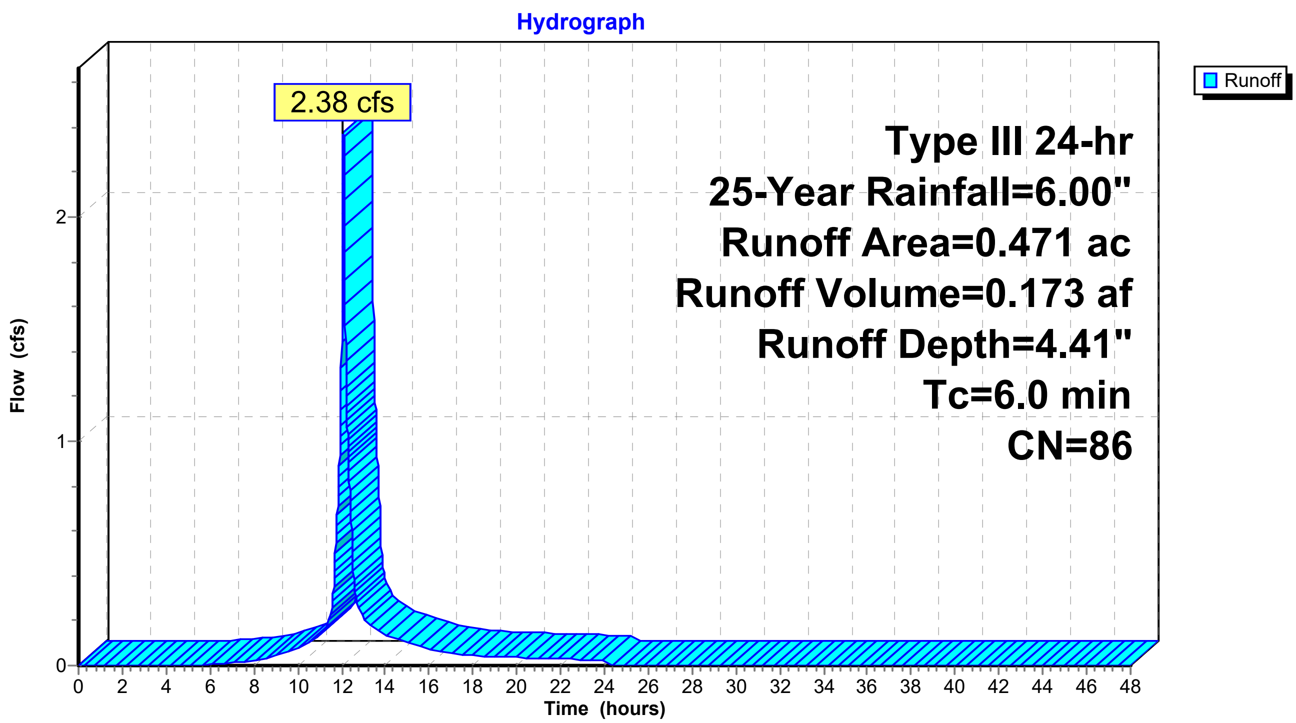
Runoff = 2.38 cfs @ 12.09 hrs, Volume= 0.173 af, Depth= 4.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.00"

Area (ac)	CN	Description
0.248	98	Paved parking, HSG C
0.223	72	Woods/grass comb., Good, HSG C
0.471	86	Weighted Average
0.223		47.35% Pervious Area
0.248		52.65% Impervious Area

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

Subcatchment P-1B: Western Driveway



Summary for Subcatchment P-1C: Permeable Pavement

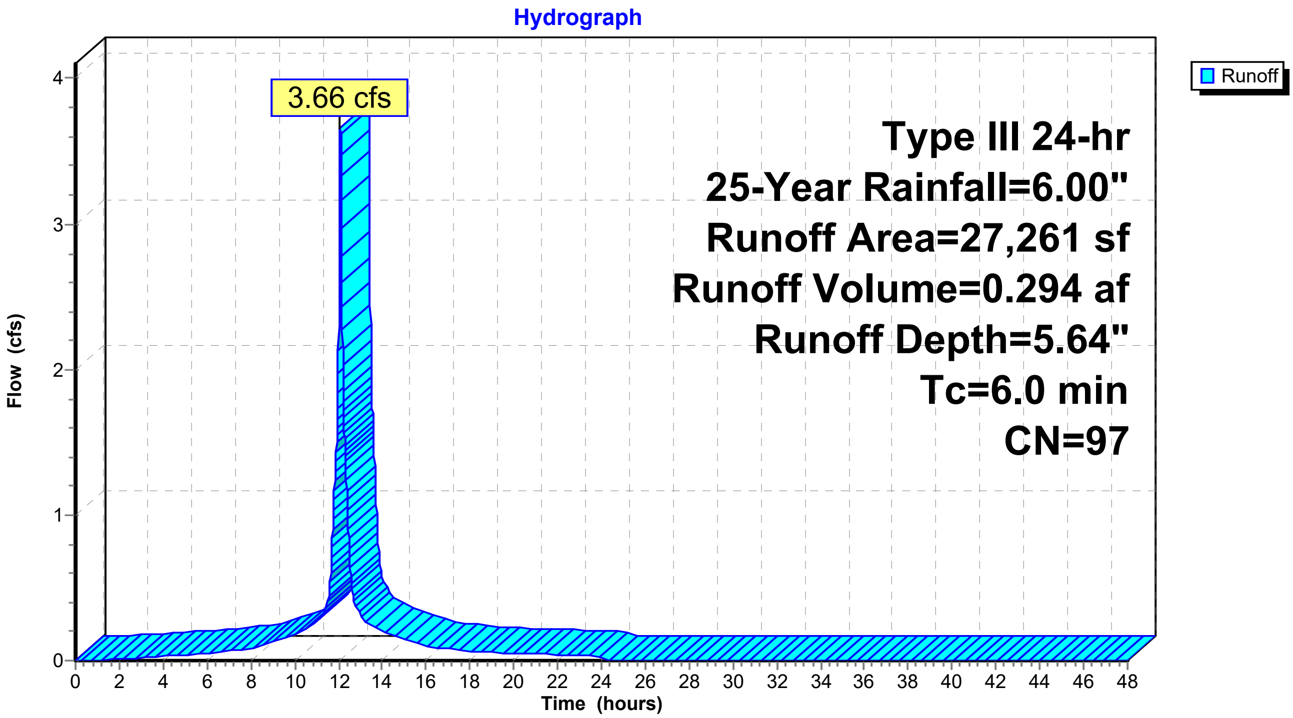
Runoff = 3.66 cfs @ 12.08 hrs, Volume= 0.294 af, Depth= 5.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.00"

	Area (sf)	CN	Description
*	25,998	98	Permeable Pavement
	1,263	74	>75% Grass cover, Good, HSG C
	27,261	97	Weighted Average
	1,263		4.63% Pervious Area
	25,998		95.37% Impervious Area

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

Subcatchment P-1C: Permeable Pavement



Summary for Subcatchment P-2: Undetained to Wetland

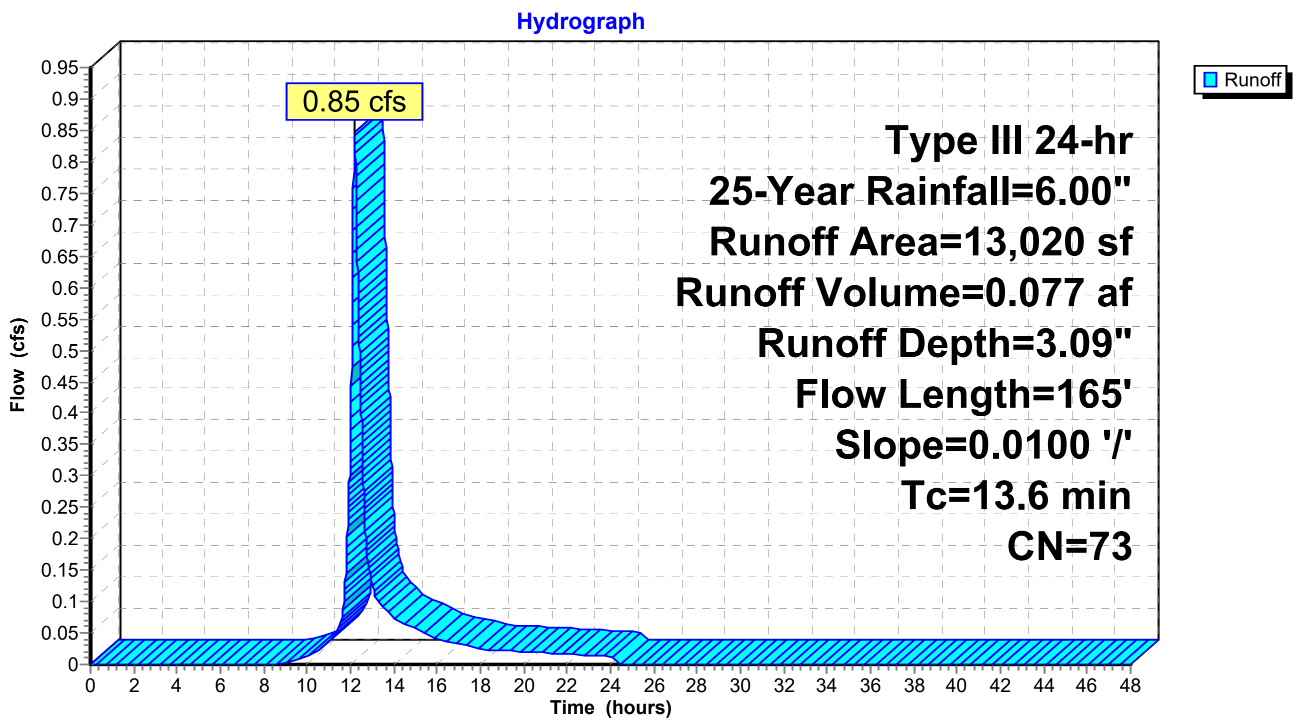
Runoff = 0.85 cfs @ 12.19 hrs, Volume= 0.077 af, Depth= 3.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.00"

Area (sf)	CN	Description
10,967	74	>75% Grass cover, Good, HSG C
2,053	70	Woods, Good, HSG C
13,020	73	Weighted Average
13,020		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	100	0.0100	0.13		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
0.7	65	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
13.6	165	Total			

Subcatchment P-2: Undetained to Wetland



Summary for Subcatchment P-3A: Additions and Upper Pavement

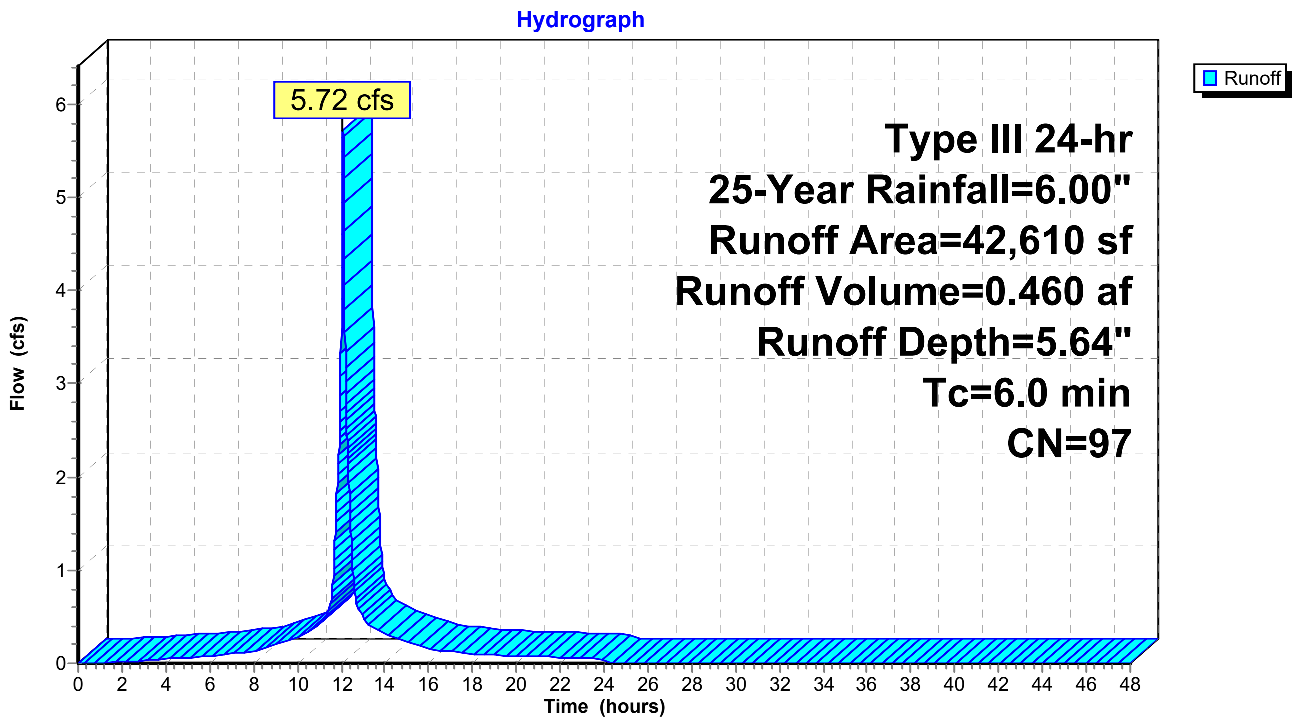
Runoff = 5.72 cfs @ 12.08 hrs, Volume= 0.460 af, Depth= 5.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.00"

Area (sf)	CN	Description
26,741	98	Paved parking, HSG C
1,277	74	>75% Grass cover, Good, HSG C
14,592	98	Roofs, HSG C
42,610	97	Weighted Average
1,277		3.00% Pervious Area
41,333		97.00% Impervious Area

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

Subcatchment P-3A: Additions and Upper Pavement



Summary for Subcatchment P-3B: Existing Building Draining to Constructed Wetland

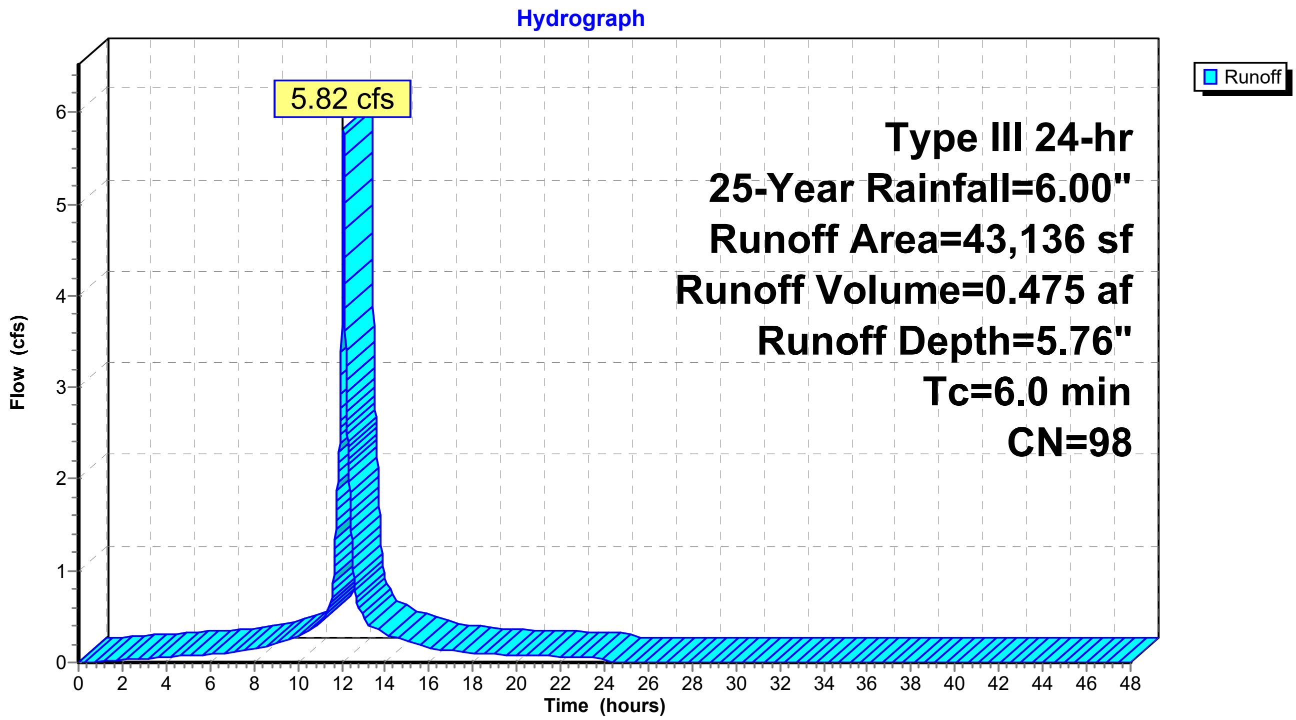
Runoff = 5.82 cfs @ 12.08 hrs, Volume= 0.475 af, Depth= 5.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.00"

Area (sf)	CN	Description
43,136	98	Roofs, HSG C
43,136		100.00% Impervious Area

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

Subcatchment P-3B: Existing Building Draining to Constructed Wetland



Summary for Subcatchment P-4: Watershed to Existing Stormwater System

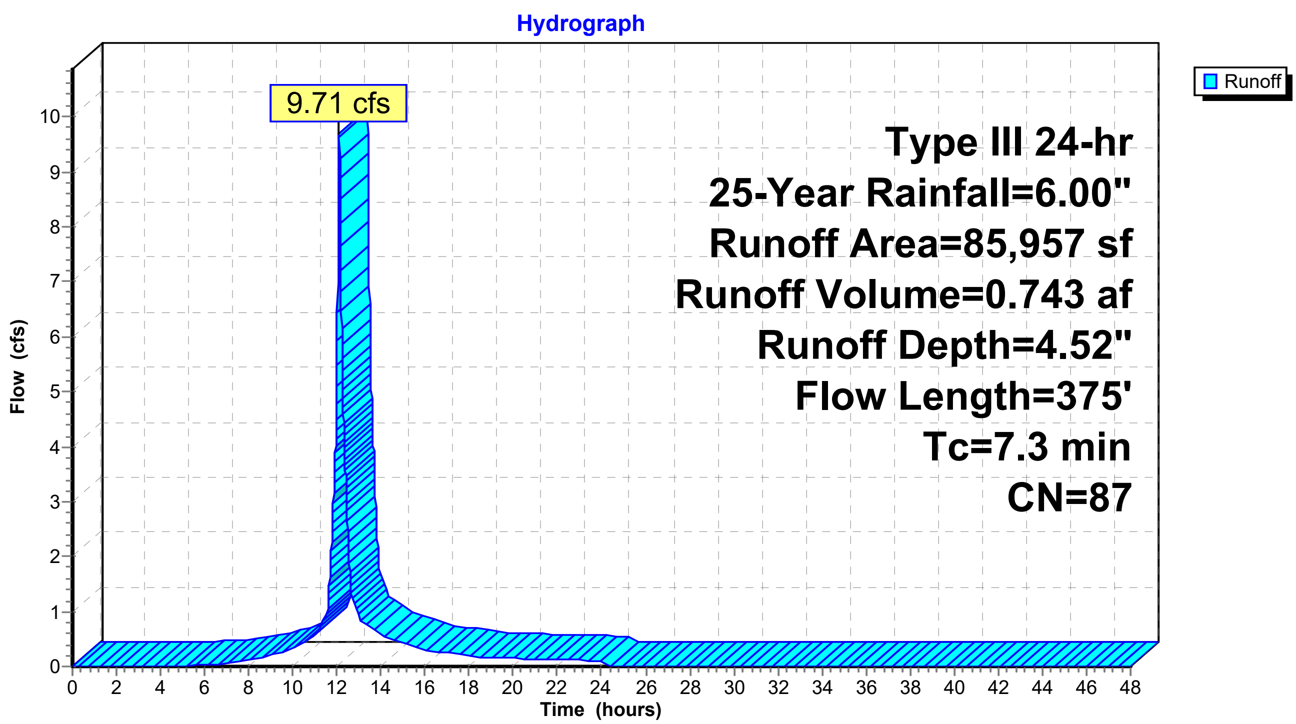
Runoff = 9.71 cfs @ 12.10 hrs, Volume= 0.743 af, Depth= 4.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.00"

Area (sf)	CN	Description
46,374	98	Paved parking, HSG C
37,535	74	>75% Grass cover, Good, HSG C
2,048	70	Woods, Good, HSG C
85,957	87	Weighted Average
39,583		46.05% Pervious Area
46,374		53.95% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.2	50	0.0240	0.16		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
1.7	245	0.0220	2.39		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.4	80	0.0287	3.44		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
7.3	375	Total			

Subcatchment P-4: Watershed to Existing Stormwater System



Summary for Subcatchment P-4A: Watershed to MassDOT CB1

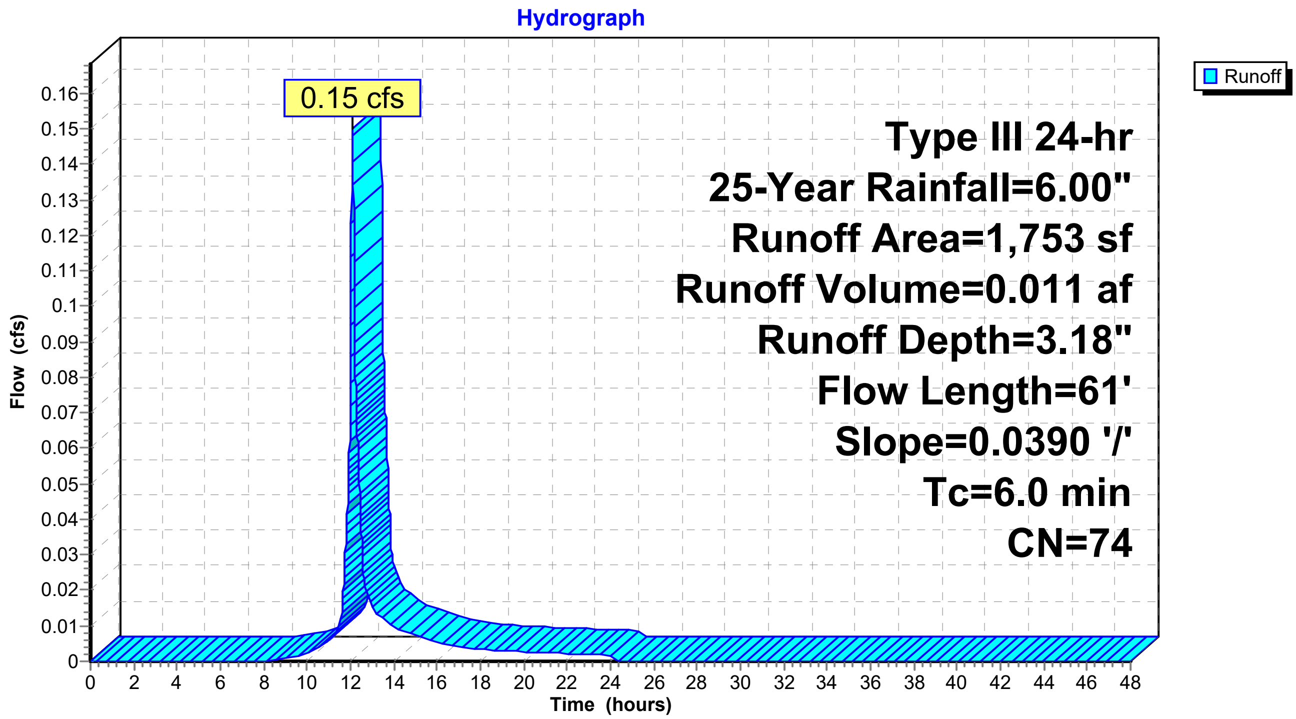
Runoff = 0.15 cfs @ 12.09 hrs, Volume= 0.011 af, Depth= 3.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.00"

Area (sf)	CN	Description
1,753	74	>75% Grass cover, Good, HSG C
1,753		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.1	61	0.0390	0.20		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
0.9					**Direct Entry,**
6.0	61	Total			

Subcatchment P-4A: Watershed to MassDOT CB1



Summary for Subcatchment P-4B: Watershed to CB2

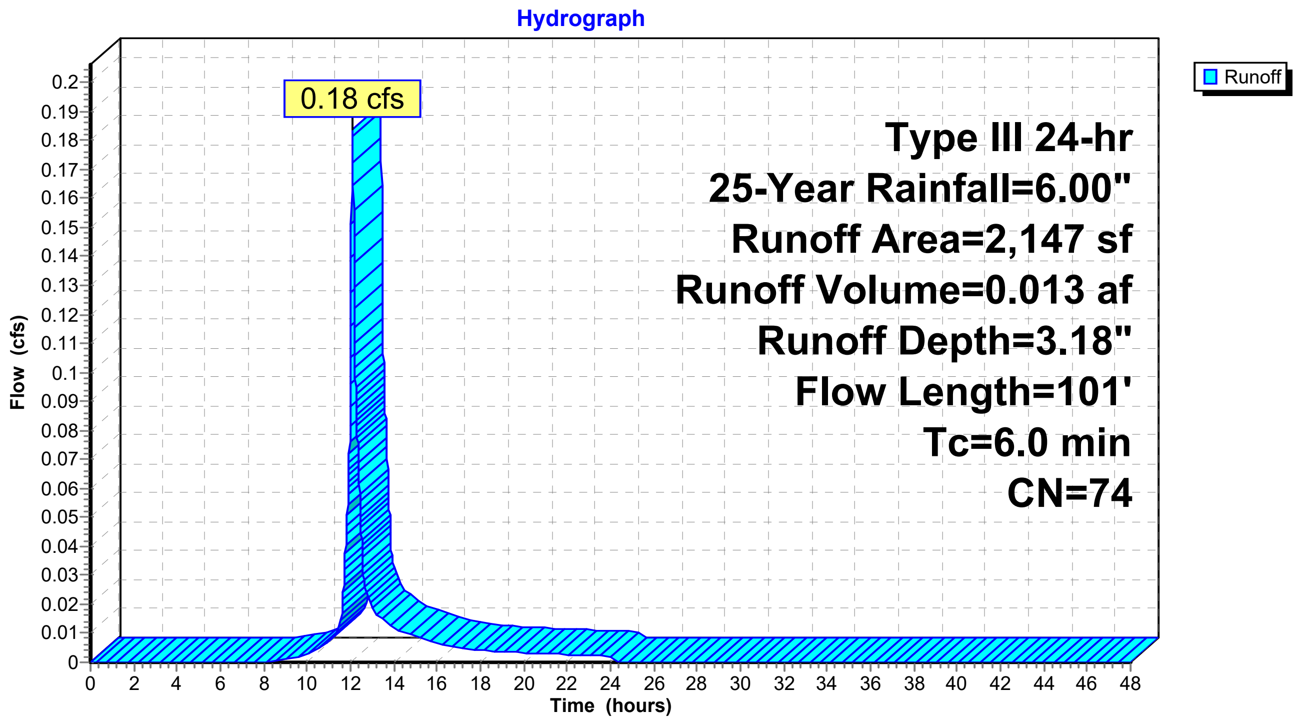
Runoff = 0.18 cfs @ 12.09 hrs, Volume= 0.013 af, Depth= 3.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.00"

Area (sf)	CN	Description
2,147	74	>75% Grass cover, Good, HSG C
2,147		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	50	0.0200	0.15		**Sheet Flow, SHeet Flow** Grass: Short n= 0.150 P2= 3.20"
0.3	51	0.0390	3.18		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.1					**Direct Entry, Miniumum**
6.0	101	Total			

Subcatchment P-4B: Watershed to CB2



Summary for Subcatchment P-5: P-5

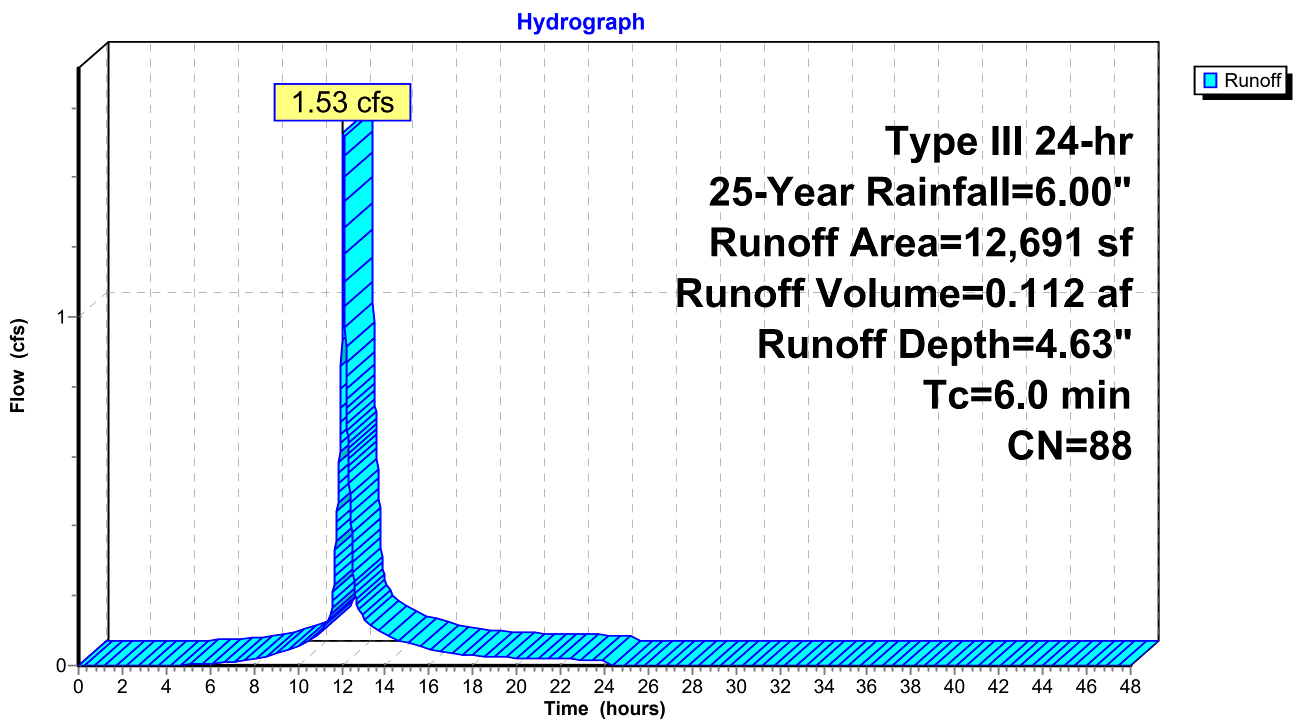
Runoff = 1.53 cfs @ 12.09 hrs, Volume= 0.112 af, Depth= 4.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.00"

Area (sf)	CN	Description
5,116	74	>75% Grass cover, Good, HSG C
7,575	98	Paved parking, HSG C
12,691	88	Weighted Average
5,116		40.31% Pervious Area
7,575		59.69% Impervious Area

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

Subcatchment P-5: P-5

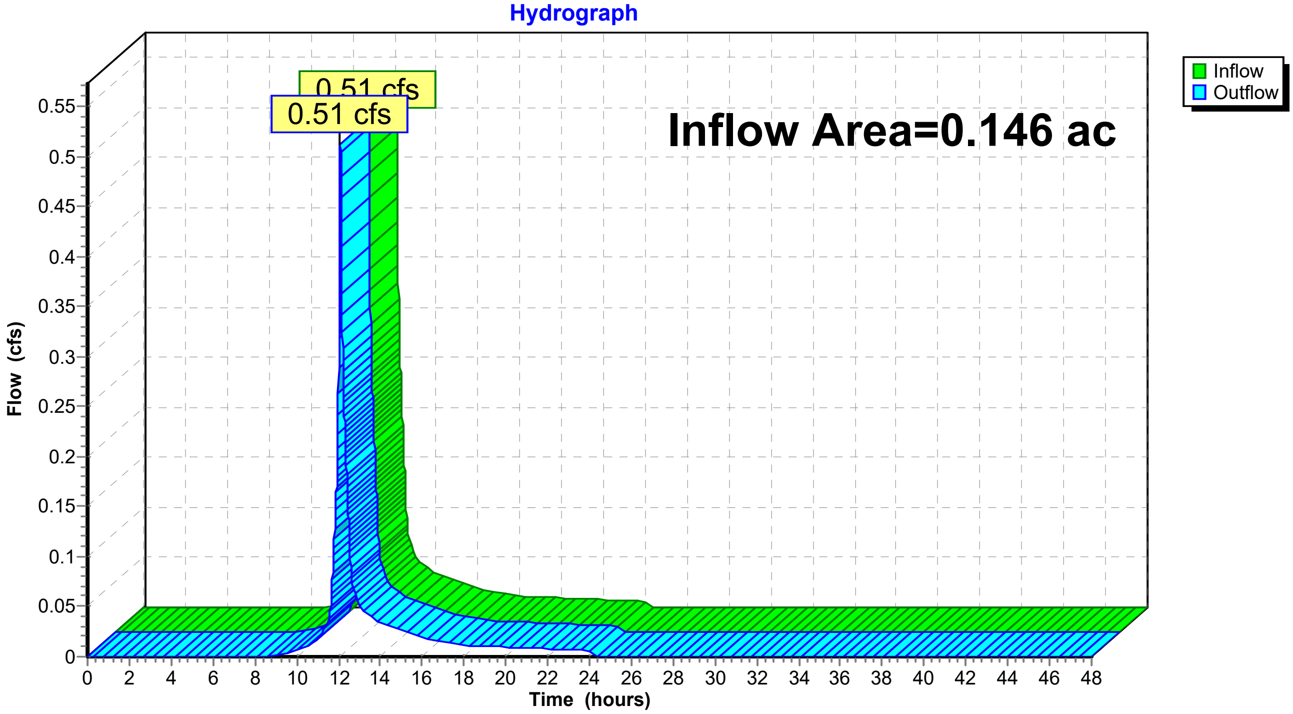


Summary for Reach DP-1: Design Point 1 (Wetland B)

Inflow Area = 0.146 ac, 0.00% Impervious, Inflow Depth = 2.99" for 25-Year event
Inflow = 0.51 cfs @ 12.09 hrs, Volume= 0.036 af
Outflow = 0.51 cfs @ 12.09 hrs, Volume= 0.036 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Reach DP-1: Design Point 1 (Wetland B)

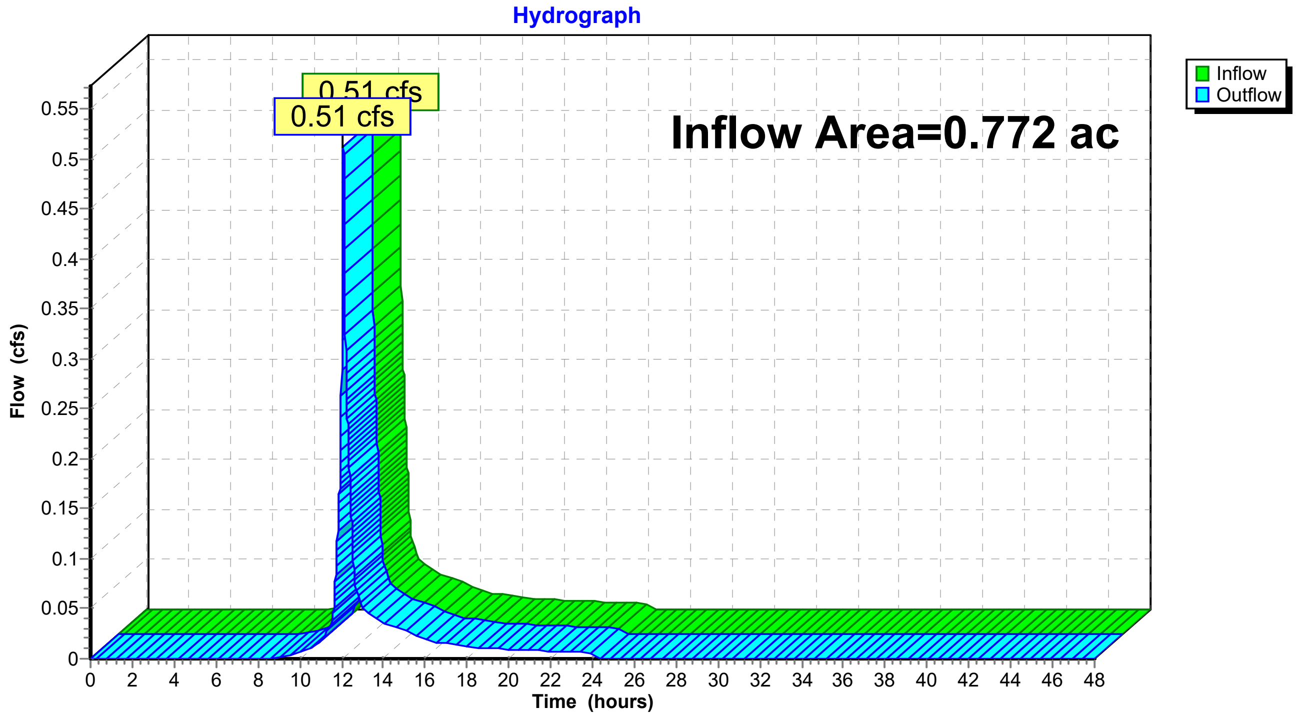


Summary for Reach DP-2: Design Point 2 (15" RCP to Wetland A)

Inflow Area = 0.772 ac, 77.33% Impervious, Inflow Depth = 0.57" for 25-Year event
Inflow = 0.51 cfs @ 12.09 hrs, Volume= 0.037 af
Outflow = 0.51 cfs @ 12.09 hrs, Volume= 0.037 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Reach DP-2: Design Point 2 (15" RCP to Wetland A)

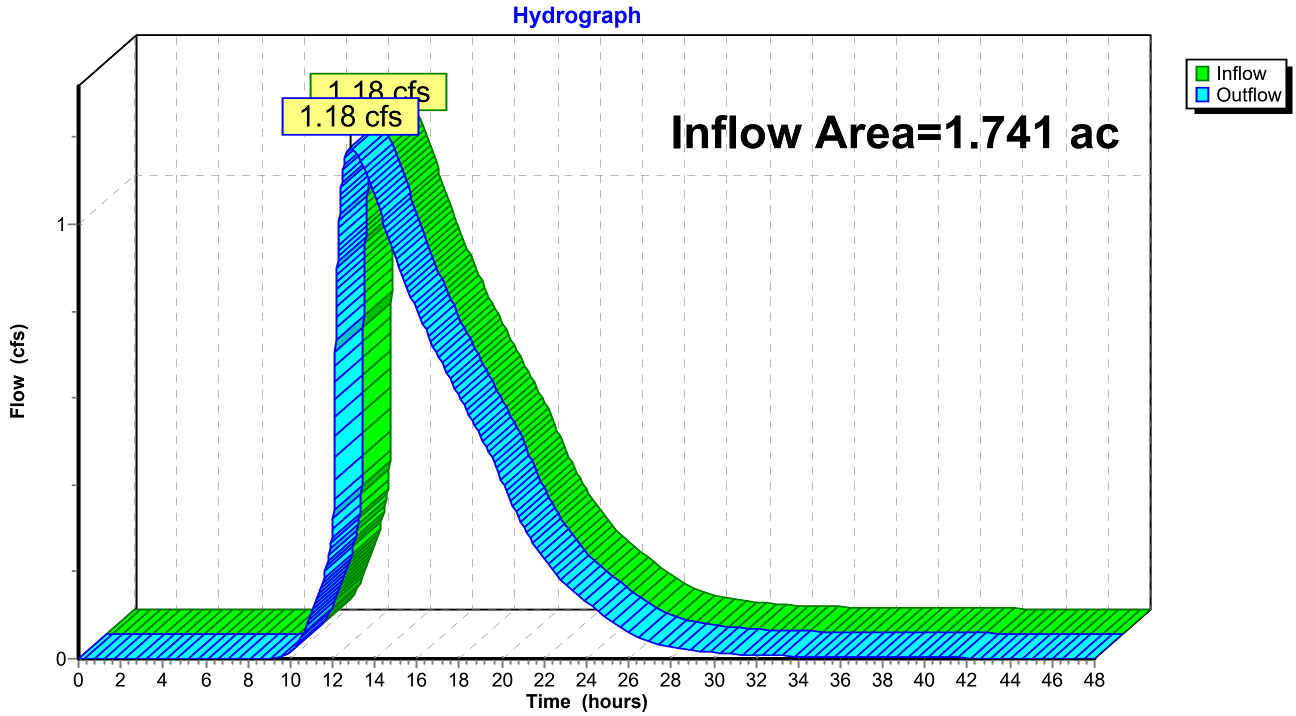


Summary for Reach DP-3: Design Point 3 (Existing Drainage Ditch)

Inflow Area = 1.741 ac, 78.76% Impervious, Inflow Depth > 4.54" for 25-Year event
Inflow = 1.18 cfs @ 12.85 hrs, Volume= 0.658 af
Outflow = 1.18 cfs @ 12.85 hrs, Volume= 0.658 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Reach DP-3: Design Point 3 (Existing Drainage Ditch)

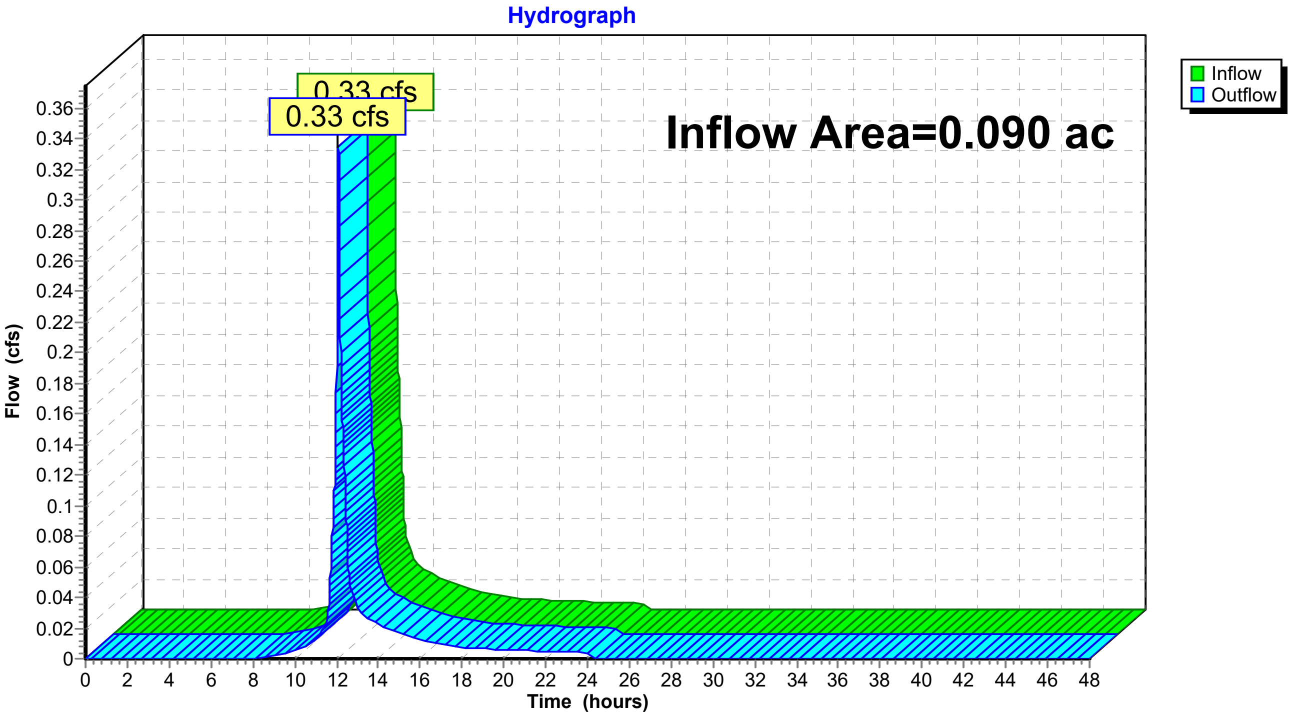


Summary for Reach DP-4: Design Point 4 (MassDOT 30" CB-2)

Inflow Area = 0.090 ac, 0.00% Impervious, Inflow Depth = 3.18" for 25-Year event
Inflow = 0.33 cfs @ 12.09 hrs, Volume= 0.024 af
Outflow = 0.33 cfs @ 12.09 hrs, Volume= 0.024 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Reach DP-4: Design Point 4 (MassDOT 30" CB-2)

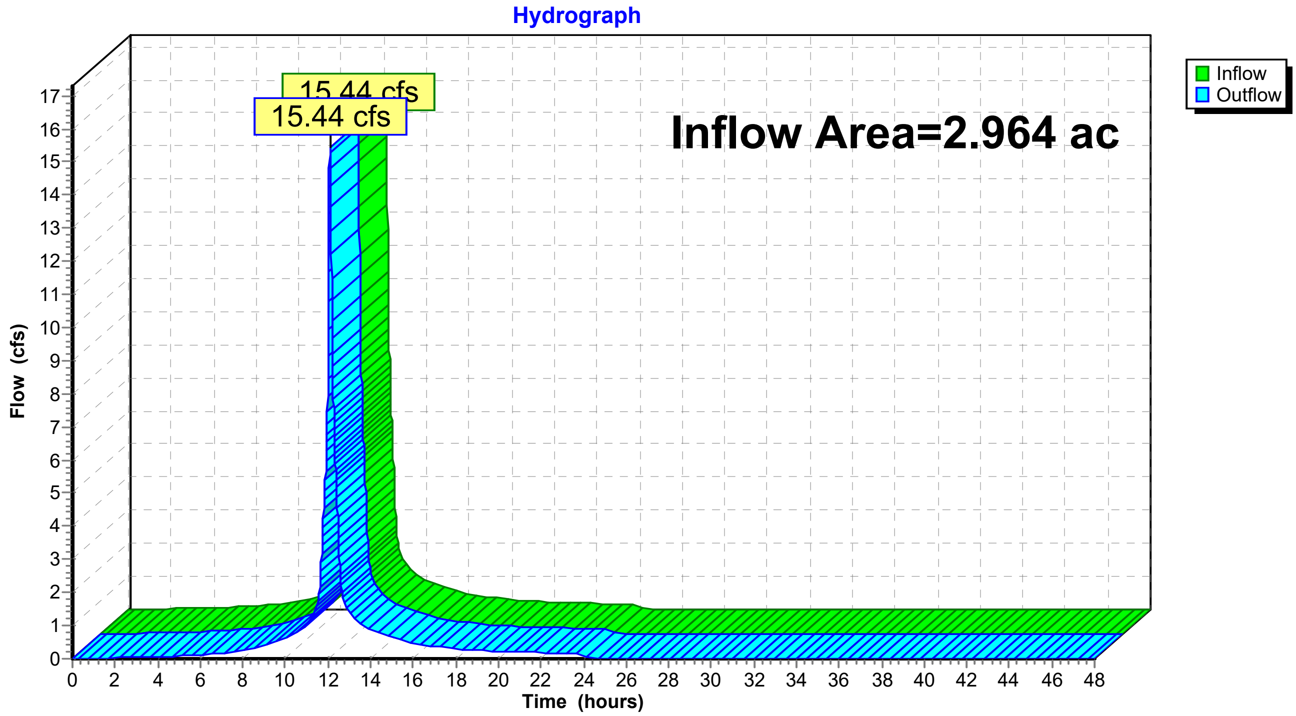


Summary for Reach DP-5: Design Point 5 (Existing Constructed Stormwater Wetland)

Inflow Area = 2.964 ac, 69.34% Impervious, Inflow Depth = 4.93" for 25-Year event
Inflow = 15.44 cfs @ 12.09 hrs, Volume= 1.218 af
Outflow = 15.44 cfs @ 12.09 hrs, Volume= 1.218 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Reach DP-5: Design Point 5 (Existing Constructed Stormwater Wetland)

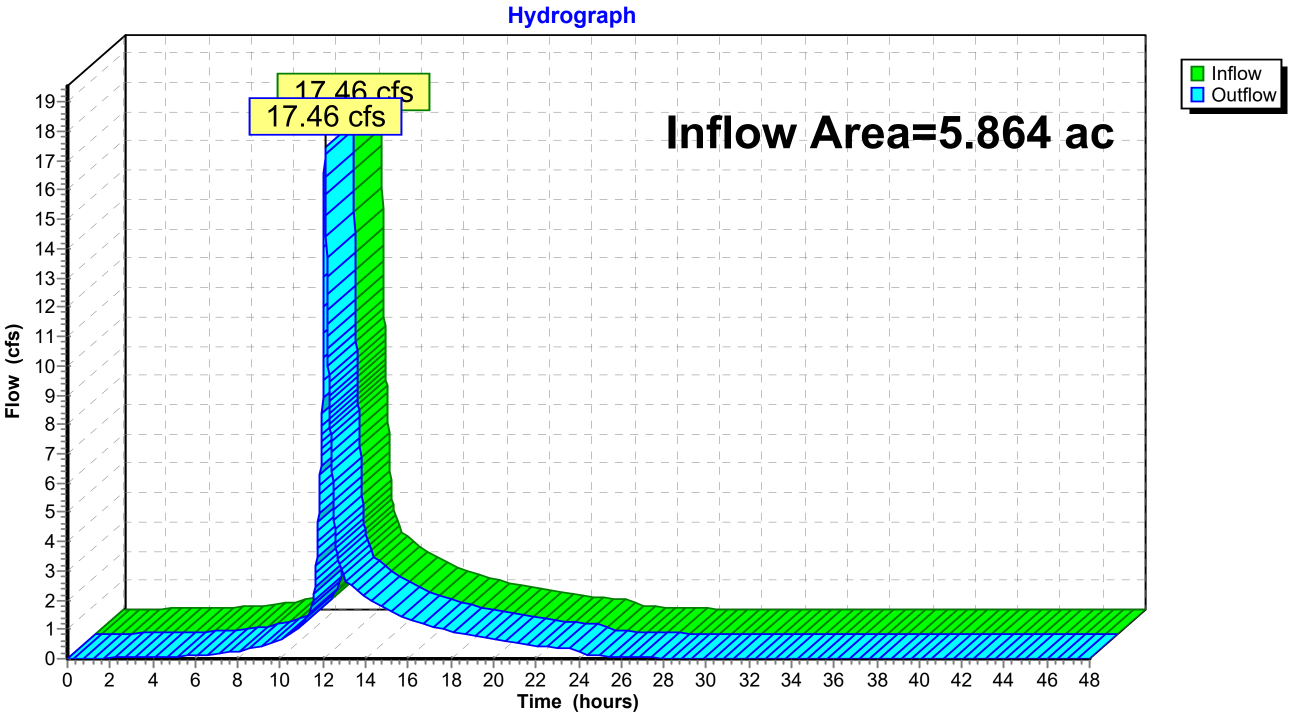


Summary for Reach DP-6: Wetland A - Design Point 6

Inflow Area = 5.864 ac, 68.59% Impervious, Inflow Depth = 4.12" for 25-Year event
Inflow = 17.46 cfs @ 12.10 hrs, Volume= 2.014 af
Outflow = 17.46 cfs @ 12.10 hrs, Volume= 2.014 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Reach DP-6: Wetland A - Design Point 6



Summary for Pond 3P: Conveyance Swale

Inflow Area = 0.471 ac, 52.65% Impervious, Inflow Depth = 4.41" for 25-Year event
Inflow = 2.38 cfs @ 12.09 hrs, Volume= 0.173 af
Outflow = 2.01 cfs @ 12.17 hrs, Volume= 0.165 af, Atten= 15%, Lag= 4.8 min
Primary = 2.01 cfs @ 12.17 hrs, Volume= 0.165 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 125.88' @ 12.14 hrs Surf.Area= 926 sf Storage= 980 cf

Plug-Flow detention time= 50.0 min calculated for 0.165 af (96% of inflow)
Center-of-Mass det. time= 24.8 min (822.5 - 797.7)

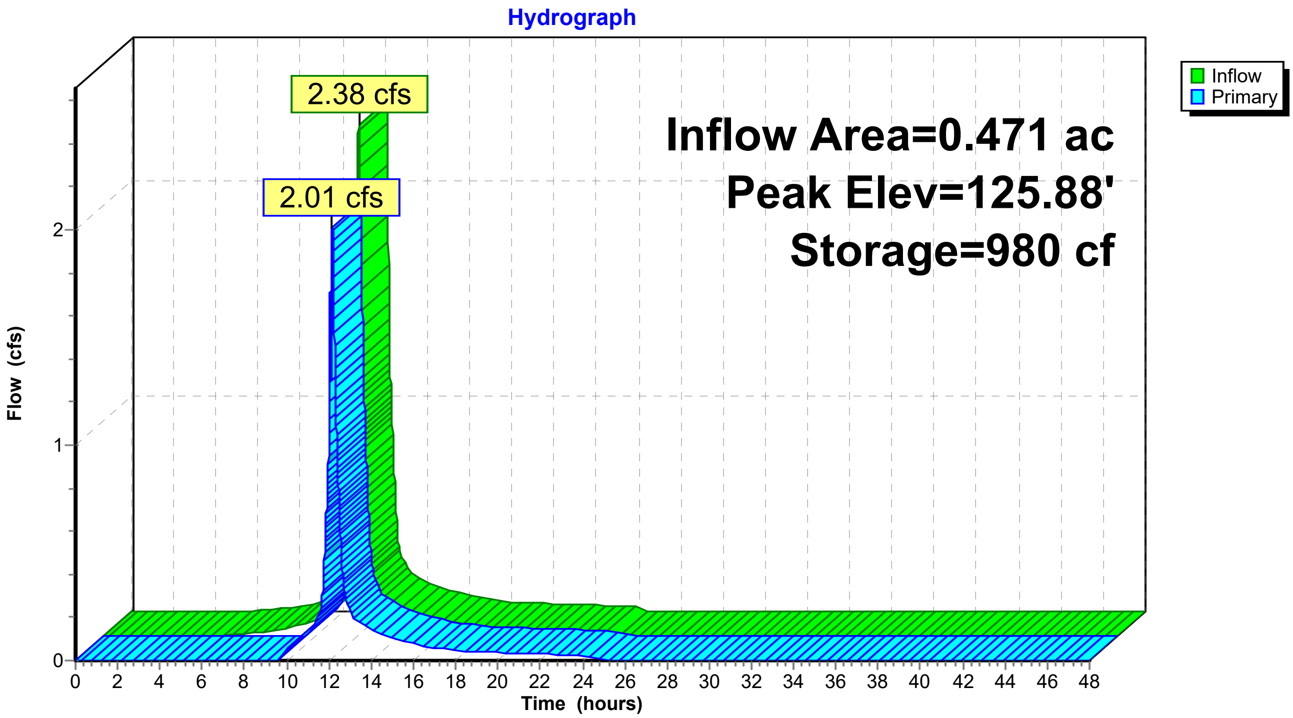
Volume	Invert	Avail.Storage	Storage Description
#1	124.00'	1,645 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
124.00	143	0	0
125.00	530	337	337
126.00	978	754	1,091
126.50	1,241	555	1,645

Device	Routing	Invert	Outlet Devices
#1	Primary	124.18'	**12.0" Round Culvert** L= 10.0' Ke= 0.500 Inlet / Outlet Invert= 124.18' / 124.13' S= 0.0050 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf
#2	Device 1	125.00'	**12.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=2.08 cfs @ 12.17 hrs HW=125.87' TW=125.51' (Dynamic Tailwater)
└─**1=Culvert** (Passes 2.08 cfs of 2.26 cfs potential flow)
  └─**2=Orifice/Grate** (Orifice Controls 2.08 cfs @ 2.87 fps)

Pond 3P: Conveyance Swale



Summary for Pond 11P: Permeable Pavement

Inflow Area = 0.626 ac, 95.37% Impervious, Inflow Depth = 5.64" for 25-Year event
Inflow = 3.66 cfs @ 12.08 hrs, Volume= 0.294 af
Outflow = 0.16 cfs @ 14.55 hrs, Volume= 0.294 af, Atten= 95%, Lag= 148.1 min
Discarded = 0.16 cfs @ 10.75 hrs, Volume= 0.294 af
Primary = 0.00 cfs @ 14.55 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 123.33' @ 14.55 hrs Surf.Area= 25,998 sf Storage= 6,043 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 308.2 min (1,060.3 - 752.2)

Volume	Invert	Avail.Storage	Storage Description
#1	122.75'	8,813 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

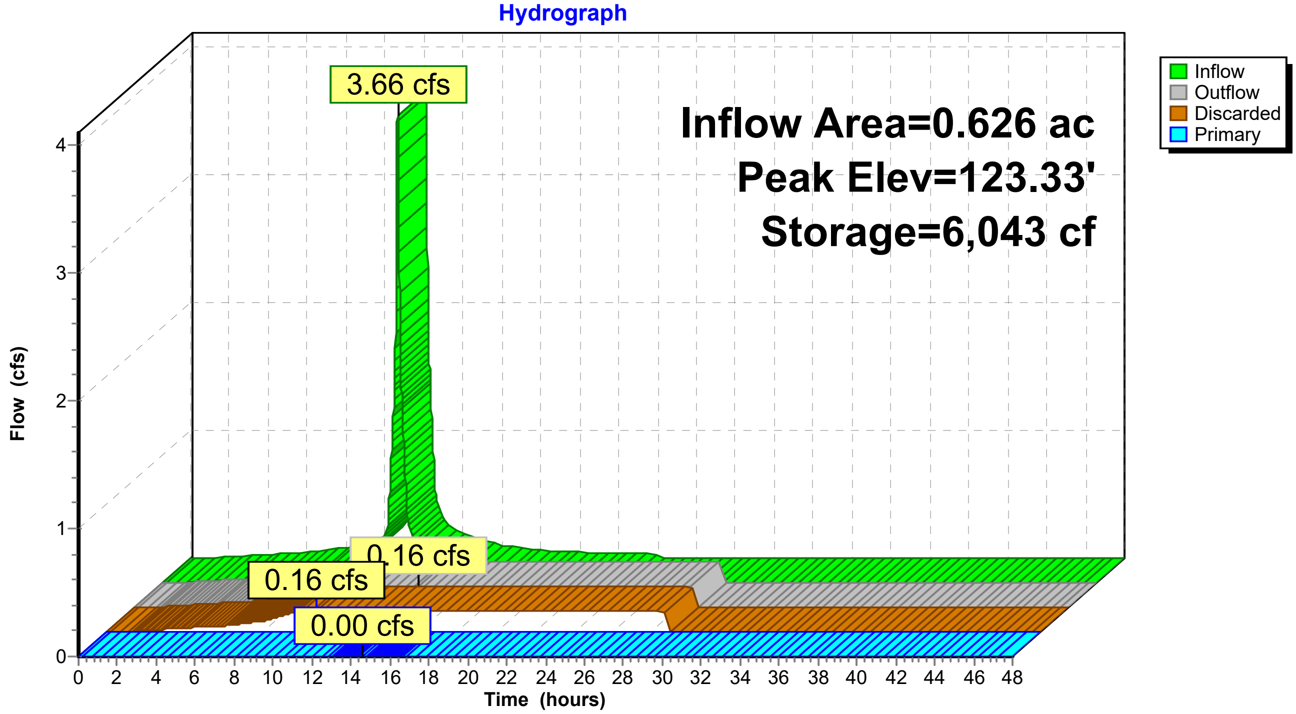
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
122.75	25,998	0.0	0	0
123.41	25,998	40.0	6,863	6,863
123.66	25,998	30.0	1,950	8,813

Device	Routing	Invert	Outlet Devices
#1	Discarded	122.75'	**0.270 in/hr Exfiltration over Surface area**
#2	Primary	123.30'	**6.0" Round Culvert** L= 10.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 123.30' / 119.00' S= 0.4300 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.20 sf

Discarded OutFlow Max=0.16 cfs @ 10.75 hrs HW=122.76' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.16 cfs)

Primary OutFlow Max=0.00 cfs @ 14.55 hrs HW=123.33' TW=0.00' (Dynamic Tailwater)
└─**2=Culvert** (Inlet Controls 0.00 cfs @ 0.47 fps)

Pond 11P: Permeable Pavement



Summary for Pond 13P: UG-1 Retain IT(Infiltration)

Inflow Area = 1.741 ac, 78.76% Impervious, Inflow Depth = 5.09" for 25-Year event
Inflow = 8.87 cfs @ 12.07 hrs, Volume= 0.738 af
Outflow = 8.67 cfs @ 12.08 hrs, Volume= 0.738 af, Atten= 2%, Lag= 0.4 min
Discarded = 0.02 cfs @ 3.78 hrs, Volume= 0.077 af
Primary = 8.65 cfs @ 12.08 hrs, Volume= 0.660 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 125.61' @ 12.08 hrs Surf.Area= 3,440 sf Storage= 8,648 cf

Plug-Flow detention time= 160.5 min calculated for 0.738 af (100% of inflow)
Center-of-Mass det. time= 160.7 min (934.6 - 773.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	121.75'	1,791 cf	**20.00'W x 172.00'L x 4.17'H Field A**
			14,333 cf Overall - 9,856 cf Embedded = 4,477 cf x 40.0% Voids
#2A	122.25'	6,948 cf	**retain_it retain_it 3.0'** x 42 Inside #1
			Inside= 84.0"W x 36.0"H => 21.33 sf x 8.00'L = 170.6 cf
			Outside= 96.0"W x 44.0"H => 29.33 sf x 8.00'L = 234.7 cf
			2 Rows adjusted for 217.2 cf perimeter wall
		8,739 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	124.75'	**3.0' long x 0.5' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00
			Coef. (English) 2.80 2.92 3.08 3.30 3.32
#2	Primary	122.50'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Discarded	121.75'	**0.270 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.02 cfs @ 3.78 hrs HW=121.79' (Free Discharge)
└─**3=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=8.65 cfs @ 12.08 hrs HW=125.61' TW=122.49' (Dynamic Tailwater)
├─**1=Broad-Crested Rectangular Weir** (Weir Controls 7.93 cfs @ 3.07 fps)
└─**2=Orifice/Grate** (Orifice Controls 0.72 cfs @ 8.26 fps)

Pond 13P: UG-1 Retain IT(Infiltration) - Chamber Wizard Field A

Chamber Model = retain_it retain_it 3.0' (retain-it®)
Inside= 84.0"W x 36.0"H => 21.33 sf x 8.00'L = 170.6 cf
Outside= 96.0"W x 44.0"H => 29.33 sf x 8.00'L = 234.7 cf
2 Rows adjusted for 217.2 cf perimeter wall

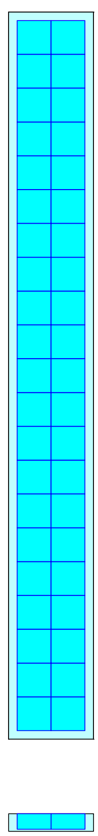
21 Chambers/Row x 8.00' Long = 168.00' Row Length +24.0" End Stone x 2 = 172.00' Base Length
2 Rows x 96.0" Wide + 24.0" Side Stone x 2 = 20.00' Base Width
6.0" Base + 44.0" Chamber Height = 4.17' Field Height

4.7 cf Sidewall x 21 x 2 + 4.7 cf Endwall x 2 x 2 = 217.2 cf Perimeter Wall
42 Chambers x 170.6 cf - 217.2 cf Perimeter wall = 6,948.5 cf Chamber Storage
42 Chambers x 234.7 cf = 9,856.0 cf Displacement

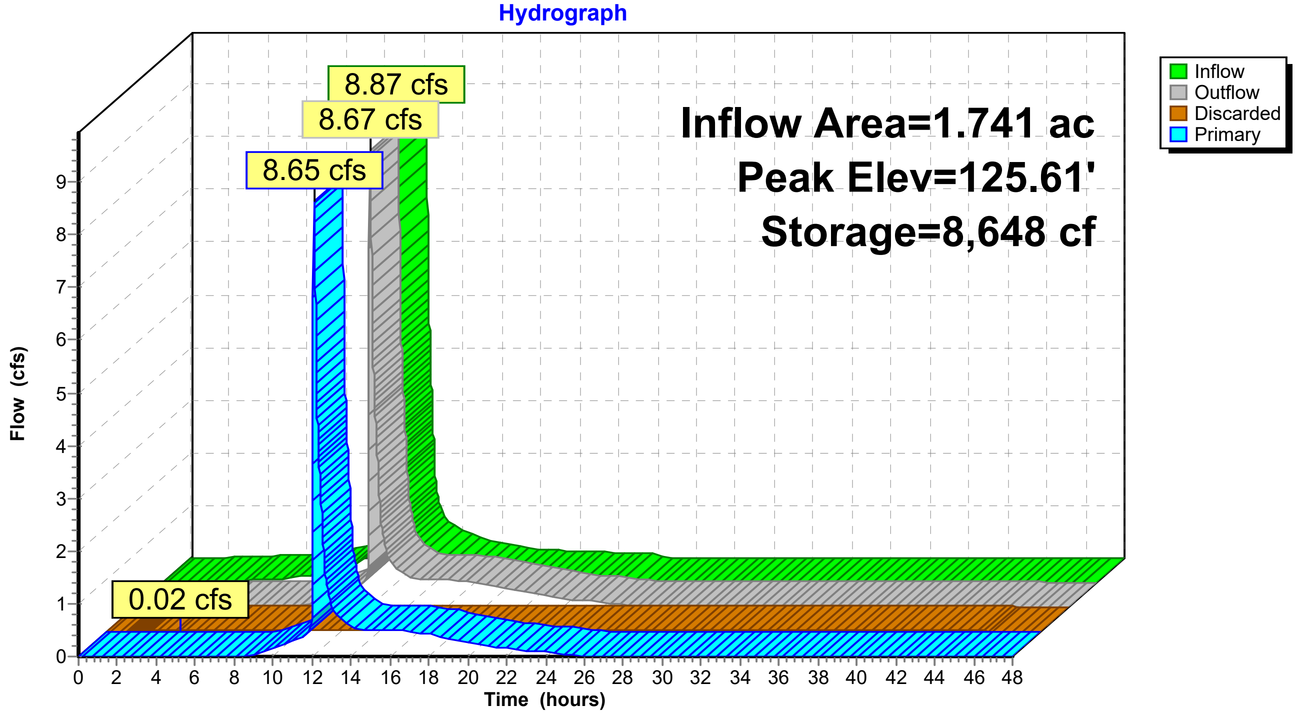
14,333.3 cf Field - 9,856.0 cf Chambers = 4,477.3 cf Stone x 40.0% Voids = 1,790.9 cf Stone Storage

Chamber Storage + Stone Storage = 8,739.4 cf = 0.201 af
Overall Storage Efficiency = 61.0%
Overall System Size = 172.00' x 20.00' x 4.17'

42 Chambers
530.9 cy Field
165.8 cy Stone



Pond 13P: UG-1 Retain IT(Infiltration)



Summary for Pond 16P: UG-2 Retain IT (Detention)

Inflow Area = 1.741 ac, 78.76% Impervious, Inflow Depth = 4.55" for 25-Year event
Inflow = 8.65 cfs @ 12.08 hrs, Volume= 0.660 af
Outflow = 1.18 cfs @ 12.85 hrs, Volume= 0.658 af, Atten= 86%, Lag= 46.1 min
Primary = 1.18 cfs @ 12.85 hrs, Volume= 0.658 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 123.80' @ 12.85 hrs Surf.Area= 6,512 sf Storage= 9,608 cf

Plug-Flow detention time= 120.3 min calculated for 0.658 af (100% of inflow)
Center-of-Mass det. time= 118.3 min (997.1 - 878.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	122.00'	1,103 cf	**44.00'W x 148.00'L x 3.67'H Field A** 23,877 cf Overall - 21,120 cf Embedded = 2,757 cf x 40.0% Voids
#2A	122.00'	15,138 cf	**retain_it retain_it 3.0'** x 90 Inside #1 Inside= 84.0"W x 36.0"H => 21.33 sf x 8.00'L = 170.6 cf Outside= 96.0"W x 44.0"H => 29.33 sf x 8.00'L = 234.7 cf 5 Rows adjusted for 217.2 cf perimeter wall
		16,241 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	121.50'	**12.0" Round Culvert** L= 10.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 121.50' / 121.40' S= 0.0100 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf
#2	Device 1	124.70'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#3	Device 1	122.00'	**6.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=1.18 cfs @ 12.85 hrs HW=123.80' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Passes 1.18 cfs of 5.07 cfs potential flow)
  ├─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
  └─**3=Orifice/Grate** (Orifice Controls 1.18 cfs @ 5.99 fps)

Pond 16P: UG-2 Retain IT (Detention) - Chamber Wizard Field A

Chamber Model = retain_it retain_it 3.0' (retain-it®)
Inside= 84.0"W x 36.0"H => 21.33 sf x 8.00'L = 170.6 cf
Outside= 96.0"W x 44.0"H => 29.33 sf x 8.00'L = 234.7 cf
5 Rows adjusted for 217.2 cf perimeter wall

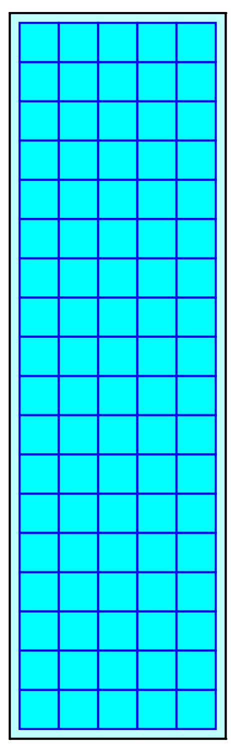
18 Chambers/Row x 8.00' Long = 144.00' Row Length +24.0" End Stone x 2 = 148.00' Base Length
5 Rows x 96.0" Wide + 24.0" Side Stone x 2 = 44.00' Base Width
44.0" Chamber Height = 3.67' Field Height

4.7 cf Sidewall x 18 x 2 + 4.7 cf Endwall x 5 x 2 = 217.2 cf Perimeter Wall
90 Chambers x 170.6 cf - 217.2 cf Perimeter wall = 15,137.8 cf Chamber Storage
90 Chambers x 234.7 cf = 21,120.0 cf Displacement

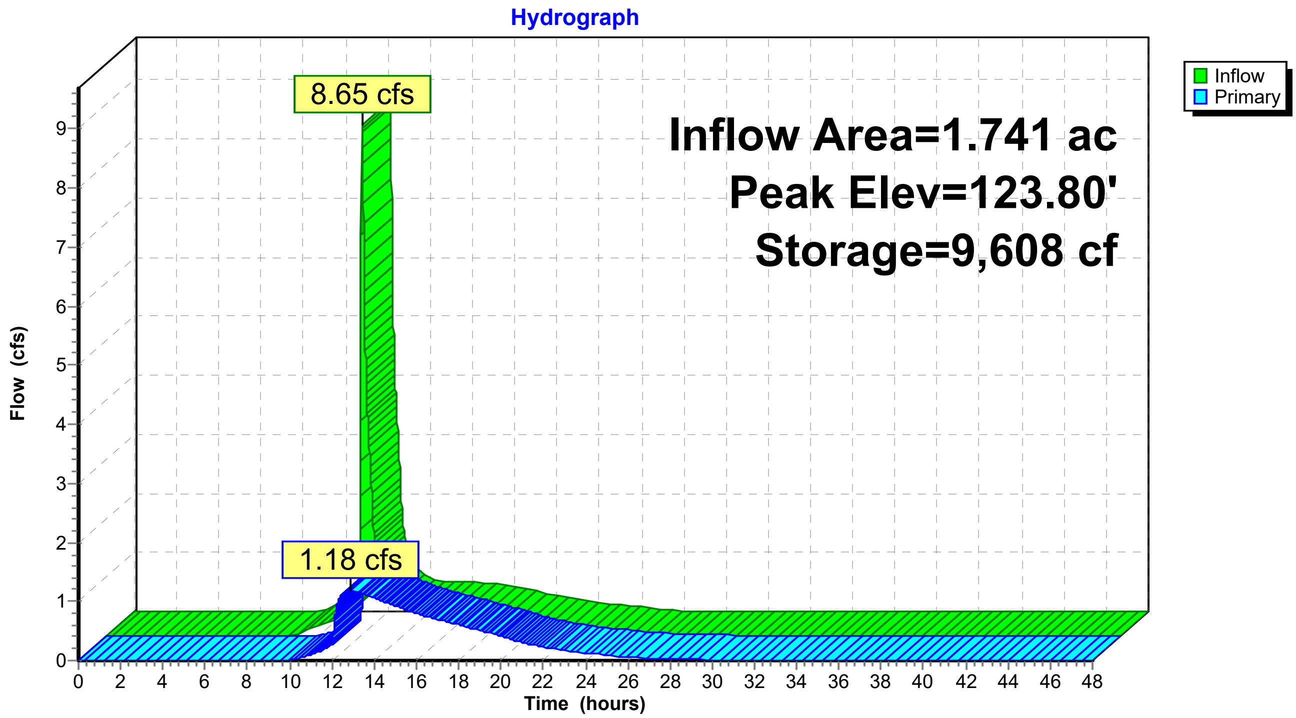
23,877.3 cf Field - 21,120.0 cf Chambers = 2,757.3 cf Stone x 40.0% Voids = 1,102.9 cf Stone Storage

Chamber Storage + Stone Storage = 16,240.7 cf = 0.373 af
Overall Storage Efficiency = 68.0%
Overall System Size = 148.00' x 44.00' x 3.67'

90 Chambers
884.3 cy Field
102.1 cy Stone



Pond 16P: UG-2 Retain IT (Detention)



Summary for Subcatchment P-1A: Undetained to Wetland B

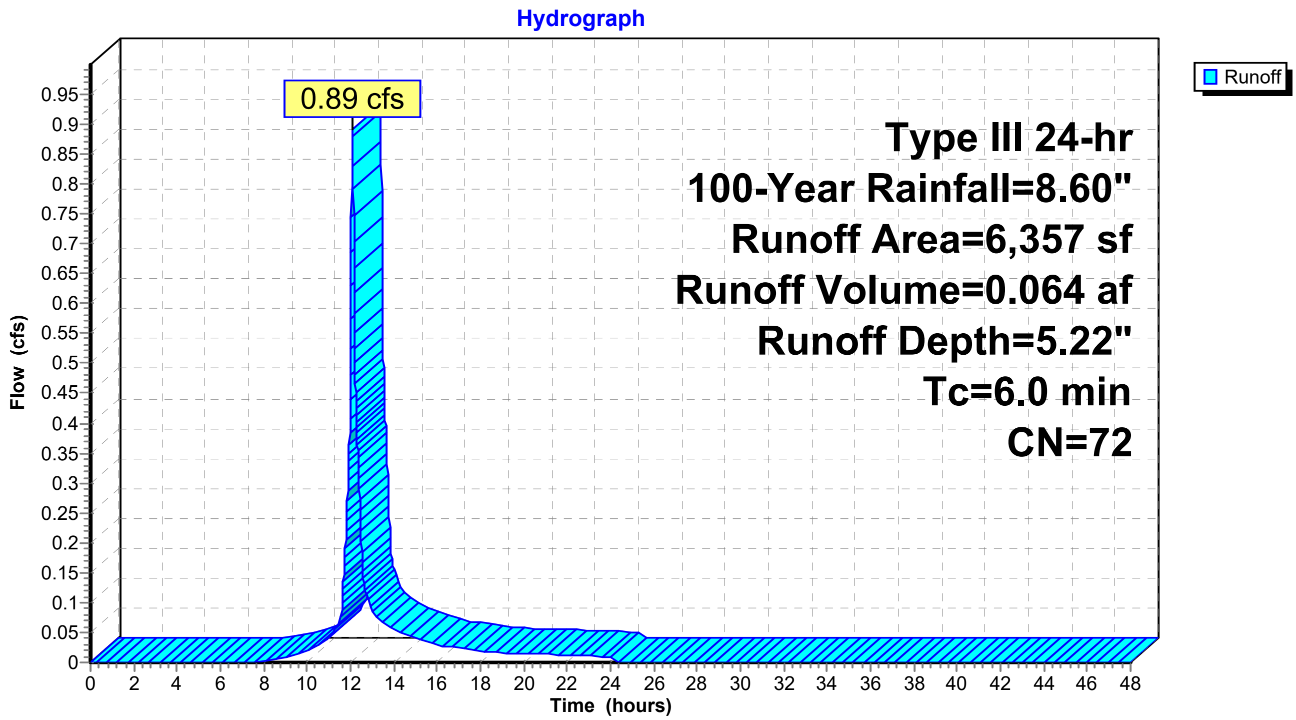
Runoff = 0.89 cfs @ 12.09 hrs, Volume= 0.064 af, Depth= 5.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.60"

Area (sf)	CN	Description
6,357	72	Woods/grass comb., Good, HSG C
6,357		100.00% Pervious Area

