



**UPPER UWCHLAN TOWNSHIP  
PLANNING COMMISSION  
AGENDA  
March 8, 2018  
7:30 p.m.**

- I. Call To Order
- II. Village at Byers Station (Parcel 5C) Commercial Lot 2 Amended Final PRD Plan  
Village at Byers Station (Parcel 5C) is the parcel on the north side of Station Boulevard, between Pottstown Pike/Route 100 and Graphite Mine Road. The Plan proposes Phase 1 of 2 totaling 81,000 SF of commercial space on Lot 2, a 13.44 acre parcel. Phase 1 is for 40,000+ SF of the commercial space. Accept Plan for Consultants' review.
- III. Jankowski Property Preliminary/Final Subdivision - Land Development Plan  
The property is on the west side of Route 100 at the border with West Vincent Township. The Plan proposes 55 single-family homes, passive and active open space, public water and public sewer service. Discuss the Township Consultants' reviews.
- IV. Approval of Minutes: February 8, 2018 Meeting
- V. Open Session
- VI. Next Meeting Date: April 12, 2018 7:30 p.m.
- VII. Adjournment



SUBDIVISION / LAND DEVELOPMENT APPLICATION

☐ Preliminary Submittal

☒ Final Submittal

The undersigned hereby applies for review of the Plan submitted herewith and described below:

1. Name of Subdivision / Development: BYERS (5C) COMMERCIAL
2. Plan Dated: 2-16-18 County Deed Book/Page No. \_\_\_\_\_
3. Name of property owner(s): BYERS COMMERCIAL L.P.  
c/o TOLL BROTHERS  
Address: 250 GIBRALTAR RD HORSHAM  
State/Zip: PA. 19044 Phone No.: 610-358-3611  
Email: M.DOWNS@TOLLBROTHERS.COM
4. Name of Applicant (If other than owner):  
EXECUTIVE LAND HOLDINGS, L.P. % Bob Dwyer  
Address: 721 OLD STATE RD  
State/Zip: BERWYN PA 19312 Phone No.: 610-996-6600  
Email: bob@LANDTRUSTPROP.COM
5. Applicant's interest (If other than owner): EQUITABLE OWNER
6. Engineer, Architect, Surveyor, or Landscape Architect responsible for Plan.  
Bohler ENGINEERING  
Address: 1600 MANOR DR SUITE 200 CHALFONT  
State/Zip: PA 18914 Phone No.: (215) 996-9100  
Email: CBOCK@bohlereng.COM
7. Total acreage: 13.439 Number of Lots: 1
8. Acreage of adjoining land in same ownership: (If any) 16.353
9. Describe Type of Development Planned: PHASE 1 of 2 Phase  
Project Consisting of 40,713 SF of COMMERCIAL  
SPACE. PHASE 2 WILL FOLLOW WITH APPROX 40,600 SF

10. This Application shall be accompanied by: the Application Fee as listed below, an aerial image of the property, and the quantity of plans/supporting information as detailed in the Township Code §162-8.B.(1)(b) and/or §162-8.C.(1)(d).

[One-half of the required plan submissions may be of a reduced size, i.e. 11 x 17]

11. List all subdivision and zoning standards or requirements which have not been met and for which a waiver or change is requested.

152 - 311. G. (1)  
152 - 311. H (3)  
162 - 57 D (1) } See Attached Letter

12. The Applicant or his/her agent shall enter into a Subdivision / Land Development Review Escrow Agreement (attached) and place into escrow with the Township at the time of application an amount estimated by the Township to cover all costs of engineering and professional planning reviews (not including County application fee), legal services and other professional services used by the Township in connection with the application.

Signature of Property Owner or Applicant:

*X*

By: ROBERT J DWYER

Date: 2-16-18

\*Development subject to ACT 209 Impact Fee.

\*Park & Recreation Fee per residence is levied. Contact Township Offices to determine amount.

### SUBDIVISION / LAND DEVELOPMENT APPLICATION FEE

1-2 Lots ..... \$250

3-5 Lots ..... \$500

Plus \$25 for each Lot over 3

Over 5 Lots ..... \$1000

Plus \$50 for each Lot over 5

Form revised January 2015

140 Pottstown Pike, Chester Springs, PA 19425  
Phone: (610) 458-9400 • Fax: (610) 458-0307  
www.upperuwchlan-pa.gov



**BOHLER**<sup>TM</sup>  
ENGINEERING

1600 Manor Drive, Suite 200  
Chalfont, PA 18914  
PHONE 215.996.9100  
FAX 215.996.9103

February 16, 2018  
Via FedEx - Priority

Upper Uwchlan Township  
140 Pottstown Pike  
Chester Springs, PA 19425

Attention: Gwen A. Jonik

Re: The Villages at Byers Station  
Proposed Lot 2 - Commercial Development  
Graphite Mine Road & Station Boulevard  
Upper Uwchlan Township  
Chester County, PA  
Bohler #PC1511921

Dear Gwen:

With regard to the above referenced project, please find below the applicant's list of the requested waivers along with justification for each:

1. §152-311.G.(1)

- Requirement: All pipe within the paved cartway shall be reinforced concrete.
- Justification: The applicant is proposing to use High Density Polyethylene (HDPE) pipe in lieu of concrete pipe within the private paved cartways as HDPE pipe is equivalent to reinforced concrete in terms of performance and longevity; and, it is significantly easier to install. The pipes within the private cartways will be maintained by the Owner.

2. §152-311.H(3)

- Requirement: Stormwater basin spillways are to be lined with concrete blocks or pavers.
- Justification: The applicant proposes utilizing natural spillway lining material in lieu of the concrete pavers. The proposed natural spillway lining material specified is equivalent or superior to the concrete pavers in terms of protecting from erosion. Based on past experience with the paver spillways, it was found that establishing vegetation is difficult due to the small openings. The small openings impeded the vegetation from rooting firmly into the ground.

3. §162-57.D(1)

- Requirement: 2 deciduous trees, 1 evergreen tree and 8 shrubs for every 1,000 square feet of building area.
- Justification: The applicant proposed the shrubs to meet the intent of this requirement. Although due to limited open space the number of deciduous and evergreen trees calculated to meet this requirement are not feasible to plant in a spacing that would avoid conflicts with the critical root zones of the trees and the utility lines existing and propose on the site. If planted the quantity of trees would also begin to hinder the design intent of preserving views to the commercial tenants and signage.

The above waivers are respectfully submitted for review and recommendation for approval at your next Planning Commission meeting. In the interim, should you have any questions or require additional information, please contact our office.

Sincerely,

**BOHLER ENGINEERING PA, LLC**

  
William R. Rearden, P.E.  
Principal

GB/em

cc: John Forde  
Bob Dwyer

R:\15PC1511921\Administrative\Correspondence\Township\2018-02-16 (Waivers & Justification).doc



**SITUATED IN:**  
**UPPER UWCHLAN TOWNSHIP**  
**CHESTER COUNTY, PENNSYLVANIA, 19425**

**OWNED AND DEVELOPED BY:**



- SHEETS 1-3 & 30-34 OF THIS PLAN SET SHALL BE CONSIDERED THE COMPLETE RECORD PLAN SET FOR FILING PURPOSES IN THE CHESTER COUNTY RECORDER OF DEEDS OFFICE.

SHEETS 4 TO 29 INCLUSIVE ON RECORD AT UPPER UWCHLAN TOWNSHIP, SHALL BE CONSIDERED A PART OF THE APPROVED AMENDED FINAL PRD PLANS AS IF RECORDED WITH SAME.

1. A WAIVER FROM §152-311(G)(1) IS HEREBY REQUESTED FROM THE UPPER UWCHLAN TOWNSHIP SALDO TO UTILIZE HDPE PIPE IN LIEU OF REINFORCED CONCRETE PIPE IN PAVED CARTWAYS.
2. A WAIVER FROM §152-311(H)(3) IS HEREBY REQUESTED FROM THE UPPER UWCHLAN TOWNSHIP SALDO TO UTILIZE A NATURAL SPILLWAY LINING IN LIEU OF USING CONCRETE BLOCK.
3. A WAIVER FROM §162-57(D)(1) IS HEREBY REQUESTED FROM THE UPPER UWCHLAN TOWNSHIP SALDO TO NOT PROVIDE 2 DECIDUOUS TREES, 1 EVERGREEN AND 8 SHRUBS FOR EVERY 1,000 SF OF BUILDING AREA.

COMMONWEALTH OF PENNSYLVANIA

ON THE \_\_\_\_\_ DAY OF \_\_\_\_\_, A.D. 20\_\_\_\_\_, BEFORE ME, THE SUBSCRIBER, A NOTARY PUBLIC OF THE COMMONWEALTH OF PENNSYLVANIA, RESIDING IN \_\_\_\_\_ PERSONALLY APPEARED \_\_\_\_\_, who acknowledged himself to be the \_\_\_\_\_ of BYERS RETAIL ACQUISITION, L.P., AND THAT AS MUCH TO DO SO, HE EXECUTED THE FOREGOING PLAN BY SIGNING THE NAME OF SAID CORPORATION BY HIMSELF AS \_\_\_\_\_. THAT THE SAID LIMITED PARTNERSHIP IS THE OWNER OF THE DESIGNATED LAND, THAT ALL NECESSARY APPROVAL OF THE PLAN HAS BEEN OBTAINED AND IS ENDORSED THEREON AND THAT THE SAID LIMITED PARTNERSHIP DESIRES THAT THE FOREGOING PLAN MAY BE DULY RECORDED.

OWNER: \_\_\_\_\_  
 \_\_\_\_\_  
 TITLE: \_\_\_\_\_  
 BYERS RETAIL ACQUISITION, L.P.  
 \_\_\_\_\_  
 WITNESS MY HAND AND NOTARIAL SEAL THE DAY AND YEAR AFORESAID

NOTARY PUBLIC OR OTHER OFFICER \_\_\_\_\_ SEAL \_\_\_\_\_

MY COMMISSION EXPIRES: \_\_\_\_\_

ANY REVISIONS TO THE APPROVED STORMWATER MANAGEMENT PLAN SHALL BE SUBMITTED TO, AND APPROVED, BY THE UPPER UWCHLAN TOWNSHIP, AND A REVISED EROSION AND SEDIMENT POLLUTION CONTROL PLAN SHALL BE SUBMITTED TO, AND APPROVED, BY THE CHESTER COUNTY CONSERVATION DISTRICT OR UPPER UWCHLAN TOWNSHIP (AS APPLICABLE) FOR DETERMINATION OF ADEQUACY PRIOR TO CONSTRUCTION OF THE REVISED FEATURES.

OWNER: BYERS RETAIL ACQUISITION, L.P.

REVIEWED BY THE PLANNING COMMISSION OF UPPER UWCHLAN TOWNSHIP, CHESTER COUNTY, PENNSYLVANIA.  
THIS DAY OF , A.D. 20 ,

CHAIRMAN

VICE CHAIRMAN

SECRETARY

APPROVED BY THE BOAD OF SUPERVISORS OF UPPER UWCHLAN TOWNSHIP, CHESTER COUNTY, PENNSYLVANIA  
THIS DAY OF , A.D. 20 ,

CHAIRMAN

VICE CHAIRMAN

MEMBER

REVIEWED BY THE PLANNING COMMISSION OF CHESTER COUNTY, PENNSYLVANIA,  
THIS DAY OF , A.D. 20 ,

SECRETARY

REVIEWED BY UPPER UWICHILAN TOWNSHIP ENGINEER:

DATE \_\_\_\_\_

I, WILLIAM R. REARDEN, ON THIS DATE \_\_\_\_\_, HEREBY CERTIFY TO THE BEST OF MY KNOWLEDGE THAT THE SWM SITE PLAN MEETS ALL DESIGN STANDARDS AND CRITERIA OF UPPER UWCHLAN TOWNSHIP ORDINANCE NO. 2013-05, STORMWATER MANAGEMENT ORDINANCE.

WILLIAM R. REARDEN, P.E.  
PRINCIPAL, CIVIL ENGINEER  
PROFESSIONAL ENGINEER  
LICENSE NO. PE073243

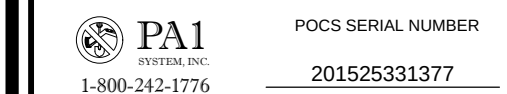
I HEREBY CERTIFY THAT TO THE BEST OF MY PROFESSIONAL KNOWLEDGE AND BELIEF, THE LOT GEOMETRY AND CLOSURE SHOWN HEREON ARE CORRECT AND MEET THE ACCURACY REQUIREMENTS SET FORTH IN THE UPPER UWCHLAN TOWNSHIP SUBDIVISION AND LAND DEVELOPMENT ORDINANCE.

JAMES C. WEED  
PENNSYLVANIA PROFESSIONAL LAND SURVEYOR No. SU075250

## REVISIONS

[illegible]

PENNSYLVANIA LAW REQUIRES  
3 WORKING DAYS NOTICE FOR  
CONSTRUCTION PHASE AND 10  
WORKING DAYS IN DESIGN



|              |                    |
|--------------|--------------------|
| PROJECT No.: | PC1511921          |
| DRAWN BY:    | J.C.F.             |
| CHECKED BY:  | W.R.R.             |
| DATE:        | 2018.02.16         |
| SCALE:       | AS NOTED           |
| CAD I.D.:    | PC1511921DETAILS-0 |

PROJECT:

AMENDED FINAL  
PRD PLANS

— FOR —

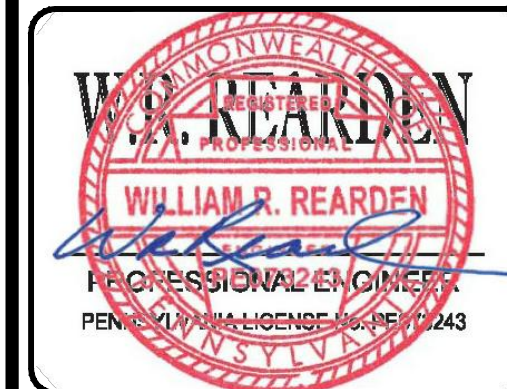
BYERS RETAIL  
ACQUISITION, L.P.

'THE VILLAGE  
@ BYERS STATION'  
LOT 2 COMMERCIAL

GRAPHITE MINE ROAD &  
STATION BOULEVARD  
UPPER UWCHLAN TOWNSHIP  
CHESTER COUNTY  
COMMONWEALTH OF PENNSYLVANIA



**1600 MANOR DRIVE, SUITE 200  
CHALFONT, PENNSYLVANIA 18914**  
Phone: (215) 996-9100  
Fax: (215) 996-9102  
***www.BohlerEngineering.com***



SHEET TITLE:

COVER SHEET  
(RECORD PLAN -  
SHEET 1 OF 8)

SHEET NUMBER:

1  
OF 34

REVISION No. 0



## GENERAL NOTES

CONTRACTOR IS RESPONSIBLE FOR COMPLIANCE WITH THE NOTES AND SPECIFICATIONS CONTAINED HEREIN. CONTRACTOR IS RESPONSIBLE TO ENSURE THAT ALL SUBCONTRACTORS FULLY AND COMPLETELY CONFORM TO AND COMPLY WITH THESE REQUIREMENTS.

- THE FOLLOWING DOCUMENTS ARE INCORPORATED BY REFERENCE AS PART OF THIS SITE PLAN:

- "ALTA/CASM LAND TITLE SURVEY," PREPARED BY CONTROL POINTS ASSOCIATES, INC., FOR BYERS RESIDENTIAL ACQUISITION, L.P. & BYERS RETAIL ACQUISITION, L.P., DATED 10/27/2015, LAST REVISED 11/16/2015.
- "BYERS STATION SUBDIVISION & AMENDED FINAL PRD PLANS," PREPARED BY BOHLER ENGINEERING, PA, LLC, FOR TOLL PA II L.P., DATED 05/20/2016, LAST REVISED 12/06/17.
- "GENERAL PROJECT DESCRIPTION AND STORMWATER MANAGEMENT CALCULATIONS," PREPARED BY BOHLER ENGINEERING, PA, LLC, DATED 5/10/17, LATEST REVISION.
- "PARK ROAD EXTENSION SANITARY SEWER AS-BUILT PLAN," PREPARED BY YERKES ASSOCIATES, INC., DATED 10/12/16.

PRIOR TO THE START OF CONSTRUCTION, THE CONTRACTOR MUST VERIFY THAT HE/HIS/HE HAS THE LATEST EDITION OF THE DOCUMENTS REFERENCED ABOVE. THIS IS THE CONTRACTOR'S RESPONSIBILITY.

- ALL ACCESSIBLE ADA PARKING SPACES MUST BE CONSTRUCTED TO MEET, AT A MINIMUM, THE REQUIREMENTS OF THE "AMERICANS WITH DISABILITIES ACT" (ADA) CODE (42 U.S.C. § 12101 et seq. AND 24 U.S.C. § 4151 et seq.) AND ANY AND ALL AMENDMENTS WHICH ARE IN EFFECT WHEN THESE PLANS ARE COMPLETED.
- PRIOR TO STARTING CONSTRUCTION, THE CONTRACTOR IS RESPONSIBLE TO ENSURE THAT ALL REQUIRED PERMITS AND APPROVALS HAVE BEEN OBTAINED. NO CONSTRUCTION OR FABRICATION SHALL BEGIN UNTIL THE CONTRACTOR HAS RECEIVED AND THOROUGHLY REVIEWED THE COMMENTS TO ALL PLANS AND OTHER DOCUMENTS REVIEWED AND APPROVED BY THE PERMITTING AUTHORITIES AND CONFIRMED THAT ALL NECESSARY OR REQUIRED PERMITS HAVE BEEN OBTAINED. CONTRACTOR MUST HAVE COPIES OF ALL PERMITS AND APPROVALS ON SITE AT ALL TIMES.
- THE OWNER/CONTRACTOR MUST BE FAMILIAR WITH AND RESPONSIBLE FOR THE PROCUREMENT OF ANY AND ALL CERTIFICATIONS REQUIRED FOR THE ISSUANCE OF A CERTIFICATE OF OCCUPANCY.
- ALL WORK MUST BE PERFORMED IN ACCORDANCE WITH THESE PLANS, SPECIFICATIONS AND CONDITIONS OF APPROVAL, AND ALL APPLICABLE REQUIREMENTS, RULES, REGULATIONS, STATUTORY REQUIREMENTS, CODES, LAWS AND STANDARDS OF ALL GOVERNMENTAL ENTITIES WITH JURISDICTION OVER THIS PROJECT.
- THE GEOTECHNICAL REPORT AND RECOMMENDATIONS SET FORTH HEREIN ARE A PART OF THE REQUIRED CONSTRUCTION DOCUMENTS AND, IN CASE OF CONFLICT, DISCREPANCY OR AMBIGUITY, THE MORE STRINGENT REQUIREMENTS CONTAINED IN THE PLANS AND THE GEOTECHNICAL REPORT SHALL CONTROL. THE CONTRACTOR SHALL FOLLOW THE RECOMMENDATIONS AND RECOMMENDATIONS SHALL TAKE PRECEDENCE UNLESS SPECIFICALLY NOTED OTHERWISE ON THE PLANS. THE CONTRACTOR MUST NOTIFY THE ENGINEER, IN WRITING, OF ANY SUCH CONFLICT, DISCREPANCY OR AMBIGUITY BETWEEN THE GEOTECHNICAL REPORT AND PLANS AND SPECIFICATIONS PRIOR TO PROCEEDING WITH ANY FURTHER WORK.
- THESE PLANS ARE BASED ON INFORMATION PROVIDED TO BOHLER ENGINEERING BY THE OWNER AND OTHERS PRIOR TO THE TIME OF PLAN PREPARATION. CONTRACTOR MUST FIELD VERIFY EXISTING CONDITIONS AND NOTIFY BOHLER ENGINEERING, IN WRITING, IMMEDIATELY IF ACTUAL SITE CONDITIONS DIFFER FROM THOSE SHOWN ON THE PLAN, OR IF THE PROVIDED WORK CONFLICTS WITH ANY OTHER SITE FEATURES.
- ALL DIMENSIONS SHOWN ON THE PLANS MUST BE FIELD VERIFIED BY THE CONTRACTOR PRIOR TO THE START OF CONSTRUCTION. CONTRACTOR MUST NOTIFY ENGINEER, IN WRITING, OF ANY CONFLICTS, DISCREPANCIES, OR AMBIGUITIES EXIST PRIOR TO PROCEEDING WITH CONSTRUCTION. NO EXTRA COMPENSATION WILL BE PAID TO THE CONTRACTOR FOR WORK WHICH HAS TO BE REDONE OR REPAIRED DUE TO DIMENSIONS OR GRADES SHOWN INCORRECTLY ON THESE PLANS PRIOR TO CONTRACTOR GIVING ENGINEER WRITTEN NOTIFICATION OF SAME AND ENGINEER, THEREAFTER, PROVIDING CONTRACTOR WITH WRITTEN AUTHORIZATION TO PROCEED WITH SUCH ADDITIONAL WORK.
- CONTRACTOR MUST REFER TO THE ARCHITECTURAL/BUILDING PLANS ("OF RECORD" FOR EXACT LOCATIONS AND DIMENSIONS OF ENTRY/EXIT POINTS, ELEVATIONS, PRECISE BUILDING DIMENSIONS, AND EXACT BUILDING UTILITY LOCATIONS.
- PRIOR TO THE START OF CONSTRUCTION, THE CONTRACTOR MUST COORDINATE THE BUILDING LAYOUT BY CAREFUL REVIEW OF THE LATEST CIVIL PLANS AND THE LATEST ARCHITECTURAL PLANS (INCLUDING, BUT NOT LIMITED TO, STRUCTURAL, MECHANICAL, ELECTRICAL, PLUMBING AND FIRE SUPPRESSION PLAN, WHERE APPLICABLE). CONTRACTOR MUST IMMEDIATELY NOTIFY OWNER, ARCHITECT AND BOHLER ENGINEERING, IN WRITING, OF ANY CONFLICTS, DISCREPANCIES OR AMBIGUITIES WHICH EXIST.
- DEBRIS MUST NOT BE BURIED ON THE SUBJECT SITE AND ALL UNSUITABLE EXCAVATED MATERIAL AND DEBRIS (SOLID WASTE) MUST BE DISPOSED OF IN ACCORDANCE WITH THE REQUIREMENTS OF ANY AND ALL GOVERNMENTAL AUTHORITIES WHICH HAVE JURISDICTION OVER THIS PROJECT OR OVER CONTRACTOR.
- THE CONTRACTOR IS RESPONSIBLE FOR IDENTIFYING WHEN SHORING IS REQUIRED AND FOR INSTALLING ALL SHORING REQUIRED DURING EXCAVATION (TO BE PERFORMED IN ACCORDANCE WITH CURRENT OSHA STANDARDS) AND ANY ADDITIONAL PRECAUTIONS TO BE TAKEN TO ASSURE THE STABILITY OF ADJACENT, NEARBY AND CONTIGUOUS STRUCTURES AND PROPERTIES.
- THE CONTRACTOR IS TO EXERCISE EXTREME CARE WHEN PERFORMING ANY WORK ADJACENT TO PAVEMENT, STRUCTURES, ETC. WHICH ARE TO REMAIN EITHER FOR AN INITIAL PHASE OF THE PROJECT OR AS PART OF THE FINAL CONDITION. CONTRACTOR IS RESPONSIBLE FOR TAKING ALL APPROPRIATE MEASURES REQUIRED TO ENSURE THE STRUCTURAL STABILITY OF SIDEWALKS AND PAVEMENT, UTILITIES, BUILDINGS, AND INFRASTRUCTURE WHICH ARE TO REMAIN, AND TO PROVIDE A SAFE WORK AREA FOR THIRD PARTIES, PEDESTRIANS AND ANYONE INVOLVED WITH THE PROJECT.
- THE CONTRACTOR IS RESPONSIBLE FOR REPAIRING ANY DAMAGE DONE TO ANY NEW OR EXISTING CONSTRUCTION OR PROPERTY DURING THE COURSE OF CONSTRUCTION, INCLUDING BUT NOT LIMITED TO DRAINAGE, UTILITIES, PAVEMENT, STRIPPING, CURB, ETC. AND SHALL BEAR ALL COSTS ASSOCIATED WITH SAME TO INCLUDE, BUT NOT BE LIMITED TO, REDESIGN, RE-SURVEY, RECONSTRUCTION, REPAIRS, AND REPAIRS TO THE PROPERTY. CONTRACTOR MUST FURNISH BOHLER ENGINEERING WITH CERTIFICATIONS OF COMPLETION, AND ANY UNDERGROUND ACCESSORY EQUIPMENT DAMAGED DURING CONSTRUCTION AND MUST BEAR ALL COSTS ASSOCIATED WITH SAME. THE REPAIR OF ANY SUCH NEW OR EXISTING CONSTRUCTION OR PROPERTY MUST RESTORE SUCH CONSTRUCTION OR PROPERTY TO A CONDITION EQUIVALENT TO OR BETTER THAN THE CONDITIONS PRIOR TO THE CONSTRUCTION, AND IN CONFORMANCE WITH APPLICABLE CODES, LAWS, RULES, REGULATIONS, STATUTORY REQUIREMENTS AND STATUTES. CONTRACTOR MUST BEAR ALL COSTS ASSOCIATED WITH SAME. CONTRACTOR IS RESPONSIBLE TO DOCUMENT ALL EXISTING DAMAGE AND TO NOTIFY THE OWNER AND THE CONSTRUCTION MANAGER PRIOR TO THE START OF CONSTRUCTION.
- ALL CONCRETE MUST BE AIR ENTRAINED AND HAVE THE MINIMUM COMPRESSIVE STRENGTH OF 4,000 PSI AT 28 DAYS UNLESS OTHERWISE NOTED ON THE PLANS, DETAILS AND/OR GEOTECHNICAL REPORT.
- THE ENGINEER IS NOT RESPONSIBLE FOR CONSTRUCTION METHODS, MEANS, TECHNIQUES OR PROCEDURES, GENERALLY OR FOR THE CONSTRUCTION MEANS, METHODS, TECHNIQUES OR PROCEDURES FOR COMPLETION OF THE WORK DEPicted BOTH ON THESE PLANS, AND FOR ANY CONSTRUCTION/SCOPE REVISIONS WHICH RESULT FROM SAME. CONTRACTOR IS RESPONSIBLE FOR DETERMINING THE METHODS/MEANS FOR COMPLETION OF THE WORK PRIOR TO THE COMMENCEMENT OF CONSTRUCTION.
- THE ENGINEER OF RECORD IS NOT RESPONSIBLE FOR JOB SITE SAFETY. THE ENGINEER OF RECORD HAS NOT BEEN RETAINED TO PERFORM OR BE RESPONSIBLE FOR JOB SITE SAFETY, SAME BEING WHOLLY OUTSIDE OF ENGINEER'S SERVICES AS RELATED TO THE PROJECT. THE ENGINEER OF RECORD IS NOT RESPONSIBLE TO IDENTIFY OR REPORT ANY JOB SITE SAFETY ISSUES, AT ANY TIME.
- ALL CONTRACTORS MUST CARRY THE SPECIFIED STAFFED WORKER'S COMPENSATION INSURANCE. EMPLOYER'S LIABILITY INSURANCE AND LIMITS OF COMMERCIAL GENERAL LIABILITY INSURANCE (CGL). ALL CONTRACTORS MUST HAVE THEIR CGL POLICIES ENDORSED TO NAME BOHLER ENGINEERING, INC. AND ITS PAST, PRESENT AND FUTURE OWNERS, OFFICERS, DIRECTORS, PARTNERS, SHAREHOLDERS, MEMBERS, PRINCIPALS, COMMISSIONERS, AGENTS, SERVANTS, EMPLOYEES, AFFILIATES, SUBSIDIARIES, AND RELATED ENTITIES, AND ITS SUBCONTRACTORS AND SUBCONSULTANTS AS ADDITIONAL NAMED INSURED AND TO PROVIDE CONTRACTUAL LIABILITY COVERAGE SUFFICIENT TO INSURE THIS HOLD HARMLESS AND INDEMNIFY OBLIGATIONS ASSUMED BY THE CONTRACTORS. ALL CONTRACTORS MUST FURNISH BOHLER ENGINEERING WITH CERTIFICATIONS OF COMPLETION, AND ANY UNDERGROUND ACCESSORY EQUIPMENT DAMAGED DURING CONSTRUCTION AND MUST BEAR ALL COSTS ASSOCIATED WITH SAME. THE REPAIR OF ANY SUCH NEW OR EXISTING CONSTRUCTION OR PROPERTY MUST RESTORE SUCH CONSTRUCTION OR PROPERTY TO A CONDITION EQUIVALENT TO OR BETTER THAN THE CONDITIONS PRIOR TO THE CONSTRUCTION, AND IN CONFORMANCE WITH APPLICABLE CODES, LAWS, RULES, REGULATIONS, STATUTORY REQUIREMENTS AND STATUTES. CONTRACTOR MUST BEAR ALL DAMAGES, LOSSES, DAMAGES, COSTS, JUDGMENTS, PENALTIES AND THE LIKE RELATED TO SAME.
- NEITHER THE PROFESSIONAL ACTIVITIES OF BOHLER ENGINEERING, NOR THE PRESENCE OF BOHLER ENGINEERING AND/OR ITS PAST, PRESENT AND FUTURE OWNERS, OFFICERS, DIRECTORS, PARTNERS, SHAREHOLDERS, MEMBERS, PRINCIPALS, COMMISSIONERS, AGENTS, SERVANTS, EMPLOYEES, AFFILIATES, SUBSIDIARIES, AND RELATED ENTITIES, AND ITS SUBCONTRACTORS AND SUBCONSULTANTS AT A CONSTRUCTION PROJECT SITE, SHALL RELIEVE THE GENERAL CONTRACTOR OF ITS OBLIGATIONS, DUTIES AND RESPONSIBILITIES INCLUDING, BUT NOT LIMITED TO, CONSTRUCTION MEANS, METHODS, TECHNIQUES OR PROCEDURES NECESSARY FOR PERFORMING, OVERSEEING, SUPERINTENDING AND COORDINATING THE WORK IN ACCORDANCE WITH THE CONTRACT DOCUMENTS AND COMPLIANCE ANY HEALTH OR SAFETY PRECAUTIONS REQUIRED BY ANY REGULATORY AGENCIES WITH JURISDICTION OVER THE PROJECT AND/OR PROPERTY. BOHLER ENGINEERING AND ITS PERSONNEL HAVE NO AUTHORITY TO EXERCISE ANY CONTROL OVER ANY CONSTRUCTION CONTRACTOR OR ITS EMPLOYEES IN CONNECTION WITH THEIR WORK OR ANY HEALTH OR SAFETY PROGRAMS OR PROCEDURES. THE GENERAL CONTRACTOR IS SOLELY RESPONSIBLE FOR JOB SITE SAFETY. BOHLER ENGINEERING SHALL BE INDEMNIFIED BY THE GENERAL CONTRACTOR AND MUST BE NAMED AN ADDITIONAL INSURED UNDER THE GENERAL CONTRACTOR'S POLICIES OF GENERAL LIABILITY INSURANCE AS DESCRIBED ABOVE FOR JOB SITE SAFETY.
- IF THE CONTRACTOR DEVIATES FROM THE PLANS AND SPECIFICATIONS, INCLUDING THE NOTES CONTAINED HEREIN, WITHOUT FIRST OBTAINING THE PRIOR WRITTEN AUTHORIZATION OF THE ENGINEER FOR SUCH DEVIATIONS, THE CONTRACTOR IS SOLELY RESPONSIBLE FOR CORRECTING THE DEVIATION. IF THE CONTRACTOR DEVIATES FROM ANY WORK DONE WHICH DEVIATES FROM THE PLANS, ALL FINES AND/OR PENALTIES ASSESSED WITH RESPECT THERETO AND ALL COMPENSATORY OR PUNITIVE DAMAGES RESULTING THEREFROM AND, FURTHER, SHALL DEFEND, INDEMNIFY AND HOLD HARMLESS THE ENGINEER, TO THE FULLEST EXTENT PERMITTED UNDER THE LAW, IN ACCORDANCE WITH THESE NOTES HEREIN, FOR AND FROM ALL FEES, ATTORNEY'S FEES, DAMAGES, COSTS, JUDGMENTS, PENALTIES AND THE LIKE RELATED TO SAME.
- CONTRACTOR IS RESPONSIBLE FOR MAINTENANCE AND PROTECTION OF TRAFFIC PLAN FOR ALL WORK THAT AFFECTS PUBLIC TRAVEL EITHER IN THE R.O.W. OR ON SITE, THE COST FOR THIS ITEM MUST BE INCLUDED IN THE CONTRACTOR'S PRICE.
- ALL SIGNING AND PAVEMENT STRIPING MUST CONFORM TO MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES OR LOCALLY APPROVED SUPPLEMENT.
- ENGINEER IS NOT RESPONSIBLE FOR ANY INJURY OR DAMAGES RESULTING FROM CONTRACTOR'S FAILURE TO BUILD OR CONSTRUCT IN STRICT ACCORDANCE WITH THE APPROVED PLANS. IF CONTRACTOR AND/OR OWNER FAIL TO BUILD OR CONSTRUCT IN STRICT ACCORDANCE WITH APPROVED PLANS, THEY AGREE TO JOINTLY AND SEVERALLY INDEMNIFY AND HOLD ENGINEER HARMLESS FOR ALL INJURIES AND DAMAGES THAT ENGINEER SUFFERS AND COSTS THAT ENGINEER INCURS.
- OWNER MUST MAINTAIN AND PRESERVE ALL PHYSICAL SITE FEATURES AND DESIGN FEATURES DEPICTED ON THE PLANS AND RELATED DOCUMENTS, IN STRICT ACCORDANCE WITH THE APPROVED PLANS AND DESIGN AND, FURTHER ENGINEER IS NOT RESPONSIBLE FOR ANY FAILURE TO SO MAINTAIN OR PRESERVE SITE AND/OR DESIGN FEATURES. IF OWNER FAILS TO MAINTAIN AND PRESERVE ALL PHYSICAL SITE FEATURES AND/OR DESIGN FEATURES DEPICTED ON THE PLANS AND RELATED DOCUMENTS, OWNER AGREES TO INDEMNIFY AND HOLD ENGINEER HARMLESS FOR ALL INJURIES AND DAMAGES THAT ENGINEER SUFFERS AND COSTS THAT ENGINEER INCURS AS A RESULT OF SAID FAILURE.
- ALL DIMENSIONS MUST BE TO FACE OF CURB, EDGE OF PAVEMENT, OR EDGE OF BUILDING, UNLESS NOTED OTHERWISE. ALL CURB RADI ARE 5' UNLESS NOTED OTHERWISE.
- ALL CONSTRUCTION AND MATERIALS MUST COMPLY WITH ELEMENTS AND CONFORM TO APPLICABLE FEDERAL, STATE AND LOCAL REGULATIONS, LAWS, ORDINANCES, RULES AND CODES, AND ALL APPLICABLE OSHA REQUIREMENTS.
- CONTRACTOR AND OWNER MUST INSTALL ALL ELEMENTS AND COMPONENTS IN STRICT COMPLIANCE WITH AND ACCORDANCE WITH MANUFACTURER'S STANDARDS AND RECOMMENDED INSTALLATION CRITERIA AND SPECIFICATIONS. IF CONTRACTOR AND/OR OWNER FAIL TO DO SO, THEY AGREE TO JOINTLY AND SEVERALLY INDEMNIFY AND HOLD ENGINEER HARMLESS FOR ALL INJURIES AND DAMAGES THAT ENGINEER SUFFERS AND COSTS THAT ENGINEER INCURS AS A RESULT OF SAID FAILURE.
- AS CONTAINED IN THESE DRAWINGS AND ASSOCIATED APPLICATION DOCUMENTS PREPARED BY THE SIGNATORY PROFESSIONAL ENGINEER, THE USE OF THE WORDS "CERTIFY" OR "CERTIFICATION" CONSTITUTES AN EXPRESSION OF "PROFESSIONAL OPINION" REGARDING THE INFORMATION WHICH IS THE SUBJECT OF THE UNDERSIGNED PROFESSIONAL KNOWLEDGE OR BELIEF, AND IN ACCORDANCE WITH COMMON ACCEPTED PRACTICE CONSISTENT WITH THE APPLICABLE STANDARDS OF PRACTICE, AND DOES NOT CONSTITUTE A WARRANTY OR GUARANTEE, EITHER EXPRESSED OR IMPLIED.
- ELEVATIONS BASED ON NAVD 1988 VERTICAL DATUM BY GPS OBSERVATIONS UTILIZING TREMBLE VRS NETWORK.
- PROPERTY LIES WITHIN FLOOD HAZARD ZONE X (AREAS DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN) AS SHOWN ON THE FLOOD INSURANCE RATE MAPS (FIRM) 42029C0090F AND 42029C0095F. MAPS LAST REVISED ON SEPTEMBER 29, 2006.
- THIS PLAN IS BEING SUBMITTED AS AN AMENDED FINAL PLANNED RESIDENTIAL DEVELOPMENT PLAN IN ACCORDANCE WITH UPPER UMWCHLAN TOWNSHIP SUBDIVISION AND LAND DEVELOPMENT ORDINANCES OF 1989.
- AS-BUILT PLANS SHALL BE SUBMITTED TO UPPER UMWCHLAN TOWNSHIP IN ACCORDANCE WITH SECTION 152-50.2 OF THE STORMWATER MANAGEMENT ORDINANCE AND SECTION 162-62 OF THE SUBDIVISION AND LAND DEVELOPMENT ORDINANCE.
- THE OWNER IS RESPONSIBLE FOR PERPETUAL MAINTENANCE OF THE STORMWATER FACILITIES ON THIS SITE. HOWEVER, SHOULD THE OWNER FAIL TO MAINTAIN THE STORMWATER FACILITIES A BLANKET EASEMENT IN FAVOR OF UPPER UMWCHLAN TOWNSHIP IS HEREBY PROVIDED FOR INSPECTION AND MAINTENANCE OF ALL STORMWATER AND BMP FACILITIES WITHIN PRIVATELY OWNED LANDS.
- ANY AND ALL TRAILS PROPOSED TO CONNECT PARCEL 5C TO OTHER PARCELS IN THE TOWNSHIP WILL BE DEDICATED TO UPPER UMWCHLAN TOWNSHIP. A BLANKET EASEMENT IN FAVOR OF UPPER UMWCHLAN TOWNSHIP, SHALL BE PROVIDED FOR THE TRAIL THAT IS OUTSIDE OF THE RIGHT-OF-WAY.
- AREA WITHIN THE ULTIMATE RIGHT-OF-WAY WILL BE DEDICATED TO UPPER UMWCHLAN TOWNSHIP. ANY ADDITIONAL RIGHT-OF-WAY REQUESTED BY UPPER UMWCHLAN TOWNSHIP FOR FUTURE ROAD IMPROVEMENTS ABOVE AND BEYOND THAT REQUIRED BY THE ORIGINAL PRD APPROVAL WILL BE OFFERED TO UPPER UMWCHLAN TOWNSHIP AND/OR THE PENNSYLVANIA DEPARTMENT OF TRANSPORTATION FOR DEDICATION, PROVIDED SUCH OFFER OF DEDICATION DOES NOT ADVERSELY AFFECT THE ALLOWABLE DENSITY APPROVED IN SAID PRD APPROVAL.
- CROSSWALK ACROSS STATION BOULEVARD TO BE CONSTRUCTED AT THE SAME TIME AS THE SITE ACCESS. THE CROSS WALK SHALL BE IN INSTALLED IN ACCORDANCE WITH EXHIBIT A' OR 'B' DATED 10/17/17.
- RETAINING WALLS SHALL BE DESIGNED BY A LICENSED PENNSYLVANIA ENGINEER WHO SPECIALIZES IN RETAINING WALL DESIGN. THE DESIGN OF THE RETAINING WALLS SHALL TAKE INTO ACCOUNT THE SATURATED SOIL CONDITIONS ADJOINING THE WALLS.

