CMA ENGINEERS, INC.
CIVIL | ENVIRONMENTAL | STRUCTURAL

35 Bow Street
Portsmouth
New Hampshire
03801-3819

P: 603|431|6196
www.cmaengineers.com

August 19, 2019

City of Portsmouth
Planning Department
1 Junkins Avenue
Portsmouth, NH 03801

Re: Technical Advisory Committee (September 3, 2019)
Portsmouth Recreation Fields
680 Peverly Hill Road/254-8 Map-Lot
CMA #1119

Portsmouth Planning Department:

Please find enclosed seven 11x17 copies and three full-size drawings of the Portsmouth Recreation Fields and ten copies of the drainage report. The project is located adjacent to the Portsmouth Public Works Facility at 680 Peverly Hill Road. In 2016, the City purchased 50 acres of land near the Community Campus property known as "Foundation Field." This land was merged with the Public Works parcel and is now a single lot (254-8 Map-Lot). In the spring of 2018, City Council and Recreation Board voted to pursue development of new recreation playing fields at this site.

The recreation fields are planned to be constructed in two phases. Phase I includes construction of two new full-size turf fields with lighting, gravel parking areas, and a connection to public water. Phase I also includes construction of regional stormwater treatment facilities for the upper Sagamore Creek watershed. Phase II includes design and construction of one additional field, paved parking areas, a concession stand, and other amenities. ***This submittal is for Phase I only.*** The City also plans to construct a new transfer station on this parcel adjacent to the existing transfer station. The design and construction of this facility will be done subsequently to the Recreation Fields.

We respectfully request to be placed on the agenda for the September 3, 2019 TAC Meeting. Should you have any questions, please do not hesitate to call.

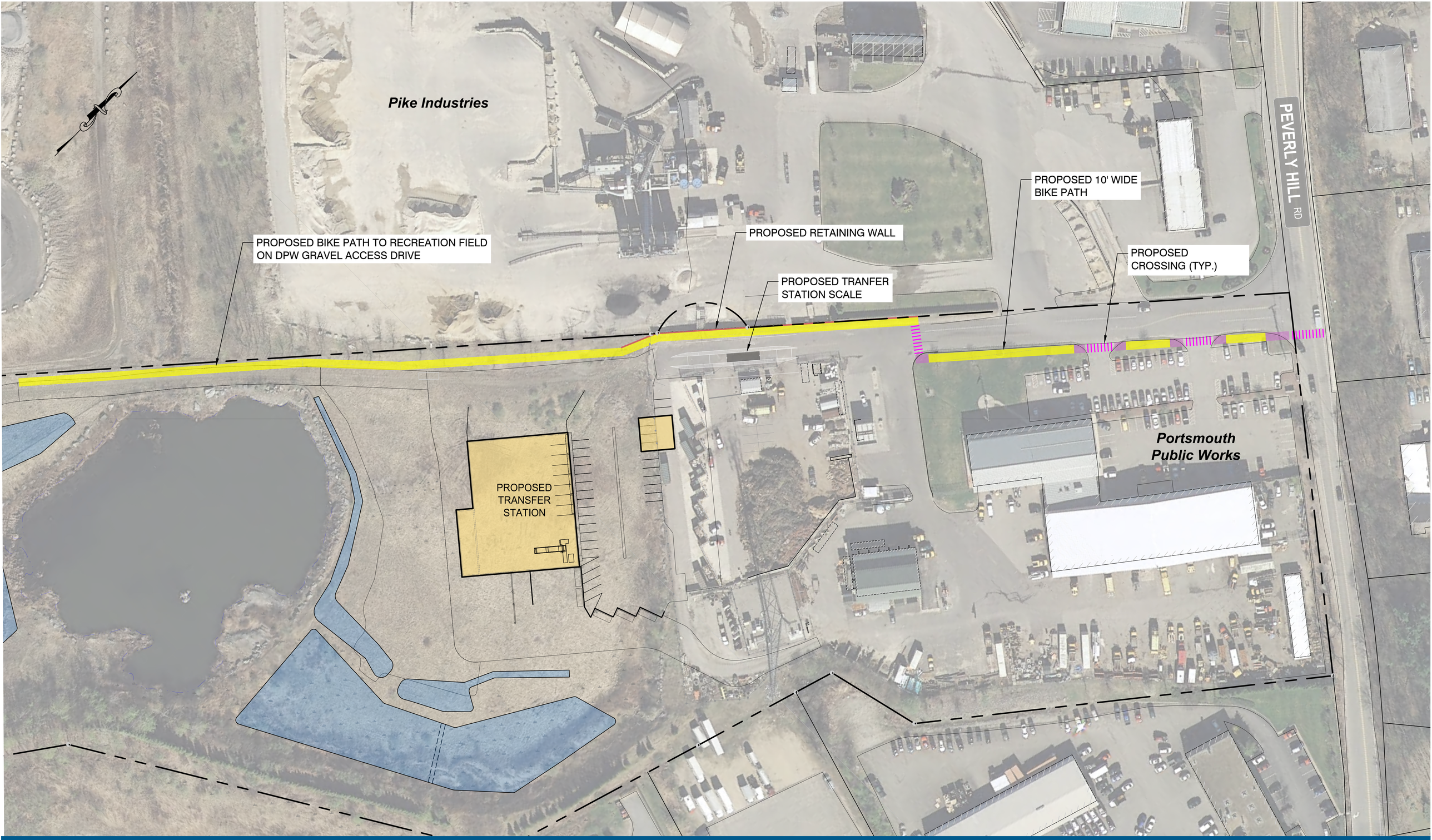
Very truly yours,
CMA ENGINEERS, INC.

William A. Straub, P.E.
Principal

Philip A. Corbett, P.E.
Project Manager

PAC:kao
Enc: Recreation Fields Figures, Plans, and Drainage Report
Cc: David Allen, City Project Manager, 1 Junkins Avenue, Portsmouth, NH 03801

1119-Portsmouth-DL-190819-Portsmouth Rec Fields-PAC



Portsmouth Multi-purpose Recreation Fields

Exhibit 1: Bike Path to Rec Fields

AUGUST, 2019 0 50 100

- Proposed Bike Path
- Proposed Crosswalk
- Proposed Ramp
- Proposed Retaining Wall

CMA ENGINEERS

Weston & Sampson

City of Portsmouth, New Hampshire

Department of Public Works
Multi-purpose Recreation Fields-Phase I
680 Peverly Hill Road

Agency Review Plans - August 2019

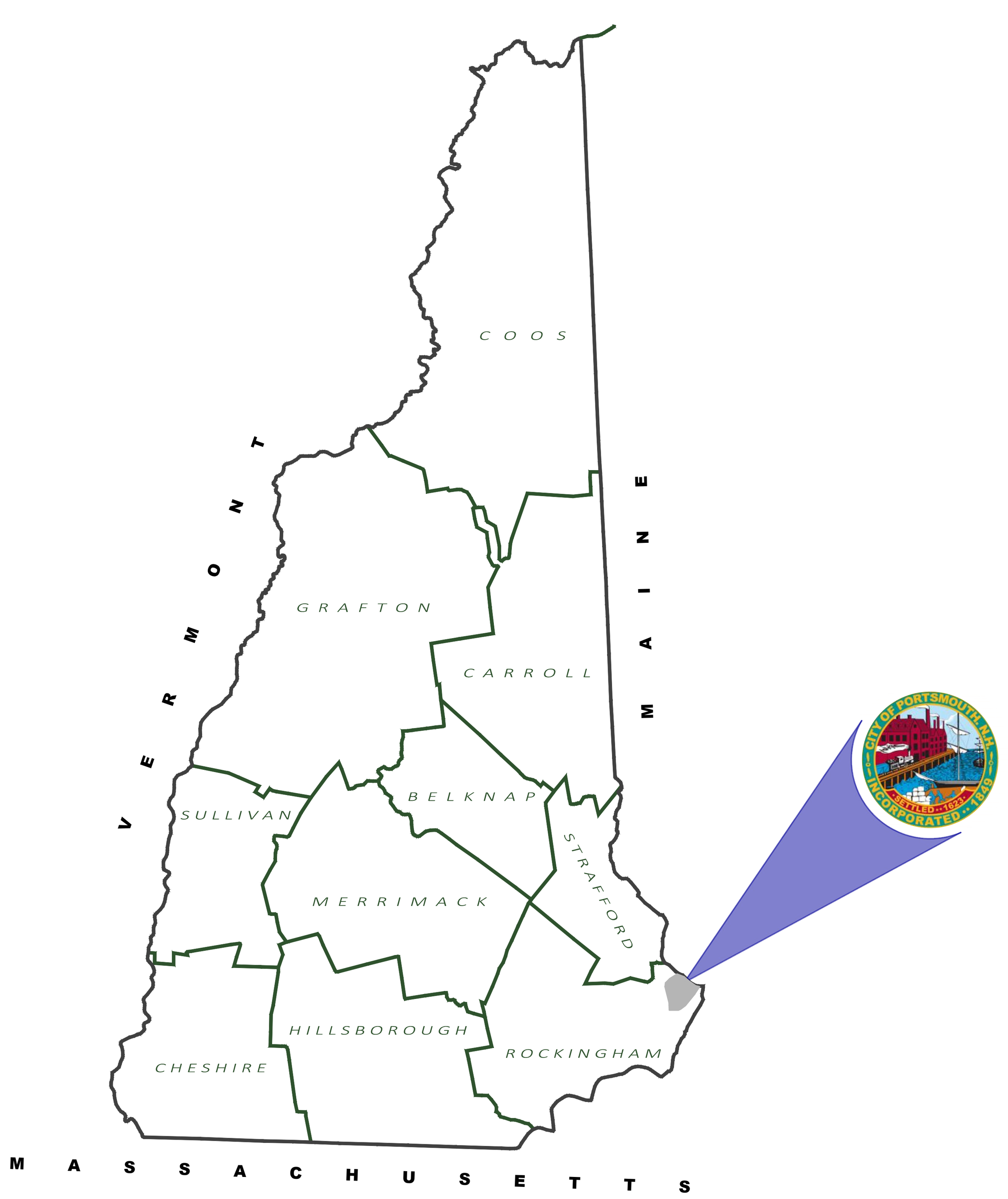
Sheet Index

Civil	
	Cover Sheet
G101	General Notes
G102	Legend
G103	Sheet Index Plan
G104	Phasing Plan
V201-V206	Existing Conditions Plan
C301	Site Plan Phase 1
C302	Site Plan Phase 1
C401	Grading & Drainage Plan Phase 1
C402	Grading & Drainage Plan Phase 1
C501	Utility Plan Phase 1
C601	Erosion Control Plan
C602	Erosion Control Details & Notes
C801	Field Site Sections Phase 1
C802	Storm Water Plans & Sections
C803	Storm Water Plans & Sections
C804	Storm Water Plans & Sections
C901	Storm Water Sections & Details
C902	Storm Water Sections & Details
C903	Drainage Details
C904	Drainage Details
C905	Water Details
C906	Electrical Details
C907	Miscellaneous Details
C908	Miscellaneous Details
C909	Stormwater Chambers

Landscaping	
L1.01	Site Plan
L1.02	Drainage & Utilities
L1.03	Planting Plan
L2.00	Details
L2.01	Details

ZONING INFORMATION:

OWNER:	City of Portsmouth Department of Public Works 680 Peverly Hill Road Portsmouth, New Hampshire 03801
ZONE:	M (Municipal)
ZONING REQUIREMENTS:	LOTS AND BUILDINGS IN THE MUNICIPAL DISTRICT ARE EXEMPT FROM ALL DIMENSIONAL AND INTENSITY REGULATIONS. SEE SECTION 10.560 OF THE CITY OF PORTSMOUTH ZONING ORDINANCE.



Locus Plan

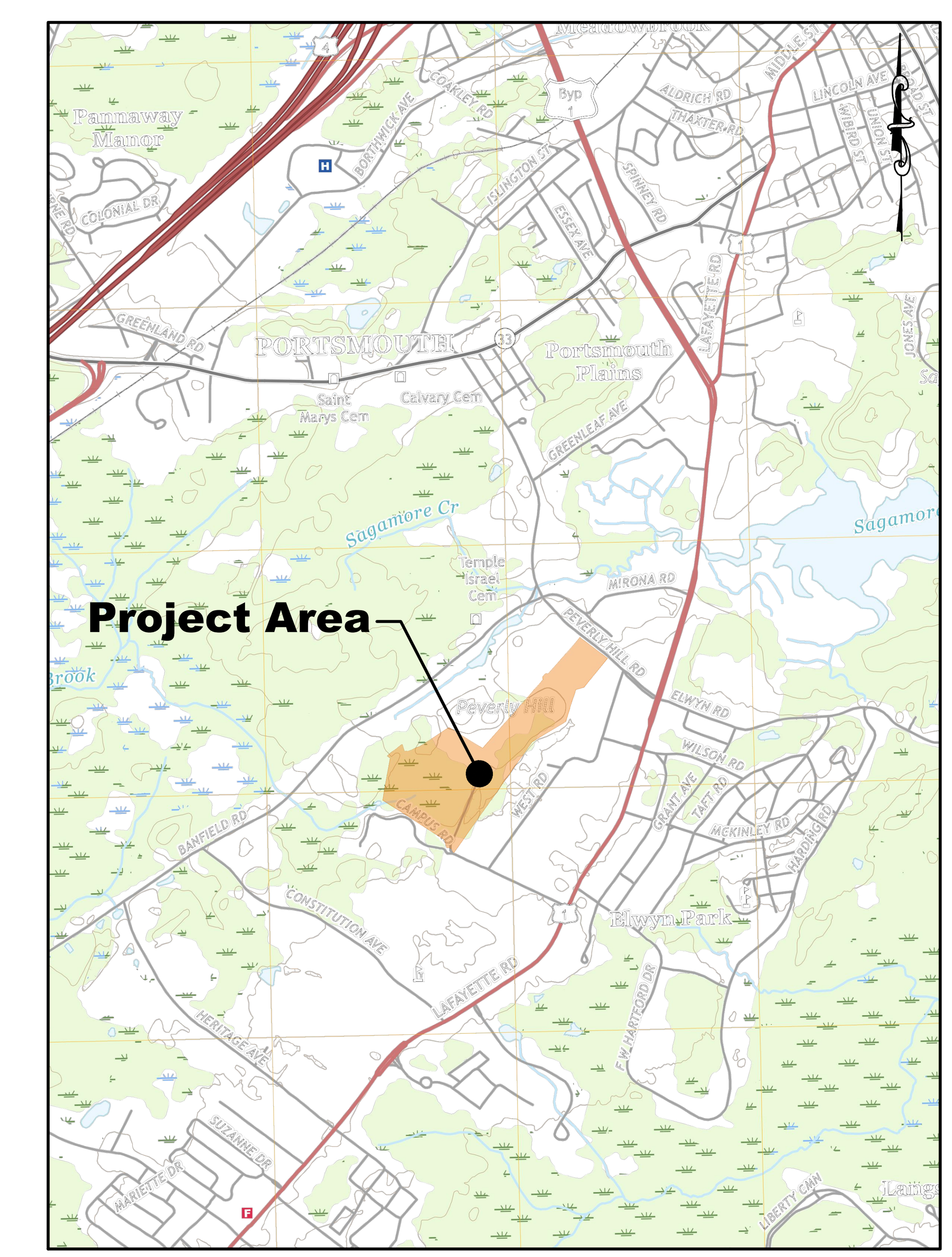
Prepared For:

City of Portsmouth
Department of Public Works
680 Peverly Hill Road
Portsmouth, New Hampshire 03801

Prepared By:

CMA ENGINEERS
CIVIL/ENVIRONMENTAL/STRUCTURAL
Portsmouth, NH 603/431-6196 • Manchester, NH 603/627-0708 • Portland, ME 207/541-4223
cmaengineers.com

Weston & Sampson
427 Main Street, Suite 400, Worcester,MA
(978) 977-0110 (800) 726-7766 (Sampson)
www.westonandsampson.com



Project Location

0 2000' 4000'
Scale: 1" = 2000'

\\mht2\MHT-Projects\CADD\PROJECTS\1119 Portsmouth Athletic fields\Production\1119 COVER RF.dwg Date Plotted: Aug 19, 2019 - 11:01am Plotted By: ALAWRENCE

GENERAL CONSTRUCTION NOTES:

1. ALL WORK SHALL BE IN CONFORMANCE WITH CURRENT CITY OF PORTSMOUTH AND CURRENT NHDOT STANDARD SPECIFICATIONS AND DETAILS.

2. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR CONSTRUCTION MEANS, METHODS, TECHNIQUES, AND PROCEDURES, AND FOR SAFETY PRECAUTIONS AND PROGRAMS IN CONNECTION WITH ALL WORK INCLUDED UNDER THIS CONTRACT, INCLUDING COMPLIANCE WITH ALL APPLICABLE OSHA REGULATIONS. THE DRAWINGS DO NOT INCLUDE NECESSARY COMPONENTS FOR CONSTRUCTION SAFETY. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR PROVIDING AND MAINTAINING ALL SAFETY BARRIERS, WARNING FLASHERS, ETC., AS REQUIRED BY THE CONDUCT OF THE WORK FOR THE PROTECTION OF WORKERS AND NON- WORKERS ALIKE. THE OWNER AND ENGINEER WILL PERIODICALLY REVIEW CONSTRUCTION FOR COMPLIANCE WITH THE PLANS AND SPECIFICATIONS; SUCH REVIEW DOES NOT IMPLY APPROVAL OF METHODS OF CONSTRUCTION.

3. THE CONTRACTOR SHALL PROVIDE STAGING AREAS AS REQUIRED FOR STAGING, PROCESSING, AND STOCK PILE AREA AS NECESSARY. THE CONTRACTOR SHALL PREPARE THE AREA AS NECESSARY AND INSTALL ALL EROSION CONTROL DEVICES TO MEET NHDES-WT STANDARDS. THE CONTRACTOR SHALL STOCKPILE, HANDLE AND TRANSPORT MATERIALS TO PRESERVE THEIR QUALITY AND FITNESS FOR THE WORK. MATERIALS SHALL ALSO BE STORED TO FACILITATE INSPECTION AND MAY BE SUBJECT TO INSPECTION AND RETESTING BEFORE INCORPORATION IN THE WORK. PRIVATE PROPERTY SHALL NOT BE USED FOR STORAGE PURPOSES WITHOUT WRITTEN PERMISSION OF THE PROPERTY OWNER. IF REQUESTED, COPIES OF SUCH WRITTEN PERMISSION SHALL BE FURNISHED TO THE OWNER. AFTER COMPLETION OF CONSTRUCTION, THE CONTRACTOR SHALL RETURN THE STAGING AREA TO PREEXISTING CONDITIONS TO THE SATISFACTION OF THE PROPERTY OWNER AND THE CITY.

4. EXISTING CONDITIONS SURVEY AND TOPOGRAPHY PROVIDED BY JAMES VERRA & ASSOCIATES, INC. IN JANUARY 2018. BENCH MARKS AND HORIZONTAL CONTROL POINTS FOR THE CONTRACTOR TO LAY OUT THE WORK HAVE BEEN ESTABLISHED AND ARE SHOWN ON THE PLANS.

5. THE CONTRACTOR SHALL PERFORM ALL REQUIRED LAYOUT AND DEVELOPING AS-BUILT DOCUMENTATION WORK WITH COMPETENT, QUALIFIED PERSONNEL IN A MANNER CONSISTENT WITH THE CURRENT SURVEY/LAYOUT PRACTICES AND ACCEPTABLE TO THE ENGINEER. NO SEPARATE PAYMENT FOR THIS WORK WILL BE MADE. THE CONTRACTOR SHALL PROVIDE THE ENGINEER WITH QUALIFIED PERSONS TO ASSIST IN THIS CHECKING AS NEEDED AND ON REQUEST OF THE ENGINEER. THE CONTRACTOR SHALL PERFORM ALL NECESSARY LAYOUT WORK IN ORDER TO CONSTRUCT ALL ELEMENTS OF THE PROJECT AS SHOWN ON THE PLANS AND SPECIFIED IN THE CONTRACT. THIS WORK SHALL INCLUDE, BUT SHALL NOT BE LIMITED TO, STAKEOUT NECESSARY TO ESTABLISH LINES AND GRADES AS EARTHWORK OPERATIONS PROGRESS; STAKEOUT, LAYOUT AND ELEVATIONS AS REQUIRED FOR INSTALLING DRAIN LINES, SEWER, WATER LINES, AND OTHER ITEMS INCLUDED IN THE WORK.

6. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR THE ACCURACY OF THE WORK. THE ENGINEER MAY CHECK ALL OR ANY PORTION OF THE LAYOUT, STAKE-OUT MADE BY THE CONTRACTOR. ANY NECESSARY CORRECTION TO THE WORK SHALL BE MADE IMMEDIATELY BY THE CONTRACTOR. SUCH CHECKING BY THE ENGINEER WILL NOT RELIEVE THE CONTRACTOR OF ANY RESPONSIBILITIES FOR THE ACCURACY OR COMPLETENESS OF THE WORK. NO CLAIM WILL BE CONSIDERED BECAUSE OF ALLEGED INACCURACIES UNLESS THE CONTRACTOR NOTIFIES THE ENGINEER THEREOF IN WRITING IMMEDIATELY UPON DISCOVERY OF THE ALLEGED INACCURACIES AND AFFORDS THE ENGINEER OPPORTUNITY TO CHECK OR VERIFY THE CONTROL IN QUESTION.

7. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PRESERVATION OF ALL BENCH MARKS AND CONTROL POINTS. IF ANY OF THE CONTROL POINTS ARE DISTURBED BY THE CONTRACTOR DURING THE CONSTRUCTION, THE CONTRACTOR SHALL REPLACE THEM AT NO EXPENSE TO THE OWNER. DAMAGED OR DESTROYED POINTS, BENCH MARKS OR STAKES OR ANY REFERENCE POINTS DAMAGED OR MADE INACCESSIBLE BY THE PROGRESS OF THE CONSTRUCTION SHALL BE REPLACED OR TRANSFERRED BY THE CONTRACTOR, SUBJECT TO VERIFICATION BY THE ENGINEER. REPLACEMENT OF ANY LAYOUT POINTS SHALL BE PERFORMED BY OR UNDER THE DIRECTION OF A NH LICENSED LAND SURVEYOR.

8. APPARENT PROPERTY BOUNDARY IS BASED ON THE EXISTING CONDITIONS SURVEY. PERFORM ALL WORK WITHIN THE EXISTING PROPERTY BOUNDARY OR ACQUIRE A TEMPORARY RIGHT OF ENTRY LIMITS.

9. THE CONTRACTOR SHALL PROTECT PRIVATE PROPERTY AND SHALL TAKE ALL NECESSARY MEASURES AND PRECAUTIONS TO AVOID DAMAGE TO EXISTING TREES, SHRUBS, LAWNS, PLANTINGS, ETC. THIS PROTECTION WILL INCLUDE THE TRIMMING OF TREES PRIOR TO CONSTRUCTION IF NECESSARY. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REPAIRS/REPLACEMENT OF ALL DAMAGED ITEMS.

10. THE CONTRACTOR SHALL PLAN AND PERFORM TEST PIT EXCAVATION WELL IN ADVANCE OF COMMENCING CONSTRUCTION AND ORDERING MATERIALS TO ALLOW TIME TO REVIEW ACTUAL CONDITIONS ENCOUNTERED. TEST PITS NOT SPECIFICALLY IDENTIFIED, SHALL BE EXCAVATED BY THE CONTRACTOR AT THE DIRECTION OF THE ENGINEER.

11. ALL EXCAVATIONS SHALL BE THOROUGHLY SECURED ON A DAILY BASIS BY THE CONTRACTOR AT THE COMPLETION OF CONSTRUCTION OPERATIONS IN THE IMMEDIATE AREA.

12. ALL DRAINAGE STRUCTURES TO BE ABANDONED IN PLACE SHALL HAVE THE CONE REMOVED AND BE FILLED WITH GRAVEL. THE MATERIAL SHALL BE COMPACTED IN LAYERS NOT EXCEEDING 12 INCHES OF COMPACTED THICKNESS. ALL CONNECTIONS SHALL BE PLUGGED WITH A CEMENT CONCRETE MASONRY PLUG AT THE PIPE LOCATIONS.

13. PLUGGING EXISTING PIPES WITH BRICK AND MORTAR SHALL BE CONSIDERED SUBSIDIARY TO THE DRAINAGE WORK.

14. PIPE CONNECTIONS TO REPLACEMENT STRUCTURES ARE SUBSIDIARY TO THE STRUCTURE.

15. ALL PROPOSED AND EXISTING DRAINAGE AND SANITARY SEWER STRUCTURE RIM AND PIPE INVERT ELEVATIONS ARE TO BE FIELD VERIFIED BY THE CONTRACTOR AND ACCEPTED BY THE ENGINEER.

16. THE CONTRACTOR SHALL SET ALL MANHOLE FRAMES AND COVERS AND CATCH BASIN GRATES AND WATER VALVE COVERS TO BE FLUSH WITH THE BASE PAVEMENT GRADES, THEN RAISED TO 1/8" TO 1/4" BELOW FINAL PAVEMENT ELEVATIONS DURING INSTALLATION OF THE FINAL WEARING COARSE.

17. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REMOVAL AND RELOCATION OF ALL SIGNS THAT CONFLICT WITH THE WORK (INCIDENTAL TO CONSTRUCTION). ANY SIGNS DAMAGED DURING CONSTRUCTION SHALL BE REPLACED AT NO ADDITIONAL COST TO THE OWNER.

18. FINAL LOCATION OF TRAFFIC SIGNS AND SUPPORTS AS SHOWN IN THE PLANS SHALL BE FIELD-CONFIRMED BY THE CONTRACTOR AND ACCEPTED BY THE ENGINEER PRIOR TO INSTALLATION.

19. REMOVE TOPSOIL FOR ITS TOTAL DEPTH WITHIN THE LIMITS OF THE SLOPE LINES. UNLESS OTHERWISE DIRECTED, STOCKPILE TOPSOIL AND USE IT ON THIS PROJECT AS NEEDED.

20. ALL DISTURBED AREAS NOT DESIGNATED TO BE PAVED OR LANDSCAPED OTHERWISE SHALL HAVE LOAM BORROW PLACED AND SEEDED. THE LOAM BORROW SHALL HAVE A MINIMUM DEPTH OF 4" AND SHALL BE PLACED FLUSH WITH THE TOP OF ADJACENT CURBING, EDGING, PAVEMENT MILLINGS, BACK OF SIDEWALK OR OTHER PAVED EDGE.

21. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE SITE RESTORATION AND CLEAN UP UPON COMPLETION OF THE PROJECT.

EXISTING UTILITY NOTES:

1. THE CONTRACTOR SHALL VERIFY ALL EXISTING UTILITY LOCATIONS, PUBLIC OR PRIVATE, SHOWN OR NOT SHOWN, ON THESE PLANS PRIOR TO CONSTRUCTION. THE ENGINEER SHALL BE NOTIFIED IN WRITING OF ANY UTILITIES FOUND INTERFERING WITH THE PROPOSED CONSTRUCTION AND APPROPRIATE REMEDIAL ACTION SHALL BE TAKEN BEFORE PROCEEDING WITH THE WORK. THE CONTRACTOR SHALL NOTIFY DIG-SAFE AT 1-800-225-4977 AND PORTSMOUTH DPW (TO LOCATE WATER, SEWER & DRAINS) AT LEAST 72 HOURS PRIOR TO BEGINNING WORK TO CONFIRM THE LOCATION OF UNDERGROUND UTILITIES.

2. THE CONTRACTOR IS RESPONSIBLE FOR THE LOCATION, PROTECTION AND REPAIR (IF DAMAGED) OF ALL EXISTING UTILITY MAINS AND SERVICES. THE LOCATIONS OF KNOWN GAS, WATER, AND SEWER MAINS SHOWN ON THESE DRAWINGS ARE APPROXIMATE. EXISTING GAS, WATER, AND SEWER SERVICE LATERALS MAY NOT BE SHOWN AND THE CONTRACTOR SHOULD ANTICIPATE THEIR EXISTENCE. THE CONTRACTOR SHOULD CONSIDER CONFLICTS, HAND EXCAVATION, AND DECREASE IN PRODUCTION WHEN PREPARING THEIR BID.

PERMIT NOTES:

1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL CONSTRUCTION PERMITS: LOCAL AND STATE, AS WELL AS FROM PUBLIC UTILITIES, INCLUDING BUT NOT LIMITED TO A RIGHT-OF-WAY TRENCH PERMIT FROM THE PORTSMOUTH DPW.

2. THE CONTRACTOR SHALL PREPARE A PROJECT SPECIFIC STORMWATER POLLUTION PREVENTION PLAN (SWPPP) AND OBTAIN AN EPA CONSTRUCTION GENERAL PERMIT.

DISPOSAL OF SURPLUS MATERIAL:

1. UNSUITABLE MATERIALS AND BOULDERS/ROCK/STONES AS DEFINED BY THE SPECIFICATIONS WHICH ARE NOT ACCEPTABLE AS FILL MATERIAL SHALL BE REMOVED FROM THE SITE. ALL PAVEMENT AND SUBGRADE SOILS REMOVED DURING CONSTRUCTION TO ACHIEVE PROPOSED GRADES SHALL BECOME PROPERTY OF THE CONTRACTOR. DISPOSAL IS THE CONTRACTOR'S RESPONSIBILITY.

2. UNLESS REQUESTED BY THE CITY, ALL FRAMES, COVERS, GRATES, VALVES AND VALVE BOXES, AND CURBING TO BE REMOVED DURING THE PROJECT SHALL BECOME THE PROPERTY OF THE CONTRACTOR. ALL PAVEMENT, CONCRETE AND SUBGRADE SOILS REMOVED DURING CONSTRUCTION TO ACHIEVE PROPOSED GRADES SHALL BECOME THE PROPERTY OF THE CONTRACTOR. ALL SIDEWALK PAVEMENT, SIDEWALK BRICK, CONCRETE OR BRICK STRUCTURES, SEWER MANHOLES, DRAINAGE, WATER AND SEWER PIPE TO BE REMOVED/DEMOLISHED SHALL BECOME THE PROPERTY OF THE CONTRACTOR.

3. IF ASBESTOS CEMENT (AC) PIPE IS ENCOUNTERED, ALL WORK SHALL BE DONE IN ACCORDANCE WITH ENV-A 1800 ASBESTOS MANAGEMENT AND CONTROL. IF THE AC PIPE IS BROKEN OR REQUIRES CUTTING OR BREAKING, A LICENSED ABATEMENT CONTRACTOR MUST COMPLETE THIS WORK AND PROPERLY BAG AND DISPOSE OF THE PIPE MATERIALS. ALL DISPOSAL SHALL BE DONE IN ACCORDANCE WITH ENV-A 1800 AND ENV-SW 901. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REMOVING AND DISPOSING ASBESTOS CEMENT PIPE, INCLUDING SERVICE CONNECTIONS, WITHIN THE LIMITS OF TRENCH EXCAVATION. THE CONTRACTOR SHALL MAINTAIN WATER SERVICE TO USERS THROUGH THE USE OF TEMPORARY BYPASS PIPING AND VALVES.

4. REMOVAL OF EXISTING DRAINAGE AND SANITARY SEWER STRUCTURES AND PIPE SHALL BE SUBSIDIARY TO PROPOSED WORK ITEMS WHEN THE EXISTING DRAINAGE AND SEWER ITEMS ARE LOCATED WITHIN THE TRENCH LIMITS OF THE PROPOSED DRAINAGE ITEMS AS SPECIFIED IN SECTION 206 OF THE NHDOT STANDARD SPECIFICATION.

BORING NOTES:

1. BORINGS INDICATED ON THE PLANS WERE MADE BY S.W. COLE ENGINEERING, INC IN NOVEMBER 2018. BLOW COUNTS SHOWN ARE THE NUMBER OF BLOWS REQUIRED TO DRIVE A 2" O.D. STANDARD SPLIT SPOON SAMPLER 6" USING A 140 LB WEIGHT FALLING 30".

2. BORINGS ARE FOR DESIGN PURPOSES SHOWING CONDITIONS AT BORING POINTS ONLY, AND DO NOT NECESSARILY INDICATE MATERIAL TO BE ENCOUNTERED DURING CONSTRUCTION.

3. WATER LEVELS INDICATE THUS ▽ WERE MEASURED AT THE TIME OF EXPLORATION. THE WATER LEVELS ENCOUNTERED DURING CONSTRUCTION MAY VARY CONSIDERABLY DUE TO PREVAILING CLIMATE, RAINFALL, OR OTHER FACTORS.

4. THE GEOTECHNICAL INVESTIGATION REPORT IS PROVIDED AS AN APPENDIX TO THE CONTRACT DOCUMENTS.

CONSTRUCTION TRAFFIC MANAGEMENT & SIGNING NOTES:

1. TWO WEEKS PRIOR TO BEGINNING WORK, THE CONTRACTOR SHALL SUBMIT A WORK PLAN FOR THE SEQUENCING OF THE PROJECT AND MANAGEMENT OF TRAFFIC IN ACCORDANCE WITH SECTION 01570. PLAN SHALL INCLUDE LOCATIONS OF CONSTRUCTION SIGNAGE, VARIABLE MESSAGE BOARDS, AND PROVISIONS FOR TEMPORARY ACCESSIBLE PEDESTRIAN ROUTES.

2. ALL TRAFFIC CONTROL DEVICES SHALL CONFORM WITH SECTIONS 618 AND 619 OF THE NHDOT STANDARD SPECIFICATIONS, THE CURRENT EDITIONS OF THE MUTCD INCLUDING ALL REVISIONS, AND THE STATE OF NH DOT TRAFFIC CONTROL HANDBOOK.

3. THE CONTRACTOR SHALL EXERCISE CAUTION AND COMPLY WITH ALL APPLICABLE TRAFFIC LAWS AND REGULATIONS IN THE EXECUTION OF WORK. THE CONTRACTOR IS TO COORDINATE ALL WORK WITH THE CITY OF PORTSMOUTH PUBLIC WORKS, FIRE AND POLICE DEPARTMENTS AND ENGINEER AT LEAST 14 DAYS PRIOR TO IMPLEMENTING ANY TEMPORARY ROAD CLOSURES OR TEMPORARY DETOURS.

4. ALL COSTS FOR TRAFFIC CONTROL DEVICES INCLUDING PLACEMENT, RELOCATION, MAINTENANCE, AND REMOVAL OF SIGNS SHALL BE INCLUDED IN THE CONTRACTOR'S BID.

5. THE CONTRACTOR IS TO FURNISH AND PLACE THREE PORTABLE MESSAGE BOARDS AT THE PROJECT SITE (LOCATION DESIGNATED BY CITY) AT LEAST 7 DAYS IN ADVANCE OF ANY WORK FOR ADVANCE PUBLIC NOTIFICATION. THE MESSAGE BOARD SHALL REMAIN ACTIVE DURING THE CONSTRUCTION PERIOD.

6. ALL PERMANENT CONSTRUCTION SIGNING AND WARNING DEVICES SHALL BE SUPPLIED, ERECTED, MAINTAINED, AND REMOVED BY THE CONTRACTOR. PLACEMENT OF PERMANENT CONSTRUCTION SIGNS SHALL BE COORDINATED WITH THE ENGINEER AND PUBLIC WORKS STAFF. THE CONTRACTOR SHALL BEAR ALL EXPENSE OF MAINTAINING THE SECTION OF ROAD UNDERGOING IMPROVEMENT INCLUDING ALL TEMPORARY APPROACHES OR CROSSINGS AND INTERSECTIONS WITH TRAILS, ROADS, STREETS, BUSINESSES, PARKING LOTS, RESIDENCES, GARAGES, FARMS, AND OTHER FEATURES AS MAY BE NECESSARY.

7. ACCESS TO EXISTING DRIVES SHALL BE MAINTAINED AT ALL TIMES. IN THE EVENT THAT MAJOR WORK MUST BE DONE AT DRIVES THAT PRECLUDES FULL ACCESS, THE CONTRACTOR IS TO COORDINATE THE WORK WITH THE OWNERS AND THE ENGINEER 24 HOURS IN ADVANCE TO MINIMIZE INCONVENIENCES.

8. UNLESS OTHERWISE APPROVED, THE CONTRACTOR SHALL MAINTAIN A MINIMUM OF 14-FEET OF ROADWAY ACCESS AT ALL TIMES TO ACCOMMODATE THROUGH TRAFFIC AND LOCAL EMERGENCY ACCESS. EMERGENCY VEHICLES SHALL BE GIVEN PRIORITY.

9. ALL ROAD OPENINGS SHALL BE BACKFILLED AT THE END OF EACH WORK DAY TO ENSURE SAFE VEHICULAR AND PEDESTRIAN TRAVEL. THE CONTRACTOR SHALL MAINTAIN TWO LANES OF TRAFFIC AT THE END OF EACH WORK DAY. PLATING TRENCHES OVERNIGHT IS NOT ALLOWED WITHOUT PRIOR CITY APPROVAL.

10. DUST CONTROL OPERATIONS SHALL BE PROVIDED THROUGHOUT THE DURATION OF THE PROJECT, INCIDENTAL TO THE WORK.

SANITARY SEWER NOTES

1. THE SANITARY SEWER MAIN SHALL BE HDPE DR 11. THE PIPE SHALL BE CONNECTED TO THE EXISTING SEWER MANHOLE IN COMMUNITY CAMPUS DRIVE AND STUBBED AND CAPPED ON THE NORTH END FOR FUTURE CONNECTION AS SHOWN ON THE PLANS.

2. SEWER MAINS SHALL BE CONSTRUCTED WITH ADEQUATE SEPARATION FROM WATER MAINS. ADEQUATE SEPARATION IS DEFINED AS 10 FEET OF HORIZONTAL SEPARATION AND 18 INCHES VERTICAL SEPARATION BELOW THE WATER MAIN. IF THE MINIMUM 18-INCH VERTICAL SEPARATION IS NOT ACHIEVABLE, A WAIVER FROM NHDES IS REQUIRED.

GRADING AND DRAINAGE NOTES:

1. ALL STORM DRAIN CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE NHDOT STANDARD SPECIFICATIONS FOR HIGHWAY AND BRIDGES, LATEST, EDITION.

2. ALL PROPOSED CATCH BASINS SHALL BE EQUIPPED WITH OIL/GAS SEPARATOR HOODS AND 4' SUMPS.

3. SEE SHEET C-401 FOR ADDITIONAL GRADING AND DRAINAGE NOTES.

EROSION CONTROL NOTES:

1. SEE SHEET C-903 FOR EROSION CONTROL NOTES AND DETAILS

WATER NOTES:

1. ALL MATERIALS AND WORKMANSHIP SHALL BE IN CONFORMANCE WITH THE CITY OF PORTSMOUTH'S CONSTRUCTION STANDARDS AND DETAILS AND NH DES ENV-DW 404. THE MORE STRINGENT REGULATION SHALL APPLY.

2. ALL WATER MAINS SHALL BE CLASS 52 CEMENT LINED (CL) DUCTILE IRON PIPE AND PIPE SHALL MEET, OR EXCEED, CURRENT AWWA C151 SPECIFICATIONS FOR DUCTILE IRON WATER PIPE.

3. WATER MAINS AND SERVICES SHALL HAVE A MINIMUM COVER OF 5'. WHERE TOP OF WATER MAIN IS LESS THAN 5'-0" BELOW FINISHED GRADE, THE CONTRACTOR SHALL INSTALL RIGID INSULATION IN CONFORMANCE WITH THE TYPICAL WATER TRENCH DETAIL.

4. ALL WATER MAINS SHALL BE ENCASED IN POLYETHYLENE ENCASEMENT (POLYWRAP). SEE SPECIFICATION SECTION 02611W.

5. AT PIPE CROSSINGS, ONE FULL LENGTH OF WATER PIPE SHALL BE LOCATED SO BOTH JOINTS WILL BE AS FAR FROM THE SEWER/DRAIN PIPE AS POSSIBLE. SPECIAL STRUCTURAL SUPPORTS FOR THE WATER AND SEWER PIPES MAY BE REQUIRED.

6. ALL MATERIALS COMING IN PHYSICAL CONTACT WITH DRINKING WATER MUST BE CERTIFIED TO MEET THE ANSI/NSF STANDARD 61 BY EITHER THE UNDERWRITERS LABS (UL) OR THE NATIONAL SANITATION FOUNDATION (NSF).

7. DISINFECTION AND TESTING OF WATER LINES SHALL BE DONE IN ACCORDANCE WITH CITY OF PORTSMOUTH AND CURRENT AWWA STANDARDS.

8. ALL EXISTING WATER PIPE IDENTIFIED TO BE ABANDONED SHALL BE CAPPED AT ALL EXPOSED ENDS AND ABANDONED IN PLACE UNLESS REMOVAL IS REQUIRED BECAUSE OF OTHER INTERFERENCES (INCIDENTAL).

9. THE CONTRACTOR SHALL USE RESTRAINT SYSTEMS ON ALL VALVES AND FITTINGS UNLESS OTHERWISE NOTED ON THE PLANS.

10. ALL GATE VALVES SHALL HAVE RESTRAINED MECHANICAL JOINTS AND SHALL OPEN LEFT.

11. EXISTING CURB BOX AND/OR OTHER CASTINGS DISTURBED OR RELOCATED BY CONSTRUCTION ACTIVITIES SHALL BE ADJUSTED TO MATCH FINAL GRADE, UNLESS OTHERWISE DIRECTED BY THE ENGINEER (SUBSIDIARY).

12. WHERE WATER MAIN IS LESS THAN 4'-0" HORIZONTALLY FROM A STRUCTURE, THE CONTRACTOR SHALL INSTALL 2 INCHES OF RIGID INSULATION ALONG THE SIDE WALL OF THE WATER MAIN TRENCH A MINIMUM OF 10'-0" HORIZONTALLY BEYOND THE CENTERLINE OF THE STRUCTURE IN BOTH DIRECTIONS TO PROTECT THE WATER MAIN FROM FREEZING.

13. MAINTAIN A MINIMUM OF 10 FEET HORIZONTAL DISTANCE BETWEEN WATER MAIN AND SEWER PIPING. NOTIFY ENGINEERS IF ANY DISCREPANCY.

14. EXISTING FIRE HYDRANTS SHALL BE REMOVED, DECOMMISSIONED BELOW GRADE, AND DELIVERED TO A LOCATION SPECIFIED BY THE CITY.

15. THE CONTRACTOR SHALL INSTALL THE WATER SERVICE CONNECTIONS (INCLUDING SERVICE SADDLES IF REQUIRED, LIVE TAPS, CORPORATIONS, CURB STOP, CURB BOX, AND PE WATER SERVICE PIPE WITH TRACER WIRE AT THE SIZE SPECIFIED IN THE SERVICE SCHEDULE) AND CONNECT THE EXISTING WATER SERVICE TO THE NEW CURB BOX. THE NEW SERVICE SHALL BE CONNECTED TO THE EXISTING SERVICE PIPE PAST THE CURB STOP UNLESS THE EXISTING WATER SERVICE PIPE IS GALVANIZED CAST IRON, GALVANIZED STEEL OR LEAD; IN THIS CASE, THE CONTRACTOR SHALL NOTIFY THE CITY AND ENGINEER.

UTILITY NOTES:

1. COORDINATE ALL UTILITY WORK WITH APPROPRIATE UTILITY COMPANY.

   WATER/SEWER - CITY OF PORTSMOUTH

   ELECTRIC - EVERSOURCE ENERGY

2. ALL ELECTRICAL MATERIAL WORKMANSHIP SHALL CONFORM TO THE NATIONAL ELECTRIC CODE, LATEST ADDITION, AND ALL APPLICABLE STATE AND LOCAL CODES.

3. ALL UNDERGROUND CONDUITS SHALL HAVE NYLON PULL ROPES TO FACILITATE PULLING CABLES.

4. THE CONTRACTOR SHALL PROVIDE AND INSTALL ALL MANHOLES, BOXES, FITTINGS, CONNECTORS, COVER PLATES, AND OTHER MISCELLANEOUS ITEMS NOT NECESSARILY DETAILED ON THESE DRAWINGS TO RENDER INSTALLATION OF UTILITIES COMPLETE AND OPERATIONAL.

5. CONTRACTOR SHALL COORDINATE ALL ELECTRICAL WORK INCLUDING, BUT NOT LIMITED TO: CONDUIT CONSTRUCTION, MANHOLE CONSTRUCTION, AND TRANSFORMER CONSTRUCTION WITH EVERSOURCE ENERGY.

AGENCY REVIEW

no.	revision	date	by
3	TAC PUBLIC HEARING	8/19/2019	JHK
2	CONSERVATION COMMISSION SUBMISSION	07/24/2019	JHK
1	TAC WORK SESSION SUBMISSION	07/09/2019	JHK

CMA ENGINEERS
CIVIL/ENVIRONMENTAL/STRUCTURAL
Portsmouth, NH • Manchester, NH • Portland, ME
603/431-6196 603/627-0708 207/541-4223
c m a e n g i n e e r s . c o m

STATE OF NEW HAMPSHIRE
JOSEPH H. KIEFFNER
No. 11717
LICENSED
PROFESSIONAL ENGINEER

designed by: ----
drawn by: AGL
approved by: ----
date: August 2019
project no: 1119
file name: 1119 NOTES.dwg
scale:

City of Portsmouth, New Hampshire
Department of Public Works
Multi-purpose Recreation Fields-Phase I
680 Peverly Hill Road
Recreation Fields
Notes

drawing no. G-101

M:\CADD\PROJECTS\1119 Portsmouth Athletic fields\Production\1119 NOTES.dwg Date Plotted: Aug 19, 2019 – 11:58am Plotted By: PCORBETT

ABBREVIATIONS:

ABBREV.	MEANING
@	AT
ABD	ABANDONED
ABAN	ABANDON IN PLACE
ACP	ASBESTOS CEMENT PIPE
ADD'L	ADDITIONAL
APPROX	APPROXIMATE
ASTM	AMERICAN SOCIETY FOR TESTING AND MATERIALS
BTM	BOTTOM
BH	BRADLEY HEAD
BIT	BITUMINOUS CONCRETE
BLDG	BUILDING
BMP	BUILDING MONITORING POINT
BOW	BOTTOM OF WALL
BR	BRICK
CB	CATCH BASIN
C.B.	CONCRETE BOUND
CBCI	CATCH BASIN WITH CURB INLET
CC	CAST-IN-PLACE CONCRETE
CEM	CEMENT
CL	CLEAR
℄	CENTER LINE
CLF	CHAIN LINK FENCE
CI	CAST IRON
CICL	CAST IRON CEMENT-LINED
CIP	CAST IN PLACE
C.O.	CLEAN OUT
CONC	CONCRETE
CONN	CONNECTION
COR	CORNER
CP	CONCRETE PIPE
CMP	CORRUGATED METAL PIPE
CSE	COBBLE STONE EDGE
D	DRAIN
DEPT	DEPARTMENT
DH	DRILL HOLE
DI	DUCTILE IRON
DIA	DIAMETER
DICL	DUCTILE IRON CEMENT-LINED
DIA	DIAMETER
DISCH	DISCHARGE
DMH	DRAIN MANHOLE
DLY	DOUBLE SOLID YELLOW LINE
DT	DRAIN TILE
DWG	DRAWING
EA	EACH
EF	EACH FACE
EM	ELECTRIC METER
E-VAULT	ELECTRIC-VAULT
EL, ELEV	ELEVATION
ELEC, E	ELECTRIC
EOP	EDGE OF PAVEMENT
EXIST	EXISTING
ESHWL	EXIST. SEASONAL HIGH WATER TABLE
F&C	FRAME AND COVER
FA	FIRE ALARM
FD	FLOOR DRAIN
FED	FEDERAL
FH	FIRE HYDRANT
FM	FORCE MAIN
FND	FOUND
FP	FLAG POLE
FT	FOOT
GM	GAS METER
GRAN	GRANITE
HDPE	HIGH DENSITY POLYETHYLENE
HH	HAND HOLE
HORIZ	HORIZONTAL
HYD	HYDRANT
H/C	HANDICAP
INV	INVERT
IN	INCHES
IP	IRON PIPE
L	LEAVE
MBOX	MAIL BOX
MHB	MASS HIGHWAY BOUND
MHW	MEAN HIGH WATER
MIN	MINIMUM
MON	MONUMENT
NIC	NOT IN CONTRACT
NO, #	NUMBER
NTS	NOT TO SCALE
PB	PULL BOX
PC	PRECAST CONCRETE
PCCP	PRESTRESSED CONCRETE CYLINDER PIPE
PCI	PIT CAST IRON
PCB	PROPOSED CATCH BASIN
PDMH	PROPOSED DRAINAGE MANHOLE
PERF	PEFORATED
PM	PARKING METER
PNS	PIPE NOT SEEN
POCS	PROPOSED OUTLET CONTROL STRUCTURE
PROP	PROPOSE
PSI	POUNDS PER SQUARE INCH
PVC	POLYVINYL CHLORIDE
R	REMOVE/RELOCATE
REC	RECORD INFORMATION
REINF	REINFORCEMENT
RES	REVERE EXTENSION SEWER
RET	RETAIN
RCP	REINFORCED CONCRETE PIPE
RS	RECEIVING SHAFT
ROW	RIGHT-OF-WAY
SB	STREET LIGHT BASE
S.B.	STONE BOUND
SD	STORM DRAIN
SF	FIRE SERVICE
SGC	SLOPED GRANITE CURB
SLCC	STREET LIGHT CONTROL CABINET
SMH	SEWER MANHOLE
SPEC	SPECIFICATION
SWL	SINGLE WHITE LINE

ABBREV.	MEANING
SQ	SQUARE
S	SANITARY SEWER
ST	STEEL
STD	SINGLE TILE DUCT
STY	STORY
SW	SIDEWALK
T&B.	TOP AND BOTTOM
TBC	TOP BACK OF CURB
TCC	TRAFFIC CONTROL CABINET
TD	TELEDUCT
TEL	TELEPHONE CONDUIT/DUCT BANK
TH	TOP OF HATCH
TL	TRAFFIC LIGHT CONDUIT
TOH	TOP OF HOOD
TOW	TOP OF WALL
TRAF	TRAFFIC CONDUIT
TS	TRAFFIC SIGNAL
TYP	TYPICAL
UMP	UTILITY MONITORING POINT
UNK	UNKNOWN
UP	UTILITY POLE
VC	VITRIFIED CLAY
VERT	VERTICAL
VGC	VERTICAL GRANITE CURB
W	WATER
W/	WITH
WC	WYE CONNECTION
WIP	WROUGHT IRON PIPE
WM	WATER METER
WMH	WATER MANHOLE
WFLG	WETLAND FLAG

GENERAL SYMBOLS:

EXISTING		PROPOSED
	UTILITY POLE & GUY WIRE	
	UTILITY POLE W/ LIGHT	
	LIGHT POLE	
	MAILBOX	
	VENT PIPE	
	SIGNS (TWO POSTS)	
	GRANITE BOUND FOUND	
	DRILL HOLE FOUND	
	IRON PIPE/ROD FOUND	
	METAL POST	
	GRANITE OR CONC. POST	
	FIRE HYDRANT	
	GAS GATE VALVE	
	WATER GATE VALVE	
	WATER CURB STOP	
	VALVE ELECTRIC BOX	
	CATCH BASIN	
	DRAIN MANHOLE	
	ELECTRIC MANHOLE	
	TELEPHONE MANHOLE	
	WATER MANHOLE	
	SEWER MANHOLE	
	MANHOLE	
	BUSH/SHRUB	
	TREE STUMP	
	CONIFEROUS TREE	
	DECIDUOUS TREE	
	ROCK	
	BORING	
	WETLAND	
	WETLAND FLAG	
	SPOT LIGHT	
	GUY WIRE	
	EDGE OF PAVEMENT	
	STOCKADE FENCE	
	EROSION CONTROL FIBER ROLL	
×335.2	SPOT ELEVATION	131.75'
	City LAYOUT LINE	
	OVERHEAD WIRES	
s	SEWER LINE	
d	FORCEMAIN	FM
G	DRAIN LINE	
w	GAS LINE	
uge	WATER SERVICE UNDERGROUND	PWS
	UNDERGROUND ELECTRIC LINE	UGE
	APPROX. ABUTTERS	
	LOT LINE	
	SHRUB LINE	
	TREE LINE	
	STONE WALL	
	GUARDRAIL	
	MAJOR CONTOUR LINE	
	MINOR CONTOUR LINE	
	EASEMENT LINE	
	WETLAND LINE	
w	STATE HIGHWAY LAYOUT LINE	
	WATER MAIN	PW
	BOLLARD	
	SLOPE LINE	
	CONSTRUCTION BASELINE	302+00
	LIMITS OF WORK	
	THRUST BLOCK	
	PROP. ELECTRICAL PULL BOX	PEMH
	PROP. TRANSFORMER	T

AGENCY REVIEW

no.	revision	date	by
3	TAC PUBLIC HEARING	8/19/2019	JHK
2	CONSERVATION COMMISSION SUBMISSION	07/24/2019	JHK
1	TAC WORK SESSION SUBMISSION	07/09/2019	JHK

CMA ENGINEERS
CIVIL/ENVIRONMENTAL/STRUCTURAL
Portsmouth, NH • Manchester, NH • Portland, ME
603/431-6196 603/627-0708 207/541-4223
c m a e n g i n e e r s . c o m

STATE OF NEW HAMPSHIRE
JOSEPH H. KIEFFNER
No. 9517
LICENSED PROFESSIONAL ENGINEER

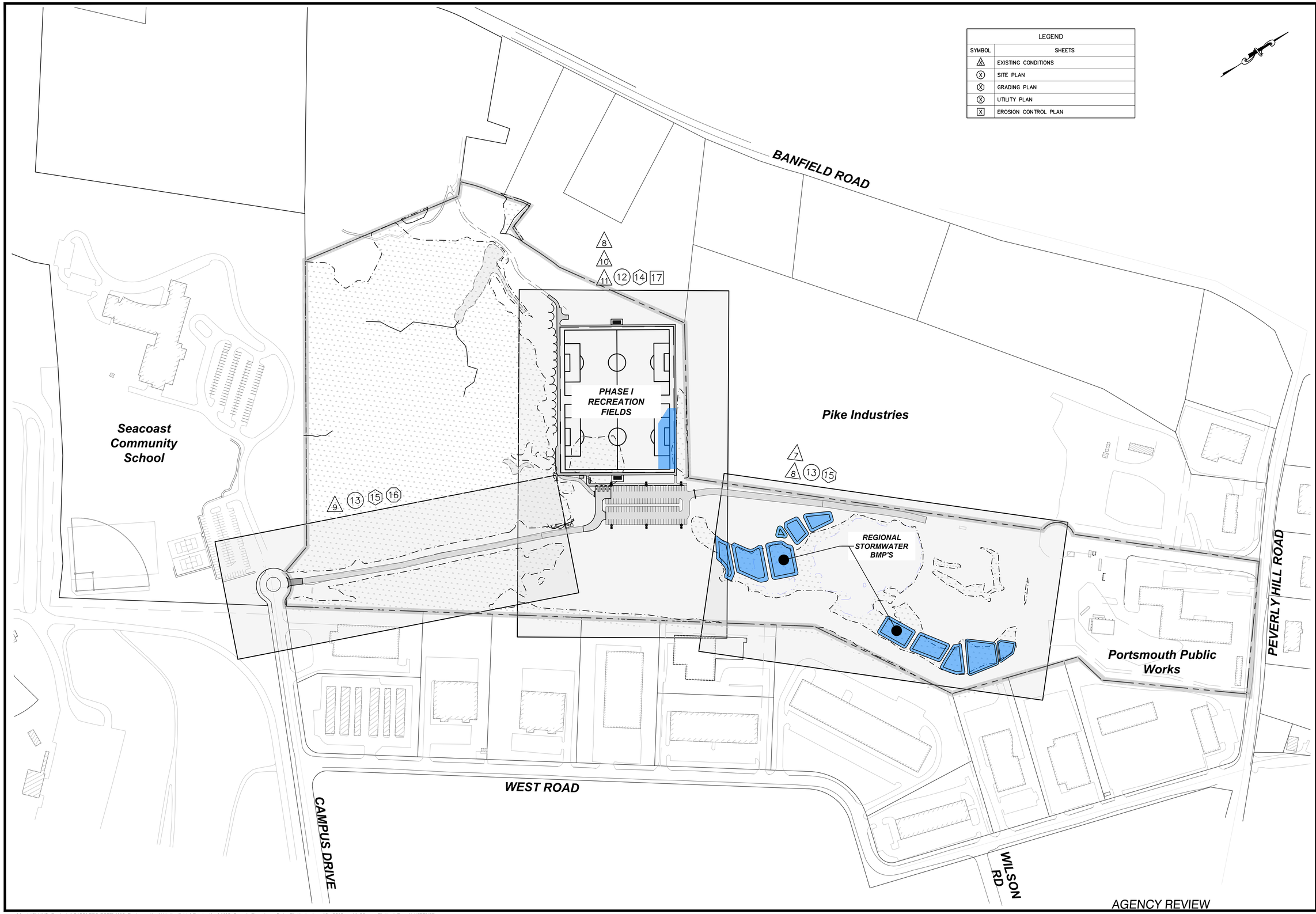
designed by: ----
drawn by: AGL
approved by: ----
date: August 2019
project no: 1119
file name: 1119 NOTES.dwg
scale:

City of Portsmouth, New Hampshire
Department of Public Works
Multi-purpose Recreation Fields-Phase I
680 Peverly Hill Road

Recreation Fields
Legends

drawing no.
G-102

\\nhf2\MHT-Projects\CADD\PROJECTS\1119 Portsmouth Athletic fields\Production\1119 NOTES.dwg Date Plotted: Aug 19, 2019 – 11:01am Plotted By: ALAWRENCE



LEGEND	
SYMBOL	SHEETS
△	EXISTING CONDITIONS
(X)	SITE PLAN
(X)	GRADING PLAN
(X)	UTILITY PLAN
[X]	EROSION CONTROL PLAN

no.	revision	date	by
3	TAC PUBLIC HEARING	8/19/2019	JHK
2	CONSERVATION COMMISSION SUBMISSION	07/24/2019	JHK
1	TAC WORK SESSION SUBMISSION	07/09/2019	JHK

CMA ENGINEERS
CIVIL/ENVIRONMENTAL/STRUCTURAL
Portsmouth, NH • Manchester, NH • Portland, ME
603/431-6196 603/627-0708 207/541-4223
c m a e n g i n e e r s . c o m

STATE OF NEW HAMPSHIRE
JOSEPH H. KIEFFNER
No. 11770
LICENSED PROFESSIONAL ENGINEER

designed by: ----
drawn by: AGL
approved by: ----
date: August 2019
project no: 1119
file name: 1119 Overall Plan.dwg
scale: 0 150' 300' Scale: 1" = 150'

City of Portsmouth, New Hampshire
Department of Public Works
Multi-purpose Recreation Fields-Phase I
680 Peverly Hill Road

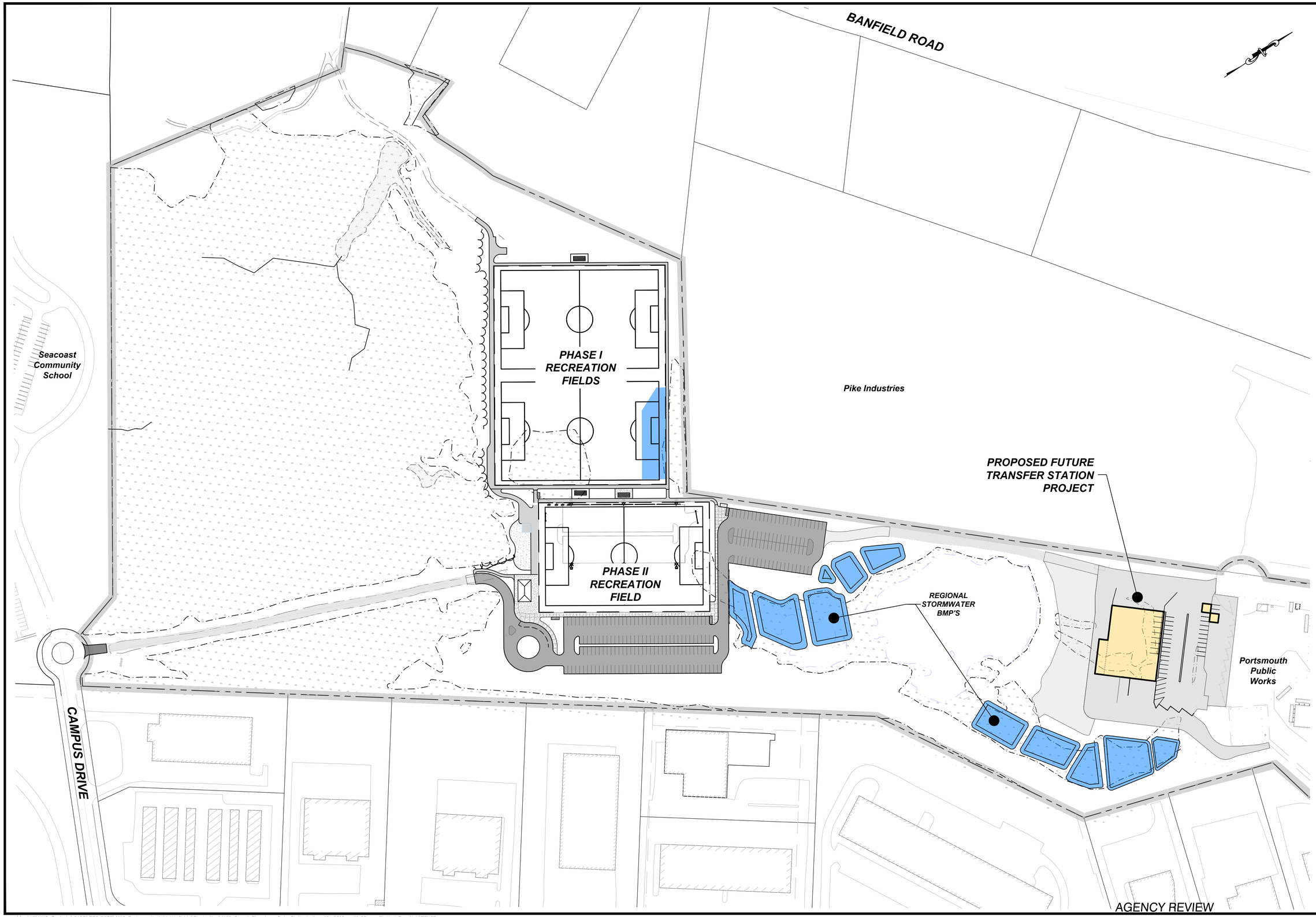
Recreation Fields
Sheet Index Plan

drawing no. G-103

sheet: 4 of 37

AGENCY REVIEW

\\mhtz\MHT-Projects\CADD\PROJECTS\1119 Portsmouth Athletic fields\Production\1119 Overall Plan.dwg Date Plotted: Aug 19, 2019 – 11:02am Plotted By: ALAWRENCE



no.	revision	date	by
3	TAC PUBLIC HEARING	8/19/2019	JHK
2	CONSERVATION COMMISSION SUBMISSION	07/24/2019	JHK
1	TAC WORK SESSION SUBMISSION	07/09/2019	JHK

CMA ENGINEERS
CIVIL/ENVIRONMENTAL/STRUCTURAL
Portsmouth, NH • Manchester, NH • Portland, ME
603/431-6196 603/627-0708 207/541-4223
c m a e n g i n e e r s . c o m

STATE OF NEW HAMPSHIRE
JOSEPH H. KIEFFNER
No. 9175
LICENSED
PROFESSIONAL ENGINEER

designed by: ----
drawn by: AGL
approved by: ----
date: August 2019
project no: 1119
file name: 1119 Overall Plan.dwg
scale: 0 100' 200' Scale: 1" = 100'

City of Portsmouth, New Hampshire
Department of Public Works
Multi-purpose Recreation Fields-Phase I
680 Peverly Hill Road

Phasing Plan

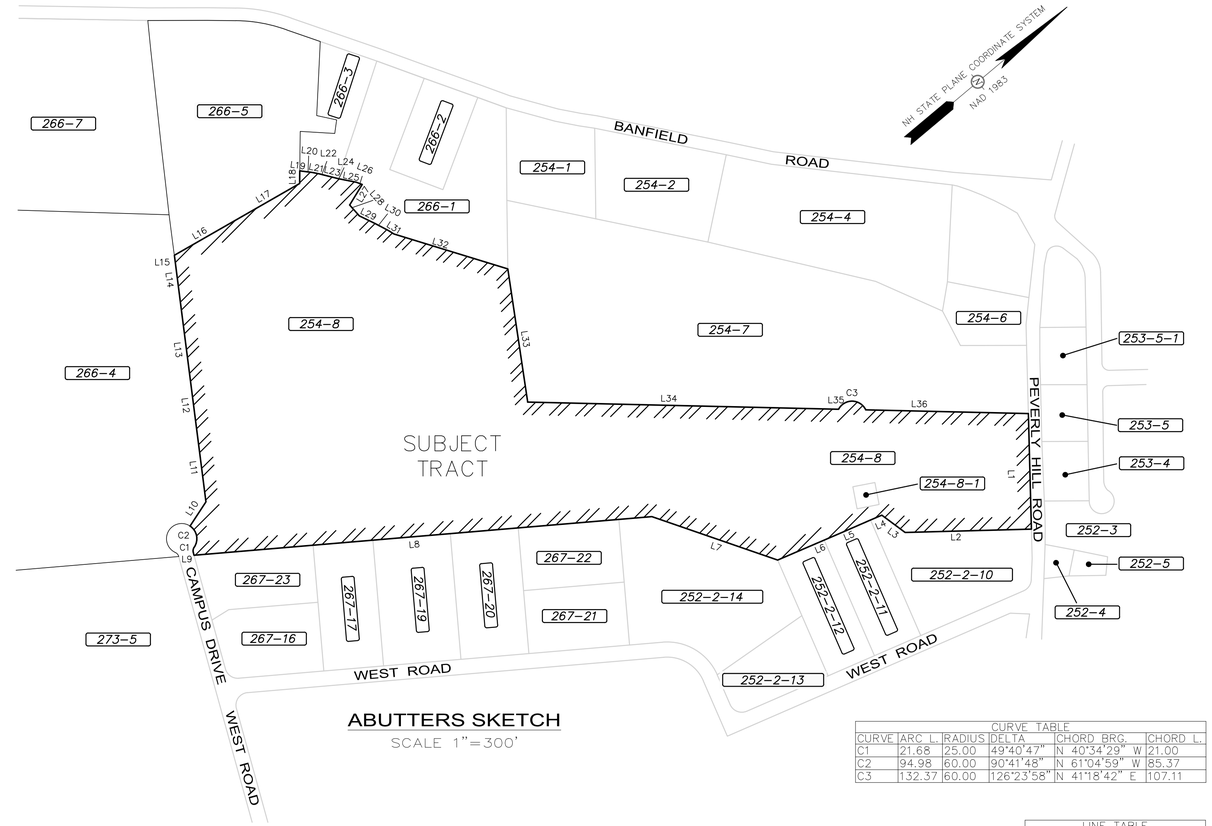
drawing no. G-104

sheet: 5 of 37

\\mht2\MHT-Projects\CADD\PROJECTS\1119 Portsmouth Athletic fields\Production\1119 Overall Plan.dwg Date Plotted: Aug 19, 2019 - 11:02am Plotted By: ALAWRENCE

ABUTTERS LIST

MAP–LOT	OWNER OF RECORD	DEED REFERENCE
252–2–10	JMK REALTY LLC, PO BOX 971, PORTSMOUTH, NH 03802	3656/744
252–2–11	HEG WEST ROAD LLC, 2 INTERNATIONAL WAY, LAWRENCE, MA 01843 60 WEST RD, PORTSMOUTH, NH 03801	5835/67
252–2–12	ONE HUNDRED WEST LLC, 100 WEST RD, PORTSMOUTH, NH 03801	3589/1427
252–2–14	LITCHFIELD PORTSMOUTH LLC C/O EATON PARTNERS INC, 175 CANAL ST STE 401, MANCHESTER, NH 03101	4800/1185
252–3	LIGHTHOUSE MANUFACTURING LLC, 25 SOUTH SATELLITE RD, SOUTH WINDSOR, CT 06074	N/A
252–4 & 252–5	4 AMIGOS LLC, 321 LAFAYETTE RD, HAMPTON, NH 03842	N/A
253–4	DPH REALTY LLC, 30 MIRONA RD EXT, PORTSMOUTH, NH 03801	N/A
253–5	GERALD W. & TERESA M. REYNOLDS, 164 MASON RD, MILTON, NH 03851	N/A
253–5–1	BOURAS GROUP LLC, 10 MIRONA RD, PORTSMOUTH, NH 03801	N/A
254–7	PIKE INDUSTRIES, INC., 3 EASTGATE PARK RD, BELMONT, NH 03220	3192/1085
254–8–1	MCM ACQUISTION 2017 LLC ATTN: TAX DEPT NH22094–A, 8051 CONGRESS AVE, BOCA RATON, FL 33487–1307	N/A
266–1	RICCI CONSTRUCTION CO., INC., 225 BANFIELD RD, PORTSMOUTH, NH 03801	2527/322
266–3	ANDREW R. & CAROL ANN CROTEAU, 285 BANFIELD RD, PORTSMOUTH, NH 03801	2274/1868
266–4	FOUNDATION FOR SEACOAST HEALTH, 100 CAMPUS DR SUITE 1, PORTSMOUTH, NH 03801	3276/2980 & 3259/2178
266–5	HOPE FOR TOMORROW FOUNDATION, 1 STONERIDGE DR, RYE, NH 03870	5783/602
267–17–1	300 WEST RD LLC, 300 WEST ROAD UNIT #1, PORTSMOUTH, NH 03801	4453/1140
267–17–2	GRAYWOLF PROPERTIES LLC, 1 LIBBEY LN, RYE, NH 03870	4397/2371
267–17–3	GRAYWOLF PROPERTIES LLC, 1 LIBBEY LN, RYE, NH 03870	4439/1934
267–17–4	GRAYWOLF PROPERTIES LLC, 1 LIBBEY LN, RYE, NH 03870	4397/2371
267–19–1	BBJ PROPERTIES, INC., 38 RAINBOW LN, SANFORD, ME 04073	3396/126
267–19–2	PETER PARADIS, 481 DENNETT ST, PORTSMOUTH, NH 03801	3090/1083
267–19–3	KEVIN J. DUPLISEA, 270 WEST RD #3, PORTSMOUTH, NH 03801	5564/2186
267–19–4	WEST ROAD EQUIPMENT LLC, 270 WEST RD UNIT 4A, PORTSMOUTH, NH 03801	5059/2202
267–20	HARVEY PROPCO LLC, 1400 MAIN ST, WALTHAM, MA 02451	5660/1693
267–21	P A M REALTY TRUST C/O CP MANAGEMENT, INC., 11 COURT ST. SUITE 100, EXETER, NH 03833	4438/828
267–21	STERLING REALTY, INC., 143 PINELOCH DR, PORTLAND, ME 04103	2762/2839
267–22	MICRONICS, INC., 200 WEST RD, PORTSMOUTH, NH 03801	5423/2254
267–23	ENGEL FAMILY TRUST, ROBERT ENGEL TRUSTEE, PO BOX 6070, MANCHESTER, NH 03108	3459/1842
273–5	BELLWOOD ASSOCIATES LTD PARTNERSHIP C/O FESTIVAL FUN PARK PROPERTY TAX SERVICES PO BOX 543185, DALLAS, TX 75354	3471/2972



ABUTTERS SKETCH

SCALE 1"=300'

CURVE TABLE					
CURVE	ARC L.	RADIUS	DELTA	CHORD BRG.	CHORD L.
C1	21.68	25.00	49°40'47"	N 40°34'29" W	21.00
C2	94.98	60.00	90°41'48"	N 61°04'59" W	85.37
C3	132.37	60.00	126°23'58"	N 41°18'42" E	107.11

LINE TABLE		
LINE	BEARING	DISTANCE
L1	S 51°30'32" E	457.64
L2	S 38°28'19" W	500.01
L3	S 76°35'13" W	114.96
L4	S 16°43'54" W	48.95
L5	S 16°31'44" W	132.02
L6	S 16°47'11" W	268.29
L7	S 59°02'50" W	526.73
L8	S 35°10'38" W	1819.23
L9	N 65°24'52" W	11.22
L10	N 16°46'42" W	115.00
L11	N 57°17'20" W	270.98
L12	N 57°17'20" W	222.72
L13	N 57°17'20" W	287.56
L14	N 57°17'20" W	202.89
L15	N 10°10'42" E	4.72
L16	N 10°10'42" E	276.88
L17	N 10°10'42" E	290.00
L18	N 49°22'45" W	50.00
L19	N 47°59'56" E	21.12
L20	N 46°59'02" E	28.17
L21	N 51°03'35" E	28.56
L22	N 54°28'19" E	13.75
L23	N 54°07'57" E	64.55
L24	N 53°40'13" E	6.03
L25	N 50°59'41" E	66.28
L26	N 61°02'31" E	25.04
L27	S 18°34'23" E	95.09
L28	N 88°31'38" E	57.65
L29	N 65°49'31" E	70.30
L30	N 67°50'02" E	58.61
L31	N 71°47'07" E	26.13
L32	N 57°02'00" E	471.36
L33	S 58°29'19" E	533.10
L34	N 41°19'31" E	1223.68
L35	N 39°27'07" E	7.78
L36	N 41°18'42" E	644.30

NOTES:

1. OWNER OF RECORD.....CITY OF PORTSMOUTH, N.H.
   ADDRESS.....1 JUNKINS AVE, PORTSMOUTH, NH 03801
   DEED REFERENCE.....3276/2986 & 5819/2310
   TAX SHEET / LOT.....254–8
   ZONED:..... MUNICIPAL — FRONT YARD SETBACK....N/A
   MINIMUM LOT AREA N/A — SIDE YARD SETBACK.....N/A
   FRONTAGE..... N/A — REAR YARD SETBACK.....N/A
2. THE RELATIVE ERROR OF CLOSURE WAS LESS THAN 1 FOOT IN 15,000 FEET.
3. THIS PLAN IS BASED ON A FIELD SURVEY, INFORMATION FROM PLANS OF RECORD AND AERIAL MAPPING BY EASTERN TOPOGRAPHICS.
   PRIMARY BM: CITY CONTROL POINT "INDU"
   HORIZONTAL DATUM: NAD 1983 (1986 CONTROL ADJUSTMENT)
   VERTICAL DATUM: NAVD 1988
4. THE LOCATION OF ALL UNDERGROUND UTILITIES SHOWN HEREON ARE APPROXIMATE AND ARE BASED UPON THE FIELD LOCATION OF ALL VISIBLE STRUCTURES (IE CATCH BASINS, MANHOLES, WATER GATES ETC.) AND INFORMATION COMPILED FROM PLANS PROVIDED BY UTILITY COMPANIES AND GOVERNMENTAL AGENCIES. ALL CONTRACTORS SHOULD NOTIFY, IN WRITING, SAID AGENCIES PRIOR TO ANY EXCAVATION WORK AND CALL DIG–SAFE @ 1–888–DIG–SAFE.
5. THE SUBJECT TRACTS LIE IN ZONE X (UNSHADED), AREAS DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN, AS SHOWN ON FLOOD INSURANCE MAP NO. 33015C0270E, EFFECTIVE DATE MAY 17, 2005, BY FEMA.
6. PARCEL 254–8 AND A PORTION OF PARCEL 266–4 ARE SUBJECT TO A RESTRICTIVE COVENANT AGREEMENT BETWEEN JOHN IAFOLLA CO., INC. & PIKE INDUSTRIES, INC., SEE RCRD BOOK 3192, PAGE 1088, BOOK 3193, PAGE 2059 AND BOOK 3198, PAGE 853.
7. WETLANDS DELINEATION 10/2018 BY GZA ENVIRONMENTAL.
8. ENGINEER OR CONTRACTOR TO VERIFY SITE BENCHMARKS BY LEVELING BETWEEN 2 BENCHMARKS PRIOR TO THE SETTING OR ESTABLISHMENT OF ANY GRADES/ELEVATIONS. DISCREPANCIES ARE TO BE REPORTED TO JAMES VERRA AND ASSOC., INC.

WETLAND DELINEATION NOTES:

1. JURISDICTIONAL WETLANDS WERE DELINEATED BY GZA GEOENVIRONMENTAL, INC. (GZA) ON OCTOBER 19 AND 22, 2018, AND APRIL 24, 2019, IN ACCORDANCE WITH THE 1987 U.S. ARMY CORPS OF ENGINEERS' (ACOE) "WETLANDS DELINEATION MANUAL," TECHNICAL REPORT Y–87–1 AND THE "REGIONAL SUPPLEMENT TO THE CORPS OF ENGINEERS WETLAND DELINEATION MANUAL, NORTHCENTRAL AND NORTHEAST REGION." JANUARY 2012.
2. GZA EVALUATED WETLANDS AS POTENTIAL VERNAL POOLS ON APRIL 24, 2019 IN ACCORDANCE WITH THE NH CODE OF ADMINISTRATIVE RULES (ENV–WT 101.75, 101.86, 101.106) AND THE MANUAL "IDENTIFICATION AND DOCUMENTATION OF VERNAL POOLS IN NEW HAMPSHIRE, NEW HAMPSHIRE FISH AND GAME DEPARTMENT, NONGAME AND ENDANGERED WILDLIFE PROGRAM. 2004.
3. GZA PERFORMED A WETLANDS FUNCTIONS AND VALUES ASSESSMENT ON OCTOBER 19 AND 22, 2018, AND APRIL 24, 2019, IN ACCORDANCE WITH THE ACOE'S "HIGHWAY METHODOLOGY WORKBOOK SUPPLEMENT," SEPTEMBER 1999, AND CLASSIFIED WETLANDS IN ACCORDANCE WITH THE "CLASSIFICATION OF WETLANDS AND DEEPWATER HABITATS OF THE UNITED STATES"(FEDERAL GEOGRAPHIC DATA COMMITTEE, 2013).

WETLAND STANDARDS:

FEDERAL GEOGRAPHIC DATA COMMITTEE. 2013. CLASSIFICATION OF WETLANDS AND DEEPWATER HABITATS OF THE UNITED STATES. FGDC–STD–004–2013. SECOND EDITION. WETLANDS SUBCOMMITTEE, FEDERAL GEOGRAPHIC DATA COMMITTEE AND U.S. FISH AND WILDLIFE SERVICE, WASHINGTON, DC.

LICHVAR, R.W., D.L. BANKS, W.N. KIRCHNER, AND N.C. MELVIN. 2016. THE NATIONAL WETLAND PLANT LIST: 2016 WETLAND RATINGS. PHYTONEURON 2016–30: 1–17. PUBLISHED 28 APRIL 2016. ISSN 2153 733X

WETLAND STANDARDS (CONTINUED):

NEW ENGLAND HYDRIC SOILS TECHNICAL COMMITTEE. 2019. VERSION 4. FIELD INDICATORS FOR IDENTIFYING HYDRIC SOILS IN NEW ENGLAND, INTERSTATE WATER POLLUTION CONTROL COMMISSION, LOWELL, MASSACHUSETTS.

U.S. ARMY CORPS OF ENGINEERS, ENVIRONMENTAL LABORATORY. 1987. CORPS OF ENGINEERS WETLANDS DELINEATION MANUAL, TECHNICAL REPORT Y–87–1, U.S. ARMY ENGINEER WATERWAYS EXPERIMENT STATION, VICKSBURG, MISSISSIPPI.

U.S. ARMY CORPS OF ENGINEERS. 2012. REGIONAL SUPPLEMENT TO THE CORPS OF ENGINEERS WETLAND DELINEATION MANUAL: NORTHCENTRAL AND NORTHEAST REGION, ED. J. S. WAKELY, R. W. LICHVAR, AND C. V. NOBLE. ERDC/EL TR–12–1. VICKSBURY, MS: U.S. ARMY ENGINEER RESEARCH AND DEVELOPMENT CENTER.

U.S. DEPARTMENT OF AGRICULTURE, NATURAL RESOURCE CONSERVATION SERVICE, 2018. FIELD INDICATORS OF HYDRIC SOILS IN THE UNITED STATES, VERSION 8.2. L.M. VASILAS, G.W. HURT, AND J.F. BERKOWITZ (EDS.). USDA, NRCS, IN COOPERATION WITH THE NATIONAL TECHNICAL COMMITTEE FOR HYDRIC SOILS.

REFERENCE PLANS:

1. AMENDED SITE PLAN, PROPERTY OF MICRONICS INC, 200 WEST ROAD, PORTSMOUTH, N.H., DATED 12/30/2014, RCRD PLAN D–38846.
2. LOT LINE REVISION PLAN, 755 BANFIELD ROAD REALTY, LLC, CONSTITUTION AVENUE, PORTSMOUTH, N.H., REVISED TO 11/28/2011, RCRD PLAN D–37091.
3. DRAINAGE EASEMENT PLAN OVER LAND OF BELLWOOD ASSOCIATES LIMITED PARTNERSHIP, CAMPUS DRIVE, PORTSMOUTH, N.H., DATED 7/30/2007, RCRD PLAN D–35073.
4. ACTIVITY AND USE RESTRICTION EASEMENT PLAN FOR PORTSMOUTH DEPARTMENT OF PUBLIC WORKS, 680 PEVERLY HILL ROAD, PORTSMOUTH, N.H., REVISED TO 9/13/2006, RCRD PLAN D–34222.
5. LATTICE TOWER EASEMENT PLAN, PEVERLY HILL ROAD, PORTSMOUTH, N.H., FOR MESSAGE CENTER MANAGEMENT, REVISED TO 4/16/2002, RCRD PLAN D–30056.
6. FOUNDATION FOR SEACOAST HEALTH, PORTSMOUTH, N.H., LOT LINE ADJUSTMENT, JOHN IAFOLLA COMPANY, INC. AND CITY OF PORTSMOUTH, REVISED TO 4/14/1998, RCRD PLAN D–26202.
7. SUBDIVISION & LOT LINE RELOCATION PLAN FOR PIKE INDUSTRIES, INC. & JOHN IAFOLLA COMPANY, INC, PEVERLY HILL ROAD/ BANFIELD ROAD, PORTSMOUTH, N.H., REVISED TO 11/21/1997, RCRD PLAN D–26136.
8. SUBDIVISION PLAN FOR JOHN IAFOLLA COMPANY, INC., PEVERLY HILL ROAD/ BANFIELD ROAD, PORTSMOUTH, N.H., REVISED TO 11/20/1996, RCRD PLAN D–25124.
9. LOT LINE ELIMINATION PLAN FOR BELLWOOD ASSOCIATES LIMITED PARTNERSHIP, LAFAYETTE ROAD/ CONSTITUTION AVENUE, PORTSMOUTH, N.H., DATED 9/3/1991, RCRD PLAN D–21288.
10. PLAN OF DRAINAGE EASEMENT FOR LAFAYETTE WEST CORP & FFP INTERIM PARTNERS, WEST ROAD, PORTSMOUTH, N.H., REVISED TO 3/28/1989, RCRD PLAN D–22902.
11. SUBDIVISION PLAN, LINCOLN AND MARY HANSCOM, PORTSMOUTH, N.H., DATED 1/1983, RCRD PLAN D–11441.
12. LOT LINE REVISION PLAN, CAMPUS DRIVE, BANFIELD & PEVERLY HILL ROADS, PORTSMOUTH, N.H., FOR CITY OF PORTSMOUTH, N.H. & FOUNDATION FOR SEACOAST HEALTH, REVISED TO 12/14/2016, RCRD PLAN D–39897.

AGENCY REVIEW

no.	revision	date	by
3	TAC PUBLIC HEARING	8/19/2019	JHK
2	CONSERVATION COMMISSION SUBMISSION	07/24/2019	JHK
1	TAC WORK SESSION SUBMISSION	07/09/2019	JHK

CMA ENGINEERS
CIVIL/ENVIRONMENTAL/STRUCTURAL
Portsmouth, NH • Manchester, NH • Portland, ME
603/431-6196 603/627-0708 207/541-4223
c m a e n g i n e e r s . c o m

designed by: ----
drawn by: AGL
approved by: ----
date: August 2019
project no: 1119
file name: 1119 ECP.dwg
scale: 0 300' 600' Scale: 1" = 300'

City of Portsmouth, New Hampshire
Department of Public Works
Multi-purpose Recreation Fields-Phase I
680 Peverly Hill Road
Existing Conditions Plan

drawing no. V-201

\\mht2\MHT-Projects\CADD\PROJECTS\1119 Portsmouth Athletic fields\Production\1119 ECP.dwg Date Plotted: Aug 19, 2019 – 11:02am Plotted By: ALAWRENCE

PEVERLY HILL ROAD
(A PUBLIC WAY)

PARCEL 254–8 IS SUBJECT TO AN EASEMENT FOR DISCHARGE AND FLOWAGE OF SURFACE WATERS – SEE RCRD BOOK 3055, PAGE 1115

40 0 40 80 120 160 FEET
20 0 20 40 METERS

AGENCY REVIEW

no.	revision	date	by
3	TAC PUBLIC HEARING	8/19/2019	JHK
2	CONSERVATION COMMISSION SUBMISSION	07/24/2019	JHK
1	TAC WORK SESSION SUBMISSION	07/09/2019	JHK

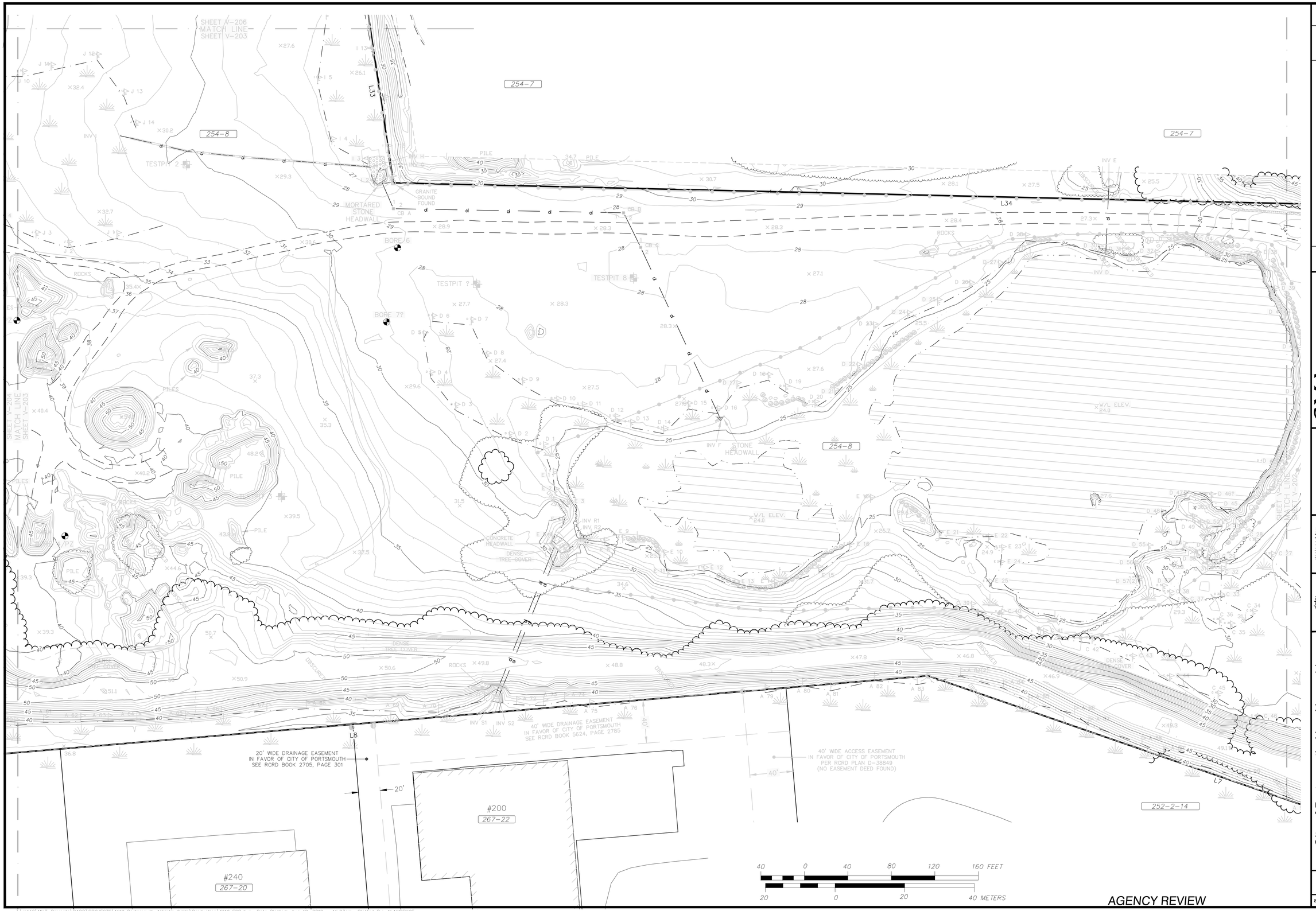
CMA ENGINEERS
CIVIL/ENVIRONMENTAL/STRUCTURAL
Portsmouth, NH • Manchester, NH • Portland, ME
603/431-6196 603/627-0708 207/541-4223
c m a e n g i n e e r s . c o m

designed by: ----
drawn by: AGL
approved by: ----
date: August 2019
project no: 1119
file name: 1119 ECP.dwg
scale: 0 40' 80' Scale: 1" = 40'

City of Portsmouth, New Hampshire
Department of Public Works
Multi-purpose Recreation Fields-Phase I
680 Peverly Hill Road
Existing Conditions Plan

drawing no. V-202

\\mht2\MHT-Projects\CADD\PROJECTS\1119 Portsmouth Athletic fields\Production\1119 ECP.dwg Date Plotted: Aug 19, 2019 – 11:02am Plotted By: ALAWRENCE



AGENCY REVIEW

no.	revision	date	by
3	TAC PUBLIC HEARING	8/19/2019	JHK
2	CONSERVATION COMMISSION SUBMISSION	07/24/2019	JHK
1	TAC WORK SESSION SUBMISSION	07/09/2019	JHK

CMA ENGINEERS
CIVIL/ENVIRONMENTAL/STRUCTURAL

Portsmouth, NH • Manchester, NH • Portland, ME
603/431-6196 603/627-0708 207/541-4223

c m a e n g i n e e r s . c o m

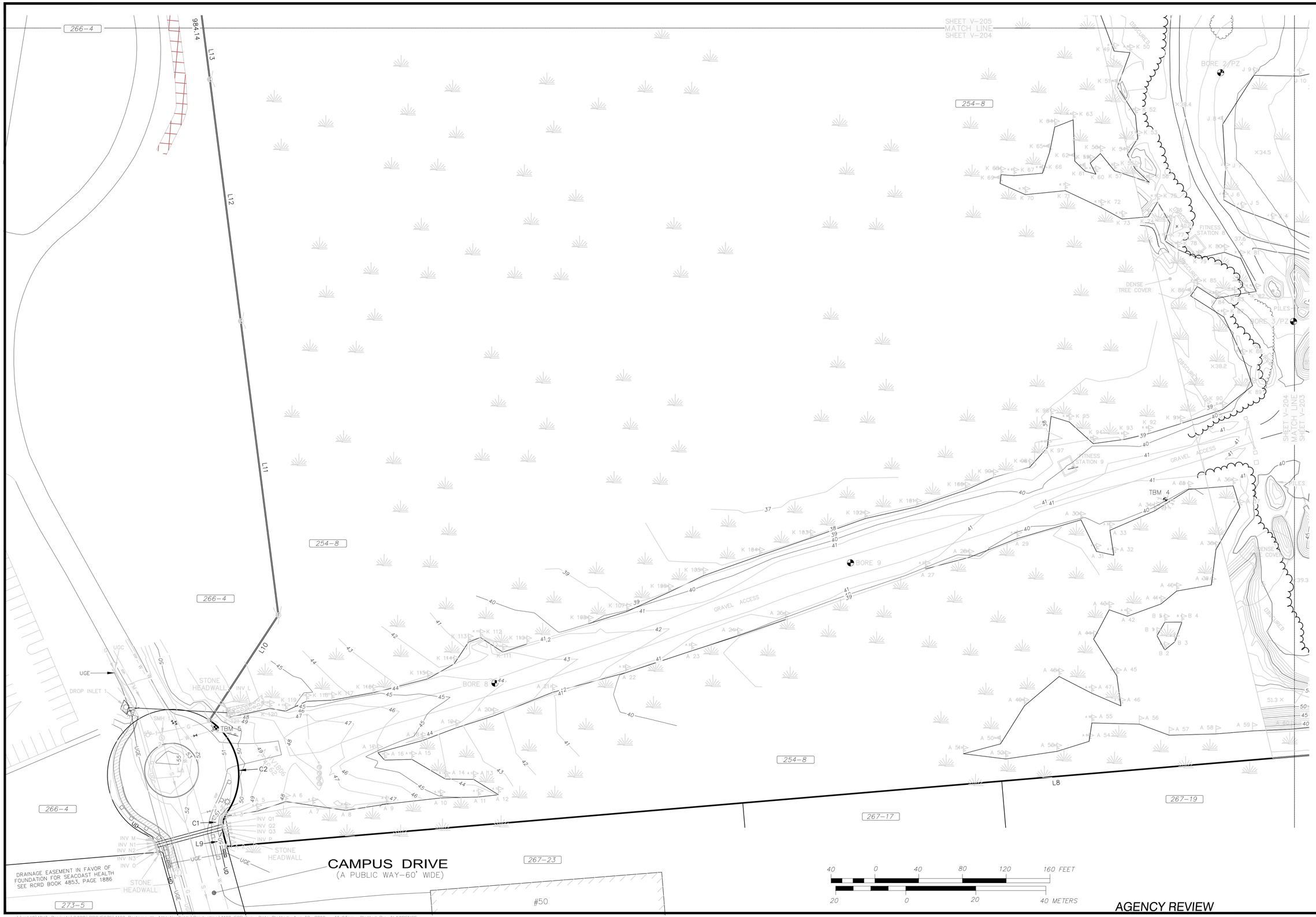
designed by: ----
drawn by: AGL
approved by: ----
date: August 2019
project no: 1119
file name: 1119 ECP.dwg
scale: 0 40' 80' Scale: 1" = 40'

City of Portsmouth, New Hampshire
Department of Public Works
Multi-purpose Recreation Fields-Phase I
680 Peverly Hill Road
Existing Conditions Plan

drawing no. V-203

sheet: 8 of 37

\\mht2\MHT-Projects\CADD\PROJECTS\1119 Portsmouth Athletic fields\Production\1119 ECP.dwg Date Plotted: Aug 19, 2019 – 11:03am Plotted By: ALAWRENCE



no.	revision	date	by
3	TAC PUBLIC HEARING	8/19/2019	JHK
2	CONSERVATION COMMISSION SUBMISSION	07/24/2019	JHK
1	TAC WORK SESSION SUBMISSION	07/09/2019	JHK

CMA ENGINEERS
CIVIL/ENVIRONMENTAL/STRUCTURAL

Portsmouth, NH • Manchester, NH • Portland, ME
603/431-6196 603/627-0708 207/541-4223
c m a e n g i n e e r s . c o m

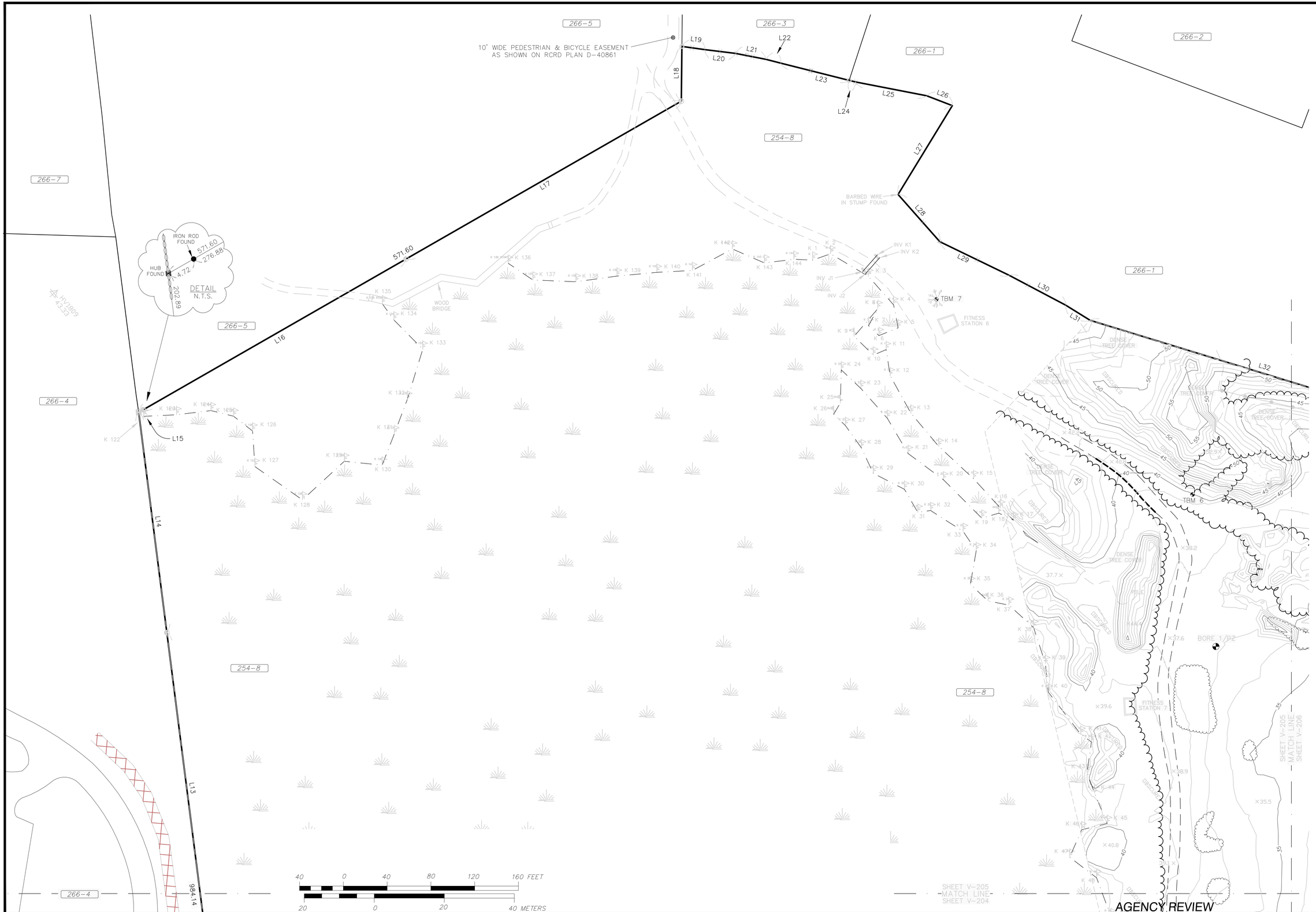
designed by: ----
drawn by: AGL
approved by: ----
date: August 2019
project no: 1119
file name: 1119 ECP.dwg
scale: 0 40' 80' Scale: 1" = 40'

City of Portsmouth, New Hampshire
Department of Public Works
Multi-purpose Recreation Fields-Phase I
680 Peverly Hill Road
Existing Conditions Plan

drawing no. V-204

sheet: 9 of 37

\\mht2\MHT-Projects\CADD\PROJECTS\1119 Portsmouth Athletic Fields\Production\1119 ECP.dwg Date Plotted: Aug 19, 2019 – 11:03am Plotted By: ALAWRENCE



AGENCY REVIEW

no.	revision	date	by
3	TAC PUBLIC HEARING	8/19/2019	JHK
2	CONSERVATION COMMISSION SUBMISSION	07/24/2019	JHK
1	TAC WORK SESSION SUBMISSION	07/09/2019	JHK

CMA ENGINEERS
CIVIL/ENVIRONMENTAL/STRUCTURAL
Portsmouth, NH • Manchester, NH • Portland, ME
603/431-6196 603/627-0708 207/541-4223
c m a e n g i n e e r s . c o m

designed by: ----
drawn by: AGL
approved by: ----
date: August 2019
project no: 1119
file name: 1119 ECP.dwg
scale: 0 40' 80' Scale: 1" = 40'

City of Portsmouth, New Hampshire
Department of Public Works

Multi-purpose Recreation Fields-Phase I
680 Peverly Hill Road

Existing Conditions Plan

drawing no. V-205

\\mht2\MHT-Projects\CADD\PROJECTS\1119 Portsmouth Athletic fields\Production\1119 ECP.dwg Date Plotted: Aug 19, 2019 – 11:03am Plotted By: ALAWRENCE

PIEZOMETER REFERENCE ELEVATIONS

(TOP OF PVC PIPE – MARK SET)

LOCATION	TOP OF PIPE	GROUND
BORE1/PZ	39.56	36.8
BORE2/PZ	39.26	36.0
BORE3/PZ	42.21	38.7
BORE4/PZ	43.32	40.7

DRAIN & SEWER TABLE

CB 44
RIM EL= 45.55
(1) INV IN 15"HDPE= 42.40
(2) INV OUT 15"HDPE= 42.30

CB 52
RIM EL= 46.87
(1) INV IN 12"HDPE= 43.10
(2) INV IN 12"HDPE= 43.37
(3) INV OUT 15"HDPE= 43.67

CB 53
RIM EL= 46.69
(1) INV OUT 12"HDPE= 43.35

CB 54
RIM EL= 44.37
(1) INV IN 15"HDPE= 41.26
(2) INV IN 12"HDPE= 41.19
(3) INV OUT 18"HDPE= 41.10

CB 55
RIM EL= 49.67
(1) INV OUT 12"HDPE= 43.00

CB 56
RIM EL= 47.97
(1) INV OUT 12"HDPE= 44.05

CB A
RIM EL= 27.63
(1) INV IN 24"HDPE= 23.81
(2) INV OUT 24"HDPE= 23.73

CB B
RIM EL= 27.41
(1) INV IN 24"HDPE= 23.43
(2) INV OUT 24"HDPE= 23.41

CB C
RIM EL= 27.22
(1) INV IN 24"HDPE= 23.24
(2) INV OUT 24"HDPE= 23.26

SMH 5557
RIM EL= 52.36
(1) INV IN 4"PVC FM= 48.1±
(2) INV OUT 8"PVC= 47.7±

DMH A
RIM EL= 49.52
(1) INV IN 18"HDPE= 40.39
(2) INV IN 15"HDPE= 39.73
(3) INV OUT 18"HDPE= 40.08
BRICK WEIR FLOW LINE
FOR (4) = 41.23
(4) INV OUT 18"HDPE= 40.24

DMH B & DMH C ARE VORTECHNICS
DRAINAGE TREATMENT STRUCTURES

DMH B
RIM EL= 48.99

DMH C
RIM EL= 49.03
TRAPEZOIDAL WEIR EL= 41.73
(1) INV OUT 18"HDPE= 39.88

DROP INLET 1
CONCRETE COVER EL= 51.58
2 SIDE INLETS 0.85 W X 0.70 H
INLET EL= 50.71
(1) INV OUT 18"HDPE= 46.26

INV A
INV OUT 18"HDPE= 40.0±

INV B
INV OUT 18"HDPE= 39.65

INV C1
INV OUT 24"RCP= 33.54

INV C2
INV OUT 24"RCP= 33.56

INV D
54"W X 42"H ARCHED CMP
INV IN= 22.31

INV E
54"W X 42"H ARCHED CMP
INV OUT= 21.90

INV F
INV OUT 24"HDPE= 23.06

INV G
INV IN 24"HDPE= 23.89

INV H (PERFORATED PIPE)
INV OUT 6"HDPE= 24.52

INV I (PERFORATED PIPE)
INV IN 6"HDPE= 30.63

INV J1
INV IN 15"HDPE= 31.83

INV J2
INV IN 15"HDPE= 31.78

INV K1
INV OUT 15"HDPE= 30.66

INV K2
INV OUT 15"HDPE= 30.90

INV L
INV OUT 18"HDPE= 45.80

INV M (UNDERDRAIN)
INV OUT 4"PVC= 46.63

INV N1
INV IN 18"HDPE= 45.26

INV N2
INV IN 18"HDPE= 45.23

INV N3
INV IN 18"HDPE= 45.23

INV O (UNDERDRAIN)
INV OUT 4"PVC= 46.05

INV P (UNDERDRAIN)
INV OUT 4"PVC= 46.15

INV Q1
INV OUT 18"HDPE= 44.90

INV Q2
INV OUT 18"HDPE= 44.92

INV Q3
INV OUT 18"HDPE= 44.84

INV R1
INV OUT 36"CMP= 27.33

INV R2
INV OUT 36"CMP= 27.32

INV S1
INV IN 36"CMP= 30.68

INV S2
INV IN 36"CMP= 30.64

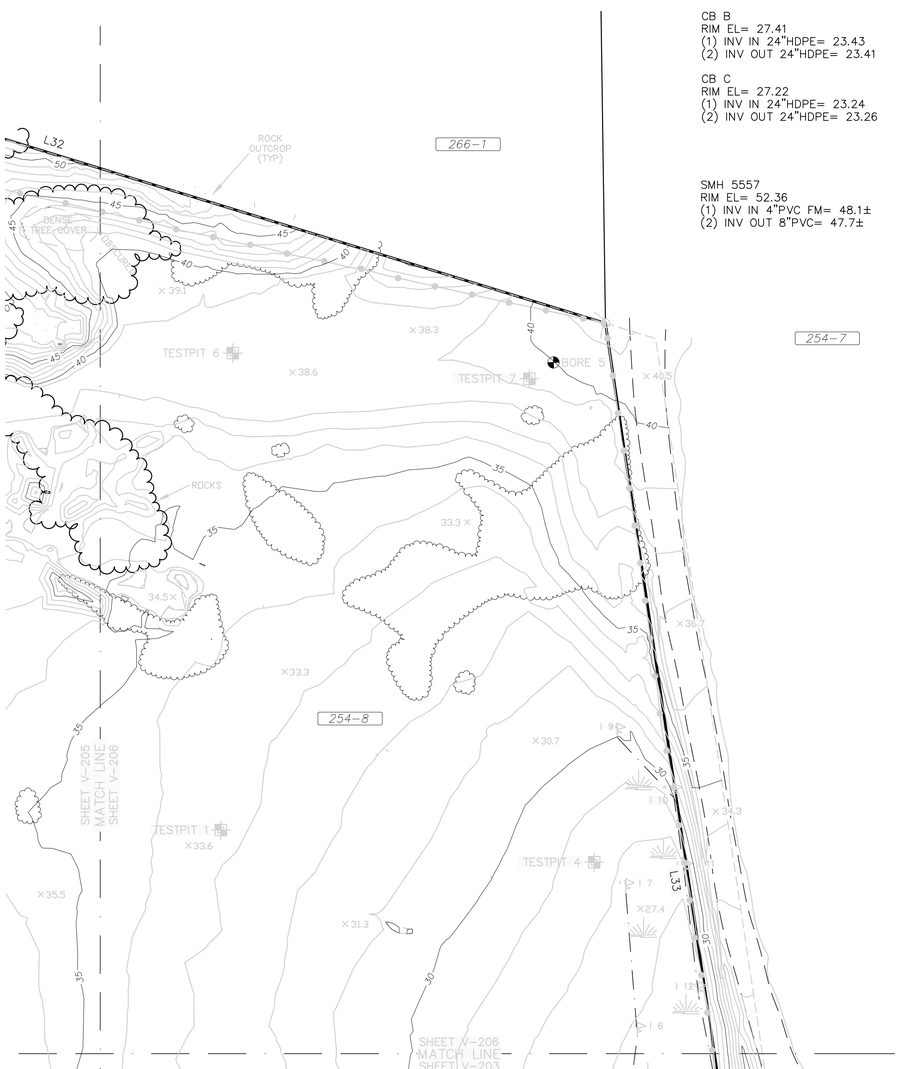
INV T1
INV IN 24"RCP= 35.22

INV T2
INV IN 24"RCP= 35.47

INV U
INV IN 12"HDPE= 41.23

LEGEND:

- STONE WALL
- IRON ROD
- IRON PIPE
- BOUND as DESCRIBED
- WOOD HUB
- DRILL HOLE
- CHAIN LINK FENCE
- WOOD FENCE
- GUARD RAIL
- WOOD FENCE POST
- BARBED WIRE FENCE
- 110–5 ..... TAX SHEET – LOT NUMBER
- RCRD ..... ROCKINGHAM COUNTY REGISTRY OF DEEDS
- EOP ..... EDGE OF PAVEMENT
- SGC ..... SLOPED FACED GRANITE CURB
- VGC ..... VERTICAL FACED GRANITE CURB
- RWBL ..... MODULAR BLOCK RETAINING WALL
- RWC ..... CONCRETE RETAINING WALL
- RWM ..... MORTARED RETAINING WALL
- RWS ..... STONE RETAINING WALL
- BOLLARD
- SIGN
- DOUBLE POST SIGN
- SIGNAL JUNCTION BOX
- LIGHT POLE
- ELECTRICAL CONDUIT
- PAD MOUNTED TRANSFORMER
- ELECTRICAL PANEL
- ELECTRICAL BOX
- E ..... ELECTRIC METER
- TELEPHONE MANHOLE
- GAS VALVE
- WATER GATE VALVE
- HYDRANT
- CATCH BASIN
- CATCH BASIN
- DRAIN MANHOLE
- SEWER MANHOLE
- TREE LINE
- BRUSH LINE
- CONIFEROUS TREE
- DECIDUOUS TREE
- W ..... WATER LINE
- S ..... SEWER LINE
- D ..... DRAIN LINE
- G ..... GAS LINE
- FM ..... FORCE MAIN
- UGC ..... UNDERGROUND COMMUNICATIONS
- UGE ..... UNDERGROUND ELECTRIC
- BORING
- TEST PIT
- CEMENT CONCRETE
- CRUSHED STONE
- RIP RAP
- RETAINING WALL
- LA ..... LANDSCAPED AREA
- ×12.5 ..... SPOT GRADE



TBM TABLE

TBM 1
WESTERLY CORNER OF CONCRETE
TRANSFORMER PAD
EL= 49.68

TBM 2
BOLT W/ "X" CUT
HYDRANT TOP FLANGE
EL= 48.63

TBM 3
BOLT W/ "X" CUT
HYDRANT TOP FLANGE
EL= 53.92

TBM 4
SURVEY SPIKE SET
IN BASE 30" PINE
EL= 42.40
(0.5' ABOVE GROUND)

TBM 5
MARKED BOLT
HYDRANT LOWER FLANGE
EL= 52.07

TBM 6
CHISELLED SQUARE FOUND
IN LEDGE OUTCROP
EL= 40.09
(AT GROUND EL.)