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

Subcatchment P-1A: Undetained to Wetland B



Summary for Subcatchment P-1B: Western Driveway

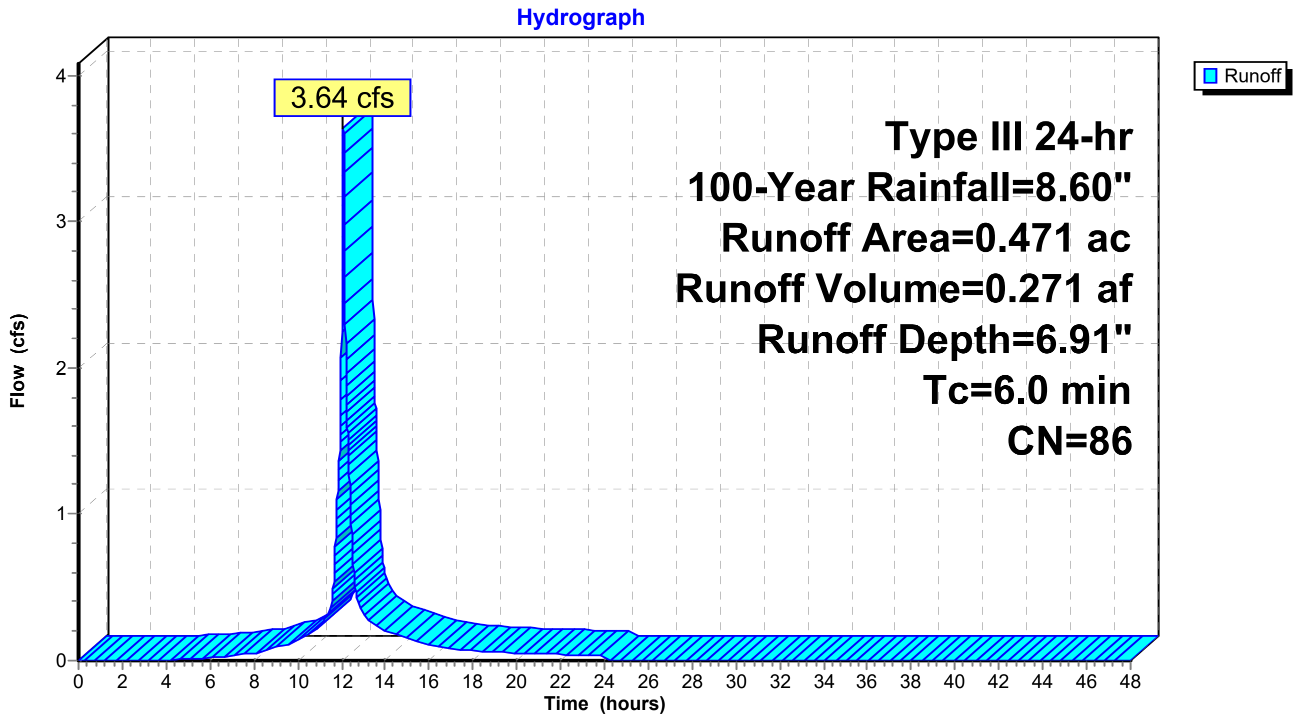
Runoff = 3.64 cfs @ 12.08 hrs, Volume= 0.271 af, Depth= 6.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.60"

Area (ac)	CN	Description
0.248	98	Paved parking, HSG C
0.223	72	Woods/grass comb., Good, HSG C
0.471	86	Weighted Average
0.223		47.35% Pervious Area
0.248		52.65% Impervious Area

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

Subcatchment P-1B: Western Driveway



Summary for Subcatchment P-1C: Permeable Pavement

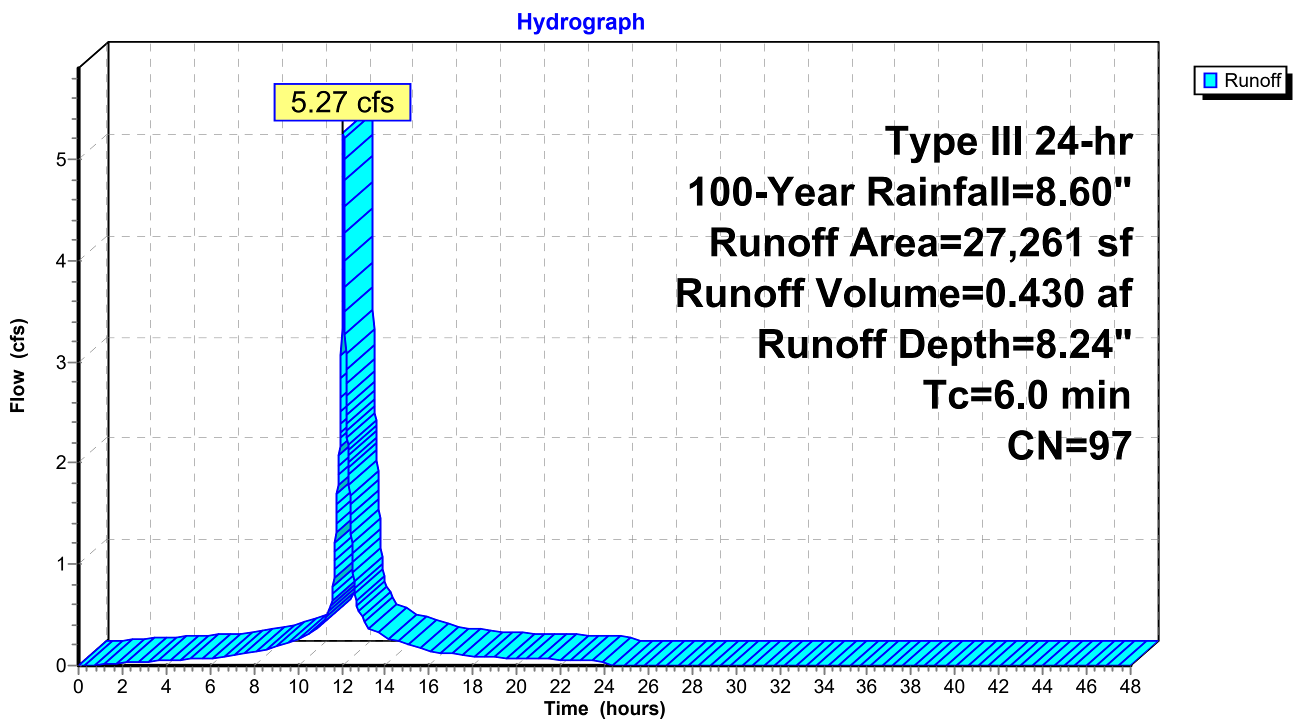
Runoff = 5.27 cfs @ 12.08 hrs, Volume= 0.430 af, Depth= 8.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.60"

	Area (sf)	CN	Description
*	25,998	98	Permeable Pavement
	1,263	74	>75% Grass cover, Good, HSG C
	27,261	97	Weighted Average
	1,263		4.63% Pervious Area
	25,998		95.37% Impervious Area

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

Subcatchment P-1C: Permeable Pavement



Summary for Subcatchment P-2: Undetained to Wetland

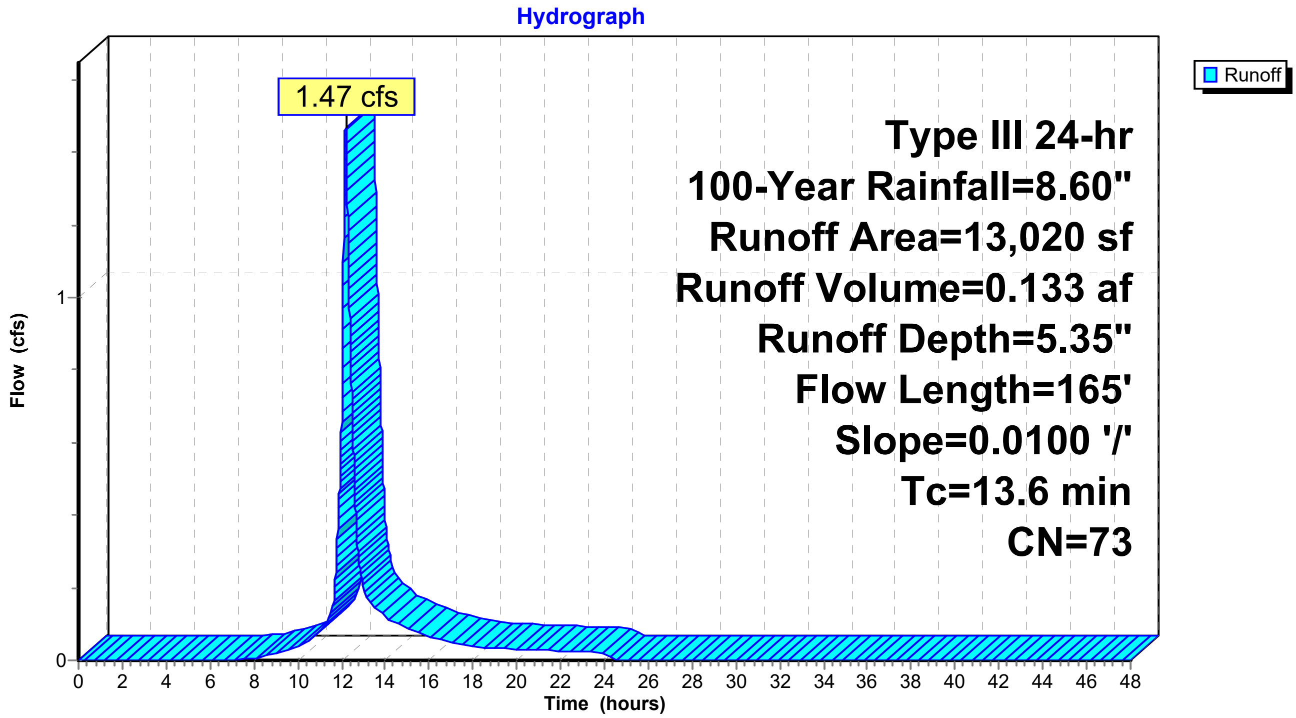
Runoff = 1.47 cfs @ 12.19 hrs, Volume= 0.133 af, Depth= 5.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.60"

Area (sf)	CN	Description
10,967	74	>75% Grass cover, Good, HSG C
2,053	70	Woods, Good, HSG C
13,020	73	Weighted Average
13,020		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	100	0.0100	0.13		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
0.7	65	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
13.6	165	Total			

Subcatchment P-2: Undetained to Wetland



Summary for Subcatchment P-3A: Additions and Upper Pavement

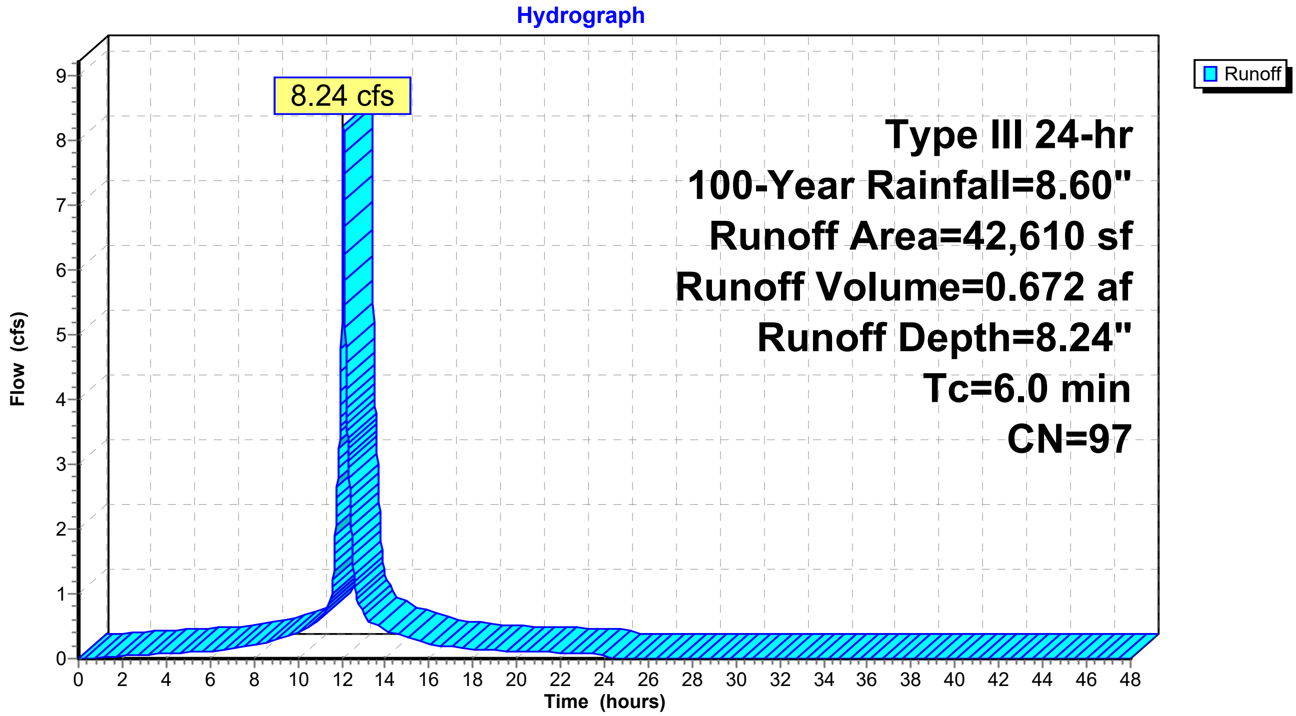
Runoff = 8.24 cfs @ 12.08 hrs, Volume= 0.672 af, Depth= 8.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.60"

Area (sf)	CN	Description
26,741	98	Paved parking, HSG C
1,277	74	>75% Grass cover, Good, HSG C
14,592	98	Roofs, HSG C
42,610	97	Weighted Average
1,277		3.00% Pervious Area
41,333		97.00% Impervious Area

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

Subcatchment P-3A: Additions and Upper Pavement



Summary for Subcatchment P-3B: Existing Building Draining to Constructed Wetland

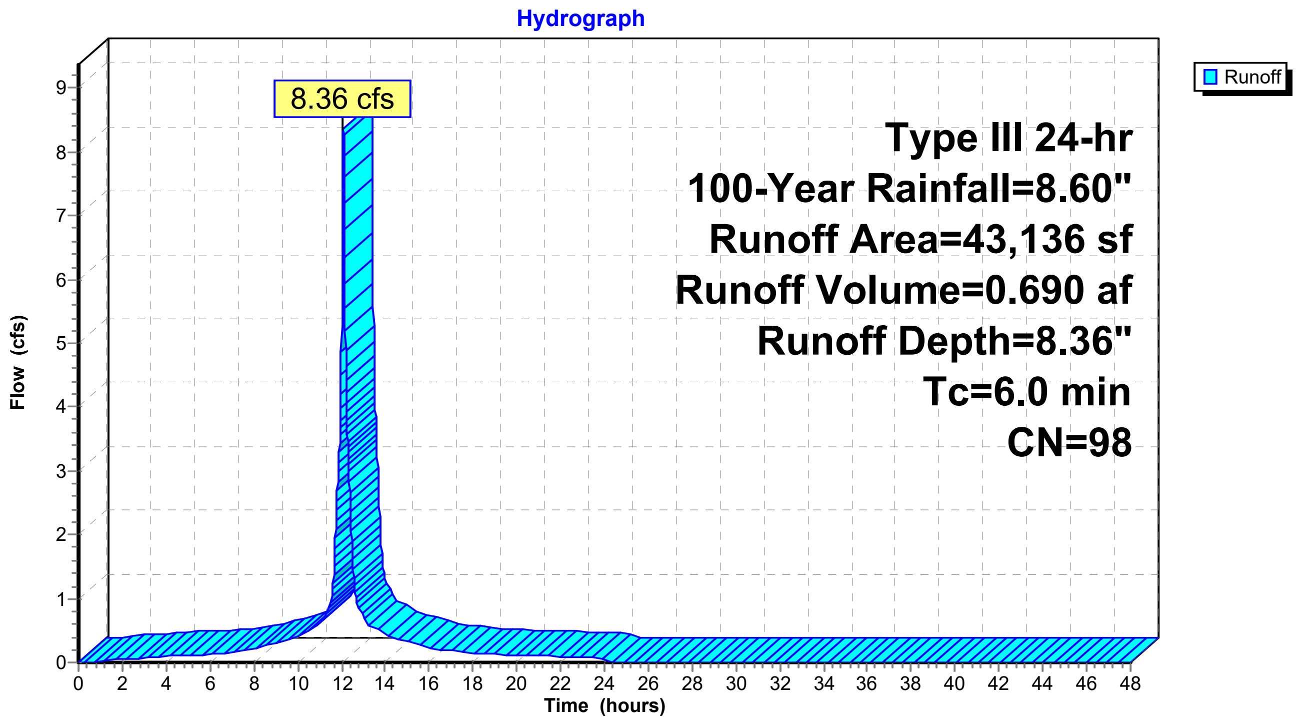
Runoff = 8.36 cfs @ 12.08 hrs, Volume= 0.690 af, Depth= 8.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.60"

Area (sf)	CN	Description
43,136	98	Roofs, HSG C
43,136		100.00% Impervious Area

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

Subcatchment P-3B: Existing Building Draining to Constructed Wetland



Summary for Subcatchment P-4: Watershed to Existing Stormwater System

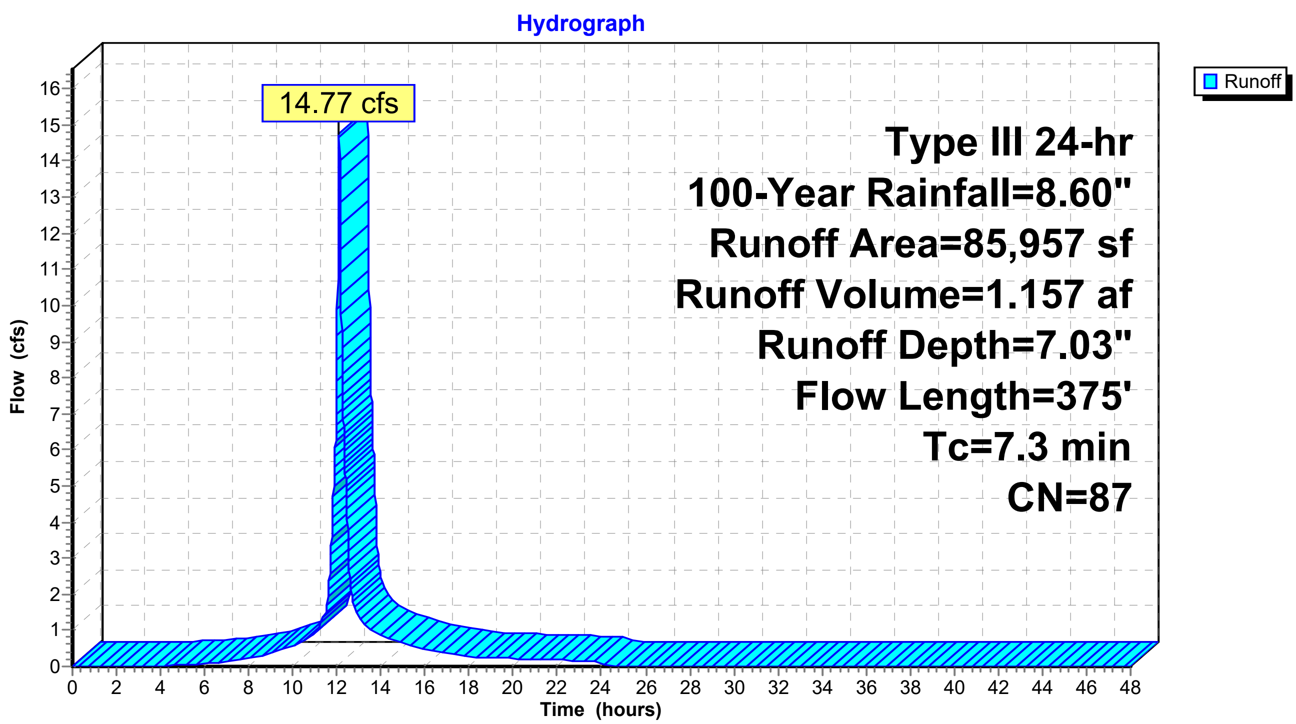
Runoff = 14.77 cfs @ 12.10 hrs, Volume= 1.157 af, Depth= 7.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.60"

Area (sf)	CN	Description
46,374	98	Paved parking, HSG C
37,535	74	>75% Grass cover, Good, HSG C
2,048	70	Woods, Good, HSG C
85,957	87	Weighted Average
39,583		46.05% Pervious Area
46,374		53.95% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.2	50	0.0240	0.16		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
1.7	245	0.0220	2.39		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.4	80	0.0287	3.44		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
7.3	375	Total			

Subcatchment P-4: Watershed to Existing Stormwater System



Summary for Subcatchment P-4A: Watershed to MassDOT CB1

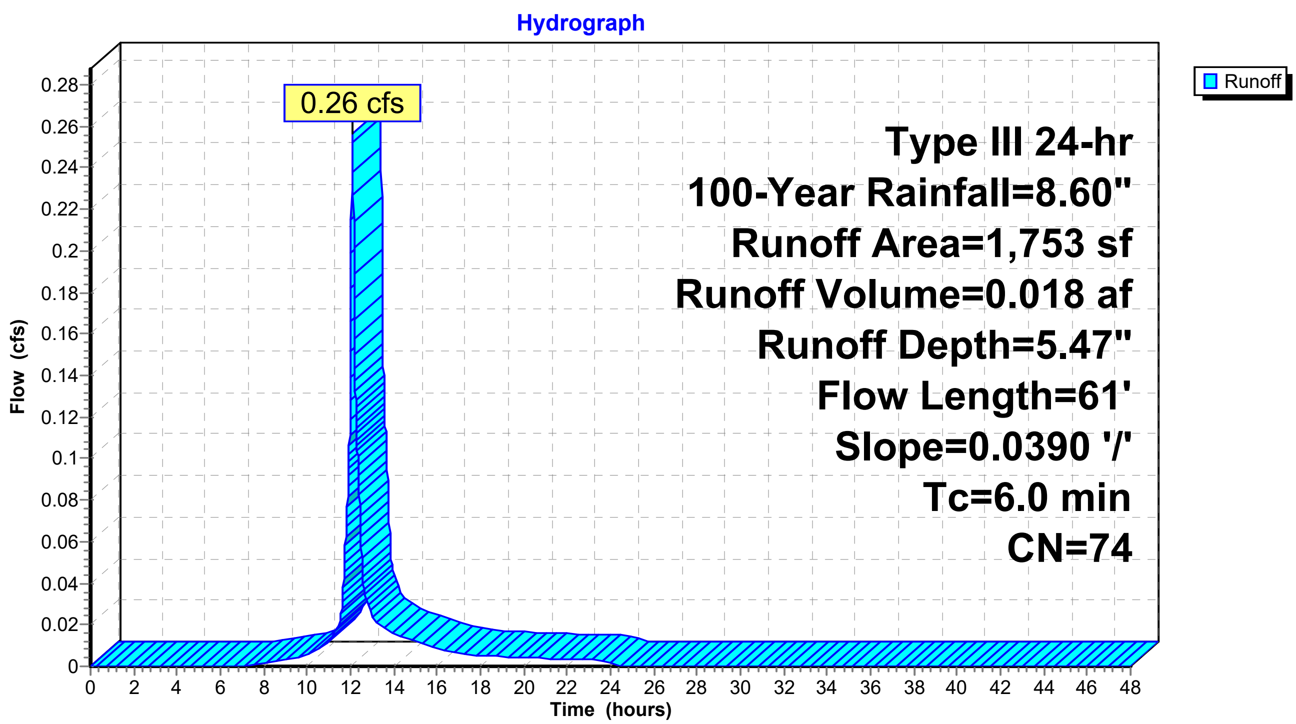
Runoff = 0.26 cfs @ 12.09 hrs, Volume= 0.018 af, Depth= 5.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.60"

Area (sf)	CN	Description
1,753	74	>75% Grass cover, Good, HSG C
1,753		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.1	61	0.0390	0.20		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
0.9					**Direct Entry,**
6.0	61	Total			

Subcatchment P-4A: Watershed to MassDOT CB1



Summary for Subcatchment P-4B: Watershed to CB2

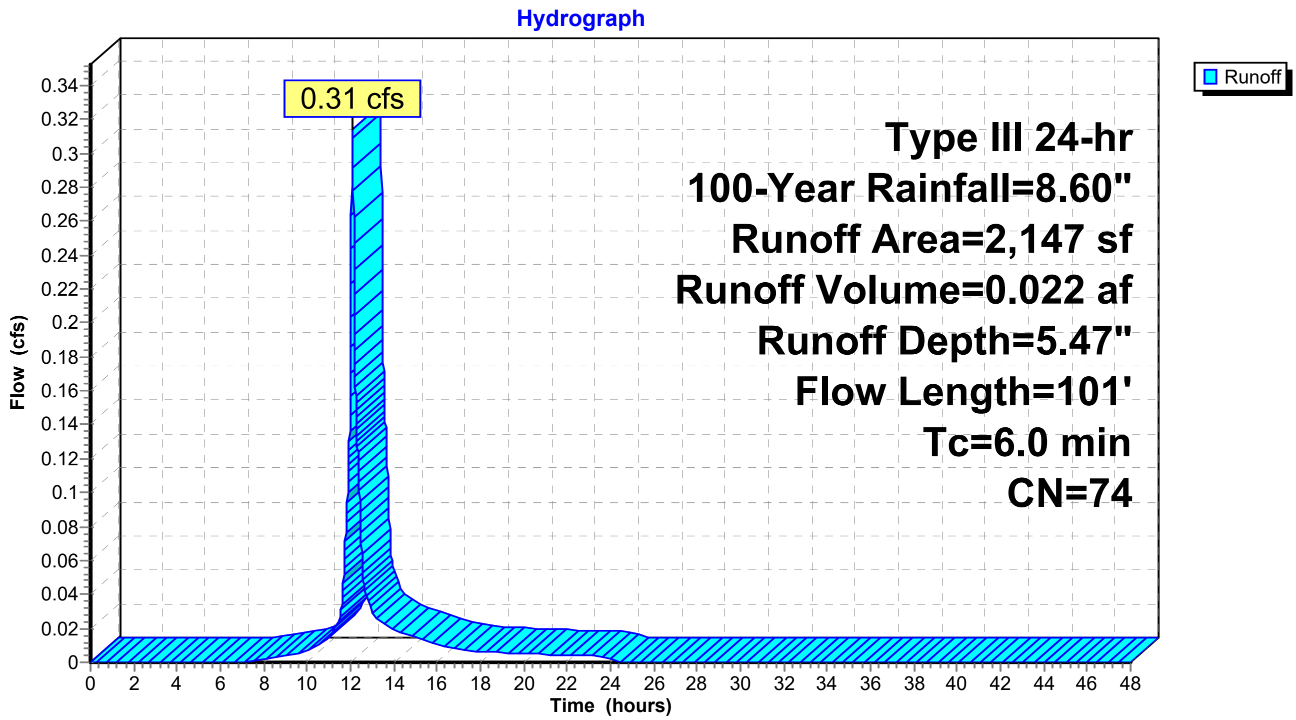
Runoff = 0.31 cfs @ 12.09 hrs, Volume= 0.022 af, Depth= 5.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.60"

Area (sf)	CN	Description
2,147	74	>75% Grass cover, Good, HSG C
2,147		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	50	0.0200	0.15		**Sheet Flow, SHeet Flow** Grass: Short n= 0.150 P2= 3.20"
0.3	51	0.0390	3.18		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.1					**Direct Entry, Miniumum**
6.0	101	Total			

Subcatchment P-4B: Watershed to CB2



Summary for Subcatchment P-5: P-5

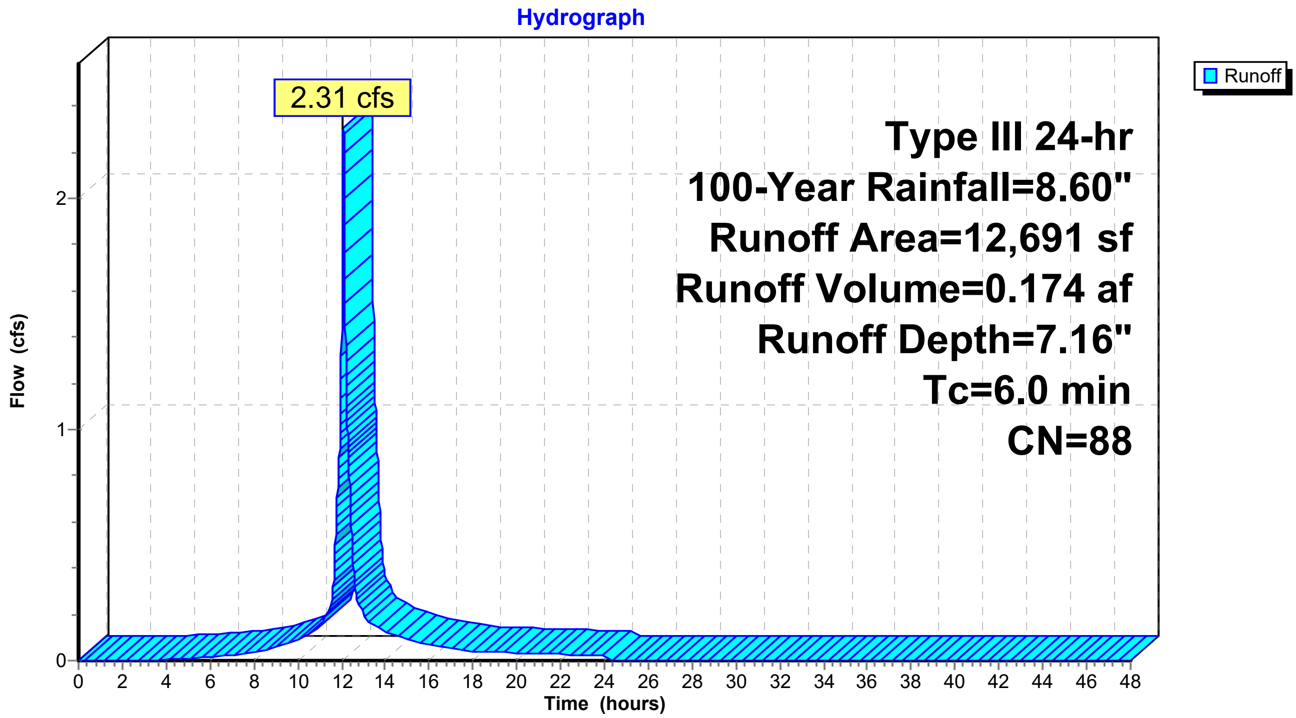
Runoff = 2.31 cfs @ 12.08 hrs, Volume= 0.174 af, Depth= 7.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.60"

Area (sf)	CN	Description
5,116	74	>75% Grass cover, Good, HSG C
7,575	98	Paved parking, HSG C
12,691	88	Weighted Average
5,116		40.31% Pervious Area
7,575		59.69% Impervious Area

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

Subcatchment P-5: P-5

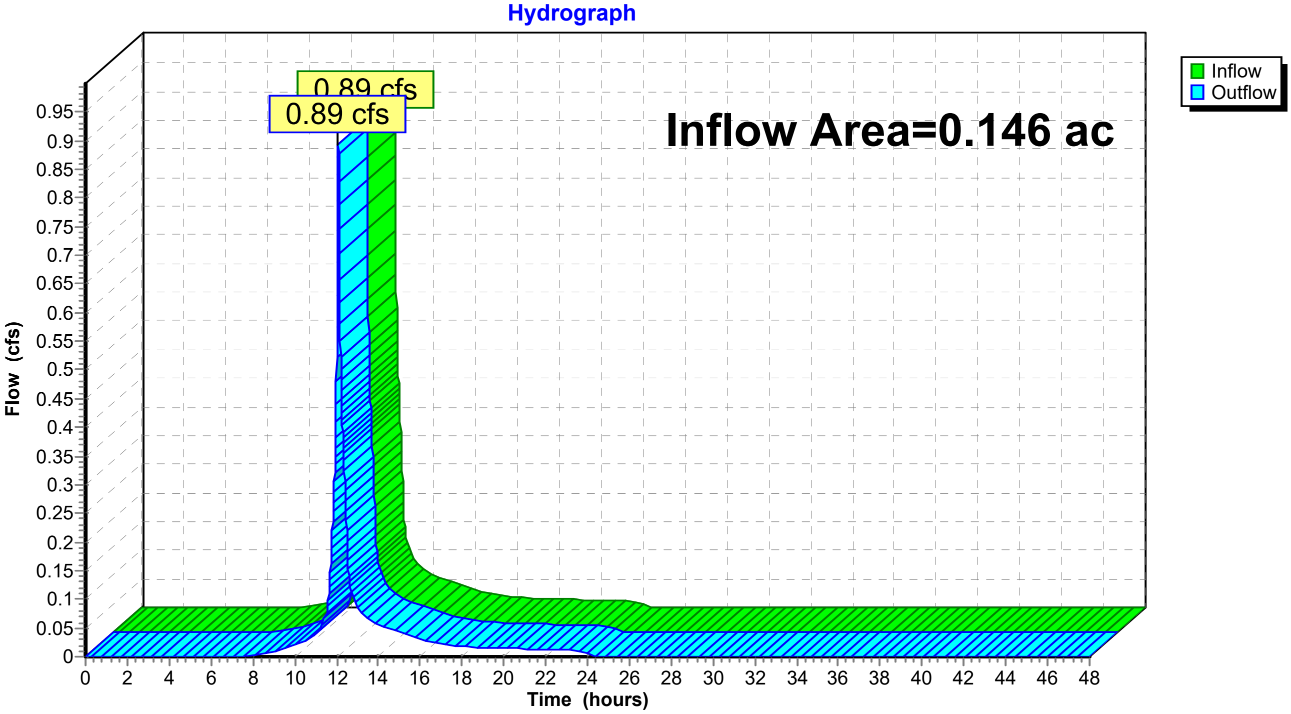


Summary for Reach DP-1: Design Point 1 (Wetland B)

Inflow Area = 0.146 ac, 0.00% Impervious, Inflow Depth = 5.22" for 100-Year event
Inflow = 0.89 cfs @ 12.09 hrs, Volume= 0.064 af
Outflow = 0.89 cfs @ 12.09 hrs, Volume= 0.064 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Reach DP-1: Design Point 1 (Wetland B)

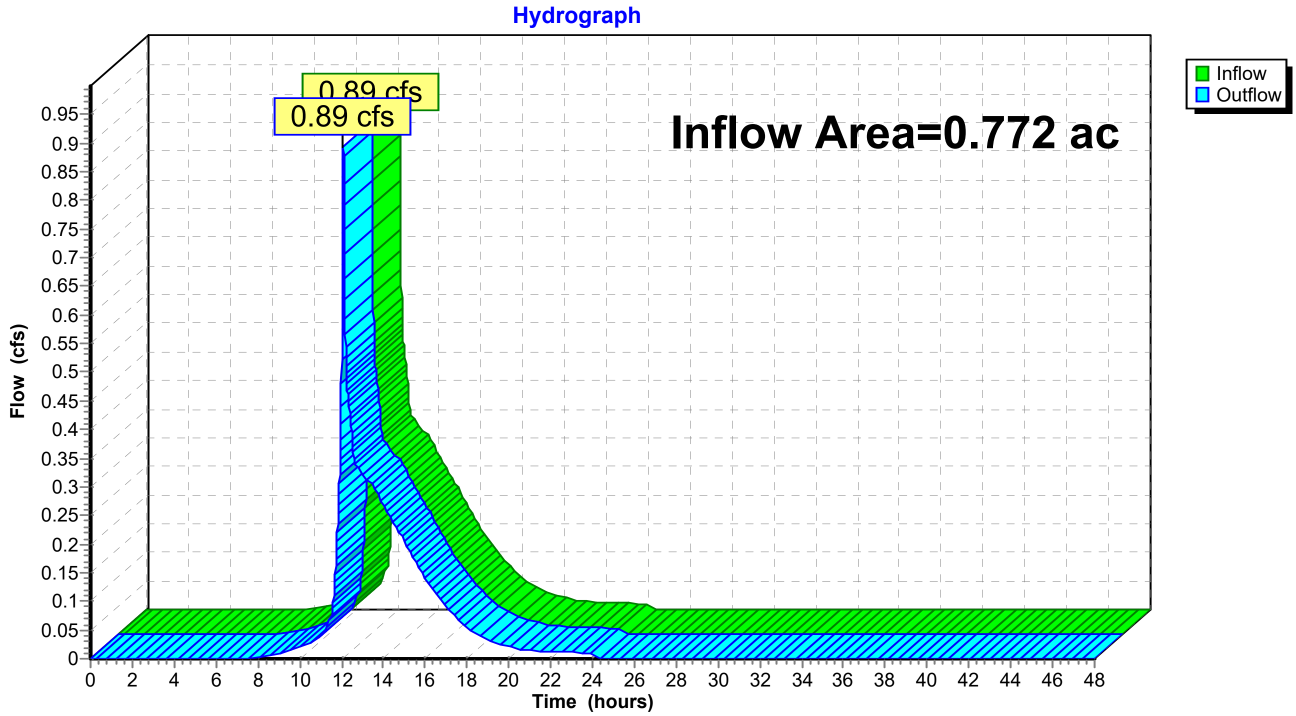


Summary for Reach DP-2: Design Point 2 (15" RCP to Wetland A)

Inflow Area = 0.772 ac, 77.33% Impervious, Inflow Depth = 2.11" for 100-Year event
Inflow = 0.89 cfs @ 12.09 hrs, Volume= 0.136 af
Outflow = 0.89 cfs @ 12.09 hrs, Volume= 0.136 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Reach DP-2: Design Point 2 (15" RCP to Wetland A)

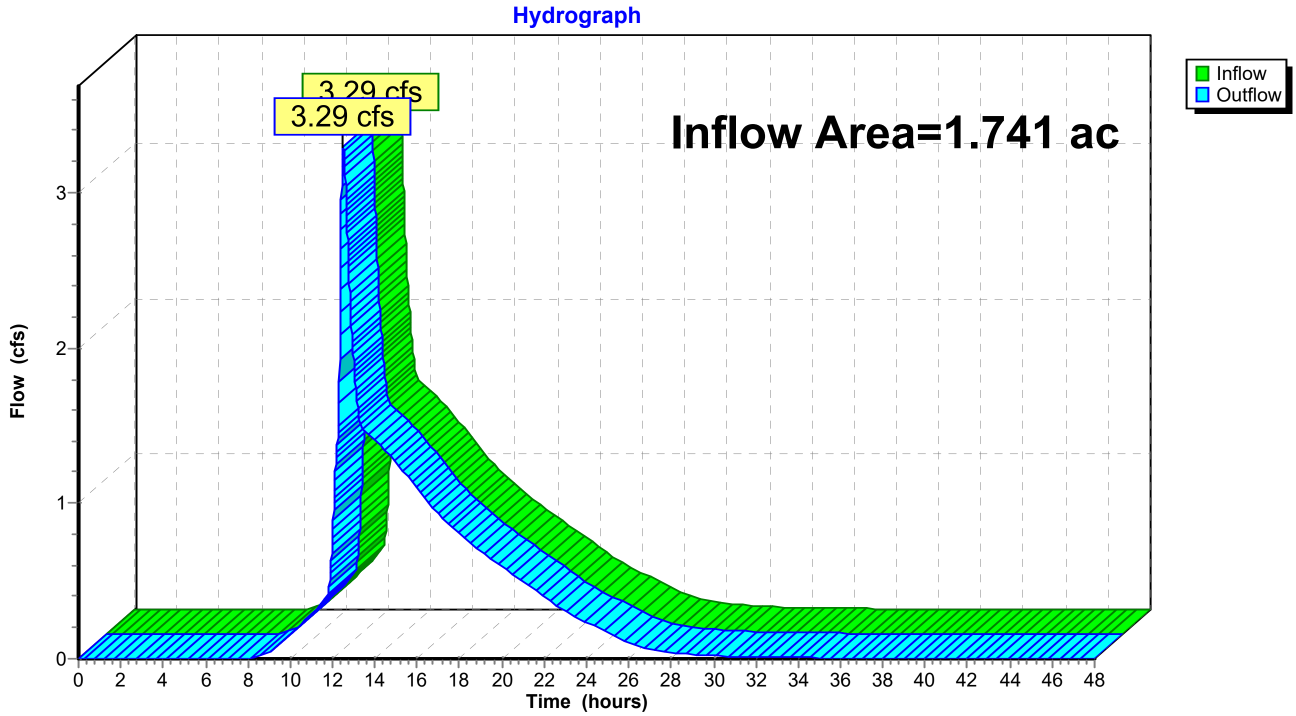


Summary for Reach DP-3: Design Point 3 (Existing Drainage Ditch)

Inflow Area =	1.741 ac, 78.76% Impervious, Inflow Depth > 7.08"	for 100-Year event	
Inflow =	3.29 cfs @ 12.50 hrs, Volume=	1.027 af	
Outflow =	3.29 cfs @ 12.50 hrs, Volume=	1.027 af, Atten= 0%, Lag= 0.0 min	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Reach DP-3: Design Point 3 (Existing Drainage Ditch)

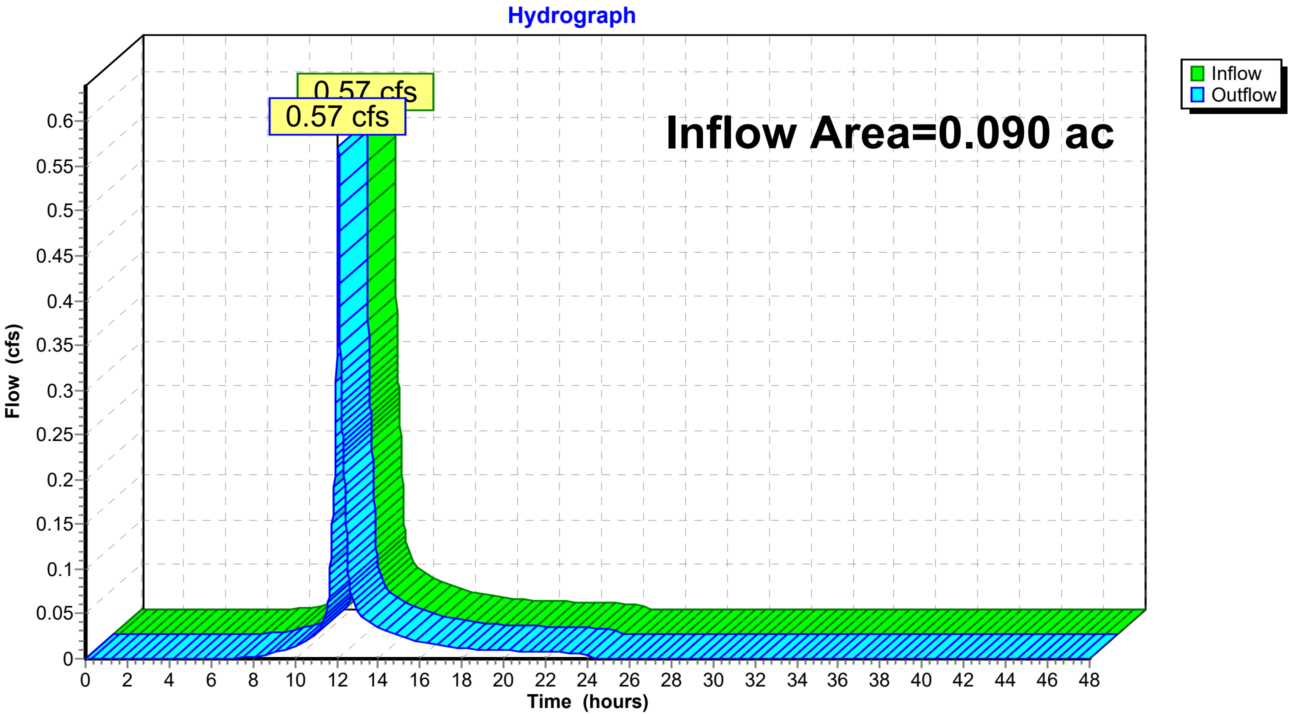


Summary for Reach DP-4: Design Point 4 (MassDOT 30" CB-2)

Inflow Area = 0.090 ac, 0.00% Impervious, Inflow Depth = 5.47" for 100-Year event
Inflow = 0.57 cfs @ 12.09 hrs, Volume= 0.041 af
Outflow = 0.57 cfs @ 12.09 hrs, Volume= 0.041 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Reach DP-4: Design Point 4 (MassDOT 30" CB-2)

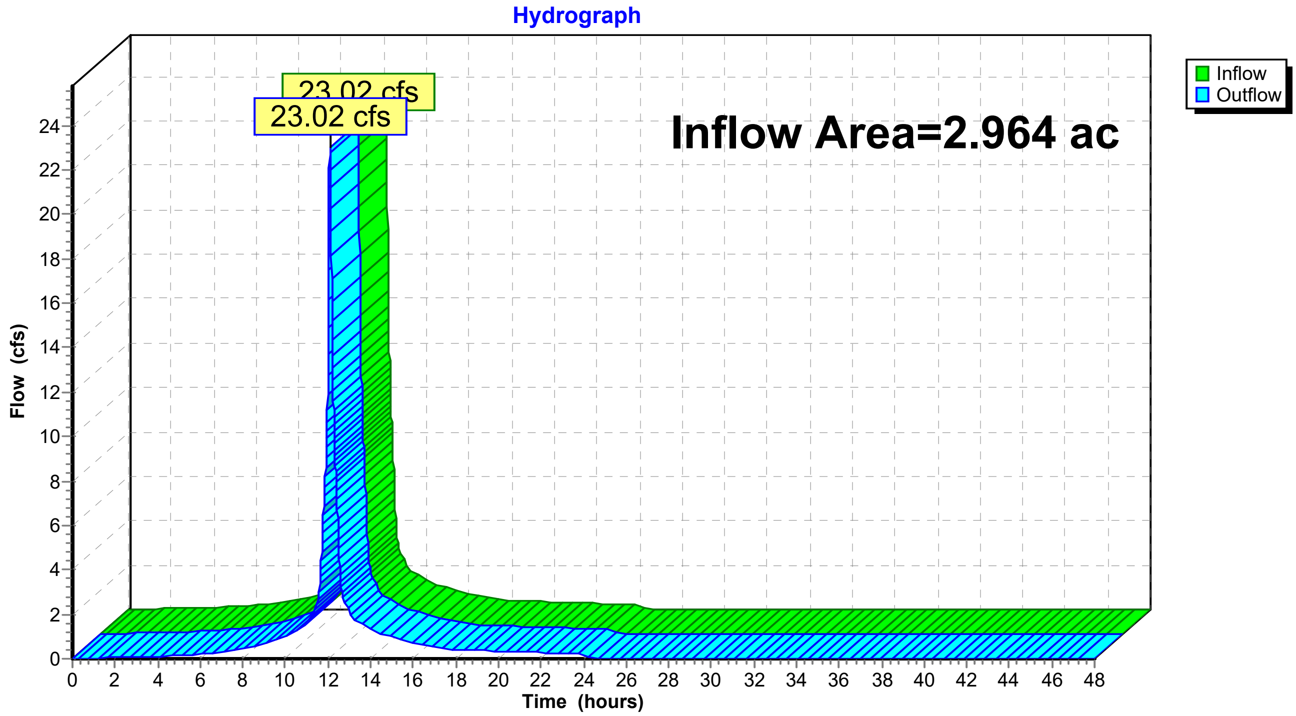


Summary for Reach DP-5: Design Point 5 (Existing Constructed Stormwater Wetland)

Inflow Area = 2.964 ac, 69.34% Impervious, Inflow Depth = 7.48" for 100-Year event
Inflow = 23.02 cfs @ 12.09 hrs, Volume= 1.847 af
Outflow = 23.02 cfs @ 12.09 hrs, Volume= 1.847 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Reach DP-5: Design Point 5 (Existing Constructed Stormwater Wetland)

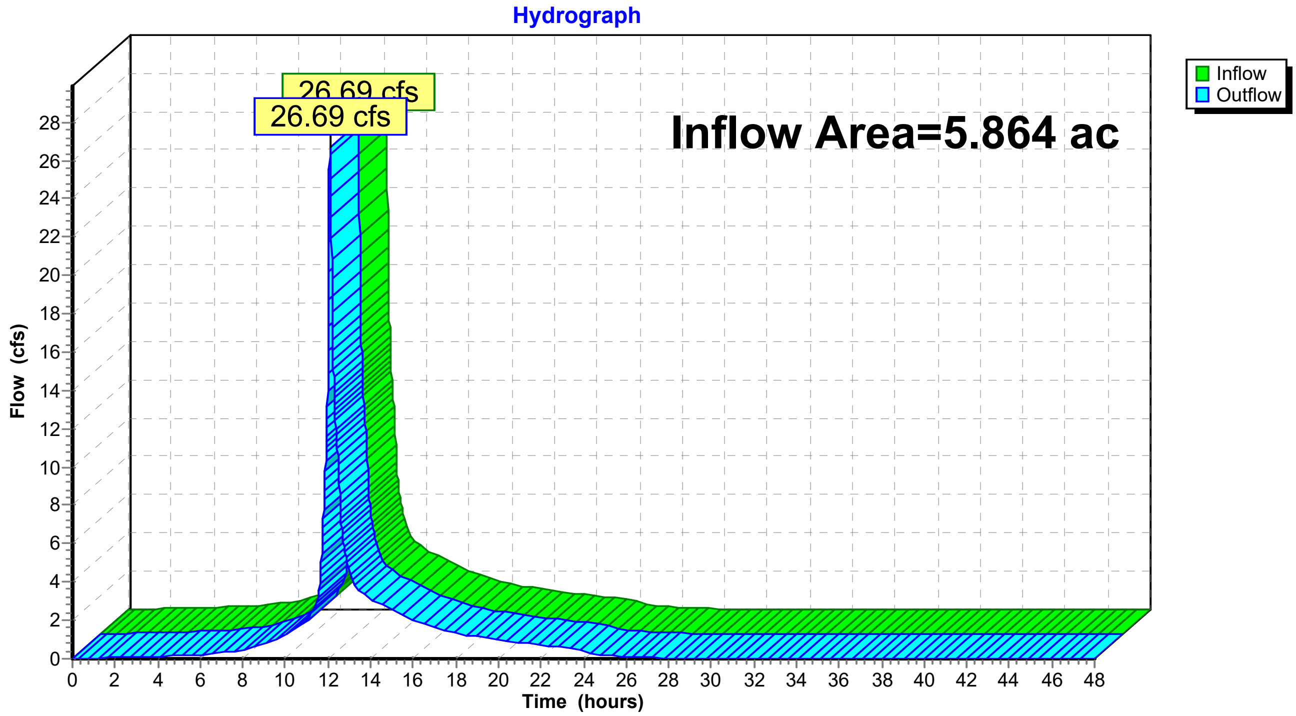


Summary for Reach DP-6: Wetland A - Design Point 6

Inflow Area = 5.864 ac, 68.59% Impervious, Inflow Depth = 6.51" for 100-Year event
Inflow = 26.69 cfs @ 12.10 hrs, Volume= 3.183 af
Outflow = 26.69 cfs @ 12.10 hrs, Volume= 3.183 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Reach DP-6: Wetland A - Design Point 6



Summary for Pond 3P: Conveyance Swale

Inflow Area = 0.471 ac, 52.65% Impervious, Inflow Depth = 6.91" for 100-Year event
Inflow = 3.64 cfs @ 12.08 hrs, Volume= 0.271 af
Outflow = 2.93 cfs @ 12.19 hrs, Volume= 0.264 af, Atten= 20%, Lag= 6.5 min
Primary = 2.93 cfs @ 12.19 hrs, Volume= 0.264 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 126.35' @ 12.15 hrs Surf.Area= 1,162 sf Storage= 1,464 cf

Plug-Flow detention time= 37.7 min calculated for 0.264 af (97% of inflow)
Center-of-Mass det. time= 20.7 min (806.1 - 785.4)

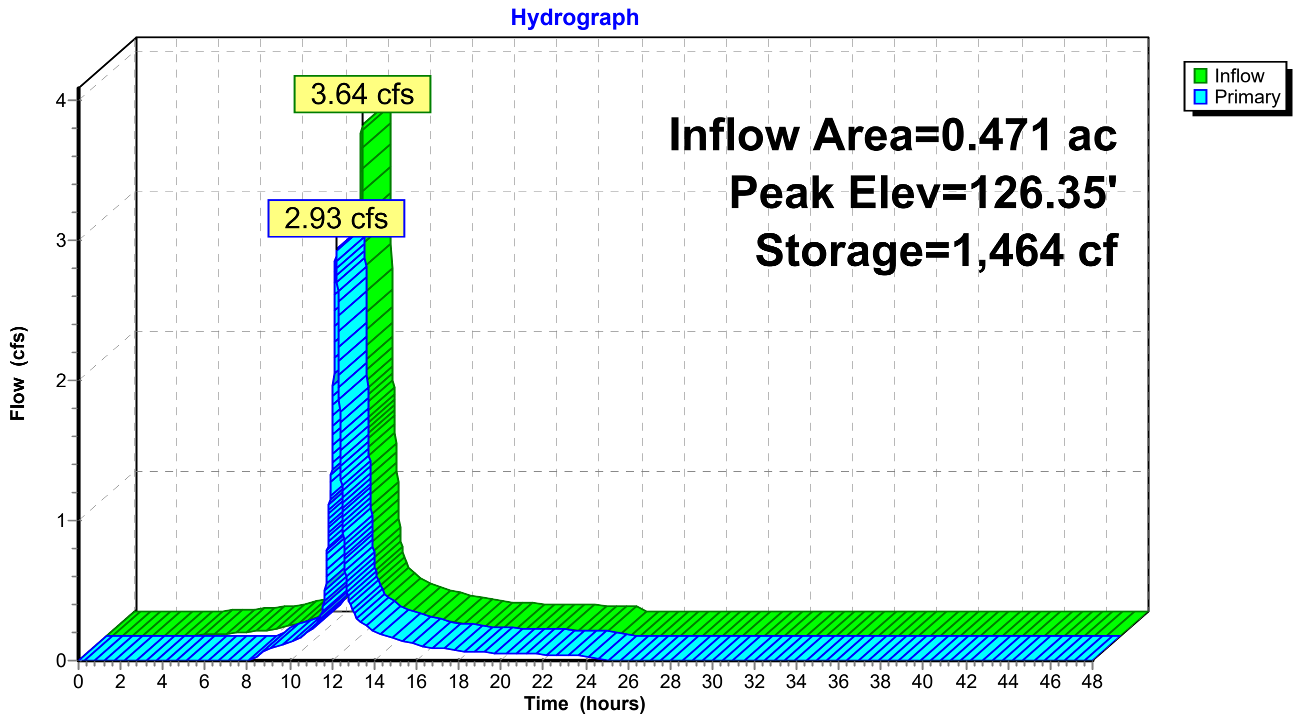
Volume	Invert	Avail.Storage	Storage Description
#1	124.00'	1,645 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
124.00	143	0	0
125.00	530	337	337
126.00	978	754	1,091
126.50	1,241	555	1,645

Device	Routing	Invert	Outlet Devices
#1	Primary	124.18'	**12.0" Round Culvert** L= 10.0' Ke= 0.500 Inlet / Outlet Invert= 124.18' / 124.13' S= 0.0050 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf
#2	Device 1	125.00'	**12.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=2.99 cfs @ 12.19 hrs HW=126.29' TW=125.66' (Dynamic Tailwater)
└─**1=Culvert** (Controls 2.99 cfs)
  └─**2=Orifice/Grate** (Orifice Controls 2.99 cfs @ 3.81 fps)

Pond 3P: Conveyance Swale



Summary for Pond 11P: Permeable Pavement

Inflow Area = 0.626 ac, 95.37% Impervious, Inflow Depth = 8.24" for 100-Year event
Inflow = 5.27 cfs @ 12.08 hrs, Volume= 0.430 af
Outflow = 0.40 cfs @ 13.09 hrs, Volume= 0.430 af, Atten= 92%, Lag= 60.3 min
Discarded = 0.16 cfs @ 9.56 hrs, Volume= 0.358 af
Primary = 0.24 cfs @ 13.09 hrs, Volume= 0.072 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 123.66' @ 13.09 hrs Surf.Area= 25,998 sf Storage= 8,785 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 333.1 min (1,079.1 - 746.0)

Volume	Invert	Avail.Storage	Storage Description
#1	122.75'	8,813 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

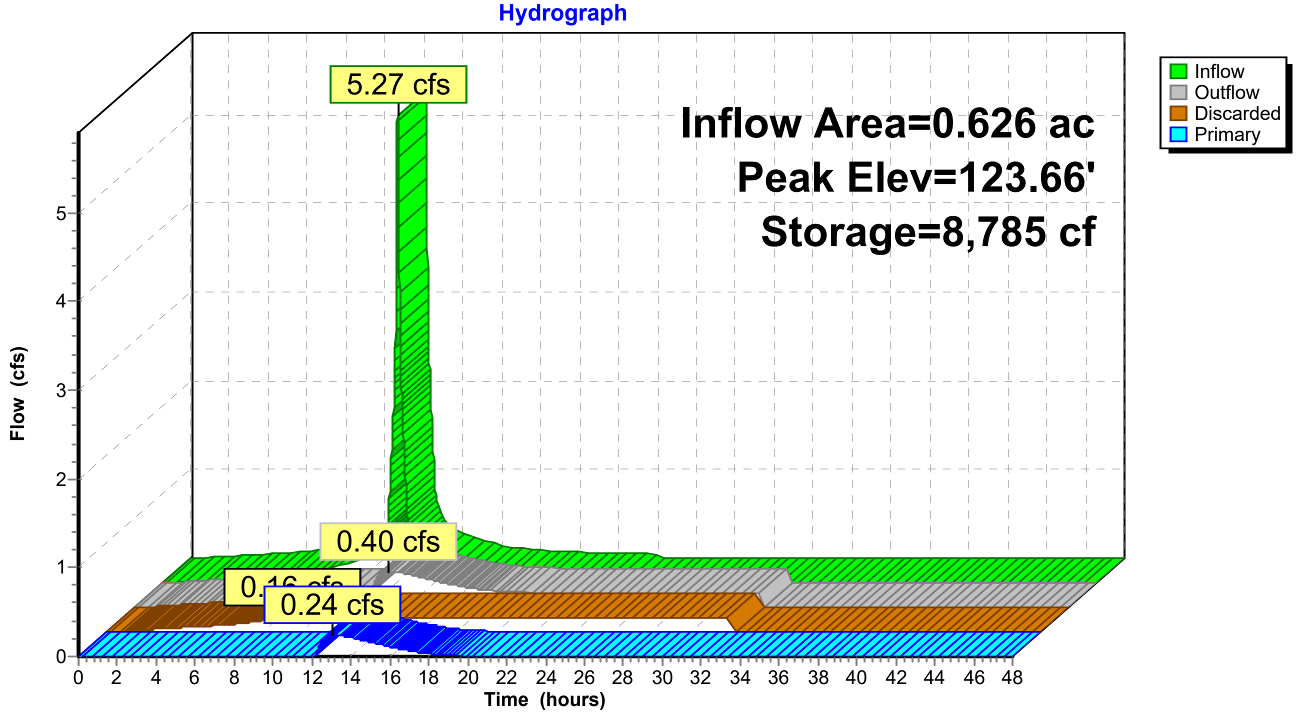
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
122.75	25,998	0.0	0	0
123.41	25,998	40.0	6,863	6,863
123.66	25,998	30.0	1,950	8,813

Device	Routing	Invert	Outlet Devices
#1	Discarded	122.75'	**0.270 in/hr Exfiltration over Surface area**
#2	Primary	123.30'	**6.0" Round Culvert** L= 10.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 123.30' / 119.00' S= 0.4300 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.20 sf

Discarded OutFlow Max=0.16 cfs @ 9.56 hrs HW=122.76' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.16 cfs)

Primary OutFlow Max=0.24 cfs @ 13.09 hrs HW=123.66' TW=0.00' (Dynamic Tailwater)
└─**2=Culvert** (Inlet Controls 0.24 cfs @ 1.60 fps)

Pond 11P: Permeable Pavement



Summary for Pond 13P: UG-1 Retain IT(Infiltration)

Inflow Area = 1.741 ac, 78.76% Impervious, Inflow Depth = 7.65" for 100-Year event
Inflow = 12.67 cfs @ 12.09 hrs, Volume= 1.109 af
Outflow = 12.64 cfs @ 12.10 hrs, Volume= 1.109 af, Atten= 0%, Lag= 0.3 min
Discarded = 0.02 cfs @ 2.51 hrs, Volume= 0.080 af
Primary = 12.62 cfs @ 12.10 hrs, Volume= 1.029 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 125.88' @ 12.10 hrs Surf.Area= 3,440 sf Storage= 8,729 cf

Plug-Flow detention time= 130.4 min calculated for 1.109 af (100% of inflow)
Center-of-Mass det. time= 130.6 min (896.2 - 765.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	121.75'	1,791 cf	**20.00'W x 172.00'L x 4.17'H Field A** 14,333 cf Overall - 9,856 cf Embedded = 4,477 cf x 40.0% Voids
#2A	122.25'	6,948 cf	**retain_it retain_it 3.0'** x 42 Inside #1 Inside= 84.0"W x 36.0"H => 21.33 sf x 8.00'L = 170.6 cf Outside= 96.0"W x 44.0"H => 29.33 sf x 8.00'L = 234.7 cf 2 Rows adjusted for 217.2 cf perimeter wall
		8,739 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	124.75'	**3.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#2	Primary	122.50'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Discarded	121.75'	**0.270 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.02 cfs @ 2.51 hrs HW=121.79' (Free Discharge)
└─**3=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=12.60 cfs @ 12.10 hrs HW=125.88' TW=123.58' (Dynamic Tailwater)
├─**1=Broad-Crested Rectangular Weir** (Weir Controls 11.96 cfs @ 3.53 fps)
└─**2=Orifice/Grate** (Orifice Controls 0.64 cfs @ 7.30 fps)

Pond 13P: UG-1 Retain IT(Infiltration) - Chamber Wizard Field A

Chamber Model = retain_it retain_it 3.0' (retain-it®)
Inside= 84.0"W x 36.0"H => 21.33 sf x 8.00'L = 170.6 cf
Outside= 96.0"W x 44.0"H => 29.33 sf x 8.00'L = 234.7 cf
2 Rows adjusted for 217.2 cf perimeter wall

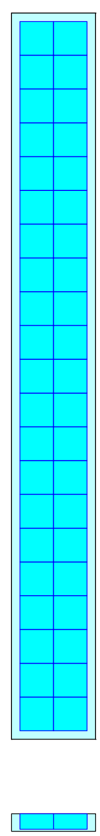
21 Chambers/Row x 8.00' Long = 168.00' Row Length +24.0" End Stone x 2 = 172.00' Base Length
2 Rows x 96.0" Wide + 24.0" Side Stone x 2 = 20.00' Base Width
6.0" Base + 44.0" Chamber Height = 4.17' Field Height

4.7 cf Sidewall x 21 x 2 + 4.7 cf Endwall x 2 x 2 = 217.2 cf Perimeter Wall
42 Chambers x 170.6 cf - 217.2 cf Perimeter wall = 6,948.5 cf Chamber Storage
42 Chambers x 234.7 cf = 9,856.0 cf Displacement

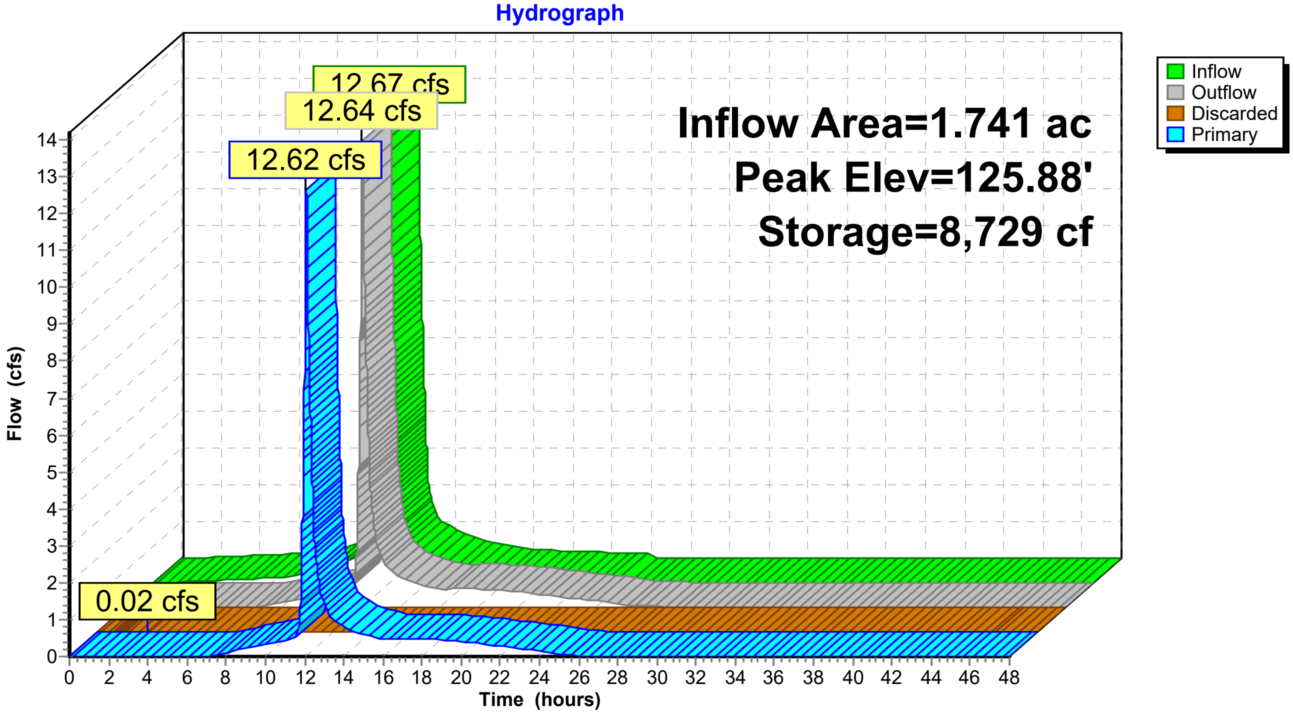
14,333.3 cf Field - 9,856.0 cf Chambers = 4,477.3 cf Stone x 40.0% Voids = 1,790.9 cf Stone Storage

Chamber Storage + Stone Storage = 8,739.4 cf = 0.201 af
Overall Storage Efficiency = 61.0%
Overall System Size = 172.00' x 20.00' x 4.17'

42 Chambers
530.9 cy Field
165.8 cy Stone



Pond 13P: UG-1 Retain IT(Infiltration)



Summary for Pond 16P: UG-2 Retain IT (Detention)

Inflow Area = 1.741 ac, 78.76% Impervious, Inflow Depth = 7.10" for 100-Year event
Inflow = 12.62 cfs @ 12.10 hrs, Volume= 1.029 af
Outflow = 3.29 cfs @ 12.50 hrs, Volume= 1.027 af, Atten= 74%, Lag= 24.3 min
Primary = 3.29 cfs @ 12.50 hrs, Volume= 1.027 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 124.98' @ 12.50 hrs Surf.Area= 6,512 sf Storage= 15,957 cf

Plug-Flow detention time= 124.4 min calculated for 1.027 af (100% of inflow)
Center-of-Mass det. time= 123.0 min (979.5 - 856.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	122.00'	1,103 cf	**44.00'W x 148.00'L x 3.67'H Field A** 23,877 cf Overall - 21,120 cf Embedded = 2,757 cf x 40.0% Voids
#2A	122.00'	15,138 cf	**retain_it retain_it 3.0'** x 90 Inside #1 Inside= 84.0"W x 36.0"H => 21.33 sf x 8.00'L = 170.6 cf Outside= 96.0"W x 44.0"H => 29.33 sf x 8.00'L = 234.7 cf 5 Rows adjusted for 217.2 cf perimeter wall
		16,241 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	121.50'	**12.0" Round Culvert** L= 10.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 121.50' / 121.40' S= 0.0100 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf
#2	Device 1	124.70'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#3	Device 1	122.00'	**6.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=3.29 cfs @ 12.50 hrs HW=124.98' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Passes 3.29 cfs of 6.53 cfs potential flow)
  ├─**2=Broad-Crested Rectangular Weir** (Weir Controls 1.73 cfs @ 1.52 fps)
  └─**3=Orifice/Grate** (Orifice Controls 1.56 cfs @ 7.96 fps)

Pond 16P: UG-2 Retain IT (Detention) - Chamber Wizard Field A

Chamber Model = retain_it retain_it 3.0' (retain-it®)
Inside= 84.0"W x 36.0"H => 21.33 sf x 8.00'L = 170.6 cf
Outside= 96.0"W x 44.0"H => 29.33 sf x 8.00'L = 234.7 cf
5 Rows adjusted for 217.2 cf perimeter wall

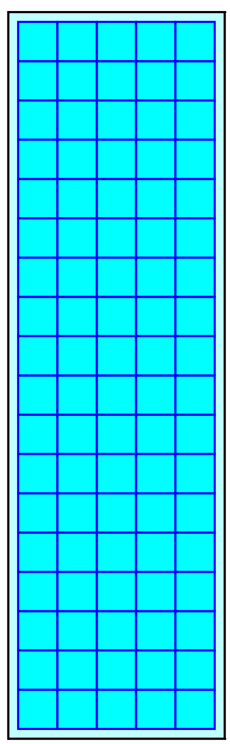
18 Chambers/Row x 8.00' Long = 144.00' Row Length +24.0" End Stone x 2 = 148.00' Base Length
5 Rows x 96.0" Wide + 24.0" Side Stone x 2 = 44.00' Base Width
44.0" Chamber Height = 3.67' Field Height

4.7 cf Sidewall x 18 x 2 + 4.7 cf Endwall x 5 x 2 = 217.2 cf Perimeter Wall
90 Chambers x 170.6 cf - 217.2 cf Perimeter wall = 15,137.8 cf Chamber Storage
90 Chambers x 234.7 cf = 21,120.0 cf Displacement

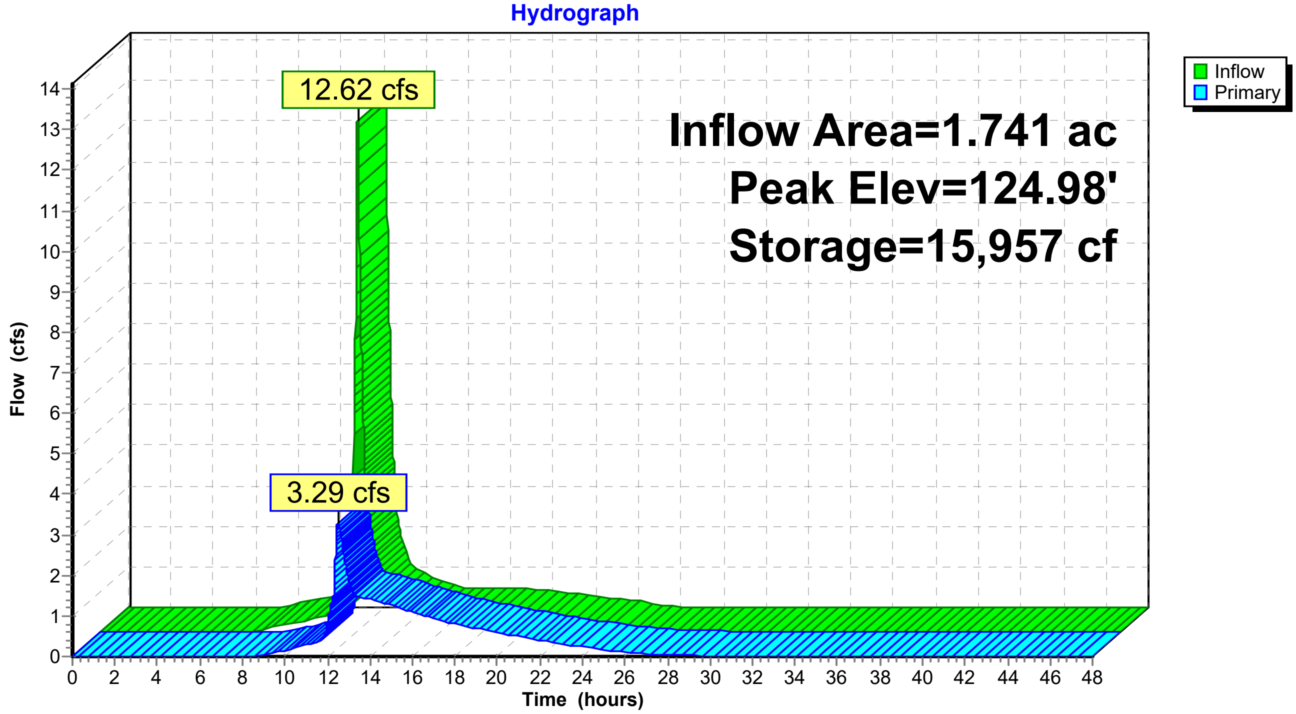
23,877.3 cf Field - 21,120.0 cf Chambers = 2,757.3 cf Stone x 40.0% Voids = 1,102.9 cf Stone Storage

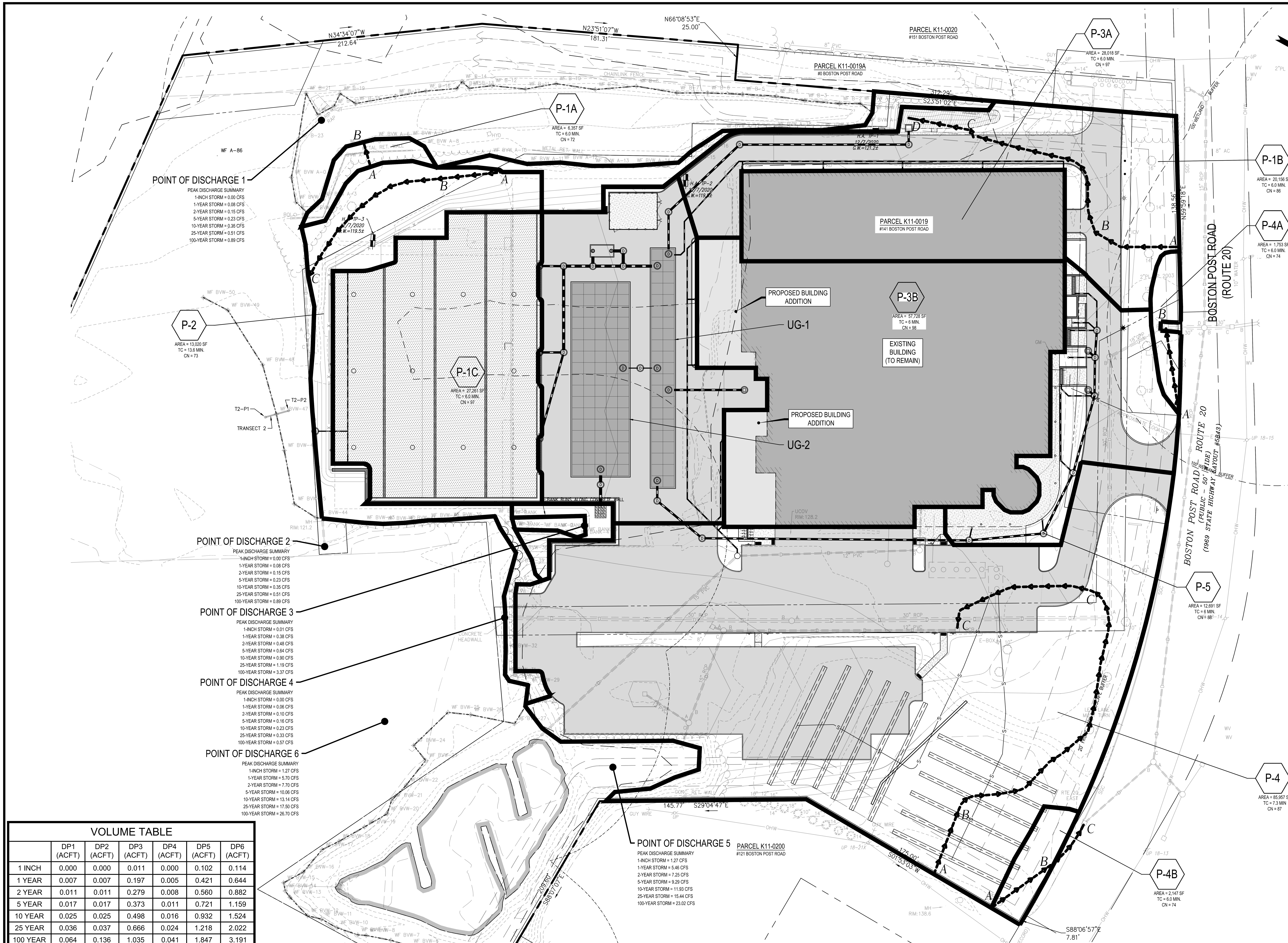
Chamber Storage + Stone Storage = 16,240.7 cf = 0.373 af
Overall Storage Efficiency = 68.0%
Overall System Size = 148.00' x 44.00' x 3.67'

90 Chambers
884.3 cy Field
102.1 cy Stone



Pond 16P: UG-2 Retain IT (Detention)





VOLUME TABLE

	DP1 (ACFT)	DP2 (ACFT)	DP3 (ACFT)	DP4 (ACFT)	DP5 (ACFT)	DP6 (ACFT)
1 INCH	0.000	0.000	0.011	0.000	0.102	0.114
1 YEAR	0.007	0.007	0.197	0.005	0.421	0.644
2 YEAR	0.011	0.011	0.279	0.008	0.560	0.882
5 YEAR	0.017	0.017	0.373	0.011	0.721	1.159
10 YEAR	0.025	0.025	0.498	0.016	0.932	1.524
25 YEAR	0.036	0.037	0.666	0.024	1.218	2.022
100 YEAR	0.064	0.136	1.035	0.041	1.847	3.191

Date	Description	No.
03/28/22	P.B. AND CON.-COM. RESUBMITTAL	4.
02/14/22	P.B. AND CON.-COM. RESUBMITTAL	3.
01/31/22	ZBA RESUBMITTAL	2.
11/15/21	PLANNING BOARD SUBMITTAL	1.