## GENERAL GRADING & UTILITY NOTES

- LOCATIONS OF ALL EXISTING AND PROPOSED SERVICES AND ALL MUST BE INDEPENDENTLY CONFIRMED WITH LOCAL UTILITY COMPANIES PRIOR TO COMMENCEMENT OF ANY CONSTRUCTION OR EXCAVATION. SANITARY SEWER AND ALL OTHER UTILITY SERVICE CONNECTION POINTS MUST BE INDEPENDENTLY CONFIRMED BY THE CONTRACTOR IN THE FIELD PRIOR TO THE COMMENCEMENT OF CONSTRUCTION. ALL DISCREPANCIES MUST IMMEDIATELY BE REPORTED, IN WRITING, TO THE ENGINEER. CONSTRUCTION MUST COMMENCE BEGINNING AT THE LOWEST INVERT (POINT OF CONCERN) AND PROGRESS UP GRADIENT. PROPOSED INTERFACE POINTS (CROSSINGS) WITH EXISTING UNDERGROUND UTILITIES SHALL BE FIELD VERIFIED BY TEST PITS PRIOR TO COMMENCEMENT OF CONSTRUCTION.
- CONTRACTOR MUST VERTICALLY AND HORIZONTALLY LOCATE ALL EXISTING UTILITIES AND SERVICES INCLUDING, BUT NOT LIMITED TO, GAS, WATER, ELECTRIC, SANITARY AND STORM SEWER, TELEPHONE, CABLE, FIBER OPTIC CABLE, ETC. WITHIN THE LIMITS OF DISTURBANCE OR WORK SPACE, WHICHEVER IS GREATER. THE CONTRACTOR MUST USE, REFER TO AND COMPLY WITH THE REQUIREMENTS OF THE APPLICABLE UTILITY NOTIFICATION SYSTEM TO LOCATE ALL THE UNDERGROUND UTILITIES. THE CONTRACTOR IS RESPONSIBLE FOR REPAIRING ALL DAMAGE TO ANY EXISTING UTILITIES DURING CONSTRUCTION, AT NO COST TO THE OWNER. CONTRACTOR SHALL BEAR ALL COSTS ASSOCIATED WITH DAMAGE TO ANY EXISTING UTILITIES DURING CONSTRUCTION.
- IT IS THE CONTRACTOR'S RESPONSIBILITY TO REVIEW ALL CONSTRUCTION CONTRACT DOCUMENTS INCLUDING, BUT NOT LIMITED TO, ALL OF THE DRAWINGS AND SPECIFICATIONS ASSOCIATED WITH THE PROJECT WORK SCOPE PRIOR TO THE INITIATION AND COMMENCEMENT OF CONSTRUCTION. SHOULD THE CONTRACTOR FIND A CONFLICT AND/OR DISCREPANCY BETWEEN THE DOCUMENTS RELATIVE TO THE SPECIFICATIONS OR THE RELATIVE OR APPLICABLE CODES, REGULATIONS, LAWS, RULES, STATUTES AND/OR ORDINANCES, IT IS THE CONTRACTOR'S SOLE RESPONSIBILITY TO NOTIFY THE PROJECT ENGINEER OF RECORD, IN WRITING, OF SAID CONFLICT AND/OR DISCREPANCY PRIOR TO THE START OF CONSTRUCTION. CONTRACTOR'S FAILURE TO NOTIFY THE PROJECT ENGINEER SHALL CONSTITUTE CONTRACTOR'S FULL AND COMPLETE ACCEPTANCE OF ALL RESPONSIBILITY TO COMPLETE THE SCOPE OF WORK AS DEFINED BY THE DRAWINGS AND IN FULL COMPLIANCE WITH ALL FEDERAL, STATE AND LOCAL REGULATIONS, LAWS, STATUTES, ORDINANCES AND CODES AND, FURTHER, CONTRACTOR SHALL BE RESPONSIBLE FOR ALL COSTS ASSOCIATED WITH SAME.
- THE CONTRACTOR MUST LOCATE AND CLEARLY AND UNAMBIGUOUSLY DEFINE VERTICALLY AND HORIZONTALLY ALL ACTIVE AND INACTIVE UTILITY AND/OR SERVICE SYSTEMS THAT ARE TO BE REMOVED. THE CONTRACTOR IS RESPONSIBLE TO PROTECT AND MAINTAIN ALL ACTIVE AND INACTIVE SYSTEMS THAT ARE NOT BEING REMOVED/RELOCATED DURING SITE ACTIVITY.
- THE CONTRACTOR MUST FAMILIARIZE ITSELF WITH THE APPLICABLE UTILITY SERVICE PROVIDER REQUIREMENTS AND IS RESPONSIBLE FOR ALL COORDINATION REGARDING UTILITY DEMOLITION AS IDENTIFIED OR REQUIRED FOR THE PROJECT. THE CONTRACTOR MUST PROVIDE THE OWNER WITH WRITTEN NOTIFICATION THAT THE EXISTING UTILITIES AND SERVICES HAVE BEEN TERMINATED AND ABANDONED IN ACCORDANCE WITH THE JURISDICTION AND UTILITY COMPANY REQUIREMENTS AND ALL OTHER APPLICABLE REQUIREMENTS, RULES, STATUTES, LAWS, ORDINANCES AND CODES.
- THE CONTRACTOR MUST INSTALL ALL STORM SEWER AND SANITARY SEWER COMPONENTS WHICH FUNCTION BY GRAVITY PRIOR TO THE INSTALLATION OF ALL OTHER UTILITIES.
- CONTRACTOR IS RESPONSIBLE FOR COORDINATION OF SITE PLAN DOCUMENTS AND ARCHITECTURAL DESIGN FOR EXACT BUILDING UTILITY CONNECTION LOCATIONS. GROUND, TRAP REQUIREMENTS/DETAILS, DOOR ACCESS, AND EXTERIOR GRADING, THE ARCHITECT WILL DETERMINE THE UTILITY SERVICE SIZES. THE CONTRACTOR MUST COORDINATE THE INSTALLATION OF ALL UTILITIES SERVICE SIZES AND TO ENSURE THAT PROPER DEPTH ARE ACHIEVED. THE CONTRACTOR IS RESPONSIBLE FOR ENSURING THAT INSTALLATION OF ALL IMPROVEMENTS COMPLIES WITH ALL UTILITY REQUIREMENTS WITH JURISDICTION AND CONTROL OFF THE PROJECT SITE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DESIGN AND CONSTRUCTION OF ALL UTILITY CONNECTIONS. THE CONTRACTOR IS RESPONSIBLE FOR COORDINATING THE UTILITY TIE-IN CONNECTIONS PRIOR TO CONNECTING TO THE EXISTING UTILITY SERVICE, WHERE A CONFLICT(S) EXISTS BETWEEN THESE PLANS AND THE ARCHITECTURAL PLANS, OR WHERE ARCHITECTURAL PLAN UTILITY CONNECTION POINTS DIFFER, THE CONTRACTOR MUST IMMEDIATELY NOTIFY THE ENGINEER, IN WRITING, AND PRIOR TO CONSTRUCTION, RESOLVE SAME.
- WATER SERVICE MATERIALS, BURIAL DEPTH, AND COVER REQUIREMENTS MUST BE SPECIFIED BY THE LOCAL UTILITY COMPANY. CONTRACTOR'S PRICE FOR WATER SERVICE MUST INCLUDE ALL FEES, COSTS, TESTING AND ASPIRY RANCES REQUIRED BY THE UTILITY COMPANY TO PROVIDE FULL AND COMPLETE WORKING SERVICE. CONTRACTOR MUST CONTACT THE APPLICABLE UTILITY COMPANY TO CONFIRM THE SIZE AND TYPE OF WATER METER AND/OR VAULT, PRIOR TO COMMENCING CONSTRUCTION.
- ALL NEW UTILITIES/SERVICES, INCLUDING ELECTRIC, TELEPHONE, CABLE TV, ETC. ARE TO BE INSTALLED UNDERGROUND. ALL NEW UTILITIES/SERVICES MUST BE INSTALLED IN ACCORDANCE WITH THE UTILITY/SERVICE PROVIDER INSTALLATION SPECIFICATIONS AND STANDARDS.
- SITE GRADING MUST BE PERFORMED IN ACCORDANCE WITH THESE PLANS AND SPECIFICATIONS AND THE RECOMMENDATIONS SET FORTH IN THE GEOTECHNICAL REPORT REFERENCED IN THIS PLAN SET. THE CONTRACTOR IS RESPONSIBLE FOR REMOVING AND REPLACING UNSUITABLE MATERIALS WITH SUITABLE MATERIALS AS SPECIFIED IN THE GEOTECHNICAL REPORT. ALL EXCAVATED OR FILLED AREAS MUST BE COMPACTED AS OUTLINED IN THE GEOTECHNICAL REPORT. MOISTURE CONTENT AT TIME OF PLACEMENT MUST BE SUBMITTED IN A FIELD REPORT PREPARED BY A QUALIFIED GEOTECHNICAL ENGINEER, REGISTERED WITH THE STATE WHERE THE WORK IS PERFORMED, VERIFYING THAT ALL FILLED AREAS AND SUBGRADE AREAS WITHIN THE BUILDING PAD AREA AND AREAS TO BE PAVED HAVE BEEN COMPACTED IN ACCORDANCE WITH THESE PLANS, SPECIFICATIONS AND THE RECOMMENDATIONS SET FORTH IN THE GEOTECHNICAL REPORT AND ALL APPLICABLE REQUIREMENTS, RULES, STATUTES, LAWS, ORDINANCES AND CODES. SUBBASE MATERIAL FOR SIDEWALKS, CURB, OR ASPHALT MUST BE FREE OF ORGANICS AND OTHER UNSUITABLE MATERIALS. SHOULD SUBBASE BE DEMAED UNSUITABLE BY OWNER/DEVELOPER, OR OWNER/DEVELOPER'S REPRESENTATIVE, SUBBASE IS TO BE REMOVED AND FILLED WITH APPROVED FILL MATERIAL COMPACTED AS DIRECTED BY THE GEOTECHNICAL REPORT. EARTHWORK ACTIVITIES INCLUDING, BUT NOT LIMITED TO, EXCAVATION, BACKFILL, AND COMPACTING MUST COMPLY WITH THE RECOMMENDATIONS IN THE GEOTECHNICAL REPORT AND ALL APPLICABLE REQUIREMENTS, RULES, STATUTES, LAWS, ORDINANCES AND CODES.
- ALL FILL, COMPACTION, AND BACKFILL MATERIALS REQUIRED FOR UTILITY INSTALLATION MUST BE AS PER THE RECOMMENDATIONS PROVIDED IN THE GEOTECHNICAL REPORT AND MUST BE COORDINATED WITH THE APPLICABLE UTILITY COMPANY SPECIFICATIONS. WHEN THE PROJECT DOES NOT HAVE GEOTECHNICAL RECOMMENDATIONS, FILL AND COMPACTION MUST, AT A MINIMUM, COMPLY WITH THE STATE DOT REQUIREMENTS AND SPECIFICATIONS AND CONSULTANT SHALL HAVE NO LIABILITY OR RESPONSIBILITY FOR OR AS RELATED TO FILL, COMPACTION AND BACKFILL.
- THE CONTRACTOR MUST COMPLY, TO THE FULLEST EXTENT, WITH THE LATEST OSHA STANDARDS AND REGULATIONS, AND/OR ANY OTHER AGENCY WITH JURISDICTION FOR EXCAVATION AND TRENCHING PROCEDURES. THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING THE "MEANS AND METHODS" REQUIRED TO MEET THE INTENT AND PERFORMANCE OF THE LATEST OSHA, AS WELL AS ANY OTHER ENTITY THAT HAS JURISDICTION FOR EXCAVATION AND/OR TRENCHING PROCEDURES AND CONSULTANT SHALL HAVE NO RESPONSIBILITY FOR OR AS RELATED TO EXCAVATION AND TRENCHING PROCEDURES.
- PAVEMENT MUST BE SAW CUT IN STRAIGHT LINES, AND EXCEPT FOR EDGE OF BUTT JOINTS, MUST EXTEND TO THE FULL DEPTH OF THE EXISTING PAVEMENT. ALL DEBRIS FROM REMOVAL OPERATIONS MUST BE REMOVED FROM THE SITE AT THE TIME OF EXCAVATION. STOCKPILING OF DEBRIS WILL NOT BE PERMITTED.
- THE TOPS OF EXISTING MANHOLES, INLET STRUCTURES, UTILITY VALVES, AND SANITARY CLEANOUTS MUST BE ADJUSTED, AS NECESSARY, TO MATCH PROPOSED GRADE IN ACCORDANCE WITH ALL APPLICABLE STANDARDS, REQUIREMENTS, RULES, STATUTES, LAWS, ORDINANCES AND CODES.
- DURING THE INSTALLATION OF SANITARY SEWER, STORM SEWER, AND ALL UTILITIES, THE CONTRACTOR MUST MAINTAIN A CONTEMPORANEOUS AND THOROUGH RECORD OF THE CONSTRUCTION TO IDENTIFY THE AS-INSTALLED LOCATIONS OF ALL UNDERGROUND INFRASTRUCTURE. THE CONTRACTOR MUST CAREFULLY NOTE ANY INSTALLATIONS THAT DEViate FROM THE INFORMATION CONTAINED IN THE UTILITY PLAN. THIS RECORD MUST BE KEPT ON A CLEAN COPY OF THESE PLANS, WHICH CONTRACTOR MUST PROMPTLY PROVIDE TO THE OWNER AT THE COMPLETION OF WORK.
- WHEN THE SITE IMPROVEMENT PLANS INVOLVE MULTIPLE BUILDINGS, SOME OF WHICH MAY BE BUILT AT A LATER DATE, TO A POINT AT LEAST FIVE (5) FEET BEYOND THE PAVED AREAS INCLUDING, BUT NOT LIMITED TO STORM SEWER, SANITARY SEWER, UTILITIES, AND IRRIGATION LINE, TO A POINT AT LEAST FIVE (5) FEET BEYOND THE PAVED AREAS FOR WHICH THE CONTRACTOR IS RESPONSIBLE, THE CONTRACTOR MUST CAP ENDS AS APPROPRIATE. MARK LOCATIONS WITH A 2x4 STAKE, AND MUST NOTE THE LOCATION OF ALL OF THE ABOVE ON A CLEAN COPY OF THESE PLANS, WHICH CONTRACTOR MUST PROMPTLY PROVIDE TO THE OWNER UPON COMPLETION OF THE WORK.
- THE CONTRACTOR IS FULLY RESPONSIBLE FOR VERIFICATION OF EXISTING TOPOGRAPHIC INFORMATION AND UTILITY INVERT ELEVATIONS PRIOR TO COMMENCING ANY CONSTRUCTION. CONTRACTOR MUST CONFIRM AND ENSURE 0.75% MINIMUM SLOPE AGAINST ALL ISLANDS, GUTTERS, AND CURBS, 1.0% ON ALL CONCRETE SURFACES, AND 1.5% MINIMUM ON ASPHALT. EXCEPT WHERE AN EXISTING LIMIT GRADING IS PRESENT, THE CONTRACTOR MUST IMMEDIATELY NOTIFY, IN WRITING TO THE ENGINEER, ANY DISCREPANCIES THAT MAY OR COULD AFFECT THE PUBLIC'S SAFETY, HEALTH OR GENERAL WELFARE, OR PROJECT COST. IF CONTRACTOR PROCEEDS WITHOUT PROVIDING THIS NOTIFICATION, THIS SHALL BE AT THE CONTRACTOR'S RISK. THE CONTRACTOR SHALL, IN WRITING, AND FURTHER, CONTRACTOR SHALL INDEMNIFY, DEFEND AND HOLD HARMLESS THE DESIGN ENGINEER FOR ANY DAMAGES, COSTS, INJURIES, ATTORNEY'S FEES AND THE LIKE WHICH RESULT FROM SAME.
- PROPOSED TOP OF CURB ELEVATIONS ARE GENERALLY 6" ABOVE EXISTING LOCAL ASPHALT GRADE UNLESS OTHERWISE NOTED. IT IS CONTRACTOR'S OBLIGATION TO ENSURE THAT DESIGN ENGINEER APPROVES FINAL CURBING CUT SHEETS PRIOR TO INSTALLATION OF SAME.
- REFER TO SITE PLAN FOR ADDITIONAL NOTES.
- IN THE EVENT OF DISCREPANCIES AND/OR CONFLICTS BETWEEN PLANS OR RELATIVE TO OTHER PLANS, THE SITE PLAN WILL TAKE PRECEDENCE AND CONTROL. CONTRACTOR MUST IMMEDIATELY NOTIFY THE DESIGN ENGINEER, IN WRITING, OF ANY DISCREPANCIES AND/OR CONFLICTS.
- CONTRACTOR IS REQUIRED TO SECURE ALL NECESSARY AND/OR REQUIRED PERMITS AND APPROVALS FOR ALL OFF-SITE MATERIAL SOURCES AND DISPOSAL FACILITIES. CONTRACTOR MUST SUPPLY A COPY OF APPROVALS TO THE ENGINEER AND OWNER PRIOR TO INITIATING ANY WORK.
- TOP AND BOTTOM OF WALL ELEVATIONS (TV & BW) REPRESENT THE PROPOSED FINISHED GRADE AT THE FACE OF WALL AND DO NOT REPRESENT THE ELEVATION OF THE PROPOSED VERTICAL CURVE OR THE FOOTING OF THE WALL. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE CONSTRUCTION OF THE WALLS. THE CONTRACTOR SHALL DETERMINE BY THE CONTRACTOR BASED ON FINAL STRUCTURAL DESIGN SHOP DRAWINGS PREPARED BY THE APPROPRIATE PROFESSIONAL LICENSED IN THE STATE WHERE THE CONSTRUCTION OCCURS. THE CONTRACTOR MUST ENSURE ALL WALLS SHOWN HEREON MUST BE DESIGNED BY A LICENSED STRUCTURAL ENGINEER AND THAT SHOP AND SEALED SHOP DRAWINGS BE APPROVED PRIOR TO THE CONSTRUCTION. FURTHER, THE CONTRACTOR SHALL ENSURE THAT FENCING, GUARDRAIL, UTILITIES, AND OTHER SITE ADJACENTIES IN THE VICINITY OF THE RETAINING WALL(S) PROPOSED SCHEMATICALLY IN THESE PLANS, SHALL BE CONSIDERED AND INCORPORATED INTO THE RETAINING WALL DESIGN BY OTHERS).
- STORM DRAINAGE PIPE: UNLESS INDICATED OTHERWISE, ALL STORM SEWER PIPE MUST BE REINFORCED CONCRETE PIPE (RCP) CLASS III WITH JOINTS WHEN HIGH-DENSITY POLYETHYLENE PIPE (HDPE) IS CALLED FOR ON THE PLANS. IT MUST CONFORM TO AASHTO M404 AND TYPE S1 (SMOOTH INTERIOR WITH ANGULAR CORRUGATIONS) WITH GASKET FOR WATER-TIGHT JOINT. PVC PIPE FOR RCP DRAIN CONNECTION MUST BE SDR 26 OR SCHEDULE 40 UNLESS INDICATED OTHERWISE.
- SANITARY SEWER MAIN MUST BE POLY(VINYL CHLORIDE (PVC) SDR 35 EXCEPT WHERE INDICATED OTHERWISE. SANITARY LATERALS MUST BE PVC SCHEDULE 40 OR PVC SDR 26 UNLESS INDICATED, IN WRITING, OTHERWISE.
- STORM AND SANITARY SEWER PIPE LENGTHS INDICATED ARE NOMINAL.
- SEWERS CONVEYING SANITARY FLOW, COMBINED SANITARY, AND STORMWATER FLOW OR INDUSTRIAL FLOW MUST BE SEPARATED FROM WATER MAINS BY A DISTANCE OF AT LEAST 10 FEET HORIZONTALLY. IF SUCH LATERAL SEPARATION IS NOT POSSIBLE, THE PIPES MUST BE IN SEPARATE TRENCHES WITH THE SEWER AT LEAST 18 INCHES BELOW THE BOTTOM OF THE WATER MAIN, OR SUCH OTHER SEPARATION AS APPROVED BY THE GOVERNMENT AGENCY WITH JURISDICTION OVER SAME.
- WHERE APPROPRIATE SEPARATION FROM A WATER MAIN IS NOT POSSIBLE, THE SEWER MUST BE ENCASED IN CONCRETE, OR CONSTRUCTED OF DUCTILE IRON PIPE USING MECHANICAL OR SLIP-ON JOINTS FOR A DISTANCE OF AT LEAST 10 FEET ON EITHER SIDE OF THE CROSSING. IN ADDITION, ONE FULL LENGTH OF SEWER PIPE SHOULD BE LOCATED SO BOTH JOINTS WILL BE AS FAR FROM THE WATER LINE AS POSSIBLE. WHERE A WATER MAIN CROSSES UNDER A SEWER, ADEQUATE STRUCTURAL SUPPORT FOR THE SEWER MUST BE PROVIDED.
- WATER MAIN PIPING MUST BE INSTALLED IN ACCORDANCE WITH THE REQUIREMENTS AND SPECIFICATIONS OF THE LOCAL WATER AUTHORITY ABSENCE OF SUCH REQUIREMENTS, WATER MAIN PIPING MUST BE CEMENT-LINED DUCTILE IRON (DIP) MINIMUM CLASS 52 THICKNESS. ALL PIPE AND APPURTENANCES MUST COMPLY WITH THE APPLICABLE AWWA STANDARDS IN EFFECT AT THE TIME OF APPLICATION.
- CONTRACTOR MUST ENSURE THAT ALL UTILITY TRENCHES LOCATED IN EXISTING PAVED ROADWAYS INCLUDING SEWER, WATER AND STORM SYSTEMS, MUST BE REPAIRED IN ACCORDANCE WITH REFERENCED MUNICIPAL, COUNTY AND/OR DOT DETAILS AS APPLICABLE. CONTRACTOR MUST COORDINATE INSPECTION AND APPROVAL OF COMPLETED WORK WITH THE AGENCY WITH JURISDICTION OVER SAME.
- WHERE BASEMENTS ARE TO BE PROVIDED FOR PROPOSED DWELLING UNITS, THE DEVELOPER SHALL, BY BORING OR BY TEST PIT, DETERMINE THE DEPTH TO GROUNDWATER AT THE LOCATION OF THE PROPOSED DWELLINGS. WHERE GROUNDWATER IS ENCOUNTERED IN THE BASEMENT AREA, BASEMENTS WILL NOT BE INSTALLED UNLESS SPECIAL CONSTRUCTION METHODS ARE UTILIZED, TO BE REVIEWED AND APPROVED BY THE MUNICIPAL CONSTRUCTION CODE OFFICIAL. IF AND WHERE SUMP PUMPS ARE INSTALLED, ALL DISCHARGES MUST BE CONNECTED TO THE STORM SEWER. A CLEANOUT MUST BE PROVIDED PRIOR TO THE CONNECTION TO THE STORM DRAIN IN ORDER THAT BLOCKAGES CAN BE ADDRESSED.
- FOR SINGLE AND MULTI-FAMILY RESIDENTIAL PROJECTS, WHERE THE PROPOSED DWELLING AND ADJACENT STOP ELEVATIONS ARE SCHEMATIC FOR GENERIC BUILDING FOOTPRINT, GRADES MUST BE ADJUSTED BASED ON FINAL ARCHITECTURAL PLANS TO PROVIDE A MINIMUM OF SIX (6) INCHES BELOW TOP OF BLOCK AND/OR SIX (6) INCHES BELOW SIDING, WHICHEVER IS LOWEST, AND MUST PROVIDE POSITIVE DRAINAGE (2" MIN.) AWAY FROM DWELLING. ALL CONSTRUCTION, INCLUDING GRADING, MUST COMPLY WITH THE LATEST LOCAL AND STATE BUILDING CODE AND ALL OTHER APPLICABLE REQUIREMENTS, RULES, STATUTES, LAWS, ORDINANCES AND CODES.
- LOCATION OF PROPOSED UTILITY POLE RELOCATION IS AT THE SOLE DISCRETION OF UTILITY COMPANY.
- CONSULTANT IS NEITHER LIABLE NOR RESPONSIBLE FOR ANY SUBSURFACE CONDITIONS AND FURTHER, SHALL HAVE NO LIABILITY FOR ANY HAZARDOUS MATERIALS, HAZARDOUS SUBSTANCES, OR POLLUTANTS ON, ABOUT OR UNDER THE PROPERTY.
- ALL SANITARY SEWER MATERIALS, SPECIFICATIONS, INSTALLATION PROCEDURES, AND PIPE SPECIFICATIONS SHALL BE CONSISTENT WITH UPPER UMWCHLAN MUNICIPAL AUTHORITY STANDARDS.
- PRIOR TO CONSTRUCTION THE CONTRACTOR SHALL OBTAIN ALL NECESSARY/REQUIRED PERMITS FOR SANITARY SEWER CONSTRUCTION.
- PRIOR TO CONSTRUCTION, A MINIMUM OF 48 HOURS NOTICE IS REQUIRED TO BE GIVEN TO THE UPPER UMWCHLAN MUNICIPAL AUTHORITY AND THEIR ENGINEER.
- AS-BUILT PLANS OF THE SANITARY SEWER SYSTEM ARE REQUIRED BY THE UPPER UMWCHLAN TOWNSHIP MUNICIPAL AUTHORITY FOR REVIEW AND APPROVAL.

## GENERAL DEMOLITION NOTES

- THIS PLAN REFERENCES DOCUMENTS AND INFORMATION BY:

- SURVEY: CONTROL POINT ASSOCIATES, INC., 1600 MANOR DRIVE, SUITE 100, CHALFONT, PA 18914  
PREPARED FOR: "BYERS RESIDENTIAL ACQUISITION, L.P. AND BYERS RETAIL ACQUISITION, L.P."  
PROJECT NO.: 02-150229  
DATE: 10/27/2015  
LAST REVISED: 11/16/2015
- CONTRACTOR SHALL PERFORM ALL WORK IN ACCORDANCE WITH THE REQUIREMENTS OF THE OCCUPATIONAL SAFETY AND HEALTH ACT OF 1970, (29 U.S.C. 651 et seq.), AS AMENDED AND ANY MODIFICATIONS, AMENDMENTS OR REVISIONS TO SAME.
- BOHLER ENGINEERING HAS NO CONTRACTUAL, LEGAL, OR OTHER RESPONSIBILITY FOR JOB SITE SAFETY OR JOB SITE SUPERVISION, OR ANYTHING RELATED TO SAME.
- THE DEMOLITION PLAN IS INTENDED TO PROVIDE GENERAL INFORMATION, ONLY, REGARDING ITEMS TO BE DEMOLISHED AND/OR REMOVED. THE CONTRACTOR MUST ALSO REVIEW THE OTHER SITE PLAN DRAWINGS AND INCLUDE IN DEMOLITION ACTIVITIES ALL INCIDENTAL WORK NECESSARY FOR THE CONSTRUCTION OF THE NEW SITE IMPROVEMENTS.
- CONTRACTOR MUST RAISE ANY QUESTIONS CONCERNING THE ACCURACY OR INTENT OF THESE PLANS OR SPECIFICATIONS, CONCERNING REGARDING THE APPLICABLE SAFETY STANDARDS, OR THE SAFETY OF THE CONTRACTOR OR THIRD PARTIES IN PERFORMING THE WORK ON THIS PROJECT, WITH BOHLER ENGINEERING, IN WRITING, AND RESPONDED TO BY BOHLER, IN WRITING, PRIOR TO THE INITIATION OF ANY SITE ACTIVITY AND ANY DEMOLITION ACTIVITY. ALL DEMOLITION ACTIVITIES MUST BE PERFORMED IN ACCORDANCE WITH THE REQUIREMENTS OF THESE PLANS AND SPECIFICATIONS AND ALL APPLICABLE FEDERAL, STATE AND LOCAL REGULATIONS, RULES, REQUIREMENTS, STATUTES, ORDINANCES AND CODES.
- PRIOR TO STARTING ANY DEMOLITION, CONTRACTOR IS RESPONSIBLE FOR/TO:
  - OBTAINING ALL REQUIRED PERMITS AND MAINTAINING THE SAME ON SITE FOR REVIEW BY THE ENGINEER AND OTHER PUBLIC AGENCIES HAVING JURISDICTION THROUGHOUT THE DURATION OF THE PROJECT, SITE WORK AND DEMOLITION WORK.
- ALL DEMOLITION ACTIVITIES ARE TO BE PERFORMED IN ACCORDANCE WITH THESE PLANS, SPECIFICATIONS, AND REFERENCED DOCUMENTS AS WELL AS ALL FEDERAL, STATE AND LOCAL REGULATIONS. ANY DISCREPANCIES OR DEVIATIONS SHALL BE IDENTIFIED BY THE CONTRACTOR TO THE ENGINEER IN WRITING FOR RESOLUTION PRIOR TO INITIATION OF ACTIVITY.
- PRIOR TO STARTING ANY DEMOLITION CONTRACTOR IS RESPONSIBLE FOR/TO:
  - ENSURE COPIES OF ALL PERMITS AND APPROVALS ARE ON SITE FOR REVIEW.
  - THE REQUIRED SOIL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE IN PLACE PRIOR TO SITE DISTURBANCE.

- ALL UTILITIES AND SERVICES, INCLUDING BUT NOT LIMITED TO GAS, WATER, ELECTRIC, SANITARY AND STORM SEWER, TELEPHONE, CABLE, FIBER OPTIC CABLE, ETC. WITHIN THE LIMITS OF DISTURBANCE, SHALL BE VERTICALLY AND HORIZONTALLY LOCATED. THE CONTRACTOR SHALL USE AND COMPLY WITH THE REQUIREMENTS OF THE APPLICABLE UTILITY NOTIFICATION SYSTEM TO LOCATE ALL THE UNDERGROUND UTILITIES.
- PROTECT AND MAINTAIN IN OPERATION, ALL ACTIVE SYSTEMS THAT ARE NOT BEING REMOVED DURING ALL DEMOLITION ACTIVITIES.
- FAMILIARIZE THEMSELVES WITH THE APPLICABLE UTILITY SERVICE PROVIDER REQUIREMENT AND IS RESPONSIBLE FOR ALL COORDINATION REGARDING UTILITY DEMOLITION AS IDENTIFIED OR REQUIRED FOR PROJECT. THE CONTRACTOR SHALL PROVIDE THE OWNER WRITTEN NOTIFICATION THAT THE EXISTING UTILITIES AND SERVICES HAVE BEEN TERMINATED AND ABANDONED IN ACCORDANCE WITH JURISDICTION AND UTILITY COMPANY REQUIREMENTS.
- COORDINATION WITH UTILITY COMPANIES REGARDING WORKING "OFF-PEAK" HOURS OR ON WEEKENDS AS MAY BE REQUIRED TO MINIMIZE THE IMPACT ON THE AFFECTED PARTIES.
- A COMPLETE INSPECTION FOR CONTAMINANTS, BY A LICENSED ENVIRONMENTAL TESTING AGENCY, OF ALL BUILDINGS AND/OR STRUCTURES TO BE REMOVED SHALL BE DONE IN ACCORDANCE WITH ALL APPLICABLE LOCAL, STATE, AND FEDERAL ENVIRONMENTAL REGULATIONS. ALL CONTAMINANTS SHALL BE REMOVED AND DISPOSED OF BY A FEDERALLY LICENSED CONTRACTOR IN ACCORDANCE WITH FEDERAL, STATE, AND LOCAL REGULATIONS. ALL ENVIRONMENTAL WORK INCLUDING HAZARDOUS MATERIAL, SOILS, ASBESTOS, OR OTHER REFERENCED OR IMPLIED HEREIN IS SOLELY THE RESPONSIBILITY OF THE OWNER'S ENVIRONMENTAL CONSULTANT.
- THE CONTRACTOR SHALL PROVIDE ALL THE "MEANS AND METHODS" NECESSARY TO PREVENT MOVEMENT, SETTLEMENT, OR COLLAPSE OF EXISTING STRUCTURES, AND ANY OTHER IMPROVEMENTS THAT ARE REMAINING ON OR OFF SITE.
- IN THE ABSENCE OF SPECIFIC REQUIREMENTS, THE CONTRACTOR SHALL PERFORM EARTH MOVEMENT ACTIVITIES, DEMOLITION AND REMOVAL OF ALL FOUNDATION WALLS, FOOTINGS, AND OTHER MATERIALS WITHIN THE LIMITS OF DISTURBANCE IN ACCORDANCE WITH DIRECTION BY OWNERS GEOTECHNICAL ENGINEER.
- EXPLOSIVES SHALL NOT BE USED WITHOUT PRIOR WRITTEN CONSENT OF BOTH THE OWNER AND APPLICABLE GOVERNMENTAL AUTHORITIES. ALL THE REQUIRED PERMITS AND EXPLOSIVE CONTROL MEASURES THAT ARE REQUIRED BY THE FEDERAL, STATE, AND LOCAL GOVERNMENTS SHALL BE IN PLACE PRIOR TO STARTING AN EXPLOSIVE PROGRAM. THE CONTRACTOR IS ALSO RESPONSIBLE FOR ALL INSPECTION AND SEISMIC VIBRATION TESTING THAT IS REQUIRED TO MONITOR THE EFFECTS ON ALL LOCAL STRUCTURES.
- CONTRACTOR SHALL PROVIDE TRAFFIC CONTROL, AND GENERALLY ACCEPTED SAFE PRACTICES IN CONFORMANCE WITH THE "MANUAL ON UNIFORM TRAFFIC CONTROL," AS WELL AS FEDERAL, STATE, AND LOCAL REGULATIONS WHEN DEMOLITION RELATED ACTIVITIES IMPACT ROADWAYS OR ROADWAY RIGHTS-OF-WAY.
- THE CONTRACTOR SHALL CONDUCT DEMOLITION ACTIVITIES IN SUCH A MANNER TO INSURE MINIMUM INTERFERENCE WITH ROADS, STREETS, SIDEWALKS, WALKWAYS, AND OTHER ADJACENT FACILITIES. STREET CLOSURE PERMITS MUST BE RECEIVED FROM THE APPROPRIATE GOVERNMENTAL AUTHORITY WHERE REQUIRED.
- DEMOLITION ACTIVITIES AND EQUIPMENT SHALL NOT USE AREAS OUTSIDE THE DEFINED PROPERTY LINES, WITHOUT WRITTEN PERMISSION OF THE OWNER, AND/OR APPROPRIATE GOVERNMENT AGENCY.
- USE DUST CONTROL MEASURES TO LIMIT THE AMOUNT OF AIRBORNE DUST AND DIRT RISINS AND SCATTERING IN THE AIR TO WITHIN FEDERAL, STATE, AND/OR LOCAL STANDARDS. AFTER THE DEMOLITION IS COMPLETE, ADJACENT STRUCTURES AND IMPROVEMENTS SHALL BE CLEANED OF ALL DUST AND DINGS CAUSED BY DEMOLITION OPERATIONS. THE CONTRACTOR IS RESPONSIBLE FOR RETURNING ALL ADJACENT AREAS TO THEIR "PRE-DEMOLITION" CONDITION.
- THE CONTRACTOR IS RESPONSIBLE TO SAFEGUARD THE SITE AS NECESSARY TO PERFORM THE DEMOLITION IN SUCH A MANNER AS TO PREVENT THE UNAUTHORIZED ENTRY OF PERSONS AT ANY TIME.
- THIS DEMOLITION PLAN IS INTENDED TO IDENTIFY THOSE EXISTING ITEMS/CONDITIONS WHICH ARE TO BE REMOVED. IT IS NOT INTENDED TO PROVIDE DIRECTION OTHER THAN THAT ALL METHODS AND MEANS ARE TO BE IN ACCORDANCE WITH STATE, FEDERAL, LOCAL, AND JURISDICTIONAL REQUIREMENTS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL OSHA AND OTHER SAFETY PRECAUTIONS NECESSARY TO PROVIDE A SAFE WORK SITE.
- THE DEMOLITION CONTRACTOR IS RESPONSIBLE FOR ALL REPAIRS OF DAMAGE TO ALL ITEMS THAT ARE TO REMAIN AS A RESULT OF HIS ACTIVITIES. ALL REPAIRS SHALL USE NEW MATERIAL. THE REPAIRS SHALL RESTORE THE ITEM TO THE PRE-DEMOLITION CONDITION.
- DEBRIS SHALL NOT BE BURIED ON THE SUBJECT SITE. ALL EXCAVATED MATERIAL AND DEBRIS (SOLID WASTE) SHALL BE DISPOSED OF IN ACCORDANCE WITH ALL TOWN, COUNTY, STATE, AND FEDERAL LAWS AND APPLICABLE CODES. THE CONTRACTOR SHALL PROPERLY REMOVE AND DISPOSE OF HAZARDOUS/UNSUITABLE MATERIAL OFF-SITE IN ACCORDANCE WITH ALL APPLICABLE CODES, ORDINANCES, AND LAWS.

## SITE DISTANCE NOTE

ALL RIGHT DISTANCE OBSTRUCTIONS (INCLUDING BUT NOT LIMITED TO EMBANKMENTS AND VEGETATION) SHALL BE REMOVED BY THE DEVELOPER (PERMITTED) TO PROVIDE A MINIMUM CONTINUOUS DESIRABLE SIGHT DISTANCE TO THE LEFT AND RIGHT FOR A DRIVER EXITING THE PROPOSED INTERSECTION ONTO THE THROUGH HIGHWAY AS NOTED ON THE SITE PLAN. THE DRIVER MUST BE CONSIDERED TO BE POSITIONED 10 FEET FROM THE NEAR EDGE OF THE CLOSEST HIGHWAY THROUGH TRAVEL LANE (FROM CURB LINE IF CURBING IS PRESENT) AT AN EYE HEIGHT OF 3'-6" ABOVE PAVED SURFACE. THE POINT SIGHTED BY THE EXITING DRIVER SHALL ALSO BE 3'-6" ABOVE THE PAVED SURFACE LOCATED IN THE CENTER OF THE CLOSEST HIGHWAY TRAVEL LANE DESIGNATED FOR USE BY THE APPROACHING TRAFFIC. THE CONTINUOUS SIGHT DISTANCE SHALL BE MAINTAINED BY THE PERMITTEE.

| STATION<br>BOULEVARD &<br>SITE ACCESS | EXISTING<br>MOVEMENTS<br>ENTERING LEFT<br>TURNS | DIRECTION<br>TO THE LEFT<br>TO THE RIGHT |                | REQUIRED SIGHT<br>DISTANCE | POTTSTOWN<br>PKE & SITE<br>ACCESS | DIRECTION<br>TO THE LEFT<br>TO THE RIGHT |                | REQUIRED SIGHT<br>DISTANCE |
|---------------------------------------|-------------------------------------------------|------------------------------------------|----------------|----------------------------|-----------------------------------|------------------------------------------|----------------|----------------------------|
|                                       |                                                 | OPPOSITE DIRECTION                       | SAME DIRECTION |                            |                                   | OPPOSITE DIRECTION                       | SAME DIRECTION |                            |
|                                       |                                                 | 345'                                     | 273'           |                            |                                   | 447'                                     | NA             |                            |
|                                       |                                                 | 245'                                     | 245'           |                            |                                   | 307'                                     | 307'           |                            |

## SITE DESIGN REQUIREMENTS

REQUIREMENTS TAKEN FROM:  
- ZONING ORDINANCE #97-7 OF UPPER UMWCHLAN TOWNSHIP - OCTOBER 1997  
- UPPER UMWCHLAN TOWNSHIP SUBDIVISION AND LAND DEVELOPMENT ORDINANCE OF 1989, AS AMENDED - CHAPTER 162  
- CONDITIONS OF TENTATIVE APPROVAL BYERS STATION PRD, RESOLUTION #07-06-99-09, ADOPTED 7/6/1999.  
PROPOSED USE:  
COMMERCIAL (RETAIL, GROCERY, DAYCARE, EATING ESTABLISHMENTS)

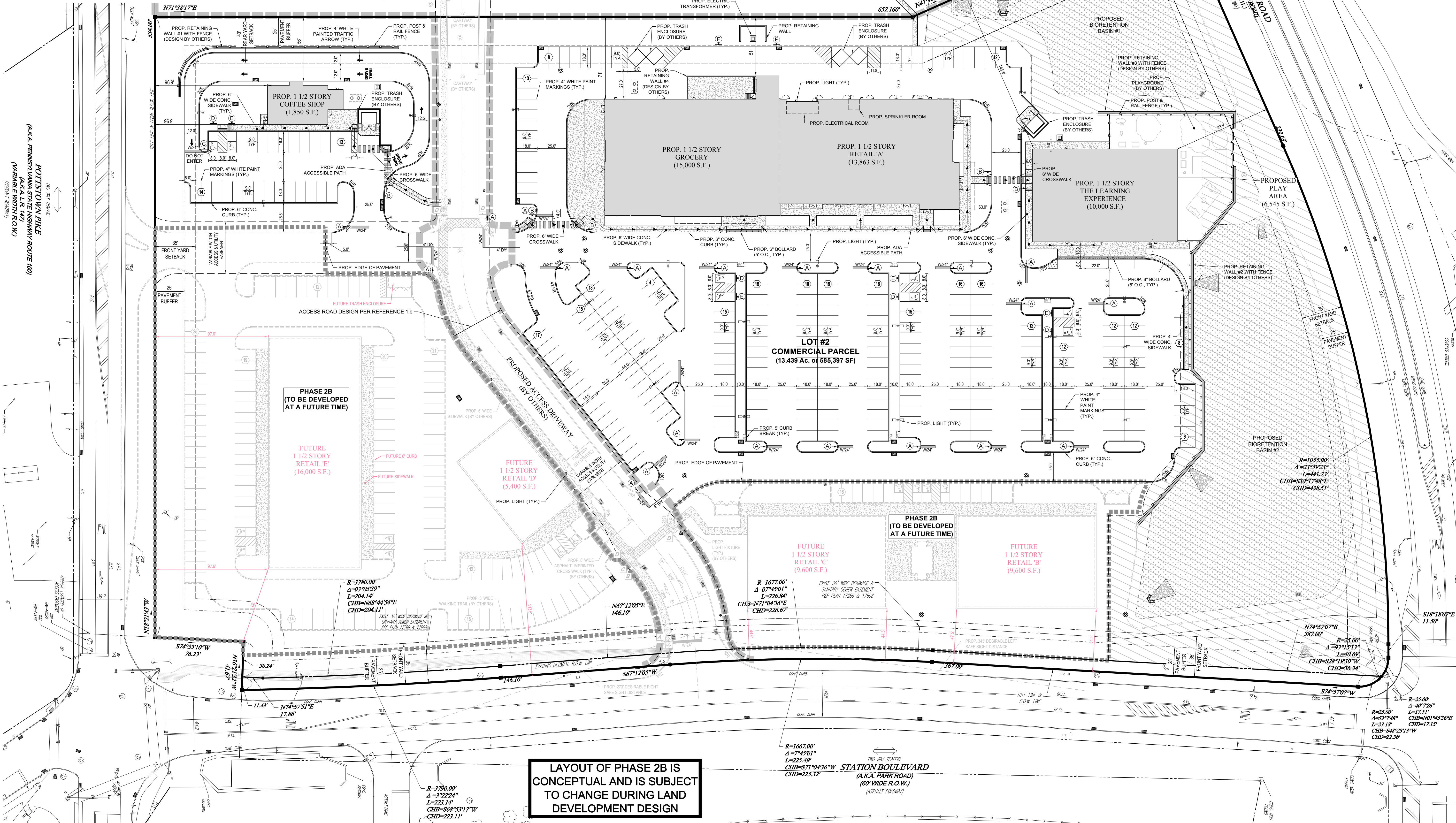
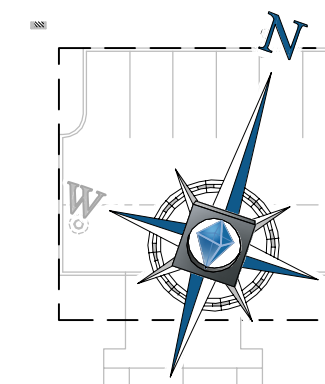
BASE SITE AREA CALCULATIONS (LOT 2 - COMMERCIAL)

TOTAL GROSS SITE AREA AS DETERMINED BY ACTUAL ON-SITE SURVEY 29.792 Ac.  
SUBTRACT LAND WITHIN LOT 1 - RESIDENTIAL 16.353 Ac.  
TOTAL GROSS AREA WITHIN LOT 2 - COMMERCIAL 13.439 Ac.



# SITE PLAN DRAWING LEGEND

- EXISTING PROPERTY LINE
- BUILDING SETBACK LINE
- PROPOSED ROAD CENTERLINE
- ADJACENT PROPERTY LINE
- PROPOSED ACCESS & UTILITY EASEMENT
- PROPOSED PHASE 1E
- DEMOTES IMPROVEMENTS AREA AS DESIGNED IN REFERENCE 1.D
- PROPOSED CONCRETE
- PROPOSED ASPHALT WALKING TRAIL
- PROPOSED OPEN SPACE
- PROPOSED DETECTABLE WARNING SURFACE
- PROPOSED GRAPHITE MINE ROAD CONSTRUCTION & MAINTENANCE EASEMENT
- PROPOSED PARKING COUNT
- FUTURE PARKING COUNT
- PROPOSED SIGN
- PROPOSED FIRE HYDRANT



LAYOUT OF PHASE 2B IS CONCEPTUAL AND IS SUBJECT TO CHANGE DURING LAND DEVELOPMENT DESIGN

## PROPOSED SIGNAGE SYMBOL LEGEND

- (A) PROPOSED 'STOP' SIGN (R1-1)
- (B) PROPOSED 'PEDESTRIAN' SIGN (W11-2) & DIAGONAL DOWNWARD POINTING ARROW PLAQUE (W16-7P)
- (C) PROPOSED 'DO NOT ENTER' SIGN (R5-1)
- (D) PROPOSED 'RESERVED PARKING' SIGN (R7-8) & 'RESERVED PARKING PENALTIES' SIGN (R7-8F) & 'VAN ACCESSIBLE' SIGN (R7-8P)
- (E) PROPOSED 'RESERVED PARKING' SIGN (R7-8) & 'RESERVED PARKING PENALTIES' SIGN (R7-8F)
- (F) PROPOSED NO PARKING SYMBOL SIGN (R7-1)

## PROPOSED SIGNAGE SYMBOL LEGEND (BY OTHERS)

- (A) PROPOSED 'STOP' SIGN (R1-1)
- (B) PROPOSED 'LEFT LANE MUST TURN LEFT' SIGN (R3-7L)
- (C) PROPOSED 'RIGHT LANE MUST TURN RIGHT' SIGN (R3-7R)
- (D) PROPOSED 'PEDESTRIAN' SIGN (W11-2) & DIAGONAL DOWNWARD POINTING ARROW PLAQUE (W16-7P)

**BOHLER ENGINEERING**

SITE CIVIL AND CONSULTING ENGINEERING

LAND SURVEYING, PROGRAM MANAGEMENT, LANDSCAPE ARCHITECTURE, SUSTAINABLE DESIGN, PROJECT MANAGEMENT, TRANSPORTATION

PHILADELPHIA, PA  
BALTIMORE, MD  
NEW YORK, NY  
NEW JERSEY  
NEW HAMPSHIRE  
MASSACHUSETTS  
CONNECTICUT  
VIRGINIA  
NORTH CAROLINA  
SOUTH CAROLINA  
FLORIDA  
ALABAMA  
LOUISIANA  
MISSISSIPPI  
ARKANSAS  
OKLAHOMA  
TEXAS  
UTAH  
IDAHO  
MONTANA  
WYOMING  
NEBRASKA  
KANSAS  
MINNESOTA  
WISCONSIN  
ILLINOIS  
INDIANA  
OHIO  
PENNSYLVANIA  
DELAWARE  
MARYLAND  
DISTRICT OF COLUMBIA  
VIRGINIA  
NORTH CAROLINA  
SOUTH CAROLINA  
FLORIDA  
ALABAMA  
LOUISIANA  
MISSISSIPPI  
ARKANSAS  
OKLAHOMA  
TEXAS  
UTAH  
IDAHO  
MONTANA  
WYOMING  
NEBRASKA  
KANSAS  
MINNESOTA  
WISCONSIN  
ILLINOIS  
INDIANA  
OHIO  
PENNSYLVANIA  
DELAWARE  
MARYLAND  
DISTRICT OF COLUMBIA

| REVISIONS |      |         |    |
|-----------|------|---------|----|
| REV       | DATE | COMMENT | BY |
|           |      |         |    |
|           |      |         |    |
|           |      |         |    |
|           |      |         |    |
|           |      |         |    |
|           |      |         |    |
|           |      |         |    |
|           |      |         |    |
|           |      |         |    |

## CALL BEFORE YOU DIG!

PENNSYLVANIA LAW REQUIRES 3 WORKING DAYS NOTICE FOR CONSTRUCTION PHASE AND 10 WORKING DAYS IN DESIGN STAGE - STOP CALL

PA1  
1-800-242-1776

POCS SERIAL NUMBER  
201525331377

PROJECT No.: PC151921  
DRAWN BY: J.C.T.  
CHECKED BY: W.R.R.  
DATE: 2018.02.16  
SCALE: 1"=40'  
CAD I.D.: PC151921BASE-0

PROJECT:  
**AMENDED FINAL PRD PLANS**  
FOR  
**BYERS RETAIL ACQUISITION, L.P.**  
**'THE VILLAGE @ BYERS STATION' LOT 2 COMMERCIAL**  
GRAPHITE MINE ROAD & STATION BOULEVARD  
UPPER UWCHLAN TOWNSHIP  
CHESTER COUNTY  
COMMONWEALTH OF PENNSYLVANIA

**BOHLER ENGINEERING**  
1600 MANOR DRIVE, SUITE 200  
CHALFONT, PENNSYLVANIA 18914  
Phone: (215) 996-9100  
Fax: (215) 996-9102  
www.BohlerEngineering.com

**W. REARDEN**  
WILLIAM R. REARDEN  
PROFESSIONAL ENGINEER  
PENNSYLVANIA LICENSE # 151743

SHEET TITLE:  
**SITE PLAN (RECORD PLAN - SHEET 3 OF 8)**

SHEET NUMBER:  
**3**  
OF 34

REVISION No. 0









## General Project Description and Stormwater Management Calculations

Project: 'The Village at Byers Station' Lot 2 Commercial  
Graphite Mine Road & Station Boulevard  
Upper Uwchlan Township  
Chester County, PA

Project  
Number: PC1511921

Client: Byers Retail Acquisition, L.P.  
3815 West Chester Pike  
Newtown Square, PA 19073

Date: 2/16/2017

*Refer to the Post Construction Stormwater Management Calculations and Post Construction Stormwater Management Plans and Details for related calculations and elevations of stormwater features.*

Professional  
Engineer: William R. Rearden  
PA License #PE073243



\_\_\_\_\_

# General Project Description/Stormwater Management

---

## GENERAL PROJECT DESCRIPTION

Byers Retail Acquisition, L.P. propose to develop the remaining portion of a the existing 29.79 acre tract at Graphite Mine Road & Station Boulevard known as parcel 5C. The existing 29.79 acre tract was subdivided into two lots – Lot #1 and Lot #2. Lot #1, which consists of 16.35 acres, contains 121 unit townhomes and was previously approved by the township and currently under construction.

Lot #2, the subject of this application, consists of 13.44 acres, and will be developed into 81,313 square feet of commercial space. Currently proposed tenants include retail, grocery, daycare, and coffee shop totaling 40,713 square feet. There is also 40,600 square feet of future commercial space which has no tenants at this time. The proposal includes the installation of public roadways, utilities, landscaping and stormwater management controls necessary to support the development. Pertinent data characterizing the existing and future site conditions are shown on the accompanying Amended Final PRD Plans.

## STORMWATER MANAGEMENT

### Pre-Development

The pre-development condition of Lot #2 consists of one Point of Interest (POI#2) which is indicated on the Pre-Development Drainage Area Plan. POI #2 is located across Graphite Mine Road near the southeast corner of the site at endwalls which discharge into Pickering Creek, which is part of the Delaware River Basin. The on-site area tributary to the point of interest has been delineated and hydrographs have been generated for the 1, 2, 5, 10, 25, 50 and 100 year storms. The pre-development conditions were analyzed based on existing conditions for all areas tributary to the points of interest. There are currently two (2) existing sediment basins located on the site. Since these sediment basins were meant to only be on the site temporarily, they were disregarded in the pre-development stormwater analysis.

*Please note that as part of the Lot #2 development POI #1 has no changes to the existing conditions.*

### Post-Development

The post-development condition of the site maintains the same Point of Interest and relative drainage patterns. There is an increase in the total impervious surface coverage with a subsequent increase in runoff rates and volume. Therefore, above ground stormwater management basins (AGBs) have been designed to reduce peak rates of runoff and runoff volume. The area tributary to each basin has been delineated and hydrographs have been generated for the 1, 2, 5, 10, 25, 50 and 100 year storms. The inflow hydrographs to each basin have been routed and peak flow rate from each routed basin has been added to the hydrographs generated for any bypass areas to determine the total post-development discharge rate.

*Similar to the pre-development condition, the Lot #2 development does not alter any of the stormwater controls for POI #1.*

### Methodology

The SCS Method was utilized for calculating the peak runoff rates and generating hydrographs for the pre- and post-development conditions as defined in the computer watershed software Hydraflow

Hydrographs, version 9.23 (Hydraflow). The hydrographs were generated based on the 24-hr precipitation amounts from NOAA Atlas 14, Volume 2, Version 3 obtained on April 28, 2016 for Chester Springs, PA.

The results of the overall stormwater analysis indicate that development will increase runoff rates and volume due to an increase in impervious surfaces. Therefore, stormwater management areas have been sized to provide adequate storage volume to reduce the post-development runoff rate to be consistent with peak flow rate release, groundwater recharge, volume control and water quality requirements set forth in Upper Uwchlan Township's Chapter 152 Stormwater Management Ordinance and the Chapter 102 CG-1 recharge and water quality requirements of PADEP's NPDES program.

## Requirements

The following requirements are from Chapter 152 "Stormwater Management" of the Upper Uwchlan Ordinances.