TBM 7
SPIKE FOUND
IN BASE 30" PINE
EL= 37.19
(0.5' ABOVE GROUND)

40 0 40 80 120 160 FEET
20 0 20 40 METERS

AGENCY REVIEW

no.	revision	date	by
3	TAC PUBLIC HEARING	8/19/2019	JHK
2	CONSERVATION COMMISSION SUBMISSION	07/24/2019	JHK
1	TAC WORK SESSION SUBMISSION	07/09/2019	JHK

CMA ENGINEERS
CIVIL/ENVIRONMENTAL/STRUCTURAL
Portsmouth, NH • Manchester, NH • Portland, ME
603/431-6196 603/627-0708 207/541-4223
c m a e n g i n e e r s . c o m

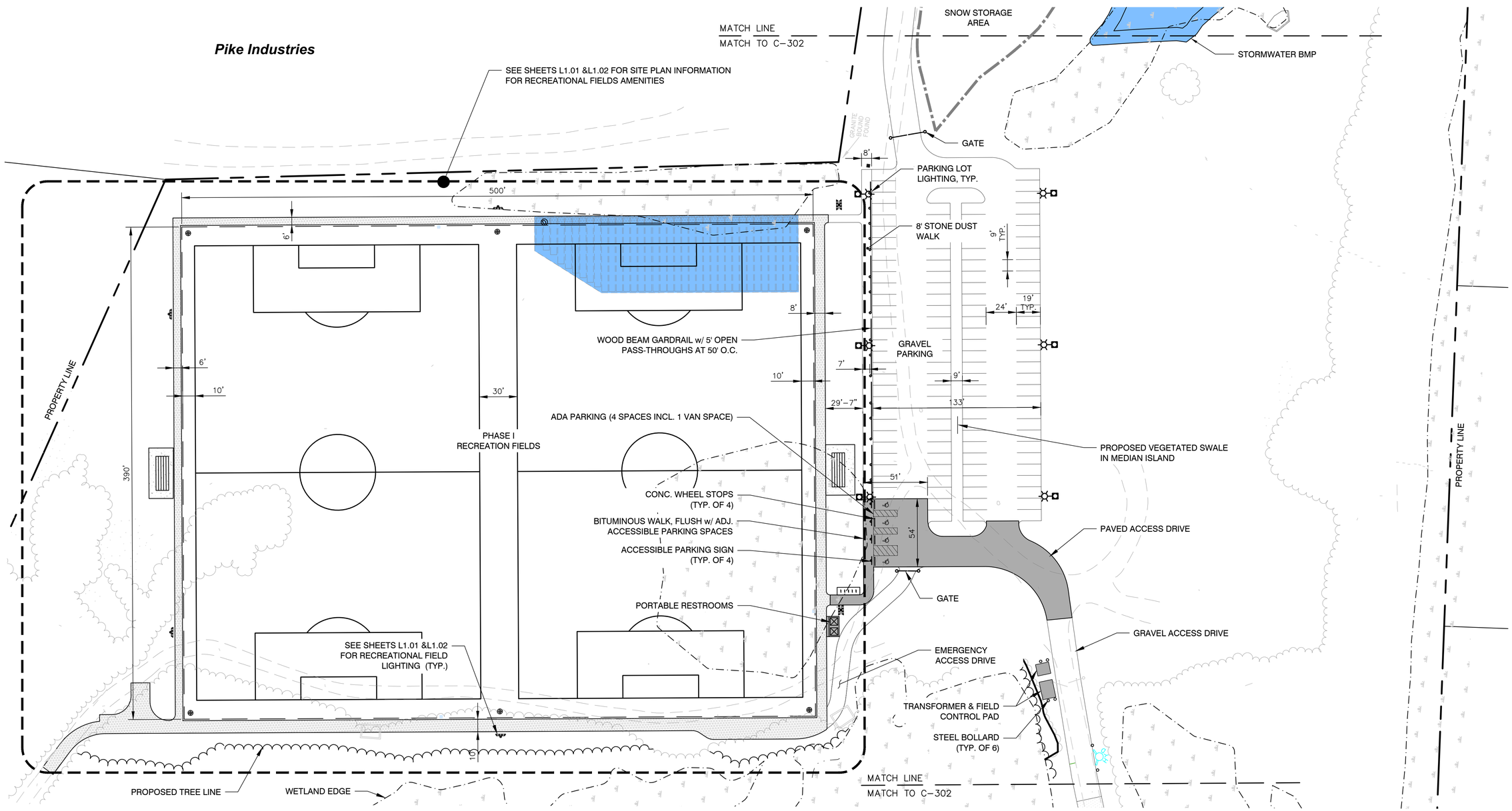
designed by: ----
drawn by: AGL
approved by: ----
date: August 2019
project no: 1119
file name: 1119 ECP.dwg
scale: 0 40' 80' Scale: 1" = 40'

City of Portsmouth, New Hampshire
Department of Public Works
Multi-purpose Recreation Fields-Phase I
680 Peverly Hill Road
Existing Conditions Plan

drawing no. V-206

\\mht2\MHT–Projects\CADD\PROJECTS\1119 Portsmouth Athletic fields\Production\1119 ECP.dwg Date Plotted: Aug 19, 2019 – 11:03am Plotted By: ALAWRENCE

PARKING REQUIREMENTS	REQUIRED	PROPOSED
PARKING STALL LAYOUT:		
• STANDARD 90°	8.5'x19'	9'x19'
DRIVE AISLE WIDTH:		
• 90° (2-WAY TRAFFIC)	24 FT.	24 FT.
PARKING SPACE REQUIREMENTS:		
RECREATIONAL:		
• NONE / FIELD		
• 2 FIELDS @ 60 SPACES/FIELD	N/A SPACES	118 SPACES
• FOUR (4) ADA SPACES PROVIDED (INCLUDING 1 VAN ACCESSIBLE SPACE)		



AGENCY REVIEW

no.	revision	date	by
3	TAC PUBLIC HEARING	8/19/2019	JHK
2	CONSERVATION COMMISSION SUBMISSION	07/24/2019	JHK
1	TAC WORK SESSION SUBMISSION	07/09/2019	JHK

CMA ENGINEERS
CIVIL/ENVIRONMENTAL ENGINEERS
Portsmouth, NH Manchester, NH Portland, Maine

Weston & Sampson
427 Main Street, Suite 400, Worcester, MA
(978) 977-0110 (800) 726-7766 (Sampson)
www.westonandsampson.com

STATE OF NEW HAMPSHIRE
JOSEPH H. KIEFFNER
No. 11777
LICENSED PROFESSIONAL ENGINEER

designed by: ----
drawn by: AGL
approved by: ----
date: August 2019
project no: 1119
file name: 1119 Site Plan-Phase1.dwg
scale: 0 40' 80' Scale: 1" = 40'

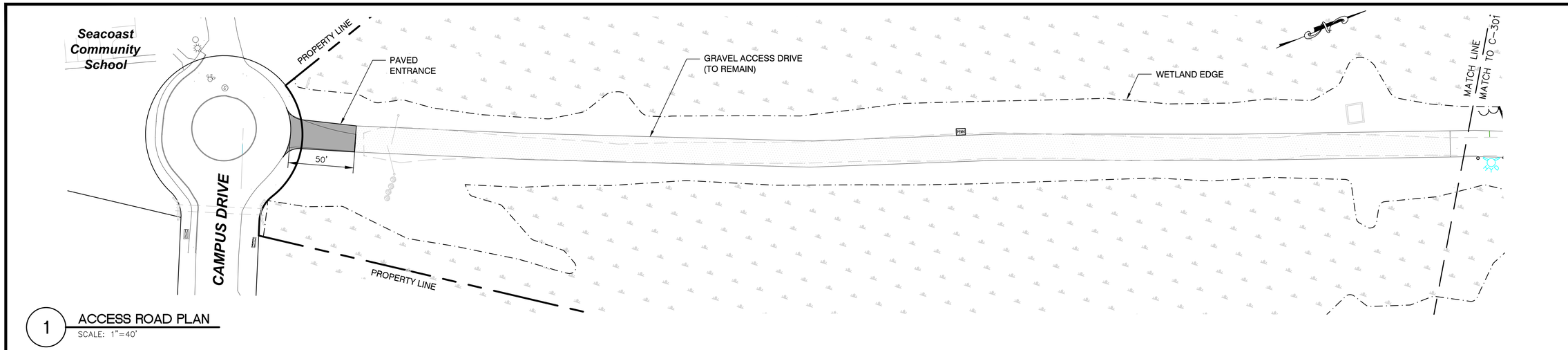
City of Portsmouth, New Hampshire
Department of Public Works
Multi-purpose Recreation Fields-Phase I
680 Peverly Hill Road

Recreation Fields
Site Plan Phase 1

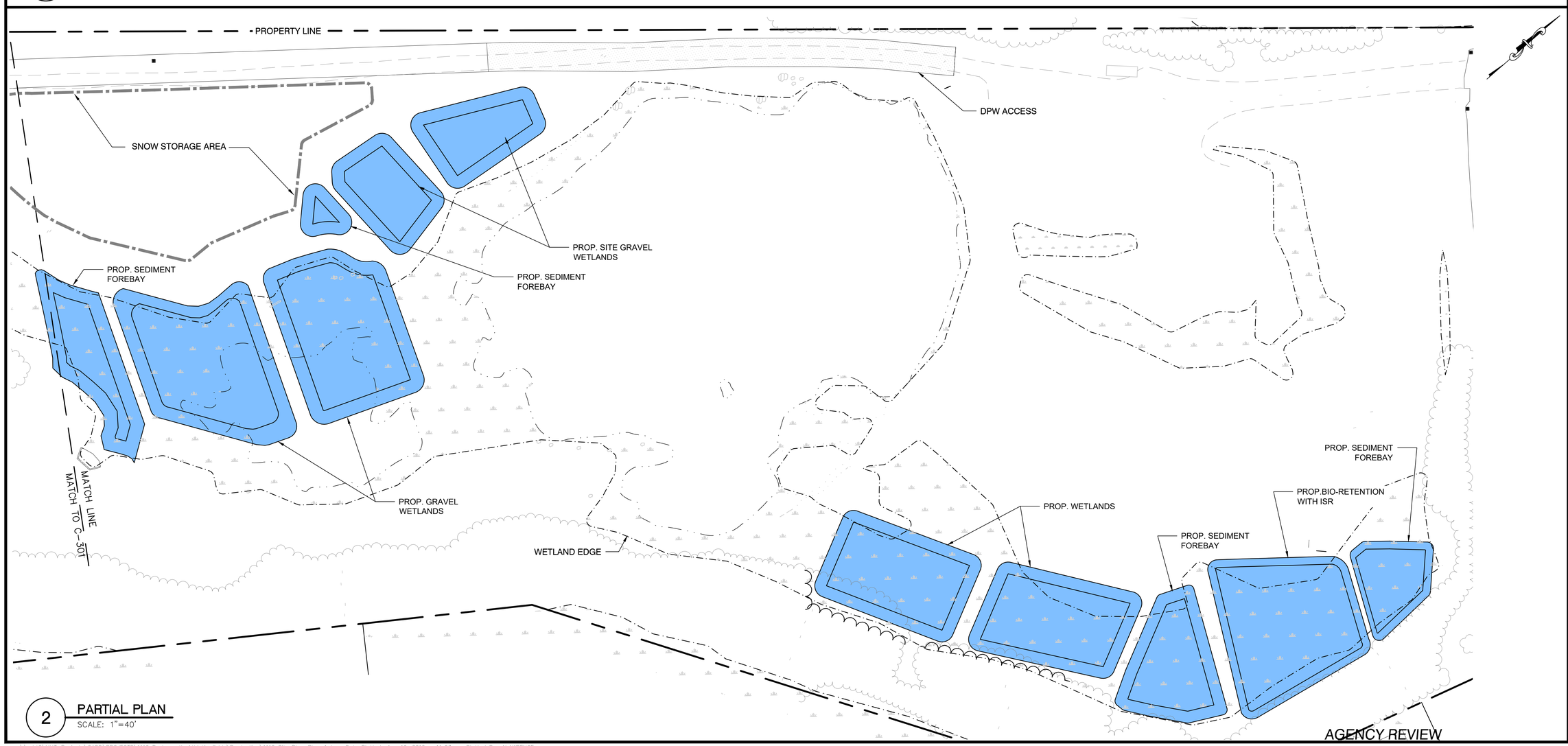
drawing no. C-301

sheet: 12 of 37

\\mhtz\MHT-Projects\CADD\PROJECTS\1119 Portsmouth Athletic fields\Production\1119 Site Plan-Phase1.dwg Date Plotted: Aug 19, 2019 - 11:03am Plotted By: ALAWRENCE



1 ACCESS ROAD PLAN
SCALE: 1"=40'



2 PARTIAL PLAN
SCALE: 1"=40'

AGENCY REVIEW

no.	revision	date	by
3	TAC PUBLIC HEARING	8/19/2019	JHK
2	CONSERVATION COMMISSION SUBMISSION	07/24/2019	JHK
1	TAC WORK SESSION SUBMISSION	07/09/2019	JHK

CMA ENGINEERS
CIVIL/ENVIRONMENTAL ENGINEERS
Portsmouth, NH Manchester, NH Portland, Maine
Weston & Sampson
427 Main Street, Suite 400, Worcester, MA
(978) 977-0110 (800) 726-7766 (Sampson)
www.westonandsampson.com

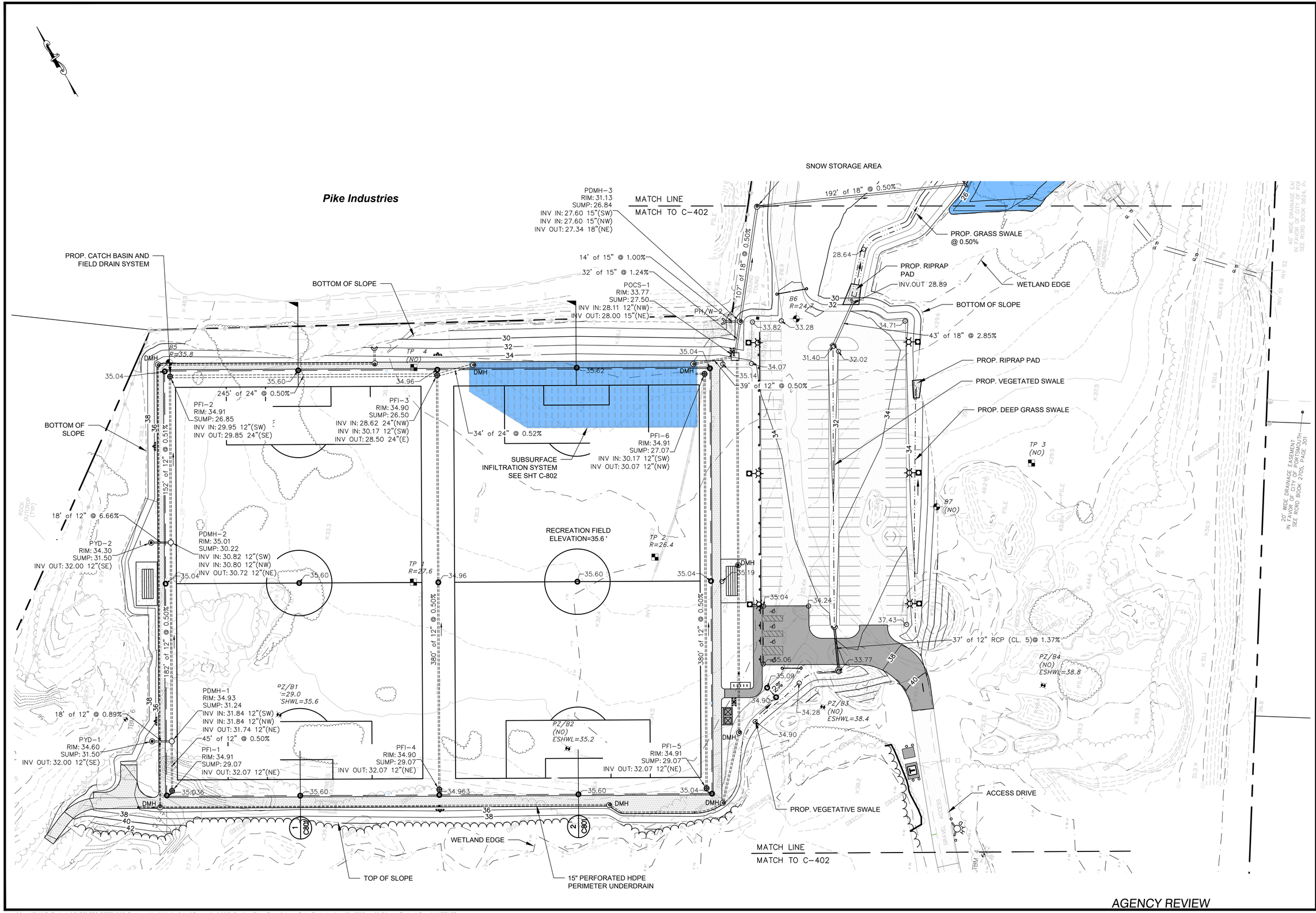
STATE OF NEW HAMPSHIRE
JOSEPH H. KIEFFNER
No. 9717
LICENSED PROFESSIONAL ENGINEER

designed by: ---
drawn by: AGL
approved by: ---
date: August 2019
project no: 1119
file name: 1119 Site Plan-Phase1.dwg
scale: 0 40' 80' Scale: 1" = 40'

City of Portsmouth, New Hampshire
Department of Public Works
Multi-purpose Recreation Fields-Phase I
680 Peverly Hill Road
Recreation Fields
Site Plan Phase 1

drawing no. C-302

\\mht2\MHT-Projects\CADD\PROJECTS\1119 Portsmouth Athletic fields\Production\1119 Site Plan-Phase1.dwg Date Plotted: Aug 19, 2019 - 11:03am Plotted By: ALAWRENCE



AGENCY REVIEW

no.	revision	date	by
3	TAC PUBLIC HEARING	8/19/2019	JHK
2	CONSERVATION COMMISSION SUBMISSION	07/24/2019	JHK
1	TAC WORK SESSION SUBMISSION	07/09/2019	JHK

CMA ENGINEERS
CIVIL/ENVIRONMENTAL ENGINEERS
Portsmouth, NH Manchester, NH Portland, Maine

Weston & Sampson
427 Main Street, Suite 400, Worcester, MA
(978) 977-0110 (800) 726-7766 (Sampson)
www.westonandsampson.com

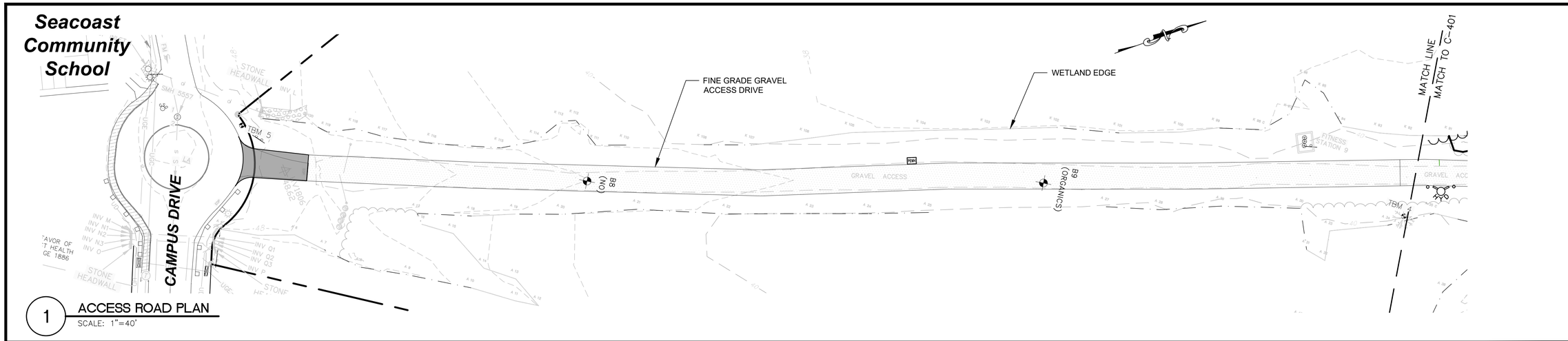
STATE OF NEW HAMPSHIRE
JOSEPH H. KIEFFNER
No. 9177
LICENSED PROFESSIONAL ENGINEER

designed by: ----
drawn by: AGL
approved by: ----
date: August 2019
project no: 1119
file name: 1119 Grading Plan-Phase I.dwg
scale: 0 40' 80' Scale: 1" = 40'

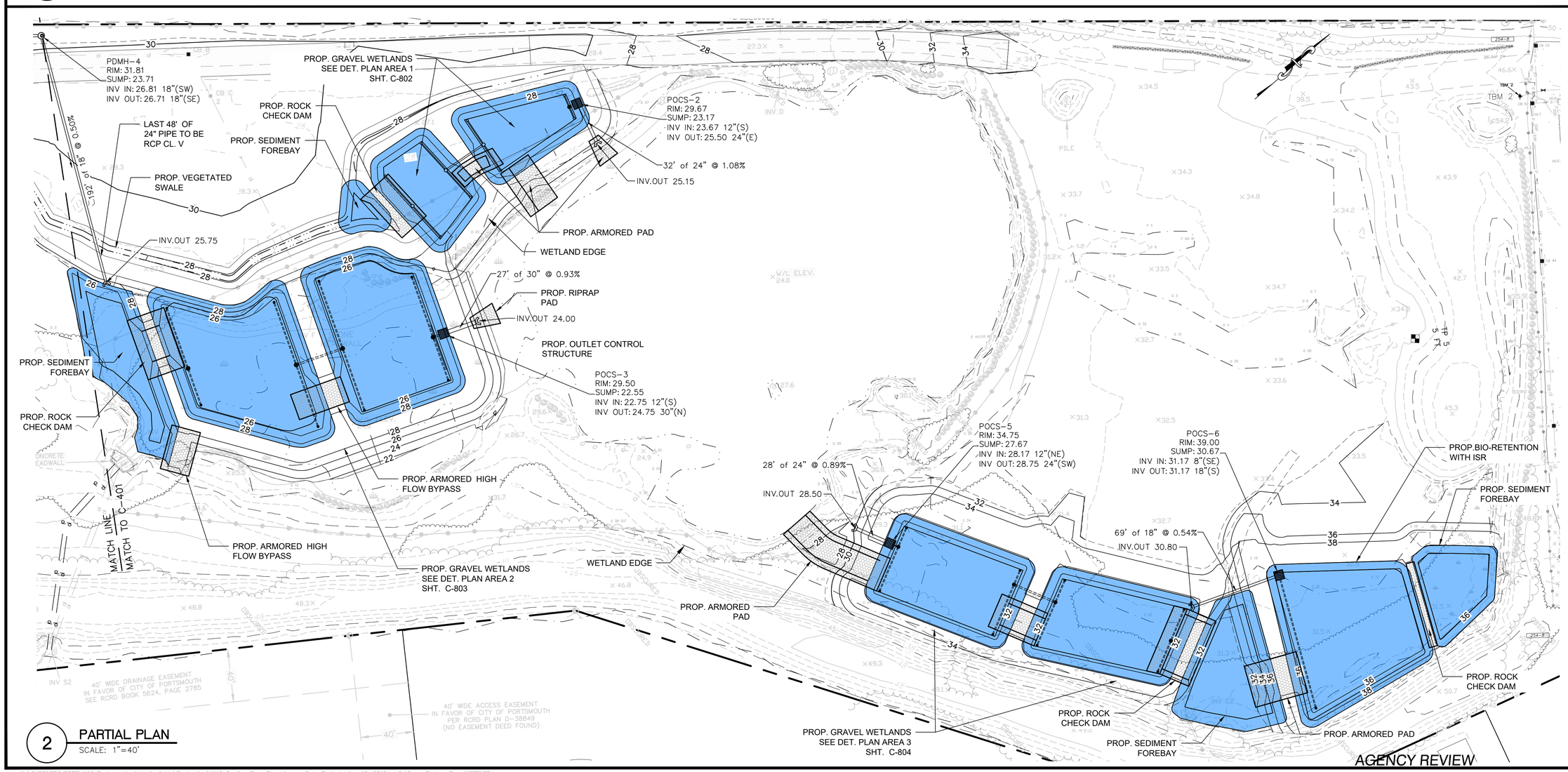
City of Portsmouth, New Hampshire
Department of Public Works
Multi-purpose Recreation Fields-Phase I
680 Peverly Hill Road
Recreation Fields
Grading & Drainage Plan Phase 1

drawing no. C-401

\\mht2\MHT-Projects\CADD\PROJECTS\1119 Portsmouth Athletic fields\Production\1119 Grading Plan-Phase1.dwg Date Plotted: Aug 19, 2019 - 11:04am Plotted By: ALAWRENCE



1 ACCESS ROAD PLAN
SCALE: 1"=40'



2 PARTIAL PLAN
SCALE: 1"=40'

AGENCY REVIEW

no.	revision	date	by
3	TAC PUBLIC HEARING	8/19/2019	JHK
2	CONSERVATION COMMISSION SUBMISSION	07/24/2019	JHK
1	TAC WORK SESSION SUBMISSION	07/09/2019	JHK

CMA ENGINEERS
CIVIL/ENVIRONMENTAL ENGINEERS
Portsmouth, NH Manchester, NH Portland, Maine

Weston & Sampson
427 Main Street, Suite 400, Worcester MA
(978) 977-0110 (800) 726-7766 (Sampson)
www.westonandsampson.com

STATE OF NEW HAMPSHIRE JOSEPH H. KIEFFNER No. 9317 LICENSED PROFESSIONAL ENGINEER

designed by: ----
drawn by: AGL
approved by: ----
date: August 2019
project no: 1119
file name: 1119 Grading Plan-Phase .dwg
scale: 0 40' 80' Scale: 1" = 40'

City of Portsmouth, New Hampshire
Department of Public Works

Multi-purpose Recreation Fields-Phase I
680 Peverly Hill Road

Access Road & Partial Plan
Grading & Drainage Plan Phase 1

drawing no. C-402

M:\CADD\PROJECTS\1119 Portsmouth Athletic fields\Production\1119 Grading Plan-Phase1.dwg Date Plotted: Aug 19, 2019 – 3:13pm Plotted By: JKIEFFNER

PHASE I
RECREATION FIELDS

PROPERTY LINE

ESMH 5557
RIM=52.39
CONST. INV IN=48.1 (6" PVC)
INV IN=48.1 (EX. 4" FM)
INV. OUT=47.7 (EX. 8")

CONST. 10 LF OF 6" PVC PIPE AT 1% GRADE DOWNWARD TOWARD MANHOLE.

CONST. 6"X2" REDUCER

GRAVEL ACCESS DRIVE

WETLAND EDGE

CONST. PEMH IN GRASSY AREA WITH EXPOSED COVERS.

CONST. TWO(2) - 5" CONDUIT DUCTBANK COORD. W/ EVERSOURCE

CAP FM PIPE END AND INSTALL $\frac{1}{2}$" LOCATOR REBAR 2' BELOW GRADE.

CONST. 1 $\frac{1}{2}$" WATER SERVICE

CONST. WATER METER PIT

CONST. ELECTRICAL SERVICE DUCT BANK

CONST. TRANSF. & FIELD CONTROL PADS

STUB AND CAP 6" WATER MAIN

CONST. FIRE HYDRANT

8" CLDI WATER MAIN

2" HDPE SEWER FORCE MAIN

CONST. 8" X 8" SS TAPPING SLEEVE, GATE VALVE, AND THRUST BLOCK. COORD. WITH DPW.

PROPERTY LINE

CONN TO EXIST. ELEC. CABINET COORD. W/ EVERSOURCE

CAMPUS DRIVE

AGENCY REVIEW

no.	revision	date	by
3	TAC PUBLIC HEARING	8/19/2019	JHK
2	CONSERVATION COMMISSION SUBMISSION	07/24/2019	JHK
1	TAC WORK SESSION SUBMISSION	07/09/2019	JHK

CMA ENGINEERS
CIVIL/ENVIRONMENTAL ENGINEERS
Portsmouth, NH Manchester, NH Portland, Maine

Weston & Sampson
427 Main Street, Suite 400, Worcester, MA
(978) 977-0110 (800) 726-7766 (Sampson)
www.westonandsampson.com

STATE OF NEW HAMPSHIRE
JOSEPH H. KIEFFNER
No. 317
LICENSED PROFESSIONAL ENGINEER

designed by: ----
drawn by: AGL
approved by: ----
date: August 2019
project no: 1119
file name: 1119 Utility Plan-Phase I.dwg
scale: 1" = 40'

City of Portsmouth, New Hampshire
Department of Public Works
Multi-purpose Recreation Fields-Phase I
680 Peverly Hill Road

Recreation Fields
Utility Plan Phase 1

drawing no. C-501

sheet: 16 of 37

\\mht2\MHT-Projects\CADD\PROJECTS\1119 Portsmouth Athletic fields\Production\1119 Utility Plan-Phase1.dwg Date Plotted: Aug 19, 2019 - 11:04am Plotted By: ALAWRENCE

35.04
35.04
35.60
35.60
35.04
35.04
33.27
35.06
34.71
37.43

PERIMETER EROSION CONTROL (TYP.)

CONSTRUCTION ENTRANCE

PERIMETER EROSION CONTROL (TYP.) - TO CAMPUS DRIVE

MATCH LINE
MATCH BELOW

TURBIDITY CURTAIN

PERIMETER EROSION CONTROL

PERIMETER EROSION CONTROL

MATCH LINE
MATCH ABOVE

CAMPUS DRIVE

ACCESS ROAD PARTIAL PLAN

AGENCY REVIEW

no.	revision	date	by
3	TAC PUBLIC HEARING	8/19/2019	JHK
2	CONSERVATION COMMISSION SUBMISSION	07/24/2019	JHK
1	TAC WORK SESSION SUBMISSION	07/09/2019	JHK

CMA ENGINEERS
CIVIL/ENVIRONMENTAL ENGINEERS
Portsmouth, NH Manchester, NH Portland, Maine

Weston & Sampson
427 Main Street, Suite 400, Worcester, MA
(978) 977-0110 (800) 726-7766 (Sampson)
www.westonandsampson.com

STATE OF NEW HAMPSHIRE
JOSEPH H. KIEFFNER
No. 17
LICENSED PROFESSIONAL ENGINEER

designed by: ---
drawn by: AGL
approved by: ---
date: August 2019
project no: 1119
file name: 1119 Grading Plan-Overall.dwg
scale: 1" = 80'
0 80' 160'
Scale: 1" = 80'

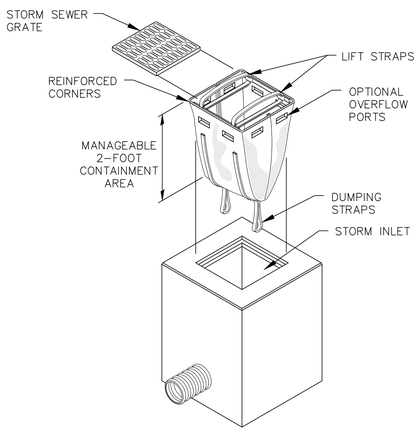
City of Portsmouth, New Hampshire
Department of Public Works

Multi-purpose Recreation Fields-Phase I
680 Peverly Hill Road

Erosion Control Plan

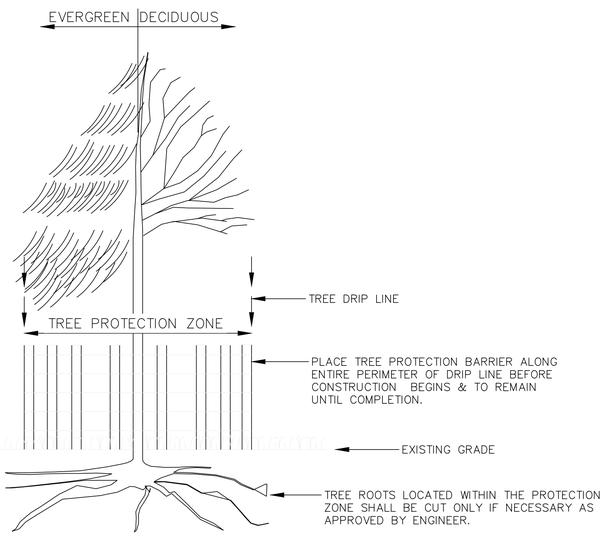
drawing no.
C-601

\\mht2\MHT-Projects\CADD\PROJECTS\1119 Portsmouth Athletic fields\Production\1119 Grading Plan-Overall.dwg Date Plotted: Aug 19, 2019 - 11:04am Plotted By: ALAWRENCE



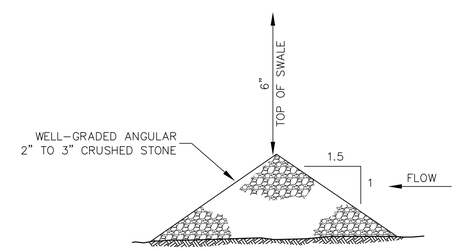
"Silt Sack" Sediment Control Device for Inlet Protection

Not to Scale



Temporary Tree Protection

Not to Scale



NOTES:

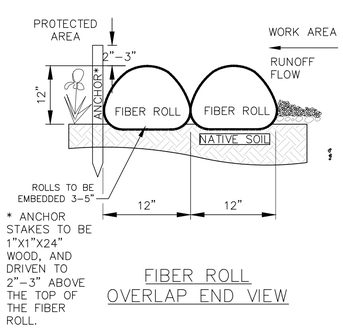
1. PLACE CRUSHED STONE TO WITHIN 6" OF TOP OF DRAINAGE WAY.
2. FOR ACTIVE DRAINAGE OUTFLOW CHECK DAMS SHALL BE PLACED IN SERIES ALONG FLOW LINE TO RETAIN SEDIMENTS.

Stone Check Dam

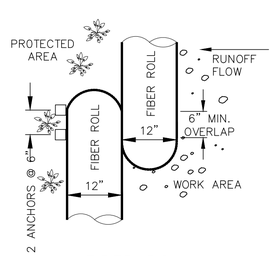
Not to Scale

Erosion Control Notes:

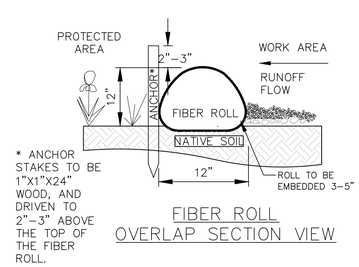
1. PERIMETER CONTROLS TO BE INSTALLED PRIOR TO EARTH MOVING OPERATIONS.
2. PRIOR TO CONSTRUCTION AND THEREAFTER EROSION CONTROL MEASURES ARE TO BE IMPLEMENTED AS NOTED. PONDS AND SWALES SHALL BE INSTALLED EARLY ON IN THE CONSTRUCTION SEQUENCE (BEFORE ROUGH GRADING THE SITE).
3. THE SMALLEST PRACTICAL AREA OF LAND SHOULD BE EXPOSED AT ANY ONE TIME DURING DEVELOPMENT. WHEN LAND IS EXPOSED DURING DEVELOPMENT, THE EXPOSURE SHOULD BE KEPT TO THE SHORTEST PRACTICAL PERIOD OF TIME. LAND SHOULD NOT BE LEFT EXPOSED DURING THE WINTER MONTHS.
4. CATCH BASIN INSERTS, MIRAFI DANDY SACK OR EQUAL, SHALL BE INSTALLED AND MAINTAINED AT CATCH BASINS UNTIL PAVEMENT IS INSTALLED. SEDIMENT AND DEBRIS SHALL BE REMOVED FOLLOWING EACH STORM EVENT.
5. ALL DISTURBED AREAS AND SIDE SLOPES WHICH ARE FINISH GRADED WITH NO FURTHER CONSTRUCTION TO TAKE PLACE SHALL BE SEEDED AND MULCHED. ALL DISTURBED AREAS OUTSIDE LIMITS OF BUILDING, AND PAVEMENT SHALL BE STABILIZED WITH LOAM AND SEED. ALL SEED, LIME AND FERTILIZER PROGRAMS SHALL CONFORM TO ALL APPLICABLE SECTIONS OF THE SPECIFICATIONS.
6. ANY DISTURBED AREAS WHICH ARE TO BE LEFT TEMPORARILY, OR LONGER THAN TWO WEEKS AND WHICH WILL BE RE-GRADED LATER DURING CONSTRUCTION, SHALL BE TEMPORARILY SEEDED AND MACHINE STRAW MULCHED AT A RATE OF 1.5 TONS/ACRE.
7. AVOID USE OF UNDISTURBED AREAS WHEREVER POSSIBLE DURING CONSTRUCTION. CONSTRUCTION TRAFFIC SHALL TRAVEL THE ROADBEDS OF EXISTING AND FUTURE ROADS AND SHALL BE LIMITED TO WITHIN THE LIMITS OF CONSTRUCTION NOTED ON THE PLANS.
8. SILT FENCES SHALL BE MINIMUM OF 36 INCHES HIGH WITH THE BOTTOM OF THE CLOTH KEYED INTO THE GROUND (SEE DETAIL). POSTS SHALL BE OF WOOD OR STEEL. SILT FENCE SHALL BE INSTALLED & MAINTAINED AS NEEDED TO PREVENT SEDIMENT FROM LEAVING THE CONSTRUCTION SITE. ADDITIONAL SILT FENCE MAY BE ADDED AS REQUIRED BY THE ENGINEER PRIOR TO ANY ON-SITE GRADING OR DISTURBANCE OF EXISTING SURFACE MATERIAL. IT SHOULD BE MAINTAINED DURING AND AFTER DEVELOPMENT TO REMOVE SEDIMENT FROM RUNOFF WATER AND FROM LAND UNDERGOING DEVELOPMENT. WHERE POSSIBLE NATURAL DRAINAGE WAYS SHOULD BE UTILIZED AND LEFT OPEN TO REMOVE CLEAN EXCESS SURFACE WATER. THE SILT FENCE IS TO BE MAINTAINED AND CLEANED UNTIL ALL SLOPES HAVE A HEALTHY STAND OF GRASS.
9. EROSION CONTROL DEVICES SHOWN REPRESENT MINIMUM MEASURES REQUIRED FOR EROSION CONTROL. THE CONTRACTOR SHALL TAKE ANY AND ALL NECESSARY MEASURES TO PREVENT TRANSPORTATION OF SEDIMENT BEYOND THE WORK AREA.
10. ALL SWALES SHALL BE STABILIZED PRIOR TO DIRECTING FLOW TO THEM.
11. AFTER ALL DISTURBED AREAS HAVE BEEN STABILIZED, THE TEMPORARY EROSION CONTROL MEASURES ARE TO BE REMOVED AND ACCUMULATED SEDIMENT DISPOSED OFF IN A LOCATION DESIGNATED BY THE OWNER.
12. WITHIN THE NEW HAMPSHIRE DEPARTMENT OF ENVIRONMENTAL SERVICES COMPREHENSIVE SHORELAND PROTECTION ACT 250' BUFFER, ONLY LOW PHOSPHATE, SLOW RELEASE NITROGEN FERTILIZER OR LIMESTONE, MAY BE USED ON LAWNS OR AREAS WITH GRASS.
13. ALL ROADWAYS AND PARKING LOTS SHALL BE STABILIZED WITHIN 72 HOURS OF ACHIEVING FINISHED GRADE.
14. ALL CUT AND FILL SLOPES SHALL BE SEEDED/LOAMED WITHIN 72 HOURS OF ACHIEVING FINISHED GRADE.
15. ALL EROSION CONTROLS SHALL BE INSPECTED WEEKLY AND AFTER EVERY 0.5" OF RAINFALL.
16. THE SMALLEST PRACTICAL AREA SHALL BE DISTURBED DURING CONSTRUCTION, BUT IN NO CASE SHALL EXCEED 5 ACRES AT ANY ONE TIME BEFORE DISTURBED AREAS ARE STABILIZED.
17. AN AREA SHALL BE CONSIDERED STABLE IF ONE OF THE FOLLOWING HAS OCCURRED:
    - BASE COURSE GRAVELS HAVE BEEN INSTALLED IN AREAS TO BE PAVED
    - A MINIMUM OF 85% VEGETATED GROWTH HAS BEEN ESTABLISHED
    - A MINIMUM OF 3" OF NO-EROSIVE MATERIAL SUCH AS STONE OR RIPRAP HAS BEEN INSTALLED
    - EROSION CONTROL BLANKETS HAVE BEEN PROPERLY INSTALLED
18. ALL AREAS SHALL BE STABILIZED WITHIN 45 DAYS OF INITIAL DISTURBANCE.
19. TEMPORARY SEEDING (IF USED) SHALL BE PERENNIAL RYE GRASS, SPREAD 0.7LB/1000 SQ. FT.
20. WINTER CONSTRUCTION NOTES
    - ALL PROPOSED VEGETATED AREAS WHICH DO NOT EXHIBIT A MINIMUM OF 85% VEGETATIVE GROWTH BY OCTOBER 15TH, OR WHICH ARE DISTURBED AFTER OCTOBER 15TH, SHALL BE STABILIZED BY SEEDING AND INSTALLING EROSION CONTROL BLANKETS ON SLOPES GREATER THAN 3:1, AND SEEDING AND PLACING 3 TO 4 TONS OF MULCH PER ACRE, SECURED WITH ANCHORED NETTING, ELSEWHERE. THE INSTALLATION OF EROSION CONTROL BLANKETS OR MULCH AND NETTING SHALL NOT OCCUR OVER ACCUMULATED SNOW OR ON FROZEN GROUND AND SHALL BE COMPLETED IN ADVANCE OF THAW OR SPRING MELT EVENTS;
    - ALL DITCHES OR SWALES WHICH DO NOT EXHIBIT A MINIMUM OF 85% VEGETATIVE GROWTH BY OCTOBER 15TH, OR WHICH ARE DISTURBED AFTER OCTOBER 15TH, SHALL BE STABILIZED TEMPORARILY WITH STONE OR EROSION CONTROL BLANKETS APPROPRIATE FOR THE DESIGN FLOW CONDITIONS;
    - AFTER NOVEMBER 15TH, INCOMPLETE ROAD OR PARKING SURFACES, WHERE WORK HAS STOPPED FOR THE WINTER SEASON, SHALL BE PROTECTED WITH A MINIMUM OF 3 INCHES OF CRUSHED GRAVEL PER NHDOT ITEM 304.3.



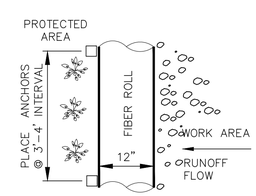
FIBER ROLL
OVERLAP END VIEW



FIBER ROLL
OVERLAP TOP VIEW



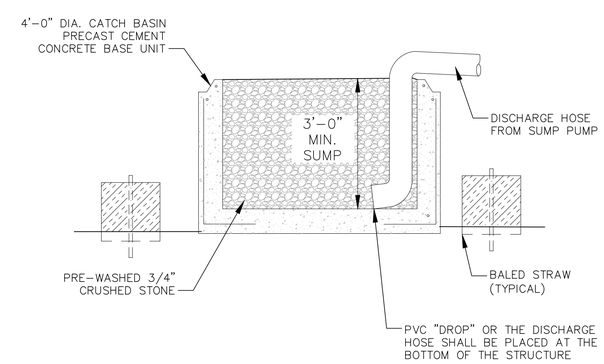
FIBER ROLL
OVERLAP SECTION VIEW



FIBER ROLL
OVERLAP TOP VIEW

Erosion Control Fiber Roll

Not to Scale



Dewatering Basin (Section)

Not to Scale

AGENCY REVIEW

no.	revision	date	by
3	TAC PUBLIC HEARING	8/19/2019	JHK
2	CONSERVATION COMMISSION SUBMISSION	07/24/2019	JHK
1	TAC WORK SESSION SUBMISSION	07/09/2019	JHK

CMA ENGINEERS
CIVIL/ENVIRONMENTAL/STRUCTURAL
Portsmouth, NH • Manchester, NH • Portland, ME
603/431-6196 603/627-0708 207/541-4223
c m a e n g i n e e r s . c o m

STATE OF NEW HAMPSHIRE – JOSEPH H. KIEFFNER – No. 13170 – LICENSED PROFESSIONAL ENGINEER

designed by: ----
drawn by: AGL
approved by: ----
date: August 2019
project no: 1119
file name: 1119 DETAILS-EC.dwg
scale:

City of Portsmouth, New Hampshire
Department of Public Works
Multi-purpose Recreation Fields-Phase I
680 Peverly Hill Road
Erosion Control Details & Notes

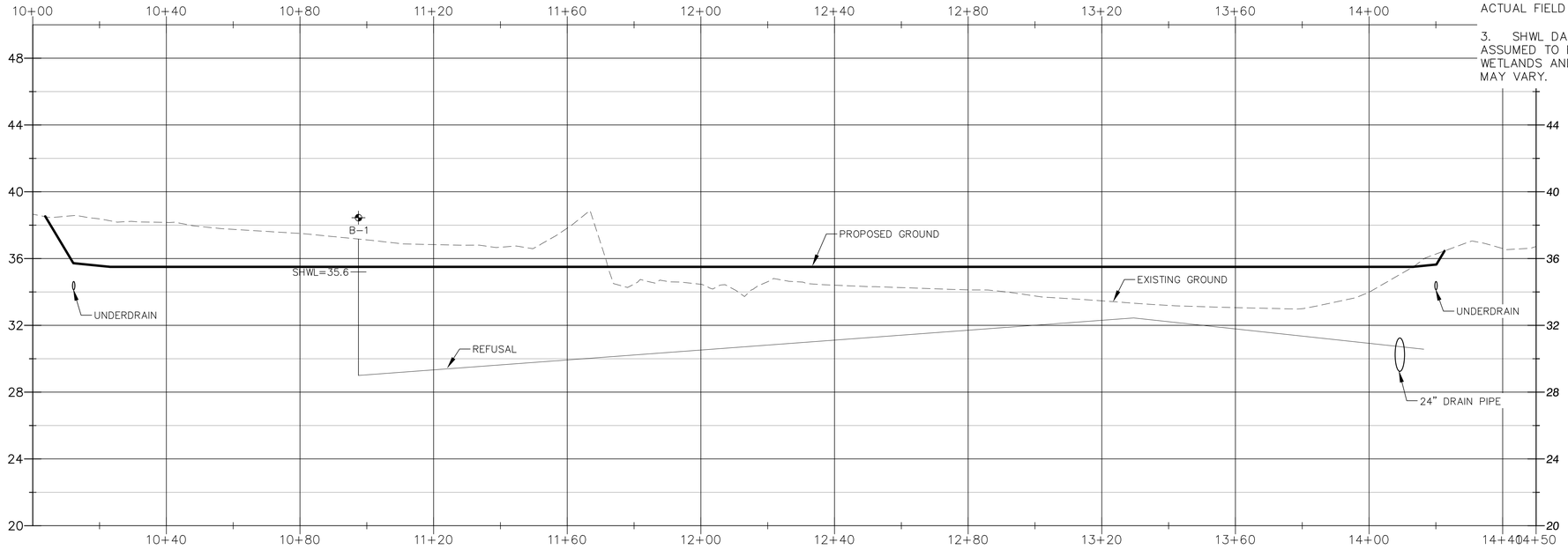
drawing no. C-602

\\mht2\MHT-Projects\CADD\PROJECTS\1119 Portsmouth Athletic fields\Production\1119 DETAILS-EC.dwg Date Plotted: Aug 19, 2019 - 11:05am Plotted By: ALAWRENCE

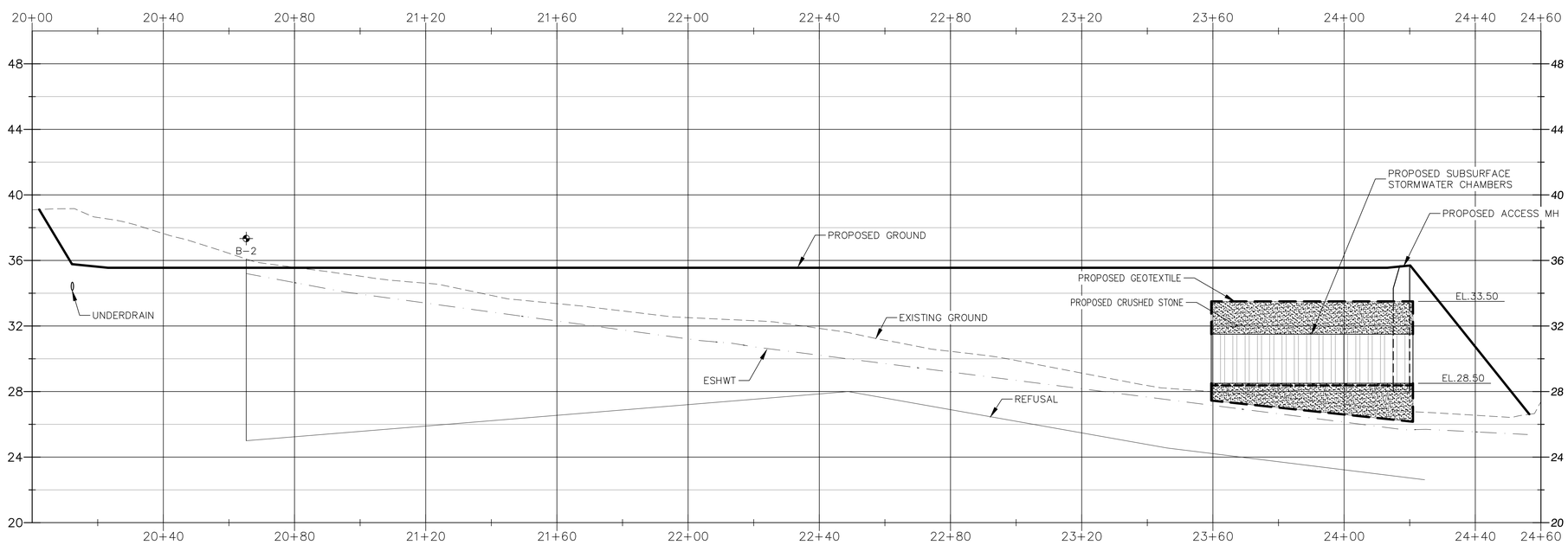
NOTE:
1. REFUSALS NOT ENCOUNTERED DURING SUBSURFACE EXPLORATIONS WERE ASSUMED TO BE AT THE BOTTOM OF THE EXPLORATION.

2. LINES REPRESENTING THE WATER SURFACE AND REFUSAL PROFILES WERE INTERPOLATED BETWEEN BORINGS AND TEST PITS. ACTUAL FIELD ELEVATIONS MAY VARY.

3. SHWL DATA NOT MEASURED AT PIEZOMETERS/BORINGS WAS ASSUMED TO BE 1 FOOT BELOW EG AT THE LIMITS OF DELINEATED WETLANDS AND INTERPOLATED IN BETWEEN. ACTUAL FIELD ELEVATIONS MAY VARY.



Site Section-1 (Field 1)
1"=4' Vert & 1"=20' Horiz.



Site Section-2 (Field 2)
1"=4' Vert & 1"=20' Horiz.

AGENCY REVIEW

no.	revision	date	by
3	TAC PUBLIC HEARING	8/19/2019	JHK
2	CONSERVATION COMMISSION SUBMISSION	07/24/2019	JHK
1	TAC WORK SESSION SUBMISSION	07/09/2019	JHK

CMA ENGINEERS
CIVIL/ENVIRONMENTAL/STRUCTURAL
Portsmouth, NH • Manchester, NH • Portland, ME
603/431-6196 603/627-0708 207/541-4223
c m a e n g i n e e r s . c o m

STATE OF NEW HAMPSHIRE
JOSEPH H. KIEFFNER
No. 11707
LICENSED
PROFESSIONAL ENGINEER

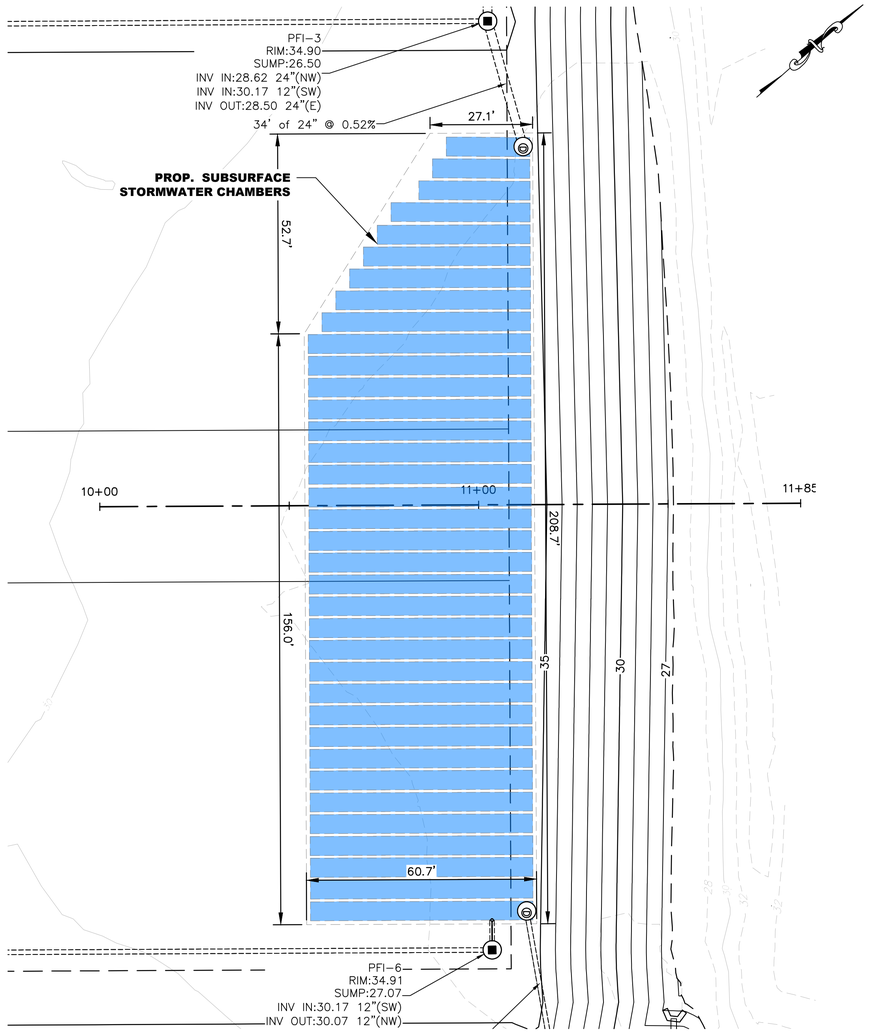
designed by: ----
drawn by: AGL
approved by: ----
date: August 2019
project no: 1119
file name: 1119 Field Site Sections.dwg
scale: Scale: 1" = 20'

City of Portsmouth, New Hampshire
Department of Public Works
Multi-purpose Recreation Fields-Phase I
680 Peverly Hill Road

Recreation Fields
Site Sections Phase 1

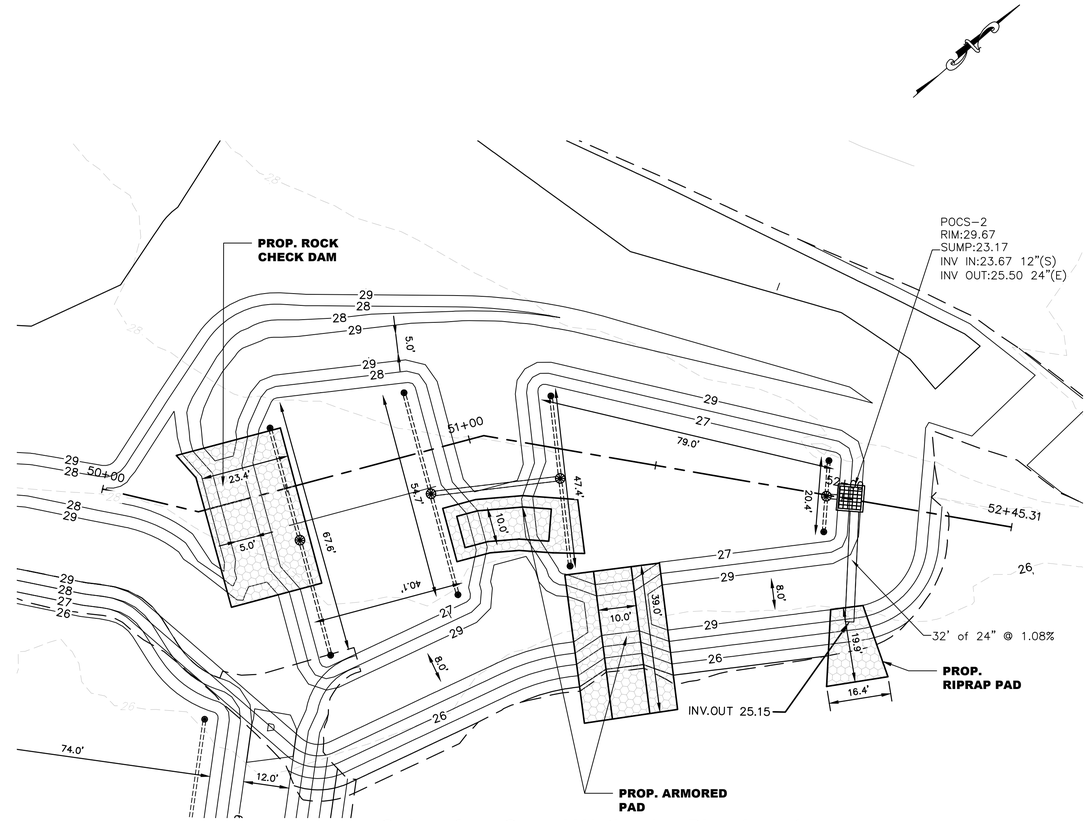
drawing no. C-801

\\mht2\MHT-Projects\CADD\PROJECTS\1119 Portsmouth Athletic fields\Production\1119 Field Site Sections.dwg Date Plotted: Aug 19, 2019 – 11:05am Plotted By: ALAWRENCE



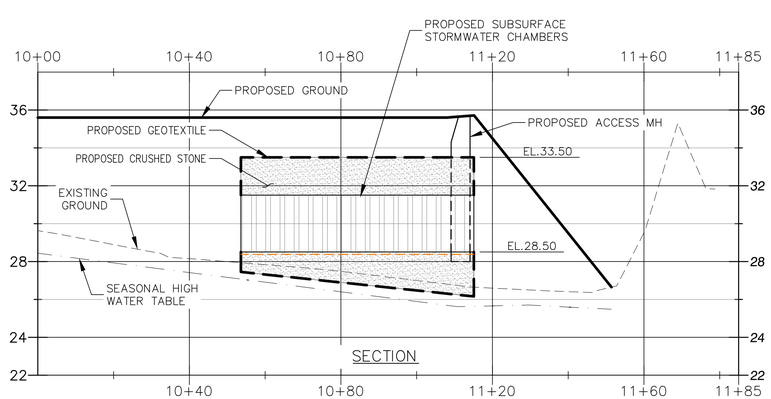
Field Subsurface Infiltration System - Plan

Scale: 1"=20'



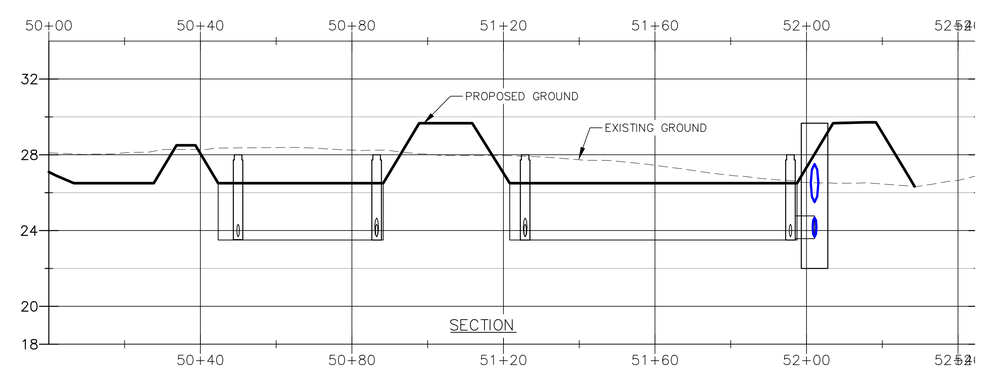
Subsurface Gravel Wetlands - Plan Area 1

Scale: 1"=20'



Field Subsurface Infiltration System

1"=4' Vert & 1"=20' Horiz.



Subsurface Gravel Wetlands

1"=4' Vert & 1"=20' Horiz.

AGENCY REVIEW

no.	revision	date	by
3	TAC PUBLIC HEARING	8/19/2019	JHK
2	CONSERVATION COMMISSION SUBMISSION	07/24/2019	JHK
1	TAC WORK SESSION SUBMISSION	07/09/2019	JHK

CMA ENGINEERS
CIVIL/ENVIRONMENTAL/STRUCTURAL
Portsmouth, NH • Manchester, NH • Portland, ME
603/431-6196 603/627-0708 207/541-4223
c m a e n g i n e e r s . c o m

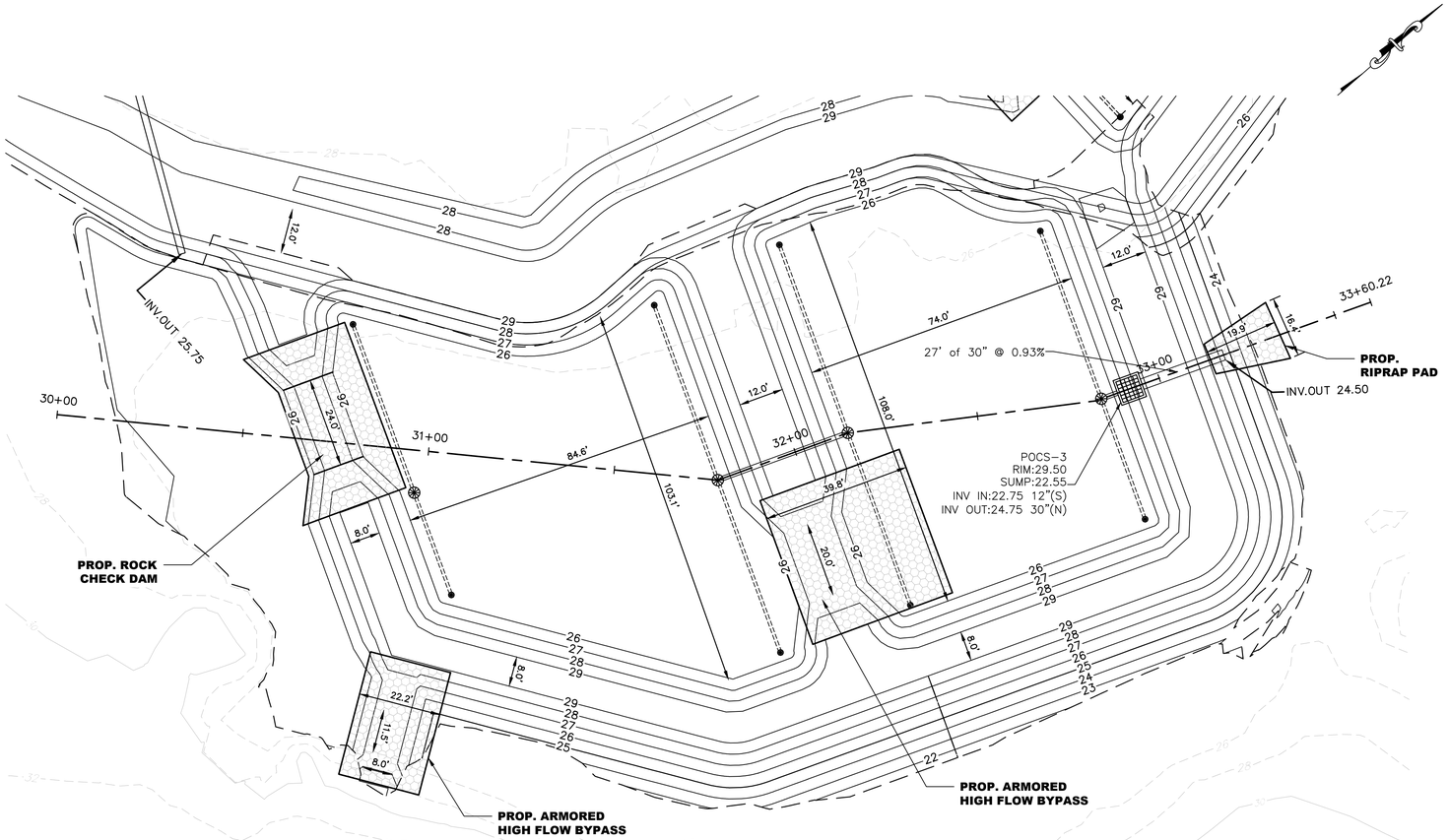
STATE OF NEW HAMPSHIRE
JOSEPH H. KIEFFNER
No. 9717
LICENSED PROFESSIONAL ENGINEER

designed by: ---
drawn by: AGL
approved by: JHK
date: August 2019
project no: 1119
file name: 1119 DETAILS-Storm Water Sections.dwg
scale: 0 20' 40' Scale: 1" = 20'

City of Portsmouth, New Hampshire
Department of Public Works
Multi-purpose Recreation Fields-Phase I
680 Peverly Hill Road
Storm Water Plans & Sections

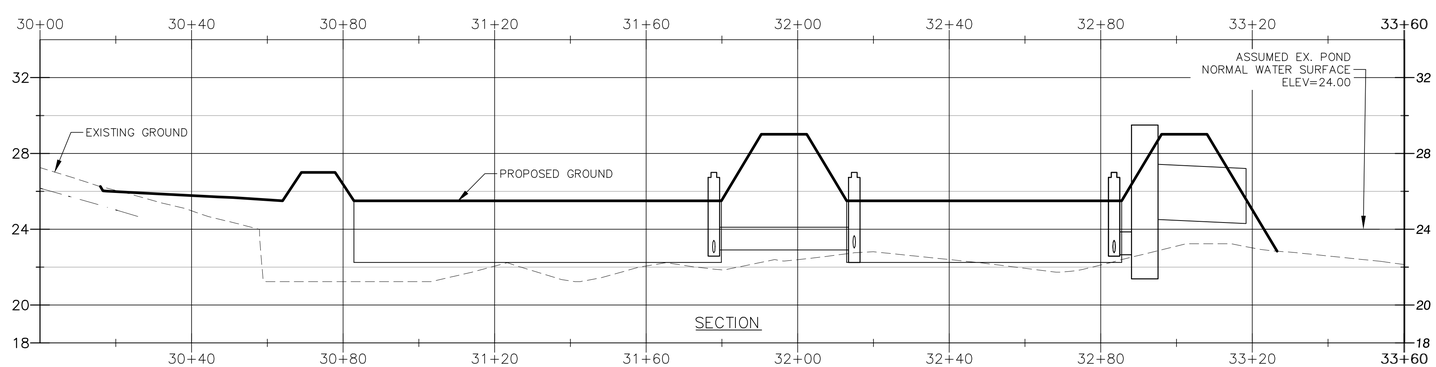
drawing no. C-802

M:\CADD\PROJECTS\1119 Portsmouth Athletic fields\Production\1119 DETAILS-Storm Water Sections.dwg Date Plotted: Aug 19, 2019 - 3:24pm Plotted By: JKIEFFNER



Regional Subsurface Gravel Wetlands - Plan Area 2

Scale: 1"=20'



Regional Subsurface Gravel Wetland - 1

1"=4' Vert & 1"=20' Horiz.

AGENCY REVIEW

no.	revision	date	by
3	TAC PUBLIC HEARING	8/19/2019	JHK
2	CONSERVATION COMMISSION SUBMISSION	07/24/2019	JHK
1	TAC WORK SESSION SUBMISSION	07/09/2019	JHK

CMA ENGINEERS
CIVIL/ENVIRONMENTAL/STRUCTURAL
Portsmouth, NH • Manchester, NH • Portland, ME
603/431-6196 603/627-0708 207/541-4223
c m a e n g i n e e r s . c o m

STATE OF NEW HAMPSHIRE
JOSEPH H. KIEFFNER
No. 9171
LICENSED PROFESSIONAL ENGINEER

designed by: ---
drawn by: AGL
approved by: 1119 DETAILS-Storm Water Sections.dwg
date: August 2019
project no: 1119
file name: 1119 DETAILS-Storm Water Sections.dwg
scale: 0 20' 40' Scale: 1" = 20'

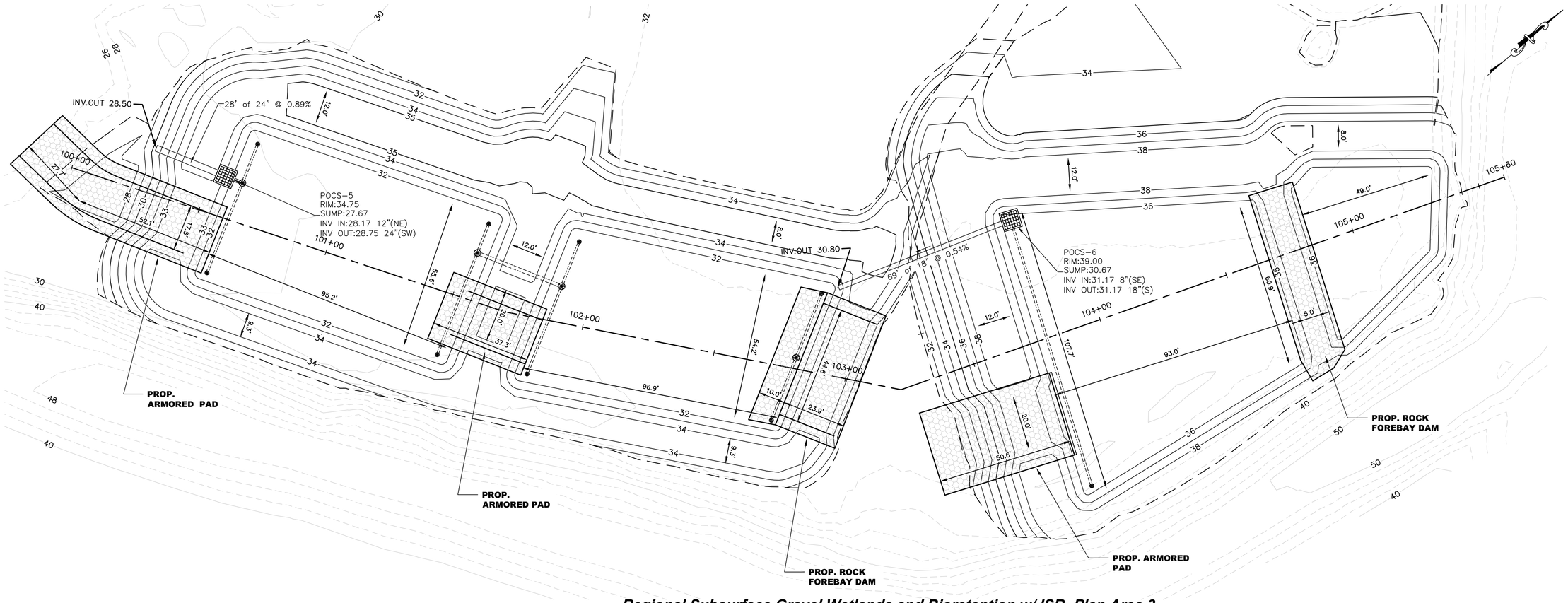
City of Portsmouth, New Hampshire
Department of Public Works

Multi-purpose Recreation Fields-Phase I
680 Peverly Hill Road

Storm Water Plans & Sections

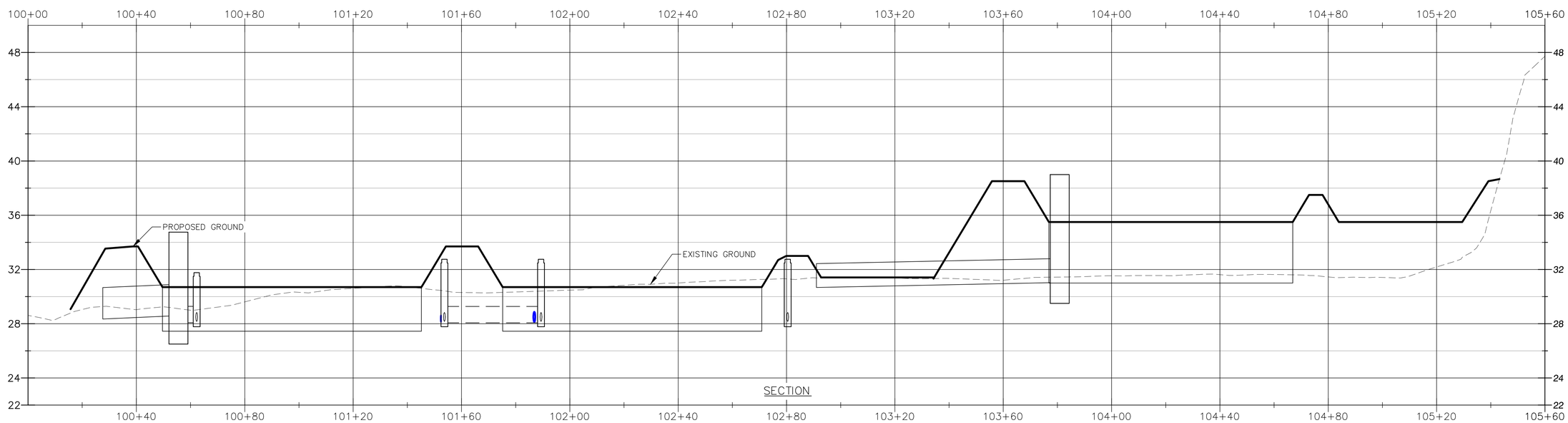
drawing no. C-803

M:\CADD\PROJECTS\1119 Portsmouth Athletic fields\Production\1119 DETAILS-Storm Water Sections.dwg Date Plotted: Aug 19, 2019 - 3:24pm Plotted By: JKIEFFNER



Regional Subsurface Gravel Wetlands and Bioretention w/ ISR- Plan Area 3

Scale: 1"=20'



Regional Subsurface Gravel Wetland - 2 and Bioretention with ISR

1"=4' Vert & 1"=20' Horiz.

AGENCY REVIEW

no.	revision	date	by
3	TAC PUBLIC HEARING	8/19/2019	JHK
2	CONSERVATION COMMISSION SUBMISSION	07/24/2019	JHK
1	TAC WORK SESSION SUBMISSION	07/09/2019	JHK

CMA ENGINEERS
CIVIL/ENVIRONMENTAL/STRUCTURAL
Portsmouth, NH • Manchester, NH • Portland, ME
603/431-6196 603/627-0708 207/541-4223
c m a e n g i n e e r s . c o m

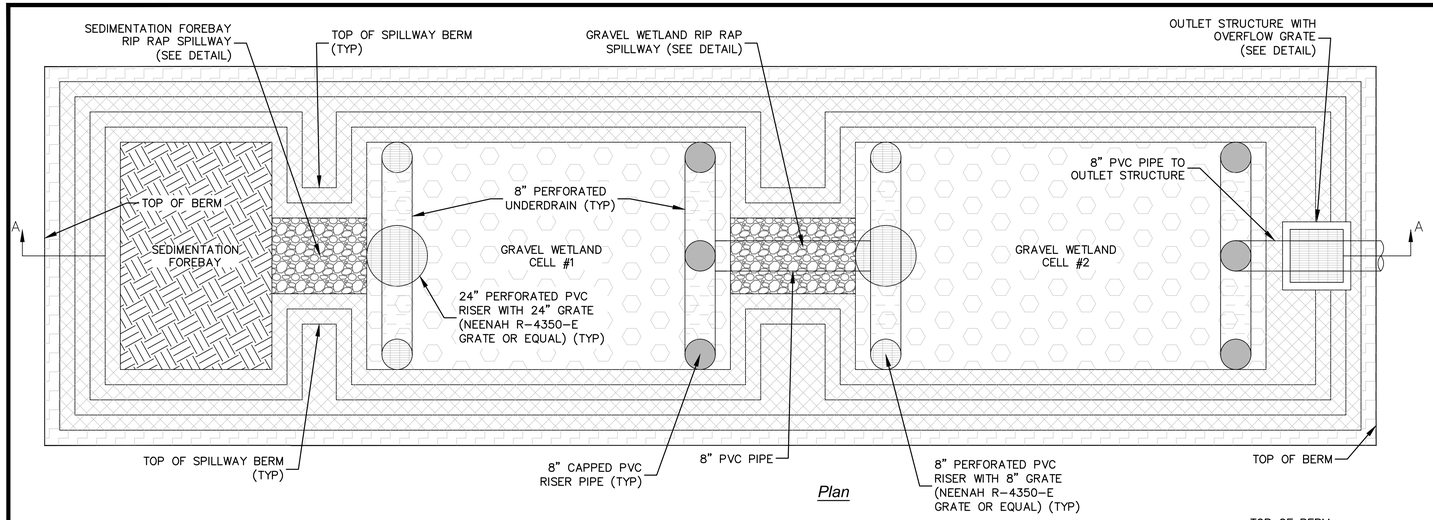
STATE OF NEW HAMPSHIRE
JOSEPH H. KIEFFNER
No. 15170
LICENSED PROFESSIONAL ENGINEER

designed by: ---
drawn by: AGL
approved by: JHK
date: August 2019
project no: 1119
file name: 1119 DETAILS-Storm Water Sections.dwg
scale: 0 20' 40' Scale: 1" = 20'

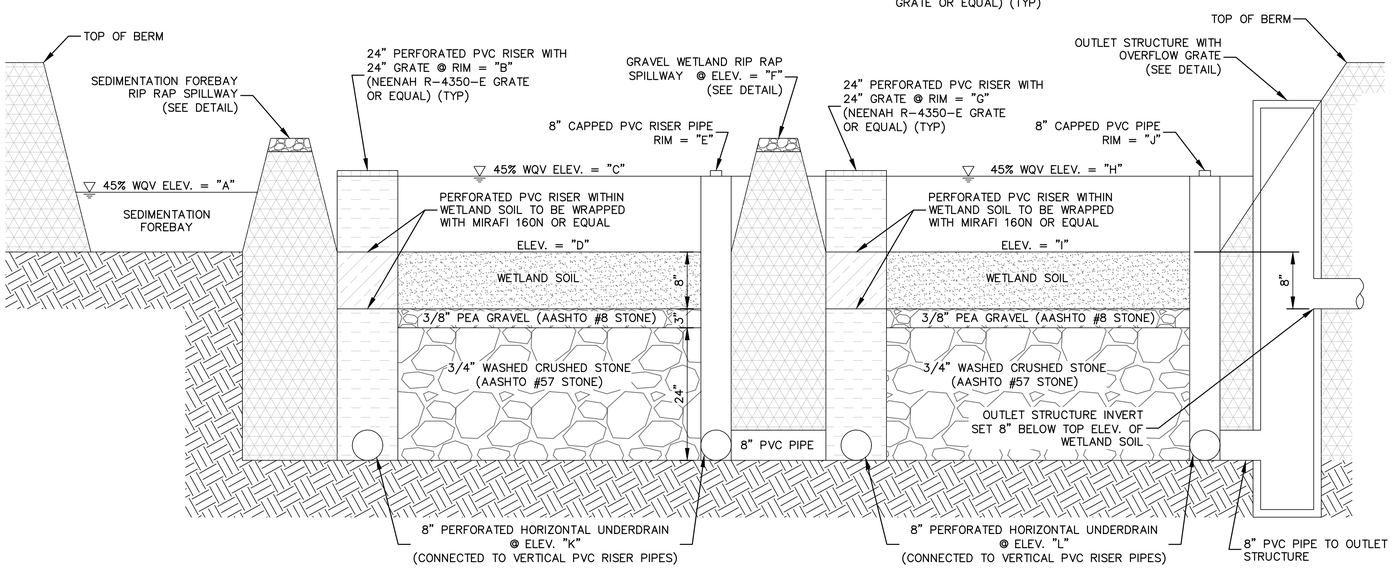
City of Portsmouth, New Hampshire
Department of Public Works
Multi-purpose Recreation Fields-Phase I
680 Peverly Hill Road
Storm Water Plans & Sections

drawing no. C-804

M:\CADD\PROJECTS\1119 Portsmouth Athletic fields\Production\1119 DETAILS-Storm Water Sections.dwg Date Plotted: Aug 19, 2019 – 3:24pm Plotted By: JKIEFFNER



Plan



Section A-A

NOTES:

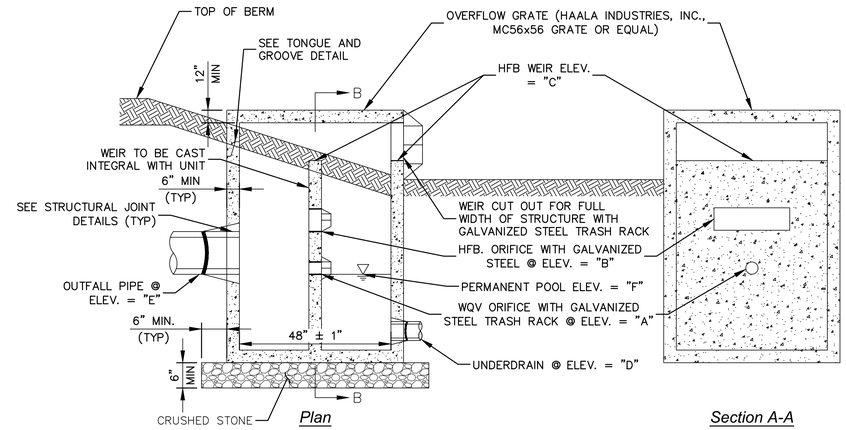
1. WETLAND SOIL SHALL BE A SANDY CLAY LOAM WITH A HYDRAULIC CONDUCTIVITY OF 0.1–0.01 FT/DAY. ORGANIC CONTENT SHALL BE GREATER THAN 15% BY VOLUME. CLAY CONTENT SHALL BE LESS THAN 15% BY VOLUME.
2. INFILTRATION TESTING OF THE NATIVE SOILS AT THE SUBGRADE AND WITHIN THE VICINITY OF THE PROPOSED GRAVEL WETLAND SHALL OCCUR PRIOR TO THE INSTALLATION OF THE GRAVEL WETLAND AND SHALL BE COORDINATED WITH THE ENGINEER. IF THE NATIVE SOILS EXCEED A PERMEABILITY RATE OF 0.03 FT/DAY OR IF EXCESSIVELY FRACTURED BEDROCK IS ENCOUNTERED THE SOILS SHOULD AMENDED OR LINER ADDED AS DETERMINED BY THE ENGINEER.
3. PERFORATED PVC RISERS SHALL HAVE VERTICAL SLOTS CUT INTO PVC RISERS ABOVE GRADE MEASURING 3"x1/8".

AASHTO #57 STONE (#4 TO 1")	
SIEVE SIZE	% PASSING
1–1/2"	100
1"	95–100
1/2"	25–60
#4	0–10
#8	0–5

AASHTO #8 STONE (#8 TO 3/8")	
SIEVE SIZE	% PASSING
1/2"	100
3/8"	85–100
#4	10–30
#8	0–10
#16	0–5

Typical Gravel Wetland Detail

Not to Scale



NOTES:

1. ALL SECTIONS SHALL BE 4,000 PSI CONCRETE (TYPE II CEMENT).
2. CIRCUMFERENTIAL REINFORCEMENT SHALL BE 0.12 SQUARE INCHES PER LINEAR FOOT IN ALL SECTIONS AND SHALL BE PLACED IN THE CENTER OF THE THIRDE WALL
3. THE TONGUE OR THE GROOVE OF THE JOINT SHALL CONTAIN ONE LINE OF CIRCUMFERENTIAL REINFORCEMENT EQUAL TO 0.12 SQUARE INCHES PER LINEAR FOOT.
4. THE STRUCTURES SHALL BE DESIGNED FOR H20 LOADING.
5. ALL JOINTS ON THE STRUCTURE AND PIPING SHALL BE WATERTIGHT.

Outlet Structure Detail

Not to Scale

	STRUCTURES				
ELEV.	1	2	3	4	5
A	29.85	25.83	25.00	30.10	33.00
B	33.00	N/A	N/A	N/A	N/A
C	N/A	27.92	27.00	32.20	36.10
D	28.11	23.67	22.42	28.17	31.17
E	28.01	25.50	24.75	28.75	31.17
F	N/A	25.83	25.00	30.10	33.00
WQV ORIFICE DIA (IN)	4.5"	2.2"	4.5	2.6	2.1
HFB (L X H) (IN)	24"X4"	72"X 9" FRONT (2)–24"X9" SIDES	72"X 9" FRONT (2)36"X9" SIDES	72"X 9" FRONT	72"X 9" FRONT

AGENCY REVIEW

no.	revision	date	by
3	TAC PUBLIC HEARING	8/19/2019	JHK
2	CONSERVATION COMMISSION SUBMISSION	07/24/2019	JHK
1	TAC WORK SESSION SUBMISSION	07/09/2019	JHK

CMA ENGINEERS
CIVIL/ENVIRONMENTAL/STRUCTURAL
Portsmouth, NH • Manchester, NH • Portland, ME
603/431-6196 603/627-0708 207/541-4223
c m a e n g i n e e r s . c o m

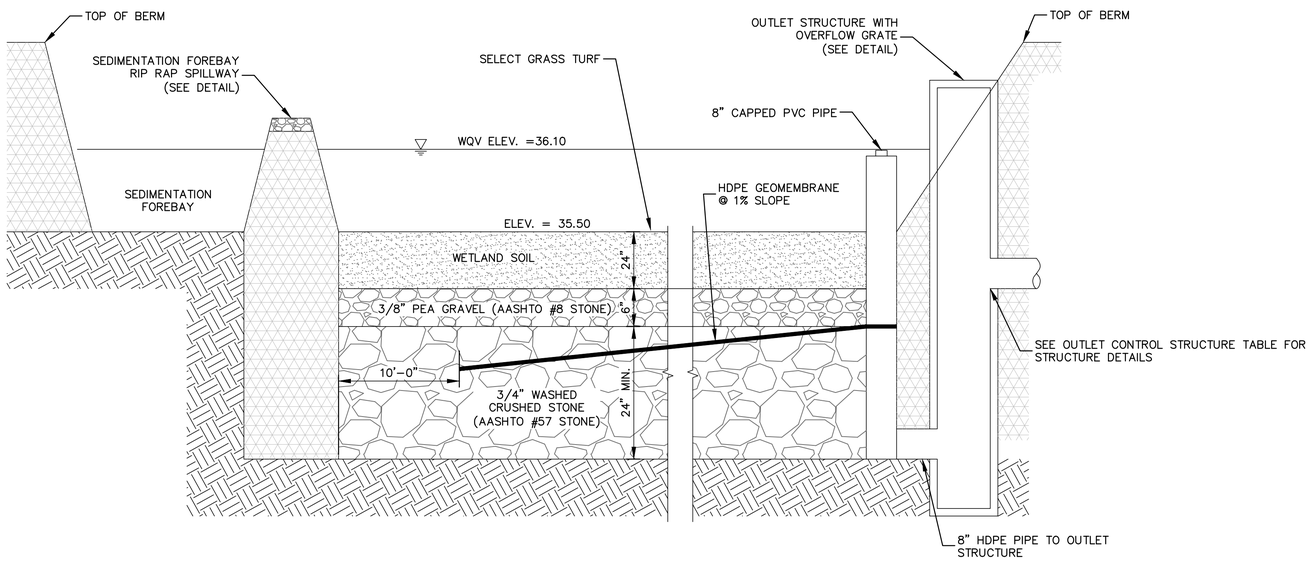
STATE OF NEW HAMPSHIRE JOSEPH H. KIEFFNER No. 11717 LICENSED PROFESSIONAL ENGINEER

designed by: ---- | drawn by: AGL | approved by: ---- | scale:
date: August 2019 | project no: 1119 | file name: 1119 DETAILS-SW.dwg

City of Portsmouth, New Hampshire
Department of Public Works
Multi-purpose Recreation Fields-Phase I
680 Peverly Hill Road
Storm Water Sections & Details

drawing no. C-901

M:\CADD\PROJECTS\1119 Portsmouth Athletic fields\Production\1119 DETAILS-SW.dwg Date Plotted: Aug 19, 2019 – 11:44am Plotted By: JKIEFFNER



Typical Bioretention with ISR Detail

Not to Scale

BIORETENTION SYSTEM NOTES:

PRODUCTS:

SOIL MEDIA SPECIFIED ACCORDING TO PERFORMANCE REQUIREMENTS: PARTICLE SIZE DISTRIBUTION ACCORDING TO ASTM D422 (STANDARD TEST METHOD FOR PARTICLE–SIZE ANALYSIS OF SOILS).