Revisions

COMMONWEALTH OF MASSACHUSETTS GABRIEL R. CROCKER CIVIL No. 47917 REGISTERED PROFESSIONAL ENGINEER

GABRIEL R. CROCKER
PROFESSIONAL ENGINEER, MA REGISTRATION #47917

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Project

MERCEDES OF SUDBURY

141 BOSTON POST ROAD,
SUDBURY, MA

Prepared for

HERB CHAMBERS 43 BRAINTREE STREET, LLC

#259 McGRATH HIGHWAY - ROUTE 28
SOMERVILLE, MA 02143

Drawing Title

PROPOSED CONDITIONS WATERSHED PLAN

Project No.	100-107	Drawing No.
Date	11/10/2021	
Scale	1" = 30'	**PH-1**
Drawn By	DJN / JPM	
Approved By	GC	

SECTION 4 – STORMWATER MANAGEMENT CALCS

4.1 STANDARD 3: RECHARGE CALCULATIONS

The Required Recharge Volume is computed using the equation provided in the 2008 Massachusetts Stormwater Handbook. The volume is computed as an equivalent depth of rainfall over the proposed impervious areas in accordance with a Target Depth Factor based on the soil classifications. The Calculations is as follows:

Rv = (F) X (Impervious Area)
(Equation 1) Volume 3, Ch 1, page 15

- Rv = Required Recharge Volume, expressed in cubic feet, cubic yards, or acre-feet
- F = Target Depth Factor associated with each Hydrologic Soil Group (HSG)
- Impervious Area = new pavement and new rooftop area
- The Target Depth Factor "F" per Table 2.3.2, Volume 3, Chapter 1 for each soil classification is as follows:
    - A soils = 0.60 inches
    - B soils = 0.35 inches
    - C soils = 0.25 inches
    - D soils = 0.10 inches

The existing impervious area within limit of work is 172,236 SF (pavement, buildings, compacted gravel parking) and the total proposed impervious area within limit of work is 175,198 SF (pavement, buildings and including permeable pavement, which per the MA Stormwater Standards and Sudbury Stormwater Bylaw must be considered impervious for this calculation). Therefore, there is an increase in impervious area of 2,962 SF.

Permeable pavement and underground infiltration chambers are utilized as infiltration BMPs for the site. Based on the test pits performed, groundwater was assumed to be at elevation 119.5. It appears that the underground infiltration system and the permeable pavement has the minimum 2-feet of separation between the bottom of the recharge structure and seasonal high groundwater.

Based on the above formula, the minimum required recharge volume for the site is as follows:

Per Section 1.3, the onsite soils are considered "C" soils:

- F (C soils) = 0.25 inches
- Impervious Area (New Impervious) =2,962 SF

    Rv = (F) X (Impervious Area)
    Rv= (0.25 in) x (1ft/12 in) x 2,962 SF = 61.71 CF

TOTAL RECHARGE VOLUME REQUIRED = 62 CF

Capture Area Adjustment:

Capture Area Adjustment = Surface Area of Inf. BMP's/0.65
PP Capture Area Adjustment = SA Perm. Pavement/0.65
Capture Area Adjustment = 25,998 SF /0.65
Capture Area Adjustment = 39,997 SF

Chambers Capture Area Adjustment = SA of Underground Chambers/0.65
Capture Area Adjustment = 3,440 SF/0.65
Capture Area Adjustment = 5,292 SF

Adjusted Recharge Volume = Capture Area Adjustment * Depth of BMP * Voids
PP Adjusted Recharge Volume = 39,997 SF * (8in/12in)FT * 0.40
PP Adjusted Recharge Volume = 10,666 CF

Chamber Adjusted Recharge Volume = 5,292 SF * (3in/12in)FT * 1.00
(Depth of BMP is from bottom of structure to orifice invert)
Chamber Adjusted Recharge Volume = 1,323 CF

Stone Adjusted Recharge Volume = 5,292 SF * (6in/12in)FT * 0.40
Stone Adjusted Recharge Volume = 1,058 CF

Stone & Chamber Adjusted Recharge Volume = 2,381 CF

Recharge Volume BMP Table

Infiltration BMP	Infiltration Rate (in/hr) k	Storage (Recharge) Volume (CF) Rv
Permeable Pavement	0.27	10,666
Underground Infiltration Chambers	0.27	2,381
Totals		**13,047**
k = saturated hydraulic conductivity (in/hr) *Rv = storage volume (CF)* *Volume 3, Chapter 1 of the MA Stormwater Handbook*		

TOTAL RECHARGE VOLUME PROVIDED = 13,047 CF

Conclusion:

Due to groundwater depth restricting infiltration BMPs elsewhere on the site, we feel that this design recharges to the maximum extent practicable.

4.2 DRAWDOWN TIME

Below are the drawdown time calculations for the infiltration systems proposed on the site. The calculation uses estimated hydraulic conductivity values "*K*" in accordance with the Rawls Rates table. The formula below utilized the recommended formula per the MA Stormwater Handbook as follows:

Drawdown Time = Rv / [(K*Bottom Area)*(1FT/12IN)]

- Rv = Storage Volume (CF)
- K = Saturated Hydraulic Conductivity per Rawls Rate Table
- Bottom Area = Area of Bottom of Proposed Recharge Structure

Below is a summary table of the drawdown calculations:

DRAWDOWN CALCULATIONS				
Infiltration BMP	**Infiltration Rate (IN/HR) k**	**Storage (Recharge) Volume Provided (CF) Rv**	**Bottom Area (SF)**	**Draw Down Time (HR)**
Permeable Pavement	0.27	10,666	25,998	18.23
Underground Chambers	0.27	2,381	5,292	20.00
Totals		**13,312**		
k = saturated hydraulic conductivity (IN/HR) *Rv = storage volume (CF)* *Bottom Area (SF)* *Volume 3, Chapter 1 of the MA Stormwater Handbook*				

<u>Conclusion:</u>
The calculations show that the infiltration BMP draws down in less than 72 hours, as required.

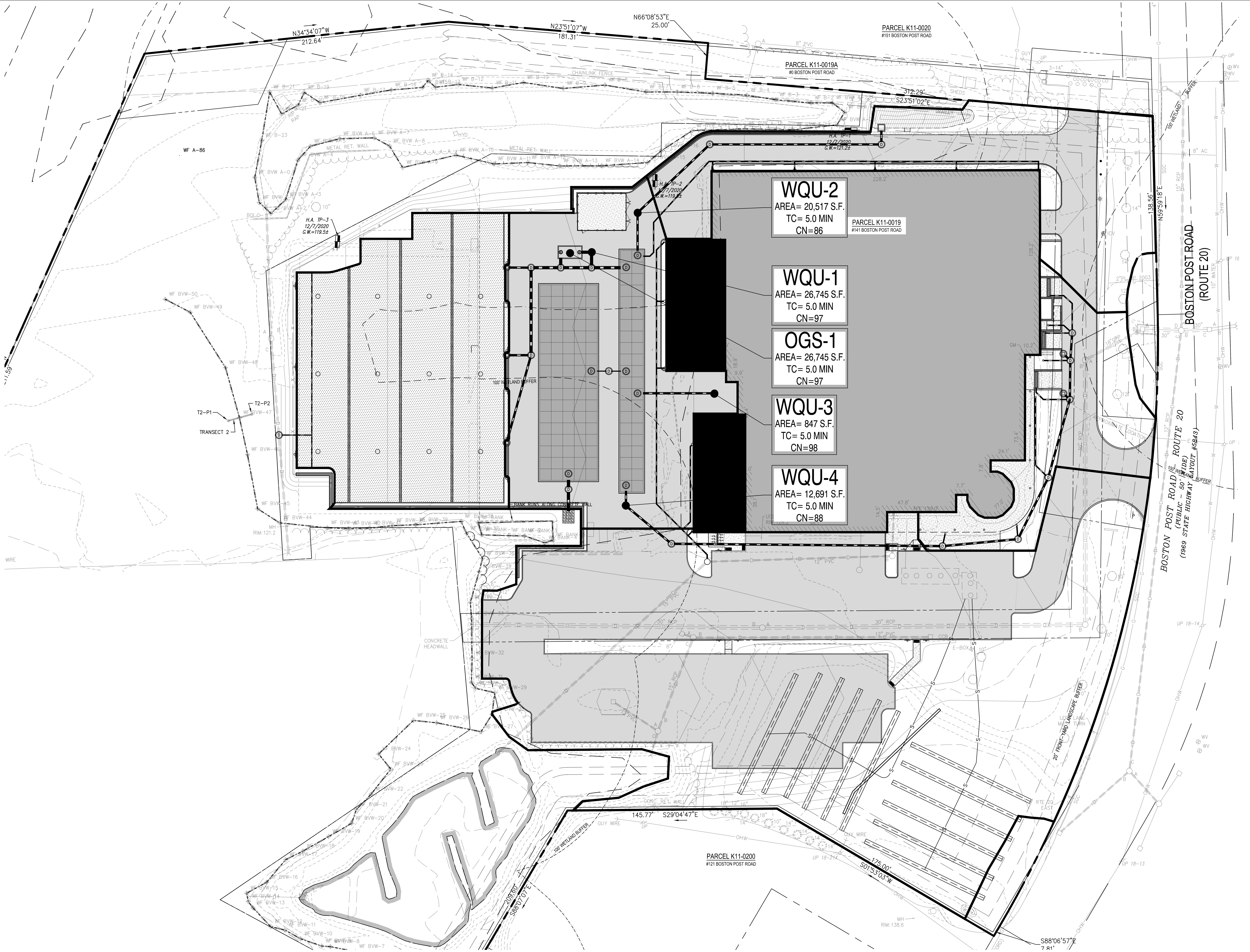
4.3 STANDARD 4: WATER QUALITY

Stormwater runoff is proposed to be treated through various combinations of deep sump catch basins, grass swales, offline water quality units, underground infiltration and detention chambers and permeable pavement. All combinations of BMP's treat the required 1-inch WQV to at least 80% TSS removal. Please refer to section 4.5 for all TSS removal calculations.

A table has been provided below that calculates the water quality flow and provides the sizing of the water quality units selected. The WQU's have been sized to treat 1" WQV of the contributing tributary area. There are three (3) in-line CDS2015 units proposed and one (1) offline CDS2020 unit (in combination with an OGS) proposed. A diversion manhole directs the required water quality flow (1-inch) into the OGS and the water quality unit. The larger flows will pass over the weir, and directly into the underground infiltration chambers. The elevation of the weir is calculated using the Manning's equation. Please see the following spread sheets for the calculations. A flow of 0.75 CFS in an 18" RCP pipe with a slope of 0.5% will develop a water depth in the pipe of approximate 3.4 inches. The weir elevation is proposed to be 3.4 inches higher than the invert in to ensure that the 1" WQV is treated in the Oil/Grit Separator and the WQU. The water quality calculated flow was used to size the unit.

Water Quality Unit Sizing Using Equivalent Flow from 1" Rainfall Depth											REQUIRED VOLUME FOR OGS IN FIRST CHAMBER	PROPOSED OIL/GRIT UNIT SIZE
Basin / WQ structure	Tributary Area	Tributary Area	Pervious	Impervious	CN Value	WQV	Tc	qu	WQF = qu A Q	Unit		
	(acres)	(sq miles)	(sf)	%	(Estimated)	(In)	(min)	(csm/in)	(cfs)		400 cf / AC of imperv (GAL)	(GAL)
OSG-1	0.61	0.0010	600	98%	97	1.00	5	795	0.75	N/A	1795.9	3,000
DMH #4- WQU #1	0.61	0.0010	600	98%	97	1.00	5	795	0.75	CDS-2020		
DMH #9- WQU #2	0.47	0.0007	6,500	68%	86	1.00	5	795	0.40	CDS-2015		
DMH #10- WQU #3	0.02	0.0000	-	100%	98	1.00	5	795	0.02	CDS-2015		
DMH #18- WQU #4	0.29	0.0005	5,116	60%	83	1.00	5	795	0.22	CDS-2015		

***Based on MASS DEP: The pool storage in the first chamber of the Oil/Grit has to accommodate 400 cubic feet per acre of impervious surface.**
First chamber is considered, at minimum, half of storage volume of the entire structure
formula used is : IMPERVIOUS (AC) X 400 (CF) X 7.48 to get the minimum storage volume in the FIRST CHAMBER of Oil/Grit structure



Date	Description	No.
03/28/22	P.B. AND CON.-COM. RESUBMITTAL	4.
02/14/22	P.B. AND CON.-COM. RESUBMITTAL	3.
01/31/22	ZBA RESUBMITTAL	2.
11/15/21	PLANNING BOARD SUBMITTAL	1.

Revisions

COMMONWEALTH OF MASSACHUSETTS
GABRIEL R. CROCKER
CIVIL
No. 47917
REGISTERED PROFESSIONAL ENGINEER

GABRIEL R. CROCKER
PROFESSIONAL ENGINEER, MA REGISTRATION #47917

Crocker Design Group

2 SHARP STREET, UNIT A
HINGHAM, MA 02043
P: 781-919-0808

Project

MERCEDES OF SUDBURY

141 BOSTON POST ROAD,
SUDBURY, MA

Prepared for

HERB CHAMBERS 43 BRAINTREE STREET, LLC

#259 McGRATH HIGHWAY - ROUTE 28
SOMERVILLE, MA 02143

Drawing Title

PROPOSED WATER QUALITY CATCHMENT MAP

Project No.	100-107
Date	11/10/2021
Scale	1" = 30'
Drawn By	DJN / JPM
Approved By	GC
Drawing No.	PH-3

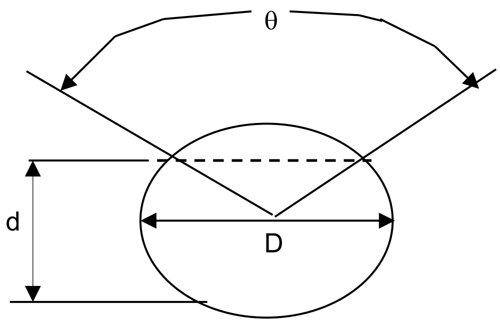
MANNING'S EQUATION FOR PIPE FLOW - 18" PIPE MINIMUM SLOPE CALC FOR DVM OGS1

Project: HERB CHAMB. MERCEDES OF SU Location: 141 BOSTON POST RD- SUDBURY

By: MJL Date: 3/28/2022

Chk. By: GRC Date: 3/28/2022 mdo version 12.8.00

Clear Data Entry Cells



INPUT

D=	18	inches
d=	3.4	inches
n=	0.01	mannings coeff
θ=	103.0	degrees
S=	0.005	slope in/in

Mannings Formula

$Q=(1.486/n)AR_h^{2/3}S^{1/2}$

R=A/P

A=cross sectional area

P=wetted perimeter

S=slope of channel

n=Manning's roughness coefficient

$V=(1.49/n)R_h^{2/3}S^{1/2}$

Q=V x A

Solution to Mannings Equation

Area, ft^2	Wetted Perimeter, ft	Hydraulic Radius, ft	velocity ft/s	flow, cfs
0.23	1.35	0.17	3.25	0.75

Manning's n-values

PVC	0.01
PE (<9"dia)	0.015
PE (>12"dia)	0.02
PE(9-12"dia)	0.017
CMP	0.025
ADS N12	0.012
HCMP	0.023
Conc	0.013

particle re-suspension. In order to not restrict the Owner's ability to maintain the SWTD, the minimum dimension providing access from the ground surface to the sump chamber shall be 20 inches in diameter.

2. The SWTD shall be designed to capture and retain Total Petroleum Hydrocarbons generated by wet-weather flow and dry-weather gross spills. The minimum storage capacity provided by the SWTD shall be in accordance with the volume listed in Table 1 below.

TABLE 1

CDS Model	Treatment Capacity (cfs)/(L/s)	Minimum Sump Storage Capacity $(yd^3)/(m^3)$	Minimum Oil Storage Capacity (gal)/(L)
CDS2015-G	0.7 (19.8)	0.5 (0.4)	70 (265)
CDS2015-4	0.7 (19.8)	0.5 (1.4)	70 (265)
CDS2015	0.7(19.8)	1.3 (1.0)	92 (348)
CDS2020	1.1 (31.2)	1.3 (1.0)	131 (496)
CDS2025	1.6 (45.3)	1.3 (1.0)	143 (541)
CDS3020	2.0 (56.6)	2.1 (1.6)	146 (552)
CDS3030	3.0 (85.0)	2.1 (1.6)	205 (776)
CDS3035	3.8 (106.2)	2.1 (1.6)	234 (885)
CDS4030	4.5 (127.4)	5.6 (4.3)	407 (1540)
CDS4040	6.0 (169.9)	5.6 (4.3)	492 (1862)
CDS4045	7.5 (212.4)	5.6 (4.3)	534 (2012)
CDS2020-D	1.1 (31.2)	1.3 (1.0)	131 (495)
CDS3020-D	2.0 (56.6)	2.1 (1.6)	146 (552)
CDS3030-D	3.0 (85.0)	2.1 (1.6)	205 (776)
CDS3035-D	3.8 (106.2)	2.1 (1.6)	234 (885)
CDS4030-D	4.5 (127.4)	4.3 (3.3)	328 (1241)
CDS4040-D	6.0 (169.9)	4.3 (3.3)	396 (1499)
CDS4045-D	7.5 (212.4)	4.3 (3.3)	430 (1627)
CDS5640-D	9.0 (254.9)	5.6 (4.3)	490 (1854)
CDS5653-D	14.0 (396.5)	5.6 (4.3)	599 (2267)
CDS5668-D	19.0 (538.1)	5.6 (4.3)	733 (2774)
CDS5678-D	25.0 (708.0)	5.6 (4.3)	814 (3081)
CDS3030-DV	3.0 (85.0)	2.1 (1.6)	205 (776)
CDS5042-DV	9.0 (254.9)	1.9 (1.5)	294 (1112)
CDS5050-DV	11.0 (311.5)	1.9 (1.5)	367 (1389)
CDS7070-DV	26.0 (736.3)	3.3 (2.5)	914 (3459)
CDS10060-DV	30.0 (849.6)	5.0 (3.8)	792 (2997)
CDS10080-DV	50.0 (1416.0)	5.0 (3.8)	1057 (4000)
CDS100100-DV	64.0 (1812.5)	5.0 (3.8)	1320 (4996)

State of New Jersey

DEPARTMENT OF ENVIRONMENTAL PROTECTION
Bureau of Nonpoint Pollution Control
Division of Water Quality
401-02B
Post Office Box 420
Trenton, New Jersey 08625-0420
609-633-7021 Fax: 609-777-0432
http://www.state.nj.us/dep/dwq/bnpc_home.htm

CHRIS CHRISTIE
Governor

KIM GUADAGNO
Lt. Governor

BOB MARTIN
Commissioner

January 9, 2015

Derek M. Berg
CONTECH Engineered Solutions, LLC
71 US Route 1, Suite F
Scarborough, ME 04074

Re: MTD Lab Certification for the
Continuous Deflective Separator (CDS®) Stormwater Treatment Device
By Contech Engineered Solutions LLC

TSS Removal Rate 50%

Dear Mr. Berg:

The Stormwater Management rules under N.J.A.C. 7:8-5.5(b) and 5.7 (c) allow the use of manufactured treatment devices (MTDs) for compliance with the design and performance standards at N.J.A.C. 7:8-5 if the pollutant removal rates have been verified by the New Jersey Corporation for Advanced Technology (NJCAT) and have been certified by the New Jersey Department of Environmental Protection (NJDEP). Contech Engineered Solutions, LLC has requested a Laboratory Certification for the CDS® Stormwater Treatment Device.

The projects falls under the "Procedure for Obtaining Verification of a Stormwater Manufactured Treatment Device from New Jersey Corporation for Advance Technology" dated January 25, 2013. The applicable protocol is the "New Jersey Laboratory Testing Protocol to Assess Total Suspended Solids Removal by a Hydrodynamic Sedimentation Manufactured Treatment Device" dated January 25, 2013.

NJCAT verification documents submitted to the NJDEP indicate that the requirements of the aforementioned protocol have been met or exceeded. The NJCAT letter also included a recommended certification TSS removal rate and the required maintenance plan. The NJCAT Verification Report with the Verification Appendix for this device is published online at http://www.njcat.org/verification-process/technology-verification-database.html.

The NJDEP certifies the use of the Continuous Deflective Separator (CDS®) Stormwater Treatment Device by Contech Engineered Solutions LLC at a TSS removal rate of 50% when designed, operated and maintained in accordance with the information provided in the Verification Appendix.

Be advised a detailed maintenance plan is mandatory for any project with a Stormwater BMP subject to the Stormwater Management Rules, N.J.A.C. 7:8. The plan must include all of the items identified in the Stormwater Management Rules, N.J.A.C. 7:8-5.8. Such items include, but are not limited to, the list of inspection and maintenance equipment and tools, specific corrective and preventative maintenance tasks, indication of problems in the system, and training of maintenance personnel. Additional information can be found in Chapter 8: Maintenance of the New Jersey Stormwater Best Management Practices Manual.

If you have any questions regarding the above information, please contact Mr. Titus Magnanao of my office at (609) 633-7021.

Sincerely,

James J. Murphy, Chief
Bureau of Nonpoint Pollution Control

C: Chron File
Richard Magee, NJCAT
Madhu Guru, DLUR
Ravi Patraju, NJDEP
Elizabeth Dragon, BNPC
Titus Magnanao, BNPC

CONTECH®
ENGINEERED SOLUTIONS

CDS® Inspection and Maintenance Guide – New Jersey

CDS TECHNOLOGIES

Maintenance

The CDS system should be inspected at regular intervals and maintained when necessary to ensure optimum performance. The rate at which the system collects pollutants will depend more heavily on site activities than the size of the unit. For example, unstable soils or heavy winter sanding will cause the grit chamber to fill more quickly but regular sweeping of paved surfaces will slow accumulation.

Inspection

Inspection is the key to effective maintenance and is easily performed. Pollutant transport and deposition may vary from year to year and regular inspections will help ensure that the system is cleaned out at the appropriate time. At a minimum, inspections should be performed twice per year (e.g. spring and fall) however more frequent inspections may be necessary in climates where winter sanding operations may lead to rapid accumulations, or in equipment washdown areas. Installations should also be inspected more frequently where excessive amounts of trash are expected.

The visual inspection should ascertain that the system components are in working order and that there are no blockages or obstructions in the inlet and separation screen. The inspection should also quantify the accumulation of hydrocarbons, trash, and sediment in the system. Measuring pollutant accumulation can be done with a calibrated dipstick, tape measure or other measuring instrument. If absorbent material is used for enhanced removal of hydrocarbons, the level of discoloration of the sorbent material should also be identified during inspection. It is useful and often required as part of an operating permit to keep a record of each inspection. A simple form for doing so is provided.

Access to the CDS unit is typically achieved through two manhole access covers. One opening allows for inspection and cleanout of the separation chamber (cylinder and screen) and isolated sump. The other allows for inspection and cleanout of sediment captured and retained outside the screen. For deep units, a single manhole access point allows both sump cleanout and access outside the screen.

The CDS system should be cleaned when the level of sediment has reached 75% of capacity in the isolated sump or when an appreciable level of hydrocarbons and trash has accumulated. If absorbent material is used, it should be replaced when significant discoloration has occurred. Performance will not be impacted until 100% of the sump capacity is exceeded however it is recommended that the system be cleaned prior to that for easier removal of sediment. The level of sediment is easily determined by measuring from finished grade down to the top of the sediment pile. To avoid underestimating the level of sediment in the chamber, the measuring device must be lowered to the top of the sediment pile carefully. Particles at the top of the pile typically offer less resistance to the end of the rod than consolidated particles toward the bottom of the pile. Once this measurement is recorded, it should be compared to the as-built drawing for the unit to determine weather the height of the sediment pile off the bottom of the sump floor exceeds 75% of the total height of isolated sump. Refer to Table 1 for depth from water surface to top of sediment pile for each model size indicating that maintenance is required.

Cleaning

Cleaning of a CDS systems should be done during dry weather conditions when no flow is entering the system. The use of a vacuum truck is generally the most effective and convenient method of removing pollutants from the system. Simply remove the manhole covers and insert the vacuum hose into the sump. The system should be completely drained down and the sump fully evacuated of sediment. The area outside the screen should also be cleaned out if pollutant build-up exists in this area.

In installations where the risk of petroleum spills is small, liquid contaminants may not accumulate as quickly as sediment. However, the system should be cleaned out immediately in the event of an oil or gasoline spill should be cleaned out immediately. Motor oil and other hydrocarbons that accumulate on a more routine basis should be removed when an appreciable layer has been captured. To remove these pollutants, it may be preferable to use absorbent pads since they are usually less expensive to dispose than the oil/water emulsion that may be created by vacuuming the oily layer. Trash and debris can be netted out to separate it from the other pollutants. The screen should be power washed to ensure it is free of trash and debris.

Manhole covers should be securely seated following cleaning activities to prevent leakage of runoff into the system from above and also to ensure that proper safety precautions have been followed. Confined space entry procedures need to be followed if physical access is required. Disposal of all material removed from the CDS system should be done in accordance with local regulations. In many jurisdictions, disposal of the sediments may be handled in the same manner as the disposal of sediments removed from catch basins or deep sump manholes.

CDS Model	Diameter		Distance from Water Surface to Top of Sediment Pile[1]		Sediment Storage Capacity	
	ft	m	ft	m	yd^3	m^3
CDS-4	4	1.2	3.0	0.9	0.9	0.7
CDS-5	5	1.5	3.7	1.1	1.5	1.1
CDS-6	6	1.8	4.7	1.4	2.1	1.6
CDS-8	8	2.4	5.8	1.8	3.7	2.8
CDS-10	10	3.0	7.4	2.3	5.8	4.4
CDS-12	12	3.4	8.0	2.4	8.4	6.4

Table 1: CDS Maintenance Indicators and Sediment Storage Capacities

[1] Distances from water surface to top of sediment pile are based on 75% of sump capacity being occupied.

Support

- Drawings and specifications are available at www.contechstormwater.com.
- Site-specific design support is available from our engineers.

Contech Engineered Solutions LLC provides site solutions for the civil engineering industry. Contech's portfolio includes bridges, drainage, sanitary sewer, stormwater, earth stabilization and wastewater treament products. For information, visit www.ContechES.com or call 800.338.1122

CONTECH® ENGINEERED SOLUTIONS
800.925.5240
www.ContechES.com

CDS Inspection & Maintenance Log

CDS Model: ______________________ Location: ______________________

Date	Water depth to sediment[1]	Floatable Layer Thickness[2]	Describe Maintenance Performed	Maintenance Personnel	Comments

1. The water depth to sediment is determined by taking two measurements with a stadia rod: one measurement from the manhole opening to the top of the sediment pile and the other from the manhole opening to the water surface. If the difference between these measurements is less than the values listed in table 1 the system should be cleaned out. **Note: to avoid underestimating the volume of sediment in the chamber, the measuring device must be carefully lowered to the top of the sediment pile.**

2. For optimum performance, the system should be cleaned out when the floating hydrocarbon layer accumulates to an appreciable thickness. In the event of an oil spill, the system should be cleaned immediately.

4.4 RIP RAP SPLASH PAD

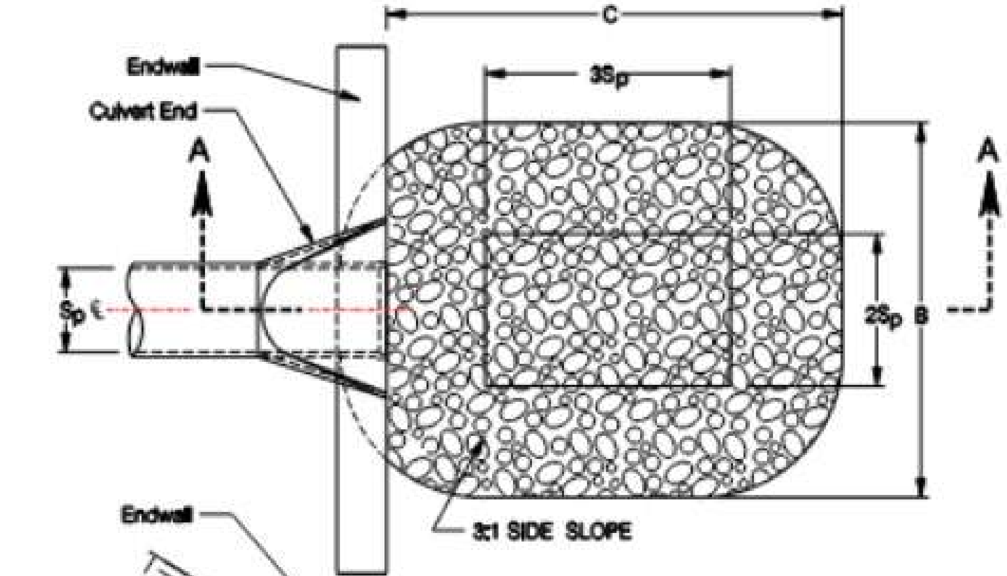
Rip rap splash pads are designed to dissipate energy, prevent scour at the stormwater outlet, and minimize the potential for downstream erosion. A LEVEL SPREADER / PLUNGE POOLE was sized for each of the outlets of the drainage system. The calculations below are in accordance with the methodology of the “2002 Connecticut Guidelines for Soil Erosion and Sediment Control” produced by The Connecticut Council on Soil and Water Conservation.

Preformed Scour Hole Calculations

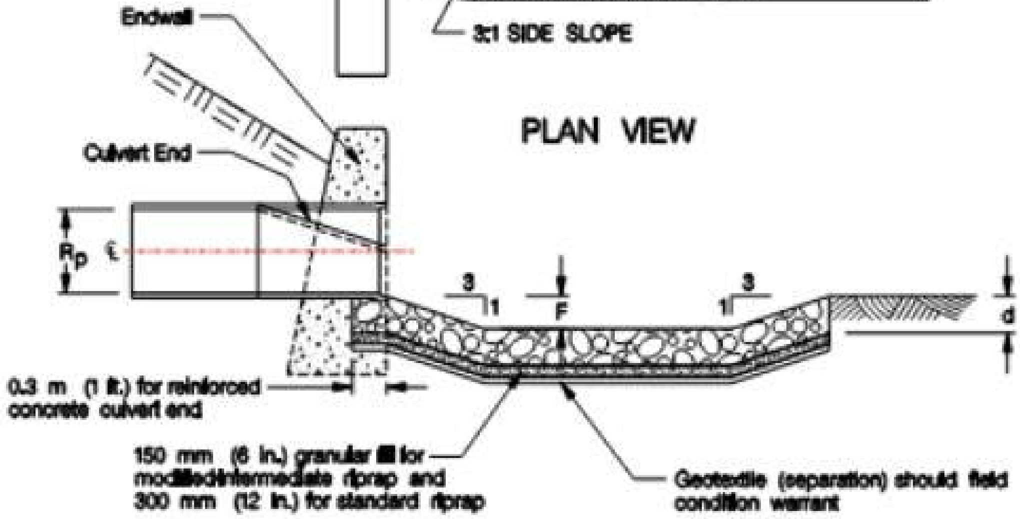
	Q (25Y)	Do	TW	Depression	C	3Sp	B	2Sp	d50	
	(cfs)	(ft.)	(ft.)	(ft.)	(ft.)	(ft.)	(ft.)	(ft.)	(ft.)	(in.)
12" HDPE Pipe	1.19	1.0	0.30	0.50	6.00	3.00	5.00	2.00	0.05	0.63

Conclusion:

As identified above, the discharge points have been designed to accommodate and exceed the required minimum rip-rap stone sizing



PLAN VIEW



SECTION A–A

LEGEND

S_p = { Max. inside pipe span (non-circular sections)
Inside pipe diameter (circular sections)

R_p = { Max. inside pipe rise (non-circular sections)
Inside pipe diameter (circular sections)

d = { 300 mm (12 in.) Modified Riprap
450 mm (18 in.) Intermediate Riprap
900 mm (36 in.) Standard Riprap

Type 1 $F = 0.5\ R_p$
Type 2 $F = R_p$
$C = 3S_p + 6F$
$B = 2S_p + 6F$

4.5 TSS REMOVAL

The project has been designed to comply with the required 80% TSS (minimum) removal per the Massachusetts Stormwater Regulations. Various combinations of stormwater BMPs including deep sump hooded catch basins, oil/grit separators, proprietary water quality units and subsurface infiltration chambers are utilized.

Please refer to the attached TSS calculation sheets that follow:

INSTRUCTIONS:

Non-automated: Mar. 4, 2008

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

Location: **UNDERGROUND INFILTRATION BASIN UG-1 (via Stone Trench, Swale, WQU)**

TSS Removal Calculation Worksheet

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Stone Trench	0.00	1.00	0.00	1.00
Grass Conveyance Swale	0.00	1.00	0.00	1.00
Contech WQU	0.50	1.00	0.50	0.50
INFILTRATION BASIN UG-1 (Retain-It System)	0.80	0.50	0.40	0.10
	0.00	0.00	0.00	0.00

Total TSS Removal = 90%

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: **141 BP Rd, Sudbury**
Prepared By: **MJL**
Date: **3/28/2022**

*Equals remaining load from previous BMP (E) which enters the BMP

INSTRUCTIONS: *Non-automated: Mar. 4, 2008*

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

Location: **UNDERGROUND INFILTRATION BASIN UG-1 (via CB, OGS, WQU)**

TSS Removal Calculation Worksheet

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Deep Sump and Hooded Catch Basin	**0.25**	**1.00**	**0.25**	**0.75**
OGS-1	**0.25**	**0.75**	**0.19**	**0.56**
SciClone	**0.65**	**0.56**	**0.37**	**0.20**
UNDERGROUND INFILTRATION CHAMBERS UG-1 (Retain-It System)	**0.80**	**0.20**	**0.16**	**0.04**
		0.00	**0.00**	**0.04**

Total TSS Removal = 96%

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: **141 BP Rd, Sudbury**
Prepared By: **MJL**
Date: **3/28/2022**

*Equals remaining load from previous BMP (E) which enters the BMP

INSTRUCTIONS: *Non-automated: Mar. 4, 2008*

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

Location: **UNDERGROUND INFILTRATION BASIN UG-1 (via CB, WQU)**

TSS Removal Calculation Worksheet

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Deep Sump and Hooded Catch Basin	0.25	1.00	0.25	0.75
Contech WQU	0.50	0.75	0.38	0.38
INFILTRATION BASIN UG-1 (Retain-It System)	0.80	0.38	0.30	0.08
	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00

Total TSS Removal = 93%

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: **141 BP Rd, Sudbury**
Prepared By: **MJL**
Date: **3/28/2022**

*Equals remaining load from previous BMP (E) which enters the BMP

INSTRUCTIONS:

Non-automated: Mar. 4, 2008

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

Location: **Permeable Pavement**

TSS Removal Calculation Worksheet

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Permeable Pavement	**0.80**	**1.00**	**0.80**	**0.20**
	0.00	**0.00**	**0.00**	**0.00**
	0.00	**0.00**	**0.00**	**0.00**
	0.00	**0.00**	**0.00**	**0.00**
	0.00	**0.00**	**0.00**	**0.00**

Total TSS Removal = **80%**

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: **141 BP, Sudbury**

Prepared By: **MJL**

Date: **3/28/2022**

*Equals remaining load from previous BMP (E) which enters the BMP

SECTION 5 – LONG TERM OPERATION & MAINTENANCE

LONG-TERM STORMWATER OPERATION & MAINTENANCE PLAN

HERB CHAMBERS OF SUDBURY, INC.

141 BOSTON POST ROAD
SUDBURY, MA 01776

November 15, 2021
Revised February 14, 2022
Revised March 28, 2022

PROJECT OVERVIEW:

The proposed project consists of the construction of a new Mercedes of Sudbury dealership at 141 Boston Post Road in Sudbury, MA. The proposed scope includes renovating and converting the existing two-story health club facility (formerly Bosse Sports) into a new automobile dealership for the sales and display of new vehicles as well as vehicle service. Site renovations include reconfigured parking for employees, customers and vehicle inventory storage, as well as upgrades to stormwater management systems, utilities and landscaping. The project has been designed to comply with the Massachusetts Stormwater Management Regulations as well as the Town of Sudbury Stormwater Management Bylaws.

Appended to this document is a sample maintenance form and a chart describing the anticipated frequency of tasks.

OWNER AND RESPONSIBLE PARTY:

Current Land Owners:
Herb Chambers 43 Braintree Street, LLC.
259 McGrath Highway
Somerville, MA 02145

Proposed Site Contractor:
TBD

For any service beyond the service ability of staff on site for Herb Chambers, there will be subcontracting to the appropriate vendors such as street sweeping, catch basin and water quality unit cleaning, etc.

CONSTRUCTION MANAGEMENT:

A construction manager with adequate knowledge and experience on projects of similar size and scope shall be employed to oversee all site work related construction. The contractor shall incorporate the appropriate techniques to control sediment and erosion pollution during construction in accordance with the *Massachusetts Erosion and Sediment Control Guidelines for Urban and Suburban Areas* and any conditions of approval from the local conservation commission.

Care should be taken when constructing stormwater control structures. Light earth-moving equipment shall be used to excavate in the vicinity of the infiltration areas. Use of heavy equipment causes excessive compaction of the soils beneath the basin resulting in reduced infiltration capacity. At no time shall temporary infiltration areas or settling basins be constructed in the vicinity of the proposed infiltration basins in order to prevent the soils from becoming clogged with sediment.

ON-GOING MAINTENANCE CONTRACT

The non-structural and structural approaches recommended below, as well as the required BMP maintenance, will be completed by the selected contractor. Adequate personnel with appropriate training and access to proper equipment will be available to complete the tasks. Future responsible parties must be notified of their responsibility to operate and maintain the system in perpetuity.

MAINTENANCE LOG

The Responsible Party shall develop and maintain a log of inspections, maintenance, repairs, and disposal (including location of disposal) during the life of the project. Records will be maintained for at least 3 years and be made available to the Massachusetts Department of Environmental Protection or the Town of Sudbury in accordance with the provisions of the Massachusetts Stormwater Handbook. A sample of such a maintenance log is provided.

STORMWATER BMP MAINTENANCE

The proposed stormwater management system has been designed with appropriate BMPs aimed at reducing the pollutants discharge based upon the intended use of the property. All BMPs require regular maintenance to function as intended. Some management measures have simple maintenance requirements; others are more involved. The Responsible Party must have all BMPs regularly inspected to ensure they are operating properly on an as needed basis, including during runoff events exceeding 0.5 inches of rainfall.

A description of the non-structural and structural approaches to be incorporated is indicated below. The following best management practices are proposed to be incorporated into the stormwater management design to reduce source runoff and improve stormwater runoff discharge quality. The Responsible Party will regularly inspect all BMPs to ensure they are operating properly. If any deficiencies are identified during these inspections, action to resolve it will be initiated and documented on the maintenance log.

STRUCTURAL BMPs

Deep Sump Hooded Catch Basins and Area/Yard Drains

On a regular basis the inlet pipe and outlet pipe shall be checked for debris and removed as necessary to ensure unobstructed flow of water. Inspections shall occur at least four times per year, and at the end of the foliage and snow removal seasons. Inspections shall verify the tees are secure and free flowing. Sediments must also be removed four times per year or whenever the depth of deposits is greater than or equal to one half the depth from the bottom of the invert of the lowest pipe in the basin. Basins shall be cleaned using a vacuum pump. All liquid shall be pumped from the sump of each basin at least once per year. All sediments and hydrocarbons should be properly handled and disposed of in accordance with local, state and federal guidelines and regulations.

Oil/Grit Separators

At a minimum, oil grit separators should be inspected monthly and sediment, trash and pollutants shall be cleaned out at least twice per year. In areas of high sediment loading, inspect and clean inlets and outlets after every major storm. Basins shall be cleaned using a vacuum pump. All sediments and hydrocarbons should be properly handled and disposed of in accordance with local, state and federal guidelines and regulations.

Subsurface Infiltration/Detention Systems

The subsurface system (retain-it, 3.0’ tall) has been designed with an access manhole to aid in the removal of sediment and debris. Preventative maintenance shall be performed in accordance with manufacturer’s instructions, which is enclosed in this section. Retain-it suggests periodic inspections with a greater number occurring during the systems start-up to identify any issues of concern as they may arise. Cleaning will take place at the completion of construction and as deemed necessary based on the inspections. Retain-it recommends use of a vacuum truck to suction the accumulated sediment, oils and greases, and trash and debris from the system. Oils and greases may additionally be handled by on-site staff utilizing absorbent products to soak up the oils. Refer to the enclosed “retain-it Owners Maintenance Manual.”

Contech CDS Water Quality Units

Contech CDS water quality units shall be maintained in accordance with the manufacturer’s recommendations. Refer to the enclosed “CDS Guide: Operation, Design Performance and Maintenance.” Cleaning of a CDS system should be done during dry weather when no flow is entering the system. Typically, a vacuum truck removes accumulated sediment and oil most efficiently. Simply remove the manhole covers and insert the vacuum hose into the sump. The system should be completely drained down and the sump filly evacuated of sediment. The area outside the screen should also be cleaned out if pollutant build-up exists in this area. The system should be cleaned out immediately in the case of an oil or gasoline soil.

Inspection should occur at least twice annually, once in the fall and then in the spring after the snow melts. Ideally the unit should be checked frequently throughout the first year, and that will dictate the schedule going forward. All sediment and hydrocarbons should be properly handled and disposed of in accordance with local, state and federal guidelines and regulations. Cleaning will take place at the completion of construction and as deemed necessary based on the inspections and manufacturer's requirements.

NON-STRUCTURAL BMPs

Porous Pavement

Porous pavement sections on site shall be monitored annually and following any storms to ensure proper drainage and note any deterioration. Maintenance of the porous asphalt is performed four (4) times per year using a regenerative air vacuum truck that picks up large particles such as leaves and debris, as well as smaller particles such as sand and sediments. Exfiltration capability shall be assessed minimum once a year and as needed if capacity is found to decline. If ponding water is observed during precipitation cleaning is recommended. Signage will be installed to clearly demarcate the limits of the porous surface. Snow removal protocols for the porous surface is discussed in more detail, below.

Constructed Stormwater Wetland

The existing stormwater wetland (detention basin) should be inspected at least once per year to ensure that the basin is operating as intended. Inspections conducted at intervals during and after the storm will help to determine if the basin is meeting the expected detention times. The outlet structure should be inspected for evidence of clogging or outflow release velocities that are greater than the design flow. Potential problems that should be checked include: subsidence, erosion, cracking, or tree growth on the embankment; damage to the emergency spillway; sediment accumulation around the outlet; inadequacy of the inlet/outlet channel erosion control measures; changes in the condition of the pilot channel; and erosion within the basin and banks. Any necessary repairs should be made immediately. During inspections, changes to the detention basin or the contributing watershed should be noted, as these may effect basin performance.

- The upper-stage, side slopes, embankment, and emergency spillway should be mowed at least twice per year. Trash and debris should also be removed at this time.
- Sediment should be removed from the basin as necessary, and at least once every 5 years.

Grass Conveyance Swale

Inspect grass swale the first few months after construction to make sure that there is no rilling or gullying, and that vegetation in the swale is adequate. Thereafter, inspect twice a year for slope integrity, soil moisture, vegetative health, soil stability, soil compaction, soil erosion, ponding, and sediment accumulation. Regular maintenance tasks include mowing, fertilizing, liming, watering, pruning, weeding and pest control. Mow the swale at least once per year. Do not cut the grass shorter than three to four inches. Keep grass height under 6 inches to maintain the design depth necessary to serve as conveyance. Do not mow excessively, because it may increase the design flow velocity. Remove sediment and debris manually at least once per year. Re seed periodically to maintain the dense growth of grass vegetation. Take care to protect grass swale from snow removal procedures and off-street parking.

Stone Trench

Inspect stone trench after the first several rainfall events, after all major storms and on regularly scheduled dates every 6 months. Inspect the trench 24 hours or several days after a rain event to look for ponded water. If there is ponded water at the surface of the trench, it is likely that the trench is clogged. To address surface clogging, remove and replace the topsoil or first layer of stone aggregate and the filter fabric. If the water is ponded inside the trench, it may indicate that the bottom of the trench has failed. To rehabilitate a failed trench, all accumulated sediment must be stripped from the bottom., the bottom of the trench must be scarified and tilled to induce infiltration, and all of the stone aggregate and filter fabric or media must be removed and replaced.

Pavement Sweeping

As street sweeping is a BMP under DEP guidelines, this non-structural BMP is an effective removal of Total Suspended Solids (TSS) in a comprehensive stormwater management program. Litter and debris are to be regularly picked up and removed from the pavement and porous pavers. Paved areas are to be swept a minimum of quarterly per year.

Pervious Areas and Slopes

Runoff from pervious areas and slopes shall be directed over vegetated areas to promote settlement of suspended solids before entering a wetland or resource area. Steep pervious slopes will be permanently vegetated to dissipate energy and reduce potential erosion. No constructed vegetated slopes should exceed 2H:1V. Slopes exceeding 2:1 shall be stabilized with rip-rap, jute netting or other similar measures to minimize the potential for future erosion.

Drainage Control Structures, Flared End Sections, Trash Racks, Riprap Pads, Swales, and Level Spreader Splash Pads

Basin control structures and flared end sections shall be inspected and any debris or growth surrounding or within these structures shall be removed. Any/all debris or vegetation encroaching on the control structures our outfall components shall be removed or appropriately trimmed back to maintain the designed control elevation and flow patterns/cross section without impediment. Inspection should occur twice annually, once in the fall and then in the spring after the snow melts. Cleaning will take place at the completion of construction and as deemed necessary based on the inspections and manufacturer's requirements.

Pest and Insect Control

- As a first-line defense against pests/insects and weeds (the "First-Line Defense"), the party responsible for maintenance shall avoid the use of non-organic pesticides, herbicides, fungicides and insecticides unless spot treatment is required for a specific control application. The owner shall not be required to undertake extraordinary measures or incur unreasonable cost to locate, purchase or apply non-organic products.

- If the First-Line Defense fails, as determined by the owner or party responsible for maintenance, in its sole but reasonable discretion, non-organic approaches to pest/insect control may be used, the same to be applied by a professional licensed in the Commonwealth of Massachusetts, where required. But in no event shall such non-organic approaches be used within the 100ft. buffer zone to the wetlands, unless approved by the Sudbury Conservation Commission.

Waste Management

Solid waste and recycling will be contained in dumpsters for routine and regular trash pickup. The maintenance staff is directed to place their trash and recyclables in the appropriate bins at the trash/recycling facility provided on site.

Snow Removal

Snow removal is handled by Herb Chambers own in-house facility maintenance personnel. The drive aisles are plowed to maintain access through the site and around the building. The Chambers team will tightly arrange the vehicles together in one part of the lot, then plow the open section of the lot toward the islands, then move the cars back into their spaces and plow the remainder. The Chambers team anticipates they can typically handle between 1 to 1.5 feet of snow accumulation before having to switch to hauling off site. The chambers team will contract to have the snow hauled from the site.

Snow on porous asphalt can be plowed the same as standard pavement, however, sunshine acts quickly to melt snow and ice sooner than on frozen standard pavement, and the melting snow infiltrates from the surface directly through the open graded porous asphalt to the stone subbase, which significantly reduces the potential for black ice. UNH (the region's experts on permeable pavement specifications and maintenance) advises to use an anti-icing treatment on the permeable pavement surface (typically a brine solution which reduces the freezing point of water) prior to storms. Salt brine is typically a 23% salt/water mixture that can be applied to the surface which prevents snow and ice from bonding, and accumulated snow can be easily removed down to the pavement. Sand application is not recommended and should be avoided if possible because it will increase the need for vacuuming and reduce the efficiency of the pavement due to clogging.

The On-Site Property Manager, who will be responsible for implementing the Stormwater Management Operations and Maintenance Plan and posted signage, will ensure that snowplow operators on this property apply the proper anti-icing treatment and do not apply sand as part of the winter maintenance. The on-site snow removal will be performed by employees of Herb Chambers and the same team members will oversee and perform snow removal from storm-to-storm, ensuring a consistent treatment of the porous pavement using anti-icing techniques. No outside contractors will be used to plow or perform anti-icing on site. The only outside contractors during a snow removal event will be those hired to conduct the snow hauling in large storm events. The snow will be loaded on to all hauling trucks by The Chambers Team. This site will use consistent anti-icing techniques throughout the site to ensure no salt or sand will be applied on this site or within the proximity of the porous pavement.

Hazardous Waste and Spill Control Containment

In the event of a discharge or spill of oil or another hazardous material, outlets to stormwater management facilities immediately downstream of the spill shall be plugged so that hazardous materials do not enter the system. In the event of a discharge of oil or other hazardous material, responsible facility personnel shall notify the appropriate state agencies, the Town of Sudbury DPW and the EPA National Response Center 1-800-424-8802 shall be notified. All hazardous waste materials will be disposed of in a manner specified by local, state and/or federal regulations and by the manufacturer of such products.

Activities Prohibited on Site

The use of sand and de-icing chemicals for this site is prohibited. Any exterior/outdoor vehicle servicing, equipment cleaning, or vehicle washing of any kind on the subject property is prohibited. Also refer to the Order of Conditions by the Conservation Commission and Planning Board Decision(s), as all general and special conditions post-construction must be followed in perpetuity, once issued.

Stormwater BMP Inspection and Maintenance Log

Facility Name	
Address	
Begin Date	End Date

Date	BMP ID#	BMP Description	Inspected by:	Cause for Inspection	Exceptions Noted	Comments and Actions Taken

Instructions: Record all inspections and maintenance for all treatment BMPs on this form. Use additional log sheets and/or attach extended comments or documentation as necessary. Submit a copy of the completed log with the annual independent inspectors' report to the municipality and start a new log at that time.

BMP ID# — Always use ID# from the Operation and Maintenance Manual.

Inspected by — Note all inspections and maintenance on this form, including the required independent annual inspection.

Cause for inspection — Note if the inspection is routine, pre-rainy-season, post-storm, annual, or in response to a noted problem or complaint.

Exceptions noted — Note any condition that requires correction or indicates a need for maintenance.

Comments and actions taken — Describe any maintenance done and need for follow-up.

Stormwater BMP Inspection Matrix

Conventional & LID Best Management Practices	Inspection & Maint. Frequency	Erosion& Scour	Obstructions	Trash & Debris	Sediment Build-Up Removal	Vegetation Cover	Remove/Reset Filter Fabric & Stone As Required	Vac Truck Sediment & Contaminants	Remove/Reset Riprap as Required
Catch Basins/Area & Yard Drains	Four times per year								
Pavement Sweeping	Four times per year								
Oil Grit Separators	Monthly								
Contech Water Quality Units	Twice-Annually (Spring and Fall)								
Subsurface Detention Structure	Annually								
Outlets (FES, Rip Rap Pad, Level Spreaders)	Twice-Annually (Spring and Fall)								
Permeable Pavement Vacuuming	Four times per year								
Grass Swale	Twice Annually (Spring and Fall)								
Constructed Stormwater Wetland	Annually								
Stone Trench	Twice Annually (Spring and Fall)								

CONSTRUCTED STORMWATER WETLAND

CONVEYANCE SWALE

WQU CDS WQU

SUBSURFACE INFILTRATION SYSTEM

SUBSURFACE DETENTION SYSTEM

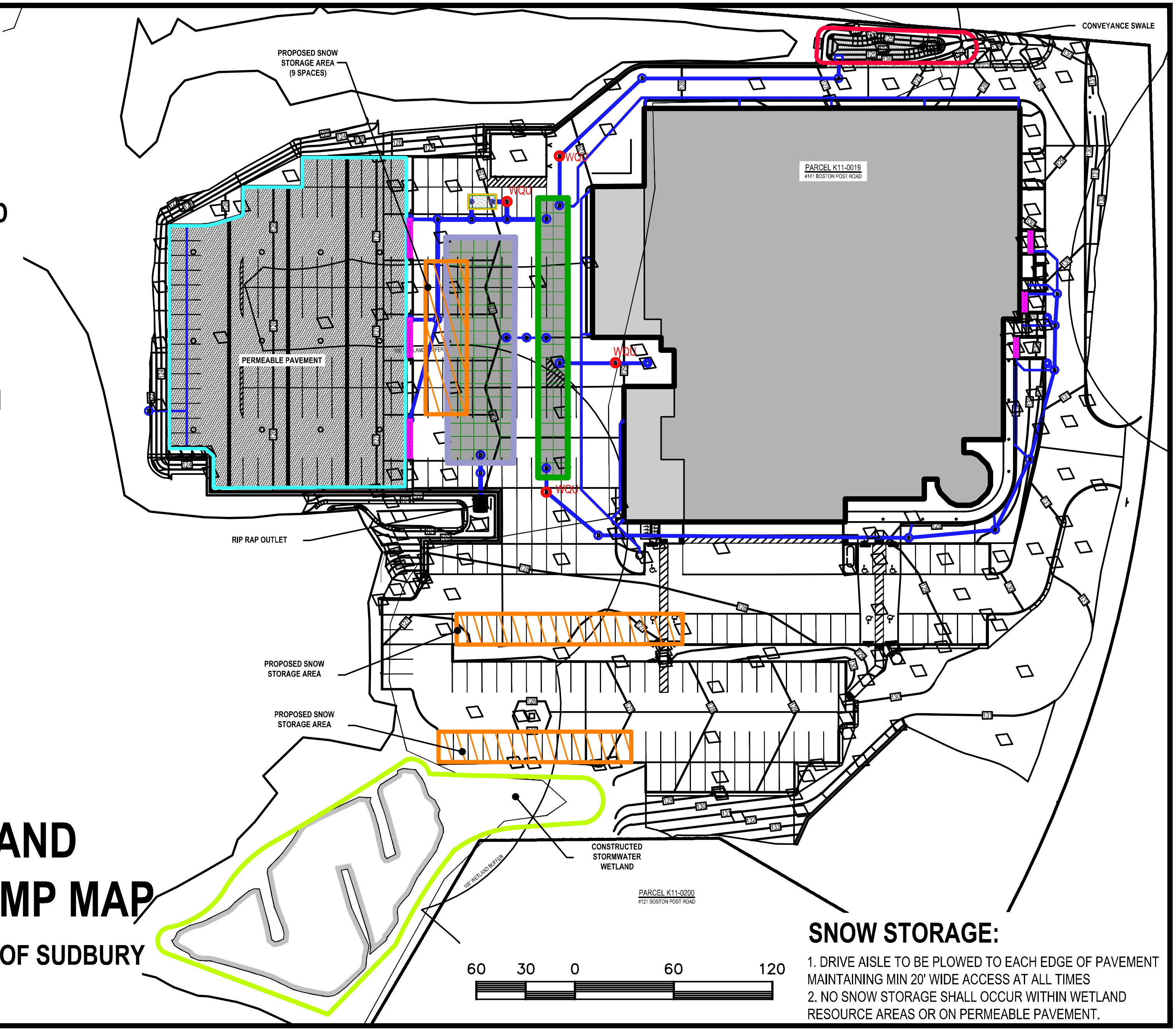
DRAINAGE SYSTEM

OIL/GRIT SEPARATOR

TRENCH DRAIN

SNOW STORAGE

PERMEABLE PAVEMENT



OPERATION AND MAINTENANCE BMP MAP

HERB CHAMBERS MERCEDES OF SUDBURY

141 BOSTON POST ROAD,
SUDBURY, MA

SNOW STORAGE:

1. DRIVE AISLE TO BE PLOWED TO EACH EDGE OF PAVEMENT MAINTAINING MIN 20' WIDE ACCESS AT ALL TIMES
2. NO SNOW STORAGE SHALL OCCUR WITHIN WETLAND RESOURCE AREAS OR ON PERMEABLE PAVEMENT.

CONTECH ENGINEERED SOLUTIONS

CDS Guide
Operation, Design, Performance and Maintenance

CDS®

Using patented continuous deflective separation technology, the CDS system screens, separates and traps debris, sediment, and oil and grease from stormwater runoff. The indirect screening capability of the system allows for 100% removal of floatables and neutrally buoyant material without blinding. Flow and screening controls physically separate captured solids, and minimize the re-suspension and release of previously trapped pollutants. Inline units can treat up to 6 cfs, and internally bypass flows in excess of 50 cfs (1416 L/s). Available precast or cast-in-place, offline units can treat flows from 1 to 300 cfs (28.3 to 8495 L/s). The pollutant removal capacity of the CDS system has been proven in lab and field testing.

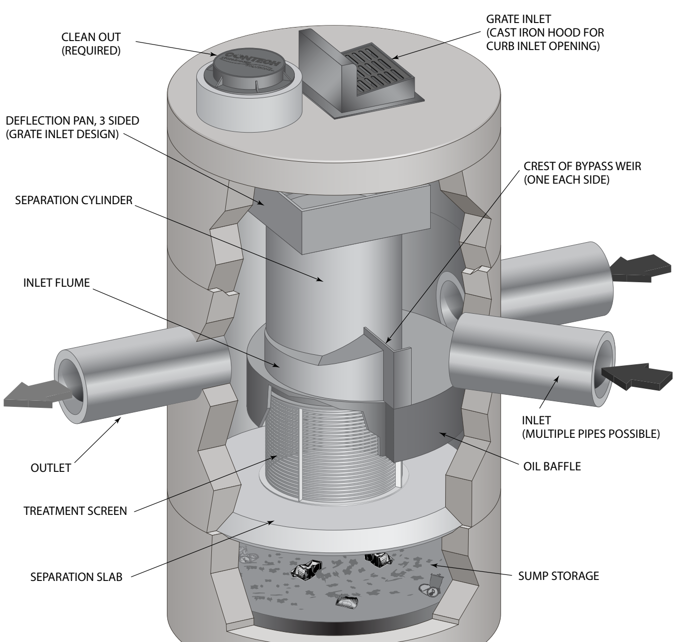
Operation Overview

Stormwater enters the diversion chamber where the diversion weir guides the flow into the unit's separation chamber and pollutants are removed from the flow. All flows up to the system's treatment design capacity enter the separation chamber and are treated.

Swirl concentration and screen deflection force floatables and solids to the center of the separation chamber where 100% of floatables and neutrally buoyant debris larger than the screen apertures are trapped.

Stormwater then moves through the separation screen, under the oil baffle and exits the system. The separation screen remains clog free due to continuous deflection.

During the flow events exceeding the treatment design capacity, the diversion weir bypasses excessive flows around the separation chamber, so captured pollutants are retained in the separation cylinder.



Design Basics

There are three primary methods of sizing a CDS system. The Water Quality Flow Rate Method determines which model size provides the desired removal efficiency at a given flow rate for a defined particle size. The Rational Rainfall Method™ or the and Probabilistic Method is used when a specific removal efficiency of the net annual sediment load is required.

Typically in the Unites States, CDS systems are designed to achieve an 80% annual solids load reduction based on lab generated performance curves for a gradation with an average particle size (d50) of 125 microns (μm). For some regulatory environments, CDS systems can also be designed to achieve an 80% annual solids load reduction based on an average particle size (d50) of 75 microns (μm) or 50 microns (μm).

Water Quality Flow Rate Method

In some cases, regulations require that a specific treatment rate, often referred to as the water quality design flow (WQQ), be treated. This WQQ represents the peak flow rate from either an event with a specific recurrence interval, e.g. the six-month storm, or a water quality depth, e.g. 1/2-inch (13 mm) of rainfall.

The CDS is designed to treat all flows up to the WQQ. At influent rates higher than the WQQ, the diversion weir will direct most flow exceeding the WQQ around the separation chamber. This allows removal efficiency to remain relatively constant in the separation chamber and eliminates the risk of washout during bypass flows regardless of influent flow rates.

Treatment flow rates are defined as the rate at which the CDS will remove a specific gradation of sediment at a specific removal efficiency. Therefore the treatment flow rate is variable, based on the gradation and removal efficiency specified by the design engineer.

Rational Rainfall Method™

Differences in local climate, topography and scale make every site hydraulically unique. It is important to take these factors into consideration when estimating the long-term performance of any stormwater treatment system. The Rational Rainfall Method combines site-specific information with laboratory generated performance data, and local historical precipitation records to estimate removal efficiencies as accurately as possible.

Short duration rain gauge records from across the United States and Canada were analyzed to determine the percent of the total annual rainfall that fell at a range of intensities. US stations' depths were totaled every 15 minutes, or hourly, and recorded in 0.01-inch increments. Depths were recorded hourly with 1-mm resolution at Canadian stations. One trend was consistent at all sites; the vast majority of precipitation fell at low intensities and high intensity storms contributed relatively little to the total annual depth.

These intensities, along with the total drainage area and runoff coefficient for each specific site, are translated into flow rates using the Rational Rainfall Method. Since most sites are relatively small and highly impervious, the Rational Rainfall Method is appropriate. Based on the runoff flow rates calculated for each intensity, operating rates within a proposed CDS system are determined. Performance efficiency curve determined from full scale laboratory tests on defined sediment PSDs is applied to calculate solids removal efficiency. The relative removal efficiency at each operating rate is added to produce a net annual pollutant removal efficiency estimate.

Probabilistic Rational Method

The Probabilistic Rational Method is a sizing program Contech developed to estimate a net annual sediment load reduction for a particular CDS model based on site size, site runoff coefficient, regional rainfall intensity distribution, and anticipated pollutant characteristics.

The Probabilistic Method is an extension of the Rational Method used to estimate peak discharge rates generated by storm events of varying statistical return frequencies (e.g. 2-year storm event). Under the Rational Method, an adjustment factor is used to adjust the runoff coefficient estimated for the 10-year event, correlating a known hydrologic parameter with the target storm event. The rainfall intensities vary depending on the return frequency of the storm event under consideration. In general, these two frequency dependent parameters (rainfall intensity and runoff coefficient) increase as the return frequency increases while the drainage area remains constant.

These intensities, along with the total drainage area and runoff coefficient for each specific site, are translated into flow rates using the Rational Method. Since most sites are relatively small and highly impervious, the Rational Method is appropriate. Based on the runoff flow rates calculated for each intensity, operating rates within a proposed CDS are determined. Performance efficiency curve on defined sediment PSDs is applied to calculate solids removal efficiency. The relative removal efficiency at each operating rate is added to produce a net annual pollutant removal efficiency estimate.

Treatment Flow Rate

The inlet throat area is sized to ensure that the WQQ passes through the separation chamber at a water surface elevation equal to the crest of the diversion weir. The diversion weir bypasses excessive flows around the separation chamber, thus preventing re-suspension or re-entrainment of previously captured particles.

Hydraulic Capacity

The hydraulic capacity of a CDS system is determined by the length and height of the diversion weir and by the maximum allowable head in the system. Typical configurations allow hydraulic capacities of up to ten times the treatment flow rate. The crest of the diversion weir may be lowered and the inlet throat may be widened to increase the capacity of the system at a given water surface elevation. The unit is designed to meet project specific hydraulic requirements.

Performance

Full-Scale Laboratory Test Results

A full-scale CDS system (Model CDS2020-5B) was tested at the facility of University of Florida, Gainesville, FL. This CDS unit was evaluated under controlled laboratory conditions of influent flow rate and addition of sediment.

Two different gradations of silica sand material (UF Sediment & OK-110) were used in the CDS performance evaluation. The particle size distributions (PSDs) of the test materials were analyzed using standard method "Gradation ASTM D-422 "Standard Test Method for Particle-Size Analysis of Soils" by a certified laboratory.

UF Sediment is a mixture of three different products produced by the U.S. Silica Company: "Sil-Co-Sil 106", "#1 DRY" and "20/40 Oil Frac". Particle size distribution analysis shows that the UF Sediment has a very fine gradation (d50 = 20 to 30 μm) covering a wide size range (Coefficient of Uniformity, C averaged at 10.6). In comparison with the hypothetical TSS gradation specified in the NJDEP (New Jersey Department of Environmental Protection) and NJCAT (New Jersey Corporation for Advanced Technology) protocol for lab testing, the UF Sediment covers a similar range of particle size but with a finer d50 (d50 for NJDEP is approximately 50 μm) (NJDEP, 2003).

The OK-110 silica sand is a commercial product of U.S. Silica Sand. The particle size distribution analysis of this material, also included in Figure 1, shows that 99.9% of the OK-110 sand is finer than 250 microns, with a mean particle size (d50) of 106 microns. The PSDs for the test material are shown in Figure 1.

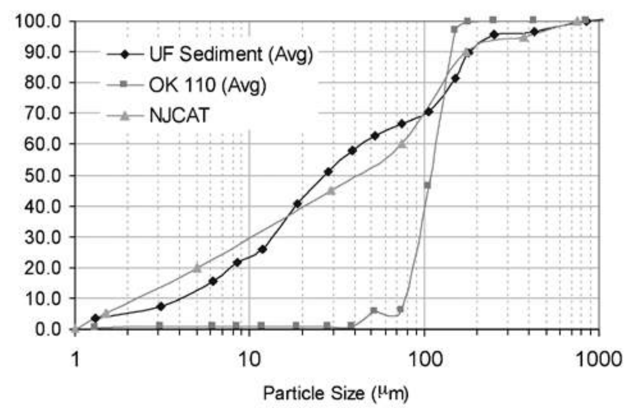


Figure 1. Particle size distributions

Tests were conducted to quantify the performance of a specific CDS unit (1.1 cfs (31.3-L/s) design capacity) at various flow rates, ranging from 1% up to 125% of the treatment design capacity of the unit, using the 2400 micron screen. All tests were conducted with controlled influent concentrations of approximately 200 mg/L. Effluent samples were taken at equal time intervals across the entire duration of each test run. These samples were then processed with a Dekaport Cone sample splitter to obtain representative sub-samples for Suspended Sediment Concentration (SSC) testing using ASTM D3977-97 "Standard Test Methods for Determining Sediment Concentration in Water Samples", and particle size distribution analysis.

Results and Modeling

Based on the data from the University of Florida, a performance model was developed for the CDS system. A regression analysis was used to develop a fitting curve representative of the scattered data points at various design flow rates. This model, which demonstrated good agreement with the laboratory data, can then be used to predict CDS system performance with respect to SSC removal for any particle size gradation, assuming the particles are inorganic sandy-silt. Figure 2 shows CDS predictive performance for two typical particle size gradations (NJCAT gradation and OK-110 sand) as a function of operating rate.

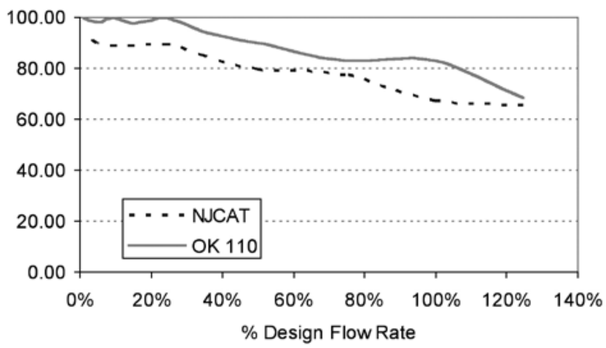


Figure 2. CDS stormwater treatment predictive performance for various particle gradations as a function of operating rate.

Many regulatory jurisdictions set a performance standard for hydrodynamic devices by stating that the devices shall be capable of achieving an 80% removal efficiency for particles having a mean particle size (d50) of 125 microns (e.g. Washington State Department of Ecology — WASDOE - 2008). The model can be used to calculate the expected performance of such a PSD (shown in Figure 3). The model indicates (Figure 4) that the CDS system with 2400 micron screen achieves approximately 80% removal at the design (100%) flow rate, for this particle size distribution (d50 = 125 μm).

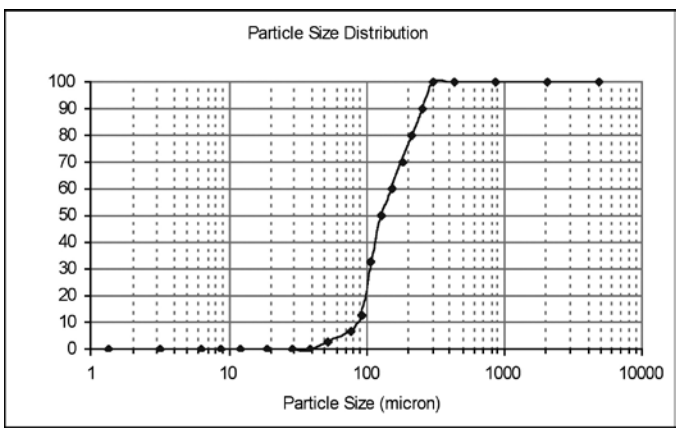


Figure 3. WASDOE PSD

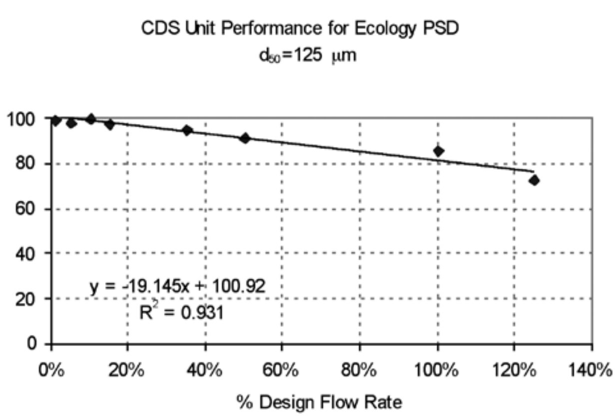


Figure 4. Modeled performance for WASDOE PSD.

Maintenance

The CDS system should be inspected at regular intervals and maintained when necessary to ensure optimum performance. The rate at which the system collects pollutants will depend more heavily on site activities than the size of the unit. For example, unstable soils or heavy winter sanding will cause the grit chamber to fill more quickly but regular sweeping of paved surfaces will slow accumulation.

Inspection

Inspection is the key to effective maintenance and is easily performed. Pollutant transport and deposition may vary from year to year and regular inspections will help ensure that the system is cleaned out at the appropriate time. At a minimum, inspections should be performed twice per year (e.g. spring and fall) however more frequent inspections may be necessary in climates where winter sanding operations may lead to rapid accumulations, or in equipment washdown areas. Installations should also be inspected more frequently where excessive amounts of trash are expected.

The visual inspection should ascertain that the system components are in working order and that there are no blockages or obstructions in the inlet and separation screen. The inspection should also quantify the accumulation of hydrocarbons, trash, and sediment in the system. Measuring pollutant accumulation can be done with a calibrated dipstick, tape measure or other measuring instrument. If absorbent material is used for enhanced removal of hydrocarbons, the level of discoloration of the sorbent material should also be identified

during inspection. It is useful and often required as part of an operating permit to keep a record of each inspection. A simple form for doing so is provided.

Access to the CDS unit is typically achieved through two manhole access covers. One opening allows for inspection and cleanout of the separation chamber (cylinder and screen) and isolated sump. The other allows for inspection and cleanout of sediment captured and retained outside the screen. For deep units, a single manhole access point would allows both sump cleanout and access outside the screen.

The CDS system should be cleaned when the level of sediment has reached 75% of capacity in the isolated sump or when an appreciable level of hydrocarbons and trash has accumulated. If absorbent material is used, it should be replaced when significant discoloration has occurred. Performance will not be impacted until 100% of the sump capacity is exceeded however it is recommended that the system be cleaned prior to that for easier removal of sediment. The level of sediment is easily determined by measuring from finished grade down to the top of the sediment pile. To avoid underestimating the level of sediment in the chamber, the measuring device must be lowered to the top of the sediment pile carefully. Particles at the top of the pile typically offer less resistance to the end of the rod than consolidated particles toward the bottom of the pile. Once this measurement is recorded, it should be compared to the as-built drawing for the unit to determine weather the height of the sediment pile off the bottom of the sump floor exceeds 75% of the total height of isolated sump.

Cleaning

Cleaning of a CDS systems should be done during dry weather conditions when no flow is entering the system. The use of a vacuum truck is generally the most effective and convenient method of removing pollutants from the system. Simply remove the manhole covers and insert the vacuum hose into the sump. The system should be completely drained down and the sump fully evacuated of sediment. The area outside the screen should also be cleaned out if pollutant build-up exists in this area.

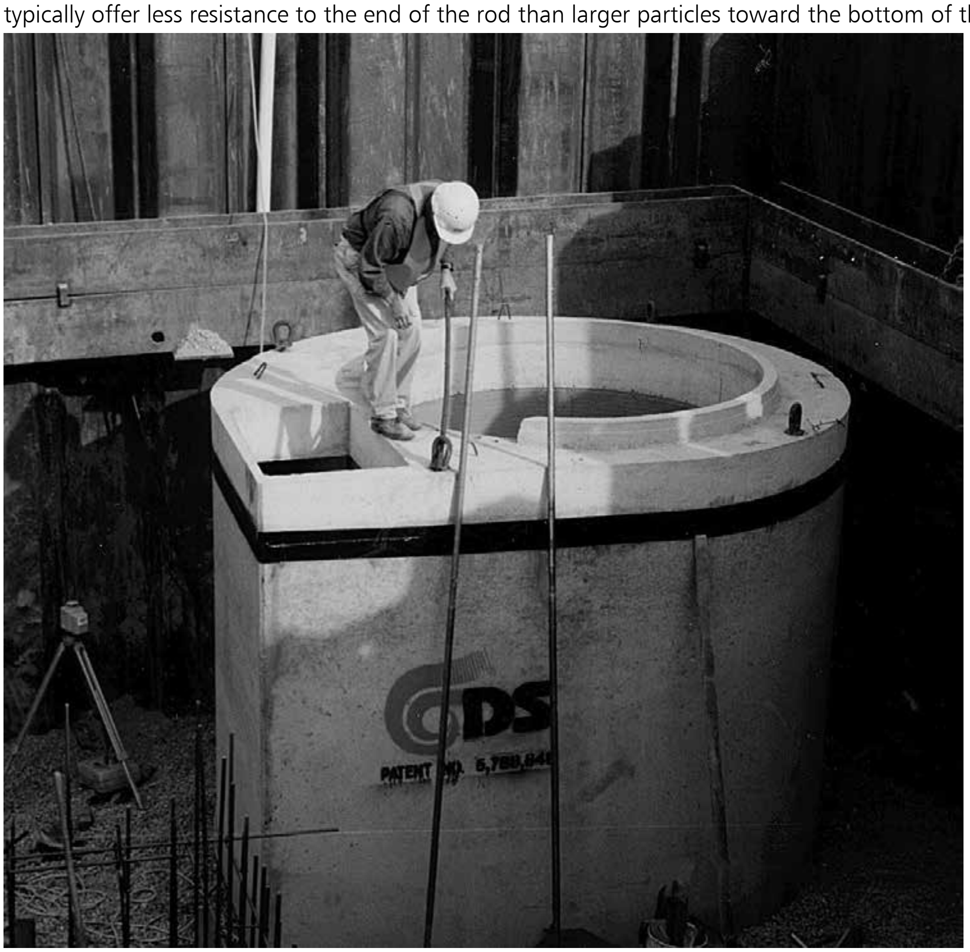
In installations where the risk of petroleum spills is small, liquid contaminants may not accumulate as quickly as sediment. However, the system should be cleaned out immediately in the event of an oil or gasoline spill. Motor oil and other hydrocarbons that accumulate on a more routine basis should be removed when an appreciable layer has been captured. To remove these pollutants, it may be preferable to use absorbent pads since they are usually less expensive to dispose than the oil/water emulsion that may be created by vacuuming the oily layer. Trash and debris can be netted out to separate it from the other pollutants. The screen should be cleaned to ensure it is free of trash and debris.

Manhole covers should be securely seated following cleaning activities to prevent leakage of runoff into the system from above and also to ensure that proper safety precautions have been followed. Confined space entry procedures need to be followed if physical access is required. Disposal of all material removed from the CDS system should be done in accordance with local regulations. In many jurisdictions, disposal of the sediments may be handled in the same manner as the disposal of sediments removed from catch basins or deep sump manholes. Check your local regulations for specific requirements on disposal.