### §152-301. General Requirements

- *§152-301.H Areas located outside of the site that drain through a proposed site area not subject to water quality and volume control, infiltration, stream channel protection, or peak flow rate control requirements. Drainage facilities located on the site shall be designed to safely convey flows from outside of the site through the site.*

### §152-305. Water Quality and Runoff Volume Requirements

- *§152-305 Follow the Design Storm Method (CG-1) of the BMP Manual.*
  - o *§152-305.A The volume of runoff from any storm less than or equal to the 2-year, 24-hour design storm shall not be increased.*
  - o *§152-305.B For modeling purposes, the predevelopment ground cover conditions shall be determined using the corresponding ground cover assumptions as presented in §152-309.D of the SWM Ordinance.*

### §152-306. Infiltration Requirements

- *§152-306.A Wherever possible, infiltration should be designed to accommodate the entire water quality runoff volume required in 152-305.*

### §152-307. Stream Channel Protection Requirements

- *§152-307.A The peak flow from the 2-year/24-hour design storm shall be reduced to the pre-development 1-year/24-hour design storm using the SCS Type II distribution.*

### §152-308. Stormwater Peak Rate Control Requirements

- *§152-308.A Post Construction peak flow rates from any regulated activity shall not exceed the predevelopment peak flow rates as shown for each of the design storms specified in Table 308.1.*

*Table 308.1  
Peak Rate Control Standards*

| <i>Postconstruction Design Storm Frequency (24-Hour Duration)</i> |                   | <i>New Development Regulated Activities</i> |
|-------------------------------------------------------------------|-------------------|---------------------------------------------|
| <i>2-year</i>                                                     | <i>Reduced to</i> | <i>1-year</i>                               |
| <i>5-year</i>                                                     |                   | <i>2-year</i>                               |
| <i>10-year</i>                                                    |                   | <i>2-year</i>                               |
| <i>25-year</i>                                                    |                   | <i>25-year</i>                              |
| <i>50-year</i>                                                    |                   | <i>50-year</i>                              |
| <i>100-year</i>                                                   |                   | <i>100-year</i>                             |



- *§152-308.D Only the area of the proposed regulated activity shall be subject to the peak flow rate control standards of this chapter. Undisturbed areas for which the discharge point has not changed are not subject to the peak flow rate control standards.*
- *§152-308.E Areas located outside of the site that drain through a proposed site are not subject to peak flow rate control requirements. Drainage facilities located on the site shall be designed to safely convey flows from outside of the site through the site.*

#### §152-309 Calculation Methodology

- *§152-309.A The runoff and volume requirements for this site are based on the SCS method, since the site exceeds the allowable 5.0 acres of the Rational Method.*
- *§152-309.B Rainfall depth data shall come from NOAA Atlas 14 partial duration series estimates.*
- *§152-309.D(1)(b) Predevelopment areas including impervious surfaces shall assume ground cover of "meadow"*
- *§152-309.E Runoff curve numbers (CN) for both pre- and post-development conditions shall be in accordance with Appendix B of Chapter 152.*

#### §152-311. Other Conveyance and System Design Standards

- *§152-311.F(1) Storm drain system(s), where provided, shall be designed to carry a 25-year peakflow rate, and a 50-year peak flow rate at the sump area.*
- *§152-311.F(3)(a) All inlets must be designed to accommodate the 25-year peak flow rate.*
- *§152-311.G(1) All pipe within the paved cartway shall be reinforced concrete.*
  - **A waiver from this requirement is being requested.**
- *§152-311.G(2) All pipe outside of the paved cartway can consist of interior polyethylene pipe.*
- *§152-311.G(4) Minimum pipe size is 15 inches and have a minimum pipe slope of 0.50%.*
- *§152-311.G(9) Minimum pipe cover of 18 inches.*
- *§152-311.H(3) Wherever possible, emergency spillways shall be provided on undisturbed ground and shall be paved with concrete monoslab pavers. The emergency spillway shall be designed to handle the 100-year/24-hour design storm that yields a depth over the spillway not greater than 1'-0".*
  - **A waiver from this requirement is being requested with regards to the spillway lining materials.**
- *§152-311.J(2) A fence or suitable vegetation shall be provided around all detention basins upon recommendation of the Township Engineer. All fencing shall be at least 3'-6" in height.*

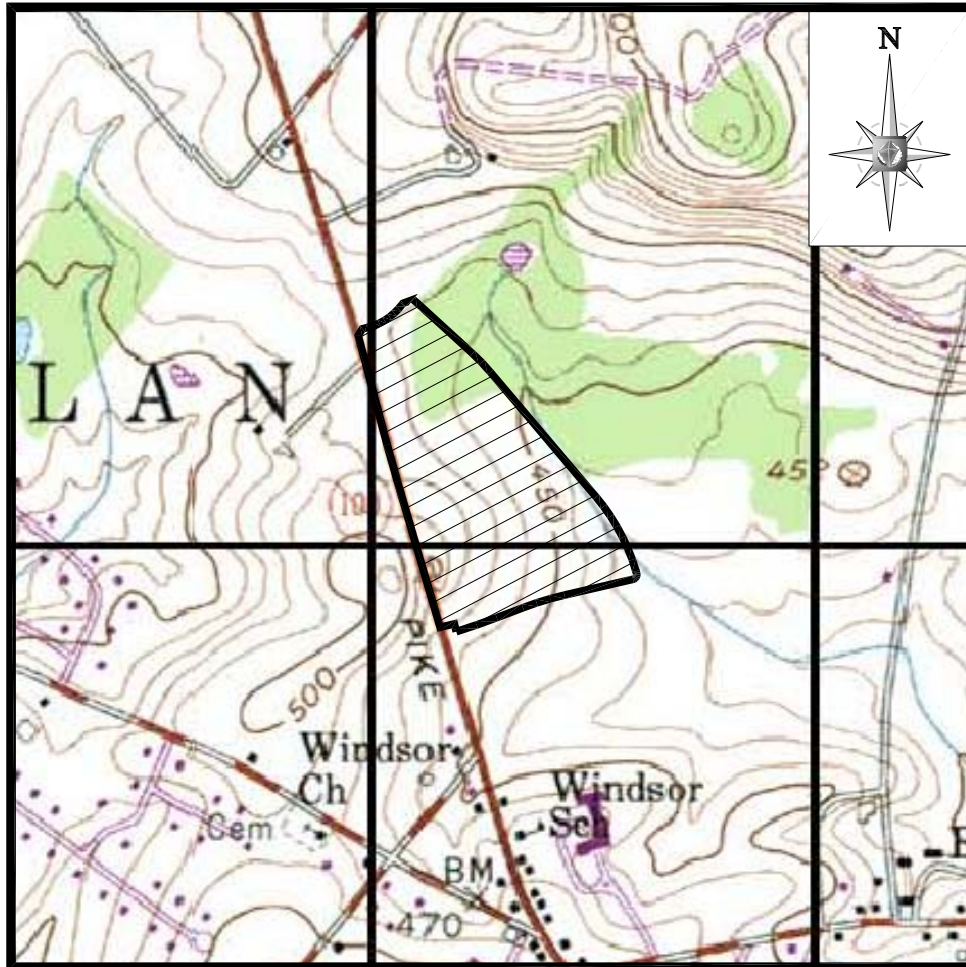
## **STORM DRAINAGE**

The storm drainage system has been designed to intercept runoff at topographic low points and areas of significant runoff quantities and convey stormwater to the stormwater management basins. StormCAD Version V8i has been utilized for designing the storm conveyance system. Conveyance design precipitation amounts are based on NOAA Atlas 14, Volume 2, Version 3 obtained on April 28, 2016 for Chester Springs, PA for a 100-year storm event.

## **CONCLUSIONS**

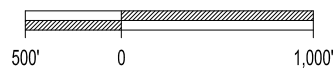
The proposed stormwater management program described above has been designed to comply with the Upper Uwchlan Township Subdivision and Land Development and Stormwater Management Ordinances, Chapter 102 CG-1 Guidelines, and the Stormwater Management Act of 1978.





USGS MAP  
(DOWNINGTOWN QUAD)

1"=1,000'





## **Stormwater Management Calculations**

---



# Stormwater Management Summary of Peak Flows

PROJECT: Byers Station - Commercial Tract  
Upper Uwchlan Township  
Chester County, PA

DATE: 2/12/2018  
REV: 0  
BY: BVW

| Point of Interest #1                     | 1           | 2           | 5            | 10           | 25           | 50           | 100          |
|------------------------------------------|-------------|-------------|--------------|--------------|--------------|--------------|--------------|
| <b>Pre-Development Peak Flows (cfs)</b>  |             |             |              |              |              |              |              |
| DA-1E                                    | 2.20        | 6.22        | 14.72        | 23.05        | 36.45        | 48.62        | 62.43        |
| <b>Pre-Development Total</b>             | <b>2.20</b> | <b>6.22</b> | <b>14.72</b> | <b>23.05</b> | <b>36.45</b> | <b>48.62</b> | <b>62.43</b> |
| <b>Post-Development Peak Flows (cfs)</b> |             |             |              |              |              |              |              |
| DA-1P (to Bioretention #3)               | 2.72        | 3.75        | 5.41         | 6.82         | 8.90         | 10.65        | 12.53        |
| <b>Bioretention #3 Outflow</b>           | <b>0.04</b> | <b>0.08</b> | <b>0.16</b>  | <b>0.22</b>  | <b>0.30</b>  | <b>1.04</b>  | <b>3.89</b>  |
| DA-1P (to Bioretention #4)               | 1.64        | 2.36        | 3.52         | 4.54         | 6.07         | 7.38         | 8.79         |
| <b>Bioretention #4 Outflow</b>           | <b>0.06</b> | <b>0.12</b> | <b>0.19</b>  | <b>0.78</b>  | <b>2.66</b>  | <b>4.41</b>  | <b>6.22</b>  |
| DA-1P (to Bioretention #5)               | 1.66        | 2.37        | 3.49         | 4.49         | 5.96         | 7.22         | 8.57         |
| <b>Bioretention #5 Outflow</b>           | <b>0.09</b> | <b>0.15</b> | <b>0.20</b>  | <b>0.23</b>  | <b>0.41</b>  | <b>1.03</b>  | <b>3.80</b>  |
| DA-1P (to Bioretention #6)               | 1.68        | 2.39        | 3.52         | 4.53         | 6.02         | 7.28         | 8.65         |
| <b>Bioretention #6 Outflow</b>           | <b>0.01</b> | <b>0.05</b> | <b>0.11</b>  | <b>0.17</b>  | <b>0.23</b>  | <b>0.39</b>  | <b>1.77</b>  |
| DA-1P (Bypass)                           | 0.67        | 1.03        | 1.64         | 2.17         | 2.98         | 3.71         | 4.49         |
| <b>Total Outflow from POI #1</b>         | <b>0.70</b> | <b>1.18</b> | <b>1.96</b>  | <b>2.68</b>  | <b>5.30</b>  | <b>8.12</b>  | <b>16.28</b> |
| <i>Allowable Post Development Flow*</i>  | 2.20        | 2.20        | 6.22         | 6.22         | 36.45        | 48.62        | 62.43        |

| Point of Interest #2                     | 1           | 2           | 5            | 10           | 25           | 50           | 100          |
|------------------------------------------|-------------|-------------|--------------|--------------|--------------|--------------|--------------|
| <b>Pre-Development Peak Flows (cfs)</b>  |             |             |              |              |              |              |              |
| DA-2E                                    | 3.28        | 8.26        | 17.97        | 27.21        | 41.93        | 55.21        | 70.18        |
| <b>Pre-Development Total</b>             | <b>3.28</b> | <b>8.26</b> | <b>17.97</b> | <b>27.21</b> | <b>41.93</b> | <b>55.21</b> | <b>70.18</b> |
| <b>Post-Development Peak Flows (cfs)</b> |             |             |              |              |              |              |              |
| DA-2P (to Bioretention #1)               | 12.80       | 18.62       | 27.92        | 36.21        | 48.55        | 59.09        | 70.50        |
| <b>Bioretention #1 Outflow</b>           | -           | -           | <b>0.14</b>  | <b>0.62</b>  | <b>2.13</b>  | <b>5.41</b>  | <b>11.04</b> |
| DA-2P (to Bioretention #2 On-Site)       | 29.11       | 39.12       | 54.43        | 67.30        | 85.92        | 101.51       | 118.19       |
| Total Inflow to Bioretention #2          | 29.11       | 39.12       | 54.43        | 67.30        | 85.93        | 101.84       | 118.96       |
| <b>Bioretention #2 Outflow</b>           | -           | <b>0.11</b> | <b>0.36</b>  | <b>1.57</b>  | <b>5.07</b>  | <b>10.65</b> | <b>20.06</b> |
| DA-2P (Bypass)                           | 1.77        | 2.53        | 3.72         | 4.78         | 6.35         | 7.69         | 9.13         |
| <b>Total Outflow from POI #2</b>         | <b>1.77</b> | <b>2.53</b> | <b>3.72</b>  | <b>4.78</b>  | <b>6.38</b>  | <b>11.08</b> | <b>20.79</b> |
| <i>Allowable Post Development Flow*</i>  | 3.28        | 3.28        | 8.26         | 8.26         | 41.93        | 55.21        | 70.18        |

\* Allowable flow is based on Upper Uwchlan Township Peak Rate Control Standards, Table 308.1 for a "new development".



# Hydrograph Return Period Recap

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

| Hyd. No.                               | Hydrograph type (origin) | Inflow hyd(s) | Peak Outflow (cfs) |       |       |       |       |       |        |                          | Hydrograph Description           |
|----------------------------------------|--------------------------|---------------|--------------------|-------|-------|-------|-------|-------|--------|--------------------------|----------------------------------|
|                                        |                          |               | 1-yr               | 2-yr  | 3-yr  | 5-yr  | 10-yr | 25-yr | 50-yr  | 100-yr                   |                                  |
| 1                                      | SCS Runoff               | -----         | 3.278              | 8.258 | ----- | 17.97 | 27.21 | 41.93 | 55.21  | 70.18                    | DA-2E                            |
| 3                                      | SCS Runoff               | -----         | 12.80              | 18.62 | ----- | 27.92 | 36.21 | 48.55 | 59.09  | 70.50                    | DA-2P (Bioretention #1)          |
| 4                                      | Reservoir                | 3             | 0.000              | 0.000 | ----- | 0.137 | 0.617 | 2.127 | 5.412  | 11.04                    | Bioretention #1 Routed           |
| 5                                      | SCS Runoff               | -----         | 29.11              | 39.12 | ----- | 54.43 | 67.30 | 85.92 | 101.51 | 118.19                   | DA-2P (Bioretention #2 On-Site)  |
| 6                                      | Combine                  | 4, 5          | 29.11              | 39.12 | ----- | 54.43 | 67.30 | 85.93 | 101.84 | 118.96                   | Total Inflow to Bioretention #2  |
| 7                                      | Reservoir                | 6             | 0.000              | 0.108 | ----- | 0.362 | 1.565 | 5.065 | 10.65  | 20.06                    | Bio #2 Routed On-Site            |
| 8                                      | SCS Runoff               | -----         | 1.771              | 2.525 | ----- | 3.718 | 4.781 | 6.353 | 7.688  | 9.132                    | DA-2P (Bypass)                   |
| 9                                      | Combine                  | 7, 8          | 1.771              | 2.525 | ----- | 3.718 | 4.781 | 6.384 | 11.08  | 20.79                    | DA-2P Total (On-Site)            |
| 11                                     | SCS Runoff               | -----         | 0.966              | 1.430 | ----- | 2.179 | 2.833 | 3.840 | 4.705  | 5.645                    | DA-2P (Bioretention #2 Off-Site) |
| 12                                     | Combine                  | 6, 11         | 30.08              | 40.55 | ----- | 56.61 | 70.13 | 89.73 | 106.47 | 124.49                   | Bioretention #2 Total Inflow     |
| 13                                     | Reservoir                | 12            | 0.000              | 0.136 | ----- | 0.383 | 1.809 | 5.588 | 12.18  | 22.23                    | Bio #2 Routed Off-Site           |
| 14                                     | Combine                  | 8, 13         | 1.771              | 2.525 | ----- | 3.718 | 4.781 | 6.429 | 12.67  | 23.03                    | DA-2P Total (On+Off Site)        |
| Proj. file: Byers Station-0 (POI2).gpw |                          |               |                    |       |       |       |       |       |        | Thursday, 02 / 15 / 2018 |                                  |



# Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

| Hyd. No.                   | Hydrograph type (origin) | Peak flow (cfs) | Time interval (min) | Time to Peak (min) | Hyd. volume (cuft)    | Inflow hyd(s) | Maximum elevation (ft) | Total strge used (cuft)  | Hydrograph Description           |
|----------------------------|--------------------------|-----------------|---------------------|--------------------|-----------------------|---------------|------------------------|--------------------------|----------------------------------|
| 1                          | SCS Runoff               | 3.278           | 2                   | 722                | 13,625                | -----         | -----                  | -----                    | DA-2E                            |
| 3                          | SCS Runoff               | 12.80           | 2                   | 720                | 29,666                | -----         | -----                  | -----                    | DA-2P (Bioretention #1)          |
| 4                          | Reservoir                | 0.000           | 2                   | n/a                | 0                     | 3             | 429.93                 | 15,948                   | Bioretention #1 Routed           |
| 5                          | SCS Runoff               | 29.11           | 2                   | 718                | 66,608                | -----         | -----                  | -----                    | DA-2P (Bioretention #2 On-Site)  |
| 6                          | Combine                  | 29.11           | 2                   | 718                | 66,608                | 4, 5          | -----                  | -----                    | Total Inflow to Bioretention #2  |
| 7                          | Reservoir                | 0.000           | 2                   | 804                | 0                     | 6             | 423.59                 | 57,486                   | Bio #2 Routed On-Site            |
| 8                          | SCS Runoff               | 1.771           | 2                   | 718                | 3,545                 | -----         | -----                  | -----                    | DA-2P (Bypass)                   |
| 9                          | Combine                  | 1.771           | 2                   | 718                | 3,545                 | 7, 8          | -----                  | -----                    | DA-2P Total (On-Site)            |
| 11                         | SCS Runoff               | 0.966           | 2                   | 718                | 1,951                 | -----         | -----                  | -----                    | DA-2P (Bioretention #2 Off-Site) |
| 12                         | Combine                  | 30.08           | 2                   | 718                | 68,558                | 6, 11         | -----                  | -----                    | Bioretention #2 Total Inflow     |
| 13                         | Reservoir                | 0.000           | 2                   | 792                | 0                     | 12            | 423.63                 | 59,184                   | Bio #2 Routed Off-Site           |
| 14                         | Combine                  | 1.771           | 2                   | 718                | 3,545                 | 8, 13         | -----                  | -----                    | DA-2P Total (On+Off Site)        |
| Byers Station-0 (POI2).gpw |                          |                 |                     |                    | Return Period: 1 Year |               |                        | Thursday, 02 / 15 / 2018 |                                  |



# Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

| Hyd. No.                   | Hydrograph type (origin) | Peak flow (cfs) | Time interval (min) | Time to Peak (min) | Hyd. volume (cuft)    | Inflow hyd(s) | Maximum elevation (ft) | Total strge used (cuft)  | Hydrograph Description           |
|----------------------------|--------------------------|-----------------|---------------------|--------------------|-----------------------|---------------|------------------------|--------------------------|----------------------------------|
| 1                          | SCS Runoff               | 8.258           | 2                   | 720                | 24,583                | -----         | -----                  | -----                    | DA-2E                            |
| 3                          | SCS Runoff               | 18.62           | 2                   | 720                | 42,687                | -----         | -----                  | -----                    | DA-2P (Bioretention #1)          |
| 4                          | Reservoir                | 0.000           | 2                   | 896                | 0                     | 3             | 430.39                 | 25,059                   | Bioretention #1 Routed           |
| 5                          | SCS Runoff               | 39.12           | 2                   | 718                | 89,629                | -----         | -----                  | -----                    | DA-2P (Bioretention #2 On-Site)  |
| 6                          | Combine                  | 39.12           | 2                   | 718                | 89,629                | 4, 5          | -----                  | -----                    | Total Inflow to Bioretention #2  |
| 7                          | Reservoir                | 0.108           | 2                   | 1442               | 3,954                 | 6             | 424.06                 | 74,877                   | Bio #2 Routed On-Site            |
| 8                          | SCS Runoff               | 2.525           | 2                   | 718                | 5,054                 | -----         | -----                  | -----                    | DA-2P (Bypass)                   |
| 9                          | Combine                  | 2.525           | 2                   | 718                | 9,008                 | 7, 8          | -----                  | -----                    | DA-2P Total (On-Site)            |
| 11                         | SCS Runoff               | 1.430           | 2                   | 718                | 2,861                 | -----         | -----                  | -----                    | DA-2P (Bioretention #2 Off-Site) |
| 12                         | Combine                  | 40.55           | 2                   | 718                | 92,491                | 6, 11         | -----                  | -----                    | Bioretention #2 Total Inflow     |
| 13                         | Reservoir                | 0.136           | 2                   | 1440               | 5,400                 | 12            | 424.11                 | 76,661                   | Bio #2 Routed Off-Site           |
| 14                         | Combine                  | 2.525           | 2                   | 718                | 10,454                | 8, 13         | -----                  | -----                    | DA-2P Total (On+Off Site)        |
| Byers Station-0 (POI2).gpw |                          |                 |                     |                    | Return Period: 2 Year |               |                        | Thursday, 02 / 15 / 2018 |                                  |



# Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

| Hyd. No.                   | Hydrograph type (origin) | Peak flow (cfs) | Time interval (min) | Time to Peak (min) | Hyd. volume (cuft)    | Inflow hyd(s) | Maximum elevation (ft) | Total strge used (cuft)  | Hydrograph Description           |
|----------------------------|--------------------------|-----------------|---------------------|--------------------|-----------------------|---------------|------------------------|--------------------------|----------------------------------|
| 1                          | SCS Runoff               | 17.97           | 2                   | 720                | 45,018                | -----         | -----                  | -----                    | DA-2E                            |
| 3                          | SCS Runoff               | 27.92           | 2                   | 720                | 63,971                | -----         | -----                  | -----                    | DA-2P (Bioretention #1)          |
| 4                          | Reservoir                | 0.137           | 2                   | 944                | 2,635                 | 3             | 431.16                 | 40,651                   | Bioretention #1 Routed           |
| 5                          | SCS Runoff               | 54.43           | 2                   | 718                | 125,628               | -----         | -----                  | -----                    | DA-2P (Bioretention #2 On-Site)  |
| 6                          | Combine                  | 54.43           | 2                   | 718                | 128,263               | 4, 5          | -----                  | -----                    | Total Inflow to Bioretention #2  |
| 7                          | Reservoir                | 0.362           | 2                   | 1234               | 27,094                | 6             | 424.73                 | 101,751                  | Bio #2 Routed On-Site            |
| 8                          | SCS Runoff               | 3.718           | 2                   | 716                | 7,506                 | -----         | -----                  | -----                    | DA-2P (Bypass)                   |
| 9                          | Combine                  | 3.718           | 2                   | 716                | 34,600                | 7, 8          | -----                  | -----                    | DA-2P Total (On-Site)            |
| 11                         | SCS Runoff               | 2.179           | 2                   | 718                | 4,369                 | -----         | -----                  | -----                    | DA-2P (Bioretention #2 Off-Site) |
| 12                         | Combine                  | 56.61           | 2                   | 718                | 132,633               | 6, 11         | -----                  | -----                    | Bioretention #2 Total Inflow     |
| 13                         | Reservoir                | 0.383           | 2                   | 1240               | 29,877                | 12            | 424.82                 | 105,094                  | Bio #2 Routed Off-Site           |
| 14                         | Combine                  | 3.718           | 2                   | 716                | 37,383                | 8, 13         | -----                  | -----                    | DA-2P Total (On+Off Site)        |
| Byers Station-0 (POI2).gpw |                          |                 |                     |                    | Return Period: 5 Year |               |                        | Thursday, 02 / 15 / 2018 |                                  |



# Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

| Hyd. No.                   | Hydrograph type (origin) | Peak flow (cfs) | Time interval (min) | Time to Peak (min) | Hyd. volume (cuft)     | Inflow hyd(s) | Maximum elevation (ft) | Total strge used (cuft)  | Hydrograph Description           |
|----------------------------|--------------------------|-----------------|---------------------|--------------------|------------------------|---------------|------------------------|--------------------------|----------------------------------|
| 1                          | SCS Runoff               | 27.21           | 2                   | 720                | 64,916                 | -----         | -----                  | -----                    | DA-2E                            |
| 3                          | SCS Runoff               | 36.21           | 2                   | 718                | 82,831                 | -----         | -----                  | -----                    | DA-2P (Bioretention #1)          |
| 4                          | Reservoir                | 0.617           | 2                   | 858                | 16,383                 | 3             | 431.63                 | 50,160                   | Bioretention #1 Routed           |
| 5                          | SCS Runoff               | 67.30           | 2                   | 718                | 156,496                | -----         | -----                  | -----                    | DA-2P (Bioretention #2 On-Site)  |
| 6                          | Combine                  | 67.30           | 2                   | 718                | 172,879                | 4, 5          | -----                  | -----                    | Total Inflow to Bioretention #2  |
| 7                          | Reservoir                | 1.565           | 2                   | 984                | 65,531                 | 6             | 425.22                 | 121,379                  | Bio #2 Routed On-Site            |
| 8                          | SCS Runoff               | 4.781           | 2                   | 716                | 9,670                  | -----         | -----                  | -----                    | DA-2P (Bypass)                   |
| 9                          | Combine                  | 4.781           | 2                   | 716                | 75,201                 | 7, 8          | -----                  | -----                    | DA-2P Total (On-Site)            |
| 11                         | SCS Runoff               | 2.833           | 2                   | 718                | 5,718                  | -----         | -----                  | -----                    | DA-2P (Bioretention #2 Off-Site) |
| 12                         | Combine                  | 70.13           | 2                   | 718                | 178,597                | 6, 11         | -----                  | -----                    | Bioretention #2 Total Inflow     |
| 13                         | Reservoir                | 1.809           | 2                   | 950                | 71,133                 | 12            | 425.25                 | 122,546                  | Bio #2 Routed Off-Site           |
| 14                         | Combine                  | 4.781           | 2                   | 716                | 80,802                 | 8, 13         | -----                  | -----                    | DA-2P Total (On+Off Site)        |
| Byers Station-0 (POI2).gpw |                          |                 |                     |                    | Return Period: 10 Year |               |                        | Thursday, 02 / 15 / 2018 |                                  |

# Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

| Hyd. No.                   | Hydrograph type (origin) | Peak flow (cfs) | Time interval (min) | Time to Peak (min) | Hyd. volume (cuft)     | Inflow hyd(s) | Maximum elevation (ft) | Total strge used (cuft)  | Hydrograph Description           |
|----------------------------|--------------------------|-----------------|---------------------|--------------------|------------------------|---------------|------------------------|--------------------------|----------------------------------|
| 1                          | SCS Runoff               | 41.93           | 2                   | 720                | 97,213                 | -----         | -----                  | -----                    | DA-2E                            |
| 3                          | SCS Runoff               | 48.55           | 2                   | 718                | 111,351                | -----         | -----                  | -----                    | DA-2P (Bioretention #1)          |
| 4                          | Reservoir                | 2.127           | 2                   | 784                | 39,810                 | 3             | 432.23                 | 63,466                   | Bioretention #1 Routed           |
| 5                          | SCS Runoff               | 85.92           | 2                   | 718                | 202,037                | -----         | -----                  | -----                    | DA-2P (Bioretention #2 On-Site)  |
| 6                          | Combine                  | 85.93           | 2                   | 718                | 241,847                | 4, 5          | -----                  | -----                    | Total Inflow to Bioretention #2  |
| 7                          | Reservoir                | 5.065           | 2                   | 816                | 132,881                | 6             | 425.59                 | 135,942                  | Bio #2 Routed On-Site            |
| 8                          | SCS Runoff               | 6.353           | 2                   | 716                | 12,930                 | -----         | -----                  | -----                    | DA-2P (Bypass)                   |
| 9                          | Combine                  | 6.384           | 2                   | 718                | 145,811                | 7, 8          | -----                  | -----                    | DA-2P Total (On-Site)            |
| 11                         | SCS Runoff               | 3.840           | 2                   | 716                | 7,772                  | -----         | -----                  | -----                    | DA-2P (Bioretention #2 Off-Site) |
| 12                         | Combine                  | 89.73           | 2                   | 718                | 249,618                | 6, 11         | -----                  | -----                    | Bioretention #2 Total Inflow     |
| 13                         | Reservoir                | 5.588           | 2                   | 806                | 140,567                | 12            | 425.63                 | 137,655                  | Bio #2 Routed Off-Site           |
| 14                         | Combine                  | 6.429           | 2                   | 718                | 153,497                | 8, 13         | -----                  | -----                    | DA-2P Total (On+Off Site)        |
| Byers Station-0 (POI2).gpw |                          |                 |                     |                    | Return Period: 25 Year |               |                        | Thursday, 02 / 15 / 2018 |                                  |



# Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

| Hyd. No.                   | Hydrograph type (origin) | Peak flow (cfs) | Time interval (min) | Time to Peak (min) | Hyd. volume (cuft)     | Inflow hyd(s) | Maximum elevation (ft) | Total strge used (cuft)  | Hydrograph Description           |
|----------------------------|--------------------------|-----------------|---------------------|--------------------|------------------------|---------------|------------------------|--------------------------|----------------------------------|
| 1                          | SCS Runoff               | 55.21           | 2                   | 720                | 126,825                | -----         | -----                  | -----                    | DA-2E                            |
| 3                          | SCS Runoff               | 59.09           | 2                   | 718                | 136,093                | -----         | -----                  | -----                    | DA-2P (Bioretention #1)          |
| 4                          | Reservoir                | 5.412           | 2                   | 748                | 62,210                 | 3             | 432.57                 | 71,775                   | Bioretention #1 Routed           |
| 5                          | SCS Runoff               | 101.51          | 2                   | 718                | 240,802                | -----         | -----                  | -----                    | DA-2P (Bioretention #2 On-Site)  |
| 6                          | Combine                  | 101.84          | 2                   | 718                | 303,013                | 4, 5          | -----                  | -----                    | Total Inflow to Bioretention #2  |
| 7                          | Reservoir                | 10.65           | 2                   | 770                | 193,160                | 6             | 426.00                 | 152,423                  | Bio #2 Routed On-Site            |
| 8                          | SCS Runoff               | 7.688           | 2                   | 716                | 15,750                 | -----         | -----                  | -----                    | DA-2P (Bypass)                   |
| 9                          | Combine                  | 11.08           | 2                   | 770                | 208,910                | 7, 8          | -----                  | -----                    | DA-2P Total (On-Site)            |
| 11                         | SCS Runoff               | 4.705           | 2                   | 716                | 9,563                  | -----         | -----                  | -----                    | DA-2P (Bioretention #2 Off-Site) |
| 12                         | Combine                  | 106.47          | 2                   | 718                | 312,576                | 6, 11         | -----                  | -----                    | Bioretention #2 Total Inflow     |
| 13                         | Reservoir                | 12.18           | 2                   | 760                | 202,648                | 12            | 426.05                 | 154,477                  | Bio #2 Routed Off-Site           |
| 14                         | Combine                  | 12.67           | 2                   | 760                | 218,398                | 8, 13         | -----                  | -----                    | DA-2P Total (On+Off Site)        |
| Byers Station-0 (POI2).gpw |                          |                 |                     |                    | Return Period: 50 Year |               |                        | Thursday, 02 / 15 / 2018 |                                  |

# Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

| Hyd. No.                   | Hydrograph type (origin) | Peak flow (cfs) | Time interval (min) | Time to Peak (min) | Hyd. volume (cuft)      | Inflow hyd(s) | Maximum elevation (ft) | Total strge used (cuft)  | Hydrograph Description           |
|----------------------------|--------------------------|-----------------|---------------------|--------------------|-------------------------|---------------|------------------------|--------------------------|----------------------------------|
| 1                          | SCS Runoff               | 70.18           | 2                   | 720                | 160,667                 | -----         | -----                  | -----                    | DA-2E                            |
| 3                          | SCS Runoff               | 70.50           | 2                   | 718                | 163,291                 | -----         | -----                  | -----                    | DA-2P (Bioretention #1)          |
| 4                          | Reservoir                | 11.04           | 2                   | 732                | 87,090                  | 3             | 432.99                 | 82,129                   | Bioretention #1 Routed           |
| 5                          | SCS Runoff               | 118.19          | 2                   | 718                | 282,869                 | -----         | -----                  | -----                    | DA-2P (Bioretention #2 On-Site)  |
| 6                          | Combine                  | 118.96          | 2                   | 718                | 369,959                 | 4, 5          | -----                  | -----                    | Total Inflow to Bioretention #2  |
| 7                          | Reservoir                | 20.06           | 2                   | 750                | 259,290                 | 6             | 426.43                 | 170,981                  | Bio #2 Routed On-Site            |
| 8                          | SCS Runoff               | 9.132           | 2                   | 716                | 18,845                  | -----         | -----                  | -----                    | DA-2P (Bypass)                   |
| 9                          | Combine                  | 20.79           | 2                   | 748                | 278,134                 | 7, 8          | -----                  | -----                    | DA-2P Total (On-Site)            |
| 11                         | SCS Runoff               | 5.645           | 2                   | 716                | 11,541                  | -----         | -----                  | -----                    | DA-2P (Bioretention #2 Off-Site) |
| 12                         | Combine                  | 124.49          | 2                   | 718                | 381,500                 | 6, 11         | -----                  | -----                    | Bioretention #2 Total Inflow     |
| 13                         | Reservoir                | 22.23           | 2                   | 746                | 270,761                 | 12            | 426.50                 | 174,199                  | Bio #2 Routed Off-Site           |
| 14                         | Combine                  | 23.03           | 2                   | 744                | 289,606                 | 8, 13         | -----                  | -----                    | DA-2P Total (On+Off Site)        |
| Byers Station-0 (POI2).gpw |                          |                 |                     |                    | Return Period: 100 Year |               |                        | Thursday, 02 / 15 / 2018 |                                  |



| INFILTRATION TESTING SUMMARY TABLE    |                                                      |                       |            |        |            |        |                     |                                   |        |                    |                               |                     |                                          |
|---------------------------------------|------------------------------------------------------|-----------------------|------------|--------|------------|--------|---------------------|-----------------------------------|--------|--------------------|-------------------------------|---------------------|------------------------------------------|
| Test Pit Number<br>(from Bohler Plan) | Test Hole Number<br>(from Earth Engineering Testing) | Existing Ground Elev. | Rock       |        | Water      |        | Limiting Zone Elev. | Infiltration Testing <sup>1</sup> |        |                    | Factor of Safety <sup>2</sup> | Design Rate (in/hr) | Average Design Rate <sup>3</sup> (in/hr) |
|                                       |                                                      |                       | Depth (ft) | Elev.  | Depth (ft) | Elev.  |                     | Depth (ft)                        | Elev.  | Field Rate (in/hr) |                               |                     |                                          |
| TP-201                                | DR-201A                                              | 459.30                | -          | -      | -          | -      | N/A                 | 9.30                              | 450.00 | 1.25               | 3.00                          | 0.42                | 0.38                                     |
|                                       | DR-201B                                              |                       |            |        |            |        |                     |                                   |        | 1.00               | 3.00                          | 0.33                |                                          |
| TP-202                                | IT-202                                               | 461.30                | -          | -      | 23.70      | 437.60 | 437.60              | 16.30                             | 445.00 | 0.07               | 3.00                          | 0.02                | N/A                                      |
| TP-203                                | DR-203A                                              | 449.20                | 9.00       | 440.20 | -          | -      | 440.20              | 6.70                              | 442.50 | 6.75               | 3.00                          | 2.25                | 2.38                                     |
|                                       | DR-203B                                              |                       |            |        |            |        |                     |                                   |        | 7.50               | 3.00                          | 2.50                |                                          |
| TP-204                                | DR-204A                                              | 438.20                | -          | -      | -          | -      | N/A                 | 1.20                              | 437.00 | 0.75               | 3.00                          | 0.25                | 0.17                                     |
|                                       | DR-204B                                              |                       |            |        |            |        |                     |                                   |        | 0.25               | 3.00                          | 0.08                |                                          |
| TP-205                                | DR-205A                                              | 435.10                | -          | -      | -          | -      | N/A                 | 8.10                              | 427.00 | 6.00               | 3.00                          | 2.00                | 2.25                                     |
|                                       | DR-205B                                              |                       |            |        |            |        |                     |                                   |        | 7.50               | 3.00                          | 2.50                |                                          |
| TP-206                                | DR-206A                                              | 432.80                | 8.00       | 424.80 | -          | -      | 424.80              | 5.80                              | 427.00 | 1.00               | 3.00                          | 0.33                | 0.29                                     |
|                                       | DR-206B                                              |                       |            |        |            |        |                     |                                   |        | 0.75               | 3.00                          | 0.25                |                                          |
| TP-207                                | DR-207A                                              | 424.10                | -          | -      | -          | -      | N/A                 | 4.60                              | 419.50 | 1.50               | 3.00                          | 0.50                | 0.42                                     |
|                                       | DR-207B                                              |                       |            |        |            |        |                     |                                   |        | 1.00               | 3.00                          | 0.33                |                                          |
| TP-208                                | DR-208A                                              | 420.80                | -          | -      | -          | -      | N/A                 | 1.30                              | 419.50 | 2.00               | 3.00                          | 0.67                | 0.54                                     |
|                                       | DR-208B                                              |                       |            |        |            |        |                     |                                   |        | 1.25               | 3.00                          | 0.42                |                                          |
| TP-209                                | DR-209A                                              | 421.00                | -          | -      | -          | -      | N/A                 | 1.50                              | 419.50 | 0.25               | 3.00                          | 0.08                | 0.04                                     |
|                                       | DR-209B                                              |                       |            |        |            |        |                     |                                   |        | 0.00               | 3.00                          | 0.00                |                                          |
| TP-210                                | DR-210A                                              | 455.30                | 7.00       | 448.30 | -          | -      | 448.30              | 4.80                              | 450.50 | 6.75               | 3.00                          | 2.25                | 2.63                                     |
|                                       | DR-210B                                              |                       |            |        |            |        |                     |                                   |        | 9.00               | 3.00                          | 3.00                |                                          |
| TP-211                                | DR-211A                                              | 440.10                | -          | -      | -          | -      | N/A                 | 3.30                              | 436.80 | 2.25               | 3.00                          | 0.75                | 1.00                                     |
|                                       | DR-211B                                              |                       |            |        |            |        |                     |                                   |        | 3.75               | 3.00                          | 1.25                |                                          |
| TP-212                                | DR-212A                                              | 443.30                | -          | -      | -          | -      | N/A                 | 2.50                              | 440.80 | 0.25               | 3.00                          | 0.08                | 0.13                                     |
|                                       | DR-212B                                              |                       |            |        |            |        |                     |                                   |        | 0.50               | 3.00                          | 0.17                |                                          |
| TP-213                                | DR-213A                                              | 450.80                | -          | -      | -          | -      | N/A                 | 6.00                              | 444.80 | 3.75               | 3.00                          | 1.25                | 1.38                                     |
|                                       | DR-213B                                              |                       |            |        |            |        |                     |                                   |        | 4.50               | 3.00                          | 1.50                |                                          |
| TP-214                                | DR-214A                                              | 443.50                | -          | -      | -          | -      | N/A                 | 0.50                              | 443.00 | 0.25               | 3.00                          | 0.08                | 0.13                                     |
|                                       | DR-214B                                              |                       |            |        |            |        |                     |                                   |        | 0.50               | 3.00                          | 0.17                |                                          |
| TP-215                                | DR-215A                                              | 449.00                | -          | -      | -          | -      | N/A                 | 3.00                              | 446.00 | 1.00               | 3.00                          | 0.33                | 0.25                                     |
|                                       | DR-215B                                              |                       |            |        |            |        |                     |                                   |        | 0.50               | 3.00                          | 0.17                |                                          |
| TP-216                                | DR-216A                                              | 438.30                | -          | -      | -          | -      | N/A                 | 6.30                              | 432.00 | 1.50               | 3.00                          | 0.50                | 0.63                                     |
|                                       | DR-216B                                              |                       |            |        |            |        |                     |                                   |        | 2.25               | 3.00                          | 0.75                |                                          |
| TP-217                                | IT-217                                               | 434.50                | -          | -      | -          | -      | N/A                 | 10.00                             | 424.50 | 0.26               | 3.00                          | 0.09                | N/A                                      |
| TP-218                                | DR-218A                                              | 430.10                | -          | -      | -          | -      | N/A                 | 5.60                              | 424.50 | 0.75               | 3.00                          | 0.25                | 0.21                                     |
|                                       | DR-218B                                              |                       |            |        |            |        |                     |                                   |        | 0.50               | 3.00                          | 0.17                |                                          |
| TP-219                                | IT-219                                               | 439.50                | -          | -      | -          | -      | N/A                 | 15.00                             | 424.50 | 0.14               | 3.00                          | 0.05                | N/A                                      |
| TP-220                                | IT-220                                               | 434.40                | -          | -      | -          | -      | N/A                 | 9.90                              | 424.50 | 0.11               | 3.00                          | 0.04                | N/A                                      |
| TP-221                                | DR-221A                                              | 445.60                | 4.30       | 441.30 | -          | -      | 441.30              | 2.10                              | 443.50 | 2.25               | 3.00                          | 0.75                | 0.88                                     |
|                                       | DR-221B                                              |                       |            |        |            |        |                     |                                   |        | 3.00               | 3.00                          | 1.00                |                                          |
| TP-222 <sup>4</sup>                   | IT-222                                               | 452.00                | 1.50       | 450.50 | 11.20      | 440.80 | 440.80              | -                                 | -      | -                  | 3.00                          | -                   | N/A                                      |
| TP-223                                | IT-223                                               | 452.20                | 16.00      | 436.20 | -          | -      | 436.20              | 13.70                             | 438.50 | 0.11               | 3.00                          | 0.04                | N/A                                      |

1. ) Testing was performed by Earth Engineering, Inc. between 6/14/16 & 6/21/16.

2.) The minimum factor of Safety recommended by the PA BMP manual is 2.0.

3.) Average design rate only applied to test pits when more than one test was performed.

4.) Test eliminated due to excessive deviation between initial limiting zone and test elevation.



**NOAA Atlas 14, Volume 2, Version 3**  
**Location name: Chester Springs, Pennsylvania,**  
**US\***

**Latitude: 40.0831°, Longitude: -75.6887°**

**Elevation: 451 ft\***

\* source: Google Maps



**POINT PRECIPITATION FREQUENCY ESTIMATES**

G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M.Yekta, and D. Riley

NOAA, National Weather Service, Silver Spring, Maryland

[PF\\_tabular](#) | [PF\\_graphical](#) | [Maps\\_&\\_aerials](#)

**PF tabular**

| <b>PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)<sup>1</sup></b> |                                            |                               |                               |                               |                               |                               |                               |                               |                               |                               |
|----------------------------------------------------------------------------------------------------------------|--------------------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
| <b>Duration</b>                                                                                                | <b>Average recurrence interval (years)</b> |                               |                               |                               |                               |                               |                               |                               |                               |                               |
|                                                                                                                | <b>1</b>                                   | <b>2</b>                      | <b>5</b>                      | <b>10</b>                     | <b>25</b>                     | <b>50</b>                     | <b>100</b>                    | <b>200</b>                    | <b>500</b>                    | <b>1000</b>                   |
| <b>5-min</b>                                                                                                   | <b>0.347</b><br>(0.317-0.381)              | <b>0.413</b><br>(0.377-0.454) | <b>0.482</b><br>(0.439-0.529) | <b>0.531</b><br>(0.483-0.581) | <b>0.585</b><br>(0.530-0.641) | <b>0.622</b><br>(0.560-0.681) | <b>0.657</b><br>(0.589-0.720) | <b>0.687</b><br>(0.614-0.754) | <b>0.720</b><br>(0.638-0.790) | <b>0.743</b><br>(0.654-0.819) |
| <b>10-min</b>                                                                                                  | <b>0.555</b><br>(0.506-0.608)              | <b>0.661</b><br>(0.604-0.726) | <b>0.772</b><br>(0.704-0.847) | <b>0.848</b><br>(0.772-0.929) | <b>0.933</b><br>(0.845-1.02)  | <b>0.990</b><br>(0.892-1.08)  | <b>1.04</b><br>(0.936-1.15)   | <b>1.09</b><br>(0.973-1.20)   | <b>1.14</b><br>(1.01-1.25)    | <b>1.17</b><br>(1.03-1.29)    |
| <b>15-min</b>                                                                                                  | <b>0.693</b><br>(0.633-0.761)              | <b>0.830</b><br>(0.759-0.912) | <b>0.976</b><br>(0.890-1.07)  | <b>1.07</b><br>(0.977-1.18)   | <b>1.18</b><br>(1.07-1.29)    | <b>1.25</b><br>(1.13-1.37)    | <b>1.32</b><br>(1.18-1.45)    | <b>1.37</b><br>(1.23-1.51)    | <b>1.43</b><br>(1.27-1.57)    | <b>1.47</b><br>(1.29-1.62)    |
| <b>30-min</b>                                                                                                  | <b>0.950</b><br>(0.868-1.04)               | <b>1.15</b><br>(1.05-1.26)    | <b>1.39</b><br>(1.26-1.52)    | <b>1.55</b><br>(1.42-1.70)    | <b>1.75</b><br>(1.59-1.92)    | <b>1.89</b><br>(1.70-2.07)    | <b>2.02</b><br>(1.81-2.22)    | <b>2.14</b><br>(1.91-2.35)    | <b>2.28</b><br>(2.02-2.50)    | <b>2.38</b><br>(2.10-2.62)    |
| <b>60-min</b>                                                                                                  | <b>1.19</b><br>(1.08-1.30)                 | <b>1.44</b><br>(1.31-1.58)    | <b>1.78</b><br>(1.62-1.95)    | <b>2.02</b><br>(1.84-2.22)    | <b>2.33</b><br>(2.11-2.55)    | <b>2.56</b><br>(2.30-2.80)    | <b>2.79</b><br>(2.50-3.05)    | <b>3.00</b><br>(2.68-3.29)    | <b>3.27</b><br>(2.90-3.59)    | <b>3.47</b><br>(3.06-3.83)    |
| <b>2-hr</b>                                                                                                    | <b>1.41</b><br>(1.28-1.57)                 | <b>1.72</b><br>(1.55-1.90)    | <b>2.13</b><br>(1.92-2.36)    | <b>2.45</b><br>(2.20-2.72)    | <b>2.87</b><br>(2.56-3.17)    | <b>3.20</b><br>(2.84-3.54)    | <b>3.52</b><br>(3.12-3.90)    | <b>3.86</b><br>(3.38-4.26)    | <b>4.30</b><br>(3.73-4.75)    | <b>4.64</b><br>(3.99-5.14)    |
| <b>3-hr</b>                                                                                                    | <b>1.54</b><br>(1.39-1.71)                 | <b>1.86</b><br>(1.68-2.07)    | <b>2.32</b><br>(2.09-2.58)    | <b>2.67</b><br>(2.40-2.96)    | <b>3.13</b><br>(2.79-3.46)    | <b>3.48</b><br>(3.10-3.85)    | <b>3.85</b><br>(3.40-4.25)    | <b>4.21</b><br>(3.69-4.66)    | <b>4.69</b><br>(4.07-5.20)    | <b>5.06</b><br>(4.35-5.62)    |
| <b>6-hr</b>                                                                                                    | <b>1.91</b><br>(1.72-2.12)                 | <b>2.30</b><br>(2.08-2.56)    | <b>2.85</b><br>(2.58-3.18)    | <b>3.30</b><br>(2.97-3.67)    | <b>3.92</b><br>(3.50-4.34)    | <b>4.42</b><br>(3.92-4.88)    | <b>4.93</b><br>(4.34-5.45)    | <b>5.48</b><br>(4.77-6.05)    | <b>6.22</b><br>(5.35-6.88)    | <b>6.82</b><br>(5.78-7.55)    |
| <b>12-hr</b>                                                                                                   | <b>2.31</b><br>(2.08-2.59)                 | <b>2.79</b><br>(2.52-3.13)    | <b>3.48</b><br>(3.13-3.89)    | <b>4.05</b><br>(3.63-4.53)    | <b>4.87</b><br>(4.33-5.42)    | <b>5.56</b><br>(4.89-6.17)    | <b>6.30</b><br>(5.48-6.99)    | <b>7.09</b><br>(6.10-7.86)    | <b>8.23</b><br>(6.95-9.13)    | <b>9.16</b><br>(7.61-10.2)    |
| <b>24-hr</b>                                                                                                   | <b>2.69</b><br>(2.47-2.96)                 | <b>3.24</b><br>(2.97-3.56)    | <b>4.06</b><br>(3.71-4.45)    | <b>4.74</b><br>(4.32-5.19)    | <b>5.72</b><br>(5.19-6.25)    | <b>6.54</b><br>(5.91-7.14)    | <b>7.42</b><br>(6.67-8.09)    | <b>8.37</b><br>(7.47-9.12)    | <b>9.75</b><br>(8.61-10.6)    | <b>10.9</b><br>(9.54-11.9)    |
| <b>2-day</b>                                                                                                   | <b>3.13</b><br>(2.85-3.45)                 | <b>3.77</b><br>(3.44-4.16)    | <b>4.73</b><br>(4.30-5.21)    | <b>5.50</b><br>(5.00-6.07)    | <b>6.60</b><br>(5.97-7.26)    | <b>7.51</b><br>(6.76-8.26)    | <b>8.47</b><br>(7.58-9.31)    | <b>9.50</b><br>(8.45-10.4)    | <b>11.0</b><br>(9.66-12.0)    | <b>12.1</b><br>(10.6-13.3)    |
| <b>3-day</b>                                                                                                   | <b>3.29</b><br>(3.00-3.64)                 | <b>3.97</b><br>(3.62-4.39)    | <b>4.97</b><br>(4.52-5.49)    | <b>5.77</b><br>(5.24-6.37)    | <b>6.92</b><br>(6.25-7.62)    | <b>7.86</b><br>(7.07-8.65)    | <b>8.85</b><br>(7.93-9.74)    | <b>9.91</b><br>(8.82-10.9)    | <b>11.4</b><br>(10.1-12.6)    | <b>12.6</b><br>(11.1-13.9)    |
| <b>4-day</b>                                                                                                   | <b>3.46</b><br>(3.15-3.83)                 | <b>4.17</b><br>(3.80-4.62)    | <b>5.21</b><br>(4.74-5.76)    | <b>6.05</b><br>(5.49-6.68)    | <b>7.23</b><br>(6.54-7.97)    | <b>8.21</b><br>(7.38-9.04)    | <b>9.24</b><br>(8.27-10.2)    | <b>10.3</b><br>(9.20-11.4)    | <b>11.9</b><br>(10.5-13.1)    | <b>13.1</b><br>(11.5-14.5)    |
| <b>7-day</b>                                                                                                   | <b>4.05</b><br>(3.72-4.44)                 | <b>4.86</b><br>(4.46-5.32)    | <b>6.00</b><br>(5.50-6.57)    | <b>6.94</b><br>(6.34-7.59)    | <b>8.28</b><br>(7.54-9.04)    | <b>9.38</b><br>(8.50-10.2)    | <b>10.5</b><br>(9.51-11.5)    | <b>11.8</b><br>(10.6-12.8)    | <b>13.5</b><br>(12.1-14.8)    | <b>15.0</b><br>(13.2-16.4)    |
| <b>10-day</b>                                                                                                  | <b>4.63</b><br>(4.27-5.03)                 | <b>5.53</b><br>(5.09-6.01)    | <b>6.73</b><br>(6.20-7.31)    | <b>7.70</b><br>(7.07-8.35)    | <b>9.04</b><br>(8.28-9.80)    | <b>10.1</b><br>(9.24-11.0)    | <b>11.2</b><br>(10.2-12.2)    | <b>12.4</b><br>(11.2-13.4)    | <b>14.0</b><br>(12.6-15.2)    | <b>15.3</b><br>(13.7-16.6)    |
| <b>20-day</b>                                                                                                  | <b>6.25</b><br>(5.81-6.73)                 | <b>7.41</b><br>(6.90-7.99)    | <b>8.84</b><br>(8.21-9.52)    | <b>9.96</b><br>(9.24-10.7)    | <b>11.5</b><br>(10.6-12.3)    | <b>12.6</b><br>(11.7-13.6)    | <b>13.8</b><br>(12.7-14.8)    | <b>15.0</b><br>(13.8-16.1)    | <b>16.6</b><br>(15.2-17.9)    | <b>17.9</b><br>(16.2-19.2)    |
| <b>30-day</b>                                                                                                  | <b>7.77</b><br>(7.30-8.28)                 | <b>9.16</b><br>(8.61-9.76)    | <b>10.7</b><br>(10.0-11.4)    | <b>11.8</b><br>(11.1-12.6)    | <b>13.4</b><br>(12.5-14.2)    | <b>14.5</b><br>(13.6-15.5)    | <b>15.7</b><br>(14.6-16.7)    | <b>16.8</b><br>(15.6-17.9)    | <b>18.3</b><br>(16.9-19.5)    | <b>19.3</b><br>(17.8-20.7)    |
| <b>45-day</b>                                                                                                  | <b>9.86</b><br>(9.33-10.5)                 | <b>11.6</b><br>(11.0-12.3)    | <b>13.3</b><br>(12.6-14.1)    | <b>14.6</b><br>(13.8-15.5)    | <b>16.2</b><br>(15.3-17.2)    | <b>17.5</b><br>(16.5-18.5)    | <b>18.6</b><br>(17.5-19.7)    | <b>19.7</b><br>(18.5-20.8)    | <b>21.0</b><br>(19.7-22.3)    | <b>22.0</b><br>(20.5-23.3)    |
| <b>60-day</b>                                                                                                  | <b>11.8</b><br>(11.2-12.5)                 | <b>13.8</b><br>(13.1-14.6)    | <b>15.8</b><br>(15.0-16.7)    | <b>17.2</b><br>(16.4-18.2)    | <b>19.1</b><br>(18.1-20.1)    | <b>20.4</b><br>(19.3-21.5)    | <b>21.6</b><br>(20.4-22.8)    | <b>22.7</b><br>(21.4-24.0)    | <b>24.1</b><br>(22.7-25.5)    | <b>25.1</b><br>(23.6-26.6)    |

<sup>1</sup> Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

[Back to Top](#)



## Runoff Calculation CN Worksheets

Project: **Byers Station - Commercial**

Description:

$$Q = [(P - 0.2S)^2 / (P + 0.8S)] * 1/12 * 43,560, \text{ where } S = (1000/CN) - 10 \text{ and:}$$

P = 3.24

## Catchment Areas

| Description                       | HSG B / CN                         |                       |        | HSG C / CN                         |        | HSG D / CN                         |                       |        | Impervious | Total Area (Ac) | Composite CN | Runoff Q (cuft) |
|-----------------------------------|------------------------------------|-----------------------|--------|------------------------------------|--------|------------------------------------|-----------------------|--------|------------|-----------------|--------------|-----------------|
|                                   | Open Space (Lawns), Good Condition | Woods, Good Condition | Meadow | Open Space (Lawns), Good Condition | Meadow | Open Space (Lawns), Good Condition | Woods, Good Condition | Meadow |            |                 |              |                 |
| Description                       | 61                                 | 55                    | 58     | 74                                 | 71     | 80                                 | 77                    | 78     | 98         |                 |              |                 |
| DA-1E                             |                                    | 0.57                  | 13.17  |                                    |        |                                    | 0.08                  | 1.26   |            | 15.08           | 60           | 23,853          |
| DA-2E                             |                                    | 0.07                  | 10.68  |                                    | 3.95   |                                    |                       | 0.01   |            | 14.71           | 61           | 26,829          |
|                                   |                                    |                       |        |                                    |        |                                    |                       |        |            |                 |              |                 |
| DA-1P (Bioretention #3)           | 0.42                               |                       |        |                                    |        | 0.53                               |                       |        | 0.53       | 1.48            | 81           | 9,244           |
| DA-1P (Bioretention #4)           | 0.65                               |                       |        |                                    |        |                                    |                       |        | 0.47       | 1.12            | 77           | 6,217           |
| DA-1P (Bioretention #5)           | 0.58                               |                       |        |                                    |        |                                    |                       |        | 0.49       | 1.07            | 78           | 6,319           |
| DA-1P (Bioretention #6)           | 0.58                               |                       |        |                                    |        |                                    |                       |        | 0.50       | 1.08            | 78           | 6,428           |
| DA-1P (Bypass)                    | 0.35                               |                       |        |                                    |        | 0.21                               |                       |        | 0.08       | 0.64            | 72           | 2,550           |
|                                   |                                    |                       |        |                                    |        |                                    |                       |        |            |                 |              |                 |
| DA-2P (Bioretention #1)           | 5.41                               |                       |        |                                    |        | 0.12                               |                       |        | 3.95       | 9.48            | 77           | 52,787          |
| DA-2P (Bioretention #2 On-Site)   | 4.20                               |                       |        | 0.92                               |        |                                    |                       |        | 8.66       | 13.78           | 85           | 105,111         |
| DA-2P (Bioretention #2 Off-Site)* | 0.46                               |                       |        | 0.01                               |        |                                    |                       |        | 0.28       | 0.75            | 75           | 3,864           |
| DA-2P (Bypass)                    | 0.01                               |                       |        | 0.94                               |        | 0.01                               |                       |        | 0.18       | 1.14            | 78           | 5,664           |
|                                   |                                    |                       |        |                                    |        |                                    |                       |        |            |                 |              |                 |
|                                   |                                    |                       |        |                                    |        |                                    |                       |        |            |                 |              |                 |
|                                   |                                    |                       |        |                                    |        |                                    |                       |        |            |                 |              |                 |
|                                   |                                    |                       |        |                                    |        |                                    |                       |        |            |                 |              |                 |
|                                   |                                    |                       |        |                                    |        |                                    |                       |        |            |                 |              |                 |
| Post POI#1 Totals:                | 2.58                               |                       |        |                                    |        | 0.74                               |                       |        | 2.07       | 5.39            |              | 30,758          |
| Post POI#2 Totals:                | 9.62                               |                       |        | 1.86                               |        | 0.13                               |                       |        | 12.79      | 24.40           |              | 163,562         |

\* Area to DA-2P (AGB #2 Off-Site) is not included in this projects Stormwater Management Area. It is only provided to demonstrate that the area tributary to AGB #2 does not cause any issues with the routing of AGB #2.