1. PARTICLE SIZE DISTRIBUTION BY SEPARATES:
   a. EXCLUDE ANY MATERIAL > 4.76 MM – 0%
   b. VERY COARSE SAND/GRAVEL: GRAVEL (2.0 TO 4.76 MM) 5% MAXIMUM (PERCENT BY DRY WEIGHT).
   c. SAND (0.42 TO 2.0 MM) 60 – 85% (PERCENT BY DRY WEIGHT).
   d. SILT (0.075 TO 0.42 MM) 20% MAXIMUM (PERCENT BY DRY WEIGHT)
   e. CLAY (LESS THAN 0.075MM) 5% MAXIMUM (PERCENT BY DRY WEIGHT).
   f. SEE TABLE 1 FOR ACCEPTABLE PARTICLE SIZE DISTRIBUTION OF FINAL BIORETENTION SOIL MIX.
2. FRAGMENT SIZE DISTRIBUTION:
   a. STICKS AND ROOTS: SHOULD BE MINIMIZED AND PREFERABLY LIMITED TO NOTHING LARGER THAN 4.76 MM
   b. DEBRIS AND OTHER FOREIGN MATERIALS: SHOULD BE MINIMIZED
3. PERCENTAGE OF ORGANIC MATTER: MINIMUM 3 PERCENT BY VOLUME AND MAXIMUM 8 PERCENT BY VOLUME.
4. SOIL REACTION: PH OF 6 TO 7
5. CEC OF TOTAL SOIL: MINIMUM 10 MEQ/100 ML AT PH OF 7.0.
6. BASIS–OF–DESIGN PRODUCT: SUBJECT TO COMPLIANCE WITH REQUIREMENTS INDICATED ON DRAWINGS
7. BASIC PROPERTIES: MANUFACTURED SOIL SHALL NOT CONTAIN THE FOLLOWING:
   a. UNACCEPTABLE MATERIALS: CONCRETE SLURRY, CONCRETE LAYERS OR CHUNKS, CEMENT, PLASTER, BUILDING DEBRIS, ASPHALT, BRICKS, OILS, GASOLINE, DIESEL FUEL, PAINT THINNER, TURPENTINE, TAR, ROOFING COMPOUND, ACID, SOLID WASTE, AND OTHER EXTRANEOUS MATERIALS THAT ARE HARMFUL TO PLANT GROWTH.
   b. UNSUITABLE MATERIALS: STONES, ROOTS, PLANTS, SOD, CLAY LUMPS, AND POCKETS OF COARSE SAND THAT EXCEED A COMBINED MAXIMUM OF 5 PERCENT BY DRY WEIGHT OF THE MANUFACTURED SOIL.
   c. LARGE MATERIALS: STONES, CLODS, ROOTS, CLAY LUMPS, AND POCKETS OF COARSE SAND EXCEEDING 0.187 INCHES (4.76 MM) IN ANY DIMENSION.

ACCEPTABLE ORGANIC SOIL AMENDMENTS

1. NO COMPOST SHOULD BE USED IN THE PLANTING MIX UNLESS SPECIFIED BY THE ENGINEER.
2. SPHAGNUM PEAT: PARTIALLY DECOMPOSED SPHAGNUM PEAT MOSS, FINELY DIVIDED OR OF GRANULAR TEXTURE WITH 100 PERCENT PASSING THROUGH A 1/2–INCH (13–MM) SIEVE, A PH OF 3.4 TO 4.8.
3. WOOD DERIVATIVES: SHREDDED WOOD, WOOD CHIPS, GROUND BARK, OR WOOD WASTE; OF UNIFORM TEXTURE AND FREE OF STONES, STICKS, SOIL, OR TOXIC MATERIALS.
4. MEDIA AMENDMENTS SUCH AS ZERO–VALENT IRON AND/OR DRINKING WATER TREATMENT RESIDUALS (ALUM) TO ENHANCE PHOSPHORUS SORPTION AS SPECIFIED BY THE ENGINEER.

EXECUTION:

1. PLACE SOIL MEDIA ACCORDING TO REQUIREMENTS IN OTHER SPECIFICATION SECTIONS.
2. VERIFY THAT NO FOREIGN OR DELETERIOUS MATERIAL OR LIQUID SUCH AS PAINT, PAINT WASHOUT, CONCRETE SLURRY, ASPHALT/CONCRETE LAYERS OR CHUNKS, CEMENT, PLASTER, OILS, GASOLINE, DIESEL FUEL, PAINT THINNER, TURPENTINE, TAR, ROOFING COMPOUND, SOLID WASTE, OR ACID HAS BEEN DEPOSITED IN PLANTING SOIL.
3. PROCEED WITH PLACEMENT ONLY AFTER UNSATISFACTORY CONDITIONS HAVE BEEN CORRECTED.
4. COMPACTION: COMPACT EACH BLENDED LIFT OF SOIL MEDIA TO 75 PERCENT OF MAXIMUM STANDARD PROCTOR DENSITY ACCORDING TO ASTM D 698.
5. FINISH GRADING: GRADE SOIL MEDIA TO A SMOOTH, UNIFORM SURFACE PLANE WITH LOOSE, UNIFORMLY FINE TEXTURE. ROLL AND RAKE, REMOVE RIDGES, AND FILL DEPRESSIONS TO MEET FINISH GRADES.

TABLE 1:
ACCEPTABLE PARTICLE SIZE DISTRIBUTION FOR FINAL BIORETENTION SOIL MIX

SIEVE #	SIEVE SIZE IN (MM)	% PASSING
4	0.187 (4.76)	100
10	0.079 (2)	95
40	0.017 (0.42)	40–15
200	0.003 (0.075)	10–20
<200	PAN	0–5

AGENCY REVIEW

no.	revision	date	by
3	TAC PUBLIC HEARING	8/19/2019	JHK
2	CONSERVATION COMMISSION SUBMISSION	07/24/2019	JHK
1	TAC WORK SESSION SUBMISSION	07/09/2019	JHK

CMA ENGINEERS
CIVIL/ENVIRONMENTAL/STRUCTURAL
Portsmouth, NH • Manchester, NH • Portland, ME
603/431-6196 603/627-0708 207/541-4223
c m a e n g i n e e r s . c o m

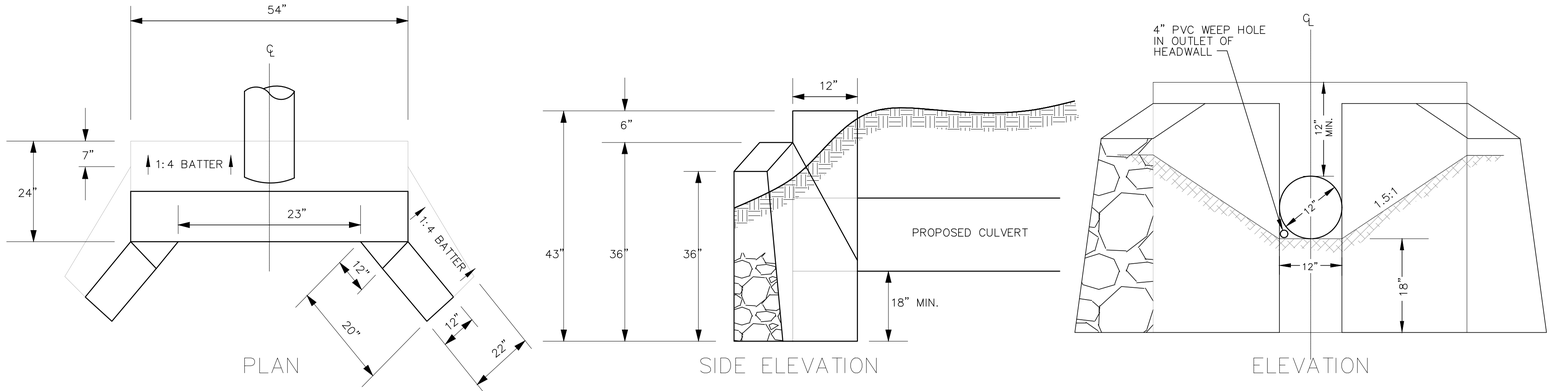
STATE OF NEW HAMPSHIRE – JOSEPH H. KIEFFNER No. 11717 – LICENSED PROFESSIONAL ENGINEER

designed by: ---
drawn by: AGL
approved by: ---
date: August 2019
project no: 1119
file name: 1119 DETAILS-SW.dwg
scale:

City of Portsmouth, New Hampshire
Department of Public Works
Multi-purpose Recreation Fields-Phase I
680 Peverly Hill Road
Storm Water Sections & Details

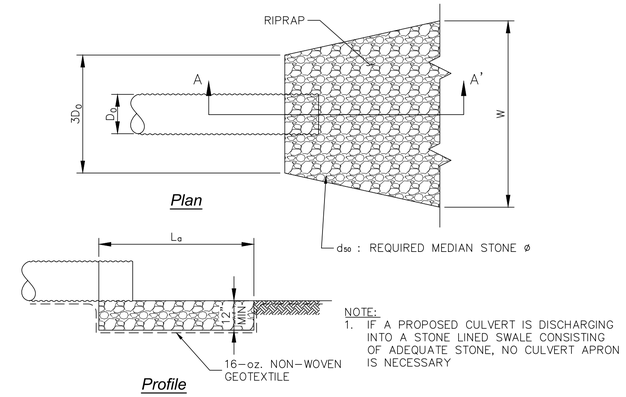
drawing no. C-902

M:\CADD\PROJECTS\1119 Portsmouth Athletic fields\Production\1119 DETAILS-SW.dwg Date Plotted: Aug 19, 2019 – 11:56am Plotted By: JKIEFFNER



Masonry Rubble (MRM) Headwall

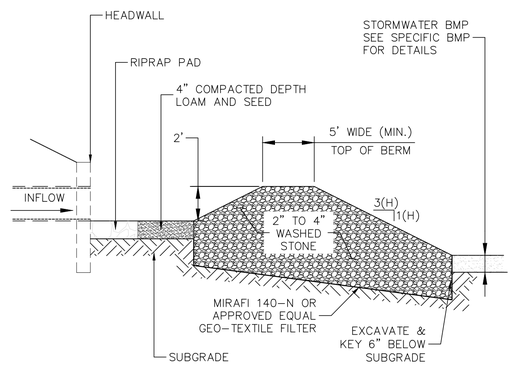
Not to Scale



NOTE:
1. IF A PROPOSED CULVERT IS DISCHARGING INTO A STONE LINED SWALE CONSISTING OF ADEQUATE STONE, NO CULVERT APRON IS NECESSARY

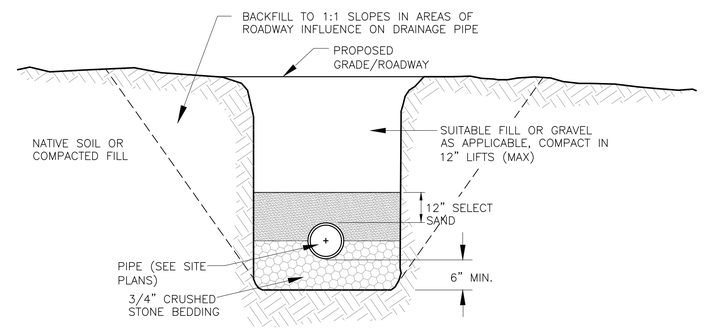
Stone Outlet Protection

Not to Scale



Stone Check Dam for Forebay BMP Outlet

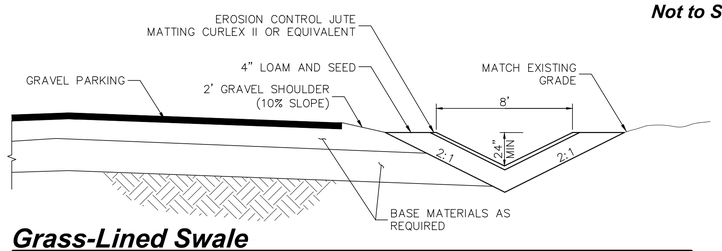
Not to Scale



NOTE: CULVERTS SHALL BE INSTALLED AT A DEPTH SUCH THAT THE CROWN OF THE CULVERT IS AT LEAST 2' BELOW GRADE

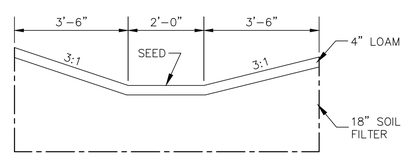
Typical Drainage Pipe

Not to Scale



Grass-Lined Swale

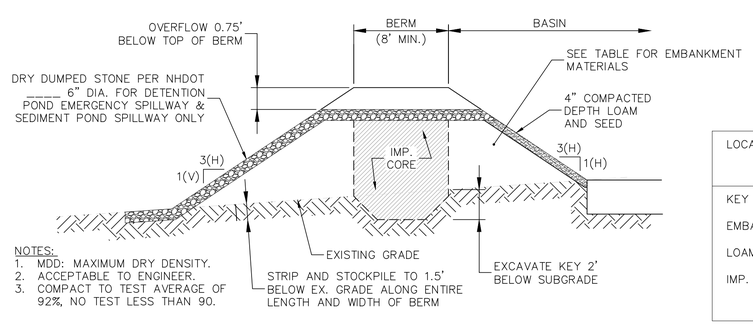
Not to Scale



NOTES:
1. ALL ITEMS SHOWN ON THIS DETAIL SHALL BE PAID FOR UNDER ITEM 645.99 VEGETATED SWALE.
2. SOIL FILTER SHALL CONFORM TO THE GRADATION REQUIREMENTS OF EITHER OPTION A OR OPTION B IN TABLE 4-4.

Vegetated Swale

Not to Scale



NOTES:
1. MDD: MAXIMUM DRY DENSITY.
2. ACCEPTABLE TO ENGINEER.
3. COMPACT TO TEST AVERAGE OF 92%, NO TEST LESS THAN 90.

LOCATION	MATERIAL	MAX. PARTICLE SIZE (IN)	LOOSE LIFT THICKNESS (IN)	COMPACTION REQUIREMENTS (% MDD)[1]
KEY	NATIVE SOIL[2]	6	12 (MAX)	92%[3]
EMBANKMENT	NATIVE SOIL[2]	6	12 (MAX)	92%[3]
LOAM COVER	NATIVE TOPSOIL	1	8 (MIN)	80%
IMP. CORE	SOIL W/ AT LEAST 30% CLAY & SILT CONTENT	3	12 (MAX)	92%[3]

Riprap Spillway Detail

Not to Scale

AGENCY REVIEW

no.	revision	date	by
3	TAC PUBLIC HEARING	8/19/2019	JHK
2	CONSERVATION COMMISSION SUBMISSION	07/24/2019	JHK
1	TAC WORK SESSION SUBMISSION	07/09/2019	JHK

CMA ENGINEERS
CIVIL/ENVIRONMENTAL/STRUCTURAL
Portsmouth, NH • Manchester, NH • Portland, ME
603/431-6196 603/627-0708 207/541-4223
c m a e n g i n e e r s . c o m

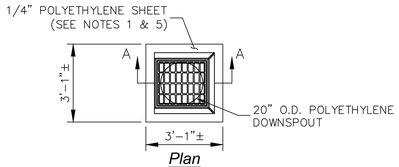
STATE OF NEW HAMPSHIRE JOSEPH H. KIEFFNER No. 9175 LICENSED PROFESSIONAL ENGINEER

designed by: ----
drawn by: AGL
approved by: ----
date: August 2019
project no: 1119
file name: 1119 DETAILS.dwg
scale:

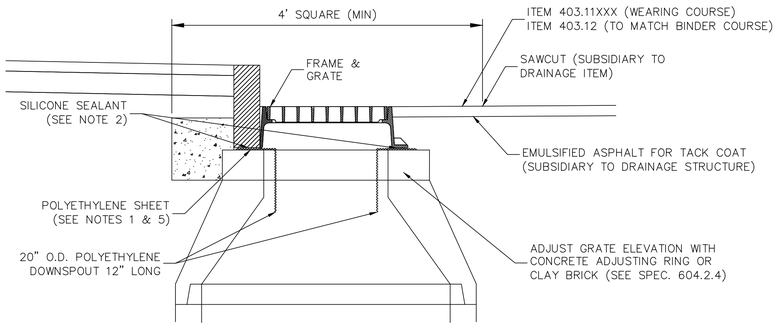
City of Portsmouth, New Hampshire
Department of Public Works
Multi-purpose Recreation Fields-Phase I
680 Peverly Hill Road
Drainage Details

drawing no. C-903

\\mht2\MHT-Projects\CADD\PROJECTS\1119 Portsmouth Athletic fields\Production\1119 DETAILS.dwg Date Plotted: Aug 19, 2019 - 11:06am Plotted By: ALAWRENCE



Plan



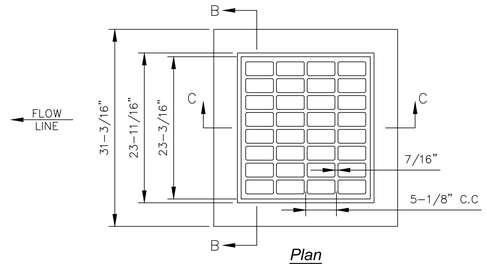
Section A-A

NOTES:

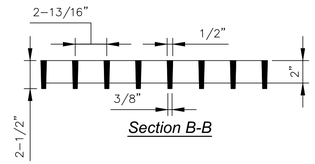
1. POLYETHYLENE LINER (ITEM 604.0007) SHALL BE FABRICATED AT THE SHOP. DOWNSPOUT SHALL BE EXTRUSION FILLET WELDED TO THE POLYETHYLENE SHEET.
2. PLACE A CONTINUOUS BEAD OF AN APPROVED SILICONE SEALANT (SUBSIDIARY TO ITEM 604.0007) BETWEEN FRAME AND POLYETHYLENE SHEET (SEE SECTION A–A, PLATE 4).
3. PLACE CLASS AA CONCRETE TO 2" BELOW THE TOP OF GRATE ELEVATION (SUBSIDIARY TO DRAINAGE STRUCTURE).
4. USE ON DRAINAGE STRUCTURES 4' MIN. DIAMETER ONLY.
5. TRIM POLYETHYLENE SHEET A MAXIMUM OF 4" OUTSIDE THE FLANGE ON THE FRAME FOR THE CATCH BASIN BEFORE PLACING CONCRETE (EXCEPT AS SHOWN WHEN USED WITH 3–FLANGE FRAME AND CURB).
6. THE CENTER OF THE GRATE & FRAME MAY BE SHIFTED A MAXIMUM OF 6" FROM THE CENTER OF THE DOWNSPOUT IN ANY DIRECTION.
7. PLACED ONLY IN DRAINAGE STRUCTURES IN PAVEMENT.
8. SEE NHDOT DR–04, "DI–DB, UNDERDRAIN FLUSHING BASIN AND POLYETHYLENE LINER DETAILS" FOR ADDITIONAL INFORMATION.

Polyethylene Liner

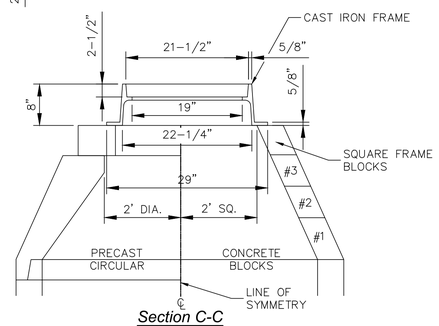
Not to Scale



Plan



Section B-B



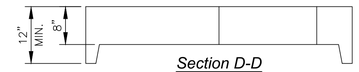
Section C-C
GRATE & FRAME DETAIL

NOTES:

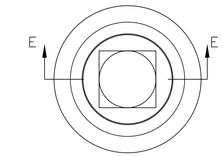
1. GRATES TO BE CAST IRON (NHDOT TYPE B ALTERNATIVE 1)
2. FRAME AND GRATE TO BE MANUFACTURED IN THE USA.

Catch Basin Frame & Grate

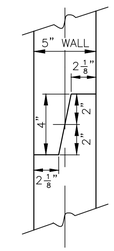
Not to Scale



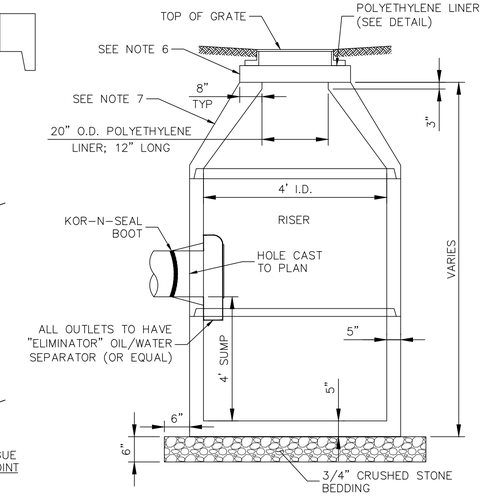
Section D-D
Flat Slab Top



Plan



DETAIL OF TONGUE
AND GROOVE JOINT



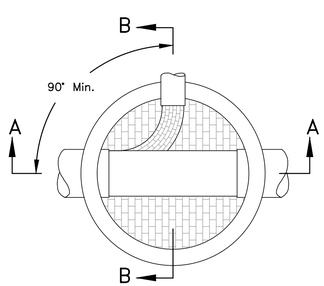
Section E-E

NOTES:

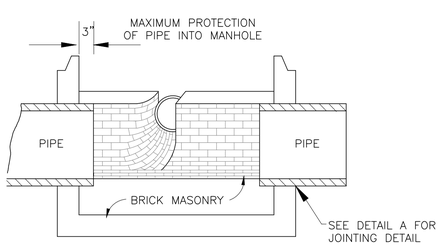
1. ALL SECTIONS SHALL BE CONCRETE CLASS AA (4000 PSI).
2. CIRCUMFERENTIAL REINFORCEMENT SHALL BE 0.12 SQ.IN PER LINEAR FT. IN ALL SECTIONS AND SHALL BE PLACED IN THE CENTER THIRD OF THE WALL.
3. THE TONGUE AND GROOVE OF THE JOINT SHALL CONTAIN ONE LINE OF CIRCUMFERENTIAL REINFORCEMENT EQUAL TO 0.12 SQ.IN. PER LINEAR FT.
4. RISERS OF 1', 2', 3', AND 4' CAN BE USED TO REACH DESIRED DEPTH.
5. THE STRUCTURES SHALL BE DESIGNED FOR H20 LOADING.
6. FITTING FRAME TO GRADE MAY BE DONE WITH PREFABRICATED ADJUSTMENT RINGS OR CLAY BRICKS (2 COURSES MAX.).
7. CONE SECTIONS MAY BE EITHER CONCENTRIC OR ECCENTRIC OR FLAT SLAB TOPS MAY BE USED WHERE PIPE WOULD OTHERWISE ENTER INTO THE CONE SECTION OF THE STRUCTURE AND WHERE PERMITTED.
8. PIPE ELEVATIONS SHOWN ON PLANS SHALL BE FIELD VERIFIED PRIOR TO PRECASTING.
9. OUTSIDE EDGES OF PIPES SHALL PROJECT NO MORE THAN 3" BEYOND INSIDE WALL OF STRUCTURE.
10. PRECAST SECTIONS SHALL HAVE A TONGUE AND GROOVE JOINT 4" HIGH AT AN 11° ANGLE CENTERED IN THE WIDTH OF THE WALL AND SHALL BE ASSEMBLED USING AN APPROVED FLEXIBLE SEALANT IN JOINTS.
11. THE TONGUE AND GROOVE JOINT SHALL BE SEALED WITH ONE STRIP OF BUTYL RUBBER SEALANT.
12. "ELIMINATOR" OIL/WATER SEPARATOR SHALL BE INSTALLED TIGHT TO INSIDE OF CATCH BASIN.

4' Diameter Catch Basin

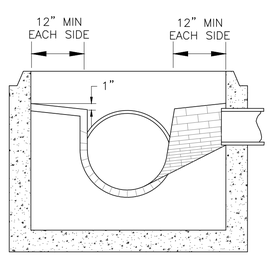
Not to Scale



Plan



Section A-A



Section B-B

TOP OF SHELF SHALL BE 1" ABOVE CROWN OF HIGHEST PIPE

NOTE: INVERT AND SHELF TO BE PLACED AFTER LEAKAGE TEST

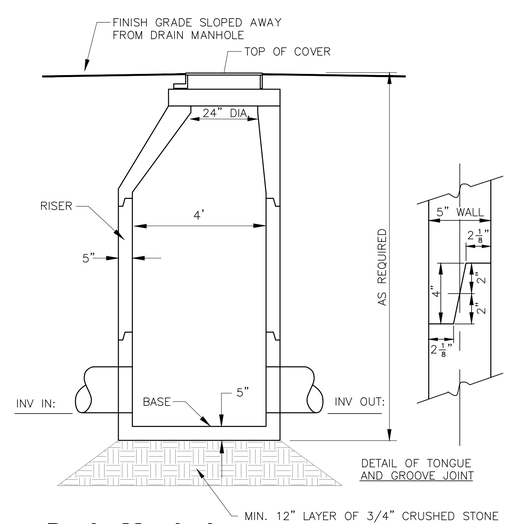
NOTE: CARE SHALL BE TAKEN TO INSURE THAT THE BRICK INVERT IS A SMOOTH CONTINUATION OF THE SEWER INVERT. INVERT BRICKS SHALL BE LAID ON EDGE

NOTES:

1. INVERT AND SHELF TO BE PLACED AFTER LEAKAGE TEST.
2. CARE SHALL BE TAKEN TO INSURE THAT THE BRICK INVERT IS SMOOTH CONTINUATION OF THE SEWER INVERT
3. INVERT BRICKS SHALL BE LAIN ON EDGE.
4. BITUMINOUS WATERPROOF COATING TO BE APPLIED TO ENTIRE EXTERIOR OF MANHOLE.
5. MANHOLE FRAME AND COVER SHALL BE EAST JORDAN IRON WORKS HINGE COVER PER CITY OF PORTSMOUTH STANDARD.
6. HORIZONTAL JOINTS SHALL BE SEALED FOR WATER TIGHTNESS USING A DOUBLE ROW OF ELASTOMERIC OR MASTIC–LIKE SEALANT.
7. BARREL AND CONE SECTIONS SHALL BE PRECAST REINFORCED CONCRETE DESIGNED FOR H20 LOADING, AND CONFIRMING TO ASTM C478–06.
8. INTERIOR OF SEWER MANHOLES SHALL BE LINED IN ACCORDANCE WITH SECTION 33 01 30.63

Sewer and Drain Manhole Part and Installation Detail

Not to Scale



NOTES:

1. HORIZONTAL JOINTS BETWEEN SECTIONS OF PRECAST CONCRETE BARRELS SHALL BE OF A TYPE APPROVED BY THE ENGINEER, WHICH SHALL, IN GENERAL, DEPEND FOR WATERTIGHTNESS UPON AN ELASTOMERIC OR MASTIC–LIKE GASKET.
2. PIPE–TO–MANHOLE JOINTS SHALL BE ONLY AS APPROVED BY THE ENGINEER AND IN GENERAL WILL DEPEND FOR WATERTIGHTNESS UPON EITHER AN APPROVED NON–SHRINKING MORTAR OR ELASTOMERIC SEALANT.
3. FOR BITUMASTIC TYPE JOINTS, THE AMOUNT OF SEALANT SHALL BE SUFFICIENT TO FILL AT LEAST 75% OF THE JOINT CAVITY. APPROVED BITUMASTIC SEALANTS INCLUDE RAM–NEK, KENT SEAL NO. 2, EZ OR EQUAL.
4. THE TONGUE OR THE GROOVE OF THE JOINT OF THE WALL SHALL CONTAIN ONE LINE OF CIRCUMFERENTIAL REINFORCEMENT EQUAL TO 0.12 SQ.IN. PER LINEAR FOOT.
5. ECCENTRIC CONES SHALL BE USED WHEN DEPTH TO CROWN OF SHALLOWEST PIPE EXCEEDS 30". RISERS OF 12", 36" AND 48" CAN BE USED TO REACH THE DESIRED DEPTH.
6. MANHOLE COVERS TO BE NHDOT TYPE B GRAY IRON.
7. ROOF LATERALS TO TIE INTO MANHOLE 4' MIN BELOW GRADE.

Drain Manhole

Not to Scale

AGENCY REVIEW

no.	revision	date	by
3	TAC PUBLIC HEARING	8/19/2019	JHK
2	CONSERVATION COMMISSION SUBMISSION	07/24/2019	JHK
1	TAC WORK SESSION SUBMISSION	07/09/2019	JHK

CMA ENGINEERS
CIVIL/ENVIRONMENTAL/STRUCTURAL
Portsmouth, NH • Manchester, NH • Portland, ME
603/431-6196 603/627-0708 207/541-4223
c m a e n g i n e e r s . c o m

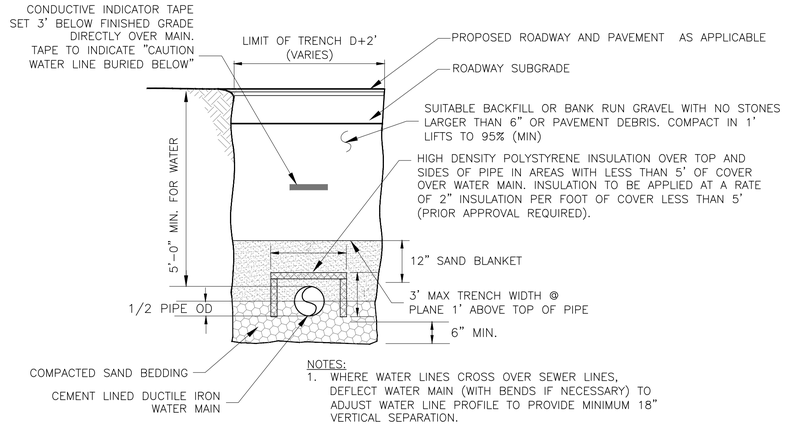
STATE OF NEW HAMPSHIRE
JOSEPH H. KIEFFNER
No. 9717
LICENSED PROFESSIONAL ENGINEER

designed by: ----
drawn by: AGL
approved by: ----
scale:
date: August 2019
project no: 1119
file name: 1119 DETAILS.dwg

City of Portsmouth, New Hampshire
Department of Public Works
Multi-purpose Recreation Fields-Phase I
680 Peverly Hill Road
Drainage Details

drawing no. C-904

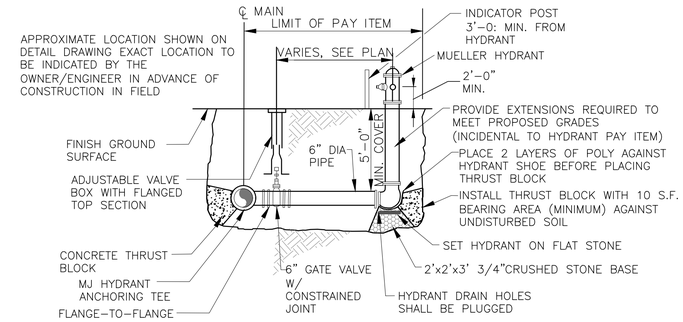
\\mht2\MHT-Projects\CADD\PROJECTS\1119 Portsmouth Athletic fields\Production\1119 DETAILS.dwg Date Plotted: Aug 19, 2019 – 11:06am Plotted By: ALAWRENCE



NOTES:
1. WHERE WATER LINES CROSS OVER SEWER LINES, DEFLECT WATER MAIN (WITH BENDS IF NECESSARY) TO ADJUST WATER LINE PROFILE TO PROVIDE MINIMUM 18" VERTICAL SEPARATION.

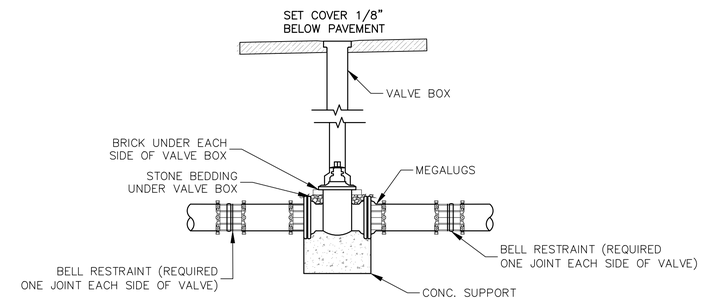
Typical Water Main Trench

Not to Scale



Hydrant Assembly

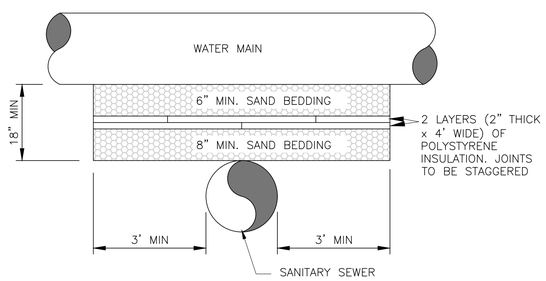
Not to Scale



NOTES:
1. VALVE BOXES SHALL BE HEAVY PATTERN CAST IRON, TWO PIECE, SLIP TYPE, 5-INCH DIAMETER SHAFT WITH EXTENSION PIECES TO ALLOW SUFFICIENT COVER.
2. THE UPPER SECTION OF THE BOX SHALL BE TOP-FLANGE TYPE TO PREVENT SETTLEMENT.
3. THE LOWER SECTION SHALL BE BELLED-TYPE TO ENCLOSE THE OPERATING NUT OF THE VALVE.
4. THE COVER SHALL BE CAST IRON WITH THE WORD "WATER" PLAINLY CAST THEREON.
5. GATE VALVES SHALL OPEN LEFT.

Valve & Valve Box Detail

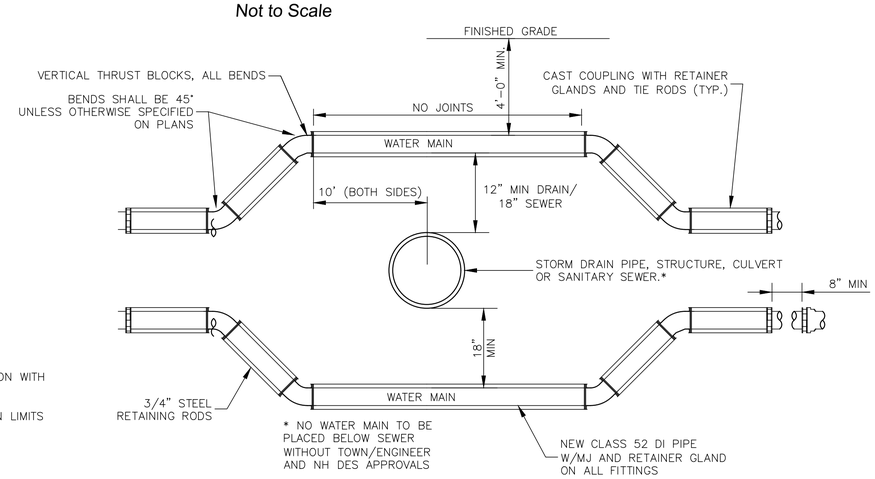
Not to Scale

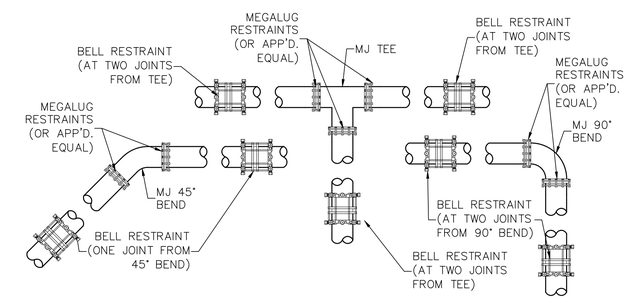


WATER MAIN INSTALLATION NOTES:
1. INSULATION TO BE USED WHERE VERTICAL PIPE SEPARATION IS 24" OR LESS AND HORIZONTAL SEPARATION WITH A SEWER MANHOLE OR OTHER OPEN STRUCTURE IS 6' OR LESS.
2. INSTALL VERTICAL MJ BENDS WITH RESTRAINED JOINT FITTINGS OR SWEEP PIPE WITHIN THE SPECIFICATION LIMITS IF NECESSARY TO ADJUST WATER MAIN PROFILE TO GAIN MINIMUM VERTICAL SEPARATION ABOVE SEWER.
3. 2" OF INSULATION TO BE USED AROUND WATER SERVICE CONNECTIONS WHERE PIPE CROSSINGS OCCUR.
4. WHERE WATER MAIN CROSSES SEWER AT 45° TO 90° PROVIDE MAXIMUM SPACING OF PIPE JOINTS FROM CROSSING LOCATION FOR BOTH WATER MAIN AND SEWER PIPE.

Water/Utility Crossing

Not to Scale





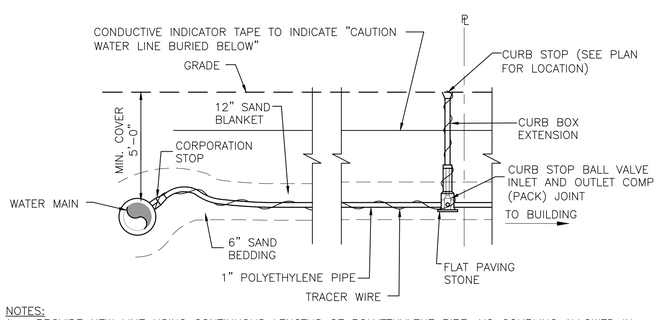
NOTES:
1. JOINT RESTRAINT IS REQUIRED AT ALL FITTINGS PER THE ABOVE TABLE.

VALVE	RESTRAINED JOINTS
IN LINE VALVES	BELL RESTRT'S REQUIRED 1 JOINT EACH SIDE/VALVE

FITTING	RESTRAINED JOINTS
22.5° BEND	1 EACH SIDE
45° BEND	1 EACH SIDE
90° BEND	2 EACH SIDE
TEE	1 EA SIDE/RUN 2 ON BRANCH

Joint Restraint Detail

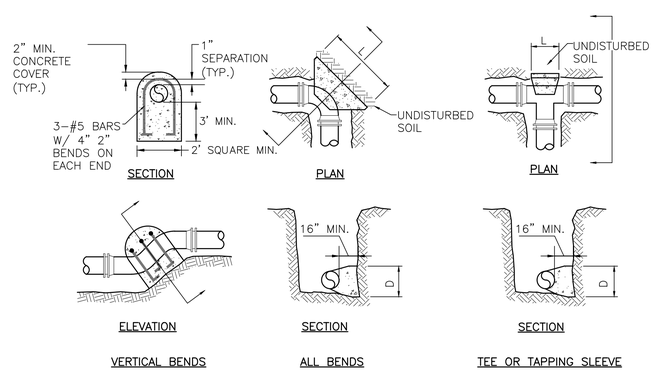
Not to Scale



NOTES:
1. PROVIDE NEW LINE USING CONTINUOUS LENGTHS OF POLYETHYLENE PIPE. NO COUPLING ALLOWED IN ROADWAY WITHOUT APPROVAL OF ENGINEER.
2. TAPS TO BE MADE AT APPROX. 10:00 AND 2:00
3. PROVIDE FOR SERVICE LINE CONTRACTION AND EXPANSION BY INSTALLING "S" IN SERVICE LINE NEAR MAIN.
4. IF SERVICE IS INSTALLED WITH LESS THAN 5'-0" COVER, INSULATE OVER LINE.
5. IF SERVICE HAS LESS THAN ADEQUATE SEPARATION (10' HORIZONTAL/18" VERTICAL-ABOVE) FROM SEWER MAINS/SERVICES, PROVIDE RIGID INSULATION ON TWO SIDES OF SERVICE PIPE.
6. TRACER WIRE (#10 INSULATED) SHALL BE PLACED ALONG THE SERVICE LINE AND SHALL BE A CONTINOUS LENGTH (WITHOUT SPLICES), EXCEPT FOR THE SPLICE AT THE STOP BOX, WHICH SHALL BE MADE WITH A COPPER CRIMP OR SPLIT BOLT CONNECTOR.
7. INSERT STAINLESS STEEL STIFFENERES REQUIRES ON ALL FLEXIBLE PLASTIC CONNECTIONS.
5. PRESSURE TEST, DISINFECT, AND FLUSH ALL WATER SERVICE CONNECTIONS.
6. CONNECT CURB STOP TO EXISTING SERVICE AT PROPERTY LINE OR AT LOCATION APPROVED BY THE ENGINEER (NO COUPLING WITHOUT APPROVAL OF ENGINEER).

Water Service Installation

Not to Scale



NOTES:
1. Thrust blocks shall be precast concrete, except thrust blocks for vertical bends can be CIP concrete.
2. The minimum bearing areas shown above are based on a system pressure of 100 PSI. If the system pressure is above 100 psi, increase the noted areas proportional to the actual system pressure. For example, if the actual system pressure is 160 psi, multiply the above values by 160%.
3. Place thrust blocks such that the length (L) of the block is approximately twice as long as the depth (D).
4. Place thrust blocks against undisturbed soil.
5. Place thrust blocks along the full length of the fitting to maximize bearing area.
5. Place 2 layers of polyethylene or roofing paper around fittings prior to placement of the concrete to create a bond break & protect the bolts.
6. Place a solid concrete block between cap/plugs and thrust blocks.
7. Place a 12" long steel horseshoe-shaped pickup hook in all plug and cap thrust blocks. Diameter of hook shall be a minimum of 5/8".
8. Use of thrust blocks does not eliminate the requirement of retainer glands.
9. Thrust blocks are required on all fittings.
10. Coat all threaded rods, nuts, and bolts with bituminous paint.
11. Place anti-seize lubricant on all bolts.

THRUST BLOCK SCHEDULE
MINIMUM BEARING AREA (SQUARE FEET)

Nominal Dia. (in)	PIPE SIZE 4	6	8	10	12	16	20	24
Tees, Caps, Plugs, & Tapping Sleeves	1.05	2.32	4.15	6.37	9.15	16.23	25.44	36.58
90 Degree Bends	1.48	3.29	5.86	9.01	12.93	22.96	35.97	51.73
45 Degree Bends	0.80	1.78	3.17	4.88	7.00	12.42	19.47	28.00
22-1/2 Degree Bends	0.41	0.91	1.62	2.49	3.57	6.33	9.92	14.27
11-1/4 Degree Bends	0.21	0.46	0.81	1.25	1.79	3.18	4.99	7.17

System Pressure: 100psi
Safety Factor: 1.5
Soil Bearing Capacity: 2,000psf

Thrust Blocks

Not to Scale

AGENCY REVIEW

no.	revision	date	by
3	TAC PUBLIC HEARING	8/19/2019	JHK
2	CONSERVATION COMMISSION SUBMISSION	07/24/2019	JHK
1	TAC WORK SESSION SUBMISSION	07/09/2019	JHK

CMA ENGINEERS
CIVIL/ENVIRONMENTAL/STRUCTURAL
Portsmouth, NH • Manchester, NH • Portland, ME
603/431-6196 603/627-0708 207/541-4223
c m a e n g i n e e r s . c o m

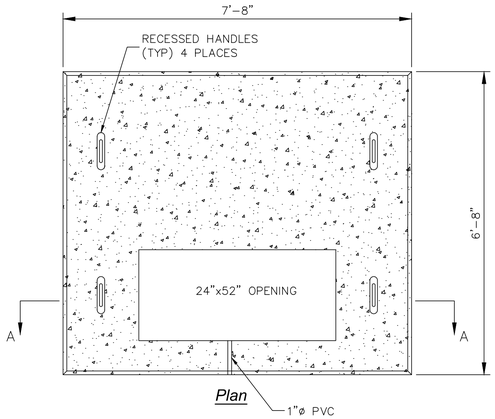
STATE OF NEW HAMPSHIRE JOSEPH H. KIEFFNER No. 9174 LICENSED PROFESSIONAL ENGINEER

designed by: ----
drawn by: AGL
approved by: ----
scale:
date: August 2019
project no: 1119
file name: 1119 DETAILS.dwg

City of Portsmouth, New Hampshire
Department of Public Works
Multi-purpose Recreation Fields-Phase I
680 Peverly Hill Road
Water Details

drawing no. C-905

\\mht2\MHT-Projects\CADD\PROJECTS\1119 Portsmouth Athletic fields\Production\1119 DETAILS.dwg Date Plotted: Aug 19, 2019 - 11:06am Plotted By: ALAWRENCE

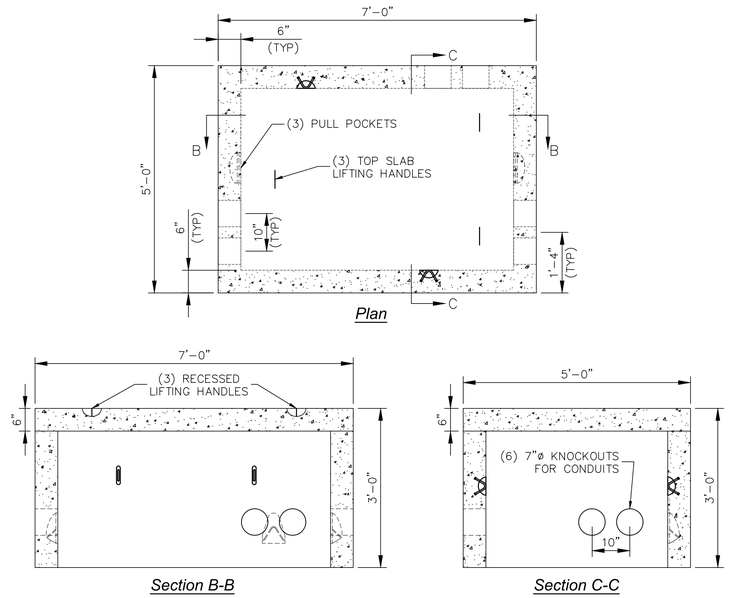


NOTES:

1. CONCRETE MINIMUM 4,000 PSI AFTER 28 DAYS.
2. REINFORCEMENT STEEL SHALL CONFORM TO ASTM A615 GRADE 60.

3 Phase 500 KVA Transformer Pad Detail

Not to Scale

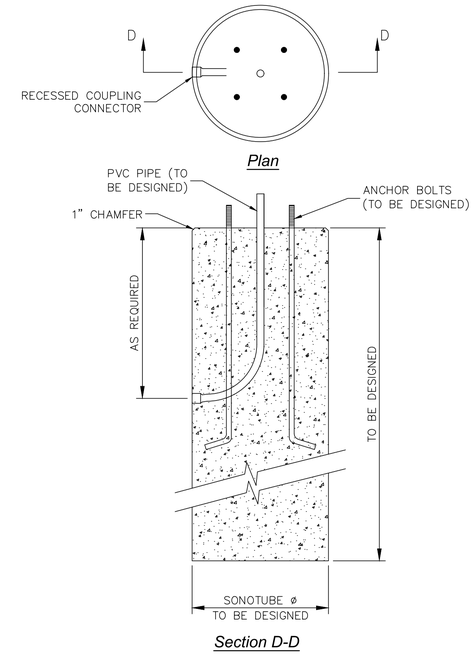


NOTES:

1. CONCRETE MINIMUM 4,000 PSI AFTER 28 DAYS.
2. REINFORCEMENT STEEL SHALL CONFORM TO ASTM A615 GRADE 60.
3. DESIGNED FOR H-10 LOADING

Pull Box Detail

Not to Scale

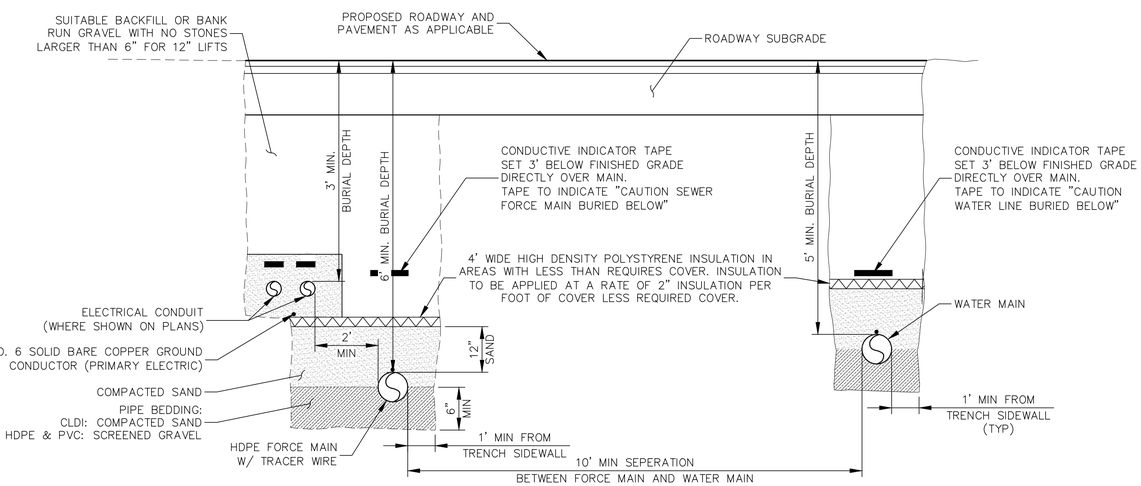


NOTES:

1. CONCRETE MINIMUM 5,000 PSI AFTER 28 DAYS.
2. LIGHT POLE BASE SIZE IS TO BE DESIGNED BY PROFESSIONAL ENGINEER.

Lightpole Base Detail

Not to Scale



NOTES:

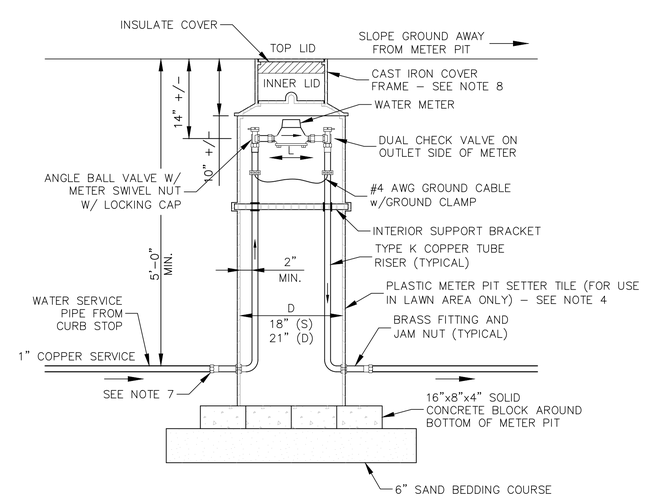
1. TRENCH WIDTH AS REQUIRED TO MAINTAIN 6 INCHES MINIMUM SPACING BETWEEN ALL CONDUITS AND TRENCH SIDEWALLS.
2. TRACER WIRE: PVC AND HDPE WATER MAINS SHALL HAVE TRACER WIRE PLACED ON TOP OF THE PIPE. PROVIDE TRACER WIRE ACCESS BOXES AT VALVES, HYDRANTS, AND MAINLINE WHERE NECESSARY TO ACHIEVE 500' MAX. INTERVALS, IN ADDITION TO THE BEGINNING AND END OF THE PIPE.

SCREENED GRAVEL BEDDING	
% PASSING	SIEVE SIZE
100%	1"
90–100%	3/4"
20–55%	3/8"

SCREENED GRAVEL BEDDING	
% PASSING	SIEVE SIZE
0–10%	#4
0–5%	#8

Water Main, Force Main and Electric/Communication Conduit Trench

Not to Scale



NOTES:

1. THE CONTRACTOR SHALL INSTALL METER SETTER HORNS. THE WATER METER WILL BE PROVIDED AND INSTALLED BY THE CITY.
2. WATER METERS ARE XXXXXXXXXXXXXX METERS. METER SIZE IS 1". CONTRACTOR TO PROVIDE FITTINGS TO REDUCE TO 1" FROM 1.5" SERVICE LINE.
3. WATER PIPE, VALVES AND FITTINGS (EXCLUDING WATER METER) ARE TO BE ASSEMBLED INSIDE METER PIT AT FACTORY.
4. METER PIT LOCATIONS ARE SUBJECT TO APPROVAL BY THE OWNER AND ENGINEER.
5. WHEN INSTALLED IN PAVED AREA, WATER METER PIT IS TO BE DESIGNED TO SUPPORT AASHTO HS-20-44 WHEEL LOADING. METER PITS SHALL BE FORD PLASTIC PIT SETTERS OF APPROVED EQUAL. SUBMIT SHOP DRAWINGS OF METER PIT FOR APPROVAL PRIOR TO FABRICATION.
6. SAND BACKFILL AROUND EXTERIOR WALLS OF METER PIT IS TO BE CAREFULLY PLACED AND COMPACTED IN 12 INCH LIFTS.
7. BOTTOM INLET AND OUTLET CONNECTIONS ARE TO ACCOMMODATE COPPER COMPRESSION JOINTS.
8. TOP LID IS TO BE 1½ INCH DIAMETER LOCKING CAST IRON WITH HOLE AND PLUG FOR ELECTRONIC METER READ MODULE. INNER LID IS TO BE PLASTIC. COVER FRAME IS TO BE SIZED TO FIT REQUIRED DIAMETER OF METER PIT SETTER TILE.
9. APPROVED NON-TESTABLE, DOUBLE-CHECK BACKFLOW PREVENTION DEVICES WILL BE REQUIRED.

Meter Pit Detail

Not to Scale

AGENCY REVIEW

no.	revision	date	by
3	TAC PUBLIC HEARING	8/19/2019	JHK
2	CONSERVATION COMMISSION SUBMISSION	07/24/2019	JHK
1	TAC WORK SESSION SUBMISSION	07/09/2019	JHK

CMA ENGINEERS
CIVIL/ENVIRONMENTAL/STRUCTURAL
Portsmouth, NH • Manchester, NH • Portland, ME
603/431-6196 603/627-0708 207/541-4223
c m a e n g i n e e r s . c o m

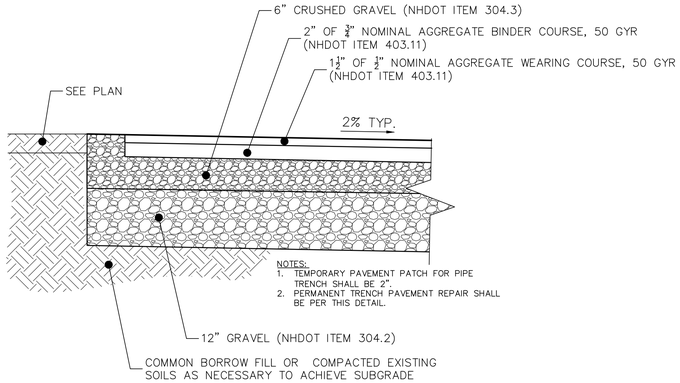
STATE OF NEW HAMPSHIRE
JOSEPH H. KIEFFNER
No. 13172
LICENSED
PROFESSIONAL ENGINEER

designed by: ----
drawn by: AGL
approved by: ----
date: August 2019
project no: 1119
file name: 1119 DETAILS.dwg
scale:

City of Portsmouth, New Hampshire
Department of Public Works
Multi-purpose Recreation Fields-Phase I
680 Peverly Hill Road
Electrical Details

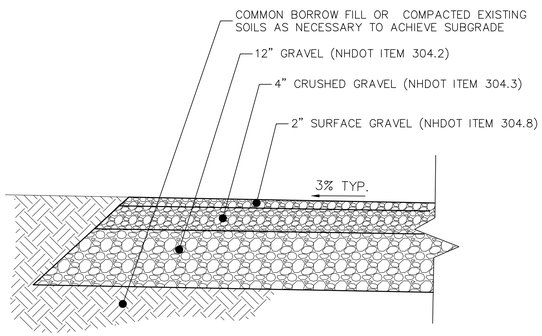
drawing no. C-906

\\mht2\MHT-Projects\CADD\PROJECTS\1119 Portsmouth Athletic fields\Production\1119 DETAILS.dwg Date Plotted: Aug 19, 2019 – 11:06am Plotted By: ALAWRENCE



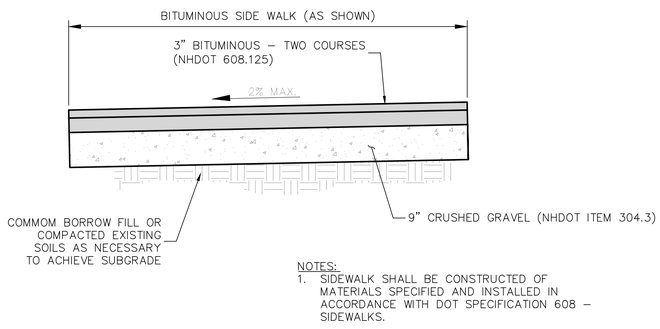
General Pavement Section

Not to Scale



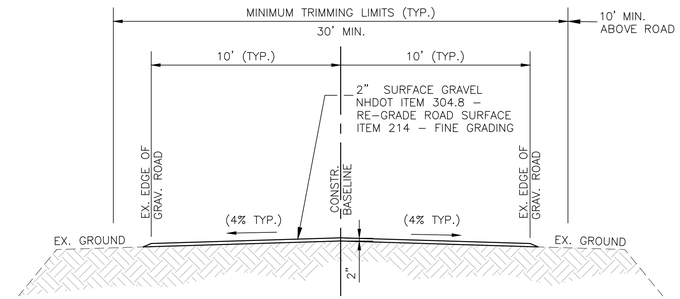
General Gravel Section

Not to Scale



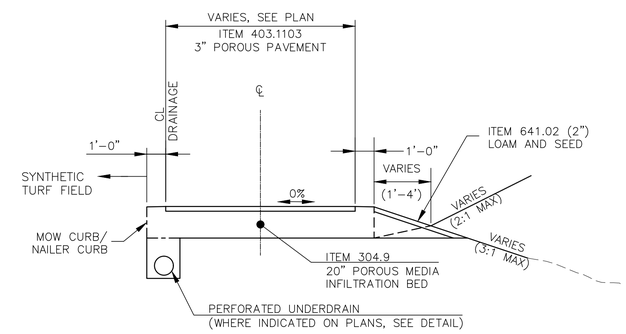
Typical Vertical Granite Curb/Bituminous Sidewalk

Not to Scale



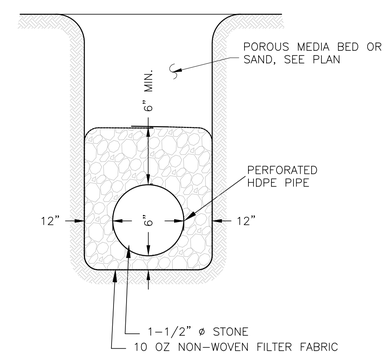
Access Drive Detail

Not to Scale



Porous Pavement Path

Not to Scale



Perimeter Underdrain Pipe Trench

Not to Scale

AGENCY REVIEW

no.	revision	date	by
3	TAC PUBLIC HEARING	8/19/2019	JHK
2	CONSERVATION COMMISSION SUBMISSION	07/24/2019	JHK
1	TAC WORK SESSION SUBMISSION	07/09/2019	JHK

CMA ENGINEERS
CIVIL/ENVIRONMENTAL/STRUCTURAL
Portsmouth, NH • Manchester, NH • Portland, ME
603/431-6196 603/627-0708 207/541-4223
c m a e n g i n e e r s . c o m

STATE OF NEW HAMPSHIRE JOSEPH H. KIEFFNER No. 9179 LICENSED PROFESSIONAL ENGINEER

designed by: ---
drawn by: AGL
approved by: ---
date: August 2019
project no: 1119
file name: 1119 DETAILS.dwg
scale:

City of Portsmouth, New Hampshire
Department of Public Works
Multi-purpose Recreation Fields-Phase I
680 Peverly Hill Road
Miscellaneous Details

drawing no. C-907

\\nhf2\MHT-Projects\CADD\PROJECTS\1119 Portsmouth Athletic fields\Production\1119 DETAILS.dwg Date Plotted: Aug 19, 2019 – 11:06am Plotted By: ALAWRENCE

CULTEC RECHARGER® 360HD PRODUCT SPECIFICATIONS

GENERAL

CULTEC RECHARGER® 360HD CHAMBERS ARE DESIGNED FOR UNDERGROUND STORMWATER MANAGEMENT. THE CHAMBERS MAY BE USED FOR RETENTION, RECHARGING, DETENTION OR CONTROLLING THE FLOW OF ON-SITE STORMWATER RUNOFF.

CHAMBER PARAMETERS

1. THE CHAMBERS SHALL BE MANUFACTURED IN THE U.S.A. OR CANADA BY CULTEC, INC. OF BROOKFIELD, CT. (203-775-4416 OR 1-800-428-5832)
2. THE CHAMBERS SHALL BE DESIGNED AND TESTED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS.
3. THE CHAMBER SHALL BE DESIGNED TO WITHSTAND THE AASHTO DESIGN TRUCK LOAD AND LIVE AND DEAD LOAD FACTORS AS DEFINED BY AASHTO LRFD SECTION 12.12 WHEN INSTALLED ACCORDING TO CULTEC'S RECOMMENDED INSTALLATION INSTRUCTIONS.
4. THE CHAMBER SHALL BE STRUCTURAL FOAM INJECTION MOLDED OF BLUE VIRGIN HIGH MOLECULAR WEIGHT IMPACT-MODIFIED POLYPROPYLENE.
5. THE CHAMBER SHALL BE ARCHED IN SHAPE.
6. THE CHAMBER SHALL BE OPEN-BOTTOMED.
7. THE CHAMBER SHALL BE JOINED USING AN INTERLOCKING OVERLAPPING RIB METHOD. CONNECTIONS MUST BE FULLY SHOULDERED OVERLAPPING RIBS, HAVING NO SEPARATE COUPLINGS.
8. THE NOMINAL CHAMBER DIMENSIONS OF THE CULTEC RECHARGER® 360HD SHALL BE 36 INCHES (915 mm) TALL, 60 INCHES (1525 mm) WIDE AND 50 INCHES (1275 mm) LONG. THE INSTALLED LENGTH OF A JOINED RECHARGER® 360HD SHALL BE 3.67 FEET (1.12 m).
9. MULTIPLE CHAMBERS MAY BE CONNECTED TO FORM DIFFERENT LENGTH ROWS. EACH ROW SHALL BEGIN AND END WITH A SEPARATELY FORMED CULTEC RECHARGER® 360HD END CAP. MAXIMUM INLET OPENING ON THE END CAP IS 24 INCH (600 mm) HDPE OR 30 INCH (750mm) PVC.
10. THE CHAMBER SHALL HAVE TWO SIDE PORTALS TO ACCEPT CULTEC HVLV™ FC-48 FEED CONNECTORS TO CREATE AN INTERNAL MANIFOLD. MAXIMUM ALLOWABLE PIPE SIZE IN THE SIDE PORTAL IS 10 INCH (250mm) HDPE OR 12 INCH (300mm) PVC.
11. THE NOMINAL CHAMBER DIMENSIONS OF THE CULTEC HVLV™ FC-48 FEED CONNECTOR SHALL BE 12 INCHES (305 mm) TALL, 16 INCHES (406 mm) WIDE AND 49 INCHES (1245 mm) LONG.
12. THE NOMINAL STORAGE VOLUME OF THE RECHARGER® 360HD CHAMBER SHALL BE 10.0 FT^3 / FT (.928 m^3 / m) - WITHOUT STONE. THE NOMINAL STORAGE VOLUME OF A JOINED RECHARGER® 360HD SHALL BE 36.66 FT^3 / UNIT (1.038 m^3 / UNIT) - WITHOUT STONE.
13. THE NOMINAL STORAGE VOLUME OF THE HVLV™ FC-48 FEED CONNECTOR SHALL BE 0.913 FT^3 / FT (0.085 m^3 / m) - WITHOUT STONE.
14. THE RECHARGER® 360HD CHAMBER SHALL HAVE 7 CORRUGATIONS.
15. THE CHAMBER SHALL BE MANUFACTURED IN A FACILITY EMPLOYING CULTEC'S QUALITY CONTROL AND ASSURANCE PROCEDURES.
16. MAXIMUM ALLOWABLE COVER OVER THE TOP OF THE CHAMBER SHALL BE 12.0 FEET (3.66 m).

END CAP PARAMETERS

1. THE CULTEC RECHARGER® 360HD END CAP (REFERRED TO AS 'END CAP') SHALL BE MANUFACTURED IN THE U.S.A. OR CANADA BY CULTEC, INC. OF BROOKFIELD, CT. (203-775-4416 OR 1-800-428-5832)
4. THE END CAP SHALL BE STRUCTURAL FOAM INJECTION MOLDED OF BLUE VIRGIN HIGH MOLECULAR WEIGHT IMPACT-MODIFIED POLYPROPYLENE.
5. THE END CAP SHALL BE ARCHED IN SHAPE.
6. THE END CAP SHALL BE OPEN-BOTTOMED.
7. THE END CAP SHALL BE JOINED AT THE BEGINNING AND END OF EACH ROW OF CHAMBERS USING AN INTERLOCKING OVERLAPPING RIB METHOD. CONNECTIONS MUST BE FULLY SHOULDERED OVERLAPPING RIBS, HAVING NO SEPARATE COUPLINGS.
8. THE END CAP SHALL HAVE 5 CORRUGATIONS.
9. THE NOMINAL DIMENSIONS OF THE END CAP SHALL BE 36.5 INCHES (927 mm) TALL, 60 INCHES (1525 mm) WIDE AND 18 INCHES (458 mm) LONG. WHEN JOINED WITH A RECHARGER 360HD CHAMBER, THE INSTALLED LENGTH OF THE END CAP SHALL BE 15 INCHES (381 mm).
10. THE NOMINAL STORAGE VOLUME OF THE END CAP SHALL BE 5.17 FT^3 / FT (0.48 m^3 / m) - WITHOUT STONE. THE NOMINAL STORAGE VOLUME OF AN INTERLOCKED END CAP SHALL BE 6.46 FT^3 / UNIT (0.183 m^3 / UNIT) - WITHOUT STONE.
11. MAXIMUM INLET OPENING ON THE END CAP IS 24 INCH (600 mm) HDPE OR 30 INCH (750mm) PVC.
12. THE CHAMBER SHALL BE MANUFACTURED IN A FACILITY EMPLOYING CULTEC'S QUALITY CONTROL AND ASSURANCE PROCEDURES
13. THE END CAP SHALL PROVIDE RESISTANCE TO THE LOADS AND LOAD FACTORS AS DEFINED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS SECTION 12.12.

CULTEC NO. 410™ NON-WOVEN GEOTEXTILE

CULTEC NO. 410™ NON-WOVEN GEOTEXTILE MAY BE USED WITH CULTEC CONTACTOR® AND RECHARGER® STORMWATER INSTALLATIONS TO PROVIDE A BARRIER THAT PREVENTS SOIL INTRUSION INTO THE STONE.

GEOTEXTILE PARAMETERS

1. THE GEOTEXTILE SHALL BE PROVIDED BY CULTEC, INC. OF BROOKFIELD, CT. (203-775-4416 OR 1-800-428-5832)
2. THE GEOTEXTILE SHALL BE BLACK IN APPEARANCE.
3. THE GEOTEXTILE SHALL HAVE A TYPICAL WEIGHT OF 4.5 OZ/SY (142 G/M).
4. THE GEOTEXTILE SHALL HAVE A TENSILE STRENGTH VALUE OF 120 LBS (533 N) PER ASTM D4632 TESTING METHOD.
5. THE GEOTEXTILE SHALL HAVE AN ELONGATION @ BREAK VALUE OF 50% PER ASTM D4632 TESTING METHOD.
6. THE GEOTEXTILE SHALL HAVE A MULLEN BURST VALUE OF 225 PSI (1551 KPA) PER ASTM D3786 TESTING METHOD.
7. THE GEOTEXTILE SHALL HAVE A PUNCTURE STRENGTH VALUE OF 65 LBS (289 N) PER ASTM D4833 TESTING METHOD.
8. THE GEOTEXTILE SHALL HAVE A CBR PUNCTURE VALUE OF 340 LBS (1513 N) PER ASTM D6241 TESTING METHOD.
9. THE GEOTEXTILE SHALL HAVE A TRAPEZOID TEAR VALUE OF 50 LBS (222 N) PER ASTM D4533 TESTING METHOD.
10. THE GEOTEXTILE SHALL HAVE A AOS VALUE OF 70 U.S. SIEVE (0.212 MM) PER ASTM D4751 TESTING METHOD.
11. THE GEOTEXTILE SHALL HAVE A PERMITTIVITY VALUE OF 1.7 SEC-1 PER ASTM D4491 TESTING METHOD.
12. THE GEOTEXTILE SHALL HAVE A WATER FLOW RATE VALUE OF 135 GAL/MIN/SF (5500 L/MIN/SM) PER ASTM D4491 TESTING METHOD.
13. THE GEOTEXTILE SHALL HAVE A UV STABILITY @ 500 HOURS VALUE OF 70% PER ASTM D4355 TESTING METHOD.

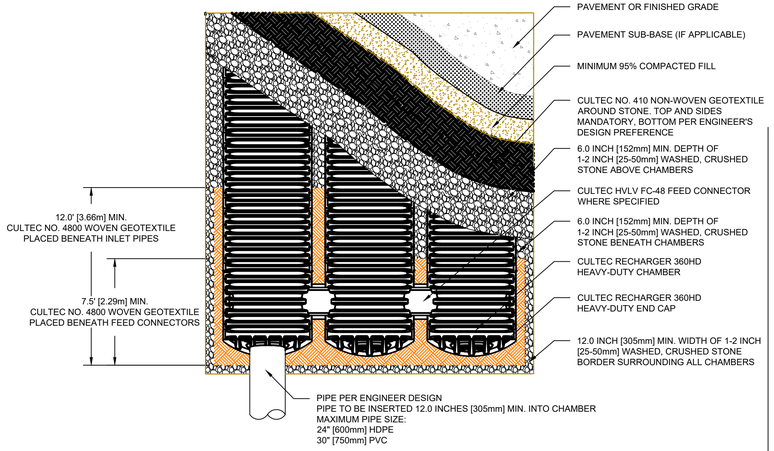
CULTEC NO. 4800™ WOVEN GEOTEXTILE

CULTEC NO. 4800 WOVEN GEOTEXTILE IS DESIGNED AS A UNDERLAYMENT TO PREVENT SCOURING CAUSED BY WATER MOVEMENT WITHIN THE CULTEC CHAMBERS AND FEED CONNECTORS UTILIZING THE CULTEC MANIFOLD FEATURE. IT MAY ALSO BE USED AS A COMPONENT OF THE CULTEC SEPARATOR ROW TO ACT AS A BARRIER TO PREVENT SOIL/CONTAMINANT INTRUSION INTO THE STONE WHILE ALLOWING FOR MAINTENANCE.

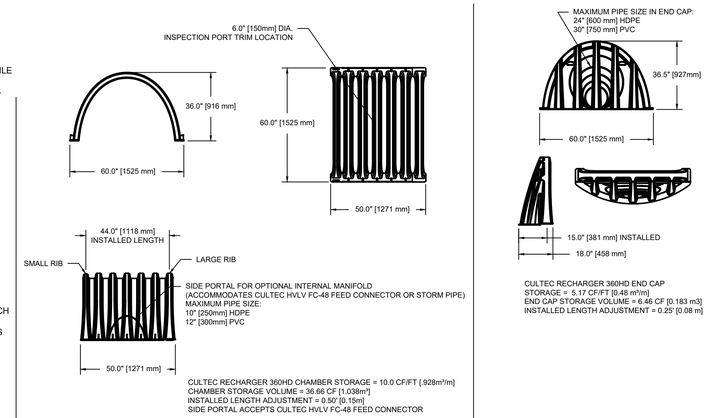
GEOTEXTILE PARAMETERS

1. THE GEOTEXTILE SHALL BE PROVIDED BY CULTEC, INC. OF BROOKFIELD, CT. (203-775-4416 OR 1-800-428-5832)
2. THE GEOTEXTILE SHALL BE BLACK IN APPEARANCE.
3. THE GEOTEXTILE SHALL HAVE A TENSILE STRENGTH OF 550 X 550 LBS (2,448 X 2,448 N) PER ASTM D4632 TESTING METHOD.
4. THE GEOTEXTILE SHALL HAVE A ELONGATION @ BREAK RESISTANCE OF 20 X 20% PER ASTM D4632 TESTING METHOD.
5. THE GEOTEXTILE SHALL HAVE A WIDE WIDTH TENSILE RESISTANCE OF 5,070 X 5,070 LBS/FT (74 X 74 KN/M) PER ASTM D4595 TESTING METHOD.
6. THE GEOTEXTILE SHALL HAVE A WIDE WIDTH TENSILE RESISTANCE @ 2% STRAIN OF 960 X 1,096 LBS/FT (14 X 16 KN/M) PER ASTM D4595 TESTING METHOD.
7. THE GEOTEXTILE SHALL HAVE A WIDE WIDTH TENSILE RESISTANCE @ 5% STRAIN OF 2,740 X 2, 740 LBS/FT (40 X 40 KN/M) PER ASTM D4595 TESTING METHOD.
8. THE GEOTEXTILE SHALL HAVE A WIDE WIDTH TENSILE RESISTANCE @ 10% STRAIN OF 4,800 X 4,800 LBS/FT (70 X 70 KN/M) PER ASTM D4595 TESTING METHOD.
9. THE GEOTEXTILE SHALL HAVE A CBR PUNCTURE RESISTANCE OF 1,700 LBS (7,560 N) PER ASTM D6241 TESTING METHOD.
10. THE GEOTEXTILE SHALL HAVE A TRAPEZOIDAL TEAR RESISTANCE OF 180 X 180 LBS (801 X 801 N) PER ASTM D4533 TESTING METHOD.
11. THE GEOTEXTILE SHALL HAVE AN APPARENT OPENING SIZE OF 40 US STD. SIEVE (0.425 MM) PER ASTM D4751 TESTING METHOD.
12. THE GEOTEXTILE SHALL HAVE A PERMITTIVITY RATING OF 0.15 SEC-1 PER ASTM D4491 TESTING METHOD.
13. THE GEOTEXTILE SHALL HAVE A WATER FLOW RATING OF 11.5 GPM/FT2 (470 LPM/M2) PER ASTM D4491 TESTING METHOD.
14. THE GEOTEXTILE SHALL HAVE A UV RESISTANCE OF 80% @ 500 HRS. PER ASTM D4355 TESTING METHOD.

360HD 1.0 **GENERAL NOTES**

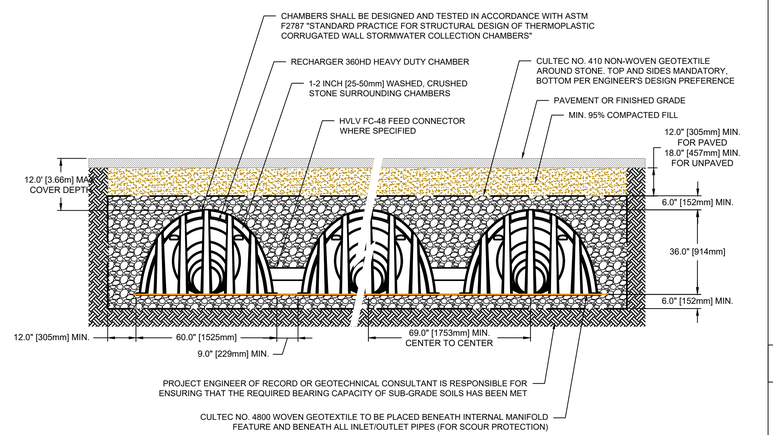


360HD 2.0 **CULTEC RECHARGER 360HD HEAVY DUTY PLAN VIEW**

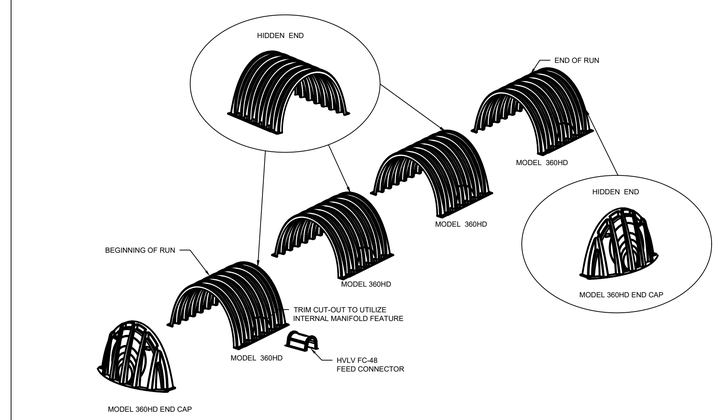


360HD 3.0 **CULTEC RECHARGER 360HD HEAVY DUTY THREE VIEW**

360HD 4.0 **CULTEC RECHARGER 360HD HEAVY DUTY END CAP THREE VIEW**



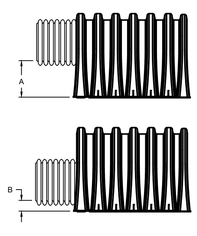
360HD 5.0 **CULTEC RECHARGER 360HD HEAVY DUTY CROSS SECTION**



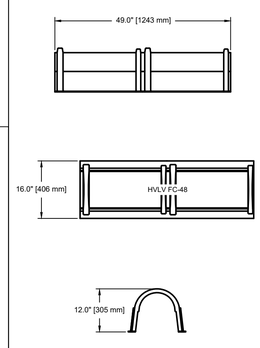
360HD 6.0 **CULTEC RECHARGER 360HD HEAVY DUTY TYPICAL INTERLOCK**

PIPE	A	B
6" [150 mm]	26.00" [660 mm]	0.75" [20 mm]
8" [200 mm]	24.00" [600 mm]	1.00" [25 mm]
10" [250 mm]	21.00" [525 mm]	1.25" [32 mm]
12" [300 mm]	18.00" [450 mm]	1.75" [45 mm]
15" [375 mm]	15.00" [375 mm]	2.00" [50 mm]
18" [450 mm]	12.00" [300 mm]	2.25" [58 mm]
24" [600 mm]	6.00" [150 mm]	2.50" [64 mm]

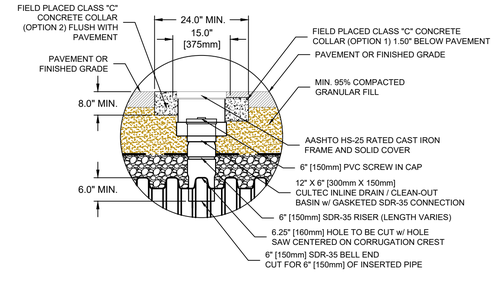
*THE TYPICAL INVERT TABLE ABOVE IS BASED ON THE INSIDE DIAMETER OF STANDARD CORRUGATED PLASTIC PIPE. THE HEAVY DUTY END CAP HAS PRE-MARKED TRIM LINES FOR PIPE DIAMETERS 12" (300mm), 15" (375mm), 18" (450mm) AND 24" (600mm). PIPES OF ANY SIZE AND MATERIAL UP TO 24" (600mm) MAY BE PLACED AT CUSTOM LOCATIONS AND CUSTOM INVERTS. 30" (750 mm) SMOOTH-WALL SDR-35 PVC PIPE MAY BE USED AT THE BOTTOM OF THE END CAP. THE CROWN OF THE PIPE MUST REMAIN A MINIMUM OF 3" (75mm) FROM THE EDGE OF THE HEAVY DUTY END CAP.



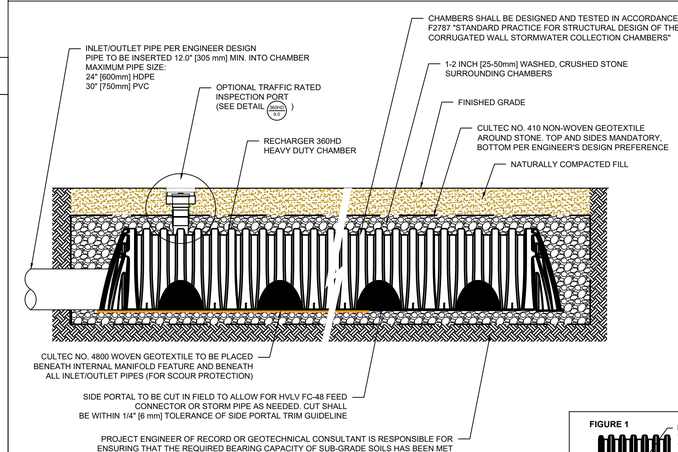
360HD 7.0 **CULTEC RECHARGER 360HD TYPICAL PIPE INVERTS**



360HD 8.0 **CULTEC HVLV FC-48 FEED CONNECTOR THREE VIEW**

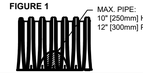


360HD 9.0 **OPTIONAL INSPECTION PORT - ZOOM DETAIL**



*THE CHAMBER SYSTEM SHALL PROVIDE RESISTANCE TO THE LOADS AND LOAD FACTORS AS DEFINED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS SECTION 12.12, WHEN INSTALLED ACCORDING TO CULTEC'S LATEST INSTALLATION GUIDE.

FIGURE 1



ZOOM OF SIDE PORTAL SHOWING MAX. PIPE O.D.

360HD 10.0 **CULTEC INTERNAL MANIFOLD - OPTIONAL INSPECTION PORT DETAIL**

no.	revision	date	by

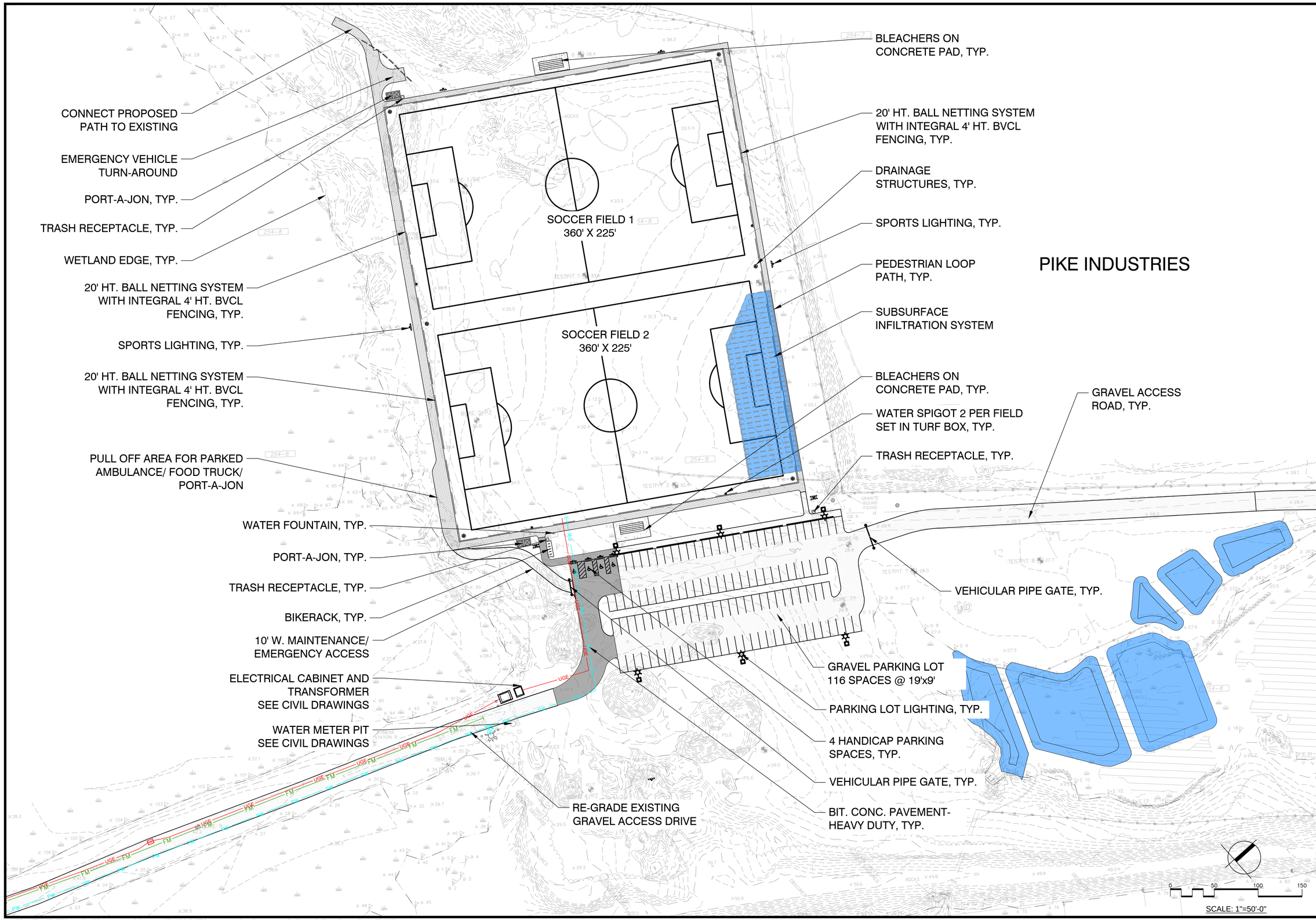
CMA ENGINEERS
CIVIL/ENVIRONMENTAL/STRUCTURAL
Portsmouth, NH • Manchester, NH • Portland, ME
603/431-6196 603/627-0708 207/541-4223
c m a e n g i n e e r s . c o m

designed by: ---
drawn by: AGL
approved by:
date: August 2019
project no: 1119
file name: 1119 DETAILS-Stormwater-Chambers.dwg
scale:

City of Portsmouth, New Hampshire
Department of Public Works
Multi-purpose Recreation Fields-Phase I
680 Peverly Hill Road
Stormwater Chambers

drawing no. C-909

\\nhh2\MHT-Projects\CADD\PROJECTS\1119 Portsmouth Athletic fields\Production\1119 DETAILS-Stormwater-Chambers.dwg Date Plotted: Aug 19, 2019 – 11:06am Plotted By: ALAWRENCE



PIKE INDUSTRIES

no.	revision	date	by

CMA ENGINEERS
CIVIL / ENVIRONMENTAL ENGINEERS
Portsmouth, NH Manchester, NH Portland, Maine

Weston & Sampson
427 Main Street, Suite 400, Worcester, MA
(978) 977-0110 (800) 726-7766
(Sampson)
www.westonandsampson.com

designed by: -
drawn by: -
approved by: -
date: -
project no: -
file name: Phase 1.dwg
scale:

City of Portsmouth, New Hampshire
Department of Public Works

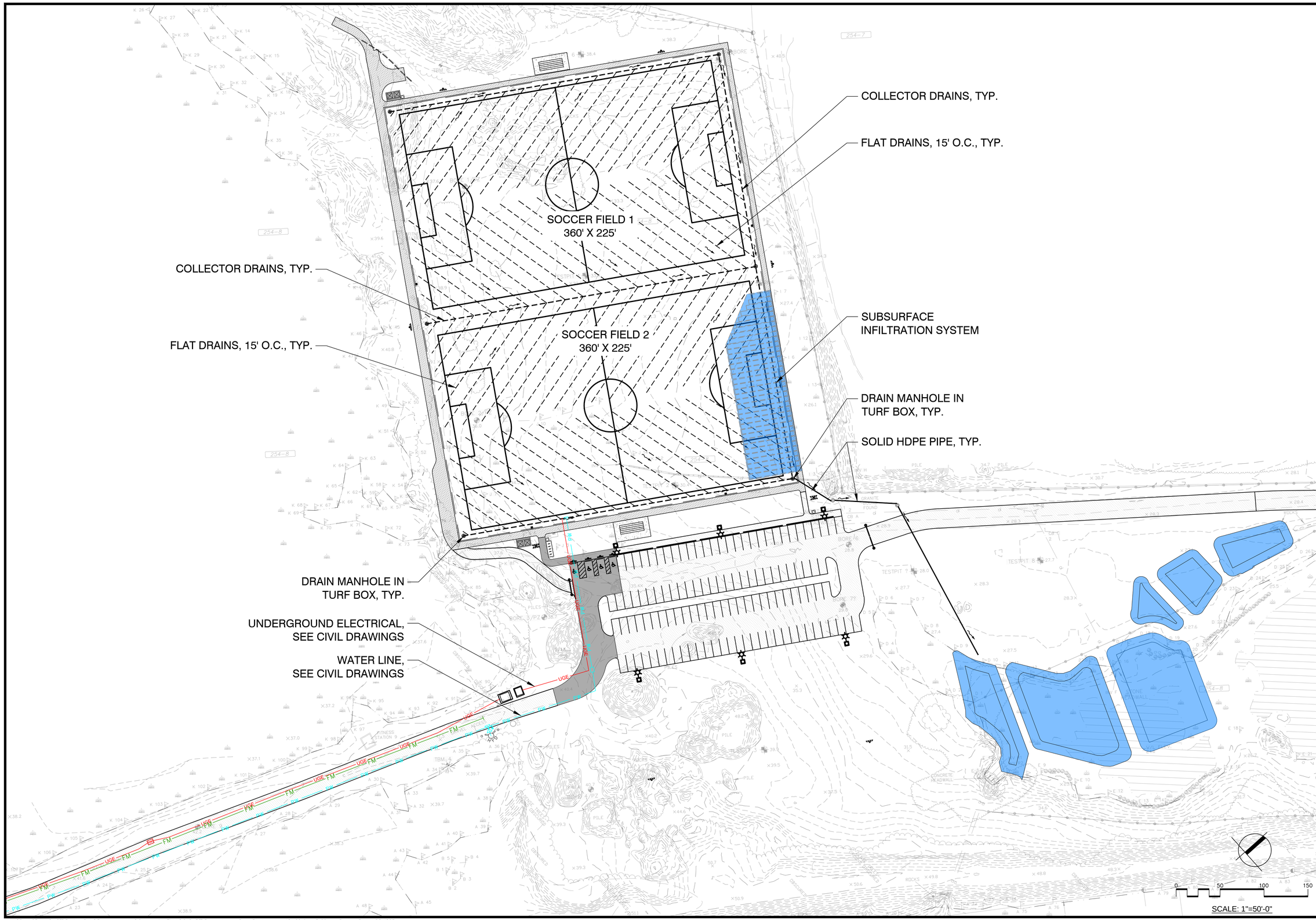
Multi-purpose Recreation Fields
680 Peverly Hill Road

Recreation Fields
SITE PLAN

drawing no. L1.01

sheet: 32 - of 37 -

\\wse03.local\WSE\Projects\NH\Portsmouth, NH\Community Fields\CADART\Phase 1.dwg Date Plotted: Aug 18, 2019 – 8:25pm Plotted By: ANDRIKOSE



no.	revision	date	by

CMA ENGINEERS
CIVIL/ENVIRONMENTAL ENGINEERS
Portsmouth, NH Manchester, NH Portland, Maine

Weston & Sampson
427 Main Street, Suite 400, Worcester, MA
(978) 977-0110 (800) 726-7766
(Sampson)
www.westonandsampson.com

designed by: -
drawn by: -
approved by: -
date: -
project no: -
file name: Phase 1.dwg
scale:

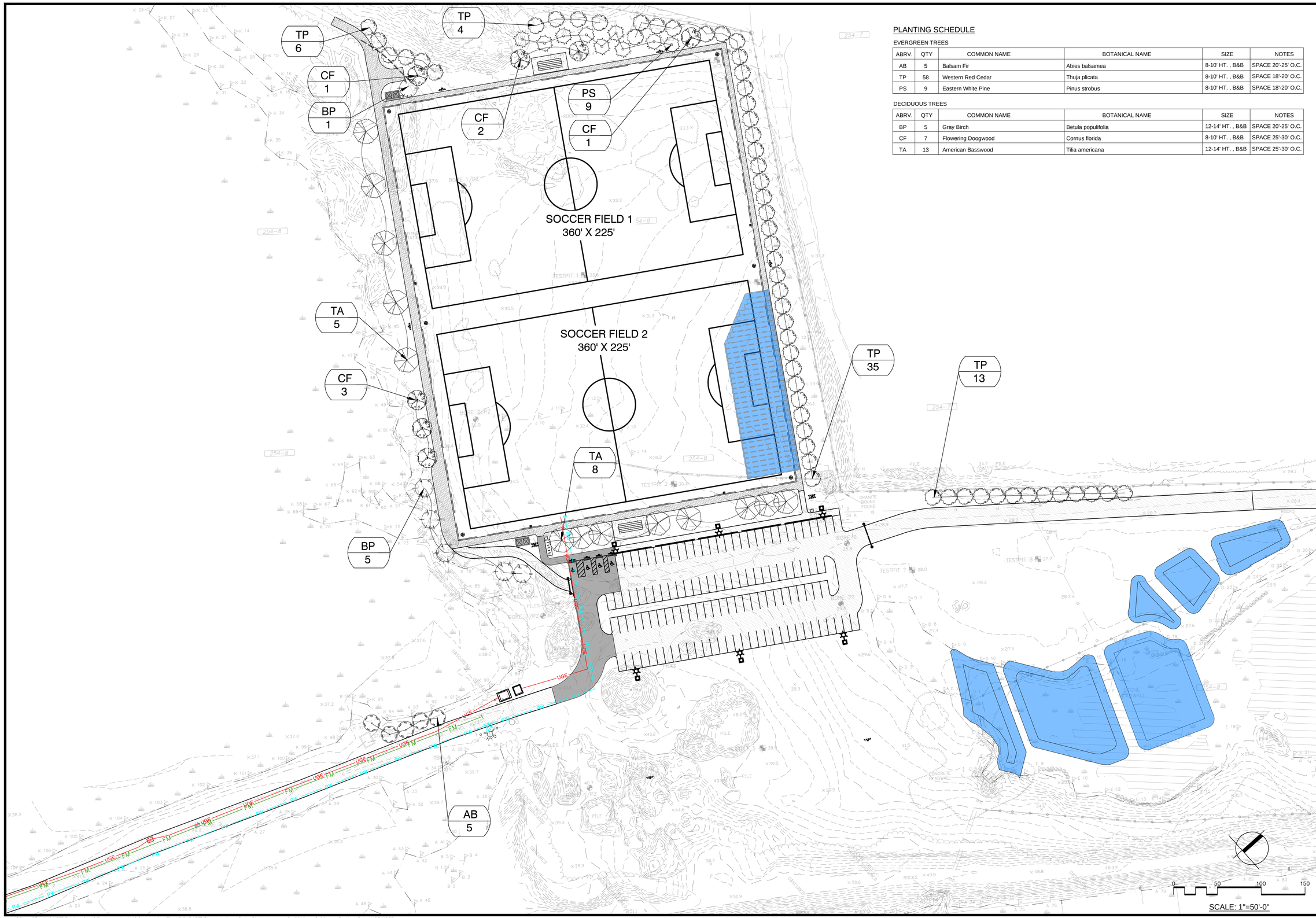
City of Portsmouth, New Hampshire
Department of Public Works
Multi-purpose Recreation Fields
680 Peverly Hill Road

Recreation Fields
DRAINAGE & UTILITIES

drawing no.
L1.02

sheet: 33 - of 37 -

\\wse03.local\WSE\Projects\NH\Portsmouth, NH\Community Fields\CADART\Phase 1.dwg Date Plotted: Aug 18, 2019 – 8:26pm Plotted By: ANDRIKOSE



PLANTING SCHEDULE

EVERGREEN TREES

ABRV.	QTY	COMMON NAME	BOTANICAL NAME	SIZE	NOTES
AB	5	Balsam Fir	Abies balsamea	8-10' HT. , B&B	SPACE 20'-25' O.C.
TP	58	Western Red Cedar	Thuja plicata	8-10' HT. , B&B	SPACE 18'-20' O.C.
PS	9	Eastern White Pine	Pinus strobus	8-10' HT. , B&B	SPACE 18'-20' O.C.

DECIDUOUS TREES

ABRV.	QTY	COMMON NAME	BOTANICAL NAME	SIZE	NOTES
BP	5	Gray Birch	Betula populifolia	12-14' HT. , B&B	SPACE 20'-25' O.C.
CF	7	Flowering Doogwood	Cornus florida	8-10' HT. , B&B	SPACE 25'-30' O.C.
TA	13	American Basswood	Tilia americana	12-14' HT. , B&B	SPACE 25'-30' O.C.

no.	revision	date	by

CMA ENGINEERS
CIVIL/ENVIRONMENTAL ENGINEERS
Portsmouth, NH Manchester, NH Portland, Maine
Weston & Sampson
427 Main Street, Suite 400, Worcester,MA
(978) 977-0110 (800) 726-7766
(Sampson)
www.westonandsampson.com

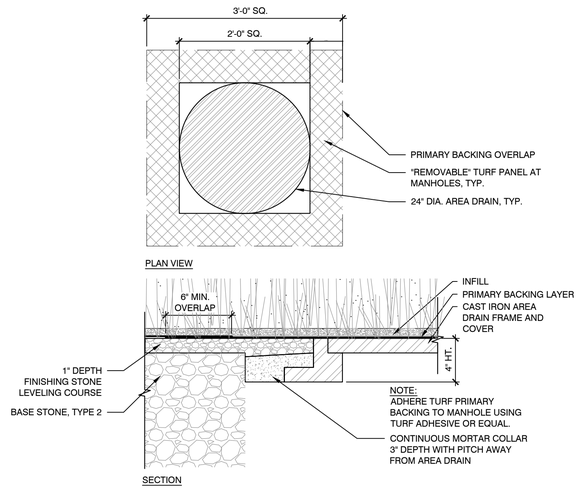
designed by: -
drawn by: -
approved by: -
date: -
project no: -
file name: Phase 1.dwg
scale:

City of Portsmouth, New Hampshire
Department of Public Works
Multi-purpose Recreation Fields
680 Peverly Hill Road
Recreation Fields
PLANTING PLAN

drawing no. L1.03

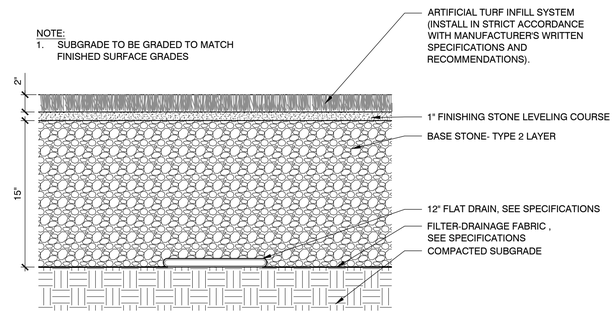
sheet: 34 - of 37 -

\\wse03.local\WSE\Projects\NH\Portsmouth, NH\Community Fields\CADART\Phase 1.dwg Date Plotted: Aug 18, 2019 – 8:26pm Plotted By: ANDRIKOSE



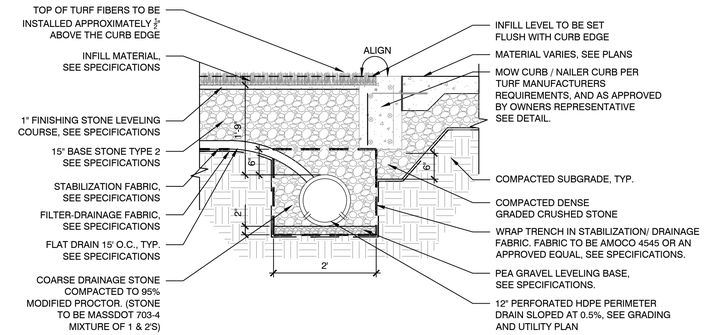
1 PVC DRAINAGE MANHOLE IN TURF FIELD

SCALE: N.T.S.