CDS Model	Diameter		Distance from Water Surface to Top of Sediment Pile		Sediment Storage Capacity	
	ft	m	ft	m	y^3	m^3
CDS1515	3	0.9	3.0	0.9	0.5	0.4
CDS2015	4	1.2	3.0	0.9	0.9	0.7
CDS2015	5	1.5	3.0	0.9	1.3	1.0
CDS2020	5	1.5	3.5	1.1	1.3	1.0
CDS2025	5	1.5	4.0	1.2	1.3	1.0
CDS3020	6	1.8	4.0	1.2	2.1	1.6
CDS3025	6	1.8	4.0	1.2	2.1	1.6
CDS3030	6	1.8	4.6	1.4	2.1	1.6
CDS3035	6	1.8	5.0	1.5	2.1	1.6
CDS4030	8	2.4	4.6	1.4	5.6	4.3
CDS4040	8	2.4	5.7	1.7	5.6	4.3
CDS4045	8	2.4	6.2	1.9	5.6	4.3
CDS5640	10	3.0	6.3	1.9	8.7	6.7
CDS5653	10	3.0	7.7	2.3	8.7	6.7
CDS5668	10	3.0	9.3	2.8	8.7	6.7
CDS5678	10	3.0	10.3	3.1	8.7	6.7

Table 1: CDS Maintenance Indicators and Sediment Storage Capacities

Note: To avoid underestimating the volume of sediment in the chamber, carefully lower the measuring device to the top of the sediment pile. Finer silty particles at the top of the pile may be more difficult to feel with a measuring stick. These finer particles typically offer less resistance to the end of the rod than larger particles toward the bottom of the pile.



CDS Inspection & Maintenance Log

CDS Model: ______________________ Location: ______________________

Date	Water depth to sediment[1]	Floatable Layer Thickness[2]	Describe Maintenance Performed	Maintenance Personnel	Comments

1. The water depth to sediment is determined by taking two measurements with a stadia rod: one measurement from the manhole opening to the top of the sediment pile and the other from the manhole opening to the water surface. If the difference between these measurements is less than the values listed in table 1 the system should be cleaned out. **Note: to avoid underestimating the volume of sediment in the chamber, the measuring device must be carefully lowered to the top of the sediment pile**.

2. For optimum performance, the system should be cleaned out when the floating hydrocarbon layer accumulates to an appreciable thickness. In the event of an oil spill, the system should be cleaned immediately.

SUPPORT

- Drawings and specifications are available at www.ContechES.com.
- Site-specific design support is available from our engineers.

CONTECH ENGINEERED SOLUTIONS
800-338-1122
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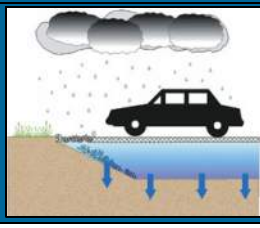
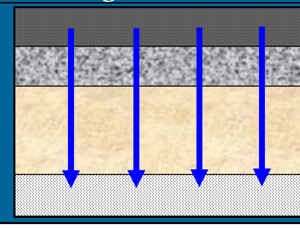
cds_manual 3/17 PDF

RECYCLED PAPER

Porous Asphalt Pavement for Stormwater Management

The UNH Stormwater Center   Web: www.unh.edu/erg/cstev/





Benefits and Uses

Porous Asphalt can be used in replace of traditional stormwater management measures given the proper conditions. Porous Asphalt's primary advantages are:

1. Quantity and Flood Control
2. Water Quality Treatment
3. Recharges Groundwater to Underlying Aquifers
4. Allows for Reduction of Stormwater Infrastructure (Piping, Catch-Basins, Retention Ponds, Curbing, etc.)
5. Suitable for Cold-Climate Applications, Maintains Recharge Capacity When Frozen
6. Allows for Reduced Salt and Sand Usage Due to Low/No Black Ice Development
7. Maintains Traction While Wet
8. Reduced Spray from Traveling Vehicles, Reduced Roadway Noise
9. Extended Pavement Life Due to Well Drained Base and Reduced Freeze-Thaw

Disadvantages

- Requires Routine (Quarterly) Vacuum Sweeping (Vac-Assisted Dry Sweeper Only)
- Proper Construction Stabilization and Erosion Control are Required to Prevent Clogging
- Quality Control for Material Production and Installation are Essential for Success
- Accidental Seal-Coating or Similar Surface Treatment Will Cause Failure

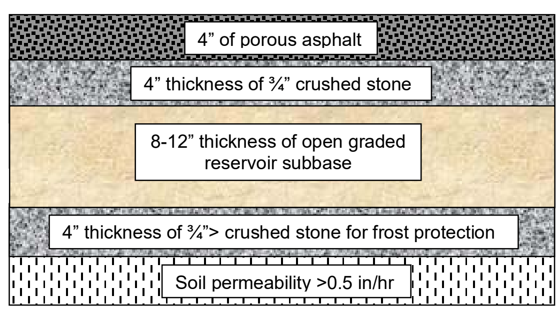
Cost & Maintenance

- Total Project Cost is Comparable for Porous Asphalt with Reduced Stormwater Infrastructure VS. Standard Pavement Applications where Stormwater Infrastructure is Required
- Materials Cost is ~20-25% More Than Traditional Asphalt
- Long-term Maintenance is Required by Routine Quarterly Vacuum Sweeping
- Sweeping Cost May Be Off-set by Reduced Deicing Costs
- Repairs Can be Made with Standard Asphalt Not to Exceed 10% of Surface Area

Design Criteria

- Soil Permeability is Recommended Between 0.25-3.0 Inches Per Hour
- Recommended Drainage Time of 24-48 Hours
- Sub-Drains Should be Used Where Proper Drainage May be an Issue to Minimize Frost Damage
- Most Appropriate for use with Low-Use Roadways and Parking Lots—Without a Modified Asphalt Binder
- 3-5 Feet of Vertical Separation is Needed from Seasonal High Groundwater

TYPICAL POROUS ASPHALT CROSS-SECTION



Additional Resources

- The UNH Stormwater Center, Porous Asphalt Specs - General Porous Bituminous Paving and Groundwater Infiltration Beds, http://www.unh.edu/erg/cstev/
- Federal Highway Administration (2006) Porous Pavement Fact Sheet http://www.fhwa.dot.gov/environment/ultraurb/3fs15.htm
- Ferguson, B. (2005), Porous Pavements, CRC Press.
- Porous Asphalt Pavements (2004) Information Series 131. The National Asphalt Pavement Association, Lanham, MD.

Winter Maintenance Guidelines for Porous Pavements

Maintenance Guidelines

- Road surfaces, porous and non-porous, are commonly not treated and plowed until 2 or more inches of snow accumulation.
- Plow after every storm. If possible plow with a slightly raised blade, while not necessary, this will help prevent pavement scarring.
- Up to ~75% salt reduction for porous asphalt can be achieved. Salt reduction amounts are site specific and are affected by degree of shading.

  USE SALT REDUCTION NUMBERS WITH CAUTION!!!
- Pervious concrete salt reduction will vary and is heavily dependent upon shading. For shaded areas, pervious concrete may not achieve salt reduction.
- Apply anti-icing treatments prior to storms. Anti-icing has the potential to provide the benefit of increased traffic safety at the lowest cost and with less environmental impact.
- Deicing is NOT required for black ice development. Meltwater readily drains through porous surfaces thereby preventing black ice.
- Apply deicing treatments during, and after storms as necessary to control compact snow and ice not removed by plowing.
- Sand application should be limited since its use will increase the need for vacuuming
- Vacuum porous areas a minimum of 2-4 times per year, especially after winter and fall seasons when debris accumulation and deposition is greatest.
- If ponding water is observed during precipitation cleaning is recommended.

Winter Maintenance Challenges

- Mixed precipitation and compact snow or ice is problematic for all paved surfaces, but is particularly problematic for porous surfaces. This is corrected by application of excess deicing chemicals.
- De-icing chemicals work by lowering the freezing point of water. Generally, the longer a de-icing chemical has to react, the greater the amount of melting. Meltwater readily drains through porous surfaces thereby reducing chemical contact time. This is corrected by excess salt application.
- Excess salt application in these instances is offset by the overall reduced salt during routine winter maintenance and salt reduction.

Additional Resources

- The UNH Stormwater Center: http://www.unh.edu/erg/cstev/
- Pennsylvania Asphalt Pavement Association (PAPA) Porous Asphalt Pavements Guide: http://www.pahotmix.org/PDF/porous1.pdf
- National Asphalt Pavement Association (NAPA) Porous Asphalt Pavements for Stormwater Management Revised 11/2008, Information Series 131

retain-it®

Stormwater Management Systems

OWNERS MAINTENANCE MANUAL

retain-it, LLC
560 Salmon Brook Street
Granby, CT 06035
(860) 413-3050

retain-it ®

Owners Maintenance Manual

Table of Contents

Description

retain-it ® is a subsurface Storm Water Management system constructed of precast concrete structures. They are installed in a side by side configuration creating a continuous internal flow channel integrated throughout the system. Systems are constructed with designated inlet and outlet modules, some with multiple inlets and outlets depending on the site storm water system layout. Infiltration systems typically have an inlet and sidewalls/ base constructed on a stone infiltration blanket with geofabric installed at the native soil interface. Other systems incorporate outlet flow control devices. Detention systems are typically lined with a watertight membrane and have inlet and outlet control devices.

The retain-it ® system can consist of multiple varying layouts, with no two the same. Given this, it should be noted that the operation and maintenance requirements are very similar regardless of the intended layout. It is important that the end user know the specific elements of each system so as to understand how best to optimize it's operation.

Installation per Design: Operation is simple to follow where the installation was performed in accordance with the design specifications, drawings and calculations. Specifics shall be identified in the design drawings. As-built drawings will benefit the locating of specific design modules where the system has been buried below a parking lot area. Optional access manholes or removable grates may be installed above every inlet/outlet pipe and at critical design elements designated by the design.

Daily Operation and Long Term Maintenance: In general, daily usage of the system is self sufficient and will operate without requiring any outside assistance, except for periodic inspection to verify optimal performance and maintenance for removal of collected pollutants. A longer term maintenance program should incorporate a more thorough inspection of the all elements of the system to verify proper operating condition. This is more important with the infiltration type of systems where the soil infiltration surface may become restricted due to fine particle build up. Long term maintenance should include provisions for cleaning and removal of collected solids, oils and debris from the system.

System Operation: The system operational function is initiated according to rainfall runoff flows entering the structure. Internally, the runoff flows in a set pattern or sequence throughout the module layout in accordance with the hydraulic design conditions. The flows primarily operate on system head derived from the changes in elevation from the internal water surface and the outlet invert elevation. Some designs incorporate internal flow controls to satisfy hydraulic conditions that enhance water quality treatment or other intended purposes. Modified systems may incorporate a pump, but in general there are no mechanical apparatus required.

End user operations primarily consist of inspection and maintenance of the system over time.

Periodic Inspection: Important note - All storm water management systems react differently depending on the conditions that are characteristic to the contributing water shed. Variables such as storm intensity, runoff flow rates, site geology, surface stabilization and pollution load will affect the system operation. As does the inspection and maintenance frequency to ensure optimum effectiveness.

Inspections should be done periodically, with a greater number scheduled during the system start up and less frequently as the operator becomes familiar with the system performance characteristics. It is recommended that the end user keep records of the performance using the inspection log record sheet found in the back of this manual. These records shall identify the cycle of maintenance “system calibration” required for the specific applications based on the contributing water shed variables operating under “normal” conditions.

Please note that immediate maintenance may be required during “non-normal” events such as during adverse weather conditions or emergency fuel spills. See information on emergency spills in this manual.

Visual inspection of all assessable components shall be performed throughout the lifetime of the system. Access has been supplied at critical points to monitor hydraulic performance and removed pollutants buildup.

Standard Maintenance:

After construction has been completed and all disturbed surfaces have been stabilized by means of vegetation, asphalt or concrete surfaces, and all drainage system components have been constructed and are free of construction debris and sediments; then the storm water management system can be considered in an operational status.

Periodic visual inspections will help to identify issues of concern.The usual indicators are signs of slow flows, backed up water, visible oil, trash and debris or an excessive amount of sediment in the storage area.

Normal operational flows can be observed to flow freely at the predicted design elevations, from the inlet to the outlet module, following a serpintine path thru the storage and attenuation modules. Note that some modules are designed to permanently retain water where others may hold water and slowly release it over a typical 24 hour period. During a storm water event, the flows and water surface elevations will fluctuate from a low flow to a high flow/ storage status. The storage modules should fill during the event and drain down within a 24 hour period after the event has stopped. All pipes, orifices, weirs and standpipes should pass flows freely and at optimum capacity.

Standard maintenance is performed using a vacuum truck to suction the accumulated sediments, oils and greases and trash and debris from the system. Whereas an on-site maintenance staff can remove these items by hand, it is preferred that the vacuum truck be used as dictated by specific system conditions. When a specialized module designed to have a permanent water level is used, the vacuum truck should pump the liquid level down to inspect the below water elevation structures and sump storage areas.

Oils and greases can be handled by on-site staff by utilizing absorbent products that soak up the oils (and not) converting the oils from a liquid into a manageable solid form. These oil soaked absorbent materials should be disposed of in an approved manner.

Sediments, trash and debris shall be removed and disposed of in an approved manner.

Any indications of hazardous material, determined by visual inspection, testing, smell or abnormality, should be reported and handled per appropriate regulations.

Flow Conditions

System operators should familiarize themselves with proper hydraulic flow condition indicators, acceptable depths of sedimentation, debris and trash build up, and concentrations of oils and greases.

Hydraulic flow conditions are those that are established by the design as either a flow/storage or as a water quality treatment function. Both have performance characteristics that can be visually identified so as to determine the effective and efficient operation of the system.

The engineering design drawings should note the various expected water surface level elevations that are achieved during different design storms within the various modules. Since it is difficult for a visual inspection to coincide with the exact time given water elevations are predicted, the following guidelines are given for evaluation.

Visual Inspection Guide:

<u>Internal Flow Evaluation</u>

Low flow: water should flow freely from the inlet to the outlet, travelling the intended attenuation path thru the system with the water surface elevation below the structure beam height (12” deep), the system should drain completely 24 hours after a storm event,

Medium flow: the system should hold and maintain a water level during the 24 hour storm event and yet continually fill as the storm increases or drain downward as the event recedes. Flow within the system should occur freely from inlet to outlet only being restricted when a flow control structure has been integrally designed in place. Flow control devices may result in a water level backing up either temporarily or permanently; noting devices such as water quality modules may require a permanent water level to operate properly (see water quality treatment). Other system applications should drain completely 24 hours after a storm event.

High flow: the system should fill to the maximum design storm water level elevation (hydraulic grade line) per design. In most cases, that is the highest storage elevation available in the system, at the underside of the module top slab, or the invert of the overflow pipe. As the storm event recedes, the water level should begin to drain down via flow thru the system and discharge. The system should drain completely within 24 hours after a storm event.

Pollutant Storage Capacities

<u>Oil and Grease</u>

Oil and Grease Collection (with optional Oil water separator module specified) - Oil and grease accumulation is generally a function related to vehicle parking lot and drive areas, oil generating land uses or emergency spill conditions. It is important to maintain the system from accumulating excessive volumes of oils in that they may wash over into other sections of the system potentially clogging and reducing the infiltration capacity, blocking control devices and contaminating the overall system. The following standards apply.

Oil should not accumulate more than a visible sheen on the water surface in the oil water separation module only. A sheen is described as a fine, thin oil layer on the water surface identified by the glossy rainbow colors. A dipstick (dry wooden stick) can be used as a probe to determine the thickness of oil on the surface.

Accumulated oils could be associated with insufficient maintenance or a potential large volume oil resource. Any accumulation of oil should be promptly maintained by an experienced waste handler. Emergency spills such as those generated by an accidental spill shall be contained and removed immediately before the next storm event. Spills shall be handled in accordance with local environmental regulations. See spill and accumulated oil maintenance procedures.

Sediments

Sediments (with optional primary grit module or sedimentation modules specified) - Sediments shall be periodically removed from the system as they accumulate within the designated storage modules. The inlet modules are generally equipped with a sediment storage sump located in the base of the inlet structure. Inspection should be performed after major storm events or a minimum of annually, unless a different inspection cycle has been determined to be sufficient. Inspection shall consist of using a probe to determine the presence of and depth of the accumulated solids. Access is via the 24” manhole.

Note that excessive volumes of sediments will reduce the performance and efficiency of the system. Regional accumulations of solids such as those associated with ice and snow, may result in large springtime volumes of sand and gravels used for traction and ice control.

Trash and Debris

Trash and Debris (with optional trash and debris module specified) - Trash and debris accumulates in the inlet module in three forms; floating debris, neutrally buoyant, and heavy material. The floating debris is visible from the access manhole floating on the water surface in the form of but not limited to wood, paper, plastic, foam, bottles and cans. The neutrally buoyant material resides below the surface and combines with the natural flow regime of the system. It is hard to detect and can only be recognized when at a high concentration appears as a thickening of the water viscosity. Heavier material will simply settle to the sump base and combine with the sediments.

Note that trash and debris typically cause the most problems when they become lodged in a flow control device such as an outlet elbow, riser pipe, and orifice or weir structure. This can be detected visibly when the system is pumped down during maintenance. It can also be evaluated as a condition when flow is impeded and the water level backs up higher than the design elevations.

Emergency Spill Conditions (with optional emergency spill control module specified):

Emergency spill conditions are defined as an excessive accumulation of hydrocarbons such as oil, gasoline, diesel fuel, transmission oil or antifreeze usually resulting from an accidental discharge. Excessive accumulation is described as any amount larger than a thin “sheen” visible on the water surface.

Care should be given in handling these types of fluids. The incident should be reported to the appropriate authorities and should be mitigated by a hazardous waste consultant approved for such matters.

retain-it ®

Maintenance Log

Storm Water Management System

Location: ID #:

Date	Inspection Notes	Inspector

Note the following conditions:

Inlet Module

Outlet Module

Water Quality Module

Oil Elbow

Oil Accumulation

Sedimentation Accumulation

Trash and Debris Quantity

Flow Conditions

Flow Control Outlet Structure

Overflow Pipe

SECTION 6 – SOILS TESTING DATA

APPENDIX B

Test Pit Logs and Photographs

TEST PIT LOG

HALEY ALDRICH

Test Pit No. TP-1

Project	HERB CHAMBERS MERCEDES OF SUDBURY	**File No.**	135627-002
Location	141 BOSTON POST ROAD, SUDBURY, MA	**H&A Rep**	S. Shay
Client	THE HERB CHAMBERS COMPANIES	**Date**	4 Dec 2020
Contractor	EARTHWORK INDUSTRIES, INC.		
Equipment Used	Doosan Dx50 Small Excavator	**Weather**	Bright sun, 50s

Ground El.: 125.0 (est.)
El. Datum: NGVD 29
Location: See Plan
Groundwater depths/entry rates (in./min.): 3.0 rapidly

Depth (ft)	Sample ID	Stratum Change Elev./ Depth (ft)	USCS Symbol	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Color GROUP NAME & SYMBOL, % oversized, maximum particle size, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Tests Dilatancy	Field Tests Toughness	Field Tests Plasticity	Field Tests Strength
0				3/4 in. minus gravel layer for roadway		100								
		124.6 0.4	SP	Gray poorly graded SAND with gravel (SP), 10% oversized, mps 1.5 ft, no structure, no odor, moist, trace fill items: concrete, crumpled metal, wood	10	15	10	10	50	5				
1				-FILL-										
2		123.0 2.0		Gray brown silty SAND with gravel (SM), 8-10% oversized, mps 1.2 ft, no structure, no odor, moist 6-in. diameter perforated drain pipe. Crown of pipe at 2.3 ft. Geofabric wrap in gravel bedding. Exposed sidewall.	10	10	10	15	35	20				
3		122.0 3.0	GP	-FILL-										
4				Gray poorly graded GRAVEL (GP), 1.5 in. minus, no oversized, mps 1.5 in., strong petroleum odor, wet	100									
5		120.0 5.0	ML	Gray SILT with sand (ML), no oversized, mps 0.1 in., no structure, no odor, moist -GLACIOLACUSTRINE DEPOSITS-					20	80				
		119.5 5.5		BOTTOM OF EXPLORATION 5.5 FT										

Obstructions: None

Remarks: Unable to observe bottom of pit due to rapid inflow of water.

Field Tests

Dilatancy	R - Rapid S - Slow N - None
Toughness	L - Low M - Medium H - High
Plasticity	N - Nonplastic L - Low M - Medium H - High
Dry Strength	N - None L - Low M - Medium H - High V - Very High

Standing Water in Completed Pit

at depth	3.5	ft
measured after	0.1	hours elapsed

Boulders

Diameter (in.)	Number		Approx. Vol. (cu.ft)
12 to 24	4.0	=	7.5
over 24	0	=	-

Test Pit Dimensions (ft)

Pit Length x Width (ft) 12.0x5.0
Pit Depth (ft) 5.5

NOTE: Soil identification based on visual-manual methods of the USCS system as practiced by Haley & Aldrich, Inc.

Photo 1: Excavation at TP-1

Photo 2: Excavated material generated from TP-1

Photo 3: Excavated material generated from TP-1

HALEY ALDRICH

TEST PIT LOG

Test Pit No. TP-2

Project HERB CHAMBERS MERCEDES OF SUDBURY
Location 141 BOSTON POST ROAD, SUDBURY, MA
Client THE HERB CHAMBERS COMPANIES
Contractor EARTHWORK INDUSTRIES, INC.
Equipment Used Doosan Dx50 Small Excavator

File No. 135627-002
H&A Rep S. Shay
Date 4 Dec 2020
Weather Mostly sun, 50s

Ground El.: 124.5 (est.)
El. Datum: NGVD 29
Location: See Plan
Groundwater depths/entry rates (in./min.): 4.4 slowly

Depth (ft)	Sample ID	Stratum Change Elev./ Depth (ft)	USCS Symbol	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Color GROUP NAME & SYMBOL, % oversized, maximum particle size, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Tests Dilatancy	Toughness	Plasticity	Strength
0		124.3 0.2	GP	Gray poorly graded GRAVEL (GP), no oversized, mps 3/4 in., no structure, no odor, dry		90	5	5						
1			SM	Brown silty SAND with gravel (SM), 4-5% oversized, mps 6.0 in., no structure, no odor, moist -FILL-	5	10	10	10	40	25				
3		121.7 2.8	SM	Gray silty SAND with gravel (SM), 15% oversized, mostly as rubble, mps 1.5 (concrete), no structure, no odor, moist to wet, trace amounts of wood, wires, rebar pieces, concrete, asphalt Concrete block from 4.0 to 4.4 ft	10	10	10	15	35	20				
		120.1 4.4	ML	Gray SILT (ML), no oversized, mps 1/4 in., no structure, no odor, moist					10	90				
5		119.8 4.7	ML	Olive brown SILT with sand (ML), no oversized, mps 1/2 in., no structure, no odor, moist -GLACIOLACUSTRINE DEPOSITS-			5	5	5	85				
		118.0 6.5		BOTTOM OF EXPLORATION 6.5 FT										

Obstructions: None

Remarks: Standard test pit backfill

Field Tests
Dilatancy R - Rapid S - Slow N - None
Toughness L - Low M - Medium H - High
Plasticity N - Nonplastic L - Low M - Medium H - High
Dry Strength N - None L - Low M - Medium H - High V - Very High

Standing Water in Completed Pit
at depth 6.3 ft
measured after 0.5 hours elapsed

Boulders

Diameter (in.)	Number	Approx. Vol. (cu.ft)
12 to 24	0	= 0
over 24	0	= 0

Test Pit Dimensions (ft)
Pit Length x Width (ft) 9.0x3.0
Pit Depth (ft) 6.5

NOTE: Soil identification based on visual-manual methods of the USCS system as practiced by Haley & Aldrich, Inc.

Photo 4: Excavation of TP-2

Photo 5: Excavated materials generated from TP-2

HALEY ALDRICH

TEST PIT LOG

Test Pit No. TP-3

Project HERB CHAMBERS MERCEDES OF SUDBURY
Location 141 BOSTON POST ROAD, SUDBURY, MA
Client THE HERB CHAMBERS COMPANIES
Contractor EARTHWORK INDUSTRIES, INC.
Equipment Used Doosan Dx50 Small Excavator

File No. 135627-002
H&A Rep S. Shay
Date 4 Dec 2020
Weather Partly cloudy, 40s

Ground El.: 124.0 (est.)
El. Datum: NGVD 29
Location: See Plan
Groundwater depths/entry rates (in./min.): Water entering pit at 3.8 ft.

Depth (ft)	Sample ID	Stratum Change Elev./ Depth (ft)	USCS Symbol	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Color GROUP NAME & SYMBOL, % oversized, maximum particle size, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Tests Dilatancy	Toughness	Plasticity	Strength
0			SM	Brown silty SAND (SM), no oversized, mps 2.0 in., no structure except heavy root mat, no odor, moist			10	10	40	40				
		123.5 / 0.5	SC	Yellow brown clayey SAND with gravel (SC), 10% oversized, mps 9.0 in., no structure, no odor, moist, appears to be disturbed -FILL-	5	10	10	15	25	35				
1		122.7 / 1.3	SM	Brown silty SAND (SM), 5% oversized, mps 6.0 in., no structure, no odor, moist	5	5	15	20	35	20				
2		121.5 / 2.5	SM	Gray silty SAND (SM), no oversized, mps 2.4 in., no structure, except excavates blocky, no odor, moist, trace fill items - fabric, metal -FILL-	5	5	5	10	30	45				
3		120.2 / 3.8	SP	Olive brown poorly graded SAND (SP), no oversized, mps 0.02 in., single grain structure, no odor, wet, dark brown variable coloring at 4.0 ft -ALLUVIAL DEPOSITS-					30	70				
4		119.5 / 4.5	ML	Bright orange brown SILT (ML), no oversized, mps 0.01 in., thin stratification, no odor, moist, well defined, irregular mottling 4.5-6.0 ft -GLACIOLACUSTRINE DEPOSITS- Note: Abrupt color change to gray at 6.0 ft. Gray SILT (ML), no oversize, mps 0.01 in., stratified, no odor, moist						100	N	L	N	N
5														
6														
7		117.0 / 7.0		BOTTOM OF EXPLORATION 7.0 FT										

Obstructions: None

Remarks: Standard test pit backfill

Field Tests

Dilatancy	R - Rapid S - Slow N - None
Toughness	L - Low M - Medium H - High
Plasticity	N - Nonplastic L - Low M - Medium H - High
Dry Strength	N - None L - Low M - Medium H - High V - Very High

Standing Water in Completed Pit

at depth 3.8 ft
measured after 0.1 hours elapsed

Boulders

Diameter (in.)	Number	Approx. Vol. (cu.ft)
12 to 24	0	= 0
over 24	0	= 0

Test Pit Dimensions (ft)

Pit Length x Width (ft) 9.0x2.5
Pit Depth (ft) 7.0

NOTE: Soil identification based on visual-manual methods of the USCS system as practiced by Haley & Aldrich, Inc.

Photo 6: Excavation of TP-3

Photo 7: Excavation of TP-3

Photo 8: Excavation of TP-3

Photo 9: Excavated materials generated from TP-3

Photo 10: Excavated materials generated from TP-3

Photo 11: Excavated materials generated from TP-3

T2-P2 Page 2

Section II. Indicators of Hydrology

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? Yes X No

title/date: NRCS Web Soil Survey Middlesex County Update 2012

map number:

soil type mapped: Udorthents Urban Land Complex and Freetoown Muck

hydric soil inclusions: Yes

Are field observations consistent with soil survey? Yes X no

Remarks:
This aresa was part of a flood storage replication area constructed in 2003 as part of the Bosse Sports project. It is in the upper edge of that area. The Latest FEMA Mapping shows that the 100 year flood elevation is lower than previously indicated. So this area is a relatively dry field at this location.

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
A–SL top	0 – 6"	10 YR 4/2	None
Bw – LS	6 – 17"	2.5 YR 5/3	10 YR 4/6 few At 9".
C – FSL	17 – 20"	10 YR 5/1	2.5 Y 5/7 Many.
			10 YR 4/6 Many. 2.5 Y 7/1 Some

Remarks: B horizon is too bright to be hydric.

SEASONAL GROUNDWATER @ 17"

3. Other:

Conclusion: Is soil hydric? Yes No X

Other Indicators of Hydrology: (check all that apply and describe)

- ☐ Site inundated:
- ☐ Depth to free water in observation hole:
- ☐ Depth to soil saturation in observation hole:
- ☐ Water marks:
- ☐ Drift lines:
- ☐ Sediment deposits:
- ☐ Drainage patterns in BVW:
- ☐ Oxidized rhizospheres:
- ☐ Water-stained leaves:
- ☐ Recorded data (stream, lake, or tidal gauge; aerial photo; other):
- ☐ Other:

Vegetation and Hydrology Conclusion

	Yes	No
Number of wetland indicator plants ≥ number of non-wetland indicator plants	☒	☐
Wetland hydrology present: hydric soil present	☐	☒
other indicators of hydrology Present	☐	☒
Sample location is in a BVW?	☐	☒

Submit this form with the Request for Determination of Applicability or Notice of Intent.

Map Scale: 1:1,730 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0, 25, 50, 100, 150

Feet: 0, 50, 100, 200, 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:25,000.

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: Middlesex County, Massachusetts
Survey Area Data: Version 21, Sep 2, 2021

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

Date(s) aerial images were photographed: Aug 31, 2020—Oct 22, 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.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
32B	Wareham loamy fine sand, 0 to 5 percent slopes	0.3	3.5%
52A	Freetown muck, 0 to 1 percent slopes	0.8	9.7%
656	Udorthents-Urban land complex	7.1	86.8%
Totals for Area of Interest		**8.2**	**100.0%**

Middlesex County, Massachusetts

52A—Freetown muck, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2t2q9
Elevation: 0 to 1,110 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Freetown and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Freetown

Setting

Landform: Depressions, depressions, swamps, kettles, marshes, bogs
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Highly decomposed organic material

Typical profile

Oe - 0 to 2 inches: mucky peat
Oa - 2 to 79 inches: muck

Properties and qualities

Slope: 0 to 1 percent
Surface area covered with cobbles, stones or boulders: 0.0 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: Rare
Frequency of ponding: Frequent
Available water supply, 0 to 60 inches: Very high (about 19.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: B/D
Ecological site: F144AY043MA - Acidic Organic Wetlands

Hydric soil rating: Yes

Minor Components

Whitman

Percent of map unit: 5 percent
Landform: Drainageways, depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Swansea

Percent of map unit: 5 percent
Landform: Bogs, swamps, marshes, depressions, depressions, kettles
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Scarboro

Percent of map unit: 5 percent
Landform: Drainageways, depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope, tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Data Source Information

Soil Survey Area: Middlesex County, Massachusetts
Survey Area Data: Version 21, Sep 2, 2021

Middlesex County, Massachusetts

656—Udorthents-Urban land complex

Map Unit Setting

National map unit symbol: 995k
Elevation: 0 to 3,000 feet
Mean annual precipitation: 32 to 54 inches
Mean annual air temperature: 43 to 54 degrees F
Frost-free period: 110 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Udorthents and similar soils: 45 percent
Urban land: 35 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Udorthents

Setting

Parent material: Loamy alluvium and/or sandy glaciofluvial deposits and/or loamy glaciolacustrine deposits and/or loamy marine deposits and/or loamy basal till and/or loamy lodgment till

Properties and qualities

Slope: 0 to 15 percent
Depth to restrictive feature: More than 80 inches
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None

Description of Urban Land

Setting

Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Excavated and filled land

Minor Components

Canton

Percent of map unit: 10 percent
Landform: Hills
Landform position (two-dimensional): Backslope, toeslope
Landform position (three-dimensional): Side slope, base slope
Down-slope shape: Linear
Across-slope shape: Convex
Hydric soil rating: No

Merrimac

Percent of map unit: 5 percent
Landform: Terraces, plains
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Tread, rise
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

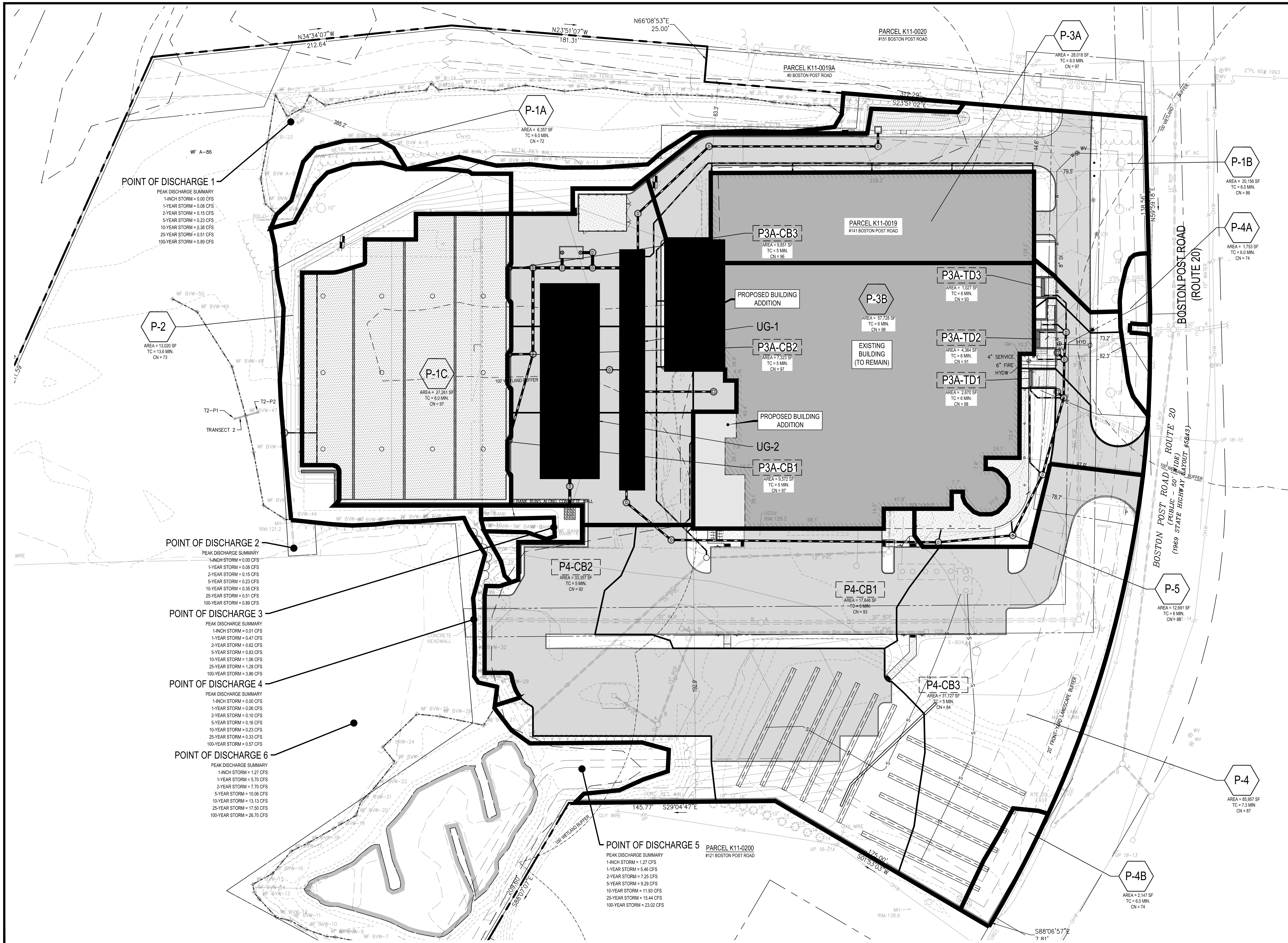
Paxton

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope, summit
Landform position (three-dimensional): Head slope, side slope
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Data Source Information

Soil Survey Area: Middlesex County, Massachusetts
Survey Area Data: Version 21, Sep 2, 2021

SECTION 7 – HYDRAULIC PIPE SIZING



30 15 0 30 60

Date	Description	No.
03/28/22	P.B. AND CON.-COM. RESUBMITTAL	4.
02/14/22	P.B. AND CON.-COM. RESUBMITTAL	3.
01/31/22	ZBA RESUBMITTAL	2.
11/15/21	PLANNING BOARD SUBMITTAL	1.

Revisions

COMMONWEALTH OF MASSACHUSETTS
GABRIEL R. CROCKER
CIVIL
No. 47917
REGISTERED PROFESSIONAL ENGINEER

GABRIEL R. CROCKER
PROFESSIONAL ENGINEER, MA REGISTRATION #47917

Crocker Design Group
2 SHARP STREET, UNIT A
HINGHAM, MA 02043
P: 781-919-0808

Project
MERCEDES OF SUDBURY
141 BOSTON POST ROAD,
SUDBURY, MA

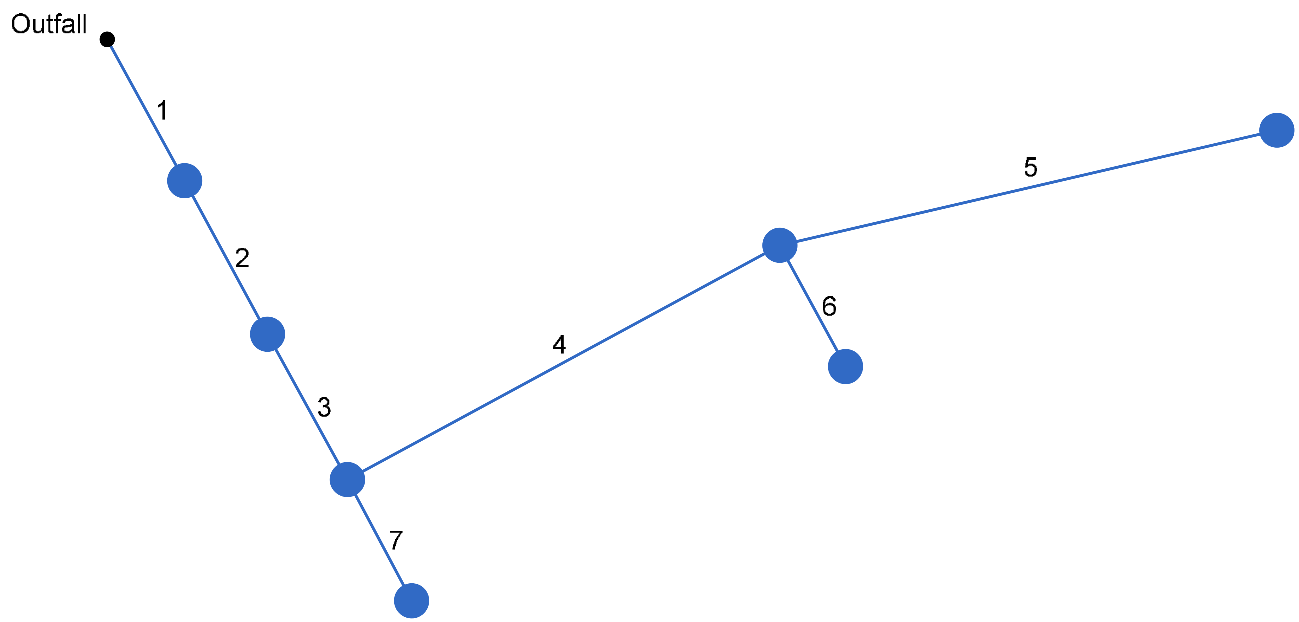
Prepared for
HERB CHAMBERS 43 BRAINTREE STREET, LLC
#259 McGRATH HIGHWAY - ROUTE 28
SOMERVILLE, MA 02143

Drawing Title
PROPOSED CONDITIONS SUB-CATCHMENT MAP

Project No.	100-107
Date	11/10/2021
Scale	1" = 30'
Drawn By	DJN / JPM
Approved By	GC

Drawing No.
PH-2

Hydraflow Storm Sewers Extension for Autodesk® Civil 3D® Plan



Project File: #1 Drainage System.stm	Number of lines: 7	Date: 3/24/2022

Storm Sewers v2021.00

Storm Sewer Tabulation

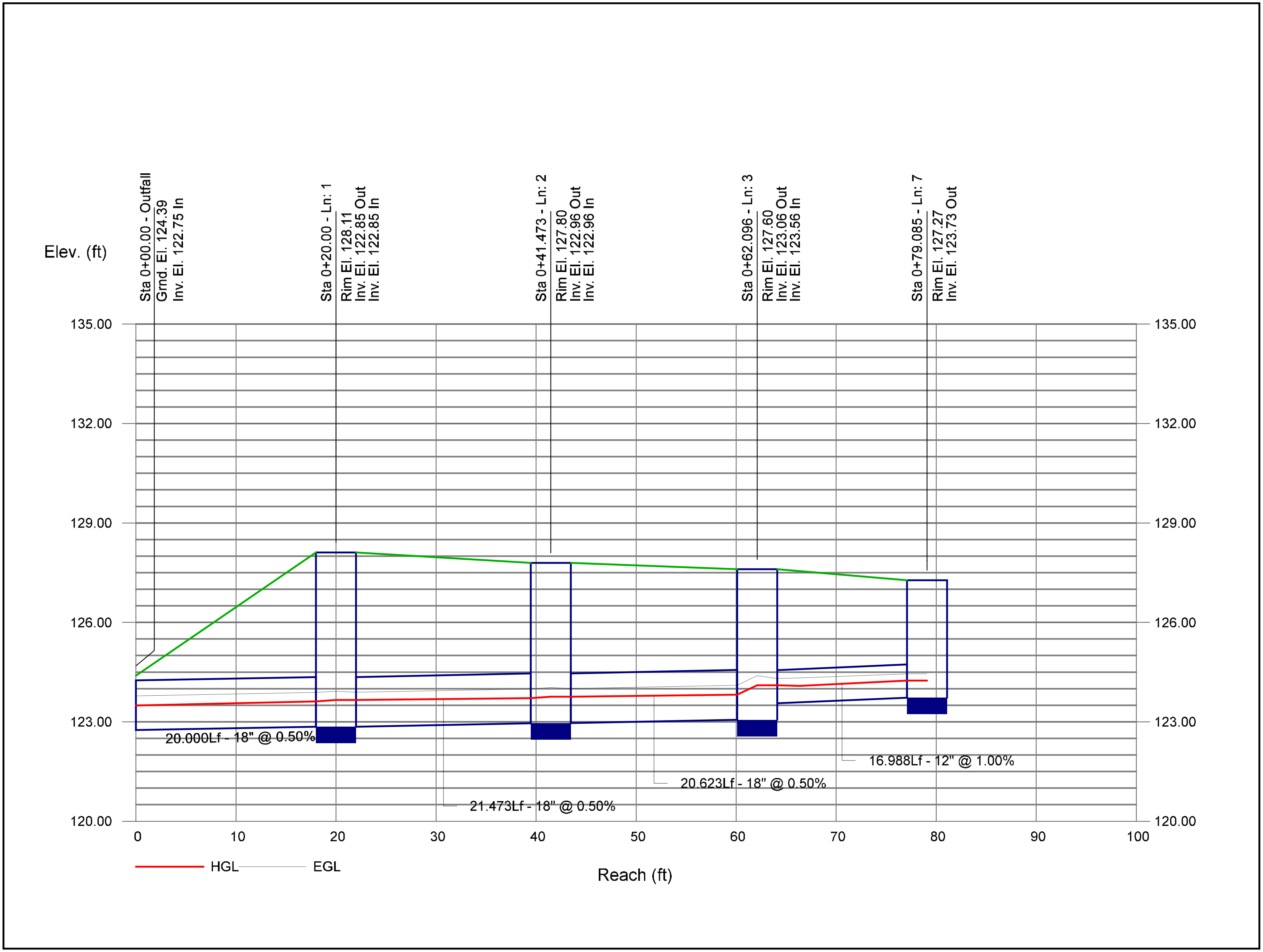
Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Dn	Up	Dn	Up	Dn	Up	
		(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
1	End	20.000	0.00	0.61	0.00	0.00	0.60	0.0	6.9	6.3	3.77	7.43	4.24	18	0.50	122.75	122.85	123.49	123.62	124.39	128.11	DMH5 to INLET1
2	1	21.473	0.00	0.61	0.00	0.00	0.60	0.0	6.8	6.3	3.80	7.43	4.08	18	0.50	122.85	122.96	123.66	123.71	128.11	127.80	DMH3 to DMH5
3	2	20.623	0.00	0.61	0.00	0.00	0.60	0.0	6.8	6.4	3.82	7.43	4.15	18	0.50	122.96	123.06	123.76	123.82	127.80	127.60	DMH2 to DMH3
4	3	60.895	0.00	0.39	0.00	0.00	0.38	0.0	6.3	6.6	2.49	7.37	2.31	18	0.49	123.06	123.36	124.10	124.13	127.60	127.51	DMH1 to DMH2
5	4	63.000	0.22	0.22	0.98	0.22	0.22	6.0	6.0	6.7	1.45	2.54	3.33	12	0.51	123.86	124.18	124.40	124.72	127.51	127.27	CB1 to DMH1
6	4	17.016	0.17	0.17	0.98	0.16	0.16	6.0	6.0	6.7	1.10	3.56	3.62	12	1.00	123.86	124.03	124.25	124.47	127.51	127.27	CB2 to DMH1
7	3	16.988	0.23	0.23	0.98	0.22	0.22	6.0	6.0	6.7	1.48	3.56	3.51	12	1.00	123.56	123.73	124.10	124.24	127.60	127.27	CB3 to DMH2

Project File: #1 Drainage System.stm | Number of lines: 7 | Run Date: 3/24/2022

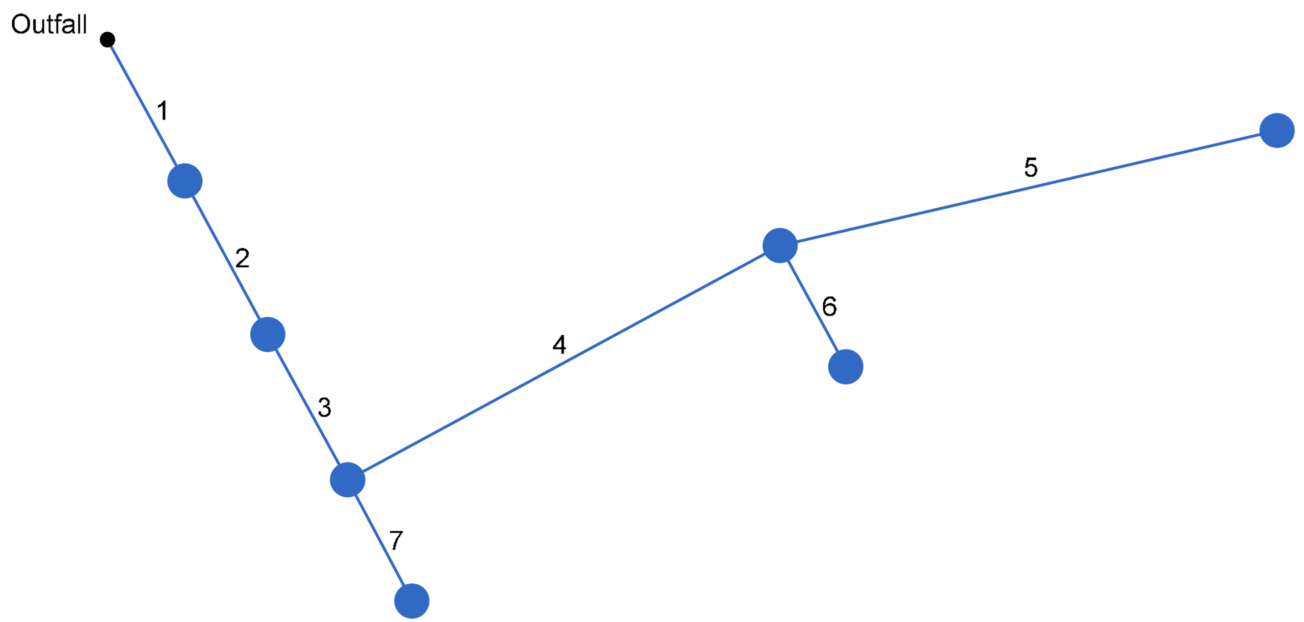
NOTES:Intensity = 32.47 / (Inlet time + 3.40) ^ 0.70; Return period =Yrs. 10 ; c = cir e = ellip b = box

Storm Sewer Profile

Proj. file: #1 Drainage System.stm



Hydraflow Storm Sewers Extension for Autodesk® Civil 3D® Plan



Project File: #1 Drainage System.stm	Number of lines: 7	Date: 3/24/2022

Storm Sewer Tabulation

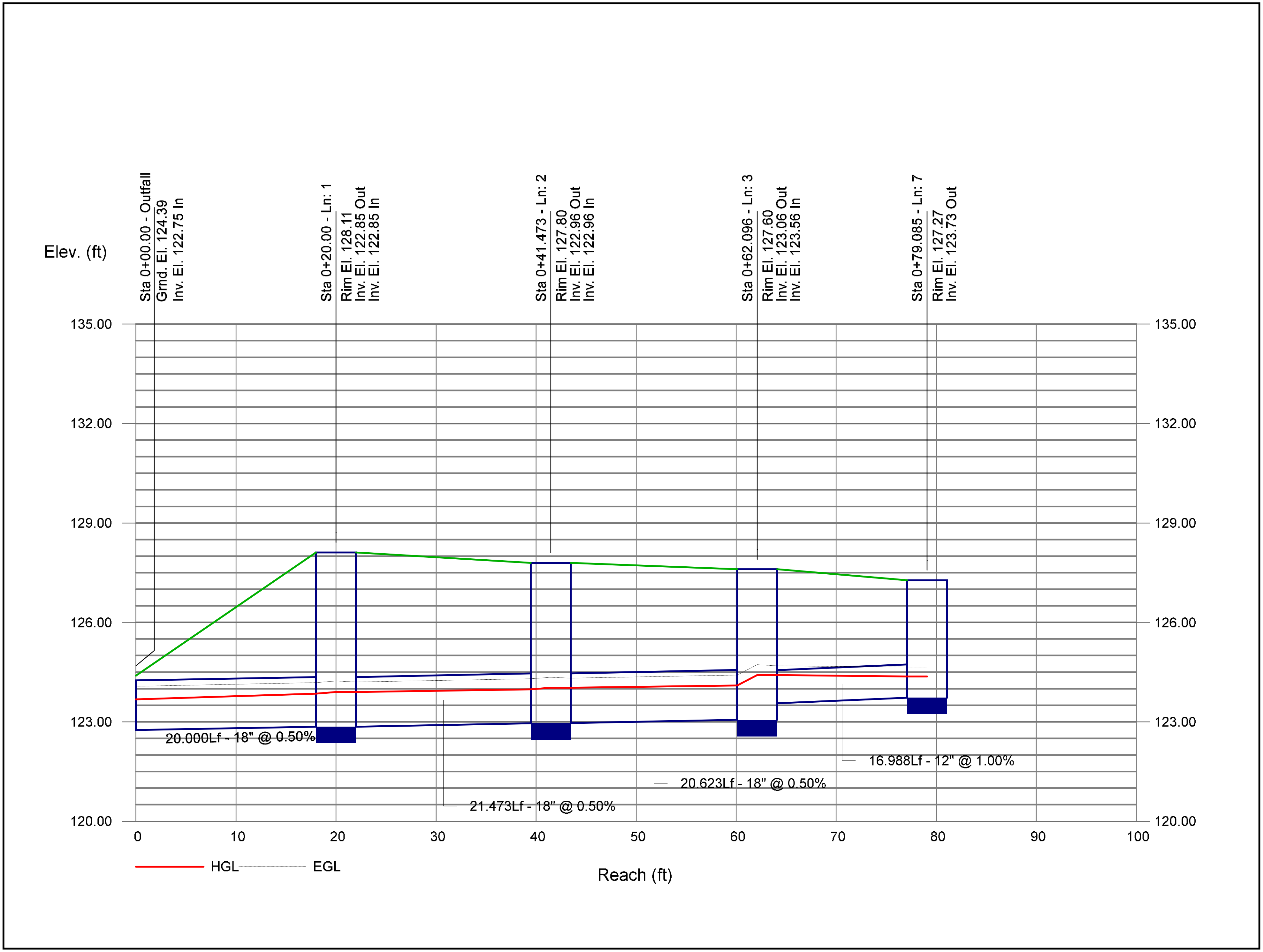
Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Dn	Up	Dn	Up	Dn	Up	
		(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
1	End	20.000	0.00	0.61	0.00	0.00	0.60	0.0	6.9	9.6	5.77	7.43	4.82	18	0.50	122.75	122.85	123.68	123.85	124.39	128.11	DMH5 to INLET1
2	1	21.473	0.00	0.61	0.00	0.00	0.60	0.0	6.8	9.7	5.80	7.43	4.46	18	0.50	122.85	122.96	123.90	123.98	128.11	127.80	DMH3 to DMH5
3	2	20.623	0.00	0.61	0.00	0.00	0.60	0.0	6.7	9.7	5.83	7.43	4.41	18	0.50	122.96	123.06	124.03	124.10	127.80	127.60	DMH2 to DMH3
4	3	60.895	0.00	0.39	0.00	0.00	0.38	0.0	6.3	10.0	3.80	7.37	2.50	18	0.49	123.06	123.36	124.41	124.46	127.60	127.51	DMH1 to DMH2
5	4	63.000	0.22	0.22	0.98	0.22	0.22	6.0	6.0	10.2	2.20	2.54	3.64	12	0.51	123.86	124.18	124.58	124.90	127.51	127.27	CB1 to DMH1
6	4	17.016	0.17	0.17	0.98	0.16	0.16	6.0	6.0	10.2	1.68	3.56	3.30	12	1.00	123.86	124.03	124.57	124.58	127.51	127.27	CB2 to DMH1
7	3	16.988	0.23	0.23	0.98	0.22	0.22	6.0	6.0	10.2	2.25	3.56	3.70	12	1.00	123.56	123.73	124.41	124.37	127.60	127.27	CB3 to DMH2

Project File: #1 Drainage System.stm | Number of lines: 7 | Run Date: 3/24/2022

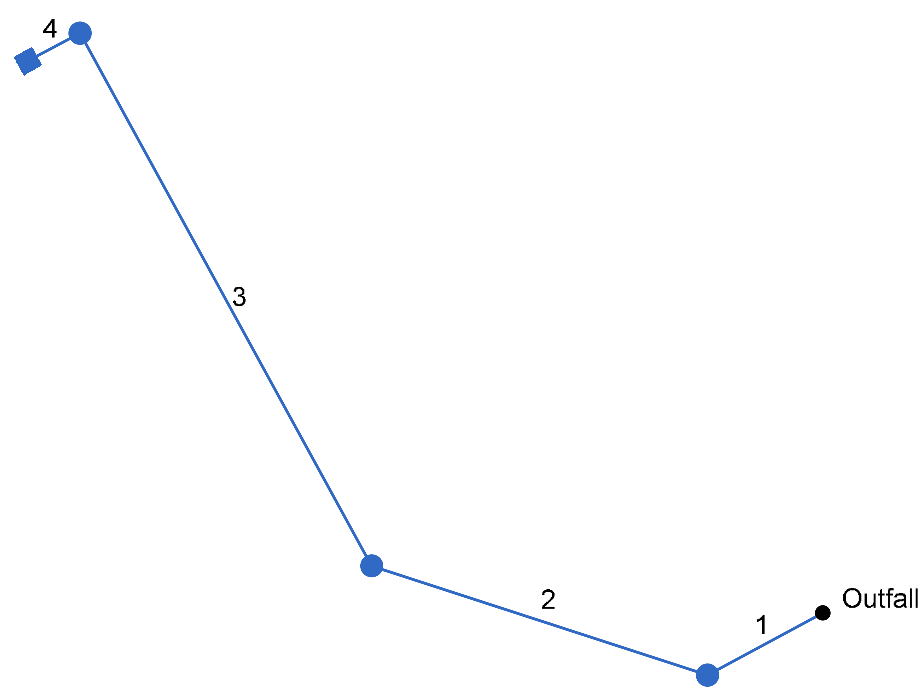
NOTES:Intensity = 49.45 / (Inlet time + 3.40) ^ 0.70; Return period =Yrs. 100 ; c = cir e = ellip b = box

Storm Sewer Profile

Proj. file: #1 Drainage System.stm



Hydraflow Storm Sewers Extension for Autodesk® Civil 3D® Plan



Project File: #2 Drainage System.stm	Number of lines: 4	Date: 3/24/2022

Storm Sewer Tabulation

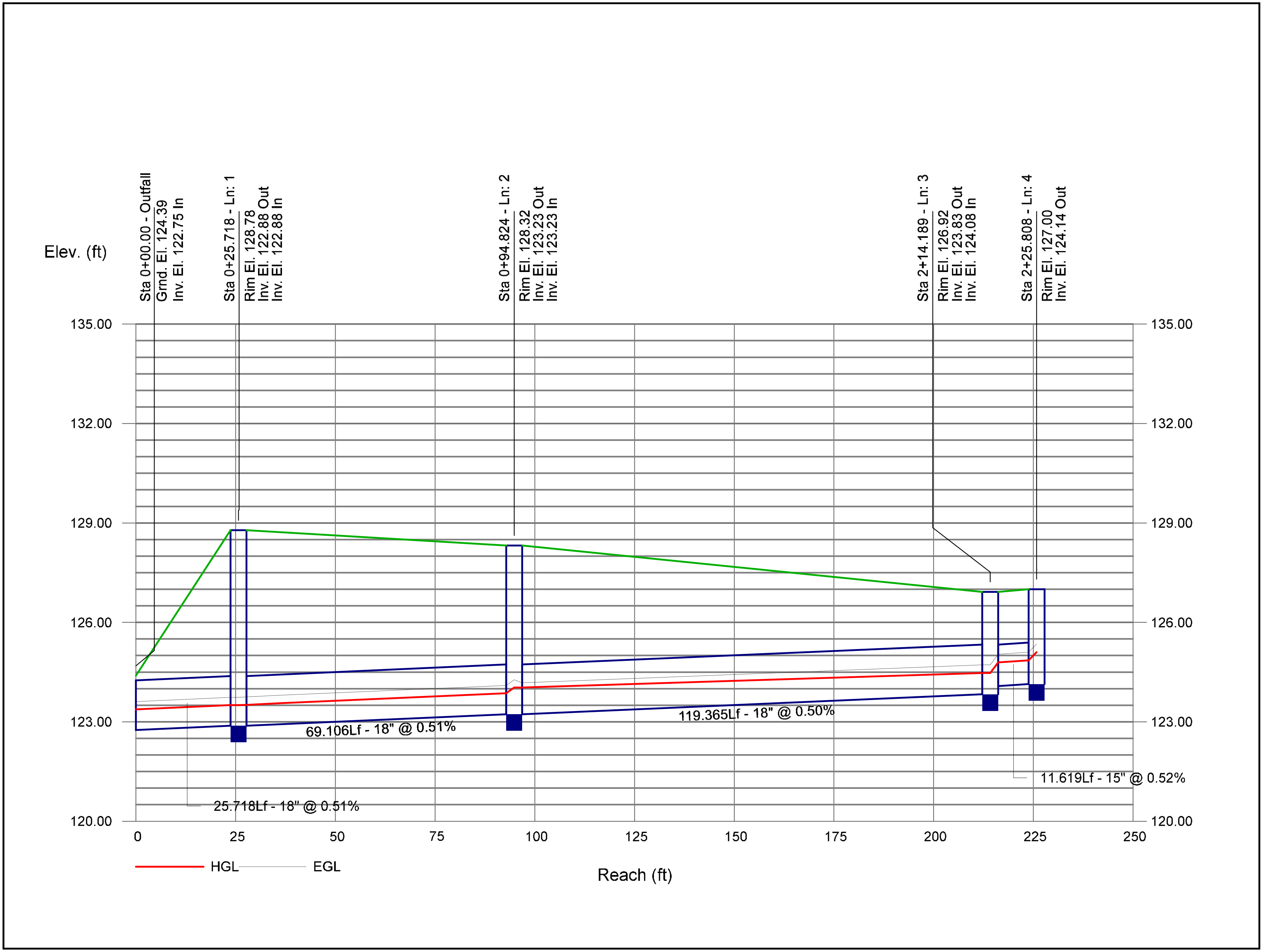
Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Dn	Up	Dn	Up	Dn	Up	
		(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
1	End	25.718	0.00	0.44	0.00	0.00	0.43	0.0	6.9	6.3	2.71	8.09	3.89	18	0.51	122.75	122.88	123.37	123.50	124.39	128.78	DMH9 to INLET2
2	1	69.106	0.00	0.44	0.00	0.00	0.43	0.0	6.6	6.4	2.76	7.47	3.90	18	0.51	122.88	123.23	123.51	123.86	128.78	128.32	DMH8 to DMH9
3	2	119.365	0.00	0.44	0.00	0.00	0.43	0.0	6.0	6.7	2.88	7.45	3.47	18	0.50	123.23	123.83	124.04	124.47	128.32	126.92	DMH7 to DMH8
4	3	11.619	0.44	0.44	0.98	0.43	0.43	6.0	6.0	6.7	2.89	4.64	3.99	15	0.52	124.08	124.14	124.79	124.85	126.92	127.00	ICS1 to DMH7

Project File: #2 Drainage System.stm | Number of lines: 4 | Run Date: 3/24/2022

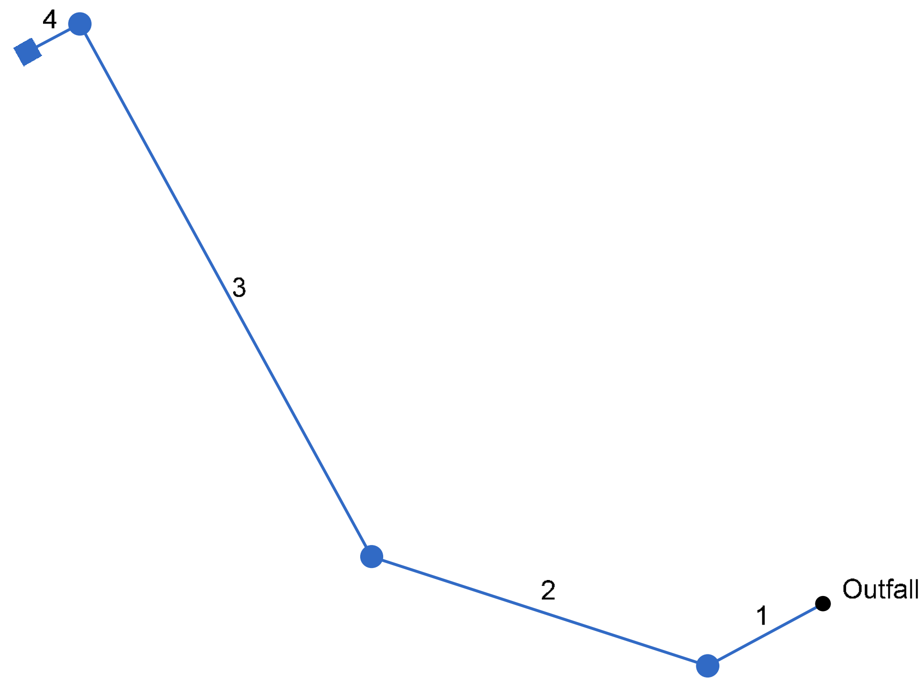
NOTES:Intensity = 32.47 / (Inlet time + 3.40) ^ 0.70; Return period =Yrs. 10 ; c = cir e = ellip b = box

Storm Sewer Profile

Proj. file: #2 Drainage System.stm



Hydraflow Storm Sewers Extension for Autodesk® Civil 3D® Plan



Project File: #2 Drainage System.stm	Number of lines: 4	Date: 3/24/2022

Storm Sewer Tabulation

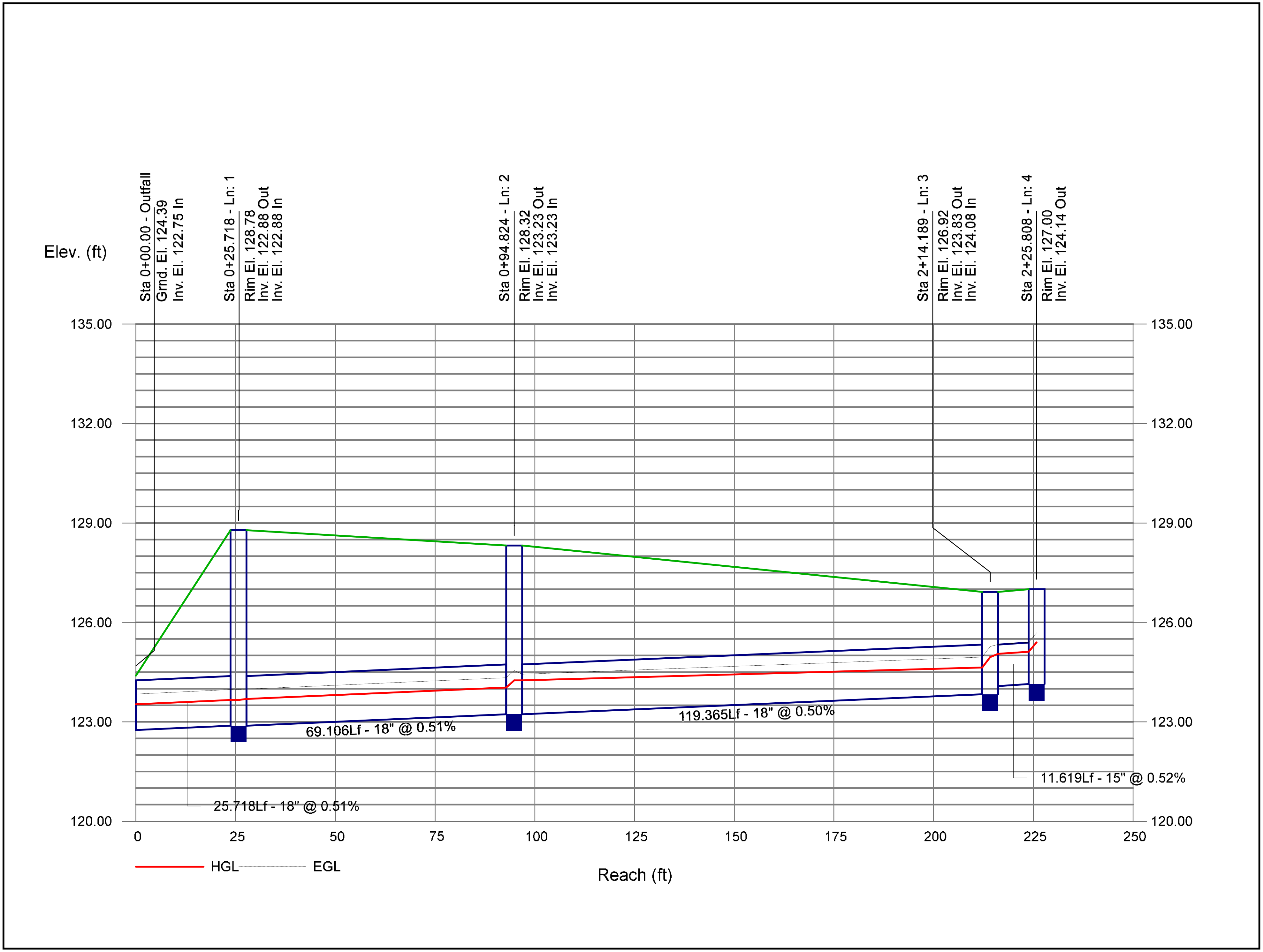
Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Dn	Up	Dn	Up	Dn	Up	
		(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
1	End	25.718	0.00	0.44	0.00	0.00	0.43	0.0	6.8	9.6	4.15	8.09	4.47	18	0.51	122.75	122.88	123.53	123.66	124.39	128.78	DMH9 to INLET2
2	1	69.106	0.00	0.44	0.00	0.00	0.43	0.0	6.5	9.8	4.23	7.47	4.36	18	0.51	122.88	123.23	123.69	124.04	128.78	128.32	DMH8 to DMH9
3	2	119.365	0.00	0.44	0.00	0.00	0.43	0.0	6.0	10.2	4.38	7.45	3.97	18	0.50	123.23	123.83	124.25	124.64	128.32	126.92	DMH7 to DMH8
4	3	11.619	0.44	0.44	0.98	0.43	0.43	6.0	6.0	10.2	4.40	4.64	4.30	15	0.52	124.08	124.14	125.05	125.11	126.92	127.00	ICS1 to DMH7

Project File: #2 Drainage System.stm | Number of lines: 4 | Run Date: 3/24/2022

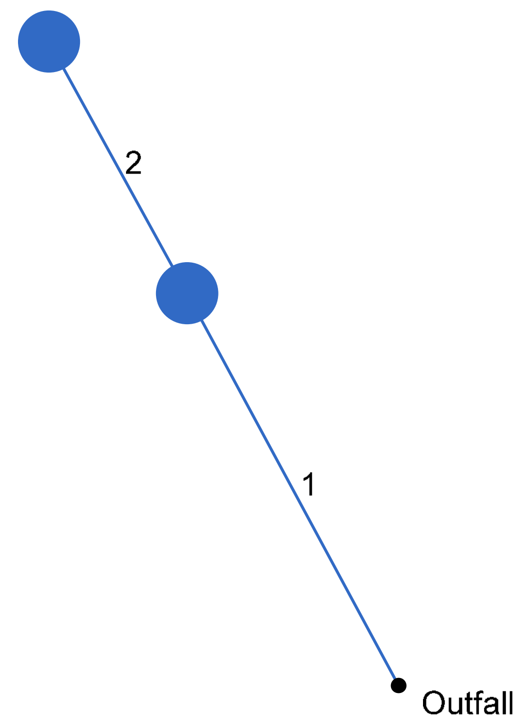
NOTES:Intensity = 49.45 / (Inlet time + 3.40) ^ 0.70; Return period =Yrs. 100 ; c = cir e = ellip b = box

Storm Sewer Profile

Proj. file: #2 Drainage System.stm



Hydraflow Storm Sewers Extension for Autodesk® Civil 3D® Plan



Project File: New.stm	Number of lines: 2	Date: 3/24/2022

Storm Sewer Tabulation

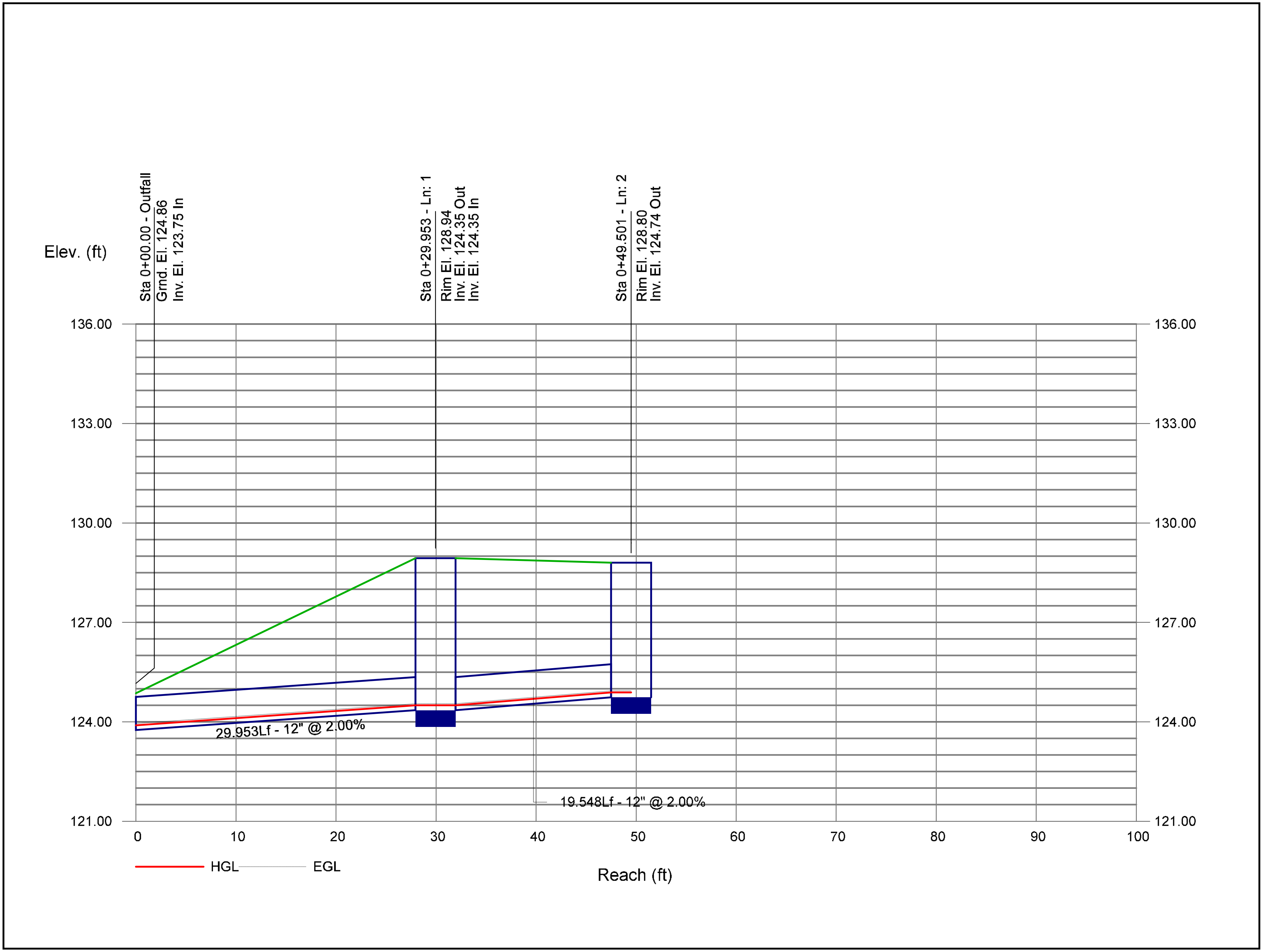
Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Dn	Up	Dn	Up	Dn	Up	
		(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
1	End	29.953	0.00	0.02	0.00	0.00	0.02	0.0	6.2	6.6	0.13	5.46	1.81	12	2.00	123.75	124.35	123.90	124.50	124.86	128.94	DMH10 to INLET4
2	1	19.548	0.02	0.02	0.98	0.02	0.02	6.0	6.0	6.7	0.13	5.03	1.82	12	2.00	124.35	124.74	124.50	124.89	128.94	128.80	CB4 to DMH10

Project File: New.stm | Number of lines: 2 | Run Date: 3/24/2022

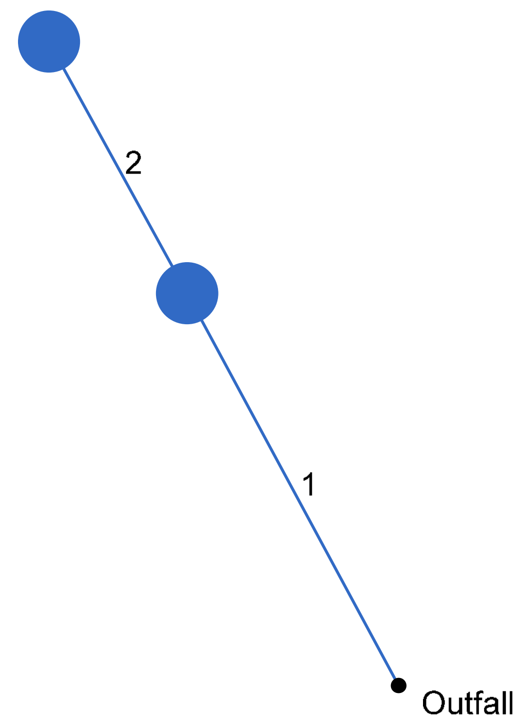
NOTES:Intensity = 32.47 / (Inlet time + 3.40) ^ 0.70; Return period =Yrs. 10 ; c = cir e = ellip b = box