\*\* Due to the limitations of TR-55 methodology all HSG "A" soils found on this site have been considered HSG "B".

## Time of Concentration (Tc) or (Tt) Calculations

Project: Byers - Commercial Tract

Description: DA-2E

Note: Space for as many as three segments per flow type can be used for each worksheet.

### Sheet Flow (Applicable to Tc only)

1. Surface Description (table 3-1)
  2. Manning's roughness coeff., n (table 3-1)
  3. Flow length, L (total  $L \leq 150$  ft)
  4. Two-yr 24-hr rainfall,  $P_2$
  5. Land slope,  $s^*$
  6.  $T_t = 0.007(nL)^{0.8} / P_2^{0.5} s^{0.4}$
- \*S is averaged

Segment ID

Compute Tt hr

|               |
|---------------|
| AB            |
| Dense grasses |
| 0.240         |
| ft            |
| 50            |
| in            |
| 3.24          |
| ft/ft         |
| 0.0740        |
| 0.0804        |

|  |
|--|
|  |
|  |
|  |
|  |
|  |
|  |
|  |
|  |
|  |

|  |
|--|
|  |
|  |
|  |
|  |
|  |
|  |
|  |
|  |
|  |

= 0.0804

### Shallow Concentrated Flow

7. Surface Description (paved or unpaved)
8. Flow length, L
9. Watercourse slope,  $s^*$
10. Average velocity, V
11.  $T_t = L / 3600V$

Segment ID

ft  
ft/ft  
ft/sec

|         |
|---------|
| BC      |
| Unpaved |
| 394     |
| 0.0380  |
| 3.14    |
| 0.0348  |

|         |
|---------|
| EF      |
| Unpaved |
| 274     |
| 0.1330  |
| 5.91    |
| 0.0129  |

|  |
|--|
|  |
|  |
|  |
|  |
|  |
|  |

= 0.0477

### Channel Flow

12. Cross sectional flow area, a
13. Wetted perimeter, p
14. Hydraulic radius,  $r = a/wp$
15. Channel Slope, s
16. Manning's roughness coeff., n
17.  $V = 1.49r^{2/3}s^{1/2} / n$
18. Flow length, L
19.  $T_t = L / 3600V$
20. Watershed or subarea  $T_c$  or  $T_t$  (add  $T_t$  in steps 6,11, and 19)

Segment ID

ft<sup>2</sup>  
ft  
ft  
ft/ft

|        |
|--------|
| CD     |
| 14.00  |
| 24.10  |
| 0.5809 |
| 0.0370 |
| 0.022  |
| 9.0700 |
| 272    |
| 0.0083 |

|         |
|---------|
| DE      |
| 7.00    |
| 10.32   |
| 0.6780  |
| 0.0410  |
| 0.022   |
| 10.5838 |
| 147     |
| 0.0039  |

|  |
|--|
|  |
|  |
|  |
|  |
|  |
|  |
|  |
|  |
|  |

= 0.0122

0.1403

Tc = 8.42 minutes



### Worksheet 4 . Change in Runoff Volume for 2-Year Storm Event

Project Name: Byers - Commercial Tract  
 Drainage Area: POI #1  
 2-Year Rainfall: 3.24 in.

Total Site Area: 29.79 Acres  
 Protected Site Area: 0.00 Acres  
 Managed Area: 29.79 Acres

#### Existing Conditions \*

| Cover Type/Condition  | **<br>Soil Type | Area<br>(Ac) | CN | S     | Ia<br>(0.2 x S) | Q<br>Runoff <sup>1</sup><br>(in) | Runoff<br>Volume <sup>2</sup><br>(cuft) |
|-----------------------|-----------------|--------------|----|-------|-----------------|----------------------------------|-----------------------------------------|
| Meadow                | B               | 13.17        | 58 | 7.241 | 1.448           | 0.355                            | 16,990.17                               |
| Meadow                | D               | 1.26         | 78 | 2.821 | 0.564           | 1.303                            | 5,958.50                                |
| Woods, Good Condition | B               | 0.57         | 55 | 8.182 | 1.636           | 0.263                            | 543.77                                  |
| Woods, Good Condition | D               | 0.08         | 77 | 2.987 | 0.597           | 1.240                            | 360.23                                  |
|                       |                 |              |    |       |                 |                                  |                                         |
|                       |                 |              |    |       |                 |                                  |                                         |
|                       |                 |              |    |       |                 |                                  |                                         |
|                       |                 |              |    |       |                 |                                  |                                         |
|                       |                 |              |    |       |                 |                                  |                                         |
| <b>Total</b>          |                 | <b>15.08</b> |    |       |                 |                                  | <b>23,852.67</b>                        |

\* Per Chapter 3, the following must be implemented:

- Existing non-forested pervious areas must be considered meadow (good condition) or its equivalent.
- Twenty-percent (20%) of existing impervious area, when present, shall be considered meadow (good condition).

#### Developed Conditions

| Cover Type/Condition               | **<br>Soil Type | Area<br>(Ac) | CN | S     | Ia<br>(0.2 x S) | Q<br>Runoff <sup>1</sup><br>(in) | Runoff<br>Volume <sup>2</sup><br>(cuft) |
|------------------------------------|-----------------|--------------|----|-------|-----------------|----------------------------------|-----------------------------------------|
| Open Space (Lawns), Good Condition | B               | 2.58         | 61 | 6.393 | 1.279           | 0.460                            | 4,312.07                                |
| Open Space (Lawns), Good Condition | D               | 0.74         | 80 | 2.500 | 0.500           | 1.433                            | 3,848.65                                |
| Impervious                         | D               | 2.07         | 98 | 0.204 | 0.041           | 3.007                            | 22,597.45                               |
|                                    |                 |              |    |       |                 |                                  |                                         |
|                                    |                 |              |    |       |                 |                                  |                                         |
|                                    |                 |              |    |       |                 |                                  |                                         |
|                                    |                 |              |    |       |                 |                                  |                                         |
|                                    |                 |              |    |       |                 |                                  |                                         |
|                                    |                 |              |    |       |                 |                                  |                                         |
|                                    |                 |              |    |       |                 |                                  |                                         |
| <b>Total</b>                       |                 | <b>5.39</b>  |    |       |                 |                                  | <b>30,758.17</b>                        |

2-year Volume Increase = 6,905.51 cuft

2-year Volume Increase = Developed Conditions Runoff Volume - Existing Conditions Runoff Volume

1. Runoff (in) =  $Q = (P - 0.2S)^2 / (P + 0.8S)$  where:

$P$  = 2-year Rainfall (in)

$S$  =  $(1000/CN) - 10$

2. Runoff Volume (cf) =  $Q \times \text{Area} \times 1/12$

$Q$  = Runoff (in)

Area = Land use area (s.f.)

**Note: Runoff Volume must be calculated for EACH land use type/condition and HSGI. The use of a weighted CN value for volume calculations is not acceptable.**

\*\* Due to the limitations of TR-55 methodology all HSG "A" soils found on this site have been considered HSG "B".

### Worksheet 5 . Structural BMP Volume Credits

Project Name: **Byers - Commercial Tract**Sub-Basin: **POI #1**

|                                                                                                                |                     |
|----------------------------------------------------------------------------------------------------------------|---------------------|
| Required Control Volume (ft <sup>3</sup> ) - from Worksheet 4:                                                 | <u>6905.51</u>      |
| Non-structural Volume Credit (ft <sup>3</sup> ) - from Worksheet 3:<br>(Maximum is 25% of Required Volume)     | <u>- 0</u>          |
| <b>Structural Volume Requirement (ft<sup>3</sup>)</b><br>(Required Control Volume minus Non-structural Credit) | <u><b>6,906</b></u> |

| Proposed BMP                                               | Area (ft <sup>2</sup> ) | Volume Reduction<br>Permanently<br>Removed (ft <sup>3</sup> ) |
|------------------------------------------------------------|-------------------------|---------------------------------------------------------------|
| 6.4.1 Porous Pavement                                      |                         |                                                               |
| 6.4.2 Infiltration Basin                                   |                         |                                                               |
| 6.4.3 Infiltration Bed                                     |                         |                                                               |
| 6.4.4 Infiltration Trench                                  |                         |                                                               |
| 6.4.5 Rain Garden/Bioretenion                              | 111,514                 | 7,953                                                         |
| 6.4.6 Dry Well/Seepage Pit                                 |                         |                                                               |
| 6.4.7 Constructed Filter                                   |                         |                                                               |
| 6.4.8 Vegetated Swale                                      |                         |                                                               |
| 6.4.9 Vegetated Filter Strip                               |                         |                                                               |
| 6.4.10 Berm                                                |                         |                                                               |
| 6.5.1 Vegetated Roof                                       |                         |                                                               |
| 6.5.2 Capture and Re-Use                                   |                         |                                                               |
| 6.6.1 Constructed Wetlands                                 |                         |                                                               |
| 6.6.2 Wet Pond/Retention Basin                             |                         |                                                               |
| 6.7.1 Riparian Buffer / Riparian Forest Buffer Restoration |                         |                                                               |
| 6.7.2 Landscape Restoration / Reforestation                |                         |                                                               |
| 6.7.3 Soil Amendment                                       |                         |                                                               |
| 6.8.1 Level Spreader                                       |                         |                                                               |
| 6.8.2 Special Storage Areas                                |                         |                                                               |
| Other                                                      |                         |                                                               |
|                                                            |                         |                                                               |
|                                                            |                         |                                                               |
|                                                            |                         |                                                               |
|                                                            |                         |                                                               |
|                                                            |                         |                                                               |

|                                                   |                     |
|---------------------------------------------------|---------------------|
| Total Structural Volume (ft <sup>3</sup> ):       | <u>7,953</u>        |
| Structural Volume Requirement (ft <sup>3</sup> ): | <u>6,906</u>        |
| <b>DIFFERENCE</b>                                 | <u><b>1,047</b></u> |



### Worksheet 4 . Change in Runoff Volume for 2-Year Storm Event

|                      |                          |       |
|----------------------|--------------------------|-------|
| Project Name:        | Byers - Commercial Tract |       |
| Drainage Area:       | POI #2                   |       |
| 2-Year Rainfall:     | 3.24                     | in.   |
| Total Site Area:     | 29.79                    | Acres |
| Protected Site Area: | 0.00                     | Acres |
| Managed Area:        | 29.79                    | Acres |

### Existing Conditions \*

| Cover Type/Condition  | Soil Type | Area<br>(Ac) | CN | S     | Ia<br>(0.2 x S) | Q<br>Runoff <sup>1</sup><br>(in) | Runoff<br>Volume <sup>2</sup><br>(cuft) |
|-----------------------|-----------|--------------|----|-------|-----------------|----------------------------------|-----------------------------------------|
| Meadow                | B         | 10.68        | 58 | 7.241 | 1.448           | 0.355                            | 13,777.90                               |
| Meadow                | C         | 3.95         | 71 | 4.085 | 0.817           | 0.902                            | 12,936.73                               |
| Meadow                | D         | 0.01         | 78 | 2.821 | 0.564           | 1.303                            | 47.29                                   |
| Woods, Good Condition | B         | 0.07         | 55 | 8.182 | 1.636           | 0.263                            | 66.78                                   |
|                       |           |              |    |       |                 |                                  |                                         |
|                       |           |              |    |       |                 |                                  |                                         |
|                       |           |              |    |       |                 |                                  |                                         |
|                       |           |              |    |       |                 |                                  |                                         |
|                       |           |              |    |       |                 |                                  |                                         |
|                       | Total     | 14.71        |    |       |                 |                                  | 26,828.71                               |

\* Per Chapter 3, the following must be implemented:

1. Existing non-forested pervious areas must be considered meadow (good condition) or its equivalent.
2. Twenty-percent (20%) of existing impervious area, when present, shall be considered meadow (good condition).

**Developed Conditions\***

| Cover Type/Condition               | **<br>Soil Type | Area<br>(Ac) | CN | S     | Ia<br>(0.2 x S) | Q<br>Runoff <sup>1</sup><br>(in) | Runoff<br>Volume <sup>2</sup><br>(cuft) |
|------------------------------------|-----------------|--------------|----|-------|-----------------|----------------------------------|-----------------------------------------|
| Open Space (Lawns), Good Condition | B               | 9.62         | 61 | 6.393 | 1.279           | 0.460                            | 16,078.34                               |
| Open Space (Lawns), Good Condition | C               | 1.86         | 74 | 3.514 | 0.703           | 1.064                            | 7,183.71                                |
| Open Space (Lawns), Good Condition | D               | 0.13         | 80 | 2.500 | 0.500           | 1.433                            | 676.11                                  |
| Impervious                         | D               | 12.79        | 98 | 0.204 | 0.041           | 3.007                            | 139,623.88                              |
|                                    |                 |              |    |       |                 |                                  |                                         |
|                                    |                 |              |    |       |                 |                                  |                                         |
|                                    |                 |              |    |       |                 |                                  |                                         |
|                                    |                 |              |    |       |                 |                                  |                                         |
|                                    |                 |              |    |       |                 |                                  |                                         |
|                                    |                 |              |    |       |                 |                                  |                                         |
|                                    |                 |              |    |       |                 |                                  |                                         |
|                                    | <b>Total</b>    | <b>24.40</b> |    |       |                 |                                  | <b>163,562.04</b>                       |

**2-year Volume Increase =** **136,733.34** cuft

$$\text{2-year Volume Increase} = \text{Developed Conditions Runoff Volume} - \text{Existing Conditions Runoff Volume}$$

1.  $\text{Runoff (in)} = Q = (P - 0.2S)^2 / (P + 0.8S)$  where:  
 $P = 2\text{-year Rainfall (in)}$   
 $S = (1000/CN) - 10$

2. **Runoff Volume (cf) = Q x Area x 1/12**  
**Q = Runoff (in)**  
**Area = Land use area (s.f.)**

**Note: Runoff Volume must be calculated for EACH land use type/condition and HSGI. The use of a weighted CN value for volume calculations is not acceptable.**

\* Offsite area to AGB #2 is not included in the stormwater management area of this project.

\*\* Due to the limitations of TR-55 methodology all HSG "A" soils found on this site have been considered HSG "B".

### Worksheet 5 . Structural BMP Volume Credits

Project Name: **Byers - Commercial Tract**Sub-Basin: **POI #2**

|                                                                                                                |                       |
|----------------------------------------------------------------------------------------------------------------|-----------------------|
| Required Control Volume (ft <sup>3</sup> ) - from Worksheet 4:                                                 | <u>136733.34</u>      |
| Non-structural Volume Credit (ft <sup>3</sup> ) - from Worksheet 3:<br>(Maximum is 25% of Required Volume)     | <u>- 0</u>            |
| <b>Structural Volume Requirement (ft<sup>3</sup>)</b><br>(Required Control Volume minus Non-structural Credit) | <u><b>136,733</b></u> |

| Proposed BMP                                               | Area (ft <sup>2</sup> ) | Volume Reduction<br>Permanently<br>Removed (ft <sup>3</sup> ) |
|------------------------------------------------------------|-------------------------|---------------------------------------------------------------|
| 6.4.1 Porous Pavement                                      |                         |                                                               |
| 6.4.2 Infiltration Basin                                   |                         |                                                               |
| 6.4.3 Infiltration Bed                                     |                         |                                                               |
| 6.4.4 Infiltration Trench                                  |                         |                                                               |
| 6.4.5 Rain Garden/Bioretenion                              | 1,013,206               | 134,867                                                       |
| 6.4.6 Dry Well/Seepage Pit                                 |                         |                                                               |
| 6.4.7 Constructed Filter                                   |                         |                                                               |
| 6.4.8 Vegetated Swale                                      |                         |                                                               |
| 6.4.9 Vegetated Filter Strip                               |                         |                                                               |
| 6.4.10 Berm                                                |                         |                                                               |
| 6.5.1 Vegetated Roof                                       |                         |                                                               |
| 6.5.2 Capture and Re-Use                                   |                         |                                                               |
| 6.6.1 Constructed Wetlands                                 |                         |                                                               |
| 6.6.2 Wet Pond/Retention Basin                             |                         |                                                               |
| 6.7.1 Riparian Buffer / Riparian Forest Buffer Restoration |                         |                                                               |
| 6.7.2 Landscape Restoration / Reforestation                |                         |                                                               |
| 6.7.3 Soil Amendment                                       |                         |                                                               |
| 6.8.1 Level Spreader                                       |                         |                                                               |
| 6.8.2 Special Storage Areas                                |                         |                                                               |
| Other Re-Vegetate Disturbed Areas                          | -                       | 2,646                                                         |
|                                                            |                         |                                                               |
|                                                            |                         |                                                               |
|                                                            |                         |                                                               |
|                                                            |                         |                                                               |

|                                                   |                   |
|---------------------------------------------------|-------------------|
| Total Structural Volume (ft <sup>3</sup> ):       | <u>137,513</u>    |
| Structural Volume Requirement (ft <sup>3</sup> ): | <u>136,733</u>    |
| <b>DIFFERENCE</b>                                 | <u><b>780</b></u> |



## SUMMARY OF BMP VOLUME REDUCTIONS

Project: [Byers - Commercial Tract \(POI 2\)](#)

### BMP 6.4.5 - Bioretention Basins

| Basin                                     | Bioretention |          |  |              |
|-------------------------------------------|--------------|----------|--|--------------|
|                                           | Basin #1     | Basin #2 |  |              |
| Total Basin Reduction                     | 47,767       | 87,100   |  |              |
| Total Volume Permanently Removed by BMP*: |              |          |  | 134,867 cuft |

### BMP 5.6.3 - Re-Vegetate Disturbed Areas

| Type:                                    | Qty |      | Volume   |            |
|------------------------------------------|-----|------|----------|------------|
| Evergreen Trees                          | 96  | x 10 | 960.00   | cuft       |
| Deciduous Trees                          | 281 | x 6  | 1,686.00 | cuft       |
| Total Volume Permanently Removed by BMP: |     |      |          | 2,646 cuft |

**Stormwater BMP Information Chart 5.B revised March 15, 2016**

|                                                 |                                         | Infiltration Information |                          |                              |                                                                      | Drainage Information       |                                       |                               |                                                  | BMP Information                                                                 |                                                                           |                                                                                   |                                                                    |                                                   |                                                     |
|-------------------------------------------------|-----------------------------------------|--------------------------|--------------------------|------------------------------|----------------------------------------------------------------------|----------------------------|---------------------------------------|-------------------------------|--------------------------------------------------|---------------------------------------------------------------------------------|---------------------------------------------------------------------------|-----------------------------------------------------------------------------------|--------------------------------------------------------------------|---------------------------------------------------|-----------------------------------------------------|
| Proposed Structural BMPs<br>(site specific)     | Measured Infiltration Rate <sup>9</sup> | Factor of Safety         | Design Infiltration Rate | Dewatering Time <sup>1</sup> | Elevation of Limiting Zone - Water Table, Bedrock, etc. <sup>2</sup> | Total Drainage Area to BMP | Total Impervious Drainage Area to BMP | Infiltration BMP Surface Area | Total Drainage Area Loading Ratio <sup>6</sup> * | Volume of Runoff Tributary to BMP During the 2yr/24hr Design Storm <sup>5</sup> | Calculated Infiltration Volume (from storms up to and including 2yr/24hr) | Calculated Managed Volume (from storms up to and including 2yr/24hr) <sup>8</sup> | Maximum water surface elevation in BMP from 2yr storm <sup>3</sup> | Infiltration Bottom of Bed/<br>Basin <sup>3</sup> | Elevation of E&S Sediment Basin Bottom (if applies) |
|                                                 | in./hr.                                 | Min. of 2                | in./hr.                  | hrs.                         |                                                                      | sq. ft.                    | sq. ft.                               | sq. ft.                       |                                                  | cf                                                                              | cf                                                                        | cf                                                                                | storm <sup>3</sup>                                                 | Test <sup>4</sup>                                 |                                                     |
| BMP 6.4.1 Pervious Pavement w/ Infiltration Bed |                                         |                          |                          |                              |                                                                      |                            |                                       |                               |                                                  |                                                                                 |                                                                           |                                                                                   |                                                                    |                                                   |                                                     |
| BMP 6.4.2 Infiltration Basin                    |                                         |                          |                          |                              |                                                                      |                            |                                       |                               |                                                  |                                                                                 |                                                                           |                                                                                   |                                                                    |                                                   |                                                     |
| BMP 6.4.3 Subsurface Infiltration Bed           |                                         |                          |                          |                              |                                                                      |                            |                                       |                               |                                                  |                                                                                 |                                                                           |                                                                                   |                                                                    |                                                   |                                                     |
| BMP 6.4.4 Infiltration Trench                   |                                         |                          |                          |                              |                                                                      |                            |                                       |                               |                                                  |                                                                                 |                                                                           |                                                                                   |                                                                    |                                                   |                                                     |
| BMP 6.4.5 Rain Garden/Bioretentention           |                                         |                          |                          |                              |                                                                      |                            |                                       |                               |                                                  |                                                                                 |                                                                           |                                                                                   |                                                                    |                                                   |                                                     |
| Bioretention Basin #1                           | 3.81                                    | 3                        | 1.27                     | 19.90                        | 424.80                                                               | 412,949                    | 172,062                               | 22,671                        | 18 :1                                            | 8 :1                                                                            | 52,787                                                                    | 47,767                                                                            | 430.39                                                             | 427.00                                            | 429.00                                              |
| Bioretention Basin #2                           | 1.00                                    | 3                        | 0.33                     | 74.08                        | N.E.*                                                                | 600,257                    | 377,230                               | 42,329                        | 14 :1                                            | 9 :1                                                                            | 105,111                                                                   | 87,100                                                                            | 424.13                                                             | 420.00                                            | 422.00                                              |
| Bioretention Basin #3                           | 1.13                                    | 3                        | 0.38                     | 39.98                        | N.E.*                                                                | 64,469                     | 23,087                                | 3,903                         | 17 :1                                            | 6 :1                                                                            | 9,244                                                                     | 4,876                                                                             | 452.11                                                             | 450.00                                            | 451.00                                              |
| Bioretention Basin #4                           |                                         | ***                      |                          | 33.72                        | 437.60                                                               | 48,787                     | 20,473                                | 2,546                         | 19 :1                                            | 8 :1                                                                            | 6,217                                                                     | ****                                                                              | 446.57                                                             | 445.00                                            | 446.00                                              |
| Bioretention Basin #5                           |                                         | ***                      |                          | 27.77                        | 440.20                                                               | 46,609                     | 21,344                                | 2,418                         | 19 :1                                            | 9 :1                                                                            | 6,319                                                                     | ****                                                                              | 441.72                                                             | 440.00                                            | 441.00                                              |
| Bioretention Basin #6                           | 0.50                                    | 3                        | 0.17                     | 61.15                        | N.E.*                                                                | 47,045                     | 21,780                                | 3,623                         | 13 :1                                            | 6 :1                                                                            | 6,428                                                                     | 3,077                                                                             | 438.65                                                             | 437.00                                            | 438.00                                              |
| BMP 6.4.6 Dry Well / Seepage Pit                |                                         |                          |                          |                              |                                                                      |                            |                                       |                               |                                                  |                                                                                 |                                                                           |                                                                                   |                                                                    |                                                   |                                                     |
| Other                                           |                                         |                          |                          |                              |                                                                      |                            |                                       |                               |                                                  |                                                                                 |                                                                           |                                                                                   |                                                                    |                                                   |                                                     |
| BMP 6.4.7 Constructed Filter                    |                                         |                          |                          |                              |                                                                      |                            |                                       |                               |                                                  |                                                                                 |                                                                           |                                                                                   |                                                                    |                                                   |                                                     |
| BMP 6.4.8 Vegetated Swale                       |                                         |                          |                          |                              |                                                                      |                            |                                       |                               |                                                  |                                                                                 |                                                                           |                                                                                   |                                                                    |                                                   |                                                     |
| BMP 6.4.9 Vegetated Filter Strip                |                                         |                          |                          |                              |                                                                      |                            |                                       |                               |                                                  |                                                                                 |                                                                           |                                                                                   |                                                                    |                                                   |                                                     |
| BMP 6.4.10 Infiltr. Berm & Ret. Grading         |                                         |                          |                          |                              |                                                                      |                            |                                       |                               |                                                  |                                                                                 |                                                                           |                                                                                   |                                                                    |                                                   |                                                     |

All information should be based on the 2-year/24-hour storm

Provide page numbers from the stormwater narrative identifying the location of the above information.

<sup>1</sup> Can include active infiltration time - dewatering time should not exceed 72 hours after the 2-year/24-hour storm (i.e. 96 hours)

<sup>2</sup> Depth to limiting zone is recommended to be at least 2 ft below infiltration testing elevation/proposed infiltration elevation.

<sup>3</sup> A maximum of 2 feet of Hydraulic head is recommended.

<sup>4</sup> Provide supporting field notes/documentation from soil evaluation.

<sup>5</sup> This value should be greater than or equal to the Volume to be infiltrated or Managed by the BMP.

<sup>6</sup> A maximum of 8:1 is recommended.

<sup>7</sup> A maximum of 5:1 is recommended; however, in carbonate geology areas, a maximum of 3:1 is recommended.

<sup>8</sup> Calculated runoff volume that is managed in ways other than infiltration to address 25 PA Code Ch 102.8(g)(2)

<sup>9</sup> The infiltration testing information should be located on the plan view of the PCSM Plan and should include infiltration test elevation and rate.

\* N.E. = None Encountered

\*\* Refer to Page 4 of the PCSM Narrative for additional information on loading Ratios. Also refer to Page 66 of the PCSM narrative for "Adjusted Loading Ratio" calculations.

\*\*\* Dewatering calculations for Bioretention Basins #4 & #5 are provided on Page 67 of the PCSM narrative.

\*\*\*\* No volume credit needed from Bioretention Basin #4 and #5 to meet CG-1 requirements for POI #1.

\*\*\*\*\* No volume credit needed from Bioretention Basin #4 and #5 to meet CG-1 requirements for POI #1.

Any deviations from the recommendations above should be adequately justified by a qualified professional and included with the application.

NOTE: This chart is for summary purposes only and should be consistent with all design calculations and worksheets.

# ADJUSTED LOADING RATIO CALCULATIONS

Project: **Byers - Commercial Tract**

| Infiltration Facility | Infiltration BMP Surface Area (sf) | Infiltration Facility Drainage Area |                      | Other BMPs within Drainage Area |                            |                      | Net Drainage Area |                      | Adjusted Loading Ratio    |                               |
|-----------------------|------------------------------------|-------------------------------------|----------------------|---------------------------------|----------------------------|----------------------|-------------------|----------------------|---------------------------|-------------------------------|
|                       |                                    | Overall Area (sf)                   | Impervious Area (sf) | BMP                             | Overall Drainage Area (sf) | Impervious Area (sf) | Overall Area (sf) | Impervious Area (sf) | Total Drainage Area Ratio | Impervious Area Loading Ratio |
| Bioretention #1       | 22,671                             | 412,949                             | 172,062              | Vegetated Swale 2               | 28,774                     | 5,952                | 285,569           | 132,386              | 13                        | 6                             |
|                       |                                    |                                     |                      | Vegetated Swale 3               | 20,774                     | 4,031                |                   |                      |                           |                               |
|                       |                                    |                                     |                      | Vegetated Swale 8               | 21,844                     | 6,407                |                   |                      |                           |                               |
|                       |                                    |                                     |                      | Vegetated Swale 10              | 46,840                     | 10,218               |                   |                      |                           |                               |
|                       |                                    |                                     |                      | WQ Inlets                       | 9,148                      | 13,068               |                   |                      |                           |                               |
| Bioretention #2       | 42,329                             | 600,257                             | 377,230              | Vegetated Swale 1               | 40,641                     | 8,860                | 477,351           | 269,244              | 11                        | 6                             |
|                       |                                    |                                     |                      | Vegetated Swale 9               | 19,538                     | 3,294                |                   |                      |                           |                               |
|                       |                                    |                                     |                      | Vegetated Swale 11              | 1,742                      | 2,178                |                   |                      |                           |                               |
|                       |                                    |                                     |                      | Vegetated Swale 12              | 1,742                      | 2,178                |                   |                      |                           |                               |
|                       |                                    |                                     |                      | Vegetated Swale 13              | 1,307                      | 5,227                |                   |                      |                           |                               |
| Bioretention #3       | 3,903                              | 64,469                              | 23,087               | WQ Inlets                       | 57,936                     | 86,249               | 44,876            | 15,492               | 11                        | 4                             |
| Bioretention #4       | 2,546                              | 48,787                              | 20,473               | Vegetated Swale 4               | 19,593                     | 7,595                | 33,009            | 13,351               | 13                        | 5                             |
| Bioretention #5       | 2,418                              | 46,609                              | 21,344               | Vegetated Swale 5               | 15,778                     | 7,122                | 31,068            | 14,002               | 13                        | 6                             |
| Bioretention #6       | 3,623                              | 47,045                              | 21,780               | Vegetated Swale 6               | 15,541                     | 7,342                | 32,013            | 14,928               | 9                         | 4                             |
|                       |                                    |                                     |                      | Vegetated Swale 7               | 15,032                     | 6,852                |                   |                      |                           |                               |



# Pond Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

Thursday, 02 / 15 / 2018

## Pond No. 1 - Bioretention Basin #1

### Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Beginning Elevation = 429.00 ft

### Stage / Storage Table

| Stage (ft) | Elevation (ft) | Contour area (sqft) | Incr. Storage (cuft) | Total storage (cuft) |
|------------|----------------|---------------------|----------------------|----------------------|
| 0.00       | 429.00         | 16,300              | 0                    | 0                    |
| 1.00       | 430.00         | 18,136              | 17,208               | 17,208               |
| 3.00       | 432.00         | 22,405              | 40,462               | 57,670               |
| 5.00       | 434.00         | 27,333              | 49,651               | 107,321              |
| 7.00       | 436.00         | 32,698              | 59,945               | 167,266              |

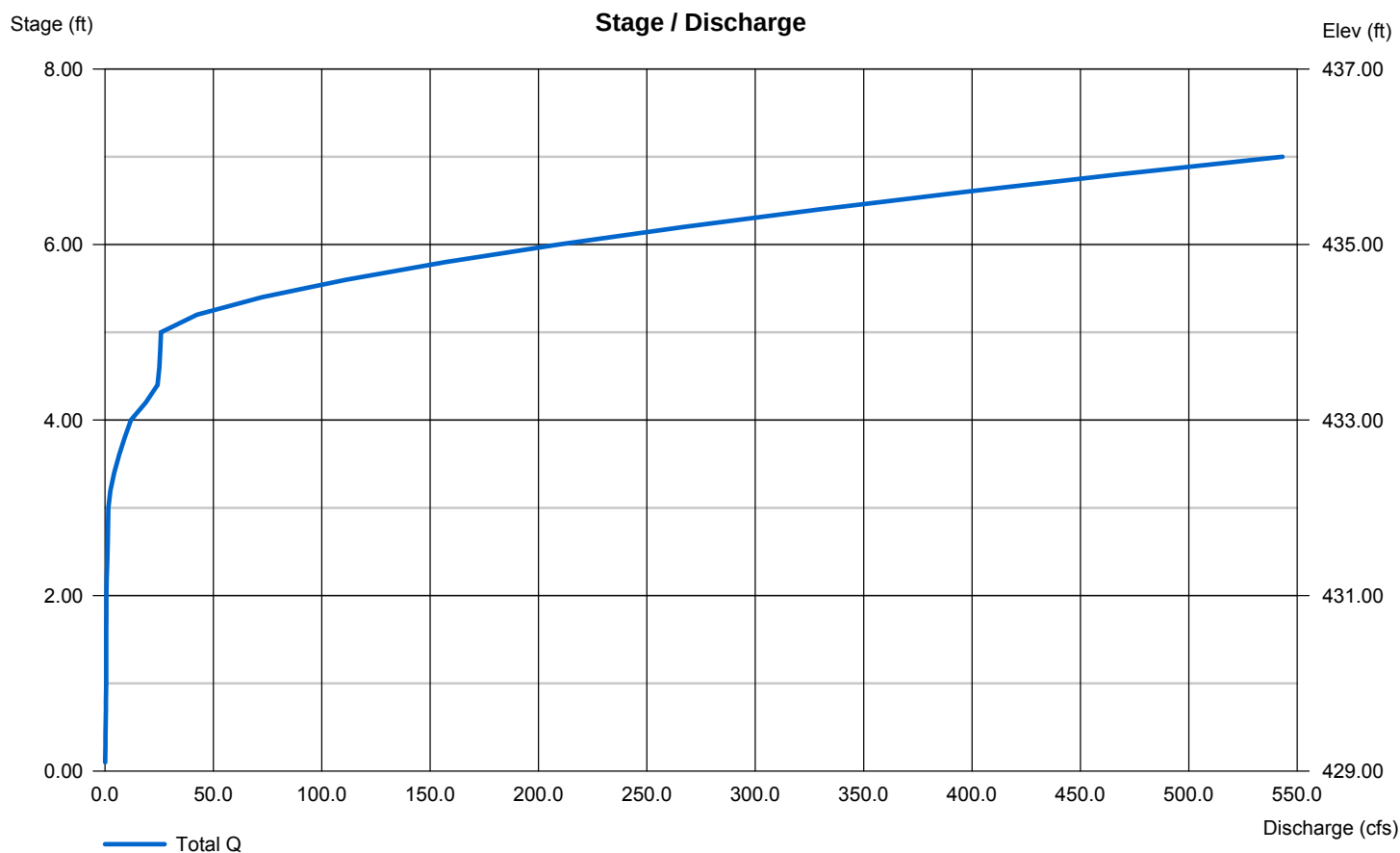
### Culvert / Orifice Structures

|                 | [A]      | [B]    | [C]  | [PrfRsr] |
|-----------------|----------|--------|------|----------|
| Rise (in)       | = 18.00  | 6.00   | 0.00 | 0.00     |
| Span (in)       | = 18.00  | 6.00   | 0.00 | 0.00     |
| No. Barrels     | = 1      | 1      | 0    | 0        |
| Invert El. (ft) | = 423.79 | 430.95 | 0.00 | 0.00     |
| Length (ft)     | = 78.00  | 0.00   | 0.00 | 0.00     |
| Slope (%)       | = 0.50   | 0.00   | 0.00 | n/a      |
| N-Value         | = .013   | .013   | .013 | n/a      |
| Orifice Coeff.  | = 0.60   | 0.60   | 0.60 | 0.60     |
| Multi-Stage     | = n/a    | Yes    | No   | No       |

### Weir Structures

|                | [A]                  | [B]    | [C]    | [D]  |
|----------------|----------------------|--------|--------|------|
| Crest Len (ft) | = 12.00              | 3.00   | 70.00  | 0.00 |
| Crest El. (ft) | = 433.00             | 432.00 | 434.00 | 0.00 |
| Weir Coeff.    | = 3.33               | 3.33   | 2.60   | 3.33 |
| Weir Type      | = 1                  | Rect   | Broad  | ---  |
| Multi-Stage    | = Yes                | Yes    | No     | No   |
| Exfil.(in/hr)  | = 1.270 (by Contour) |        |        |      |
| TW Elev. (ft)  | = 0.00               |        |        |      |

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



# Pond Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

Thursday, 02 / 15 / 2018

## Pond No. 2 - Bioretention Basin #2

### Pond Data

**Contours** -User-defined contour areas. Conic method used for volume calculation. Beginning Elevation = 422.00 ft

### Stage / Storage Table

| Stage (ft) | Elevation (ft) | Contour area (sqft) | Incr. Storage (cuft) | Total storage (cuft) |
|------------|----------------|---------------------|----------------------|----------------------|
| 0.00       | 422.00         | 34,435              | 0                    | 0                    |
| 2.00       | 424.00         | 38,056              | 72,454               | 72,454               |
| 4.00       | 426.00         | 41,868              | 79,886               | 152,339              |
| 6.00       | 428.00         | 45,914              | 87,742               | 240,081              |

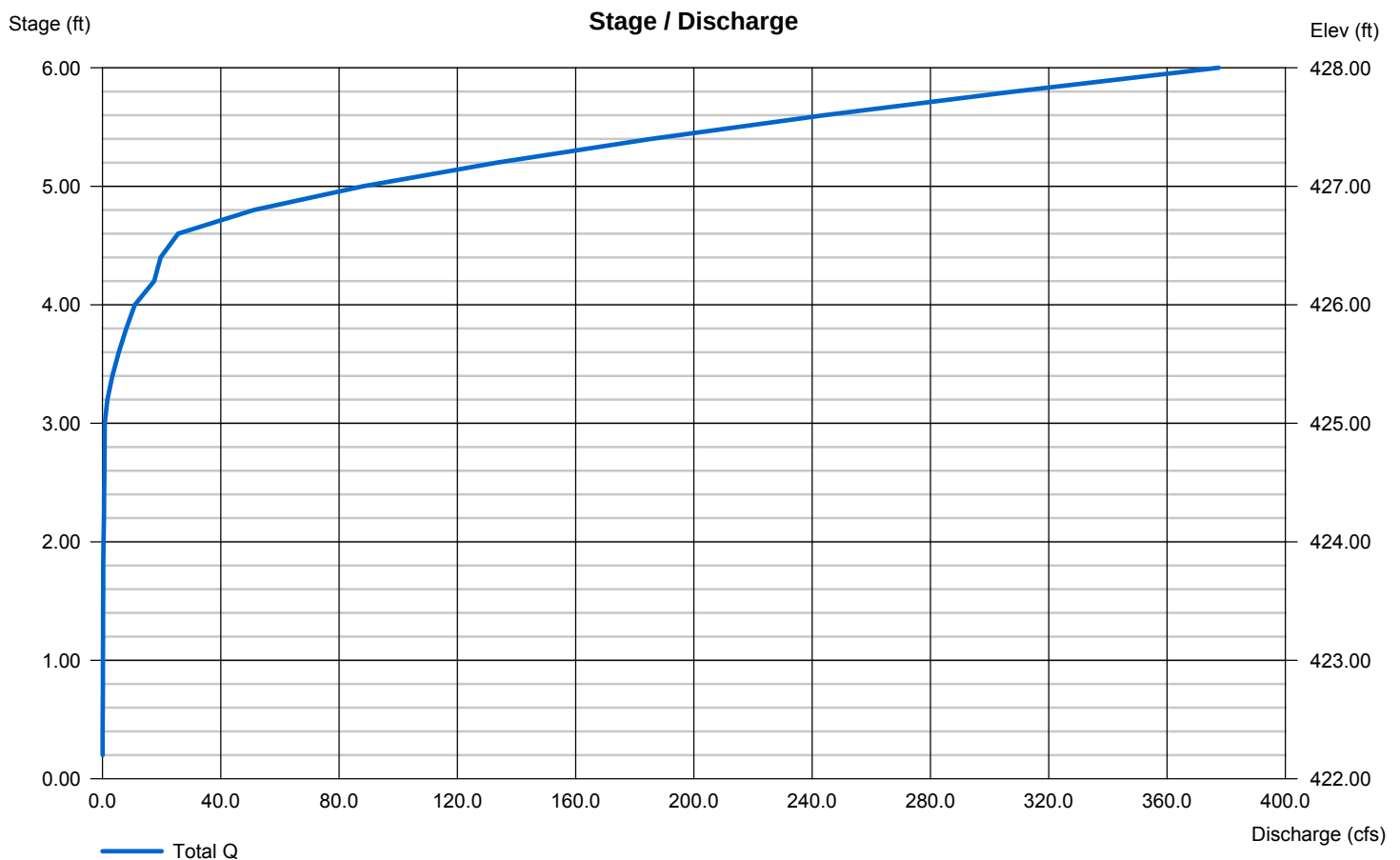
### Culvert / Orifice Structures

|                 | [A]      | [B]    | [C]  | [PrfRsr] |
|-----------------|----------|--------|------|----------|
| Rise (in)       | = 18.00  | 4.00   | 0.00 | 0.00     |
| Span (in)       | = 18.00  | 4.00   | 0.00 | 0.00     |
| No. Barrels     | = 1      | 1      | 0    | 0        |
| Invert El. (ft) | = 420.23 | 423.82 | 0.00 | 0.00     |
| Length (ft)     | = 36.00  | 0.00   | 0.00 | 0.00     |
| Slope (%)       | = 0.50   | 0.00   | 0.00 | n/a      |
| N-Value         | = .013   | .013   | .013 | n/a      |
| Orifice Coeff.  | = 0.60   | 0.60   | 0.60 | 0.60     |
| Multi-Stage     | = n/a    | Yes    | No   | No       |

### Weir Structures

|                | [A]                  | [B]    | [C]    | [D]  |
|----------------|----------------------|--------|--------|------|
| Crest Len (ft) | = 12.00              | 3.00   | 75.00  | 0.00 |
| Crest El. (ft) | = 426.00             | 425.00 | 426.51 | 0.00 |
| Weir Coeff.    | = 3.33               | 3.33   | 2.60   | 3.33 |
| Weir Type      | = 1                  | Rect   | Broad  | ---  |
| Multi-Stage    | = Yes                | Yes    | No     | No   |
| Exfil.(in/hr)  | = 0.330 (by Contour) |        |        |      |
| TW Elev. (ft)  | = 0.00               |        |        |      |

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



## Spillway Calculations

Project Name: Byers - Commercial Tract

Description: Bioretention #1

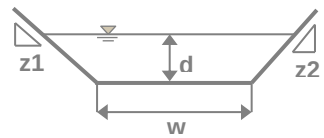
Determine Values for Equation  $Q = CLH^{1.5}$

Q = 70.50 Post-development 100-year flow (cfs)  
 L = 50 Length (LF)  
 C = 50.00 Weir Coefficient  
 ↓  
 H = 0.09 Flow Depth Over Weir (ft)

Determine Required Top of Berm Elevation

434.00 Spillway Elevation  
 + 1.00 Required Freeboard  
 + 0.09 Depth of Flow (from above)  
 ↓  
 = 435.09 Required Top of Berm Elevation  
  
436.00 Provided Top of Berm Elevation

Determine Spillway Lining



Z1 & Z2 = 3.00 ft : ft  
 Slope = 0.33 ft/ft (downslope of spillway)

Velocity Design Method

15.13 Calculated Velocity (fps)

NAG SC250 Spillway Lining

15.00 Allowable Velocity (fps)



## Spillway Calculations

Project Name: Byers - Commercial Tract

Description: Bioretention #2

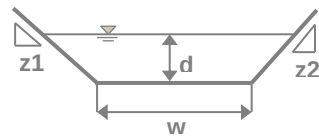
Determine Values for Equation  $Q = CLH^{1.5}$

Q = 118.96 Post-development 100-year flow (cfs)  
 L = 75 Length (LF)  
 C = 3.33 Weir Coefficient  
 ↓  
 H = 0.61 Flow Depth Over Weir (ft)

Determine Required Top of Berm Elevation

426.51 Spillway Elevation  
 + 1.00 Required Freeboard  
 + 0.61 Depth of Flow (from above)  
 ↓  
 = 428.12 Required Top of Berm Elevation  
  
428.84 Provided Top of Berm Elevation

Determine Spillway Lining



Z1 & Z2 = 20.00 ft : ft  
 Slope = 0.33 ft/ft (downslope of spillway)

Velocity Design Method

2.24 Calculated Velocity (fps)

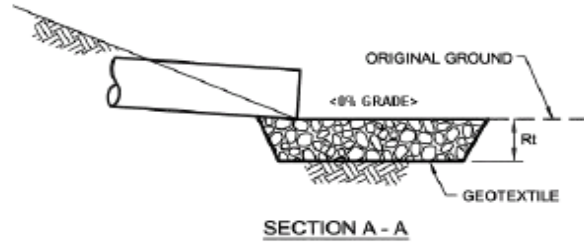
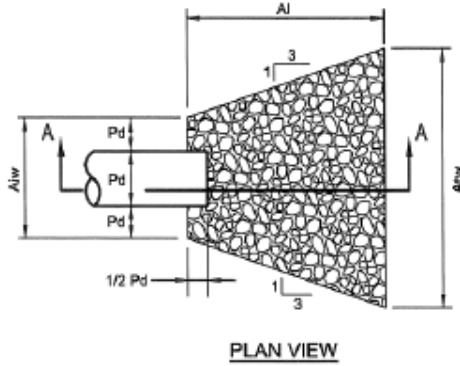
NAG SC250 Spillway Lining

15.00 Allowable Velocity (fps)

## Rip-rap Apron Summary Sheet

Project: Byers - Commercial Tract

Description: Endwalls

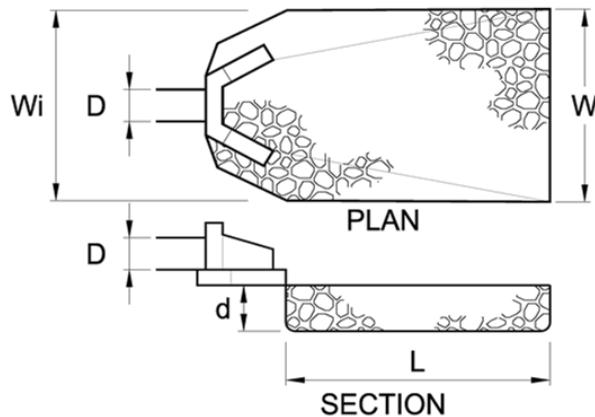


| Outlet Name | Pipe     |                                 |                        |        |       |                    | Apron                  |         |        |        |         |         |
|-------------|----------|---------------------------------|------------------------|--------|-------|--------------------|------------------------|---------|--------|--------|---------|---------|
|             | Dia. In. | Tail Water Condition Min or Max | Manning's "n" For Pipe | Slope  | Q cfs | V <sup>1</sup> fps | d <sub>50</sub> R- in. |         | Rt in. | Al ft. | Aiw ft. | Atw ft. |
| EW03        | 30       | MAX                             | 0.012                  | 0.0050 | 21.91 | 4.47               | 3.0000                 | 6.0000  | 9.0    | 13.00  | 7.5     | 12.7    |
| EW04        | 15       | MAX                             | 0.012                  | 0.0100 | 6.50  | 6.96               | 4.0000                 | 12.0000 | 18.0   | 21.00  | 3.8     | 12.15   |
| EW05        | 30       | MAX                             | 0.012                  | 0.0100 | 24.37 | 7.09               | 4.0000                 | 12.0000 | 18.0   | 31.00  | 7.5     | 19.9    |
| EW09        | 18       | MAX                             | 0.012                  | 0.0051 | 4.67  | 4.81               | 3.0000                 | 6.0000  | 9.0    | 12.00  | 4.5     | 9.3     |

## Rip-Rap Apron Worksheet

Project: Byers - Commercial Tract

Description: EW03



### Rip-Rap Dimensions:

$L =$  13.0 ft  
 $W =$  12.7 ft  
 $W_i =$  7.5 ft

Rip-rap Size = R-3  
 $d_{50} =$  6.0 in  
 $d =$  9.0 in

### Design Values:

$n =$  Manning's  $n$   
 $D =$  Diameter of Pipe  
 $S =$  Slope of Pipe  
 $Q_d =$  Design Discharge  
 $V_d =$  Velocity  
 $T_w =$  Tailwater Condition  
 $A =$  Full Flow Area of Pipe

|       |        |
|-------|--------|
| $n$   | 0.012  |
| $D$   | 30     |
| $S$   | 0.0050 |
| $Q_d$ | 21.91  |
| $V_d$ | 4.47   |
| $T_w$ | MAX    |
| $A$   | 4.91   |

in.  $\leftarrow$  Rise (in.) 30 x Span (in.) 30  $\leftarrow$  Barrels 1  
 ft/ft  $\leftarrow$  21.91  
 cfs\*\*\*  $\leftarrow$  4.47  
 fps\*\*\*  $\leftarrow$  4.47  
 either MIN or MAX  
 sf  
 \*\*\* Formulas based on full-flow capacity.