3 SYNTHETIC TURF FIELD

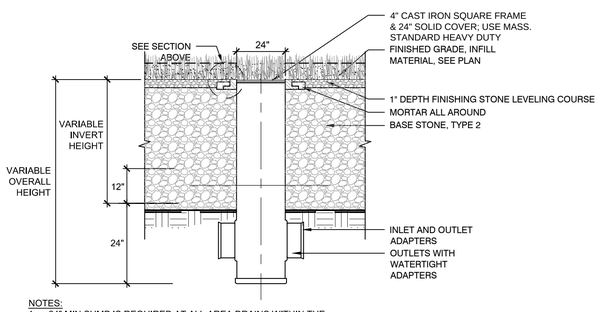
SCALE: NTS



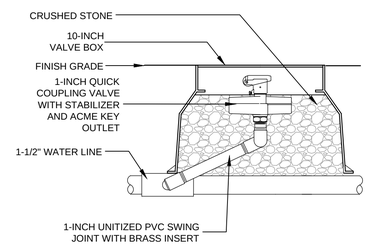
NOTES:
1. FLAT DRAIN TO BE DIRECTLY CONNECTED TO PERIMETER DRAIN. PROVIDE MANUFACTURED FITTINGS TO MAKE THE CONNECTION AS REQUIRED AND APPROVED BY THE OWNERS REPRESENTATIVE.
2. CONCRETE CURB TO BE 4,500 PSI AT 28 DAYS (AIR CONTENT 6% +/- 1%) (COARSE AGGREGATE ASTM C-33 SIZE #57)

5 COLLECTOR DRAIN

SCALE: NTS

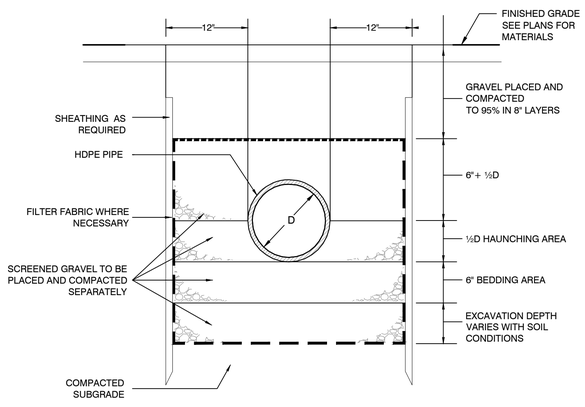


NOTES:
1. 24" MIN SUMP IS REQUIRED AT ALL AREA DRAINS WITHIN THE SYNTHETIC TURF FIELD.
2. GRATES AND/OR COVERS SHALL BE 24" ROUND AT THE LOCATIONS INDICATED ON THE GRADING PLAN.



4 QUICK COUPLER HOSE CONNECTION, VALVE AND BOX

SCALE: NTS



2 DRAIN PIPE TRENCH

SCALE: NTS

no.	revision	date	by

CMA ENGINEERS
CIVIL / ENVIRONMENTAL ENGINEERS
Portsmouth, NH Manchester, NH Portland, Maine

Weston & Sampson
427 Main Street, Suite 400, Worcester, MA
(978) 977-0110 (800) 726-7766
(Sampson)
www.westonandsampson.com

designed by: -
drawn by: -
approved by: -
date: -
project no: -
file name: L7.01- Drainage Details.dwg
scale:

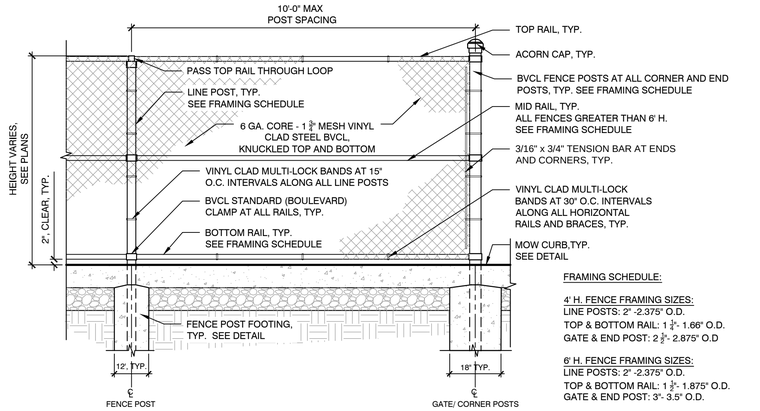
City of Portsmouth, New Hampshire
Department of Public Works

Multi-purpose Recreation Fields
680 Peverly Hill Road

Recreation Fields
DETAILS

drawing no.
L2.00

sheet: 35 - of 37 -



FRAMING SCHEDULE:

4' H. FENCE FRAMING SIZES:
LINE POSTS: 2" -2.375" O.D.
TOP & BOTTOM RAIL: 1 3/4"- 1.66" O.D.
GATE & END POST: 2 3/8"- 2.875" O.D

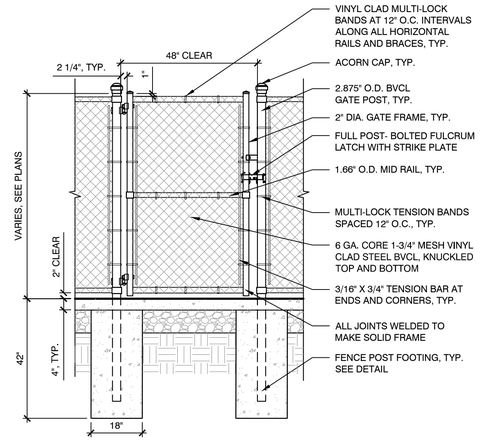
6' H. FENCE FRAMING SIZES:
LINE POSTS: 2" 2.375" O.D.
TOP & BOTTOM RAIL: 1 3/4"- 1.875" O.D.
GATE & END POST: 3"- 3.5" O.D.

8' H. FENCE FRAMING SIZES:
LINE POSTS: 2.5" -2.875" O.D.
TOP, MID & BOTTOM RAIL: 2"- 2.375" O.D.
GATE & END POST: 3"- 3.5" O.D

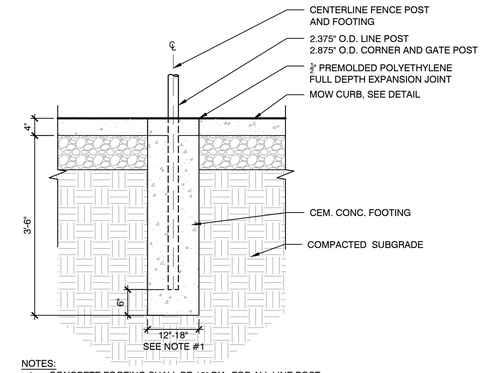
10' H. & ABOVE FENCE FRAMING SIZES:
LINE POSTS: 2.5" -2.875" O.D.
TOP, MID & BOTTOM RAIL: 2.5"- 2.375" O.D.
CORNER & END POST: 4"- 4" O.D.
GATE POST: 4"- 4" O.D

NOTES:
1. ALL FENCE PIPE SHALL BE SCH. 40, VINYL CLAD HOT DIP GALV. STEEL PIPE.
2. ALL LINE POSTS SHALL BE INSTALLED EQUALLY SPACED BETWEEN END & CORNER POSTS.
3. ALL CLAMPS, TIES, POST TOPS, BANDS, POSTS, ETC. SHALL BE VINYL CLAD TO MATCH FABRIC.
4. REFER TO DETAIL AND SPECS FOR GATE REQUIREMENTS.
5. SEE FRAMING SCHEDULE FOR SIZING.

1 BVCL SINGLE SWING GATE
SCALE: N.T.S.

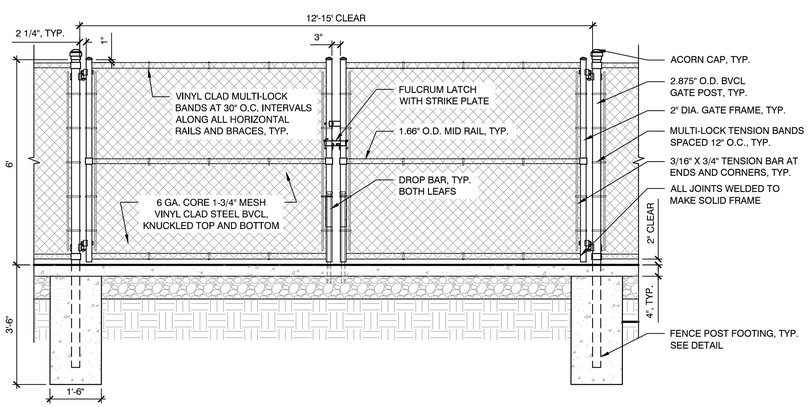


3 BVCL SINGLE SWING GATE
SCALE: N.T.S.

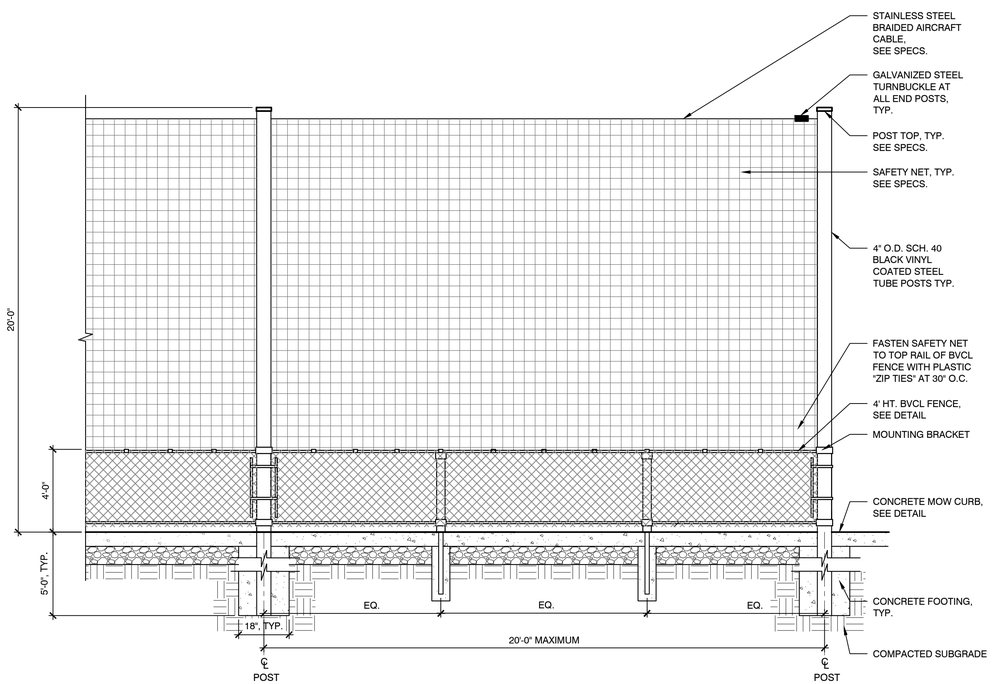


NOTES:
1. CONCRETE FOOTING SHALL BE 12" DIA. FOR ALL LINE POST. PROVIDE 18" DIA. FOOTING AT ALL CORNER AND GATE POSTS.

5 FENCE POST FOOTING
SCALE: N.T.S.



2 BVCL DOUBLE SWING GATE
SCALE: N.T.S.



4 BALL NETTING INTEGRAL WITH 4' HT. BCVL FENCE, TYP.
SCALE: N.T.S.

no.	revision	date	by

CMA ENGINEERS
CIVIL / ENVIRONMENTAL ENGINEERS
Portsmouth, NH Manchester, NH Portland, Maine

Weston & Sampson
427 Main Street, Suite 400, Worcester, MA
(978) 977-0110 (800) 726-7766
(Sampson)
www.westonandsampson.com

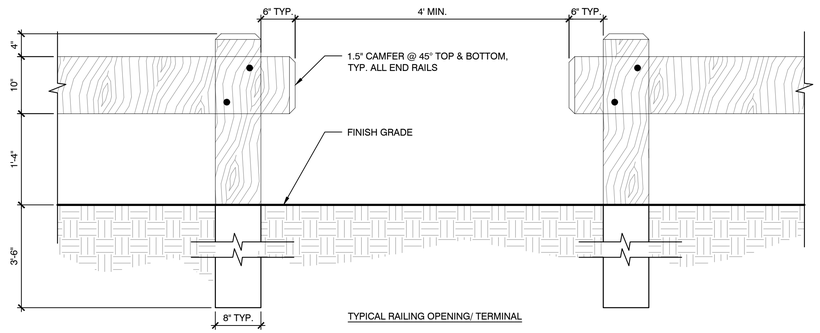
designed by: -
drawn by: -
approved by: -
date: -
project no: -
file name: L7.01- Drainage Details.dwg
scale:

City of Portsmouth, New Hampshire
Department of Public Works
Multi-purpose Recreation Fields
680 Peverly Hill Road
Recreation Fields
DETAILS

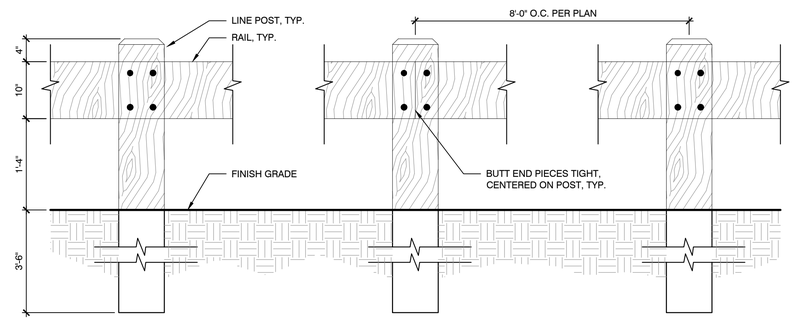
drawing no.
L2.01

sheet: 36 - of 37 -

\\wse03.local\WSE\Projects\NH\Portsmouth, NH\Community Fields\CADART\L7.01- Drainage Details.dwg Date Plotted: Aug 14, 2019 - 2:25pm Plotted By: ANDRIKOSE

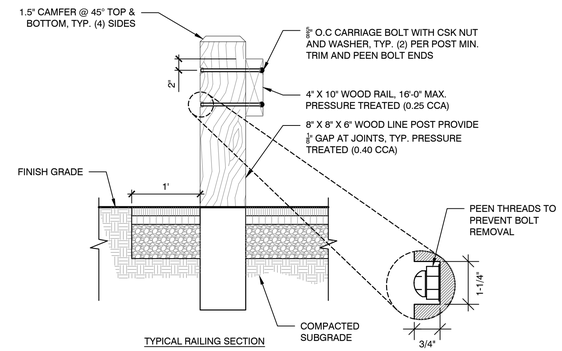


TYPICAL RAILING OPENING/ TERMINAL

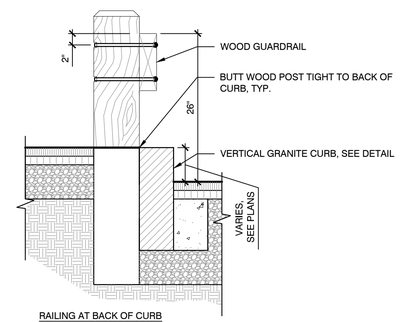


TYPICAL RAILING ELEVATION

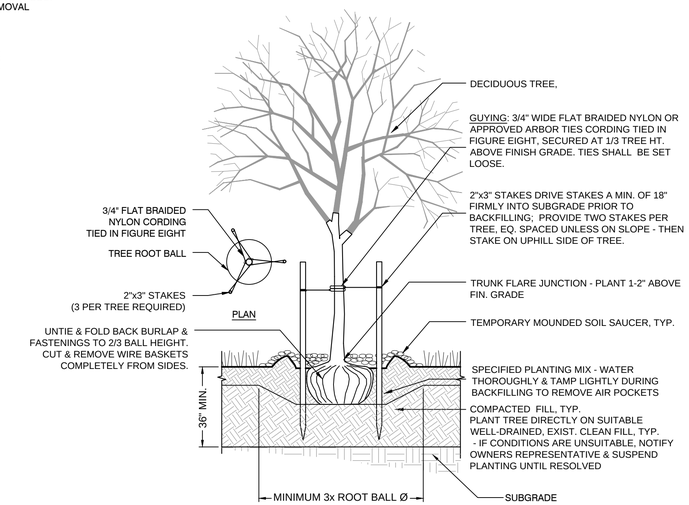
1 WOOD GUARDRAIL
SCALE: NTS



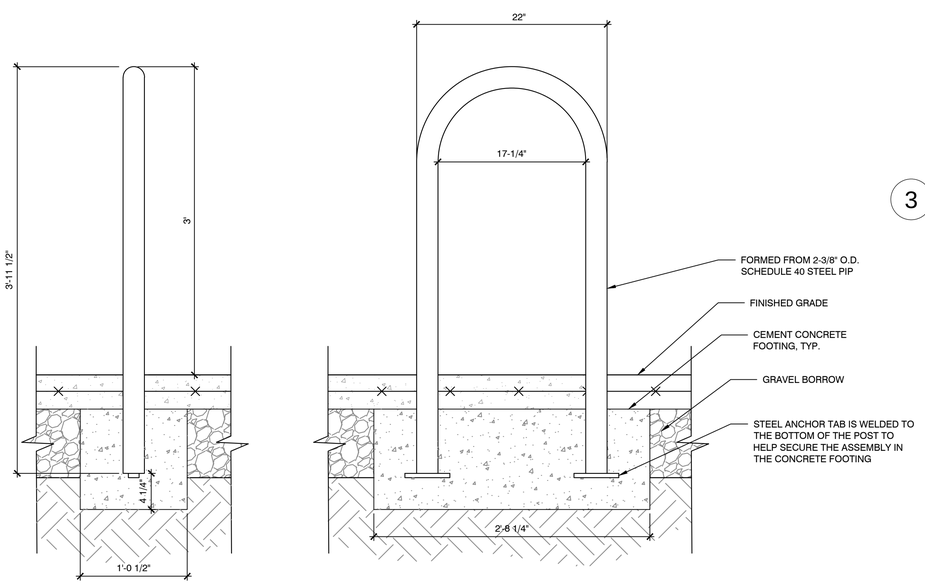
TYPICAL RAILING SECTION



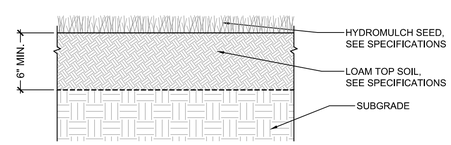
RAILING AT BACK OF CURB



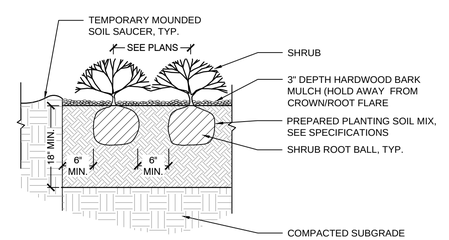
5 TREE PLANTING- DECIDUOUS
SCALE: NTS



2 BIKE RACK
SCALE: NTS

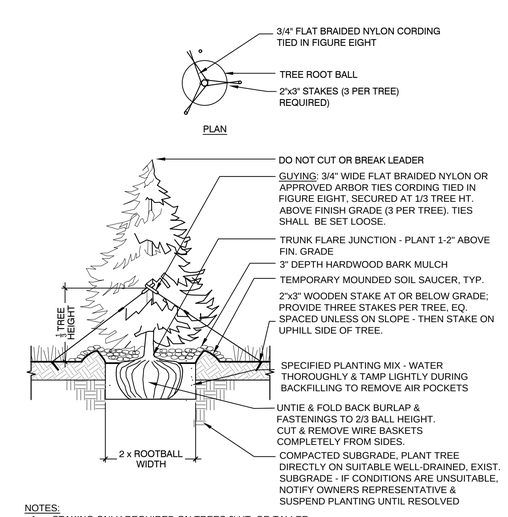


3 LOAM AND SEED
SCALE: NTS



NOTES:
1. ALL MULCH MUST BE DOUBLE GROUND AND DARK IN COLOR. PROVIDE SAMPLE PRIOR TO INSTALLATION TO BE APPROVED BY OWNER'S REPRESENTATIVE.

4 SHRUB PLANTING
SCALE: NTS



NOTES:
1. STAKING ONLY REQUIRED ON TREES 6' HT. OR TALLER.

6 TREE PLANTING- EVERGREEN
SCALE: NTS

no.	revision	date	by

CMA ENGINEERS
CIVIL / ENVIRONMENTAL ENGINEERS
Portsmouth, NH Manchester, NH Portland, Maine
Weston & Sampson
427 Main Street, Suite 400, Worcester, MA
(978) 977-0110 (800) 726-7766
(Sampson)
www.westonandsampson.com

designed by: -
drawn by: -
approved by: -
date: -
project no: -
file name: L7.01- Drainage Details.dwg
scale:

City of Portsmouth, New Hampshire
Department of Public Works
Multi-purpose Recreation Fields
680 Peverly Hill Road
Recreation Fields
DETAILS

drawing no. L2.02

\\wse03.local\WSE\Projects\NH\Portsmouth, NH\Community Fields\CADART\L7.01- Drainage Details.dwg Date Plotted: Aug 14, 2019 - 2:29pm Plotted By: ANDRIKOSE

Model: Steelworx Square Porta Enclosure, 10'
Model # SQ-10-SW-ENC

Manufacturing Mission: To provide all prefabricated components and installation instructions for a 10' square (measured from eave to eave) free standing bolt together, tubular steel constructed shelter kit.

Design Criteria: Structure is typically designed for a 25 lb live load and a 90 mph wind load capacity, but can be designed based on specific site requirements upon request. All structural members are ASTM A-500 U.S. grade B steel. Welded connection plates shall be ASTM A-36 hot rolled steel. All fabrication performed to latest AISC standards by AWS Certified welders. All framing connections are done using A325 grade bolts within concealed access openings from above and will later be concealed by the roofing. All roof framing shall be flush against the roof decking to eliminate the possibility of bird nesting.

Tubular Steel Columns and Beams: Standard column dimension shall be 5" x 5" x 3/16" tubular steel welded to 5/8" base plates for surface mounting. Main support beams are 5" x 5" x 3/16" and purlins are 4" x 3" x 1/8". Steel sizes are preliminary and may change due to ongoing review and final engineering.

Roofing: 24 Ga. pre-cut steel Multi-Rib panels with Kynar 500 finish in a variety of colors with white underside. Standard roof slope is a 4/12 pitch with a eave height of 7'-6". Attached to structural framing with exposed self tapping screws painted to match roof color. Matching 24 Ga. trim included.

Screening: 20 Ga. steel panels with 50% perforation surrounded by a 1 1/2" x 1 1/2" steel tube frame with 2 1/2" x 1 1/2" steel tube support beams. Perforated panels and frame shall receive the same polyester powder coat finish as the main shelter frame. Various perforated screens styles are available.

Frame Finish: All steel framework will receive a corrosion protective TGIC Polyester powder coat, electro-statically applied and cured at 400°F. A large selection of standard colors are available.

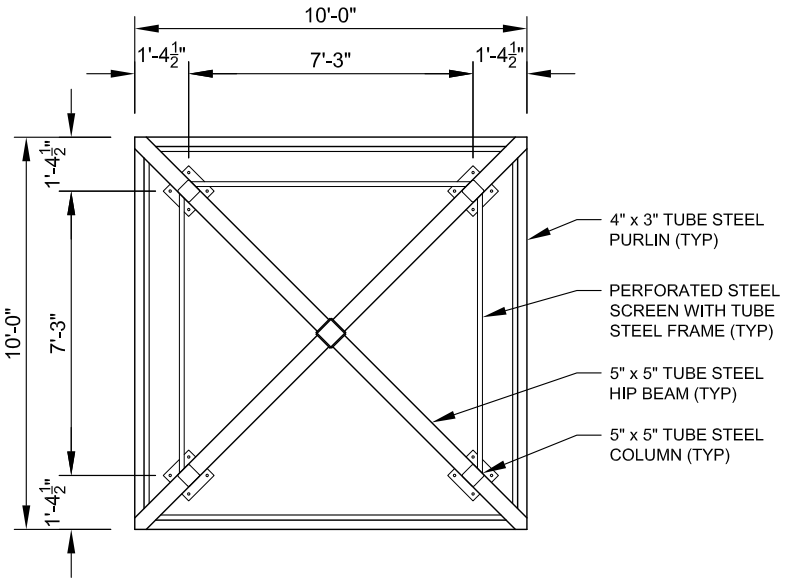
Foundation: All columns need to be anchored to concrete footings (footing design provided separately). Columns can be surface mounted to footings with anchor bolts at or below finish slab elevation or they can be embedded directly into the footing without base plates upon request. Anchor bolts and bracing templates are included. Optional base plate covers are available at an additional cost.

Hardware: All structural hardware and roofing fasteners shall be provided.

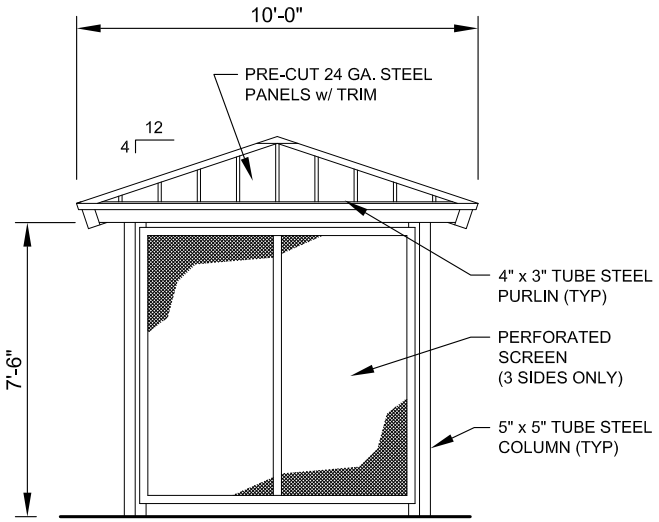
Warranty: 10 years against manufacturer defects.

Not Included: Concrete work of any kind, unloading of product and installation.

Additional Options: Visit www.Coverworx.com for the latest available options and upgrades.



FRAMING PLAN
SCALE: 1/4" = 1'-0"



ELEVATION
SCALE: 1/4" = 1'-0"

COVERWORX
Recreational Architecture
A Division of Ross & Barr Inc.

11800 East 9 Mile Road
Warren, MI 48089
Office: (586) 486-1088
Fax: (586) 754-9130
Toll Free: (800) 657-6118
Email: info@coverworx.com
www.CoverWorx.com

Steelworx Square Porta Enclosure - 10'

Model: SQ-10-SW-ENC

DESIGN SPECIFICATIONS

City of Portsmouth

Application for Site Plan Review
City of Portsmouth, NH

Multi-purpose Recreational Fields
Stormwater Management Report

August 2019

Submitted by:

City of Portsmouth
Department of Public Works
680 Peverly Road
Portsmouth, New Hampshire

Prepared by:

CMA ENGINEERS
Civil and Environmental Engineers
35 Bow Street
Portsmouth, New Hampshire 03801

STATE OF NEW HAMPSHIRE
JOSEPH H. KIEFFNER
No. 13174
LICENSED
PROFESSIONAL ENGINEER

Joseph H. Kieffner

Application for Site Plan Review, City of Portsmouth, NH
Stormwater Management Report
City of Portsmouth
Portsmouth, New Hampshire

August 2019

TABLE OF CONTENTS

Storm Water Management Report..... Page

Project Description 1

Pre-Development Conditions..... 4

Post-Development Conditions 5

Stormwater Control Practices..... 8

Stormwater Recharge Practices..... 8

Stormwater Treatment Practices..... 9

Regional Treatment Practices 10

Erosion and Sediment Control During Construction 11

Conclusions 11

LOCUS MAPS

Figure 1: Locus Ortho Map
Figure 2: USGS Quad Map
FEMA FIRMette Map

APPENDICES

A. Site Specific Soil Mapping
B. USDA Web Soil Survey
C. Extreme Precipitation Table
D. Pre-Development Drainage Analysis
    i. Pre-Development Watershed Plan
    ii. 2-Year, 24 Hour Storm HydroCAD Calculations
    iii. 10-Year, 25-Year, and 50-Year 24 Hour Storm Summary Calculations
E. Post-Development Drainage Analysis
    i. Post-Development Watershed Plan
    ii. 2-Year, 24 Hour Storm HydroCAD Calculations
    iii. 10-Year, 25-Year, and 50-Year 24 Hour Storm Summary Calculations
    iv. NHDES AoT Gravel Wetland Sizing Sheet
F. Regional Watershed Drainage Analysis.
    i. Regional Watershed Plan
    ii. 2-Year, 24 Hour Storm HydroCAD Calculations
    iii. 10-Year, 25-Year, 50-Year, and 100-Year 24 Hour Storm Summary Calculations

PROJECT DESCRIPTION

The project is located adjacent to the Portsmouth Public Works Facility at 680 Peverly Hill Road. In 2016, the City purchased 50 acres of land near the Community Campus property known as "Foundation Field." This land was merged with the Public Works parcel and is now a single lot (254-8 Map-Lot). In the spring of 2018, City Council and Recreation Board voted to pursue development of new recreation playing fields at this site.

The recreation fields are planned to be constructed in two phases. Phase I (The Project) includes construction of two new full-size turf fields with lighting, gravel parking areas, and a connection to public water. Phase I also includes construction of regional stormwater treatment facilities for Sagamore Creek Watershed. Phase II includes design and construction of one additional field, paved parking areas, a concession stand, and other amenities. Phase I is expected to be constructed during the 2020 construction season.

This report presents the design of the stormwater management system for Phase II which is sufficiently sized for the smaller Phase I development. This report and the supporting stormwater model includes assumptions from a conceptual design of Phase II and should be revisited for the Phase II final design to incorporate any changes from the assumptions used in this analysis for this report.

The project is bounded by Industrial developments to the east and west, the Department of Public Works Transfer station and offices to the north, and Campus Drive to the south. Current access to the site is located off Campus Drive or off Peverly Road at the Portsmouth Department of Public Works transfer station. A gravel drive runs through the site to Campus Drive. Vehicular access is controlled by gates at Campus Drive and the transfer station. A large forested area on the property exists to the south of the project and contains high quality wetlands and two vernal pools but will not be impacted by the Project. Low quality wetlands that formed since the quarry was reclaimed will be impacted and a NHDES Wetlands permit will be obtained.

Because this project will disturb greater than 100,000 sf of land area, an Alteration of Terrain (AoT) permit will be obtained through the New Hampshire Department of Environmental Services (NHDES). As required by NHDES rules, the AoT permit application will be for all phases of construction: Phase I and Phase II recreational fields and the future

transfer station. Additionally, since the site will disturb greater than one acre of land, coverage will need to be obtained under the Environmental Protection Agency's (EPA) Construction General Permit (CGP). There are provisions for actively managing sediment and erosion during construction for both the AoT and CGP, which, for this site, will include silt fencing, stone check dams in channels, riprap pads for velocity dissipation, and erosion matting for any steep slopes or drainage ways. Proposed erosion control methods and locations are depicted on the enclosed plans.

CMA Engineers, City of Portsmouth representatives, and NHDES-AoT held a pre-application meeting on June 11, 2019 to discuss the AoT Rules requirements and to review draft plans of the site. NHDES-AoT requires onsite stormwater runoff from the proposed fields and new gravel paved areas to be treated separately from the regional stormwater facilities, and NHDES will not be reviewing the design and analysis of the regional treatment facilities since these are will only be treating stormwater flowing from offsite developed areas. Permanent and temporary construction stormwater facilities for the onsite project will be required to meet all applicable NHDES-AoT Rules and specifications.

This project proposes to replace existing gravel areas, grass areas, and some small diameter woods with the proposed fields, gravel parking, and stormwater BMPs within the reclaimed rock quarry site. The disturb perimeter areas will be landscaped with grass and tree plantings. Electrical, water, and sewer utilities will be installed underground from Campus Drive to serve the field amenities. A transformer pad will need to be constructed along the access road near the fields. Vehicular access to the Site will be controlled by entry gates at Campus Drive and at the DPW/ transfer station connection road.

The project area is largely open, with mild uniform slopes (3% to 5%) across most of the western portion, medium slopes (4 to 8%) on the eastern portion south of the pond, and gentle slopes north of the pond excluded portions of fill soil piles. Stormwater runoff flows primarily towards the existing stormwater pond constructed as part of the quarry reclamation. Along most of eastern property line lies a large berm with very steep side slopes of 1.5:1 to 2:1. This berm was constructed as part of the former quarry and has become densely vegetated with brush and small trees. Approximately 34 acres of off-site area from the Public Works property to the north and commercial properties to the northeast of the site drain to the existing onsite pond via onsite treatment swales created

during the reclamation. Another 113 acres of offsite area east of the site flows through the large berm to the existing stormwater pond via twin 36-inch culverts.

The peak stormwater runoff flows were calculated for the 2-, 10-, 25-, and 50-year, Type III, 24-hour storm events. The method used for all analyses was SCS TR55: Urban Hydrology for Small Watersheds, performed with HydroCAD® modeling software. The Pre- and post-development drainage analysis results are presented in Appendix D and E, respectively.

The regional stormwater treatment facilities were sized based on available funds and site constraints. These facilities were analyzed to adequately convey stormwater flows for the 2-, 10-, 25, 50-, and 100-year, Type III, 24-hour storm events. The regional analysis results are presented in Appendix F.

Precipitation values for each 24-hour storm event were obtained from the Extreme Precipitation Estimates published by the Northeast Regional Climate Center (NRCC) (see Appendix B). Utilization of these tables to model storm events was required by NHDES-Alteration of Terrain (AoT) Program for all projects starting in 2013. To anticipate projected increases in rainfall events, AoT Rules were amended in 2017 to required new developments within "coastal communities" to increase the NRCC values by 15 percent if the projected service life is beyond the year 2050. The proposed facilities in this report are projected to serve beyond 2050, thus the 15 percent increase was applied for the analysis. The results of the analyses are summarized in the following sections.

Soils within the project area were classified by James H. Long, CSS, CWS (Certified Soil Scientist #15) with a large majority being Udorthents (fill) placed as part of the closure and reclamation of the former quarry (See Appendix A). These soils are mostly within Hydrologic Soil Group (HSG) C with a little being in Group D. Soils of off-site contributing drainage areas were classified using United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) mapping, which are similarly classified as Udorthents with small areas of HSG groups A,B, and C soils. The offsite Udorthents were assumed to be mainly HSG Type C with some being A, B, and D.

There are four analysis points in the stormwater model, the first (SP-1) is the area discharging from the existing pond to the Pike Industries property. The second point of analysis (SP-2) is offsite discharge onto 225 Banfield Road (Map-Lot 266-1). The third

point of analysis (SP-3) is for onsite runoff to south and west, towards the "SW Wetlands". The fourth point of analysis is (SP-4) and is for onsite discharge towards the "SE Wetlands". For analysis point locations and contributing areas see the Wateshed Plans in Appendix D and E.

PRE-DEVELOPMENT CONDITIONS

The pre-development conditions include primarily grassy ("meadow") areas and a little woods with both in "good" condition along with some gravel areas mostly over HSG C soils. A small amount of the reclaimed area contains "meadow" wetlands with an HSG D soil classification. Much of the area has been dormant since the reclamation of the quarry. Four pre-development sub-areas (B, C, D, and E) have been evaluated for peak flow and off-site stormwater volume prior to development and are summarized in the following table. The Pre-Development Watershed Plan and the pre-development stormwater modeling calculations are provided in Appendix D.

Drainage Area B (B1 and B2): 13.90 acres

Drainage Areas ***B1*** and ***B2*** are predominantly made up of meadow with a little woods and includes approximately 0.54 acres of gravel driveway and drains to the existing stormwater pond which discharges to SP-1.

Drainage Area C1: 0.19 acres

Drainage Area ***C1*** is comprised of meadow areas and approximately 0.06 acres of woods. This area drains offsite to SP-2.

Drainage Area D (D1 and D2): 0.97 acres

Drainage Area ***D1*** consist of mostly woods and some meadow areas. D2 consists mainly of the westward draining portion of the access drive and small portions of run-on from the Campus Drive cul-de-sac. The access drive was used as truck route for the quarry and consists of compacted gravel mostly overgrown with grass. Both Drainage Areas drain to SP-3.

Drainage Area E1: 0.87 acres

Drainage Area ***E1*** consists mainly of the eastward draining portion of the access drive and small portions of run-on from the Campus Drive cul-de-sac. This drains to SP-4.

Drainage Area F1: 0.93 acres

Drainage Area ***F1*** includes an area that discharges directly on the Pike property near the existing stormwater pond culvert. Cover consists of largely meadow with a little woods and gravel pavement. This area drains to SP-1

Drain Area G1: 0.22 acres

Drain Area ***G1*** consists of mostly meadow with some gravel pavement and a small amount of woods. This area discharges to the existing pond and SP-1.

A summary of peak off-site flows and volumes for the pre-development condition is presented in **Table 1** below.

Table 1: Pre-Development Peak Flows and Volumes

Analysis Point	Pre-Development Peak Flows (cfs)			
	2-year	10-year	25-year	50-year
SP-1	1.74	3.64	6.04	9.43
SP-2	0.25	0.57	0.85	1.12
SP-3	2.79	4.56	5.95	7.27
SP-4	2.66	4.41	5.75	7.02
TOTAL	**7.45**	**13.23**	**18.61**	**24.86**

Analysis Point	Pre-Development Volumes (acre-ft)			
	2-year	10-year	25-year	50-year
SP-1	1.45	3.277	4.859	6.433
SP-2	0.019	0.041	0.060	0.079
SP-3	0.214	0.359	0.475	0.585
SP-4	0.193	0.327	0.434	0.536
TOTAL	**1.877**	**4.006**	**5.829**	**7.635**

POST-DEVELOPMENT CONDITIONS

The post-development condition includes the construction of the fields, gravel parking and accessways, gravel snow dump, porous perimeter path, landscaped areas, and stormwater conveyance and treatment BMPs. The topography of the fields is relatively flat at 0.5% and the gravel parking grades range from 1% to 4%. Landscaped areas will be largely vegetated with grass or trees with grades ranging from flat 0.5% to 33% (3:1 slope).

Athletic Field CN values were classified as HSG C with CN of 71 in areas of fill (same as predevelopment) and HSG D with CN of 78 in areas of cut to an elevation of 33.5 where the bottom of field "daylights" to existing grade. since groundwater was estimated to be shallow. The area of field over the proposed subsurface system BMP was classified as 98 since the water does not flow over soil but vertically downward into the BMP. Proposed

gravels and non-porous pavements were considered impervious with CN values of 96 and 98, respectively.

Similar to the pre-development model, four post-development drainage areas, B, C, D, and E were created for analysis based on their discharge locations. Drainage Area B discharges to SP-1, Drainage Area C discharges to SP-2, Drainage Area D drains to SP-3, and Drain Area E discharges to SP-4. The Post-Development Watershed Plan and the post-development stormwater modeling calculations are provided in Appendix E.

The following is a summary of the post-development Drainage Areas:

Drainage Area B (B1, B1c, B2, B3, B4): 13.24 acres

Drainage Area ***B1*** flows to SP-1. Area ***B1*** is predominantly made up of the athletic fields and surrounding paths. A relatively small amount of woods and meadow is located on the west and south portions of the area.

Drain Area ***B1c*** consists of meadow and a small amount of woods with a little impervious gravel located on offsite on the Pike property. No onsite impervious is proposed to be in this catchment. This area will drain to the pond via a closed drain system.

Drainage area **B2** and **B3** consist of the impervious parking lot areas and will drain to SP-1 via the gravel wetland where the stormwater is treated before being discharged to the existing pond.

Drainage Area C1: 0.15 acres,

Drainage Area ***C1*** is slightly reduced from the predevelopment condition and the cover is comprised of meadow areas and woods. This area drains offsite to SP-2.

Drainage Area D (D1 and D2): 0.85 acres

Drainage Area ***D1*** area is slightly reduced from the pre-development area and consists of woods cover. Drainage Area D2 is also slightly reduced and the cover will remain the same except that the gravel road surface will be fine graded. These areas drain to SP-3.

Drainage Area E1: 0.84 acres

Drainage Area ***E1*** area is slightly reduced from the pre-development area and the cover will remain the same except the gravel road surface will be fine graded. This area drains to SP-4.

Drain Area F1: 0.93 acres

Drain Area ***F1*** discharges directly to the Pike property (SP-1) and consist of meadow. The proposed drain area north of the pond outlet culvert was taken from preliminary grades of the transfer station design

Drain Area G (G1 and G2): 1.74 acres

These drainage areas discharge directly to the existing pond via overland flow. **G1** is approximately the same as in the existing condition except it consists more gravel cover due to the widening of the existing access road near the pond. Drain area **G2** includes onsite flow south of the pond that discharge directly to the pond and wetlands. This area is included since it was part of the larger contributing Drainage Area B2 in the predevelopment condition. The proposed grading of the regional BMPs was not considered since the regional facilities are not part of the onsite development analysis.

The proposed development of the site decreases total off-site stormwater peak flows when compared to the those in the pre-development conditions. The distribution of flow reduction between the four modeled offsite outfalls varies. A summary comparison of peak flows between pre- and post-development flows is located in **Table 2** below**.**

Table 2: Pre- and Post- Development Peak Flow Comparison

Analysis Point	Pre-Development Peak Flows (cfs)			
	2-year	10-year	25-year	50-year
SP-1	1.74	3.64	6.04	9.43
SP-2	0.25	0.57	0.85	1.12
SP-3	2.79	4.56	5.95	7.27
SP-4	2.66	4.41	5.75	7.02
TOTAL	**7.45**	**13.23**	**18.61**	**24.86**

Analysis Point	Post-Development Flows (cfs)			
	2-year	10-year	25-year	50-year
SP-1	1.24	3.39	5.19	6.96
SP-2	0.20	0.45	0.67	0.89
SP-3	2.56	4.14	5.38	6.56
SP-4	2.48	4.08	5.34	6.53
TOTAL	**6.48**	**12.06**	**16.58**	**20.94**

Offsite runoff volume for 3 of the 4 study points analyzed is reduced in the post-development condition except for SP-1. Volumes at SP-1 were slightly reduced in the 2-year storm event and slightly increased for the larger storm events. A summary of off-

site flow volume for the pre-development and post-development conditions at the site is presented below in **Table 3**.

Table 3: Pre- and Post-Development Runoff Volume Comparison

Analysis Point	Pre-Development Volumes (ac-ft)			
	2-year	10-year	25-year	50-year
SP-1	1.450	3.277	4.859	6.433
SP-2	0.019	0.041	0.060	0.079
SP-3	0.214	0.359	0.475	0.585
SP-4	0.193	0.327	0.434	0.536
TOTAL	**1.877**	**4.006**	**5.829**	**7.635**

Analysis Point	Post-Development Volumes (ac-ft)			
	2-year	10-year	25-year	50-year
SP-1	1.447	3.448	5.161	6.847
SP-2	0.015	0.032	0.048	0.063
SP-3	0.199	0.328	0.431	0.529
SP-4	0.189	0.315	0.415	0.512
TOTAL	**1.850**	**4.123**	**6.055**	**7.951**

STORMWATER CONTROL PRACTICES

Proposed stormwater flow controls include a subsurface storage facility under the north side of the field and storage in the proposed subsurface gravel wetland. The subsurface facility consists of storage chambers and gravel and was sized to help provide peak flow attenuation and groundwater recharge for Phase I and Phase 2 of the recreation fields.

STORMWATER RECHARGE PRACTICES

The proposed construction of impervious covers in Phase 1, future Phase 2, and the future transfer station increases the impervious area above pre-development conditions requirement groundwater recharge BMPs to be constructed. Most of the existing soil being covered with impervious pavement has an HSG C classification which NHDES AoT rules require a volume of 0.10 inch times the increase in impervious area to be infiltrated into the soil. Impervious areas over HSG D soils do not have a required recharge depth. Since these areas are very small relative to HSG C areas, HSG D soil were counted as HSG C, thus making the required minimum recharge volume calculated to be conservative. The following table is a summary of the recharge volume (Rv) calculations. As seen in the following **Table 4**, the actual recharge volume provided is much greater than the minimum requried. This is due to large subsurface infiltration system under the field for peak flow attenuation.

Table 4: Summary of Recharge Volume, Rv,

Existing Impervious (sf)	Proposed Impervious (sf)	Net Impervious (sf)	Rv Required (0.10"/*12 x Net Impervious) (cf)	Rv Provided (cf)
84,219	297,275	213,056	1,768	21,409

STORMWATER TREATMENT PRACTICES

Stormwater treatment BMPs will be constructed to recharge ground water and to treat stormwater flowing off the new gravel pavements in Phase 1 and future paved surfaces in Phase 2 and the proposed transfer station. NHDES AoT Rules require the first 1" of stormwater runoff from impervious areas to be treated before being discharged to wetlands or surface waters. For this project, a subsurface gravel wetland BMP is proposed to provide treatment of the proposed fields parking and other impervious areas. This report only includes an analysis of impervious areas needed for support of the recreational fields and does not include treatment calculations of the future Transfer station. Stormwater treatment proposed for the proposed transfer station will be submitted as part of the Site Plan Review process for that project.

The following **Table 5** summarizes the required minimum water quality volume by NHDES AoT Rules and provided by the proposed site subsurface gravel wetland. See Appendix E for NHDES AoT Calculation sheet

Table 5: Summary of Project Specific Water Quality Volume (WQV) Calculations:

Hardscape Impervious (acres)	WQV Required (cf)	WQV Provided (cf)
2.48	8,803	9,987

The regional BMPS were sized to provide treatment volumes within the site constraints and available construction funds. The site constraints and funds did not allow for treatment systems to be sized to treat the recommended 1" depth of runoff from connected impervious surfaces. However, research by the University of New Hampshire Stormwater Center (UNHSC) shows that the proposed systems do perform well even when undersized. Below is a table summarizing the estimated connected impervious area contributing to each regional BMP, the 1" WQv, provided WQv, plus the estimated removal efficiency at the provided WQv.

REGIONAL TREATMENT PRACTICES

Three regional stormwater facilities (BMPs) are proposed within the site to replace portions of the existing stormwater system with better systems that have shown to provide high pollutant removal efficiencies relative to existing systems. A subsurface gravel wetlands (BMP-R1) is proposed on the south side of the pond to replace the existing dilapidated forebay to the pond. To the North of the pond a bioretention with ISR (BMP-R3) is proposed that discharges into a proposed subsurface gravel wetlands (BMP-R2). These are expected to have higher pollutant removal efficiencies than those for the overgrown treatment swales. **Table 6** below summarizes the estimated contributing impervious, total area, Standard WQV, and WQV provided, and **Table 7** presents the estimated pollutant load reduction for each of the three BMPs. In the even that construction bid costs are higher than allowable construction fund, BMP-R3 may not be constructed. This treatment scenario is included in the following summary tables for BMP-R2a.

Table 6: Regional Stormwater BMP WQV Calculations

BMP	Estimated Effective Impervious (acres)	Total Drainage Area (acres)	WQV @ 1" Impervious (cf)	WQV Provided (cf)	Percent of Standard WQV (%)	Depth of Runoff Treated (in.)
BMP-R1	51.633	112.514	189,106	30,626	16	0.16
BMP-R2	13.367	19.096	47,134	21,000	45	0.43
BMP-R3	10.572	14.296	37,134	10,342	28	0.27
BMP-R2a	23.939	33.392	84,268	21,000	25	0.24

Table 7: Regional Stormwater BMP Pollutant Removal Efficiencies

BMP	Depth of Runoff Treated (in)	Pollutant Load Reduction[1] (%)			
		TSS	Phosphorous	Nitrogen	Zinc
BMP-R1	0.16	56	23	29	64
BMP-R2	0.43	87	42	49	84
BMP-R3	0.27	78	41	49	90
BMP-R2A	0.24	65	29	36	71

1. Estimates interpolated from EPA Region 1/UNHSC data tables at https://www.unh.edu/unhsc/sites/default/files/media/ms4_permit_nomographs_sheet_final_2019.pdf .

Offsite contributing drainage areas, effective impervious area, and stormwater discharge to each BMP was estimated using free and readily available ortho imagery, LiDar surface data, and GIS data from the City of Portsmouth GIS department data. For the runoff

calculations, the Drainage area Time of Concentrations (Tc) were adjusted to estimate the effect of existing offsite stormwater facilities in slowing peak flows for each drainage area.

All three BMPs are design to allow high flows up to the 100-year storm to bypass the treatment components of the BMPs without overtopping the dam. Outfalls will be designed to NDHES AoT standards for outlet velocity discharge protection.

EROSION CONTROL DURING CONSTRUCTION

The proposed construction of the project will require the installation of temporary erosion control devices until the site is fully stabilized. The erosion control devices include a stabilized stone construction entrance, silt fencing, rock check dams. The proposed erosion control plan and notes and the erosion control and stormwater details are included in the Site Plan Review application (bound separately).

A Notice of Intent (NOI) for coverage under the Construction General Permit will be prepared and submitted prior to construction since greater than one acre of land will be disturbed. A copy of the document will be kept on-site for the duration of the project and all Stormwater Pollution Prevention Plan-related (SWPPP) inspections will be performed by qualified personnel.

CONCLUSIONS

Off-site peak flows are reduced with the proposed development of the site. These reductions are attributed primarily to the construction of the field subsurface system for peak attenuation and infiltration. Off-site volumes are reduced at three of the four analysis points for all storm events except for SP-1 where there were only slight increases in runoff volumes for higher, but less frequent, rainfall events. The subsurface field BMP provided groundwater recharge for the increase in imperviousness for the full build-out of the fields and future transfer station. This same BMP also helped reduce the volume increase caused by the higher post-development CN values resulting from lowering the ground surface in the southern portion of the fields to reduce the volume of imported borrow.

Stormwater runoff from the proposed parking, gravel snow dump, and future hardscapes will be treated for water quality above the minimums required by NHDES AoT rules. The proposed porous paved walking path around the fields will reduce runoff as well as hold less heat than impervious asphalt.

The proposed regional BMP facilities will provide treatment of stormwater runoff from highly impervious areas of industrial and commercial use. This is expected to improve the water quality of Elwyn Brook which discharges into the impaired Sagamore Creek.

The proposed drainage system and erosion control measures depicted on the Design Drawings and described herein will provide adequate erosion and sedimentation control during construction. The project will require an EPA Construction General Permit, which will require frequent inspections of erosion control devices, including after major storm events.

The content for the onsite stormwater calculations included in this report and the erosion and sediment control for the entire site including the stormwater BMPs will also be submitted to NHDES-Alteration of Terrain for review and approval prior to the start of construction. A copy of the permit is required to be posted at the job site.

Stormwater Management Report

Locus Maps

Figure 1: Locus Ortho Map

Figure 2: USGS Quad Map

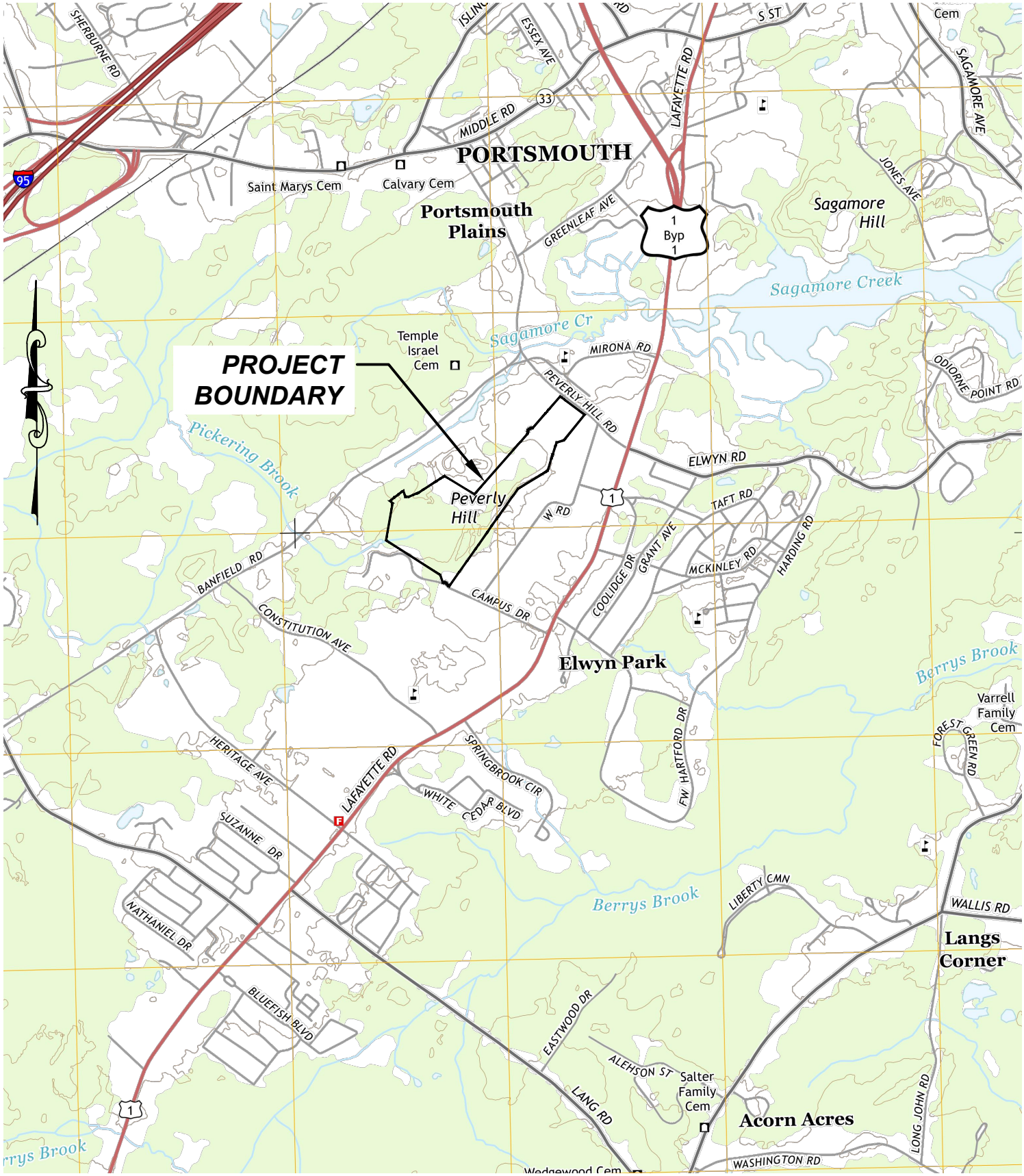
FEMA FIRMette Map

CMA
ENGINEERS
CIVIL/ENVIRONMENTAL/STRUCTURAL
Portsmouth, NH • Manchester, NH • Portland, ME
603/431-6196 • 603/627-0708 • 207/541-4223
c m a e n g i n e e r s . c o m

City of Portsmouth, NH
Multi-purpose Recreation Fields
Alteration of Terrain Permit Application

FIGURE 1: Locus Ortho Map

April, 2019 *Scale: 1" = 1,000'*



CMA ENGINEERS

CIVIL/ENVIRONMENTAL/STRUCTURAL

Portsmouth, NH • Manchester, NH • Portland, ME

603/431-6196 • 603/627-0708 • 207/541-4223

c m a e n g i n e e r s . c o m

City of Portsmouth, NH
Multi-purpose Recreation Fields
Alteration of Terrain Permit Application

FIGURE 2: USGS 7.5 Minute Quad Map

April, 2019 *Scale: 1" = 2,000'*

\\mht2\MHT-Projects\CADD\PROJECTS\1119 Portsmouth Athletic fields\XREF\1119 Permiting Figures.dwg Date Plotted: Apr 15, 2019 – 2:10pm

National Flood Hazard Layer FIRMette

FEMA

43°2'46.73"N

70°47'9.42"W

70°46'31.96"W

43°2'20.44"N

Feet 1:6,000

0 250 500 1,000 1,500 2,000

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- B 20.2 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
- 8 Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 4/15/2019 at 2:28:12 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

Stormwater Management Report

Appendix A

Site Specific Soil Mapping

See Site Specific Soil Survey By GZA Environmental with electronic file name "final 04.0190892 SSSM Report 050619.pdf

Stormwater Management Report

Appendix B

NRCS Web Soil Survey

Hydrologic Soil Group—Rockingham County, New Hampshire
(Portsmouth Athletic Fields Pond Watershed)

Map Scale: 1:10,700 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 150 300 600 900

Feet: 0 500 1000 2000 3000

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 Rating Polygons

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

Soil Rating Lines

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

Soil Rating Points

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

Water Features

Streams and Canals

Transportation

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

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

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: Rockingham County, New Hampshire
Survey Area Data: Version 20, Sep 7, 2018

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

Date(s) aerial images were photographed: Dec 31, 2009—Jun 14, 2017

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
134	Maybid silt loam	C/D	4.9	1.4%
140B	Chatfield-Hollis-Canton complex, 0 to 8 percent slopes, rocky	B	54.3	15.1%
140C	Chatfield-Hollis-Canton complex, 8 to 15 percent slopes, rocky	B	10.0	2.8%
298	Pits, sand and gravel		49.9	13.9%
299	Udorthents, smoothed		100.8	28.1%
314A	Pipestone sand, 0 to 5 percent slopes	A/D	3.9	1.1%
447B	Scituate-Newfields complex, 3 to 8 percent slopes, very stony	C	8.8	2.4%
510A	Hoosic gravelly fine sandy loam, 0 to 3 percent slopes	A	11.5	3.2%
510B	Hoosic gravelly fine sandy loam, 3 to 8 percent slopes	A	4.6	1.3%
538A	Squamscott fine sandy loam, 0 to 5 percent slopes	C/D	15.4	4.3%
547B	Walpole very fine sandy loam, 3 to 8 percent slopes, very stony	A/D	5.9	1.7%
699	Urban land		46.4	12.9%
799	Urban land-Canton complex, 3 to 15 percent slopes		42.6	11.9%
Totals for Area of Interest			**359.1**	**100.0%**

Description

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

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

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

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

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

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

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

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Appendix C

Extreme Precipitation Tables

Extreme Precipitation Tables

Northeast Regional Climate Center

Data represents point estimates calculated from partial duration series. All precipitation amounts are displayed in inches.

Smoothing	Yes
State	New Hampshire
Location	
Longitude	70.780 degrees West
Latitude	43.043 degrees North
Elevation	0 feet
Date/Time	Wed, 17 Apr 2019 17:13:31 -0400

Extreme Precipitation Estimates

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.26	0.40	0.50	0.65	0.82	1.04	**1yr**	0.71	0.98	1.22	1.57	2.04	2.67	2.94	**1yr**	2.37	2.83	3.24	3.96	4.58	**1yr**
2yr	0.32	0.50	0.62	0.81	1.02	1.30	**2yr**	0.88	1.18	1.52	1.94	2.50	3.23	3.59	**2yr**	2.86	3.45	3.96	4.71	5.36	**2yr**
5yr	0.37	0.58	0.73	0.98	1.25	1.61	**5yr**	1.08	1.47	1.89	2.44	3.15	4.09	4.61	**5yr**	3.62	4.43	5.08	5.97	6.74	**5yr**
10yr	0.41	0.65	0.82	1.12	1.45	1.90	**10yr**	1.26	1.73	2.24	2.90	3.77	4.90	5.57	**10yr**	4.34	5.35	6.13	7.16	8.03	**10yr**
25yr	0.48	0.76	0.97	1.34	1.78	2.35	**25yr**	1.54	2.15	2.79	3.65	4.77	6.21	7.15	**25yr**	5.50	6.87	7.87	9.09	10.12	**25yr**
50yr	0.54	0.86	1.10	1.54	2.08	2.77	**50yr**	1.79	2.53	3.30	4.35	5.70	7.44	8.64	**50yr**	6.59	8.31	9.51	10.90	12.06	**50yr**
100yr	0.60	0.97	1.25	1.78	2.43	3.27	**100yr**	2.09	2.99	3.92	5.19	6.81	8.92	10.45	**100yr**	7.89	10.05	11.49	13.08	14.38	**100yr**
200yr	0.68	1.11	1.43	2.05	2.84	3.85	**200yr**	2.45	3.53	4.64	6.17	8.14	10.69	12.64	**200yr**	9.46	12.16	13.90	15.69	17.16	**200yr**
500yr	0.80	1.32	1.72	2.50	3.49	4.79	**500yr**	3.02	4.40	5.80	7.75	10.29	13.59	16.27	**500yr**	12.03	15.64	17.87	19.97	21.67	**500yr**

Lower Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.23	0.36	0.44	0.59	0.72	0.88	**1yr**	0.63	0.87	0.92	1.33	1.68	2.25	2.54	**1yr**	1.99	2.45	2.88	3.18	3.92	**1yr**
2yr	0.32	0.49	0.60	0.81	1.00	1.19	**2yr**	0.86	1.16	1.37	1.82	2.33	3.08	3.48	**2yr**	2.72	3.35	3.85	4.58	5.11	**2yr**
5yr	0.35	0.54	0.67	0.92	1.17	1.41	**5yr**	1.01	1.38	1.61	2.12	2.73	3.82	4.24	**5yr**	3.38	4.07	4.76	5.59	6.30	**5yr**
10yr	0.39	0.60	0.74	1.03	1.33	1.60	**10yr**	1.15	1.57	1.81	2.39	3.06	4.41	4.92	**10yr**	3.91	4.74	5.52	6.49	7.27	**10yr**
25yr	0.44	0.67	0.84	1.19	1.57	1.91	**25yr**	1.36	1.86	2.10	2.75	3.53	4.76	5.99	**25yr**	4.21	5.76	6.77	7.91	8.79	**25yr**
50yr	0.49	0.74	0.92	1.32	1.78	2.17	**50yr**	1.54	2.13	2.35	3.07	3.93	5.38	6.93	**50yr**	4.77	6.66	7.89	9.20	10.16	**50yr**
100yr	0.54	0.82	1.02	1.48	2.03	2.48	**100yr**	1.75	2.42	2.63	3.41	4.35	6.06	8.02	**100yr**	5.36	7.71	9.21	10.72	11.74	**100yr**
200yr	0.60	0.90	1.14	1.65	2.31	2.83	**200yr**	1.99	2.76	2.94	3.77	4.79	6.80	9.28	**200yr**	6.02	8.92	10.75	12.50	13.59	**200yr**
500yr	0.70	1.04	1.33	1.94	2.75	3.38	**500yr**	2.38	3.31	3.42	4.31	5.46	7.93	11.25	**500yr**	7.02	10.82	13.20	15.34	16.47	**500yr**

Upper Confidence Limits

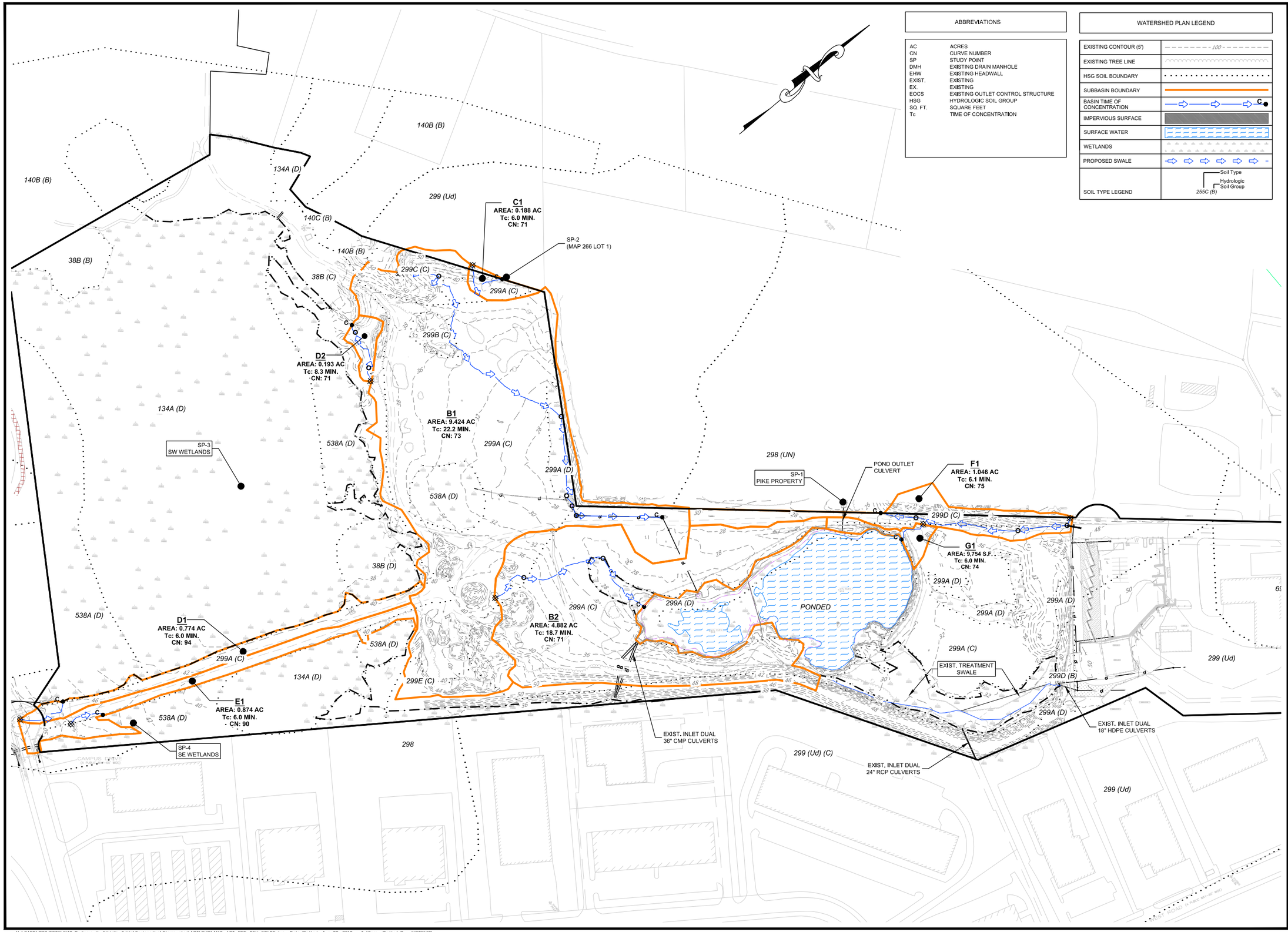
	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.29	0.44	0.54	0.72	0.89	1.09	**1yr**	0.77	1.06	1.26	1.74	2.20	3.00	3.17	**1yr**	2.66	3.05	3.60	4.39	5.08	**1yr**
2yr	0.34	0.52	0.64	0.86	1.07	1.27	**2yr**	0.92	1.24	1.48	1.96	2.51	3.44	3.72	**2yr**	3.05	3.57	4.10	4.86	5.66	**2yr**
5yr	0.40	0.62	0.77	1.05	1.34	1.62	**5yr**	1.16	1.59	1.88	2.53	3.25	4.36	4.97	**5yr**	3.86	4.78	5.41	6.39	7.18	**5yr**
10yr	0.47	0.72	0.89	1.25	1.61	1.98	**10yr**	1.39	1.93	2.28	3.10	3.95	5.37	6.20	**10yr**	4.75	5.97	6.81	7.85	8.77	**10yr**
25yr	0.58	0.88	1.09	1.56	2.05	2.57	**25yr**	1.77	2.52	2.95	4.07	5.14	7.82	8.33	**25yr**	6.92	8.01	9.12	10.35	11.42	**25yr**
50yr	0.67	1.02	1.27	1.83	2.47	3.14	**50yr**	2.13	3.07	3.59	4.99	6.30	9.79	10.42	**50yr**	8.66	10.02	11.37	12.73	13.97	**50yr**
100yr	0.79	1.20	1.50	2.16	2.97	3.82	**100yr**	2.56	3.73	4.37	6.15	7.74	12.24	13.04	**100yr**	10.84	12.54	14.19	15.69	17.08	**100yr**
200yr	0.93	1.39	1.77	2.56	3.56	4.66	**200yr**	3.08	4.56	5.33	7.57	9.50	15.36	16.33	**200yr**	13.59	15.70	17.72	19.32	20.90	**200yr**
500yr	1.15	1.71	2.20	3.19	4.54	6.05	**500yr**	3.92	5.92	6.92	10.01	12.49	20.74	21.99	**500yr**	18.36	21.15	23.77	25.45	27.30	**500yr**

Powered by ACIS
Northeast Regional Climate Center

Appendix D

Pre-Development Drainage Analysis

i. Pre-Development Watershed Plan
ii. 2-Year, 24-Hour HydroCad Report Calculations
iii. 10-Year, 25-Year, and 50-Year Report Summary Calculations



ABBREVIATIONS

AC	ACRES
CN	CURVE NUMBER
SP	STUDY POINT
DMH	EXISTING DRAIN MANHOLE
EHW	EXISTING HEADWALL
EXIST.	EXISTING
EX.	EXISTING
EOCS	EXISTING OUTLET CONTROL STRUCTURE
HSG	HYDROLOGIC SOIL GROUP
SQ. FT.	SQUARE FEET
Tc	TIME OF CONCENTRATION

WATERSHED PLAN LEGEND

EXISTING CONTOUR (5')	100
EXISTING TREE LINE	
HSG SOIL BOUNDARY	
SUBBASIN BOUNDARY	
BASIN TIME OF CONCENTRATION	C
IMPERVIOUS SURFACE	
SURFACE WATER	
WETLANDS	
PROPOSED SWALE	
SOIL TYPE LEGEND	Soil Type; Hydrologic Soil Group; 255C (B)

no.	revision	date	by

CMA ENGINEERS
CIVIL/ENVIRONMENTAL/STRUCTURAL
Portsmouth, NH • Manchester, NH • Portland, ME
603/431-6196 • 603/627-0708 • 207/541-4223
c m a e n g i n e e r s . c o m

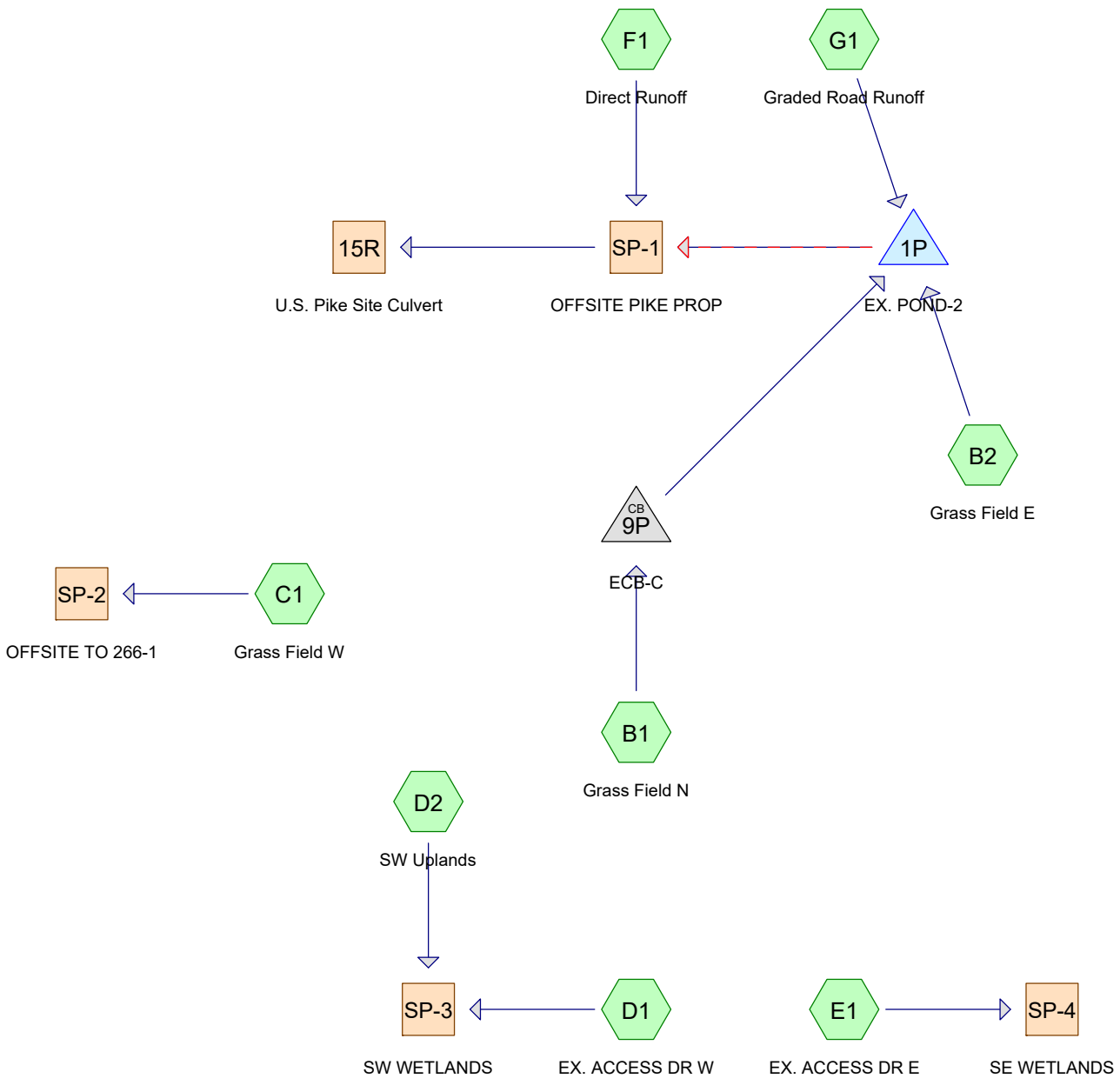
designed by: JHK
drawn by: AGL
approved by: PAC
date: August 2019
project no: 1122
checked by: PAC
scale: 20' 10' 0 Scale: 1" = 100'

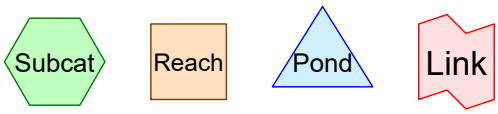
City of Portsmouth
Portsmouth, New Hampshire
Site Plan Review Application
Multi-purpose Recreation Fields
Stormwater Analysis
Pre-Development Watershed Plan

drawing no. H1

sheet: 1 of 1

M:\CADD\PROJECTS\1119 Portsmouth Athletic fields\Engineering\Stormwater\AOT\DWG\1119-AOT-PRE-DEV-FIELDS.dwg Date Plotted: Aug 20, 2019 – 5:19pm Plotted By: JKIEFFNER





Routing Diagram for 1119-Pre-Development-Fields
Prepared by {enter your company name here}, Printed 8/18/2019
HydroCAD® 10.00-25 s/n 10642 © 2019 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
1.088	96	Gravel surface, 100% imp, HSG C (B1, B2, D1, E1, F1)
0.021	96	Gravel surface, 100%, imp, HSG C (G1)
0.866	96	Gravel surface, grass ovrgrowth, 100% imp, HSG C (D1, E1)
10.545	71	Meadow, non-grazed, HSG C (B1, B2, C1, D1, D2, E1, F1, G1)
1.310	78	Meadow, non-grazed, HSG D (B1, B2, E1, G1)
0.080	98	Paved parking, HSG C (D1, E1)
2.971	70	Woods, Good, HSG C (B1, B2, C1, D2, E1, F1, G1)
0.320	77	Woods, Good, HSG D (B1, B2, D1, E1)
17.201	**74**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
15.571	HSG C	B1, B2, C1, D1, D2, E1, F1, G1
1.630	HSG D	B1, B2, D1, E1, G1
0.000	Other	
17.201		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subc Numi
0.000	0.000	1.088	0.000	0.000	1.088	Gravel surface, 100% imp	
0.000	0.000	0.021	0.000	0.000	0.021	Gravel surface, 100%, imp	
0.000	0.000	0.866	0.000	0.000	0.866	Gravel surface, grass ovrgrowth, 100% imp	
0.000	0.000	10.545	1.310	0.000	11.855	Meadow, non-grazed	
0.000	0.000	0.080	0.000	0.000	0.080	Paved parking	
0.000	0.000	2.971	0.320	0.000	3.291	Woods, Good	
0.000	**0.000**	**15.571**	**1.630**	**0.000**	**17.201**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	1P	22.34	21.91	61.3	0.0070	0.022	53.0	41.0	19.0
2	9P	23.26	23.06	174.5	0.0011	0.013	24.0	0.0	0.0

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points x 4
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment B1: Grass Field N Runoff Area=9.424 ac 5.59% Impervious Runoff Depth=1.32"
Flow Length=1,113' Tc=22.3 min CN=73 Runoff=9.03 cfs 1.039 af

Subcatchment B2: Grass Field E Runoff Area=4.478 ac 0.27% Impervious Runoff Depth=1.20"
Flow Length=481' Tc=18.8 min CN=71 Runoff=4.09 cfs 0.448 af

Subcatchment C1: Grass Field W Runoff Area=0.188 ac 0.00% Impervious Runoff Depth=1.20"
Flow Length=134' Tc=6.0 min CN=71 Runoff=0.25 cfs 0.019 af

Subcatchment D1: EX. ACCESS DR W Runoff Area=0.774 ac 87.73% Impervious Runoff Depth=3.04"
Flow Length=133' Tc=6.0 min CN=94 Runoff=2.62 cfs 0.196 af

Subcatchment D2: SW Uplands Runoff Area=0.193 ac 0.00% Impervious Runoff Depth=1.14"
Flow Length=162' Tc=9.7 min CN=70 Runoff=0.21 cfs 0.018 af

Subcatchment E1: EX. ACCESS DR E Runoff Area=0.874 ac 71.51% Impervious Runoff Depth=2.65"
Flow Length=90' Tc=6.0 min CN=90 Runoff=2.66 cfs 0.193 af

Subcatchment F1: Direct Runoff Runoff Area=1.046 ac 18.26% Impervious Runoff Depth=1.45"
Flow Length=489' Tc=6.1 min CN=75 Runoff=1.74 cfs 0.127 af

Subcatchment G1: Graded Road Runoff Runoff Area=0.224 ac 0.00% Impervious Runoff Depth=1.39"
Tc=6.0 min CN=74 Runoff=0.35 cfs 0.026 af

Reach 15R: U.S. Pike Site Culvert Inflow=0.96 cfs 1.446 af
Outflow=0.96 cfs 1.446 af

Reach SP-1: OFFSITE PIKE PROP Avg. Flow Depth=0.30' Max Vel=0.30 fps Inflow=1.74 cfs 1.450 af
n=0.120 L=490.0' S=0.0051 '/' Capacity=139.53 cfs Outflow=0.96 cfs 1.446 af

Reach SP-2: OFFSITE TO 266-1 Inflow=0.25 cfs 0.019 af
Outflow=0.25 cfs 0.019 af

Reach SP-3: SW WETLANDS Inflow=2.79 cfs 0.214 af
Outflow=2.79 cfs 0.214 af

Reach SP-4: SE WETLANDS Inflow=2.66 cfs 0.193 af
Outflow=2.66 cfs 0.193 af

Pond 1P: EX. POND-2 Peak Elev=24.34' Storage=489,621 cf Inflow=13.21 cfs 1.512 af
Primary=0.89 cfs 1.323 af Secondary=0.00 cfs 0.000 af Outflow=0.89 cfs 1.323 af

Pond 9P: ECB-C Peak Elev=25.19' Inflow=9.03 cfs 1.039 af
24.0" Round Culvert n=0.013 L=174.5' S=0.0011 '/' Outflow=9.03 cfs 1.039 af

Total Runoff Area = 17.201 ac Runoff Volume = 2.065 af Average Runoff Depth = 1.44"
88.18% Pervious = 15.167 ac 11.82% Impervious = 2.034 ac

Summary for Subcatchment B1: Grass Field N

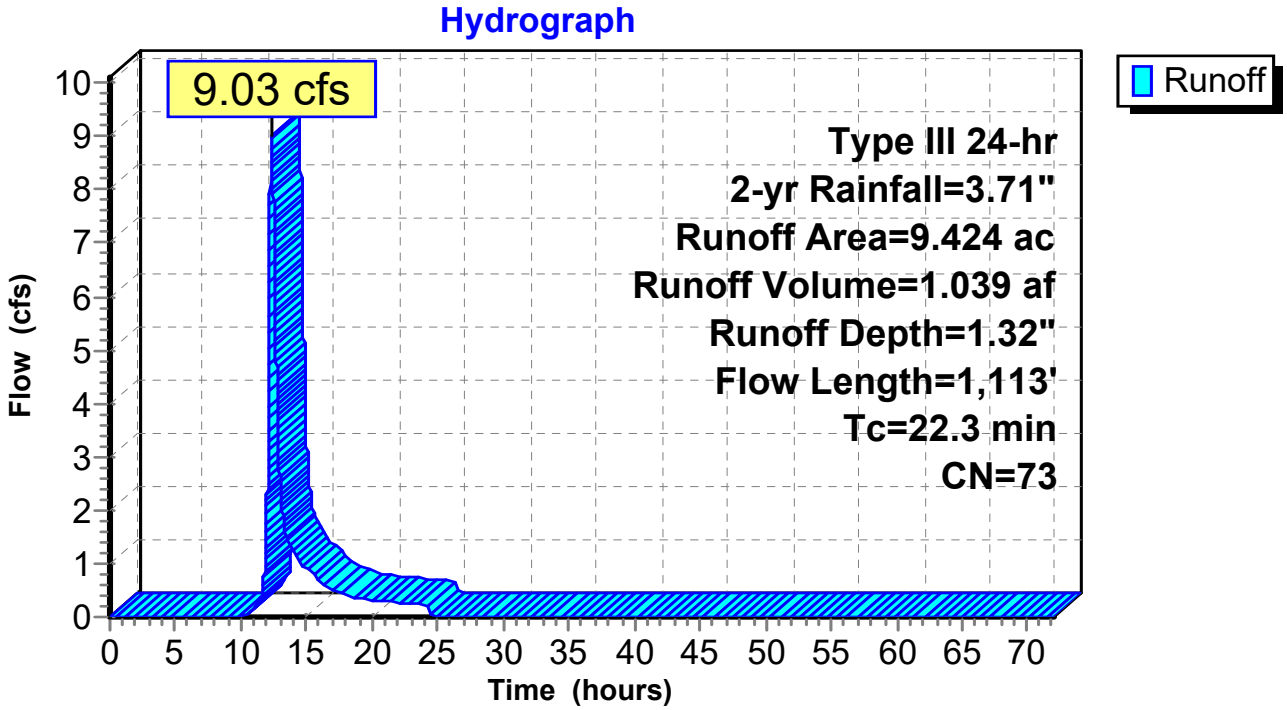
Runoff = 9.03 cfs @ 12.32 hrs, Volume= 1.039 af, Depth= 1.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.71"

	Area (ac)	CN	Description
	6.175	71	Meadow, non-grazed, HSG C
	1.653	70	Woods, Good, HSG C
	0.969	78	Meadow, non-grazed, HSG D
	0.100	77	Woods, Good, HSG D
*	0.527	96	Gravel surface, 100% imp, HSG C
	9.424	73	Weighted Average
	8.897		94.41% Pervious Area
	0.527		5.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.2	9	0.0611	0.12		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.71"
0.3	12	0.6205	0.78		**Sheet Flow, Ledge Slope** n= 0.080 P2= 3.71"
1.8	84	0.0986	0.79		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
8.3	541	0.0241	1.09		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
9.1	198	0.0053	0.36		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.4	31	0.0644	1.35	4.31	**Channel Flow,** Area= 3.2 sf Perim= 15.0' r= 0.21' n= 0.100
0.1	26	0.0031	4.30	13.32	**Channel Flow,** Area= 3.1 sf Perim= 6.3' r= 0.49' n= 0.012
1.1	212	0.0018	3.27	10.15	**Channel Flow,** Area= 3.1 sf Perim= 6.3' r= 0.49' n= 0.012
22.3	1,113	Total			

Subcatchment B1: Grass Field N



Hydrograph for Subcatchment B1: Grass Field N

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.04	0.00	0.00
2.00	0.07	0.00	0.00
3.00	0.11	0.00	0.00
4.00	0.16	0.00	0.00
5.00	0.21	0.00	0.00
6.00	0.27	0.00	0.00
7.00	0.34	0.00	0.00
8.00	0.42	0.00	0.00
9.00	0.54	0.00	0.00
10.00	0.70	0.00	0.00
11.00	0.93	0.01	0.12
12.00	1.85	0.26	**2.39**
13.00	2.78	0.73	**2.41**
14.00	3.01	0.86	1.23
15.00	3.17	0.96	0.92
16.00	3.29	1.04	0.68
17.00	3.37	1.10	0.53
18.00	3.44	1.14	0.41
19.00	3.50	1.18	0.35
20.00	3.55	1.21	0.32
21.00	3.60	1.25	0.29
22.00	3.64	1.27	0.27
23.00	3.68	1.30	0.24
24.00	**3.71**	**1.32**	0.22
25.00	3.71	1.32	0.00
26.00	3.71	1.32	0.00
27.00	3.71	1.32	0.00
28.00	3.71	1.32	0.00
29.00	3.71	1.32	0.00
30.00	3.71	1.32	0.00
31.00	3.71	1.32	0.00
32.00	3.71	1.32	0.00
33.00	3.71	1.32	0.00
34.00	3.71	1.32	0.00
35.00	3.71	1.32	0.00
36.00	3.71	1.32	0.00
37.00	3.71	1.32	0.00
38.00	3.71	1.32	0.00
39.00	3.71	1.32	0.00
40.00	3.71	1.32	0.00
41.00	3.71	1.32	0.00
42.00	3.71	1.32	0.00
43.00	3.71	1.32	0.00
44.00	3.71	1.32	0.00
45.00	3.71	1.32	0.00
46.00	3.71	1.32	0.00
47.00	3.71	1.32	0.00
48.00	3.71	1.32	0.00
49.00	3.71	1.32	0.00
50.00	3.71	1.32	0.00
51.00	3.71	1.32	0.00
52.00	3.71	1.32	0.00
53.00	3.71	1.32	0.00
54.00	3.71	1.32	0.00
55.00	3.71	1.32	0.00
56.00	3.71	1.32	0.00
57.00	3.71	1.32	0.00
58.00	3.71	1.32	0.00
59.00	3.71	1.32	0.00
60.00	3.71	1.32	0.00
61.00	3.71	1.32	0.00
62.00	3.71	1.32	0.00
63.00	3.71	1.32	0.00
64.00	3.71	1.32	0.00
65.00	3.71	1.32	0.00
66.00	3.71	1.32	0.00
67.00	3.71	1.32	0.00
68.00	3.71	1.32	0.00
69.00	3.71	1.32	0.00
70.00	3.71	1.32	0.00
71.00	3.71	1.32	0.00
72.00	3.71	1.32	0.00

Summary for Subcatchment B2: Grass Field E

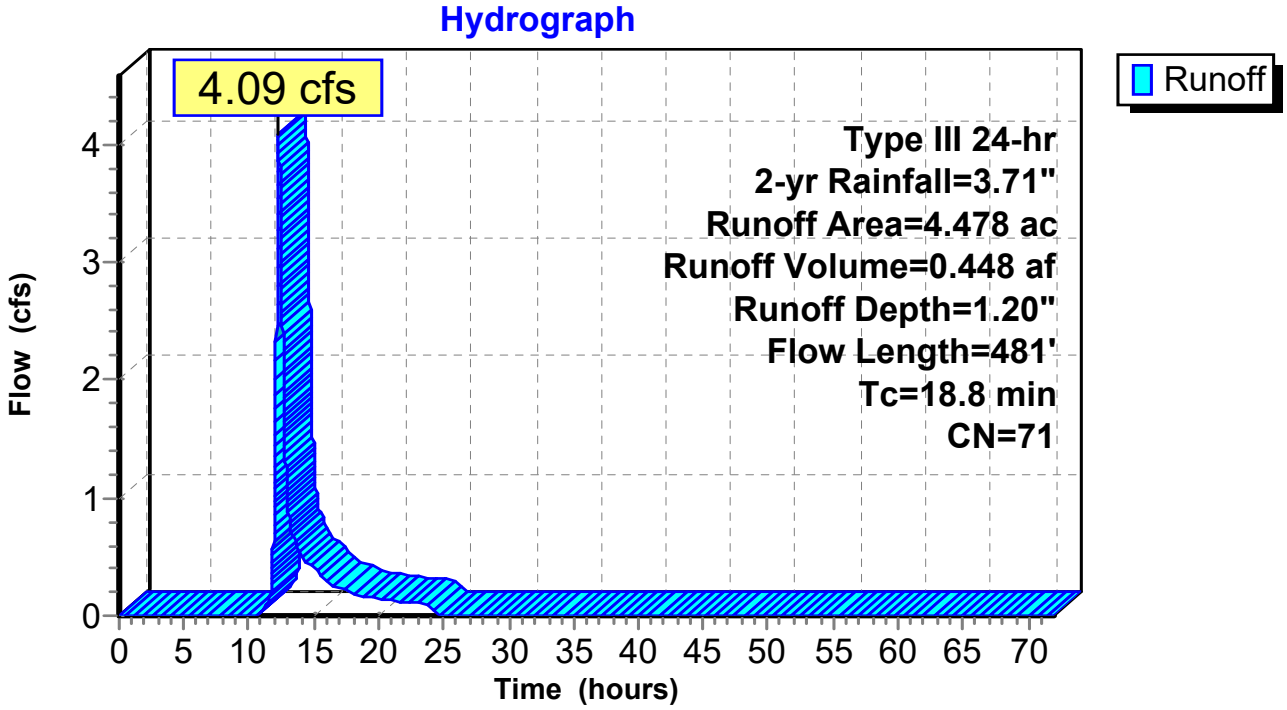
Runoff = 4.09 cfs @ 12.28 hrs, Volume= 0.448 af, Depth= 1.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.71"

	Area (ac)	CN	Description
	3.259	71	Meadow, non-grazed, HSG C
	0.904	70	Woods, Good, HSG C
	0.296	78	Meadow, non-grazed, HSG D
	0.007	77	Woods, Good, HSG D
*	0.012	96	Gravel surface, 100% imp, HSG C
	4.478	71	Weighted Average
	4.466		99.73% Pervious Area
	0.012		0.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.6	100	0.0282	0.14		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.71"
3.4	215	0.0457	1.07		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
3.8	166	0.0210	0.72		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
18.8	481	Total			

Subcatchment B2: Grass Field E



Hydrograph for Subcatchment B2: Grass Field E

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.04	0.00	0.00
2.00	0.07	0.00	0.00
3.00	0.11	0.00	0.00
4.00	0.16	0.00	0.00
5.00	0.21	0.00	0.00
6.00	0.27	0.00	0.00
7.00	0.34	0.00	0.00
8.00	0.42	0.00	0.00
9.00	0.54	0.00	0.00
10.00	0.70	0.00	0.00
11.00	0.93	0.00	0.02
12.00	1.85	0.21	**1.14**
13.00	2.78	0.64	**0.95**
14.00	3.01	0.77	0.53
15.00	3.17	0.86	0.40
16.00	3.29	0.93	0.30
17.00	3.37	0.98	0.23
18.00	3.44	1.03	0.18
19.00	3.50	1.06	0.16
20.00	3.55	1.10	0.14
21.00	3.60	1.13	0.13
22.00	3.64	1.15	0.12
23.00	3.68	1.18	0.11
24.00	**3.71**	**1.20**	0.10
25.00	3.71	1.20	0.00
26.00	3.71	1.20	0.00
27.00	3.71	1.20	0.00
28.00	3.71	1.20	0.00
29.00	3.71	1.20	0.00
30.00	3.71	1.20	0.00
31.00	3.71	1.20	0.00
32.00	3.71	1.20	0.00
33.00	3.71	1.20	0.00
34.00	3.71	1.20	0.00
35.00	3.71	1.20	0.00
36.00	3.71	1.20	0.00
37.00	3.71	1.20	0.00
38.00	3.71	1.20	0.00
39.00	3.71	1.20	0.00
40.00	3.71	1.20	0.00
41.00	3.71	1.20	0.00
42.00	3.71	1.20	0.00
43.00	3.71	1.20	0.00
44.00	3.71	1.20	0.00
45.00	3.71	1.20	0.00
46.00	3.71	1.20	0.00
47.00	3.71	1.20	0.00
48.00	3.71	1.20	0.00
49.00	3.71	1.20	0.00
50.00	3.71	1.20	0.00
51.00	3.71	1.20	0.00
52.00	3.71	1.20	0.00
53.00	3.71	1.20	0.00
54.00	3.71	1.20	0.00
55.00	3.71	1.20	0.00
56.00	3.71	1.20	0.00
57.00	3.71	1.20	0.00
58.00	3.71	1.20	0.00
59.00	3.71	1.20	0.00
60.00	3.71	1.20	0.00
61.00	3.71	1.20	0.00
62.00	3.71	1.20	0.00
63.00	3.71	1.20	0.00
64.00	3.71	1.20	0.00
65.00	3.71	1.20	0.00
66.00	3.71	1.20	0.00
67.00	3.71	1.20	0.00
68.00	3.71	1.20	0.00
69.00	3.71	1.20	0.00
70.00	3.71	1.20	0.00
71.00	3.71	1.20	0.00
72.00	3.71	1.20	0.00

Summary for Subcatchment C1: Grass Field W

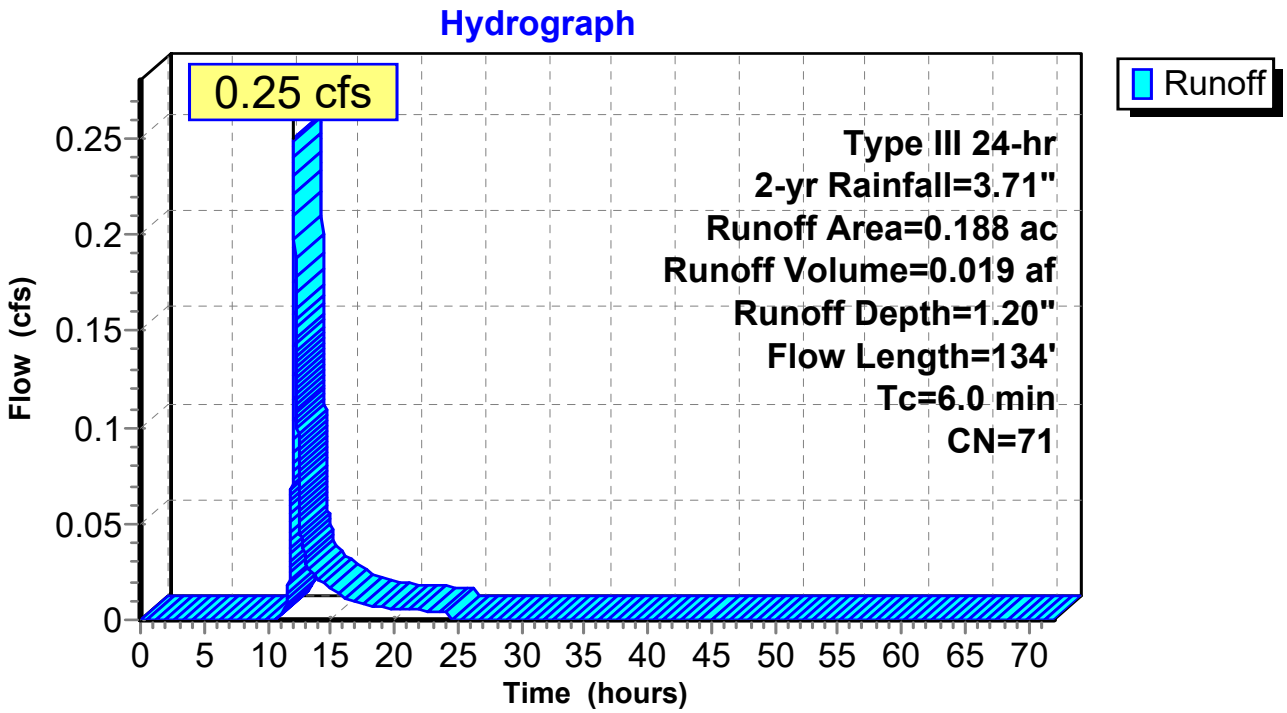
Runoff = 0.25 cfs @ 12.10 hrs, Volume= 0.019 af, Depth= 1.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.71"

Area (ac)	CN	Description
0.133	71	Meadow, non-grazed, HSG C
0.055	70	Woods, Good, HSG C
0.188	71	Weighted Average
0.188		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.1	13	0.2095	1.97		**Sheet Flow, Gravel Pave** n= 0.015 P2= 3.71"
2.7	30	0.2753	0.19		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.71"
0.9	50	0.0161	0.89		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.3	41	0.0835	2.02		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
4.0	134	Total, Increased to minimum Tc = 6.0 min			

Subcatchment C1: Grass Field W



Hydrograph for Subcatchment C1: Grass Field W

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.04	0.00	0.00
2.00	0.07	0.00	0.00
3.00	0.11	0.00	0.00
4.00	0.16	0.00	0.00
5.00	0.21	0.00	0.00
6.00	0.27	0.00	0.00
7.00	0.34	0.00	0.00
8.00	0.42	0.00	0.00
9.00	0.54	0.00	0.00
10.00	0.70	0.00	0.00
11.00	0.93	0.00	0.00
12.00	1.85	0.21	**0.13**
13.00	2.78	0.64	**0.03**
14.00	3.01	0.77	0.02
15.00	3.17	0.86	0.02
16.00	3.29	0.93	0.01
17.00	3.37	0.98	0.01
18.00	3.44	1.03	0.01
19.00	3.50	1.06	0.01
20.00	3.55	1.10	0.01
21.00	3.60	1.13	0.01
22.00	3.64	1.15	0.00
23.00	3.68	1.18	0.00
24.00	**3.71**	**1.20**	0.00
25.00	3.71	1.20	0.00
26.00	3.71	1.20	0.00
27.00	3.71	1.20	0.00
28.00	3.71	1.20	0.00
29.00	3.71	1.20	0.00
30.00	3.71	1.20	0.00
31.00	3.71	1.20	0.00
32.00	3.71	1.20	0.00
33.00	3.71	1.20	0.00
34.00	3.71	1.20	0.00
35.00	3.71	1.20	0.00
36.00	3.71	1.20	0.00
37.00	3.71	1.20	0.00
38.00	3.71	1.20	0.00
39.00	3.71	1.20	0.00
40.00	3.71	1.20	0.00
41.00	3.71	1.20	0.00
42.00	3.71	1.20	0.00
43.00	3.71	1.20	0.00
44.00	3.71	1.20	0.00
45.00	3.71	1.20	0.00
46.00	3.71	1.20	0.00
47.00	3.71	1.20	0.00
48.00	3.71	1.20	0.00
49.00	3.71	1.20	0.00
50.00	3.71	1.20	0.00
51.00	3.71	1.20	0.00
52.00	3.71	1.20	0.00
53.00	3.71	1.20	0.00
54.00	3.71	1.20	0.00
55.00	3.71	1.20	0.00
56.00	3.71	1.20	0.00
57.00	3.71	1.20	0.00
58.00	3.71	1.20	0.00
59.00	3.71	1.20	0.00
60.00	3.71	1.20	0.00
61.00	3.71	1.20	0.00
62.00	3.71	1.20	0.00
63.00	3.71	1.20	0.00
64.00	3.71	1.20	0.00
65.00	3.71	1.20	0.00
66.00	3.71	1.20	0.00
67.00	3.71	1.20	0.00
68.00	3.71	1.20	0.00
69.00	3.71	1.20	0.00
70.00	3.71	1.20	0.00
71.00	3.71	1.20	0.00
72.00	3.71	1.20	0.00