Storm Sewer Profile

Proj. file: New.stm



Hydraflow Storm Sewers Extension for Autodesk® Civil 3D® Plan



Project File: New.stm	Number of lines: 2	Date: 3/24/2022

Storm Sewer Tabulation

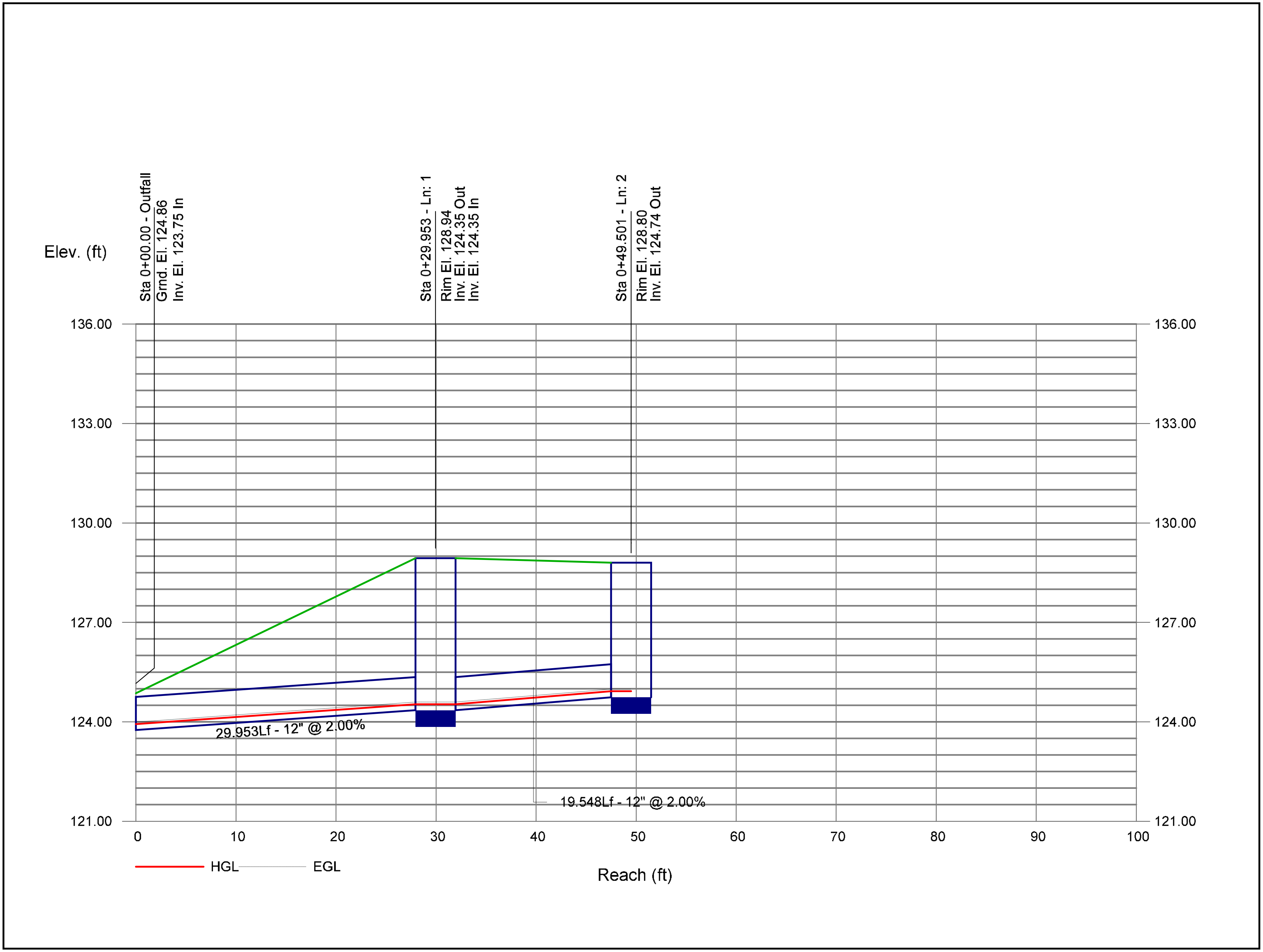
Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	29.953	0.00	0.02	0.00	0.00	0.02	0.0	6.2	10.1	0.20	5.46	2.02	12	2.00	123.75	124.35	123.93	124.53	124.86	128.94	DMH10 to INLET4
2	1	19.548	0.02	0.02	0.98	0.02	0.02	6.0	6.0	10.2	0.20	5.03	2.04	12	2.00	124.35	124.74	124.53	124.92	128.94	128.80	CB4 to DMH10

Project File: New.stm | Number of lines: 2 | Run Date: 3/24/2022

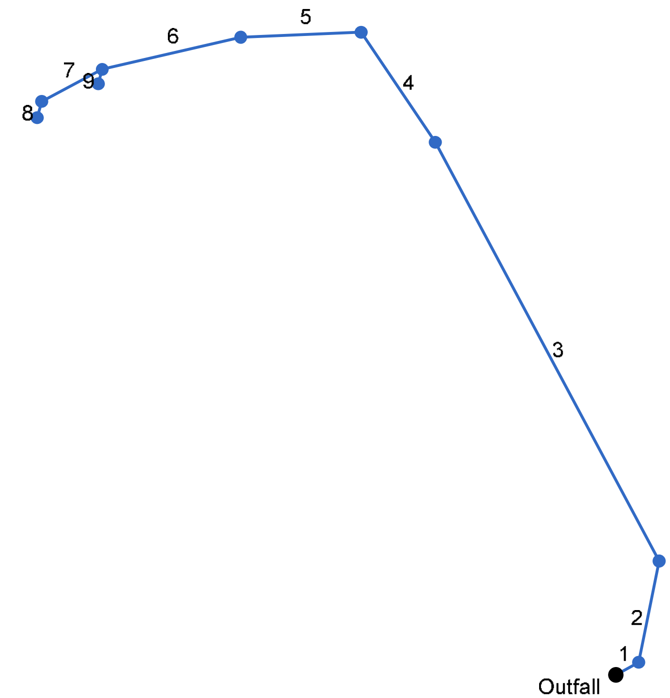
NOTES:Intensity = 49.45 / (Inlet time + 3.40) ^ 0.70; Return period =Yrs. 100 ; c = cir e = ellip b = box

Storm Sewer Profile

Proj. file: New.stm



Hydraflow Storm Sewers Extension for Autodesk® Civil 3D® Plan



Project File: #5 Drainage System.stm	Number of lines: 9	Date: 3/24/2022

Storm Sewer Tabulation

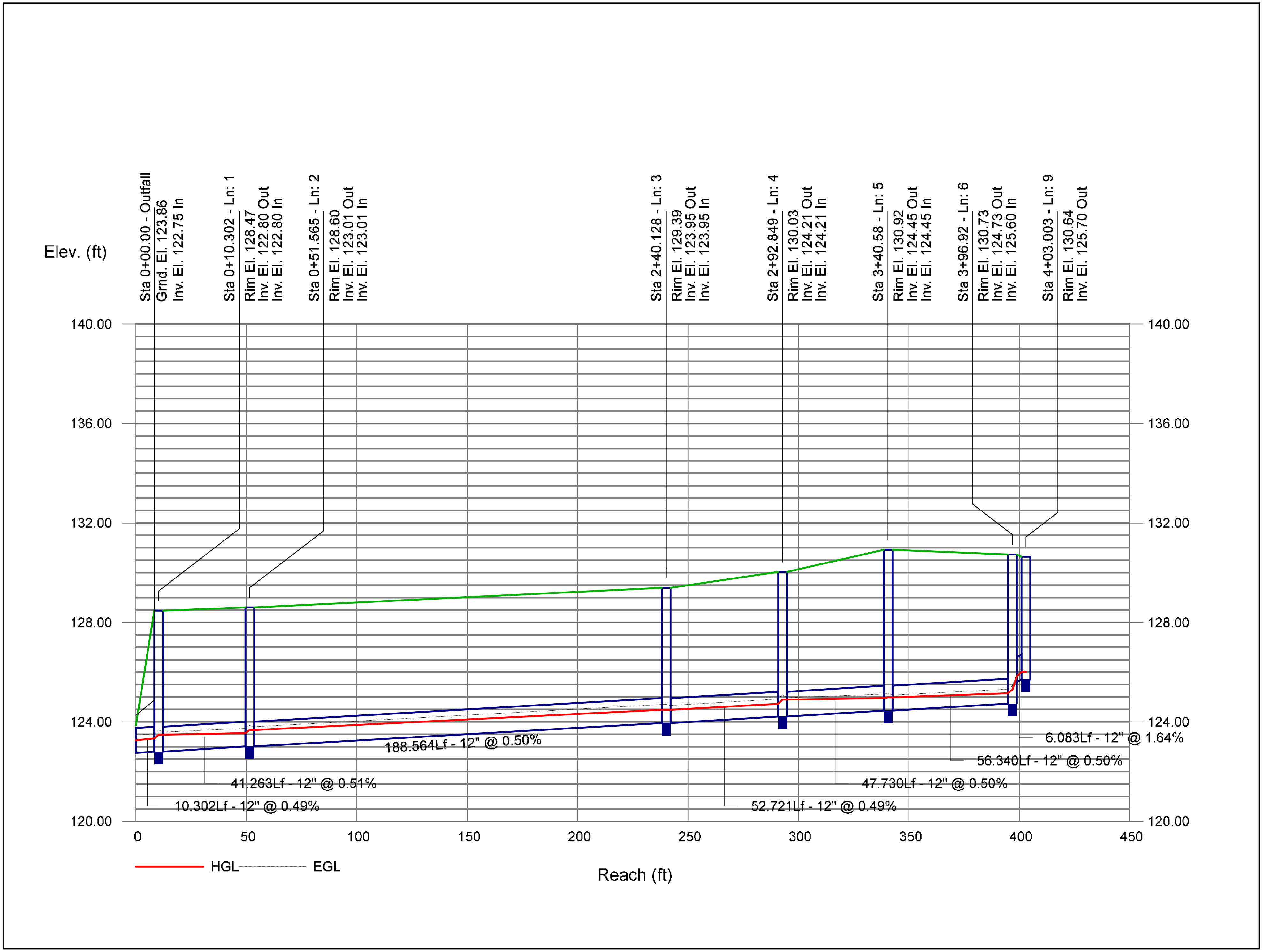
Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Dn	Up	Dn	Up	Dn	Up	
		(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
1	End	10.302	0.00	0.27	0.00	0.00	0.26	0.0	8.5	5.7	1.47	2.69	3.54	12	0.49	122.75	122.80	123.26	123.33	123.86	128.47	DMH18 to INLET5
2	1	41.263	0.00	0.27	0.00	0.00	0.26	0.0	8.2	5.8	1.49	2.75	3.05	12	0.51	122.80	123.01	123.48	123.54	128.47	128.60	DMH17 to DMH18
3	2	188.564	0.03	0.27	0.98	0.03	0.26	6.0	7.3	6.1	1.58	2.72	3.29	12	0.50	123.01	123.95	123.67	124.48	128.60	129.39	DMH16 to DMH17
4	3	52.721	0.03	0.24	0.98	0.03	0.23	6.0	7.0	6.2	1.43	2.71	3.46	12	0.49	123.95	124.21	124.48	124.72	129.39	130.03	DMH15 to DMH16
5	4	47.730	0.05	0.21	0.95	0.05	0.20	6.0	6.7	6.4	1.27	2.74	2.73	12	0.50	124.21	124.45	124.89	124.95	130.03	130.92	DMH14 to DMH15
6	5	56.340	0.00	0.16	0.00	0.00	0.15	0.0	6.4	6.5	1.01	2.51	2.76	12	0.50	124.45	124.73	124.99	125.15	130.92	130.73	DMH13 to DMH14
7	6	27.142	0.05	0.08	0.93	0.05	0.08	6.0	6.0	6.7	0.51	2.56	1.33	12	0.52	124.73	124.87	125.30	125.30	130.73	130.39	DMH12 to DMH13
8	7	6.721	0.03	0.03	0.98	0.03	0.03	6.0	6.0	6.7	0.20	4.34	2.41	12	1.49	125.85	125.95	126.00	126.13	130.39	130.29	CB5 to DMH12
9	6	6.083	0.08	0.08	0.98	0.08	0.08	6.0	6.0	6.7	0.53	4.57	3.26	12	1.64	125.60	125.70	125.83	126.00	130.73	130.64	CB6 to DMH13

Project File: #5 Drainage System.stm	Number of lines: 9	Run Date: 3/24/2022

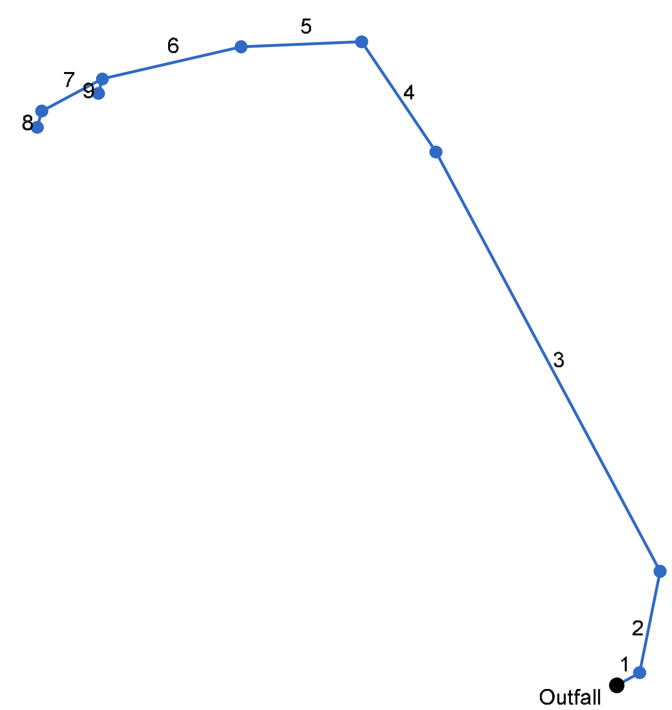
NOTES:Intensity = 32.47 / (Inlet time + 3.40) ^ 0.70; Return period =Yrs. 10 ; c = cir e = ellip b = box

Storm Sewer Profile

Proj. file: #5 Drainage System.stm



Hydraflow Storm Sewers Extension for Autodesk® Civil 3D® Plan



Project File: #5 Drainage System.stm	Number of lines: 9	Date: 3/24/2022

Storm Sewer Tabulation

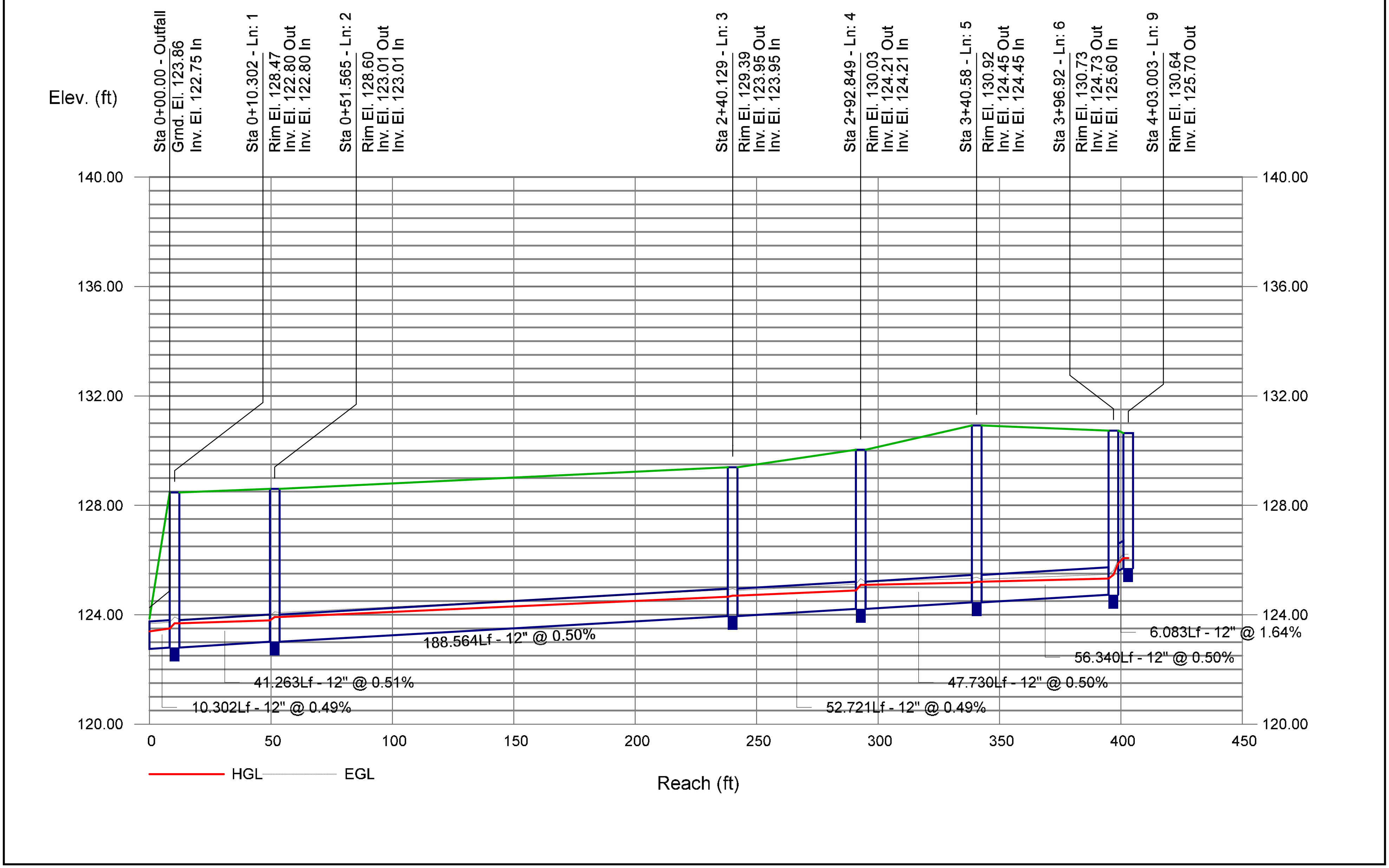
Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Dn	Up	Dn	Up	Dn	Up	
		(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
1	End	10.302	0.00	0.27	0.00	0.00	0.26	0.0	8.3	8.8	2.26	2.69	4.05	12	0.49	122.75	122.80	123.39	123.50	123.86	128.47	DMH18 to INLET5
2	1	41.263	0.00	0.27	0.00	0.00	0.26	0.0	8.1	8.9	2.28	2.75	3.29	12	0.51	122.80	123.01	123.68	123.79	128.47	128.60	DMH17 to DMH18
3	2	188.564	0.03	0.27	0.98	0.03	0.26	6.0	7.2	9.4	2.41	2.72	3.65	12	0.50	123.01	123.95	123.92	124.66	128.60	129.39	DMH16 to DMH17
4	3	52.721	0.03	0.24	0.98	0.03	0.23	6.0	7.0	9.5	2.18	2.71	3.67	12	0.49	123.95	124.21	124.70	124.89	129.39	130.03	DMH15 to DMH16
5	4	47.730	0.05	0.21	0.95	0.05	0.20	6.0	6.7	9.7	1.94	2.74	2.91	12	0.50	124.21	124.45	125.09	125.18	130.03	130.92	DMH14 to DMH15
6	5	56.340	0.00	0.16	0.00	0.00	0.15	0.0	6.4	9.9	1.53	2.51	2.76	12	0.50	124.45	124.73	125.21	125.33	130.92	130.73	DMH13 to DMH14
7	6	27.142	0.05	0.08	0.93	0.05	0.08	6.0	6.0	10.2	0.77	2.56	1.40	12	0.52	124.73	124.87	125.47	125.47	130.73	130.39	DMH12 to DMH13
8	7	6.721	0.03	0.03	0.98	0.03	0.03	6.0	6.0	10.2	0.30	4.34	2.71	12	1.49	125.85	125.95	126.03	126.18	130.39	130.29	CB5 to DMH12
9	6	6.083	0.08	0.08	0.98	0.08	0.08	6.0	6.0	10.2	0.80	4.57	3.68	12	1.64	125.60	125.70	125.88	126.07	130.73	130.64	CB6 to DMH13

Project File: #5 Drainage System.stm | Number of lines: 9 | Run Date: 3/24/2022

NOTES:Intensity = 49.45 / (Inlet time + 3.40) ^ 0.70; Return period =Yrs. 100 ; c = cir e = ellip b = box

Storm Sewer Profile

Proj. file: #5 Drainage System.stm



SECTION 8 – DRAFT SWPPP

(INCLUDED UNDER SEPARATE COVER)

DRAFT Stormwater Pollution Prevention Plan (SWPPP)

For Construction Activities At:

Herb Chambers Mercedes of Sudbury
141 Boston Post Road
Sudbury, MA 01776

SWPPP Prepared For:

Contractor TBD

SWPPP Prepared By:

Crocker Design Group, LLC.
Gabe Crocker, P.E.
2 Sharp Street, Unit B
Hingham, MA 02043
781-919-0808

SWPPP Preparation Date:

11/08/2021

Estimated Project Dates:

Project Start Date: April/May 2022

Project Completion Date: November/December 2022

Contents

SECTION 1: CONTACT INFORMATION/RESPONSIBLE PARTIES

1.1 Operator(s) / Subcontractor(s)

Instructions (see definition of "operator" at CGP Part 1.1.1):

- Identify the operator(s) who will be engaged in construction activities at the site. Indicate respective responsibilities, where appropriate. Also include the 24-hour emergency contact.
- List subcontractors expected to work on-site. Notify subcontractors of stormwater requirements applicable to their work.
- Consider using Subcontractor Agreements such as the type included as a sample in Appendix G of the Template.

Operator(s):

TBD

Subcontractor(s):

TBD

[Repeat as necessary.]

Emergency 24-Hour Contact:

TBD

1.2 Stormwater Team

Instructions (see CGP Part 7.2.2):

- Identify the individuals (by name or position) that are part of the project's stormwater team, their individual responsibilities, and which members are responsible for inspections. At a minimum the stormwater team is comprised of individuals who are responsible for overseeing the development of the SWPPP, any later modifications to it, and for compliance with the permit requirements (i.e., installing and maintaining stormwater controls, conducting site inspections, and taking corrective actions where required).
- Each member of the stormwater team must have ready access to either an electronic or paper copy of applicable portions of the 2017 CGP and the SWPPP.

Stormwater Team		
Name and/or position, and contact	Responsibilities	I Have Read the CGP and Understand the Applicable Requirements
Gabe Crocker, Crocker Design Group Principal 781-919-0808 gabecrocker@crockerdesigngroup.com	SWPPP Preparer	☒ Yes Date: 11/5/2021
	Personnel Responsible for Installation & Maintenance of Stormwater BMPs	☐ Yes Date: Click here to enter a date.
Gabe Crocker, Crocker Design Group	Inspection Personnel	☒ Yes Date: 11/5/2021
	Personnel Responsible for Taking Corrective Action	☐ Yes Date: Click here to enter a date.

SECTION 2: SITE EVALUATION, ASSESSMENT, AND PLANNING

2.1 Project/Site Information

Instructions (see "Project/Site Information" section of Appendix J – NOI form):

– In this section, you are asked to compile basic site information that will be helpful when you file your NOI.

Project Name and Address

Project/Site Name: Herb Chambers Mercedes of Sudbury
Project Street/Location: 141 Boston Post Road
City: Sudbury
State: MA
ZIP Code: 01776
County or Similar Subdivision: South Middlesex

Business days and hours for the project: M-F, 8AM-5PM

Project Latitude/Longitude

Latitude: 42.3623º N (decimal degrees)

Longitude: - -71.3961 º W (decimal degrees)

Latitude/longitude data source:

☐ Map ☐ GPS ☒ Other (please specify): _Google Earth___________________________

Horizontal Reference Datum:

☐ NAD 27 ☒ NAD 83 ☐ WGS 84

Additional Project Information

Are you requesting permit coverage as a "federal operator" as defined in Appendix A of the 2017 CGP? ☐ Yes ☒ No

Is the project/site located on Indian country lands, or located on a property of religious or cultural significance to an Indian tribe? ☐ Yes ☒ No

If yes, provide the name of the Indian tribe associated with the area of Indian country (including the name of Indian reservation if applicable), or if not in Indian country, provide the name of the Indian tribe associated with the property: Insert Text Here

If you are conducting earth-disturbing activities in response to a public emergency, document the cause of the public emergency *(e.g., natural disaster, extreme flooding conditions)*, information substantiating its occurrence *(e.g., state disaster declaration)*, and a description of the construction necessary to reestablish effective public services: N/A

2.2 Discharge Information

Instructions (see "Discharge Information" section of Appendix J – NOI form):

- In this section, include information relating to your site's discharge. This information corresponds to the "Discharge Information" section of the NOI form.
- List all of the stormwater points of discharge from your site. Identify each point of discharge with a unique 3-digit ID (e.g., 001, 002).
- For each unique point of discharge you list, specify the name of the first water of the U.S. that receives stormwater directly from the point of discharge and/or from the MS4 that the point of discharge discharges to. You may have multiple points of discharge that discharge to the same receiving water.
- Next, specify whether any waters of the U.S. that you discharge to are listed as "impaired" as defined in Appendix A, and the pollutants causing the impairment. Identify any Total Maximum Daily Loads (TMDL) that have been completed for any of the waters of the U.S. that you discharge to and the pollutants for which there is a TMDL. For more information on impaired waters and TMDLs, including a list of TMDL contacts and links by state, visit https://www.epa.gov/tmdl.
- Finally, indicate whether any water of the U.S. that you discharge to is designated as a Tier 2, Tier 2.5, or Tier 3 water and if so, what the designation is (2, 2.5, or 3). A list of Tier 2, 2.5, and 3 waters is provided in Appendix F.

Does your project/site discharge stormwater into a Municipal Separate Storm Sewer System (MS4)?	☒ Yes	☐ No
Are there any waters of the U.S. within 50 feet of your project's earth disturbances?	☒ Yes	☒ No

For each point of discharge, provide a point of discharge ID (a unique 3-digit ID, e.g., 001, 002), the name of the first water of the U.S. that receives stormwater directly from the point of discharge and/or from the MS4 that the point of discharge discharges to, and the following receiving water information, if applicable:								
Point of Discharge ID	Name of receiving water:	Is the receiving water impaired (on the CWA 303(d) list)?	If yes, list the pollutants that are causing the impairment:	Has a TMDL been completed for this receiving waterbody?	If yes, list TMDL Name and ID:	Pollutant(s) for which there is a TMDL:	Is this receiving water designated as a Tier 2, Tier 2.5, or Tier 3 water?	If yes, specify which Tier (2, 2.5, or 3)?
[001]	Wash Brook	☒ Yes ☐ No	Mercury in Fish Tissue	☐ Yes ☒ No			☒ Yes ☐ No	Tier 2

[Include additional rows or delete as necessary.]

2.3 Nature of the Construction Activities

Instructions (see CGP Parts 1.2.1.c and 7.2.3):

- Provide a general description of the nature of the construction activities at your site.
- Describe the size of the property (in acres or in miles if a linear construction site), the total area expected to be disturbed by the construction activities (to the nearest quarter acre or quarter mile if a linear construction site), and the maximum area expected to be disturbed at any one time.
- Indicate the type of construction site, whether there will be certain demolition activities, and whether the predevelopment land use was for agriculture.
- Provide a list and description of all pollutant-generating activities (e.g., paving operations; concrete, paint, and stucco washout and waste disposal; solid waste storage and disposal; and dewatering operations) and indicate for each activity the type of pollutant that will be generated (e.g., sediment, fertilizers, pesticides, paints, caulks, sealants, fluorescent light ballasts, contaminated substrates, solvents, fuels) and could be discharged in stormwater from your site.
- Describe the construction support activities covered by this permit (see Part 1.2.1.c of the permit).

General Description of Project

Provide a general description of the nature of your construction activities, including the age dates of past renovations for structures that are undergoing demolition:

Herb Chambers proposes to renovate and convert the existing two-story gymnasium building into a dealership building (7,190SF footprint with small mezzanine) for the sales and display of new vehicles as well as vehicle maintenance. Site renovations also include reconfigured parking for employees, customers and vehicle storage as well as upgrades to stormwater treatment and utilities.

Size of Construction Site

Size of Property	15.67 acres
Total Area Expected to be Disturbed by Construction Activities	5.94 acres
Maximum Area Expected to be Disturbed at Any One Time	5.94 acres

[Repeat as necessary for individual project phases.]

Type of Construction Site *(check all that apply):*

☐ Single-Family Residential ☐ Multi-Family Residential ☒ Commercial ☐ Industrial
☐ Institutional ☐ Highway or Road ☐ Utility ☐ Other ______________________

Will there be demolition of any structure built or renovated before January 1, 1980? ☐ Yes ☒ No

If yes, do any of the structures being demolished have at least 10,000 square feet of floor space?	☐ Yes ☒ No ☐ N/A
Was the pre-development land use used for agriculture (see Appendix A for definition of "agricultural land")?	☐ Yes ☒ No

Pollutant-Generating Activities

List and describe all pollutant-generating activities and indicate for each activity the type of pollutant that will be generated. Take into account where potential spills and leaks could occur that contribute pollutants to stormwater discharges, and any known hazardous or toxic substances, such as PCBs and asbestos, that will be disturbed during construction.

Pollutant-Generating Activity (e.g., paving operations; concrete, paint, and stucco washout and waste disposal; solid waste storage and disposal; and dewatering operations)	**Pollutants or Pollutant Constituents** (e.g., sediment, fertilizers, pesticides, paints, caulks, sealants, fluorescent light ballasts, contaminated substrates, solvents, fuels)
Paving Operations	Hot Mix Asphalt
Dewatering Operations	Silt
Heavy Equipment Use	Diesel Fuel and Lubricant Products
Concrete Washout	Concrete Residue
Concrete Curing Materials	Chemical Solvents
Concrete Form Oil	Oil Mixture

Construction Support Activities *(only provide if applicable)*

Describe any construction support activities for the project (e.g., concrete or asphalt batch plants, equipment staging yards, material storage areas, excavated material disposal areas, borrow areas):

Contact information for construction support activity:

2.4 Sequence and Estimated Dates of Construction Activities

Instructions (see CGP Part 7.2.5):

- Describe the intended construction sequence and duration of major activities.
- For each portion or phase of the construction site, include the following:
  - ✓ Commencement and duration of construction activities, including clearing and grubbing, mass grading, demolition activities, site preparation (i.e., excavating, cutting and filling), final grading, and creation of soil and vegetation stockpiles requiring stabilization;
  - ✓ Temporary or permanent cessation of construction activities;
  - ✓ Temporary or final stabilization of areas of exposed soil. The dates for stabilization must reflect the applicable deadlines to which you are subject to in Part 2.2.14; and
  - ✓ Removal of temporary stormwater controls and construction equipment or vehicles, and cessation of any pollutant-generating activities.
- The construction sequence must reflect the following requirements:
  - ✓ Part 2.1.3 (installation of stormwater controls); and
  - ✓ Parts 2.2.14 (stabilization deadlines).

Phase I

Before any site grading activities begin	
Estimated Start Date of Construction Activities for this Phase	4/15/2022
Estimated End Date of Construction Activities for this Phase	4/27/2022
Estimated Date(s) of Application of Stabilization Measures for Areas of the Site Required to be Stabilized*	9/30/2022
Estimated Date(s) when Stormwater Controls will be Removed	5/15/2023

**Suitable growing period for permanent seeding shall be between April 15-November 15, but could be extended with engineer's approval*

Phase II

Site Grading	
Estimated Start Date of Construction Activities for this Phase	5/10/2022
Estimated End Date of Construction Activities for this Phase	9/1/2022
Estimated Date(s) of Application of Stabilization Measures for Areas of the Site Required to be Stabilized*	9/30/2022
Estimated Date(s) when Stormwater Controls will be Removed	5/15/2023

**Suitable growing period for permanent seeding shall be between April 15-November 15, but could be extended with engineer's approval*

Phase III

Parking Lot/Site Drainage Construction	
Estimated Start Date of Construction Activities for this Phase	6/21/2022
Estimated End Date of Construction Activities for this Phase	9/15/2022

Estimated Date(s) of Application of Stabilization Measures for Areas of the Site Required to be Stabilized	9/30/2022
Estimated Date(s) when Stormwater Controls will be Removed	5/15/2023

[Repeat as needed.]

2.5 Authorized Non-Stormwater Discharges

Instructions (see CGP Parts 1.2.2 and 7.2.5):

– Identify all authorized sources of non-stormwater discharges. The authorized non-stormwater discharges identified in Part 1.2.2 of the 2017 CGP include:
  - ✓ Discharges from emergency fire-fighting activities;
  - ✓ Fire hydrant flushings;
  - ✓ Landscape irrigation;
  - ✓ Waters used to wash vehicles and equipment, provided that there is no discharge of soaps, solvents, or detergents used for such purposes;
  - ✓ Water used to control dust;
  - ✓ Potable water including uncontaminated water line flushings;
  - ✓ External building washdown, provided soaps, solvents and detergents are not used, and external surfaces do not contain hazardous substances (e.g., paint or caulk containing PCBs);
  - ✓ Pavement wash waters provided spills or leaks of toxic or hazardous materials have not occurred (unless all spilled material has been removed) and detergents are not used. You are prohibited from directing pavement wash waters directly into any water of the U.S., storm drain inlet, or stormwater conveyance, unless the conveyance is connected to a sediment basin, sediment trap, or similarly effective control;
  - ✓ Uncontaminated air conditioning or compressor condensate;
  - ✓ Uncontaminated, non-turbid discharges of ground water or spring water;
  - ✓ Foundation or footing drains where flows are not contaminated with process materials such as solvents or contaminated ground water; and
  - ✓ Construction dewatering water discharged in accordance with Part 2.4.

List of Authorized Non-Stormwater Discharges Present at the Site

Type of Authorized Non-Stormwater Discharge	**Likely to be Present at Your Site?**
Discharges from emergency fire-fighting activities	☐ Yes ☒ No
Fire hydrant flushing	☒ Yes ☐ No
Landscape irrigation	☒ Yes ☐ No

Waters used to wash vehicles and equipment	☐ Yes ☒ No
Water used to control dust	☒ Yes ☐ No
Potable water including uncontaminated water line flushing	☒ Yes ☐ No
External building washdown (soaps/solvents are not used and external surfaces do not contain hazardous substances)	☐ Yes ☒ No
Pavement wash waters	☐ Yes ☒ No
Uncontaminated air conditioning or compressor condensate	☐ Yes ☒ No
Uncontaminated, non-turbid discharges of ground water or spring water	☐ Yes ☒ No
Foundation or footing drains	☐ Yes ☒ No
Construction dewatering water	☒ Yes ☐ No

(Note: You are required to identify the likely locations of these authorized non-stormwater discharges on your site map. See Section 2.6, below, of the SWPPP Template.)

Notes:

Depending on timing of potable water main and fire hydrant flushing, it is assumed the clean, clear water may be discharged to the completed underground drainage system provided the flows are properly controlled and the system is ready to accept the flow. If not, the flow will be controlled through localized control measures including dewatering basins on site as needed.

Construction dewatering activities, expected to be minimal given current groundwater conditions and time of year of excavation activities, are to be addressed via localized control measures including dewatering sumps. Sumps shall be excavated adjacent to area requiring dewatering. Sumps will be lined with washed, crushed stone. Insert perforated pipe in crushed stone. Place 2” dewatering pump within the perforated pipe. Discharge to silt bag filter placed in the recharge area. Depth of sump shall be less than width.

Water used to control dust is not anticipated to produce a “discharge.” Care shall be taken to prevent “over-watering” of the site.

2.6 Site Maps

Instructions (see CGP Part 7.2.4):

- Attach site maps in Appendix A of the Template. For most projects, a series of site maps is necessary and recommended. The first should show the undeveloped site and its current features. An additional map or maps should be created to show the developed site or, for more complicated sites, show the major phases of development.

These maps must include the following features:

- Boundaries of the property and of the locations where construction will occur, including:
  - ✓ Locations where earth-disturbing activities will occur, noting any phasing of construction activities and any demolition activities;
  - ✓ Approximate slopes before and after major grading activities. Note areas of steep slopes, as defined in CGP Appendix A;
  - ✓ Locations where sediment, soil, or other construction materials will be stockpiled;
  - ✓ Locations of any crossings of waters of the U.S.;
  - ✓ Designated points where vehicles will exit onto paved roads;
  - ✓ Locations of structures and other impervious surfaces upon completion of construction; and
  - ✓ Locations of on-site and off-site construction support activity areas covered by this permit (see Part 1.2.1.c).
- Locations of all waters of the U.S., including wetlands, on your site and within one mile downstream of the site's discharge point. Indicate which waterbodies are listed as impaired, and which are identified by your state, tribe, or EPA as Tier 2, Tier 2.5, or Tier 3 waters.
- Areas of federally-listed critical habitat for endangered or threatened species within the site and/or at discharge locations.
- Type and extent of pre-construction cover on the site (e.g., vegetative cover, forest, pasture, pavement, structures)
- Drainage pattern(s) of stormwater and authorized non-stormwater before and after major grading activities.
- Stormwater and authorized non-stormwater discharge locations, including:
  - ✓ Locations where stormwater and/or authorized non-stormwater will be discharged to storm drain inlets; and
  - ✓ Locations where stormwater or allowable non-stormwater will be discharged to waters of the U.S. (including wetlands).
- Locations of all potential pollutant-generating activities.
- Locations of stormwater controls, including natural buffer areas and any shared controls utilized to comply with the permit.
- Locations where polymers, flocculants, or other treatment chemicals will be used and stored.

SECTION 3: DOCUMENTATION OF COMPLIANCE WITH OTHER FEDERAL REQUIREMENTS

3.1 Endangered Species Protection

Instructions (see CGP Parts 1.1.5, 7.2.9.a, Appendix D, and the "Endangered Species Protection" section of the Appendix J – NOI form):

Using the instructions in Appendix D of the permit, determine under which criterion listed below (A-F) you are eligible for coverage under this permit with respect to the protection of endangered species. To make this determination, you must use information from **BOTH** the National Marine Fisheries Service (NMFS) and U.S. Fish and Wildlife Service (USFWS). Both the NMFS and USFWS maintain lists of Endangered Species Act-listed (ESA-listed) species and designated critical habitat. Operators must consult both when determining their eligibility.

– Check only 1 box, include the required information and provide a sound basis for supporting the criterion selected. Select the most conservative criterion that applies
– Include documentation supporting your determination of eligibility.
– A step-by-step guide and flow-chart on ESA provisions for EPA's CGP is available at https://www.epa.gov/npdes/stormwater-discharges-construction-activities#species

Eligibility Criterion

Under which criterion listed in Appendix D are you eligible for coverage under this permit?

☒ **Criterion A**: No ESA-listed species and/or designated critical habitat present in action area. Using the process outlined in Appendix D of this permit, you certify that ESA-listed species and designated critical habitat(s) under the jurisdiction of the USFWS or NMFS are not likely to occur in your site's "action area" as defined in Appendix A of this permit.

Basis statement content/Supporting documentation: A basis statement supporting the selection of Criterion A should identify the USFWS and NMFS information sources used. Attaching aerial image(s) of the site to your NOI is helpful to EPA, USFWS, and NMFS in confirming eligibility under this criterion. Please Note: NMFS' jurisdiction includes ESA-listed marine and estuarine species that spawn in inland rivers. Check the applicable source(s) of information you relied upon:

☒ Specific communication with staff of the USFWS and/or NMFS.

The U.S. Fish and Wildlife Service's IPaC tool indicates that the site could potentially impact the Northern Long-eared Bat and the Monarch Butterfly. This species is tracked at a state level by the Massachusetts's Natural Heritage and Endangered Species Program.

The MASSGIS NHESP Priority Habitat of Rare Species Layer, Updated August 1, 2021 indicates that a priority habitat of rare species is located within the project property, however, no work is proposed within the Priority Habitat.

The NHESP Northern Long-eared Bat Locations in Massachusetts map, last updated June, 2019 was reviewed. It was determined that the Project does not occur within 0.25 miles of a known winter hibernacula or within a 150-foot radius of a known maternity roost tree. Therefore, no further review of potential impacts to Northern Long-eared Bat is required pursuant to the MESA.

☐ Species list from USFWS and/or NMFS. See the CGP ESA webpage, Step 2 for available websites. INSERT SPECIFIC DOCUMENT AND/OR WEBSITE RELIED UPON

☐ **Criterion B:** Eligibility requirements met by another operator under the 2017 CGP. The construction site's discharges and discharge-related activities were already addressed in another operator's valid certification of eligibility for your "action area" under eligibility Criterion A, C, D, E, or F of the 2017 CGP and you have confirmed that no additional ESA-listed species and/or designated critical habitat under the jurisdiction of USFWS and/or NMFS not considered in the that certification may be present or located in the "action area." To certify your eligibility under this criterion, there must be no lapse of NPDES permit coverage in the other CGP operator's certification. By certifying eligibility under this criterion, you agree to comply with any conditions upon which the other CGP operator's certification was based. You must include in your NOI the NPDES ID from the other 2017CGP operator's notification of authorization under this permit. If your certification is based on another 2017 CGP operator's certification under criterion C, you must provide EPA with the relevant supporting information required of existing dischargers in criterion C in your NOI form.

Basis statement content/Supporting documentation: A basis statement supporting the selection of Criterion B should identify the eligibility criterion of the other CGP NOI, the authorization date, and confirmation that the authorization is effective.

- ✓ Provide the 9-digit NPDES ID number from the other operator's NOI under the 2017 CGP: __ __ __ __ __ __ __ __ __
- ✓ Authorization date of the other 2017 CGP operator: INSERT AUTHORIZATION DATE OF OTHER OPERATOR
- ✓ Eligibility criterion of the other 2017 CGP operator: ☐A ☐C ☐D ☐E ☐F
- ✓ Provide a brief summary of the basis the other operator used for selecting criterion A, C, D, E, or F: INSERT TEXT HERE

☐ **Criterion C:** Discharges not likely to adversely affect ESA-listed species and/or designated critical habitat. ESA-listed species and/or designated critical habitat(s) under the jurisdiction of the USFWS and/or NMFS are likely to occur in or near your site's "action area," and you certify to EPA that your site's discharges and discharge-related activities are not likely to adversely affect ESA-listed threatened or endangered species and/or designated critical habitat. This certification may include consideration of any stormwater controls and/or management practices you will adopt to ensure that your discharges and discharge-related activities are not likely to adversely affect ESA-listed species and/or designated critical habitat. To certify your eligibility under this criterion, indicate 1) the ESA-listed species and/or designated habitat located in your "action area" using the process outlined in Appendix D of this permit; 2) the distance between the site and the listed species and/or designated critical habitat in the action area (in miles); and 3) a rationale describing specifically how adverse effects to ESA-listed species will be avoided from the discharges and discharge-related activities. You must also include a copy of your site map from your SWPPP showing the upland and in-water extent of your "action area" with this NOI.

Basis statement content/Supporting documentation: A basis statement supporting the selection of Criterion C should identify the information resources and expertise (e.g., state or federal biologists) used to arrive at this conclusion. Any supporting documentation should explicitly state that both ESA-listed species and designated critical habitat under the jurisdiction of the USFWS and/or NMFS were considered in the evaluation.

- ✓ Resources used to make determination: INSERT RESOURCES YOU USED TO DETERMINE THAT DISCHARGES ARE NOT LIKELY TO ADVERSELY AFFECT ESA-LISTED SPECIES OR DESIGNATED CRITICAL HABITAT
- ✓ ESA-listed Species/Critical Habitat in action area: INSERT LIST OF ESA-LISTED SPECIES OR DESIGNATED CRITICAL HABITAT LOCATED IN YOUR ACTION AREA
- ✓ Distance between site and ESA-listed Species/Critical Habitat: INSERT DISTANCE BETWEEN YOUR SITE AND THE ESA-LISTED SPECIES OR CRITICAL HABITAT (in miles)
- ✓ How adverse effects will be avoided: DESCRIBE SPECIFICALLY HOW ADVERSE EFFECTS TO ESA-LISTED SPECIES WILL BE AVOIDED FROM THE DISCHARGES AND DISCHARGE-RELATED ACTIVITIES

☐ **Criterion D**: Coordination with USFWS and/or NMFS has successfully concluded.
Coordination between you and the USFWS and/or NMFS has concluded. The coordination must have addressed the effects of your site's discharges and discharge-related activities on ESA-listed species and/or designated critical habitat under the jurisdiction of USFWS and/or NMFS, and resulted in a written concurrence from USFWS and/or NMFS that your site's discharges and discharge-related activities are not likely to adversely affect listed species and/or critical habitat. You must include copies of the correspondence with the participating agencies in your SWPPP and this NOI.

Basis statement content/Supporting documentation: A basis statement supporting the selection of Criterion D should identify whether USFWS or NMFS or both agencies participated in coordination, the field office/regional office(s) providing that coordination, and the date that coordination concluded.

- ✓ Agency coordinated with: ☐USFWS ☐ NMFS
- ✓ Field/regional office(s) providing coordination: INSERT FIELD/REGIONAL OFFICE(S) PROVIDING COORDINATION
- ✓ Date coordination concluded: INSERT DATE COORDINATION CONCLUDED
- ✓ Attach copies of any letters or other communication between you and the U.S. Fish & Wildlife Service or National Marine Fisheries Service concluding coordination activities.

☐ **Criterion E:** ESA Section 7 consultation has successfully concluded. Consultation between a Federal Agency and the USFWS and/or NMFS under section 7 of the ESA has concluded. The consultation must have addressed the effects of the construction site's discharges and discharge-related activities on ESA-listed species and/or designated critical habitat under the jurisdiction of USFWS and/or NMFS. To certify eligibility under this criterion, Indicate the result of the consultation:

☐ Biological opinion from USFWS and/or NMFS that concludes that the action in question (taking into account the effects of your site's discharges and discharge-related activities) is not likely to jeopardize the continued existence of listed species, nor the destruction or adverse modification of critical habitat; or

☐ Written concurrence from USFWS and/or NMFS with a finding that the site's discharges and discharge-related activities are not likely to adversely affect ESA-listed species and/or designated critical habitat. You must include copies of the correspondence between yourself and the USFWS and/or NMFS in your SWPPP and this NOI.

Basis statement content/Supporting documentation: A basis statement supporting the selection of Criterion E should identify the federal action agency(ies) involved, the field office/regional office(s) providing that consultation, any tracking numbers of identifiers associated with that consultation (e.g., IPaC number, PCTS number), and the date the consultation was completed.

- ✓ Federal agency(ies) involved: INSERT FEDERAL AGENCY(IES) INVOLVED
- ✓ Field/regional office(s) providing consultation: INSERT FIELD/REGIONAL OFFICE(S) PROVIDING CONSULTATION
- ✓ Tracking numbers associated with consultation: INSERT CONSULTATION TRACKING NUMBER(S)
- ✓ Date consultation completed: INSERT DATE CONSULTATION COMPLETED
- ✓ Attach copies of any letters or other communication between you and the U.S. Fish & Wildlife Service or National Marine Fisheries Service concluding consultation.

☐ **Criterion F:** Issuance of section 10 permit. Potential take is authorized through the issuance of a permit under section 10 of the ESA by the USFWS and/or NMFS, and this authorization addresses the effects of the site's discharges and discharge-related activities on ESA-listed species and designated critical habitat. You must include copies of the correspondence between yourself and the participating agencies in your SWPPP and your NOI.

Basis statement content/Supporting documentation: A basis statement supporting the selection of Criterion F should identify whether USFWS or NMFS or both agencies provided a section 10 permit, the field office/regional office(s) providing permit(s), any tracking numbers of identifiers associated with that consultation (e.g., IPaC number, PCTS number), and the date the permit was granted.

- ✓ Agency providing section 10 permit: ☐USFWS ☐NMFS
- ✓ Field/regional office(s) providing permit: INSERT FIELD/REGIONAL OFFICE(S) PROVIDING PERMIT
- ✓ Tracking numbers associated with consultation: INSERT CONSULTATION TRACKING NUMBER(S)
- ✓ Date permit granted: INSERT DATE PERMIT GRANTED
- ✓ Attach copies of any letters or other communication between you and the U.S. Fish & Wildlife Service or National Marine Fisheries Service.

3.2 Historic Preservation

Instructions (see CGP Part 1.1.6, 7.2.9.b, Appendix E, and the "Historic Preservation" section of the Appendix J – NOI form):

Follow the screening process in Appendix E of the permit for determining whether your installation of subsurface earth-disturbing stormwater controls will have an effect on historic properties.

– Include documentation supporting your determination of eligibility.

– To contact your applicable state or tribal historic preservation office, information is available at *www.achp.gov/programs/html*.

Appendix E, Step 1

Do you plan on installing any of the following stormwater controls at your site? Check all that apply below, and proceed to Appendix E, Step 2.

☐ Dike

☐ Berm

☒ Catch Basin

☐ Pond

☒ Stormwater Conveyance Channel (e.g., ditch, trench, perimeter drain, swale, etc.)

☐ Culvert

☒ Other type of ground-disturbing stormwater control: underground infiltration chambers, permeable pavement

(Note: If you will not be installing any ground-disturbing stormwater controls, no further documentation is required for Section 3.2 of the Template.)

Appendix E, Step 2

If you answered yes in Step 1, have prior surveys or evaluations conducted on the site already determined that historic properties do not exist, or that prior disturbances at the site have precluded the existence of historic properties? ☐ YES ☒ NO

- If yes, no further documentation is required for Section 3.2 of the Template.
- If no, proceed to Appendix E, Step 3.

Appendix E, Step 3

If you answered no in Step 2, have you determined that your installation of subsurface earth-disturbing stormwater controls will have no effect on historic properties? ☒ YES ☐ NO

If yes, provide documentation of the basis for your determination. See attached results from the Massachusetts Cultural Resource Information System that indicates there are no historical areas, buildings, burial grounds, objects or structures.

If no, proceed to Appendix E, Step 4.

Appendix E, Step 4

If you answered no in Step 3, did the State Historic Preservation Officer (SHPO), Tribal Historic Preservation Office (THPO), or other tribal representative (whichever applies) respond to you within 15 calendar days to indicate whether the subsurface earth disturbances caused by the installation of stormwater controls affect historic properties? ☐ YES ☐ NO

If no, no further documentation is required for Section 3.2 of the Template.

If yes, describe the nature of their response:

☐ Written indication that no historic properties will be affected by the installation of stormwater controls. INSERT COPIES OF LETTERS, EMAILS, OR OTHER COMMUNICATION BETWEEN YOU AND THE APPLICABLE SHPO, THPO, OR OTHER TRIBAL REPRESENTATIVE

☐ Written indication that adverse effects to historic properties from the installation of stormwater controls can be mitigated by agreed upon actions. INSERT COPIES OF

LETTERS, EMAILS, OR OTHER COMMUNICATION BETWEEN YOU AND THE APPLICABLE SHPO, THPO, OR OTHER TRIBAL REPRESENTATIVE

☐ No agreement has been reached regarding measures to mitigate effects to historic properties from the installation of stormwater controls. INSERT COPIES OF LETTERS, EMAILS, OR OTHER COMMUNICATION BETWEEN YOU AND THE APPLICABLE SHPO, THPO, OR OTHER TRIBAL REPRESENTATIVE

☐ Other: INSERT COPIES OF LETTERS, EMAILS, OR OTHER COMMUNICATION BETWEEN YOU AND THE APPLICABLE SHPO, THPO, OR OTHER TRIBAL REPRESENTATIVE

3.3 Safe Drinking Water Act Underground Injection Control Requirements

Instructions (see CGP Part 7.2.9.c):

- If you will use any of the identified controls in this section, include documentation of contact between you and the applicable state agency or EPA Regional Office responsible for implementing the requirements for underground injection wells in the Safe Drinking Water Act and EPA's implementing regulations at 40 CFR Parts 144-147. \
- For state UIC program contacts, refer to the following EPA website: https://www.epa.gov/uic.

Do you plan to install any of the following controls? Check all that apply below.

☐ Infiltration trenches (if stormwater is directed to any bored, drilled, driven shaft or dug hole that is deeper than its widest surface dimension, or has a subsurface fluid distribution system)

☒ Commercially manufactured pre-cast or pre-built proprietary subsurface detention vaults, chambers, or other devices designed to capture and infiltrate stormwater flow

☐ Drywells, seepage pits, or improved sinkholes (if stormwater is directed to any bored, drilled, driven shaft or dug hole that is deeper than its widest surface dimension, or has a subsurface fluid distribution system)

There are no underground injection controls proposed on this project.

SECTION 4: EROSION AND SEDIMENT CONTROLS

General Instructions (See CGP Parts 2.2 and 7.2.6):

- Describe the erosion and sediment controls that will be installed and maintained at your site.
- Describe any applicable stormwater control design specifications (including references to any manufacturer specifications and/or erosion and sediment control manuals/ordinances relied upon).
- Describe any routine stormwater control maintenance specifications.
- Describe the projected schedule for stormwater control installation/implementation.

4.1 Natural Buffers or Equivalent Sediment Controls

Instructions (see CGP Parts 2.2.1 and 7.2.6.b.i, and Appendix G):

This section only applies to you if a water of the U.S. is located within 50 feet of your site's earth disturbances. If this is the case, consult CGP Part 2.2.1 and Appendix G for information on how to comply with the buffer requirements.

- Describe the compliance alternative (CGP Part 2.2.1.a.i, ii, or iii) that was chosen to meet the buffer requirements, and include any required documentation supporting the alternative selected. The compliance alternative selected must be maintained throughout the duration of permit coverage. However, if you select a different compliance alternative during your period of permit coverage, you must modify your SWPPP to reflect this change.
- If you qualify for one of the exceptions in CGP Part 2.2.1.b, include documentation related to your qualification for such exceptions.

Buffer Compliance Alternatives

Are there any waters of the U.S. within 50 feet of your project's earth disturbances? ☒ YES ☐ NO

(Note: If no, no further documentation is required for Part 4.1 in the SWPPP Template. Continue on to Part 4.2.)

Check the compliance alternative that you have chosen:

☐ (i) I will provide and maintain a 50-foot undisturbed natural buffer.

(Note (1): You must show the 50-foot boundary line of the natural buffer on your site map.)

(Note (2): You must show on your site map how all discharges from your construction disturbances through the natural buffer area will first be treated by the site's erosion and sediment controls. Also, show on the site map any velocity dissipation devices used to prevent erosion within the natural buffer area.)

☐ (ii) I will provide and maintain an undisturbed natural buffer that is less than 50 feet and is supplemented by additional erosion and sediment controls, which in combination achieves the sediment load reduction equivalent to a 50-foot undisturbed natural buffer.

(Note (1): You must show the boundary line of the natural buffer on your site map.)

(Note (2): You must show on your site map how all discharges from your construction disturbances through the natural buffer area will first be treated by the site's erosion and sediment controls. Also, show on the site map any velocity dissipation devices used to prevent erosion within the natural buffer area.)

☒ (iii) It is infeasible to provide and maintain an undisturbed natural buffer of any size, therefore I will implement erosion and sediment controls that achieve the sediment load reduction equivalent to a 50-foot undisturbed natural buffer.

☐ I qualify for one of the exceptions in Part 2.2.1.b. (If you have checked this box, provide information on the applicable buffer exception that applies, below.)

Buffer Exceptions

Which of the following exceptions to the buffer requirements applies to your site?

☐ There is no discharge of stormwater to the water of the U.S. that is located 50 feet from my construction disturbances.

(Note: If this exception applies, no further documentation is required for Section 4.1 of the Template.)

☐ No natural buffer exists due to preexisting development disturbances that occurred prior to the initiation of planning for this project.

(Note (1): If this exception applies, no further documentation is required for Section 4.1 of the Template.)

(Note (2): Where some natural buffer exists but portions of the area within 50 feet of the surface water are occupied by preexisting development disturbances, you must still comply with the one of the CGP Part 2.2.1.a compliance alternatives.)

☐ For a “linear construction sites” (defined in Appendix A), site constraints (e.g., limited right-of-way) make it infeasible to meet any of the CGP Part 2.2.1.a compliance alternatives.

☐ The project qualifies as “small residential lot” construction (defined in Appendix A) (see Appendix G, Part G.3.2).

☐ For Alternative 1:

☐ For Alternative 2:

☐ Buffer disturbances are authorized under a CWA Section 404 permit.

(Note (1): If this exception applies, no further documentation is required for Section 4.1 of the Template.)

(Note (2): This exception only applies to the limits of disturbance authorized under the Section 404 permit, and does not apply to any upland portion of the construction project.)

☐ Buffer disturbances will occur for the construction of a water-dependent structure or water access area (e.g., pier, boat ramp, and trail).

(Note (1): If this exception applies, no further documentation is required for Section 4.1 of the Template.)

4.2 Perimeter Controls

Instructions (see CGP Parts 2.2.3 and 7.2.6.b.ii):

- Describe sediment controls that will be used (e.g., silt fences, filter berms, temporary diversion dikes, or fiber rolls) to meet the Part 2.2.3 requirement to "install sediment controls along any perimeter areas of the site that will receive pollutant discharges."
- For linear projects, where you have determined that the use of perimeter controls in portions of the site is infeasible, document other practices that you will implement.

General

- Silt (mulch) sock and silt fence will be installed all perimeter areas of the site that could receive pollutant/sediment discharge. A double silt sock and no silt fence will be located

Specific Perimeter Controls

Silt Sock/Silt Fence	
Description: A 12-inch silt sock will be staked on alternating sides, embedded +/-3-inches into the ground, with a silt fence installed on the side of the silt sock closest to the project perimeter, or a double silt sock with no silt fence is proposed.	
Installation	TBD
Maintenance Requirements	Remove sediment before it has accumulated to one-half of the above ground height of any perimeter control. (Note: At a minimum, you must provide for maintenance that meets the following requirement in CGP 2.2.3.a:" Remove sediment before it has accumulated to one-half of the above-ground height of any perimeter control.")
Design Specifications	See attached site plans for specifications.

[Repeat as needed for individual perimeter controls.]

4.3 Sediment Track-Out

Instructions (see CGP Parts 2.2.4 and 7.2.6.b.iii):

- Describe stormwater controls that will be used to minimize sediment track-out.
- Describe location(s) of vehicle exit(s), procedures to remove accumulated sediment off-site (e.g., vehicle tracking), and stabilization practices (e.g., stone pads or wash racks or both) to minimize off-site vehicle tracking of sediment. Also include the design, installation, and maintenance specifications for each control.

General

- Construction traffic will be limited to one (1) designated entrance/exit point to public paved roads, and it shall have a gravel/stone tracking pad installed. See enclosed Sheet C-5 in Appendix A for locations and details. Construction entrances shall be built to slope to a sump area within the construction entrance.

Specific Track-Out Controls

Gravel/Stone Construction Entrance Tracking Pads

Description: Temporary gravel or crushed stone construction entrances/exits or other means shall be used to minimize off-site movement of soil with vehicles. Construction access points shall be maintained to minimize tracking of soil onto public roads and existing parking lots to remain. If the rock entrance is not working to keep streets clean, then install wheel wash, sweep streets, or wash streets if wash water can be collected.	
Installation	TBD
Maintenance Requirements	Stabilized construction entrances shall be inspected daily. Gravel or crushed stone shall be added if the pad is no longer in accordance with the specifications. If the rock entrance is not working to keep streets clean, then install wheel wash, sweep streets, or wash streets if wash water can be collected. When sediment has been tracked off of the site, it shall be removed by the end of the same working day, or by the end of the next working day if track-out occurs on a non-workday. Remove sediment by sweeping, shoveling or vacuuming roadways where sediment has been tracked-out.
Design Specifications	See attached site plan for specifications.

[Repeat as needed for individual track-out controls.]

4.4 Stockpiled Sediment or Soil

Instructions (see CGP Parts 2.2.5 and 7.2.6):

– Describe stormwater controls and other measures you will take to minimize the discharge of sediment or soil particles from stockpiled sediment or soil. Include a description of structural practices (e.g., diversions, berms, ditches, storage basins), including design, installation, and maintenance specifications, used to divert flows from stockpiled sediment or soil, retain or detain flows, or otherwise limit exposure and the discharge of pollutants from stockpiled sediment or soil.
– For piles that will be unused for 14 or more days, describe what cover or other appropriate temporary stabilization will be used.
– Also, describe any controls or procedures used to minimize exposure resulting from adding to or removing materials from the pile.

General

- Piles will be located outside of any natural buffers and away from any stormwater conveyances, drain inlets, future infiltration locations and areas where stormwater flow is concentrated. Material stockpile locations are noted on the attached site plans. Stockpiling of sediment is not anticipated, but the SWPPP will be updated accordingly if the situation is need/arises to store these materials on site.
- Material stockpiling on the site will be minimized by the contractor to the extent practicable.
- See sheet C-5 in Appendix A for potential stockpile locations.

Specific Stockpile Controls

Entrenched Silt Fence Barrier	
Description: Entrenched Silt Fence Barrier	
Installation	TBD

Maintenance Requirements	The silt fence and temporary erosion controls shall be installed immediately after the stockpile has been established. For piles that will be unused for 14 or more days, provide cover over the stockpile or temporary stabilization to avoid direct contract with precipitation and wind. Install a sediment barrier along all downgradient perimeter areas of stockpiles. You are prohibited from hosing down or sweeping soil or sediment accumulated on pavement or other impervious surfaces into any stormwater conveyance, storm drain inlet, or water of the U.S.
Design Specifications	See attached site plan for specifications.

[Repeat as needed for individual stockpile controls.]

4.5 Minimize Dust

Instructions (see CGP Parts 2.2.6 and 7.2.6):

Describe controls and procedures you will use at your site to minimize the generation of dust.

General

- Dust from the site shall be controlled by using a mobile pressure-type distributor truck to apply water to disturbed areas. The mobile unit shall apply water at a rate of 300 gallons per acre and minimized as necessary to prevent runoff and ponding.

Specific Dust Controls

Application of Water	
Description: Dust from the site shall be controlled by using a mobile pressure-type distributor truck to apply water to disturbed areas. The mobile unit shall apply water at a rate of 300 gallons per acre and minimized as necessary to prevent runoff and ponding.	
Installation	Ongoing/As needed
Maintenance Requirements	Dust control shall be implemented as needed once site grading has been initiated and during windy conditions (forecasted or actual wind conditions of 20 mph or greater) while site grading is occurring. Spraying of water shall be performed no more than three times a day during the months of May–September and once per day during the months of October–April or whenever the dryness of the soil warrants it. At least one mobile unit shall be available at all times to distribute water to control dust on the project area. Each mobile unit shall be equipped with a positive shutoff valve to prevent over watering of the disturbed area.
Design Specifications	N/A

[Repeat as needed for individual dust controls.]

4.6 Minimize Steep Slope Disturbances

Instructions (see CGP Parts 2.2.7 and 7.2.6):

- Describe how you will minimize the disturbance to steep slopes (as defined by CGP Appendix A).
- Describe controls (e.g., erosion control blankets, tackifiers), including design, installation and maintenance specifications, that will be implemented to minimize sediment discharges from slope disturbances.

General

- Erosion control blankets shall be used to provide stabilization for slopes greater than 3:1 throughout the site.

Specific Steep Slope Controls

Erosion Control Blanket	
Description: Erosion control blankets shall be used to provide stabilization for the slopes in the grass drainage channels and sediment basins, and on slopes greater than 3:1 throughout the site.	
Installation	TBD
Maintenance Requirements	The erosion control blanket shall be inspected weekly and immediately after storm events to determine if cracks, tears, or breaches have formed in the fabric; if so, the blanket shall be repaired or replaced immediately. Good contact with the soil shall be maintained and erosion shall not occur under the blanket. Any areas where the blanket is not in close contact with the ground shall be repaired or replaced.
Design Specifications	See attached site plan.

[Repeat as needed for individual steep slope controls.]

4.7 Topsoil

Instructions (see CGP Parts 2.2.8 and 7.2.6):

- Describe how topsoil will be preserved and identify these areas and associated control measures on your site map(s).
- If it is infeasible for you to preserve topsoil on your site, provide an explanation for why this is the case.

General

- Topsoil stockpiling is not proposed on site. Topsoil will be stripped and loaded into 18-wheelers and hauled off site. As such, no locations for temporary topsoil stockpiling are included in the plan.

4.8 Soil Compaction

Instructions (see CGP Parts 2.2.9 and 7.2.6):

– In areas where final vegetative stabilization will occur or where infiltration practices will be installed, describe the controls, including design, installation, and maintenance specifications that will be used to restrict vehicle or equipment access or condition the soil for seeding or planting.

General

- Protect proposed infiltration areas by adding an erosion control barrier around the perimeter of all proposed infiltration areas.
- See sheet C-5 in Appendix A for locations of silt fence and underground infiltration system.

Specific Soil Compaction Controls

Entrenched Silt Fence Barrier	
Description: An erosion control barrier, consisting of silt fencing, shall be installed around the perimeter of all proposed infiltration areas to prevent construction vehicles from impacting the area, to decrease the velocity of sheet flows and intercept, and detain small amounts of sediment from disturbed areas.	
Installation	TBD
Maintenance Requirements	The erosion control barrier shall be installed after clearing and grubbing. Silt fence shall be inspected weekly, following storms, and daily during rainy periods. Damaged sections shall be replaced. Concentrated flows shall be intercepted and rerouted. Sediment accumulations shall be removed when reaching a depth of 6-inches.
Design Specifications	See attached site plan.

[Repeat as needed for individual soil compaction controls.]

4.9 Storm Drain Inlets

Instructions (see CGP Parts 2.2.10 and 7.2.6):

– Describe controls (e.g., inserts, rock-filled bags, or block and gravel) including design, installation, and maintenance specifications that will be implemented to protect all inlets that carry stormwater flow from your site to a water of the U.S., provided you have the authority to access the storm drain inlet.

General

- Filter bags will be installed at all storm drain inlets to prevent sediment from entering the drainage system.

Specific Storm Drain Inlet Controls

Filter Bags	
Description: Filter bag manufactured specifically for controlling sediment flow into all storm drain inlets to prevent coarse sediment from entering drainage systems prior to permanent stabilization of the disturbed area.	
Installation	TBD

Maintenance Requirements	Storm drain inlet protection shall be inspected weekly and following storms. Clean, or remove and replace the protection measures as sediment accumulates, the filter becomes clogged, and/or performance is compromised. Where there is evidence of sediment accumulation adjacent to the inlet protection measure, remove the deposited sediment by the end of the same business day in which it is found or by the end of the following business day if removal by the same business day is not feasible.
Design Specifications	See attached site plan.

[Repeat as needed for individual storm drain inlet controls.]

4.10 Stormwater Conveyance Channels

Instructions (see CGP Parts 2.2.11 and 7.2.6):

If you will be installing a stormwater conveyance channel, describe control practices (e.g., velocity dissipation devices), including design specifications and details (volume, dimensions, outlet structure), that will be implemented at the construction site.

General

- There are no stormwater conveyance channels proposed.

Specific Conveyance Channel Controls

[Repeat as needed for individual stormwater conveyance channel controls.]

4.11 Sediment Basins

Instructions (see CGP Parts 2.2.12 and 7.2.6.b.iv):

If you will install a sediment basin, include design specifications and other details (volume, dimensions, outlet structure) that will be implemented in conformance with CGP Part 2.2.12.

- Sediment basins must be situated outside waters of the U.S. and any natural buffers established under CGP Part 2.2.1; and designed to avoid collecting water from wetlands.
- At a minimum, sediment basins provide storage for either (1) the calculated volume of runoff from the 2-year, 24-hour storm (see CGP App. H), or (2) 3,600 cubic feet per acre drained
- Sediment basins must also utilize outlet structures that withdraw water from the surface, unless infeasible

General

- Site runoff during construction will be captured and managed in a localized fashion by constructing berms and diversion swales to create sediment basins that provide the required capture capacity in accordance with the above volumetric requirements. The goal is to avoid large downstream sediment basins to the extent possible and manage runoff as close to the source as possible.

- If sediment basins are determined to be needed, they will be sized on a case-by-case basis as the needs arise, and the SWPPP will be updated accordingly. In no circumstance will a sediment basin be placed directly over a proposed infiltration area.

Specific Sediment Basin Controls (if needed)

Typical Sediment Basin	
Description: Localized Sediment Basin(s) to be installed using low permeability berms and diversion swales.	
Installation	TBD
Maintenance Requirements	Remove accumulated sediment to maintain at least one-half of the design capacity and conduct all other appropriate maintenance to ensure the basin or impoundment remains in effective operating condition.
Design Specifications	To be sized on-site in compliance with the calculated volume of runoff from the 2-year, 24-hour storm or 3,600 cubic feet per acre drained. See sheet C-5 in Appendix A for proposed locations of temporary sediment basins for the site.

4.12 Chemical Treatment

There is no chemical treatment proposed at the site.

> **Instructions (see CGP Parts 2.2.13 and 7.2.6.v):**
>
> If you are using treatment chemicals at your site, provide details for each of the items below. This information is required as part of the SWPPP requirements in CGP Part 7.2.6.v.

Soil Types
List all the soil types (including soil types expected to be found in fill material) that are expected to be exposed during construction in areas of the project that will drain to chemical treatment systems: N/A

Treatment Chemicals
List all treatment chemicals that will be used at the site and explain why these chemicals are suited to the soil characteristics: N/A
Describe the dosage of all treatment chemicals you will use at the site or the methodology you will use to determine dosage: N/A

Provide information from any applicable Safety Data Sheets (SDS): N/A

Describe how each of the chemicals will stored: N/A

Include references to applicable state or local requirements affecting the use of treatment chemicals, and copies of applicable manufacturer's specifications regarding the use of your specific treatment chemicals and/or chemical treatment systems: N/A

Special Controls for Cationic Treatment Chemicals (if applicable)
If the applicable EPA Regional Office authorized you to use cationic treatment chemicals, include the official EPA authorization letter or other communication, and identify the specific controls and implementation procedures designed to ensure that your use of cationic treatment chemicals will not lead to an exceedance of water quality standards: N/A

Schematic Drawings of Stormwater Controls/Chemical Treatment Systems

Provide schematic drawings of any chemically-enhanced stormwater controls or chemical treatment systems to be used for application of treatment chemicals: N/A

Training
Describe the training that personnel who handle and apply chemicals have received prior to permit coverage, or will receive prior to the use of treatment chemicals: N/A

4.13 Dewatering Practices

Instructions (see CGP Parts 2.4 and 7.2.6):

If you will be discharging ground water or accumulated stormwater that is removed from excavations, trenches, foundations, vaults, or other similar points of accumulation, include design specifications and details of all dewatering practices that are installed and maintained to comply with CGP Part 2.4.

General

- Some dewatering is anticipated during excavation for the installation of the deepest drainage and water tanks (i.e. oil/grit tanks and water tank for car wash, etc.).

Specific Dewatering Practices

Localized Sump Dewatering	
Description: Localized Sump Dewatering	
Installation	TBD
Maintenance Requirements	Maintain pump screens and discharge silt bags to ensure clear discharge water.
Design Specifications	Excavate sump adjacent to area requiring dewatering. Line sump with washed, crushed stone. Insert perforated pipe in crushed stone. Place 2" dewatering pump within the perforated pipe. Discharge to silt bag filter placed in the recharge area. Depth of sump shall be less than width.

[Repeat as needed for individual dewatering practices.]

4.14 Other Stormwater Controls

There are no other stormwater controls proposed.

Instructions: – Describe any other stormwater controls that do not fit into the above categories.

4.15 Site Stabilization

Instructions (see CGP Parts 2.2.14 and 7.2.6.vi): The CGP requires you to immediately initiate stabilization when work in an area of your site has permanently or temporarily stopped, and to complete certain stabilization activities within prescribed deadlines. Construction projects disturbing more than 5 acres at any one time have a different deadline than projects disturbing 5 acres or less at any one time. See CGP Part 2.2.14.a. The CGP also requires that stabilization measures meet certain minimum criteria. See CGP Part 2.2.14.b. For your SWPPP, you must include the following: – Describe the specific vegetative and/or non-vegetative practices that will be used to stabilize exposed soils where construction activities have temporarily or permanently ceased. Avoid using impervious surfaces for stabilization whenever possible. – The stabilization deadline(s) that will be met in accordance with Part 2.2.14.a – Once you begin construction, consider using the Grading/Stabilization Activities log in Appendix H of the Template to document your compliance with the stabilization requirements in CGP Part 2.2.14.

Total Amount of Land Disturbance Occurring at Any One Time

☒ *Five Acres or less*

☐ *More than Five Acres*

Use this template box if you are <u>not</u> located in an arid, semi-arid, or drought-stricken area

Temporary Stabilization	
☒ *Vegetative* ☐ *Non-Vegetative* ☒ *Temporary* ☐ *Permanent*	
Description: ▪ Initiation of temporary vegetative cover shall occur immediately where construction will cease for more than 14 days. It shall be established using hydroseeding for areas of exposed soil (including stockpiles) during the growing season from April 15 to November 15. ▪ Complete all soil conditioning, seeding, watering or irrigation installation, mulching or other required activities related to the planting and initial establishment of vegetation as soon as conditions or circumstances allow it on your site. ▪ Outside of the growing season, the contractor will provide temporary stabilization by utilizing spray tackifier in lieu of hydroseed. ▪ See General Note 6, 7 and 8 on Sheet C-5 in Appendix A.	
Installation	TBD
Completion	TBD
Maintenance Requirements	Stabilized areas shall be inspected weekly and after storm events until a dense cover of vegetation has become established. If failure is noticed at the seeded area, the area shall be reseeded, fertilized, and mulched immediately.

Design Specifications	See attached site plans in Appendix A.

Mulching	
☐ *Vegetative* ☒ *Non-Vegetative* ☒ *Temporary* ☐ *Permanent*	
Description: ▪ Wood chip mulch shall provide immediate protection to exposed soils during short periods of disturbance. Wood chip mulch shall also be applied in areas that have been seeded for temporary or permanent stabilization. ▪ Complete all soil conditioning, seeding, watering or irrigation installation, mulching or other required activities related to the planting and initial establishment of vegetation as soon as conditions or circumstances allow it on your site.	
Installation	TBD
Completion	TBD
Maintenance Requirements	Mulched areas shall be inspected weekly and after storm events to check for movement of mulch or erosion. If washout, breakage, or erosion occurs, the surface shall be repaired, and new mulch shall be applied to the damaged area.
Design Specifications	See attached site plans in Appendix A.

Permanent Stabilization	
☒ *Vegetative* ☐ *Non-Vegetative* ☐ *Temporary* ☒ *Permanent*	
Description: ▪ Initiation of permanent stabilization measures shall occur immediately after the final design grades are achieved and earth moving activities cease. Native species of plants shall be used to establish vegetative cover on exposed soils. Permanent stabilization shall be completed in accordance with the procedures outlined in the Final Stabilization section of this report. Portions of the site where construction activities have permanently ceased shall be stabilized as soon as possible, but no later than 14 calendar days after stabilization has been initiated.	
Installation	TBD
Completion	TBD
Maintenance Requirements	All seeded areas shall be inspected weekly during construction activities and after storm events until a dense cover of vegetation has been established. If failure is noticed at the seeded area, the area shall be reseeded, fertilized, and mulched immediately. Care shall be taken to avoid compacting newly placed topsoil. After construction is completed at the site, permanently stabilized areas shall be monitored until final stabilization is reached.
Design Specifications	See attached site plans in Appendix A.

[Repeat as needed for additional stabilization practices.]

Use this template box if unforeseen circumstances have delayed the initiation and/or completion of vegetative stabilization. Note: You will not be able to include this information in your initial SWPPP. If you are affected by circumstances such as those described in CGP Part 2.2.14.a.iii, you will need to modify your SWPPP to include this information.

<table>
<tr><th colspan="2">INSERT NAME OF SITE STABILIZATION PRACTICE</th></tr>
<tr><td colspan="2">☐ *Vegetative*
☐ *Temporary* ☐ *Permanent*</td></tr>
<tr><td colspan="2">Description:
▪ INSERT DESCRIPTION OF STABILIZATION PRACTICE TO BE INSTALLED
▪ NOTE HOW DESIGN WILL MEET REQUIREMENTS OF PART 2.2.14.b</td></tr>
<tr><td>Justification</td><td>INSERT DESCRIPTION OF CIRCUMSTANCES THAT PREVENT YOU FROM MEETING THE DEADLINES REQUIRED IN CGP PARTS 2.2.14.a</td></tr>
<tr><td rowspan="2">Installation and completion schedule</td><td>Vegetative Measures:
DESCRIBE THE SCHEDULE YOU WILL FOLLOW FOR INITIATING AND COMPLETING VEGETATIVE STABILIZATION
▪ Approximate installation date: INSERT APPROXIMATE DATE
▪ Approximate completion date: INSERT APPROXIMATE DATE</td></tr>
<tr><td>Non-Vegetative Measures:
(must be completed within 14 days of the cessation of construction if disturbing 5 acres or less; within 7 days if disturbing more than 5 acres)
▪ Approximate installation date: INSERT APPROXIMATE DATE
▪ Approximate completion date: INSERT APPROXIMATE DATE</td></tr>
<tr><td>Maintenance Requirements</td><td>INSERT MAINTENANCE REQUIREMENTS FOR THE STABILIZATION PRACTICE</td></tr>
<tr><td>Design Specifications</td><td>INCLUDE COPIES OF DESIGN SPECIFICATIONS HERE</td></tr>
</table>

[Repeat as needed for additional stabilization practices.]

SECTION 5: POLLUTION PREVENTION STANDARDS

5.1 Potential Sources of Pollution

Instructions (see CGP Part 7.2.3.g):

- Identify and describe all pollutant-generating activities at your site (e.g., paving operations; concrete, paint, and stucco washout and waste disposal; solid waste storage and disposal).
- For each pollutant-generating activity, include an inventory of pollutants or pollutant constituents associated with that activity (e.g., sediment, fertilizers, and/or pesticides, paints, solvents, fuels), which could be exposed to rainfall or snowmelt, and could be discharged from your construction site. You must take into account where potential spills and leaks could occur that contribute pollutants to stormwater discharges, and any known hazardous or toxic substances, such as PCBs and asbestos, that will be disturbed or removed during construction.