### Full Flow Pipe Discharge:

$Q_f = 0.464/n * D^{8/3} * S^{1/2} =$  31.48 cfs

### Ratio of Part-Full to Full Flow Discharge:

$d/D = Q_d/Q_f =$  0.70

### Figure 20 Ratios:

Area of Flow = 0.64  
 Depth of Flow = 0.61

### Calculate Equivalent Flow:

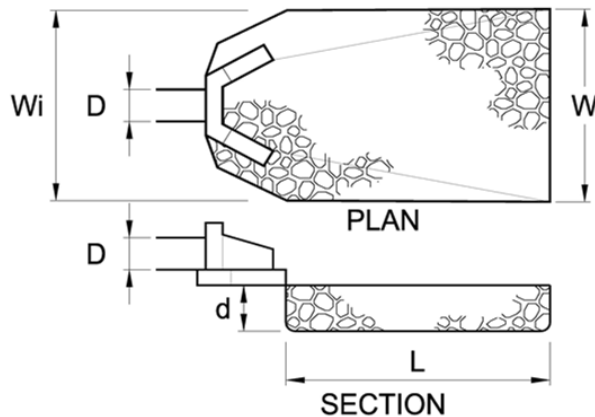
$A * Ratio =$  3.16 sf  
 Equivalent Pipe Size full-flow = 24 in (smaller size = larger rip-rap (factor of safety))



## Rip-Rap Apron Worksheet

Project: Byers - Commercial Tract

Description: EW04



### Rip-Rap Dimensions:

$L =$  21.0 ft  
 $W =$  12.2 ft  
 $W_i =$  3.8 ft

Rip-rap Size = R-4  
 $d_{50} =$  12.0 in  
 $d =$  18.0 in

### Design Values:

$n =$  Manning's  $n$   
 $D =$  Diameter of Pipe  
 $S =$  Slope of Pipe  
 $Q_d =$  Design Discharge  
 $V_d =$  Velocity  
 $T_w =$  Tailwater Condition  
 $A =$  Full Flow Area of Pipe

|       |        |
|-------|--------|
| $n$   | 0.012  |
| $D$   | 15     |
| $S$   | 0.0100 |
| $Q_d$ | 6.50   |
| $V_d$ | 6.96   |
| $T_w$ | MAX    |
| $A$   | 1.23   |

in.  $\leftarrow$  Rise (in.) 15 x Span (in.) 15  $\leftarrow$  Barrels 1  
 ft/ft  $\leftarrow$  6.50  
 cfs\*\*\*  $\leftarrow$  6.96  
 fps\*\*\*  $\leftarrow$  6.96  
 either MIN or MAX  
 sf  
 \*\*\* Formulas based on full-flow capacity.

### Full Flow Pipe Discharge:

$Q_f = 0.464/n * D^{8/3} * S^{1/2} =$  7.01 cfs

### Ratio of Part-Full to Full Flow Discharge:

$d/D = Q_d/Q_f =$  0.93

### Figure 20 Ratios:

Area of Flow = 0.89  
 Depth of Flow = 0.76

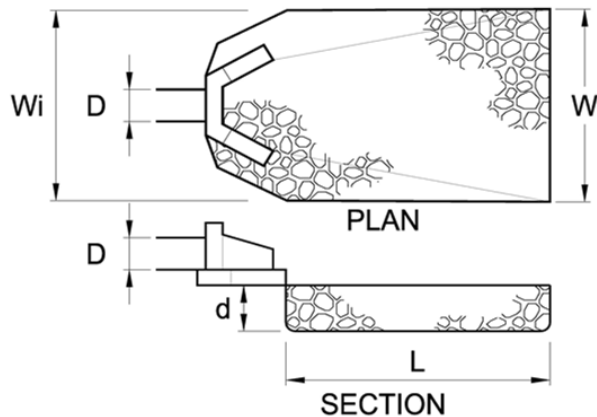
### Calculate Equivalent Flow:

$A * Ratio =$  1.09 sf  
 Equivalent Pipe Size full-flow = 12 in (smaller size = larger rip-rap (factor of safety))

## Rip-Rap Apron Worksheet

Project: Byers - Commercial Tract

Description: EW05



### Rip-Rap Dimensions:

$L =$  31.0 ft  
 $W =$  19.9 ft  
 $W_i =$  7.5 ft

Rip-rap Size = R-4  
 $d_{50} =$  12.0 in  
 $d =$  18.0 in

### Design Values:

$n =$  Manning's  $n$   
 $D =$  Diameter of Pipe  
 $S =$  Slope of Pipe  
 $Q_d =$  Design Discharge  
 $V_d =$  Velocity  
 $T_w =$  Tailwater Condition  
 $A =$  Full Flow Area of Pipe

|       |        |
|-------|--------|
| $n$   | 0.012  |
| $D$   | 30     |
| $S$   | 0.0100 |
| $Q_d$ | 24.37  |
| $V_d$ | 7.09   |
| $T_w$ | MAX    |
| $A$   | 4.91   |

in.  $\leftarrow$  Rise (in.) 30  $\times$  Span (in.) 30  $\leftarrow$  Barrels 1  
 ft/ft  $\leftarrow$  24.37  
 cfs\*\*\*  $\leftarrow$  7.09  
 fps\*\*\*  $\leftarrow$  7.09  
 either MIN or MAX  
 sf  
 \*\*\* Formulas based on full-flow capacity.

### Full Flow Pipe Discharge:

$Q_f = 0.464/n * D^{8/3} * S^{1/2} =$  44.52 cfs

### Ratio of Part-Full to Full Flow Discharge:

$d/D = Q_d/Q_f =$  0.55

### Figure 20 Ratios:

Area of Flow = 0.53  
 Depth of Flow = 0.53

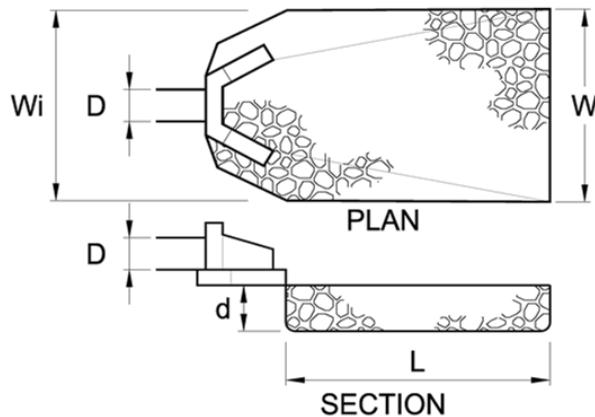
### Calculate Equivalent Flow:

$A * Ratio =$  2.61 sf  
 Equivalent Pipe Size full-flow = 21 in (smaller size = larger rip-rap (factor of safety))

## Rip-Rap Apron Worksheet

Project: Byers - Commercial Tract

Description: EW09



### Rip-Rap Dimensions:

L = 12.0 ft  
W = 9.3 ft  
 $W_i$  = 4.5 ft

Rip-rap Size = R-3  
d50 = 6.0 in  
d = 9.0 in

### Design Values:

n = Manning's n  
D = Diameter of Pipe  
S = Slope of Pipe  
 $Q_d$  = Design Discharge  
 $V_d$  = Velocity  
 $T_w$  = Tailwater Condition  
A = Full Flow Area of Pipe

|       |        |
|-------|--------|
| n     | 0.012  |
| D     | 18     |
| S     | 0.0051 |
| $Q_d$ | 4.67   |
| $V_d$ | 4.81   |
| $T_w$ | MAX    |
| A     | 1.77   |

in. ← Rise (in.) 18 × Span (in.) 18 ← Barrels 1  
ft/ft  
cfs\*\*\* ← 4.67  
fps\*\*\* ← 4.81  
either MIN or MAX  
sf  
\*\*\* Formulas based on full-flow capacity.

### Full Flow Pipe Discharge:

$Q_f = 0.464/n * D^{8/3} * S^{1/2} =$  8.14 cfs

### Ratio of Part-Full to Full Flow Discharge:

$d/D = Q_d/Q_f =$  0.57

### Figure 20 Ratios:

Area of Flow = 0.55  
Depth of Flow = 0.54

### Calculate Equivalent Flow:

A \* Ratio = 0.97 sf  
Equivalent Pipe Size full-flow = 12 in (smaller size = larger rip-rap (factor of safety))



Temporary & Permanent Channel Design Data

Project: Byers - Commercial Tract  
Location:

| Slope Condition (Minimum, Maximum, Entire)                                                    | Entire     | Entire      | Entire     | Entire      | Entire     | Entire      | Entire      |
|-----------------------------------------------------------------------------------------------|------------|-------------|------------|-------------|------------|-------------|-------------|
| Channel or Channel Section                                                                    | 11         | 11          | 12         | 12          | 13         | 13          | 13          |
| Channel Condition (Temporary or Permanent)                                                    | Temporary  | Permanent   | Temporary  | Permanent   | Temporary  | Permanent   | Permanent   |
| Design                                                                                        | 2-yr storm | 10-yr storm | 2-yr storm | 10-yr storm | 2-yr storm | 10-yr storm | 10-yr storm |
| Acres                                                                                         | 0.00       | 0.00        | 0.00       | 0.00        | 0.00       | 0.00        | 0.00        |
| Protective Lining <sup>2</sup>                                                                | 0.00       | 0.00        | 0.00       | 0.00        | 0.00       | 0.00        | 0.00        |
| Channel Top Width (ft) @D                                                                     | NAG SC150  | Lawn (2.5') | NAG SC150  | Lawn (2.5') | NAG SC150  | Lawn (2.5') | Lawn (2.5') |
| Channel Top Width (ft) @d                                                                     | 8.00       | 8.00        | 8.00       | 8.00        | 8.00       | 8.00        | 8.00        |
| Z1 Channel Side Slope (H:V)                                                                   | 2.65       | 3.06        | 2.65       | 3.06        | 3.00       | 3.00        | 3.50        |
| Z2 Channel Side Slope (H:V)                                                                   | 3.00       | 3.00        | 3.00       | 3.00        | 3.00       | 3.00        | 3.00        |
| Channel Bottom Width (ft)                                                                     | 2.00       | 2.00        | 2.00       | 2.00        | 2.00       | 2.00        | 2.00        |
| D (Design Depth in ft)                                                                        | 1.00       | 1.00        | 1.00       | 1.00        | 1.00       | 1.00        | 1.00        |
| d (Flow Depth in ft)                                                                          | 0.11       | 0.18        | 0.11       | 0.18        | 0.17       | 0.17        | 0.25        |
| Bottom Width: Depth Ratio (12:1 max)                                                          | 18.52      | 11.36       | 18.52      | 11.36       | 12.05      | 12.05       | 8.00        |
| A (Area in s.f. at flow depth, d)                                                             | 0.25       | 0.44        | 0.25       | 0.44        | 0.41       | 0.41        | 0.69        |
| P (Wetted Perimeter in ft)                                                                    | 2.68       | 3.11        | 2.68       | 3.11        | 3.05       | 3.05        | 3.58        |
| R (Hydraulic Radius (A/P))                                                                    | 0.09       | 0.14        | 0.09       | 0.14        | 0.14       | 0.14        | 0.19        |
| S (Bed Slope, ft/ft) <sup>3</sup>                                                             | 0.037      | 0.037       | 0.037      | 0.037       | 0.037      | 0.037       | 0.037       |
| Vegetative Lining Retardance                                                                  | N/A        | D           | N/A        | D           | N/A        | D           | D           |
| n (Manning's Coefficient) <sup>2</sup>                                                        | 0.050      | 0.406       | 0.050      | 0.406       | 0.050      | 0.050       | 0.577       |
| V (At Flow Depth d, fps)                                                                      | 1.20       | 0.85        | 1.20       | 0.85        | 1.52       | 1.52        | 1.18        |
| Q (At Flow Depth d, cfs)                                                                      | 0.30       | 0.38        | 0.30       | 0.38        | 0.63       | 0.63        | 0.81        |
| Q <sub>r</sub> (Required Capacity, cfs)                                                       | 0.30       | 0.30        | 0.30       | 0.38        | 0.63       | 0.63        | 0.81        |
| S <sub>c</sub> (Critical Slope)                                                               | 0.081      | 4.684       | 0.081      | 4.684       | 0.072      | 0.072       | 8.604       |
| 0.75 <sub>c</sub>                                                                             | 0.057      | 3.279       | 0.057      | 3.279       | 0.050      | 0.050       | 6.023       |
| 1.35 <sub>c</sub>                                                                             | 0.106      | 6.089       | 0.106      | 6.089       | 0.094      | 0.094       | 11.185      |
| Stable Flow? (Y/N)                                                                            | Y          | Y           | Y          | Y           | Y          | Y           | Y           |
| Freeboard Based on Unstable Flow, ft                                                          | N/A        | N/A         | N/A        | N/A         | N/A        | N/A         | N/A         |
| Freeboard Based On Stable Flow, ft                                                            | 0.03       | 0.04        | 0.03       | 0.04        | 0.04       | 0.04        | 0.06        |
| Minimum Required Freeboard, ft <sup>4</sup>                                                   | 0.50       | 0.50        | 0.50       | 0.50        | 0.50       | 0.50        | 0.50        |
| Include Bend Analysis (Approx. Horizontal Radius, ft)                                         |            |             |            |             |            |             |             |
| Additional Depth Adjustment for Horizontal Bend                                               | 0.00       | 0.00        | 0.00       | 0.00        | 0.00       | 0.00        | 0.00        |
| Minimum Required Depth, ft                                                                    | 0.61       | 0.68        | 0.61       | 0.68        | 0.67       | 0.67        | 0.75        |
| d <sub>50</sub> Stone Size (in)                                                               | N/A        | N/A         | N/A        | N/A         | N/A        | N/A         | N/A         |
| Design Method for Protective Lining <sup>3</sup> Permissible Velocity (V) or Shear Stress (S) | V          | V           | V          | V           | V          | V           | V           |
| V <sub>a</sub> (Allowable Velocity, fps)                                                      | 8.00       | 3.00        | 8.00       | 3.00        | 8.00       | 8.00        | 3.00        |
| τ <sub>d</sub> (Shear Stress at Flow Depth d, lbf/ft <sup>2</sup> )                           | N/A        | N/A         | N/A        | N/A         | N/A        | N/A         | N/A         |
| τ <sub>s</sub> (Max. Allowable Shear Stress, lbf/ft <sup>2</sup> )                            | N/A        | N/A         | N/A        | N/A         | N/A        | N/A         | N/A         |

(1) Use 1.6 for Temporary Channels; 2.25 for Temporary Channels in Special Protection (HQ & EV) Watersheds; 2.75 for Permanent Channels. For Rational Method, enter "N/A" and attach E&S Worksheets 9 and 10. For TR-55, enter "N/A" and attach appropriate Worksheets.

(2) Adjust "n" value for changes in channel liner and flow depth. For vegetated channels, provide data for manufactured lining without vegetation and with vegetation in separate columns.

(3) Slopes may not be averaged

(4) Minimum Freeboard is 0.5 ft. or 1/4 Total Channel Depth, whichever is greater.

(5) Permissible velocity lining design method is not acceptable for channels with a bed slope of 10% or greater. Shear stress lining design method is required for channels with a bed slope of 10% or greater. Shear stress lining design method may be used for any channel bed slope.

## Swale Calculations

Project: Byers Station - Commercial Tract

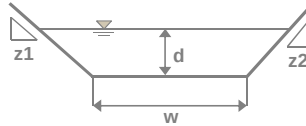
Description: Swale 11

Swale Name: 11

### Input Channel Parameters

#### Channel Dimensions

|    |                                                                  |                         |
|----|------------------------------------------------------------------|-------------------------|
| z1 | <span style="border: 1px solid black; padding: 2px;">3.00</span> | ft. (horiz to 1' vert.) |
| z2 | <span style="border: 1px solid black; padding: 2px;">3.00</span> | ft. (horiz to 1' vert.) |
| w  | <span style="border: 1px solid black; padding: 2px;">2.00</span> | ft. (bottom width)      |
| d  | <span style="border: 1px solid black; padding: 2px;">1.00</span> | ft. (design depth)      |



#### Slope Condition

|         |                                                                    |                   |
|---------|--------------------------------------------------------------------|-------------------|
| Minimum |                                                                    | ft/ft (capacity)  |
| Maximum |                                                                    | ft/ft (stability) |
| Entire  | <span style="border: 1px solid black; padding: 2px;">0.0370</span> | ft/ft             |

### Evaluate Temporary & Permanent Conditions

Design Method: Velocity

☒ **Temporary**

#### Calculate Design Flow (Q)

2-yr storm 0.30 cfs

OR

Area acres  
x cfs/acre

0.30 cfs (design Q)

#### Results

|              | n-value                                                           | d                                                                | v (fps)                                                          | $\tau_d$ (lb/ft <sup>2</sup> )                                   |
|--------------|-------------------------------------------------------------------|------------------------------------------------------------------|------------------------------------------------------------------|------------------------------------------------------------------|
| Min. slope   | N/A                                                               | N/A                                                              | N/A                                                              | N/A                                                              |
| Max. slope   | N/A                                                               | N/A                                                              | N/A                                                              | N/A                                                              |
| Entire slope | <span style="border: 1px solid black; padding: 2px;">0.050</span> | <span style="border: 1px solid black; padding: 2px;">0.11</span> | <span style="border: 1px solid black; padding: 2px;">1.20</span> | <span style="border: 1px solid black; padding: 2px;">0.25</span> |

#### Select Lining Material

|    | Lining                                                                | Retardance<br>(A, B, C, D) | d <sub>50</sub> Stone<br>Size (in.) | Initial<br>n-value                                                | Allowable<br>Velocity                                             | Allowable<br>$\tau_d$ (lb/ft <sup>2</sup> )                       |
|----|-----------------------------------------------------------------------|----------------------------|-------------------------------------|-------------------------------------------------------------------|-------------------------------------------------------------------|-------------------------------------------------------------------|
| z1 | <span style="border: 1px solid black; padding: 2px;">NAG SC150</span> | N/A                        | N/A                                 | <span style="border: 1px solid black; padding: 2px;">0.050</span> | <span style="border: 1px solid black; padding: 2px;">8.000</span> | <span style="border: 1px solid black; padding: 2px;">2.000</span> |
| z2 | <span style="border: 1px solid black; padding: 2px;">NAG SC150</span> | N/A                        | N/A                                 | <span style="border: 1px solid black; padding: 2px;">0.050</span> | <span style="border: 1px solid black; padding: 2px;">8.000</span> | <span style="border: 1px solid black; padding: 2px;">2.000</span> |
| w  | <span style="border: 1px solid black; padding: 2px;">NAG SC150</span> | N/A                        | N/A                                 | <span style="border: 1px solid black; padding: 2px;">0.050</span> | <span style="border: 1px solid black; padding: 2px;">8.000</span> | <span style="border: 1px solid black; padding: 2px;">2.000</span> |

☒ **Permanent**

#### Calculate Design Flow (Q)

10-yr storm 0.38 cfs

OR

Area acres  
x cfs/acre

0.38 cfs (design Q)

#### Results

|              | n-value                                                          | d                                                                | v (fps)                                                          | $\tau_d$ (lb/ft <sup>2</sup> ) |
|--------------|------------------------------------------------------------------|------------------------------------------------------------------|------------------------------------------------------------------|--------------------------------|
| Min. slope   | N/A                                                              | N/A                                                              | N/A                                                              | N/A                            |
| Max. slope   | N/A                                                              | N/A                                                              | N/A                                                              | N/A                            |
| Entire slope | <span style="border: 1px solid black; padding: 2px;">0.41</span> | <span style="border: 1px solid black; padding: 2px;">0.18</span> | <span style="border: 1px solid black; padding: 2px;">0.85</span> |                                |

#### Select Lining Material

|    | Lining                                                                  | Retardance<br>(A, B, C, D)                                    | d <sub>50</sub> Stone<br>Size (in.) | Initial<br>n-value                                                | Allowable<br>Velocity                                             | Allowable<br>$\tau_d$ (lb/ft <sup>2</sup> )                       |
|----|-------------------------------------------------------------------------|---------------------------------------------------------------|-------------------------------------|-------------------------------------------------------------------|-------------------------------------------------------------------|-------------------------------------------------------------------|
| z1 | <span style="border: 1px solid black; padding: 2px;">Lawn (2.5")</span> | <span style="border: 1px solid black; padding: 2px;">D</span> | N/A                                 | <span style="border: 1px solid black; padding: 2px;">0.022</span> | <span style="border: 1px solid black; padding: 2px;">3.000</span> | <span style="border: 1px solid black; padding: 2px;">0.600</span> |
| z2 | <span style="border: 1px solid black; padding: 2px;">Lawn (2.5")</span> | <span style="border: 1px solid black; padding: 2px;">D</span> | N/A                                 | <span style="border: 1px solid black; padding: 2px;">0.022</span> | <span style="border: 1px solid black; padding: 2px;">3.000</span> | <span style="border: 1px solid black; padding: 2px;">0.600</span> |
| w  | <span style="border: 1px solid black; padding: 2px;">Lawn (2.5")</span> | <span style="border: 1px solid black; padding: 2px;">D</span> | N/A                                 | <span style="border: 1px solid black; padding: 2px;">0.022</span> | <span style="border: 1px solid black; padding: 2px;">3.000</span> | <span style="border: 1px solid black; padding: 2px;">0.600</span> |

## Swale Calculations

Project: Byers Station - Commercial Tract

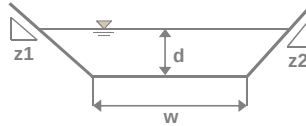
Description: Swale 12

Swale Name: 12

### Input Channel Parameters

#### Channel Dimensions

|    |                                                                  |                         |
|----|------------------------------------------------------------------|-------------------------|
| z1 | <span style="border: 1px solid black; padding: 2px;">3.00</span> | ft. (horiz to 1' vert.) |
| z2 | <span style="border: 1px solid black; padding: 2px;">3.00</span> | ft. (horiz to 1' vert.) |
| w  | <span style="border: 1px solid black; padding: 2px;">2.00</span> | ft. (bottom width)      |
| d  | <span style="border: 1px solid black; padding: 2px;">1.00</span> | ft. (design depth)      |



#### Slope Condition

|         |                                                                    |                   |
|---------|--------------------------------------------------------------------|-------------------|
| Minimum |                                                                    | ft/ft (capacity)  |
| Maximum |                                                                    | ft/ft (stability) |
| Entire  | <span style="border: 1px solid black; padding: 2px;">0.0370</span> | ft/ft             |

### Evaluate Temporary & Permanent Conditions

Design Method: Velocity

☒ Temporary

#### Calculate Design Flow (Q)

2-yr storm 0.30 cfs

OR

Area acres  
x cfs/acre

0.30 cfs (design Q)

#### Results

|              | n-value                                                           | d                                                                | v (fps)                                                          | $\tau_d$ (lb/ft <sup>2</sup> )                                   |
|--------------|-------------------------------------------------------------------|------------------------------------------------------------------|------------------------------------------------------------------|------------------------------------------------------------------|
| Min. slope   | N/A                                                               | N/A                                                              | N/A                                                              | N/A                                                              |
| Max. slope   | N/A                                                               | N/A                                                              | N/A                                                              | N/A                                                              |
| Entire slope | <span style="border: 1px solid black; padding: 2px;">0.050</span> | <span style="border: 1px solid black; padding: 2px;">0.11</span> | <span style="border: 1px solid black; padding: 2px;">1.20</span> | <span style="border: 1px solid black; padding: 2px;">0.25</span> |

#### Select Lining Material

|    | Lining                                                                | Retardance<br>(A, B, C, D) | d <sub>50</sub> Stone<br>Size (in.) | Initial<br>n-value                                                | Allowable<br>Velocity                                             | Allowable<br>$\tau_d$ (lb/ft <sup>2</sup> )                       |
|----|-----------------------------------------------------------------------|----------------------------|-------------------------------------|-------------------------------------------------------------------|-------------------------------------------------------------------|-------------------------------------------------------------------|
| z1 | <span style="border: 1px solid black; padding: 2px;">NAG SC150</span> | N/A                        | N/A                                 | <span style="border: 1px solid black; padding: 2px;">0.050</span> | <span style="border: 1px solid black; padding: 2px;">8.000</span> | <span style="border: 1px solid black; padding: 2px;">2.000</span> |
| z2 | <span style="border: 1px solid black; padding: 2px;">NAG SC150</span> | N/A                        | N/A                                 | <span style="border: 1px solid black; padding: 2px;">0.050</span> | <span style="border: 1px solid black; padding: 2px;">8.000</span> | <span style="border: 1px solid black; padding: 2px;">2.000</span> |
| w  | <span style="border: 1px solid black; padding: 2px;">NAG SC150</span> | N/A                        | N/A                                 | <span style="border: 1px solid black; padding: 2px;">0.050</span> | <span style="border: 1px solid black; padding: 2px;">8.000</span> | <span style="border: 1px solid black; padding: 2px;">2.000</span> |

☒ Permanent

#### Calculate Design Flow (Q)

10-yr storm 0.38 cfs

OR

Area acres  
x cfs/acre

0.38 cfs (design Q)

#### Results

|              | n-value                                                          | d                                                                | v (fps)                                                          | $\tau_d$ (lb/ft <sup>2</sup> ) |
|--------------|------------------------------------------------------------------|------------------------------------------------------------------|------------------------------------------------------------------|--------------------------------|
| Min. slope   | N/A                                                              | N/A                                                              | N/A                                                              | N/A                            |
| Max. slope   | N/A                                                              | N/A                                                              | N/A                                                              | N/A                            |
| Entire slope | <span style="border: 1px solid black; padding: 2px;">0.41</span> | <span style="border: 1px solid black; padding: 2px;">0.18</span> | <span style="border: 1px solid black; padding: 2px;">0.85</span> |                                |

#### Select Lining Material

|    | Lining                                                                  | Retardance<br>(A, B, C, D)                                    | d <sub>50</sub> Stone<br>Size (in.) | Initial<br>n-value                                                | Allowable<br>Velocity                                             | Allowable<br>$\tau_d$ (lb/ft <sup>2</sup> )                       |
|----|-------------------------------------------------------------------------|---------------------------------------------------------------|-------------------------------------|-------------------------------------------------------------------|-------------------------------------------------------------------|-------------------------------------------------------------------|
| z1 | <span style="border: 1px solid black; padding: 2px;">Lawn (2.5")</span> | <span style="border: 1px solid black; padding: 2px;">D</span> | N/A                                 | <span style="border: 1px solid black; padding: 2px;">0.022</span> | <span style="border: 1px solid black; padding: 2px;">3.000</span> | <span style="border: 1px solid black; padding: 2px;">0.600</span> |
| z2 | <span style="border: 1px solid black; padding: 2px;">Lawn (2.5")</span> | <span style="border: 1px solid black; padding: 2px;">D</span> | N/A                                 | <span style="border: 1px solid black; padding: 2px;">0.022</span> | <span style="border: 1px solid black; padding: 2px;">3.000</span> | <span style="border: 1px solid black; padding: 2px;">0.600</span> |
| w  | <span style="border: 1px solid black; padding: 2px;">Lawn (2.5")</span> | <span style="border: 1px solid black; padding: 2px;">D</span> | N/A                                 | <span style="border: 1px solid black; padding: 2px;">0.022</span> | <span style="border: 1px solid black; padding: 2px;">3.000</span> | <span style="border: 1px solid black; padding: 2px;">0.600</span> |



## Swale Calculations

Project: Byers Station - Commercial Tract

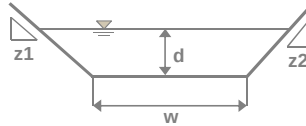
Description: Swale 13

Swale Name: 13

### Input Channel Parameters

#### Channel Dimensions

|    |                                                                  |                         |
|----|------------------------------------------------------------------|-------------------------|
| z1 | <span style="border: 1px solid black; padding: 2px;">3.00</span> | ft. (horiz to 1' vert.) |
| z2 | <span style="border: 1px solid black; padding: 2px;">3.00</span> | ft. (horiz to 1' vert.) |
| w  | <span style="border: 1px solid black; padding: 2px;">2.00</span> | ft. (bottom width)      |
| d  | <span style="border: 1px solid black; padding: 2px;">1.00</span> | ft. (design depth)      |



#### Slope Condition

|         |                                                                    |                   |
|---------|--------------------------------------------------------------------|-------------------|
| Minimum |                                                                    | ft/ft (capacity)  |
| Maximum |                                                                    | ft/ft (stability) |
| Entire  | <span style="border: 1px solid black; padding: 2px;">0.0370</span> | ft/ft             |

### Evaluate Temporary & Permanent Conditions

Design Method: Velocity

☒ **Temporary**

#### Calculate Design Flow (Q)

2-yr storm 0.63 cfs

OR

Area acres  
x cfs/acre

0.63 cfs (design Q)

#### Results

|              | n-value                                                           | d                                                                | v (fps)                                                          | $\tau_d$ (lb/ft <sup>2</sup> )                                   |
|--------------|-------------------------------------------------------------------|------------------------------------------------------------------|------------------------------------------------------------------|------------------------------------------------------------------|
| Min. slope   | N/A                                                               | N/A                                                              | N/A                                                              | N/A                                                              |
| Max. slope   | N/A                                                               | N/A                                                              | N/A                                                              | N/A                                                              |
| Entire slope | <span style="border: 1px solid black; padding: 2px;">0.050</span> | <span style="border: 1px solid black; padding: 2px;">0.17</span> | <span style="border: 1px solid black; padding: 2px;">1.52</span> | <span style="border: 1px solid black; padding: 2px;">0.38</span> |

#### Select Lining Material

|    | Lining                                                                | Retardance<br>(A, B, C, D) | d <sub>50</sub> Stone<br>Size (in.) | Initial<br>n-value                                                | Allowable<br>Velocity                                             | Allowable<br>$\tau_d$ (lb/ft <sup>2</sup> )                       |
|----|-----------------------------------------------------------------------|----------------------------|-------------------------------------|-------------------------------------------------------------------|-------------------------------------------------------------------|-------------------------------------------------------------------|
| z1 | <span style="border: 1px solid black; padding: 2px;">NAG SC150</span> | N/A                        | N/A                                 | <span style="border: 1px solid black; padding: 2px;">0.050</span> | <span style="border: 1px solid black; padding: 2px;">8.000</span> | <span style="border: 1px solid black; padding: 2px;">2.000</span> |
| z2 | <span style="border: 1px solid black; padding: 2px;">NAG SC150</span> | N/A                        | N/A                                 | <span style="border: 1px solid black; padding: 2px;">0.050</span> | <span style="border: 1px solid black; padding: 2px;">8.000</span> | <span style="border: 1px solid black; padding: 2px;">2.000</span> |
| w  | <span style="border: 1px solid black; padding: 2px;">NAG SC150</span> | N/A                        | N/A                                 | <span style="border: 1px solid black; padding: 2px;">0.050</span> | <span style="border: 1px solid black; padding: 2px;">8.000</span> | <span style="border: 1px solid black; padding: 2px;">2.000</span> |

☒ **Permanent**

#### Calculate Design Flow (Q)

10-yr storm 0.81 cfs

OR

Area acres  
x cfs/acre

0.81 cfs (design Q)

#### Results

|              | n-value                                                          | d                                                                | v (fps)                                                          | $\tau_d$ (lb/ft <sup>2</sup> ) |
|--------------|------------------------------------------------------------------|------------------------------------------------------------------|------------------------------------------------------------------|--------------------------------|
| Min. slope   | N/A                                                              | N/A                                                              | N/A                                                              | N/A                            |
| Max. slope   | N/A                                                              | N/A                                                              | N/A                                                              | N/A                            |
| Entire slope | <span style="border: 1px solid black; padding: 2px;">0.58</span> | <span style="border: 1px solid black; padding: 2px;">0.25</span> | <span style="border: 1px solid black; padding: 2px;">1.18</span> |                                |

#### Select Lining Material

|    | Lining                                                                  | Retardance<br>(A, B, C, D)                                    | d <sub>50</sub> Stone<br>Size (in.) | Initial<br>n-value                                                | Allowable<br>Velocity                                             | Allowable<br>$\tau_d$ (lb/ft <sup>2</sup> )                       |
|----|-------------------------------------------------------------------------|---------------------------------------------------------------|-------------------------------------|-------------------------------------------------------------------|-------------------------------------------------------------------|-------------------------------------------------------------------|
| z1 | <span style="border: 1px solid black; padding: 2px;">Lawn (2.5")</span> | <span style="border: 1px solid black; padding: 2px;">D</span> | N/A                                 | <span style="border: 1px solid black; padding: 2px;">0.022</span> | <span style="border: 1px solid black; padding: 2px;">3.000</span> | <span style="border: 1px solid black; padding: 2px;">0.600</span> |
| z2 | <span style="border: 1px solid black; padding: 2px;">Lawn (2.5")</span> | <span style="border: 1px solid black; padding: 2px;">D</span> | N/A                                 | <span style="border: 1px solid black; padding: 2px;">0.022</span> | <span style="border: 1px solid black; padding: 2px;">3.000</span> | <span style="border: 1px solid black; padding: 2px;">0.600</span> |
| w  | <span style="border: 1px solid black; padding: 2px;">Lawn (2.5")</span> | <span style="border: 1px solid black; padding: 2px;">D</span> | N/A                                 | <span style="border: 1px solid black; padding: 2px;">0.022</span> | <span style="border: 1px solid black; padding: 2px;">3.000</span> | <span style="border: 1px solid black; padding: 2px;">0.600</span> |

# Hydrograph Report

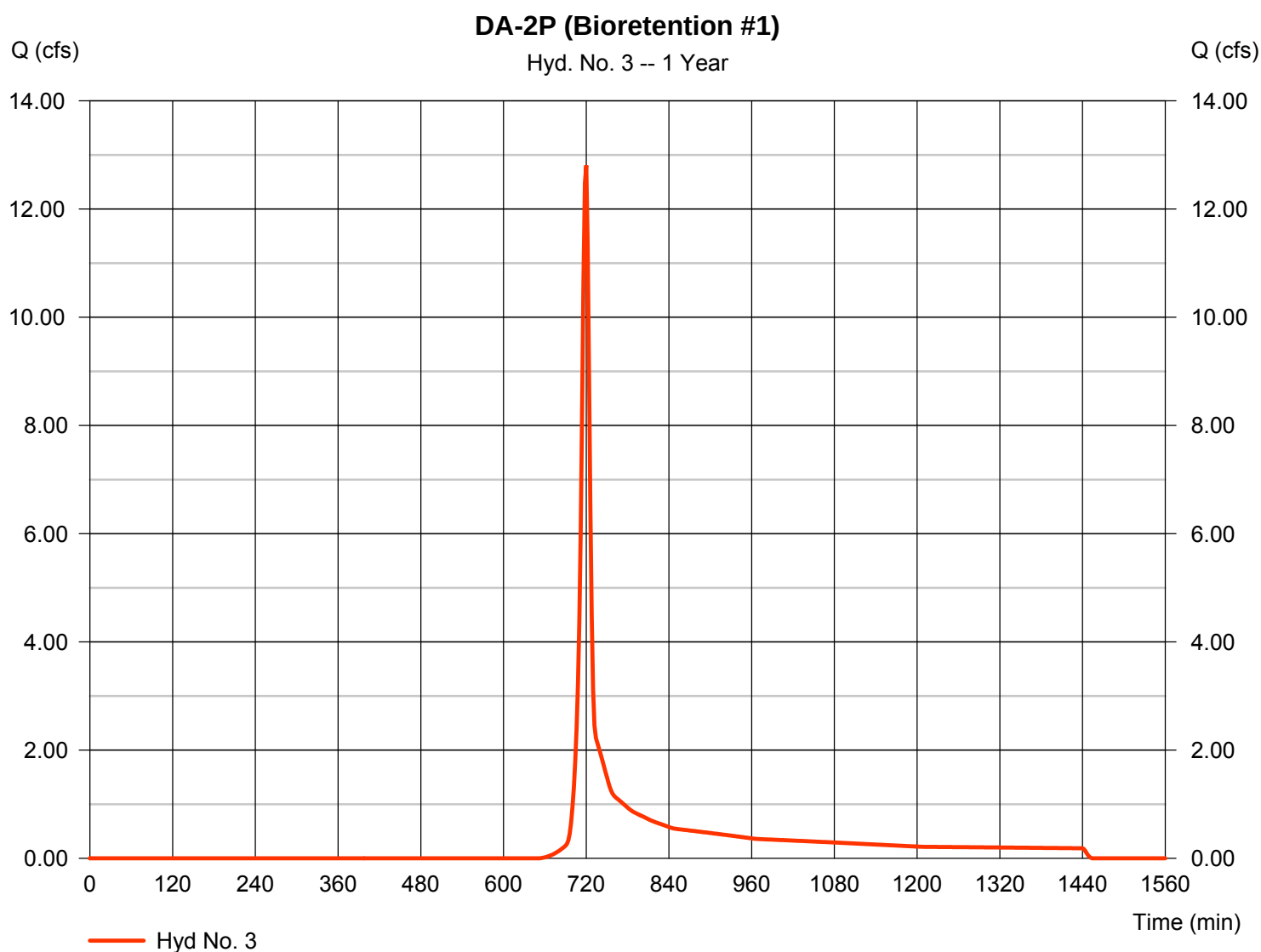
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

Thursday, 02 / 15 / 2018

## Hyd. No. 3

DA-2P (Bioretention #1)

|                 |              |                    |               |
|-----------------|--------------|--------------------|---------------|
| Hydrograph type | = SCS Runoff | Peak discharge     | = 12.80 cfs   |
| Storm frequency | = 1 yrs      | Time to peak       | = 720 min     |
| Time interval   | = 2 min      | Hyd. volume        | = 29,666 cuft |
| Drainage area   | = 9.480 ac   | Curve number       | = 77          |
| Basin Slope     | = 0.0 %      | Hydraulic length   | = 0 ft        |
| Tc method       | = User       | Time of conc. (Tc) | = 7.90 min    |
| Total precip.   | = 2.69 in    | Distribution       | = Type II     |
| Storm duration  | = 24 hrs     | Shape factor       | = 484         |



# Hydrograph Report

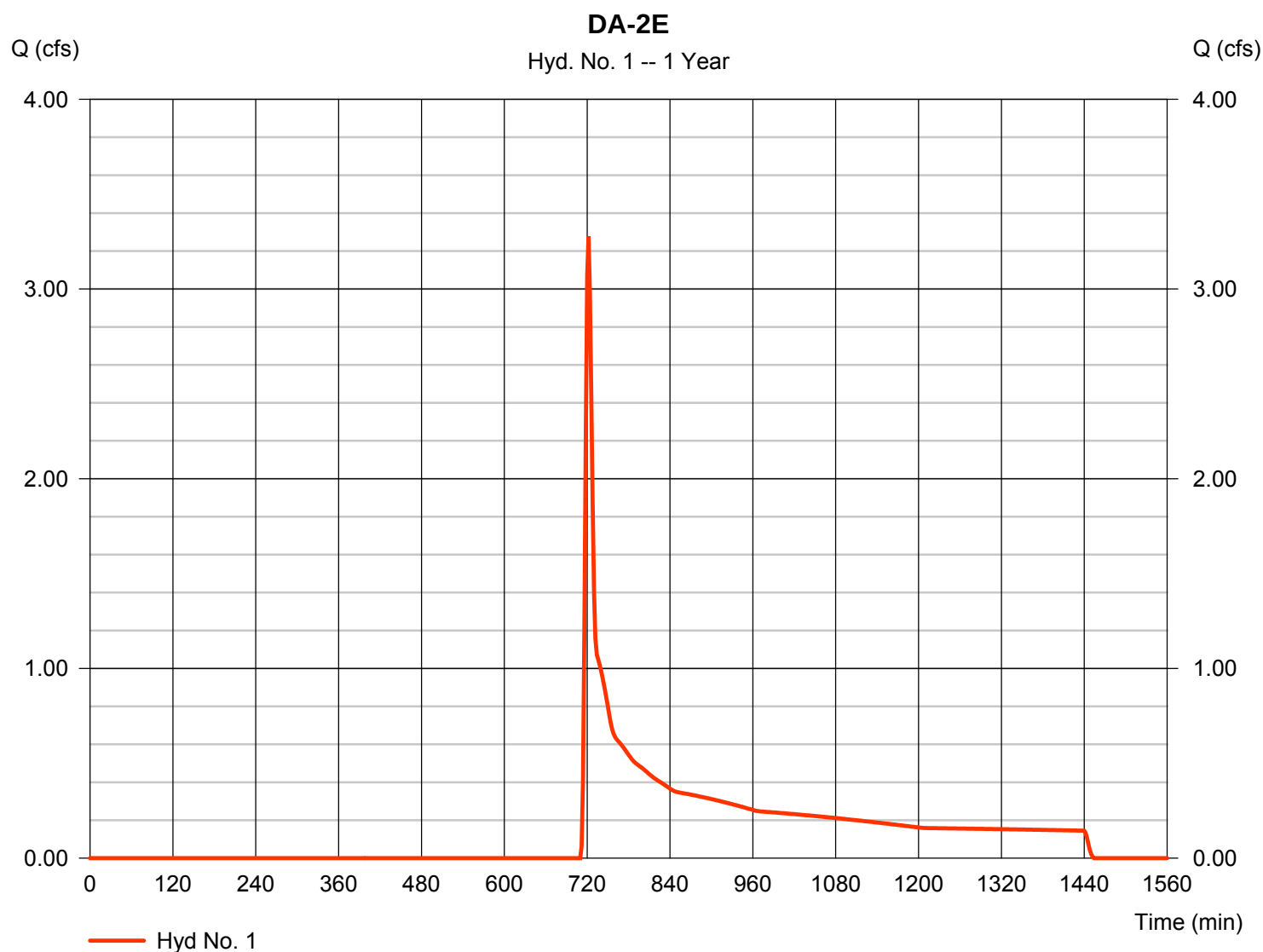
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

Thursday, 02 / 15 / 2018

## Hyd. No. 1

DA-2E

|                 |              |                    |               |
|-----------------|--------------|--------------------|---------------|
| Hydrograph type | = SCS Runoff | Peak discharge     | = 3.278 cfs   |
| Storm frequency | = 1 yrs      | Time to peak       | = 722 min     |
| Time interval   | = 2 min      | Hyd. volume        | = 13,625 cuft |
| Drainage area   | = 14.710 ac  | Curve number       | = 61          |
| Basin Slope     | = 0.0 %      | Hydraulic length   | = 0 ft        |
| Tc method       | = User       | Time of conc. (Tc) | = 8.40 min    |
| Total precip.   | = 2.69 in    | Distribution       | = Type II     |
| Storm duration  | = 24 hrs     | Shape factor       | = 484         |



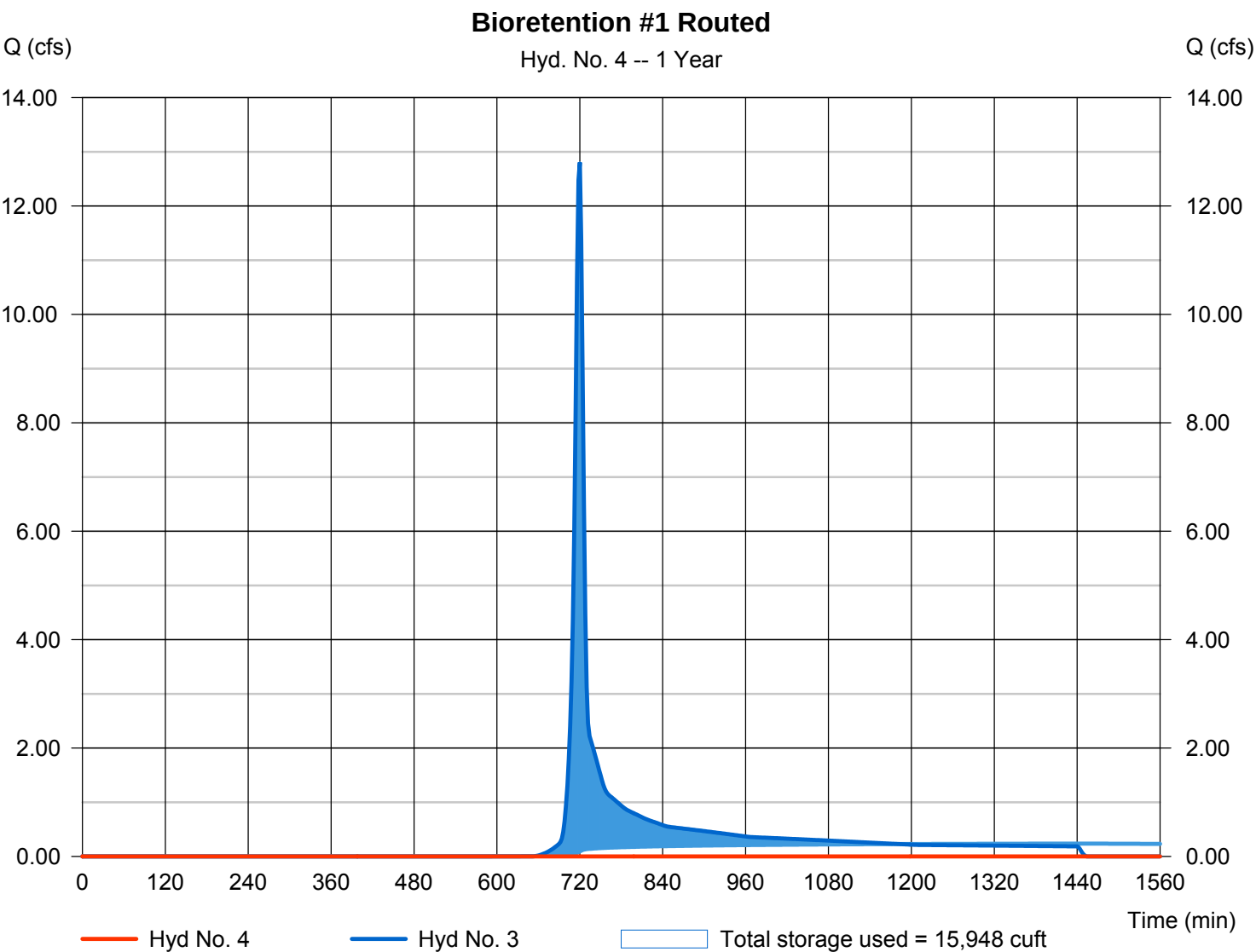
# Hydrograph Report

## Hyd. No. 4

### Bioretention #1 Routed

|                 |                               |                |               |
|-----------------|-------------------------------|----------------|---------------|
| Hydrograph type | = Reservoir                   | Peak discharge | = 0.000 cfs   |
| Storm frequency | = 1 yrs                       | Time to peak   | = n/a         |
| Time interval   | = 2 min                       | Hyd. volume    | = 0 cuft      |
| Inflow hyd. No. | = 3 - DA-2P (Bioretention #1) | Max. Elevation | = 429.93 ft   |
| Reservoir name  | = Bioretention Basin #1       | Max. Storage   | = 15,948 cuft |

Storage Indication method used. Exfiltration extracted from Outflow.