Summary for Subcatchment D1: EX. ACCESS DR W

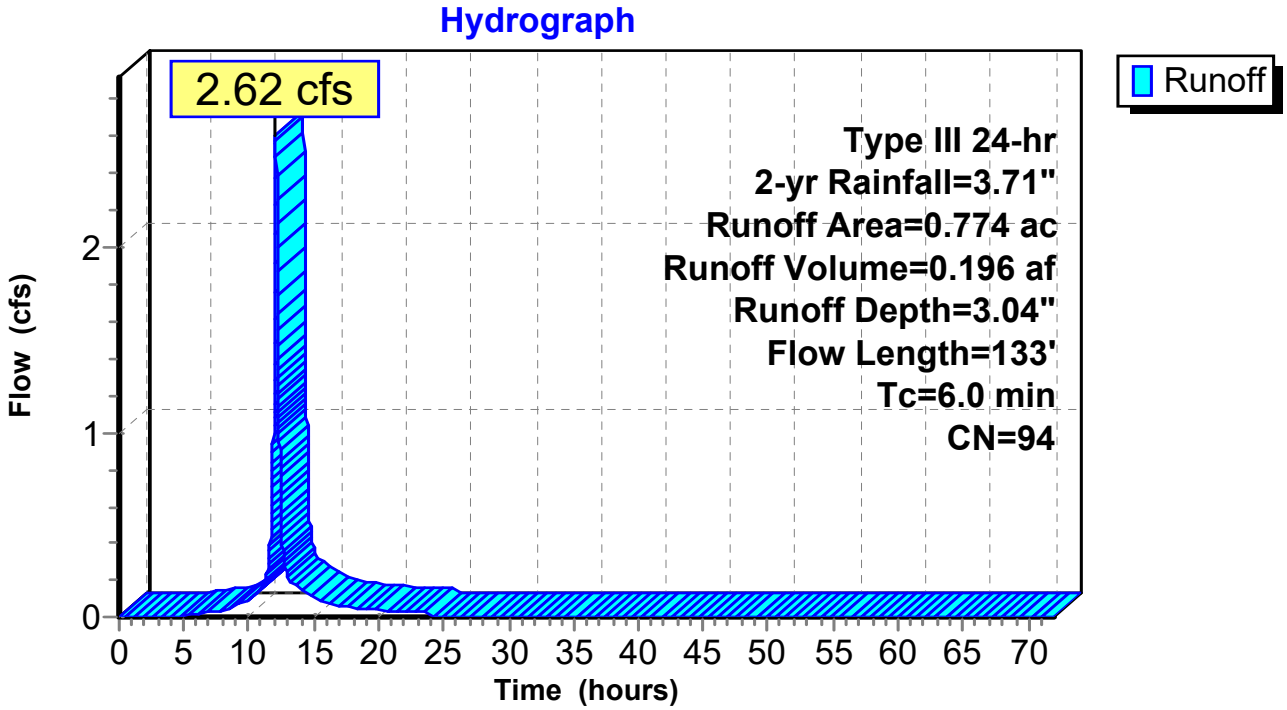
Runoff = 2.62 cfs @ 12.08 hrs, Volume= 0.196 af, Depth= 3.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.71"

	Area (ac)	CN	Description
*	0.477	96	Gravel surface, grass ovrgrowth, 100% imp, HSG C
	0.092	77	Woods, Good, HSG D
*	0.164	96	Gravel surface, 100% imp, HSG C
	0.038	98	Paved parking, HSG C
	0.003	71	Meadow, non-grazed, HSG C
	0.774	94	Weighted Average
	0.095		12.27% Pervious Area
	0.679		87.73% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	21	0.1468	0.10		**Sheet Flow, Woods: Medium Underbrush** n= 0.600 P2= 3.71"
0.3	26	0.0532	1.31		**Sheet Flow, Gravel Pave** n= 0.015 P2= 3.71"
0.4	34	0.0608	1.45		**Sheet Flow, Gravel Pave** n= 0.015 P2= 3.71"
0.1	20	0.0417	3.29		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.3	32	0.0783	1.96		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
4.7	133	Total, Increased to minimum Tc = 6.0 min			

Subcatchment D1: EX. ACCESS DR W



Hydrograph for Subcatchment D1: EX. ACCESS DR W

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.04	0.00	0.00
2.00	0.07	0.00	0.00
3.00	0.11	0.00	0.00
4.00	0.16	0.00	0.00
5.00	0.21	0.01	0.01
6.00	0.27	0.03	0.01
7.00	0.34	0.05	0.03
8.00	0.42	0.09	0.04
9.00	0.54	0.16	0.07
10.00	0.70	0.27	0.10
11.00	0.93	0.44	0.16
12.00	1.85	1.26	**1.62**
13.00	2.78	2.14	**0.23**
14.00	3.01	2.36	0.14
15.00	3.17	2.51	0.11
16.00	3.29	2.63	0.08
17.00	3.37	2.71	0.06
18.00	3.44	2.78	0.05
19.00	3.50	2.84	0.04
20.00	3.55	2.88	0.04
21.00	3.60	2.93	0.03
22.00	3.64	2.97	0.03
23.00	3.68	3.01	0.03
24.00	**3.71**	**3.04**	0.02
25.00	3.71	3.04	0.00
26.00	3.71	3.04	0.00
27.00	3.71	3.04	0.00
28.00	3.71	3.04	0.00
29.00	3.71	3.04	0.00
30.00	3.71	3.04	0.00
31.00	3.71	3.04	0.00
32.00	3.71	3.04	0.00
33.00	3.71	3.04	0.00
34.00	3.71	3.04	0.00
35.00	3.71	3.04	0.00
36.00	3.71	3.04	0.00
37.00	3.71	3.04	0.00
38.00	3.71	3.04	0.00
39.00	3.71	3.04	0.00
40.00	3.71	3.04	0.00
41.00	3.71	3.04	0.00
42.00	3.71	3.04	0.00
43.00	3.71	3.04	0.00
44.00	3.71	3.04	0.00
45.00	3.71	3.04	0.00
46.00	3.71	3.04	0.00
47.00	3.71	3.04	0.00
48.00	3.71	3.04	0.00
49.00	3.71	3.04	0.00
50.00	3.71	3.04	0.00
51.00	3.71	3.04	0.00
52.00	3.71	3.04	0.00
53.00	3.71	3.04	0.00
54.00	3.71	3.04	0.00
55.00	3.71	3.04	0.00
56.00	3.71	3.04	0.00
57.00	3.71	3.04	0.00
58.00	3.71	3.04	0.00
59.00	3.71	3.04	0.00
60.00	3.71	3.04	0.00
61.00	3.71	3.04	0.00
62.00	3.71	3.04	0.00
63.00	3.71	3.04	0.00
64.00	3.71	3.04	0.00
65.00	3.71	3.04	0.00
66.00	3.71	3.04	0.00
67.00	3.71	3.04	0.00
68.00	3.71	3.04	0.00
69.00	3.71	3.04	0.00
70.00	3.71	3.04	0.00
71.00	3.71	3.04	0.00
72.00	3.71	3.04	0.00

Summary for Subcatchment D2: SW Uplands

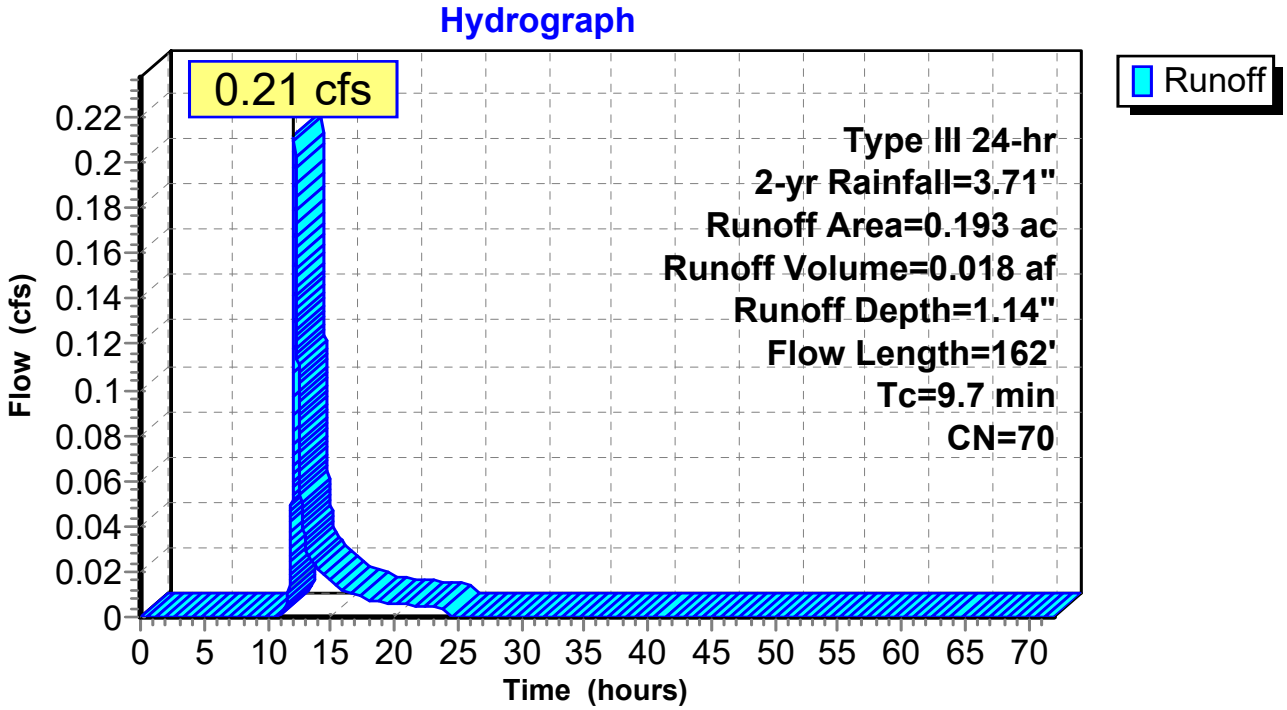
Runoff = 0.21 cfs @ 12.15 hrs, Volume= 0.018 af, Depth= 1.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.71"

Area (ac)	CN	Description
0.163	70	Woods, Good, HSG C
0.030	71	Meadow, non-grazed, HSG C
0.193	70	Weighted Average
0.193		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.1	35	0.0270	0.11		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.71"
4.3	105	0.0067	0.41		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.3	22	0.0798	1.41		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
9.7	162	Total			

Subcatchment D2: SW Uplands



Hydrograph for Subcatchment D2: SW Uplands

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.04	0.00	0.00
2.00	0.07	0.00	0.00
3.00	0.11	0.00	0.00
4.00	0.16	0.00	0.00
5.00	0.21	0.00	0.00
6.00	0.27	0.00	0.00
7.00	0.34	0.00	0.00
8.00	0.42	0.00	0.00
9.00	0.54	0.00	0.00
10.00	0.70	0.00	0.00
11.00	0.93	0.00	0.00
12.00	1.85	0.19	**0.08**
13.00	2.78	0.60	**0.03**
14.00	3.01	0.72	0.02
15.00	3.17	0.81	0.02
16.00	3.29	0.88	0.01
17.00	3.37	0.93	0.01
18.00	3.44	0.97	0.01
19.00	3.50	1.01	0.01
20.00	3.55	1.04	0.01
21.00	3.60	1.07	0.01
22.00	3.64	1.09	0.00
23.00	3.68	1.12	0.00
24.00	**3.71**	**1.14**	0.00
25.00	3.71	1.14	0.00
26.00	3.71	1.14	0.00
27.00	3.71	1.14	0.00
28.00	3.71	1.14	0.00
29.00	3.71	1.14	0.00
30.00	3.71	1.14	0.00
31.00	3.71	1.14	0.00
32.00	3.71	1.14	0.00
33.00	3.71	1.14	0.00
34.00	3.71	1.14	0.00
35.00	3.71	1.14	0.00
36.00	3.71	1.14	0.00
37.00	3.71	1.14	0.00
38.00	3.71	1.14	0.00
39.00	3.71	1.14	0.00
40.00	3.71	1.14	0.00
41.00	3.71	1.14	0.00
42.00	3.71	1.14	0.00
43.00	3.71	1.14	0.00
44.00	3.71	1.14	0.00
45.00	3.71	1.14	0.00
46.00	3.71	1.14	0.00
47.00	3.71	1.14	0.00
48.00	3.71	1.14	0.00
49.00	3.71	1.14	0.00
50.00	3.71	1.14	0.00
51.00	3.71	1.14	0.00
52.00	3.71	1.14	0.00
53.00	3.71	1.14	0.00
54.00	3.71	1.14	0.00
55.00	3.71	1.14	0.00
56.00	3.71	1.14	0.00
57.00	3.71	1.14	0.00
58.00	3.71	1.14	0.00
59.00	3.71	1.14	0.00
60.00	3.71	1.14	0.00
61.00	3.71	1.14	0.00
62.00	3.71	1.14	0.00
63.00	3.71	1.14	0.00
64.00	3.71	1.14	0.00
65.00	3.71	1.14	0.00
66.00	3.71	1.14	0.00
67.00	3.71	1.14	0.00
68.00	3.71	1.14	0.00
69.00	3.71	1.14	0.00
70.00	3.71	1.14	0.00
71.00	3.71	1.14	0.00
72.00	3.71	1.14	0.00

Summary for Subcatchment E1: EX. ACCESS DR E

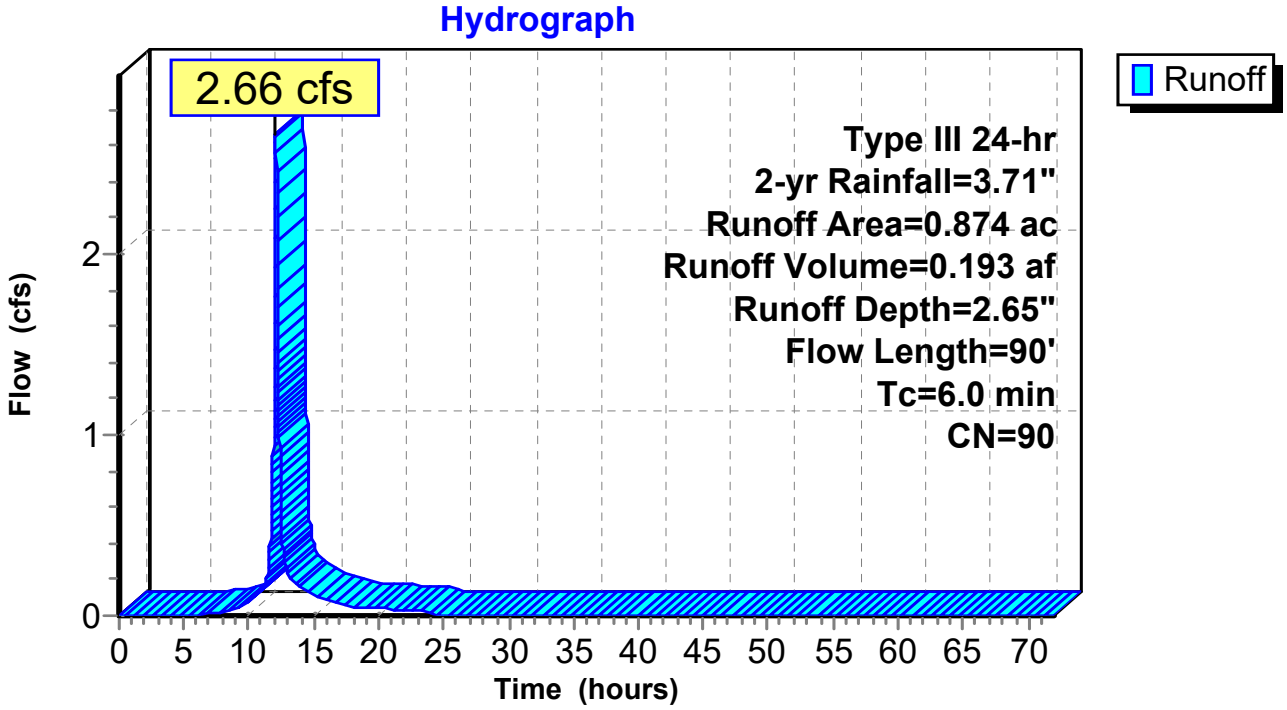
Runoff = 2.66 cfs @ 12.09 hrs, Volume= 0.193 af, Depth= 2.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.71"

	Area (ac)	CN	Description
*	0.389	96	Gravel surface, grass ovrgrowth, 100% imp, HSG C
	0.050	70	Woods, Good, HSG C
	0.035	78	Meadow, non-grazed, HSG D
	0.121	77	Woods, Good, HSG D
*	0.194	96	Gravel surface, 100% imp, HSG C
	0.042	98	Paved parking, HSG C
	0.043	71	Meadow, non-grazed, HSG C
	0.874	90	Weighted Average
	0.249		28.49% Pervious Area
	0.625		71.51% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.4	50	0.0305	0.19		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.71"
0.4	40	0.0609	1.73		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
4.8	90	Total, Increased to minimum Tc = 6.0 min			

Subcatchment E1: EX. ACCESS DR E



Hydrograph for Subcatchment E1: EX. ACCESS DR E

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.04	0.00	0.00
2.00	0.07	0.00	0.00
3.00	0.11	0.00	0.00
4.00	0.16	0.00	0.00
5.00	0.21	0.00	0.00
6.00	0.27	0.00	0.00
7.00	0.34	0.01	0.01
8.00	0.42	0.03	0.02
9.00	0.54	0.07	0.05
10.00	0.70	0.14	0.08
11.00	0.93	0.27	0.14
12.00	1.85	0.97	**1.61**
13.00	2.78	1.79	**0.24**
14.00	3.01	1.99	0.15
15.00	3.17	2.14	0.12
16.00	3.29	2.25	0.08
17.00	3.37	2.33	0.07
18.00	3.44	2.39	0.05
19.00	3.50	2.45	0.04
20.00	3.55	2.50	0.04
21.00	3.60	2.54	0.04
22.00	3.64	2.58	0.03
23.00	3.68	2.61	0.03
24.00	**3.71**	**2.65**	0.03
25.00	3.71	2.65	0.00
26.00	3.71	2.65	0.00
27.00	3.71	2.65	0.00
28.00	3.71	2.65	0.00
29.00	3.71	2.65	0.00
30.00	3.71	2.65	0.00
31.00	3.71	2.65	0.00
32.00	3.71	2.65	0.00
33.00	3.71	2.65	0.00
34.00	3.71	2.65	0.00
35.00	3.71	2.65	0.00
36.00	3.71	2.65	0.00
37.00	3.71	2.65	0.00
38.00	3.71	2.65	0.00
39.00	3.71	2.65	0.00
40.00	3.71	2.65	0.00
41.00	3.71	2.65	0.00
42.00	3.71	2.65	0.00
43.00	3.71	2.65	0.00
44.00	3.71	2.65	0.00
45.00	3.71	2.65	0.00
46.00	3.71	2.65	0.00
47.00	3.71	2.65	0.00
48.00	3.71	2.65	0.00
49.00	3.71	2.65	0.00
50.00	3.71	2.65	0.00
51.00	3.71	2.65	0.00
52.00	3.71	2.65	0.00
53.00	3.71	2.65	0.00
54.00	3.71	2.65	0.00
55.00	3.71	2.65	0.00
56.00	3.71	2.65	0.00
57.00	3.71	2.65	0.00
58.00	3.71	2.65	0.00
59.00	3.71	2.65	0.00
60.00	3.71	2.65	0.00
61.00	3.71	2.65	0.00
62.00	3.71	2.65	0.00
63.00	3.71	2.65	0.00
64.00	3.71	2.65	0.00
65.00	3.71	2.65	0.00
66.00	3.71	2.65	0.00
67.00	3.71	2.65	0.00
68.00	3.71	2.65	0.00
69.00	3.71	2.65	0.00
70.00	3.71	2.65	0.00
71.00	3.71	2.65	0.00
72.00	3.71	2.65	0.00

Summary for Subcatchment F1: Direct Runoff

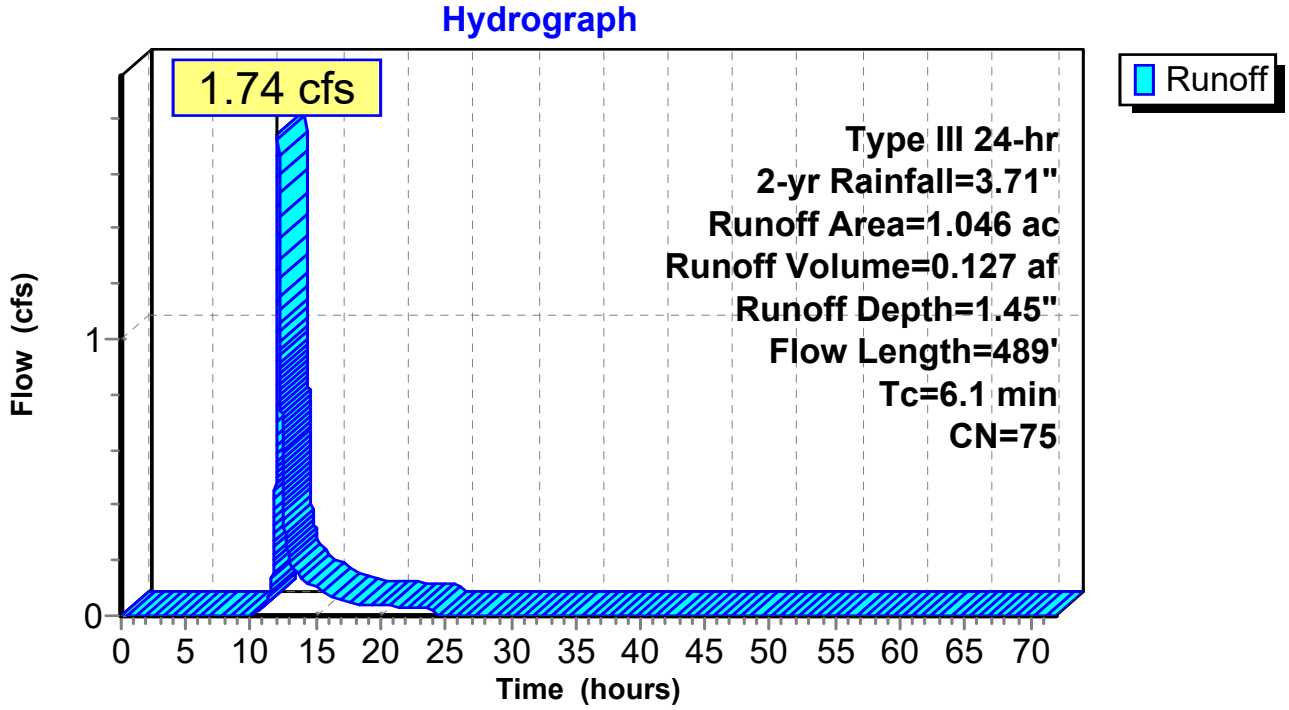
Runoff = 1.74 cfs @ 12.09 hrs, Volume= 0.127 af, Depth= 1.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.71"

	Area (ac)	CN	Description
	0.723	71	Meadow, non-grazed, HSG C
	0.132	70	Woods, Good, HSG C
*	0.191	96	Gravel surface, 100% imp, HSG C
	1.046	75	Weighted Average
	0.855		81.74% Pervious Area
	0.191		18.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.0	20	0.2607	0.17		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.71"
0.9	122	0.0514	2.27		**Shallow Concentrated Flow, Riprap swale** Kv= 10.0 fps
2.8	259	0.0243	1.56		**Shallow Concentrated Flow, Riprap swale** Kv= 10.0 fps
0.4	88	0.0480	3.29		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
6.1	489	Total			

Subcatchment F1: Direct Runoff



Hydrograph for Subcatchment F1: Direct Runoff

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.04	0.00	0.00
2.00	0.07	0.00	0.00
3.00	0.11	0.00	0.00
4.00	0.16	0.00	0.00
5.00	0.21	0.00	0.00
6.00	0.27	0.00	0.00
7.00	0.34	0.00	0.00
8.00	0.42	0.00	0.00
9.00	0.54	0.00	0.00
10.00	0.70	0.00	0.00
11.00	0.93	0.02	0.04
12.00	1.85	0.31	**0.92**
13.00	2.78	0.82	**0.20**
14.00	3.01	0.97	0.13
15.00	3.17	1.07	0.10
16.00	3.29	1.15	0.07
17.00	3.37	1.21	0.06
18.00	3.44	1.26	0.05
19.00	3.50	1.30	0.04
20.00	3.55	1.34	0.04
21.00	3.60	1.37	0.03
22.00	3.64	1.40	0.03
23.00	3.68	1.43	0.03
24.00	**3.71**	**1.45**	0.02
25.00	3.71	1.45	0.00
26.00	3.71	1.45	0.00
27.00	3.71	1.45	0.00
28.00	3.71	1.45	0.00
29.00	3.71	1.45	0.00
30.00	3.71	1.45	0.00
31.00	3.71	1.45	0.00
32.00	3.71	1.45	0.00
33.00	3.71	1.45	0.00
34.00	3.71	1.45	0.00
35.00	3.71	1.45	0.00
36.00	3.71	1.45	0.00
37.00	3.71	1.45	0.00
38.00	3.71	1.45	0.00
39.00	3.71	1.45	0.00
40.00	3.71	1.45	0.00
41.00	3.71	1.45	0.00
42.00	3.71	1.45	0.00
43.00	3.71	1.45	0.00
44.00	3.71	1.45	0.00
45.00	3.71	1.45	0.00
46.00	3.71	1.45	0.00
47.00	3.71	1.45	0.00
48.00	3.71	1.45	0.00
49.00	3.71	1.45	0.00
50.00	3.71	1.45	0.00
51.00	3.71	1.45	0.00
52.00	3.71	1.45	0.00
53.00	3.71	1.45	0.00
54.00	3.71	1.45	0.00
55.00	3.71	1.45	0.00
56.00	3.71	1.45	0.00
57.00	3.71	1.45	0.00
58.00	3.71	1.45	0.00
59.00	3.71	1.45	0.00
60.00	3.71	1.45	0.00
61.00	3.71	1.45	0.00
62.00	3.71	1.45	0.00
63.00	3.71	1.45	0.00
64.00	3.71	1.45	0.00
65.00	3.71	1.45	0.00
66.00	3.71	1.45	0.00
67.00	3.71	1.45	0.00
68.00	3.71	1.45	0.00
69.00	3.71	1.45	0.00
70.00	3.71	1.45	0.00
71.00	3.71	1.45	0.00
72.00	3.71	1.45	0.00

Summary for Subcatchment G1: Graded Road Runoff

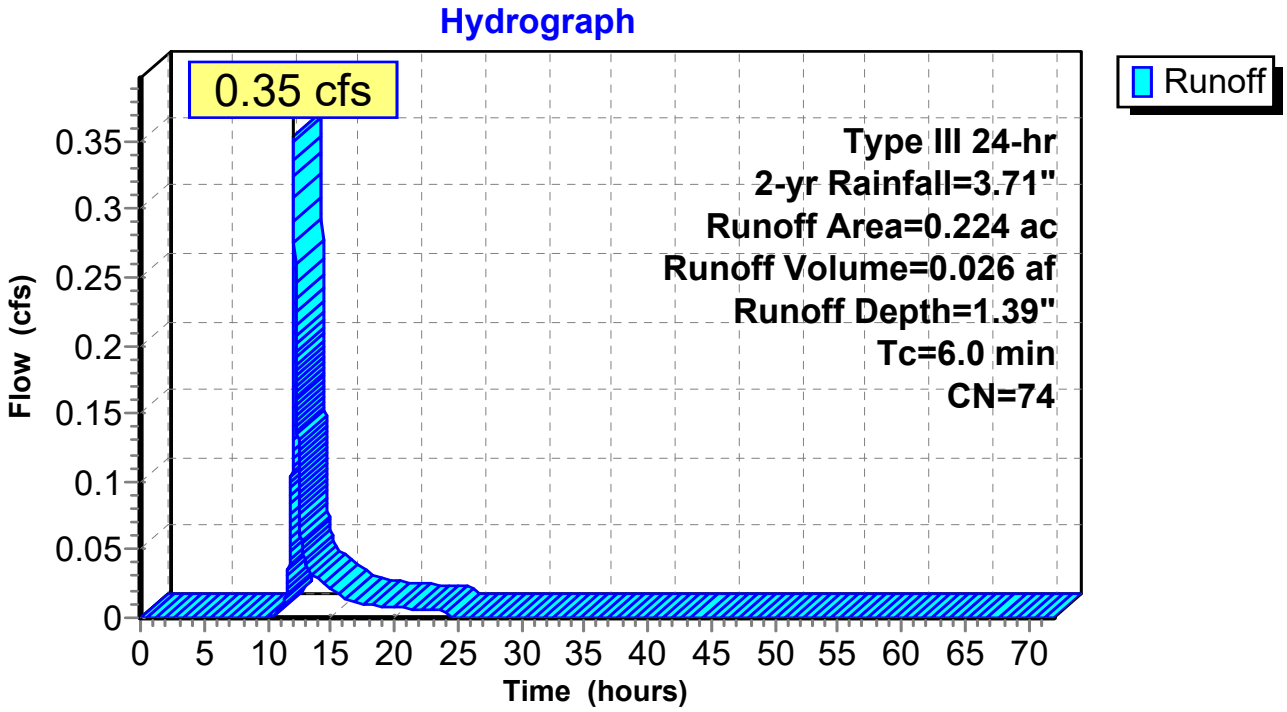
Runoff = 0.35 cfs @ 12.09 hrs, Volume= 0.026 af, Depth= 1.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.71"

	Area (ac)	CN	Description
*	0.021	96	Gravel surface, 100%, imp, HSG C
	0.010	78	Meadow, non-grazed, HSG D
	0.179	71	Meadow, non-grazed, HSG C
	0.014	70	Woods, Good, HSG C
	0.224	74	Weighted Average
	0.224		100.00% Pervious Area

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

Subcatchment G1: Graded Road Runoff



Hydrograph for Subcatchment G1: Graded Road Runoff

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.04	0.00	0.00
2.00	0.07	0.00	0.00
3.00	0.11	0.00	0.00
4.00	0.16	0.00	0.00
5.00	0.21	0.00	0.00
6.00	0.27	0.00	0.00
7.00	0.34	0.00	0.00
8.00	0.42	0.00	0.00
9.00	0.54	0.00	0.00
10.00	0.70	0.00	0.00
11.00	0.93	0.01	0.01
12.00	1.85	0.28	**0.19**
13.00	2.78	0.77	**0.04**
14.00	3.01	0.91	0.03
15.00	3.17	1.02	0.02
16.00	3.29	1.10	0.02
17.00	3.37	1.15	0.01
18.00	3.44	1.20	0.01
19.00	3.50	1.24	0.01
20.00	3.55	1.27	0.01
21.00	3.60	1.31	0.01
22.00	3.64	1.34	0.01
23.00	3.68	1.36	0.01
24.00	**3.71**	**1.39**	0.01
25.00	3.71	1.39	0.00
26.00	3.71	1.39	0.00
27.00	3.71	1.39	0.00
28.00	3.71	1.39	0.00
29.00	3.71	1.39	0.00
30.00	3.71	1.39	0.00
31.00	3.71	1.39	0.00
32.00	3.71	1.39	0.00
33.00	3.71	1.39	0.00
34.00	3.71	1.39	0.00
35.00	3.71	1.39	0.00
36.00	3.71	1.39	0.00
37.00	3.71	1.39	0.00
38.00	3.71	1.39	0.00
39.00	3.71	1.39	0.00
40.00	3.71	1.39	0.00
41.00	3.71	1.39	0.00
42.00	3.71	1.39	0.00
43.00	3.71	1.39	0.00
44.00	3.71	1.39	0.00
45.00	3.71	1.39	0.00
46.00	3.71	1.39	0.00
47.00	3.71	1.39	0.00
48.00	3.71	1.39	0.00
49.00	3.71	1.39	0.00
50.00	3.71	1.39	0.00
51.00	3.71	1.39	0.00
52.00	3.71	1.39	0.00
53.00	3.71	1.39	0.00
54.00	3.71	1.39	0.00
55.00	3.71	1.39	0.00
56.00	3.71	1.39	0.00
57.00	3.71	1.39	0.00
58.00	3.71	1.39	0.00
59.00	3.71	1.39	0.00
60.00	3.71	1.39	0.00
61.00	3.71	1.39	0.00
62.00	3.71	1.39	0.00
63.00	3.71	1.39	0.00
64.00	3.71	1.39	0.00
65.00	3.71	1.39	0.00
66.00	3.71	1.39	0.00
67.00	3.71	1.39	0.00
68.00	3.71	1.39	0.00
69.00	3.71	1.39	0.00
70.00	3.71	1.39	0.00
71.00	3.71	1.39	0.00
72.00	3.71	1.39	0.00

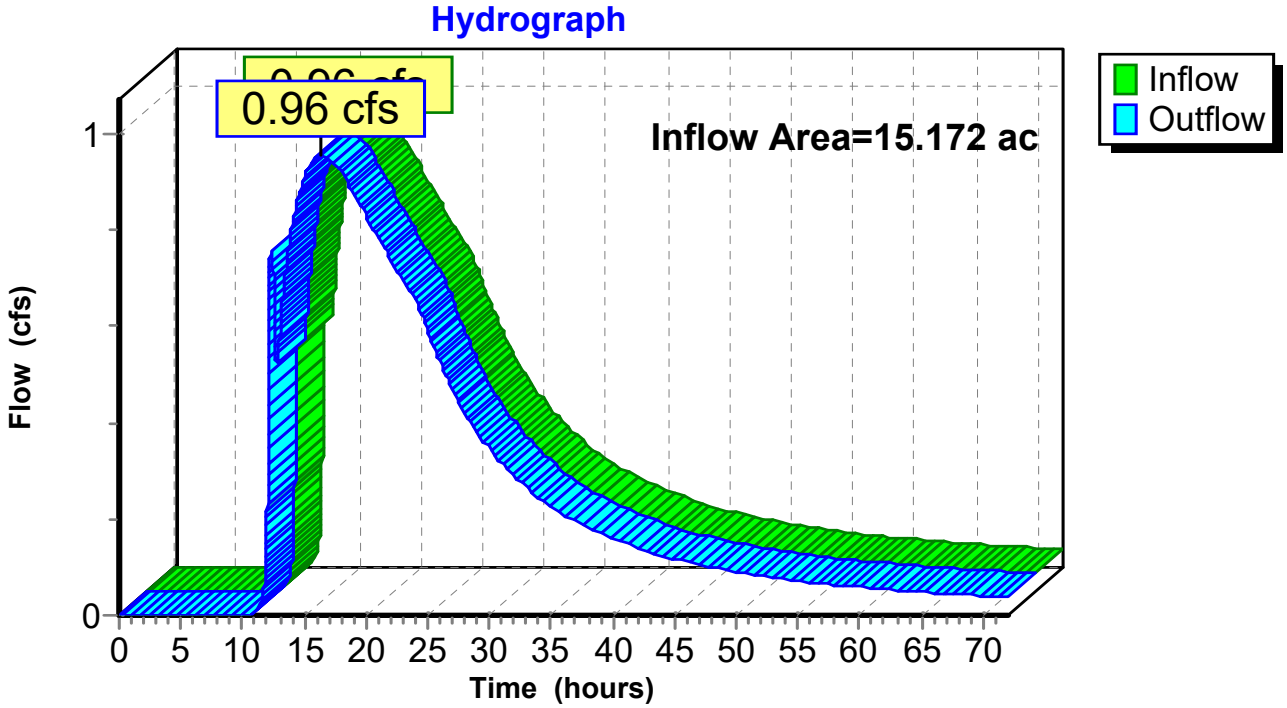
Summary for Reach 15R: U.S. Pike Site Culvert

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 15.172 ac, 4.81% Impervious, Inflow Depth > 1.14" for 2-yr event
Inflow = 0.96 cfs @ 16.32 hrs, Volume= 1.446 af
Outflow = 0.96 cfs @ 16.32 hrs, Volume= 1.446 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 4

Reach 15R: U.S. Pike Site Culvert



Hydrograph for Reach 15R: U.S. Pike Site Culvert

Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)	Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
0.00	0.00		0.00	53.00	0.08		0.08
1.00	0.00		0.00	54.00	0.07		0.07
2.00	0.00		0.00	55.00	0.07		0.07
3.00	0.00		0.00	56.00	0.07		0.07
4.00	0.00		0.00	57.00	0.07		0.07
5.00	0.00		0.00	58.00	0.06		0.06
6.00	0.00		0.00	59.00	0.06		0.06
7.00	0.00		0.00	60.00	0.06		0.06
8.00	0.00		0.00	61.00	0.06		0.06
9.00	0.00		0.00	62.00	0.05		0.05
10.00	0.00		0.00	63.00	0.05		0.05
11.00	0.01		0.01	64.00	0.05		0.05
12.00	0.22		0.22	65.00	0.05		0.05
13.00	0.58		0.58	66.00	0.05		0.05
14.00	0.80		0.80	67.00	0.05		0.05
15.00	0.91		0.91	68.00	0.04		0.04
16.00	**0.96**		**0.96**	69.00	0.04		0.04
17.00	**0.95**		**0.95**	70.00	0.04		0.04
18.00	0.92		0.92	71.00	0.04		0.04
19.00	0.88		0.88	72.00	0.04		0.04
20.00	0.83		0.83				
21.00	0.78		0.78				
22.00	0.74		0.74				
23.00	0.70		0.70				
24.00	0.66		0.66				
25.00	0.59		0.59				
26.00	0.52		0.52				
27.00	0.47		0.47				
28.00	0.42		0.42				
29.00	0.38		0.38				
30.00	0.35		0.35				
31.00	0.31		0.31				
32.00	0.29		0.29				
33.00	0.27		0.27				
34.00	0.25		0.25				
35.00	0.23		0.23				
36.00	0.21		0.21				
37.00	0.20		0.20				
38.00	0.18		0.18				
39.00	0.17		0.17				
40.00	0.16		0.16				
41.00	0.15		0.15				
42.00	0.14		0.14				
43.00	0.13		0.13				
44.00	0.12		0.12				
45.00	0.12		0.12				
46.00	0.11		0.11				
47.00	0.11		0.11				
48.00	0.10		0.10				
49.00	0.10		0.10				
50.00	0.09		0.09				
51.00	0.09		0.09				
52.00	0.08		0.08				

Summary for Reach SP-1: OFFSITE PIKE PROP

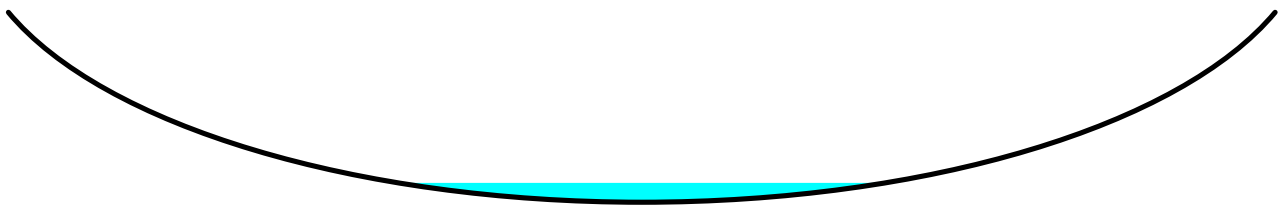
[80] Warning: Exceeded Pond 1P by 0.19' @ 12.17 hrs (1.35 cfs 0.079 af)

Inflow Area = 15.172 ac, 4.81% Impervious, Inflow Depth > 1.15" for 2-yr event
Inflow = 1.74 cfs @ 12.09 hrs, Volume= 1.450 af
Outflow = 0.96 cfs @ 16.32 hrs, Volume= 1.446 af, Atten= 45%, Lag= 253.4 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 4
Max. Velocity= 0.30 fps, Min. Travel Time= 27.0 min
Avg. Velocity = 0.19 fps, Avg. Travel Time= 44.1 min

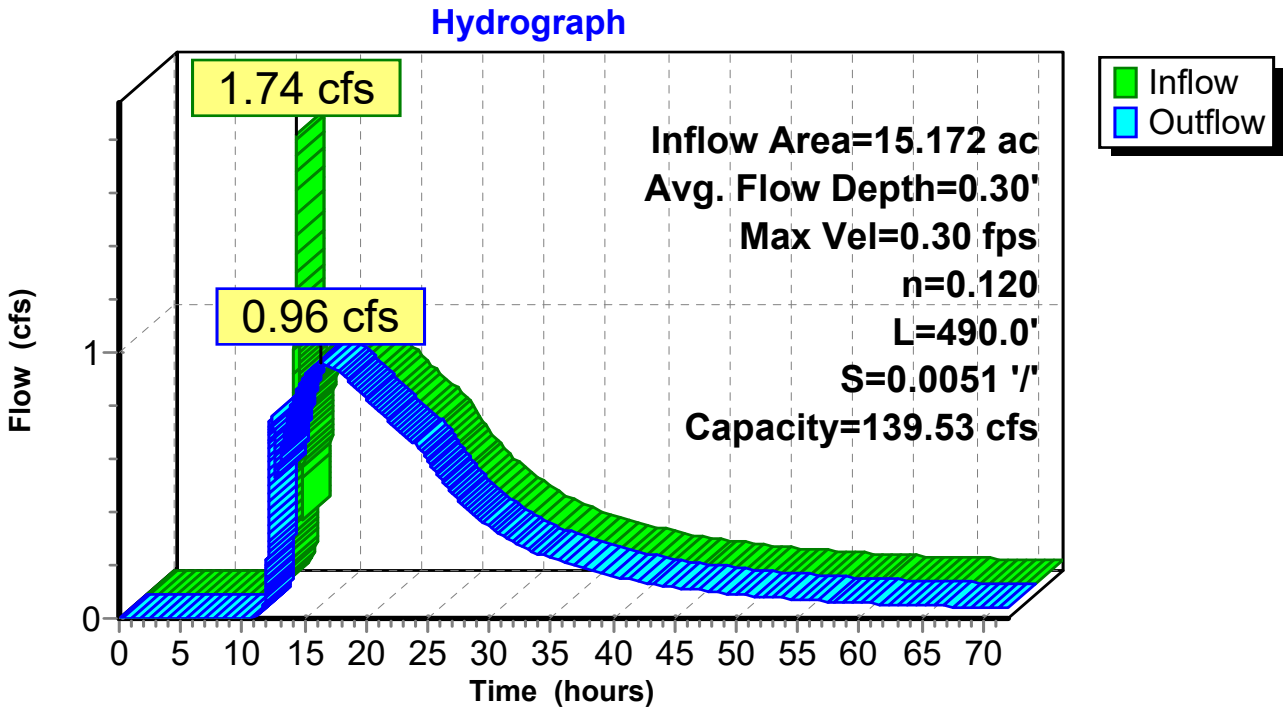
Peak Storage= 1,551 cf @ 16.32 hrs
Average Depth at Peak Storage= 0.30'
Bank-Full Depth= 3.00' Flow Area= 100.0 sf, Capacity= 139.53 cfs

50.00' x 3.00' deep Parabolic Channel, n= 0.120
Length= 490.0' Slope= 0.0051 '/'
Inlet Invert= 24.00', Outlet Invert= 21.50'



‡

Reach SP-1: OFFSITE PIKE PROP



Hydrograph for Reach SP-1: OFFSITE PIKE PROP

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)
0.00	0.00	0	24.00	0.00
2.00	0.00	0	24.00	0.00
4.00	0.00	0	24.00	0.00
6.00	0.00	0	24.00	0.00
8.00	0.00	0	24.00	0.00
10.00	0.00	0	24.00	0.00
12.00	**0.92**	554	24.15	0.22
14.00	**0.85**	1,373	24.28	0.80
16.00	0.96	**1,548**	**24.30**	**0.96**
18.00	0.91	**1,507**	**24.29**	**0.92**
20.00	0.81	1,403	24.28	0.83
22.00	0.73	1,297	24.27	0.74
24.00	0.64	1,195	24.25	0.66
26.00	0.50	1,021	24.23	0.52
28.00	0.40	878	24.21	0.42
30.00	0.33	765	24.19	0.35
32.00	0.28	675	24.17	0.29
34.00	0.24	602	24.16	0.25
36.00	0.20	540	24.15	0.21
38.00	0.18	490	24.14	0.18
40.00	0.15	446	24.13	0.16
42.00	0.13	408	24.12	0.14
44.00	0.12	376	24.12	0.12
46.00	0.11	348	24.11	0.11
48.00	0.10	323	24.10	0.10
50.00	0.09	301	24.10	0.09
52.00	0.08	281	24.10	0.08
54.00	0.07	263	24.09	0.07
56.00	0.07	247	24.09	0.07
58.00	0.06	233	24.08	0.06
60.00	0.06	221	24.08	0.06
62.00	0.05	209	24.08	0.05
64.00	0.05	199	24.08	0.05
66.00	0.05	189	24.07	0.05
68.00	0.04	179	24.07	0.04
70.00	0.04	171	24.07	0.04
72.00	0.04	163	24.07	0.04

Stage-Area-Storage for Reach SP-1: OFFSITE PIKE PROP

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
24.00	0.0	0
24.05	0.2	109
24.10	0.6	300
24.15	1.1	548
24.20	1.7	845
24.25	2.4	1,180
24.30	3.2	1,550
24.35	4.0	1,954
24.40	4.9	2,387
24.45	5.8	2,847
24.50	6.8	3,335
24.55	7.9	3,847
24.60	8.9	4,383
24.65	10.1	4,943
24.70	11.3	5,524
24.75	12.5	6,125
24.80	13.8	6,748
24.85	15.1	7,391
24.90	16.4	8,052
24.95	17.8	8,732
25.00	19.2	9,431
25.05	20.7	10,146
25.10	22.2	10,880
25.15	23.7	11,630
25.20	25.3	12,396
25.25	26.9	13,180
25.30	28.5	13,978
25.35	30.2	14,792
25.40	31.9	15,622
25.45	33.6	16,466
25.50	35.4	17,324
25.55	37.1	18,198
25.60	39.0	19,086
25.65	40.8	19,987
25.70	42.7	20,903
25.75	44.6	21,831
25.80	46.5	22,773
25.85	48.4	23,729
25.90	50.4	24,698
25.95	52.4	25,678
26.00	54.4	26,673
26.05	56.5	27,679
26.10	58.6	28,697
26.15	60.7	29,729
26.20	62.8	30,772
26.25	65.0	31,826
26.30	67.1	32,894
26.35	69.3	33,972
26.40	71.6	35,062
26.45	73.8	36,163
26.50	76.1	37,276
26.55	78.4	38,399
26.60	80.7	39,535
26.65	83.0	40,681
26.70	85.4	41,837
26.75	87.8	43,005
26.80	90.2	44,183
26.85	92.6	45,371
26.90	95.0	46,571
26.95	97.5	47,781
27.00	**100.0**	**49,000**

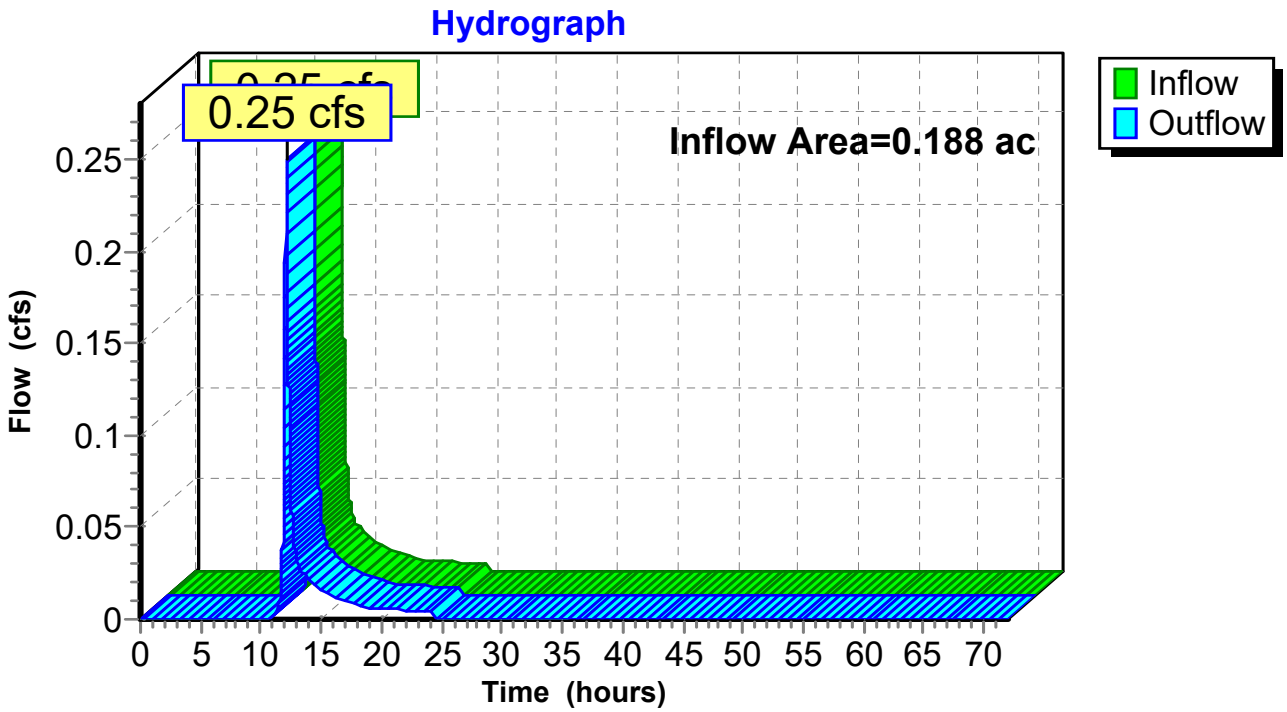
Summary for Reach SP-2: OFFSITE TO 266-1

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.188 ac, 0.00% Impervious, Inflow Depth = 1.20" for 2-yr event
Inflow = 0.25 cfs @ 12.10 hrs, Volume= 0.019 af
Outflow = 0.25 cfs @ 12.10 hrs, Volume= 0.019 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 4

Reach SP-2: OFFSITE TO 266-1



Hydrograph for Reach SP-2: OFFSITE TO 266-1

Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)	Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
0.00	0.00		0.00	53.00	0.00		0.00
1.00	0.00		0.00	54.00	0.00		0.00
2.00	0.00		0.00	55.00	0.00		0.00
3.00	0.00		0.00	56.00	0.00		0.00
4.00	0.00		0.00	57.00	0.00		0.00
5.00	0.00		0.00	58.00	0.00		0.00
6.00	0.00		0.00	59.00	0.00		0.00
7.00	0.00		0.00	60.00	0.00		0.00
8.00	0.00		0.00	61.00	0.00		0.00
9.00	0.00		0.00	62.00	0.00		0.00
10.00	0.00		0.00	63.00	0.00		0.00
11.00	0.00		0.00	64.00	0.00		0.00
12.00	**0.13**		**0.13**	65.00	0.00		0.00
13.00	**0.03**		**0.03**	66.00	0.00		0.00
14.00	0.02		0.02	67.00	0.00		0.00
15.00	0.02		0.02	68.00	0.00		0.00
16.00	0.01		0.01	69.00	0.00		0.00
17.00	0.01		0.01	70.00	0.00		0.00
18.00	0.01		0.01	71.00	0.00		0.00
19.00	0.01		0.01	72.00	0.00		0.00
20.00	0.01		0.01				
21.00	0.01		0.01				
22.00	0.00		0.00				
23.00	0.00		0.00				
24.00	0.00		0.00				
25.00	0.00		0.00				
26.00	0.00		0.00				
27.00	0.00		0.00				
28.00	0.00		0.00				
29.00	0.00		0.00				
30.00	0.00		0.00				
31.00	0.00		0.00				
32.00	0.00		0.00				
33.00	0.00		0.00				
34.00	0.00		0.00				
35.00	0.00		0.00				
36.00	0.00		0.00				
37.00	0.00		0.00				
38.00	0.00		0.00				
39.00	0.00		0.00				
40.00	0.00		0.00				
41.00	0.00		0.00				
42.00	0.00		0.00				
43.00	0.00		0.00				
44.00	0.00		0.00				
45.00	0.00		0.00				
46.00	0.00		0.00				
47.00	0.00		0.00				
48.00	0.00		0.00				
49.00	0.00		0.00				
50.00	0.00		0.00				
51.00	0.00		0.00				
52.00	0.00		0.00				

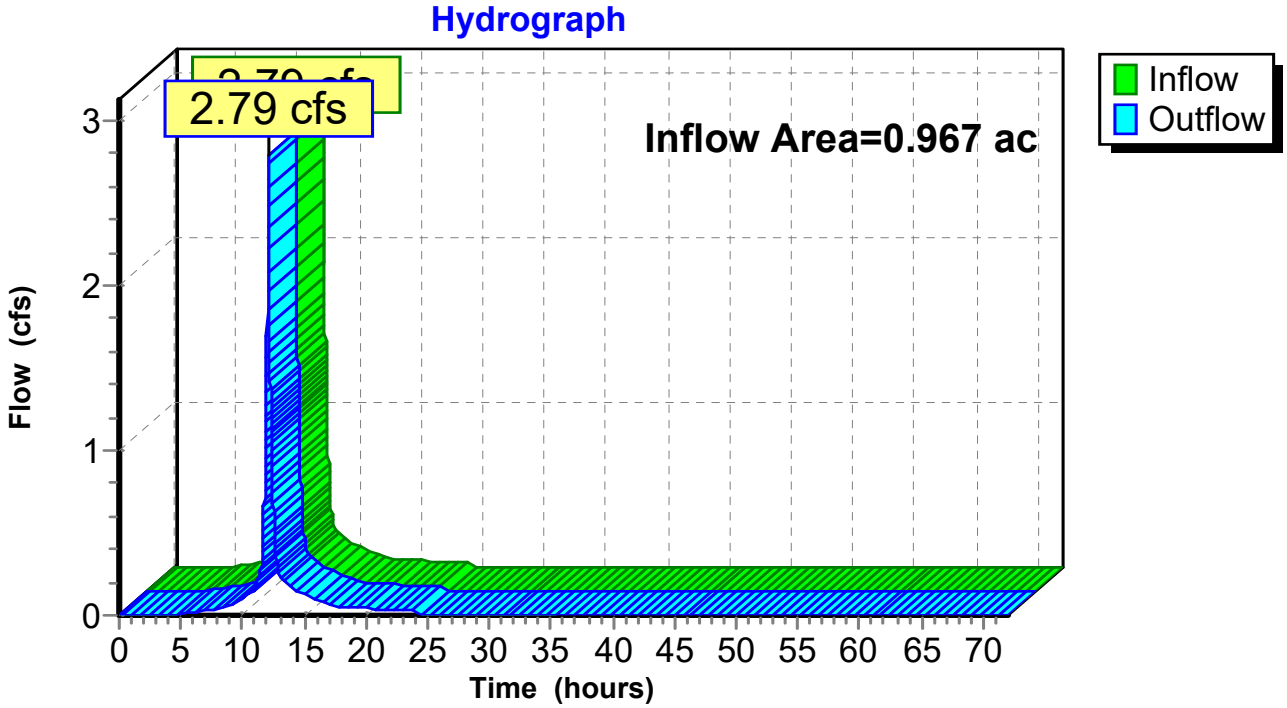
Summary for Reach SP-3: SW WETLANDS

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.967 ac, 70.22% Impervious, Inflow Depth = 2.66" for 2-yr event
Inflow = 2.79 cfs @ 12.09 hrs, Volume= 0.214 af
Outflow = 2.79 cfs @ 12.09 hrs, Volume= 0.214 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 4

Reach SP-3: SW WETLANDS



Hydrograph for Reach SP-3: SW WETLANDS

Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)	Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
0.00	0.00		0.00	53.00	0.00		0.00
1.00	0.00		0.00	54.00	0.00		0.00
2.00	0.00		0.00	55.00	0.00		0.00
3.00	0.00		0.00	56.00	0.00		0.00
4.00	0.00		0.00	57.00	0.00		0.00
5.00	0.01		0.01	58.00	0.00		0.00
6.00	0.01		0.01	59.00	0.00		0.00
7.00	0.03		0.03	60.00	0.00		0.00
8.00	0.04		0.04	61.00	0.00		0.00
9.00	0.07		0.07	62.00	0.00		0.00
10.00	0.10		0.10	63.00	0.00		0.00
11.00	0.16		0.16	64.00	0.00		0.00
12.00	**1.70**		**1.70**	65.00	0.00		0.00
13.00	**0.26**		**0.26**	66.00	0.00		0.00
14.00	0.16		0.16	67.00	0.00		0.00
15.00	0.12		0.12	68.00	0.00		0.00
16.00	0.09		0.09	69.00	0.00		0.00
17.00	0.07		0.07	70.00	0.00		0.00
18.00	0.05		0.05	71.00	0.00		0.00
19.00	0.05		0.05	72.00	0.00		0.00
20.00	0.04		0.04				
21.00	0.04		0.04				
22.00	0.04		0.04				
23.00	0.03		0.03				
24.00	0.03		0.03				
25.00	0.00		0.00				
26.00	0.00		0.00				
27.00	0.00		0.00				
28.00	0.00		0.00				
29.00	0.00		0.00				
30.00	0.00		0.00				
31.00	0.00		0.00				
32.00	0.00		0.00				
33.00	0.00		0.00				
34.00	0.00		0.00				
35.00	0.00		0.00				
36.00	0.00		0.00				
37.00	0.00		0.00				
38.00	0.00		0.00				
39.00	0.00		0.00				
40.00	0.00		0.00				
41.00	0.00		0.00				
42.00	0.00		0.00				
43.00	0.00		0.00				
44.00	0.00		0.00				
45.00	0.00		0.00				
46.00	0.00		0.00				
47.00	0.00		0.00				
48.00	0.00		0.00				
49.00	0.00		0.00				
50.00	0.00		0.00				
51.00	0.00		0.00				
52.00	0.00		0.00				

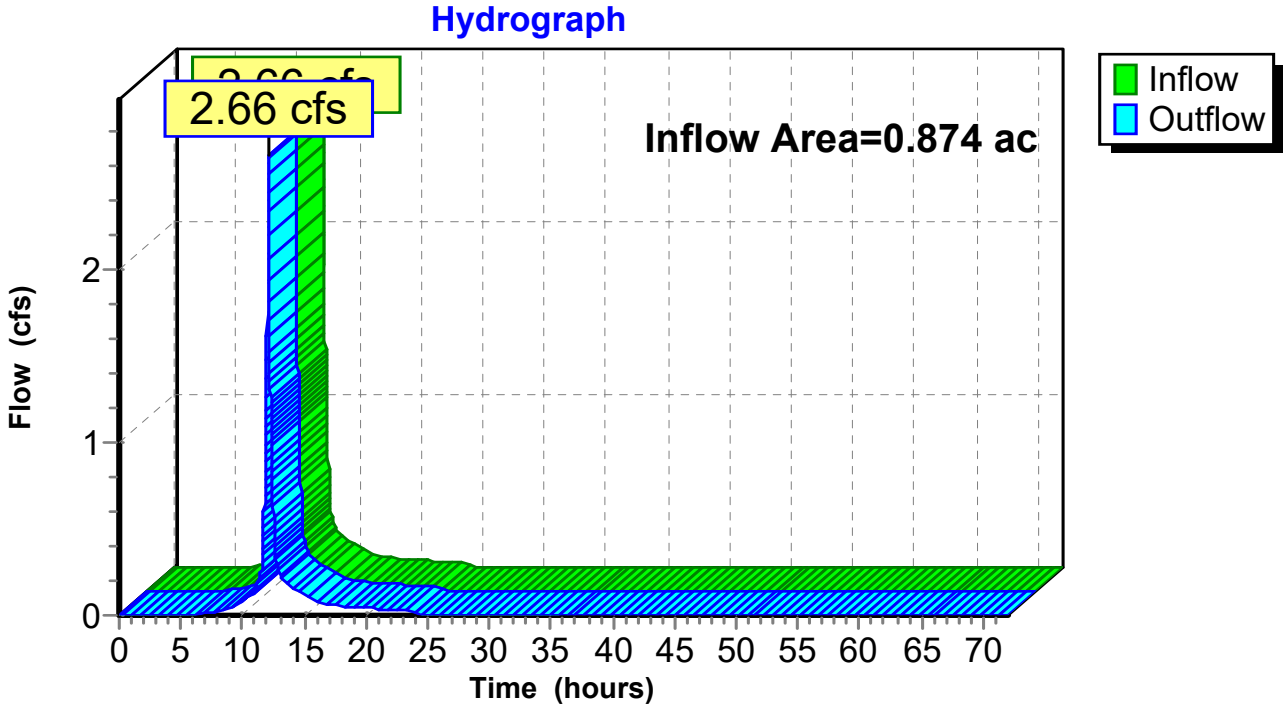
Summary for Reach SP-4: SE WETLANDS

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.874 ac, 71.51% Impervious, Inflow Depth = 2.65" for 2-yr event
Inflow = 2.66 cfs @ 12.09 hrs, Volume= 0.193 af
Outflow = 2.66 cfs @ 12.09 hrs, Volume= 0.193 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 4

Reach SP-4: SE WETLANDS



Hydrograph for Reach SP-4: SE WETLANDS

Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)	Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
0.00	0.00		0.00	53.00	0.00		0.00
1.00	0.00		0.00	54.00	0.00		0.00
2.00	0.00		0.00	55.00	0.00		0.00
3.00	0.00		0.00	56.00	0.00		0.00
4.00	0.00		0.00	57.00	0.00		0.00
5.00	0.00		0.00	58.00	0.00		0.00
6.00	0.00		0.00	59.00	0.00		0.00
7.00	0.01		0.01	60.00	0.00		0.00
8.00	0.02		0.02	61.00	0.00		0.00
9.00	0.05		0.05	62.00	0.00		0.00
10.00	0.08		0.08	63.00	0.00		0.00
11.00	0.14		0.14	64.00	0.00		0.00
12.00	**1.61**		**1.61**	65.00	0.00		0.00
13.00	**0.24**		**0.24**	66.00	0.00		0.00
14.00	0.15		0.15	67.00	0.00		0.00
15.00	0.12		0.12	68.00	0.00		0.00
16.00	0.08		0.08	69.00	0.00		0.00
17.00	0.07		0.07	70.00	0.00		0.00
18.00	0.05		0.05	71.00	0.00		0.00
19.00	0.04		0.04	72.00	0.00		0.00
20.00	0.04		0.04				
21.00	0.04		0.04				
22.00	0.03		0.03				
23.00	0.03		0.03				
24.00	0.03		0.03				
25.00	0.00		0.00				
26.00	0.00		0.00				
27.00	0.00		0.00				
28.00	0.00		0.00				
29.00	0.00		0.00				
30.00	0.00		0.00				
31.00	0.00		0.00				
32.00	0.00		0.00				
33.00	0.00		0.00				
34.00	0.00		0.00				
35.00	0.00		0.00				
36.00	0.00		0.00				
37.00	0.00		0.00				
38.00	0.00		0.00				
39.00	0.00		0.00				
40.00	0.00		0.00				
41.00	0.00		0.00				
42.00	0.00		0.00				
43.00	0.00		0.00				
44.00	0.00		0.00				
45.00	0.00		0.00				
46.00	0.00		0.00				
47.00	0.00		0.00				
48.00	0.00		0.00				
49.00	0.00		0.00				
50.00	0.00		0.00				
51.00	0.00		0.00				
52.00	0.00		0.00				

Summary for Pond 1P: EX. POND-2

[80] Warning: Exceeded Pond 9P by 1.01' @ 24.77 hrs (2.85 cfs 0.998 af)

Inflow Area =	14.126 ac,	3.82% Impervious,	Inflow Depth =	1.28"	for 2-yr event
Inflow =	13.21 cfs @	12.31 hrs,	Volume=	1.512 af	
Outflow =	0.89 cfs @	16.33 hrs,	Volume=	1.323 af,	Atten= 93%, Lag= 240.9 min
Primary =	0.89 cfs @	16.33 hrs,	Volume=	1.323 af	
Secondary =	0.00 cfs @	0.00 hrs,	Volume=	0.000 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 4
Starting Elev= 24.00' Surf.Area= 120,600 sf Storage= 447,701 cf
Peak Elev= 24.34' @ 16.32 hrs Surf.Area= 124,668 sf Storage= 489,621 cf (41,920 cf above start)

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= 755.9 min (1,627.7 - 871.8)

Volume	Invert	Avail.Storage	Storage Description
#1	16.00'	819,738 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)
#2	22.33'	213,963 cf	**Upper Pond (Prismatic)**Listed below (Recalc)
		1,033,701 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
16.00	0	0	0
22.34	81,800	259,306	259,306
22.50	83,600	13,232	272,538
23.00	88,000	42,900	315,438
24.00	89,800	88,900	404,338
25.00	96,800	93,300	497,638
26.00	103,800	100,300	597,938
27.00	110,900	107,350	705,288
28.00	118,000	114,450	819,738

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
22.33	0	0	0
22.34	20,500	103	103
22.50	21,500	3,360	3,463
23.00	25,500	11,750	15,213
24.00	30,800	28,150	43,363
25.00	35,700	33,250	76,613
26.00	41,000	38,350	114,963
27.00	48,500	44,750	159,713
28.00	60,000	54,250	213,963

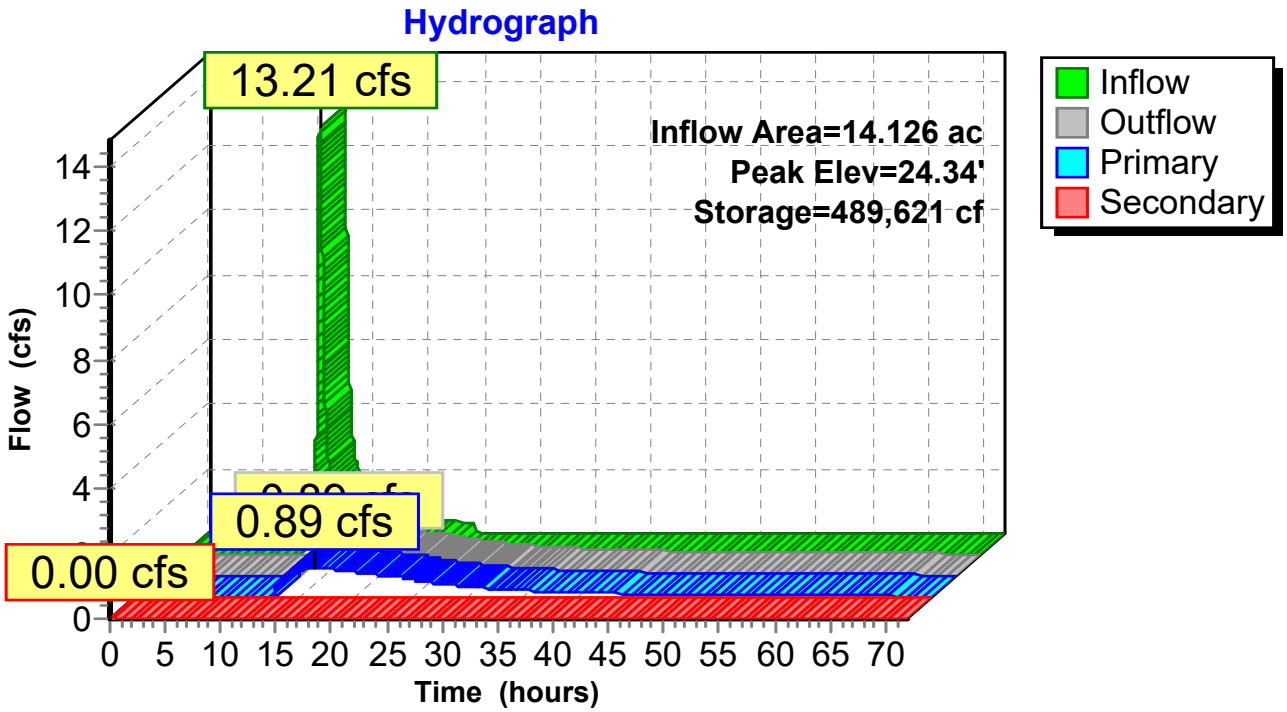
Device	Routing	Invert	Outlet Devices
#1	Primary	23.92'	**53.0" W x 41.0" H, R=28.1"/73.4" Pipe Arch CMP_Arch_1 53x41 w/ 19.0" ins** L= 61.3' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 22.34' / 21.91' S= 0.0070 '/' Cc= 0.900 n= 0.022, Flow Area= 6.21 sf
#2	Secondary	27.39'	**Asymmetrical Weir, C= 2.63**

Offset (feet)	0.00	52.00	83.00	94.00	124.00
Elev. (feet)	28.00	27.50	27.39	27.50	28.00

Primary OutFlow Max=0.89 cfs @ 16.33 hrs HW=24.34' TW=24.30' (Dynamic Tailwater)
└─**1=CMP_Arch_1 53x41** (Outlet Controls 0.89 cfs @ 0.65 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=24.00' TW=24.00' (Dynamic Tailwater)
└─**2=Asymmetrical Weir** (Controls 0.00 cfs)

Pond 1P: EX. POND-2



Hydrograph for Pond 1P: EX. POND-2

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Primary (cfs)	Secondary (cfs)
0.00	0.00	447,701	24.00	0.00	0.00	**0.00**
2.00	0.00	447,701	24.00	0.00	0.00	0.00
4.00	0.00	447,701	24.00	0.00	0.00	0.00
6.00	0.00	447,701	24.00	0.00	0.00	0.00
8.00	0.00	447,701	24.00	0.00	0.00	0.00
10.00	0.00	447,701	24.00	0.00	0.00	0.00
12.00	**3.72**	450,949	24.03	0.00	0.00	0.00
14.00	**1.79**	485,763	24.31	0.72	0.72	0.00
16.00	1.00	**489,562**	**24.34**	**0.89**	**0.89**	0.00
18.00	0.61	**488,803**	**24.34**	**0.86**	**0.86**	0.00
20.00	0.48	486,681	24.32	0.78	0.78	0.00
22.00	0.40	484,501	24.30	0.70	0.70	0.00
24.00	0.32	482,341	24.28	0.62	0.62	0.00
26.00	0.00	478,639	24.25	0.50	0.50	0.00
28.00	0.00	475,397	24.23	0.40	0.40	0.00
30.00	0.00	472,755	24.21	0.33	0.33	0.00
32.00	0.00	470,571	24.19	0.28	0.28	0.00
34.00	0.00	468,725	24.17	0.24	0.24	0.00
36.00	0.00	467,157	24.16	0.20	0.20	0.00
38.00	0.00	465,801	24.15	0.18	0.18	0.00
40.00	0.00	464,615	24.14	0.15	0.15	0.00
42.00	0.00	463,578	24.13	0.13	0.13	0.00
44.00	0.00	462,665	24.12	0.12	0.12	0.00
46.00	0.00	461,845	24.12	0.11	0.11	0.00
48.00	0.00	461,106	24.11	0.10	0.10	0.00
50.00	0.00	460,439	24.11	0.09	0.09	0.00
52.00	0.00	459,838	24.10	0.08	0.08	0.00
54.00	0.00	459,295	24.10	0.07	0.07	0.00
56.00	0.00	458,803	24.09	0.07	0.07	0.00
58.00	0.00	458,346	24.09	0.06	0.06	0.00
60.00	0.00	457,922	24.08	0.06	0.06	0.00
62.00	0.00	457,527	24.08	0.05	0.05	0.00
64.00	0.00	457,161	24.08	0.05	0.05	0.00
66.00	0.00	456,820	24.08	0.05	0.05	0.00
68.00	0.00	456,503	24.07	0.04	0.04	0.00
70.00	0.00	456,208	24.07	0.04	0.04	0.00
72.00	0.00	455,934	24.07	0.04	0.04	0.00

Stage-Area-Storage for Pond 1P: EX. POND-2

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
16.00	0	23.95	441,679
16.15	145	24.10	459,820
16.30	581	24.25	478,222
16.45	1,306	24.40	496,892
16.60	2,322	24.55	515,830
16.75	3,629	24.70	535,036
16.90	5,225	24.85	554,509
17.05	7,112	25.00	574,251
17.20	9,290	25.15	594,264
17.35	11,757	25.30	614,554
17.50	14,515	25.45	635,121
17.65	17,563	25.60	655,965
17.80	20,902	25.75	677,085
17.95	24,530	25.90	698,482
18.10	28,449	26.05	720,159
18.25	32,659	26.20	742,152
18.40	37,158	26.35	764,475
18.55	41,948	26.50	787,126
18.70	47,029	26.65	810,105
18.85	52,399	26.80	833,413
19.00	58,060	26.95	857,049
19.15	64,011	27.10	881,033
19.30	70,253	27.25	905,432
19.45	76,784	27.40	930,248
19.60	83,606	27.55	955,484
19.75	90,719	27.70	981,137
19.90	98,121	27.85	1,007,210
20.05	105,814	28.00	**1,033,701**
20.20	113,797		
20.35	122,071		
20.50	130,635		
20.65	139,489		
20.80	148,633		
20.95	158,068		
21.10	167,793		
21.25	177,809		
21.40	188,114		
21.55	198,710		
21.70	209,596		
21.85	220,773		
22.00	232,240		
22.15	243,997		
22.30	256,044		
22.45	270,767		
22.60	286,595		
22.75	302,801		
22.90	319,384		
23.05	336,334		
23.20	353,492		
23.35	370,810		
23.50	388,288		
23.65	405,925		
23.80	423,723		

Summary for Pond 9P: ECB-C

[90] Warning: Qout>Qin may require smaller dt or Finer Routing

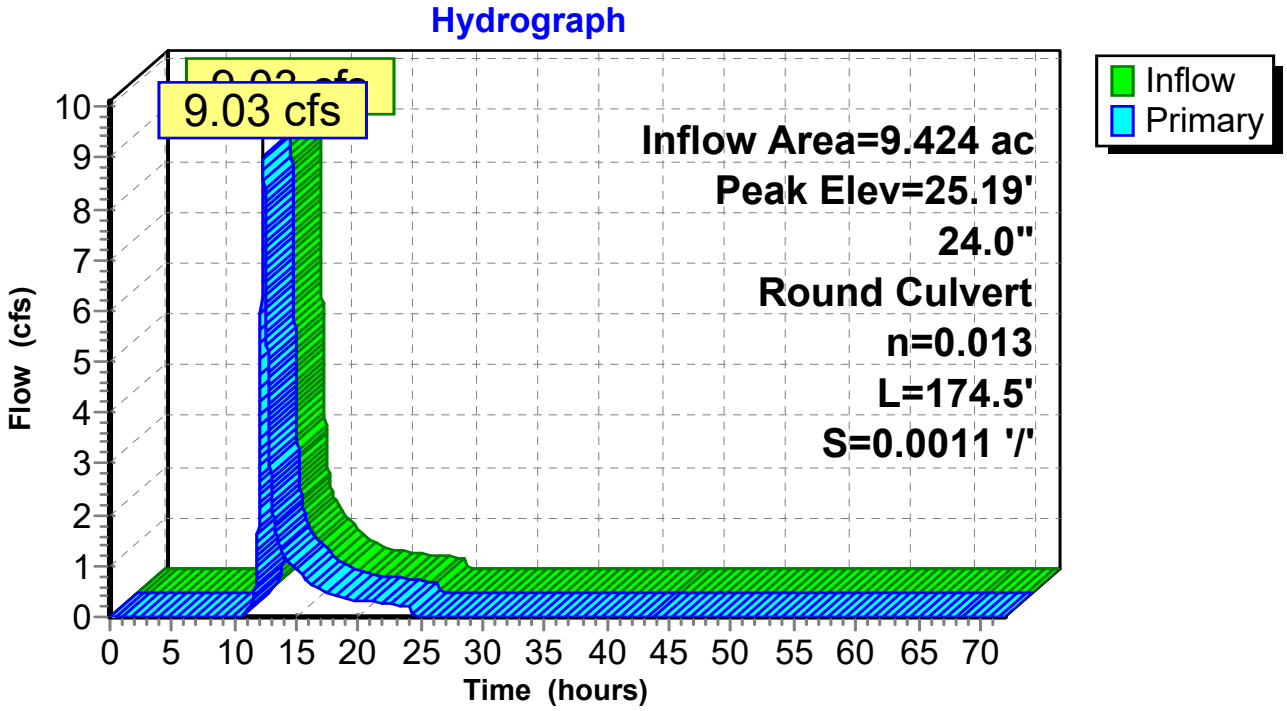
Inflow Area =	9.424 ac,	5.59% Impervious,	Inflow Depth =	1.32"	for 2-yr event
Inflow =	9.03 cfs @	12.32 hrs,	Volume=	1.039 af	
Outflow =	9.03 cfs @	12.32 hrs,	Volume=	1.039 af,	Atten= 0%, Lag= 0.0 min
Primary =	9.03 cfs @	12.32 hrs,	Volume=	1.039 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 4
Peak Elev= 25.19' @ 12.32 hrs
Flood Elev= 27.22'

Device	Routing	Invert	Outlet Devices
#1	Primary	23.26'	**24.0" Round 24" HDPE** L= 174.5' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 23.26' / 23.06' S= 0.0011 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=9.03 cfs @ 12.32 hrs HW=25.19' TW=24.11' (Dynamic Tailwater)
└─**1=24" HDPE** (Barrel Controls 9.03 cfs @ 3.70 fps)

Pond 9P: ECB-C



Hydrograph for Pond 9P: ECB-C

Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
0.00	0.00	23.28	0.00
1.00	0.00	24.00	0.00
2.00	0.00	24.00	0.00
3.00	0.00	24.00	0.00
4.00	0.00	24.00	0.00
5.00	0.00	24.00	0.00
6.00	0.00	24.00	0.00
7.00	0.00	24.00	0.00
8.00	0.00	24.00	0.00
9.00	0.00	24.00	0.00
10.00	0.00	24.00	0.00
11.00	0.12	24.00	0.13
12.00	**2.39**	**24.31**	**2.40**
13.00	**2.41**	**24.45**	**2.41**
14.00	1.23	24.37	1.23
15.00	0.92	24.37	0.93
16.00	0.68	24.36	0.69
17.00	0.53	24.35	0.53
18.00	0.41	24.34	0.42
19.00	0.35	24.33	0.36
20.00	0.32	24.32	0.33
21.00	0.29	24.31	0.30
22.00	0.27	24.30	0.27
23.00	0.24	24.30	0.25
24.00	0.22	24.29	0.22
25.00	0.00	24.27	0.00
26.00	0.00	24.25	0.00
27.00	0.00	24.23	0.00
28.00	0.00	24.23	0.00
29.00	0.00	24.21	0.00
30.00	0.00	24.20	0.00
31.00	0.00	24.19	0.00
32.00	0.00	24.19	0.00
33.00	0.00	24.18	0.00
34.00	0.00	24.17	0.00
35.00	0.00	24.16	0.00
36.00	0.00	24.15	0.00
37.00	0.00	24.15	0.00
38.00	0.00	24.15	0.00
39.00	0.00	24.14	0.00
40.00	0.00	24.14	0.00
41.00	0.00	24.13	0.00
42.00	0.00	24.12	0.00
43.00	0.00	24.12	0.00
44.00	0.00	24.12	0.00
45.00	0.00	24.12	0.00
46.00	0.00	24.12	0.00
47.00	0.00	24.11	0.00
48.00	0.00	24.11	0.00
49.00	0.00	24.11	0.00
50.00	0.00	24.10	0.00
51.00	0.00	24.10	0.00
52.00	0.00	24.10	0.00
53.00	0.00	24.09	0.00
54.00	0.00	24.09	0.00
55.00	0.00	24.09	0.00
56.00	0.00	24.09	0.00
57.00	0.00	24.08	0.00
58.00	0.00	24.08	0.00
59.00	0.00	24.08	0.00
60.00	0.00	24.08	0.00
61.00	0.00	24.08	0.00
62.00	0.00	24.08	0.00
63.00	0.00	24.08	0.00
64.00	0.00	24.08	0.00
65.00	0.00	24.08	0.00
66.00	0.00	24.07	0.00
67.00	0.00	24.07	0.00
68.00	0.00	24.07	0.00
69.00	0.00	24.07	0.00
70.00	0.00	24.07	0.00
71.00	0.00	24.07	0.00
72.00	0.00	24.07	0.00

Stage-Area-Storage for Pond 9P: ECB-C

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
23.26	**0**	25.91	0
23.31	0	25.96	0
23.36	0	26.01	0
23.41	0	26.06	0
23.46	0	26.11	0
23.51	0	26.16	0
23.56	0	26.21	0
23.61	0	26.26	0
23.66	0	26.31	0
23.71	0	26.36	0
23.76	0	26.41	0
23.81	0	26.46	0
23.86	0	26.51	0
23.91	0	26.56	0
23.96	0	26.61	0
24.01	0	26.66	0
24.06	0	26.71	0
24.11	0	26.76	0
24.16	0	26.81	0
24.21	0	26.86	0
24.26	0	26.91	0
24.31	0	26.96	0
24.36	0	27.01	0
24.41	0	27.06	0
24.46	0	27.11	0
24.51	0	27.16	0
24.56	0	27.21	0
24.61	0		
24.66	0		
24.71	0		
24.76	0		
24.81	0		
24.86	0		
24.91	0		
24.96	0		
25.01	0		
25.06	0		
25.11	0		
25.16	0		
25.21	0		
25.26	0		
25.31	0		
25.36	0		
25.41	0		
25.46	0		
25.51	0		
25.56	0		
25.61	0		
25.66	0		
25.71	0		
25.76	0		
25.81	0		
25.86	0		

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points x 4
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment B1: Grass Field N Runoff Area=9.424 ac 5.59% Impervious Runoff Depth=2.79"
Flow Length=1,113' Tc=22.3 min CN=73 Runoff=19.81 cfs 2.193 af

Subcatchment B2: Grass Field E Runoff Area=4.478 ac 0.27% Impervious Runoff Depth=2.61"
Flow Length=481' Tc=18.8 min CN=71 Runoff=9.41 cfs 0.975 af

Subcatchment C1: Grass Field W Runoff Area=0.188 ac 0.00% Impervious Runoff Depth=2.61"
Flow Length=134' Tc=6.0 min CN=71 Runoff=0.57 cfs 0.041 af

Subcatchment D1: EX. ACCESS DR W Runoff Area=0.774 ac 87.73% Impervious Runoff Depth=4.94"
Flow Length=133' Tc=6.0 min CN=94 Runoff=4.14 cfs 0.319 af

Subcatchment D2: SW Uplands Runoff Area=0.193 ac 0.00% Impervious Runoff Depth=2.52"
Flow Length=162' Tc=9.7 min CN=70 Runoff=0.50 cfs 0.041 af

Subcatchment E1: EX. ACCESS DR E Runoff Area=0.874 ac 71.51% Impervious Runoff Depth=4.50"
Flow Length=90' Tc=6.0 min CN=90 Runoff=4.41 cfs 0.327 af

Subcatchment F1: Direct Runoff Runoff Area=1.046 ac 18.26% Impervious Runoff Depth=2.98"
Flow Length=489' Tc=6.1 min CN=75 Runoff=3.64 cfs 0.260 af

Subcatchment G1: Graded Road Runoff Runoff Area=0.224 ac 0.00% Impervious Runoff Depth=2.88"
Tc=6.0 min CN=74 Runoff=0.76 cfs 0.054 af

Reach 15R: U.S. Pike Site Culvert Inflow=3.23 cfs 3.273 af
Outflow=3.23 cfs 3.273 af

Reach SP-1: OFFSITE PIKE PROP Avg. Flow Depth=0.53' Max Vel=0.44 fps Inflow=3.64 cfs 3.277 af
n=0.120 L=490.0' S=0.0051 '/' Capacity=139.53 cfs Outflow=3.23 cfs 3.273 af

Reach SP-2: OFFSITE TO 266-1 Inflow=0.57 cfs 0.041 af
Outflow=0.57 cfs 0.041 af

Reach SP-3: SW WETLANDS Inflow=4.56 cfs 0.359 af
Outflow=4.56 cfs 0.359 af

Reach SP-4: SE WETLANDS Inflow=4.41 cfs 0.327 af
Outflow=4.41 cfs 0.327 af

Pond 1P: EX. POND-2 Peak Elev=24.64' Storage=527,048 cf Inflow=29.31 cfs 3.221 af
Primary=3.02 cfs 3.017 af Secondary=0.00 cfs 0.000 af Outflow=3.02 cfs 3.017 af

Pond 9P: ECB-C Peak Elev=27.33' Inflow=19.81 cfs 2.193 af
24.0" Round Culvert n=0.013 L=174.5' S=0.0011 '/' Outflow=19.81 cfs 2.193 af

Total Runoff Area = 17.201 ac Runoff Volume = 4.209 af Average Runoff Depth = 2.94"
88.18% Pervious = 15.167 ac 11.82% Impervious = 2.034 ac

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points x 4
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment B1: Grass Field N Runoff Area=9.424 ac 5.59% Impervious Runoff Depth=4.06"
Flow Length=1,113' Tc=22.3 min CN=73 Runoff=28.90 cfs 3.185 af

Subcatchment B2: Grass Field E Runoff Area=4.478 ac 0.27% Impervious Runoff Depth=3.84"
Flow Length=481' Tc=18.8 min CN=71 Runoff=13.96 cfs 1.434 af

Subcatchment C1: Grass Field W Runoff Area=0.188 ac 0.00% Impervious Runoff Depth=3.84"
Flow Length=134' Tc=6.0 min CN=71 Runoff=0.85 cfs 0.060 af

Subcatchment D1: EX. ACCESS DR W Runoff Area=0.774 ac 87.73% Impervious Runoff Depth=6.43"
Flow Length=133' Tc=6.0 min CN=94 Runoff=5.30 cfs 0.415 af

Subcatchment D2: SW Uplands Runoff Area=0.193 ac 0.00% Impervious Runoff Depth=3.74"
Flow Length=162' Tc=9.7 min CN=70 Runoff=0.74 cfs 0.060 af

Subcatchment E1: EX. ACCESS DR E Runoff Area=0.874 ac 71.51% Impervious Runoff Depth=5.96"
Flow Length=90' Tc=6.0 min CN=90 Runoff=5.75 cfs 0.434 af

Subcatchment F1: Direct Runoff Runoff Area=1.046 ac 18.26% Impervious Runoff Depth=4.27"
Flow Length=489' Tc=6.1 min CN=75 Runoff=5.22 cfs 0.372 af

Subcatchment G1: Graded Road Runoff Runoff Area=0.224 ac 0.00% Impervious Runoff Depth=4.16"
Tc=6.0 min CN=74 Runoff=1.09 cfs 0.078 af

Reach 15R: U.S. Pike Site Culvert Inflow=6.01 cfs 4.855 af
Outflow=6.01 cfs 4.855 af

Reach SP-1: OFFSITE PIKE PROP Avg. Flow Depth=0.70' Max Vel=0.53 fps Inflow=6.04 cfs 4.859 af
n=0.120 L=490.0' S=0.0051 '/' Capacity=139.53 cfs Outflow=6.01 cfs 4.855 af

Reach SP-2: OFFSITE TO 266-1 Inflow=0.85 cfs 0.060 af
Outflow=0.85 cfs 0.060 af

Reach SP-3: SW WETLANDS Inflow=5.95 cfs 0.475 af
Outflow=5.95 cfs 0.475 af

Reach SP-4: SE WETLANDS Inflow=5.75 cfs 0.434 af
Outflow=5.75 cfs 0.434 af

Pond 1P: EX. POND-2 Peak Elev=24.89' Storage=559,242 cf Inflow=42.99 cfs 4.697 af
Primary=5.62 cfs 4.487 af Secondary=0.00 cfs 0.000 af Outflow=5.62 cfs 4.487 af

Pond 9P: ECB-C Peak Elev=29.89' Inflow=28.90 cfs 3.185 af
24.0" Round Culvert n=0.013 L=174.5' S=0.0011 '/' Outflow=28.91 cfs 3.185 af

Total Runoff Area = 17.201 ac Runoff Volume = 6.038 af Average Runoff Depth = 4.21"
88.18% Pervious = 15.167 ac 11.82% Impervious = 2.034 ac

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points x 4
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment B1: Grass Field N Runoff Area=9.424 ac 5.59% Impervious Runoff Depth=5.31"
Flow Length=1,113' Tc=22.3 min CN=73 Runoff=37.77 cfs 4.170 af

Subcatchment B2: Grass Field E Runoff Area=4.478 ac 0.27% Impervious Runoff Depth=5.07"
Flow Length=481' Tc=18.8 min CN=71 Runoff=18.43 cfs 1.892 af

Subcatchment C1: Grass Field W Runoff Area=0.188 ac 0.00% Impervious Runoff Depth=5.07"
Flow Length=134' Tc=6.0 min CN=71 Runoff=1.12 cfs 0.079 af

Subcatchment D1: EX. ACCESS DR W Runoff Area=0.774 ac 87.73% Impervious Runoff Depth=7.84"
Flow Length=133' Tc=6.0 min CN=94 Runoff=6.40 cfs 0.506 af

Subcatchment D2: SW Uplands Runoff Area=0.193 ac 0.00% Impervious Runoff Depth=4.95"
Flow Length=162' Tc=9.7 min CN=70 Runoff=0.99 cfs 0.080 af

Subcatchment E1: EX. ACCESS DR E Runoff Area=0.874 ac 71.51% Impervious Runoff Depth=7.36"
Flow Length=90' Tc=6.0 min CN=90 Runoff=7.02 cfs 0.536 af

Subcatchment F1: Direct Runoff Runoff Area=1.046 ac 18.26% Impervious Runoff Depth=5.55"
Flow Length=489' Tc=6.1 min CN=75 Runoff=6.74 cfs 0.484 af

Subcatchment G1: Graded Road Runoff Runoff Area=0.224 ac 0.00% Impervious Runoff Depth=5.43"
Tc=6.0 min CN=74 Runoff=1.42 cfs 0.101 af

Reach 15R: U.S. Pike Site Culvert Inflow=9.36 cfs 6.428 af
Outflow=9.36 cfs 6.428 af

Reach SP-1: OFFSITE PIKE PROP Avg. Flow Depth=0.86' Max Vel=0.61 fps Inflow=9.43 cfs 6.433 af
n=0.120 L=490.0' S=0.0051 '/' Capacity=139.53 cfs Outflow=9.36 cfs 6.428 af

Reach SP-2: OFFSITE TO 266-1 Inflow=1.12 cfs 0.079 af
Outflow=1.12 cfs 0.079 af

Reach SP-3: SW WETLANDS Inflow=7.27 cfs 0.585 af
Outflow=7.27 cfs 0.585 af

Reach SP-4: SE WETLANDS Inflow=7.02 cfs 0.536 af
Outflow=7.02 cfs 0.536 af

Pond 1P: EX. POND-2 Peak Elev=25.13' Storage=591,916 cf Inflow=56.36 cfs 6.163 af
Primary=8.85 cfs 5.949 af Secondary=0.00 cfs 0.000 af Outflow=8.85 cfs 5.949 af

Pond 9P: ECB-C Peak Elev=33.31' Inflow=37.77 cfs 4.170 af
24.0" Round Culvert n=0.013 L=174.5' S=0.0011 '/' Outflow=37.77 cfs 4.170 af

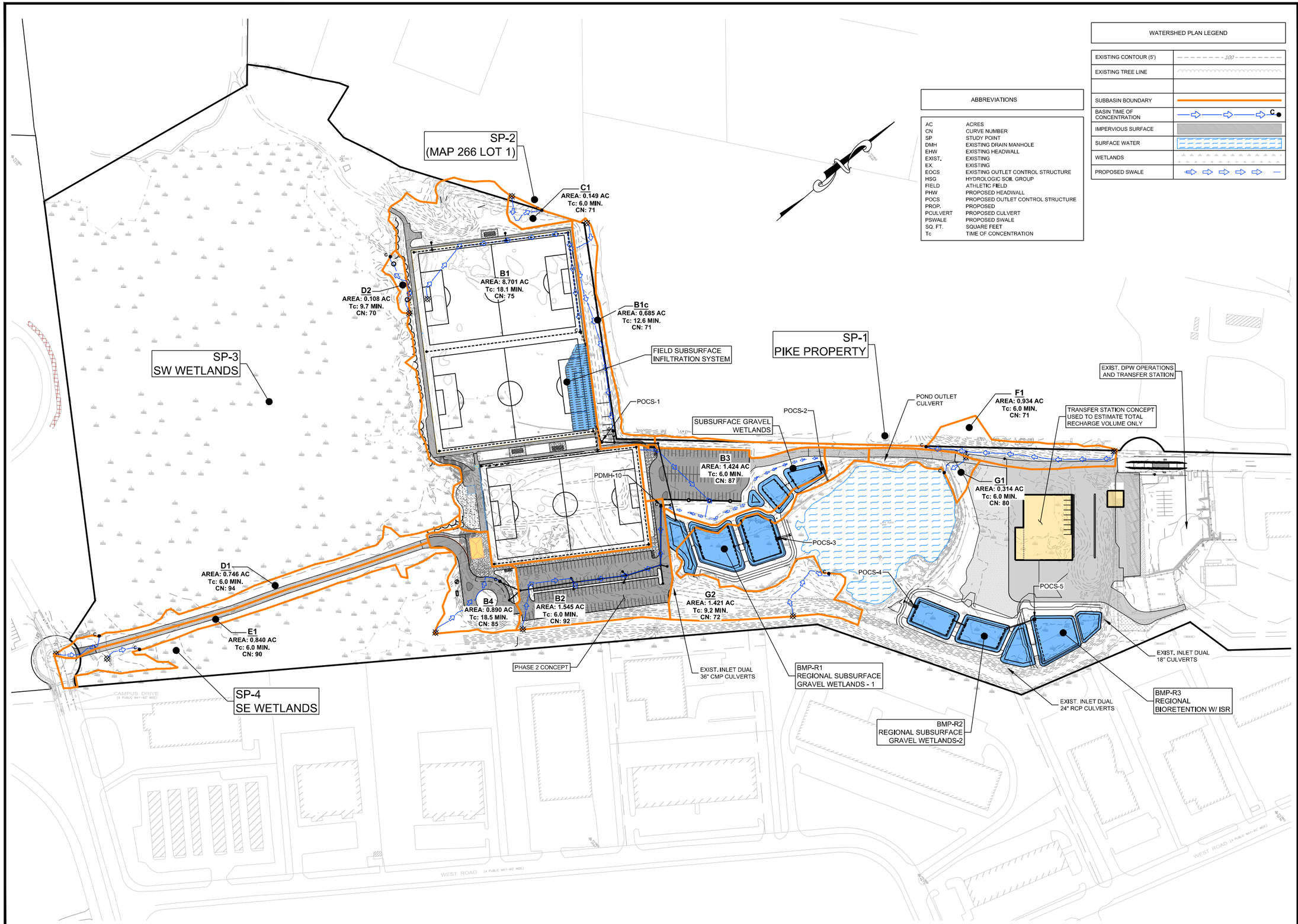
Total Runoff Area = 17.201 ac Runoff Volume = 7.847 af Average Runoff Depth = 5.47"
88.18% Pervious = 15.167 ac 11.82% Impervious = 2.034 ac

Stormwater Management Report

Appendix E

Post-Development Drainage Analysis

i. Post-Development Watershed Plan
ii. 2-Year, 24-Hour HydroCad Report Calculations
iii. 10-Year, 25-Year, and 50-Year Report Summary Calculations
iv. NHDES AoT Gravel Wetland Sizing Sheet



ABBREVIATIONS

AC	ACRES
CN	CURVE NUMBER
SP	STUDY POINT
DMH	EXISTING DRAIN MANHOLE
EHW	EXISTING HEADWALL
EXIST.	EXISTING
EX.	EXISTING
EOCS	EXISTING OUTLET CONTROL STRUCTURE
HSG	HYDROLOGIC SOIL GROUP
FIELD	ATHLETIC FIELD
PHW	PROPOSED HEADWALL
POCS	PROPOSED OUTLET CONTROL STRUCTURE
PROP.	PROPOSED
PCULVERT	PROPOSED CULVERT
PSWALE	PROPOSED SWALE
SQ. FT.	SQUARE FEET
Tc	TIME OF CONCENTRATION

WATERSHED PLAN LEGEND

EXISTING CONTOUR (5')	100
EXISTING TREE LINE	
SUBBASIN BOUNDARY	
BASIN TIME OF CONCENTRATION	C
IMPERVIOUS SURFACE	
SURFACE WATER	
WETLANDS	
PROPOSED SWALE	

no.	revision	date	by

CMA ENGINEERS
CIVIL/ENVIRONMENTAL/STRUCTURAL
Portsmouth, NH • Manchester, NH • Portland, ME
603/431-6196 • 603/627-0708 • 207/541-4223
c m a e n g i n e e r s . c o m

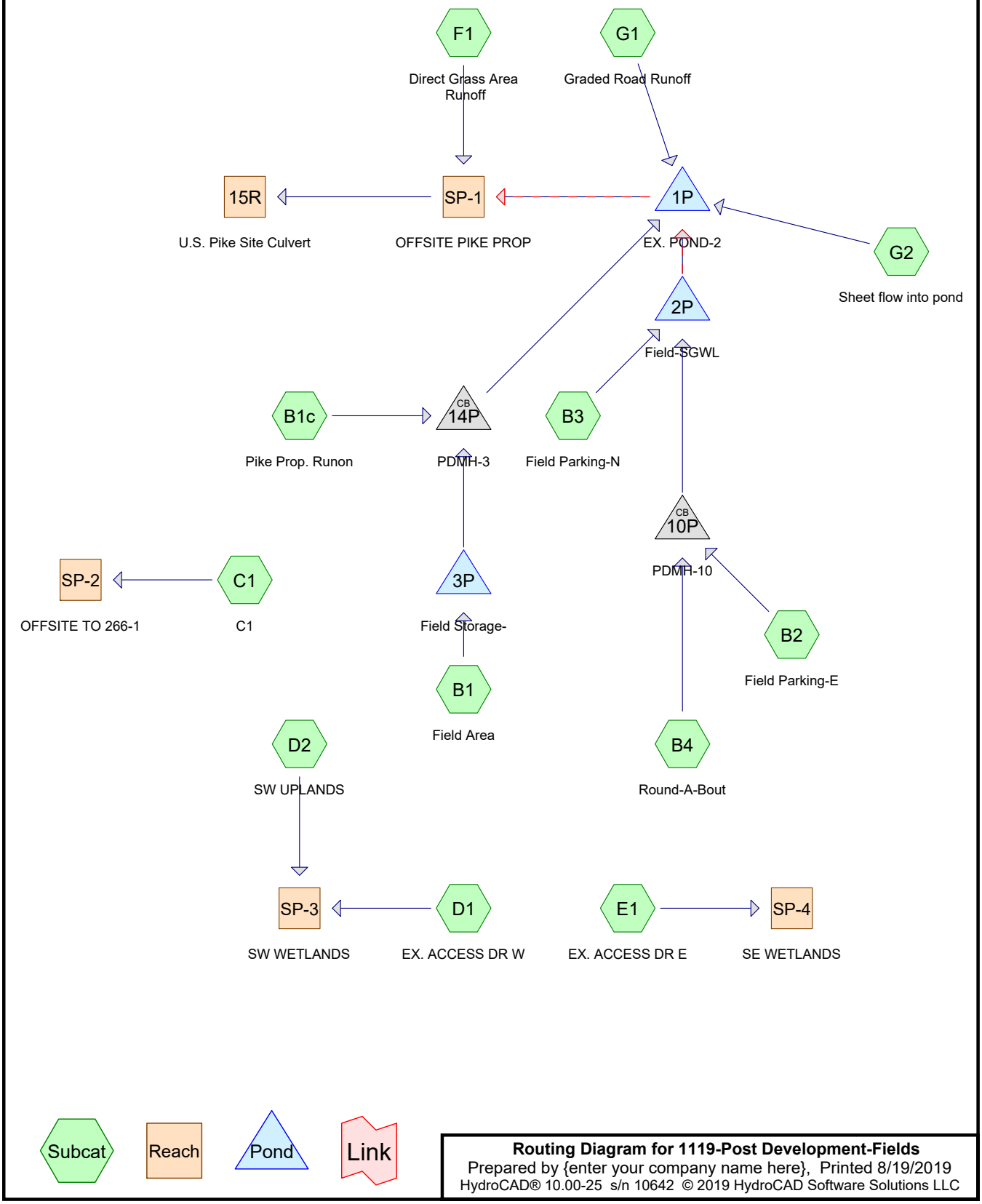
designed by: JHK
drawn by: AGL
approved by: PAC
date: August 2019
project no: 1119
checked by: PAC
scale: 0 100' 200' Scale: 1" = 100'

City of Portsmouth
Portsmouth, New Hampshire
Site Plan Review Application
Multi-purpose Recreation Fields
Stormwater Analysis
Post-Development Watershed Plan

drawing no. H2

sheet: 1 of 1

M:\CADD\PROJECTS\1119 Portsmouth Athletic fields\Engineering\Stormwater\AOT\DWG\1119-AOT-POST-DEV-FIELDS.dwg Date Plotted: Aug 20, 2019 – 5:50pm Plotted By: JKIEFFNER