Construction Site Pollutants

Pollutant-Generating Activity	**Pollutants or Pollutant Constituents** (that could be discharged if exposed to stormwater)	**Location on Site** (or reference SWPPP site map where this is shown)
Asphalt/Paving/Concrete	Oil, petroleum distillates, concrete residue	Streets, parking areas
Curing compounds	Naptha	Curb and gutter/walkways
Hydraulic oil/fluids	Mineral Oil	Leaks or broken hoses from equipment
Gasoline	Benzene, ethyl benzene, toluene, xylene, MTBE	Leaks or broken hoses from equipment
Diesel Fuel	Petroleum distillate, oil & grease, naphthalene, xylenes	Leaks or broken hoses from equipment
Antifreeze/Coolant	Ethylene glycol, propylene glycol, heavy metals (copper, lead, zinc)	Leaks or broken hoses from equipment
Sanitary Toilets	Bacteria, parasites, and viruses	See Plan (near proposed dumpster location)

**Containerized pollutants shall be safely stored within the designated, enclosed storage containers (Conex Boxes). See SheetC-5 in Appendix A for proposed location of storage units.

5.2 Spill Prevention and Response

Instructions (see CGP Parts 2.3.6 and 7.2.6.vii):

- Describe procedures you will use to prevent and respond to leaks, spills, and other releases. You must implement the following at a minimum:
  - ✓ Procedures for expeditiously stopping, containing, and cleaning up spills, leaks, and other releases. Identify the name or title of the employee(s) responsible for detection and response of spills or leaks; and
  - ✓ Procedures for notification of appropriate facility personnel, emergency response agencies, and regulatory agencies where a leak, spill, or other release containing a hazardous substance or oil in an amount equal to or in excess of a reportable quantity consistent with Part 2.3.6 and established under either 40 CFR Part 110, 40 CFR Part 117, or 40 CFR Part 302, occurs during a 24-hour period. Contact information must be in locations that are readily accessible and available.
- Some projects/site may be required to develop a Spill Prevention Control and Countermeasure (SPCC) plan under a separate regulatory program (40 CFR 112). If you are required to develop an SPCC plan, or you already have one, you should include references to the relevant requirements from your plan.

i. Employee Training: All employees shall be trained as detailed in the Inspection and Maintenance section of this report. For this specific site, the Contractor's Project Manager, (TBD) will be responsible for detection and response of spills or leaks.

ii. Vehicle Maintenance: Vehicles and equipment shall be maintained off-site. All vehicles and equipment including subcontractor vehicles shall be checked for leaking oil and fluids. Vehicles leaking fluids shall not be allowed on-site.

iii. Hazardous Material Storage: Hazardous materials shall be stored in accordance with this report and federal and municipal regulations. Enclosed storage units (Conex Boxes) are proposed on site. See Sheet C-5 in Appendix A.

iv. Spill Kits: Spill kits shall be kept within the materials storage area.

Spills: All spills shall be cleaned up immediately upon discovery. Spent absorbent materials and rags shall be hauled off-site immediately after the spill is cleaned up for disposal at an approved landfill. Spills in an amount equal to or in excess of a reportable quantity established under either 40 CFR 110, 40 CFR 117, or 40 CFR 302 occurring during a 24-hour period shall be reported to the National Response Center at 1-800-424-8802 and MA DEP at 617-792-7653. You must also, within seven (7) calendar days of knowledge of the release, provide a description of the release, the circumstances leading to the release, and the date of the release. State, tribal, or local requirements may necessitate additional reporting of spills or discharges to local emergency response, public health, or drinking water supply agencies.

v. Material safety data sheets: A material inventory and emergency contact information shall be maintained at the on-site project trailer.

5.3 Fueling and Maintenance of Equipment or Vehicles

Instructions (see CGP Parts 2.3.1 and 7.2.6):

- Describe equipment/vehicle fueling and maintenance practices that will be implemented to eliminate the discharge of spilled or leaked chemicals (e.g., providing secondary containment *(examples: spill berms, decks, spill containment pallets)* and cover where appropriate, and/or having spill kits readily available.)

General

- There will be no storage of vehicle fuel or maintenance of vehicles on site. A licensed contractor will fuel the construction vehicles and equipment while on site.

5.4 Washing of Equipment and Vehicles

Instructions (see CGP Parts 2.3.2 and 7.2.6):

- Describe equipment/vehicle washing practices that will be used to minimize the discharge of pollutants from equipment and vehicle washing, wheel wash water, and other types of wash waters (e.g., locating activities away from waters of the U.S. and stormwater inlets or conveyances and directing wash waters to a sediment basin or sediment trap, using filtration devices, such as filter bags or sand filters, or using other similarly effective controls).
- Describe how you will prevent the discharge of soaps, detergents, or solvents by providing either (1) cover (*examples: plastic sheeting or temporary roofs*) to prevent these detergents from coming into contact with rainwater, or (2) a similarly effective means designed to prevent the discharge of pollutants from these areas.

General

- There is no on-site vehicle or equipment washing is proposed.

5.5 Storage, Handling, and Disposal of Building Products, Materials, and Wastes

Instructions (see CGP Parts 2.3.3 and 7.2.6):

- For any of the types of building products, materials, and wastes below in Sections 5.5.1-5.5.6 below that you expect to use or store at your site, provide the information on how you will comply with the corresponding CGP provision and the specific practices that you will be employ.

5.5.1 Building Products

(Note: Examples include asphalt sealants, copper flashing, roofing materials, adhesives, and concrete admixtures.)

General

- Building products including adhesives, concrete admixtures, and form oil shall be stored in the designated, enclosed storage units (Conex Boxes).

Specific Pollution Prevention Practices

Cover	
Description: A cover, in this case Conex boxes will be used to minimize the exposure of these products to precipitation and to stormwater.	
Installation	As Needed
Maintenance Requirements	Monitor cover, and replace/repair as needed.
Design Specifications	N/A

[Repeat as needed.]

5.5.2 Pesticides, Herbicides, Insecticides, Fertilizers, and Landscape Materials

General

- Pesticides, herbicides, insecticides, and fertilizers are prohibited from use on this site. Landscape materials will be covered during storage, although storage is not anticipated as these materials are proposed to be delivered at the time of installation.

Specific Pollution Prevention Practices

Cover	
Description: A cover (e.g. plastic sheeting) will be used to minimize the exposure of landscape materials to precipitation and to stormwater.	
Installation	As Needed
Maintenance Requirements	Monitor container and replace/repair as needed.
Design Specifications	N/A

[Repeat as needed.]

5.5.3 Diesel Fuel, Oil, Hydraulic Fluids, Other Petroleum Products, and Other Chemicals

General

- Diesel fuel will not be stored on site. Rather, a fueling truck will deliver to the site, and directly fill the equipment as-needed.
- Chemicals will be stored in water tight containers (Conex Boxes). Also, a spill kit should be on site at all times.

Specific Pollution Prevention Practices

Cover	
Description: Chemicals will be stored in water tight containers (Conex Boxes) to minimize exposure of these containers to precipitation and to stormwater.	
Installation	As Needed
Maintenance Requirements	Monitor container and replace/repair as needed.
Design Specifications	N/A

Spill Kit	
Description: A spill kit should be available on site and ensuring personnel are available to respond expeditiously in the event of a leak or spill. Clean up spills immediately, using dry clean-up methods where possible and dispose of used materials properly. You are prohibited from hosing the area down to clean surfaces or spills. Eliminate the source of the spill to prevent a discharge or furtherance of an ongoing discharge.	
Installation	As Needed
Maintenance Requirements	Employees should be trained in spill response and know where the spill kit is stored on site.
Design Specifications	N/A

5.5.4 Hazardous or Toxic Waste

(Note: Examples include paints, solvents, petroleum-based products, wood preservatives, additives, curing compounds, acids.)

General

- Hazardous and toxic wastes will be separated from construction and domestic waste. Hazardous and toxic wastes shall be stored in Conex boxes and a spill kit should be stored on site at all times.

Specific Pollution Prevention Practices

Storage	
Description: Store waste in Conex boxes, to prevent leakage and corrosion, and which are labeled in accordance with applicable resource conservation and recovery act (RCRA) requirements, and all other applicable federal, state, tribal or local requirements. Store all outside containers within appropriately-sized secondary containment to prevent spills from being discharged.	
Installation	As needed.
Maintenance Requirements	Dispose of hazardous or toxic waste in accordance with the manufacturer's recommended method of disposal and in compliance with federal, state, tribal and local requirements.
Design Specifications	N/A

Spill Kit	
Description: A spill kit should be available on site and ensuring personnel are available to respond expeditiously in the event of a leak or spill. Clean up spills immediately, using dry clean-up methods where possible and dispose of used materials properly. You are prohibited from hosing the area down to clean surfaces or spills. Eliminate the source of the spill to prevent a discharge or furtherance of an ongoing discharge.	
Installation	As Needed
Maintenance Requirements	Employees should be trained in spill response and know where the spill kit is stored on site.
Design Specifications	N/A

5.5.5 *Construction and Domestic Waste*

(Note: Examples include packaging materials, scrap construction materials, masonry products, timber, pipe and electrical cuttings, plastics, styrofoam, concrete, and other trash or building materials.)

General

- Waste containers shall be provided to contain domestic wastes and shall be regularly removed from the site.

Specific Pollution Prevention Practices

Waste Containers	
Description: Waste containers (e.g. , dumpster, trash receptacle) of sufficient size and number to contain construction and domestic wastes.	
Installation	Upon mobilization to the site, and replacement as needed.
Maintenance Requirements	Keep waste container lids closed when not in use and close lids at the end of the business day for those containers that are actively used throughout the day. For waste containers that do not have lids, provide either a cover to minimize the exposure of wastes to precipitation, or a similarly effective means designed to minimize the discharge of pollutants. Clean up immediately if containers overflow.
Design Specifications	N/A

5.5.6 *Sanitary Waste*

General

- Sanitary toilets shall be secured and located away from waters of the U.S.

Specific Pollution Prevention Practices

Sanitary Toilets	
Description: Position portable toilets so that they are secure and will not be tipped or knocked over, and located away from waters of the U.S. and stormwater inlets or conveyances.	
Installation	Upon mobilization to the site.
Maintenance Requirements	After every cleaning and scheduled maintenance of toilets, they should be checked to ensure they are secured and not at risk to tip over.
Design Specifications	N/A

5.6 *Washing of Applicators and Containers used for Paint, Concrete or Other Materials*

Instructions (see CGP Parts 2.3.4 and 7.2.6):

– Describe how you will comply with the CGP Part 2.3.4 requirement for washing applications and containers.

General

- A designated temporary, above-grade washout area shall be constructed as needed for the washout and cleanout of stucco, paint, or other non-hazardous construction materials.

Specific Pollution Prevention Practices

Washout Areas	
Description: A designated temporary, above-grade washout area shall be constructed as needed for the washout and cleanout of stucco, paint, or other non-hazardous construction materials. The temporary washout area shall be a leak-proof container with sufficient volume to contain all liquid and waste generated by washout operations. The temporary washout shall be sited outside of all buffer zones.	
Installation	The washout area shall be constructed as needed.
Maintenance Requirements	The washout areas shall be inspected daily to ensure that all washing is being discharged into the washout area, no leaks or tears are present, and to identify when wastes need to be removed. The washout areas shall be cleaned out once the area is filled to 75 percent of the holding capacity. Liquid wastes shall be disposed of in accordance with applicable Federal and State requirements and shall not be discharged into drainage systems.
Design Specifications	N/A

5.7 Fertilizers

Instructions (CGP Parts 2.3.5 and 7.2.6.ix):

Describe how you will comply with the CGP Part 2.3.5 requirement for the application of fertilizers.

General

- Due to the proximity of the site to Wetlands and Priority Habitats, the use of fertilizers, herbicides and pesticides are prohibited on this property.

5.8 Other Pollution Prevention Practices

Instructions:

Describe any additional pollution prevention practices that do not fit into the above categories.

General

- INSERT GENERAL DESCRIPTION OF THE PROBLEM THIS CONTROL IS DESIGNED TO ADDRESS

Specific Pollution Prevention Practices

INSERT NAME OF POLLUTION PREVENTION PRACTICE	
Description: INSERT DESCRIPTION OF PRACTICE TO BE INSTALLED	
Installation	INSERT APPROXIMATE DATE OF INSTALLATION
Maintenance Requirements	INSERT MAINTENANCE REQUIREMENTS FOR THE POLLUTION PREVENTION PRACTICE
Design Specifications	IF APPLICABLE INCLUDE COPIES OF DESIGN SPECIFICATIONS HERE

[Repeat as needed.]

SECTION 6: INSPECTION, MAINTENANCE, AND CORRECTIVE ACTION

6.1 Inspection Personnel and Procedures

Instructions (see CGP Parts 3.2, 4, 5, and 7.2.7):

Describe the procedures you will follow for conducting inspections in accordance with CGP Parts 3.2, 4, 5, and 7.2.7.

Personnel Responsible for Inspections

TBD

Note: All personnel conducting inspections must be considered a "qualified person." CGP Part 4.1 clarifies that a "qualified person" is a person knowledgeable in the principles and practices of erosion and sediment controls and pollution prevention, who possesses the appropriate skills and training to assess conditions at the construction site that could impact stormwater quality, and the appropriate skills and training to assess the effectiveness of any stormwater controls selected and installed to meet the requirements of this permit.

Inspection Schedule

Select the inspection frequency(ies) that applies, based on CGP Parts 4.2, 4.3, or 4.4

(Note: you may be subject to different inspection frequencies in different areas of the site. Check all that apply)

Standard Frequency:
☐ Every 7 days ☐ Every 14 days and within 24 hours of a 0.25" rain or the occurrence of runoff from snowmelt sufficient to cause a discharge
Increased Frequency (if applicable):
For areas of sites discharging to sediment or nutrient-impaired waters or to waters designated as Tier 2, Tier 2.5, or Tier 3 ☒ Every 7 days and within 24 hours of a 0.25" rain
Reduced Frequency (if applicable)
For stabilized areas ☐ Twice during first month, no more than 14 calendar days apart; then once per month after first month; ▪ SPECIFY LOCATIONS WHERE STABILIZATION STEPS HAVE BEEN COMPLETED ▪ INSERT DATE THAT THEY WERE COMPLETED (Note: It is likely that you will not be able to include this in your initial SWPPP. If you qualify for this reduction (see CGP Part 4.4.1), you will need to modify your SWPPP to include this information.)
For stabilized areas on "linear construction sites" ☐ Twice during first month, no more than 14 calendar days apart; then once more within 24 hours of a 0.25" rain ▪ SPECIFY LOCATIONS WHERE STABILIZATION STEPS HAVE BEEN COMPLETED ▪ INSERT DATE THAT THEY WERE COMPLETED (Note: It is likely that you will not be able to include this in your initial SWPPP. If you qualify for this reduction (see CGP Part 4.4.1), you will need to modify your SWPPP to include this information.)

For arid, semi-arid, or drought-stricken areas during seasonally dry periods or during drought ☐ Once per month and within 24 hours of a 0.25" rain Insert beginning and ending dates of the seasonally-defined dry period for your area or the valid period of drought: ▪ Beginning date of seasonally dry period: INSERT APPROXIMATE DATE ▪ Ending date of seasonally dry period: INSERT APPROXIMATE DATE
For frozen conditions where earth-disturbing activities are being conducted ☐ Once per month Insert beginning and ending dates of frozen conditions on your site: ▪ Beginning date of frozen conditions: INSERT APPROXIMATE DATE ▪ Ending date of frozen conditions: INSERT APPROXIMATE DATE

The National Weather Service Station will be monitored and rainfall amounts will be utilized to prepare for storm events and schedule inspections afterwards.

Inspection Report Forms
Inspection Report forms are attached in Appendix D of this SWPPP.

(Note: EPA has developed a sample inspection form that CGP operators can use. The form is available at https://www.epa.gov/npdes/stormwater-discharges-construction-activities#resources)

6.2 Corrective Action

Instructions (CGP Parts 5 and 7.2.7):

- Describe the procedures for taking corrective action in compliance with CGP Part 5.

Personnel Responsible for Corrective Actions

TBD

Corrective Action Forms

Corrective Action forms are attached in Appendix E of this SWPPP.

(Note: EPA has developed a sample corrective action form that CGP operators can use. The form is available at https://www.epa.gov/npdes/stormwater-discharges-construction-activities#resources)

6.3 Delegation of Authority

Instructions:

- Identify the individual(s) or positions within the company who have been delegated authority to sign inspection reports.
- Attach a copy of the signed delegation of authority (see example in Appendix J of the Template.)
- For more on this topic, see Appendix I, Subsection 11 of EPA's CGP.

Duly Authorized Representative(s) or Position(s):

SECTION 7: TRAINING

Instructions (see CGP Part 6 and 7.2.8):

- Complete the table below to provide documentation that the personnel required to be trained in CGP Part 6 completed the appropriate training
- If personnel will be taking course training (which is not required as part of the CGP), consider using Appendix I of this SWPPP template to track completion of this training
- The following personnel, at a minimum, must receive training, and therefore should be listed out individually in the table below:
  - ✓ Personnel who are responsible for the design, installation, maintenance, and/or repair of stormwater controls (including pollution prevention measures);
  - ✓ Personnel responsible for the application and storage of treatment chemicals (if applicable);
  - ✓ Personnel who are responsible for conducting inspections as required in Part 4.1; and
  - ✓ Personnel who are responsible for taking corrective actions as required in Part 5.
- CGP Part 6 requires that the required personnel must be trained to understand the following if related to the scope of their job duties:
  - ✓ The permit deadlines associated with installation, maintenance, and removal of stormwater controls and with stabilization;
  - ✓ The location of all stormwater controls on the site required by this permit, and how they are to be maintained;
  - ✓ The proper procedures to follow with respect to the permit's pollution prevention requirements; and
  - ✓ When and how to conduct inspections, record applicable findings, and take corrective actions.

Table 7-1: Documentation for Completion of Training

Name	Describe Training	Date Training Completed
Gabe Crocker, CDG	Professional Engineer	10/1/2002
Margaret Laracy, CDG	Professional Engineer	4/1/2019
David Newhall, CDG	EIT, Project Engineer	2020
INSERT NAME OF PERSONNEL		INSERT COMPLETION DATE
INSERT NAME OF PERSONNEL		INSERT COMPLETION DATE
INSERT NAME OF PERSONNEL		INSERT COMPLETION DATE
INSERT NAME OF PERSONNEL		INSERT COMPLETION DATE
INSERT NAME OF PERSONNEL		INSERT COMPLETION DATE
INSERT NAME OF PERSONNEL		INSERT COMPLETION DATE
INSERT NAME OF PERSONNEL		INSERT COMPLETION DATE
INSERT NAME OF PERSONNEL		INSERT COMPLETION DATE
INSERT NAME OF PERSONNEL		INSERT COMPLETION DATE
INSERT NAME OF PERSONNEL		INSERT COMPLETION DATE
INSERT NAME OF PERSONNEL		INSERT COMPLETION DATE

SECTION 8: CERTIFICATION AND NOTIFICATION

Instructions (CGP Appendix I, Part I.11.b):

- The following certification statement must be signed and dated by a person who meets the requirements of Appendix I, Part I.11.b.
- This certification must be re-signed in the event of a SWPPP Modification.

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 manage 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 have no personal knowledge that the information submitted is other than true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Name: ______________________________ Title: ______________________________

Signature: ______________________________________ Date: __________________

[Repeat as needed for multiple construction operators at the site.]

SWPPP APPENDICES

Attach the following documentation to the SWPPP:

Appendix A – Site Maps

Appendix B – Copy of 2017 CGP
(Note: The 2017 CGP is available at https://www.epa.gov/npdes/epas-2017-construction-general-permit-cgp-and-related-documents)

Appendix C – NOI and EPA Authorization Email

Appendix D – Inspection Form
(Note: EPA has developed a sample inspection form that CGP operators can use. The form is available at https://www.epa.gov/npdes/stormwater-discharges-construction-activities#resources)

Appendix E – Corrective Action Form
(Note: EPA has developed a sample corrective action form that CGP operators can use. The form is available at https://www.epa.gov/npdes/stormwater-discharges-construction-activities#resources)

Appendix F – SWPPP Amendment Log

Appendix G – Subcontractor Certifications/Agreements

Appendix H – Grading and Stabilization Activities Log

Appendix I – Training Log

Appendix J – Delegation of Authority

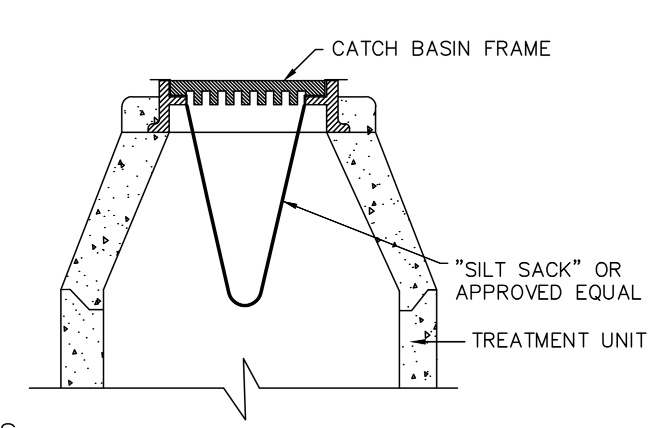
Appendix K – Endangered Species Documentation

Appendix L – Historic Preservation Documentation

Appendix A – Site Maps

LEGEND

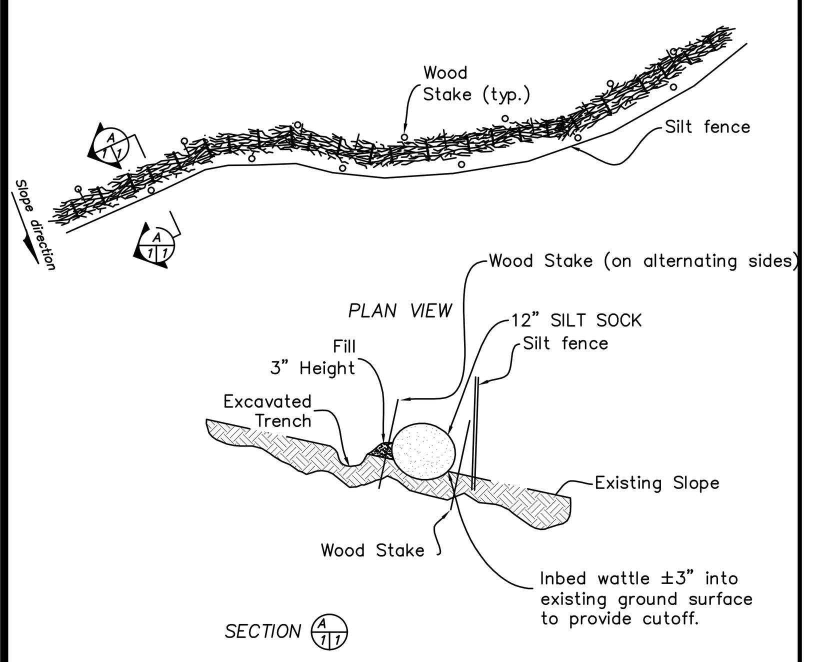
- PROPOSED LIMIT OF DISTURBANCE
- PROPOSED SILT SOCK ROW
- PROPOSED SILT FENCE
- PROPOSED CONSTRUCTION ENTRANCE
- PROPOSED INLET PROTECTION
- PROPOSED STOCK PILE



NOTES:
1. TO BE INSTALLED IN ALL GRATED TREATMENT UNITS AFTER INSTALLATION AND UNTIL COMPLETION OF CONSTRUCTION.
2. BOOT ADAPTER MAY BE TRIMMED TO SIZE.

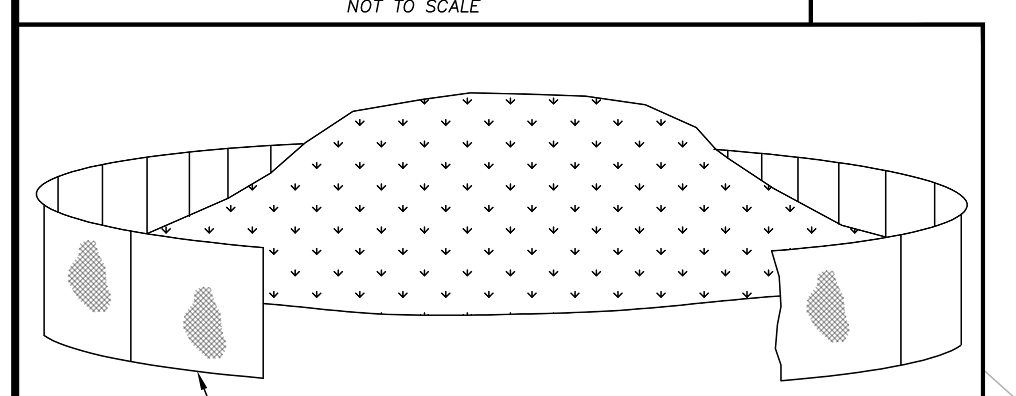
"SILT SACK" FILTER BAG

(N.T.S.)



12" SILT SOCK / SILT FENCE DETAIL

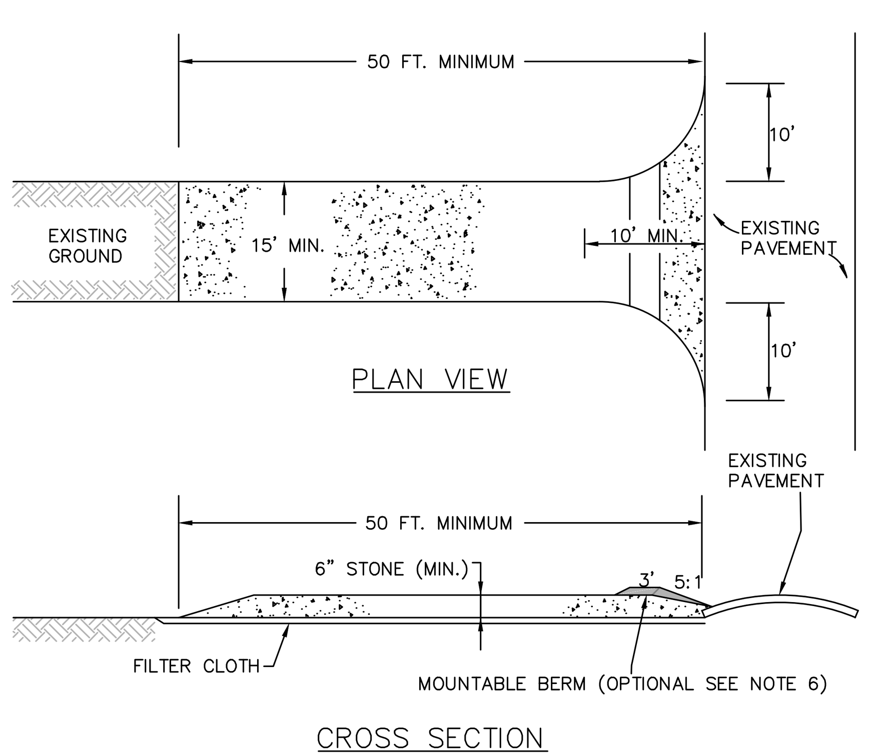
NOT TO SCALE



NOTE:
STABILIZE STOCKPILE WITH ANNUAL RYEGRASS, MULCH OR EROSION CONTROL BLANKETS.

SOIL STOCKPILE

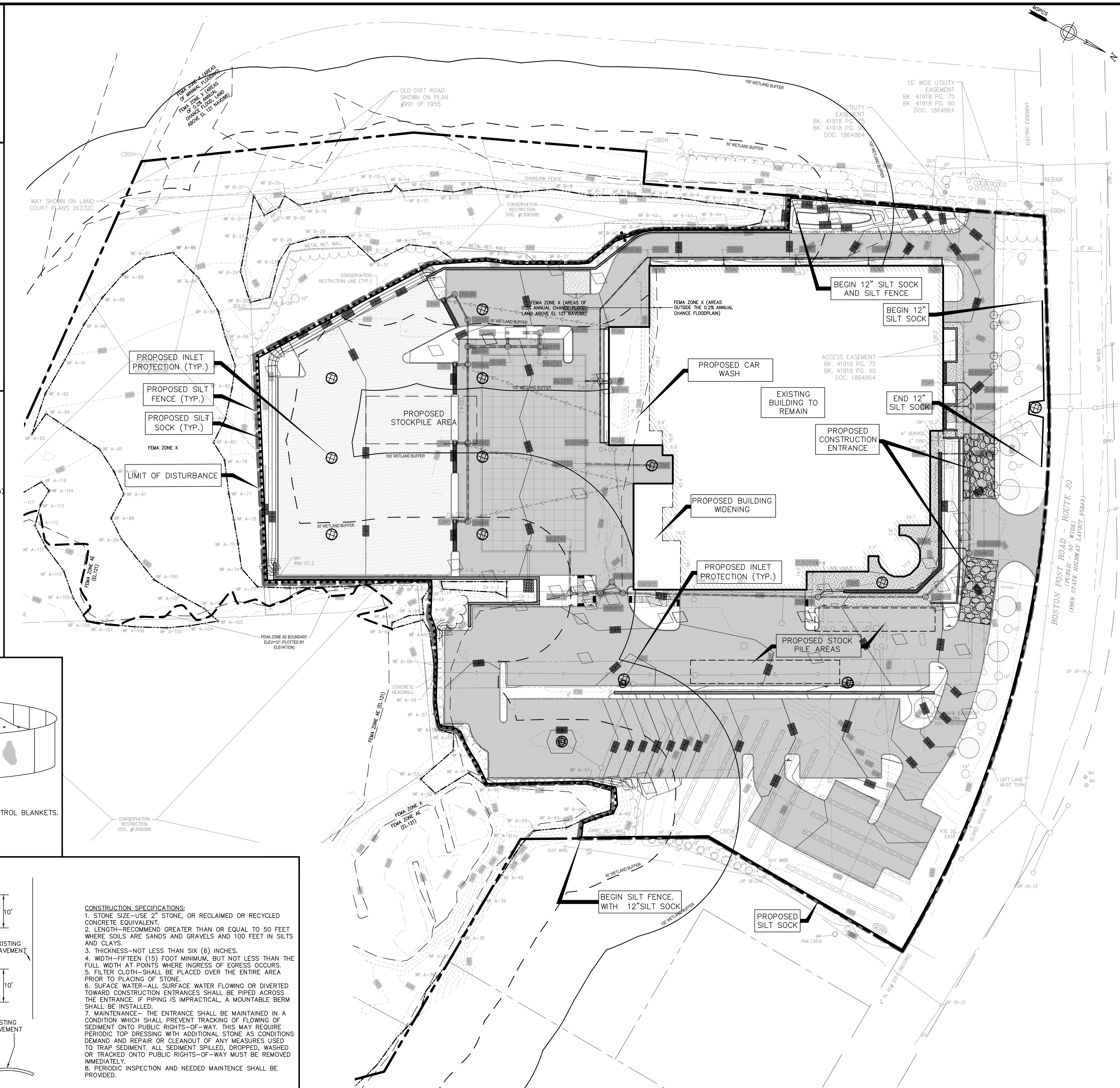
NOT TO SCALE



CONSTRUCTION SPECIFICATIONS:
1. STONE SIZE–USE 2" STONE, OR RECLAIMED OR RECYCLED CONCRETE EQUIVALENT.
2. LENGTH–RECOMMEND GREATER THAN OR EQUAL TO 50 FEET WHERE SOILS ARE SANDS AND GRAVELS AND 100 FEET IN SILTS AND CLAYS.
3. THICKNESS–NOT LESS THAN SIX (6) INCHES.
4. WIDTH–FIFTEEN (15) FOOT MINIMUM, BUT NOT LESS THAN THE FULL WIDTH AT POINTS WHERE INGRESS OF EGRESS OCCURS.
5. FILTER CLOTH–SHALL BE PLACED OVER THE ENTIRE AREA PRIOR TO PLACING OF STONE.
6. SUFACE WATER–ALL SURFACE WATER FLOWING OR DIVERTED TOWARD CONSTRUCTION ENTRANCES SHALL BE PIPED ACROSS THE ENTRANCE. IF PIPING IS IMPRACTICAL, A MOUNTABLE BERM SHALL BE INSTALLED.
7. MAINTENANCE– THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH SHALL PREVENT TRACKING OF FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS–OF–WAY. THIS MAY REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL STONE AS CONDITIONS DEMAND AND REPAIR OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT. ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ONTO PUBLIC RIGHTS–OF–WAY MUST BE REMOVED IMMEDIATELY.
8. PERIODIC INSPECTION AND NEEDED MAINTENCE SHALL BE PROVIDED.

CONSTRUCTION ENTRANCE

NOT TO SCALE



GENERAL NOTES

1. CONTRACTOR TO ABIDE BY PROVISIONS OF EPA NOI NPDES STORMWATER POLLUTION PREVENTION PLAN (SWPPP) AND BY STORMWATER MANAGEMENT OPERATION AND MAINTENANCE PLAN AS PREPARED BY CROCKER DESIGN GROUP, LLC.

2. ALL TEMPORARY STOCKPILE AREAS SHALL HAVE EROSION CONTROLS (SILT SOCK AND SILT FENCE) AROUND THE PERIMETER.

3. UNDERGROUND UTILITIES MAY EXIST THAT ARE NOT SHOWN ON THIS PLAN. DIG SAFE MUST BE NOTIFIED (1-800-344-7233) AT LEAST 72 HOURS PRIOR TO ANY CONSTRUCTION.

4. ALL SEDIMENTATION AND EROSION CONTROL MEASURES SHALL BE MAINTAINED THROUGHOUT THE CONSTRUCTION PERIOD. SEDIMENTATION AND EROSION CONTROL MEASURES SHALL BE IN PLACE AND OBSERVED PRIOR TO ANY WORK STARTING ON THE PROJECT.

5. SITE ENTRY AND EXIT LOCATIONS SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC ROADWAYS. ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ON A PUBLIC ROADWAY MUST BE REMOVED IMMEDIATELY. WHEN WASHING IS REQUIRED TO REMOVE SEDIMENT PRIOR TO ENTRANCE TO A PUBLIC ROADWAY, IT SHALL BE DONE ON AN AREA STABILIZED WITH CRUSHED STONE WHICH DRAINS INTO AN APPROVED SEDIMENT BASIN. ALL FINES IMPOSED FOR TRACKING ONTO PUBLIC ROADS SHALL BE PAID BY THE CONTRACTOR.

6. TEMPORARY SEEDING OR OTHER METHOD OF STABILIZATION SHALL BE INITIATED WITHIN 14 DAYS OF THE LAST DISTURBANCE ON ANY AREA OF THE SITE, UNLESS ADDITIONAL CONSTRUCTION OF THE AREAS IS EXPECTED WITHIN 21 DAYS OF THE LAST DISTURBANCE.

7. UPON COMPLETION OF FINE GRADING, ALL AREAS NOT OTHERWISE PERMANENTLY STABILIZED SHALL BE SEEDED AND MAINTAINED UNTIL A UNIFORM COVERAGE OF 75%± MINIMUM DENSITY, AS DETERMINED BY THE OWNER'S REPRESENTATIVE, IS ACHIEVED.

8. MAINTENANCE - EROSION CONTROLS SHALL BE REPAIRED OR REPLACED AS INSPECTION DEEMS NECESSARY OR AS DIRECTED BY THE ENGINEER OR ARCHITECT. ACCUMULATED SILT AT ANY EROSION CONTROL DEVICE SHALL BE REMOVED WHEN IT REACHES A DEPTH OF 6", AND SHALL BE DISTRIBUTED ON-SITE IN A MANNER NOT CONTRIBUTING TO ADDITIONAL SILTATION.

9. ANY CONTRACTOR IS RESPONSIBLE FOR REESTABLISHING ANY EROSION CONTROL DEVICE

(CONTINUATION OF GENERAL NOTES)

WHICH HE DISTURBS. EACH CONTRACTOR SHALL NOTIFY THE ENGINEER/ARCHITECT OF ANY DEFICIENCIES IN THE ESTABLISHED EROSION CONTROL MEASURES WHICH MAY LEAD TO UNAUTHORIZED DISCHARGE OR STORM WATER POLLUTION, SEDIMENTATION OR OTHER POLLUTANTS. UNAUTHORIZED POLLUTANTS INCLUDE, BUT ARE NOT LIMITED TO, EXCESS CONCRETE DUMPING OR CONCRETE RESIDUE, PAINTS, SOLVENTS, GREASE, FUEL AND LUBE OIL, PESTICIDES, ANY SOLID WASTE MATERIALS.

9. ALL SIDE SLOPES SHALL BE SEEDED WITH GRASS OR INSTALL JUTE NETTING TO PREVENT EROSION.

10. INSPECTIONS: INSPECTIONS ARE TO BE PERFORMED BY QUALIFIED PERSONNEL. DISTURBED AREAS THAT HAVE NOT BEEN FINALLY STABILIZED, AREAS USED FOR STORAGE, STRUCTURAL CONTROL MEASURES, AND LOCATIONS WHERE VEHICLES ENTER OR EXIT THE SITE, MUST BE INSPECTED ONCE EVERY 7 DAYS AND WITHIN 24 HOURS OF A STORM EVEN OF 0.5 INCHES OR GREATER. STABILIZED AREAS ARE TO BE INSPECTED ONCE PER MONTH DISTURBED AREAS AND STORAGE AREAS EXPOSED TO PRECIPITATION SHALL BE INSPECTED FOR EVIDENCE OF OR POTENTIAL FOR POLLUTANTS ENTERING THE DRAINAGE SYSTEM. CONTROL MEASURES SHALL BE OBSERVED TO ENSURE THEY ARE WORKING PROPERLY. DISCHARGE LOCATIONS AND POINTS SHALL BE INSPECTED TO ASCERTAIN WHETHER CONTROLS ARE PREVENTING SIGNIFICANT IMPACT. BASED ON THE RESULTS OF THE ABOVE INSPECTIONS, ANY NECESSARY CHANGES TO THE PLAN WILL BE MADE WITHIN 7 DAYS OF THE INSPECTION AND SUBMITTED TO THE TOWN OF SUDBURY PLANNING BOARD. THE CHANGES MUST BE IMPLEMENTED IN THE FIELD BEFORE THE NEXT STORM EVEN IF PRACTICABLE, OTHERWISE AS SOON AS POSSIBLE.

11. INSTALL AND MAINTAIN CATCH BASIN INSERTS IN ALL PROPOSED AND EXISTING CATCH BASINS.

12. PROVIDE TEMPORARY SEDIMENTATION BASINS, SILT SOCK, ETC. AS NECESSARY.

13. STOCKPILES ARE TO BE AT LEAST 100 FEET FROM WETLAND AREAS. STOCKPILES NOT TO BE REUSED WITHIN 30 DAYS ARE TO BE STABILIZED WITH SEED OR MULCH.

14. POTENTIAL STOCK PILE AREA TO BE PROTECTED WITH EROSION CONTROL MEASURES.

15. THE CONTRACTOR SHALL HAVE A WATER TRUCK ON-SITE AT ALL TIMES AND SHALL PROVIDE TEMPORARY PLANTINGS OR OTHER COVERINGS, SUCH AS WOOD CHIPS, TO MINIMIZE THE AMOUNT OF DUST LEAVING THE PREMISES.

CONSTRUCTION PHASING

1. BELOW IS A GENERAL CONSTRUCTION PHASING. A MORE DETAILED SCHEDULE IS PRESENTED IN THE STORMWATER POLLUTION PREVENTION PLAN (SWPPP).

2. CENTERLINE OF ROAD AND EXTENTS OF CONSTRUCTION TO BE DELINEATED BY CONTRACTOR.

3. EROSION AND SEDIMENTATION CONTROL MEASURES INCLUDING SILT SOCK AND SILT FENCE (OR OPTIONAL FILTER SACK IN LIEU OF SILT SOCK AND SILT FENCE) WILL BE INSTALLED. CONTRACTOR SHALL INSPECT CONTROL MEASURES MONTHLY AND AFTER RAIN EVENTS OF 0.5" OR GREATER.

4. THE PROJECT AREA WILL BE CLEARED OF DEBRIS AND BOULDERS. MATERIAL REMOVED FROM THE SITE WILL BE TRANSPORTED TO AN APPROPRIATE FACILITY OR WILL BE DISPOSED OF ELSEWHERE ACCORDING TO FEDERAL, STATE, AND LOCAL GUIDELINES. INACTIVE STOCKPILES OR AREAS OF GRANULAR MATERIAL OR TOPSOIL SHALL BE TEMPORARILY SEEDED OR MULCHED IN ORDER TO CONTROL SEDIMENT LADEN RUNOFF.

5. CONTRACTOR IS RESPONSIBLE TO SET OUT UTILITIES AND ANY NECESSARY GRADES.

6. GRADING OF SITE INCLUDING BUILDING PADS, PARKING AREAS, AND DETENTION BASINS AND DIGGING OF UTILITY TRENCHES TO DEFINED INVERT LEVELS. MATERIAL TO BE STORED ON AN UNUSED SITE AREA FOR FILL OR PROPERLY REMOVED FROM THE JOB SITE. IF SUITABLE TOPSOIL IS FOUND, IT WILL BE REMOVED AND STOCKPILED IN AN UPLAND AREA AT LEAST 100' FROM WETLANDS TO BE REUSED AS TOPSOIL ON THE PROJECT.

7. PLACING OF FILL OR SUITABLE MATERIAL ON ALL ACCESS ROADS FOR EASY ACCESS. SETTING OUT OF FOUNDATIONS AND SURROUNDING ROADS.

8. LAYING OF ALL UTILITIES INCLUDING DRAINAGE PIPES AND STRUCTURES FOLLOWED BY BACK-FILL, TAKING CARE TO LEAVE ONLY TRENCHES BEING WORKED ON OPEN.

9. FINE GRADING FOR THE PARKING AREAS, ROADWAYS, AND DRAINAGE BASINS TO BE COMPLETED.

10. DRAINAGE BASIN VEGETATION TO BE ESTABLISHED PRIOR TO DISCHARGE FROM CONSTRUCTED DRAINAGE STRUCTURES.

11. ONCE THE DRAINAGE STRUCTURES ARE INSTALLED, PROVIDE PROTECTION AT ALL CATCH BASINS AND INLETS TO PREVENT SEDIMENT FROM ENTERING THE DRAINAGE SYSTEM.

12. INSTALL BINDER COURSE AND SPREAD TOPSOIL AS NEEDED.

13. LIGHT POLES, SIGNAGE, ETC. WILL BE INSTALLED.

14. INSTALL TOP COURSE OF PAVING AND SIDEWALK.

15. THE FINAL PHASE OF CONSTRUCTION IS RESTORATION AND STABILIZATION OF ALL EXPOSED SURFACES. DISTURBED AREAS SHALL BE LANDSCAPED OR SEEDED (SEE ADDITIONAL DISCUSSION IN SWPPP). IN THE EVENT THAT WEATHER CONDITIONS PREVENT FINAL STABILIZATION, TEMPORARY EROSION AND SEDIMENTATION MEASURES WILL BE EMPLOYED UNTIL THE TEMPERATURE AND WEATHER IS SUITABLE FOR GRASS GROWING. A FINAL INSPECTION WILL ENSURE THAT THE SITE IS CLEARED OF ALL PROJECT DEBRIS AND THAT EROSION AND SEDIMENTATION CONTROLS ARE FUNCTIONING PROPERLY. SILT SOCK AND SILT FENCE WILL REMAIN IN PLACE UNTIL THE SITE IS FULLY STABILIZED AND THE SITE HAS PASSED FINAL INSPECTION. VEGETATION IS TO BE OF A UNIFORM DENSITY OF AT LEAST 75% FOR ACCEPTANCE.

40 20 0 40 80

Date	Description	No.

Revisions

GABRIEL R. CROCKER
PROFESSIONAL ENGINEER, MA REGISTRATION #47917

Crocker Design Group
2 SHARP STREET, UNIT B
HINGHAM, MA 02043
P: 781-919-0808

Project
HERB CHAMBERS MERCEDES OF SUDBURY
141 BOSTON POST ROAD, SUDBURY, MA

Prepared for
HERB CHAMBERS
#83 BOSTON POST ROAD - ROUTE 20
SUDBURY, MA 01776

Drawing Title
SOIL EROSION AND SEDIMENT CONTROL PLAN

Project No.	100-107
Date	8/6/2021
Scale	1"=40'
Drawn By	DJN / JPM
Approved By	GC

Drawing No.
C-2

Appendix B – Copy of 2017 CGP

National Pollutant Discharge Elimination System
General Permit for Discharges from
Construction Activities
(as modified)

In compliance with the provisions of the Clean Water Act, 33 U.S.C. §1251 et. seq., (hereafter CWA), as amended by the Water Quality Act of 1987, P.L. 100-4, "operators" of construction activities (defined in Appendix A) that meet the requirements of Part 1.1 of this National Pollutant Discharge Elimination System (NPDES) general permit, are authorized to discharge pollutants in accordance with the effluent limitations and conditions set forth herein. Permit coverage is required from the "commencement of construction activities" (see Appendix A) until one of the conditions for terminating CGP coverage has been met (see Part 8.2).

This permit becomes effective on **June 27, 2019**.

This permit and the authorization to discharge expire at 11:59pm, **February 16, 2022.**

Signed and issued this 14th day of May 2019
Deborah Szaro,
Acting Regional Administrator, EPA Region 1.

Signed and issued this 14th day of May 2019
Jeff Gratz,
Deputy Director, Water Division, EPA Region 2.

Signed and issued this 14th day of May 2019
Jose C. Font,
Acting Director, Caribbean Environmental Protection Division, EPA Region 2.

Signed and issued this 14th day of May 2019
Catharine McManus,
Deputy Director, Water Division, EPA Region 3.

Signed and issued this 14th day of May 2019
Jeaneanne M. Gettle,
Director, Water Division, EPA Region 4.

Signed and issued this 14th day of May 2019
Joan M. Tanaka,
Acting Director, Water Division, EPA Region 5.

Signed and issued this 14th day of May 2019
Charles W. Maguire,
Director, Water Division, EPA Region 6.

Signed and issued this 14th day of May 2019
Jeffery Robichaud,
Director, Water Division, EPA Region 7.

Signed and issued this 14th day of May 2019
Darcy O'Connor,
Director, Water Division, EPA Region 8.

Signed and issued this 14th day of May 2019
Tomás Torres,
Director, Water Division, EPA Region 9.

Signed and issued this 14th day of May 2019
Daniel D. Opalski,
Director, Water Division, EPA Region 10.

CONTENTS

1 HOW TO OBTAIN COVERAGE UNDER THE CONSTRUCTION GENERAL PERMIT (CGP)

To be covered under this permit, you must meet the eligibility conditions and follow the requirements for obtaining permit coverage in this Part.

1.1 ELIGIBILITY CONDITIONS

1.1.1 You are an "operator" of a construction site for which discharges will be covered under this permit. For the purposes of this permit and in the context of stormwater discharges associated with construction activity, an "operator" is any party associated with a construction project that meets either of the following two criteria:

a. The party has operational control over construction plans and specifications, including the ability to make modifications to those plans and specifications; or

b. The party has day-to-day operational control of those activities at a project that are necessary to ensure compliance with the permit conditions.

Where there are multiple operators associated with the same project, all operators must obtain permit coverage.[1] Subcontractors generally are not considered operators for the purposes of this permit.

1.1.2 Your site's construction activities:

a. Will disturb one or more acres of land, or will disturb less than one acre of land but are part of a common plan of development or sale that will ultimately disturb one or more acres of land; or

b. Have been designated by EPA as needing permit coverage under 40 CFR 122.26(a)(1)(v) or 40 CFR 122.26(b)(15)(ii);

1.1.3 Your site is located in an area where EPA is the permitting authority (see Appendix B);

1.1.4 Discharges from your site are not:

a. Already covered by a different NPDES permit for the same discharge; or

b. In the process of having coverage under a different NPDES permit for the same discharge denied, terminated, or revoked.[2, 3]

1.1.5 You are able to demonstrate that you meet one of the criteria listed in Appendix D with respect to the protection of species that are federally listed as endangered or threatened under the Endangered Species Act (ESA) and federally designated critical habitat;

1.1.6 You have completed the screening process in Appendix E relating to the protection of historic properties; and

[1] If the operator of a "construction support activity" (see Part 1.2.1c) is different than the operator of the main site, that operator must also obtain permit coverage. See Part 7.1 for clarification on the sharing of permit-related functions between and among operators on the same site and for conditions that apply to developing a SWPPP for multiple operators associated with the same site.

[2] Parts 1.1.4a and 1.1.4b do not include sites currently covered under the 2012 CGP that are in the process of obtaining coverage under this permit, nor sites covered under this permit that are transferring coverage to a different operator.

[3] Notwithstanding a site being made ineligible for coverage under this permit because it falls under the description of Parts 1.1.4a or 1.1.4b, above, EPA may waive the applicable eligibility requirement after specific review if it determines that coverage under this permit is appropriate.

1.1.7 You have complied with all requirements in Part 9 imposed by the applicable state, Indian tribe, or territory in which your construction activities and/or discharge will occur.

1.1.8 For "new sources" (as defined in Appendix A) only:

a. EPA has not, prior to authorization under this permit, determined that discharges from your site will cause, have the reasonable potential to cause, or contribute to an excursion above any applicable water quality standard. Where such a determination is made prior to authorization, EPA may notify you that an individual permit application is necessary. However, EPA may authorize your coverage under this permit after you have included appropriate controls and implementation procedures designed to bring your discharge into compliance with this permit, specifically the requirement to meet water quality standards. In the absence of information demonstrating otherwise, EPA expects that compliance with the requirements of this permit, including the requirements applicable to such discharges in Part 3, will result in discharges that will not cause, have the reasonable potential to cause, or contribute to an excursion above any applicable water quality standard.

b. Discharges from your site to a Tier 2, Tier 2.5, or Tier 3 water[4] will not lower the water quality of the applicable water. In the absence of information demonstrating otherwise, EPA expects that compliance with the requirements of this permit, including the requirements applicable to such discharges in Part 3.2, will result in discharges that will not lower the water quality of such waters.

1.1.9 If you plan to add "cationic treatment chemicals" (as defined in Appendix A) to stormwater and/or authorized non-stormwater prior to discharge, you may not submit your Notice of Intent (NOI) unless and until you notify your applicable EPA Regional Office (see Appendix L) in advance and the EPA Regional Office authorizes coverage under this permit after you have included appropriate controls and implementation procedures designed to ensure that your use of cationic treatment chemicals will not lead to discharges that cause an exceedance of water quality standards.

1.2 TYPES OF DISCHARGES AUTHORIZED[5]

1.2.1 The following stormwater discharges are authorized under this permit provided that appropriate stormwater controls are designed, installed, and maintained (see Parts 2 and 3):

a. Stormwater discharges, including stormwater runoff, snowmelt runoff, and surface runoff and drainage, associated with construction activity under 40 CFR 122.26(b)(14) or 122.26(b)(15)(i);

b. Stormwater discharges designated by EPA as needing a permit under 40 CFR 122.26(a)(1)(v) or 122.26(b)(15)(ii);

[4] Note: Your site will be considered to discharge to a Tier 2, Tier 2.5, or Tier 3 water if the first water to which you discharge is identified by a state, tribe, or EPA as a Tier 2, Tier 2.5, or Tier 3 water. For discharges that enter a storm sewer system prior to discharge, the first water of the U.S. to which you discharge is the waterbody that receives the stormwater discharge from the storm sewer system. See list of Tier 2, Tier 2.5, and Tier 3 waters in Appendix F.

[5] See "Discharge" as defined in Appendix A. Note: Any discharges not expressly authorized in this permit cannot become authorized or shielded from liability under CWA section 402(k) by disclosure to EPA, state, or local authorities after issuance of this permit via any means, including the Notice of Intent (NOI) to be covered by the permit, the SWPPP, or during an inspection.

c. Stormwater discharges from construction support activities *(e.g., concrete or asphalt batch plants, equipment staging yards, material storage areas, excavated material disposal areas, borrow areas)* provided that:

   i. The support activity is directly related to the construction site required to have permit coverage for stormwater discharges;

   ii. The support activity is not a commercial operation, nor does it serve multiple unrelated construction sites;

   iii. The support activity does not continue to operate beyond the completion of the construction activity at the site it supports; and

   iv. Stormwater controls are implemented in accordance with Part 2 and Part 3 for discharges from the support activity areas.

d. Stormwater discharges from earth-disturbing activities associated with the construction of staging areas and the construction of access roads conducted prior to active mining.

1.2.2 The following non-stormwater discharges associated with your construction activity are authorized under this permit provided that, with the exception of water used to control dust and to irrigate vegetation in stabilized areas, these discharges are not routed to areas of exposed soil on your site and you comply with any applicable requirements for these discharges in Parts 2 and 3:

a. Discharges from emergency fire-fighting activities;

b. Fire hydrant flushings;

c. Landscape irrigation;

d. Water used to wash vehicles and equipment, provided that there is no discharge of soaps, solvents, or detergents used for such purposes;

e. Water used to control dust;

f. Potable water including uncontaminated water line flushings;

g. External building washdown, provided soaps, solvents, and detergents are not used, and external surfaces do not contain hazardous substances (as defined in Appendix A) *(e.g., paint or caulk containing polychlorinated biphenyls (PCBs))*;

h. Pavement wash waters, provided spills or leaks of toxic or hazardous substances have not occurred (unless all spill material has been removed) and where soaps, solvents, and detergents are not used. You are prohibited from directing pavement wash waters directly into any water of the U.S., storm drain inlet, or stormwater conveyance, unless the conveyance is connected to a sediment basin, sediment trap, or similarly effective control;

i. Uncontaminated air conditioning or compressor condensate;

j. Uncontaminated, non-turbid discharges of ground water or spring water;

k. Foundation or footing drains where flows are not contaminated with process materials such as solvents or contaminated ground water; and

l. Construction dewatering water discharged in accordance with Part 2.4.

1.2.3 Also authorized under this permit are discharges of stormwater listed above in Part 1.2.1, or authorized non-stormwater discharges listed above in Part 1.2.2, commingled with a discharge authorized by a different NPDES permit and/or a discharge that does not require NPDES permit authorization.

1.3 PROHIBITED DISCHARGES[6]

1.3.1 Wastewater from washout of concrete, unless managed by an appropriate control as described in Part 2.3.4;

1.3.2 Wastewater from washout and cleanout of stucco, paint, form release oils, curing compounds, and other construction materials;

1.3.3 Fuels, oils, or other pollutants used in vehicle and equipment operation and maintenance;

1.3.4 Soaps, solvents, or detergents used in vehicle and equipment washing or external building washdown; and

1.3.5 Toxic or hazardous substances from a spill or other release.

To prevent the above-listed prohibited non-stormwater discharges, operators must comply with the applicable pollution prevention requirements in Part 2.3.

1.4 SUBMITTING YOUR NOTICE OF INTENT (NOI)

All "operators" (as defined in Appendix A) associated with your construction site, who meet the Part 1.1 eligibility requirements, and who seek coverage under this permit, must submit to EPA a complete and accurate NOI in accordance with the deadlines in **Table 1** prior to commencing construction activities.

Exception*:* If you are conducting construction activities in response to a public emergency *(e.g., mud slides, earthquake, extreme flooding conditions, widespread disruption in essential public services)*, and the related work requires immediate authorization to avoid imminent endangerment to human health, public safety, or the environment, or to reestablish essential public services, you may discharge on the condition that a complete and accurate NOI is submitted within 30 calendar days after commencing construction activities (see Table 1) establishing that you are eligible for coverage under this permit. You must also provide documentation in your Stormwater Pollution Prevention Plan (SWPPP) to substantiate the occurrence of the public emergency.

1.4.1 Prerequisite for Submitting Your NOI

You must develop a SWPPP consistent with Part 7 before submitting your NOI for coverage under this permit.

1.4.2 How to Submit Your NOI

You must use EPA's NPDES eReporting Tool (NeT) to electronically prepare and submit your NOI for coverage under the 2017 CGP, unless you received a waiver from your EPA Regional Office.

To access NeT, go to https://www.epa.gov/npdes/stormwater-discharges-construction-activities#ereporting.

Waivers from electronic reporting may be granted based on one of the following conditions:

[6] EPA includes these prohibited non-stormwater discharges here as a reminder to the operator that the only non-stormwater discharges authorized by this permit are at Part 1.2.2. Any unauthorized non-stormwater discharges must be covered under an individual permit or alternative general permit.

a. If your operational headquarters is physically located in a geographic area (*i.e., ZIP code or census tract*) that is identified as under-served for broadband Internet access in the most recent report from the Federal Communications Commission; or

b. If you have limitations regarding available computer access or computer capability.

If the EPA Regional Office grants you approval to use a paper NOI, and you elect to use it, you must complete the form in Appendix J.

1.4.3 Deadlines for Submitting Your NOI and Your Official Date of Permit Coverage

Table 1 provides the deadlines for submitting your NOI and the official start date of your permit coverage, which differ depending on when you commence construction activities.

Table 1 NOI Submittal Deadlines and Official Start Date for Permit Coverage.

Type of Operator	NOI Submittal Deadline[7]	Permit Authorization Date[8]
Operator of a new site (*i.e., a site where construction activities commence on or after February 16, 2017*)	At least 14 calendar days before commencing construction activities.	14 calendar days after EPA notifies you that it has received a complete NOI, unless EPA notifies you that your authorization is delayed or denied.
Operator of an existing site (*i.e., a site with 2012 CGP coverage where construction activities commenced prior to February 16, 2017*)	No later than **May 17, 2017**.	
New operator of a permitted site (*i.e., an operator that through transfer of ownership and/or operation replaces the operator of an already permitted construction site that is either a "new site" or an "existing site"*)	At least 14 calendar days before the date the transfer to the new operator will take place.	
Operator of an "emergency-related project" (*i.e., a project initiated in response to a public emergency (e.g., mud slides, earthquake, extreme flooding conditions, disruption in essential public services), for which the related work requires immediate authorization to avoid imminent endangerment to human health or the environment, or to reestablish essential public services*)	No later than 30 calendar days after commencing construction activities.	You are considered provisionally covered under the terms and conditions of this permit immediately, and fully covered 14 calendar days after EPA notifies you that it has received a complete NOI, unless EPA notifies you that your authorization is delayed or denied.

1.4.4 Modifying your NOI

[7] If you miss the deadline to submit your NOI, any and all discharges from your construction activities will continue to be unauthorized under the CWA until they are covered by this or a different NPDES permit. EPA may take enforcement action for any unpermitted discharges that occur between the commencement of construction activities and discharge authorization.

[8] Discharges are not authorized if your NOI is incomplete or inaccurate or if you are not eligible for permit coverage.

If after submitting your NOI you need to correct or update any fields, you may do so by submitting a "Change NOI" form using NeT. Waivers from electronic reporting may be granted as specified in Part 1.4.1. If the EPA Regional Office has granted you approval to submit a paper NOI modification, you may indicate any NOI changes on the same NOI form in Appendix J.

When there is a change to the site's operator, the new operator must submit a new NOI, and the previous operator must submit a Notice of Termination (NOT) form as specified in Part 8.3.

1.4.5 Your Official End Date of Permit Coverage

Once covered under this permit, your coverage will last until the date that:

a. You terminate permit coverage consistent with Part 8; or

b. You receive permit coverage under a different NPDES permit or a reissued or replacement version of this permit after expiring on February 16, 2022; or

c. You fail to submit an NOI for coverage under a revised or replacement version of this permit before the deadline for existing construction sites where construction activities continue after this permit has expired.

1.5 REQUIREMENT TO POST A NOTICE OF YOUR PERMIT COVERAGE

You must post a sign or other notice of your permit coverage at a safe, publicly accessible location in close proximity to the construction site. The notice must be located so that it is visible from the public road that is nearest to the active part of the construction site, and it must use a font large enough to be readily viewed from a public right-of-way.[9] At a minimum, the notice must include:

a. The NPDES ID (*i.e., permit tracking number assigned to your NOI*);

b. A contact name and phone number for obtaining additional construction site information;

c. The Uniform Resource Locator (URL) for the SWPPP (if available), or the following statement: "If you would like to obtain a copy of the Stormwater Pollution Prevention Plan (SWPPP) for this site, contact the EPA Regional Office at [*include the appropriate CGP Regional Office contact information found at https://www.epa.gov/npdes/contact-us-stormwater#regional*];" and

d. The following statement "If you observe indicators of stormwater pollutants in the discharge or in the receiving waterbody, contact the EPA through the following website: https://www.epa.gov/enforcement/report-environmental-violations."

2 TECHNOLOGY-BASED EFFLUENT LIMITATIONS

You must comply with the following technology-based effluent limitations in this Part for all authorized discharges.[10]

[9] If the active part of the construction site is not visible from a public road, then place the notice of permit coverage in a position that is visible from the nearest public road and as close as possible to the construction site.

[10] For each of the effluent limits in Part 2, as applicable to your site, you must include in your SWPPP (1) a description of the specific control(s) to be implemented to meet the effluent limit; (2) any applicable design specifications; (3) routine maintenance specifications; and (4) the projected schedule for its (their)

2.1 GENERAL STORMWATER CONTROL DESIGN, INSTALLATION, AND MAINTENANCE REQUIREMENTS

You must design, install, and maintain stormwater controls required in Parts 2.2 and 2.3 to minimize the discharge of pollutants in stormwater from construction activities. To meet this requirement, you must:

2.1.1 Account for the following factors in designing your stormwater controls:

a. The expected amount, frequency, intensity, and duration of precipitation;

b. The nature of stormwater runoff and run-on at the site, including factors such as expected flow from impervious surfaces, slopes, and site drainage features. You must design stormwater controls to control stormwater volume, velocity, and peak flow rates to minimize discharges of pollutants in stormwater and to minimize channel and streambank erosion and scour in the immediate vicinity of discharge points; and

c. The soil type and range of soil particle sizes expected to be present on the site.

2.1.2 Design and install all stormwater controls in accordance with good engineering practices, including applicable design specifications.[11]

2.1.3 Complete installation of stormwater controls by the time each phase of construction activities has begun.

a. By the time construction activity in any given portion of the site begins, install and make operational any downgradient sediment controls (*e.g., buffers, perimeter controls, exit point controls, storm drain inlet protection*) that control discharges from the initial site clearing, grading, excavating, and other earth-disturbing activities.[12]

b. Following the installation of these initial controls, install and make operational all stormwater controls needed to control discharges prior to subsequent earth-disturbing activities.

2.1.4 Ensure that all stormwater controls are maintained and remain in effective operating condition during permit coverage and are protected from activities that would reduce their effectiveness.

a. Comply with any specific maintenance requirements for the stormwater controls listed in this permit, as well as any recommended by the manufacturer.[13]

b. If at any time you find that a stormwater control needs routine maintenance, you must immediately initiate the needed maintenance work, and complete such work by the close of the next business day.

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installation/implementation. See Part 7.2.6.

[11] Design specifications may be found in manufacturer specifications and/or in applicable erosion and sediment control manuals or ordinances. Any departures from such specifications must reflect good engineering practices and must be explained in your SWPPP. You must also comply with any additional design and installation requirements specified for the effluent limits in Parts 2.2 and 2.3.

[12] Note that the requirement to install stormwater controls prior to each phase of construction activities for the site does not apply to the earth disturbance associated with the actual installation of these controls. Operators should take all reasonable actions to minimize the discharges of pollutants during the installation of stormwater controls.

[13] Any departures from such maintenance recommendations made by the manufacturer must reflect good engineering practices and must be explained in your SWPPP.

c. If at any time you find that a stormwater control needs repair or replacement, you must comply with the corrective action requirements in Part 5.

2.2 EROSION AND SEDIMENT CONTROL REQUIREMENTS

You must implement erosion and sediment controls in accordance with the following requirements to minimize the discharge of pollutants in stormwater from construction activities.

2.2.1 Provide and maintain natural buffers and/or equivalent erosion and sediment controls when a water of the U.S. is located within 50 feet of the site's earth disturbances.

a. **Compliance Alternatives.** For any discharges to waters of the U.S. located within 50 feet of your site's earth disturbances, you must comply with one of the following alternatives:

   i. Provide and maintain a 50-foot undisturbed natural buffer; or

   ii. Provide and maintain an undisturbed natural buffer that is less than 50 feet and is supplemented by erosion and sediment controls that achieve, in combination, the sediment load reduction equivalent to a 50-foot undisturbed natural buffer; or

   iii. If infeasible to provide and maintain an undisturbed natural buffer of any size, implement erosion and sediment controls to achieve the sediment load reduction equivalent to a 50-foot undisturbed natural buffer.

   See Appendix G, Part G.2 for additional conditions applicable to each compliance alternative.

b. **Exceptions.** See Appendix G, Part G.2 for exceptions to the compliance alternatives.

2.2.2 Direct stormwater to vegetated areas and maximize stormwater infiltration and filtering to reduce pollutant discharges, unless infeasible.

2.2.3 Install sediment controls along any perimeter areas of the site that will receive pollutant discharges.[14]

a. Remove sediment before it has accumulated to one-half of the above-ground height of any perimeter control.

b. **Exception**. For areas at "linear construction sites" (as defined in Appendix A) where perimeter controls are infeasible *(e.g., due to a limited or restricted right-of-way),* implement other practices as necessary to minimize pollutant discharges to perimeter areas of the site.

2.2.4 Minimize sediment track-out.

a. Restrict vehicle use to properly designated exit points;

b. Use appropriate stabilization techniques[15] at all points that exit onto paved roads.

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[14] Examples of perimeter controls include filter berms, silt fences, vegetative strips, and temporary diversion dikes.

[15] Examples of appropriate stabilization techniques include the use of aggregate stone with an underlying geotextile or non-woven filter fabric, and turf mats.

i. **Exception**: Stabilization is not required for exit points at linear utility construction sites that are used only episodically and for very short durations over the life of the project, provided other exit point controls[16] are implemented to minimize sediment track-out;

c. Implement additional track-out controls[17] as necessary to ensure that sediment removal occurs prior to vehicle exit; and

d. Where sediment has been tracked-out from your site onto paved roads, sidewalks, or other paved areas outside of your site, remove the deposited sediment by the end of the same business day in which the track-out occurs or by the end of the next business day if track-out occurs on a non-business day. Remove the track-out by sweeping, shoveling, or vacuuming these surfaces, or by using other similarly effective means of sediment removal. You are prohibited from hosing or sweeping tracked-out sediment into any stormwater conveyance, storm drain inlet, or water of the U.S.[18]

2.2.5 Manage stockpiles or land clearing debris piles composed, in whole or in part, of sediment and/or soil:

a. Locate the piles outside of any natural buffers established under Part 2.2.1 and away from any stormwater conveyances, drain inlets, and areas where stormwater flow is concentrated;

b. Install a sediment barrier along all downgradient perimeter areas;[19]

c. For piles that will be unused for 14 or more days, provide cover[20] or appropriate temporary stabilization (consistent with Part 2.2.14);

d. You are prohibited from hosing down or sweeping soil or sediment accumulated on pavement or other impervious surfaces into any stormwater conveyance, storm drain inlet, or water of the U.S.

2.2.6 Minimize dust. On areas of exposed soil, minimize dust through the appropriate application of water or other dust suppression techniques to control the generation of pollutants that could be discharged in stormwater from the site.

2.2.7 Minimize steep slope disturbances. Minimize the disturbance of “steep slopes” (as defined in Appendix A).

[16] Examples of other exit point controls include preventing the use of exit points during wet periods; minimizing exit point use by keeping vehicles on site to the extent possible; limiting exit point size to the width needed for vehicle and equipment usage; using scarifying and compaction techniques on the soil; and avoiding establishing exit points in environmentally sensitive areas (*e.g., karst areas; steep slopes).*

[17] Examples of additional track-out controls include the use of wheel washing, rumble strips, and rattle plates.

[18] Fine grains that remain visible *(i.e., staining)* on the surfaces of off-site streets, other paved areas, and sidewalks after you have implemented sediment removal practices are not a violation of Part 2.2.4.

[19] Examples of sediment barriers include berms, dikes, fiber rolls, silt fences, sandbags, gravel bags, or straw bale.

[20] Examples of cover include tarps, blown straw and hydroseeding.

2.2.8 Preserve native topsoil, unless infeasible.[21]

2.2.9 Minimize soil compaction.[22] In areas of your site where final vegetative stabilization will occur or where infiltration practices will be installed:

a. Restrict vehicle and equipment use in these locations to avoid soil compaction; and

b. Before seeding or planting areas of exposed soil that have been compacted, use techniques that rehabilitate and condition the soils as necessary to support vegetative growth.

2.2.10 Protect storm drain inlets.

a. Install inlet protection measures that remove sediment from discharges prior to entry into any storm drain inlet that carries stormwater flow from your site to a water of the U.S., provided you have authority to access the storm drain inlet;[23] and

b. Clean, or remove and replace, the protection measures as sediment accumulates, the filter becomes clogged, and/or performance is compromised. Where there is evidence of sediment accumulation adjacent to the inlet protection measure, remove the deposited sediment by the end of the same business day in which it is found or by the end of the following business day if removal by the same business day is not feasible.

2.2.11 Control stormwater discharges, including both peak flowrates and total stormwater volume, to minimize channel and streambank erosion and scour in the immediate vicinity of discharge points. [24].

2.2.12 If you install a sediment basin or similar impoundment:

a. Situate the basin or impoundment outside of any water of the U.S. and any natural buffers established under Part 2.2.1;

b. Design the basin or impoundment to avoid collecting water from wetlands;

c. Design the basin or impoundment to provide storage for either:

  i. The calculated volume of runoff from a 2-year, 24-hour storm (see Appendix H); or

  ii. 3,600 cubic feet per acre drained.

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[21] Stockpiling topsoil at off-site locations, or transferring topsoil to other locations, is an example of a practice that is consistent with the requirements in Part 2.2.8. Preserving native topsoil is not required where the intended function of a specific area of the site dictates that the topsoil be disturbed or removed. For example, some sites may be designed to be highly impervious after construction, and therefore little or no vegetation is intended to remain, or may not have space to stockpile native topsoil on site for later use, in which case, it may not be feasible to preserve topsoil.

[22] Minimizing soil compaction is not required where the intended function of a specific area of the site dictates that it be compacted.

[23] Inlet protection measures can be removed in the event of flood conditions or to prevent erosion.

[24] Examples of control measures that can be used to comply with this requirement include the use of erosion controls and/or velocity dissipation devices (e.g., check dams, sediment traps), within and along the length of a stormwater conveyance and at the outfall to slow down runoff.

d. Utilize outlet structures that withdraw water from the surface of the sediment basin or similar impoundment, unless infeasible;[25]

e. Use erosion controls and velocity dissipation devices to prevent erosion at inlets and outlets; and

f. Remove accumulated sediment to maintain at least one-half of the design capacity and conduct all other appropriate maintenance to ensure the basin or impoundment remains in effective operating condition.

2.2.13 If using treatment chemicals (*e.g., polymers, flocculants, coagulants*):

a. **Use conventional erosion and sediment controls before and after the application of treatment chemicals.** Chemicals may only be applied where treated stormwater is directed to a sediment control *(e.g., sediment basin, perimeter control)* before discharge.

b. **Select appropriate treatment chemicals**. Chemicals must be appropriately suited to the types of soils likely to be exposed during construction and present in the discharges being treated *(i.e., the expected turbidity, pH, and flow rate of stormwater flowing into the chemical treatment system or area).*

c. **Minimize discharge risk from stored chemicals.** Store all treatment chemicals in leak-proof containers that are kept under storm-resistant cover and surrounded by secondary containment structures *(e.g., spill berms, decks, spill containment pallets),* or provide equivalent measures designed and maintained to minimize the potential discharge of treatment chemicals in stormwater or by any other means *(e.g., storing chemicals in a covered area, having a spill kit available on site and ensuring personnel are available to respond expeditiously in the event of a leak or spill)*.

d. **Comply with state/local requirements.** Comply with applicable state and local requirements regarding the use of treatment chemicals.

e. **Use chemicals in accordance with good engineering practices and specifications of the chemical provider/supplier.** Use treatment chemicals and chemical treatment systems in accordance with good engineering practices, and with dosing specifications and sediment removal design specifications provided by the provider/supplier of the applicable chemicals, or document in your SWPPP specific departures from these specifications and how they reflect good engineering practice.

f. **Ensure proper training.** Ensure that all persons who handle and use treatment chemicals at the construction site are provided with appropriate, product-specific training. Among other things, the training must cover proper dosing requirements.

g. **Perform additional measures specified by the EPA Regional Office for the authorized use of cationic chemicals.** If you have been authorized to use cationic chemicals at your site pursuant to Part 1.1.9, you must perform all additional measures as conditioned by your authorization to ensure that the use of such chemicals will not cause an exceedance of water quality standards.

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[25] The circumstances in which it is infeasible to design outlet structures in this manner are rare. Exceptions may include areas with extended cold weather, where using surface outlets may not be feasible during certain time periods (although they must be used during other periods). If you determine that it is infeasible to meet this requirement, you must provide documentation in your SWPPP to support your determination, including the specific conditions or time periods when this exception will apply.

2.2.14 Stabilize exposed portions of the site. Implement and maintain stabilization measures (*e.g., seeding protected by erosion controls until vegetation is established, sodding, mulching, erosion control blankets, hydromulch, gravel*) that minimize erosion from exposed portions of the site in accordance with Parts 2.2.14a and 2.2.14b.

a. **Stabilization Deadlines:**[26]

Total Amount of Land Disturbance Occurring At Any One Time[27]	Deadline
i. **Five acres or less (≤5.0)** **Note: this includes sites disturbing more than five acres (>5.0) total over the course of a project, but that limit disturbance at any one time *(i.e., phase the disturbance)* to five acres or less (≤5.0)**	• Initiate the installation of stabilization measures immediately[28] in any areas of exposed soil where construction activities have permanently ceased or will be temporarily inactive for 14 or more calendar days;[29] and • Complete the installation of stabilization measures as soon as practicable, but no later than 14 calendar days after stabilization has been initiated.[30]

[26] EPA may determine, based on an inspection carried out under Part 4.8 and corrective actions required under Part 5.3, that the level of sediment discharge on the site makes it necessary to require a faster schedule for completing stabilization. For instance, if sediment discharges from an area of exposed soil that is required to be stabilized are compromising the performance of existing stormwater controls, EPA may require stabilization to correct this problem.

[27] Limiting disturbances to five (5) acres or less at any one time means that at no time during the project do the cumulative earth disturbances exceed five (5) acres. The following examples would qualify as limiting disturbances at any one time to five (5) acres or less:

1. The total area of disturbance for a project is five (5) acres or less.
2. The total area of disturbance for a project will exceed five (5) acres, but the operator ensures that no more than five (5) acres will be disturbed at any one time through implementation of stabilization measures. In this way, site stabilization can be used to "free up" land that can be disturbed without exceeding the five (5)-acre cap to qualify for the 14-day stabilization deadline. For instance, if an operator completes stabilization of two (2) acres of land on a five (5)-acre disturbance, then two (2) additional acres could be disturbed while still qualifying for the longer 14-day stabilization deadline.

[28] The following are examples of activities that would constitute the immediate initiation of stabilization:

1. Prepping the soil for vegetative or non-vegetative stabilization as long as seeding, planting, and/or installation of non-vegetative stabilization products takes place as soon as practicable, but no later than one (1) calendar day of completing soil preparation;
2. Applying mulch or other non-vegetative product to the exposed area;
3. Seeding or planting the exposed area;
4. Starting any of the activities in # 1 – 3 on a portion of the entire area that will be stabilized; and
5. Finalizing arrangements to have stabilization product fully installed in compliance with the deadlines for completing stabilization.

[29] The requirement to initiate stabilization immediately is triggered as soon as you know that construction work on a portion of the site is temporarily ceased and will not resume for 14 or more days, or as soon as you know that construction work is permanently ceased. In the context of this provision, "immediately" means as soon as practicable, but no later than the end of the next business day, following the day when the construction activities have temporarily or permanently ceased.

[30] If vegetative stabilization measures are being implemented, stabilization is considered "installed" when all activities necessary to seed or plant the area are completed. If non-vegetative stabilization measures are being implemented, stabilization is considered "installed" when all such measures are implemented or applied.

ii. **More than five acres (>5.0)**	• Initiate the installation of stabilization measures immediately[31] in any areas of exposed soil where construction activities have permanently ceased or will be temporarily inactive for 14 or more calendar days;[32] and • Complete the installation of stabilization measures as soon as practicable, but no later than seven (7) calendar days after stabilization has been initiated.[33]

iii. **Exceptions:**

(a) Arid, semi-arid, and drought-stricken areas (as defined in Appendix A)**.** If it is the seasonally dry period or a period in which drought is occurring, and vegetative stabilization measures are being used:

(i) Immediately initiate and, within 14 calendar days of a temporary or permanent cessation of work in any portion of your site, complete the installation of temporary non-vegetative stabilization measures to the extent necessary to prevent erosion;

(ii) As soon as practicable, given conditions or circumstances on the site, complete all activities necessary to seed or plant the area to be stabilized; and

(iii) If construction is occurring during the seasonally dry period, indicate in your SWPPP the beginning and ending dates of the seasonally dry period and your site conditions. Also include the schedule you will follow for initiating and completing vegetative stabilization.