# Hydrograph Report

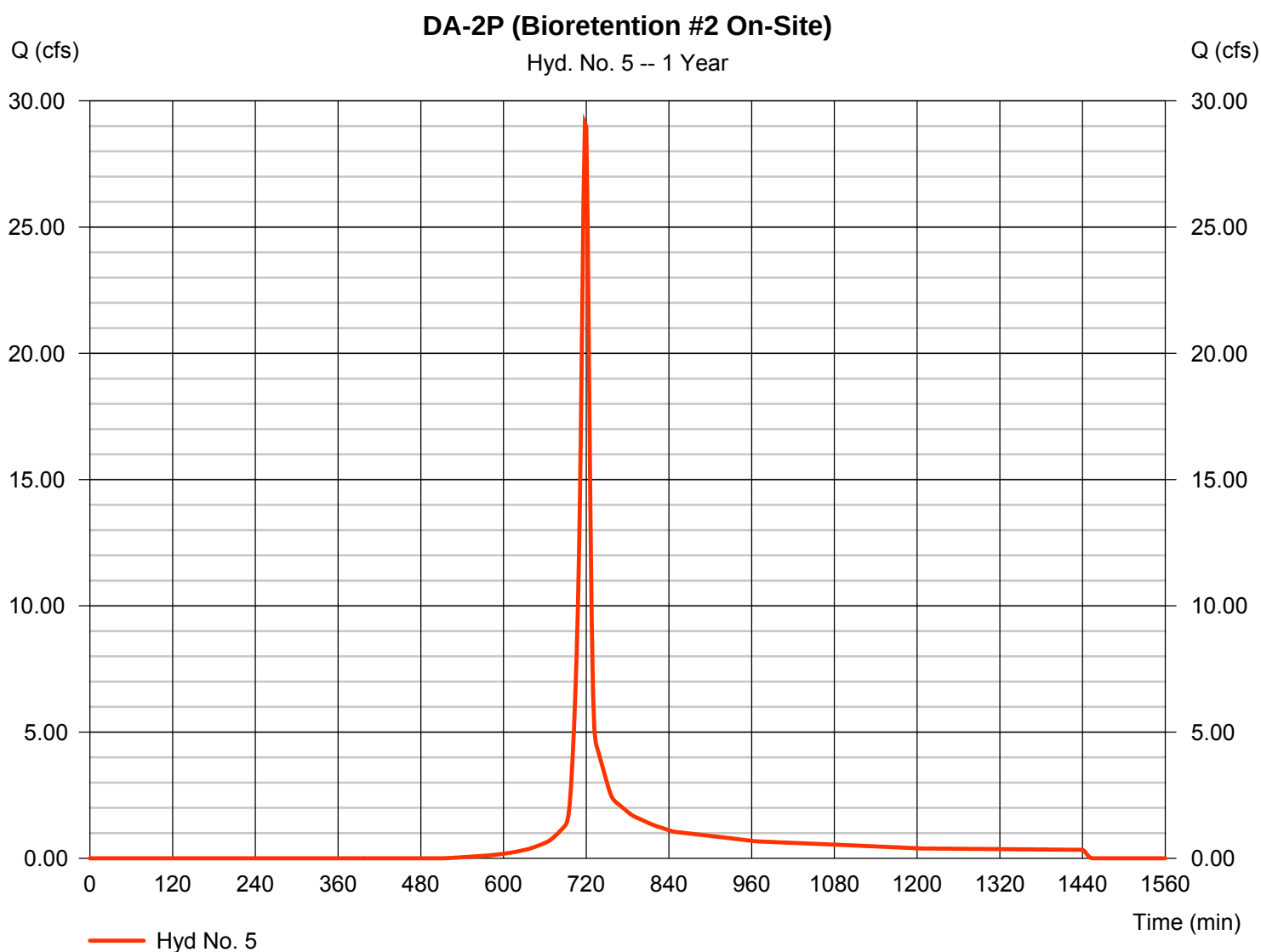
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

Thursday, 02 / 15 / 2018

## Hyd. No. 5

DA-2P (Bioretention #2 On-Site)

|                 |              |                    |               |
|-----------------|--------------|--------------------|---------------|
| Hydrograph type | = SCS Runoff | Peak discharge     | = 29.11 cfs   |
| Storm frequency | = 1 yrs      | Time to peak       | = 718 min     |
| Time interval   | = 2 min      | Hyd. volume        | = 66,608 cuft |
| Drainage area   | = 13.780 ac  | Curve number       | = 85          |
| Basin Slope     | = 0.0 %      | Hydraulic length   | = 0 ft        |
| Tc method       | = User       | Time of conc. (Tc) | = 8.00 min    |
| Total precip.   | = 2.69 in    | Distribution       | = Type II     |
| Storm duration  | = 24 hrs     | Shape factor       | = 484         |

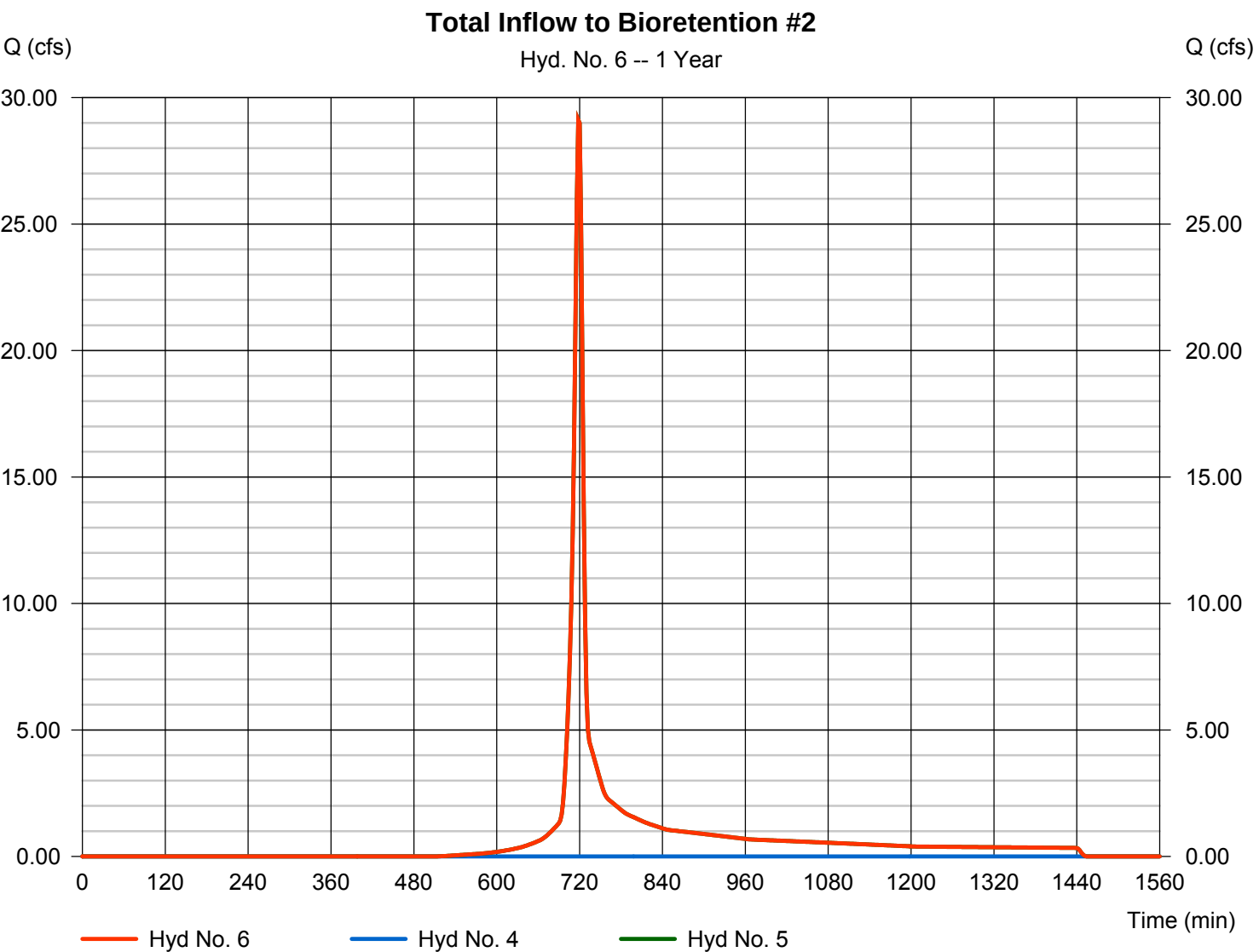


# Hydrograph Report

## Hyd. No. 6

Total Inflow to Bioretention #2

|                 |           |                      |               |
|-----------------|-----------|----------------------|---------------|
| Hydrograph type | = Combine | Peak discharge       | = 29.11 cfs   |
| Storm frequency | = 1 yrs   | Time to peak         | = 718 min     |
| Time interval   | = 2 min   | Hyd. volume          | = 66,608 cuft |
| Inflow hyds.    | = 4, 5    | Contrib. drain. area | = 13.780 ac   |



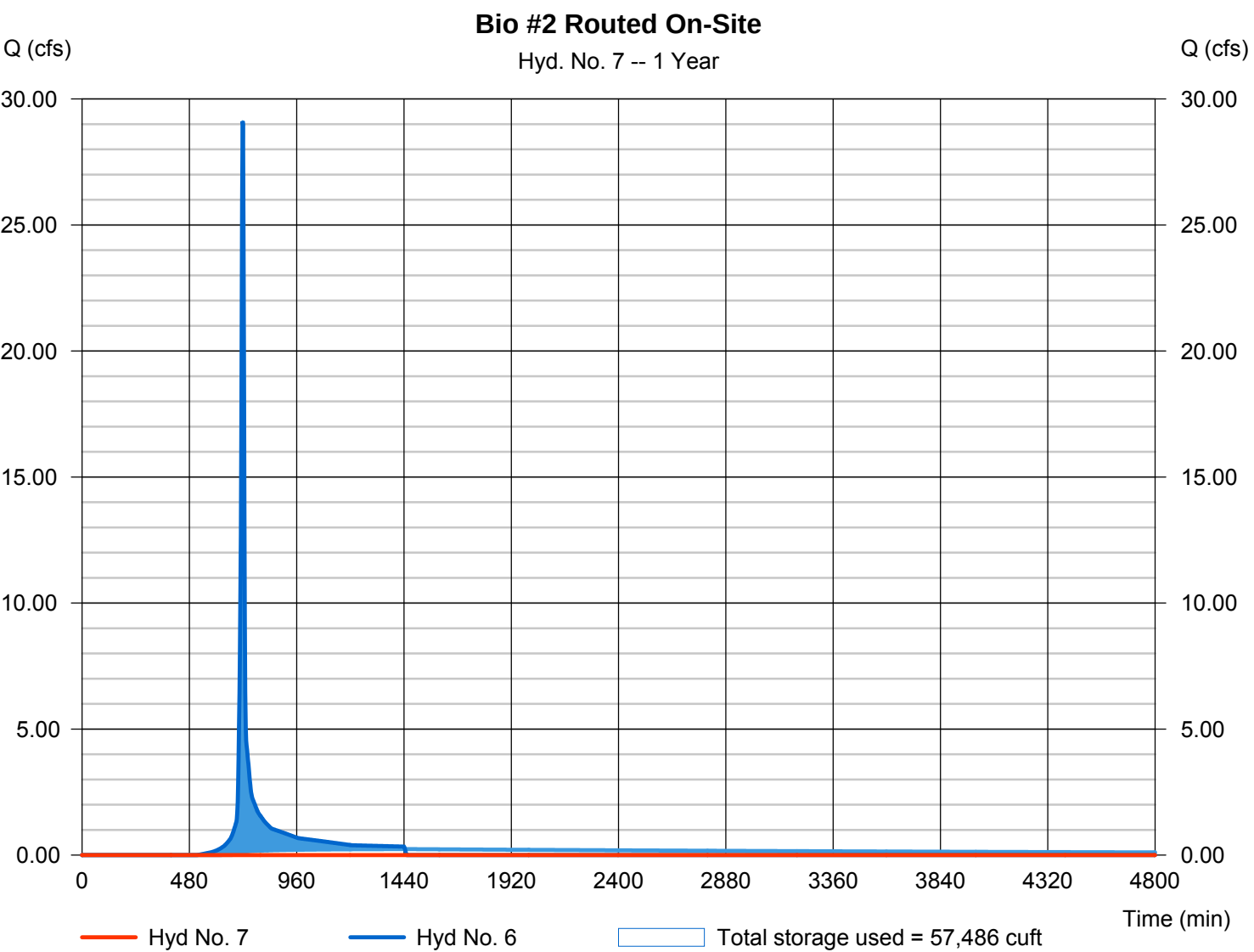
# Hydrograph Report

## Hyd. No. 7

Bio #2 Routed On-Site

|                 |                                       |                |               |
|-----------------|---------------------------------------|----------------|---------------|
| Hydrograph type | = Reservoir                           | Peak discharge | = 0.000 cfs   |
| Storm frequency | = 1 yrs                               | Time to peak   | = 804 min     |
| Time interval   | = 2 min                               | Hyd. volume    | = 0 cuft      |
| Inflow hyd. No. | = 6 - Total Inflow to Bioretention #2 | Max. Elevation | = 423.59 ft   |
| Reservoir name  | = Bioretention Basin #2               | Max. Storage   | = 57,486 cuft |

Storage Indication method used. Exfiltration extracted from Outflow.

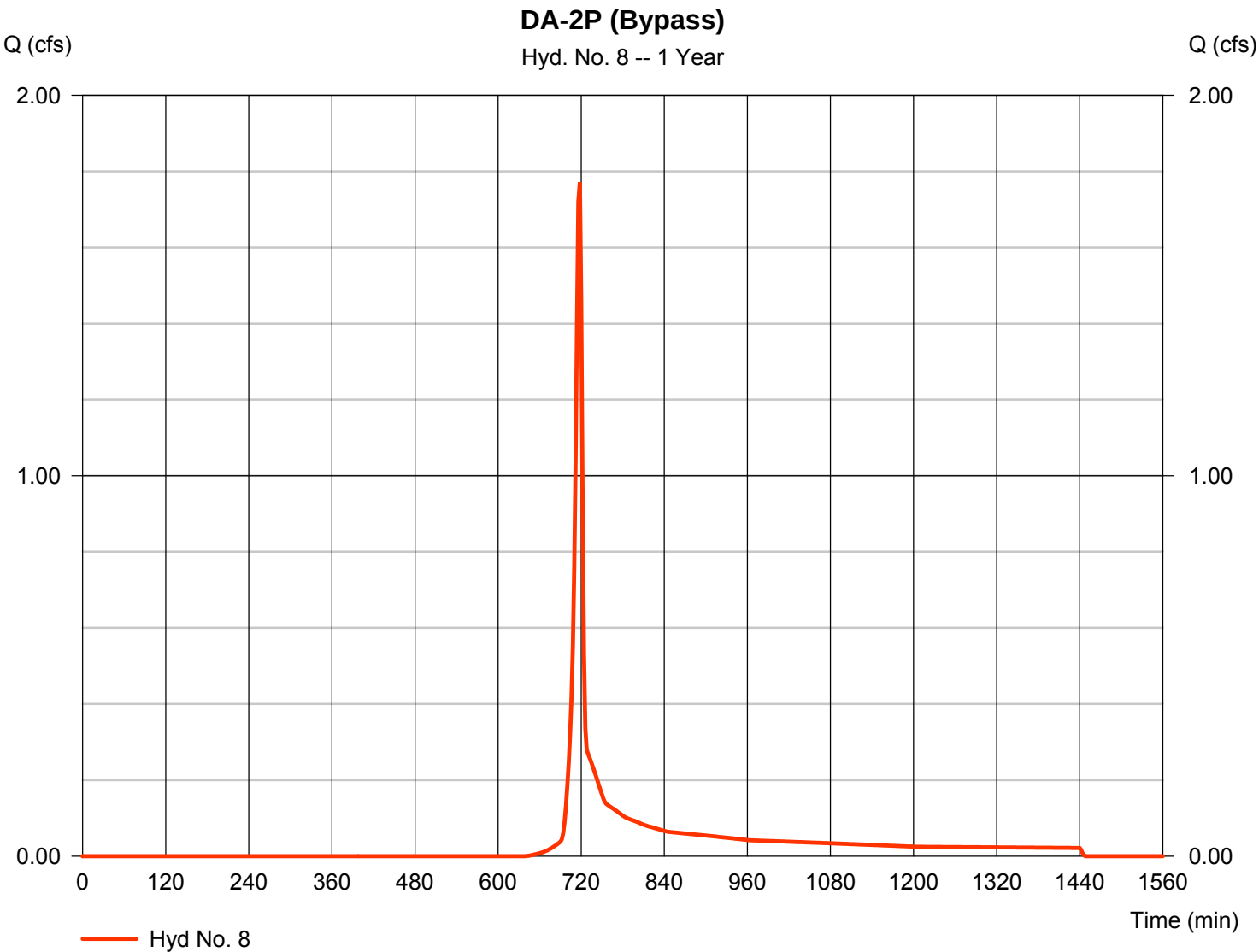


# Hydrograph Report

## Hyd. No. 8

DA-2P (Bypass)

|                 |              |                    |              |
|-----------------|--------------|--------------------|--------------|
| Hydrograph type | = SCS Runoff | Peak discharge     | = 1.771 cfs  |
| Storm frequency | = 1 yrs      | Time to peak       | = 718 min    |
| Time interval   | = 2 min      | Hyd. volume        | = 3,545 cuft |
| Drainage area   | = 1.140 ac   | Curve number       | = 78         |
| Basin Slope     | = 0.0 %      | Hydraulic length   | = 0 ft       |
| Tc method       | = User       | Time of conc. (Tc) | = 5.00 min   |
| Total precip.   | = 2.69 in    | Distribution       | = Type II    |
| Storm duration  | = 24 hrs     | Shape factor       | = 484        |



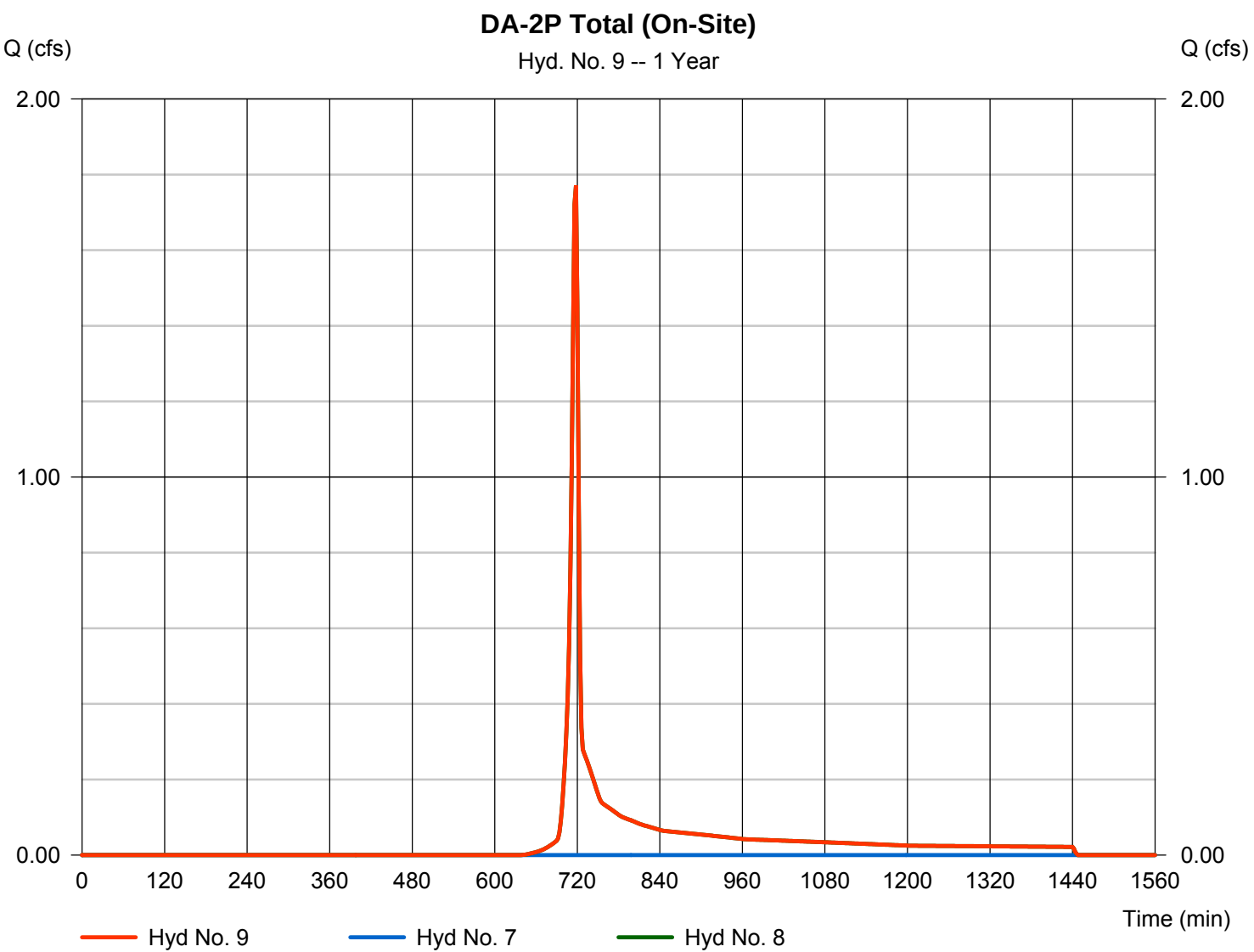


# Hydrograph Report

## Hyd. No. 9

DA-2P Total (On-Site)

|                 |           |                      |              |
|-----------------|-----------|----------------------|--------------|
| Hydrograph type | = Combine | Peak discharge       | = 1.771 cfs  |
| Storm frequency | = 1 yrs   | Time to peak         | = 718 min    |
| Time interval   | = 2 min   | Hyd. volume          | = 3,545 cuft |
| Inflow hyds.    | = 7, 8    | Contrib. drain. area | = 1.140 ac   |



# Hydrograph Report

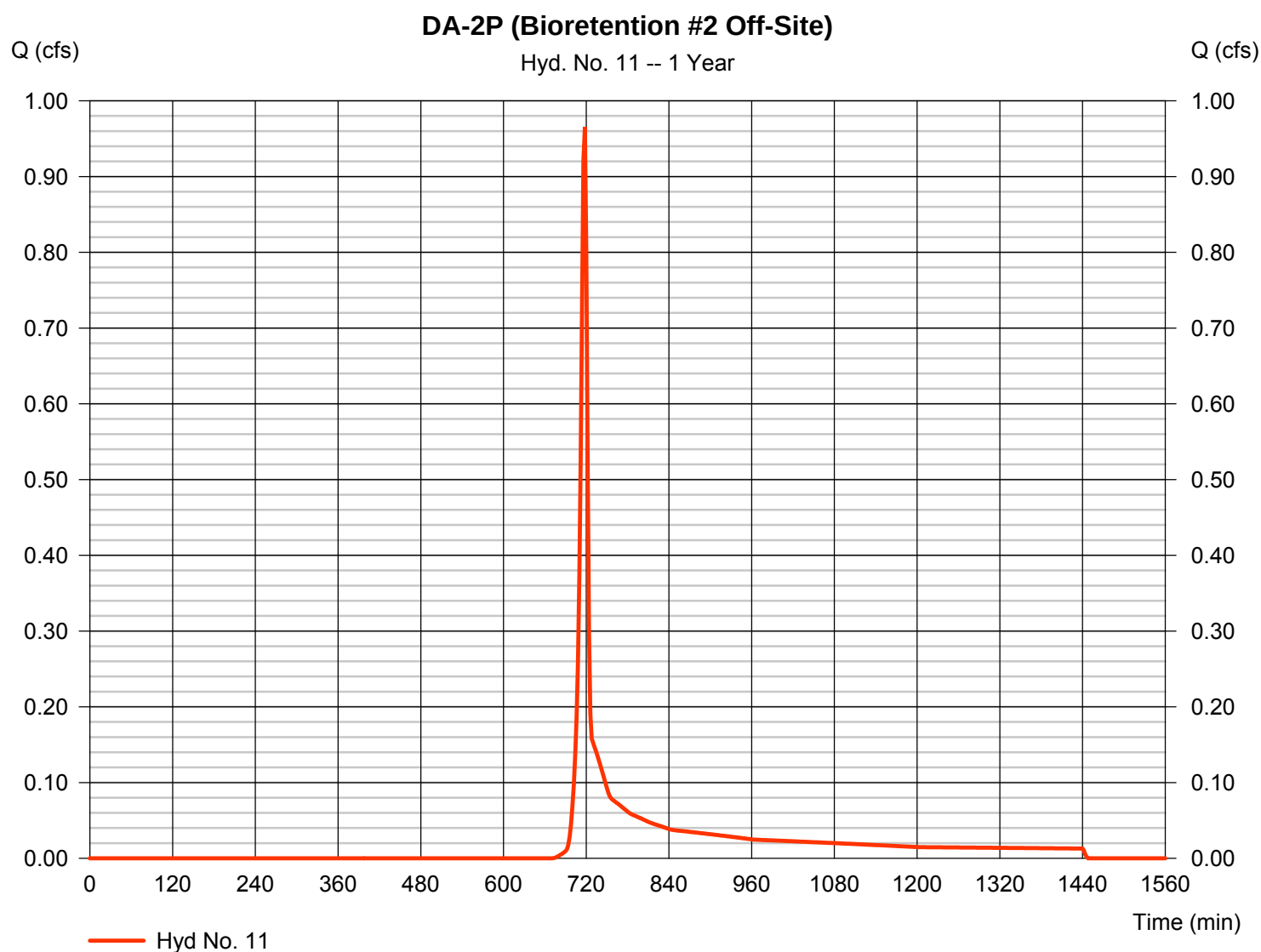
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

Thursday, 02 / 15 / 2018

## Hyd. No. 11

DA-2P (Bioretention #2 Off-Site)

|                 |              |                    |              |
|-----------------|--------------|--------------------|--------------|
| Hydrograph type | = SCS Runoff | Peak discharge     | = 0.966 cfs  |
| Storm frequency | = 1 yrs      | Time to peak       | = 718 min    |
| Time interval   | = 2 min      | Hyd. volume        | = 1,951 cuft |
| Drainage area   | = 0.750 ac   | Curve number       | = 75         |
| Basin Slope     | = 0.0 %      | Hydraulic length   | = 0 ft       |
| Tc method       | = User       | Time of conc. (Tc) | = 5.00 min   |
| Total precip.   | = 2.69 in    | Distribution       | = Type II    |
| Storm duration  | = 24 hrs     | Shape factor       | = 484        |

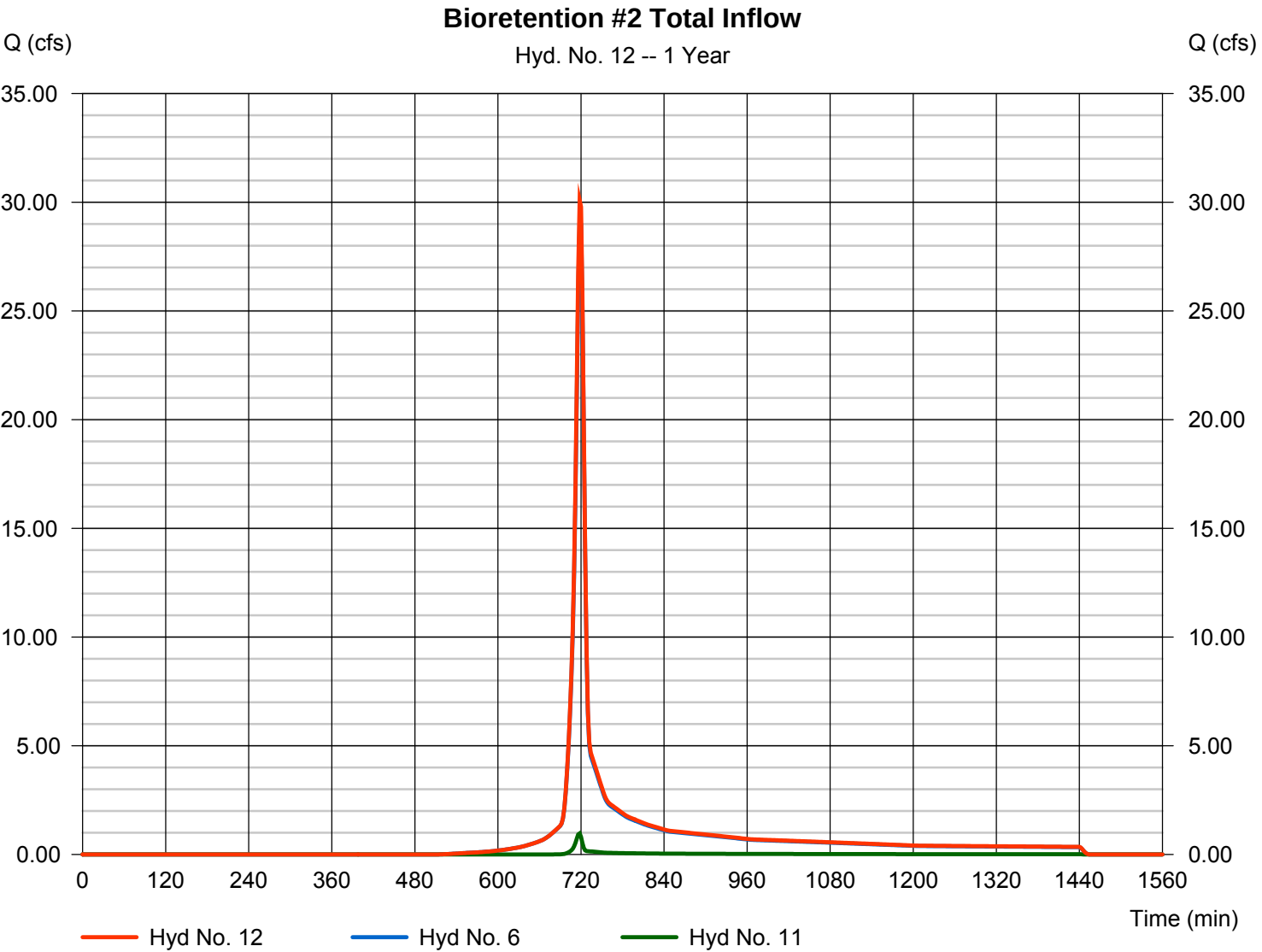


# Hydrograph Report

## Hyd. No. 12

### Bioretention #2 Total Inflow

|                 |           |                      |               |
|-----------------|-----------|----------------------|---------------|
| Hydrograph type | = Combine | Peak discharge       | = 30.08 cfs   |
| Storm frequency | = 1 yrs   | Time to peak         | = 718 min     |
| Time interval   | = 2 min   | Hyd. volume          | = 68,558 cuft |
| Inflow hyds.    | = 6, 11   | Contrib. drain. area | = 0.750 ac    |



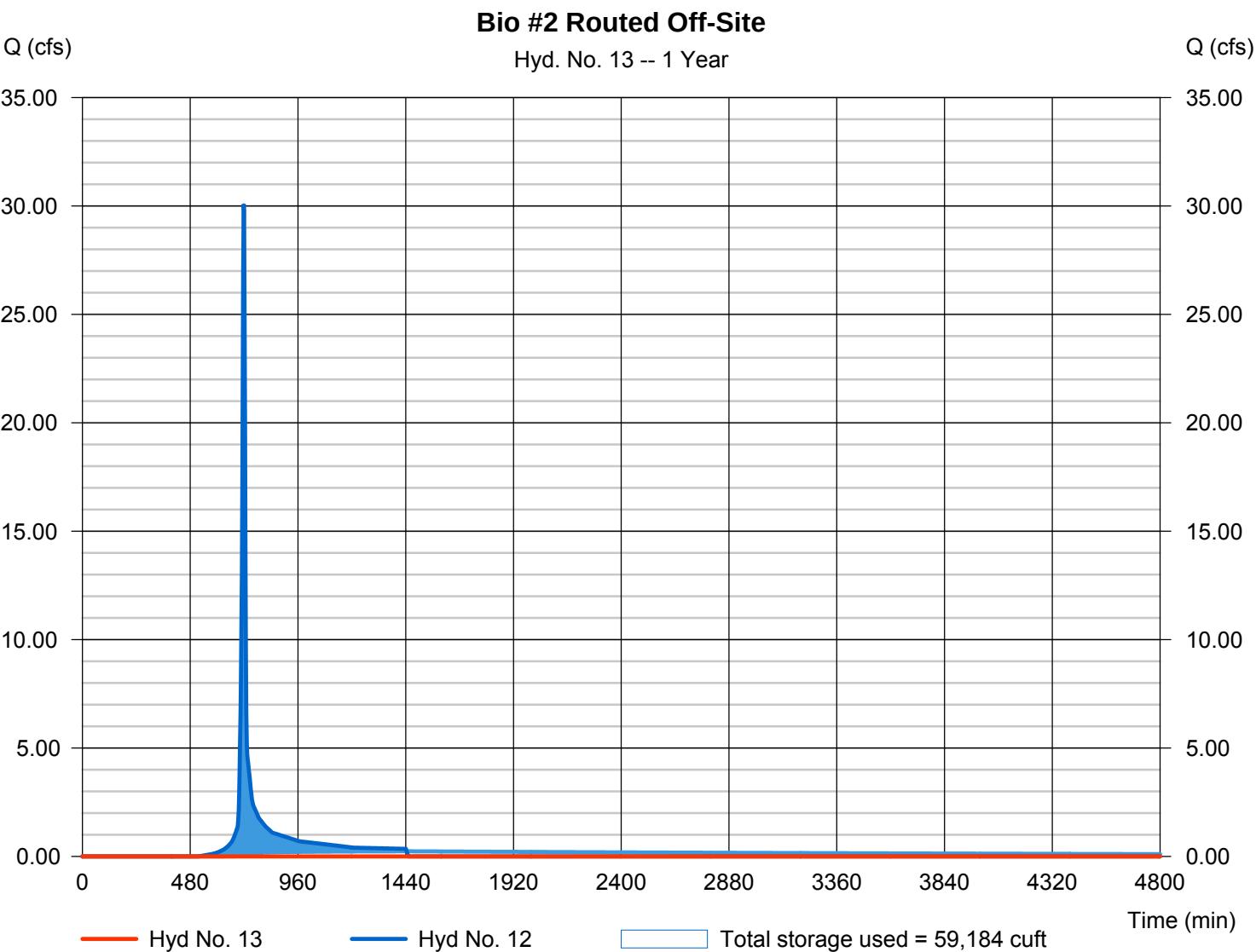
# Hydrograph Report

## Hyd. No. 13

Bio #2 Routed Off-Site

|                 |                                     |                |               |
|-----------------|-------------------------------------|----------------|---------------|
| Hydrograph type | = Reservoir                         | Peak discharge | = 0.000 cfs   |
| Storm frequency | = 1 yrs                             | Time to peak   | = 792 min     |
| Time interval   | = 2 min                             | Hyd. volume    | = 0 cuft      |
| Inflow hyd. No. | = 12 - Bioretention #2 Total Inflow | Max. Elevation | = 423.63 ft   |
| Reservoir name  | = Bioretention Basin #2             | Max. Storage   | = 59,184 cuft |

Storage Indication method used. Exfiltration extracted from Outflow.



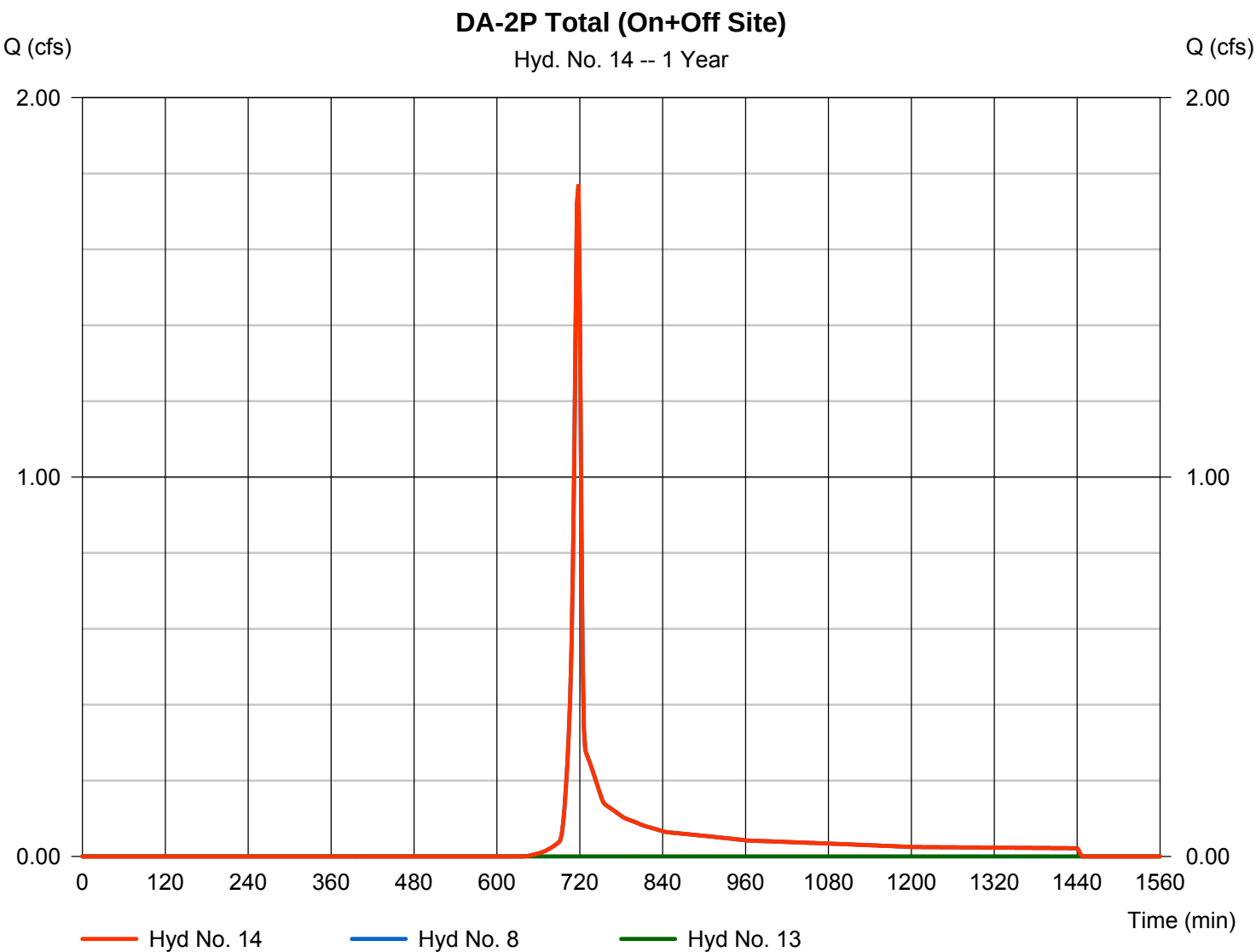


# Hydrograph Report

## Hyd. No. 14

DA-2P Total (On+Off Site)

|                 |           |                      |              |
|-----------------|-----------|----------------------|--------------|
| Hydrograph type | = Combine | Peak discharge       | = 1.771 cfs  |
| Storm frequency | = 1 yrs   | Time to peak         | = 718 min    |
| Time interval   | = 2 min   | Hyd. volume          | = 3,545 cuft |
| Inflow hyds.    | = 8, 13   | Contrib. drain. area | = 1.140 ac   |



# Hydrograph Report

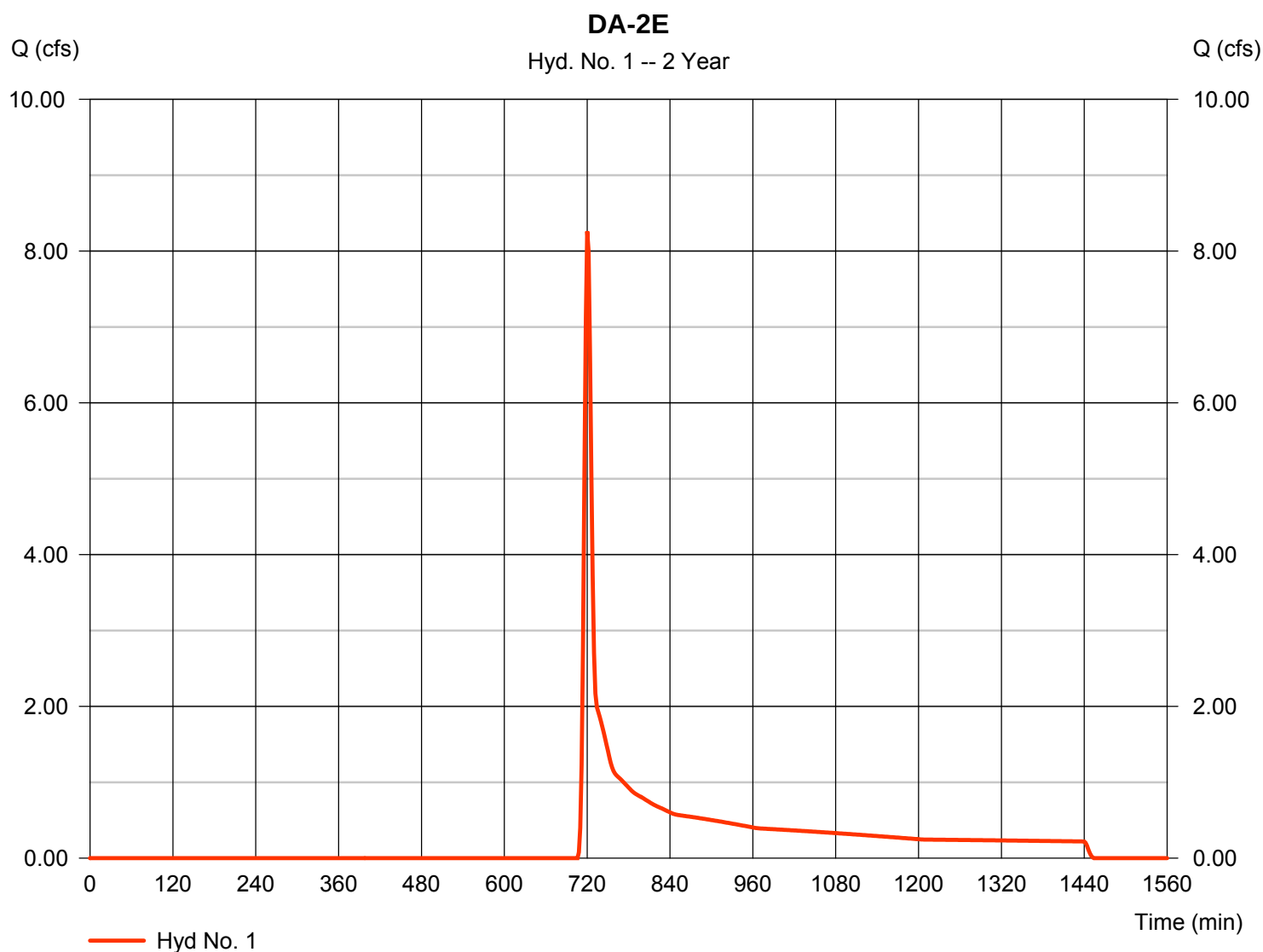
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

Thursday, 02 / 15 / 2018

## Hyd. No. 1

DA-2E

|                 |              |                    |               |
|-----------------|--------------|--------------------|---------------|
| Hydrograph type | = SCS Runoff | Peak discharge     | = 8.258 cfs   |
| Storm frequency | = 2 yrs      | Time to peak       | = 720 min     |
| Time interval   | = 2 min      | Hyd. volume        | = 24,583 cuft |
| Drainage area   | = 14.710 ac  | Curve number       | = 61          |
| Basin Slope     | = 0.0 %      | Hydraulic length   | = 0 ft        |
| Tc method       | = User       | Time of conc. (Tc) | = 8.40 min    |
| Total precip.   | = 3.24 in    | Distribution       | = Type II     |
| Storm duration  | = 24 hrs     | Shape factor       | = 484         |