Routing Diagram for 1119-Post Development-Fields
Prepared by {enter your company name here}, Printed 8/19/2019
HydroCAD® 10.00-25 s/n 10642 © 2019 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.090	74	>75% Grass cover, Good, HSG C (B1)
0.061	80	>75% Grass cover, Good, HSG D (B1)
2.533	71	Field Turf, HSG C (B1)
3.976	78	Field Turf, HSG D (B1)
0.270	97	Field turf over BMP, 0% imp, HSG C (B1)
0.526	96	Gravel surface, 100% imp, HSG C (B3, D1, E1, G2)
0.010	96	Gravel surface, 100% imp., HSG C (B1c)
0.115	96	Gravel surface, 100%, imp, HSG C (G1)
0.759	96	Gravel surface, grass ovrgrowth, 100% imp, HSG C (D1, E1)
4.128	71	Meadow, non-grazed, HSG C (B1, B1c, B2, B3, B4, C1, D1, E1, F1, G1, G2)
0.237	78	Meadow, non-grazed, HSG D (E1, G1, G2)
2.010	98	Paved parking, HSG C (B2, B3, D1, E1)
0.476	98	Paved parking, HSG D (B4)
0.374	71	Porous Pavement, Phase 1, HSG C (B1)
0.173	71	Porous Pavement, Phase 2, HSG C (B1)
0.039	98	Unconnected pavement, Phase 1 (B1)
0.022	98	Unconnected pavement, Phase 2 (B1)
0.069	98	Water Surface, 0% imp, HSG C (B3)
1.673	70	Woods, Good, HSG C (B1, B1c, B2, B4, C1, D2, E1, G1, G2)
0.217	77	Woods, Good, HSG D (D1, E1, G2)
17.758	**79**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
12.730	HSG C	B1, B1c, B2, B3, B4, C1, D1, D2, E1, F1, G1, G2
4.967	HSG D	B1, B4, D1, E1, G1, G2
0.061	Other	B1
17.758		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subc Numi
0.000	0.000	0.090	0.061	0.000	0.151	>75% Grass cover, Good	
0.000	0.000	2.533	3.976	0.000	6.509	Field Turf	
0.000	0.000	0.270	0.000	0.000	0.270	Field turf over BMP, 0% imp	
0.000	0.000	0.526	0.000	0.000	0.526	Gravel surface, 100% imp	
0.000	0.000	0.010	0.000	0.000	0.010	Gravel surface, 100% imp.	
0.000	0.000	0.115	0.000	0.000	0.115	Gravel surface, 100%, imp	
0.000	0.000	0.759	0.000	0.000	0.759	Gravel surface, grass ovrgrowth, 100% imp	
0.000	0.000	4.128	0.237	0.000	4.365	Meadow, non-grazed	
0.000	0.000	2.010	0.476	0.000	2.486	Paved parking	
0.000	0.000	0.374	0.000	0.000	0.374	Porous Pavement, Phase 1	
0.000	0.000	0.173	0.000	0.000	0.173	Porous Pavement, Phase 2	
0.000	0.000	0.000	0.000	0.039	0.039	Unconnected pavement, Phase 1	
0.000	0.000	0.000	0.000	0.022	0.022	Unconnected pavement, Phase 2	
0.000	0.000	0.069	0.000	0.000	0.069	Water Surface, 0% imp	
0.000	0.000	1.673	0.217	0.000	1.890	Woods, Good	
0.000	**0.000**	**12.730**	**4.967**	**0.061**	**17.758**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	B1	0.00	0.00	130.0	0.0030	0.022	12.0	0.5	0.0
2	B2	0.00	0.00	373.0	0.0172	0.012	15.0	0.0	0.0
3	B4	0.00	0.00	550.0	0.0172	0.012	15.0	0.0	0.0
4	1P	22.34	21.91	61.3	0.0070	0.022	53.0	41.0	19.0
5	2P	25.50	25.15	33.0	0.0106	0.012	24.0	0.0	0.0
6	3P	28.01	27.60	32.0	0.0128	0.012	15.0	0.0	0.0
7	10P	28.62	28.50	22.0	0.0055	0.012	24.0	0.0	0.0
8	14P	27.34	25.75	299.0	0.0053	0.012	18.0	0.0	0.0

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment B1: Field Area Runoff Area=8.701 ac 0.00% Impervious Runoff Depth=1.45"
Flow Length=669' Tc=18.1 min CN=75/0 Runoff=10.12 cfs 1.053 af

Subcatchment B1c: Pike Prop. Runon Runoff Area=0.685 ac 1.46% Impervious Runoff Depth=1.23"
Flow Length=547' Tc=12.6 min CN=71/96 Runoff=0.75 cfs 0.070 af

Subcatchment B2: Field Parking-E Runoff Area=1.545 ac 79.35% Impervious Runoff Depth=3.01"
Flow Length=589' Tc=6.0 min CN=71/98 Runoff=4.85 cfs 0.387 af

Subcatchment B3: Field Parking-N Runoff Area=1.424 ac 54.63% Impervious Runoff Depth=2.53"
Flow Length=261' Tc=6.0 min CN=74/98 Runoff=3.83 cfs 0.300 af

Subcatchment B4: Round-A-Bout Runoff Area=0.890 ac 53.48% Impervious Runoff Depth=2.42"
Flow Length=781' Tc=18.5 min CN=71/98 Runoff=1.59 cfs 0.179 af

Subcatchment C1: C1 Runoff Area=0.149 ac 0.00% Impervious Runoff Depth=1.20"
Flow Length=134' Tc=6.0 min CN=71/0 Runoff=0.20 cfs 0.015 af

Subcatchment D1: EX. ACCESS DR W Runoff Area=0.746 ac 87.40% Impervious Runoff Depth=3.04"
Flow Length=133' Tc=6.0 min CN=77/96 Runoff=2.46 cfs 0.189 af

Subcatchment D2: SW UPLANDS Runoff Area=0.108 ac 0.00% Impervious Runoff Depth=1.14"
Flow Length=162' Tc=9.7 min CN=70/0 Runoff=0.12 cfs 0.010 af

Subcatchment E1: EX. ACCESS DR E Runoff Area=0.840 ac 69.52% Impervious Runoff Depth=2.70"
Flow Length=90' Tc=6.0 min CN=75/96 Runoff=2.48 cfs 0.189 af

Subcatchment F1: Direct Grass Area Runoff Runoff Area=0.934 ac 0.00% Impervious Runoff Depth=1.20"
Flow Length=295' Tc=6.0 min CN=71/0 Runoff=1.24 cfs 0.093 af

Subcatchment G1: Graded Road Runoff Runoff Area=0.315 ac 0.00% Impervious Runoff Depth=1.80"
Flow Length=79' Tc=6.0 min CN=80/0 Runoff=0.66 cfs 0.047 af

Subcatchment G2: Sheet flow into pond Runoff Area=1.421 ac 3.87% Impervious Runoff Depth=1.28"
Flow Length=186' Tc=9.2 min CN=71/96 Runoff=1.80 cfs 0.151 af

Reach 15R: U.S. Pike Site Culvert Inflow=0.82 cfs 1.444 af
Outflow=0.82 cfs 1.444 af

Reach SP-1: OFFSITE PIKE PROP Avg. Flow Depth=0.28' Max Vel=0.29 fps Inflow=1.24 cfs 1.447 af
n=0.120 L=490.0' S=0.0051 '/' Capacity=139.53 cfs Outflow=0.82 cfs 1.444 af

Reach SP-2: OFFSITE TO 266-1 Inflow=0.20 cfs 0.015 af
Outflow=0.20 cfs 0.015 af

Reach SP-3: SW WETLANDS Inflow=2.56 cfs 0.199 af
Outflow=2.56 cfs 0.199 af

Reach SP-4: SE WETLANDS Inflow=2.48 cfs 0.189 af
Outflow=2.48 cfs 0.189 af

Pond 1P: EX. POND-2 Peak Elev=24.32' Storage=433,185 cf Inflow=8.05 cfs 1.486 af
Primary=0.78 cfs 1.354 af Secondary=0.00 cfs 0.000 af Outflow=0.78 cfs 1.354 af

Pond 2P: Field-SGWL Peak Elev=28.22' Storage=17,595 cf Inflow=9.66 cfs 0.866 af
Primary=5.58 cfs 0.866 af Secondary=0.00 cfs 0.000 af Outflow=5.58 cfs 0.866 af

Pond 3P: Field Storage- Peak Elev=30.75' Storage=29,425 cf Inflow=10.12 cfs 1.053 af
Discarded=0.15 cfs 0.695 af Primary=0.45 cfs 0.351 af Outflow=0.60 cfs 1.046 af

Pond 10P: PDMH-10 Peak Elev=29.88' Inflow=5.84 cfs 0.566 af
24.0" Round Culvert n=0.012 L=22.0' S=0.0055 '/' Outflow=5.84 cfs 0.566 af

Pond 14P: PDMH-3 Peak Elev=27.75' Inflow=0.75 cfs 0.421 af
18.0" Round Culvert n=0.012 L=299.0' S=0.0053 '/' Outflow=0.75 cfs 0.421 af

Total Runoff Area = 17.758 ac Runoff Volume = 2.685 af Average Runoff Depth = 1.81"
78.71% Pervious = 13.977 ac 21.29% Impervious = 3.781 ac

Summary for Subcatchment B1: Field Area

Runoff = 10.12 cfs @ 12.25 hrs, Volume= 1.053 af, Depth= 1.45"

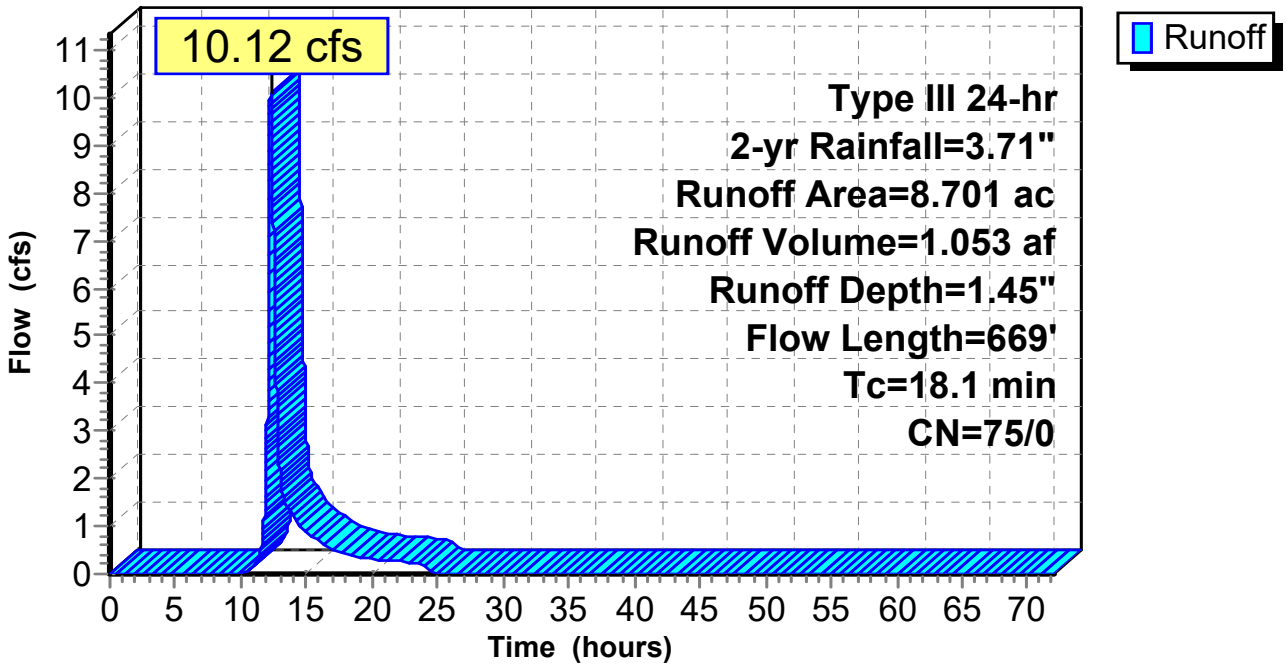
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-72.00 hrs, dt= 0.01
Type III 24-hr 2-yr Rainfall=3.71"

	Area (ac)	CN	Description
*	3.976	78	Field Turf, HSG D
*	2.533	71	Field Turf, HSG C
*	0.374	71	Porous Pavement, Phase 1, HSG C
*	0.173	71	Porous Pavement, Phase 2, HSG C
*	0.039	98	Unconnected pavement, Phase 1
*	0.022	98	Unconnected pavement, Phase 2
	0.678	70	Woods, Good, HSG C
	0.485	71	Meadow, non-grazed, HSG C
	0.090	74	>75% Grass cover, Good, HSG C
	0.061	80	>75% Grass cover, Good, HSG D
*	0.270	97	Field turf over BMP, 0% imp, HSG C
	8.701	75	Weighted Average
	8.701	75	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, Vert. Flow Through Turf to subgrade**
2.2	26	0.0050	0.19		**Sheet Flow, Horizontal flow through stone base** n= 0.050 P2= 3.71"
7.9	130	0.0030	0.27	0.01	**Pipe Channel, Flat Pipe channels** 12.0" x 0.5" Box Area= 0.0 sf Perim= 2.1' r= 0.02' n= 0.022
3.0	513	0.0050	2.84	2.27	**Channel Flow, Perimeter Drain** Area= 0.8 sf Perim= 3.1' r= 0.26' n= 0.015
18.1	669	Total			

Subcatchment B1: Field Area

Hydrograph



Hydrograph for Subcatchment B1: Field Area

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	**0.00**	0.00
2.00	0.07	0.00	0.00	0.00
4.00	0.16	0.00	0.00	0.00
6.00	0.27	0.00	0.00	0.00
8.00	0.42	0.00	0.00	0.00
10.00	0.70	0.00	0.00	0.00
12.00	1.85	0.31	0.00	**3.29**
14.00	3.01	0.97	0.00	**1.17**
16.00	3.29	1.15	0.00	0.65
18.00	3.44	1.26	0.00	0.40
20.00	3.55	1.34	0.00	0.31
22.00	3.64	1.40	0.00	0.26
24.00	**3.71**	**1.45**	0.00	0.21
26.00	3.71	1.45	0.00	0.00
28.00	3.71	1.45	0.00	0.00
30.00	3.71	1.45	0.00	0.00
32.00	3.71	1.45	0.00	0.00
34.00	3.71	1.45	0.00	0.00
36.00	3.71	1.45	0.00	0.00
38.00	3.71	1.45	0.00	0.00
40.00	3.71	1.45	0.00	0.00
42.00	3.71	1.45	0.00	0.00
44.00	3.71	1.45	0.00	0.00
46.00	3.71	1.45	0.00	0.00
48.00	3.71	1.45	0.00	0.00
50.00	3.71	1.45	0.00	0.00
52.00	3.71	1.45	0.00	0.00
54.00	3.71	1.45	0.00	0.00
56.00	3.71	1.45	0.00	0.00
58.00	3.71	1.45	0.00	0.00
60.00	3.71	1.45	0.00	0.00
62.00	3.71	1.45	0.00	0.00
64.00	3.71	1.45	0.00	0.00
66.00	3.71	1.45	0.00	0.00
68.00	3.71	1.45	0.00	0.00
70.00	3.71	1.45	0.00	0.00
72.00	3.71	1.45	0.00	0.00

Summary for Subcatchment B1c: Pike Prop. Runon

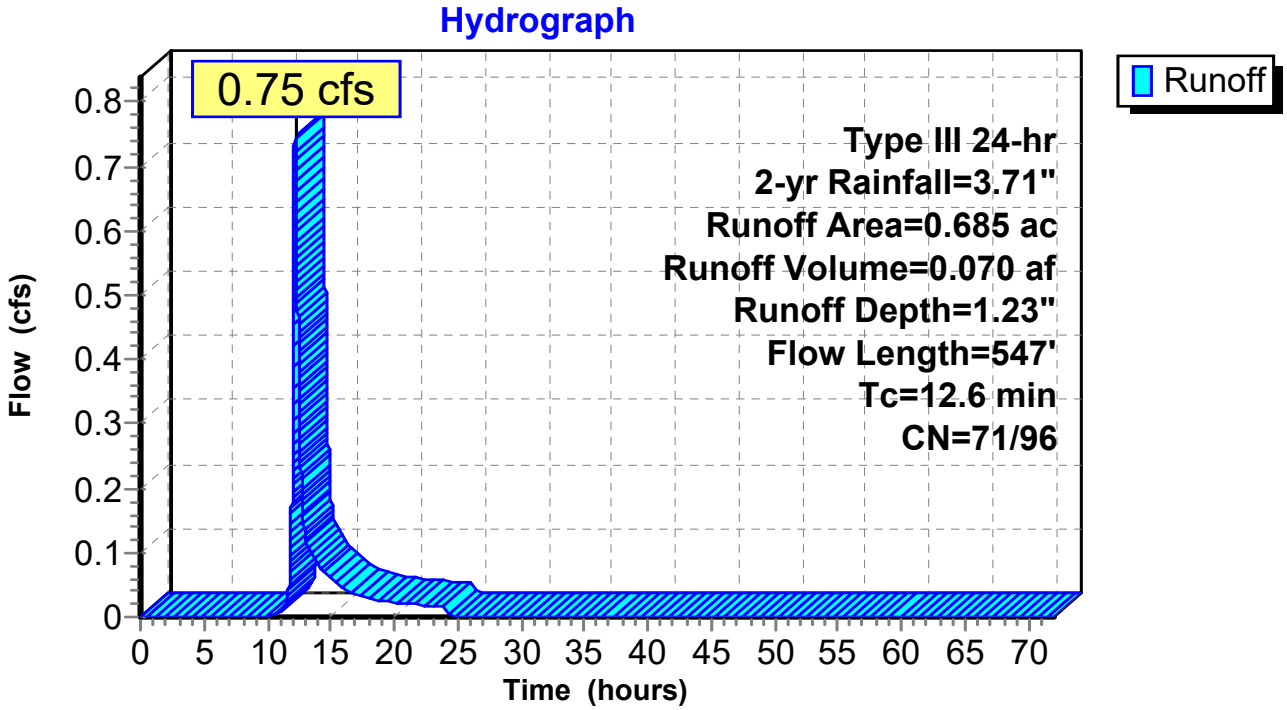
Runoff = 0.75 cfs @ 12.19 hrs, Volume= 0.070 af, Depth= 1.23"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-72.00 hrs, dt= 0.01
Type III 24-hr 2-yr Rainfall=3.71"

	Area (ac)	CN	Description
	0.629	71	Meadow, non-grazed, HSG C
	0.046	70	Woods, Good, HSG C
*	0.010	96	Gravel surface, 100% imp., HSG C
	0.685	71	Weighted Average
	0.675	71	98.54% Pervious Area
	0.010	96	1.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.0	15	0.0088	0.06		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.71"
0.5	30	0.0250	0.99		**Sheet Flow, Gravel Drive** n= 0.015 P2= 3.71"
0.3	35	0.0607	1.72		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.0	8	0.3798	4.31		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
7.8	459	0.0194	0.97		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
12.6	547	Total			

Subcatchment B1c: Pike Prop. Runon



Hydrograph for Subcatchment B1c: Pike Prop. Runon

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	0.00
2.00	0.07	0.00	0.00	0.00
4.00	0.16	0.00	0.01	0.00
6.00	0.27	0.00	0.06	0.00
8.00	0.42	0.00	0.15	0.00
10.00	0.70	0.00	0.37	0.00
12.00	1.85	0.21	1.43	**0.27**
14.00	3.01	0.77	2.56	**0.08**
16.00	3.29	0.93	2.84	0.04
18.00	3.44	1.03	2.99	0.03
20.00	3.55	1.10	3.10	0.02
22.00	3.64	1.15	3.18	0.02
24.00	**3.71**	**1.20**	**3.25**	0.01
26.00	3.71	1.20	3.25	0.00
28.00	3.71	1.20	3.25	0.00
30.00	3.71	1.20	3.25	0.00
32.00	3.71	1.20	3.25	0.00
34.00	3.71	1.20	3.25	0.00
36.00	3.71	1.20	3.25	0.00
38.00	3.71	1.20	3.25	0.00
40.00	3.71	1.20	3.25	0.00
42.00	3.71	1.20	3.25	0.00
44.00	3.71	1.20	3.25	0.00
46.00	3.71	1.20	3.25	0.00
48.00	3.71	1.20	3.25	0.00
50.00	3.71	1.20	3.25	0.00
52.00	3.71	1.20	3.25	0.00
54.00	3.71	1.20	3.25	0.00
56.00	3.71	1.20	3.25	0.00
58.00	3.71	1.20	3.25	0.00
60.00	3.71	1.20	3.25	0.00
62.00	3.71	1.20	3.25	0.00
64.00	3.71	1.20	3.25	0.00
66.00	3.71	1.20	3.25	0.00
68.00	3.71	1.20	3.25	0.00
70.00	3.71	1.20	3.25	0.00
72.00	3.71	1.20	3.25	0.00

Summary for Subcatchment B2: Field Parking-E

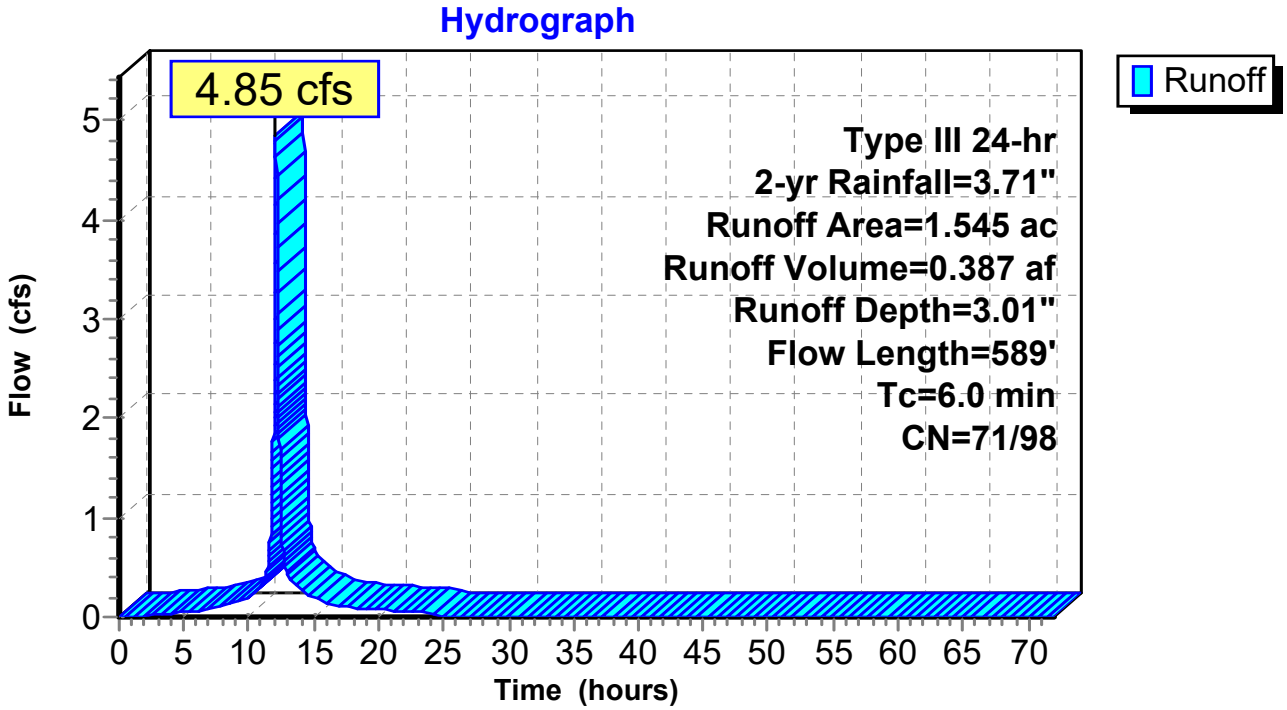
Runoff = 4.85 cfs @ 12.08 hrs, Volume= 0.387 af, Depth= 3.01"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-72.00 hrs, dt= 0.01
Type III 24-hr 2-yr Rainfall=3.71"

Area (ac)	CN	Description
0.290	71	Meadow, non-grazed, HSG C
0.029	70	Woods, Good, HSG C
1.226	98	Paved parking, HSG C
1.545	92	Weighted Average
0.319	71	20.65% Pervious Area
1.226	98	79.35% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	2	0.0100	0.02		**Sheet Flow, Woods: medium underbrush** n= 0.600 P2= 3.71"
1.0	20	0.5000	0.33		**Sheet Flow, Berm slope** Grass: Dense n= 0.240 P2= 3.71"
0.6	63	0.0415	1.81		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.71"
0.8	131	0.0191	2.81		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.8	373	0.0172	7.48	9.18	**Pipe Channel, Closed storm drain** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.012
4.8	589	Total, Increased to minimum Tc = 6.0 min			

Subcatchment B2: Field Parking-E



Hydrograph for Subcatchment B2: Field Parking-E

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	0.00
2.00	0.07	0.00	0.00	0.01
4.00	0.16	0.00	0.04	0.03
6.00	0.27	0.00	0.12	0.06
8.00	0.42	0.00	0.25	0.10
10.00	0.70	0.00	0.50	0.21
12.00	1.85	0.21	1.63	**3.00**
14.00	3.01	0.77	2.78	**0.27**
16.00	3.29	0.93	3.05	0.14
18.00	3.44	1.03	3.21	0.09
20.00	3.55	1.10	3.32	0.07
22.00	3.64	1.15	3.40	0.06
24.00	**3.71**	**1.20**	**3.48**	0.05
26.00	3.71	1.20	3.48	0.00
28.00	3.71	1.20	3.48	0.00
30.00	3.71	1.20	3.48	0.00
32.00	3.71	1.20	3.48	0.00
34.00	3.71	1.20	3.48	0.00
36.00	3.71	1.20	3.48	0.00
38.00	3.71	1.20	3.48	0.00
40.00	3.71	1.20	3.48	0.00
42.00	3.71	1.20	3.48	0.00
44.00	3.71	1.20	3.48	0.00
46.00	3.71	1.20	3.48	0.00
48.00	3.71	1.20	3.48	0.00
50.00	3.71	1.20	3.48	0.00
52.00	3.71	1.20	3.48	0.00
54.00	3.71	1.20	3.48	0.00
56.00	3.71	1.20	3.48	0.00
58.00	3.71	1.20	3.48	0.00
60.00	3.71	1.20	3.48	0.00
62.00	3.71	1.20	3.48	0.00
64.00	3.71	1.20	3.48	0.00
66.00	3.71	1.20	3.48	0.00
68.00	3.71	1.20	3.48	0.00
70.00	3.71	1.20	3.48	0.00
72.00	3.71	1.20	3.48	0.00

Summary for Subcatchment B3: Field Parking-N

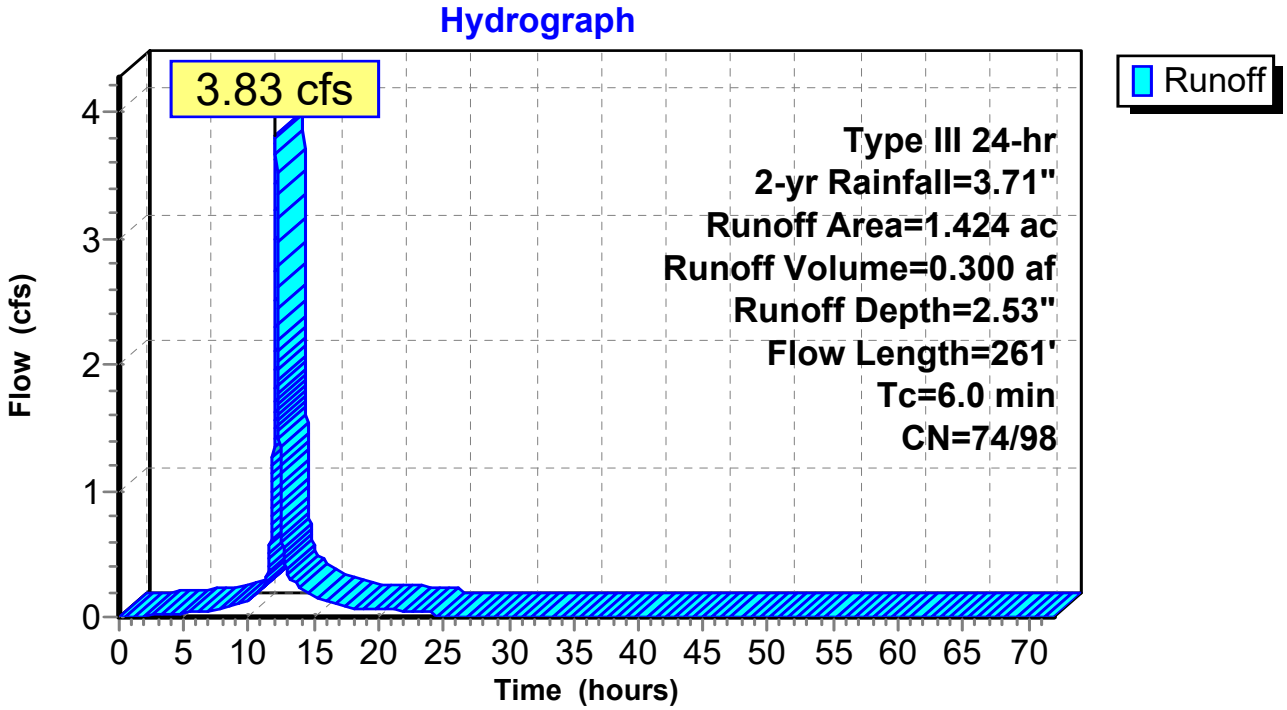
Runoff = 3.83 cfs @ 12.09 hrs, Volume= 0.300 af, Depth= 2.53"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-72.00 hrs, dt= 0.01
Type III 24-hr 2-yr Rainfall=3.71"

	Area (ac)	CN	Description
	0.700	98	Paved parking, HSG C
	0.577	71	Meadow, non-grazed, HSG C
*	0.078	96	Gravel surface, 100% imp, HSG C
*	0.069	98	Water Surface, 0% imp, HSG C
	1.424	87	Weighted Average
	0.646	74	45.37% Pervious Area
	0.778	98	54.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.2	11	0.1000	0.15		**Sheet Flow, landscape area** Grass: Dense n= 0.240 P2= 3.71"
0.5	34	0.0160	1.09		**Sheet Flow, Sidewalk** Smooth surfaces n= 0.011 P2= 3.71"
0.8	58	0.0160	1.21		**Sheet Flow, Parking lot** Smooth surfaces n= 0.011 P2= 3.71"
0.8	118	0.0160	2.57		**Shallow Concentrated Flow, Parking lot** Paved Kv= 20.3 fps
0.7	40	0.0200	0.99		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
4.0	261	Total, Increased to minimum Tc = 6.0 min			

Subcatchment B3: Field Parking-N



Hydrograph for Subcatchment B3: Field Parking-N

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	0.00
2.00	0.07	0.00	0.00	0.01
4.00	0.16	0.00	0.04	0.02
6.00	0.27	0.00	0.12	0.04
8.00	0.42	0.00	0.25	0.07
10.00	0.70	0.00	0.50	0.13
12.00	1.85	0.28	1.63	**2.31**
14.00	3.01	0.91	2.78	**0.23**
16.00	3.29	1.10	3.05	0.12
18.00	3.44	1.20	3.21	0.07
20.00	3.55	1.27	3.32	0.06
22.00	3.64	1.34	3.40	0.05
24.00	**3.71**	**1.39**	**3.48**	0.04
26.00	3.71	1.39	3.48	0.00
28.00	3.71	1.39	3.48	0.00
30.00	3.71	1.39	3.48	0.00
32.00	3.71	1.39	3.48	0.00
34.00	3.71	1.39	3.48	0.00
36.00	3.71	1.39	3.48	0.00
38.00	3.71	1.39	3.48	0.00
40.00	3.71	1.39	3.48	0.00
42.00	3.71	1.39	3.48	0.00
44.00	3.71	1.39	3.48	0.00
46.00	3.71	1.39	3.48	0.00
48.00	3.71	1.39	3.48	0.00
50.00	3.71	1.39	3.48	0.00
52.00	3.71	1.39	3.48	0.00
54.00	3.71	1.39	3.48	0.00
56.00	3.71	1.39	3.48	0.00
58.00	3.71	1.39	3.48	0.00
60.00	3.71	1.39	3.48	0.00
62.00	3.71	1.39	3.48	0.00
64.00	3.71	1.39	3.48	0.00
66.00	3.71	1.39	3.48	0.00
68.00	3.71	1.39	3.48	0.00
70.00	3.71	1.39	3.48	0.00
72.00	3.71	1.39	3.48	0.00

Summary for Subcatchment B4: Round-A-Bout

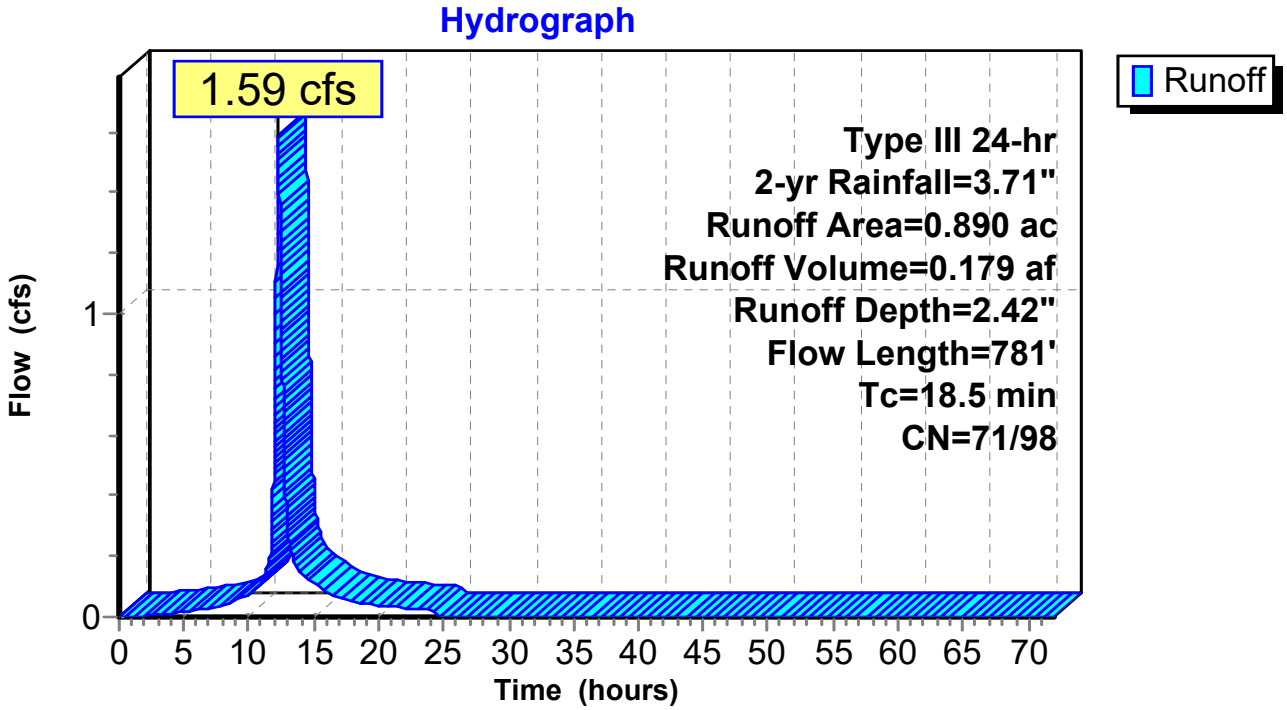
Runoff = 1.59 cfs @ 12.25 hrs, Volume= 0.179 af, Depth= 2.42"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-72.00 hrs, dt= 0.01
Type III 24-hr 2-yr Rainfall=3.71"

Area (ac)	CN	Description
0.476	98	Paved parking, HSG D
0.112	70	Woods, Good, HSG C
0.302	71	Meadow, non-grazed, HSG C
0.890	85	Weighted Average
0.414	71	46.52% Pervious Area
0.476	98	53.48% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.5	81	0.0551	0.09		**Sheet Flow, Woods: Medium underbrush** n= 0.600 P2= 3.71"
0.8	16	0.5000	0.32		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.71"
0.6	97	0.0203	2.89		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.4	37	0.0050	1.44		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.2	550	0.0172	7.48	9.18	**Pipe Channel, Closed storm Drain** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.012
18.5	781	Total			

Subcatchment B4: Round-A-Bout



Hydrograph for Subcatchment B4: Round-A-Bout

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	0.00
2.00	0.07	0.00	0.00	0.00
4.00	0.16	0.00	0.04	0.01
6.00	0.27	0.00	0.12	0.02
8.00	0.42	0.00	0.25	0.04
10.00	0.70	0.00	0.50	0.08
12.00	1.85	0.21	1.63	**0.67**
14.00	3.01	0.77	2.78	**0.15**
16.00	3.29	0.93	3.05	0.08
18.00	3.44	1.03	3.21	0.05
20.00	3.55	1.10	3.32	0.04
22.00	3.64	1.15	3.40	0.03
24.00	**3.71**	**1.20**	**3.48**	0.02
26.00	3.71	1.20	3.48	0.00
28.00	3.71	1.20	3.48	0.00
30.00	3.71	1.20	3.48	0.00
32.00	3.71	1.20	3.48	0.00
34.00	3.71	1.20	3.48	0.00
36.00	3.71	1.20	3.48	0.00
38.00	3.71	1.20	3.48	0.00
40.00	3.71	1.20	3.48	0.00
42.00	3.71	1.20	3.48	0.00
44.00	3.71	1.20	3.48	0.00
46.00	3.71	1.20	3.48	0.00
48.00	3.71	1.20	3.48	0.00
50.00	3.71	1.20	3.48	0.00
52.00	3.71	1.20	3.48	0.00
54.00	3.71	1.20	3.48	0.00
56.00	3.71	1.20	3.48	0.00
58.00	3.71	1.20	3.48	0.00
60.00	3.71	1.20	3.48	0.00
62.00	3.71	1.20	3.48	0.00
64.00	3.71	1.20	3.48	0.00
66.00	3.71	1.20	3.48	0.00
68.00	3.71	1.20	3.48	0.00
70.00	3.71	1.20	3.48	0.00
72.00	3.71	1.20	3.48	0.00

Summary for Subcatchment C1: C1

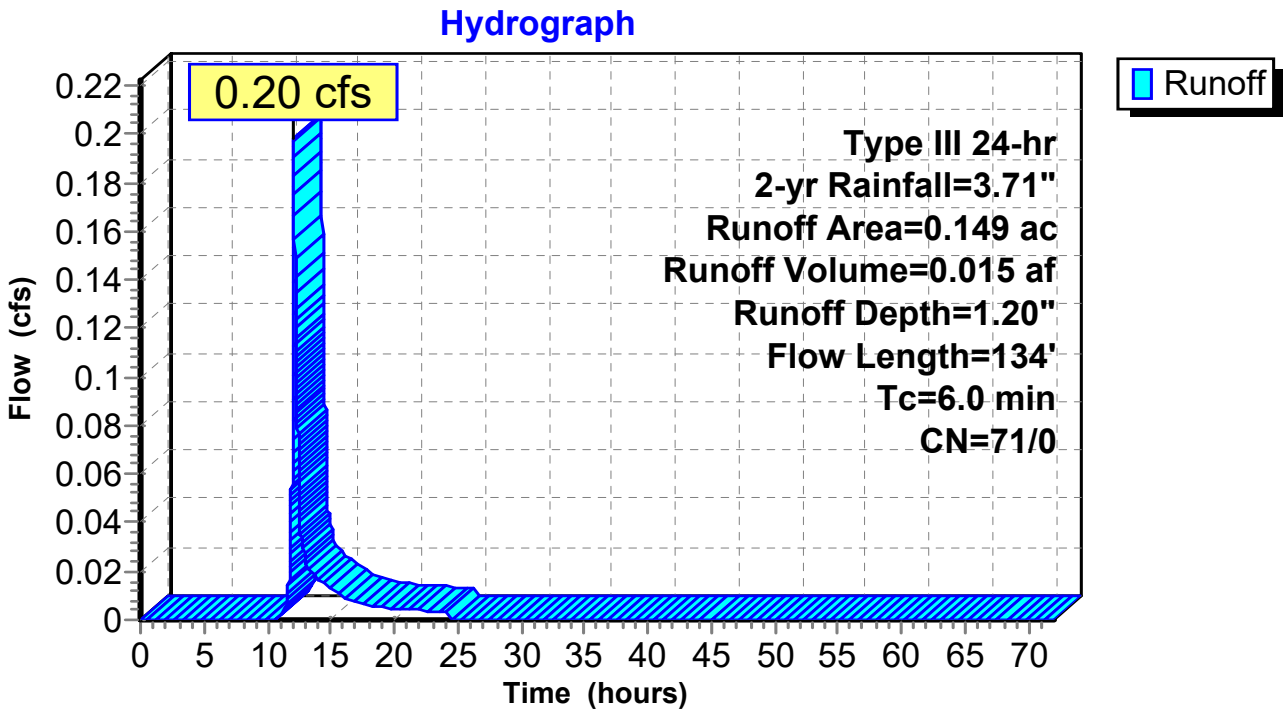
Runoff = 0.20 cfs @ 12.10 hrs, Volume= 0.015 af, Depth= 1.20"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-72.00 hrs, dt= 0.01
Type III 24-hr 2-yr Rainfall=3.71"

Area (ac)	CN	Description
0.094	71	Meadow, non-grazed, HSG C
0.055	70	Woods, Good, HSG C
0.149	71	Weighted Average
0.149	71	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.1	13	0.2095	1.97		**Sheet Flow, Gravel Pave** n= 0.015 P2= 3.71"
2.7	30	0.2753	0.19		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.71"
0.9	50	0.0161	0.89		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.3	41	0.0835	2.02		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
4.0	134	Total, Increased to minimum Tc = 6.0 min			

Subcatchment C1: C1



Hydrograph for Subcatchment C1: C1

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	**0.00**	0.00
2.00	0.07	0.00	0.00	0.00
4.00	0.16	0.00	0.00	0.00
6.00	0.27	0.00	0.00	0.00
8.00	0.42	0.00	0.00	0.00
10.00	0.70	0.00	0.00	0.00
12.00	1.85	0.21	0.00	**0.10**
14.00	3.01	0.77	0.00	**0.02**
16.00	3.29	0.93	0.00	0.01
18.00	3.44	1.03	0.00	0.01
20.00	3.55	1.10	0.00	0.00
22.00	3.64	1.15	0.00	0.00
24.00	**3.71**	**1.20**	0.00	0.00
26.00	3.71	1.20	0.00	0.00
28.00	3.71	1.20	0.00	0.00
30.00	3.71	1.20	0.00	0.00
32.00	3.71	1.20	0.00	0.00
34.00	3.71	1.20	0.00	0.00
36.00	3.71	1.20	0.00	0.00
38.00	3.71	1.20	0.00	0.00
40.00	3.71	1.20	0.00	0.00
42.00	3.71	1.20	0.00	0.00
44.00	3.71	1.20	0.00	0.00
46.00	3.71	1.20	0.00	0.00
48.00	3.71	1.20	0.00	0.00
50.00	3.71	1.20	0.00	0.00
52.00	3.71	1.20	0.00	0.00
54.00	3.71	1.20	0.00	0.00
56.00	3.71	1.20	0.00	0.00
58.00	3.71	1.20	0.00	0.00
60.00	3.71	1.20	0.00	0.00
62.00	3.71	1.20	0.00	0.00
64.00	3.71	1.20	0.00	0.00
66.00	3.71	1.20	0.00	0.00
68.00	3.71	1.20	0.00	0.00
70.00	3.71	1.20	0.00	0.00
72.00	3.71	1.20	0.00	0.00

Summary for Subcatchment D1: EX. ACCESS DR W

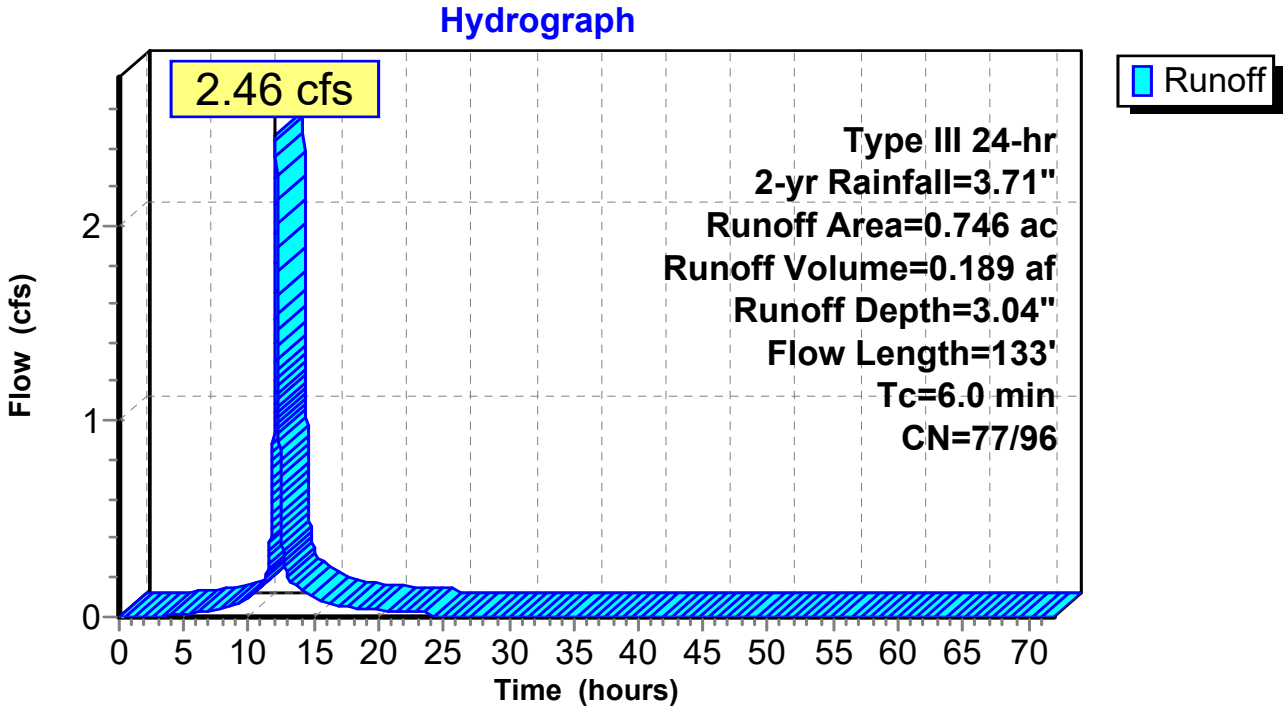
Runoff = 2.46 cfs @ 12.08 hrs, Volume= 0.189 af, Depth= 3.04"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-72.00 hrs, dt= 0.01
Type III 24-hr 2-yr Rainfall=3.71"

	Area (ac)	CN	Description
	0.003	71	Meadow, non-grazed, HSG C
	0.091	77	Woods, Good, HSG D
*	0.196	96	Gravel surface, 100% imp, HSG C
	0.037	98	Paved parking, HSG C
*	0.419	96	Gravel surface, grass ovrgrowth, 100% imp, HSG C
	0.746	94	Weighted Average
	0.094	77	12.60% Pervious Area
	0.652	96	87.40% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	21	0.1468	0.10		**Sheet Flow,** n= 0.600 P2= 3.71"
0.3	26	0.0532	1.31		**Sheet Flow, Gravel Pave** n= 0.015 P2= 3.71"
0.4	34	0.0608	1.45		**Sheet Flow, Gravel Pave** n= 0.015 P2= 3.71"
0.1	20	0.0417	3.29		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.3	32	0.0783	1.96		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
4.7	133	Total, Increased to minimum Tc = 6.0 min			

Subcatchment D1: EX. ACCESS DR W



Hydrograph for Subcatchment D1: EX. ACCESS DR W

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	0.00
2.00	0.07	0.00	0.00	0.00
4.00	0.16	0.00	0.01	0.01
6.00	0.27	0.00	0.06	0.02
8.00	0.42	0.00	0.15	0.04
10.00	0.70	0.00	0.37	0.10
12.00	1.85	0.37	1.43	**1.53**
14.00	3.01	1.08	2.56	**0.14**
16.00	3.29	1.27	2.84	0.07
18.00	3.44	1.39	2.99	0.04
20.00	3.55	1.47	3.10	0.04
22.00	3.64	1.53	3.18	0.03
24.00	**3.71**	**1.59**	**3.25**	0.02
26.00	3.71	1.59	3.25	0.00
28.00	3.71	1.59	3.25	0.00
30.00	3.71	1.59	3.25	0.00
32.00	3.71	1.59	3.25	0.00
34.00	3.71	1.59	3.25	0.00
36.00	3.71	1.59	3.25	0.00
38.00	3.71	1.59	3.25	0.00
40.00	3.71	1.59	3.25	0.00
42.00	3.71	1.59	3.25	0.00
44.00	3.71	1.59	3.25	0.00
46.00	3.71	1.59	3.25	0.00
48.00	3.71	1.59	3.25	0.00
50.00	3.71	1.59	3.25	0.00
52.00	3.71	1.59	3.25	0.00
54.00	3.71	1.59	3.25	0.00
56.00	3.71	1.59	3.25	0.00
58.00	3.71	1.59	3.25	0.00
60.00	3.71	1.59	3.25	0.00
62.00	3.71	1.59	3.25	0.00
64.00	3.71	1.59	3.25	0.00
66.00	3.71	1.59	3.25	0.00
68.00	3.71	1.59	3.25	0.00
70.00	3.71	1.59	3.25	0.00
72.00	3.71	1.59	3.25	0.00

Summary for Subcatchment D2: SW UPLANDS

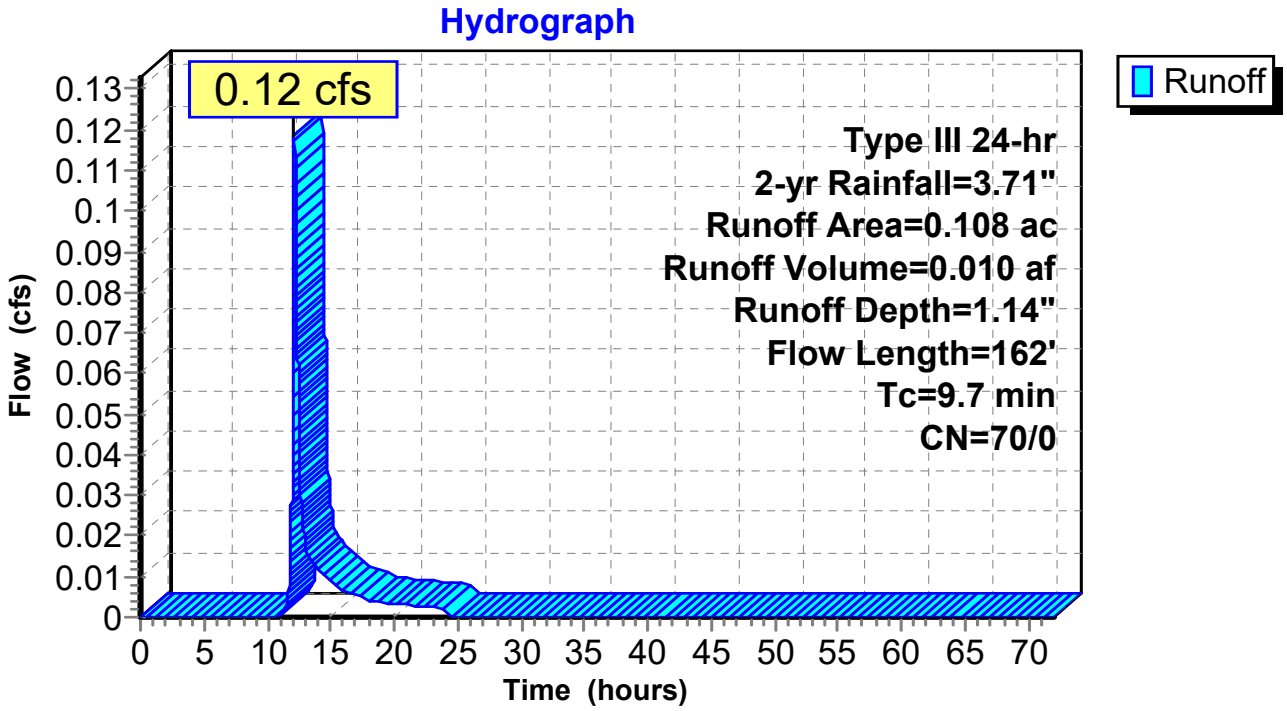
Runoff = 0.12 cfs @ 12.15 hrs, Volume= 0.010 af, Depth= 1.14"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-72.00 hrs, dt= 0.01
Type III 24-hr 2-yr Rainfall=3.71"

Area (ac)	CN	Description
0.108	70	Woods, Good, HSG C
0.108	70	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.1	35	0.0270	0.11		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.71"
4.3	105	0.0067	0.41		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.3	22	0.0798	1.41		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
9.7	162	Total			

Subcatchment D2: SW UPLANDS



Hydrograph for Subcatchment D2: SW UPLANDS

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	**0.00**	0.00
2.00	0.07	0.00	0.00	0.00
4.00	0.16	0.00	0.00	0.00
6.00	0.27	0.00	0.00	0.00
8.00	0.42	0.00	0.00	0.00
10.00	0.70	0.00	0.00	0.00
12.00	1.85	0.19	0.00	**0.05**
14.00	3.01	0.72	0.00	**0.01**
16.00	3.29	0.88	0.00	0.01
18.00	3.44	0.97	0.00	0.00
20.00	3.55	1.04	0.00	0.00
22.00	3.64	1.09	0.00	0.00
24.00	**3.71**	**1.14**	0.00	0.00
26.00	3.71	1.14	0.00	0.00
28.00	3.71	1.14	0.00	0.00
30.00	3.71	1.14	0.00	0.00
32.00	3.71	1.14	0.00	0.00
34.00	3.71	1.14	0.00	0.00
36.00	3.71	1.14	0.00	0.00
38.00	3.71	1.14	0.00	0.00
40.00	3.71	1.14	0.00	0.00
42.00	3.71	1.14	0.00	0.00
44.00	3.71	1.14	0.00	0.00
46.00	3.71	1.14	0.00	0.00
48.00	3.71	1.14	0.00	0.00
50.00	3.71	1.14	0.00	0.00
52.00	3.71	1.14	0.00	0.00
54.00	3.71	1.14	0.00	0.00
56.00	3.71	1.14	0.00	0.00
58.00	3.71	1.14	0.00	0.00
60.00	3.71	1.14	0.00	0.00
62.00	3.71	1.14	0.00	0.00
64.00	3.71	1.14	0.00	0.00
66.00	3.71	1.14	0.00	0.00
68.00	3.71	1.14	0.00	0.00
70.00	3.71	1.14	0.00	0.00
72.00	3.71	1.14	0.00	0.00

Summary for Subcatchment E1: EX. ACCESS DR E

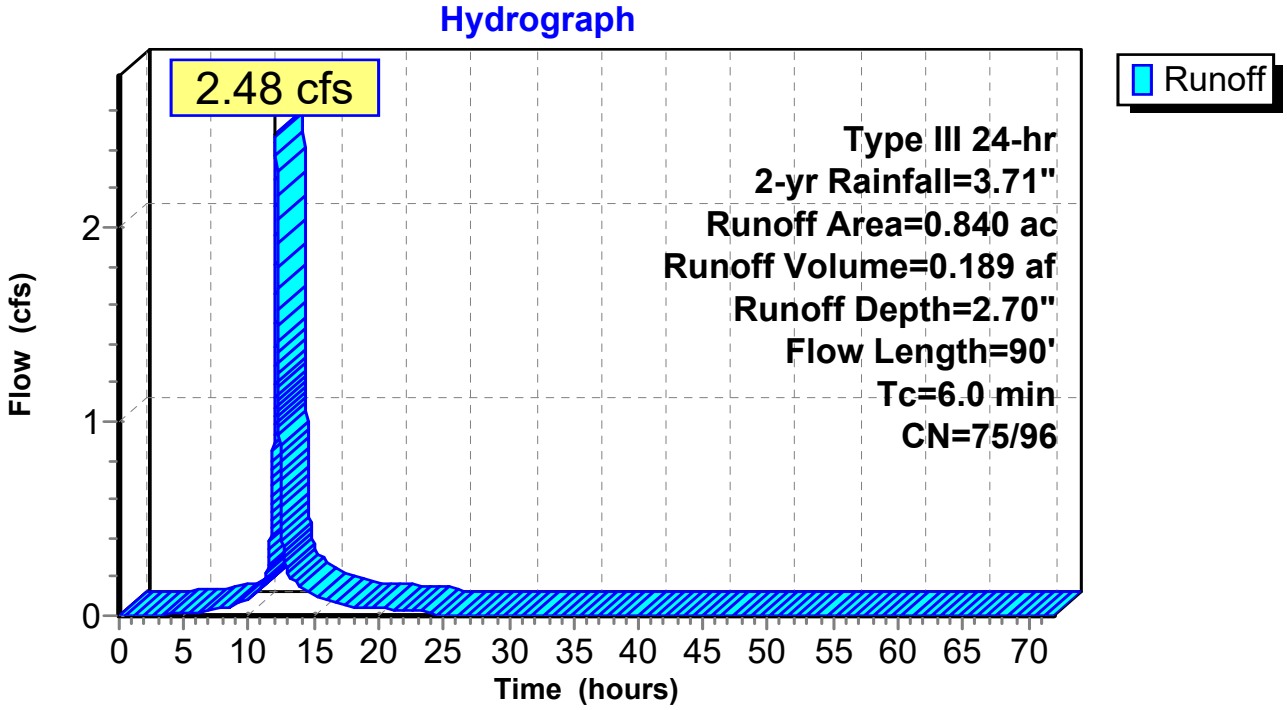
Runoff = 2.48 cfs @ 12.09 hrs, Volume= 0.189 af, Depth= 2.70"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-72.00 hrs, dt= 0.01
Type III 24-hr 2-yr Rainfall=3.71"

	Area (ac)	CN	Description
	0.036	71	Meadow, non-grazed, HSG C
	0.040	70	Woods, Good, HSG C
	0.058	78	Meadow, non-grazed, HSG D
	0.122	77	Woods, Good, HSG D
*	0.197	96	Gravel surface, 100% imp, HSG C
	0.047	98	Paved parking, HSG C
	0.340	96	Gravel surface, grass ovrgrowth, 100% imp, HSG C
	0.840	90	Weighted Average
	0.256	75	30.48% Pervious Area
	0.584	96	69.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.4	50	0.0305	0.19		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.71"
0.4	40	0.0609	1.73		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
4.8	90	Total, Increased to minimum Tc = 6.0 min			

Subcatchment E1: EX. ACCESS DR E



Hydrograph for Subcatchment E1: EX. ACCESS DR E

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	0.00
2.00	0.07	0.00	0.00	0.00
4.00	0.16	0.00	0.01	0.01
6.00	0.27	0.00	0.06	0.02
8.00	0.42	0.00	0.15	0.04
10.00	0.70	0.00	0.37	0.09
12.00	1.85	0.31	1.43	**1.51**
14.00	3.01	0.97	2.56	**0.14**
16.00	3.29	1.15	2.84	0.08
18.00	3.44	1.26	2.99	0.05
20.00	3.55	1.34	3.10	0.04
22.00	3.64	1.40	3.18	0.03
24.00	**3.71**	**1.45**	**3.25**	0.02
26.00	3.71	1.45	3.25	0.00
28.00	3.71	1.45	3.25	0.00
30.00	3.71	1.45	3.25	0.00
32.00	3.71	1.45	3.25	0.00
34.00	3.71	1.45	3.25	0.00
36.00	3.71	1.45	3.25	0.00
38.00	3.71	1.45	3.25	0.00
40.00	3.71	1.45	3.25	0.00
42.00	3.71	1.45	3.25	0.00
44.00	3.71	1.45	3.25	0.00
46.00	3.71	1.45	3.25	0.00
48.00	3.71	1.45	3.25	0.00
50.00	3.71	1.45	3.25	0.00
52.00	3.71	1.45	3.25	0.00
54.00	3.71	1.45	3.25	0.00
56.00	3.71	1.45	3.25	0.00
58.00	3.71	1.45	3.25	0.00
60.00	3.71	1.45	3.25	0.00
62.00	3.71	1.45	3.25	0.00
64.00	3.71	1.45	3.25	0.00
66.00	3.71	1.45	3.25	0.00
68.00	3.71	1.45	3.25	0.00
70.00	3.71	1.45	3.25	0.00
72.00	3.71	1.45	3.25	0.00

Summary for Subcatchment F1: Direct Grass Area Runoff

Area of grassed/lanscaped area on the proposed transfer station side (north of pond) was take from transfer station 30% design plans.

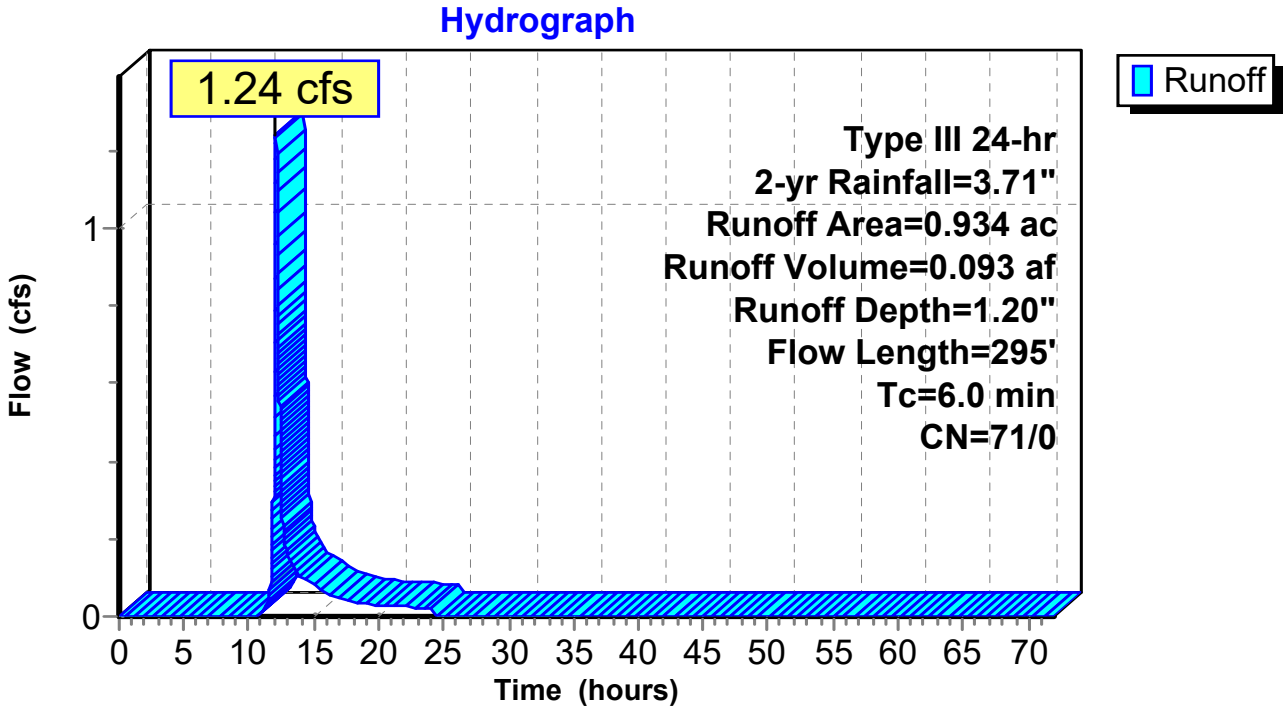
Runoff = 1.24 cfs @ 12.10 hrs, Volume= 0.093 af, Depth= 1.20"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-72.00 hrs, dt= 0.01
Type III 24-hr 2-yr Rainfall=3.71"

Area (ac)	CN	Description
0.934	71	Meadow, non-grazed, HSG C
0.934	71	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.0	20	0.2607	0.17		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.71"
2.2	275	0.0438	2.09		**Shallow Concentrated Flow, Riprap swale** Kv= 10.0 fps
4.2	295	Total, Increased to minimum Tc = 6.0 min			

Subcatchment F1: Direct Grass Area Runoff



Hydrograph for Subcatchment F1: Direct Grass Area Runoff

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	**0.00**	0.00
2.00	0.07	0.00	0.00	0.00
4.00	0.16	0.00	0.00	0.00
6.00	0.27	0.00	0.00	0.00
8.00	0.42	0.00	0.00	0.00
10.00	0.70	0.00	0.00	0.00
12.00	1.85	0.21	0.00	**0.63**
14.00	3.01	0.77	0.00	**0.10**
16.00	3.29	0.93	0.00	0.06
18.00	3.44	1.03	0.00	0.04
20.00	3.55	1.10	0.00	0.03
22.00	3.64	1.15	0.00	0.02
24.00	**3.71**	**1.20**	0.00	0.02
26.00	3.71	1.20	0.00	0.00
28.00	3.71	1.20	0.00	0.00
30.00	3.71	1.20	0.00	0.00
32.00	3.71	1.20	0.00	0.00
34.00	3.71	1.20	0.00	0.00
36.00	3.71	1.20	0.00	0.00
38.00	3.71	1.20	0.00	0.00
40.00	3.71	1.20	0.00	0.00
42.00	3.71	1.20	0.00	0.00
44.00	3.71	1.20	0.00	0.00
46.00	3.71	1.20	0.00	0.00
48.00	3.71	1.20	0.00	0.00
50.00	3.71	1.20	0.00	0.00
52.00	3.71	1.20	0.00	0.00
54.00	3.71	1.20	0.00	0.00
56.00	3.71	1.20	0.00	0.00
58.00	3.71	1.20	0.00	0.00
60.00	3.71	1.20	0.00	0.00
62.00	3.71	1.20	0.00	0.00
64.00	3.71	1.20	0.00	0.00
66.00	3.71	1.20	0.00	0.00
68.00	3.71	1.20	0.00	0.00
70.00	3.71	1.20	0.00	0.00
72.00	3.71	1.20	0.00	0.00

Summary for Subcatchment G1: Graded Road Runoff

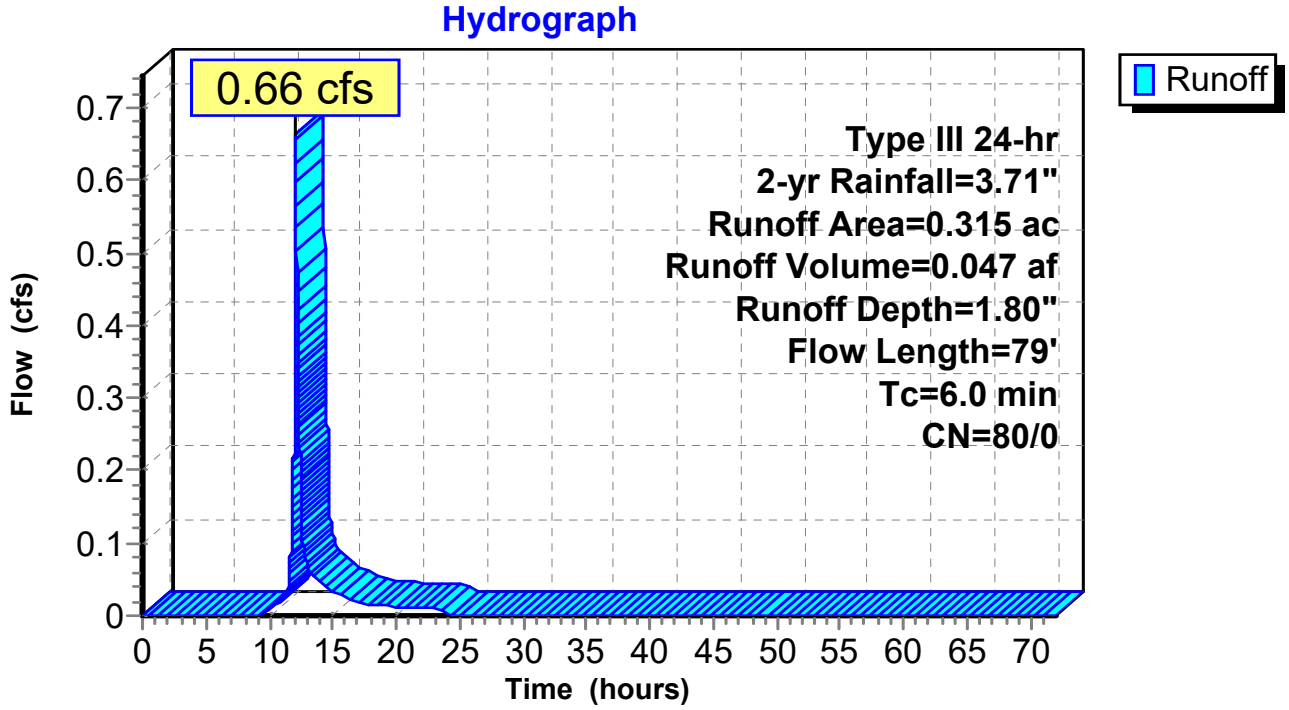
Runoff = 0.66 cfs @ 12.09 hrs, Volume= 0.047 af, Depth= 1.80"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-72.00 hrs, dt= 0.01
Type III 24-hr 2-yr Rainfall=3.71"

	Area (ac)	CN	Description
*	0.115	96	Gravel surface, 100%, imp, HSG C
	0.010	78	Meadow, non-grazed, HSG D
	0.176	71	Meadow, non-grazed, HSG C
	0.014	70	Woods, Good, HSG C
	0.315	80	Weighted Average
	0.315	80	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3	15	0.0166	0.73		**Sheet Flow, gravel drive** n= 0.015 P2= 3.71"
0.6	43	0.0323	1.26		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.2	15	0.0265	1.14		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.0	6	0.8794	6.56		**Shallow Concentrated Flow, Weedy ledge pond bank** Short Grass Pasture Kv= 7.0 fps
1.1	79	Total, Increased to minimum Tc = 6.0 min			

Subcatchment G1: Graded Road Runoff



Hydrograph for Subcatchment G1: Graded Road Runoff

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	**0.00**	0.00
2.00	0.07	0.00	0.00	0.00
4.00	0.16	0.00	0.00	0.00
6.00	0.27	0.00	0.00	0.00
8.00	0.42	0.00	0.00	0.00
10.00	0.70	0.01	0.00	0.01
12.00	1.85	0.48	0.00	**0.37**
14.00	3.01	1.26	0.00	**0.05**
16.00	3.29	1.47	0.00	0.02
18.00	3.44	1.59	0.00	0.02
20.00	3.55	1.68	0.00	0.01
22.00	3.64	1.75	0.00	0.01
24.00	**3.71**	**1.80**	0.00	0.01
26.00	3.71	1.80	0.00	0.00
28.00	3.71	1.80	0.00	0.00
30.00	3.71	1.80	0.00	0.00
32.00	3.71	1.80	0.00	0.00
34.00	3.71	1.80	0.00	0.00
36.00	3.71	1.80	0.00	0.00
38.00	3.71	1.80	0.00	0.00
40.00	3.71	1.80	0.00	0.00
42.00	3.71	1.80	0.00	0.00
44.00	3.71	1.80	0.00	0.00
46.00	3.71	1.80	0.00	0.00
48.00	3.71	1.80	0.00	0.00
50.00	3.71	1.80	0.00	0.00
52.00	3.71	1.80	0.00	0.00
54.00	3.71	1.80	0.00	0.00
56.00	3.71	1.80	0.00	0.00
58.00	3.71	1.80	0.00	0.00
60.00	3.71	1.80	0.00	0.00
62.00	3.71	1.80	0.00	0.00
64.00	3.71	1.80	0.00	0.00
66.00	3.71	1.80	0.00	0.00
68.00	3.71	1.80	0.00	0.00
70.00	3.71	1.80	0.00	0.00
72.00	3.71	1.80	0.00	0.00

Summary for Subcatchment G2: Sheet flow into pond

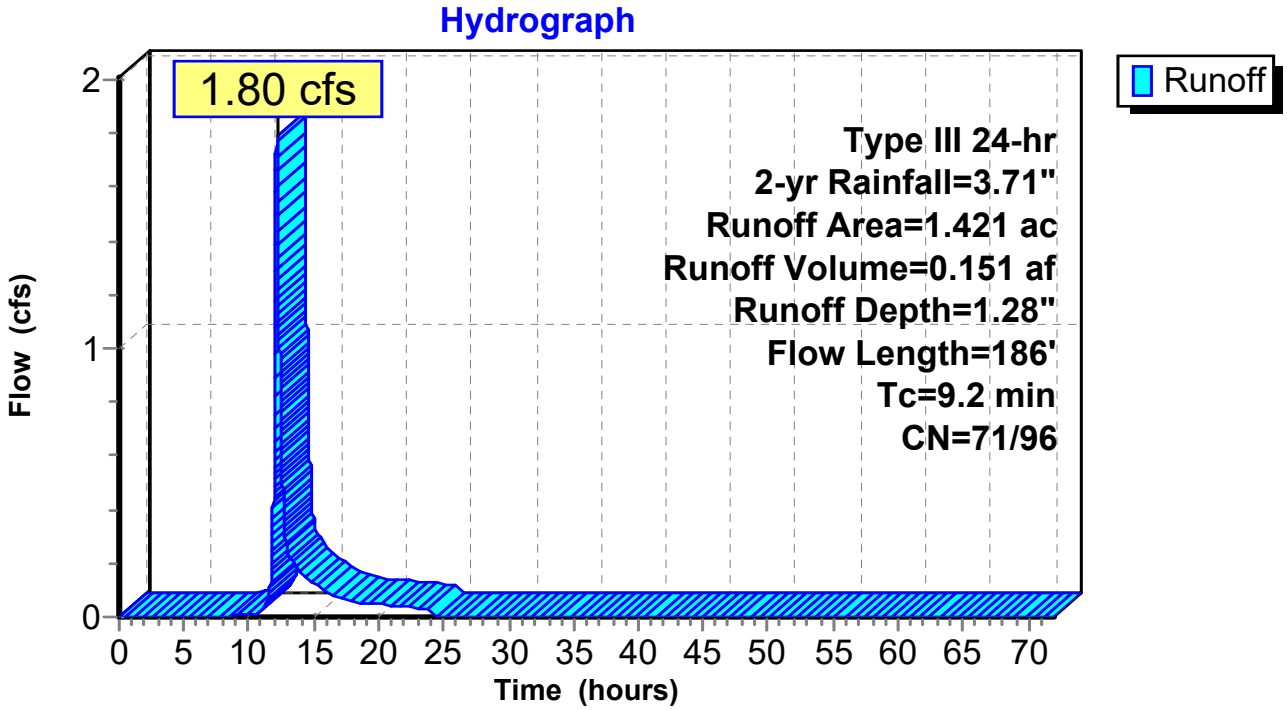
Runoff = 1.80 cfs @ 12.14 hrs, Volume= 0.151 af, Depth= 1.28"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-72.00 hrs, dt= 0.01
Type III 24-hr 2-yr Rainfall=3.71"

	Area (ac)	CN	Description
	0.591	70	Woods, Good, HSG C
	0.602	71	Meadow, non-grazed, HSG C
	0.169	78	Meadow, non-grazed, HSG D
	0.004	77	Woods, Good, HSG D
*	0.055	96	Gravel surface, 100% imp, HSG C
	1.421	72	Weighted Average
	1.366	71	96.13% Pervious Area
	0.055	96	3.87% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.5	7	0.0400	0.05		**Sheet Flow, Woods: Medium underbrush** n= 0.600 P2= 3.71"
1.9	18	0.5365	0.16		**Sheet Flow, Woods: Medium underbrush** n= 0.600 P2= 3.71"
2.6	37	0.1569	0.23		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.71"
0.9	40	0.0902	0.75		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
0.2	27	0.1333	2.56		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.1	57	0.0150	0.86		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
9.2	186	Total			

Subcatchment G2: Sheet flow into pond



Hydrograph for Subcatchment G2: Sheet flow into pond

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	0.00
2.00	0.07	0.00	0.00	0.00
4.00	0.16	0.00	0.01	0.00
6.00	0.27	0.00	0.06	0.00
8.00	0.42	0.00	0.15	0.00
10.00	0.70	0.00	0.37	0.01
12.00	1.85	0.21	1.43	**0.75**
14.00	3.01	0.77	2.56	**0.16**
16.00	3.29	0.93	2.84	0.09
18.00	3.44	1.03	2.99	0.06
20.00	3.55	1.10	3.10	0.05
22.00	3.64	1.15	3.18	0.04
24.00	**3.71**	**1.20**	**3.25**	0.03
26.00	3.71	1.20	3.25	0.00
28.00	3.71	1.20	3.25	0.00
30.00	3.71	1.20	3.25	0.00
32.00	3.71	1.20	3.25	0.00
34.00	3.71	1.20	3.25	0.00
36.00	3.71	1.20	3.25	0.00
38.00	3.71	1.20	3.25	0.00
40.00	3.71	1.20	3.25	0.00
42.00	3.71	1.20	3.25	0.00
44.00	3.71	1.20	3.25	0.00
46.00	3.71	1.20	3.25	0.00
48.00	3.71	1.20	3.25	0.00
50.00	3.71	1.20	3.25	0.00
52.00	3.71	1.20	3.25	0.00
54.00	3.71	1.20	3.25	0.00
56.00	3.71	1.20	3.25	0.00
58.00	3.71	1.20	3.25	0.00
60.00	3.71	1.20	3.25	0.00
62.00	3.71	1.20	3.25	0.00
64.00	3.71	1.20	3.25	0.00
66.00	3.71	1.20	3.25	0.00
68.00	3.71	1.20	3.25	0.00
70.00	3.71	1.20	3.25	0.00
72.00	3.71	1.20	3.25	0.00

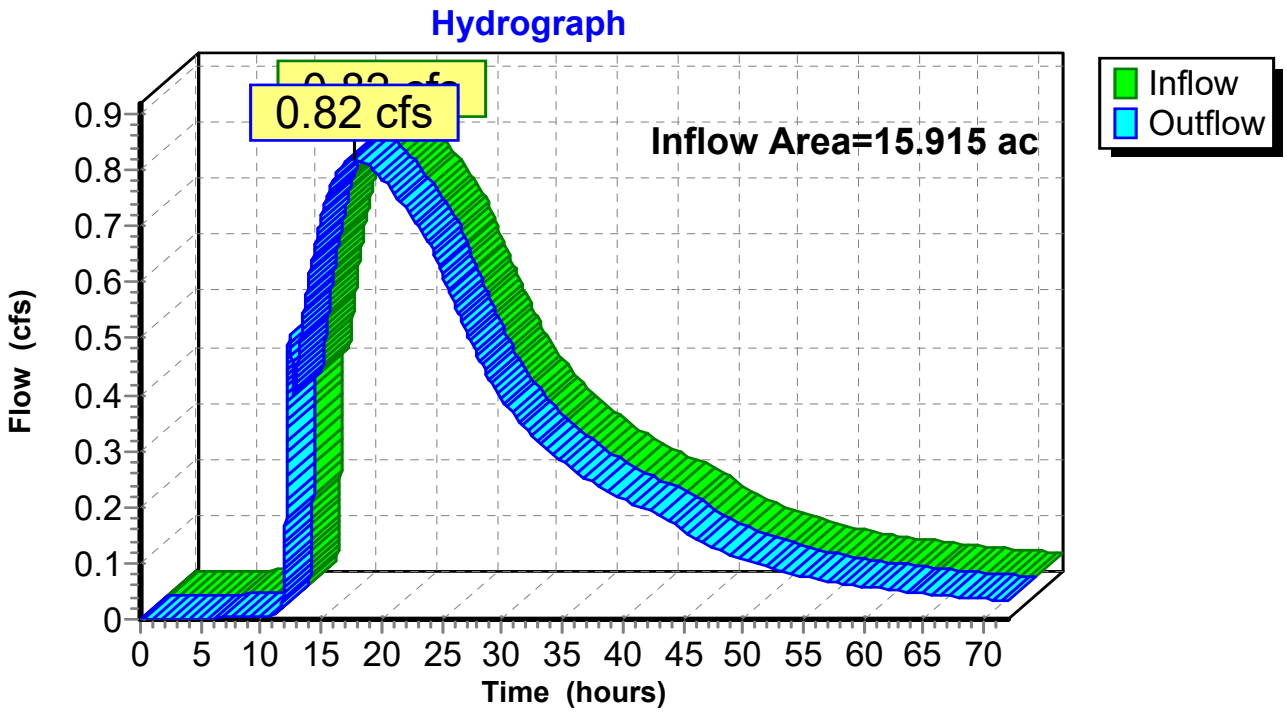
Summary for Reach 15R: U.S. Pike Site Culvert

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 15.915 ac, 15.99% Impervious, Inflow Depth > 1.09" for 2-yr event
Inflow = 0.82 cfs @ 17.74 hrs, Volume= 1.444 af
Outflow = 0.82 cfs @ 17.74 hrs, Volume= 1.444 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Reach 15R: U.S. Pike Site Culvert



Hydrograph for Reach 15R: U.S. Pike Site Culvert

Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
0.00	0.00		0.00
1.00	0.00		0.00
2.00	0.00		0.00
3.00	0.00		0.00
4.00	0.00		0.00
5.00	0.00		0.00
6.00	0.00		0.00
7.00	0.00		0.00
8.00	0.00		0.00
9.00	0.00		0.00
10.00	0.01		0.01
11.00	0.01		0.01
12.00	0.12		0.12
13.00	0.44		0.44
14.00	0.61		0.61
15.00	0.72		0.72
16.00	0.78		0.78
17.00	**0.81**		**0.81**
18.00	**0.82**		**0.82**
19.00	0.81		0.81
20.00	0.79		0.79
21.00	0.76		0.76
22.00	0.73		0.73
23.00	0.70		0.70
24.00	0.67		0.67
25.00	0.62		0.62
26.00	0.57		0.57
27.00	0.51		0.51
28.00	0.47		0.47
29.00	0.43		0.43
30.00	0.39		0.39
31.00	0.36		0.36
32.00	0.34		0.34
33.00	0.31		0.31
34.00	0.30		0.30
35.00	0.28		0.28
36.00	0.26		0.26
37.00	0.25		0.25
38.00	0.24		0.24
39.00	0.22		0.22
40.00	0.21		0.21
41.00	0.20		0.20
42.00	0.20		0.20
43.00	0.19		0.19
44.00	0.17		0.17
45.00	0.16		0.16
46.00	0.15		0.15
47.00	0.13		0.13
48.00	0.12		0.12
49.00	0.12		0.12
50.00	0.11		0.11
51.00	0.10		0.10
52.00	0.09		0.09
53.00	0.09		0.09
54.00	0.08		0.08
55.00	0.08		0.08
56.00	0.07		0.07
57.00	0.07		0.07
58.00	0.06		0.06
59.00	0.06		0.06
60.00	0.06		0.06
61.00	0.06		0.06
62.00	0.05		0.05
63.00	0.05		0.05
64.00	0.05		0.05
65.00	0.05		0.05
66.00	0.04		0.04
67.00	0.04		0.04
68.00	0.04		0.04
69.00	0.04		0.04
70.00	0.04		0.04
71.00	0.03		0.03
72.00	0.03		0.03

Summary for Reach SP-1: OFFSITE PIKE PROP

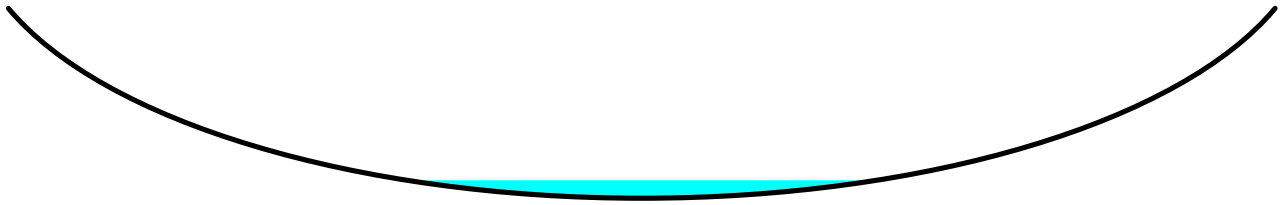
[80] Warning: Exceeded Pond 1P by 0.12' @ 12.17 hrs (0.83 cfs 0.041 af)

Inflow Area = 15.915 ac, 15.99% Impervious, Inflow Depth > 1.09" for 2-yr event
Inflow = 1.24 cfs @ 12.10 hrs, Volume= 1.447 af
Outflow = 0.82 cfs @ 17.74 hrs, Volume= 1.444 af, Atten= 34%, Lag= 338.5 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.29 fps, Min. Travel Time= 28.3 min
Avg. Velocity = 0.17 fps, Avg. Travel Time= 47.1 min

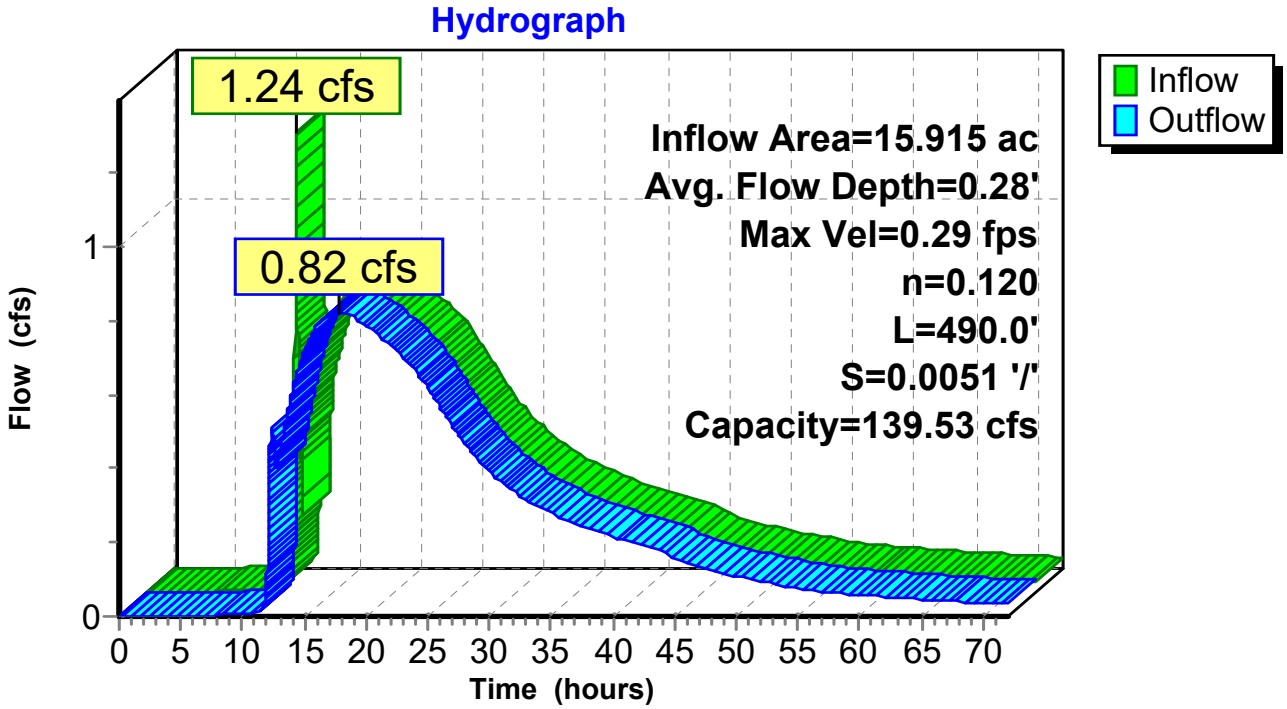
Peak Storage= 1,392 cf @ 17.74 hrs
Average Depth at Peak Storage= 0.28'
Bank-Full Depth= 3.00' Flow Area= 100.0 sf, Capacity= 139.53 cfs

50.00' x 3.00' deep Parabolic Channel, n= 0.120
Length= 490.0' Slope= 0.0051 '/'
Inlet Invert= 24.00', Outlet Invert= 21.50'



‡

Reach SP-1: OFFSITE PIKE PROP



Hydrograph for Reach SP-1: OFFSITE PIKE PROP

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)
0.00	0.00	0	24.00	0.00
2.00	0.00	0	24.00	0.00
4.00	0.00	6	24.00	0.00
6.00	0.00	16	24.01	0.00
8.00	0.01	29	24.02	0.00
10.00	0.01	43	24.03	0.01
12.00	**0.63**	362	24.11	0.12
14.00	**0.65**	1,129	24.24	0.61
16.00	0.80	**1,348**	**24.27**	**0.78**
18.00	0.82	**1,391**	**24.28**	**0.82**
20.00	0.78	1,352	24.27	0.79
22.00	0.72	1,287	24.26	0.73
24.00	0.66	1,207	24.25	0.67
26.00	0.55	1,076	24.24	0.57
28.00	0.45	943	24.22	0.47
30.00	0.38	836	24.20	0.39
32.00	0.33	753	24.19	0.34
34.00	0.29	687	24.17	0.30
36.00	0.26	634	24.16	0.26
38.00	0.23	588	24.16	0.24
40.00	0.21	549	24.15	0.21
42.00	0.19	515	24.14	0.20
44.00	0.17	472	24.14	0.17
46.00	0.14	418	24.13	0.15
48.00	0.12	374	24.12	0.12
50.00	0.10	338	24.11	0.11
52.00	0.09	307	24.10	0.09
54.00	0.08	280	24.10	0.08
56.00	0.07	256	24.09	0.07
58.00	0.06	237	24.09	0.06
60.00	0.06	220	24.08	0.06
62.00	0.05	205	24.08	0.05
64.00	0.05	191	24.07	0.05
66.00	0.04	179	24.07	0.04
68.00	0.04	168	24.07	0.04
70.00	0.03	157	24.06	0.04
72.00	0.03	148	24.06	0.03

Stage-Area-Storage for Reach SP-1: OFFSITE PIKE PROP

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
24.00	0.0	0
24.05	0.2	109
24.10	0.6	300
24.15	1.1	548
24.20	1.7	845
24.25	2.4	1,180
24.30	3.2	1,550
24.35	4.0	1,954
24.40	4.9	2,387
24.45	5.8	2,847
24.50	6.8	3,335
24.55	7.9	3,847
24.60	8.9	4,383
24.65	10.1	4,943
24.70	11.3	5,524
24.75	12.5	6,125
24.80	13.8	6,748
24.85	15.1	7,391
24.90	16.4	8,052
24.95	17.8	8,732
25.00	19.2	9,431
25.05	20.7	10,146
25.10	22.2	10,880
25.15	23.7	11,630
25.20	25.3	12,396
25.25	26.9	13,180
25.30	28.5	13,978
25.35	30.2	14,792
25.40	31.9	15,622
25.45	33.6	16,466
25.50	35.4	17,324
25.55	37.1	18,198
25.60	39.0	19,086
25.65	40.8	19,987
25.70	42.7	20,903
25.75	44.6	21,831
25.80	46.5	22,773
25.85	48.4	23,729
25.90	50.4	24,698
25.95	52.4	25,678
26.00	54.4	26,673
26.05	56.5	27,679
26.10	58.6	28,697
26.15	60.7	29,729
26.20	62.8	30,772
26.25	65.0	31,826
26.30	67.1	32,894
26.35	69.3	33,972
26.40	71.6	35,062
26.45	73.8	36,163
26.50	76.1	37,276
26.55	78.4	38,399
26.60	80.7	39,535
26.65	83.0	40,681
26.70	85.4	41,837
26.75	87.8	43,005
26.80	90.2	44,183
26.85	92.6	45,371
26.90	95.0	46,571
26.95	97.5	47,781
27.00	**100.0**	**49,000**

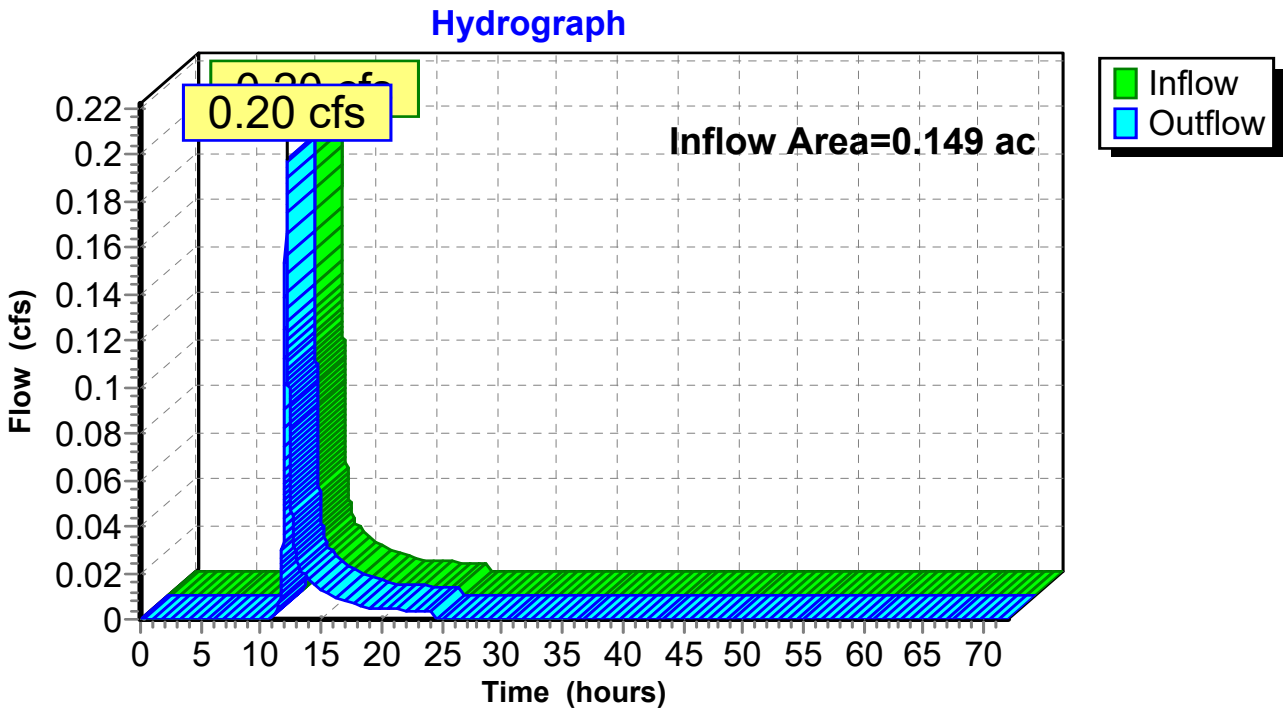
Summary for Reach SP-2: OFFSITE TO 266-1

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.149 ac, 0.00% Impervious, Inflow Depth = 1.20" for 2-yr event
Inflow = 0.20 cfs @ 12.10 hrs, Volume= 0.015 af
Outflow = 0.20 cfs @ 12.10 hrs, Volume= 0.015 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Reach SP-2: OFFSITE TO 266-1



Hydrograph for Reach SP-2: OFFSITE TO 266-1

Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)	Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
0.00	0.00		0.00	53.00	0.00		0.00
1.00	0.00		0.00	54.00	0.00		0.00
2.00	0.00		0.00	55.00	0.00		0.00
3.00	0.00		0.00	56.00	0.00		0.00
4.00	0.00		0.00	57.00	0.00		0.00
5.00	0.00		0.00	58.00	0.00		0.00
6.00	0.00		0.00	59.00	0.00		0.00
7.00	0.00		0.00	60.00	0.00		0.00
8.00	0.00		0.00	61.00	0.00		0.00
9.00	0.00		0.00	62.00	0.00		0.00
10.00	0.00		0.00	63.00	0.00		0.00
11.00	0.00		0.00	64.00	0.00		0.00
12.00	**0.10**		**0.10**	65.00	0.00		0.00
13.00	**0.02**		**0.02**	66.00	0.00		0.00
14.00	0.02		0.02	67.00	0.00		0.00
15.00	0.01		0.01	68.00	0.00		0.00
16.00	0.01		0.01	69.00	0.00		0.00
17.00	0.01		0.01	70.00	0.00		0.00
18.00	0.01		0.01	71.00	0.00		0.00
19.00	0.01		0.01	72.00	0.00		0.00
20.00	0.00		0.00				
21.00	0.00		0.00				
22.00	0.00		0.00				
23.00	0.00		0.00				
24.00	0.00		0.00				
25.00	0.00		0.00				
26.00	0.00		0.00				
27.00	0.00		0.00				
28.00	0.00		0.00				
29.00	0.00		0.00				
30.00	0.00		0.00				
31.00	0.00		0.00				
32.00	0.00		0.00				
33.00	0.00		0.00				
34.00	0.00		0.00				
35.00	0.00		0.00				
36.00	0.00		0.00				
37.00	0.00		0.00				
38.00	0.00		0.00				
39.00	0.00		0.00				
40.00	0.00		0.00				
41.00	0.00		0.00				
42.00	0.00		0.00				
43.00	0.00		0.00				
44.00	0.00		0.00				
45.00	0.00		0.00				
46.00	0.00		0.00				
47.00	0.00		0.00				
48.00	0.00		0.00				
49.00	0.00		0.00				
50.00	0.00		0.00				
51.00	0.00		0.00				
52.00	0.00		0.00				

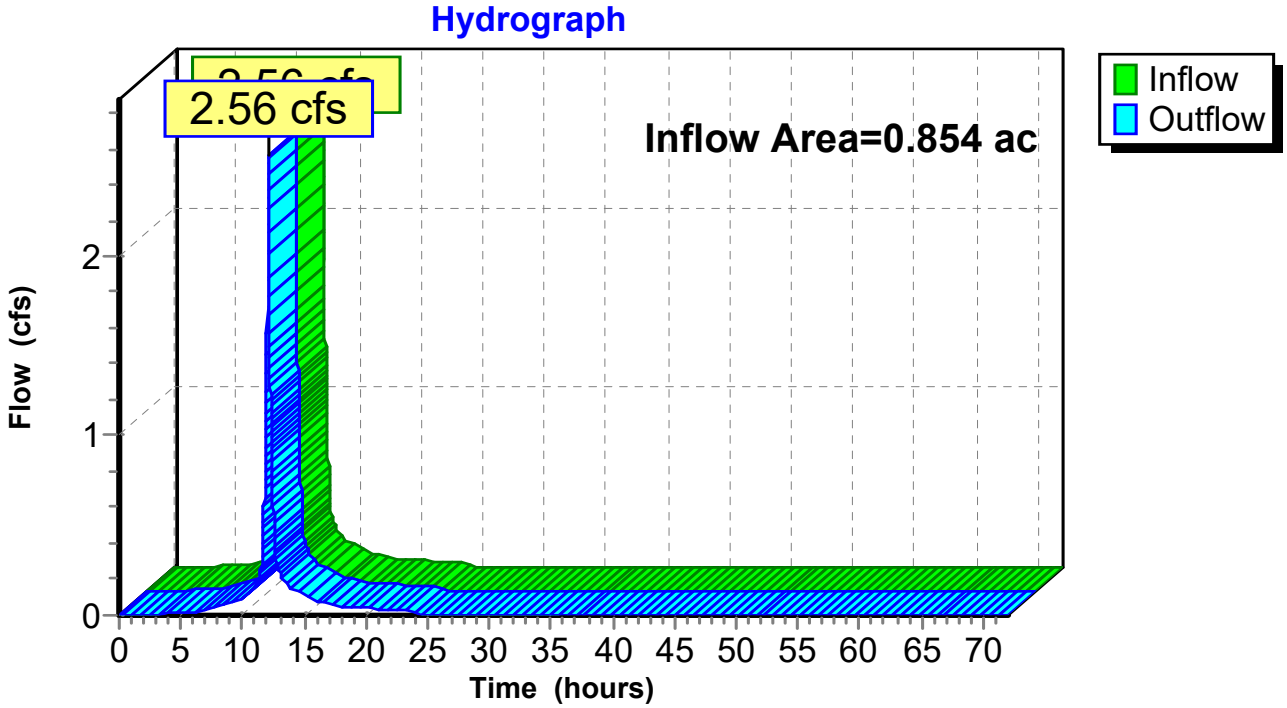
Summary for Reach SP-3: SW WETLANDS

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.854 ac, 76.35% Impervious, Inflow Depth = 2.80" for 2-yr event
Inflow = 2.56 cfs @ 12.09 hrs, Volume= 0.199 af
Outflow = 2.56 cfs @ 12.09 hrs, Volume= 0.199 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Reach SP-3: SW WETLANDS