(b) Operators that are affected by unforeseen circumstances[34] that delay the initiation and/or completion of vegetative stabilization:

(i) Immediately initiate and, within 14 calendar days, complete the installation of temporary non-vegetative stabilization measures to prevent erosion;

(ii) Complete all soil conditioning, seeding, watering or irrigation installation, mulching, and other required activities related to the planting and initial establishment of vegetation as soon as conditions or circumstances allow it on your site; and

(iii) Document in the SWPPP the circumstances that prevent you from meeting the deadlines in Part 2.2.14a and the schedule you will follow for initiating and completing stabilization.

(c) Discharges to a sediment- or nutrient-impaired water or to a water that is identified by your state, tribe, or EPA as Tier 2, Tier 2.5, or Tier 3 for antidegradation purposes. Complete stabilization as soon as

[31] See footnote 27

[32] See footnote 28

[33] See footnote 29

[34] Examples include problems with the supply of seed stock or with the availability of specialized equipment and unsuitability of soil conditions due to excessive precipitation and/or flooding.

practicable, but no later than seven (7) calendar days after stabilization has been initiated.

b. **Final Stabilization Criteria** (for any areas not covered by permanent structures)**:**

i. Establish uniform, perennial vegetation *(i.e., evenly distributed, without large bare areas)* that provides 70 percent or more of the cover that is provided by vegetation native to local undisturbed areas; and/or

ii. Implement permanent non-vegetative stabilization measures[35] to provide effective cover.

iii. **Exceptions:**

(a) Arid, semi-arid, and drought-stricken areas (as defined in Appendix A). Final stabilization is met if the area has been seeded or planted to establish vegetation that provides 70 percent or more of the cover that is provided by vegetation native to local undisturbed areas within three (3) years and, to the extent necessary to prevent erosion on the seeded or planted area, non-vegetative erosion controls have been applied that provide cover for at least three years without active maintenance.

(b) Disturbed areas on agricultural land that are restored to their preconstruction agricultural use. The Part 2.2.14b final stabilization criteria does not apply.

***(c)* Areas that need to remain disturbed.** In limited circumstances, stabilization may not be required if the intended function of a specific area of the site necessitates that it remain disturbed, and only the minimum area needed remains disturbed *(e.g., dirt access roads, utility pole pads, areas being used for storage of vehicles, equipment, materials).*

2.3 POLLUTION PREVENTION REQUIREMENTS[36]

You must implement pollution prevention controls in accordance with the following requirements to minimize the discharge of pollutants in stormwater and to prevent the discharge of pollutants from spilled or leaked materials from construction activities.

2.3.1 For equipment and vehicle fueling and maintenance:

a. Provide an effective means of eliminating the discharge of spilled or leaked chemicals, including fuels and oils, from these activities;[37]

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[35] Examples of permanent non-vegetative stabilization measures include riprap, gravel, gabions, and geotextiles.

[36] Under this permit, you are not required to minimize exposure for any products or materials where the exposure to precipitation and to stormwater will not result in a discharge of pollutants, or where exposure of a specific material or product poses little risk of stormwater contamination (such as final products and materials intended for outdoor use).

[37] Examples of effective means include:

- Locating activities away from waters of the U.S. and stormwater inlets or conveyances so that stormwater coming into contact with these activities cannot reach waters of the U.S.;
- Providing secondary containment (*e.g., spill berms, decks, spill containment pallets*) and cover where appropriate; and
- Having a spill kit available on site and ensuring personnel are available to respond expeditiously in the event of a leak or spill.

b. If applicable, comply with the Spill Prevention Control and Countermeasures (SPCC) requirements in 40 CFR part 112 and Section 311 of the CWA;

c. Ensure adequate supplies are available at all times to handle spills, leaks, and disposal of used liquids;

d. Use drip pans and absorbents under or around leaky vehicles;

e. Dispose of or recycle oil and oily wastes in accordance with other federal, state, tribal, or local requirements; and

f. Clean up spills or contaminated surfaces immediately, using dry clean up measures (do not clean contaminated surfaces by hosing the area down), and eliminate the source of the spill to prevent a discharge or a continuation of an ongoing discharge.

2.3.2 For equipment and vehicle washing:

a. Provide an effective means of minimizing the discharge of pollutants from equipment and vehicle washing, wheel wash water, and other types of wash waters;[38]

b. Ensure there is no discharge of soaps, solvents, or detergents in equipment and vehicle wash water; and

c. For storage of soaps, detergents, or solvents, provide either (1) cover *(e.g., plastic sheeting, temporary roofs)* to minimize the exposure of these detergents to precipitation and to stormwater, or (2) a similarly effective means designed to minimize the discharge of pollutants from these areas.

2.3.3 For storage, handling, and disposal of building products, materials, and wastes:

a. *For building materials and building products*[39], provide either (1) cover (*e.g., plastic sheeting, temporary roofs*) to minimize the exposure of these products to precipitation and to stormwater, or (2) a similarly effective means designed to minimize the discharge of pollutants from these areas.

Minimization of exposure is not required in cases where the exposure to precipitation and to stormwater will not result in a discharge of pollutants, or where exposure of a specific material or product poses little risk of stormwater contamination (such as final products and materials intended for outdoor use).

b. *For pesticides, herbicides, insecticides, fertilizers, and landscape materials*:

   i. In storage areas, provide either (1) cover (*e.g., plastic sheeting, temporary roofs*) to minimize the exposure of these chemicals to precipitation and to stormwater, or (2) a similarly effective means designed to minimize the discharge of pollutants from these areas; and

   ii. Comply with all application and disposal requirements included on the registered pesticide, herbicide, insecticide, and fertilizer label (see also Part 2.3.5).

c. *For diesel fuel, oil, hydraulic fluids, other petroleum products, and other chemicals*:

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[38] Examples of effective means include locating activities away from waters of the U.S. and stormwater inlets or conveyances and directing wash waters to a sediment basin or sediment trap, using filtration devices, such as filter bags or sand filters, or using other similarly effective controls.

[39] Examples of building materials and building products typically present at construction sites include asphalt sealants, copper flashing, roofing materials, adhesives, concrete admixtures, and gravel and mulch stockpiles.

i. Store chemicals in water-tight containers, and provide either (1) cover *(e.g., plastic sheeting, temporary roofs)* to minimize the exposure of these containers to precipitation and to stormwater, or (2) a similarly effective means designed to minimize the discharge of pollutants from these areas *(e.g., having a spill kit available on site and ensuring personnel are available to respond expeditiously in the event of a leak or spill)*, or provide secondary containment *(e.g., spill berms, decks, spill containment pallets)*; and

ii. Clean up spills immediately, using dry clean-up methods where possible, and dispose of used materials properly. You are prohibited from hosing the area down to clean surfaces or spills. Eliminate the source of the spill to prevent a discharge or a furtherance of an ongoing discharge.

d. *For hazardous or toxic wastes*:[40]

i. Separate hazardous or toxic waste from construction and domestic waste;

ii. Store waste in sealed containers, which are constructed of suitable materials to prevent leakage and corrosion, and which are labeled in accordance with applicable Resource Conservation and Recovery Act (RCRA) requirements and all other applicable federal, state, tribal, or local requirements;

iii. Store all outside containers within appropriately-sized secondary containment (*e.g., spill berms, decks, spill containment pallets*) to prevent spills from being discharged, or provide a similarly effective means designed to prevent the discharge of pollutants from these areas *(e.g., storing chemicals in a covered area, having a spill kit available on site);*

iv. Dispose of hazardous or toxic waste in accordance with the manufacturer's recommended method of disposal and in compliance with federal, state, tribal, and local requirements;

v. Clean up spills immediately, using dry clean-up methods, and dispose of used materials properly. You are prohibited from hosing the area down to clean surfaces or spills. Eliminate the source of the spill to prevent a discharge or a furtherance of an ongoing discharge; and

vi. Follow all other federal, state, tribal, and local requirements regarding hazardous or toxic waste.

e. *For construction and domestic wastes*:[41]

i. Provide waste containers *(e.g., dumpster, trash receptacle)* of sufficient size and number to contain construction and domestic wastes;

ii. Keep waste container lids closed when not in use and close lids at the end of the business day for those containers that are actively used throughout the day. For waste containers that do not have lids, provide either (1) cover *(e.g., a tarp, plastic sheeting, temporary roof)* to minimize exposure of wastes to precipitation,

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[40] Examples of hazardous or toxic waste that may be present at construction sites include paints, caulks, sealants, fluorescent light ballasts, solvents, petroleum-based products, wood preservatives, additives, curing compounds, and acids.

[41] Examples of construction and domestic waste include packaging materials, scrap construction materials, masonry products, timber, pipe and electrical cuttings, plastics, styrofoam, concrete, demolition debris; and other trash or building materials.

or (2) a similarly effective means designed to minimize the discharge of pollutants *(e.g., secondary containment)*;

iii. On business days, clean up and dispose of waste in designated waste containers; and

iv. Clean up immediately if containers overflow.

f. *For sanitary waste*, position portable toilets so that they are secure and will not be tipped or knocked over, and located away from waters of the U.S. and stormwater inlets or conveyances.

2.3.4 For washing applicators and containers used for stucco, paint, concrete, form release oils, curing compounds, or other materials:

a. Direct wash water into a leak-proof container or leak-proof and lined pit designed so that no overflows can occur due to inadequate sizing or precipitation;

b. Handle washout or cleanout wastes as follows:

i. Do not dump liquid wastes in storm sewers or waters of the U.S.;

ii. Dispose of liquid wastes in accordance with applicable requirements in Part 2.3.3; and

iii. Remove and dispose of hardened concrete waste consistent with your handling of other construction wastes in Part 2.3.3; and

c. Locate any washout or cleanout activities as far away as possible from waters of the U.S. and stormwater inlets or conveyances, and, to the extent feasible, designate areas to be used for these activities and conduct such activities only in these areas.

2.3.5 For the application of fertilizers:

a. Apply at a rate and in amounts consistent with manufacturer's specifications, or document in the SWPPP departures from the manufacturer specifications where appropriate in accordance with Part 7.2.6.b.ix;

b. Apply at the appropriate time of year for your location, and preferably timed to coincide as closely as possible to the period of maximum vegetation uptake and growth;

c. Avoid applying before heavy rains that could cause excess nutrients to be discharged;

d. Never apply to frozen ground;

e. Never apply to stormwater conveyance channels; and

f. Follow all other federal, state, tribal, and local requirements regarding fertilizer application.

2.3.6 Emergency Spill Notification Requirements

Discharges of toxic or hazardous substances from a spill or other release are prohibited, consistent with Part 1.3.5. Where a leak, spill, or other release containing a hazardous substance or oil in an amount equal to or in excess of a reportable quantity established under either 40 CFR 110, 40 CFR 117, or 40 CFR 302 occurs during a 24-hour period, you must notify the National Response Center (NRC) at (800) 424-8802 or, in the Washington, DC metropolitan area, call (202) 267-2675 in accordance with the requirements of 40 CFR 110, 40 CFR 117, and 40 CFR 302 as soon as you have knowledge of the release. You must also, within seven (7) calendar days of knowledge of the release, provide a description of the release, the circumstances leading to the release, and the date of the release. State, tribal, or local requirements may necessitate additional reporting of spills or discharges to local emergency response, public health, or drinking water supply agencies.

2.4 CONSTRUCTION DEWATERING REQUIREMENTS

Comply with the following requirements to minimize the discharge of pollutants in ground water or accumulated stormwater that is removed from excavations, trenches, foundations, vaults, or other similar points of accumulation, in accordance with Part 1.2.2.[42]

2.4.1 Treat dewatering discharges with controls to minimize discharges of pollutants;[43]

2.4.2 Do not discharge visible floating solids or foam;

2.4.3 Use an oil-water separator or suitable filtration device (such as a cartridge filter) that is designed to remove oil, grease, or other products if dewatering water is found to contain these materials;

2.4.4 To the extent feasible, use vegetated, upland areas of the site to infiltrate dewatering water before discharge. You are prohibited from using waters of the U.S. as part of the treatment area;

2.4.5 At all points where dewatering water is discharged, comply with the velocity dissipation requirements of Part 2.2.11;

2.4.6 With backwash water, either haul it away for disposal or return it to the beginning of the treatment process; and

2.4.7 Replace and clean the filter media used in dewatering devices when the pressure differential equals or exceeds the manufacturer's specifications.

3 WATER QUALITY-BASED EFFLUENT LIMITATIONS

3.1 GENERAL EFFLUENT LIMITATION TO MEET APPLICABLE WATER QUALITY STANDARDS

Discharges must be controlled as necessary to meet applicable water quality standards. Discharges must also comply with any additional state or tribal requirements that are in Part 9.

In the absence of information demonstrating otherwise, EPA expects that compliance with the conditions in this permit will result in stormwater discharges being controlled as necessary to meet applicable water quality standards. If at any time you become aware, or EPA determines, that discharges are not being controlled as necessary to meet applicable water quality standards, you must take corrective action as required in Parts 5.1 and 5.2, and document the corrective actions as required in Part 5.4.

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[42] Uncontaminated, clear (non-turbid) dewatering water can be discharged without being routed to a control.

[43] Appropriate controls include sediment basins or sediment traps, sediment socks, dewatering tanks, tube settlers, weir tanks, filtration systems (*e.g., bag or sand filters*), and passive treatment systems that are designed to remove sediment. Appropriate controls to use downstream of dewatering controls to minimize erosion include vegetated buffers, check dams, riprap, and grouted riprap at outlets.

EPA may insist that you install additional controls (to meet the narrative water quality-based effluent limit above) on a site-specific basis, or require you to obtain coverage under an individual permit, if information in your NOI or from other sources indicates that your discharges are not controlled as necessary to meet applicable water quality standards. This includes situations where additional controls are necessary to comply with a wasteload allocation in an EPA-established or approved TMDL.

If during your coverage under a previous permit, you were required to install and maintain stormwater controls specifically to meet the assumptions and requirements of an EPA-approved or established TMDL (for any parameter) or to otherwise control your discharge to meet water quality standards, you must continue to implement such controls as part of your coverage under this permit.

3.2 DISCHARGE LIMITATIONS FOR SITES DISCHARGING TO SENSITIVE WATERS[44]

For any portion of the site that discharges to a sediment or nutrient-impaired water or to a water that is identified by your state, tribe, or EPA as Tier 2, Tier 2.5, or Tier 3 for antidegradation purposes, you must comply with the inspection frequency specified in 4.3 and you must comply with the stabilization deadline specified in Part 2.2.14.a.iii.(c).[45]

If you discharge to a water that is impaired for a parameter other than a sediment-related parameter or nutrients, EPA will inform you if any additional controls are necessary for your discharge to be controlled as necessary to meet water quality standards, including for it to be consistent with the assumptions of any available wasteload allocation in any applicable TMDL, or if coverage under an individual permit is necessary.

In addition, on a case-by-case basis, EPA may notify operators of new sites or operators of existing sites with increased discharges that additional analyses, stormwater controls, or other measures are necessary to comply with the applicable

[44] Sensitive waters include waters that are impaired and Tier 2, Tier 2.5, and Tier 3 waters.

"Impaired waters" are those waters identified by the state, tribe, or EPA as not meeting an applicable water quality standard and (1) requires development of a TMDL (pursuant to section 303(d) of the CWA; or (2) is addressed by an EPA-approved or established TMDL; or (3) is not in either of the above categories but the waterbody is covered by a pollution control program that meets the requirements of 40 CFR 130.7(b)(1). Your construction site will be considered to discharge to an impaired water if the first water of the U.S. to which you discharge is an impaired water for the pollutants contained in the discharge from your site. For discharges that enter a storm sewer system prior to discharge, the first water of the U.S. to which you discharge is the waterbody that receives the stormwater discharge from the storm sewer system. For assistance in determining whether your site discharges to impaired waters, EPA has developed a tool that is available both within the electronic NOI form in NeT, and at https://water.epa.gov/polwaste/npdes/stormwater/discharge.cfm.

Tiers 2, 2.5 and 3 refer to waters either identified by the state as high quality waters or Outstanding National Resource Waters under 40 CFR 131.12(a)(2) and (3). For the purposes of this permit, you are considered to discharge to a Tier 2, Tier 2.5, or Tier 3 water if the first water of the U.S. to which you discharge is identified by a state, tribe, or EPA as Tier 2, Tier 2.5, or Tier 3. For discharges that enter a storm sewer system prior to discharge, the water of the U.S. to which you discharge is the first water of the U.S. that receives the stormwater discharge from the storm sewer system. See list of Tier 2, Tier 2.5, and Tier 3 waters in Appendix F.

EPA may determine on a case-by-case basis that a site discharges to a sensitive water.

[45] If you qualify for any of the reduced inspection frequencies in Part 4.4, you may conduct inspections in accordance with Part 4.4 for any portion of your site that discharges to a sensitive water.

antidegradation requirements, or notify you that an individual permit application is necessary.

If you discharge to a water that is impaired for polychlorinated biphenyls (PCBs) and are engaging in demolition of any structure with at least 10,000 square feet of floor space built or renovated before January 1, 1980, you must:

a. Implement controls[46] to minimize the exposure of PCB-containing building materials, including paint, caulk, and pre-1980 fluorescent lighting fixtures, to precipitation and to stormwater; and

b. Ensure that disposal of such materials is performed in compliance with applicable state, federal, and local laws.

4 SITE INSPECTION REQUIREMENTS

4.1 PERSON(S) RESPONSIBLE FOR INSPECTING SITE

The person(s) inspecting your site may be a person on your staff or a third party you hire to conduct such inspections. You are responsible for ensuring that the person who conducts inspections is a "qualified person."[47]

4.2 FREQUENCY OF INSPECTIONS.[48]

At a minimum, you must conduct a site inspection in accordance with one of the two schedules listed below, unless you are subject to the Part 4.3 site inspection frequency for discharges to sensitive waters or qualify for a Part 4.4 reduction in the inspection frequency:

4.2.1 At least once every seven (7) calendar days; *or*

4.2.2 Once every 14 calendar days *and* within 24 hours of the occurrence of a storm event of 0.25 inches or greater, or the occurrence of runoff from snowmelt sufficient to cause a discharge.[49] To determine if a storm event of 0.25 inches or greater has occurred on your site, you must either keep a properly maintained rain gauge on your site, or obtain the storm event information from a weather station that is representative of your location. For any day of rainfall during normal business hours that measures 0.25 inches or greater, you must record the total rainfall measured for that day in accordance with Part 4.7.1d.

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[46] Examples of controls to minimize exposure of PCBs to precipitation and stormwater include separating work areas from non-work areas and selecting appropriate personal protective equipment and tools, constructing a containment area so that all dust or debris generated by the work remains within the protected area, using tools that minimize dust and heat (<212°F). For additional information, refer to Part 2.3.3 of the CGP Fact Sheet.

[47] A "qualified person" is a person knowledgeable in the principles and practice of erosion and sediment controls and pollution prevention, who possesses the appropriate skills and training to assess conditions at the construction site that could impact stormwater quality, and the appropriate skills and training to assess the effectiveness of any stormwater controls selected and installed to meet the requirements of this permit.

[48] Inspections are only required during the site's normal working hours.

[49] "Within 24 hours of the occurrence of a storm event" means that you must conduct an inspection within 24 hours once a storm event has produced 0.25 inches within a 24-hour period, even if the storm event is still continuing. Thus, if you have elected to inspect bi-weekly in accordance with Part 4.2.2 and there is a storm event at your site that continues for multiple days, and each day of the storm produces 0.25 inches or more of rain, you must conduct an inspection within 24 hours of the first day of the storm and within 24 hours after the end of the storm.

4.3 INCREASE IN INSPECTION FREQUENCY FOR SITES DISCHARGING TO SENSITIVE WATERS.

For any portion of the site that discharges to a sediment or nutrient-impaired water or to a water that is identified by your state, tribe, or EPA as Tier 2, Tier 2.5, or Tier 3 for antidegradation purposes (see Part 3.2), instead of the inspection frequency specified in Part 4.2, you must conduct inspections in accordance with the following inspection frequencies:

Once every seven (7) calendar days *and* within 24 hours of the occurrence of a storm event of 0.25 inches or greater, or the occurrence of runoff from snowmelt sufficient to cause a discharge. To determine if a storm event of 0.25 inches or greater has occurred on your site, you must either keep a properly maintained rain gauge on your site, or obtain the storm event information from a weather station that is representative of your location. For any day of rainfall during normal business hours that measures 0.25 inches or greater, you must record the total rainfall measured for that day in accordance with Part 4.7.1d.

4.4 REDUCTIONS IN INSPECTION FREQUENCY

4.4.1 Stabilized areas.

a. You may reduce the frequency of inspections to twice per month for the first month, no more than 14 calendar days apart, then once per month in any area of your site where the stabilization steps in 2.2.14a have been completed. If construction activity resumes in this portion of the site at a later date, the inspection frequency immediately increases to that required in Parts 4.2 and 4.3, as applicable. You must document the beginning and ending dates of this period in your SWPPP.

b. **Exception.** For “linear construction sites” (as defined in Appendix A) where disturbed portions have undergone final stabilization at the same time active construction continues on others, you may reduce the frequency of inspections to twice per month for the first month, no more than 14 calendar days apart, in any area of your site where the stabilization steps in 2.2.14a have been completed. After the first month, inspect once more within 24 hours of the occurrence of a storm event of 0.25 inches or greater. If there are no issues or evidence of stabilization problems, you may suspend further inspections. If “wash-out” of stabilization materials and/or sediment is observed, following re-stabilization, inspections must resume at the inspection frequency required in Part 4.4.1a Inspections must continue until final stabilization is visually confirmed following a storm event of 0.25 inches or greater.

4.4.2 Arid, semi-arid, or drought-stricken areas (as defined in Appendix A). If it is the seasonally dry period or a period in which drought is occurring, you may reduce the frequency of inspections to once per month and within 24 hours of the occurrence of a storm event of 0.25 inches or greater. You must document that you are using this reduced schedule and the beginning and ending dates of the seasonally dry period in your SWPPP. To determine if a storm event of 0.25 inches or greater has occurred on your site, you must either keep a properly maintained rain gauge on your site, or obtain the storm event information from a weather station that is representative of your location. For any day of rainfall during normal business hours that measures 0.25 inches or greater, you must record the total rainfall measured for that day in accordance with Part 4.7.1d.

4.4.3 Frozen conditions:

a. If you are suspending construction activities due to frozen conditions, you may temporarily suspend inspections on your site until thawing conditions (as defined in Appendix A) begin to occur if:

i. Runoff is unlikely due to continuous frozen conditions that are likely to continue at your site for at least three (3) months based on historic seasonal averages. If unexpected weather conditions (such as above freezing temperatures or rain events) make discharges likely, you must immediately resume your regular inspection frequency as described in Parts 4.2 and 4.3, as applicable;

ii. Land disturbances have been suspended; and

iii. All disturbed areas of the site have been stabilized in accordance with Part 2.2.14a.

b. If you are still conducting construction activities during frozen conditions, you may reduce your inspection frequency to once per month if:

i. Runoff is unlikely due to continuous frozen conditions that are likely to continue at your site for at least three (3) months based on historic seasonal averages. If unexpected weather conditions (such as above freezing temperatures or rain events) make discharges likely, you must immediately resume your regular inspection frequency as described in Parts 4.2 and 4.3, as applicable; and

ii. Except for areas in which you are actively conducting construction activities, disturbed areas of the site have been stabilized in accordance with Part 2.2.14a.

You must document the beginning and ending dates of this period in your SWPPP.

4.5 AREAS THAT MUST BE INSPECTED

During your site inspection, you must at a minimum inspect the following areas of your site:

4.5.1 All areas that have been cleared, graded, or excavated and that have not yet completed stabilization consistent with Part 2.2.14a;

4.5.2 All stormwater controls (including pollution prevention controls) installed at the site to comply with this permit;[50]

4.5.3 Material, waste, borrow, and equipment storage and maintenance areas that are covered by this permit;

4.5.4 All areas where stormwater typically flows within the site, including drainageways designed to divert, convey, and/or treat stormwater;

4.5.5 All points of discharge from the site; and

4.5.6 All locations where stabilization measures have been implemented.

You are not required to inspect areas that, at the time of the inspection, are considered unsafe to your inspection personnel.

4.6 REQUIREMENTS FOR INSPECTIONS

During your site inspection, you must at a minimum:

4.6.1 Check whether all stormwater controls *(i.e., erosion and sediment controls and pollution prevention controls)* are properly installed, appear to be operational, and are working as intended to minimize pollutant discharges;

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[50] This includes the requirement to inspect for sediment that has been tracked out from the site onto paved roads, sidewalks, or other paved areas consistent with Part 2.2.4.

4.6.2 Check for the presence of conditions that could lead to spills, leaks, or other accumulations of pollutants on the site;

4.6.3 Identify any locations where new or modified stormwater controls are necessary to meet the requirements of Parts 2 and/or 3;

4.6.4 Check for signs of visible erosion and sedimentation *(i.e., sediment deposits)* that have occurred and are attributable to your discharge at points of discharge and, if applicable, the banks of any waters of the U.S. flowing within or immediately adjacent to the site;

4.6.5 Identify any incidents of noncompliance observed;

4.6.6 If a discharge is occurring during your inspection:

a. Identify all discharge points at the site; and

b. Observe and document the visual quality of the discharge, and take note of the characteristics of the stormwater discharge, including color; odor; floating, settled, or suspended solids; foam; oil sheen; and other indicators of stormwater pollutants.

4.6.7 Based on the results of your inspection, complete any necessary maintenance under Part 2.1.4 and corrective action under Part 5.

4.7 INSPECTION REPORT

4.7.1 You must complete an inspection report within 24 hours of completing any site inspection. Each inspection report must include the following:

a. The inspection date;

b. Names and titles of personnel making the inspection;

c. A summary of your inspection findings, covering at a minimum the observations you made in accordance with Part 4.6, including any necessary maintenance or corrective actions;

d. If you are inspecting your site at the frequency specified in Part 4.2.2, Part 4.3, or Part 4.4.1b, and you conducted an inspection because of rainfall measuring 0.25 inches or greater, you must include the applicable rain gauge or weather station readings that triggered the inspection; and

e. If you determined that it is unsafe to inspect a portion of your site, you must describe the reason you found it to be unsafe and specify the locations to which this condition applies.

4.7.2 Each inspection report must be signed in accordance with Appendix I, Part I.11 of this permit.

4.7.3 You must keep a copy of all inspection reports at the site or at an easily accessible location, so that it can be made available at the time of an on-site inspection or upon request by EPA.

4.7.4 You must retain all inspection reports completed for this Part for at least three (3) years from the date that your permit coverage expires or is terminated.

4.8 INSPECTIONS BY EPA

You must allow EPA, or an authorized representative of EPA, to conduct the following activities at reasonable times. To the extent that you are utilizing shared controls that are not on site to comply with this permit, you must make arrangements for EPA to have access at all reasonable times to those areas where the shared controls are located.

4.8.1 Enter onto all areas of the site, including any construction support activity areas covered by this permit, any off-site areas where shared controls are utilized to comply with this permit, discharge locations, adjoining waterbodies, and locations where records are kept under the conditions of this permit;

4.8.2 Access and copy any records that must be kept under the conditions of this permit;

4.8.3 Inspect your construction site, including any construction support activity areas covered by this permit (see Part 1.2.1c), any stormwater controls installed and maintained at the site, and any off-site shared controls utilized to comply with this permit; and

4.8.4 Sample or monitor for the purpose of ensuring compliance.

5 CORRECTIVE ACTIONS

5.1 CONDITIONS TRIGGERING CORRECTIVE ACTION.

You must take corrective action to address any of the following conditions identified at your site:

5.1.1 A stormwater control needs repair or replacement (beyond routine maintenance required under Part 2.1.4); or

5.1.2 A stormwater control necessary to comply with the requirements of this permit was never installed, or was installed incorrectly; or

5.1.3 Your discharges are causing an exceedance of applicable water quality standards; or

5.1.4 A prohibited discharge has occurred (see Part 1.3).

5.2 CORRECTIVE ACTION DEADLINES

For any corrective action triggering conditions in Part 5.1, you must**:**

5.2.1 Immediately take all reasonable steps to address the condition, including cleaning up any contaminated surfaces so the material will not discharge in subsequent storm events;

5.2.2 When the problem does not require a new or replacement control or significant repair, the corrective action must be completed by the close of the next business day;

5.2.3 When the problem requires a new or replacement control or significant repair, install the new or modified control and make it operational, or complete the repair, by no later than seven (7) calendar days from the time of discovery. If it is infeasible to complete the installation or repair within seven (7) calendar days, you must document in your records why it is infeasible to complete the installation or repair within the 7-day timeframe and document your schedule for installing the stormwater control(s) and making it operational as soon as feasible after the 7-day timeframe. Where these actions result in changes to any of the stormwater controls or procedures documented in your SWPPP, you must modify your SWPPP accordingly within seven (7) calendar days of completing this work.

5.3 CORRECTIVE ACTION REQUIRED BY EPA

You must comply with any corrective actions required by EPA as a result of permit violations found during an inspection carried out under Part 4.8.

5.4 CORRECTIVE ACTION REPORT

For each corrective action taken in accordance with this Part, you must complete a report in accordance with the following:

5.4.1 Within 24 hours of identifying the corrective action condition, document the specific condition and the date and time it was identified.

5.4.2 Within 24 hours of completing the corrective action (in accordance with the deadlines in Part 5.2), document the actions taken to address the condition, including whether any SWPPP modifications are required.

5.4.3 Each corrective action report must be signed in accordance with Appendix I, Part I.11 of this permit.

5.4.4 You must keep a copy of all corrective action reports at the site or at an easily accessible location, so that it can be made available at the time of an on-site inspection or upon request by EPA.

5.4.5 You must retain all corrective action reports completed for this Part for at least three (3) years from the date that your permit coverage expires or is terminated.

6 STAFF TRAINING REQUIREMENTS

Each operator, or group of multiple operators, must assemble a “stormwater team” to carry out compliance activities associated with the requirements in this permit.

6.1 Prior to the commencement of construction activities, you must ensure that the following personnel[51] on the stormwater team understand the requirements of this permit and their specific responsibilities with respect to those requirements:

a. Personnel who are responsible for the design, installation, maintenance, and/or repair of stormwater controls (including pollution prevention controls);
b. Personnel responsible for the application and storage of treatment chemicals (if applicable);
c. Personnel who are responsible for conducting inspections as required in Part 4.1; and
d. Personnel who are responsible for taking corrective actions as required in Part 5.

6.2 You are responsible for ensuring that all activities on the site comply with the requirements of this permit. You are not required to provide or document formal training for subcontractors or other outside service providers, but you must ensure that such personnel understand any requirements of this permit that may be affected by the work they are subcontracted to perform.

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[51] If the person requiring training is a new employee who starts after you commence construction activities, you must ensure that this person has the proper understanding as required above prior to assuming particular responsibilities related to compliance with this permit.

For emergency-related projects, the requirement to train personnel prior to commencement of construction activities does not apply, however, such personnel must have the required training prior to NOI submission.

6.3 At a minimum, members of the stormwater team must be trained to understand the following if related to the scope of their job duties *(e.g., only personnel responsible for conducting inspections need to understand how to conduct inspections*):

a. The permit deadlines associated with installation, maintenance, and removal of stormwater controls and with stabilization**;**
b. The location of all stormwater controls on the site required by this permit and how they are to be maintained;
c. The proper procedures to follow with respect to the permit's pollution prevention requirements; and
d. When and how to conduct inspections, record applicable findings, and take corrective actions.

6.4 Each member of the stormwater team must have easy access to an electronic or paper copy of applicable portions of this permit, the most updated copy of your SWPPP, and other relevant documents or information that must be kept with the SWPPP.

7 STORMWATER POLLUTION PREVENTION PLAN (SWPPP)

7.1 GENERAL REQUIREMENTS

All operators associated with a construction site under this permit must develop a SWPPP consistent with the requirements in Part 7 prior to their submittal of the NOI.[52, 53] The SWPPP must be kept up-to-date throughout coverage under this permit.

If a SWPPP was prepared under a previous version of this permit, the operator must review and update the SWPPP to ensure that this permit's requirements are addressed prior to submitting an NOI for coverage under this permit.

7.2 SWPPP CONTENTS

At a minimum, the SWPPP must include the information specified in this Part and as specified in other parts of this permit.

7.2.1 All Site Operators. Include a list of all other operators who will be engaged in construction activities at the site, and the areas of the site over which each operator has control.

7.2.2 Stormwater Team. Identify the personnel (by name or position) that are part of the stormwater team, as well as their individual responsibilities, including which members are responsible for conducting inspections.

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[52] The SWPPP does not establish the effluent limits and other permit terms and conditions that apply to your site's discharges; these limits, terms, and conditions are established in this permit.

Where there are multiple operators associated with the same site, they may develop a group SWPPP instead of multiple individual SWPPPs. Regardless of whether there is a group SWPPP or multiple individual SWPPPs, each operator is responsible for compliance with the permit's terms and conditions. In other words, if Operator A relies on Operator B to satisfy its permit obligations, Operator A does not have to duplicate those permit-related functions if Operator B is implementing them for both operators to be in compliance with the permit. However, Operator A remains responsible for permit compliance if Operator B fails to implement any measures necessary for Operator A to comply with the permit. In addition, all operators must ensure, either directly or through coordination with other operators, that their activities do not compromise any other operators' controls and/or any shared controls.

7.2.3 Nature of Construction Activities.[54] Include the following:

a. A description of the nature of your construction activities, including the age or dates of past renovations for structures that are undergoing demolition;

b. The size of the property (in acres or length in miles if a linear construction site);

c. The total area expected to be disturbed by the construction activities (to the nearest quarter acre or nearest quarter mile if a linear construction site);

d. A description of any on-site and off-site construction support activity areas covered by this permit (see Part 1.2.1c);

e. The maximum area expected to be disturbed at any one time, including on-site and off-site construction support activity areas;

f. A description and projected schedule for the following:

   i. Commencement of construction activities in each portion of the site, including clearing and grubbing, mass grading, demolition activities, site preparation (*i.e., excavating, cutting and filling*), final grading, and creation of soil and vegetation stockpiles requiring stabilization;

   ii. Temporary or permanent cessation of construction activities in each portion of the site;

   iii. Temporary or final stabilization of exposed areas for each portion of the site; and

   iv. Removal of temporary stormwater controls and construction equipment or vehicles, and the cessation of construction-related pollutant-generating activities.

g. A list and description of all pollutant-generating activities[55] on the site. For each pollutant-generating activity, include an inventory of pollutants or pollutant constituents (*e.g., sediment, fertilizers, pesticides, paints, caulks, sealants, fluorescent light ballasts, contaminated substrates, solvents, fuels*) associated with that activity, which could be discharged in stormwater from your construction site. You must take into account where potential spills and leaks could occur that contribute pollutants to stormwater discharges, and any known hazardous or toxic substances, such as PCBs and asbestos, that will be disturbed or removed during construction;

h. Business days and hours for the project;

i. If you are conducting construction activities in response to a public emergency (see Part 1.4), a description of the cause of the public emergency *(e.g., mud slides, earthquake, extreme flooding conditions, widespread disruption in essential public services)*, information substantiating its occurrence *(e.g., state disaster declaration or similar state or local declaration)*, and a description of the construction necessary to reestablish affected public services.

7.2.4 Site Map. Include a legible map, or series of maps, showing the following features of the site:

a. Boundaries of the property;

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[54] If plans change due to unforeseen circumstances or for other reasons, the requirement to describe the sequence and estimated dates of construction activities is not meant to "lock in" the operator to meeting these dates. When departures from initial projections are necessary, this should be documented in the SWPPP itself, or in associated records, as appropriate.

[55] Examples of pollutant-generating activities include paving operations; concrete, paint, and stucco washout and waste disposal; solid waste storage and disposal; and dewatering operations.

b. Locations where construction activities will occur, including:

   i. Locations where earth-disturbing activities will occur (note any phasing), including any demolition activities;

   ii. Approximate slopes before and after major grading activities (note any steep slopes (as defined in Appendix A));

   iii. Locations where sediment, soil, or other construction materials will be stockpiled;

   iv. Any water of the U.S. crossings;

   v. Designated points where vehicles will exit onto paved roads;

   vi. Locations of structures and other impervious surfaces upon completion of construction; and

   vii. Locations of on-site and off-site construction support activity areas covered by this permit (see Part 1.2.1c).

c. Locations of all waters of the U.S. within and one mile downstream of the site's discharge point. Also identify if any are listed as impaired, or are identified as a Tier 2, Tier 2.5, or Tier 3 water;

d. Areas of federally listed critical habitat within the site and/or at discharge locations;

e. Type and extent of pre-construction cover on the site (*e.g., vegetative cover, forest, pasture, pavement, structure*s);

f. Drainage patterns of stormwater and authorized non-stormwater before and after major grading activities;

g. Stormwater and authorized non-stormwater discharge locations, including:

   i. Locations where stormwater and/or authorized non-stormwater will be discharged to storm drain inlets;[56] and

   ii. Locations where stormwater or authorized non-stormwater will be discharged directly to waters of the U.S.

h. Locations of all potential pollutant-generating activities identified in Part 7.2.3g;

i. Locations of stormwater controls, including natural buffer areas and any shared controls utilized to comply with this permit; and

j. Locations where polymers, flocculants, or other treatment chemicals will be used and stored.

7.2.5 Non-Stormwater Discharges. Identify all authorized non-stormwater discharges in Part 1.2.2 that will or may occur.

7.2.6 Description of Stormwater Controls.

a. For each of the Part 2.2 erosion and sediment control effluent limits, Part 2.3 pollution prevention effluent limits, and Part 2.4 construction dewatering effluent limits, as applicable to your site, you must include the following:

   i. A description of the specific control(s) to be implemented to meet the effluent limit;

[56] The requirement to show storm drain inlets in the immediate vicinity of the site on your site map only applies to those inlets that are easily identifiable from your site or from a publicly accessible area immediately adjacent to your site.

ii. Any applicable stormwater control design specifications (including references to any manufacturer specifications and/or erosion and sediment control manuals/ordinances relied upon);[57]

iii. Routine stormwater control maintenance specifications; and

iv. The projected schedule for stormwater control installation/implementation.

b. You must also include any of the following additional information as applicable.

i. **Natural buffers and/or equivalent sediment controls** (see Part 2.2.1 and Appendix G). You must include the following:

(a) The compliance alternative to be implemented;

(b) If complying with alternative 2, the width of natural buffer retained;

(c) If complying with alternative 2 or 3, the erosion and sediment control(s) you will use to achieve an equivalent sediment reduction, and any information you relied upon to demonstrate the equivalency;

(d) If complying with alternative 3, a description of why it is infeasible for you to provide and maintain an undisturbed natural buffer of any size;

(e) For "linear construction sites" where it is infeasible to implement compliance alternative 1, 2, or 3, a rationale for this determination, and a description of any buffer width retained and/or supplemental erosion and sediment controls installed; and

(f) A description of any disturbances that are exempt under Part 2.2.1 that occur within 50 feet of a water of the U.S.

ii. **Perimeter controls for a "linear construction site"** (see Part 2.2.3). For areas where perimeter controls are not feasible, include documentation to support this determination and a description of the other practices that will be implemented to minimize discharges of pollutants in stormwater associated with construction activities.

Note: Routine maintenance specifications for perimeter controls documented in the SWPPP must include the Part 2.2.3a requirement that sediment be removed before it has accumulated to one-half of the above-ground height of any perimeter control.

iii. **Sediment track-out controls** (see Parts 2.2.4b and 2.2.4c). Document the specific stabilization techniques and/or controls that will be implemented to remove sediment prior to vehicle exit.

iv. **Sediment basins** (see Part 2.2.12). In circumstances where it is infeasible to utilize outlet structures that withdraw water from the surface, include documentation to support this determination, including the specific conditions or time periods when this exception will apply.

v. **Treatment chemicals** (see Part 2.2.13), you must include the following:

(a) A listing of the soil types that are expected to be exposed during construction in areas of the project that will drain to chemical treatment systems. Also include a listing of soil types expected to be found in fill material to be used in these same areas, to the extent you have this information prior to construction;

[57] Design specifications may be found in manufacturer specifications and/or in applicable erosion and sediment control manuals or ordinances. Any departures from such specifications must reflect good engineering practice and must be explained in the SWPPP.

(b) A listing of all treatment chemicals to be used at the site and why the selection of these chemicals is suited to the soil characteristics of your site;

(c) If the applicable EPA Regional Office authorized you to use cationic treatment chemicals for sediment control, include the specific controls and implementation procedures designed to ensure that your use of cationic treatment chemicals will not lead to an exceedance of water quality standards;

(d) The dosage of all treatment chemicals to be used at the site or the methodology to be used to determine dosage;

(e) Information from any applicable Safety Data Sheet (SDS);

(f) Schematic drawings of any chemically enhanced stormwater controls or chemical treatment systems to be used for application of the treatment chemicals;

(g) A description of how chemicals will be stored consistent with Part 2.2.13c;

(h) References to applicable state or local requirements affecting the use of treatment chemicals, and copies of applicable manufacturer's specifications regarding the use of your specific treatment chemicals and/or chemical treatment systems; and

(i) A description of the training that personnel who handle and apply chemicals have received prior to permit coverage, or will receive prior to use of the treatment chemicals at your site.

vi. **Stabilization measures** (see Part 2.2.14). You must include the following:

(a) The specific vegetative and/or non-vegetative practices that will be used;

(b) The stabilization deadline that will be met in accordance with Part 2.2.14.a.i-ii;

(c) If complying with the deadlines for sites in arid, semi-arid, or drought-stricken areas, the beginning and ending dates of the seasonally dry period and the schedule you will follow for initiating and completing vegetative stabilization; and

(d) If complying with deadlines for sites affected by unforeseen circumstances that delay the initiation and/or completion of vegetative stabilization, document the circumstances and the schedule for initiating and completing stabilization.

vii. **Spill prevention and response procedures** (see Part 1.3.5 and Part 2.3). You must include the following:

(a) Procedures for expeditiously stopping, containing, and cleaning up spills, leaks, and other releases. Identify the name or position of the employee(s) responsible for detection and response of spills or leaks; and

(b) Procedures for notification of appropriate facility personnel, emergency response agencies, and regulatory agencies where a leak, spill, or other release containing a hazardous substance or oil in an amount equal to or in excess of a reportable quantity consistent with Part 2.3.6 and established under either 40 CFR 110, 40 CFR 117, or 40 CFR 302, occurs during a 24-hour period. Contact information must be in locations that are readily accessible and available to all employees.

You may also reference the existence of Spill Prevention Control and

Countermeasure (SPCC) plans developed for the construction activity under Part 311 of the CWA, or spill control programs otherwise required by an NPDES permit for the construction activity, provided that you keep a copy of that other plan on site.[58]

viii. **Waste management procedures** (see Part 2.3.3). Describe the procedures you will follow for handling, storing and disposing of all wastes generated at your site consistent with all applicable federal, state, tribal, and local requirements, including clearing and demolition debris, sediment removed from the site, construction and domestic waste, hazardous or toxic waste, and sanitary waste.

ix. **Application of fertilizers** (see Part 2.3.5). Document any departures from the manufacturer specifications where appropriate.

7.2.7 Procedures for Inspection, Maintenance, and Corrective Action. Describe the procedures you will follow for maintaining your stormwater controls, conducting site inspections, and, where necessary, taking corrective actions, in accordance with Part 2.1.4, Part 4, and Part 5 of this permit. Also include:

a. The inspection schedule you will follow, which is based on whether your site is subject to Part 4.2 or Part 4.3, or whether your site qualifies for any of the reduced inspection frequencies in Part 4.4;

b. If you will be conducting inspections in accordance with the inspection schedule in Part 4.2.2, Part 4.3, or Part 4.4.1b, the location of the rain gauge or the address of the weather station you will be using to obtain rainfall data;

c. If you will be reducing your inspection frequency in accordance with Part 4.4.1b, the beginning and ending dates of the seasonally defined arid period for your area or the valid period of drought;

d. If you will be reducing your inspection frequency in accordance with Part 4.4.3, the beginning and ending dates of frozen conditions on your site; and

e. Any maintenance or inspection checklists or other forms that will be used.

7.2.8 Staff Training. Include documentation that the required personnel were, or will be, trained in accordance with Part 6.

7.2.9 Compliance with Other Requirements.

a. **Threatened and Endangered Species Protection.** Include documentation required in Appendix D supporting your eligibility with regard to the protection of threatened and endangered species and designated critical habitat.

b. **Historic Properties.** Include documentation required in Appendix E supporting your eligibility with regard to the protection of historic properties.

c. **Safe Drinking Water Act Underground Injection Control (UIC) Requirements for Certain Subsurface Stormwater Controls.** If you are using any of the following stormwater controls at your site, document any contact you have had with the applicable state agency[59] or EPA Regional Office responsible for implementing the requirements for underground injection wells in the Safe Drinking Water Act and EPA's implementing

[58] Even if you already have an SPCC or other spill prevention plan in existence, your plans will only be considered adequate if they meet all of the requirements of this Part, either as part of your existing plan or supplemented as part of the SWPPP.

[59] For state UIC program contacts, refer to the following EPA website: https://www.epa.gov/uic.

regulations at 40 CFR 144 -147. Such controls would generally be considered Class V UIC wells:

i. Infiltration trenches (if stormwater is directed to any bored, drilled, driven shaft or dug hole that is deeper than its widest surface dimension, or has a subsurface fluid distribution system);

ii. Commercially manufactured pre-cast or pre-built proprietary subsurface detention vaults, chambers, or other devices designed to capture and infiltrate stormwater flow; and

iii. Drywells, seepage pits, or improved sinkholes (if stormwater is directed to any bored, drilled, driven shaft or dug hole that is deeper than its widest surface dimension, or has a subsurface fluid distribution system).

7.2.10 SWPPP Certification. You must sign and date your SWPPP in accordance with Appendix I, Part I.11.

7.2.11 Post-Authorization Additions to the SWPPP. Once you are authorized for coverage under this permit, you must include the following documents as part of your SWPPP:

a. A copy of your NOI submitted to EPA along with any correspondence exchanged between you and EPA related to coverage under this permit;

b. A copy of the acknowledgment letter you receive from NeT assigning your NPDES ID (*i.e., permit tracking number*);

c. A copy of this permit (an electronic copy easily available to the stormwater team is also acceptable).

7.3 ON-SITE AVAILABILITY OF YOUR SWPPP

You must keep a current copy of your SWPPP at the site or at an easily accessible location so that it can be made available at the time of an on-site inspection or upon request by EPA; a state, tribal, or local agency approving stormwater management plans; the operator of a storm sewer system receiving discharges from the site; or representatives of the U.S. Fish and Wildlife Service (USFWS) or the National Marine Fisheries Service (NMFS).

EPA may provide access to portions of your SWPPP to a member of the public upon request. Confidential Business Information (CBI) will be withheld from the public, but may not be withheld from EPA, USFWS, or NMFS.[60]

If an on-site location is unavailable to keep the SWPPP when no personnel are present, notice of the plan's location must be posted near the main entrance of your construction site.

7.4 SWPPP MODIFICATIONS

[60] Information covered by a claim of confidentiality will be disclosed by EPA only to the extent of, and by means of, the procedures set forth in 40 CFR Part 2, Subpart B. In general, submitted information protected by a business confidentiality claim may be disclosed to other employees, officers, or authorized representatives of the United States concerned with implementing the CWA. The authorized representatives, including employees of other executive branch agencies, may review CBI during the course of reviewing draft regulations.

7.4.1 You must modify your SWPPP, including the site map(s), within seven (7) days of any of the following conditions:

a. Whenever new operators become active in construction activities on your site, or you make changes to your construction plans, stormwater controls, or other activities at your site that are no longer accurately reflected in your SWPPP. This includes changes made in response to corrective actions triggered under Part 5. You do not need to modify your SWPPP if the estimated dates in Part 7.2.3f change during the course of construction;

b. To reflect areas on your site map where operational control has been transferred (and the date of transfer) since initiating permit coverage;

c. If inspections or investigations by EPA or its authorized representatives determine that SWPPP modifications are necessary for compliance with this permit;

d. Where EPA determines it is necessary to install and/or implement additional controls at your site in order to meet the requirements of this permit, the following must be included in your SWPPP:

   i. A copy of any correspondence describing such measures and requirements; and

   ii. A description of the controls that will be used to meet such requirements.

e. To reflect any revisions to applicable federal, state, tribal, or local requirements that affect the stormwater controls implemented at the site; and

f. If applicable, if a change in chemical treatment systems or chemically enhanced stormwater control is made, including use of a different treatment chemical, different dosage rate, or different area of application.

7.4.2 You must maintain records showing the dates of all SWPPP modifications. The records must include the name of the person authorizing each change (see Part 7.2.10 above) and a brief summary of all changes.

7.4.3 All modifications made to the SWPPP consistent with Part 7.4 must be authorized by a person identified in Appendix I, Part I.11.b.

7.4.4 Upon determining that a modification to your SWPPP is required, if there are multiple operators covered under this permit, you must immediately notify any operators who may be impacted by the change to the SWPPP.

8 HOW TO TERMINATE COVERAGE

Until you terminate coverage under this permit, you must comply with all conditions and effluent limitations in the permit. To terminate permit coverage, you must submit to EPA a complete and accurate Notice of Termination (NOT), which certifies that you have met the requirements for terminating in Part 8.

8.1 MINIMUM INFORMATION REQUIRED IN NOT

8.1.1 NPDES ID (*i.e., permit tracking number)* provided by EPA when you received coverage under this permit;

8.1.2 Basis for submission of the NOT (see Part 8.2);

8.1.3 Operator contact information;

8.1.4 Name of site and address (or a description of location if no street address is available); and

8.1.5 NOT certification.

8.2 CONDITIONS FOR TERMINATING CGP COVERAGE

You must terminate CGP coverage only if one or more of the following conditions has occurred:

8.2.1 You have completed all construction activities at your site and, if applicable, construction support activities covered by this permit (see Part 1.2.1c), and you have met the following requirements:

a. For any areas that (1) were disturbed during construction, (2) are not covered over by permanent structures, and (3) over which you had control during the construction activities, you have met the requirements for final vegetative or non-vegetative stabilization in Part 2.2.14b;

b. You have removed and properly disposed of all construction materials, waste and waste handling devices, and have removed all equipment and vehicles that were used during construction, unless intended for long-term use following your termination of permit coverage;

c. You have removed all stormwater controls that were installed and maintained during construction, except those that are intended for long-term use following your termination of permit coverage or those that are biodegradable; and

d. You have removed all potential pollutants and pollutant-generating activities associated with construction, unless needed for long-term use following your termination of permit coverage; or

8.2.2 You have transferred control of all areas of the site for which you are responsible under this permit to another operator, and that operator has submitted an NOI and obtained coverage under this permit; or

8.2.3 Coverage under an individual or alternative general NPDES permit has been obtained.

8.3 HOW TO SUBMIT YOUR NOT

You must use EPA's NPDES eReporting Tool (NeT) to electronically prepare and submit your NOT for the 2017 CGP.

To access NeT, go to https://www.epa.gov/npdes/stormwater-discharges-construction-activities#ereporting.

Waivers from electronic reporting may be granted as specified in Part 1.4.1. If the EPA Regional Office grants you approval to use a paper NOT, and you elect to use it, you must complete the form in Appendix K.

8.4 DEADLINE FOR SUBMITTING THE NOT

You must submit your NOT within 30 calendar days after any one of the conditions in Part 8.2 occurs.

8.5 EFFECTIVE DATE OF TERMINATION OF COVERAGE

Your authorization to discharge under this permit terminates at midnight of the calendar day that a complete NOT is submitted to EPA.

9 PERMIT CONDITIONS APPLICABLE TO SPECIFIC STATES, INDIAN COUNTRY LANDS, OR TERRITORIES

The provisions in this Part provide modifications or additions to the applicable conditions of this permit to reflect specific additional conditions required as part of the state or tribal CWA Section 401 certification process, or the Coastal Zone Management Act (CZMA) certification process, or as otherwise established by the permitting authority. The specific additional revisions and requirements only apply to activities in those specific states, Indian country, and areas in certain states subject to construction projects by Federal Operators. States, Indian country, and areas subject to construction by Federal Operators not included in this Part do not have any modifications or additions to the applicable conditions of this permit.

9.1 EPA Region 1

9.1.1 NHR100000 State of New Hampshire

a. If you disturb 100,000 square feet or more of contiguous area, you must also apply for an Alteration of Terrain (AoT) permit from DES pursuant to RSA 485- A:17 and Env-Wq 1500. This requirement also applies to a lower disturbance threshold of 50,000 square feet or more when construction occurs within the protected shoreline under the Shoreland Water Quality Protection Act (see RSA 483-B and Env-Wq 1400). A permit application must also be filed if your project disturbs an area of greater than 2,500 square feet, is within 50 feet of any surface water, and has a flow path of 50 feet or longer disturbing a grade of 25 percent or greater. Project sites with disturbances smaller than those discussed above, that have the potential to adversely affect state surface waters, are subject to the conditions of an AoT General Permit by Rule.

b. You must determine that any excavation dewatering discharges are not contaminated before they will be authorized as an allowable non-stormwater discharge under this permit (see Part 1.2.2). The water is considered uncontaminated if there is no groundwater contamination within 1,000 feet of the groundwater dewatering location. Information on groundwater contamination can be generated over the Internet via the NHDES web site http://des.nh.gov/ by using the One Stop Data Mapper at http://des.nh.gov/onestop/gis.htm. If it is determined that the groundwater to be dewatered is near a remediation or other waste site you must apply for the Remediation General Permit (see https://www3.epa.gov/region1/npdes/rgp.html.)

c. You must treat any uncontaminated excavation dewatering discharges as necessary to remove suspended solids and turbidity. The discharges must be sampled at least once per week during weeks when discharges occur. Samples must be analyzed for total suspended solids (TSS) or turbidity and must meet monthly average and daily maximum limits of 50 milligrams per liter (mg/L) and 100 mg/L, respectively for TSS or 33 mg/l and 67 mg/l, respectively for turbidity. TSS (a.k.a. Residue, Nonfilterable) or turbidity sampling and analysis must be performed in accordance with Tables IB and II in 40 CFR 136.3 (http://www.ecfr.gov/cgi-bin/text-idx?SID=0243e3c4283cbd7d8257eb6afc7ce9a2&mc=true&node=se40.25.136_13&rgn=div8). Records of any sampling and analysis must be maintained and kept with the SWPPP for at least three years after final site stabilization.

d. Construction site owners and operators must consider opportunities for post-construction groundwater recharge using infiltration best management practices

(BMPs) during site design and preparation of the SWPPP. If your construction site is in a town that is required to obtain coverage under the NPDES General Permit for discharges from Municipal Separate Storm Sewer Systems (MS4) you may be required to use such practices. The SWPPP must include a description of any on-site infiltration that will be installed as a post-construction stormwater management measure or reasons for not employing such measures such as 1) The facility is located in a wellhead protection area as defined in RSA 485- C:2; or 2) The facility is located in an area where groundwater has been reclassified to GAA, GAI or GA2 pursuant to RSA 485-C and Env-DW 901; or 3) Any areas that would be exempt from the groundwater recharge requirements contained in Env-Wq 1507.04, including all land uses or activities considered to be a "High-load Area" (see Env-Wq 1502.30). For design considerations for infiltration measures see Env-Wq 1508.06.

e. Appendix F contains a list of Tier 2, or high quality waters. Although there is no official list of tier 2 waters, it can be assumed that all NH surface waters are tier 2 for turbidity unless 1) the surface water that you are proposing to discharge into is listed as impaired for turbidity in the states listing of impaired waters (see Surface Water Quality - Watershed Report Cards at http://des.nh.gov/organization/divisions/water/wmb/swqa/report_cards.htm) or 2) sampling upstream of the proposed discharge location shows turbidity values greater than 10 NTU. A single grab sample collected during dry weather (no precipitation within 48 hours) is acceptable.

f. To ensure compliance with RSA 485-C, RSA 485-A, RSA 485-A:13, I(a), Env-Wq 1700 and Env-Wq 302, the following information may be requested by NHDES. This information must be kept on site unless you receive a written request from NHDES that it be sent to the address shown in Part 9.1.4 (g).

   i. A site map required in Part 7.2.4, showing the type and location of all post-construction infiltration BMPs utilized at the facility or the reason(s) why none were installed;

   ii. A list of all non-stormwater discharges that occur at the facility, including their source locations and the control measures being used (see Part 1.2.2).

   iii. Records of sampling and analysis of TSS required for construction dewatering discharges (see Part 9.1.4 (c)).

g. All required or requested documents must be sent to:

NH Department of Environmental Services, Wastewater Engineering Bureau,
Permits & Compliance Section
P.O. Box 95
Concord, NH 03302-0095

9.1.2 VTR10F000 Areas in the State of Vermont subject to construction by a Federal Operator

a. Earth disturbance at any one time is limited to five acres.

b. All areas of earth disturbance must have temporary or final stabilization within 14 days of the initial disturbance. After this time, disturbed areas must be temporarily or permanently stabilized in advance of any runoff producing event. A runoff producing event is an event that produces runoff from the construction site. Temporary stabilization is not required if the work is occurring in a self-contained excavation (i.e. no outlet) with a depth of two feet or greater (e.g. house foundation excavation, utility trenches). Areas of a construction site that drain to sediment basins are not considered eligible for this exemption, and the exemption applies only to the excavated area itself.

c. The use of the cationic polymers is prohibited unless approved under a site-specific plan.

d. Site inspections on active construction sites shall be conducted daily during the period from October 15 – April 15.

e. Any applicant under EPA's CGP shall allow authorized Agency representatives, at reasonable times and upon presentation of credentials, to enter upon the project site for purposes of inspecting the project and determining compliance with this Certification.

f. The Agency may reopen and alter or amend the conditions of this Certification over the life of the project when such action is necessary to assure compliance with the VWQS.

9.2 EPA Region 3

9.2.1 DCR100000 District of Columbia

a. The permittee must comply with the District of Columbia Water Pollution Control Act of 1984, as amended, (D.C. Official Code § 8-103.01 et seq.) and its implementing regulations in Title 21, Chapters 11 and 19 of the District of Columbia Municipal Regulations. Nothing in this permit will be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties established pursuant to District of Columbia laws and regulations.

b. The permittee must comply with the District of Columbia Stormwater Management, and Soil Erosion and Sediment Control in Chapter 5 of Title 21 of the District of Columbia Municipal Regulations.

c. The permittee must comply with District of Columbia Flood Management control in Chapter 31 of Title 20 of the District of Columbia Municipal Regulations.

d. The Department may request a copy of the Stormwater Pollution Prevention Plan (SWPPP) and the permittee is required to submit the SWPPP to the Department within 14 days of such request. The Department may conduct an inspection of any facility covered by this permit to ensure compliance with District's law requirements, including water quality standards. The Department may enforce its certification conditions.

e. The Department may require the permittee to perform water quality monitoring during the permit term if monitoring is necessary for the protection of public health or the environment as designated under the authority in Chapter 19 of Title 21 of the District of Columbia Municipal Regulations.

f. The Department may require the permittee to provide measurable verification of the effectiveness of Best Management Practices (BMPs) and other control measures used in the stormwater management program, including water quality monitoring.

g. The Department has determined that compliance with this permit does not protect the permittee from enforcement actions deemed necessary by the Department under its associated regulations to address an imminent threat to public health or a significant adverse environmental impact which results in a violation of the District of Columbia Water Pollution Control Act of 1984, as amended, (D.C. Official Code § 8-103.01 et seq.) and its implementing regulations.

h. The Department reserves the right to modify this Section 401 Water Quality Certification if any changes, modifications, or deletions are made to this general permit. In addition, the Department reserves the right to add and/or alter the terms and conditions of this Section 401 Water Quality Certification to carry out its responsibilities during the term of this general permit with respect to water quality, including any revisions to District of Columbia Water Quality Standards in Chapter 11 of Title 21 of the District of Columbia Municipal Regulations.

i. Should any violation of the District's Water Quality Standards, or the conditions of this Section 401 Water Quality Certification occur, the Department will direct the permittee to correct the violation(s). The Department has the right to take any action as authorized by the District laws and regulations to address the violations of this permit or the Water Pollution Control Act and implementing regulations. Substantial civil and criminal penalties are authorized for discharging into District waters in violation of an order or permit issued by the Department. This Section 401 Water Quality Certification does not relieve the permittee of the duty to comply with other applicable District's statutes and regulations.

j. The permittee must submit copies of Notice of Intent (NOI) and Notice of Termination to DOEE at the same time these documents are submitted to EPA.

k. The permittee shall allow DOEE to inspect any facilities, equipment, practices, or operations regulated or required under this permit and to access records maintained under the conditions of this permit.

l. All required or requested documents shall be signed and sent to the: Department of Energy & Environment, 1200 First Street, N.E., 5th Floor, Washington, DC 20002, Attention: Associate Director, Inspection and Enforcement Division.

9.2.2 DER10F000 Areas in the State of Delaware subject to construction by a Federal Operator

a. Federal agencies engaging in construction activities must submit, to DNREC, a sediment and stormwater management (S&S) plan and obtain approval from DNREC in accordance with 7 Del. C. §4010, 7 DE Admin. Code 5101, and 7 DE Admin. Code 7201.

b. Federal agencies engaging in construction activities must provide for construction review by a certified construction reviewer in accordance with 7 Del. C. §§4010 & 4013 and 7 DE Admin. Code 5101, subsection 6.1.6.

c. Federal agencies engaging in construction activities must certify that all responsible personnel involved in the construction project will have attended the blue card training prior to initiation of any land disturbing activity – *see* 7 Del. C. §§ 4002 & 4014 and 7 DE Admin. Code 5101.

9.3 EPA Region 5

9.3.1 MNR10I000 Indian country within the State of Minnesota

9.3.1.1 Fond du Lac Band of Lake Superior Chippewa. The following conditions apply only to discharges on the Fond du Lac Band of Lake Superior Chippewa Reservation:

a. A copy of the Stormwater Pollution Prevention Plan (SWPPP) must be submitted to the Office of Water Protection at least fifteen (15) days in advance of sending the Notice of Intent (NOI) to EPA. The SWPPP can be submitted electronically to richardgitar@FDLREZ.com or by hardcopy sent to:

   Fond du Lac Reservation
   Office of Water Protection
   1720 Big Lake Road
   Cloquet, MN 55720

   CGP applicants are encouraged to work with the FDL Office of Water Protection in the identification of all proposed receiving.

b. Copies of the Notice of Intent (NOI) and the Notice of Termination (NOT) must be sent to the Fond du Lac Office of Water Protection at the same time they are submitted to EPA.

c. The turbidity limit shall NOT exceed 10% of natural background within the receiving water(s) as determined by Office of Water Protection staff.

d. Turbidity sampling must take place within 24 hours of a ½-inch or greater rainfall event. The results of the sampling must be reported to the Office of Water Protection within 7 days of the sample collection. All sample reporting must include the date and time, location (GPS: UTM/Zone 15), and NTU. CGP applicants are encouraged to work with the Office of Water Protection in determining the most appropriate location(s) for sampling.

e. Receiving waters with open water must be sampled for turbidity prior to any authorized discharge as determined by Office of Water Protection staff. This requirement only applies to receiving waters in which no ambient turbidity data exists.

f. This Certification does not pertain to any new discharge to Outstanding Reservation Resource Waters (ORRW) as described in §105 b.3. of the Fond du Lac Water Quality Standards (Ordinance #12/98, as amended). Although additional waters may be designated in the future, currently Perch Lake, Rice Portage Lake, Miller Lake, Deadfish Lake, and Jaskari Lake are designated as ORRWs. New dischargers wishing to discharge to an ORRW must obtain an individual permit from EPA for stormwater discharges from large and small construction activities.

g. All work shall be carried out in such a manner as will prevent violations of water quality criteria as stated in the Water Quality Standards of the Fond du Lac Reservation, Ordinance 12/98, as amended. This includes, but is not limited to, the prevention of any discharge that causes a condition in which visible solids, bottom deposits, or turbidity impairs the usefulness of water of the Fond du Lac Reservation for any of the uses designated in the Water Quality Standards of the Fond du Lac Reservation. These uses include wildlife, aquatic life, warm water fisheries, cold water fisheries, subsistence fishing (netting), primary contact recreation, secondary contact recreation, cultural, wild rice areas, aesthetic waters, agriculture, navigation, and commercial.

h. Appropriate steps shall be taken to ensure that petroleum products or other chemical pollutants are prevented from entering waters of the Fond du Lac Reservation. All spills must be reported to the appropriate emergency management agency (National Response Center AND the State Duty Officer), and measures shall be taken immediately to prevent the pollution of waters of the Fond du Lac Reservation, including groundwater. The Fond du Lac Office of Water Protection must also be notified immediately of any spill regardless of size.

i. This certification does not authorize impacts to cultural, historical, or archeological features or sites, or properties that may be eligible for such listing.

9.3.1.2 Grand Portage Band of Lake Superior Chippewa. The following conditions apply only to discharges on the Grand Portage Band of Lake Superior Chippewa Reservation:

a. The CGP authorization is for construction activities that may occur within the exterior boundaries of the Grand Portage Reservation in accordance to the Grand Portage Land Use Ordinance. The CGP regulates stormwater discharges associated with construction sites of one acre or more in size. Only those activities specifically authorized by the CGP are authorized by this certification (the "Certification"). This Certification does not authorize impacts to cultural, historical, or archeological features or sites, or properties that may be eligible for listing as such.

b. All construction stormwater discharges authorized by the CGP must comply with the Water Quality Standards and Water Resources Ordinance, as well as Applicable Federal Standards (as defined in the Water Resources Ordinance). As such, appropriate steps must be taken to ensure that petroleum products or other chemical pollutants are prevented from entering the Waters of the Reservation (as defined in the Water Resources Ordinance). All spills must be reported to the appropriate emergency-management agency, and measures must be taken to prevent the pollution of the Waters of the Reservation, including groundwater.

c. The 2017 CGP requires inspections and monitoring reports of the construction site stormwater discharges by a qualified person. Monitoring and inspection reports must comply with the minimum requirements contained in the 2017 CGP. The monitoring plan must be prepared and incorporated into the Stormwater Pollution Prevention Plan (the "SWPPP"). A copy of the SWPPP must be submitted to the Board at least 30 days in advance of sending the requisite Notice of Intent to EPA. The SWPPP should be sent to:

Grand Portage Environmental Resources Board
P.O. Box 428
Grand Portage, MN 55605

Copies of the Notice of Intent and Notice of Termination required under the CGP must be submitted to the Board at the address above at the same time they are submitted to the EPA.

d. If requested by the Grand Portage Environmental Department, the permittee must provide additional information necessary for a case-by-case eligibility determination to assure compliance with the Water Quality Standards and any Applicable Federal Standards.

e. Discharges that the Board has determined to be or that may reasonably be expected to be contributing to a violation of Water Quality Standards or Applicable Federal Standards are not authorized by this Certification.

f. The Board retains full authority provided by the Water Resources Ordinance to ensure compliance with and to enforce the provisions of the Water Resource Ordinance and Water Quality Standards, Applicable Federal Standards, and these Certification conditions.

g. Appeals related to Board actions taken in accordance with any of the preceding conditions may be heard by the Grand Portage Tribal Court.

9.3.2 WIR10I000 Indian country within the State of Wisconsin, except the Sokaogon Chippewa (Mole Lake) Community

9.3.2.1 Bad River Band of Lake Superior Tribe of Chippewa Indians: The following conditions apply only to discharges on the Bad River Band of the Lake Superior Tribe of Chippewa Indians Reservation:

a. Only those activities specifically authorized by the CGP are authorized by this Certification. This Certification does not authorize impacts to cultural properties, or historical sites, or properties that may be eligible for listing as such.[61, 62]

b. All projects which are eligible for coverage under the CGP and are located within the exterior boundaries of the Bad River Reservation shall be implemented in such a manner that is consistent with the Tribe's Water Quality Standards (WQS) in order to protect Reservations waters that may be impacted by stormwater discharge including embankments, outlets, adjacent streambanks, slopes, and downstream waters.[63]

c. Operators are not eligible to obtain authorization under the CGP for all new discharges to an Outstanding Tribal Resource Water (or Tier 3 water).[64] Outstanding Tribal Resource Waters, or Tier 3 waters, include the following: Kakagon Slough and the lower wetland reaches of its tributaries that support wild rice, Kakagon River, Bad River Slough, Honest John Lake, Bog Lake, a portion of Bad River, from where it enters the Reservation through the confluence with the White River, and Potato River.[65]

d. An operator proposing to discharge to an Outstanding Resource Water (or Tier 2.5 water) under the CGP must comply with the antidegradation provisions of the Tribe's WQS. Outstanding Resource Waters, or Tier 2.5 waters, include the following: a portion of Bad River, from downstream the confluence with the White River to Lake Superior, White River, Marengo River, Graveyard Creek, Bear Trap Creek, Wood Creek, Brunsweiler River, Tyler Forks, Bell Creek, and Vaughn Creek.[66] The antidegradation demonstration materials described in provision E.4.iii. must be submitted to the following address:

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[61] Bad River Band of Lake Superior Tribe of Chippewa Indians Water Quality Standards adopted by Resolution No. 7-6-11-441 (hereafter, Tribe's WQS).

[62] 36 C.F.R. § 800.16(l)(2).

[63] See footnote 61.

[64] Tribe's WQS: See provisions E.3.ii. and E.4.iv.

[65] Tribe's WQS: See provision E.2.iii.

[66] Tribe's WQS: See provision E.2.ii.

Bad River Tribe's Natural Resources Department
Attn: Water Resources Specialist
P.O. Box 39
Odanah, WI 54861

e. An operator proposing to discharge to an Exceptional Resource Water (or Tier 2 water) under the CGP must comply with the antidegradation provisions of the Tribe's WQS. Exceptional Resource Waters, or Tier 2 waters, include the following: any surface water within the exterior boundaries of the Reservation that is not specifically classified as an Outstanding Resource Water (Tier 2.5 water) or an Outstanding Tribal Resource Water (Tier 3 water).[67] The antidegradation demonstration materials described in provision E.4.ii. must be submitted to the following address:

Bad River Tribe's Natural Resources Department
Attn: Water Resources Specialist
P.O. Box 39
Odanah, WI 54861

f. Projects utilizing cationic treatment chemicals[68] within the Bad River Reservation boundaries are not eligible for coverage under the CGP.[69]

g. A discharge to a surface water within the Bad River Reservation boundaries shall not cause or contribute to an exceedance of the turbidity criterion included in the Tribe's WQS, which states: Turbidity shall not exceed 5 NTU over natural background turbidity when the background turbidity is 50 NTU or less, or turbidity shall not increase more than 10% when the background turbidity is more than 50 NTU.[70]

h. All projects which are eligible for coverage under the CGP within the exterior boundaries of the Bad River Reservation must comply with the Bad River Reservation Wetland and Watercourse Protection Ordinance, or Chapter 323 of the Bad River Tribal Ordinances, including the erosion and sedimentation control, natural buffer, and stabilization requirements. Questions regarding Chapter 323 and requests for permit applications can be directed to the Wetlands Specialist in the Tribe's Natural Resources Department at (715) 682-7123 or wetlands@badriver-nsn.gov.

i. An operator of a project, which is eligible for coverage under the CGP, that would result in an allowable discharge under the CGP occurring within the exterior boundaries of the Bad River Reservation must notify the Tribe prior to the commencing earth-disturbing activities.[71, 72] The operator must submit a copy of the Notice of Intent (NOI) to the following addresses at the same time it is submitted to the U.S. EPA:

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[67] Tribe's WQS: See provision E.2.i.

[68] See definition of cationic treatment chemicals in Appendix A of the CGP.

[69] Tribe's WQS: See provisions E.6.ii.a. and E.6.ii.c.

[70] Tribe's WQS: See provision E.7.iii.

[71] See footnote 61.

[72] See footnote 62.

Bad River Tribe's Natural Resources Department
Attn: Water Resources Specialist
P.O. Box 39
Odanah, WI 54861

Bad River Tribe's Natural Resources Department
Attn: Tribal Historic Preservation Officer (THPO)
P.O. Box 39
Odanah, WI 54861

The operator must also submit a copy of the Notice of Termination (NOT) to the above addresses at the same time it is submitted to the U.S. EPA.

j. The Tribal Historic Preservation Officer (THPO) must be provided 30 days to comment on the project.[73]

k. The operator must obtain THPO concurrence in writing. This written concurrence will outline measures to be taken to prevent or mitigate effects to historic properties. For more information regarding the specifics of the cultural resources process, see 36 CFR Part 800. A best practice for an operator is to consult with the THPO during the planning stages of an undertaking.[74]

l. An operator of a project, which is eligible for coverage under the CGP, that would result in an allowable discharge under the CGP occurring within the exterior boundaries of the Bad River Reservation must submit a copy of the Stormwater Pollution Prevention Plan (SWPPP) to the following address at the same time as submitting the NOI: [75]

Bad River Tribe's Natural Resources Department
Attn: Water Resources Specialist
P.O. Box 39
Odanah, WI 54861

m. Any corrective action reports that are required under the CGP must be submitted to the following address within one (1) working day of the report completion: [76]

Bad River Tribe's Natural Resources Department
P.O. Box 39
Odanah, WI 54861

n. An operator shall be responsible for meeting any additional permit requirements imposed by the U.S. EPA necessary to comply with the Tribe's antidegradation policies if the discharge point is located upstream of waters designated by the Tribe.[77]

[73] 36 C.F.R. § 800.3(c)(4).

[74] 36 C.F.R. § 800.3(b).

[75] See footnote 61.

[76] See footnote 61.

[77] See footnote 61.

9.3.2.2 Lac du Flambeau Band of Lake Superior Tribe of Chippewa Indians: The following conditions apply only to discharges on the Lac du Flambeau Band of the Lake Superior Tribe of Chippewa Indians Reservation:

a. A copy of the Stormwater Pollution Prevention Plan must be submitted to the following office, for the Traival environmental review process, at least thirty (30) days in advance of sending the Notice of Intent (NOI) to EPA:

Lac du Flambeau
Tribal Land Management
P.O. Box 279
Lac du Flambeau, WI 54538

CGP applicants are encouraged to work with the LdF Water Resources Program in the identification of all proposed receiving waters.

b. Copies of the NOI and the Notice of Termination (NOT) must be sent to the LdF Water Resources Program at the same time they are submitted to EPA.

c. All work shall be carried out in such a manner as will prevent violations of water quality criteria as stated in the Water Quality Standards of the Lac du Flambeau Reservation. This includes, but is not limited to, the prevention of any discharge that cause a condition in which visible solids, bottom deposits, or turbidity impairs the usefulness of water of the Lac du Flambeau Reservation for any of the uses designated in the Water Quality Standards of the Lac du Flambeau Reservation.

d. Appropriate steps shall be taken to ensure that petroleum products or other chemical pollutants are prevented from entering waters of the Lac du Flambeau Reservation. All spills must be reported to the appropriate emergency management agency, and measures shall be taken immediately to prevent the pollution of waters of the Lac du Flambeau reservation, including groundwater.

e. This certification does not authorize impacts to cultural, historical, or archeological features or sties, or properties that may be eligible for such listing.

f. Due to the significant ecological and cultural importance of the Lac du Flambeau Reservation, any operator requesting a permit for a point source discharge of pollutants (i.e., discharge) associated with the Stormwater Discharge will need a stormwater pollution prevention plan in place that does not violate Lac du Flambeau Water Quality Standards to protect Reservation Waters.