# Hydrograph Report

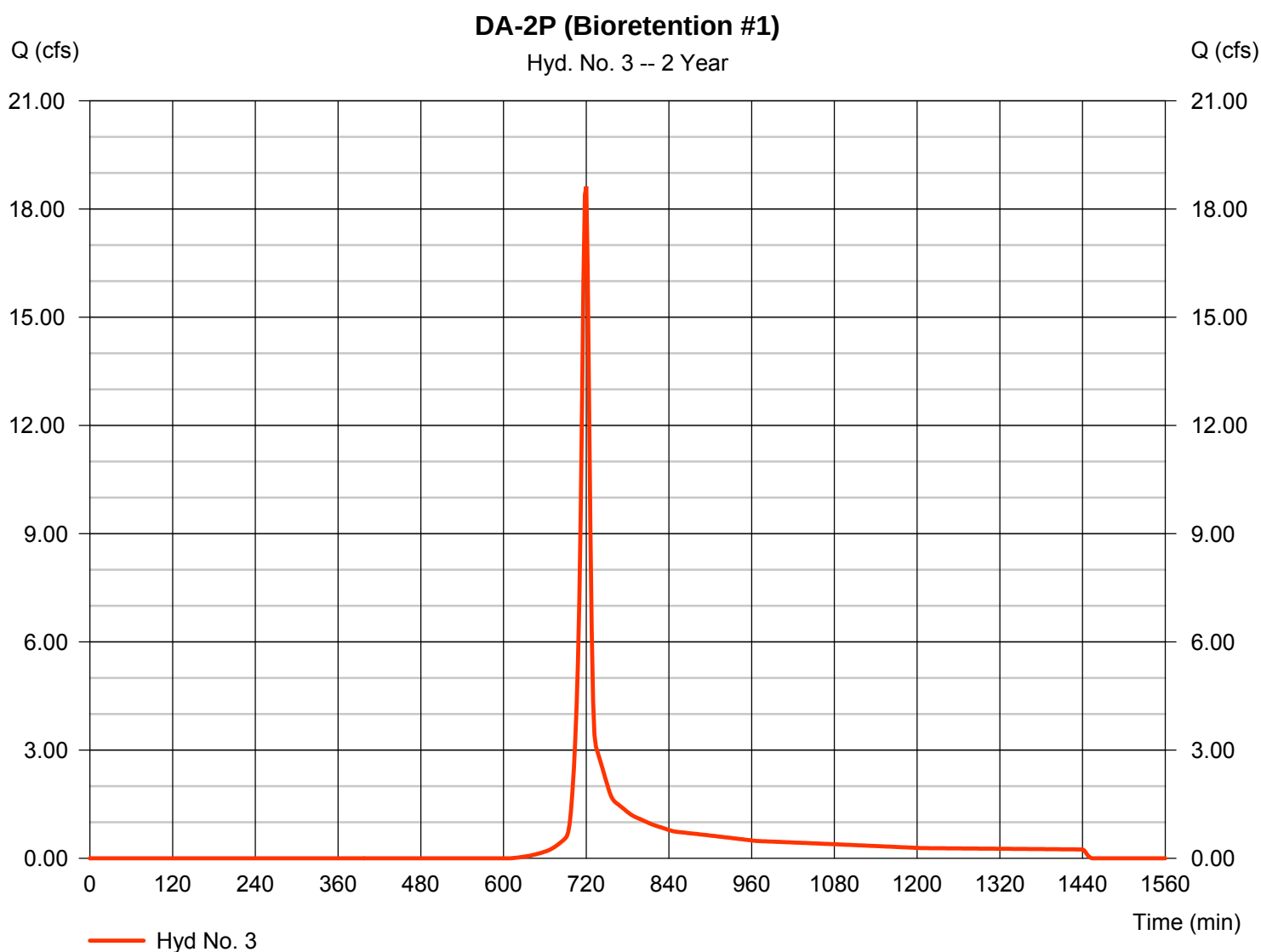
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

Thursday, 02 / 15 / 2018

## Hyd. No. 3

DA-2P (Bioretention #1)

|                 |              |                    |               |
|-----------------|--------------|--------------------|---------------|
| Hydrograph type | = SCS Runoff | Peak discharge     | = 18.62 cfs   |
| Storm frequency | = 2 yrs      | Time to peak       | = 720 min     |
| Time interval   | = 2 min      | Hyd. volume        | = 42,687 cuft |
| Drainage area   | = 9.480 ac   | Curve number       | = 77          |
| Basin Slope     | = 0.0 %      | Hydraulic length   | = 0 ft        |
| Tc method       | = User       | Time of conc. (Tc) | = 7.90 min    |
| Total precip.   | = 3.24 in    | Distribution       | = Type II     |
| Storm duration  | = 24 hrs     | Shape factor       | = 484         |



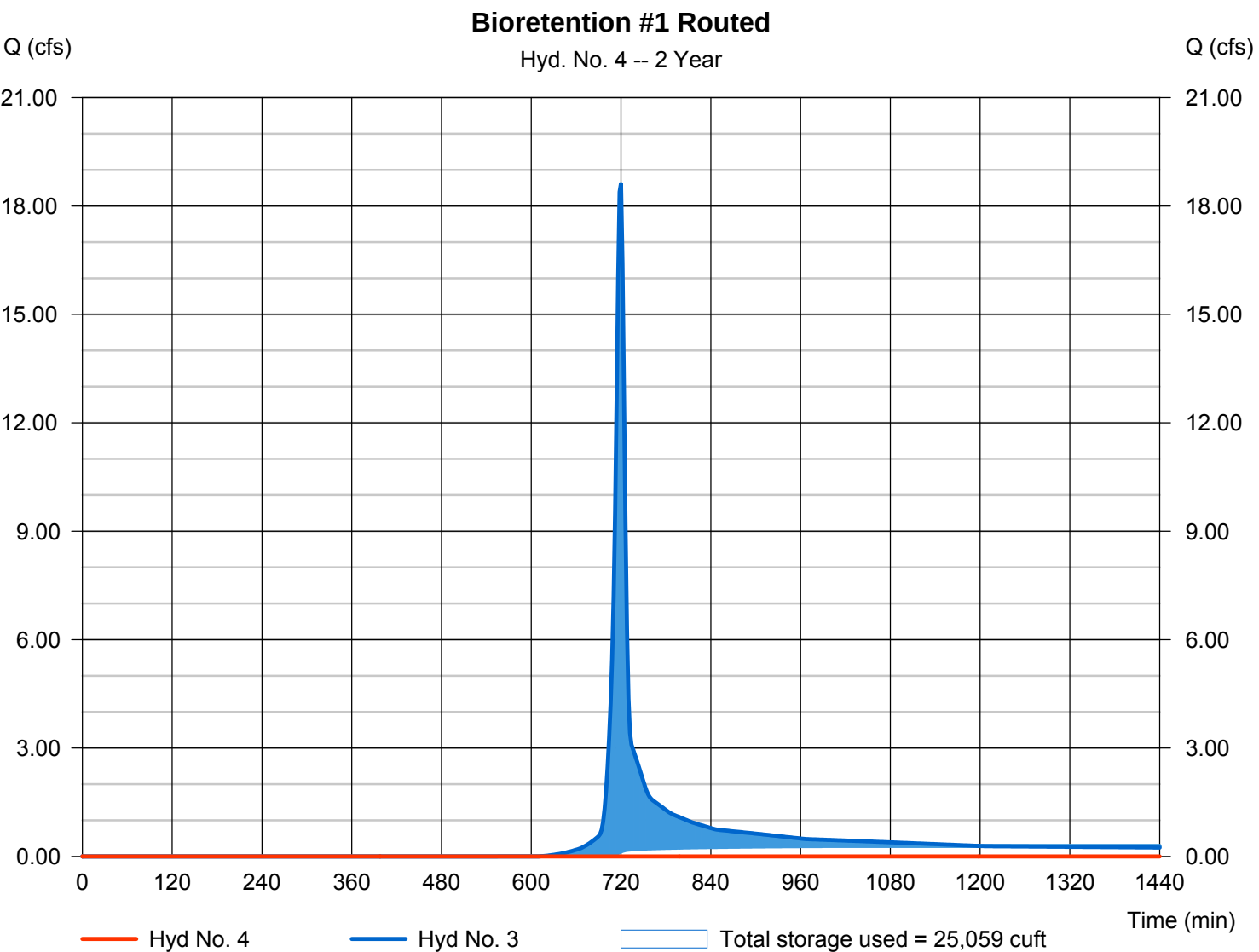
# Hydrograph Report

## Hyd. No. 4

### Bioretention #1 Routed

|                 |                               |                |               |
|-----------------|-------------------------------|----------------|---------------|
| Hydrograph type | = Reservoir                   | Peak discharge | = 0.000 cfs   |
| Storm frequency | = 2 yrs                       | Time to peak   | = 896 min     |
| Time interval   | = 2 min                       | Hyd. volume    | = 0 cuft      |
| Inflow hyd. No. | = 3 - DA-2P (Bioretention #1) | Max. Elevation | = 430.39 ft   |
| Reservoir name  | = Bioretention Basin #1       | Max. Storage   | = 25,059 cuft |

Storage Indication method used. Exfiltration extracted from Outflow.



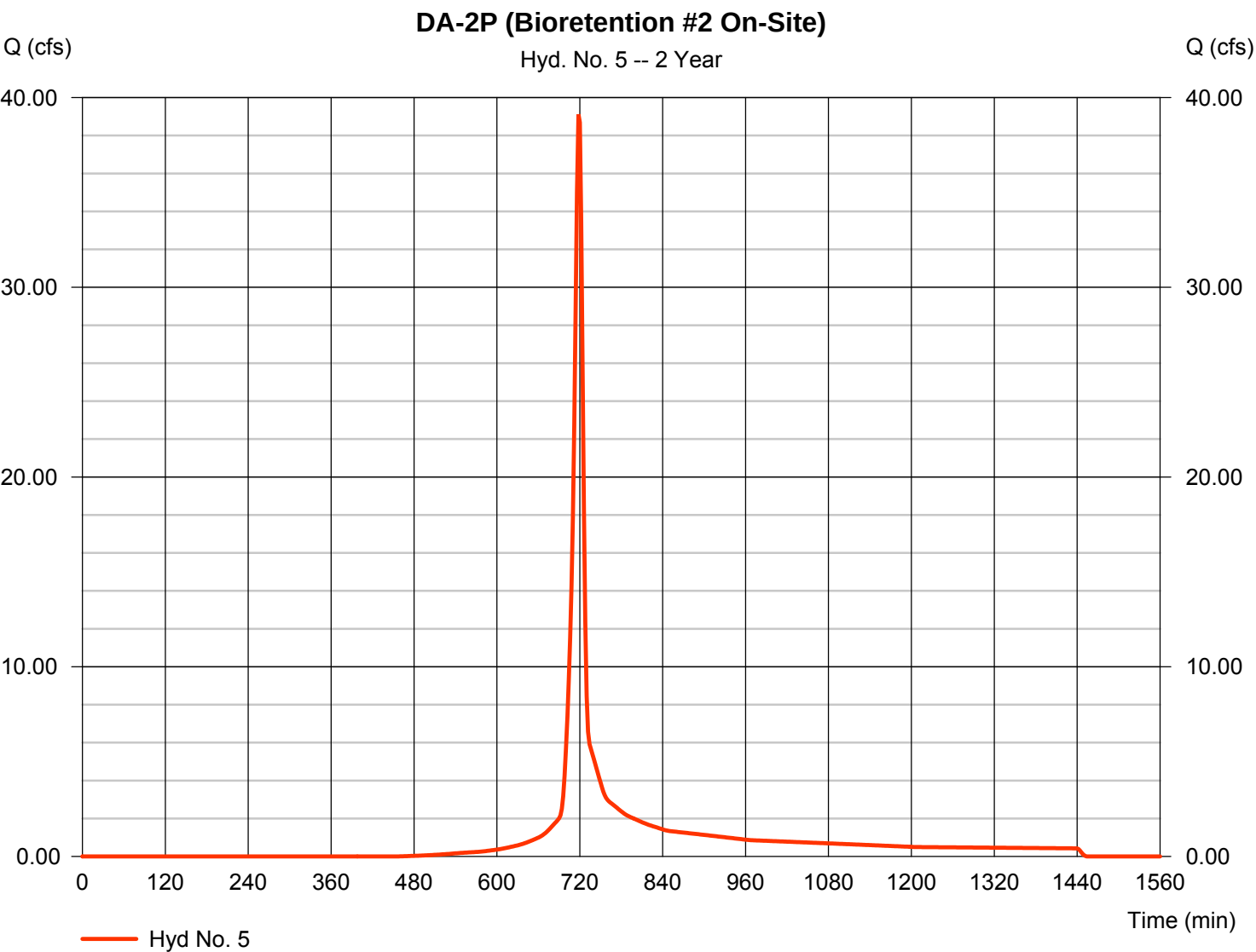


# Hydrograph Report

## Hyd. No. 5

DA-2P (Bioretention #2 On-Site)

|                 |              |                    |               |
|-----------------|--------------|--------------------|---------------|
| Hydrograph type | = SCS Runoff | Peak discharge     | = 39.12 cfs   |
| Storm frequency | = 2 yrs      | Time to peak       | = 718 min     |
| Time interval   | = 2 min      | Hyd. volume        | = 89,629 cuft |
| Drainage area   | = 13.780 ac  | Curve number       | = 85          |
| Basin Slope     | = 0.0 %      | Hydraulic length   | = 0 ft        |
| Tc method       | = User       | Time of conc. (Tc) | = 8.00 min    |
| Total precip.   | = 3.24 in    | Distribution       | = Type II     |
| Storm duration  | = 24 hrs     | Shape factor       | = 484         |

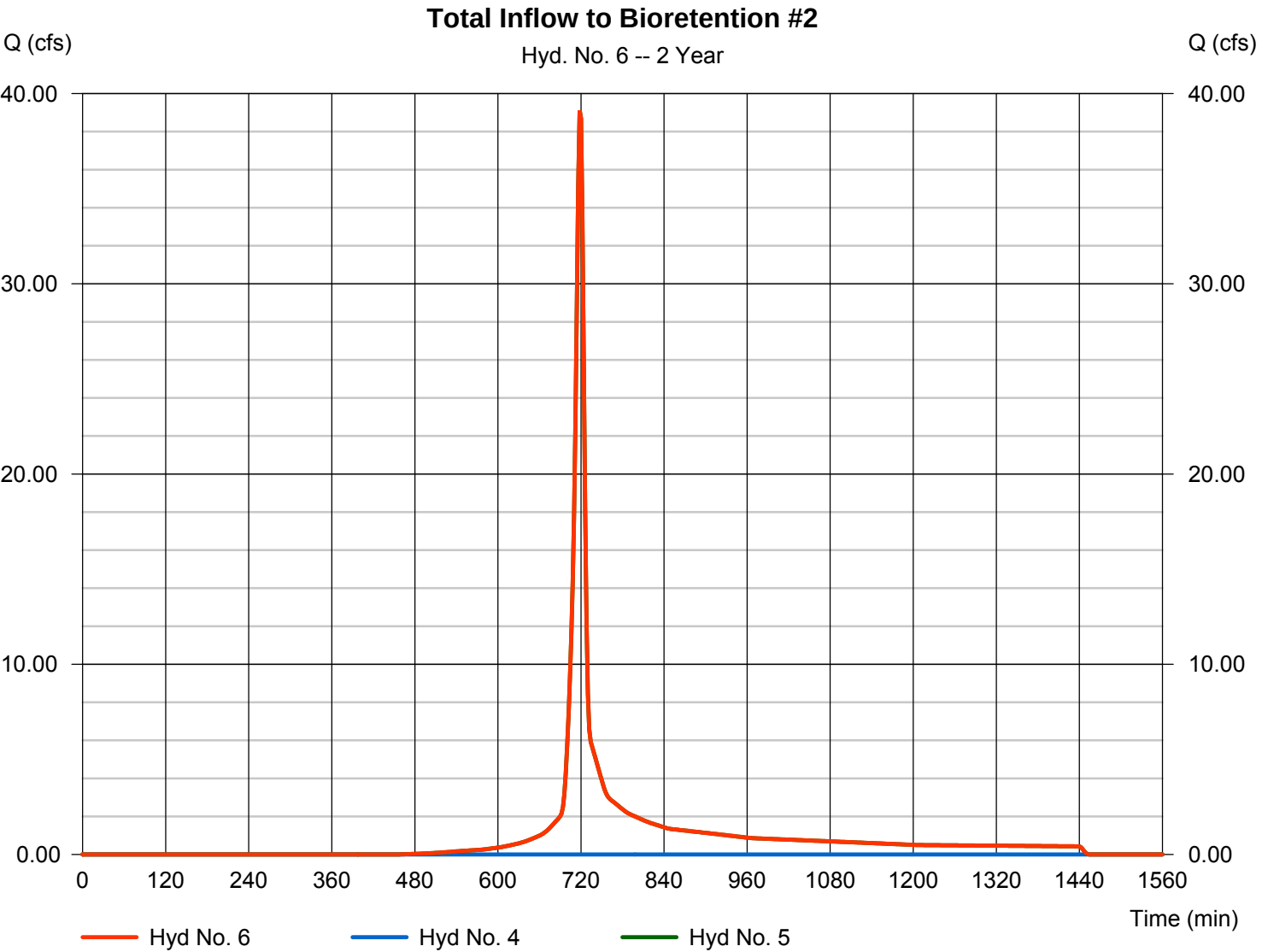


# Hydrograph Report

## Hyd. No. 6

Total Inflow to Bioretention #2

|                 |           |                      |               |
|-----------------|-----------|----------------------|---------------|
| Hydrograph type | = Combine | Peak discharge       | = 39.12 cfs   |
| Storm frequency | = 2 yrs   | Time to peak         | = 718 min     |
| Time interval   | = 2 min   | Hyd. volume          | = 89,629 cuft |
| Inflow hyds.    | = 4, 5    | Contrib. drain. area | = 13.780 ac   |



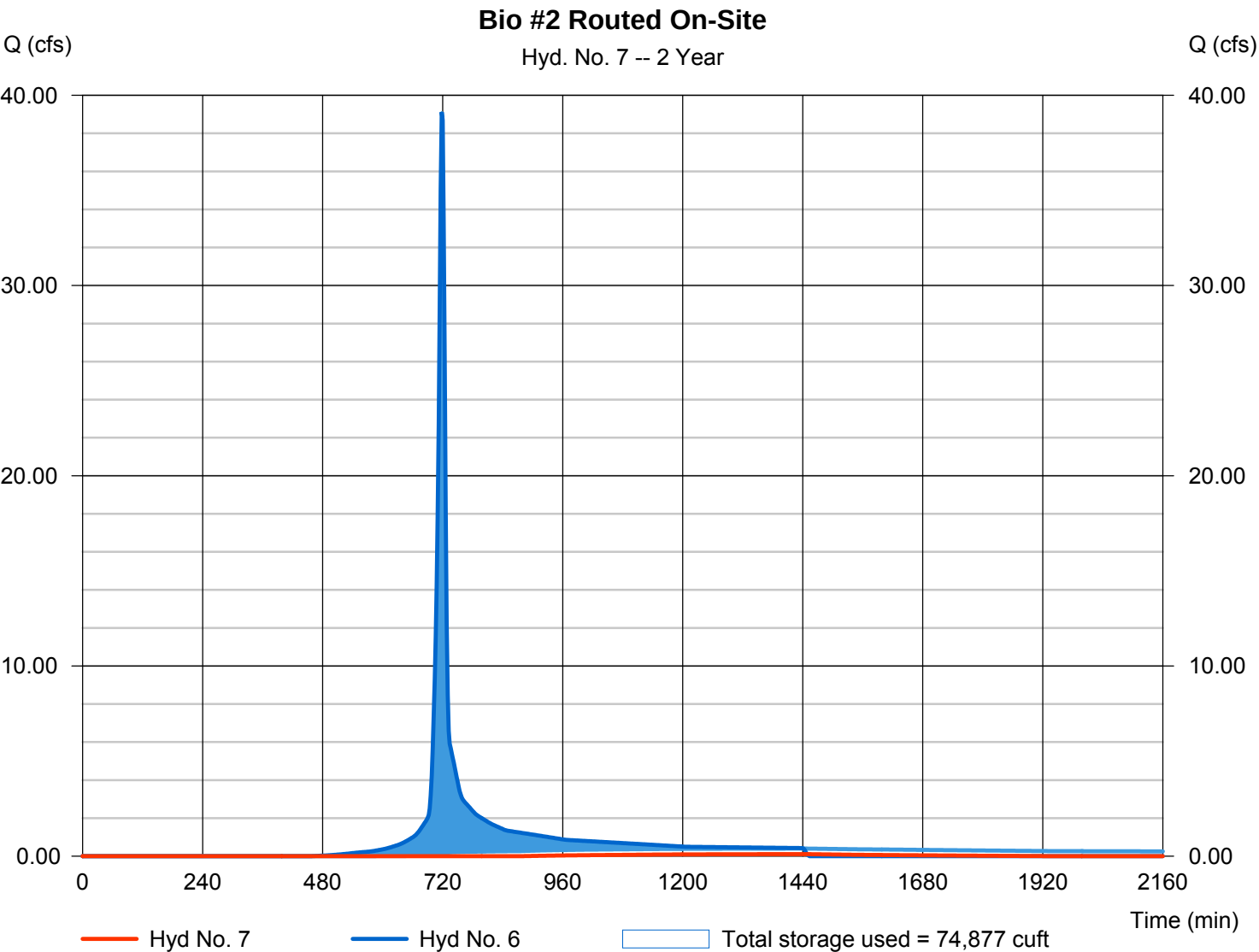
# Hydrograph Report

## Hyd. No. 7

Bio #2 Routed On-Site

|                 |                                       |                |               |
|-----------------|---------------------------------------|----------------|---------------|
| Hydrograph type | = Reservoir                           | Peak discharge | = 0.108 cfs   |
| Storm frequency | = 2 yrs                               | Time to peak   | = 1442 min    |
| Time interval   | = 2 min                               | Hyd. volume    | = 3,954 cuft  |
| Inflow hyd. No. | = 6 - Total Inflow to Bioretention #2 | Max. Elevation | = 424.06 ft   |
| Reservoir name  | = Bioretention Basin #2               | Max. Storage   | = 74,877 cuft |

Storage Indication method used. Exfiltration extracted from Outflow.

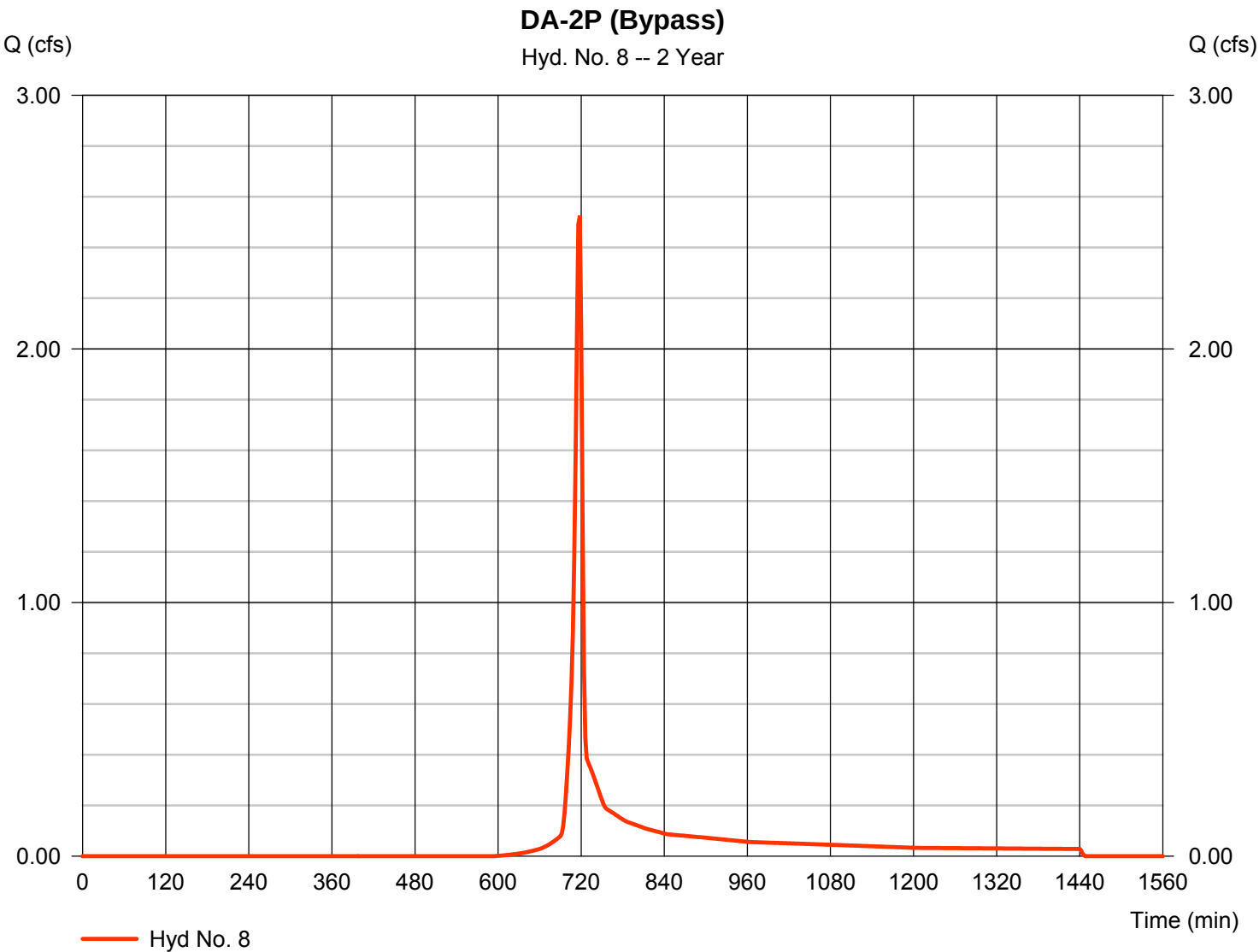


# Hydrograph Report

## Hyd. No. 8

DA-2P (Bypass)

|                 |              |                    |              |
|-----------------|--------------|--------------------|--------------|
| Hydrograph type | = SCS Runoff | Peak discharge     | = 2.525 cfs  |
| Storm frequency | = 2 yrs      | Time to peak       | = 718 min    |
| Time interval   | = 2 min      | Hyd. volume        | = 5,054 cuft |
| Drainage area   | = 1.140 ac   | Curve number       | = 78         |
| Basin Slope     | = 0.0 %      | Hydraulic length   | = 0 ft       |
| Tc method       | = User       | Time of conc. (Tc) | = 5.00 min   |
| Total precip.   | = 3.24 in    | Distribution       | = Type II    |
| Storm duration  | = 24 hrs     | Shape factor       | = 484        |

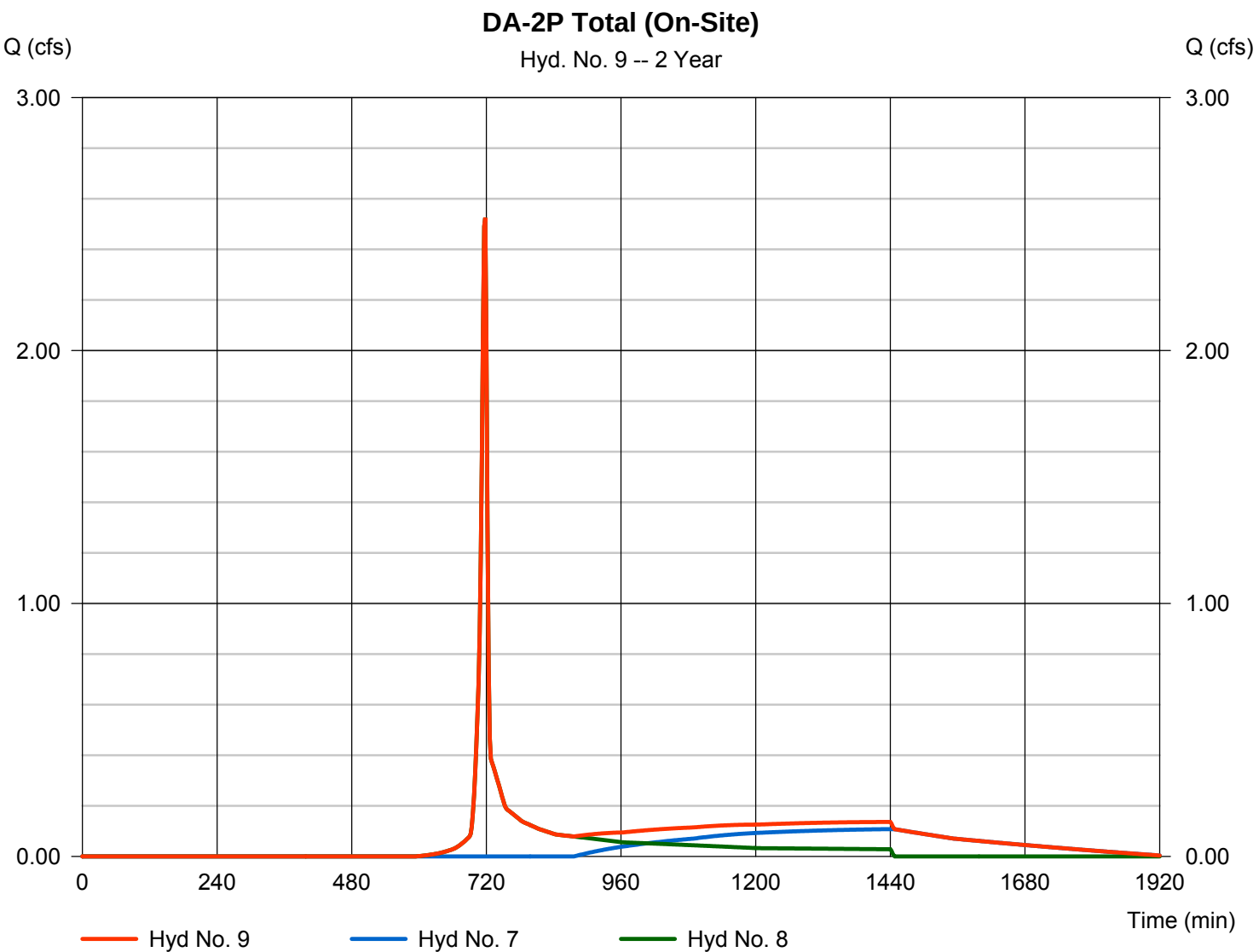


# Hydrograph Report

## Hyd. No. 9

DA-2P Total (On-Site)

|                 |           |                      |              |
|-----------------|-----------|----------------------|--------------|
| Hydrograph type | = Combine | Peak discharge       | = 2.525 cfs  |
| Storm frequency | = 2 yrs   | Time to peak         | = 718 min    |
| Time interval   | = 2 min   | Hyd. volume          | = 9,008 cuft |
| Inflow hyds.    | = 7, 8    | Contrib. drain. area | = 1.140 ac   |





# Hydrograph Report

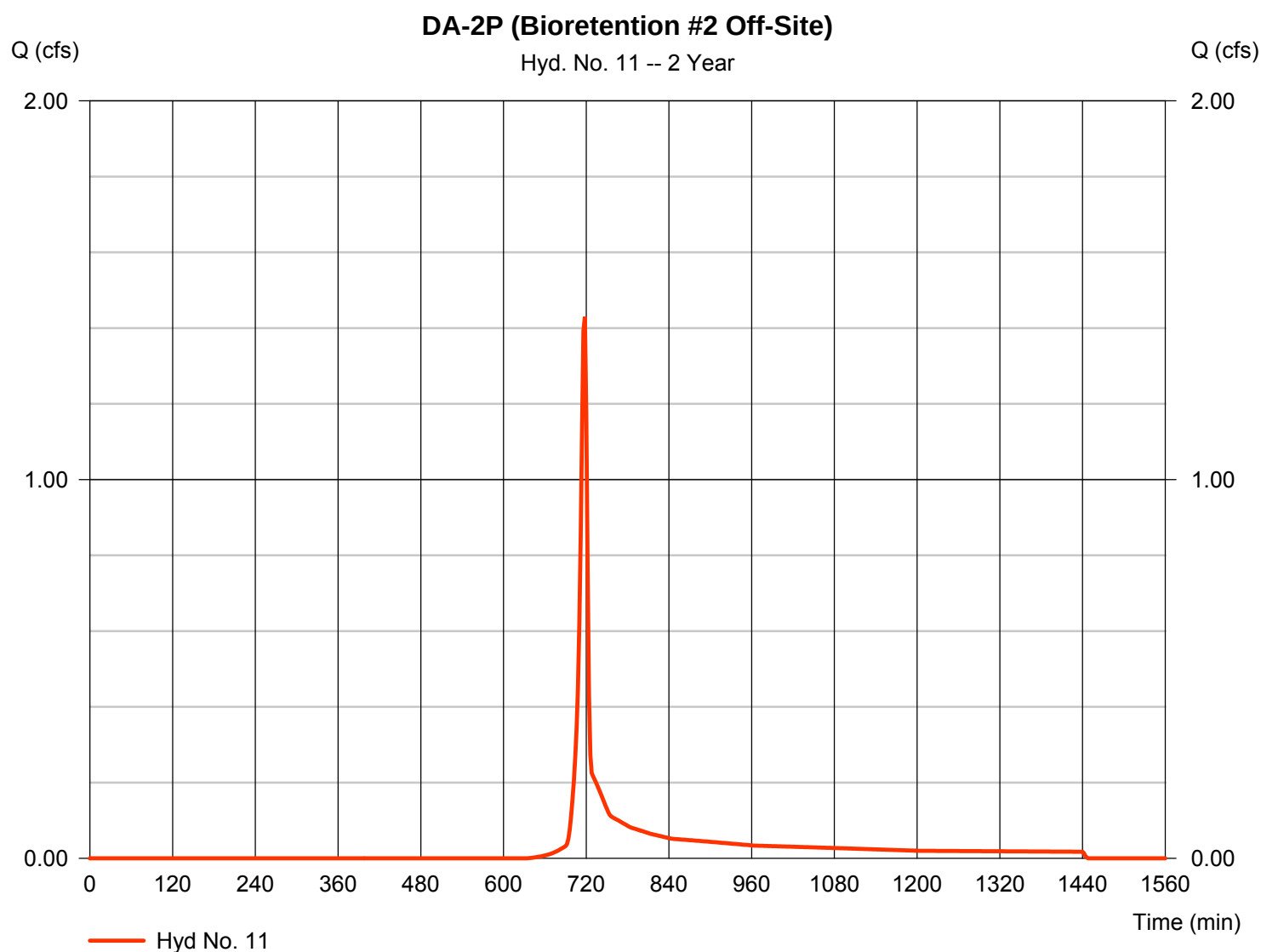
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

Thursday, 02 / 15 / 2018

## Hyd. No. 11

DA-2P (Bioretention #2 Off-Site)

|                 |              |                    |              |
|-----------------|--------------|--------------------|--------------|
| Hydrograph type | = SCS Runoff | Peak discharge     | = 1.430 cfs  |
| Storm frequency | = 2 yrs      | Time to peak       | = 718 min    |
| Time interval   | = 2 min      | Hyd. volume        | = 2,861 cuft |
| Drainage area   | = 0.750 ac   | Curve number       | = 75         |
| Basin Slope     | = 0.0 %      | Hydraulic length   | = 0 ft       |
| Tc method       | = User       | Time of conc. (Tc) | = 5.00 min   |
| Total precip.   | = 3.24 in    | Distribution       | = Type II    |
| Storm duration  | = 24 hrs     | Shape factor       | = 484        |

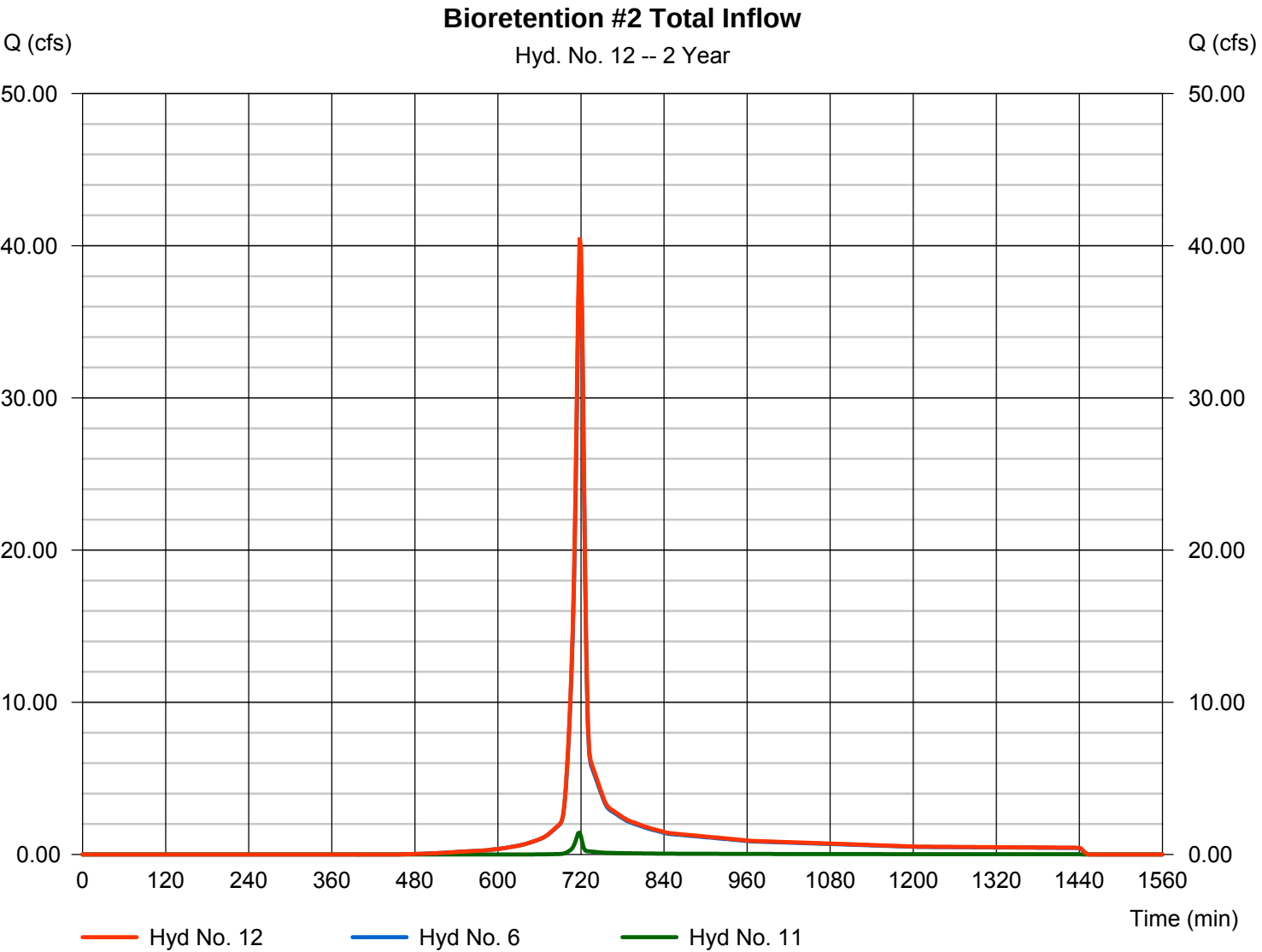


# Hydrograph Report

## Hyd. No. 12

### Bioretention #2 Total Inflow

|                 |           |                      |               |
|-----------------|-----------|----------------------|---------------|
| Hydrograph type | = Combine | Peak discharge       | = 40.55 cfs   |
| Storm frequency | = 2 yrs   | Time to peak         | = 718 min     |
| Time interval   | = 2 min   | Hyd. volume          | = 92,491 cuft |
| Inflow hyds.    | = 6, 11   | Contrib. drain. area | = 0.750 ac    |



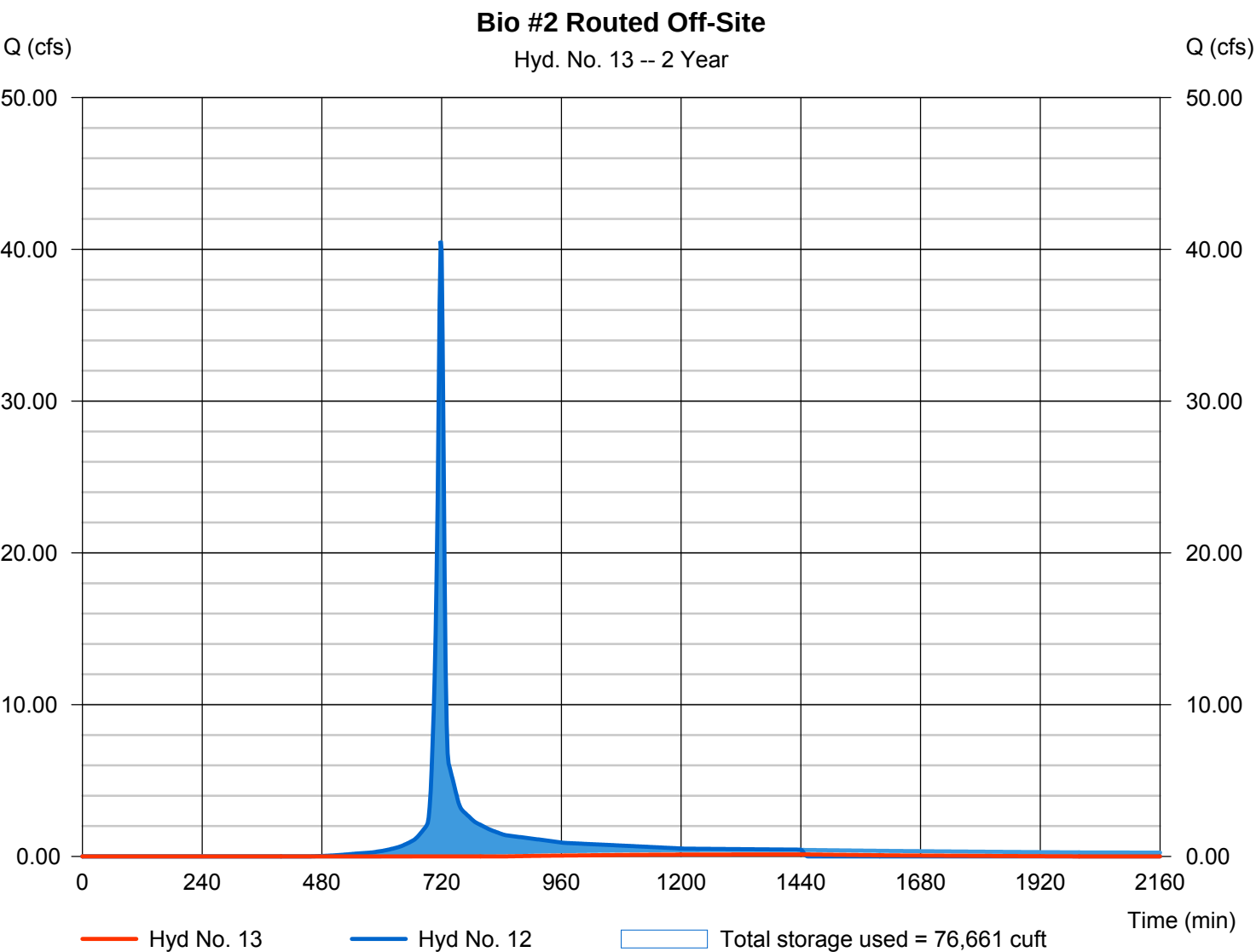
# Hydrograph Report

## Hyd. No. 13

Bio #2 Routed Off-Site

|                 |                                     |                |               |
|-----------------|-------------------------------------|----------------|---------------|
| Hydrograph type | = Reservoir                         | Peak discharge | = 0.136 cfs   |
| Storm frequency | = 2 yrs                             | Time to peak   | = 1440 min    |
| Time interval   | = 2 min                             | Hyd. volume    | = 5,400 cuft  |
| Inflow hyd. No. | = 12 - Bioretention #2 Total Inflow | Max. Elevation | = 424.11 ft   |
| Reservoir name  | = Bioretention Basin #2             | Max. Storage   | = 76,661 cuft |

Storage Indication method used. Exfiltration extracted from Outflow.