Hydrograph for Reach SP-3: SW WETLANDS

Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)	Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
0.00	0.00		0.00	53.00	0.00		0.00
1.00	0.00		0.00	54.00	0.00		0.00
2.00	0.00		0.00	55.00	0.00		0.00
3.00	0.00		0.00	56.00	0.00		0.00
4.00	0.01		0.01	57.00	0.00		0.00
5.00	0.01		0.01	58.00	0.00		0.00
6.00	0.02		0.02	59.00	0.00		0.00
7.00	0.03		0.03	60.00	0.00		0.00
8.00	0.04		0.04	61.00	0.00		0.00
9.00	0.07		0.07	62.00	0.00		0.00
10.00	0.10		0.10	63.00	0.00		0.00
11.00	0.16		0.16	64.00	0.00		0.00
12.00	**1.57**		**1.57**	65.00	0.00		0.00
13.00	**0.23**		**0.23**	66.00	0.00		0.00
14.00	0.15		0.15	67.00	0.00		0.00
15.00	0.11		0.11	68.00	0.00		0.00
16.00	0.08		0.08	69.00	0.00		0.00
17.00	0.06		0.06	70.00	0.00		0.00
18.00	0.05		0.05	71.00	0.00		0.00
19.00	0.04		0.04	72.00	0.00		0.00
20.00	0.04		0.04				
21.00	0.04		0.04				
22.00	0.03		0.03				
23.00	0.03		0.03				
24.00	0.03		0.03				
25.00	0.00		0.00				
26.00	0.00		0.00				
27.00	0.00		0.00				
28.00	0.00		0.00				
29.00	0.00		0.00				
30.00	0.00		0.00				
31.00	0.00		0.00				
32.00	0.00		0.00				
33.00	0.00		0.00				
34.00	0.00		0.00				
35.00	0.00		0.00				
36.00	0.00		0.00				
37.00	0.00		0.00				
38.00	0.00		0.00				
39.00	0.00		0.00				
40.00	0.00		0.00				
41.00	0.00		0.00				
42.00	0.00		0.00				
43.00	0.00		0.00				
44.00	0.00		0.00				
45.00	0.00		0.00				
46.00	0.00		0.00				
47.00	0.00		0.00				
48.00	0.00		0.00				
49.00	0.00		0.00				
50.00	0.00		0.00				
51.00	0.00		0.00				
52.00	0.00		0.00				

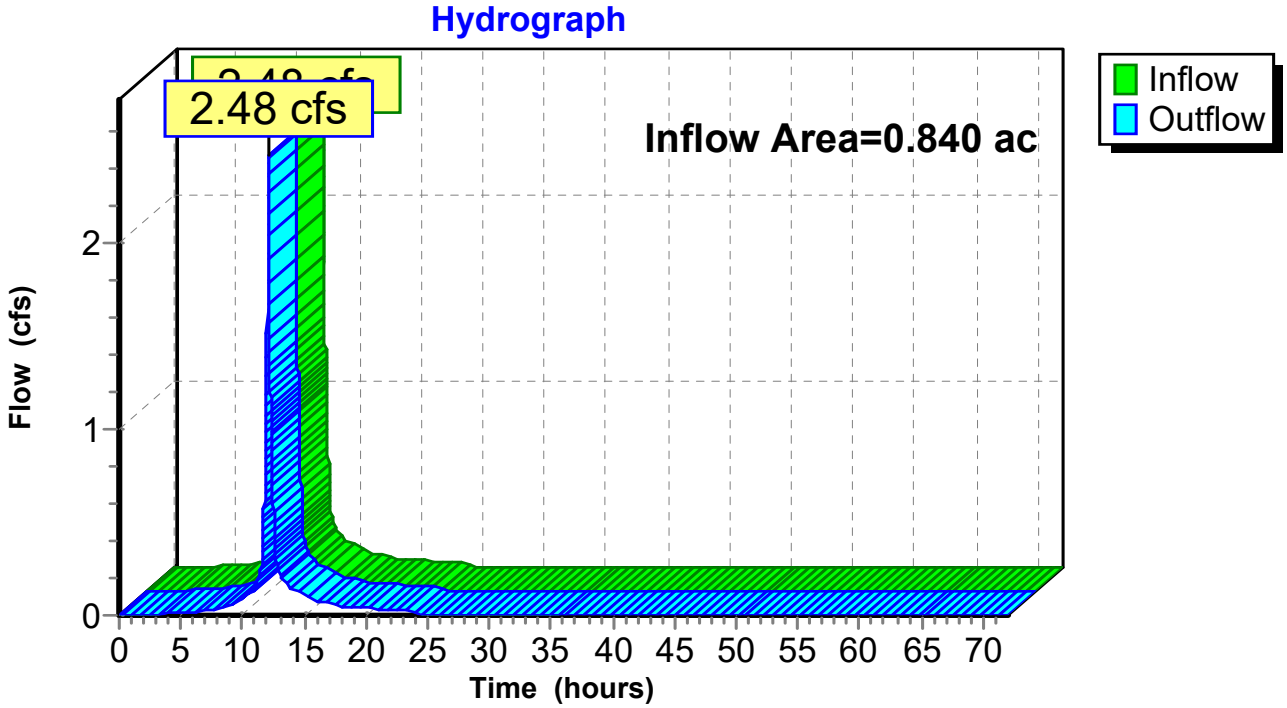
Summary for Reach SP-4: SE WETLANDS

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.840 ac, 69.52% Impervious, Inflow Depth = 2.70" for 2-yr event
Inflow = 2.48 cfs @ 12.09 hrs, Volume= 0.189 af
Outflow = 2.48 cfs @ 12.09 hrs, Volume= 0.189 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Reach SP-4: SE WETLANDS



Hydrograph for Reach SP-4: SE WETLANDS

Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)	Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
0.00	0.00		0.00	53.00	0.00		0.00
1.00	0.00		0.00	54.00	0.00		0.00
2.00	0.00		0.00	55.00	0.00		0.00
3.00	0.00		0.00	56.00	0.00		0.00
4.00	0.01		0.01	57.00	0.00		0.00
5.00	0.01		0.01	58.00	0.00		0.00
6.00	0.02		0.02	59.00	0.00		0.00
7.00	0.03		0.03	60.00	0.00		0.00
8.00	0.04		0.04	61.00	0.00		0.00
9.00	0.06		0.06	62.00	0.00		0.00
10.00	0.09		0.09	63.00	0.00		0.00
11.00	0.15		0.15	64.00	0.00		0.00
12.00	**1.51**		**1.51**	65.00	0.00		0.00
13.00	**0.22**		**0.22**	66.00	0.00		0.00
14.00	0.14		0.14	67.00	0.00		0.00
15.00	0.11		0.11	68.00	0.00		0.00
16.00	0.08		0.08	69.00	0.00		0.00
17.00	0.06		0.06	70.00	0.00		0.00
18.00	0.05		0.05	71.00	0.00		0.00
19.00	0.04		0.04	72.00	0.00		0.00
20.00	0.04		0.04				
21.00	0.03		0.03				
22.00	0.03		0.03				
23.00	0.03		0.03				
24.00	0.02		0.02				
25.00	0.00		0.00				
26.00	0.00		0.00				
27.00	0.00		0.00				
28.00	0.00		0.00				
29.00	0.00		0.00				
30.00	0.00		0.00				
31.00	0.00		0.00				
32.00	0.00		0.00				
33.00	0.00		0.00				
34.00	0.00		0.00				
35.00	0.00		0.00				
36.00	0.00		0.00				
37.00	0.00		0.00				
38.00	0.00		0.00				
39.00	0.00		0.00				
40.00	0.00		0.00				
41.00	0.00		0.00				
42.00	0.00		0.00				
43.00	0.00		0.00				
44.00	0.00		0.00				
45.00	0.00		0.00				
46.00	0.00		0.00				
47.00	0.00		0.00				
48.00	0.00		0.00				
49.00	0.00		0.00				
50.00	0.00		0.00				
51.00	0.00		0.00				
52.00	0.00		0.00				

Summary for Pond 1P: EX. POND-2

Inflow Area = 14.981 ac, 16.99% Impervious, Inflow Depth = 1.19" for 2-yr event
Inflow = 8.05 cfs @ 12.21 hrs, Volume= 1.486 af
Outflow = 0.78 cfs @ 17.89 hrs, Volume= 1.354 af, Atten= 90%, Lag= 340.9 min
Primary = 0.78 cfs @ 17.89 hrs, Volume= 1.354 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Starting Elev= 24.00' Surf.Area= 89,800 sf Storage= 404,338 cf
Peak Elev= 24.32' @ 17.80 hrs Surf.Area= 92,021 sf Storage= 433,185 cf (28,847 cf above start)

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= 625.4 min (1,698.0 - 1,072.6)

Volume	Invert	Avail.Storage	Storage Description
#1	16.00'	817,738 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

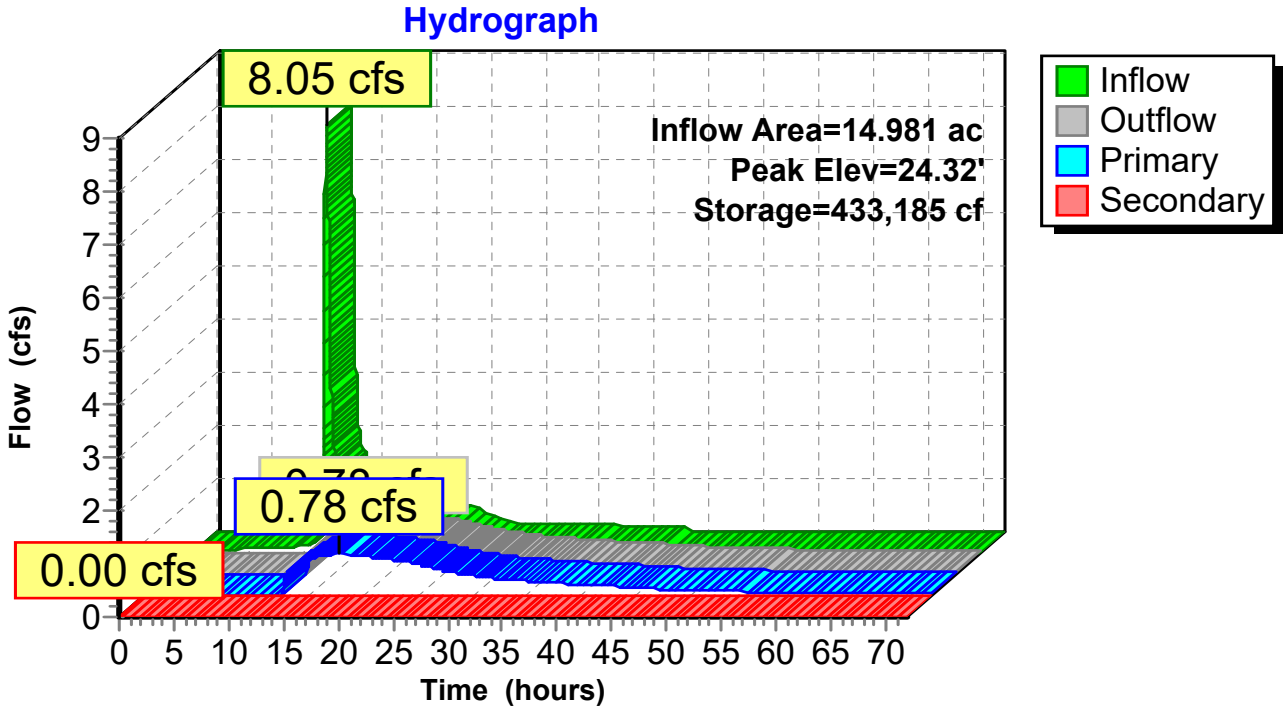
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
16.00	0	0	0
22.34	81,800	259,306	259,306
22.50	83,600	13,232	272,538
23.00	88,000	42,900	315,438
24.00	89,800	88,900	404,338
25.00	96,800	93,300	497,638
26.00	103,800	100,300	597,938
27.00	110,900	107,350	705,288
28.00	114,000	112,450	817,738

Device	Routing	Invert	Outlet Devices
#1	Primary	23.92'	**53.0" W x 41.0" H, R=28.1"/73.4" Pipe Arch CMP_Arch_1 53x41 w/ 19.0" ins** L= 61.3' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 22.34' / 21.91' S= 0.0070 '/' Cc= 0.900 n= 0.022, Flow Area= 6.21 sf
#2	Secondary	27.39'	**Asymmetrical Weir, C= 2.63** Offset (feet) 0.00 52.00 83.00 94.00 134.00 Elev. (feet) 28.00 27.50 27.39 27.50 28.00

Primary OutFlow Max=0.78 cfs @ 17.89 hrs HW=24.32' TW=24.28' (Dynamic Tailwater)
└**1=CMP_Arch_1 53x41** (Outlet Controls 0.78 cfs @ 0.60 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=24.00' TW=24.00' (Dynamic Tailwater)
└**2=Asymmetrical Weir** (Controls 0.00 cfs)

Pond 1P: EX. POND-2



Hydrograph for Pond 1P: EX. POND-2

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Primary (cfs)	Secondary (cfs)
0.00	0.00	404,338	24.00	0.00	0.00	**0.00**
2.00	0.02	404,351	24.00	0.00	0.00	0.00
4.00	0.07	404,650	24.00	0.00	0.00	0.00
6.00	0.10	405,247	24.01	0.00	0.00	0.00
8.00	0.11	405,947	24.02	0.01	0.01	0.00
10.00	0.14	406,751	24.03	0.01	0.01	0.00
12.00	**1.57**	408,888	24.05	0.00	0.00	0.00
14.00	**1.34**	428,841	24.27	0.55	0.55	0.00
16.00	0.99	**432,467**	**24.31**	**0.74**	**0.74**	0.00
18.00	0.76	**433,177**	**24.32**	**0.78**	**0.78**	0.00
20.00	0.63	432,581	24.31	0.75	0.75	0.00
22.00	0.54	431,564	24.30	0.70	0.70	0.00
24.00	0.45	430,319	24.29	0.64	0.64	0.00
26.00	0.23	428,268	24.26	0.55	0.55	0.00
28.00	0.16	426,044	24.24	0.45	0.45	0.00
30.00	0.16	424,217	24.22	0.38	0.38	0.00
32.00	0.15	422,766	24.20	0.33	0.33	0.00
34.00	0.14	421,590	24.19	0.29	0.29	0.00
36.00	0.13	420,596	24.18	0.26	0.26	0.00
38.00	0.12	419,740	24.17	0.23	0.23	0.00
40.00	0.11	418,992	24.16	0.21	0.21	0.00
42.00	0.10	418,320	24.15	0.19	0.19	0.00
44.00	0.00	417,438	24.15	0.17	0.17	0.00
46.00	0.00	416,349	24.13	0.14	0.14	0.00
48.00	0.00	415,432	24.12	0.12	0.12	0.00
50.00	0.00	414,638	24.11	0.10	0.10	0.00
52.00	0.00	413,946	24.11	0.09	0.09	0.00
54.00	0.00	413,343	24.10	0.08	0.08	0.00
56.00	0.00	412,818	24.09	0.07	0.07	0.00
58.00	0.00	412,350	24.09	0.06	0.06	0.00
60.00	0.00	411,926	24.08	0.06	0.06	0.00
62.00	0.00	411,541	24.08	0.05	0.05	0.00
64.00	0.00	411,192	24.08	0.05	0.05	0.00
66.00	0.00	410,875	24.07	0.04	0.04	0.00
68.00	0.00	410,588	24.07	0.04	0.04	0.00
70.00	0.00	410,327	24.07	0.03	0.03	0.00
72.00	0.00	410,090	24.06	0.03	0.03	0.00

Stage-Area-Storage for Pond 1P: EX. POND-2

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
16.00	0	0
16.15	1,935	145
16.30	3,871	581
16.45	5,806	1,306
16.60	7,741	2,322
16.75	9,677	3,629
16.90	11,612	5,225
17.05	13,547	7,112
17.20	15,483	9,290
17.35	17,418	11,757
17.50	19,353	14,515
17.65	21,289	17,563
17.80	23,224	20,902
17.95	25,159	24,530
18.10	27,095	28,449
18.25	29,030	32,659
18.40	30,965	37,158
18.55	32,901	41,948
18.70	34,836	47,029
18.85	36,771	52,399
19.00	38,707	58,060
19.15	40,642	64,011
19.30	42,577	70,253
19.45	44,513	76,784
19.60	46,448	83,606
19.75	48,383	90,719
19.90	50,319	98,121
20.05	52,254	105,814
20.20	54,189	113,797
20.35	56,125	122,071
20.50	58,060	130,635
20.65	59,995	139,489
20.80	61,931	148,633
20.95	63,866	158,068
21.10	65,801	167,793
21.25	67,737	177,809
21.40	69,672	188,114
21.55	71,607	198,710
21.70	73,543	209,596
21.85	75,478	220,773
22.00	77,413	232,240
22.15	79,349	243,997
22.30	81,284	256,044
22.45	83,037	268,372
22.60	84,480	280,942
22.75	85,800	293,713
22.90	87,120	306,682
23.05	88,090	319,840
23.20	88,360	333,074
23.35	88,630	346,348
23.50	88,900	359,663
23.65	89,170	373,018
23.80	89,440	386,414
23.95	89,710	399,850
24.10	90,500	413,353
24.25	91,550	427,007
24.40	92,600	440,818
24.55	93,650	454,787
24.70	94,700	468,913
24.85	95,750	483,197
25.00	96,800	497,638
25.15	97,850	512,237
25.30	98,900	526,993
25.45	99,950	541,907
25.60	101,000	556,978
25.75	102,050	572,207
25.90	103,100	587,593
26.05	104,155	603,137
26.20	105,220	618,840
26.35	106,285	634,703
26.50	107,350	650,726
26.65	108,415	666,908
26.80	109,480	683,250
26.95	110,545	699,752
27.10	111,210	716,393
27.25	111,675	733,110
27.40	112,140	749,896
27.55	112,605	766,752
27.70	113,070	783,677
27.85	113,535	800,673
28.00	**114,000**	**817,738**

Summary for Pond 2P: Field-SGWL

Inflow Area = 3.859 ac, 64.27% Impervious, Inflow Depth = 2.69" for 2-yr event
Inflow = 9.66 cfs @ 12.09 hrs, Volume= 0.866 af
Outflow = 5.58 cfs @ 12.26 hrs, Volume= 0.866 af, Atten= 42%, Lag= 10.1 min
Primary = 5.58 cfs @ 12.26 hrs, Volume= 0.866 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Starting Elev= 25.75' Surf.Area= 2,520 sf Storage= 4,438 cf
Peak Elev= 28.22' @ 12.26 hrs Surf.Area= 7,021 sf Storage= 17,595 cf (13,157 cf above start)
Flood Elev= 29.42' Surf.Area= 10,957 sf Storage= 33,542 cf (29,104 cf above start)

Plug-Flow detention time= 481.4 min calculated for 0.764 af (88% of inflow)
Center-of-Mass det. time= 346.9 min (1,120.5 - 773.6)

Volume	Invert	Avail.Storage	Storage Description
#1	26.50'	8,791 cf	**Sed. Forebay & connecing swales (Prismatic)** Listed below (Recalc)
#2	23.50'	14,506 cf	**CELL #1 (Prismatic)** Listed below
#3	23.50'	14,188 cf	**CELL #2** Listed below
		37,485 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
26.50	279	0	0
27.17	500	261	261
27.50	970	243	504
27.92	1,910	605	1,108
28.00	2,130	162	1,270
28.22	3,100	575	1,845
28.50	3,550	931	2,776
29.00	4,900	2,113	4,889
29.67	6,750	3,903	8,791

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
23.50	2,520	0.0	0	0
25.50	2,520	40.0	2,016	2,016
25.75	2,520	35.0	221	2,237
26.50	2,520	2.0	38	2,274
26.51	2,730	100.0	26	2,301
27.17	3,150	100.0	1,940	4,241
27.75	3,530	100.0	1,937	6,178
27.92	3,650	100.0	610	6,788
28.00	3,707	100.0	294	7,083
28.17	3,824	100.0	640	7,723
28.18	3,880	100.0	39	7,761
28.42	4,065	100.0	953	8,715
28.50	4,260	100.0	333	9,048
29.67	5,070	100.0	5,458	14,506

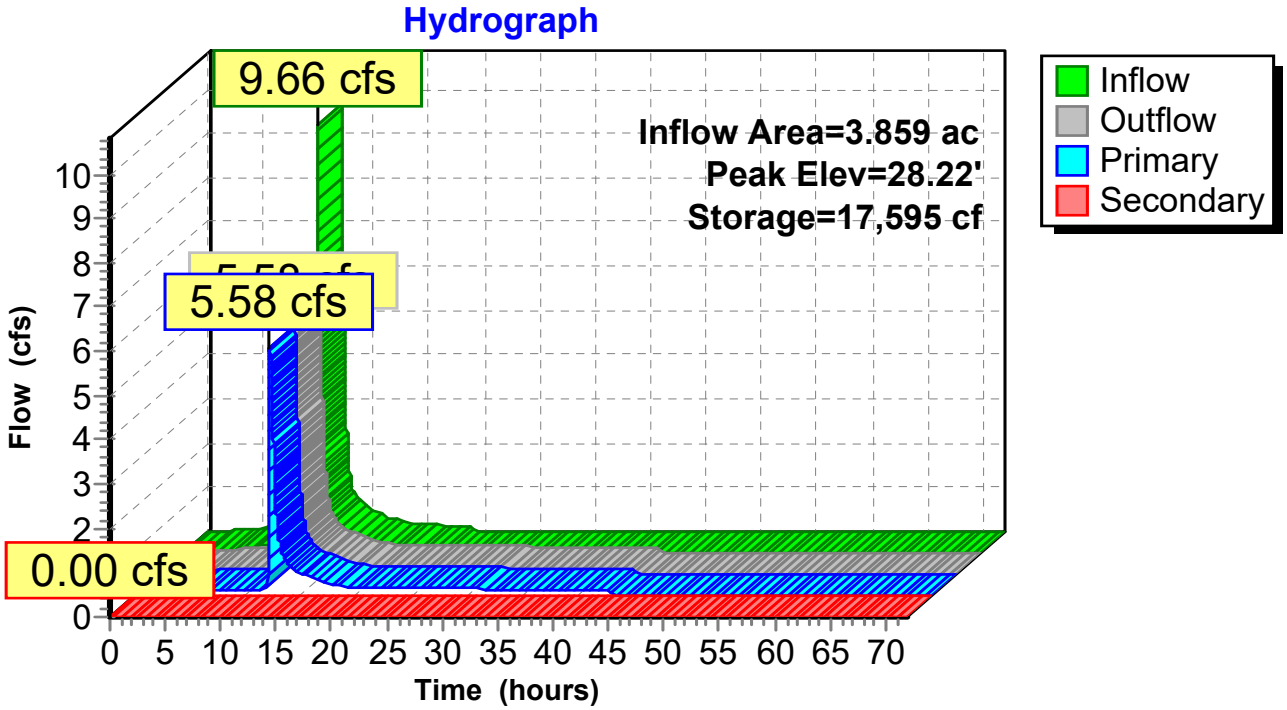
Elevation (feet)	Cum.Store (cubic-feet)
23.50	0
25.50	1,984
25.75	2,201
26.50	2,238
26.51	2,264
27.17	4,151
27.75	6,057
27.92	6,660
28.00	6,951
28.17	7,586
28.18	7,624
28.42	8,571
28.50	8,896
29.00	11,036
29.67	14,188

Device	Routing	Invert	Outlet Devices
#1	Primary	25.50'	**24.0" Round Culvert** L= 33.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 25.50' / 25.15' S= 0.0106 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Device 1	25.83'	**2.2" Vert. Orifice/Grate** C= 0.600
#3	Device 1	27.92'	**72.0" W x 9.0" H Vert. Orifice/Grate** C= 0.600
#4	Device 1	27.92'	**24.0" W x 9.0" H Vert. Orifice/Grate X 2.00** C= 0.600
#5	Secondary	28.67'	**10.0' long x 8.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74
#6	Secondary	28.67'	**161.0 deg Sharp-Crested Vee/Trap Weir** Cv= 1.97 (C= 2.46)

Primary OutFlow Max=5.58 cfs @ 12.26 hrs HW=28.22' TW=24.11' (Dynamic Tailwater)
└─**1=Culvert** (Passes 5.58 cfs of 19.21 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.19 cfs @ 7.31 fps)
  ├─**3=Orifice/Grate** (Orifice Controls 3.23 cfs @ 1.77 fps)
  └─**4=Orifice/Grate** (Orifice Controls 2.16 cfs @ 1.77 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=25.75' TW=24.00' (Dynamic Tailwater)
├─**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
└─**6=Sharp-Crested Vee/Trap Weir** (Controls 0.00 cfs)

Pond 2P: Field-SGWL



Hydrograph for Pond 2P: Field-SGWL

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Primary (cfs)	Secondary (cfs)
0.00	0.00	4,438	25.75	0.00	0.00	**0.00**
2.00	0.02	4,456	25.94	0.02	0.02	0.00
4.00	0.07	4,480	26.18	0.06	0.06	0.00
6.00	0.11	4,530	26.50	0.10	0.10	0.00
8.00	0.21	4,945	26.57	0.10	0.10	0.00
10.00	0.41	6,355	26.80	0.12	0.12	0.00
12.00	**5.97**	**13,352**	**27.78**	**0.17**	**0.17**	0.00
14.00	**0.64**	**15,156**	**27.98**	**0.71**	**0.71**	0.00
16.00	0.35	14,874	27.95	0.38	0.38	0.00
18.00	0.21	14,689	27.93	0.24	0.24	0.00
20.00	0.17	14,574	27.92	0.18	0.18	0.00
22.00	0.14	14,382	27.90	0.18	0.18	0.00
24.00	0.11	13,999	27.86	0.18	0.18	0.00
26.00	0.00	12,801	27.72	0.17	0.17	0.00
28.00	0.00	11,600	27.57	0.16	0.16	0.00
30.00	0.00	10,453	27.42	0.16	0.16	0.00
32.00	0.00	9,363	27.27	0.15	0.15	0.00
34.00	0.00	8,330	27.12	0.14	0.14	0.00
36.00	0.00	7,362	26.96	0.13	0.13	0.00
38.00	0.00	6,462	26.82	0.12	0.12	0.00
40.00	0.00	5,629	26.68	0.11	0.11	0.00
42.00	0.00	4,864	26.56	0.10	0.10	0.00
44.00	0.00	4,447	25.85	0.00	0.00	0.00
46.00	0.00	4,446	25.84	0.00	0.00	0.00
48.00	0.00	4,446	25.83	0.00	0.00	0.00
50.00	0.00	4,446	25.83	0.00	0.00	0.00
52.00	0.00	4,446	25.83	0.00	0.00	0.00
54.00	0.00	4,446	25.83	0.00	0.00	0.00
56.00	0.00	4,446	25.83	0.00	0.00	0.00
58.00	0.00	4,446	25.83	0.00	0.00	0.00
60.00	0.00	4,446	25.83	0.00	0.00	0.00
62.00	0.00	4,446	25.83	0.00	0.00	0.00
64.00	0.00	4,445	25.83	0.00	0.00	0.00
66.00	0.00	4,445	25.83	0.00	0.00	0.00
68.00	0.00	4,445	25.83	0.00	0.00	0.00
70.00	0.00	4,445	25.83	0.00	0.00	0.00
72.00	0.00	4,445	25.83	0.00	0.00	0.00

Stage-Area-Storage for Pond 2P: Field-SGWL

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
23.50	0	25.62	4,210	27.74	12,970
23.54	80	25.66	4,280	27.78	13,312
23.58	160	25.70	4,350	27.82	13,663
23.62	240	25.74	4,420	27.86	14,018
23.66	320	25.78	4,440	27.90	14,376
23.70	400	25.82	4,444	27.94	14,742
23.74	480	25.86	4,448	27.98	15,115
23.78	560	25.90	4,452	28.02	15,497
23.82	640	25.94	4,456	28.06	15,889
23.86	720	25.98	4,460	28.10	16,289
23.90	800	26.02	4,464	28.14	16,695
23.94	880	26.06	4,468	28.18	17,110
23.98	960	26.10	4,472	28.22	17,547
24.02	1,040	26.14	4,476	28.26	17,989
24.06	1,120	26.18	4,480	28.30	18,434
24.10	1,200	26.22	4,484	28.34	18,881
24.14	1,280	26.26	4,488	28.38	19,331
24.18	1,360	26.30	4,492	28.42	19,783
24.22	1,440	26.34	4,496	28.46	20,250
24.26	1,520	26.38	4,500	28.50	20,720
24.30	1,600	26.42	4,504	28.54	21,222
24.34	1,680	26.46	4,508	28.58	21,728
24.38	1,760	26.50	4,512	28.62	22,239
24.42	1,840	26.54	4,750	28.66	22,754
24.46	1,920	26.58	4,994	28.70	23,273
24.50	2,000	26.62	5,238	28.74	23,797
24.54	2,080	26.66	5,483	28.78	24,324
24.58	2,160	26.70	5,729	28.82	24,857
24.62	2,240	26.74	5,975	28.86	25,393
24.66	2,320	26.78	6,221	28.90	25,934
24.70	2,400	26.82	6,468	28.94	26,479
24.74	2,480	26.86	6,716	28.98	27,029
24.78	2,560	26.90	6,964	29.02	27,591
24.82	2,640	26.94	7,213	29.06	28,166
24.86	2,720	26.98	7,462	29.10	28,746
24.90	2,800	27.02	7,712	29.14	29,330
24.94	2,880	27.06	7,962	29.18	29,918
24.98	2,960	27.10	8,213	29.22	30,511
25.02	3,040	27.14	8,464	29.26	31,108
25.06	3,120	27.18	8,724	29.30	31,710
25.10	3,200	27.22	9,011	29.34	32,316
25.14	3,280	27.26	9,300	29.38	32,927
25.18	3,360	27.30	9,591	29.42	33,542
25.22	3,440	27.34	9,885	29.46	34,161
25.26	3,520	27.38	10,181	29.50	34,785
25.30	3,600	27.42	10,479	29.54	35,413
25.34	3,680	27.46	10,779	29.58	36,046
25.38	3,760	27.50	11,082	29.62	36,683
25.42	3,840	27.54	11,388	29.66	**37,324**
25.46	3,920	27.58	11,697		
25.50	4,000	27.62	12,010		
25.54	4,070	27.66	12,326		
25.58	4,140	27.70	12,646		

Summary for Pond 3P: Field Storage-

Inflow Area = 8.701 ac, 0.00% Impervious, Inflow Depth = 1.45" for 2-yr event
Inflow = 10.12 cfs @ 12.25 hrs, Volume= 1.053 af
Outflow = 0.60 cfs @ 16.22 hrs, Volume= 1.046 af, Atten= 94%, Lag= 237.8 min
Discarded = 0.15 cfs @ 12.06 hrs, Volume= 0.695 af
Primary = 0.45 cfs @ 16.22 hrs, Volume= 0.351 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 30.75' @ 16.22 hrs Surf.Area= 12,212 sf Storage= 29,425 cf

Plug-Flow detention time= 1,091.4 min calculated for 1.046 af (99% of inflow)
Center-of-Mass det. time= 1,087.6 min (1,949.0 - 861.5)

Volume	Invert	Avail.Storage	Storage Description
#1	25.90'	3,761 cf	**Chambers to bot of top soil (Prismatic)** Listed below (Recalc) 9,403 cf Overall x 40.0% Voids
#2B	27.80'	19,176 cf	**139.25'W x 85.17'L x 5.70'H Field B** -Impervious 67,599 cf Overall - 19,658 cf Embedded = 47,940 cf x 40.0% Voids
#3B	28.30'	19,658 cf	**Cultec R-360HD** x 528 Inside #2 Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap 528 Chambers in 24 Rows Cap Storage= +6.5 cf x 2 x 24 rows = 310.1 cf
#4	29.95'	298 cf	**12.0" Round Pipe Storage, west-1, Phase 1** -Impervious L= 379.0' S= 0.0051 '/'
#5	28.62'	770 cf	**24.0" Round Pipe Storage, north-1** L= 245.0' S= 0.0050 '/'
#6	30.17'	298 cf	**12.0" Round Pipe Storage, center-1, Phase 1** -Impervious L= 380.0' S= 0.0050 '/'
#7	30.17'	298 cf	**12.0" Round Pipe Storage, east-1, Phase 1** -Impervious L= 380.0' S= 0.0050 '/'
#8	33.50'	56,062 cf	**Field #1 Base (Prismatic)** Listed below (Recalc) x 2 224,250 cf Overall x 25.0% Voids
#9	33.50'	28,031 cf	**Field #2 Base (Prismatic)** Listed below (Recalc) 112,125 cf Overall x 25.0% Voids
#10	33.50'	28,031 cf	**Field #3 Base (Prismatic)** Listed below (Recalc) 112,125 cf Overall x 25.0% Voids
		156,385 cf	Total Available Storage

Storage Group B created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
25.90	0	0	0
26.00	290	15	15
27.00	5,000	2,645	2,660
27.80	11,859	6,744	9,403

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
33.50	97,500	0	0
34.01	97,500	49,725	49,725
34.65	97,500	62,400	112,125

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
33.50	97,500	0	0
34.10	97,500	58,500	58,500
34.65	97,500	53,625	112,125

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
33.50	97,500	0	0
34.65	97,500	112,125	112,125

Device	Routing	Invert	Outlet Devices
#1	Primary	28.01'	**15.0" Round Culvert** L= 32.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 28.01' / 27.60' S= 0.0128 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.23 sf
#2	Device 1	29.85'	**4.5" Vert. Orifice/Grate** C= 0.600
#3	Primary	33.00'	**24.0" W x 4.0" H Vert. Orifice/Grate** C= 0.600
#4	Discarded	25.90'	**0.550 in/hr Exfiltration over Surface area from 25.90' - 27.80'** Excluded Surface area = 0 sf

Discarded OutFlow Max=0.15 cfs @ 12.06 hrs HW=27.83' (Free Discharge)
└─**4=Exfiltration** (Exfiltration Controls 0.15 cfs)

Primary OutFlow Max=0.45 cfs @ 16.22 hrs HW=30.75' TW=27.67' (Dynamic Tailwater)
├─**1=Culvert** (Passes 0.45 cfs of 8.59 cfs potential flow)
│ └─**2=Orifice/Grate** (Orifice Controls 0.45 cfs @ 4.06 fps)
└─**3=Orifice/Grate** (Controls 0.00 cfs)

Pond 3P: Field Storage- - Chamber Wizard Field B

Chamber Model = Cultec R-360HD (Cultec Recharger® 360HD)
Effective Size= 54.9"W x 36.0"H => 9.99 sf x 3.67'L = 36.6 cf
Overall Size= 60.0"W x 36.0"H x 4.17'L with 0.50' Overlap
Cap Storage= +6.5 cf x 2 x 24 rows = 310.1 cf

60.0" Wide + 9.0" Spacing = 69.0" C-C Row Spacing

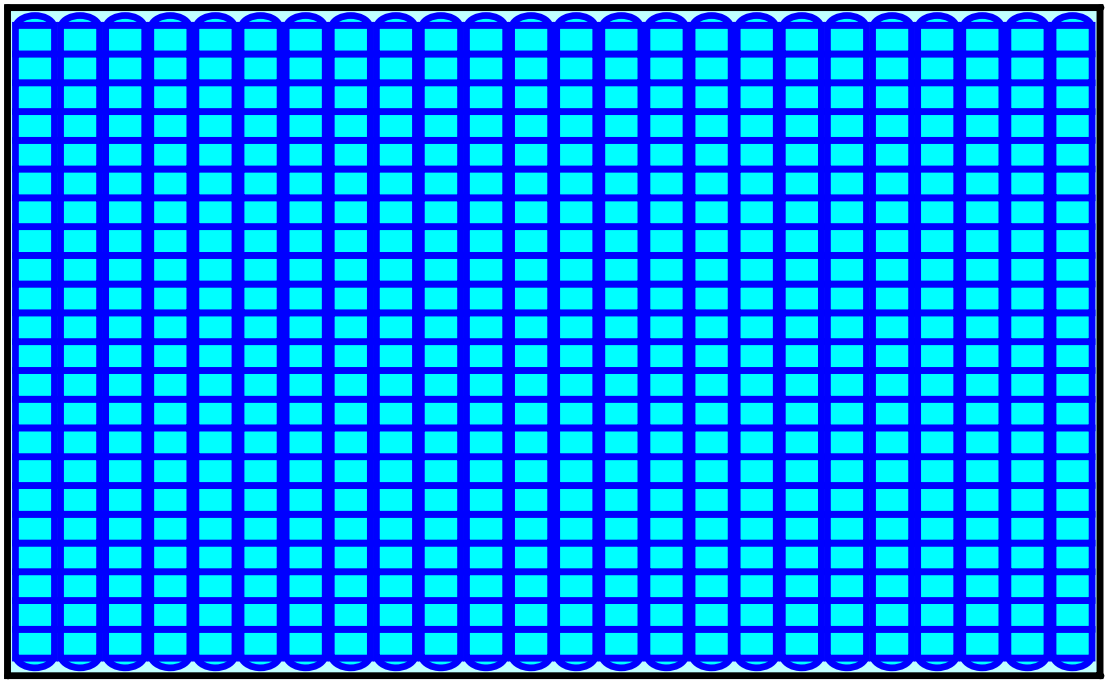
22 Chambers/Row x 3.67' Long +1.25' Cap Length x 2 = 83.17' Row Length +12.0" End Stone x 2 = 85.17' Base Length
24 Rows x 60.0" Wide + 9.0" Spacing x 23 + 12.0" Side Stone x 2 = 139.25' Base Width
6.0" Base + 36.0" Chamber Height + 26.4" Cover = 5.70' Field Height

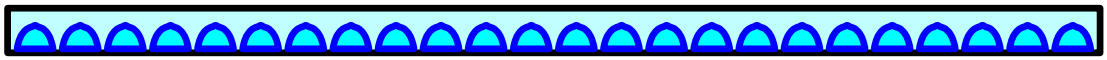
528 Chambers x 36.6 cf + 6.5 cf Cap Volume x 2 x 24 Rows = 19,658.5 cf Chamber Storage

67,598.9 cf Field - 19,658.5 cf Chambers = 47,940.4 cf Stone x 40.0% Voids = 19,176.2 cf Stone Storage

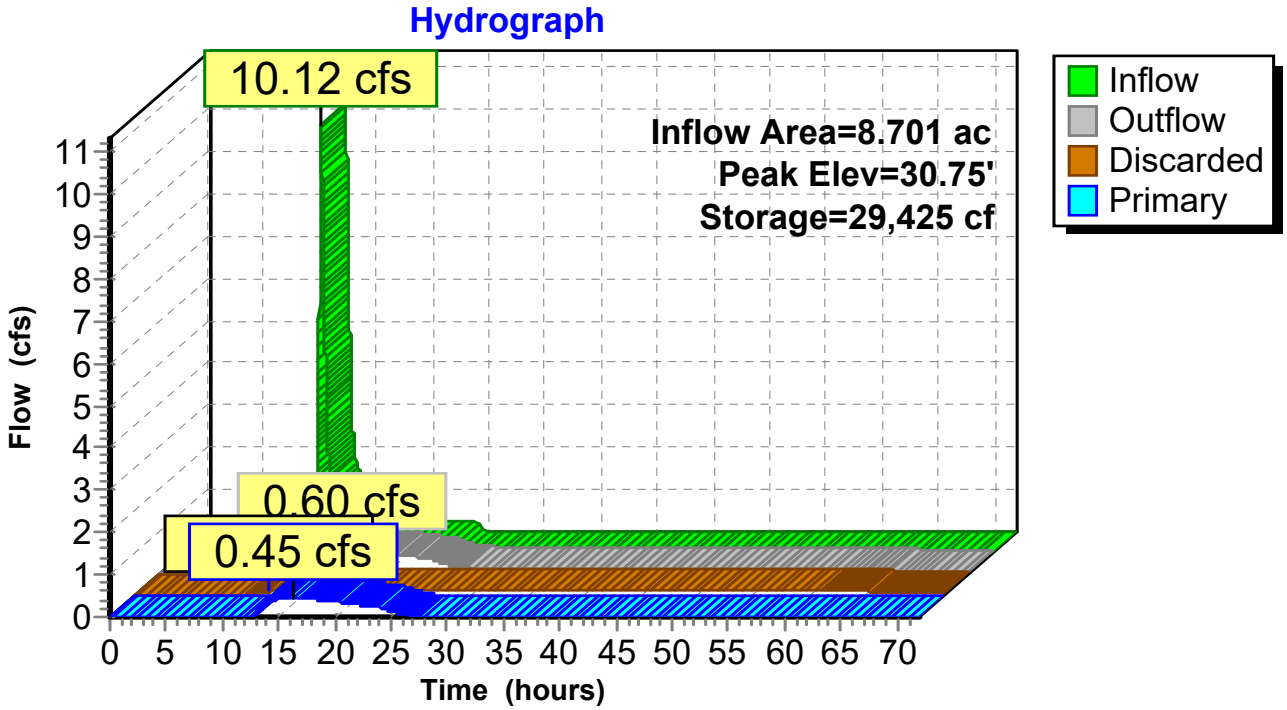
Chamber Storage + Stone Storage = 38,834.6 cf = 0.892 af
Overall Storage Efficiency = 57.4%
Overall System Size = 85.17' x 139.25' x 5.70'

528 Chambers
2,503.7 cy Field
1,775.6 cy Stone





Pond 3P: Field Storage-



Hydrograph for Pond 3P: Field Storage-

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	25.90	0.00	0.00	0.00
2.00	0.00	0	25.90	0.00	0.00	0.00
4.00	0.00	0	25.90	0.00	0.00	0.00
6.00	0.00	0	25.90	0.00	0.00	0.00
8.00	0.00	0	25.90	0.00	0.00	0.00
10.00	0.00	0	25.92	0.00	0.00	0.00
12.00	**3.29**	3,098	27.65	0.13	**0.13**	0.00
14.00	**1.17**	27,071	30.47	0.50	**0.15**	0.35
16.00	0.65	**29,405**	**30.75**	**0.60**	0.15	**0.45**
18.00	0.40	**28,805**	**30.67**	**0.57**	0.15	**0.42**
20.00	0.31	27,363	30.50	0.51	0.15	0.36
22.00	0.26	25,953	30.34	0.44	0.15	0.29
24.00	0.21	24,702	30.20	0.37	0.15	0.22
26.00	0.00	22,852	30.00	0.21	0.15	0.06
28.00	0.00	21,612	29.87	0.15	0.15	0.00
30.00	0.00	20,524	29.76	0.15	0.15	0.00
32.00	0.00	19,437	29.64	0.15	0.15	0.00
34.00	0.00	18,350	29.53	0.15	0.15	0.00
36.00	0.00	17,263	29.42	0.15	0.15	0.00
38.00	0.00	16,176	29.31	0.15	0.15	0.00
40.00	0.00	15,089	29.20	0.15	0.15	0.00
42.00	0.00	14,002	29.09	0.15	0.15	0.00
44.00	0.00	12,915	28.98	0.15	0.15	0.00
46.00	0.00	11,828	28.87	0.15	0.15	0.00
48.00	0.00	10,741	28.76	0.15	0.15	0.00
50.00	0.00	9,654	28.65	0.15	0.15	0.00
52.00	0.00	8,567	28.54	0.15	0.15	0.00
54.00	0.00	7,479	28.43	0.15	0.15	0.00
56.00	0.00	6,392	28.33	0.15	0.15	0.00
58.00	0.00	5,305	28.13	0.15	0.15	0.00
60.00	0.00	4,218	27.90	0.15	0.15	0.00
62.00	0.00	3,161	27.67	0.14	0.14	0.00
64.00	0.00	2,269	27.44	0.11	0.11	0.00
66.00	0.00	1,556	27.21	0.09	0.09	0.00
68.00	0.00	1,024	26.98	0.06	0.06	0.00
70.00	0.00	623	26.75	0.05	0.05	0.00
72.00	0.00	322	26.52	0.03	0.03	0.00

Stage-Area-Storage for Pond 3P: Field Storage-

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
25.90	0	0
26.00	290	6
26.10	761	27
26.20	1,232	67
26.30	1,703	125
26.40	2,174	203
26.50	2,645	299
26.60	3,116	415
26.70	3,587	549
26.80	4,058	701
26.90	4,529	873
27.00	5,000	1,064
27.10	5,857	1,281
27.20	6,715	1,532
27.30	7,572	1,818
27.40	8,429	2,138
27.50	9,287	2,492
27.60	10,144	2,881
27.70	11,002	3,304
27.80	11,859	3,761
27.90	11,859	4,236
28.00	11,859	4,710
28.10	11,859	5,184
28.20	11,859	5,659
28.30	11,859	6,133
28.40	11,859	7,146
28.50	11,859	8,156
28.60	11,859	9,161
28.70	11,867	10,163
28.80	11,887	11,160
28.90	11,913	12,155
29.00	11,942	13,146
29.10	11,975	14,135
29.20	12,010	15,120
29.30	12,047	16,101
29.40	12,086	17,078
29.50	12,125	18,050
29.60	12,165	19,018
29.70	12,205	19,979
29.80	12,245	20,934
29.90	12,279	21,883
30.00	12,299	22,821
30.10	12,311	23,749
30.20	12,316	24,665
30.30	12,315	25,570
30.40	12,307	26,461
30.50	12,293	27,338
30.60	12,269	28,197
30.70	12,231	29,034
30.80	12,191	29,847
30.90	12,151	30,627
31.00	12,111	31,364
31.10	12,072	32,039
31.20	12,034	32,656
31.30	11,998	33,227
31.40	11,963	33,760
31.50	11,931	34,290
31.60	11,903	34,817
31.70	11,879	35,342
31.80	11,863	35,864
31.90	11,859	36,385
32.00	11,859	36,906
32.10	11,859	37,425
32.20	11,859	37,942
32.30	11,859	38,454
32.40	11,859	38,961
32.50	11,859	39,462
32.60	11,859	39,958
32.70	11,859	40,447
32.80	11,859	40,932
32.90	11,859	41,411
33.00	11,859	41,888
33.10	11,859	42,363
33.20	11,859	42,837
33.30	11,859	43,311
33.40	11,859	43,786
33.50	**401,859**	44,260
33.60	401,859	54,010
33.70	401,859	63,760
33.80	401,859	73,510
33.90	401,859	83,260
34.00	401,859	93,010
34.10	401,859	102,760
34.20	401,859	112,510
34.30	401,859	122,260
34.40	401,859	132,010
34.50	401,859	141,760
34.60	401,859	**151,510**

Summary for Pond 10P: PDMH-10

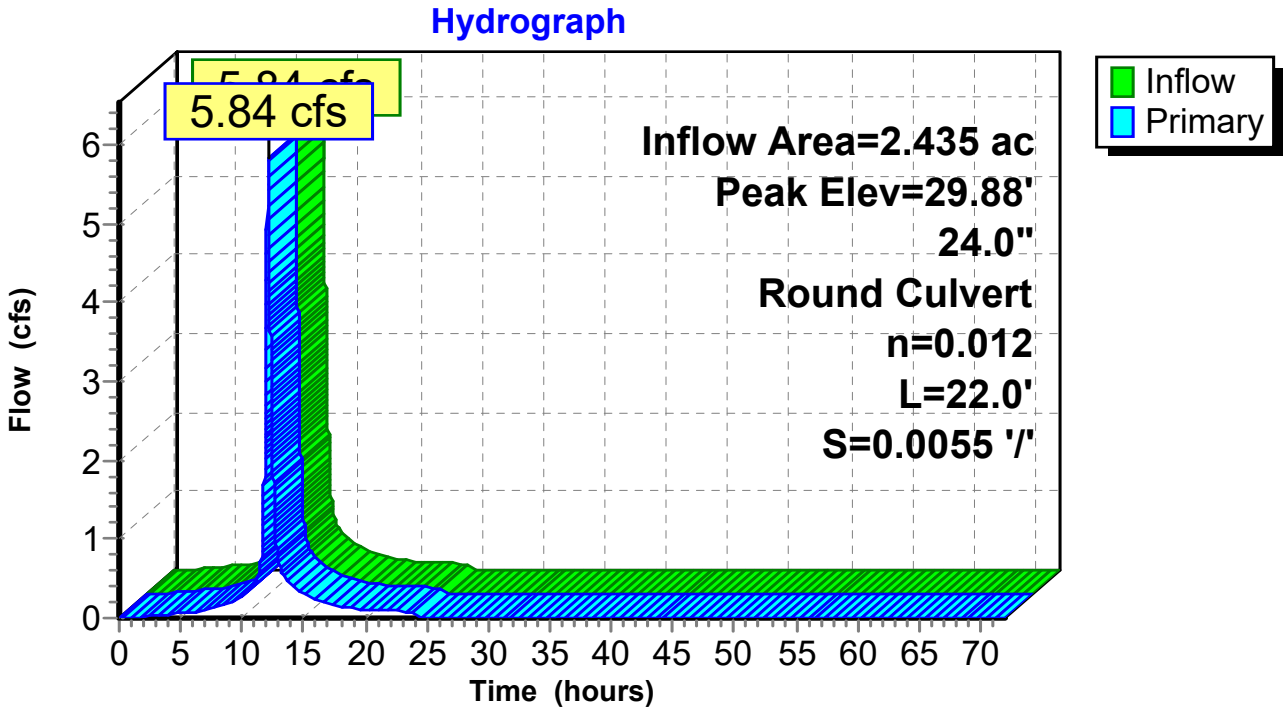
Inflow Area = 2.435 ac, 69.90% Impervious, Inflow Depth = 2.79" for 2-yr event
Inflow = 5.84 cfs @ 12.09 hrs, Volume= 0.566 af
Outflow = 5.84 cfs @ 12.09 hrs, Volume= 0.566 af, Atten= 0%, Lag= 0.0 min
Primary = 5.84 cfs @ 12.09 hrs, Volume= 0.566 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 29.88' @ 12.09 hrs
Flood Elev= 34.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	28.62'	**24.0" Round 24" HDPE** L= 22.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 28.62' / 28.50' S= 0.0055 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf

Primary OutFlow Max=5.83 cfs @ 12.09 hrs HW=29.88' TW=28.06' (Dynamic Tailwater)
└**1=24" HDPE** (Barrel Controls 5.83 cfs @ 4.00 fps)

Pond 10P: PDMH-10



Hydrograph for Pond 10P: PDMH-10

Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
0.00	0.00	28.62	0.00
1.00	0.00	28.62	0.00
2.00	0.01	28.68	0.01
3.00	0.03	28.70	0.03
4.00	0.05	28.72	0.05
5.00	0.06	28.74	0.06
6.00	0.08	28.75	0.08
7.00	0.11	28.77	0.11
8.00	0.14	28.79	0.14
9.00	0.21	28.83	0.21
10.00	0.28	28.87	0.28
11.00	0.43	28.93	0.43
12.00	**3.67**	**29.58**	**3.67**
13.00	**0.70**	**29.01**	**0.70**
14.00	0.42	28.92	0.42
15.00	0.31	28.88	0.31
16.00	0.22	28.84	0.22
17.00	0.18	28.81	0.18
18.00	0.14	28.79	0.14
19.00	0.12	28.78	0.12
20.00	0.11	28.77	0.11
21.00	0.10	28.77	0.10
22.00	0.09	28.76	0.09
23.00	0.08	28.75	0.08
24.00	0.07	28.74	0.07
25.00	0.00	28.62	0.00
26.00	0.00	28.62	0.00
27.00	0.00	28.62	0.00
28.00	0.00	28.62	0.00
29.00	0.00	28.62	0.00
30.00	0.00	28.62	0.00
31.00	0.00	28.62	0.00
32.00	0.00	28.62	0.00
33.00	0.00	28.62	0.00
34.00	0.00	28.62	0.00
35.00	0.00	28.62	0.00
36.00	0.00	28.62	0.00
37.00	0.00	28.62	0.00
38.00	0.00	28.62	0.00
39.00	0.00	28.62	0.00
40.00	0.00	28.62	0.00
41.00	0.00	28.62	0.00
42.00	0.00	28.62	0.00
43.00	0.00	28.62	0.00
44.00	0.00	28.62	0.00
45.00	0.00	28.62	0.00
46.00	0.00	28.62	0.00
47.00	0.00	28.62	0.00
48.00	0.00	28.62	0.00
49.00	0.00	28.62	0.00
50.00	0.00	28.62	0.00
51.00	0.00	28.62	0.00
52.00	0.00	28.62	0.00
53.00	0.00	28.62	0.00
54.00	0.00	28.62	0.00
55.00	0.00	28.62	0.00
56.00	0.00	28.62	0.00
57.00	0.00	28.62	0.00
58.00	0.00	28.62	0.00
59.00	0.00	28.62	0.00
60.00	0.00	28.62	0.00
61.00	0.00	28.62	0.00
62.00	0.00	28.62	0.00
63.00	0.00	28.62	0.00
64.00	0.00	28.62	0.00
65.00	0.00	28.62	0.00
66.00	0.00	28.62	0.00
67.00	0.00	28.62	0.00
68.00	0.00	28.62	0.00
69.00	0.00	28.62	0.00
70.00	0.00	28.62	0.00
71.00	0.00	28.62	0.00
72.00	0.00	28.62	0.00

Stage-Area-Storage for Pond 10P: PDMH-10

Elevation (feet)	Storage (acre-feet)	Elevation (feet)	Storage (acre-feet)	Elevation (feet)	Storage (acre-feet)
28.62	**0.000**	30.74	0.000	32.86	0.000
28.66	0.000	30.78	0.000	32.90	0.000
28.70	0.000	30.82	0.000	32.94	0.000
28.74	0.000	30.86	0.000	32.98	0.000
28.78	0.000	30.90	0.000	33.02	0.000
28.82	0.000	30.94	0.000	33.06	0.000
28.86	0.000	30.98	0.000	33.10	0.000
28.90	0.000	31.02	0.000	33.14	0.000
28.94	0.000	31.06	0.000	33.18	0.000
28.98	0.000	31.10	0.000	33.22	0.000
29.02	0.000	31.14	0.000	33.26	0.000
29.06	0.000	31.18	0.000	33.30	0.000
29.10	0.000	31.22	0.000	33.34	0.000
29.14	0.000	31.26	0.000	33.38	0.000
29.18	0.000	31.30	0.000	33.42	0.000
29.22	0.000	31.34	0.000	33.46	0.000
29.26	0.000	31.38	0.000	33.50	0.000
29.30	0.000	31.42	0.000	33.54	0.000
29.34	0.000	31.46	0.000	33.58	0.000
29.38	0.000	31.50	0.000	33.62	0.000
29.42	0.000	31.54	0.000	33.66	0.000
29.46	0.000	31.58	0.000	33.70	0.000
29.50	0.000	31.62	0.000	33.74	0.000
29.54	0.000	31.66	0.000	33.78	0.000
29.58	0.000	31.70	0.000	33.82	0.000
29.62	0.000	31.74	0.000	33.86	0.000
29.66	0.000	31.78	0.000	33.90	0.000
29.70	0.000	31.82	0.000	33.94	0.000
29.74	0.000	31.86	0.000	33.98	0.000
29.78	0.000	31.90	0.000		
29.82	0.000	31.94	0.000		
29.86	0.000	31.98	0.000		
29.90	0.000	32.02	0.000		
29.94	0.000	32.06	0.000		
29.98	0.000	32.10	0.000		
30.02	0.000	32.14	0.000		
30.06	0.000	32.18	0.000		
30.10	0.000	32.22	0.000		
30.14	0.000	32.26	0.000		
30.18	0.000	32.30	0.000		
30.22	0.000	32.34	0.000		
30.26	0.000	32.38	0.000		
30.30	0.000	32.42	0.000		
30.34	0.000	32.46	0.000		
30.38	0.000	32.50	0.000		
30.42	0.000	32.54	0.000		
30.46	0.000	32.58	0.000		
30.50	0.000	32.62	0.000		
30.54	0.000	32.66	0.000		
30.58	0.000	32.70	0.000		
30.62	0.000	32.74	0.000		
30.66	0.000	32.78	0.000		
30.70	0.000	32.82	0.000		

Summary for Pond 14P: PDMH-3

[57] Hint: Peaked at 27.75' (Flood elevation advised)

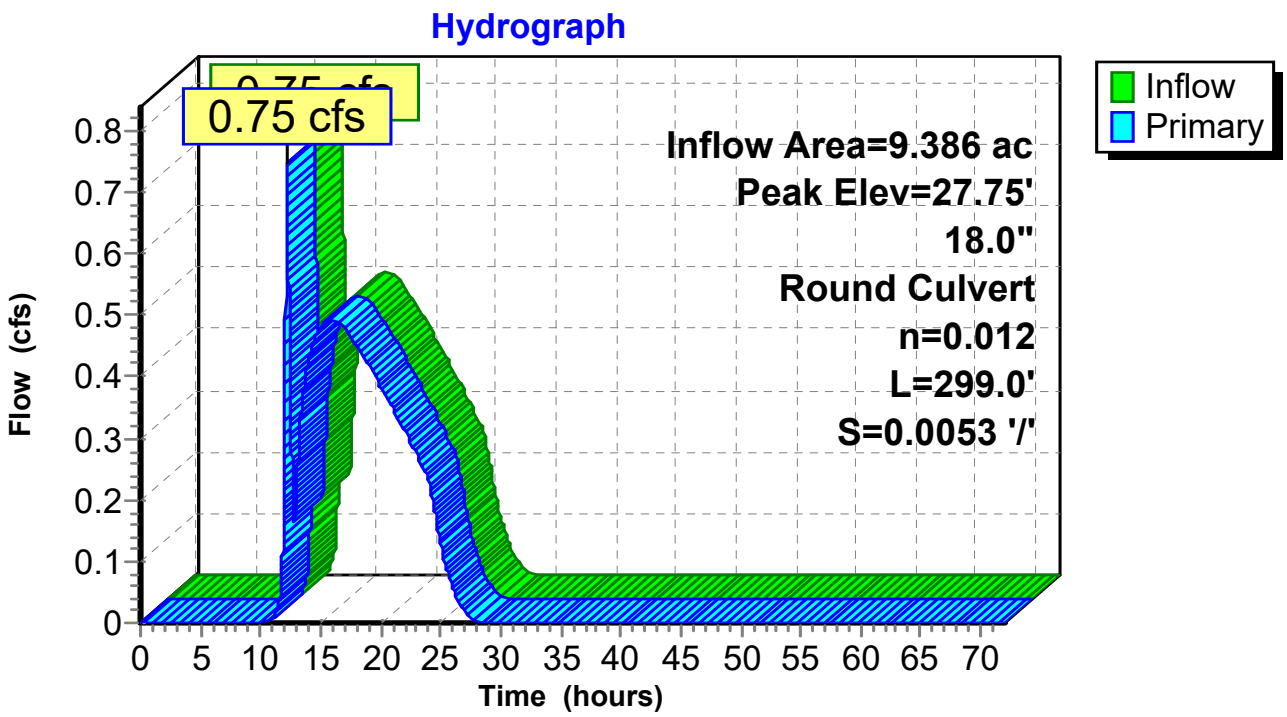
Inflow Area =	9.386 ac,	0.11% Impervious,	Inflow Depth =	0.54"	for 2-yr event
Inflow =	0.75 cfs @	12.19 hrs,	Volume=	0.421 af	
Outflow =	0.75 cfs @	12.19 hrs,	Volume=	0.421 af,	Atten= 0%, Lag= 0.0 min
Primary =	0.75 cfs @	12.19 hrs,	Volume=	0.421 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 27.75' @ 12.19 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	27.34'	**18.0" Round HDPE_Round 18"** L= 299.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 27.34' / 25.75' S= 0.0053 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf

Primary OutFlow Max=0.75 cfs @ 12.19 hrs HW=27.75' TW=24.09' (Dynamic Tailwater)
└─**1=HDPE_Round 18"** (Barrel Controls 0.75 cfs @ 2.85 fps)

Pond 14P: PDMH-3



Hydrograph for Pond 14P: PDMH-3

Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
0.00	0.00	27.34	0.00
1.00	0.00	27.34	0.00
2.00	0.00	27.34	0.00
3.00	0.00	27.34	0.00
4.00	0.00	27.35	0.00
5.00	0.00	27.35	0.00
6.00	0.00	27.35	0.00
7.00	0.00	27.35	0.00
8.00	0.00	27.35	0.00
9.00	0.00	27.36	0.00
10.00	0.00	27.36	0.00
11.00	0.01	27.39	0.01
12.00	**0.27**	**27.59**	**0.27**
13.00	**0.22**	**27.56**	**0.22**
14.00	0.43	27.65	0.43
15.00	0.48	27.67	0.48
16.00	0.49	27.67	0.49
17.00	0.48	27.67	0.48
18.00	0.45	27.66	0.45
19.00	0.42	27.65	0.42
20.00	0.38	27.64	0.38
21.00	0.35	27.62	0.35
22.00	0.31	27.61	0.31
23.00	0.27	27.59	0.27
24.00	0.23	27.57	0.23
25.00	0.13	27.52	0.13
26.00	0.06	27.46	0.06
27.00	0.02	27.41	0.02
28.00	0.00	27.36	0.00
29.00	0.00	27.34	0.00
30.00	0.00	27.34	0.00
31.00	0.00	27.34	0.00
32.00	0.00	27.34	0.00
33.00	0.00	27.34	0.00
34.00	0.00	27.34	0.00
35.00	0.00	27.34	0.00
36.00	0.00	27.34	0.00
37.00	0.00	27.34	0.00
38.00	0.00	27.34	0.00
39.00	0.00	27.34	0.00
40.00	0.00	27.34	0.00
41.00	0.00	27.34	0.00
42.00	0.00	27.34	0.00
43.00	0.00	27.34	0.00
44.00	0.00	27.34	0.00
45.00	0.00	27.34	0.00
46.00	0.00	27.34	0.00
47.00	0.00	27.34	0.00
48.00	0.00	27.34	0.00
49.00	0.00	27.34	0.00
50.00	0.00	27.34	0.00
51.00	0.00	27.34	0.00
52.00	0.00	27.34	0.00
53.00	0.00	27.34	0.00
54.00	0.00	27.34	0.00
55.00	0.00	27.34	0.00
56.00	0.00	27.34	0.00
57.00	0.00	27.34	0.00
58.00	0.00	27.34	0.00
59.00	0.00	27.34	0.00
60.00	0.00	27.34	0.00
61.00	0.00	27.34	0.00
62.00	0.00	27.34	0.00
63.00	0.00	27.34	0.00
64.00	0.00	27.34	0.00
65.00	0.00	27.34	0.00
66.00	0.00	27.34	0.00
67.00	0.00	27.34	0.00
68.00	0.00	27.34	0.00
69.00	0.00	27.34	0.00
70.00	0.00	27.34	0.00
71.00	0.00	27.34	0.00
72.00	0.00	27.34	0.00

Stage-Area-Storage for Pond 14P: PDMH-3

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
27.34	**0**	27.87	0	28.40	0
27.35	0	27.88	0	28.41	0
27.36	0	27.89	0	28.42	0
27.37	0	27.90	0	28.43	0
27.38	0	27.91	0	28.44	0
27.39	0	27.92	0	28.45	0
27.40	0	27.93	0	28.46	0
27.41	0	27.94	0	28.47	0
27.42	0	27.95	0	28.48	0
27.43	0	27.96	0	28.49	0
27.44	0	27.97	0	28.50	0
27.45	0	27.98	0	28.51	0
27.46	0	27.99	0	28.52	0
27.47	0	28.00	0	28.53	0
27.48	0	28.01	0	28.54	0
27.49	0	28.02	0	28.55	0
27.50	0	28.03	0	28.56	0
27.51	0	28.04	0	28.57	0
27.52	0	28.05	0	28.58	0
27.53	0	28.06	0	28.59	0
27.54	0	28.07	0	28.60	0
27.55	0	28.08	0	28.61	0
27.56	0	28.09	0	28.62	0
27.57	0	28.10	0	28.63	0
27.58	0	28.11	0	28.64	0
27.59	0	28.12	0	28.65	0
27.60	0	28.13	0	28.66	0
27.61	0	28.14	0	28.67	0
27.62	0	28.15	0	28.68	0
27.63	0	28.16	0	28.69	0
27.64	0	28.17	0	28.70	0
27.65	0	28.18	0	28.71	0
27.66	0	28.19	0	28.72	0
27.67	0	28.20	0	28.73	0
27.68	0	28.21	0	28.74	0
27.69	0	28.22	0	28.75	0
27.70	0	28.23	0	28.76	0
27.71	0	28.24	0	28.77	0
27.72	0	28.25	0	28.78	0
27.73	0	28.26	0	28.79	0
27.74	0	28.27	0	28.80	0
27.75	0	28.28	0	28.81	0
27.76	0	28.29	0	28.82	0
27.77	0	28.30	0	28.83	0
27.78	0	28.31	0	28.84	0
27.79	0	28.32	0		
27.80	0	28.33	0		
27.81	0	28.34	0		
27.82	0	28.35	0		
27.83	0	28.36	0		
27.84	0	28.37	0		
27.85	0	28.38	0		
27.86	0	28.39	0		

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment B1: Field Area Runoff Area=8.701 ac 0.00% Impervious Runoff Depth=2.98"
Flow Length=669' Tc=18.1 min CN=75/0 Runoff=21.34 cfs 2.159 af

Subcatchment B1c: Pike Prop. Runon Runoff Area=0.685 ac 1.46% Impervious Runoff Depth=2.65"
Flow Length=547' Tc=12.6 min CN=71/96 Runoff=1.70 cfs 0.151 af

Subcatchment B2: Field Parking-E Runoff Area=1.545 ac 79.35% Impervious Runoff Depth=4.83"
Flow Length=589' Tc=6.0 min CN=71/98 Runoff=7.74 cfs 0.621 af

Subcatchment B3: Field Parking-N Runoff Area=1.424 ac 54.63% Impervious Runoff Depth=4.26"
Flow Length=261' Tc=6.0 min CN=74/98 Runoff=6.48 cfs 0.506 af

Subcatchment B4: Round-A-Bout Runoff Area=0.890 ac 53.48% Impervious Runoff Depth=4.10"
Flow Length=781' Tc=18.5 min CN=71/98 Runoff=2.72 cfs 0.304 af

Subcatchment C1: C1 Runoff Area=0.149 ac 0.00% Impervious Runoff Depth=2.61"
Flow Length=134' Tc=6.0 min CN=71/0 Runoff=0.45 cfs 0.032 af

Subcatchment D1: EX. ACCESS DR W Runoff Area=0.746 ac 87.40% Impervious Runoff Depth=4.92"
Flow Length=133' Tc=6.0 min CN=77/96 Runoff=3.90 cfs 0.306 af

Subcatchment D2: SW UPLANDS Runoff Area=0.108 ac 0.00% Impervious Runoff Depth=2.52"
Flow Length=162' Tc=9.7 min CN=70/0 Runoff=0.28 cfs 0.023 af

Subcatchment E1: EX. ACCESS DR E Runoff Area=0.840 ac 69.52% Impervious Runoff Depth=4.50"
Flow Length=90' Tc=6.0 min CN=75/96 Runoff=4.08 cfs 0.315 af

Subcatchment F1: Direct Grass Area Runoff Runoff Area=0.934 ac 0.00% Impervious Runoff Depth=2.61"
Flow Length=295' Tc=6.0 min CN=71/0 Runoff=2.84 cfs 0.203 af

Subcatchment G1: Graded Road Runoff Runoff Area=0.315 ac 0.00% Impervious Runoff Depth=3.46"
Flow Length=79' Tc=6.0 min CN=80/0 Runoff=1.27 cfs 0.091 af

Subcatchment G2: Sheet flow into pond Runoff Area=1.421 ac 3.87% Impervious Runoff Depth=2.71"
Flow Length=186' Tc=9.2 min CN=71/96 Runoff=3.99 cfs 0.321 af

Reach 15R: U.S. Pike Site Culvert Inflow=3.36 cfs 3.444 af
Outflow=3.36 cfs 3.444 af

Reach SP-1: OFFSITE PIKE PROP Avg. Flow Depth=0.54' Max Vel=0.45 fps Inflow=3.39 cfs 3.448 af
n=0.120 L=490.0' S=0.0051 '/' Capacity=139.53 cfs Outflow=3.36 cfs 3.444 af

Reach SP-2: OFFSITE TO 266-1 Inflow=0.45 cfs 0.032 af
Outflow=0.45 cfs 0.032 af

Reach SP-3: SW WETLANDS Inflow=4.14 cfs 0.328 af
Outflow=4.14 cfs 0.328 af

Reach SP-4: SE WETLANDS Inflow=4.08 cfs 0.315 af
Outflow=4.08 cfs 0.315 af

Pond 1P: EX. POND-2 Peak Elev=24.66' Storage=464,715 cf Inflow=19.26 cfs 3.384 af
Primary=3.23 cfs 3.244 af Secondary=0.00 cfs 0.000 af Outflow=3.23 cfs 3.244 af

Pond 2P: Field-SGWL Peak Elev=28.45' Storage=20,168 cf Inflow=15.92 cfs 1.431 af
Primary=12.69 cfs 1.431 af Secondary=0.00 cfs 0.000 af Outflow=12.69 cfs 1.431 af

Pond 3P: Field Storage- Peak Elev=33.54' Storage=48,323 cf Inflow=21.34 cfs 2.159 af
Discarded=0.15 cfs 0.745 af Primary=2.94 cfs 1.390 af Outflow=3.10 cfs 2.135 af

Pond 10P: PDMH-10 Peak Elev=30.30' Inflow=9.45 cfs 0.926 af
24.0" Round Culvert n=0.012 L=22.0' S=0.0055 '/' Outflow=9.45 cfs 0.926 af

Pond 14P: PDMH-3 Peak Elev=28.25' Inflow=3.31 cfs 1.541 af
18.0" Round Culvert n=0.012 L=299.0' S=0.0053 '/' Outflow=3.31 cfs 1.541 af

Total Runoff Area = 17.758 ac Runoff Volume = 5.032 af Average Runoff Depth = 3.40"
78.71% Pervious = 13.977 ac 21.29% Impervious = 3.781 ac

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment B1: Field Area Runoff Area=8.701 ac 0.00% Impervious Runoff Depth=4.27"
Flow Length=669' Tc=18.1 min CN=75/0 Runoff=30.66 cfs 3.098 af

Subcatchment B1c: Pike Prop. Runon Runoff Area=0.685 ac 1.46% Impervious Runoff Depth=3.88"
Flow Length=547' Tc=12.6 min CN=71/96 Runoff=2.51 cfs 0.222 af

Subcatchment B2: Field Parking-E Runoff Area=1.545 ac 79.35% Impervious Runoff Depth=6.27"
Flow Length=589' Tc=6.0 min CN=71/98 Runoff=10.02 cfs 0.807 af

Subcatchment B3: Field Parking-N Runoff Area=1.424 ac 54.63% Impervious Runoff Depth=5.66"
Flow Length=261' Tc=6.0 min CN=74/98 Runoff=8.60 cfs 0.672 af

Subcatchment B4: Round-A-Bout Runoff Area=0.890 ac 53.48% Impervious Runoff Depth=5.48"
Flow Length=781' Tc=18.5 min CN=71/98 Runoff=3.64 cfs 0.406 af

Subcatchment C1: C1 Runoff Area=0.149 ac 0.00% Impervious Runoff Depth=3.84"
Flow Length=134' Tc=6.0 min CN=71/0 Runoff=0.67 cfs 0.048 af

Subcatchment D1: EX. ACCESS DR W Runoff Area=0.746 ac 87.40% Impervious Runoff Depth=6.39"
Flow Length=133' Tc=6.0 min CN=77/96 Runoff=5.02 cfs 0.397 af

Subcatchment D2: SW UPLANDS Runoff Area=0.108 ac 0.00% Impervious Runoff Depth=3.74"
Flow Length=162' Tc=9.7 min CN=70/0 Runoff=0.42 cfs 0.034 af

Subcatchment E1: EX. ACCESS DR E Runoff Area=0.840 ac 69.52% Impervious Runoff Depth=5.93"
Flow Length=90' Tc=6.0 min CN=75/96 Runoff=5.34 cfs 0.415 af

Subcatchment F1: Direct Grass Area Runoff Runoff Area=0.934 ac 0.00% Impervious Runoff Depth=3.84"
Flow Length=295' Tc=6.0 min CN=71/0 Runoff=4.21 cfs 0.299 af

Subcatchment G1: Graded Road Runoff Runoff Area=0.315 ac 0.00% Impervious Runoff Depth=4.82"
Flow Length=79' Tc=6.0 min CN=80/0 Runoff=1.76 cfs 0.127 af

Subcatchment G2: Sheet flow into pond Runoff Area=1.421 ac 3.87% Impervious Runoff Depth=3.95"
Flow Length=186' Tc=9.2 min CN=71/96 Runoff=5.86 cfs 0.468 af

Reach 15R: U.S. Pike Site Culvert Inflow=5.18 cfs 5.157 af
Outflow=5.18 cfs 5.157 af

Reach SP-1: OFFSITE PIKE PROP Avg. Flow Depth=0.65' Max Vel=0.51 fps Inflow=5.19 cfs 5.161 af
n=0.120 L=490.0' S=0.0051 '/' Capacity=139.53 cfs Outflow=5.18 cfs 5.157 af

Reach SP-2: OFFSITE TO 266-1 Inflow=0.67 cfs 0.048 af
Outflow=0.67 cfs 0.048 af

Reach SP-3: SW WETLANDS Inflow=5.38 cfs 0.431 af
Outflow=5.38 cfs 0.431 af

Reach SP-4: SE WETLANDS Inflow=5.34 cfs 0.415 af
Outflow=5.34 cfs 0.415 af

Pond 1P: EX. POND-2 Peak Elev=24.82' Storage=480,789 cf Inflow=26.98 cfs 5.004 af
Primary=4.98 cfs 4.862 af Secondary=0.00 cfs 0.000 af Outflow=4.98 cfs 4.862 af

Pond 2P: Field-SGWL Peak Elev=28.57' Storage=21,579 cf Inflow=20.92 cfs 1.885 af
Primary=16.96 cfs 1.885 af Secondary=0.00 cfs 0.000 af Outflow=16.96 cfs 1.885 af

Pond 3P: Field Storage- Peak Elev=33.78' Storage=71,832 cf Inflow=30.66 cfs 3.098 af
Discarded=0.15 cfs 0.765 af Primary=3.54 cfs 2.303 af Outflow=3.69 cfs 3.068 af

Pond 10P: PDMH-10 Peak Elev=30.62' Inflow=12.33 cfs 1.213 af
24.0" Round Culvert n=0.012 L=22.0' S=0.0055 '/' Outflow=12.33 cfs 1.213 af

Pond 14P: PDMH-3 Peak Elev=28.47' Inflow=4.70 cfs 2.525 af
18.0" Round Culvert n=0.012 L=299.0' S=0.0053 '/' Outflow=4.70 cfs 2.525 af

Total Runoff Area = 17.758 ac Runoff Volume = 6.992 af Average Runoff Depth = 4.73"
78.71% Pervious = 13.977 ac 21.29% Impervious = 3.781 ac

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment B1: Field Area Runoff Area=8.701 ac 0.00% Impervious Runoff Depth=5.55"
Flow Length=669' Tc=18.1 min CN=75/0 Runoff=39.67 cfs 4.024 af

Subcatchment B1c: Pike Prop. Runon Runoff Area=0.685 ac 1.46% Impervious Runoff Depth=5.11"
Flow Length=547' Tc=12.6 min CN=71/96 Runoff=3.31 cfs 0.292 af

Subcatchment B2: Field Parking-E Runoff Area=1.545 ac 79.35% Impervious Runoff Depth=7.65"
Flow Length=589' Tc=6.0 min CN=71/98 Runoff=12.20 cfs 0.985 af

Subcatchment B3: Field Parking-N Runoff Area=1.424 ac 54.63% Impervious Runoff Depth=7.01"
Flow Length=261' Tc=6.0 min CN=74/98 Runoff=10.63 cfs 0.832 af

Subcatchment B4: Round-A-Bout Runoff Area=0.890 ac 53.48% Impervious Runoff Depth=6.81"
Flow Length=781' Tc=18.5 min CN=71/98 Runoff=4.53 cfs 0.505 af

Subcatchment C1: C1 Runoff Area=0.149 ac 0.00% Impervious Runoff Depth=5.07"
Flow Length=134' Tc=6.0 min CN=71/0 Runoff=0.89 cfs 0.063 af

Subcatchment D1: EX. ACCESS DR W Runoff Area=0.746 ac 87.40% Impervious Runoff Depth=7.79"
Flow Length=133' Tc=6.0 min CN=77/96 Runoff=6.08 cfs 0.484 af

Subcatchment D2: SW UPLANDS Runoff Area=0.108 ac 0.00% Impervious Runoff Depth=4.95"
Flow Length=162' Tc=9.7 min CN=70/0 Runoff=0.55 cfs 0.045 af

Subcatchment E1: EX. ACCESS DR E Runoff Area=0.840 ac 69.52% Impervious Runoff Depth=7.31"
Flow Length=90' Tc=6.0 min CN=75/96 Runoff=6.53 cfs 0.512 af

Subcatchment F1: Direct Grass Area Runoff Runoff Area=0.934 ac 0.00% Impervious Runoff Depth=5.07"
Flow Length=295' Tc=6.0 min CN=71/0 Runoff=5.55 cfs 0.395 af

Subcatchment G1: Graded Road Runoff Runoff Area=0.315 ac 0.00% Impervious Runoff Depth=6.15"
Flow Length=79' Tc=6.0 min CN=80/0 Runoff=2.23 cfs 0.161 af

Subcatchment G2: Sheet flow into pond Runoff Area=1.421 ac 3.87% Impervious Runoff Depth=5.19"
Flow Length=186' Tc=9.2 min CN=71/96 Runoff=7.69 cfs 0.614 af

Reach 15R: U.S. Pike Site Culvert Inflow=6.95 cfs 6.843 af
Outflow=6.95 cfs 6.843 af

Reach SP-1: OFFSITE PIKE PROP Avg. Flow Depth=0.75' Max Vel=0.56 fps Inflow=6.96 cfs 6.847 af
n=0.120 L=490.0' S=0.0051 '/' Capacity=139.53 cfs Outflow=6.95 cfs 6.843 af

Reach SP-2: OFFSITE TO 266-1 Inflow=0.89 cfs 0.063 af
Outflow=0.89 cfs 0.063 af

Reach SP-3: SW WETLANDS Inflow=6.56 cfs 0.529 af
Outflow=6.56 cfs 0.529 af

Reach SP-4: SE WETLANDS Inflow=6.53 cfs 0.512 af
Outflow=6.53 cfs 0.512 af

Pond 1P: EX. POND-2 Peak Elev=24.96' Storage=494,134 cf Inflow=35.21 cfs 6.596 af
Primary=6.62 cfs 6.452 af Secondary=0.00 cfs 0.000 af Outflow=6.62 cfs 6.452 af

Pond 2P: Field-SGWL Peak Elev=28.67' Storage=22,871 cf Inflow=25.69 cfs 2.321 af
Primary=21.02 cfs 2.321 af Secondary=0.00 cfs 0.000 af Outflow=21.02 cfs 2.321 af

Pond 3P: Field Storage- Peak Elev=34.04' Storage=97,132 cf Inflow=39.67 cfs 4.024 af
Discarded=0.15 cfs 0.779 af Primary=4.06 cfs 3.207 af Outflow=4.21 cfs 3.987 af

Pond 10P: PDMH-10 Peak Elev=30.95' Inflow=15.08 cfs 1.490 af
24.0" Round Culvert n=0.012 L=22.0' S=0.0055 '/' Outflow=15.08 cfs 1.490 af

Pond 14P: PDMH-3 Peak Elev=28.69' Inflow=6.15 cfs 3.499 af
18.0" Round Culvert n=0.012 L=299.0' S=0.0053 '/' Outflow=6.15 cfs 3.499 af

Total Runoff Area = 17.758 ac Runoff Volume = 8.911 af Average Runoff Depth = 6.02"
78.71% Pervious = 13.977 ac 21.29% Impervious = 3.781 ac

GRAVEL WETLAND DESIGN CRITERIA
(Env-Wq 1508.05)

Type/Node Name: **2P Fields SGWL**

Enter the node name in the drainage analysis if applicable

3.86	ac	A = Area draining to the practice	
2.48	ac	A_I = Impervious area draining to the practice	
0.64	decimal	I = percent impervious area draining to the practice, in decimal form	
0.63	unitless	Rv = Runoff coefficient = 0.05 + (0.9 x I)	
2.42	ac-in	WQV= 1" x Rv x A	
8,803	cf	WQV conversion (ac-in x 43,560 sf/ac x 1ft/12")	
880	cf	10% x WQV (check calc for sediment forebay and micropool volume)	
3,961	cf	45% x WQV (check calc for gravel wetland treatment bay volume)	
1,108	cf	V_{SED} = sediment forebay volume	← **≥ 10%WQV**
4,487	cf	V_{TB1} = volume of treatment bay 1 [1]	← **≥ 45%WQV**
4,396	cf	V_{TB2} = volume of treatment bay 2 [1]	← **≥ 45%WQV**
27.92	ft	E_{WQV} = elevation of WQV (attach stage-storage table)	
0.18	cfs	Q_{WQV} = discharge at the E_{WQV} (attach stage-discharge table)	← **$<2Q_{avg}$**
27.17	hours	T_{ED} = drawdown time of extended detention = $2WQV/Q_{WQV}$	← **≥ 24-hrs**
3.00	:1	Pond side slopes	← **≥3:1**
26.00	ft	Elevation of SHWT	
25.83	ft	Epp = Elevation of the permanent pool (elevation of lowest orifice)[2]	← **≤ E_{SHWT} - 2 ft**
36.00	ft	Length of the flow path between the inlet and outlet in each cell	← **≥ 15 ft**
Trash racks		What mechanism is proposed to prevent the outlet structure from clogging (applicable for orifices/weirs with a dimension of ≤6")?	
28.67	ft	Peak elevation of the 50-year storm event (E_{50})	
29.67	ft	Berm elevation of the pond	
YES		E_{50} ≤ the berm elevation?	← **yes**

Qualified professional that developed the planting plan:
Name, Profession:

1. Volume stored above the wetland soil and below the high flow by-pass.
2. 4" to 8" below the wetland soil. If lowest orifice is less than 2 feet below SHWT, and saturated hydraulic conductivity (Ksat) is greater than 0.015 in/hr, the system must be lined.

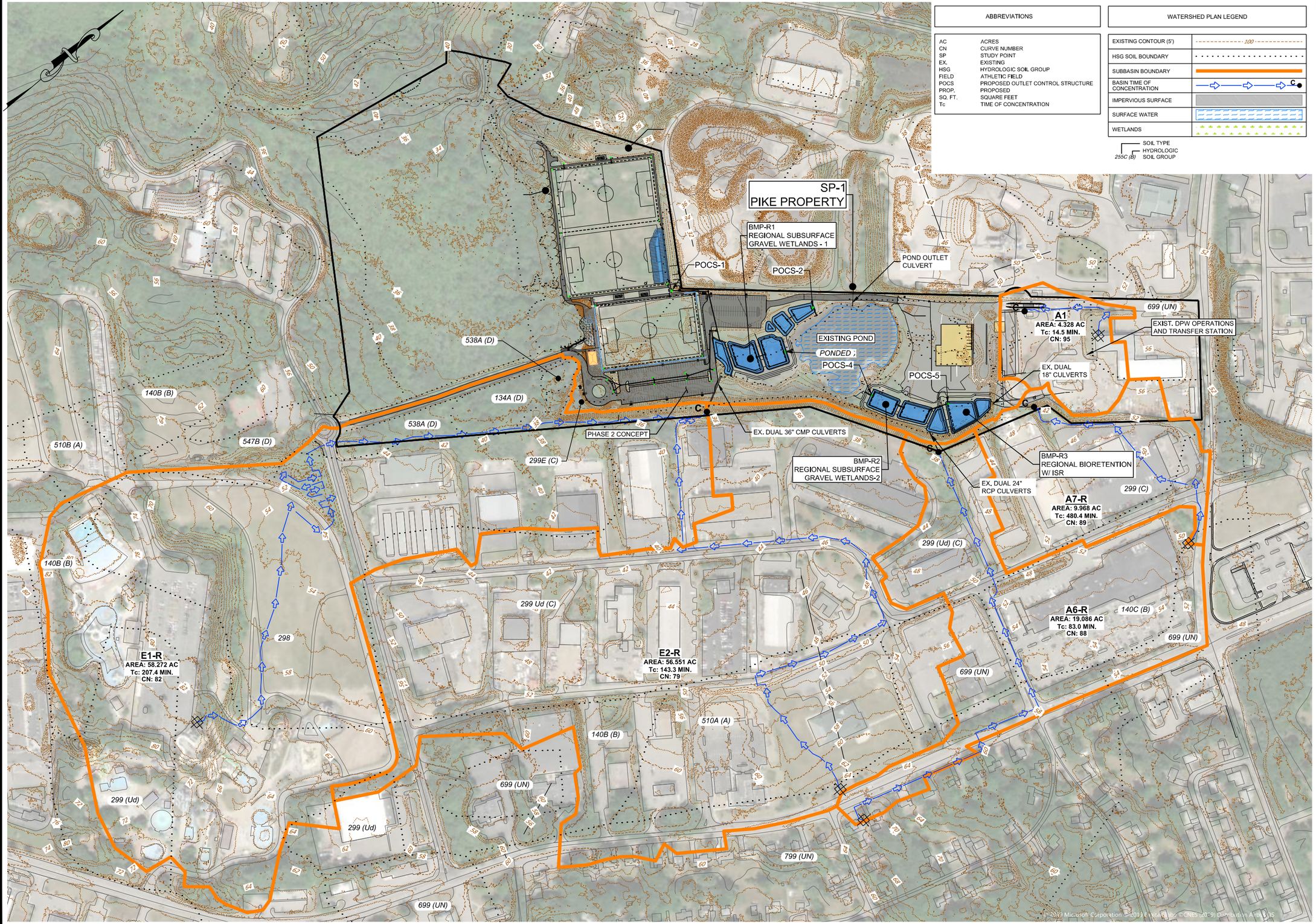
Designer's Notes:

Stormwater Management Report

Appendix F

Post-Development Drainage Analysis

i. Regional Watershed Plan
ii. 2-Year, 24-Hour HydroCad Report Calculations
iii. 10-Year, 25-Year, 50-Year, and 100-Year Report Summary Calculations



ABBREVIATIONS	
AC	ACRES
CN	CURVE NUMBER
SP	STUDY POINT
EX.	EXISTING
HSG	HYDROLOGIC SOIL GROUP
FIELD	ATHLETIC FIELD
POCS	PROPOSED OUTLET CONTROL STRUCTURE
PROP.	PROPOSED
SQ. FT.	SQUARE FEET
Tc	TIME OF CONCENTRATION

WATERSHED PLAN LEGEND	
EXISTING CONTOUR (5')	100
HSG SOIL BOUNDARY	
SUBBASIN BOUNDARY	
BASIN TIME OF CONCENTRATION	C
IMPERVIOUS SURFACE	
SURFACE WATER	
WETLANDS	

255C (B) — SOIL TYPE; HYDROLOGIC SOIL GROUP

no.	revision	date	by

CMA ENGINEERS
CIVIL/ENVIRONMENTAL/STRUCTURAL
Portsmouth, NH • Manchester, NH • Portland, ME
603/431-6196 603/627-0706 207/541-4223
c m a e n g i n e e r s . c o m

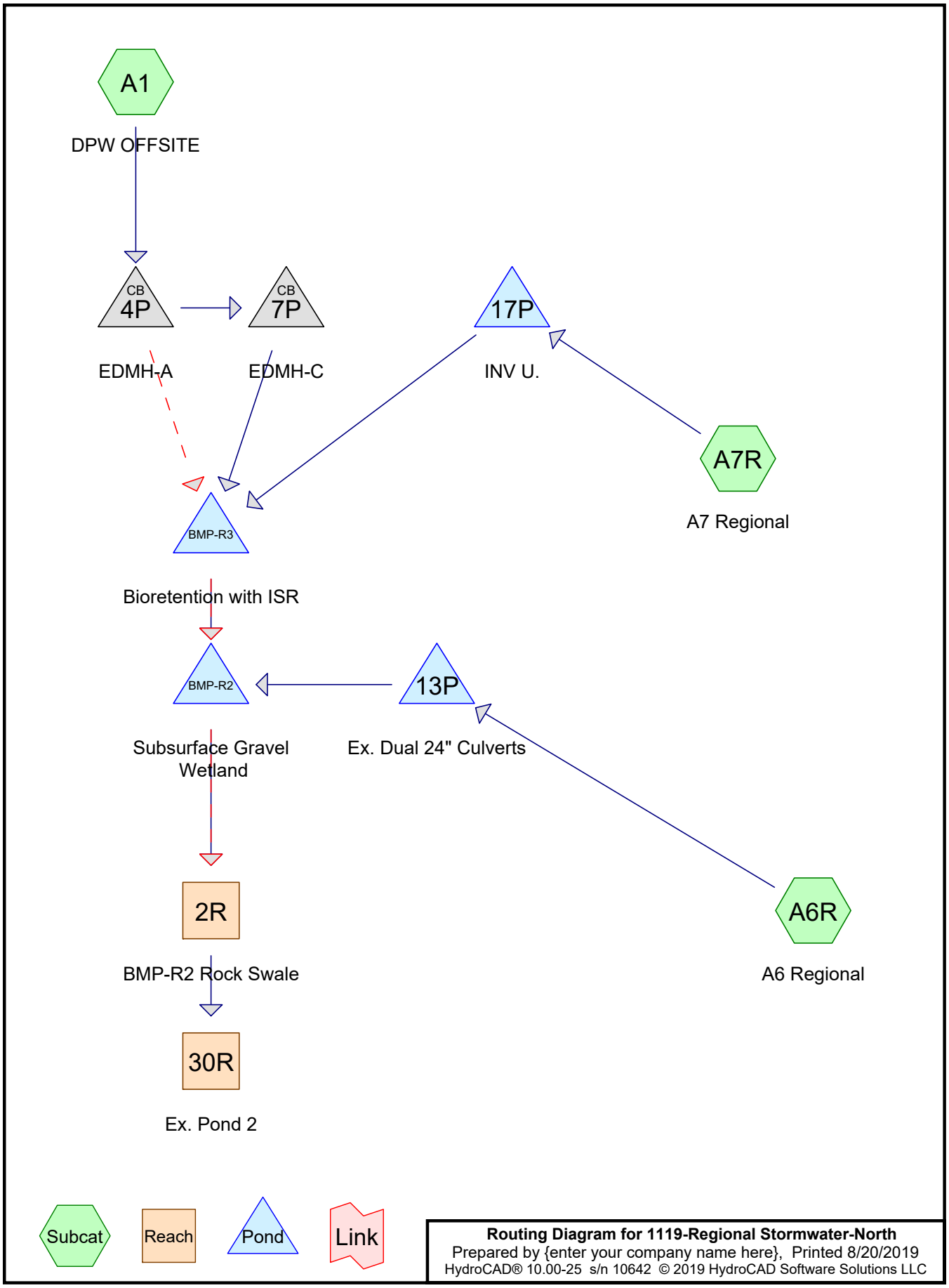
designed by: JHK
drawn by: JHK
approved by: PAC
date: August 2019
project no: 1119
checked by: PAC
scale: 1"=160' (Scale: 1" = 160')

City of Portsmouth
Portsmouth, New Hampshire
Site Plan Review Application
Multi-purpose Recreation Fields
Stormwater Analysis
Regional Facilities Watershed Plan

drawing no. H3

sheet: 1 of 1

M:\CADD\PROJECTS\1119 Portsmouth Athletic fields\Engineering\Stormwater\AOT\DWG\1119-AOT-POST-DEV-REGIONAL.dwg Date Plotted: Aug 20, 2019 – 8:41pm Plotted By: JKIEFFNER



Routing Diagram for 1119-Regional Stormwater-North
Prepared by {enter your company name here}, Printed 8/20/2019
HydroCAD® 10.00-25 s/n 10642 © 2019 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
3.167	58	Meadow, non-grazed, HSG B (A6R, A7R)
6.276	71	Meadow, non-grazed, HSG C (A1, A6R, A7R)
15.402	98	Paved parking, HSG C (A1, A6R, A7R)
8.537	98	Unconnected pavement, HSG C (A6R, A7R)
33.382	**89**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
3.167	HSG B	A6R, A7R
30.215	HSG C	A1, A6R, A7R
0.000	HSG D	
0.000	Other	
33.382		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	3.167	6.276	0.000	0.000	9.443	Meadow, non-grazed	A1, A6R, A7R
0.000	0.000	15.402	0.000	0.000	15.402	Paved parking	A1, A6R, A7R
0.000	0.000	8.537	0.000	0.000	8.537	Unconnected pavement	A6R, A7R
0.000	**3.167**	**30.215**	**0.000**	**0.000**	**33.382**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	A6R	0.00	0.00	777.0	0.0178	0.013	18.0	0.0	0.0
2	A6R	0.00	0.00	424.0	0.0090	0.013	24.0	0.0	0.0
3	A7R	0.00	0.00	159.0	0.0050	0.013	15.0	0.0	0.0
4	4P	40.08	39.98	20.0	0.0050	0.013	18.0	0.0	0.0
5	4P	40.24	40.00	40.9	0.0059	0.013	18.0	0.0	0.0
6	7P	39.88	39.66	42.6	0.0052	0.012	18.0	0.0	0.0
7	13P	35.47	33.57	80.9	0.0235	0.013	24.0	0.0	0.0
8	13P	35.19	33.51	84.0	0.0200	0.013	24.0	0.0	0.0
9	17P	41.21	39.98	115.5	0.0106	0.012	12.0	0.0	0.0
10	BMP-R2	28.75	28.50	28.0	0.0089	0.012	36.0	0.0	0.0
11	BMP-R3	31.17	30.70	69.0	0.0068	0.012	18.0	0.0	0.0

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment A1: DPW OFFSITE Runoff Area=4.328 ac 89.60% Impervious Runoff Depth=3.15"
Flow Length=864' Tc=14.5 min CN=95 Runoff=11.54 cfs 1.134 af

Subcatchment A6R: A6 Regional Runoff Area=19.086 ac 70.04% Impervious Runoff Depth=2.46"
Flow Length=2,013' Tc=83.0 min CN=88 Runoff=17.61 cfs 3.914 af

Subcatchment A7R: A7 Regional Runoff Area=9.968 ac 67.15% Impervious Runoff Depth=2.55"
Flow Length=734' Tc=480.4 min CN=89 Runoff=2.75 cfs 2.120 af

Reach 2R: BMP-R2 Rock Swale Avg. Flow Depth=0.38' Max Vel=2.46 fps Inflow=19.60 cfs 6.707 af
n=0.032 L=45.0' S=0.0111 '/' Capacity=62.82 cfs Outflow=19.60 cfs 6.707 af

Reach 30R: Ex. Pond 2 Inflow=19.60 cfs 6.707 af
Outflow=19.60 cfs 6.707 af

Pond 4P: EDMH-A Peak Elev=41.79' Inflow=11.54 cfs 1.134 af
Primary=5.84 cfs 0.990 af Secondary=5.71 cfs 0.144 af Outflow=11.54 cfs 1.134 af

Pond 7P: EDMH-C Peak Elev=41.32' Inflow=5.84 cfs 0.990 af
18.0" Round Culvert n=0.012 L=42.6' S=0.0052 '/' Outflow=5.84 cfs 0.990 af

Pond 13P: Ex. Dual 24" Culverts Peak Elev=36.67' Storage=48 cf Inflow=17.61 cfs 3.914 af
Discarded=0.00 cfs 0.001 af Primary=17.61 cfs 3.913 af Outflow=17.61 cfs 3.914 af

Pond 17P: INV U. Peak Elev=42.14' Storage=5,435 cf Inflow=2.75 cfs 2.120 af
Discarded=0.24 cfs 0.416 af Primary=2.49 cfs 1.704 af Outflow=2.72 cfs 2.120 af

Pond BMP-R2: Subsurface Gravel Wetland Peak Elev=33.42' Storage=44,207 cf Inflow=19.82 cfs 6.750 af
Primary=10.94 cfs 5.512 af Secondary=8.66 cfs 1.195 af Outflow=19.60 cfs 6.707 af

Pond BMP-R3: Bioretention with ISR Peak Elev=36.67' Storage=22,619 cf Inflow=11.54 cfs 2.838 af
Primary=8.46 cfs 2.837 af Secondary=0.00 cfs 0.000 af Outflow=8.46 cfs 2.837 af

Total Runoff Area = 33.382 ac Runoff Volume = 7.168 af Average Runoff Depth = 2.58"
28.29% Pervious = 9.443 ac 71.71% Impervious = 23.939 ac

Summary for Subcatchment A1: DPW OFFSITE

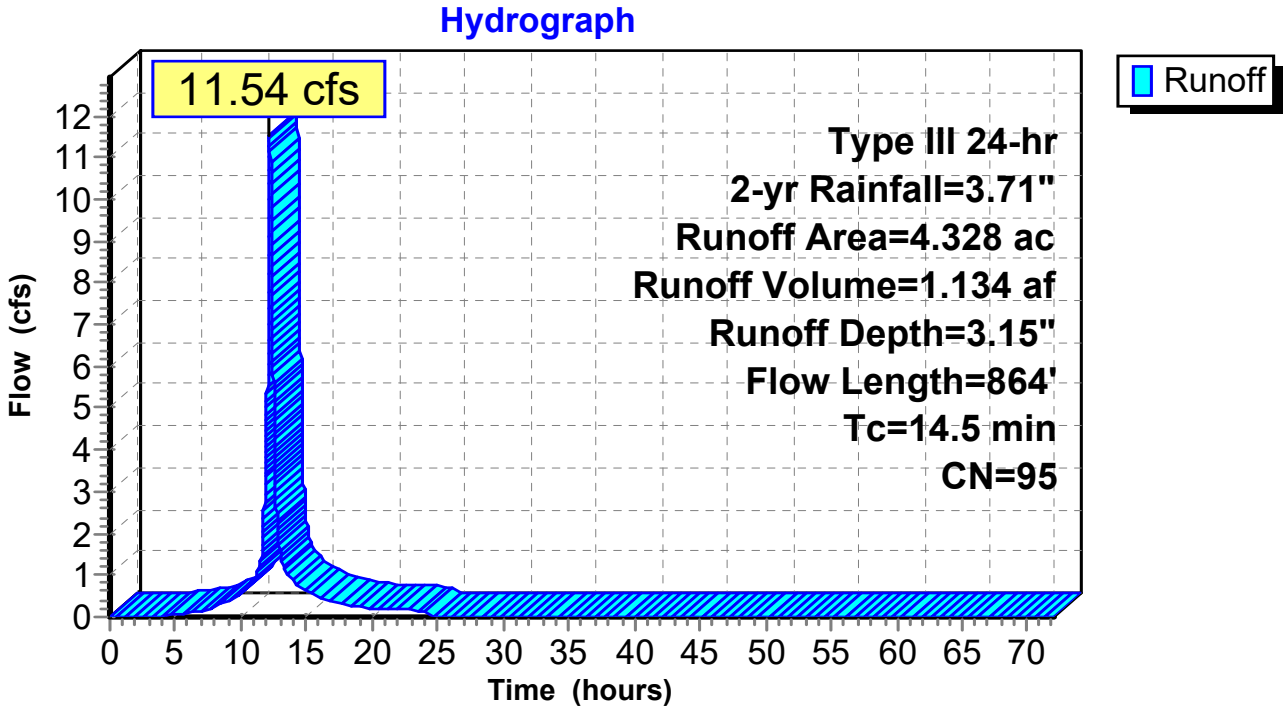
Runoff = 11.54 cfs @ 12.19 hrs, Volume= 1.134 af, Depth= 3.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.71"