9.4 EPA Region 6

9.4.1 NMR100000 State of New Mexico, except Indian country

a. If construction dewatering activities are anticipated at a site, permittees must complete the following steps:

   i. Investigative information must be documented in the facility SWPPP.

   ii. Refer to the GWQB Mapper at https://gis.web.env.nm.gov/GWQB/ AND the PSTB Mapper (Go Mapper) at https://gis.web.env.nm.gov/GoNM/

and check if the following sources are located within the noted distance from your anticipated construct site groundwater dewatering activity:

Project Location Relative to a Source of Potential Groundwater Contamination	***Constituents likely to be required for testing***
Within 0.5 mile of an open Leaking Underground Storage Tank (LUST) site	*BTEX (Benzene, Toluene, Ethylbenzene, and Xylene) plus additional parameters depending on site conditions.**
Within 0.5 mile of an open Voluntary Remediation site	*All parameters listed in Appendix A (or an alternate list approved by the NMED SWQB)***
Within 0.5 mile of an open RCRA Corrective Action Site	
Within 0.5 mile of an open Abatement Site	
Within 0.5 mile of an open Brownfield Site	
Within 1.0 mile or *more of a Superfund site or National Priorities List (NPL) site with associated groundwater contamination.*	

**For further assistance determining whether dewatering may encounter impacted groundwater, the permittee may contact the NMED Ground Water Quality Bureau at: 505-827-2965.*

***EPA approved-sufficiently sensitive methods must be used - approved methods are listed in 40 CFR Part 136.3.*

ii. Indicate on the NOI that dewatering activities are anticipated. Provide information on flow and potential to encounter impacted groundwater.

iii. Permittee must test the quality of the groundwater according to the chart above. Hardness and pH must also be measured.

iv. Permittee must send test result data to EPA Region 6 and the NMED Surface Water Quality Bureau. If the test data exceed standards, it cannot be discharged from the construction site into surface waters under this permit. Discharge to surface waters must be conducted under a separate NPDES individual permit to ensure proper treatment and disposal.

v. If disposal will be to the ground surface or in an unlined pond, the permittee must submit an NO/ to the NMED Ground Water Quality Bureau.

b. Operators are not eligible to obtain authorization under this permit for all new and existing storm water discharges to outstanding national resource waters (ONRWs) (also referred to as "Tier 3" waters.)

c. Operators who intend to obtain authorization under this permit for new and existing storm water discharges from construction sites must satisfy the following condition:

i. The SWPPP must include site-specific interim and permanent stabilization, managerial, and structural solids, erosion and sediment control best management practices (BMPs) and/or other controls that are designed to prevent to the maximum extent practicable an increase in the sediment yield and flow velocity from pre-construction, pre-development conditions to assure that applicable standards in 20.6.4.NMAC, including the antidegradation policy, or TMDL waste load allocations (WLAs) are met. This requirement applies to discharges both during construction and after construction operations have been completed. The SWPPP must identify and document the rationale for selecting these BMPs and/or other controls. The SWPPP must also describe design specifications, construction specifications, maintenance schedules (including a long term maintenance plan), criteria for inspections, and expected performance and longevity of these BMPs. For sites greater than 5 acres in size, BMP selection must be made based on the use of appropriate soil loss prediction models (i.e. SEDCAD, RUSLE, SEDIMOT, MULTISED, etc.) OR equivalent generally accepted (by professional erosion control specialists) soil loss prediction tools.

ii. For all sites, the operator(s) must demonstrate, and include documentation in the SWPPP, that implementation of the site-specific practices will assure that the applicable standards or TMDL WLAs are met, and will result in sediment yields and flow velocities that, to the maximum extent practicable, will not be greater than the sediment yield levels and flow velocities from preconstruction, pre-development conditions.

iii. All SWPPPs must be prepared in accordance with good engineering practices by qualified (e.g. CPESC certified, engineers with appropriate training) erosion control specialists familiar with the use of soil loss prediction models and design of erosion and sediment control systems based on these models (or equivalent soil loss prediction tools). Qualifications of the preparer (e.g., professional certifications, description of appropriate training) must be documented in the SWPPP. The operator(s) must design, implement, and maintain BMPs in the manner specified in the SWPPP.

d. Permittees can call 505-827-9329 for emergencies at any time and 505-476-6000 for non-emergencies during business hours from 5am-5pm, Monday through Friday.

9.4.2 NMR10I000 Indian country within the State of New Mexico, except Navajo Reservation Lands that are covered under Arizona permit AZR10I000 and Ute Mountain Reservation Lands that are covered under Colorado permit COR10I000.

9.4.2.1 Pueblo of Isleta. The following conditions apply only to discharges on the Pueblo of Isleta Reservation:

a. CGP at 1.3 Prohibited discharges: Stormwater discharges associated with construction activity that EPA or the Pueblo of Isleta, prior to authorization under this perm it, determines will cause, have the reasonable potential to cause, or may reasonably be expected to contribute to a violation or excursion of any applicable water quality standard, including the antidegradation policy, or the impairment of a designated use of receiving waters are not authorized by this permit.

b. CGP at 1.4.1 How to Submit Your NOI: The operator shall provide a copy of the Notice of Intent ("NOI") to the Pueblo of Isleta at the same time it is submitted to the U.S. Environmental Protection Agency, for projects occurring within the exterior boundaries of the Pueblo of Isleta. The operator shall also notify the Pueblo of Isleta when it has submitted the Notice of Termination ("NOT"). The NOI and NOT shall be sent to the Pueblo of Isleta at the following address:

Water Quality Control Officer
Pueblo of Isleta
Environment Department
PO Box 1270

Isleta, NM 87022
(505) 869-9819
E-mail: POI36871@isletapueblo.com

Overnight/Express Mail Delivery
Pueblo of Isleta
Environment Department
6 Sagebrush St.
Albuquerque, NM 87105

c. CGP at 1.5 Requirement to post a notice of your permit coverage: Amend to read: "You must post a sign or other notice of your permit coverage at a safe, publicly accessible location in close proximity to the construction site. The notice must be located so that it is visible from the public road or tribal road that is nearest to the active part of the construction site..."

d. CGP at 7.2.6 Description of stormwater controls: The SWPPP will be considered to be incomplete if the operator has not coordinated requirements under this Part with the Pueblo of Isleta Environment Department.

e. CGP I.12.6.1 at pg.I-6 of 8. The Pueblo of Isleta requests notification within 10 hours (rather than 24 hrs.) if health or the environment become endangered.

f. CGP at I.12.2 Anticipated noncompliance: Amend to read: "You must give advance notice to EPA and the Pueblo of Isleta at the address indicated in 1.4.1(a) of any planned changes in the permitted facility or activity which may results in noncompliance with permit requirements."

g. CGP at I.12.6.1: Any noncompliance for projects within the exterior boundaries of the Pueblo of Isleta which may endanger health or the environment shall be reported directly to the EPA Regional Office [(see contacts at https://www2.epa.gov/national-pollutant-discharge-elimination-system-npdes/contact-us-stormwater#regional)l and to the Pueblo of Isleta Water Quality Control Officer. Any information must be provided orally with n 12 hours of the time you become aware of the circumstances. Other requirements of this Part for a written submission apply. Electronic communication (E-mail) shall be provided as soon as practical. Verbal notice shall be provided to:

Water Quality Control Officer
Pueblo of Isleta
E-mail: POI36871@isletapueblo.com
(505) 869-9819
(505) 917-8346 mobile
(505) 869-3030 Police Dispatch

h. CGP at 2.2 Erosion and sediment control requirements: Erosion and sediment controls shall be designed to retain sediment on-site.

i. CGP at 2.2 Under Sediment control requirements, Standard Permit Condition Duty to Mitigate Volumes of sediment at or over (five) 5 cubic yards must be removed and placed for disposal within a tribally approved sediment Disposal Site, located on Pueblo of Isleta lands. CGP 2.2 at pg. 8.

j. Under Minimize erosion, a permittee must secure permission from the Pueblo or affected Pueblo of Isleta land assignment owner if a dissipation device needs to be placed up- or down- elevation of a given construction site. CGP 2.2.11 at pg. 11.

k. CGP at 2.3.6 Emergency spill notification requirements: You must notify the Pueblo of Isleta Water Quality Control Officer and National Response Center (NRC) [at (800) 424-8802 or, in the Washington, DC metropolitan area, call (202) 267-2675 in accordance with the requirements of 40 CFR 110, 40 CFR 117, and 40 CFR 302] as soon as you have knowledge of the release. Verbal and electronic notice shall be provided as specified in I.12.6.1

l. CGP at C.3 Equivalent analysis waiver: Parties wishing to apply for an Equivalent Analysis Waiver (see Appendix D, Section C) must provide a copy of the waiver analysis to the Pueblo of Isleta Water Quality Control Officer at the address indicated in 1.4.1 (a).

9.4.2.2 **Pueblo of Sandia.** The following conditions apply only to discharges on the Pueblo of Sandia Reservation:

a. Only those activities specifically authorized by the CGP are authorized by the Pueblo of Sandia's Water Quality certification. The Pueblo of Sandia's Water Quality Certification does not authorize impact to cultural properties, historical sites or properties that may be eligible as such.

b. Copies of all Notices of Intent (NOI) submitted to the EPA must also be sent concurrently to the Pueblo of Sandia at the following address. Discharges are not authorized by this permit unless an accurate and complete NOI has been submitted to the Pueblo of Sandia, either by mail or electronically.

<u>Regular U.S. Delivery Mail:</u>
Pueblo of Sandia Environment Department
Attention: Scott Bulgrin, Water Quality Manager
481 Sandia Loop
Bernalillo, New Mexico 87004

<u>Electronically:</u>
sbulgrin@sandiapueblo.nsn.us

c. Any correspondences between the applicant and EPA related to analytical data, written reports, corrective action, enforcement, monitoring, or an adverse incident written reports should likewise be routed to the Pueblo of Sandia at the above address.

d. The Stormwater Pollution Prevention Plan (SWPPP) must be available to the Pueblo of Sandia Environment Department either electronically or hard copy upon request for review. The SWPPP must be made available at least fourteen (14) days before construction begins. The fourteen (14) day period will give Pueblo staff time to become familiar with the project site, prepare for construction site inspections, and determine compliance with the Pueblo of Sandia Water Quality Standards. Failure to provide a SWPPP to the Pueblo of Sandia may result in the delay or denial of the construction project.

e. If requested by the Pueblo of Sandia Environment Department, the permittee must provide additional information necessary for a case-by-case eligibility determination to assure compliance with the Pueblo of Sandia Water Quality Standards and/or applicable Federal Standards not authorized by this certification.

f. An "Authorization to Proceed Letter" with site specific mitigation requirements may be sent out to the permittee when a review of the NOI and SWPPP, on a case- by-case basis is completed by the Pueblo of Sandia Environment Department. This approval will allow the application to proceed if all mitigation requirements are met.

g. The Pueblo of Sandia will not allow Small construction Waivers (Appendix C) or the Rainfall Erosivity Waiver (Appendix C.1) to be granted for any small construction activities.

h. Before submitting a Notice of Termination (NOT) to the EPA, permittees must clearly demonstrate to the Pueblo of Sandia Environment Department through a site visit or documentation that requirements for site stabilization have been met and any temporary erosion control structures have been removed. A short letter stating the NOT is acceptable and all requirements have been met will be sent to the permittee to add to the permittee's NOT submission to EPA.

i. Copies of all NOT submitted to the EPA must also be sent concurrently to the Pueblo of Sandia through the mail or electronically.

Regular U.S. Delivery Mail:
Pueblo of Sandia Environment Department
Attention: Scott Bulgrin, Water Quality Manager
481 Sandia Loop
Bernalillo, New Mexico 87004

Electronically:
sbulgrin@sandiapueblo.nsn.us

j. The Pueblo of Sandia may require the permittee to perform water quality monitoring for pH, turbidity, and total suspended solids (TSS) during the permit term if the discharge is to a surface water leading to the Rio Grande for the protection of public health and the environment.

9.4.2.3 Pueblo of Santa Ana. The following conditions apply only to discharges on the Pueblo of Santa Ana Reservation:

a. The permittee shall provide a copy of the Notice of Intent (NOI) to the Pueblo of Santa Ana (the Pueblo), at the same time it is submitted to the U.S. Environmental Protection Agency (EPA), for projects with discharges onto the lands of the Pueblo as defined in the Pueblo's antidegradation policy within the Pueblo of Santa Ana Water Quality Standards.

b. The permittee shall provide a final copy of the Stormwater Pollution Prevention Plan (SWPPP) to the Pueblo that is associated with any project identified in the NOI, at the same time that an NOI is submitted to the EPA. The SWPPP should include any projects with discharges onto the lands of the Pueblo as defined in the antidegradation policy within the Pueblo of Santa Ana Water Quality Standards.

c. The operator shall provide copies of inspections reports and of corrective action reports to the Pueblo at the address below for review, upon request.

d. Upon completion of the project identified in the NOI, the permittee will submit a Notice of Termination (NOT) to the Pueblo.

e. All required or requested permittee specific information identified above shall be submitted to the following address:

Pueblo of Santa Ana Department of Natural Resources,
Attention: Water Resources Division
2 Dove Road
Santa Ana Pueblo, NM 87004

f. Discharges are not authorized by permittee unless an accurate and complete NOI and SWPPP have been submitted to the Pueblo. Failure to provide an accurate and complete NOI and SWPPP may result in a denial of the discharge permit or a delay in groundbreaking or construction.

g. The permittee will not proceed with site work until authorized by the Pueblo. The Pueblo requires review of the complete and final SWPPP before authorization to proceed. The Pueblo will provide an "Authorization to Process" notice after review and approval of the SWPPP.

h. The permittee could be required to perform water quality monitoring, sampling or analysis during the active permit dates for constituents determined by the Pueblo.

i. Before submitting a NOT, permittees must certify to the Pueblo's Department of Natural Resources in writing that requirements for site stabilization have been met, and any temporary erosion control structures have been removed. Documentation of the Pueblo's review that such requirements have been reviewed and met will be provided for the permittee to add to the permittee's NOT submission to EPA. Copies of all NOT submitted to the EPA must also be sent to the Pueblo at the address provided above.

9.4.2.4 Pueblo of Santa Clara. The following conditions apply only to discharges on the Pueblo of Santa Clara Reservation:

a. The operator must provide a copy of the Notice of Intent (NOI) and Notice of Termination (NOT) to the Santa Clara Pueblo Governor's Office at the same time it is provided to the US Environmental Protection Agency.

b. A copy of the Storm water Pollution Prevention Plan shall be made available to the Pueblo of Santa Clara staff upon request.

9.4.2.5 Pueblo of Tesuque. The following conditions apply only to discharges on the Pueblo of Tesuque Reservation:

a. Based on the Section 401 Certification provisions within the CWA, no discharges that will exceed or cause the exceedance of the Pueblo of Tesuque Water Quality Standards will be allowed within the boundaries of the Pueblo of Tesuque.

b. The operator shall provide a copy of the Notice of Intent (NOI) to the Pueblo of Tesuque Governor’s Office in care of the Department of Environmental and Natural Resources (DENR) at the same time it is submitted to the Environmental

Protection Agency, for projects occurring within the boundaries of Tesuque tribal lands. The operator shall also notify the Pueblo of Tesuque Governor's Office in care of the DENR when it submits the Notice of Termination (NOT), but not before the DENR post-construction inspection has been completed as described below. The NOI and NOT shall be sent to the following address:

Pueblo of Tesuque
Office of the Governor
Attn: DENR
20 TP828 Administration Bldg.
Santa Fe, NM 87506-5512

Alternatively, the operator may arrange with DENR to email the documents.

c. The operator shall also provide a copy of the Stormwater Pollution Prevention Plan, copies of inspection reports, and copies of corrective action reports to the DENR.

d. Construction requiring this permit will not commence until the above document submissions have been made and DENR provides the operator with notice to proceed. Operators will not demobilize until DENR personnel inspect the site for complication of stabilization. Once the inspection has taken place and all SWPPP-related work has been completed to the satisfaction of DENR, the operator will submit its NOT as described above and then demobilize.

9.4.2.6 **Taos Pueblo**. The following conditions apply only to discharges on the Taos Pueblo Reservation:

a. The operator shall provide a copy of the Notice of Intent (NOI) to the Taos Pueblo Governor's Office, War Chief's Office and Environmental Office, at the same time it is submitted to the U.S. Environmental Protection Agency, for projects occurring within the exterior boundaries of Taos Pueblo. The operator shall also notify Taos Pueblo when it has submitted the Notice of Termination (NOT). The NOI and NOT shall be sent to the Taos Pueblo at the following addresses:

i. Taos Pueblo Governor's Office
P.O. Box 1846
Taos NM 87571

ii. Taos Pueblo War Chief's Office
P.O. Box 2596
Taos NM 87571

iii. Environmental Office
Attn: Program Manger
P.O. Box 1846
Taos NM 87571

b. Taos Pueblo requests that in the event Indian artifacts or human remains are inadvertently discovered on projects occurring near or on Taos Pueblo lands that consultation with the tribal Governor's Office occur at the earliest possible time.

c. The operator shall provide a copy of the Stormwater Pollution Prevention Plan, copies of inspections reports, and copies of corrective action reports to staff in the Taos Pueblo Environmental Office for review and copy, upon request.

9.4.2.7 **Ohkay Owingeh.** The following conditions apply only to discharges on the Ohkay Owingeh Reservation:

a. Prior to commencement of any construction activity on Ohkay Owingeh Lands requiring permit coverage under EPA's Construction General Permit, the operator(s) shall submit to Ohkay Owingeh Office of Environmental Affairs, a copy of the electronic "Notice of Intent," submitted to the Environmental Protection Agency, immediately following EPA's electronic notification that the NOI has been received. A copy of the Stormwater Pollution Prevention Plan(s) must be made available to the Ohkay Owingeh Office of Environmental Affairs upon the tribe's request either electronically or hard copy. Operator(s) shall also submit to Ohkay Owingeh Office of Environmental Affairs a copy of the electronic Notice of Termination (NOT) submitted to the Environmental Protection Agency. Documents shall be submitted to Ohkay Owingeh at the following address:

Ohkay Owingeh Office of Environment Affairs
Attention: Environmental Programs Manager
P.O. Box 717
Ohkay Owingeh, New Mexico 87566
Office # 505.852.4212
Fax # 505.852.1432
Electronic mail: naomi.archuleta@ohkay.org

b. Ohkay Owingeh will not allow the Rainfall Erosivity Waivers (see Appendix C) to be granted for any small construction activities.

c. All vegetation used to prevent soil loss, seeding or planting of the disturbed area(s) to meet the vegetative stabilization requirements must utilize native seeds/vegetation commonly known to the area. All temporary erosion control structures, such as silt fences must be removed as soon as stabilization requirements are met.

9.4.2.8 **Pueblo of Laguna.** The following conditions apply only to discharges on the Pueblo of Laguna Reservation:

a. The operator must provide a paper and electronic copy of the Notice of Intent (NOI) and Notice of Termination (NOT) to the Pueblo of Laguna at the same time it is provided to the U.S. Environmental Protection Agency. The NOI and NOT should be provided to the following address:

Pueblo of Laguna, Office of the Governor
Attn: Environmental & Natural Resources Department
P.O. Box 194
Laguna, NM 87026

Email: setter@pol-nsn.gov

b. The operator must provide an electronic copy of the Storm Water Pollution

Prevention Plan to the Pueblo of Laguna Environmental Program at the same time the NOI is submitted to the above listed email addresses. Any correspondences between the applicant and EPA related to analytical data, written reports, corrective action, enforcement, monitoring, or an adverse incident written reports threshold likewise be routed to the Pueblo of Laguna Environmental Program.

c. Immediate initiation of consultation with the Pueblo of Laguna is required should any human remains or artifacts be unearthed during the project that fall under the Native American Graves Protection and Repatriation Act guidelines. If human remains are unearthed, contact the Pueblo of Laguna Police Department at 505.552.6666. If artifacts are unearthed, contact the Pueblo of Laguna Tribal Historic Preservation Office at 505.552.5033.

9.4.2.9 **Picuris Pueblo.** The following conditions apply only to discharges on the Picuris Pueblo Reservation:

a. The operator, landowner and construction operators doing earth-disturbance work must meet the definition of "operator" under the Construction General Permit (CGP), and must provide an electronic and paper copy of the Notice of Intent (NOI) and Notice of Termination (NOT) to **both** The Office of the Picuris Pueblo Governor and the Picuris Pueblo Environmental Department at the same time it is provided to the U.S. Environmental Protection Agency (USEPA). The NOI and NOT should be provided to the following address:

Picuris Pueblo
The Office of the Governor
PO BOX 127
Penasco, NM 87553
575-587-2519
575-587-1071 (Fax)
Governor: governor@picurispueblo.org

Picuris Pueblo Environmental Department
PO BOX 158
Penasco, NM 87553
575-587-0110
575-587-0223 (Fax)
Environmental Director: environment@picurispueblo.org

b. The operator must provide an electronic copy of the Storm Water Pollution Prevention Plan to the Picuris Pueblo Environmental Department at least 30 days prior to submitting the NOI to USEPA and the Picuris Pueblo by email to Picuris Pueblo Environmental Department: environment@picurispueblo.org.

9.4.2.10 **Pueblo of Pojoaque.** The following conditions apply only to discharges on the Pueblo of Pojoaque Reservation:

a. The operator, landowner and construction operators doing earth-disturbance work must meet the definition of "operator" under the CGP and must provide a copy of the Notice of Intent (NOI) to the Pueblo of Pojoaque Governor's Office and Environmental Department within 3 days following U.S. Environmental Protection Agency's electronic confirmation that the NOI was certified and submitted and is undergoing its 14-day review period. Additionally, a copy of the Notice of Termination (NOT) must be provided the same day electronic confirmation is received from the U.S. Environmental Protection Agency that the NOT has been accepted. The NOI and NOT should be provided to the following address:

Pueblo of Pojoaque
Office of the Governor
78 Cities of Gold Road
Santa Fe, NM 87506

Pueblo of Pojoaque
Environmental Department
39 Camino Del Rincon
Santa Fe, NM 87506

b. The operator must provide an electronic copy of the Stormwater Pollution Prevention Plans to the Pueblo of Pojoaque Environmental Department by email to Adam L Duran (aduran@pojoaque.org) at least 30 days prior to submitting the NOI to EPA and the Pueblo of Pojoaque.

9.4.2.11 Nambe Pueblo. The following conditions apply only to discharges on Nambe Pueblo:

a. The operator must provide a copy of the Notice of Intent (NOI) and Notice of Termination (NOT) to the Nambe Pueblo Governor's Office at the same time it is provided to the US Environmental Protection Agency. The NOI and NOT should be provided to the following address:

Office of the Governor
Nambe Pueblo
15A NP102 WEST
Nambe Pueblo, NM 87506

b. The operator must provide a copy of the Stormwater Pollution Prevention Plan to Nambe Pueblo at the same time it is submitted to the EPA, either by email to srydeen@nambepueblo.org or mailed to the above address.

9.4.3 OKR10I000 Indian country within the State of Oklahoma

9.4.3.1 Pawnee Nation. The following conditions apply only to discharges within Pawnee Indian country:

a. Copies of the Notice of Intent (NOI) and Notice of Termination (NOT) must be provided to the Pawnee Nation at the same time it is submitted to the Environmental Protection Agency to the following address:

Pawnee Nation Department of Environmental Conservation and Safety
P.O. Box 470
Pawnee, OK 74058
Or email to mmatlock@pawneenation.org

b. The Storm Water Pollution Prevention Plan must be available to Departmental inspectors upon request.

c. The Department must be notified at 918-762-3655 immediately upon discovery of any noncompliance with any provision of the permit conditions.

9.4.4 OKR10F000 Discharges in the State of Oklahoma that are not under the authority of the Oklahoma Department of Environmental Quality, including activities associated with oil and gas exploration, drilling, operations, and pipelines (includes SIC Groups 13 and 46, and SIC codes 492 and 5171), and point source discharges associated with agricultural production, services, and silviculture (includes SIC Groups 01, 02, 07, 08, 09).

a. For activities located within the watershed of any Oklahoma Scenic River, including the Illinois River, Flint Creek, Barren Fork Creek, Upper Mountain Fork, Little Lee Creek, and Lee Creek or any water or watershed designated "ORW" in Oklahoma's Water Quality Standards, this permit may only be used to authorize discharges from temporary construction activities. Certification is denied for any on-going activities such as sand and gravel mining or any other mineral mining.

b. For activities located within the watershed of any Oklahoma Scenic River, including the Illinois River, Flint Creek, Barren Fork Creek, Upper Mountain Fork, Little Lee Creek, and Lee Creek or any water or watershed designated "ORW" in Oklahoma's Water Quality Standards, certification is denied for any discharges originating from support activities, including concrete or asphalt batch plants, equipment staging yards, material storage areas, excavated material disposal areas, or borrow areas.

c. In order to company with Oklahoma's Water Quality Standards, these conditions and restrictions also apply to any construction projects located wholly or partially on Indian Country lands within the State of Oklahoma.

9.5 EPA Region 8

9.5.1 COR10I000 Indian country within the State of Colorado, as well as the portion of the Ute Mountain Reservation located in New Mexico.

9.5.1.1 The Ute Mountain Ute Tribe. The following conditions apply only to discharges on the Ute Mountain Ute Reservation.

a. Permittees must send the Stormwater Pollution Prevention Plan (SWPPP) to the Tribal Environmental Department for review and approval at least 30 days before construction starts.

b. Before submitting the Notice of Termination (NOT), permittees must clearly demonstrate to the Tribal Environmental Department during an on-site inspection that requirements for site stabilization have been met.

c. The permittee must send a copy of the Notice of Intent (NOI) and the Tribal Environmental Department.

d. Permittees may submit their SWPPPs and NOI and NOT requests electronically to: clarrick@utemountain.org.

e. Written NOIs, SWPPPs, and NOTs may be mailed to:

Colin Larrick, Water Quality Program Manager
Ute Mountain Ute Tribe
Environmental Department
P.O. Box 448
Towaoc, CO 81334

9.5.2 MTR10I000 Indian country within the State of Montana

9.5.2.1 The Confederated Salish and Kootenai Tribes of the Flathead Nation. The following conditions apply only to discharges on the Confederated Salish and Kootenai Tribes of the Flathead Nation Reservation:

a. Permittees must submit the Stormwater Pollution Prevention Plan (SWPPP) to the Confederated Salish and Kootenai Tribes at least 30 days before construction starts.

b. Before submitting the Notice of Termination (NOT), permittees must clearly demonstrate to an appointed Tribal staff person during an onsite inspection that requirements for site stabilization have been met.

c. The permittee must send a copy of the Notice of Intent (NOI) and the NOT to CSKT.

d. Permittees may submit their SWPPPs, NOIs and NOTs electronically to: clintf@cskt.org.

e. Written SWPPPs, NOIs and NOTs may be mailed to:

Clint Folden, Water Quality Regulatory Specialist
Confederated Salish and Kootenai Tribes
Natural Resources Department
P.O. Box 278
Pablo, MT 59855

9.6 EPA Region 9

9.6.1 AZR10I000 Indian Country within the state of Arizona, as well as Navajo Nation lands in New Mexico and Utah

9.6.1.1 Navajo Nation. The following conditions apply only to discharges on the Navajo Nation reservation:

a. Courtesy copies of Notice of Intents and stormwater pollution prevention plans shall be made available to Navajo EPA.

b. Copies of all monitoring reports must be provided to Navajo EPA.

c. Facilities covered under the CGP will be subject to compliance inspections by Navajo EPA staff with active Federal Inspector Credentials under the authority of the Clean Water Act.

d. Specific awareness and adherence to Sections 201 – Anti-degradation Policy, 203 – Narrative WQS, and 207.H - Turbidity.

9.6.2 CAR10I000 Indian country within the State of California

9.6.2.1 Twenty-Nine Palms Band of Mission Indians. The following conditions apply only to discharges on the Twenty-Nine Palms Band of Mission Indians Reservation:

a. At the time the applicant submits its Notice of Intent (NOI) to the EPA, the applicant must concurrently submit written notification of the NOI and a copy of the Stormwater Pollution Prevention Plan (SWPPP) to the Twenty-Nine Palms Band of Mission Indians at the address below:

Tribal Environmental Coordinator
Twenty-Nine Palms Band of Mission Indians
46-200 Harrison Place

Coachella, CA 92236

b. The applicant must also concurrently submit to the Tribal Environmental Coordinator written notification of any other forms or information submitted to the EPA, including waivers, reporting, and Notice of Termination (NOT).

c. Permitted entities under the CGP must keep the Tribal EPA informed of authorized discharges under the CGP by submitting written information about the type, quantity, frequency and location, intended purpose, and potential human health and/or environmental effects of their activities. These requirements are pursuant to Section 4 of the Twenty-Nine Palms Band of Mission Indians Water Pollution Control Ordinance (022405A). This information may be submitted to Tribal EPA in the form of Stormwater Pollution Prevention Plans (SWPPPs), monitoring reports, or other reports as required under the CGP. Spills, leaks, or unpermitted discharges must be reported in writing to Tribal EPA within 24 hours of the incident.

9.6.2.2 Morongo Band of Mission Indians. The following conditions apply only to discharges on the Morongo Band of Mission Indians Reservation:

a. This certification does not exempt, and is provisional upon compliance with, other applicable statutes and codes administered by federal and tribal agencies. Pursuant to the Morongo Band of Mission Indians Surface Water Quality Protection Ordinance (Ordinance 39), all unpermitted discharges must be reported to the Morongo Band of Mission Indians Environmental Protection Department (Morongo EPD) within 24 hours of the incident.

b. Each operator shall submit a signed hard copy of the Notice of Intent (NOI) and stormwater pollution prevention plan (SWPPP) to the Morongo EPD at the same time it is submitted electronically to the EPA.

c. The operator shall allow the Morongo EPD or its designee to inspect and sample at the construction site as needed.

Correspondence should be submitted to:

Morongo Band of Mission Indians
Environmental Protection Department
12700 Pumarra Road
Banning, CA 92220
Phone: (951) 755-5128
Email: epd@morongo-nsn.gov

9.6.3 GUR100000 Island of Guam. The following conditions apply only to discharges on the Island of Guam:

a. Any earth-moving operations which require a permit must be obtained from the Department of Public Works (DPW) with clearance approval from various Government of Guam Agencies including Guam EPA prior to the start of any earth-moving activity.

b. In the event that the construction sites are within the Guam Sole Source Aquifer, the construction site owner and operator must consider opportunities to facilitate groundwater recharge for construction and post-construction implementing infiltration Best Management Practices. Stormwater disposal systems shall be designed and operated within the boundaries of the project. Stormwater systems shall not be permitted within any Wellhead Protection Zone unless the discharge meets the Guam Water Quality Standards within the zone. Waters discharged within the identified category G-2 recharge zone shall receive treatment to the degree required to protect the drinking water quality prior to it entering the category G-1 resource zone.

c. All conditions and requirements set forth in the 22 Guam Administrative Rules and Regulations (GARR), Division II, Water Control, Chapter 10, Guam Soil Erosion and Sediment Control Regulations (GSESCR) that are more protective than the CGP regarding construction activities must be complied with.

d. All standards and requirements set forth in the 22 GARR, Division II, Water Control, Chapter 5, *Guam Water Quality Standards (GWQS) 2001 Revisions*, must be complied with to include reporting GWQS exceedance to Guam EPA.

e. All operators/owners of any property development or earth moving activities shall comply with the erosion control pre-construction and post-construction BMP design performance standards and criteria set forth in the 2006 CNMI and Guam Stormwater Management Manual.

f. All conditions and requirements regarding dewatering activities set forth in 22 Guam Administrative Rules and Regulations Chapter 7, Water Resources Development and Operating Regulations must be complied with to include securing permits with Guam EPA prior to the start of any dewatering activities.

g. If a project to be developed is covered under the Federal Stormwater Regulations (40 CFR Parts 122 & 123), a Notice of Intent (NOI) to discharge stormwater to the surface and marine waters of Guam must be submitted to the U.S. EPA and a copy furnished to Guam EPA, pursuant to Section 10, 104(B)(5)(d) 22GAR, Division II, Chapter 10.

h. Guam EPA shall apply the Buffer Requirements listed in Appendix G of the CGP NPDES Permit for construction activities as it pertains to Waters of the U.S. in Guam. Guam EPA shall also apply the same buffer requirements for sinkholes in Guam.

i. When Guam EPA, through its permit review process, identifies that the proposed construction activity is close proximity to marine waters, contractors and owners will be informed that any activity that may impair water quality are required to stop during peak coral spawning periods as per the Guam Coral Spawning Construction Moratoriums.

j. The Proposed Construction General Permit must set appropriate measures and conditions to protect Guam's Threatened and Endangered Species and Outstanding Resource Waters of exceptional recreational or ecological significance as determined by the Guam EPA Administrator as per *Guam Water Quality Standards 2001 Revisions,* §5102, Categories of Waters, D. Outstanding Resource Waters.

k. When Guam EPA through its permit review process identifies that proposed construction activity is in close proximity to any Section 303d impaired waters, which includes marine waters and surface waters, shall ensure that construction activity does not increase the impaired water's ambient parameters.

l. When Rainfall Erosivity and TMDL Waivers reflected in the CGP, Appendix C, are submitted to the U.S. EPA, Guam EPA will review waivers on a project by project basis.

m. Prior to submission of the Notice of Termination (NOT) to the U.S. EPA, permittees must clearly demonstration to Guam EPA that the project site has met all soil stabilization requirements and removal of any temporary erosion control as outlined in the GSESCR.

9.7 EPA Region 10

9.7.1 IDR100000 State of Idaho, except Indian country

a. *Idaho's Antidegradation Policy*. The WQS contain an antidegradation policy providing three levels of protection to water bodies in Idaho (IDAPA 58.01.02.051).

1. Tier I Protection. The first level of protection applies to all water bodies subject to Clean Water Act jurisdiction and ensures that existing uses of a water body and the level of water quality necessary to protect those existing uses will be maintained and protected (IDAPA 58.01.02.051.01; 58.01.02.052.01). Additionally, a Tier 1 review is performed for all new or reissued permits or licenses (IDAPA 58.01.02.052.05).
2. Tier II Protection. The second level of protection applies to those water bodies considered high quality and ensures that no lowering of water quality will be allowed unless deemed necessary to accommodate important economic or social development (IDAPA 58.01.02.051.02; 58.01.02.052.08).
3. Tier III Protection. The third level of protection applies to water bodies that have been designated outstanding resource waters and requires that activities not cause a lowering of water quality (IDAPA 58.01.02.051.03; 58.01.02.052.09).

DEQ is employing a water body by water body approach to implementing Idaho's antidegradation policy. This approach means that any water body fully supporting its beneficial uses will be considered high quality (IDAPA 58.01.02.052.05.a). Any water body not fully supporting its beneficial uses will be provided Tier I protection for that use, unless specific circumstances warranting Tier II protection are met (IDAPA 58.01.02.052.05.c). The most recent federally approved Integrated Report and supporting data are used to determine support status and the tier of protection (IDAPA 58.01.02.052.05).

b. *Pollutants of Concern.* The primary pollutants of concern associated with stormwater discharges from construction activities are sediment, typically measured as total suspended solids and turbidity. Other potential pollutants include the following: phosphorus, nitrogen, pesticides, organics, metals, PCBs, petroleum products, construction chemicals, and solid wastes.

c. *Receiving Water Body Level of Protection.* The CGP provides coverage to construction activities throughout the entire State of Idaho. Because of the statewide applicability, all of the jurisdictional waters within Idaho could potentially receive discharges either directly or indirectly from activities covered under the CGP. DEQ applies a water body by water body approach to determine the level of antidegradation a water body will receive.

All waters in Idaho that receive discharges from activities authorized under the CGP will receive, at minimum Tier I antidegradation protection because Idaho's antidegradation policy applies to all waters of the state. Water bodies that fully support their aquatic life or recreational uses are considered to be *high quality waters* and will receive Tier II antidegradation protection.

Although Idaho does not currently have any Tier III designated outstanding resource waters (ORWs) designated, it is possible for a water body to be designated as an ORW during the life of the CGP. Because of this potential, the antidegradation review also assesses whether the permit complies with the outstanding resource water requirements of Idaho's antidegradation policy.

To determine the support status of the receiving water body, persons filing a Notice of Intent (NOI) for coverage under this general permit must use the most recent EPA-approved Integrated Report, available on Idaho DEQ's website: http://www.deq.idaho.gov/water-quality/surface-water/monitoring-assessment/integrated-report/.

High quality waters are identified in Categories 1 and 2 of the Integrated Report. If a water body is in either Category 1 or 2, it is a Tier II water body.

Unassessed waters are identified as Category 3 of DEQ's Integrated Report. These waters require a case-by-case determination to be made by DEQ based on available information at the time of the application for permit coverage. If a water body is unassessed, the applicant is directed to contact DEQ for assistance in filing the NOI.

Impaired waters are identified in Categories 4 and 5 of the Integrated Report. Category 4(a) contains impaired waters for which a TMDL has been approved by EPA. Category 4(b) contains impaired waters for which controls other than a TMDL have been approved by EPA. Category 5 contains waters which have been identified as "impaired," for which a TMDL is needed. These waters are Tier I waters, for the use which is impaired. With the exception, if the aquatic life uses are impaired for any of these three pollutants—dissolved oxygen, pH, or temperature—and the biological or aquatic habitat parameters show a health, balanced biological community, then the water body shall receive Tier II protection, in addition to Tier I protection, for aquatic life uses (IDAPA 58.01.02.052.05.c.i.).

DEQ's webpage also has a link to the state's map-based Integrated Report which presents information from the Integrated Report in a searchable, map-based format: http://www.deq.idaho.gov/assistance-resources/maps-data/.

Water bodies can be in multiple categories for different causes. If assistance is needed in using these tools, or if additional information/clarification regarding the support status of the receiving water body is desired, the operator is directed to make contact with the appropriate DEQ regional office of the State office in the table below:

Regional and State Office	Address	Phone Number	Email
Boise	1445 N. Orchard Rd., Boise 83706	208-373-0550	Kati.carberry@deq.idaho.gov
Coeur d'Alene	2110 Ironwood Parkway, Coeur D'Alene 83814	208-769-1422	June.bergquist@deq.idaho.gov
Idaho Falls	900 N. Skyline, Suite B., Idaho Falls 83402	208-528-2650	Troy.saffle@deq.idaho.gov

Lewiston	1118 “F” St., Lewiston 83501	208-799-4370	Mark.sellet@deq.idaho.gov
Pocatello	444 Hospital way, #300 Pocatello 83201	208-236-6160	Lynn.vanevery@deq.idaho.gov
Twin Falls	650 Addison Ave., W., Suite 110, Twin Falls 83301	208-736-2190	Balthasar.buhidar@deq.idaho.gov
State Office	1410 N. Hilton Rd., Boise 83706	208-373-0502	Nicole.deinarowicz@deq.idaho.gov

d. *Turbidity Monitoring.* The permittee must conduct turbidity monitoring during construction activities and thereafter on days where there is a direct discharge of pollutants from an unstabilized portion of the site which is causing a visible plume to a water of the U.S.

A properly and regularly calibrated turbidimeter is required for measurements analyzed in the field (preferred method), but grab samples may be collected and taken to a laboratory for analysis. If the permittee can demonstrate that there will be no direct discharge from the construction site, then turbidity monitoring is not required. When monitoring is required, a sample must be taken at an undisturbed area immediately upstream of the project area to establish background turbidity levels for the monitoring event. Background turbidity, location, date and time must be recorded prior to monitoring downstream of the project area. A sample must also be taken immediately downstream from any point of discharge and *within* any visible plume. The turbidity, location, date and time must be recorded. The downstream sample must be taken immediately following the upstream sample in order to obtain meaningful and representative results.

Results from the compliance point sampling or observation[78] must be compared to the background levels to determine whether project activities are causing an exceedance of state WQS. If the downstream turbidity is 50 NTUs or more than the upstream turbidity, then the project is causing an exceedance of WQS. *Any exceedance of the turbidity standard must be reporting to the appropriate DEQ regional office within 24 hours. The following six (6) steps should be followed to ensure compliance with the turbidity standard:*

1. If a visible plume is observed, quantify the plume by collecting turbidity measurements from within the plume and compare the results to Idaho’s instantaneous numeric turbidity criterion (50 NTU over the background).

[78] A visual observation is only acceptable to determine whether BMPs are functioning properly. If a plume is observed, the project may be causing an exceedance of WQS and the permittee must collect turbidity data and inspect the condition of the projects BMPs. If the BMPs appear to be functioning to their fullest capability and the turbidity is 50 NTUs or more than the upstream turbidity, then the permittee must modify the activity or implement additional BMPs (this may also include modifying existing BMPs).

2. If turbidity is less than 50 NTU instantaneously over the background turbidity; continue monitoring as long as the plume is visible. If turbidity exceeds background turbidity by more than 50 NTU instantaneously then stop all earth disturbing construction activities and proceed to step 3.
3. Take immediate action to address the cause of the exceedance. That may include inspection the condition of project BMPs. If the BMPs are functioning to their fullest capability, then the permittee must modify project activities and/or BMPs to correct the exceedance.
4. Notify the appropriate DEQ regional office within 24 hours.
5. Possibly increase monitoring frequency until state water quality standards are met.
6. Continue earth disturbing construction activities once turbidity readings return to within 50 NTU instantaneously and 25 NTU for more than ten consecutive days over the background turbidity.

Copies of daily logs for turbidity monitoring must be available to DEQ upon request. The report must describe all exceedances and subsequent actions taken, including the effectiveness of the action.

e. *Reporting of Discharges Containing Hazardous Materials or Petroleum Products.* All spills of hazardous material, deleterious material or petroleum products which may impact waters (ground and surface) of the state shall be immediately reported. Call 911 if immediate assistance is required to control, contain or clean up the spill. If no assistance is needed in cleaning up the spill, contact the appropriate DEQ regional office in the table below during normal working hours or Idaho State Communications Center after normal working hours. If the spilled volume is above federal reportable quantities, contact the National Repose Center.

For immediate assistance: Call 911

National Response Center: (800) 424-8802

Idaho State Communications Center: (208) 632-8000

Regional office	Toll Free Phone Number	Phone Number
Boise	888-800-3480	208-373-0321
Coeur d’Alene	877-370-0017	208-769-1422
Idaho Falls	800-232-4635	208-528-2650
Lewiston	977-547-3304	208-799-4370
Pocatello	888-655-6160	208-236-6160
Twin Falls	800-270-1663	208-736-2190

9.7.2 IDR10I000 Indian country within the State of Idaho, except Duck Valley Reservation lands (see Region 9)

9.7.2.1 Shoshone-Bannock Tribes. The following conditions apply only to discharges on the Shoshone-Bannock Reservation:

f. Each operator shall submit a signed hard copy of the Notice of Intent (NOI) to the Shoshone-Bannock Tribes Water Resources Department at the same time it is submitted electronically to the Environmental Protection Agency (EPA) and shall provide the Shoshone-Bannock Tribes Water Resources Department the acknowledgement of receipt of the NOI from the EPA within 7 calendar days of receipt from the EPA.

9.7.3 WAR10F000 Areas in the State of Washington, except those located on Indian country, subject to construction activity by a Federal Operator. The following conditions apply only to discharges on federal facilities in the State of Washington:

a. Discharges shall not cause or contribute to a violation of surface water quality standards (Chapter 173-201A WAC), groundwater quality standards (Chapter 173-200 WAC), sediment management standards (Chapter 173-204 WAC), and human health-based criteria in the National Toxics Rule (40 CFR Part 131.36). Discharges that are not in compliance with these standards are not authorized.

b. Prior to the discharge of stormwater and non-storm water to waters of the State, the Permittee must apply all known, available, and reasonable methods of prevention, control, and treatment (AKART). This includes the preparation and implementation of an adequate SWPPP, with all appropriate BMPs installed and maintained in accordance with the SWPPP and the terms and conditions of this permit.

c. Permittees who discharge to segments of waterbodies listed as impaired by the State of Washington under Section 303(d) of the Clean Water Act for turbidity, fine sediment, phosphorus, or pH must comply with the following numeric effluent limits:

Parameter Identified in 303(d) Listing	Parameter Sampled	Unit	Analytical Method	Numeric Effluent Limit
• Turbidity • Fine Sediment • Phosphorus	Turbidity	NTU	SM2130 or EPA 180.1	25 NTUs at the point where the stormwater is discharged from the site.
High pH	pH	Su	pH meter	In the range of 6.5 – 8.5

d. All references and requirements associated with Section 303(d) of the Clean Water Act mean the most current EPA approved listing of impaired waters that exists on February 16, 2017, or the date when the operator's complete permit application is received by EPA, whichever is later.

e. Discharges to waterbodies subject to an applicable Total Maximum Daily Load (TMDL) for turbidity, fine sediment, high pH, or phosphorus, shall be consistent with the assumptions and requirements of the TMDL.

   i. Where an applicable TMDL sets specific waste load allocations or requirements for discharges covered by this permit, discharges shall be consistent with any specific waste load allocations or requirements establish by the applicable TMDL.

   ii. Where an applicable TMDL has established a general waste load allocation for construction stormwater discharges, but no specific requirements have been identified, compliance with this permit will be assumed to be consistent with the approved TMDL.

iii. Where an applicable TMDL has not specified a waste load allocation for construction stormwater discharges, but has not excluded these discharges, compliance with this permit will be assumed to be consistent with the approved TMDL.

iv. Where an applicable TMDL specifically precludes or prohibits discharges from construction activity, the operator is not eligible for coverage under this permit.

v. Applicable TMDL means a TMDL for turbidity, fine sediment, high pH, or phosphorus, which has been completed and approved by EPA prior to February 16, 2017, or prior to the date the operator's complete NOI is received by EPA, whichever is later.

9.7.4 WAR10I000 Indian country within the State of Washington

9.7.4.1 Confederated Tribes of the Colville Reservation. The following conditions apply only to discharges on the Colville Indian Reservation (CIR) and on other Tribal trust lands or allotments of the Confederated Tribes of the Colville Reservation:

a. A copy of the Stormwater Pollution Prevention Plan must be submitted to the following office at least thirty (30) days in advance of sending the Notice of Intent (NOI) to EPA:

Environmental Trust Department
Confederated Tribes of the Colville Reservation
PO Box 150
Nesepelem, WA 99155

b. Copies of the Notice of Intent (NOI) and Notice of Termination (NOT) must be sent to the ETD at the same time they are submitted to EPA.

c. Discharges to Omak Creek, the Okanogan River, and Columbia River downstream of Chief Joseph Dam may affect threatened or endangered species, and shall only be permitted in adherence with Appendix D of the CGP.

d. All work shall be carried out in such a manner as will prevent violations of water quality criteria as stated in Chapter 4-8 Water Quality Standards of the Colville Law and Order Code, as amended.

e. Appropriate steps shall be taken to ensure that petroleum products or other chemical pollutants are prevented from entering waters of the CIR. All spills must be reported to the appropriate emergency management agency and the ETD, and measures shall be taken immediately to prevent the pollution of waters of the CIR, including groundwater.

f. Stormwater site inspections shall be conducted at least once every 7 calendar days, within 24-hours of the occurrence of a rain event of 0.25 inches or greater in a 24-hour period, and daily during periods of saturated ground surface or snowmelt with accompanying surface runoff.

g. Results of discharge sampling must be reported to the ETD within 7 days of sample collection. All sample reporting must include the date and time, location, and individual performing the sampling.

h. Any corrective action reports that are required under the CGP must be submitted to the ETD at the above address within one (1) working day of the report completion.

i. This certification does not authorize impacts to cultural, historical, or archeological features or sites, or proprieties that may be eligible for such listing.

9.7.4.2 Lummi Nation. The following conditions apply only to discharges on the Lummi Reservation:

a. The Lummi Nation reserves the right to modify this 401 certification if the final version of the NPDES General Permit for Storm Water Discharges Associated with Construction Activity (CGP) on tribal lands in the State of Washington (Permit No. WAR10I000) is substantively different than the draft version of the proposed permit that was made available for public comments during April 2016. The Lummi Nation will determine if the final version of the NPDES CGP is substantively different than the draft version following review of the final version once the EPA makes it available.

b. This certification does not exempt and is provisional upon compliance with other applicable statutes and codes administered by federal and Lummi tribal agencies. Pursuant to Lummi Code of Laws (LCL) 17.05.020(a), the operator must also obtain a land use permit from the Lummi Planning Department as provided in Title 15 of the Lummi Code of Laws and regulations adopted thereunder.

c. Pursuant to LCL 17.05.020(a), each operator shall develop and submit a Storm Water Pollution Prevention Plan to the Lummi Water Resources Division for review and approval by the Water Resources Manager prior to beginning any discharge activities.

d. Pursuant to LCL Title 17, each operator shall be responsible for achieving compliance with the Water Quality Standards for Surface Waters of the Lummi Indian Reservation (Lummi Administrative Regulations [LAR] 17 LAR 07.010 through 17 LAR 07.210 together with supplements and amendments thereto).

e. Each operator shall submit a signed hard copy of the Notice of Intent (NOI) to the Lummi Water Resources Division at the same time it is submitted electronically to the Environmental Protection Agency (EPA) and shall provide the Lummi Water Resources Division the acknowledgement of receipt of the NOI from the EPA and the associated NPDES tracking number provided by the EPA within 7 calendar days of receipt from the EPA.

f. Each operator shall submit a signed hard copy of the Notice of Termination (NOT) to the Lummi Water Resources Division at the same time it is submitted electronically to the EPA and shall provide the Lummi Water Resources Division the EPA acknowledgement of receipt of the NOT.

g. Storm Water Pollution Prevention Plans, Notice of Intent, Notice of Termination and associated correspondence with the EPA shall be submitted to:

Lummi Natural Resources Department
ATTN: Water Resources Manager
2665 Kwina Road
Bellingham, WA 98226-9298

9.7.4.3 Makah Tribe. The following conditions apply only to discharges on the Makah Reservation:

a. The operator shall be responsible for achieving compliance with the Makah Tribe's Water Quality Standards.

b. The operator shall submit a Storm Water Pollution Prevention Plan to the Makah Tribe Water Quality Program and Makah Fisheries Habitat Division for review and approval at least thirty (30) days prior to beginning any discharge activities.

c. The operator shall submit a copy of the Notice of Intent to the Makah Tribe Water Quality Program and Makah Fisheries Habitat Division at the same time it is submitted to EPA.

d. Storm Water Pollution Prevention Plans and Notices of Intent shall be submitted to:

Aaron Parker
Makah Fisheries Management Water Quality Specialist
(360) 645-3162
Cell 206-356-0319
Aaron.parker@makah.com
PO Box 115
Neah Bay WA 98357

9.7.4.4 Puyallup Tribe of Indians. The following conditions apply only to discharges on the Puyallup Tribe of Indians Reservation:

a. Each permittee shall be responsible for achieving compliance with the Puyallup Tribe's Water Quality Standards, including antidegradation provisions. The Puyallup Natural Resources Department will conduct an antidegradation review for permitted activities that have the potential to lower water quality. The antidegradation review will be consistent with the Tribe's Antidegradation Implementation Procedures. The Tribe may also impose additional controls on a site-specific basis, or request EPA to require the operator obtain coverage under an individual permit, if information in the NOI or from other sources indicates that the operator's discharges are not controlled as necessary to meet applicable water quality standards.

b. The permittee shall be responsible for meeting any additional permit requirements imposed by EPA necessary to comply with the Puyallup Tribe's antidegradation policies if the discharge point is located within 1 linear mile upstream of waters designated by the Tribe.

c. Each permittee shall submit a copy of the Notice of Intent (NOI) to be covered by the general permit to Char Naylor (char.naylor@puyalluptribe.com) and Russ Ladley (russ.ladley@puyalluptribe.com) by email or at the address listed below at the same time it is submitted to EPA.

Puyallup Tribe of Indians
3009 E. Portland Avenue
Tacoma, WA 98404
ATTN: Russ Ladley and Char Naylor

d. All supporting documentation and certifications in the NOI related to coverage under the general permit for Endangered Species Act purposes shall be submitted to the Tribe's Resource Protection Manager (russ.ladley@puyalluptribe.com) and Char Naylor (char.naylor@puyalluptribe.com) for review.

e. If EPA requires coverage under an individual or alternative permit, the permittee shall submit a copy of the permit to Russ Ladley and Char Naylor at the address listed above.

f. The permittee shall submit all stormwater pollution prevention plans to Char Naylor for review and approval prior to beginning any activities resulting in a discharge to tribal waters.

g. The permittee shall conduct benchmark monitoring for turbidity (or transparency) and, in the event of significant concrete work or engineered soils, pH monitoring as well. Monitoring, benchmarks, and reporting requirements contained in Condition S.4. (pp.13-20) of the Washington State Construction Stormwater General Permit, effective January 1, 2016, shall apply, as applicable.

h. The permittee shall notify Char Naylor (253-680-5520) and Russ Ladley (253-680-5560) prior to conducting inspections at construction sites generating storm water discharged to tribal waters.

i. Treat dewatering discharges with controls necessary to minimize discharges of pollutants in order to minimize the discharge of pollutants to groundwater or surface waters from stormwater that is removed from excavations, trenches, foundations, vaults, or other storage areas. Examples of appropriate controls include sediment basins or sediment traps, sediment socks, dewatering tanks, tube settlers, weir tanks, and filtration systems (e.g., bag or sand filters) that are designed to remove sediment.

   To the extent feasible, utilize vegetated, upland areas of the site to infiltrate dewatering water before discharge. At all points where dewatering water is discharged, comply with the velocity dissipation requirements of Part 2.2.11 of EPA's 2016 General Construction Stormwater Permit. Examples of velocity dissipation devices include check dams, sediment traps, riprap, and grouted riprap at outlets.

j. The permittee shall provide and maintain natural buffers to the maximum extent possible (and/or equivalent erosion and sediment controls) when tribal waters are located within 100 feet of the site's earth disturbances. If infeasible to provide and maintain an undisturbed 100 foot natural buffer, erosion and sediment controls to achieve the sediment load reduction equivalent to a 100-foot undisturbed natural buffer shall be required.

9.7.4.5 Spokane Tribe of Indians. The following conditions apply only to discharges on the Spokane Tribe Reservation:

a. Pursuant to Tribal Law and Order Code (TLOC) Chapter 30 each operator shall be responsible for achieving compliance with the Surface Water Quality Standards of the Spokane Tribe. The operator shall notify the Spokane Tribe, Water Control Board (WCB) of any spills of hazardous material and;

b. Each operator shall submit a signed hard copy of the Notice of Intent (NOI) to the WCB at the same time it is submitted to EPA.

c. The permittee shall allow the Tribal Water Control Board or its designee to inspect and sample at the construction site as needed.

d. Each operator shall submit a signed copy of the Notice of Termination (NOT) to the WCB at the same time it is submitted to EPA.

   The correspondence address for the Spokane Tribe Water Control Board is:

   Water Control Board
   c/o. Brian Crossley
   P0 Box 480
   Wellpinit WA 99040

(509)626-4409
crossley@spokanetribe.com

9.7.4.6 Swinomish Indian Tribal Community. The following conditions apply only to discharges on the Swinomish Reservation:

a. Owners and operators seeking coverage under this permit who intend to discharge to Regulated Surface Waters must submit a copy of the Notice of Intent (NOI) to the DEP at the same time the NOI is submitted to EPA.

b. Owners and operators seeking coverage under this permit must also submit a Stormwater Pollution Prevention Plan to the DEP for review and approval by DEP prior to beginning any discharge activities.

c. Owners and operators must also submit to the DEP Changes in NOI and/or Notices of Termination at the same time they are submitted to EPA.

9.7.4.7 Tulalip Tribes. The following conditions apply only to discharges on the Tulalip Reservation:

a. This certification does not exempt and is provisional upon compliance with other applicable statues and codes administered by federal and Tulalip tribal agencies. Pursuant to Tulalip Tribes code of law, the operator must also obtain a land use permit from the Tulalip Tribes Planning Department as provided in Title 7 of the Tulalip Tribal Code (http://www.codepublishing.com/WA/Tulalip/?Tulalip02/Tulalip0205.html).

b. Each CGP operator shall be responsible for achieving compliance with Tulalip Tribes Water Quality Standards.

c. Each CGP operator shall submit their Stormwater Pollution Prevention Plan (SWPPP) to the:

Tulalip Natural & Cultural Resources Department
Tulalip Tribes
6406 Marine Drive
Tulalip, WA 98271

Appendix C – Copy of NOI and EPA Authorization email

INSERT COPY OF NOI AND EPA'S AUTHORIZATION EMAIL PROVIDING COVERAGE UNDER THE CGP

Appendix D – Copy of Inspection Form

General Information (see reverse for instructions)					
Name of Project		**NPDES ID No.**		**Inspection Date**	
Weather conditions during inspection		**Inspection start time**		**Inspection end time**	
Inspector Name, Title & Contact Information					
Present Phase of Construction					
Inspection Location (if multiple inspections are required, specify location where this inspection is being conducted)					

Inspection Frequency *(Note: you may be subject to different inspection frequencies in different areas of the site. Check all that apply)*

Standard Frequency:

☐ Every 7 days
☐ Every 14 days and within 24 hours of a 0.25" rain or the occurrence of runoff from snowmelt sufficient to cause a discharge

Increased Frequency:

☐ Every 7 days and within 24 hours of a 0.25" rain (for areas of sites discharging to sediment or nutrient-impaired waters or to waters designated as Tier 2, Tier 2.5, or Tier 3)

Reduced Frequency:

☐ Twice during first month, no more than 14 calendar days apart; then once per month after first month; (for stabilized areas)
☐ Twice during first month, no more than 14 calendar days apart; then once more within 24 hours of a 0.25" rain (for stabilized areas on "linear construction sites")
☐ Once per month and within 24 hours of a 0.25" rain (for arid, semi-arid, or drought-stricken areas during seasonally dry periods or during drought)
☐ Once per month (for frozen conditions where earth-disturbing activities are being conducted)

Was this inspection triggered by a 0.25" storm event? ☐ Yes ☐ No

If yes, how did you determined whether a 0.25" storm event has occurred?

☐ Rain gauge on site ☐ Weather station representative of site. Specify weather station source:

Total rainfall amount that triggered the inspection (in inches)**:**

Was this inspection triggered by the occurrence of runoff from snowmelt sufficient to cause a discharge? ☐ Yes ☐ No

Unsafe Conditions for Inspection

Did you determine that any portion of your site was unsafe for inspection per CGP Part 4.5? ☐ Yes ☐ No

If "yes", complete the following:

- Describe the conditions that prevented you from conducting the inspection in this location:

- Location(s) where conditions were found:

Condition and Effectiveness of Erosion and Sediment (E&S) Controls (CGP Part 2.2) (see reverse for instructions)				
Type/Location of E&S Control **[Add an additional sheet if necessary]**	**Maintenance Needed?***	**Corrective Action Required?***	**Date on Which Maintenance or Corrective Action First Identified?**	**Notes**
1.	☐Yes ☐No	☐Yes ☐No		
2.	☐Yes ☐No	☐Yes ☐No		
3.	☐Yes ☐No	☐Yes ☐No		
4.	☐Yes ☐No	☐Yes ☐No		
5.	☐Yes ☐No	☐Yes ☐No		
6.	☐Yes ☐No	☐Yes ☐No		
7.	☐Yes ☐No	☐Yes ☐No		
8.	☐Yes ☐No	☐Yes ☐No		
9.	☐Yes ☐No	☐Yes ☐No		
10.	☐Yes ☐No	☐Yes ☐No		

*** Note:** The permit differentiates between conditions requiring routine maintenance, and those requiring corrective action. The permit requires maintenance in order to keep controls in effective operating condition. Corrective actions are triggered only for specific conditions, which include: 1) A stormwater control needs repair or replacement (beyond routine maintenance) if it is not operating as intended; 2) A stormwater control necessary to comply with the permit was never installed or was installed incorrectly; 3) You become aware that the stormwater controls you have installed and are maintaining are not effective enough for the discharge to meet applicable water quality standards or applicable requirements in Part 3.1; 4) One of the prohibited discharges in Part 1.3 is occurring or has occurred; or 5) EPA requires corrective actions as a result of a permit violation found during an inspection carried out under Part 4.8. If a condition on your site requires a corrective action, you must also fill out a corrective action form found at https://www.epa.gov/npdes/stormwater-discharges-construction-activities#resources. See Part 5 of the permit for more information.

Condition and Effectiveness of Pollution Prevention (P2) Practices (CGP Part 2.3) (see reverse for instructions)				
Type/Location of P2 Practices [Add an additional sheet if necessary]	**Maintenance Needed?***	**Corrective Action Required?***	**Date on Which Maintenance or Corrective Action First Identified?**	**Notes**
1.	☐Yes ☐No	☐Yes ☐No		
2.	☐Yes ☐No	☐Yes ☐No		
3.	☐Yes ☐No	☐Yes ☐No		
4.	☐Yes ☐No	☐Yes ☐No		
5.	☐Yes ☐No	☐Yes ☐No		
6.	☐Yes ☐No	☐Yes ☐No		
7.	☐Yes ☐No	☐Yes ☐No		
8.	☐Yes ☐No	☐Yes ☐No		
9.	☐Yes ☐No	☐Yes ☐No		
10.	☐Yes ☐No	☐Yes ☐No		

*** Note:** The permit differentiates between conditions requiring routine maintenance, and those requiring corrective action. The permit requires maintenance in order to keep controls in effective operating condition. Corrective actions are triggered only for specific conditions, which include: 1) A stormwater control needs repair or replacement (beyond routine maintenance) if it is not operating as intended; 2) A stormwater control necessary to comply with the permit was never installed or was installed incorrectly; 3) You become aware that the stormwater controls you have installed and are maintaining are not effective enough for the discharge to meet applicable water quality standards or applicable requirements in Part 3.1; 4) One of the prohibited discharges in Part 1.3 is occurring or has occurred; or 5) EPA requires corrective actions as a result of a permit violation found during an inspection carried out under Part 4.8. If a condition on your site requires a corrective action, you must also fill out a corrective action form found at https://www.epa.gov/npdes/stormwater-discharges-construction-activities#resources. See Part 5 of the permit for more information.

Stabilization of Exposed Soil (CGP Part 2.2.14) (see reverse for instructions)			
Stabilization Area **[Add an additional sheet if necessary]**	**Stabilization Method**	**Have You Initiated Stabilization?**	**Notes**
1.		☐ YES ☐ NO If yes, provide date:	
2.		☐ YES ☐ NO If yes, provide date:	
3.		☐ YES ☐ NO If yes, provide date:	
4.		☐ YES ☐ NO If yes, provide date:	
5.		☐ YES ☐ NO If yes, provide date:	

Description of Discharges (CGP Part 4.6.6) (see reverse for instructions)	
Was a stormwater discharge or other discharge occurring from any part of your site at the time of the inspection? ☐ Yes ☐ No **If "yes", provide the following information for each point of discharge:**	
Discharge Location **[Add an additional sheet if necessary]**	**Observations**
1.	Describe the discharge: At points of discharge and the channels and banks of waters of the U.S. in the immediate vicinity, are there any visible signs of erosion and/or sediment accumulation that can be attributed to your discharge? ☐ Yes ☐ No If yes, describe what you see, specify the location(s) where these conditions were found, and indicate whether modification, maintenance, or corrective action is needed to resolve the issue:
2.	Describe the discharge: At points of discharge and the channels and banks of waters of the U.S. in the immediate vicinity, are there any visible signs of erosion and/or sediment accumulation that can be attributed to your discharge? ☐ Yes ☐ No If yes, describe what you see, specify the location(s) where these conditions were found, and indicate whether modification, maintenance, or corrective action is needed to resolve the issue:

Contractor or Subcontractor Signature and Certification (see reverse for instructions)
"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 manage 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 have no personal knowledge that the information submitted is other than true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations." **Signature of Contractor or Subcontractor:** ______________________________ **Date:** **Printed Name and Affiliation:** ______________________________

Operator Signature and Certification (see reverse for instructions)
"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 manage 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 have no personal knowledge that the information submitted is other than true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations." **Signature of Operator or "Duly Authorized Representative":** ______________________________ **Date:** **Printed Name and Affiliation:** ______________________________

Appendix E – Copy of Corrective Action Form

Section A – Initial Report (CGP Part 5.4.1) (Complete this section within 24 hours of identifying the condition that triggered corrective action)					
Name of Project	Herb Chambers of Sudbury	**NPDES ID No.**		**Today's Date**	
Date Problem First Discovered		**Time Problem First Discovered**			
Name and Contact Information of Individual Completing this Form					

What site conditions triggered the requirement to conduct corrective action *(check the box that applies)*:

- ☐ A stormwater control needs repair or replacement (beyond routine maintenance required under Part 2.1.4)
- ☐ A stormwater control necessary to comply with the requirements of this permit was never installed, or was installed incorrectly
- ☐ A discharge is causing an exceedance of applicable water quality standards
- ☐ A Part 1.3 prohibited discharge has occurred
- ☐ EPA requires corrective action as a result of permit violations found during an EPA inspection carried out under Part 4.8

Provide a description of the problem:

Deadline for completing corrective action *(check the box that applies)*:

- ☐ Immediately take all reasonable steps to address the condition, including cleaning up any contaminated surfaces so the material will not discharge in subsequent storm events
- ☐ Complete by close of the next business day when problem does not require a new or replacement control or significant repair
- ☐ No later than 7 calendar days from the time of discovery for problems that require a new or replacement control or significant repair
- ☐ Infeasible to complete the installation or repair within 7 calendar days. Explain why it is infeasible and document schedule for installing control:

Enter date of corrective action completion: ____________________

Section B – Corrective Action Completion (CGP Part 5.4.2) (Complete this section no later than 24 hours after completing the corrective action)	
Section B.1 – Why the Problem Occurred	
Cause(s) of Problem *(Add an additional sheet if necessary)*	**How You Determined the Cause and the Date You Determined the Cause**
1. **2.**	**1.** **2.**

Section B.2 – Stormwater Control Modifications Implemented to Correct the Problem			
List of Stormwater Control Modification(s) Needed to Correct Problem *(Add an additional sheet if necessary)*	**Date of Completion**	**SWPPP Update Necessary?**	**Notes**
1.		☐Yes ☐No If yes, provide date SWPPP modified:	
2.		☐Yes ☐No If yes, provide date SWPPP modified:	

Section C –Signature and Certification (CGP Part 5.4.3)
Section C.1 – Contractor or Subcontractor Signature and 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 manage 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 have no personal knowledge that the information submitted is other than true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations." **Signature of Contractor or Subcontractor:** ____ **Date:** **Printed Name and Affiliation:** ____

Section C.2 – Operator Signature and 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 manage 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 have no personal knowledge that the information submitted is other than true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations." **Signature of Operator or "Duly Authorized Representative":** ____ **Date:** **Printed Name and Affiliation:** ____

Appendix F –SWPPP Amendment Log

Instructions (see CGP Part 7.4):

- Create a log here of changes and updates to the SWPPP. You may use the table below to track these modifications.
- SWPPP modifications are required pursuant to CGP Part 7.4.1 in the following circumstances:
  - ✓ Whenever new operators become active in construction activities on your site, or you make changes to your construction plans, stormwater controls, or other activities at your site that are no longer accurately reflected in your SWPPP;
  - ✓ To reflect areas on your site map where operational control has been transferred (and the date of transfer) since initiating permit coverage;
  - ✓ If inspections or investigations determine that SWPPP modifications are necessary for compliance with this permit;
  - ✓ Where EPA determines it is necessary to install and/or implement additional controls at your site in order to meet requirements of the permit; and
- To reflect any revisions to applicable federal, state, tribal, or local requirements that affect the stormwater control measures implemented at the site.
- If applicable, if a change in chemical treatment systems or chemically-enhanced stormwater control is made, including use of a different treatment chemical, different dosage rate, or different area of application.

No.	Description of the Amendment	Date of Amendment	Amendment Prepared by [Name(s) and Title]
		INSERT DATE	
		INSERT DATE	
		INSERT DATE	
		INSERT DATE	
		INSERT DATE	
		INSERT DATE	
		INSERT DATE	
		INSERT DATE	

Appendix G –Subcontractor Certifications/Agreements

SUBCONTRACTOR CERTIFICATION
STORMWATER POLLUTION PREVENTION PLAN

Project Number: ______________________________

Project Title: ______________________________

Operator(s): ______________________________

As a subcontractor, you are required to comply with the Stormwater Pollution Prevention Plan (SWPPP) for any work that you perform on-site. Any person or group who violates any condition of the SWPPP may be subject to substantial penalties or loss of contract. You are encouraged to advise each of your employees working on this project of the requirements of the SWPPP. A copy of the SWPPP is available for your review at the office trailer.

Each subcontractor engaged in activities at the construction site that could impact stormwater must be identified and sign the following certification statement:

I certify under the penalty of law that I have read and understand the terms and conditions of the SWPPP for the above designated project and agree to follow the practices described in the SWPPP.

This certification is hereby signed in reference to the above named project:

Company: ______________________________

Address: ______________________________

Telephone Number: ______________________________

Type of construction service to be provided: ______________________________

____

____

Signature: ______________________________

Title: ______________________________

Date: ______________________________

Appendix H –Grading and Stabilization Activities Log

Date Grading Activity Initiated	Description of Grading Activity	Description of Stabilization Measure and Location	Date Grading Activity Ceased (Indicate Temporary or Permanent)	Date When Stabilization Measures Initiated
INSERT DATE			INSERT DATE ☐ Temporary ☐ Permanent	INSERT DATE
INSERT DATE			INSERT DATE ☐ Temporary ☐ Permanent	INSERT DATE
INSERT DATE			INSERT DATE ☐ Temporary ☐ Permanent	INSERT DATE
INSERT DATE			INSERT DATE ☐ Temporary ☐ Permanent	INSERT DATE
INSERT DATE			INSERT DATE ☐ Temporary ☐ Permanent	INSERT DATE
INSERT DATE			INSERT DATE ☐ Temporary ☐ Permanent	INSERT DATE
INSERT DATE			INSERT DATE ☐ Temporary ☐ Permanent	INSERT DATE
INSERT DATE			INSERT DATE ☐ Temporary ☐ Permanent	INSERT DATE

Appendix I – SWPPP Training Log

Stormwater Pollution Prevention Training Log

Project Name:

Project Location:

Instructor's Name(s):

Instructor's Title(s):

Course Location: ______________________________ Date: ________________

Course Length (hours): __________________________

Stormwater Training Topic: *(check as appropriate)*

☐ **Sediment and Erosion Controls**
☐ **Stabilization Controls**
☐ **Pollution Prevention Measures**
☐ **Emergency Procedures**
☐ **Inspections/Corrective Actions**

Specific Training Objective:____

____

Attendee Roster: *(attach additional pages as necessary)*

No.	Name of Attendee	Company
1		
2		
3		
4		
5		
6		
7		
8		

Appendix J – Delegation of Authority Form

Delegation of Authority

I, ______________________ (name), hereby designate the person or specifically described position below to be a duly authorized representative for the purpose of overseeing compliance with environmental requirements, including the Construction General Permit (CGP), at the ___________________________________ construction site. The designee is authorized to sign any reports, stormwater pollution prevention plans and all other documents required by the permit.

_______________________________________ (name of person or position)
_______________________________________ (company)
_______________________________________ (address)
_______________________________________ (city, state, zip)
_______________________________________ (phone)

By signing this authorization, I confirm that I meet the requirements to make such a designation as set forth in Appendix I of EPA's CGP, and that the designee above meets the definition of a "duly authorized representative" as set forth in Appendix I.

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 manage 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 have no personal knowledge that the information submitted is other than true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Name: ____

Company: ____

Title: ____

Signature: ____

Date: ____

Appendix K – Endangered Species Documentation

Crocker Design Group
2 SHARP STREET, UNIT B
HINGHAM, MA 02043

Project
HERB CHAMBERS MERCEDES OF SUDBURY
141 BOSTON POST ROAD, SUDBURY, MA

Prepared for
HERB CHAMBERS
83 BOSTON POST ROAD - ROUTE 20, SUDBURY, MA

Drawing Title
NHESP MAP

DATE: 07.09.2021 | DRAWN: SVP
JOB NO.:100–107 | CHECK: DJN
SCALE:
500 250 0 500

5

IPaC **U.S. Fish & Wildlife Service**

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Location

Middlesex County, Massachusetts

Local office

New England Ecological Services Field Office

(603) 223-2541
(603) 223-0104

70 Commercial Street, Suite 300
Concord, NH 03301-5094

http://www.fws.gov/newengland

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

---

1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information. IPaC only shows species that are regulated by USFWS (see FAQ).
2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Mammals

NAME	STATUS

Northern Long-eared Bat *Myotis septentrionalis* Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/9045	Threatened

Insects

NAME	STATUS
Monarch Butterfly *Danaus plexippus* Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/9743	Candidate

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

THERE ARE NO CRITICAL HABITATS AT THIS LOCATION.

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Measures for avoiding and minimizing impacts to birds http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Nationwide conservation measures for birds http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON (IF A BREEDING SEASON IS INDICATED FOR A BIRD ON YOUR LIST, THE BIRD MAY BREED IN YOUR PROJECT AREA SOMETIME WITHIN THE TIMEFRAME SPECIFIED, WHICH IS A VERY LIBERAL ESTIMATE OF THE DATES INSIDE WHICH THE BIRD BREEDS ACROSS ITS ENTIRE RANGE. "BREEDS ELSEWHERE" INDICATES THAT THE BIRD DOES NOT LIKELY BREED IN YOUR PROJECT AREA.)
Bald Eagle Haliaeetus leucocephalus This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Oct 15 to Aug 31
Black-billed Cuckoo Coccyzus erythropthalmus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9399	Breeds May 15 to Oct 10
Blue-winged Warbler Vermivora pinus This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds May 1 to Jun 30
Bobolink Dolichonyx oryzivorus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 20 to Jul 31

Canada Warbler Cardellina canadensis — Breeds May 20 to Aug 10
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Lesser Yellowlegs Tringa flavipes — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9679

Prairie Warbler Dendroica discolor — Breeds May 1 to Jul 31
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Rusty Blackbird Euphagus carolinus — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA

Short-billed Dowitcher Limnodromus griseus — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9480

Wood Thrush Hylocichla mustelina — Breeds May 10 to Aug 31
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.

2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

Breeding Season ( )

Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)

Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)

A week is marked as having no data if there were no survey events for that week.

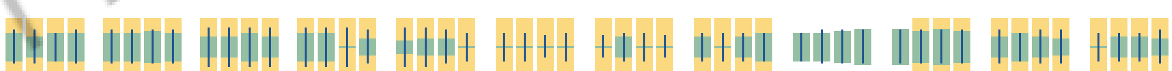
Survey Timeframe

Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.

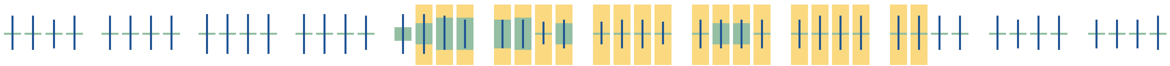
■ probability of presence ■ breeding season | survey effort – no data

SPECIES JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC

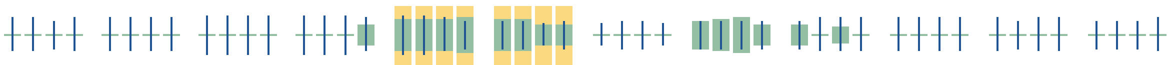
Bald Eagle
Non-BCC Vulnerable (This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.)



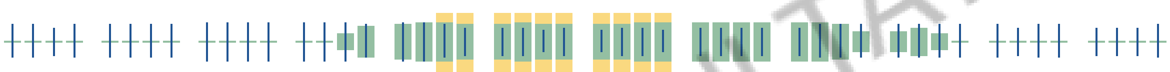
Black-billed Cuckoo
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



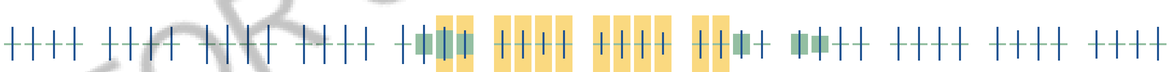
Blue-winged Warbler
BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)



Bobolink
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

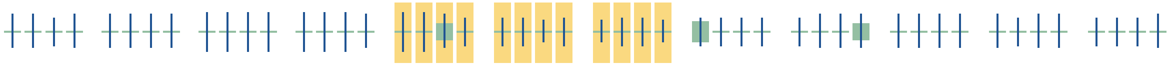


Canada Warbler
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

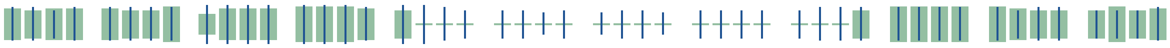


Lesser Yellowlegs
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Prairie Warbler
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

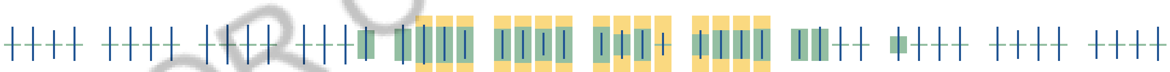


Rusty Blackbird
BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)



Short-billed Dowitcher
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Wood Thrush
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the AKN Phenology Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds guide. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS AT THIS LOCATION.

Fish hatcheries

THERE ARE NO FISH HATCHERIES AT THIS LOCATION.

Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

This location overlaps the following wetlands:

FRESHWATER EMERGENT WETLAND

PEM5E

A full description for each wetland code can be found at the National Wetlands Inventory website

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

Appendix L – Historic Properties Documentation

Massachusetts Cultural Resource Information System
MACRIS

MACRIS Search Results

Search Criteria: Town(s): Sudbury; Street No: 141; Street Name: Boston Post Rd; Resource Type(s): Area, Building, Burial Ground, Object, Structure;

Inv. No.	Property Name	Street	Town	Year

Appendix M – Rainfall Recording

Use the table below to record the rainfall readings at the beginning and end of each work day. An example table follows.

Month/Year			Month/Year			Month/Year		
Day	Start time	End time	Day	Start time	End time	Day	Start time	End time
1			1			1		
2			2			2		
3			3			3		
4			4			4		
5			5			5		
6			6			6		
7			7			7		
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30			30			30		
31			31			31		

SECTION 9 – PROJECT PLANS
(Under Separate Cover)