Area (ac)	CN	Description
0.450	71	Meadow, non-grazed, HSG C
3.878	98	Paved parking, HSG C
4.328	95	Weighted Average
0.450	71	10.40% Pervious Area
3.878	98	89.60% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	105	0.0371	0.16		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.71"
0.0	3	0.1550	7.99		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
2.2	322	0.0150	2.49		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.5	94	0.0040	3.17	2.54	**Channel Flow,** Area= 0.8 sf Perim= 3.1' r= 0.26' n= 0.012
0.7	244	0.0105	5.78	6.94	**Channel Flow,** Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.012
0.3	96	0.0074	5.62	10.11	**Channel Flow,** Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.012
14.5	864	Total			

Subcatchment A1: DPW OFFSITE



Hydrograph for Subcatchment A1: DPW OFFSITE

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.04	0.00	0.00
2.00	0.07	0.00	0.00
3.00	0.11	0.00	0.00
4.00	0.16	0.01	0.03
5.00	0.21	0.02	0.06
6.00	0.27	0.04	0.10
7.00	0.34	0.07	0.16
8.00	0.42	0.12	0.24
9.00	0.54	0.20	0.39
10.00	0.70	0.32	0.57
11.00	0.93	0.50	0.91
12.00	1.85	1.35	**5.56**
13.00	2.78	2.24	**1.50**
14.00	3.01	2.46	0.86
15.00	3.17	2.61	0.64
16.00	3.29	2.73	0.45
17.00	3.37	2.82	0.35
18.00	3.44	2.88	0.27
19.00	3.50	2.94	0.24
20.00	3.55	2.99	0.21
21.00	3.60	3.03	0.19
22.00	3.64	3.08	0.18
23.00	3.68	3.11	0.16
24.00	**3.71**	**3.15**	0.14
25.00	3.71	3.15	0.00
26.00	3.71	3.15	0.00
27.00	3.71	3.15	0.00
28.00	3.71	3.15	0.00
29.00	3.71	3.15	0.00
30.00	3.71	3.15	0.00
31.00	3.71	3.15	0.00
32.00	3.71	3.15	0.00
33.00	3.71	3.15	0.00
34.00	3.71	3.15	0.00
35.00	3.71	3.15	0.00
36.00	3.71	3.15	0.00
37.00	3.71	3.15	0.00
38.00	3.71	3.15	0.00
39.00	3.71	3.15	0.00
40.00	3.71	3.15	0.00
41.00	3.71	3.15	0.00
42.00	3.71	3.15	0.00
43.00	3.71	3.15	0.00
44.00	3.71	3.15	0.00
45.00	3.71	3.15	0.00
46.00	3.71	3.15	0.00
47.00	3.71	3.15	0.00
48.00	3.71	3.15	0.00
49.00	3.71	3.15	0.00
50.00	3.71	3.15	0.00
51.00	3.71	3.15	0.00
52.00	3.71	3.15	0.00
53.00	3.71	3.15	0.00
54.00	3.71	3.15	0.00
55.00	3.71	3.15	0.00
56.00	3.71	3.15	0.00
57.00	3.71	3.15	0.00
58.00	3.71	3.15	0.00
59.00	3.71	3.15	0.00
60.00	3.71	3.15	0.00
61.00	3.71	3.15	0.00
62.00	3.71	3.15	0.00
63.00	3.71	3.15	0.00
64.00	3.71	3.15	0.00
65.00	3.71	3.15	0.00
66.00	3.71	3.15	0.00
67.00	3.71	3.15	0.00
68.00	3.71	3.15	0.00
69.00	3.71	3.15	0.00
70.00	3.71	3.15	0.00
71.00	3.71	3.15	0.00
72.00	3.71	3.15	0.00

Summary for Subcatchment A6R: A6 Regional

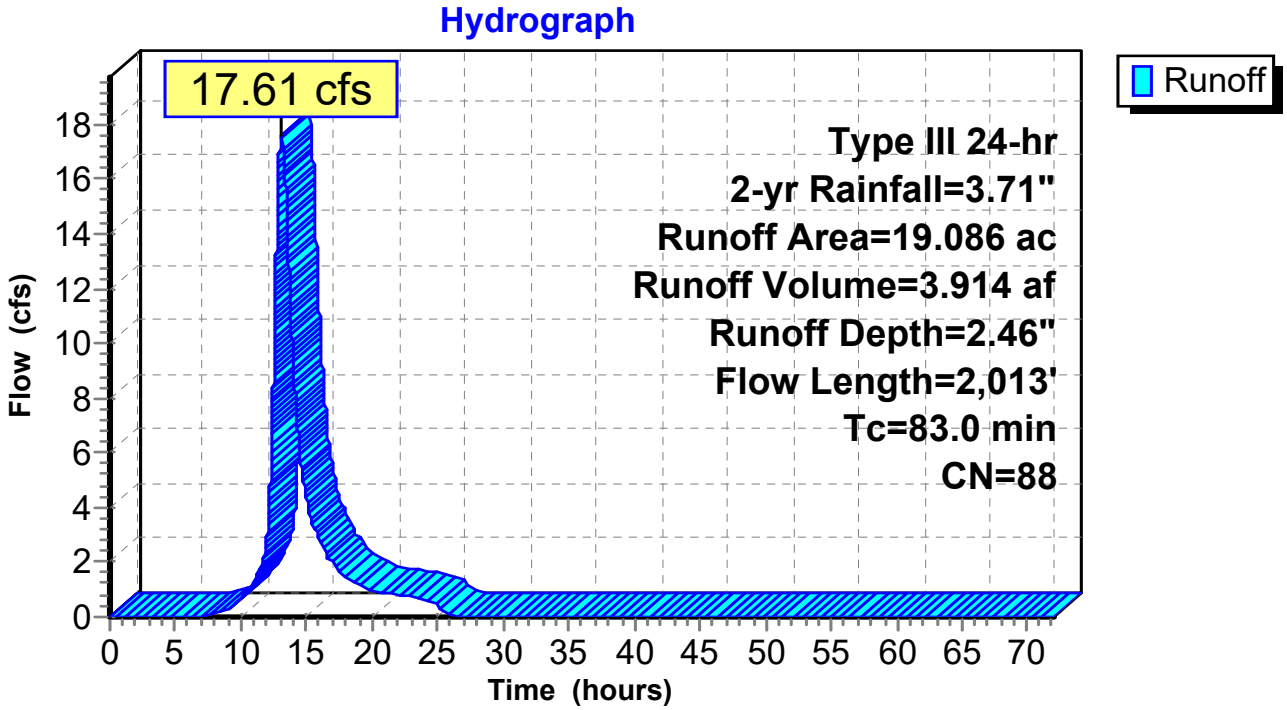
Runoff = 17.61 cfs @ 13.10 hrs, Volume= 3.914 af, Depth= 2.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.71"

Area (ac)	CN	Description
2.795	58	Meadow, non-grazed, HSG B
2.924	71	Meadow, non-grazed, HSG C
7.985	98	Unconnected pavement, HSG C
5.382	98	Paved parking, HSG C
19.086	88	Weighted Average
5.719	65	29.96% Pervious Area
13.367	98	70.04% Impervious Area
7.985		59.74% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	66	0.0527	0.17		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.71"
11.9	543	0.0118	0.76		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.4	73	0.0200	2.87		**Shallow Concentrated Flow, Lafayette Rd crossing pipe** Paved Kv= 20.3 fps
1.6	777	0.0178	7.93	14.01	**Pipe Channel, RCP_Round 18" (assumed avg.)** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013
1.0	424	0.0090	6.83	21.46	**Pipe Channel, RCP_Round 24" (assumed avg.)** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.013
1.6	130	0.0100	1.34	10.05	**Trap/Vee/Rect Channel Flow, Grassed/Weedy channel** Bot.W=3.00' D=1.00' Z= 6.0 & 3.0 '/' Top.W=12.00' n= 0.080 Earth, long dense weeds
60.0					**Direct Entry, Approximate Detention Pond Lag**
83.0	2,013	Total			

Subcatchment A6R: A6 Regional



Hydrograph for Subcatchment A6R: A6 Regional

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.04	0.00	0.00
2.00	0.07	0.00	0.00
3.00	0.11	0.00	0.00
4.00	0.16	0.00	0.00
5.00	0.21	0.00	0.00
6.00	0.27	0.00	0.00
7.00	0.34	0.00	0.01
8.00	0.42	0.01	0.10
9.00	0.54	0.04	0.31
10.00	0.70	0.10	0.70
11.00	0.93	0.21	1.35
12.00	1.85	0.85	3.01
13.00	2.78	1.63	**17.44**
14.00	3.01	1.83	**8.89**
15.00	3.17	1.97	4.28
16.00	3.29	2.08	2.77
17.00	3.37	2.15	1.93
18.00	3.44	2.22	1.48
19.00	3.50	2.27	1.15
20.00	3.55	2.31	0.99
21.00	3.60	2.36	0.88
22.00	3.64	2.40	0.80
23.00	3.68	2.43	0.72
24.00	**3.71**	**2.46**	0.65
25.00	3.71	2.46	0.38
26.00	3.71	2.46	0.07
27.00	3.71	2.46	0.01
28.00	3.71	2.46	0.00
29.00	3.71	2.46	0.00
30.00	3.71	2.46	0.00
31.00	3.71	2.46	0.00
32.00	3.71	2.46	0.00
33.00	3.71	2.46	0.00
34.00	3.71	2.46	0.00
35.00	3.71	2.46	0.00
36.00	3.71	2.46	0.00
37.00	3.71	2.46	0.00
38.00	3.71	2.46	0.00
39.00	3.71	2.46	0.00
40.00	3.71	2.46	0.00
41.00	3.71	2.46	0.00
42.00	3.71	2.46	0.00
43.00	3.71	2.46	0.00
44.00	3.71	2.46	0.00
45.00	3.71	2.46	0.00
46.00	3.71	2.46	0.00
47.00	3.71	2.46	0.00
48.00	3.71	2.46	0.00
49.00	3.71	2.46	0.00
50.00	3.71	2.46	0.00
51.00	3.71	2.46	0.00
52.00	3.71	2.46	0.00
53.00	3.71	2.46	0.00
54.00	3.71	2.46	0.00
55.00	3.71	2.46	0.00
56.00	3.71	2.46	0.00
57.00	3.71	2.46	0.00
58.00	3.71	2.46	0.00
59.00	3.71	2.46	0.00
60.00	3.71	2.46	0.00
61.00	3.71	2.46	0.00
62.00	3.71	2.46	0.00
63.00	3.71	2.46	0.00
64.00	3.71	2.46	0.00
65.00	3.71	2.46	0.00
66.00	3.71	2.46	0.00
67.00	3.71	2.46	0.00
68.00	3.71	2.46	0.00
69.00	3.71	2.46	0.00
70.00	3.71	2.46	0.00
71.00	3.71	2.46	0.00
72.00	3.71	2.46	0.00

Summary for Subcatchment A7R: A7 Regional

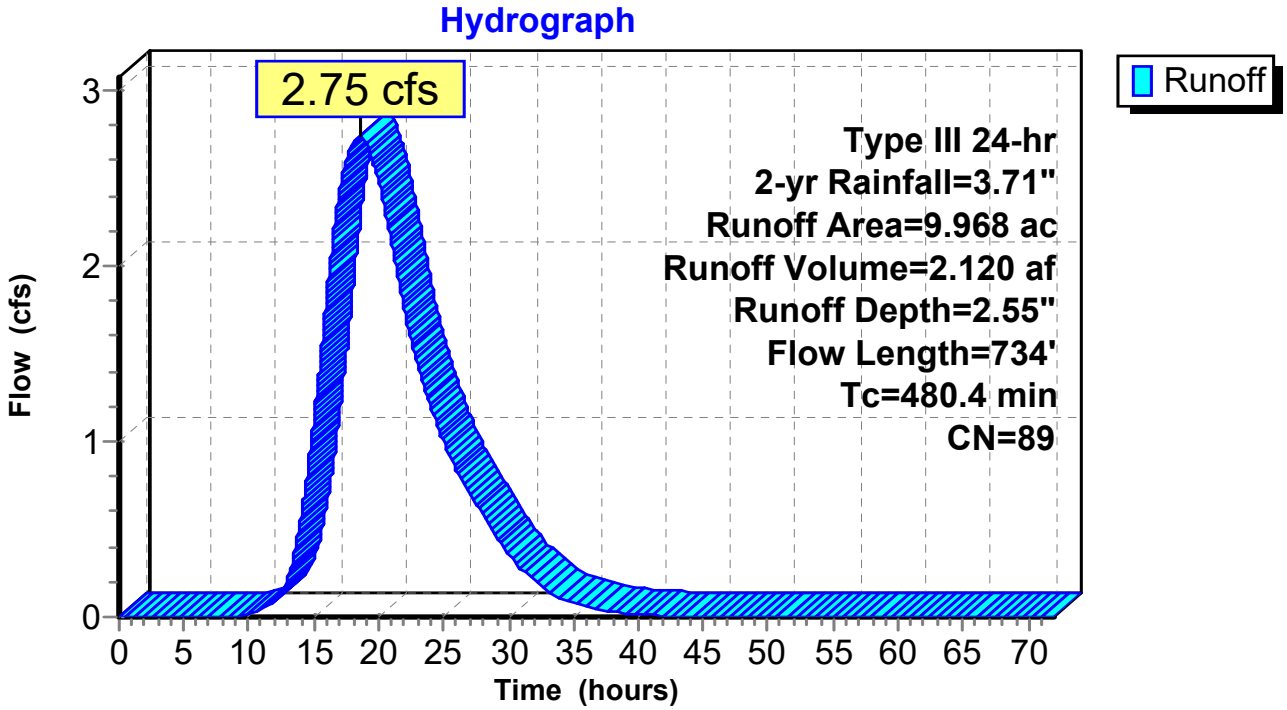
Runoff = 2.75 cfs @ 18.68 hrs, Volume= 2.120 af, Depth= 2.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.71"

Area (ac)	CN	Description
0.372	58	Meadow, non-grazed, HSG B
2.902	71	Meadow, non-grazed, HSG C
0.552	98	Unconnected pavement, HSG C
6.142	98	Paved parking, HSG C
9.968	89	Weighted Average
3.274	70	32.85% Pervious Area
6.694	98	67.15% Impervious Area
0.552		8.25% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8	65	0.0323	0.14		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.71"
2.2	113	0.0029	0.87		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.9	58	0.0029	1.09		**Shallow Concentrated Flow, Pipe Segment across West Rd.** Paved Kv= 20.3 fps
0.7	159	0.0050	3.72	4.57	**Pipe Channel, RCP_Round 15" (assumed avg.)** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
2.3	159	0.0056	1.17	1.17	**Trap/Vee/Rect Channel Flow, Riprap/grass/brush channel. Dims** Bot.W=0.50' D=0.50' Z= 3.0 '/' Top.W=3.50' n= 0.040
1.5	180	0.0141	1.98	2.63	**Parabolic Channel, Spread flow through open grass** W=8.00' D=0.25' Area=1.3 sf Perim=8.0' n= 0.027
465.0					**Direct Entry, To approximate Market Basket Infiltration and Dete**
480.4	734	Total			

Subcatchment A7R: A7 Regional



Hydrograph for Subcatchment A7R: A7 Regional

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.04	0.00	0.00
2.00	0.07	0.00	0.00
3.00	0.11	0.00	0.00
4.00	0.16	0.00	0.00
5.00	0.21	0.00	0.00
6.00	0.27	0.00	0.00
7.00	0.34	0.01	0.00
8.00	0.42	0.02	0.00
9.00	0.54	0.06	0.00
10.00	0.70	0.12	0.02
11.00	0.93	0.24	0.04
12.00	1.85	0.91	0.10
13.00	2.78	1.70	0.23
14.00	3.01	1.91	0.57
15.00	3.17	2.05	1.11
16.00	3.29	2.16	1.84
17.00	3.37	2.24	2.43
18.00	3.44	2.30	**2.70**
19.00	3.50	2.36	**2.70**
20.00	3.55	2.40	2.48
21.00	3.60	2.45	2.13
22.00	3.64	2.49	1.73
23.00	3.68	2.52	1.43
24.00	**3.71**	**2.55**	1.19
25.00	3.71	2.55	1.00
26.00	3.71	2.55	0.84
27.00	3.71	2.55	0.70
28.00	3.71	2.55	0.58
29.00	3.71	2.55	0.46
30.00	3.71	2.55	0.36
31.00	3.71	2.55	0.27
32.00	3.71	2.55	0.20
33.00	3.71	2.55	0.15
34.00	3.71	2.55	0.11
35.00	3.71	2.55	0.08
36.00	3.71	2.55	0.06
37.00	3.71	2.55	0.04
38.00	3.71	2.55	0.03
39.00	3.71	2.55	0.02
40.00	3.71	2.55	0.01
41.00	3.71	2.55	0.01
42.00	3.71	2.55	0.01
43.00	3.71	2.55	0.00
44.00	3.71	2.55	0.00
45.00	3.71	2.55	0.00
46.00	3.71	2.55	0.00
47.00	3.71	2.55	0.00
48.00	3.71	2.55	0.00
49.00	3.71	2.55	0.00
50.00	3.71	2.55	0.00
51.00	3.71	2.55	0.00
52.00	3.71	2.55	0.00
53.00	3.71	2.55	0.00
54.00	3.71	2.55	0.00
55.00	3.71	2.55	0.00
56.00	3.71	2.55	0.00
57.00	3.71	2.55	0.00
58.00	3.71	2.55	0.00
59.00	3.71	2.55	0.00
60.00	3.71	2.55	0.00
61.00	3.71	2.55	0.00
62.00	3.71	2.55	0.00
63.00	3.71	2.55	0.00
64.00	3.71	2.55	0.00
65.00	3.71	2.55	0.00
66.00	3.71	2.55	0.00
67.00	3.71	2.55	0.00
68.00	3.71	2.55	0.00
69.00	3.71	2.55	0.00
70.00	3.71	2.55	0.00
71.00	3.71	2.55	0.00
72.00	3.71	2.55	0.00

Summary for Reach 2R: BMP-R2 Rock Swale

Existing man-made treatment swale constructed during the quarry reclaimation.

Inflow Area = 33.382 ac, 71.71% Impervious, Inflow Depth = 2.41" for 2-yr event
Inflow = 19.60 cfs @ 13.11 hrs, Volume= 6.707 af
Outflow = 19.60 cfs @ 13.11 hrs, Volume= 6.707 af, Atten= 0%, Lag= 0.2 min

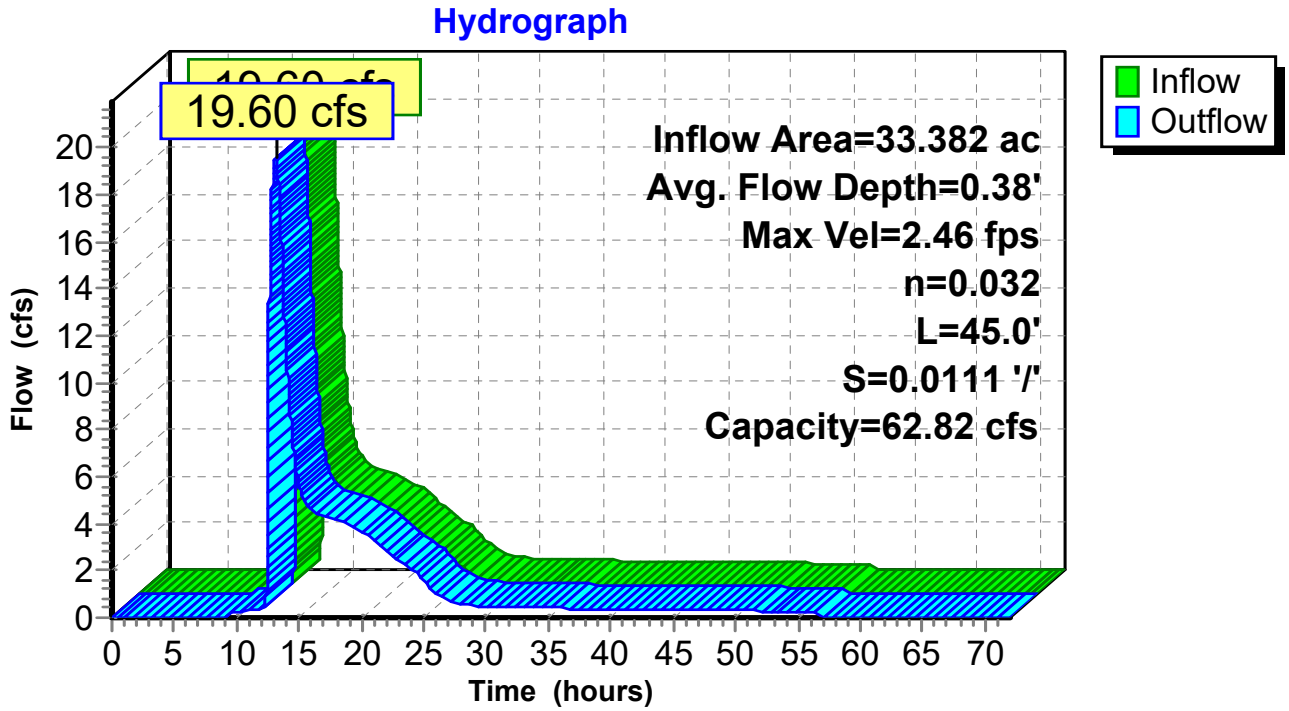
Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.46 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 0.62 fps, Avg. Travel Time= 1.2 min

Peak Storage= 359 cf @ 13.11 hrs
Average Depth at Peak Storage= 0.38'
Bank-Full Depth= 0.75' Flow Area= 16.7 sf, Capacity= 62.82 cfs

20.00' x 0.75' deep channel, n= 0.032
Side Slope Z-value= 3.0 '/' Top Width= 24.50'
Length= 45.0' Slope= 0.0111 '/'
Inlet Invert= 28.00', Outlet Invert= 27.50'

‡

Reach 2R: BMP-R2 Rock Swale



Hydrograph for Reach 2R: BMP-R2 Rock Swale

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)
0.00	0.00	0	28.00	0.00
2.00	0.00	0	28.00	0.00
4.00	0.00	0	28.00	0.00
6.00	0.00	0	28.00	0.00
8.00	0.00	0	28.00	0.00
10.00	0.24	24	28.03	0.24
12.00	**0.35**	**31**	**28.03**	**0.35**
14.00	**10.99**	**251**	**28.27**	**11.03**
16.00	4.59	146	28.16	4.59
18.00	4.14	137	28.15	4.14
20.00	3.64	127	28.14	3.65
22.00	2.83	109	28.12	2.83
24.00	2.05	90	28.10	2.05
26.00	1.03	59	28.07	1.03
28.00	0.59	42	28.05	0.59
30.00	0.43	35	28.04	0.43
32.00	0.42	34	28.04	0.42
34.00	0.41	34	28.04	0.41
36.00	0.40	33	28.04	0.40
38.00	0.39	33	28.04	0.39
40.00	0.38	32	28.04	0.38
42.00	0.36	31	28.03	0.36
44.00	0.35	31	28.03	0.35
46.00	0.34	30	28.03	0.34
48.00	0.32	29	28.03	0.32
50.00	0.30	28	28.03	0.30
52.00	0.28	27	28.03	0.28
54.00	0.25	25	28.03	0.25
56.00	0.22	23	28.03	0.22
58.00	0.01	1	28.00	0.01
60.00	0.00	1	28.00	0.00
62.00	0.00	1	28.00	0.00
64.00	0.00	0	28.00	0.00
66.00	0.00	0	28.00	0.00
68.00	0.00	0	28.00	0.00
70.00	0.00	0	28.00	0.00
72.00	0.00	0	28.00	0.00

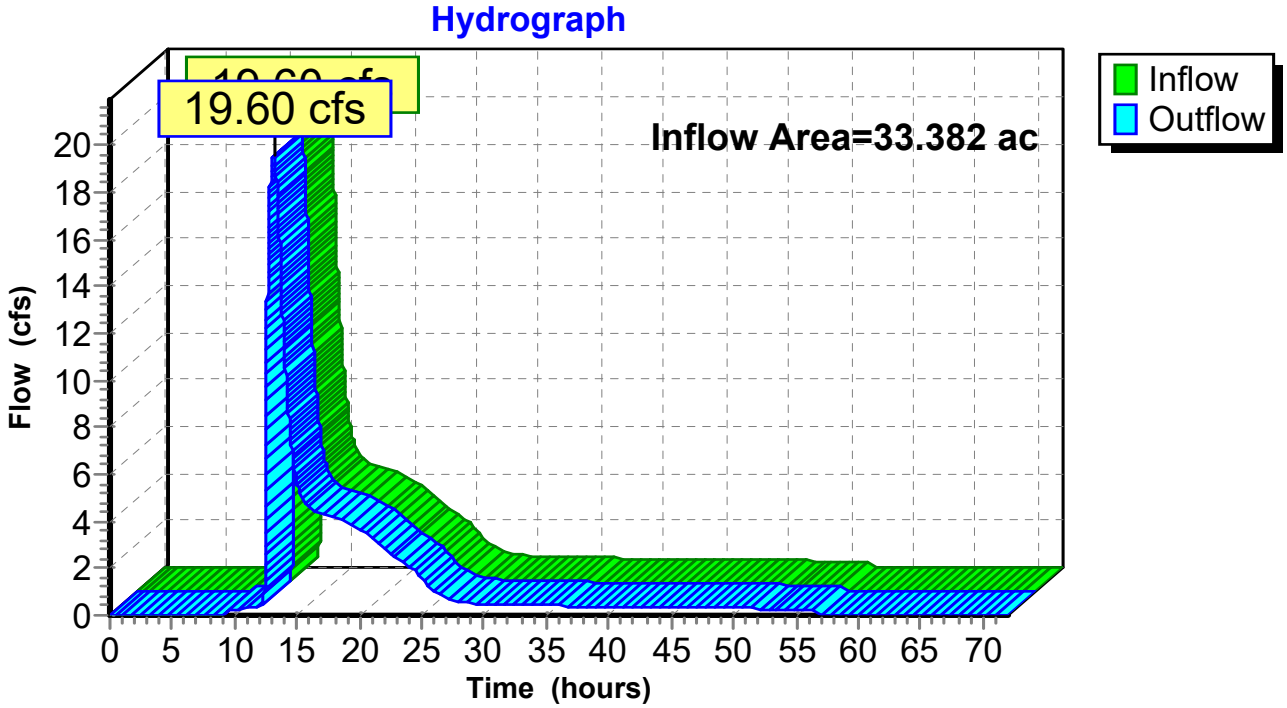
Summary for Reach 30R: Ex. Pond 2

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 33.382 ac, 71.71% Impervious, Inflow Depth = 2.41" for 2-yr event
Inflow = 19.60 cfs @ 13.11 hrs, Volume= 6.707 af
Outflow = 19.60 cfs @ 13.11 hrs, Volume= 6.707 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Reach 30R: Ex. Pond 2



Hydrograph for Reach 30R: Ex. Pond 2

Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)	Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
0.00	0.00		0.00	53.00	0.27		0.27
1.00	0.00		0.00	54.00	0.25		0.25
2.00	0.00		0.00	55.00	0.24		0.24
3.00	0.00		0.00	56.00	0.22		0.22
4.00	0.00		0.00	57.00	0.02		0.02
5.00	0.00		0.00	58.00	0.01		0.01
6.00	0.00		0.00	59.00	0.00		0.00
7.00	0.00		0.00	60.00	0.00		0.00
8.00	0.00		0.00	61.00	0.00		0.00
9.00	0.00		0.00	62.00	0.00		0.00
10.00	0.24		0.24	63.00	0.00		0.00
11.00	0.28		0.28	64.00	0.00		0.00
12.00	0.35		0.35	65.00	0.00		0.00
13.00	**19.33**		**19.33**	66.00	0.00		0.00
14.00	**11.03**		**11.03**	67.00	0.00		0.00
15.00	5.65		5.65	68.00	0.00		0.00
16.00	4.59		4.59	69.00	0.00		0.00
17.00	4.26		4.26	70.00	0.00		0.00
18.00	4.14		4.14	71.00	0.00		0.00
19.00	3.92		3.92	72.00	0.00		0.00
20.00	3.65		3.65				
21.00	3.28		3.28				
22.00	2.83		2.83				
23.00	2.41		2.41				
24.00	2.05		2.05				
25.00	1.58		1.58				
26.00	1.03		1.03				
27.00	0.75		0.75				
28.00	0.59		0.59				
29.00	0.48		0.48				
30.00	0.43		0.43				
31.00	0.43		0.43				
32.00	0.42		0.42				
33.00	0.41		0.41				
34.00	0.41		0.41				
35.00	0.40		0.40				
36.00	0.40		0.40				
37.00	0.39		0.39				
38.00	0.39		0.39				
39.00	0.38		0.38				
40.00	0.38		0.38				
41.00	0.37		0.37				
42.00	0.36		0.36				
43.00	0.36		0.36				
44.00	0.35		0.35				
45.00	0.34		0.34				
46.00	0.34		0.34				
47.00	0.33		0.33				
48.00	0.32		0.32				
49.00	0.31		0.31				
50.00	0.30		0.30				
51.00	0.29		0.29				
52.00	0.28		0.28				

Summary for Pond 4P: EDMH-A

Inflow Area = 4.328 ac, 89.60% Impervious, Inflow Depth = 3.15" for 2-yr event
Inflow = 11.54 cfs @ 12.19 hrs, Volume= 1.134 af
Outflow = 11.54 cfs @ 12.19 hrs, Volume= 1.134 af, Atten= 0%, Lag= 0.0 min
Primary = 5.84 cfs @ 12.19 hrs, Volume= 0.990 af
Secondary = 5.71 cfs @ 12.19 hrs, Volume= 0.144 af

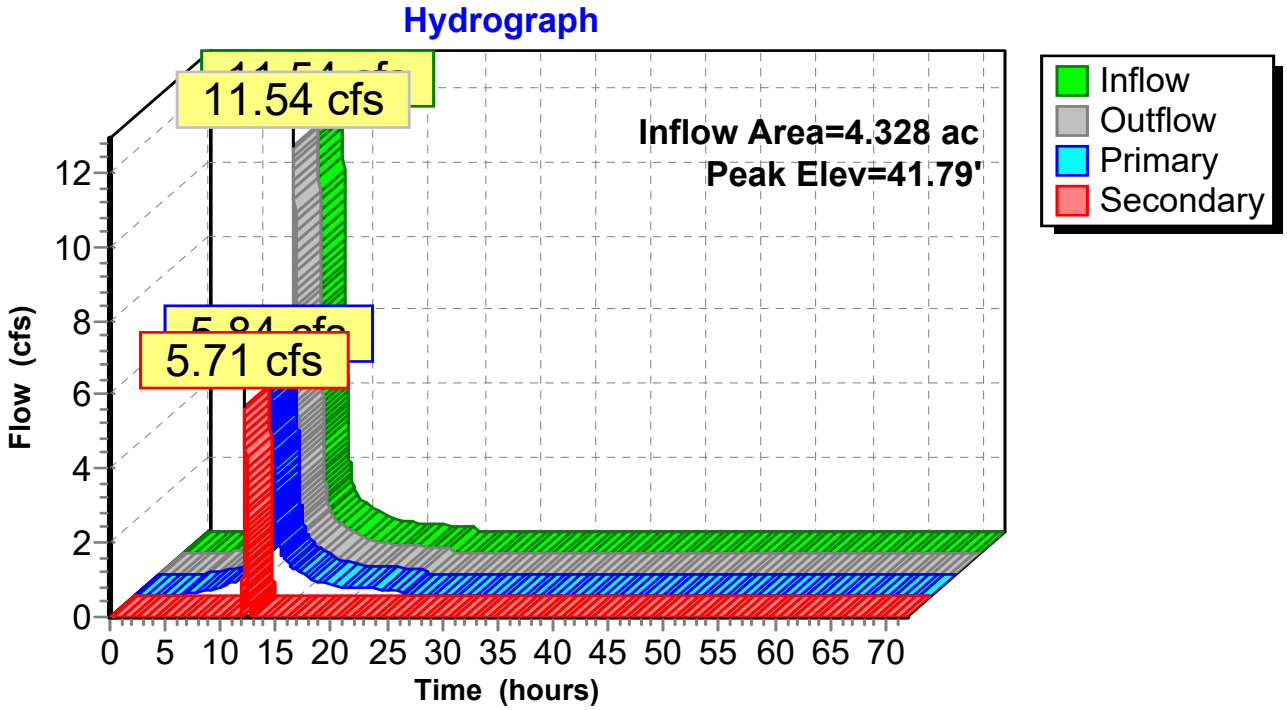
Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 41.79' @ 12.19 hrs
Flood Elev= 49.52'

Device	Routing	Invert	Outlet Devices
#1	Primary	40.08'	**18.0" Round EX. 18" HDPE** L= 20.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 40.08' / 39.98' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Secondary	40.24'	**18.0" Round EX. 18" HDPE** L= 40.9' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 40.24' / 40.00' S= 0.0059 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#3	Device 2	41.23'	**4.0' long Sharp-Crested Rectangular Weir** 0 End Contraction(s) 1.5' Crest Height

Primary OutFlow Max=5.83 cfs @ 12.19 hrs HW=41.79' TW=41.32' (Dynamic Tailwater)
└─**1=EX. 18" HDPE** (Inlet Controls 5.83 cfs @ 3.30 fps)

Secondary OutFlow Max=5.70 cfs @ 12.19 hrs HW=41.79' TW=36.56' (Dynamic Tailwater)
└─**2=EX. 18" HDPE** (Passes 5.70 cfs of 6.47 cfs potential flow)
└─**3=Sharp-Crested Rectangular Weir** (Weir Controls 5.70 cfs @ 2.55 fps)

Pond 4P: EDMH-A



Hydrograph for Pond 4P: EDMH-A

Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)	Primary (cfs)	Secondary (cfs)
0.00	0.00	40.08	0.00	0.00	0.00
2.00	0.00	40.08	0.00	0.00	0.00
4.00	0.03	40.17	0.03	0.03	0.00
6.00	0.10	40.24	0.10	0.10	0.00
8.00	0.24	40.33	0.24	0.24	0.00
10.00	0.57	40.48	0.57	0.57	0.00
12.00	**5.56**	**41.42**	**5.56**	**4.46**	**1.10**
14.00	**0.86**	**40.57**	**0.86**	**0.86**	**0.00**
16.00	0.45	40.43	0.45	0.45	0.00
18.00	0.27	40.35	0.27	0.27	0.00
20.00	0.21	40.32	0.21	0.21	0.00
22.00	0.18	40.30	0.18	0.18	0.00
24.00	0.14	40.27	0.14	0.14	0.00
26.00	0.00	40.08	0.00	0.00	0.00
28.00	0.00	40.08	0.00	0.00	0.00
30.00	0.00	40.08	0.00	0.00	0.00
32.00	0.00	40.08	0.00	0.00	0.00
34.00	0.00	40.08	0.00	0.00	0.00
36.00	0.00	40.08	0.00	0.00	0.00
38.00	0.00	40.08	0.00	0.00	0.00
40.00	0.00	40.08	0.00	0.00	0.00
42.00	0.00	40.08	0.00	0.00	0.00
44.00	0.00	40.08	0.00	0.00	0.00
46.00	0.00	40.08	0.00	0.00	0.00
48.00	0.00	40.08	0.00	0.00	0.00
50.00	0.00	40.08	0.00	0.00	0.00
52.00	0.00	40.08	0.00	0.00	0.00
54.00	0.00	40.08	0.00	0.00	0.00
56.00	0.00	40.08	0.00	0.00	0.00
58.00	0.00	40.08	0.00	0.00	0.00
60.00	0.00	40.08	0.00	0.00	0.00
62.00	0.00	40.08	0.00	0.00	0.00
64.00	0.00	40.08	0.00	0.00	0.00
66.00	0.00	40.08	0.00	0.00	0.00
68.00	0.00	40.08	0.00	0.00	0.00
70.00	0.00	40.08	0.00	0.00	0.00
72.00	0.00	40.08	0.00	0.00	0.00

Summary for Pond 7P: EDMH-C

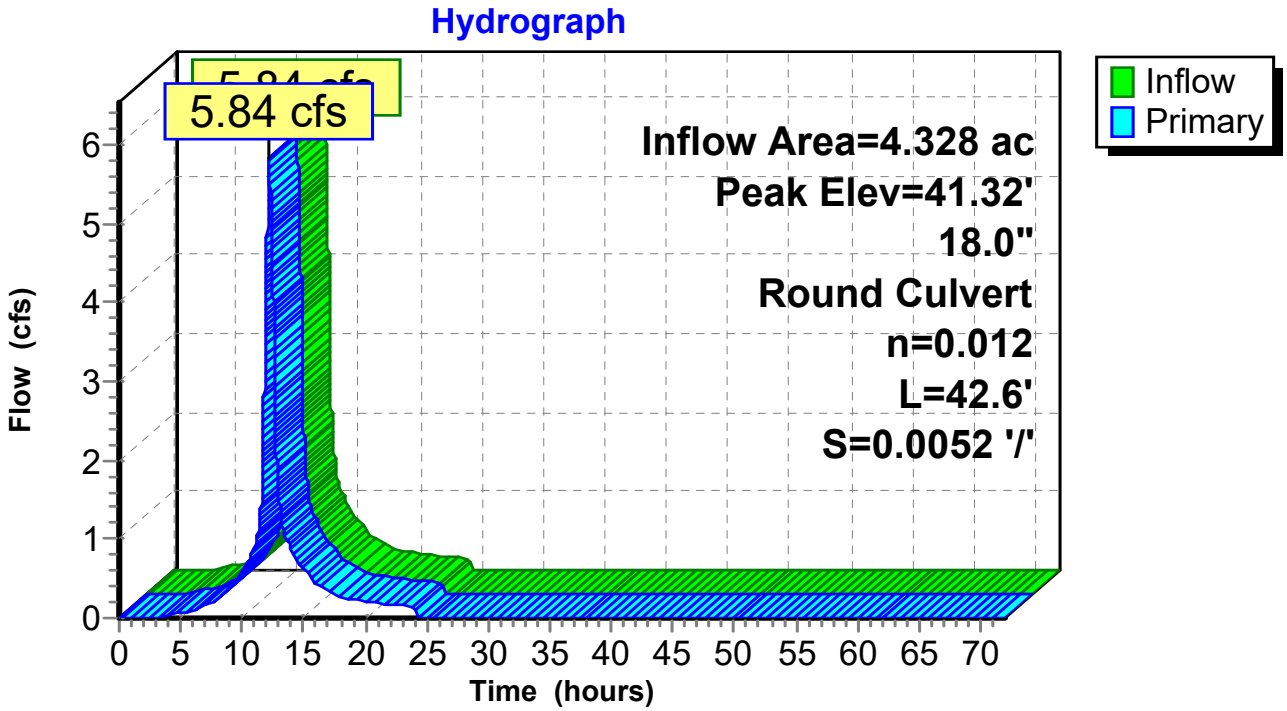
Inflow Area = 4.328 ac, 89.60% Impervious, Inflow Depth = 2.75" for 2-yr event
Inflow = 5.84 cfs @ 12.19 hrs, Volume= 0.990 af
Outflow = 5.84 cfs @ 12.19 hrs, Volume= 0.990 af, Atten= 0%, Lag= 0.0 min
Primary = 5.84 cfs @ 12.19 hrs, Volume= 0.990 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 41.32' @ 12.19 hrs
Flood Elev= 49.03'

Device	Routing	Invert	Outlet Devices
#1	Primary	39.88'	**18.0" Round EX. 18" HDPE** L= 42.6' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 39.88' / 39.66' S= 0.0052 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf

Primary OutFlow Max=5.84 cfs @ 12.19 hrs HW=41.32' TW=36.55' (Dynamic Tailwater)
└─**1=EX. 18" HDPE** (Barrel Controls 5.84 cfs @ 4.29 fps)

Pond 7P: EDMH-C



Hydrograph for Pond 7P: EDMH-C

Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
0.00	0.00	39.88	0.00
1.00	0.00	39.88	0.00
2.00	0.00	39.88	0.00
3.00	0.00	39.90	0.00
4.00	0.03	39.97	0.03
5.00	0.06	40.01	0.06
6.00	0.10	40.04	0.10
7.00	0.16	40.08	0.16
8.00	0.24	40.12	0.24
9.00	0.39	40.19	0.39
10.00	0.57	40.26	0.57
11.00	0.91	40.37	0.91
12.00	**4.46**	**41.08**	**4.46**
13.00	**1.50**	**40.52**	**1.50**
14.00	0.86	40.35	0.86
15.00	0.64	40.28	0.64
16.00	0.45	40.22	0.45
17.00	0.35	40.18	0.35
18.00	0.27	40.14	0.27
19.00	0.24	40.12	0.24
20.00	0.21	40.11	0.21
21.00	0.19	40.10	0.19
22.00	0.18	40.09	0.18
23.00	0.16	40.08	0.16
24.00	0.14	40.07	0.14
25.00	0.00	39.88	0.00
26.00	0.00	39.88	0.00
27.00	0.00	39.88	0.00
28.00	0.00	39.88	0.00
29.00	0.00	39.88	0.00
30.00	0.00	39.88	0.00
31.00	0.00	39.88	0.00
32.00	0.00	39.88	0.00
33.00	0.00	39.88	0.00
34.00	0.00	39.88	0.00
35.00	0.00	39.88	0.00
36.00	0.00	39.88	0.00
37.00	0.00	39.88	0.00
38.00	0.00	39.88	0.00
39.00	0.00	39.88	0.00
40.00	0.00	39.88	0.00
41.00	0.00	39.88	0.00
42.00	0.00	39.88	0.00
43.00	0.00	39.88	0.00
44.00	0.00	39.88	0.00
45.00	0.00	39.88	0.00
46.00	0.00	39.88	0.00
47.00	0.00	39.88	0.00
48.00	0.00	39.88	0.00
49.00	0.00	39.88	0.00
50.00	0.00	39.88	0.00
51.00	0.00	39.88	0.00
52.00	0.00	39.88	0.00
53.00	0.00	39.88	0.00
54.00	0.00	39.88	0.00
55.00	0.00	39.88	0.00
56.00	0.00	39.88	0.00
57.00	0.00	39.88	0.00
58.00	0.00	39.88	0.00
59.00	0.00	39.88	0.00
60.00	0.00	39.88	0.00
61.00	0.00	39.88	0.00
62.00	0.00	39.88	0.00
63.00	0.00	39.88	0.00
64.00	0.00	39.88	0.00
65.00	0.00	39.88	0.00
66.00	0.00	39.88	0.00
67.00	0.00	39.88	0.00
68.00	0.00	39.88	0.00
69.00	0.00	39.88	0.00
70.00	0.00	39.88	0.00
71.00	0.00	39.88	0.00
72.00	0.00	39.88	0.00

Summary for Pond 13P: Ex. Dual 24" Culverts

Inflow Area = 19.086 ac, 70.04% Impervious, Inflow Depth = 2.46" for 2-yr event
Inflow = 17.61 cfs @ 13.10 hrs, Volume= 3.914 af
Outflow = 17.61 cfs @ 13.10 hrs, Volume= 3.914 af, Atten= 0%, Lag= 0.1 min
Discarded = 0.00 cfs @ 13.10 hrs, Volume= 0.001 af
Primary = 17.61 cfs @ 13.10 hrs, Volume= 3.913 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 36.67' @ 13.10 hrs Surf.Area= 65 sf Storage= 48 cf

Plug-Flow detention time= 0.0 min calculated for 3.914 af (100% of inflow)
Center-of-Mass det. time= 0.0 min (880.6 - 880.6)

Volume	Invert	Avail.Storage	Storage Description
#1	35.19'	28,612 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

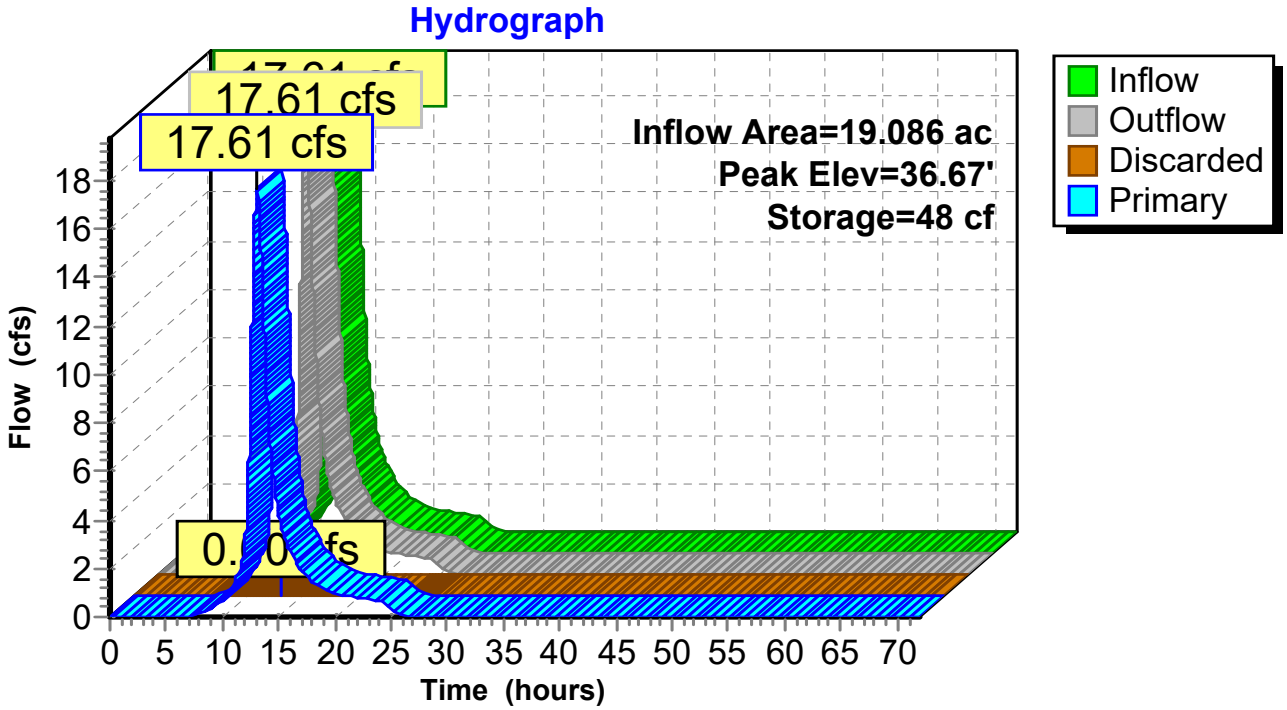
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
35.19	0	0	0
37.00	80	72	72
38.00	1,300	690	762
39.00	13,700	7,500	8,262
40.00	27,000	20,350	28,612

Device	Routing	Invert	Outlet Devices
#1	Primary	35.47'	**24.0" Round RCP_Round 24"** L= 80.9' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 35.47' / 33.57' S= 0.0235 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#2	Primary	35.19'	**24.0" Round RCP_Round 24"** L= 84.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 35.19' / 33.51' S= 0.0200 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#3	Discarded	35.19'	**1.270 in/hr Exfiltration over Surface area** Phase-In= 0.01'

Discarded OutFlow Max=0.00 cfs @ 13.10 hrs HW=36.67' (Free Discharge)
└─**3=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=17.61 cfs @ 13.10 hrs HW=36.67' TW=33.42' (Dynamic Tailwater)
├─**1=RCP_Round 24"** (Inlet Controls 7.31 cfs @ 3.73 fps)
└─**2=RCP_Round 24"** (Inlet Controls 10.30 cfs @ 4.14 fps)

Pond 13P: Ex. Dual 24" Culverts



Hydrograph for Pond 13P: Ex. Dual 24" Culverts

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	35.19	0.00	0.00	0.00
2.00	0.00	0	35.19	0.00	0.00	0.00
4.00	0.00	0	35.19	0.00	0.00	0.00
6.00	0.00	0	35.19	0.00	0.00	0.00
8.00	0.10	0	35.32	0.10	0.00	0.10
10.00	0.70	2	35.52	0.70	0.00	0.70
12.00	**3.01**	**9**	**35.82**	**3.01**	**0.00**	**3.01**
14.00	**8.89**	**24**	**36.22**	**8.89**	**0.00**	**8.89**
16.00	2.77	8	35.80	2.77	0.00	2.77
18.00	1.48	5	35.65	1.48	0.00	1.48
20.00	0.99	3	35.58	0.99	0.00	0.99
22.00	0.80	3	35.54	0.80	0.00	0.80
24.00	0.65	2	35.51	0.65	0.00	0.65
26.00	0.07	0	35.29	0.07	0.00	0.07
28.00	0.00	0	35.20	0.00	0.00	0.00
30.00	0.00	0	35.19	0.00	0.00	0.00
32.00	0.00	0	35.19	0.00	0.00	0.00
34.00	0.00	0	35.19	0.00	0.00	0.00
36.00	0.00	0	35.19	0.00	0.00	0.00
38.00	0.00	0	35.19	0.00	0.00	0.00
40.00	0.00	0	35.19	0.00	0.00	0.00
42.00	0.00	0	35.19	0.00	0.00	0.00
44.00	0.00	0	35.19	0.00	0.00	0.00
46.00	0.00	0	35.19	0.00	0.00	0.00
48.00	0.00	0	35.19	0.00	0.00	0.00
50.00	0.00	0	35.19	0.00	0.00	0.00
52.00	0.00	0	35.19	0.00	0.00	0.00
54.00	0.00	0	35.19	0.00	0.00	0.00
56.00	0.00	0	35.19	0.00	0.00	0.00
58.00	0.00	0	35.19	0.00	0.00	0.00
60.00	0.00	0	35.19	0.00	0.00	0.00
62.00	0.00	0	35.19	0.00	0.00	0.00
64.00	0.00	0	35.19	0.00	0.00	0.00
66.00	0.00	0	35.19	0.00	0.00	0.00
68.00	0.00	0	35.19	0.00	0.00	0.00
70.00	0.00	0	35.19	0.00	0.00	0.00
72.00	0.00	0	35.19	0.00	0.00	0.00

Summary for Pond 17P: INV U.

Inflow Area = 9.968 ac, 67.15% Impervious, Inflow Depth = 2.55" for 2-yr event
Inflow = 2.75 cfs @ 18.68 hrs, Volume= 2.120 af
Outflow = 2.72 cfs @ 18.83 hrs, Volume= 2.120 af, Atten= 1%, Lag= 9.4 min
Discarded = 0.24 cfs @ 18.83 hrs, Volume= 0.416 af
Primary = 2.49 cfs @ 18.83 hrs, Volume= 1.704 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 42.14' @ 18.83 hrs Surf.Area= 4,271 sf Storage= 5,435 cf

Plug-Flow detention time= 57.8 min calculated for 2.120 af (100% of inflow)
Center-of-Mass det. time= 57.7 min (1,306.4 - 1,248.7)

Volume	Invert	Avail.Storage	Storage Description
#1	39.50'	44,875 cf	**Lidar Contours (Prismatic)**Listed below (Recalc)

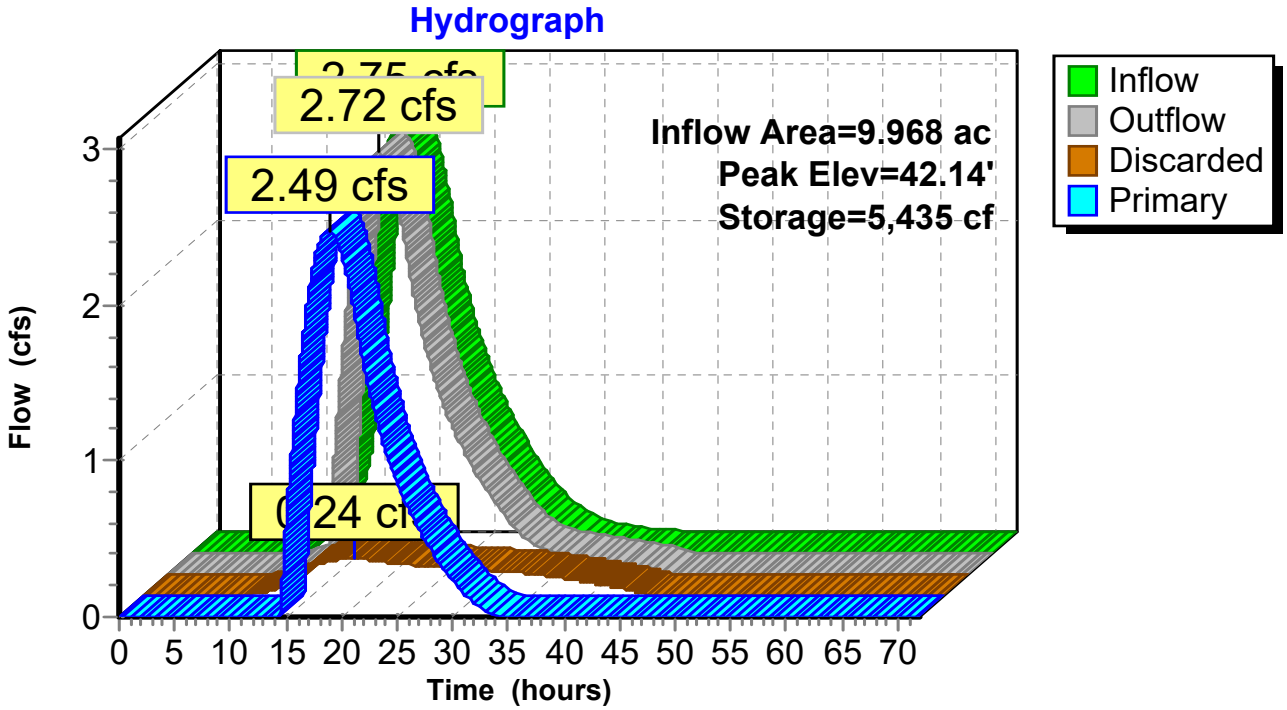
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
39.50	0	0	0
40.00	900	225	225
41.00	2,200	1,550	1,775
42.00	4,000	3,100	4,875
43.00	6,000	5,000	9,875
44.00	9,000	7,500	17,375
45.00	15,000	12,000	29,375
46.00	16,000	15,500	44,875

Device	Routing	Invert	Outlet Devices
#1	Primary	41.21'	**12.0" Round Ex 12" HDPE Pipe** L= 115.5' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 41.21' / 39.98' S= 0.0106 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Discarded	39.50'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.01'

Discarded OutFlow Max=0.24 cfs @ 18.83 hrs HW=42.14' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.24 cfs)

Primary OutFlow Max=2.49 cfs @ 18.83 hrs HW=42.14' TW=36.36' (Dynamic Tailwater)
└**1=Ex 12" HDPE Pipe** (Inlet Controls 2.49 cfs @ 3.28 fps)

Pond 17P: INV U.



Hydrograph for Pond 17P: INV U.

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	39.50	0.00	0.00	0.00
2.00	0.00	0	39.50	0.00	0.00	0.00
4.00	0.00	0	39.50	0.00	0.00	0.00
6.00	0.00	0	39.50	0.00	0.00	0.00
8.00	0.00	0	39.51	0.00	0.00	0.00
10.00	0.02	10	39.61	0.01	0.01	0.00
12.00	0.10	170	39.93	0.04	0.04	0.00
14.00	0.57	1,557	40.90	0.12	0.12	0.00
16.00	1.84	4,273	41.84	1.63	0.21	1.42
18.00	**2.70**	**5,318**	**42.11**	**2.63**	**0.24**	**2.40**
20.00	**2.48**	**5,237**	**42.09**	**2.57**	**0.23**	**2.33**
22.00	1.73	4,472	41.90	1.84	0.21	1.62
24.00	1.19	3,906	41.74	1.26	0.20	1.06
26.00	0.84	3,523	41.63	0.88	0.19	0.69
28.00	0.58	3,221	41.54	0.62	0.18	0.44
30.00	0.36	2,931	41.44	0.40	0.17	0.23
32.00	0.20	2,651	41.35	0.24	0.16	0.08
34.00	0.11	2,369	41.25	0.15	0.15	0.00
36.00	0.06	1,949	41.08	0.13	0.13	0.00
38.00	0.03	1,402	40.82	0.11	0.11	0.00
40.00	0.01	841	40.50	0.09	0.09	0.00
42.00	0.01	375	40.15	0.06	0.06	0.00
44.00	0.00	75	39.79	0.03	0.03	0.00
46.00	0.00	0	39.51	0.00	0.00	0.00
48.00	0.00	0	39.51	0.00	0.00	0.00
50.00	0.00	0	39.50	0.00	0.00	0.00
52.00	0.00	0	39.50	0.00	0.00	0.00
54.00	0.00	0	39.50	0.00	0.00	0.00
56.00	0.00	0	39.50	0.00	0.00	0.00
58.00	0.00	0	39.50	0.00	0.00	0.00
60.00	0.00	0	39.50	0.00	0.00	0.00
62.00	0.00	0	39.50	0.00	0.00	0.00
64.00	0.00	0	39.50	0.00	0.00	0.00
66.00	0.00	0	39.50	0.00	0.00	0.00
68.00	0.00	0	39.50	0.00	0.00	0.00
70.00	0.00	0	39.50	0.00	0.00	0.00
72.00	0.00	0	39.50	0.00	0.00	0.00

Summary for Pond BMP-R2: Subsurface Gravel Wetland

Inflow Area = 33.382 ac, 71.71% Impervious, Inflow Depth = 2.43" for 2-yr event
Inflow = 19.82 cfs @ 13.01 hrs, Volume= 6.750 af
Outflow = 19.60 cfs @ 13.11 hrs, Volume= 6.707 af, Atten= 1%, Lag= 6.2 min
Primary = 10.94 cfs @ 13.11 hrs, Volume= 5.512 af
Secondary = 8.66 cfs @ 13.11 hrs, Volume= 1.195 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Starting Elev= 30.10' Surf.Area= 5,260 sf Storage= 8,862 cf
Peak Elev= 33.42' @ 13.11 hrs Surf.Area= 11,528 sf Storage= 44,207 cf (35,345 cf above start)

Plug-Flow detention time= 227.6 min calculated for 6.503 af (96% of inflow)
Center-of-Mass det. time= 160.8 min (1,187.3 - 1,026.5)

Volume	Invert	Avail.Storage	Storage Description
#1	28.00'	25,501 cf	**Cell#1** Listed below
#2	28.00'	25,549 cf	**Cell#2 (Prismatic)** Listed below (Recalc)
#3	31.50'	9,930 cf	**SGWL-N Forebay (Prismatic)** Listed below (Recalc)
		60,980 cf	Total Available Storage

Elevation (feet)	Cum.Store (cubic-feet)
28.00	0
30.32	4,909
30.58	5,391
31.25	5,461
32.00	9,693
32.75	14,461
34.25	25,501

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
28.00	5,260	0.0	0	0
30.32	5,260	40.0	4,881	4,881
30.58	5,260	35.0	479	5,360
31.25	5,260	2.0	70	5,430
32.00	5,955	100.0	4,206	9,636
32.75	6,680	100.0	4,738	14,374
34.25	8,220	100.0	11,175	25,549

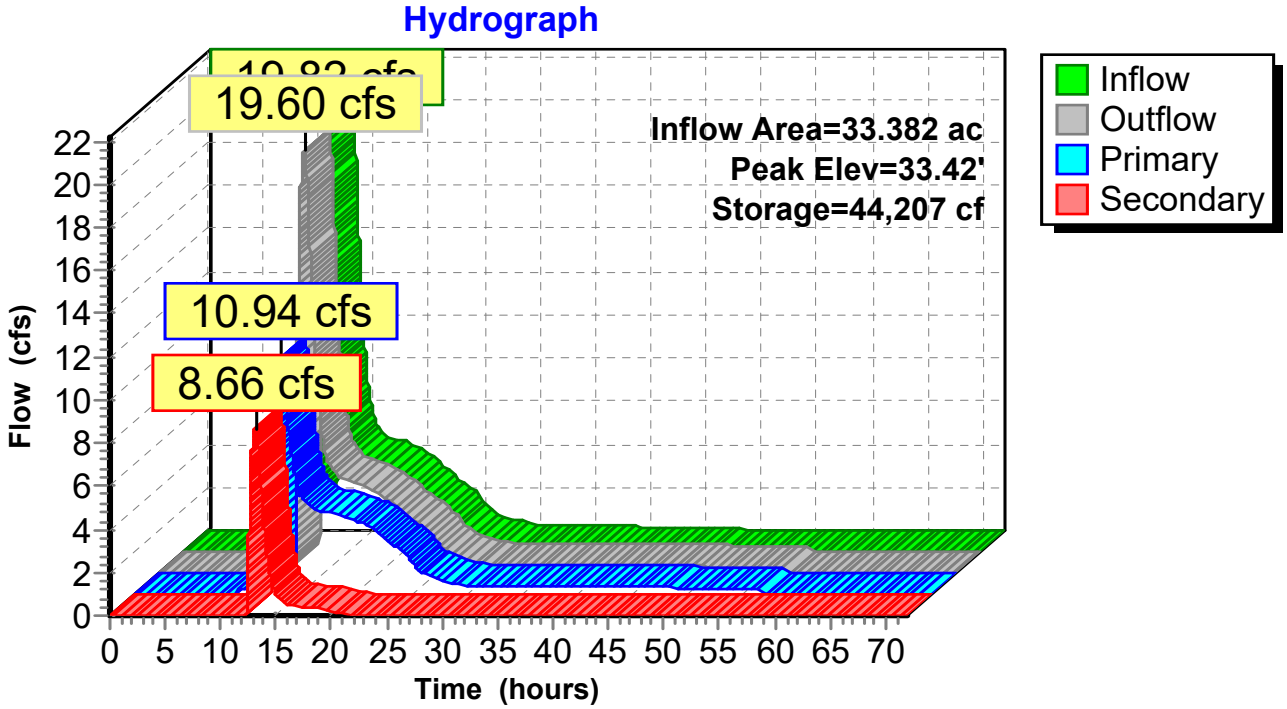
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
31.50	2,091	0	0
32.00	2,450	1,135	1,135
33.00	3,650	3,050	4,185
33.50	4,270	1,980	6,165
34.25	5,770	3,765	9,930

Device	Routing	Invert	Outlet Devices
#1	Primary	28.75'	**36.0" Round Culvert** L= 28.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 28.75' / 28.50' S= 0.0089 '/' Cc= 0.900 n= 0.012, Flow Area= 7.07 sf
#2	Device 1	30.60'	**3.4" Vert. Orifice/Grate** C= 0.600
#3	Device 1	32.75'	**72.0" W x 9.0" H Vert. Orifice/Grate** C= 0.600
#4	Secondary	33.00'	**10.0' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64
#5	Secondary	33.00'	**161.0 deg Sharp-Crested Vee/Trap Weir** Cv= 2.47 (C= 3.09)

Primary OutFlow Max=10.94 cfs @ 13.11 hrs HW=33.42' TW=28.38' (Dynamic Tailwater)
└─**1=Culvert** (Passes 10.94 cfs of 60.55 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.50 cfs @ 7.87 fps)
  └─**3=Orifice/Grate** (Orifice Controls 10.45 cfs @ 2.62 fps)

Secondary OutFlow Max=8.66 cfs @ 13.11 hrs HW=33.42' TW=28.38' (Dynamic Tailwater)
├─**4=Broad-Crested Rectangular Weir** (Weir Controls 7.02 cfs @ 1.69 fps)
└─**5=Sharp-Crested Vee/Trap Weir** (Weir Controls 1.64 cfs @ 1.59 fps)

Pond BMP-R2: Subsurface Gravel Wetland



Hydrograph for Pond BMP-R2: Subsurface Gravel Wetland

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Primary (cfs)	Secondary (cfs)
0.00	0.00	8,862	30.10	0.00	0.00	0.00
2.00	0.00	8,862	30.10	0.00	0.00	0.00
4.00	0.00	8,862	30.10	0.00	0.00	0.00
6.00	0.03	8,951	30.12	0.00	0.00	0.00
8.00	0.17	9,486	30.25	0.00	0.00	0.00
10.00	0.85	12,058	31.36	0.24	0.24	0.00
12.00	**3.86**	**21,945**	**32.10**	**0.35**	**0.35**	**0.00**
14.00	**9.89**	**41,125**	**33.25**	**10.99**	**7.30**	**3.70**
16.00	4.50	37,916	33.08	4.59	4.03	0.55
18.00	4.11	37,616	33.06	4.14	3.76	0.38
20.00	3.58	37,256	33.04	3.64	3.45	0.20
22.00	2.69	36,523	33.00	2.83	2.83	0.00
24.00	1.92	35,491	32.94	2.05	2.05	0.00
26.00	0.82	33,858	32.85	1.03	1.03	0.00
28.00	0.49	32,851	32.79	0.59	0.59	0.00
30.00	0.28	32,053	32.74	0.43	0.43	0.00
32.00	0.20	30,605	32.66	0.42	0.42	0.00
34.00	0.20	29,049	32.56	0.41	0.41	0.00
36.00	0.19	27,539	32.46	0.40	0.40	0.00
38.00	0.19	26,074	32.37	0.39	0.39	0.00
40.00	0.18	24,652	32.28	0.38	0.38	0.00
42.00	0.16	23,242	32.19	0.36	0.36	0.00
44.00	0.13	21,704	32.08	0.35	0.35	0.00
46.00	0.10	20,037	31.97	0.34	0.34	0.00
48.00	0.07	18,264	31.84	0.32	0.32	0.00
50.00	0.05	16,470	31.71	0.30	0.30	0.00
52.00	0.03	14,690	31.58	0.28	0.28	0.00
54.00	0.02	12,941	31.44	0.25	0.25	0.00
56.00	0.01	11,303	31.29	0.22	0.22	0.00
58.00	0.00	10,765	30.65	0.01	0.01	0.00
60.00	0.00	10,763	30.64	0.00	0.00	0.00
62.00	0.00	10,762	30.63	0.00	0.00	0.00
64.00	0.00	10,761	30.63	0.00	0.00	0.00
66.00	0.00	10,760	30.62	0.00	0.00	0.00
68.00	0.00	10,759	30.62	0.00	0.00	0.00
70.00	0.00	10,759	30.62	0.00	0.00	0.00
72.00	0.00	10,759	30.62	0.00	0.00	0.00

Summary for Pond BMP-R3: Bioretention with ISR

Inflow Area = 14.296 ac, 73.95% Impervious, Inflow Depth = 2.38" for 2-yr event
Inflow = 11.54 cfs @ 12.19 hrs, Volume= 2.838 af
Outflow = 8.46 cfs @ 12.33 hrs, Volume= 2.837 af, Atten= 27%, Lag= 8.2 min
Primary = 8.46 cfs @ 12.33 hrs, Volume= 2.837 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Starting Elev= 33.00' Surf.Area= 7,520 sf Storage= 6,016 cf
Peak Elev= 36.67' @ 12.33 hrs Surf.Area= 11,506 sf Storage= 22,619 cf (16,603 cf above start)

Plug-Flow detention time= 228.9 min calculated for 2.699 af (95% of inflow)
Center-of-Mass det. time= 166.0 min (1,227.8 - 1,061.7)

Volume	Invert	Avail.Storage	Storage Description
#1	31.00'	37,951 cf	**Bioretention w/ ISR Bay (Prismatic)** Listed below (Recalc)
#2	35.50'	8,796 cf	**Bioret w/ ISR Forebay (Prismatic)** Listed below (Recalc)
		46,747 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
31.00	7,520	0.0	0	0
33.00	7,520	40.0	6,016	6,016
33.50	7,520	35.0	1,316	7,332
35.50	7,520	20.0	3,008	10,340
37.00	9,170	100.0	12,518	22,858
38.50	10,954	100.0	15,093	37,951

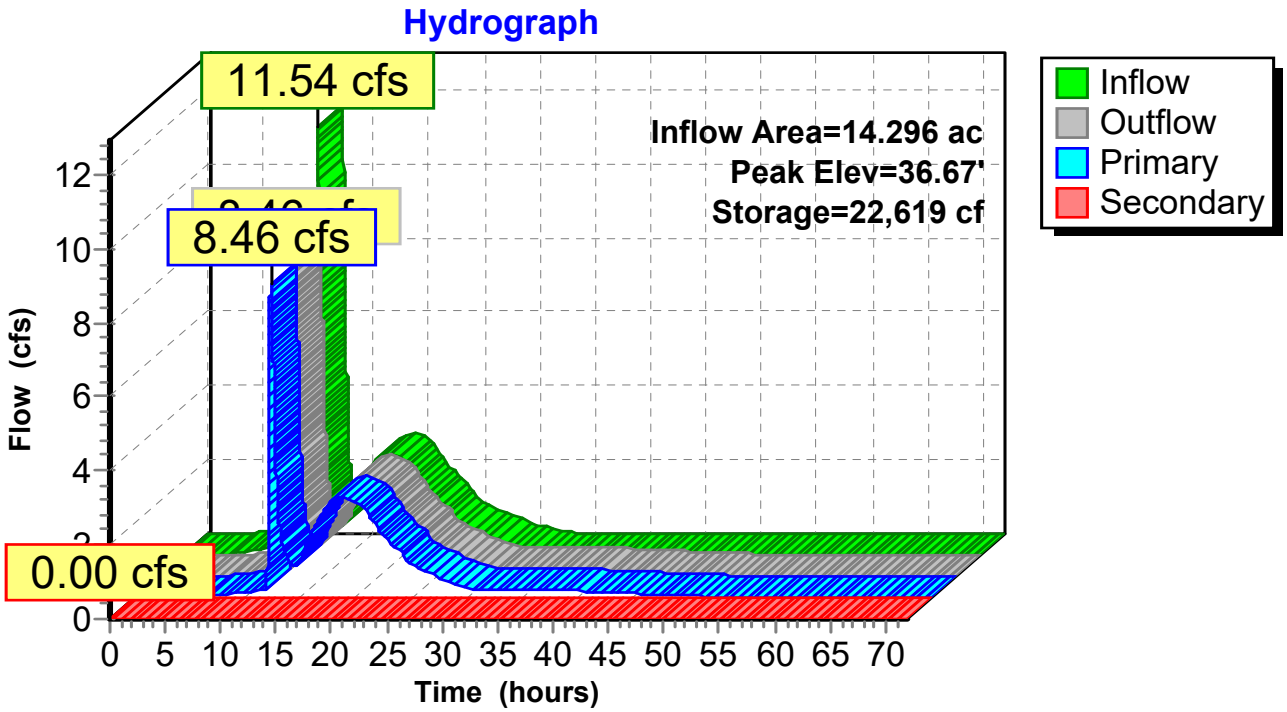
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
35.50	2,000	0	0
37.00	2,900	3,675	3,675
38.50	3,928	5,121	8,796

Device	Routing	Invert	Outlet Devices
#1	Primary	31.17'	**18.0" Round Culvert** L= 69.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 31.17' / 30.70' S= 0.0068 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf
#2	Device 1	33.00'	**2.1" Vert. WQV Orifice** C= 0.600
#3	Device 1	36.10'	**72.0" W x 9.0" H Vert. Front High flow bypass** C= 0.600
#4	Secondary	37.25'	**10.0' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64
#5	Secondary	37.25'	**161.0 deg Sharp-Crested Vee/Trap Weir** Cv= 1.98 (C= 2.48)

Primary OutFlow Max=8.46 cfs @ 12.33 hrs HW=36.67' TW=32.77' (Dynamic Tailwater)
└─**1=Culvert** (Passes 8.46 cfs of 16.80 cfs potential flow)
  ├─**2=WQV Orifice** (Orifice Controls 0.22 cfs @ 9.11 fps)
  └─**3=Front High flow bypass** (Orifice Controls 8.24 cfs @ 2.42 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=33.00' TW=30.10' (Dynamic Tailwater)
├─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
└─**5=Sharp-Crested Vee/Trap Weir** (Controls 0.00 cfs)

Pond BMP-R3: Bioretention with ISR



Hydrograph for Pond BMP-R3: Bioretention with ISR

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Primary (cfs)	Secondary (cfs)
0.00	0.00	6,016	33.00	0.00	0.00	**0.00**
2.00	0.00	6,016	33.00	0.00	0.00	0.00
4.00	0.03	6,069	33.02	0.00	0.00	0.00
6.00	0.10	6,442	33.16	0.03	0.03	0.00
8.00	0.24	7,241	33.47	0.07	0.07	0.00
10.00	0.57	9,272	34.79	0.15	0.15	0.00
12.00	**5.56**	**17,467**	**36.20**	**0.85**	**0.85**	0.00
14.00	**0.86**	**17,630**	**36.22**	**1.00**	**1.00**	0.00
16.00	1.88	18,326	36.28	1.73	1.73	0.00
18.00	2.67	19,058	36.35	2.63	2.63	0.00
20.00	2.54	19,028	36.35	2.59	2.59	0.00
22.00	1.80	18,467	36.30	1.89	1.89	0.00
24.00	1.20	17,899	36.24	1.26	1.26	0.00
26.00	0.69	17,341	36.19	0.75	0.75	0.00
28.00	0.44	16,993	36.16	0.49	0.49	0.00
30.00	0.23	16,636	36.13	0.28	0.28	0.00
32.00	0.08	16,117	36.08	0.20	0.20	0.00
34.00	0.00	14,958	35.97	0.20	0.20	0.00
36.00	0.00	13,564	35.83	0.19	0.19	0.00
38.00	0.00	12,201	35.69	0.19	0.19	0.00
40.00	0.00	10,873	35.56	0.18	0.18	0.00
42.00	0.00	9,615	35.02	0.16	0.16	0.00
44.00	0.00	8,572	34.32	0.13	0.13	0.00
46.00	0.00	7,760	33.78	0.10	0.10	0.00
48.00	0.00	7,175	33.44	0.07	0.07	0.00
50.00	0.00	6,746	33.28	0.05	0.05	0.00
52.00	0.00	6,448	33.16	0.03	0.03	0.00
54.00	0.00	6,282	33.10	0.02	0.02	0.00
56.00	0.00	6,201	33.07	0.01	0.01	0.00
58.00	0.00	6,155	33.05	0.00	0.00	0.00
60.00	0.00	6,127	33.04	0.00	0.00	0.00
62.00	0.00	6,108	33.04	0.00	0.00	0.00
64.00	0.00	6,095	33.03	0.00	0.00	0.00
66.00	0.00	6,085	33.03	0.00	0.00	0.00
68.00	0.00	6,077	33.02	0.00	0.00	0.00
70.00	0.00	6,070	33.02	0.00	0.00	0.00
72.00	0.00	6,065	33.02	0.00	0.00	0.00

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment A1: DPW OFFSITE Runoff Area=4.328 ac 89.60% Impervious Runoff Depth=5.05"
Flow Length=864' Tc=14.5 min CN=95 Runoff=18.08 cfs 1.823 af

Subcatchment A6R: A6 Regional Runoff Area=19.086 ac 70.04% Impervious Runoff Depth=4.28"
Flow Length=2,013' Tc=83.0 min CN=88 Runoff=30.20 cfs 6.807 af

Subcatchment A7R: A7 Regional Runoff Area=9.968 ac 67.15% Impervious Runoff Depth=4.39"
Flow Length=734' Tc=480.4 min CN=89 Runoff=4.69 cfs 3.644 af

Reach 2R: BMP-R2 Rock Swale Avg. Flow Depth=0.51' Max Vel=2.99 fps Inflow=33.14 cfs 11.716 af
n=0.032 L=45.0' S=0.0111 '/' Capacity=62.82 cfs Outflow=33.14 cfs 11.716 af

Reach 30R: Ex. Pond 2 Inflow=33.14 cfs 11.716 af
Outflow=33.14 cfs 11.716 af

Pond 4P: EDMH-A Peak Elev=42.64' Inflow=18.08 cfs 1.823 af
Primary=8.01 cfs 1.488 af Secondary=10.08 cfs 0.334 af Outflow=18.08 cfs 1.823 af

Pond 7P: EDMH-C Peak Elev=41.75' Inflow=8.01 cfs 1.488 af
18.0" Round Culvert n=0.012 L=42.6' S=0.0052 '/' Outflow=8.01 cfs 1.488 af

Pond 13P: Ex. Dual 24" Culverts Peak Elev=37.32' Storage=162 cf Inflow=30.20 cfs 6.807 af
Discarded=0.01 cfs 0.002 af Primary=30.18 cfs 6.805 af Outflow=30.19 cfs 6.807 af

Pond 17P: INV U. Peak Elev=42.99' Storage=9,818 cf Inflow=4.69 cfs 3.644 af
Discarded=0.33 cfs 0.512 af Primary=4.17 cfs 3.132 af Outflow=4.51 cfs 3.644 af

Pond BMP-R2: Subsurface Gravel Wetland Peak Elev=33.62' Storage=48,178 cf Inflow=33.44 cfs 11.759 af
Primary=15.38 cfs 8.267 af Secondary=17.75 cfs 3.449 af Outflow=33.14 cfs 11.716 af

Pond BMP-R3: Bioretention with ISR Peak Elev=36.94' Storage=25,752 cf Inflow=18.08 cfs 4.955 af
Primary=14.44 cfs 4.954 af Secondary=0.00 cfs 0.000 af Outflow=14.44 cfs 4.954 af

Total Runoff Area = 33.382 ac Runoff Volume = 12.274 af Average Runoff Depth = 4.41"
28.29% Pervious = 9.443 ac 71.71% Impervious = 23.939 ac

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment A1: DPW OFFSITE Runoff Area=4.328 ac 89.60% Impervious Runoff Depth=6.55"
Flow Length=864' Tc=14.5 min CN=95 Runoff=23.11 cfs 2.361 af

Subcatchment A6R: A6 Regional Runoff Area=19.086 ac 70.04% Impervious Runoff Depth=5.73"
Flow Length=2,013' Tc=83.0 min CN=88 Runoff=39.97 cfs 9.113 af

Subcatchment A7R: A7 Regional Runoff Area=9.968 ac 67.15% Impervious Runoff Depth=5.84"
Flow Length=734' Tc=480.4 min CN=89 Runoff=6.20 cfs 4.855 af

Reach 2R: BMP-R2 Rock Swale Avg. Flow Depth=0.61' Max Vel=3.31 fps Inflow=43.73 cfs 15.655 af
n=0.032 L=45.0' S=0.0111 '/' Capacity=62.82 cfs Outflow=43.73 cfs 15.655 af

Reach 30R: Ex. Pond 2 Inflow=43.73 cfs 15.655 af
Outflow=43.73 cfs 15.655 af

Pond 4P: EDMH-A Peak Elev=43.49' Inflow=23.11 cfs 2.361 af
Primary=9.75 cfs 1.870 af Secondary=13.36 cfs 0.491 af Outflow=23.11 cfs 2.361 af

Pond 7P: EDMH-C Peak Elev=42.18' Inflow=9.75 cfs 1.870 af
18.0" Round Culvert n=0.012 L=42.6' S=0.0052 '/' Outflow=9.75 cfs 1.870 af

Pond 13P: Ex. Dual 24" Culverts Peak Elev=38.07' Storage=874 cf Inflow=39.97 cfs 9.113 af
Discarded=0.06 cfs 0.004 af Primary=39.82 cfs 9.109 af Outflow=39.89 cfs 9.113 af

Pond 17P: INV U. Peak Elev=44.03' Storage=17,678 cf Inflow=6.20 cfs 4.855 af
Discarded=0.51 cfs 0.625 af Primary=5.14 cfs 4.230 af Outflow=5.65 cfs 4.855 af

Pond BMP-R2: Subsurface Gravel Wetland Peak Elev=33.77' Storage=51,167 cf Inflow=43.98 cfs 15.698 af
Primary=17.73 cfs 10.175 af Secondary=26.01 cfs 5.480 af Outflow=43.73 cfs 15.655 af

Pond BMP-R3: Bioretention with ISR Peak Elev=37.18' Storage=28,741 cf Inflow=23.11 cfs 6.591 af
Primary=16.23 cfs 6.589 af Secondary=0.00 cfs 0.000 af Outflow=16.23 cfs 6.589 af

Total Runoff Area = 33.382 ac Runoff Volume = 16.329 af Average Runoff Depth = 5.87"
28.29% Pervious = 9.443 ac 71.71% Impervious = 23.939 ac

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment A1: DPW OFFSITE Runoff Area=4.328 ac 89.60% Impervious Runoff Depth=7.96"
Flow Length=864' Tc=14.5 min CN=95 Runoff=27.85 cfs 2.871 af

Subcatchment A6R: A6 Regional Runoff Area=19.086 ac 70.04% Impervious Runoff Depth=7.12"
Flow Length=2,013' Tc=83.0 min CN=88 Runoff=49.17 cfs 11.318 af

Subcatchment A7R: A7 Regional Runoff Area=9.968 ac 67.15% Impervious Runoff Depth=7.24"
Flow Length=734' Tc=480.4 min CN=89 Runoff=7.65 cfs 6.011 af

Reach 2R: BMP-R2 Rock Swale Avg. Flow Depth=0.67' Max Vel=3.52 fps Inflow=51.87 cfs 19.342 af
n=0.032 L=45.0' S=0.0111 '/' Capacity=62.82 cfs Outflow=51.87 cfs 19.342 af

Reach 30R: Ex. Pond 2 Inflow=51.87 cfs 19.342 af
Outflow=51.87 cfs 19.342 af

Pond 4P: EDMH-A Peak Elev=44.56' Inflow=27.85 cfs 2.871 af
Primary=11.78 cfs 2.229 af Secondary=16.08 cfs 0.641 af Outflow=27.85 cfs 2.871 af

Pond 7P: EDMH-C Peak Elev=42.65' Inflow=11.78 cfs 2.229 af
18.0" Round Culvert n=0.012 L=42.6' S=0.0052 '/' Outflow=11.78 cfs 2.229 af

Pond 13P: Ex. Dual 24" Culverts Peak Elev=38.75' Storage=5,255 cf Inflow=49.17 cfs 11.318 af
Discarded=0.31 cfs 0.019 af Primary=47.07 cfs 11.300 af Outflow=47.38 cfs 11.318 af

Pond 17P: INV U. Peak Elev=44.90' Storage=27,876 cf Inflow=7.65 cfs 6.011 af
Discarded=0.80 cfs 0.795 af Primary=5.82 cfs 5.217 af Outflow=6.63 cfs 6.011 af

Pond BMP-R2: Subsurface Gravel Wetland Peak Elev=33.88' Storage=53,283 cf Inflow=53.06 cfs 19.386 af
Primary=19.16 cfs 11.816 af Secondary=32.71 cfs 7.526 af Outflow=51.87 cfs 19.342 af

Pond BMP-R3: Bioretention with ISR Peak Elev=37.46' Storage=32,347 cf Inflow=28.12 cfs 8.087 af
Primary=16.68 cfs 8.039 af Secondary=2.82 cfs 0.047 af Outflow=19.46 cfs 8.086 af

Total Runoff Area = 33.382 ac Runoff Volume = 20.201 af Average Runoff Depth = 7.26"
28.29% Pervious = 9.443 ac 71.71% Impervious = 23.939 ac

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment A1: DPW OFFSITE Runoff Area=4.328 ac 89.60% Impervious Runoff Depth=9.65"
Flow Length=864' Tc=14.5 min CN=95 Runoff=33.51 cfs 3.482 af

Subcatchment A6R: A6 Regional Runoff Area=19.086 ac 70.04% Impervious Runoff Depth=8.79"
Flow Length=2,013' Tc=83.0 min CN=88 Runoff=60.11 cfs 13.976 af

Subcatchment A7R: A7 Regional Runoff Area=9.968 ac 67.15% Impervious Runoff Depth=8.91"
Flow Length=734' Tc=480.4 min CN=89 Runoff=9.38 cfs 7.403 af

Reach 2R: BMP-R2 Rock Swale Avg. Flow Depth=0.73' Max Vel=3.70 fps Inflow=59.95 cfs 23.782 af
n=0.032 L=45.0' S=0.0111 '/' Capacity=62.82 cfs Outflow=59.95 cfs 23.782 af

Reach 30R: Ex. Pond 2 Inflow=59.95 cfs 23.782 af
Outflow=59.95 cfs 23.782 af

Pond 4P: EDMH-A Peak Elev=46.16' Inflow=33.51 cfs 3.482 af
Primary=14.16 cfs 2.654 af Secondary=19.35 cfs 0.828 af Outflow=33.51 cfs 3.482 af

Pond 7P: EDMH-C Peak Elev=43.40' Inflow=14.16 cfs 2.654 af
18.0" Round Culvert n=0.012 L=42.6' S=0.0052 '/' Outflow=14.16 cfs 2.654 af

Pond 13P: Ex. Dual 24" Culverts Peak Elev=39.50' Storage=16,781 cf Inflow=60.11 cfs 13.976 af
Discarded=0.60 cfs 0.047 af Primary=53.85 cfs 13.929 af Outflow=54.45 cfs 13.976 af

Pond 17P: INV U. Peak Elev=45.99' Storage=44,688 cf Inflow=9.38 cfs 7.403 af
Discarded=0.89 cfs 0.988 af Primary=6.58 cfs 6.416 af Outflow=7.48 cfs 7.403 af

Pond BMP-R2: Subsurface Gravel Wetland Peak Elev=33.98' Storage=55,252 cf Inflow=60.87 cfs 23.826 af
Primary=20.37 cfs 13.694 af Secondary=39.58 cfs 10.089 af Outflow=59.95 cfs 23.782 af

Pond BMP-R3: Bioretention with ISR Peak Elev=37.69' Storage=35,265 cf Inflow=34.17 cfs 9.898 af
Primary=16.96 cfs 9.693 af Secondary=9.10 cfs 0.203 af Outflow=25.99 cfs 9.896 af

Total Runoff Area = 33.382 ac Runoff Volume = 24.862 af Average Runoff Depth = 8.94"
28.29% Pervious = 9.443 ac 71.71% Impervious = 23.939 ac

CMA ENGINEERS, INC.
CIVIL | ENVIRONMENTAL | STRUCTURAL

35 Bow Street
Portsmouth
New Hampshire
03801-3819

P: 603|431|6196
www.cmaengineers.com

August 19, 2019

City of Portsmouth
Planning Department
1 Junkins Avenue
Portsmouth, NH 03801

Re: Technical Advisory Committee (September 3, 2019)
Portsmouth Recreation Fields
680 Peverly Hill Road/254-8 Map-Lot
CMA #1119

Portsmouth Planning Department:

Please find enclosed seven 11x17 copies and three full-size drawings of the Portsmouth Recreation Fields and ten copies of the drainage report. The project is located adjacent to the Portsmouth Public Works Facility at 680 Peverly Hill Road. In 2016, the City purchased 50 acres of land near the Community Campus property known as "Foundation Field." This land was merged with the Public Works parcel and is now a single lot (254-8 Map-Lot). In the spring of 2018, City Council and Recreation Board voted to pursue development of new recreation playing fields at this site.

The recreation fields are planned to be constructed in two phases. Phase I includes construction of two new full-size turf fields with lighting, gravel parking areas, and a connection to public water. Phase I also includes construction of regional stormwater treatment facilities for the upper Sagamore Creek watershed. Phase II includes design and construction of one additional field, paved parking areas, a concession stand, and other amenities. ***This submittal is for Phase I only.*** The City also plans to construct a new transfer station on this parcel adjacent to the existing transfer station. The design and construction of this facility will be done subsequently to the Recreation Fields.

We respectfully request to be placed on the agenda for the September 3, 2019 TAC Meeting. Should you have any questions, please do not hesitate to call.

Very truly yours,
CMA ENGINEERS, INC.

William A. Straub, P.E.
Principal

Philip A. Corbett, P.E.
Project Manager

PAC:kao
Enc: Recreation Fields Figures, Plans, and Drainage Report
Cc: David Allen, City Project Manager, 1 Junkins Avenue, Portsmouth, NH 03801

1119-Portsmouth-DL-190819-Portsmouth Rec Fields-PAC

City of Portsmouth, New Hampshire

Site Plan Application Checklist

This site plan application checklist is a tool designed to assist the applicant in the planning process and for preparing the application for Planning Board review. A pre-application conference with a member of the planning department is strongly encouraged as additional project information may be required depending on the size and scope. The applicant is cautioned that this checklist is only a guide and is not intended to be a complete list of all site plan review requirements. Please refer to the Site Plan review regulations for full details.

Applicant Responsibilities (Section 2.5.2): Applicable fees are due upon application submittal along with required attachments. The application shall be complete as submitted and provide adequate information for evaluation of the proposed site development. Waiver requests must be submitted in writing with appropriate justification.

Name of Owner/Applicant: City of Portmsouth Date Submitted: 08-19-2019

Phone Number: 603-428-1530 E-mail: dsallen@cityofportsmouth.com

Site Address: 680 Peverly Hill Road Map: 254 Lot: 8

Zoning District: Municipal Lot area: 2,625,754 sq. ft.

Application Requirements			
☑	**Required Items for Submittal**	**Item Location (e.g. Page or Plan Sheet/Note #)**	**Waiver Requested**
☐	Fully executed and signed Application form. **(2.5.2.3)**		N/A
☐	All application documents, plans, supporting documentation and other materials provided in digital Portable Document Format (PDF). **(2.5.2.8)**		N/A

Site Plan Review Application Required Information			
☑	**Required Items for Submittal**	**Item Location (e.g. Page/line or Plan Sheet/Note #)**	**Waiver Requested**
☐	Statement that lists and describes "green" building components and systems. **(2.5.3.1A)**		
☐	Gross floor area and dimensions of all buildings and statement of uses and floor area for each floor. **(2.5.3.1B)**		N/A
☐	Tax map and lot number, and current zoning of all parcels under Site Plan Review. **(2.5.3.1C)**		N/A
☐	Owner's name, address, telephone number, and signature. Name, address, and telephone number of applicant if different from owner. **(2.5.3.1D)**		N/A

Site Plan Review Application Required Information			
☑	**Required Items for Submittal**	**Item Location (e.g. Page/line or Plan Sheet/Note #)**	**Waiver Requested**
☐	Names and addresses (including Tax Map and Lot number and zoning districts) of all direct abutting property owners (including properties located across abutting streets) and holders of existing conservation, preservation or agricultural preservation restrictions affecting the subject property. **(2.5.3.1E)**		N/A
☐	Names, addresses and telephone numbers of all professionals involved in the site plan design. **(2.5.3.1F)**		N/A
☐	List of reference plans. **(2.5.3.1G)**		N/A
☐	List of names and contact information of all public or private utilities servicing the site. **(2.5.3.1H)**		N/A

Site Plan Specifications			
☑	**Required Items for Submittal**	**Item Location (e.g. Page/line or Plan Sheet/Note #)**	**Waiver Requested**
☐	Full size plans shall not be larger than 22 inches by 34 inches with match lines as required, unless approved by the Planning Director. Submittals shall be a minimum of 11 inches by 17 inches as specified by Planning Dept. staff. **(2.5.4.1A)**	Required on all plan sheets	N/A
☐	Scale: Not less than 1 inch = 60 feet and a graphic bar scale shall be included on all plans. **(2.5.4.1B)**	Required on all plan sheets	N/A
☐	GIS data should be referenced to the coordinate system New Hampshire State Plane, NAD83 (1996), with units in feet. **(2.5.4.1C)**		N/A
☐	Plans shall be drawn to scale. **(2.5.4.1D)**	Required on all plan sheets	N/A
☐	Plans shall be prepared and stamped by a NH licensed civil engineer. **(2.5.4.1D)**		N/A
☐	Wetlands shall be delineated by a NH certified wetlands scientist and so stamped. **(2.5.4.1E)**		N/A
☐	Title (name of development project), north point, scale, legend. **(2.5.4.2A)**		N/A
☐	Date plans first submitted, date and explanation of revisions. **(2.5.4.2B)**		N/A
☐	Individual plan sheet title that clearly describes the information that is displayed. **(2.5.4.2C)**	Required on all plan sheets	N/A
☐	Source and date of data displayed on the plan. **(2.5.4.2D)**		N/A

Site Plan Specifications			
☑	**Required Items for Submittal**	**Item Location (e.g. Page/line or Plan Sheet/Note #)**	**Waiver Requested**
☐	A note shall be provided on the Site Plan stating: "All conditions on this Plan shall remain in effect in perpetuity pursuant to the requirements of the Site Plan Review Regulations." **(2.5.4.2E)**		N/A
☐	Plan sheets submitted for recording shall include the following notes: a. "This Site Plan shall be recorded in the Rockingham County Registry of Deeds." b. "All improvements shown on this Site Plan shall be constructed and maintained in accordance with the Plan by the property owner and all future property owners. No changes shall be made to this Site Plan without the express approval of the Portsmouth Planning Director." **(2.13.3)**		N/A
☐	Plan sheets showing landscaping and screening shall also include the following additional notes: a. "The property owner and all future property owners shall be responsible for the maintenance, repair and replacement of all required screening and landscape materials." b. "All required plant materials shall be tended and maintained in a healthy growing condition, replaced when necessary, and kept free of refuse and debris. All required fences and walls shall be maintained in good repair." c. "The property owner shall be responsible to remove and replace dead or diseased plant materials immediately with the same type, size and quantity of plant materials as originally installed, unless alternative plantings are requested, justified and approved by the Planning Board or Planning Director." **(2.13.4)**		N/A

Site Plan Specifications – Required Exhibits and Data			
☑	**Required Items for Submittal**	**Item Location (e.g. Page/line or Plan Sheet/Note #)**	**Waiver Requested**
	1. Existing Conditions: (2.5.4.3A)		
☐	a. Surveyed plan of site showing existing natural and built features;		
☐	b. Zoning boundaries;		
☐	c. Dimensional Regulations;		
☐	d. Wetland delineation, wetland function and value assessment;		
☐	e. SFHA, 100-year flood elevation line and BFE data.		
	2. Buildings and Structures: (2.5.4.3B)		
☐	a. Plan view: Use, size, dimensions, footings, overhangs, 1st fl. elevation;		
☐	b. Elevations: Height, massing, placement, materials, lighting, façade treatments;		
☐	c. Total Floor Area;		
☐	d. Number of Usable Floors;		
☐	e. Gross floor area by floor and use.		
	3. Access and Circulation: (2.5.4.3C)		
☐	a. Location/width of access ways within site;		
☐	b. Location of curbing, right of ways, edge of pavement and sidewalks;		
☐	c. Location, type, size and design of traffic signing (pavement markings);		
☐	d. Names/layout of existing abutting streets;		
☐	e. Driveway curb cuts for abutting prop. and public roads;		
☐	f. If subdivision; Names of all roads, right of way lines and easements noted;		
☐	g. AASHTO truck turning templates, description of minimum vehicle allowed being a WB-50 (unless otherwise approved by TAC).		
	4. Parking and Loading: (2.5.4.3D)		
☐	a. Location of off street parking/loading areas, landscaped areas/buffers;		
☐	b. Parking Calculations (# required and the # provided).		
	5. Water Infrastructure: (2.5.4.3E)		
☐	a. Size, type and location of water mains, shut-offs, hydrants & Engineering data;		
☐	b. Location of wells and monitoring wells (include protective radii).		
	6. Sewer Infrastructure: (2.5.4.3F)		
☐	a. Size, type and location of sanitary sewage facilities & Engineering data.		
	7. Utilities: (2.5.4.3G)		
☐	a. The size, type and location of all above & below ground utilities;		
☐	b. Size type and location of generator pads, transformers and other fixtures.		

Site Plan Specifications – Required Exhibits and Data			
☑	**Required Items for Submittal**	**Item Location (e.g. Page/line or Plan Sheet/Note #)**	**Waiver Requested**
☐	**8. Solid Waste Facilities: (2.5.4.3H)**		
☐	a. The size, type and location of solid waste facilities.		
	9. Storm water Management: (2.5.4.3I)		
☐	a. The location, elevation and layout of all storm-water drainage.		
	10. Outdoor Lighting: (2.5.4.3J)		
☐	a. Type and placement of all lighting (exterior of building, parking lot and any other areas of the site) and; b. photometric plan.		
☐	**11.** Indicate where dark sky friendly lighting measures have been implemented. **(10.1)**		
	12. Landscaping: (2.5.4.3K)		
☐	a. Identify all undisturbed area, existing vegetation and that which is to be retained;		
☐	**b.** Location of any irrigation system and water source.		
	13. Contours and Elevation: (2.5.4.3L)		
☐	a. Existing/Proposed contours (2 foot minimum) and finished grade elevations.		
	14. Open Space: (2.5.4.3M)		
☐	a. Type, extent and location of all existing/proposed open space.		
☐	**15. All easements, deed restrictions and non-public rights of ways. (2.5.4.3N)**		
☐	**16. Location of snow storage areas and/or off-site snow removal. (2.5.4.3O)**		
☐	**17. Character/Civic District (All following information shall be included): (2.5.4.3Q)**		
	a. Applicable Building Height (10.5A21.20 & 10.5A43.30);		
	b. Applicable Special Requirements (10.5A21.30);		
	c. Proposed building form/type (10.5A43);		
	d. Proposed community space (10.5A46).		

Other Required Information			
☑	**Required Items for Submittal**	**Item Location (e.g. Page/line or Plan Sheet/Note #)**	**Waiver Requested**
☐	Traffic Impact Study or Trip Generation Report, as required. (*Four (4) hardcopies of the full study/report and Six (6) summaries to be submitted with the Site Plan Application*) **(3.2.1-2)**		
☐	Indicate where Low Impact Development Design practices have been incorporated. **(7.1)**		
☐	Indicate whether the proposed development is located in a wellhead protection or aquifer protection area. Such determination shall be approved by the Director of the Dept. of Public Works. **(7.3.1)**		
☐	Indicate where measures to minimize impervious surfaces have been implemented. **(7.4.3)**		
☐	Calculation of the maximum effective impervious surface as a percentage of the site. **(7.4.3.2)**		
☐	Stormwater Management and Erosion Control Plan. (*Four (4) hardcopies of the full plan/report and Six (6) summaries to be submitted with the Site Plan Application*) **(7.4.4.1)**		

Final Site Plan Approval Required Information			
☑	**Required Items for Submittal**	**Item Location (e.g. Page/line or Plan Sheet/Note #)**	**Waiver Requested**
☐	All local approvals, permits, easements and licenses required, including but not limited to: a. Waivers; b. Driveway permits; c. Special exceptions; d. Variances granted; e. Easements; f. Licenses. **(2.5.3.2A)**		
☐	Exhibits, data, reports or studies that may have been required as part of the approval process, including but not limited to: a. Calculations relating to stormwater runoff; b. Information on composition and quantity of water demand and wastewater generated; c. Information on air, water or land pollutants to be discharged, including standards, quantity, treatment and/or controls; d. Estimates of traffic generation and counts pre- and post-construction; e. Estimates of noise generation; f. A Stormwater Management and Erosion Control Plan; g. Endangered species and archaeological / historical studies; h. Wetland and water body (coastal and inland) delineations; i. Environmental impact studies. **(2.5.3.2B)**		

Final Site Plan Approval Required Information			
☑	**Required Items for Submittal**	**Item Location (e.g. Page/line or Plan Sheet/Note #)**	**Waiver Requested**
☐	A document from each of the required private utility service providers indicating approval of the proposed site plan and indicating an ability to provide all required private utilities to the site. **(2.5.3.2D)**		
☐	A list of any required state and federal permit applications required for the project and the status of same. **(2.5.3.2E)**		

Applicant's Signature: _____ Date: _____