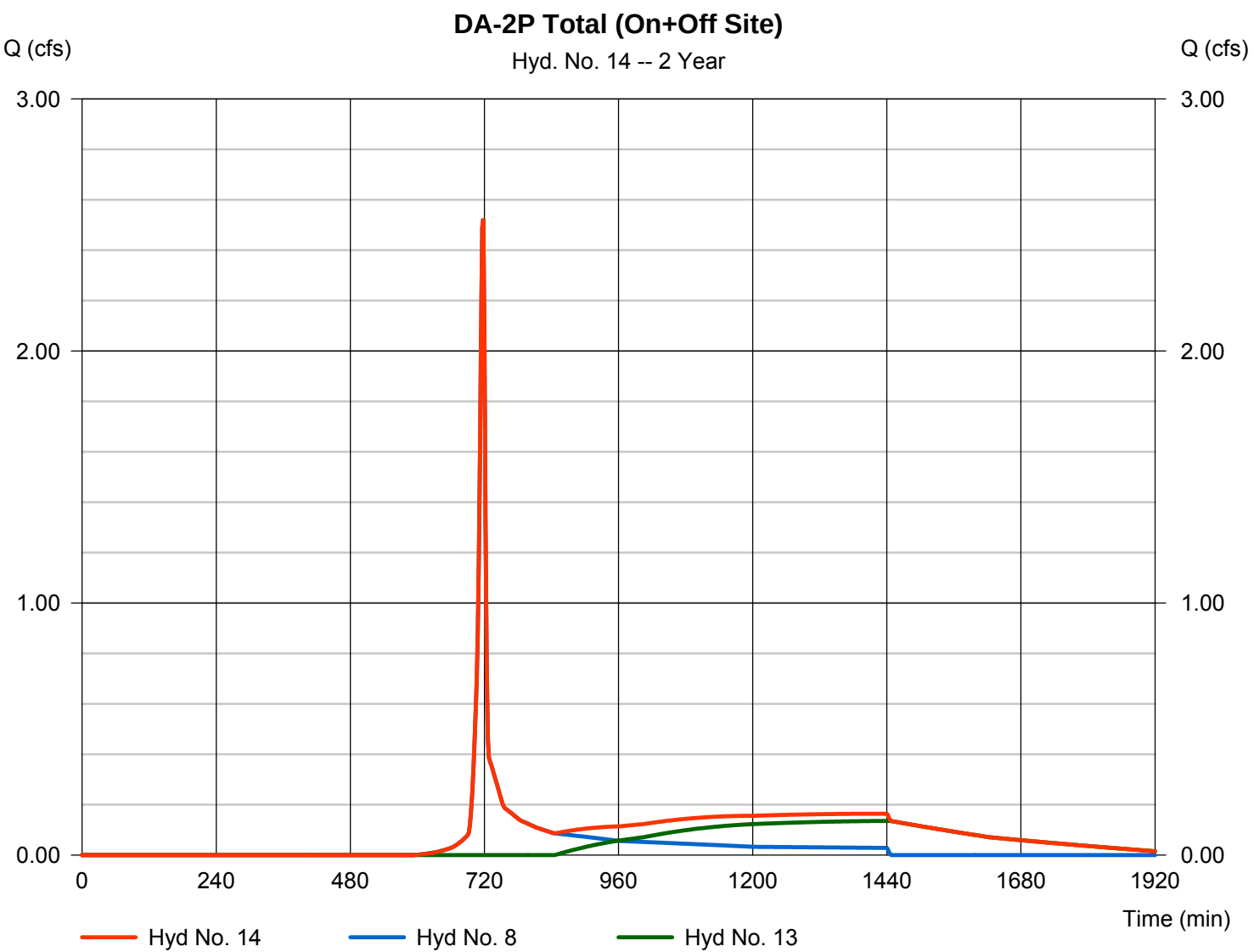


# Hydrograph Report

## Hyd. No. 14

DA-2P Total (On+Off Site)

|                 |           |                      |               |
|-----------------|-----------|----------------------|---------------|
| Hydrograph type | = Combine | Peak discharge       | = 2.525 cfs   |
| Storm frequency | = 2 yrs   | Time to peak         | = 718 min     |
| Time interval   | = 2 min   | Hyd. volume          | = 10,454 cuft |
| Inflow hyds.    | = 8, 13   | Contrib. drain. area | = 1.140 ac    |

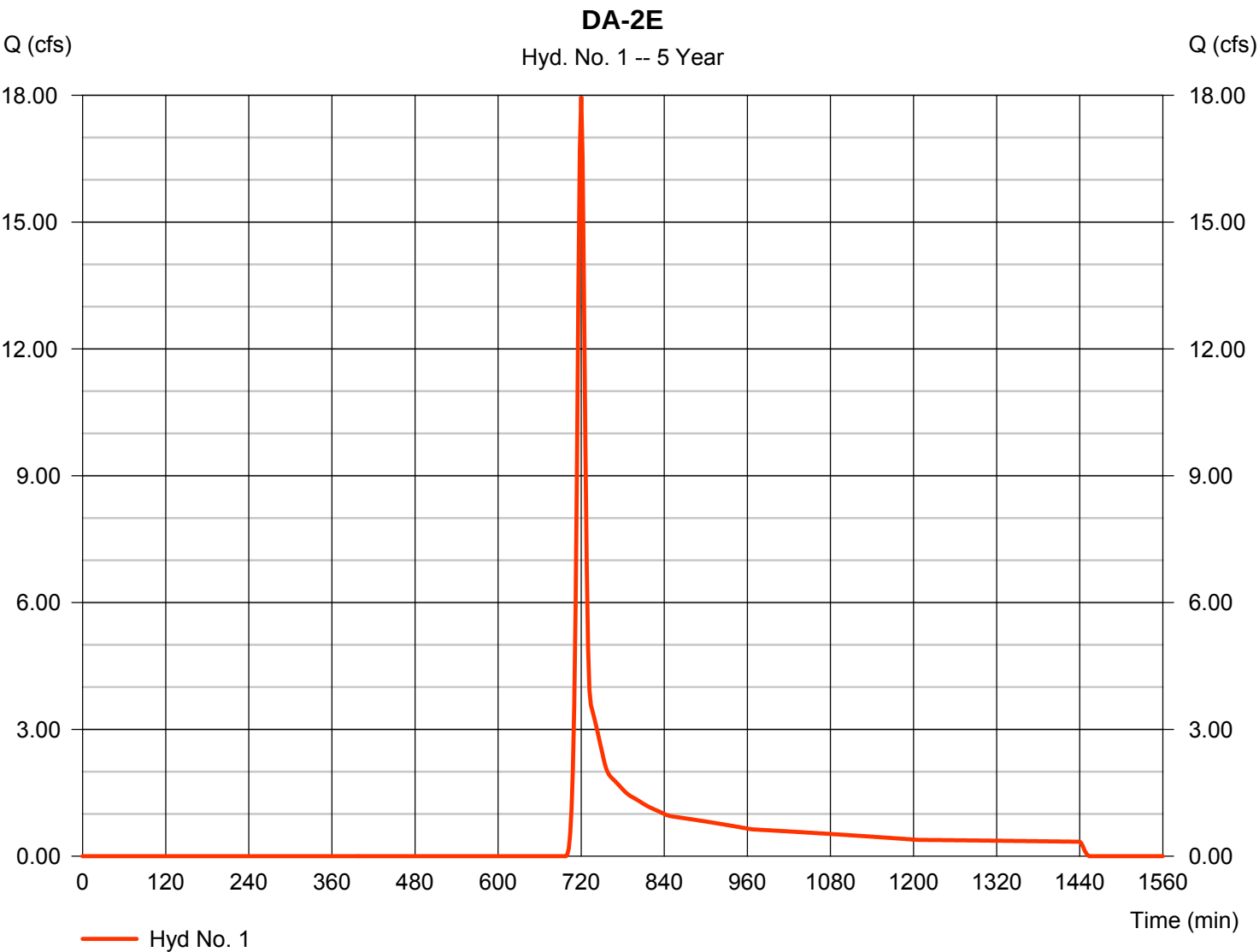


# Hydrograph Report

## Hyd. No. 1

DA-2E

|                 |              |                    |               |
|-----------------|--------------|--------------------|---------------|
| Hydrograph type | = SCS Runoff | Peak discharge     | = 17.97 cfs   |
| Storm frequency | = 5 yrs      | Time to peak       | = 720 min     |
| Time interval   | = 2 min      | Hyd. volume        | = 45,018 cuft |
| Drainage area   | = 14.710 ac  | Curve number       | = 61          |
| Basin Slope     | = 0.0 %      | Hydraulic length   | = 0 ft        |
| Tc method       | = User       | Time of conc. (Tc) | = 8.40 min    |
| Total precip.   | = 4.06 in    | Distribution       | = Type II     |
| Storm duration  | = 24 hrs     | Shape factor       | = 484         |





# Hydrograph Report

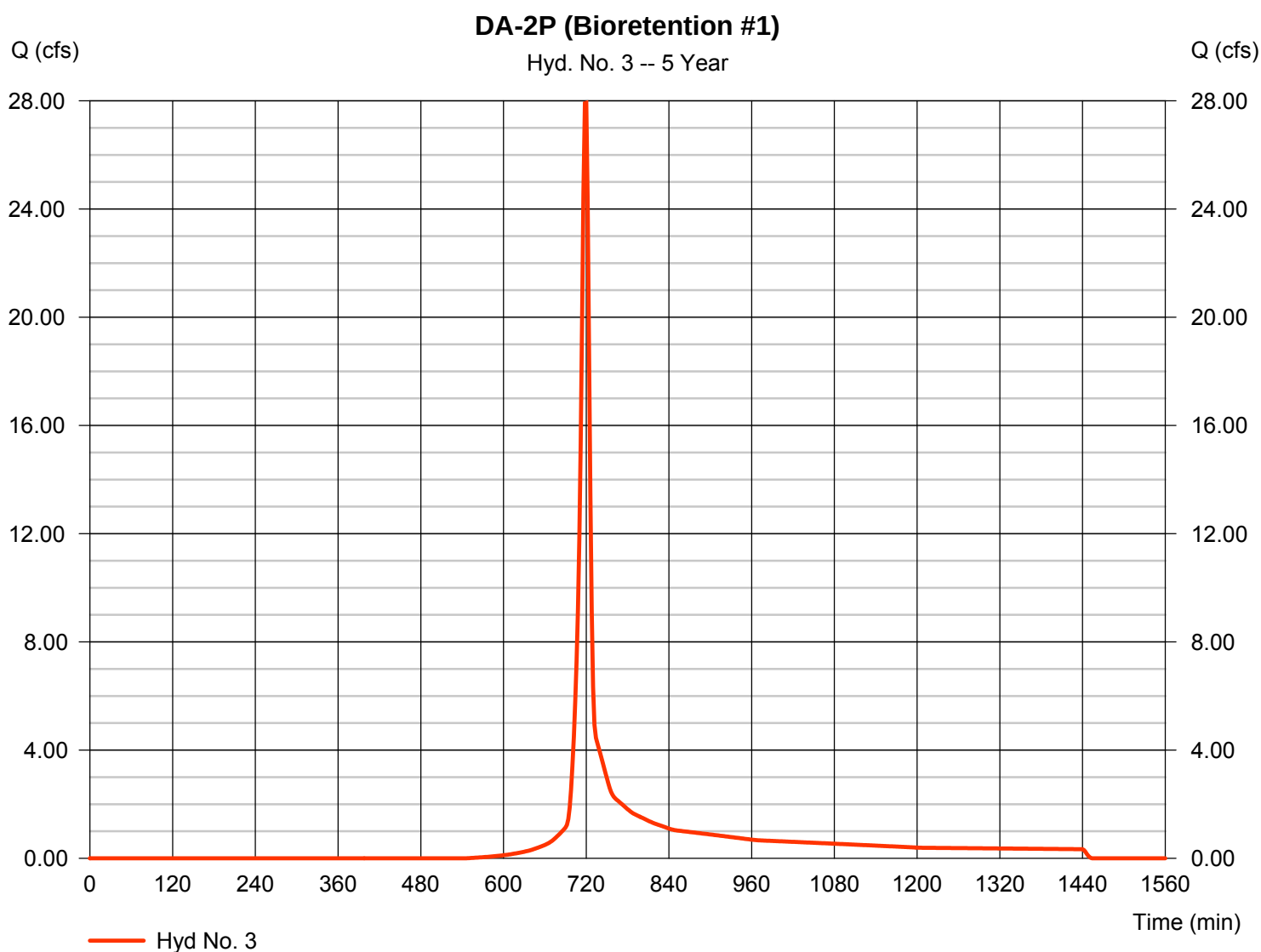
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

Thursday, 02 / 15 / 2018

## Hyd. No. 3

DA-2P (Bioretention #1)

|                 |              |                    |               |
|-----------------|--------------|--------------------|---------------|
| Hydrograph type | = SCS Runoff | Peak discharge     | = 27.92 cfs   |
| Storm frequency | = 5 yrs      | Time to peak       | = 720 min     |
| Time interval   | = 2 min      | Hyd. volume        | = 63,971 cuft |
| Drainage area   | = 9.480 ac   | Curve number       | = 77          |
| Basin Slope     | = 0.0 %      | Hydraulic length   | = 0 ft        |
| Tc method       | = User       | Time of conc. (Tc) | = 7.90 min    |
| Total precip.   | = 4.06 in    | Distribution       | = Type II     |
| Storm duration  | = 24 hrs     | Shape factor       | = 484         |



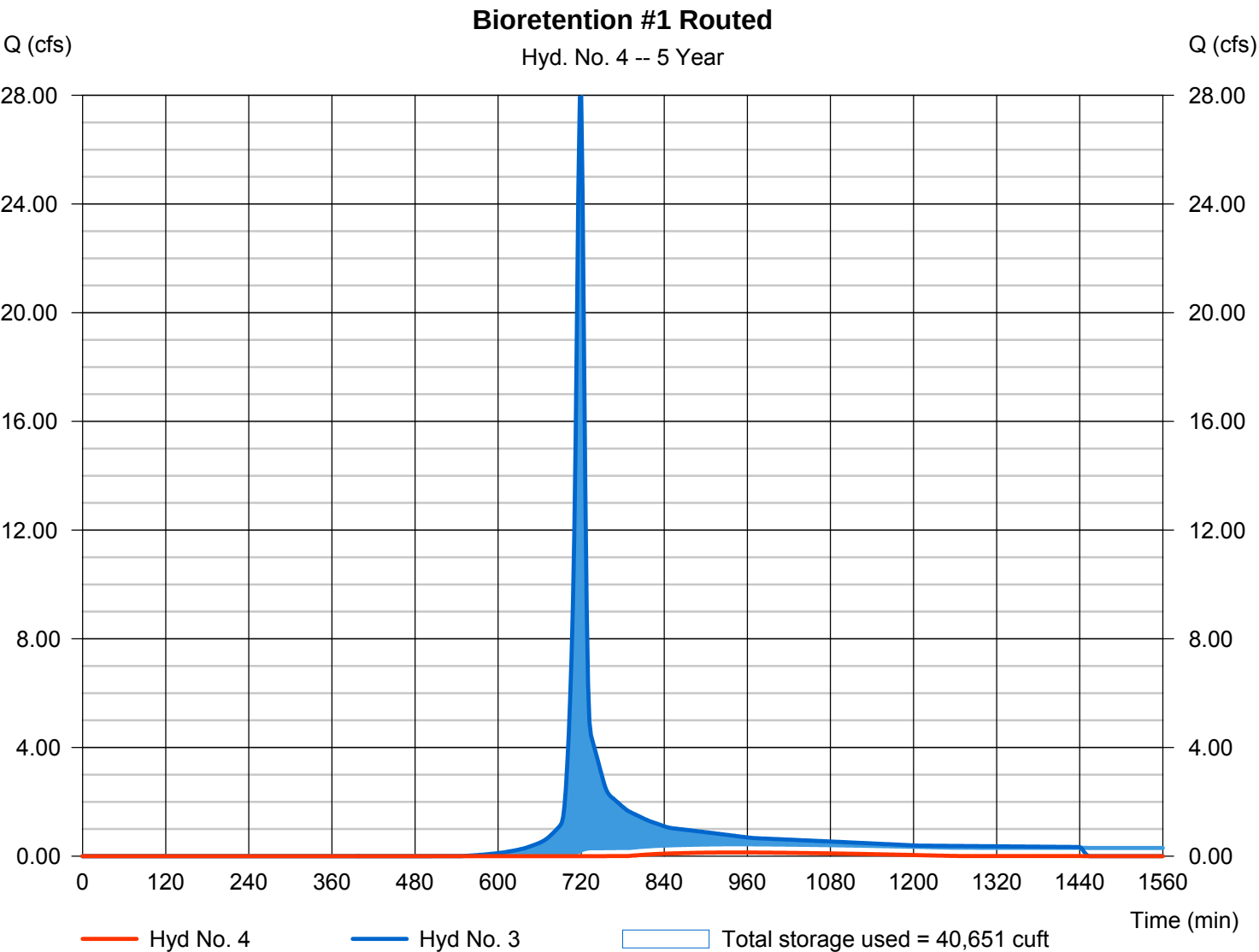
# Hydrograph Report

## Hyd. No. 4

### Bioretention #1 Routed

|                 |                               |                |               |
|-----------------|-------------------------------|----------------|---------------|
| Hydrograph type | = Reservoir                   | Peak discharge | = 0.137 cfs   |
| Storm frequency | = 5 yrs                       | Time to peak   | = 944 min     |
| Time interval   | = 2 min                       | Hyd. volume    | = 2,635 cuft  |
| Inflow hyd. No. | = 3 - DA-2P (Bioretention #1) | Max. Elevation | = 431.16 ft   |
| Reservoir name  | = Bioretention Basin #1       | Max. Storage   | = 40,651 cuft |

Storage Indication method used. Exfiltration extracted from Outflow.

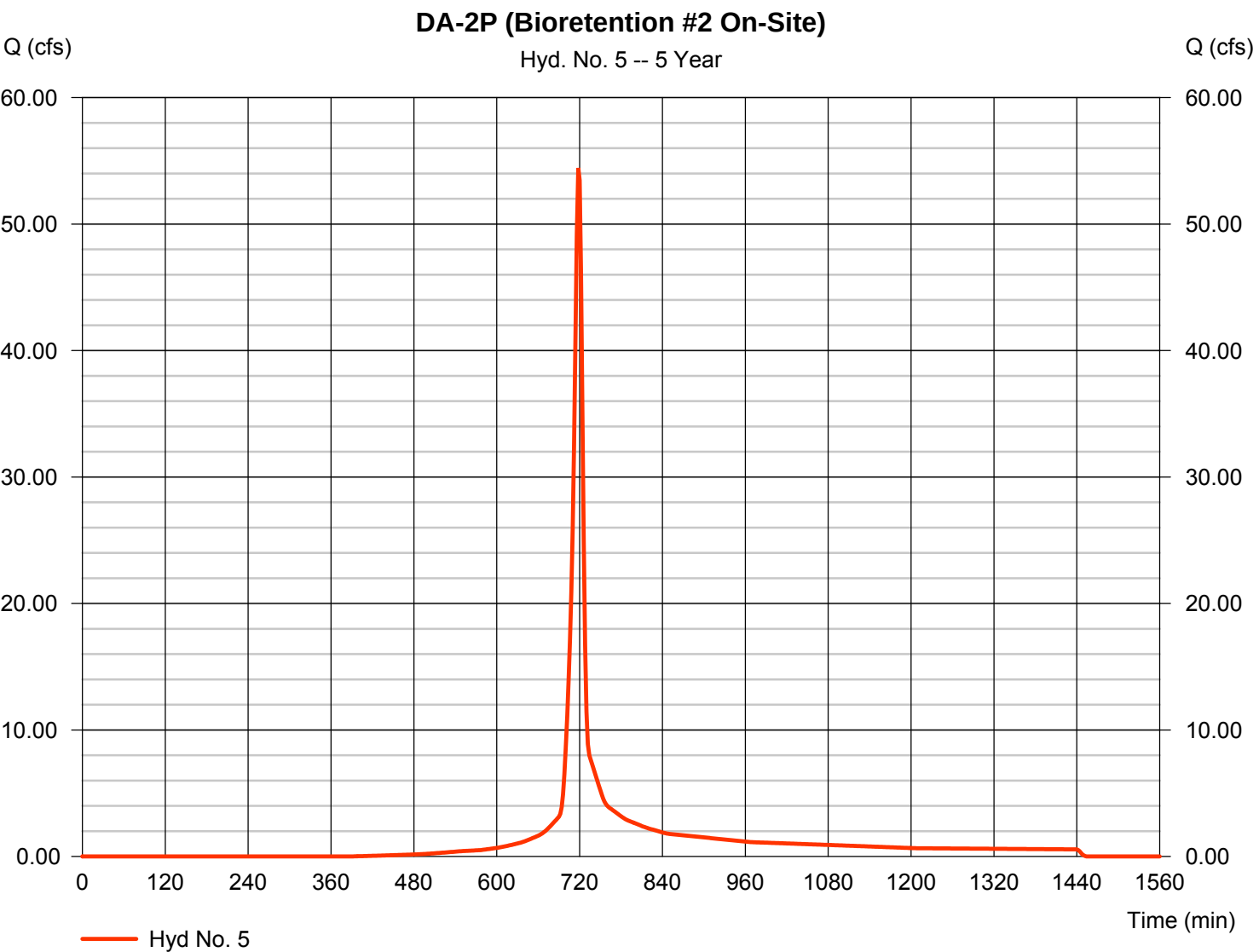


# Hydrograph Report

## Hyd. No. 5

DA-2P (Bioretention #2 On-Site)

|                 |              |                    |                |
|-----------------|--------------|--------------------|----------------|
| Hydrograph type | = SCS Runoff | Peak discharge     | = 54.43 cfs    |
| Storm frequency | = 5 yrs      | Time to peak       | = 718 min      |
| Time interval   | = 2 min      | Hyd. volume        | = 125,628 cuft |
| Drainage area   | = 13.780 ac  | Curve number       | = 85           |
| Basin Slope     | = 0.0 %      | Hydraulic length   | = 0 ft         |
| Tc method       | = User       | Time of conc. (Tc) | = 8.00 min     |
| Total precip.   | = 4.06 in    | Distribution       | = Type II      |
| Storm duration  | = 24 hrs     | Shape factor       | = 484          |

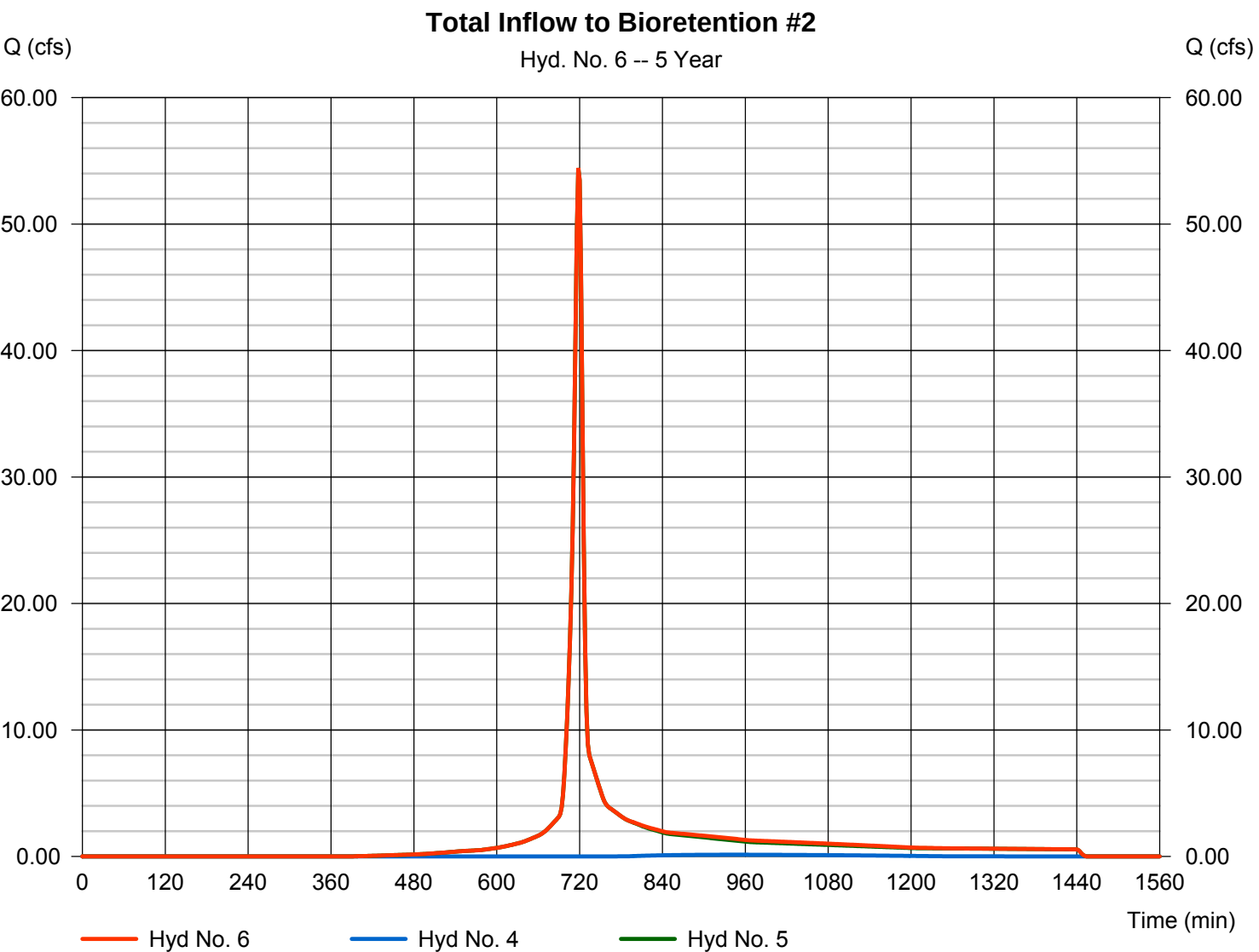


# Hydrograph Report

## Hyd. No. 6

Total Inflow to Bioretention #2

|                 |           |                      |                |
|-----------------|-----------|----------------------|----------------|
| Hydrograph type | = Combine | Peak discharge       | = 54.43 cfs    |
| Storm frequency | = 5 yrs   | Time to peak         | = 718 min      |
| Time interval   | = 2 min   | Hyd. volume          | = 128,263 cuft |
| Inflow hyds.    | = 4, 5    | Contrib. drain. area | = 13.780 ac    |



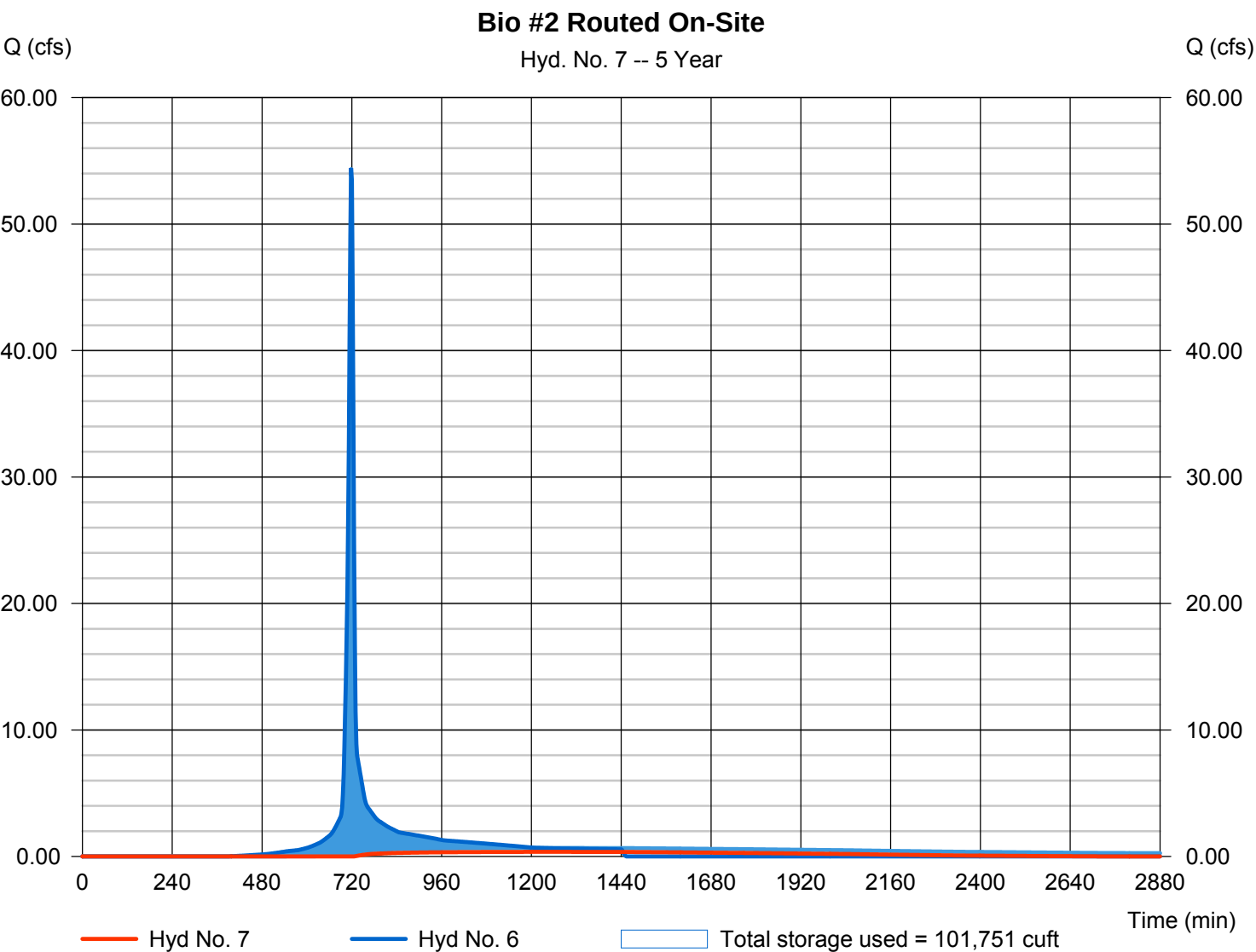
# Hydrograph Report

## Hyd. No. 7

Bio #2 Routed On-Site

|                 |                                       |                |                |
|-----------------|---------------------------------------|----------------|----------------|
| Hydrograph type | = Reservoir                           | Peak discharge | = 0.362 cfs    |
| Storm frequency | = 5 yrs                               | Time to peak   | = 1234 min     |
| Time interval   | = 2 min                               | Hyd. volume    | = 27,094 cuft  |
| Inflow hyd. No. | = 6 - Total Inflow to Bioretention #2 | Max. Elevation | = 424.73 ft    |
| Reservoir name  | = Bioretention Basin #2               | Max. Storage   | = 101,751 cuft |

Storage Indication method used. Exfiltration extracted from Outflow.



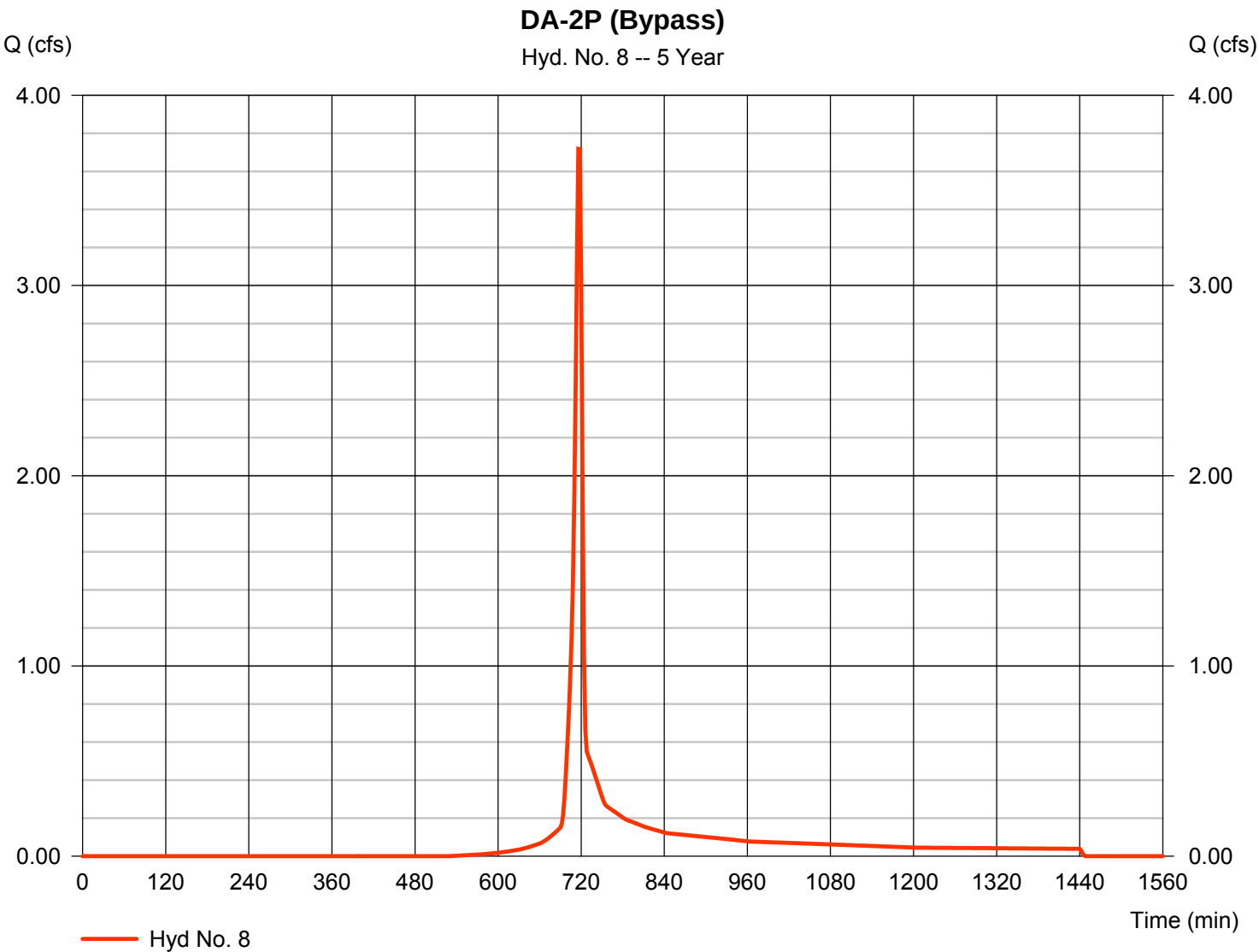


# Hydrograph Report

## Hyd. No. 8

DA-2P (Bypass)

|                 |              |                    |              |
|-----------------|--------------|--------------------|--------------|
| Hydrograph type | = SCS Runoff | Peak discharge     | = 3.718 cfs  |
| Storm frequency | = 5 yrs      | Time to peak       | = 716 min    |
| Time interval   | = 2 min      | Hyd. volume        | = 7,506 cuft |
| Drainage area   | = 1.140 ac   | Curve number       | = 78         |
| Basin Slope     | = 0.0 %      | Hydraulic length   | = 0 ft       |
| Tc method       | = User       | Time of conc. (Tc) | = 5.00 min   |
| Total precip.   | = 4.06 in    | Distribution       | = Type II    |
| Storm duration  | = 24 hrs     | Shape factor       | = 484        |

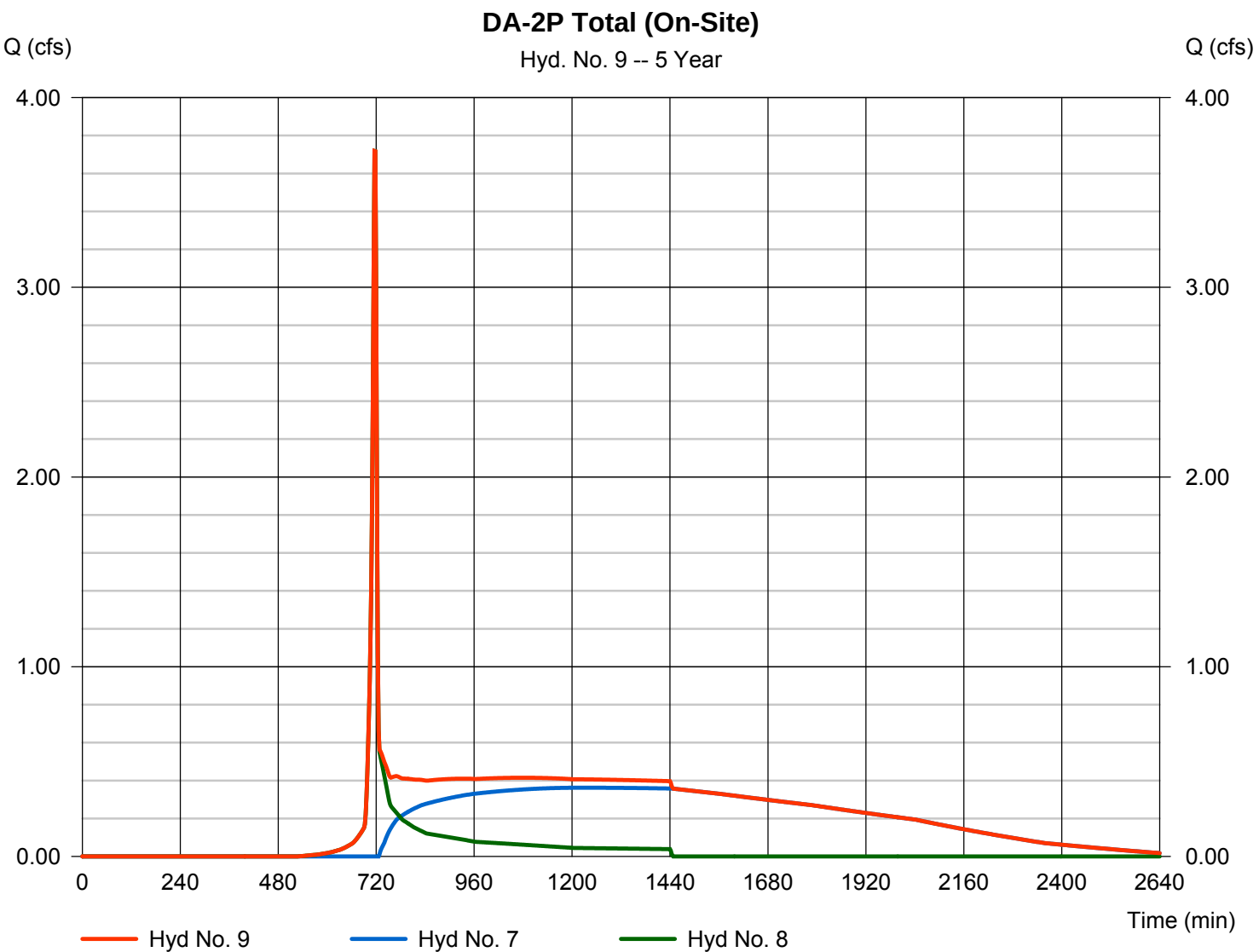


# Hydrograph Report

## Hyd. No. 9

DA-2P Total (On-Site)

|                 |           |                      |               |
|-----------------|-----------|----------------------|---------------|
| Hydrograph type | = Combine | Peak discharge       | = 3.718 cfs   |
| Storm frequency | = 5 yrs   | Time to peak         | = 716 min     |
| Time interval   | = 2 min   | Hyd. volume          | = 34,600 cuft |
| Inflow hyds.    | = 7, 8    | Contrib. drain. area | = 1.140 ac    |



# Hydrograph Report

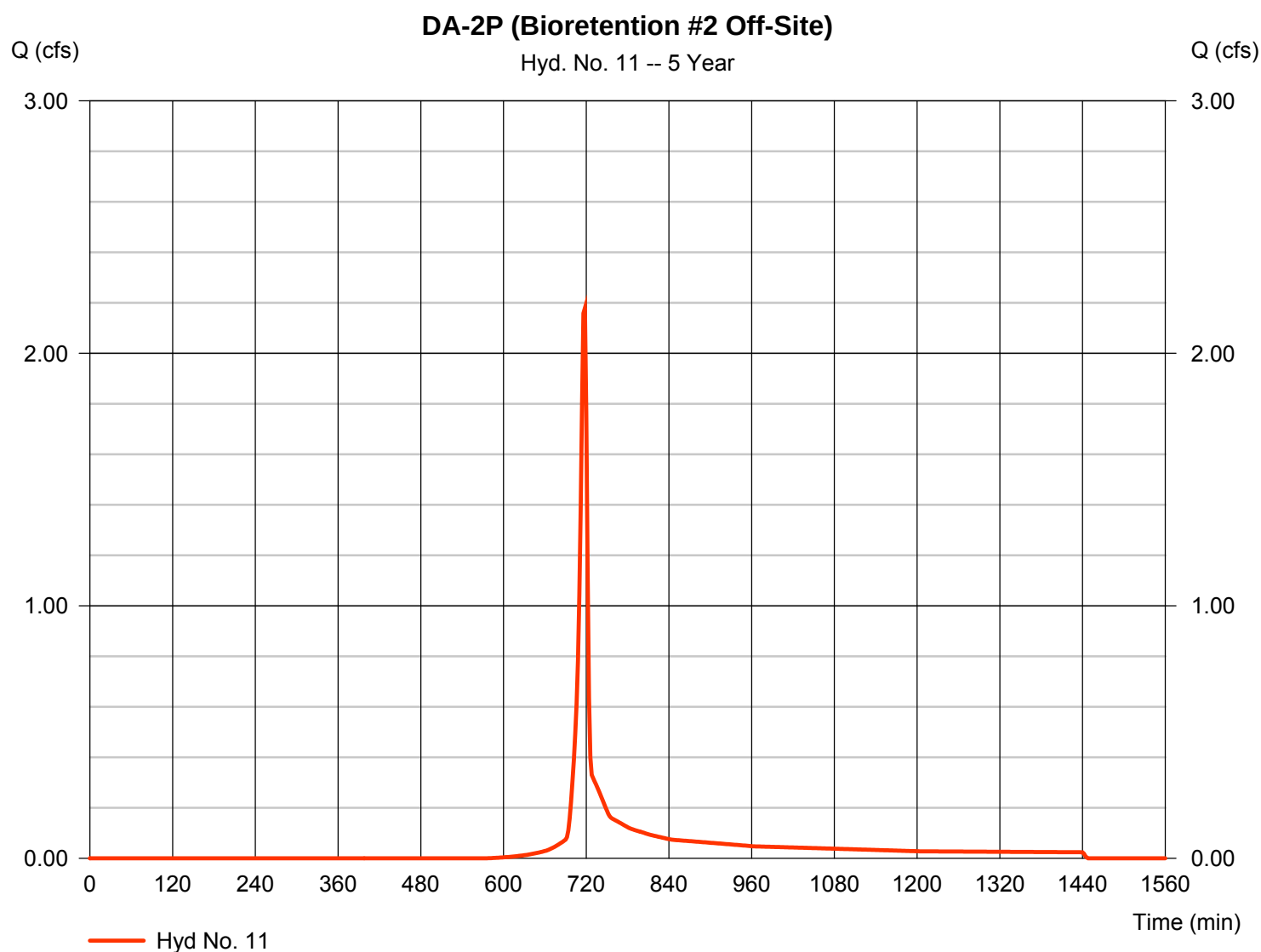
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

Thursday, 02 / 15 / 2018

## Hyd. No. 11

DA-2P (Bioretention #2 Off-Site)

|                 |              |                    |              |
|-----------------|--------------|--------------------|--------------|
| Hydrograph type | = SCS Runoff | Peak discharge     | = 2.179 cfs  |
| Storm frequency | = 5 yrs      | Time to peak       | = 718 min    |
| Time interval   | = 2 min      | Hyd. volume        | = 4,369 cuft |
| Drainage area   | = 0.750 ac   | Curve number       | = 75         |
| Basin Slope     | = 0.0 %      | Hydraulic length   | = 0 ft       |
| Tc method       | = User       | Time of conc. (Tc) | = 5.00 min   |
| Total precip.   | = 4.06 in    | Distribution       | = Type II    |
| Storm duration  | = 24 hrs     | Shape factor       | = 484        |

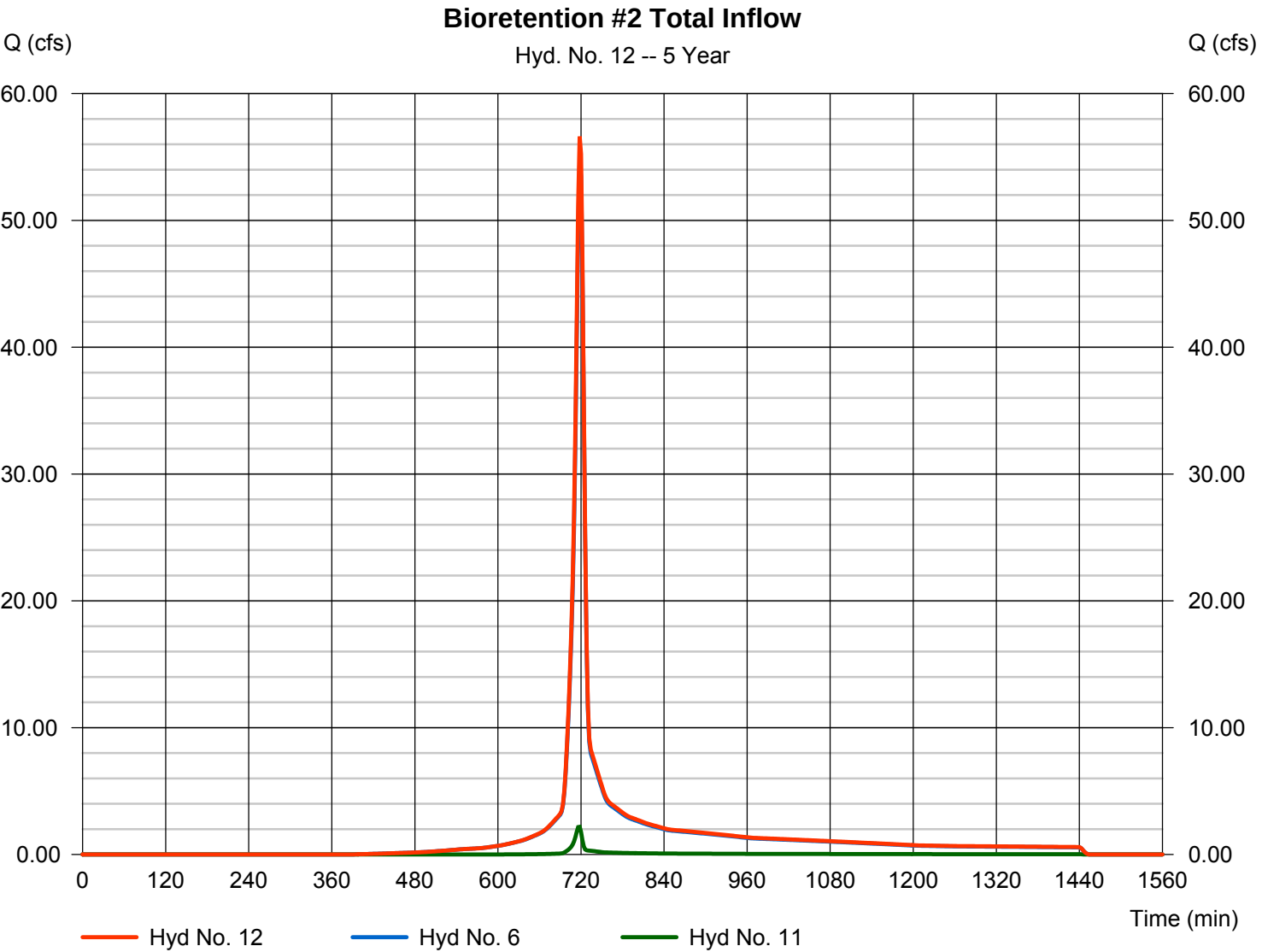


# Hydrograph Report

## Hyd. No. 12

### Bioretention #2 Total Inflow

|                 |           |                      |                |
|-----------------|-----------|----------------------|----------------|
| Hydrograph type | = Combine | Peak discharge       | = 56.61 cfs    |
| Storm frequency | = 5 yrs   | Time to peak         | = 718 min      |
| Time interval   | = 2 min   | Hyd. volume          | = 132,633 cuft |
| Inflow hyds.    | = 6, 11   | Contrib. drain. area | = 0.750 ac     |



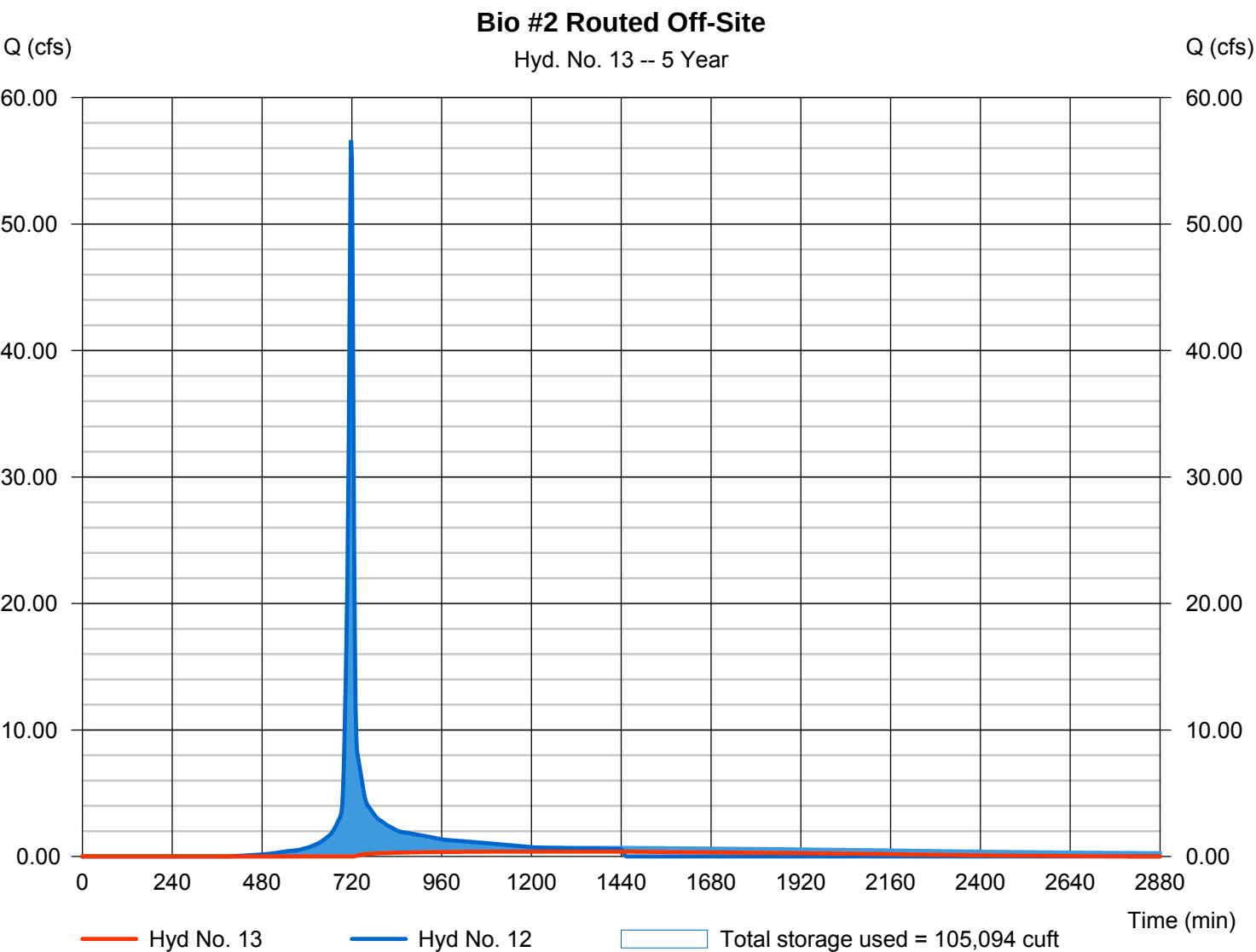
# Hydrograph Report

## Hyd. No. 13

Bio #2 Routed Off-Site

|                 |                                     |                |                |
|-----------------|-------------------------------------|----------------|----------------|
| Hydrograph type | = Reservoir                         | Peak discharge | = 0.383 cfs    |
| Storm frequency | = 5 yrs                             | Time to peak   | = 1240 min     |
| Time interval   | = 2 min                             | Hyd. volume    | = 29,877 cuft  |
| Inflow hyd. No. | = 12 - Bioretention #2 Total Inflow | Max. Elevation | = 424.82 ft    |
| Reservoir name  | = Bioretention Basin #2             | Max. Storage   | = 105,094 cuft |

Storage Indication method used. Exfiltration extracted from Outflow.





# Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

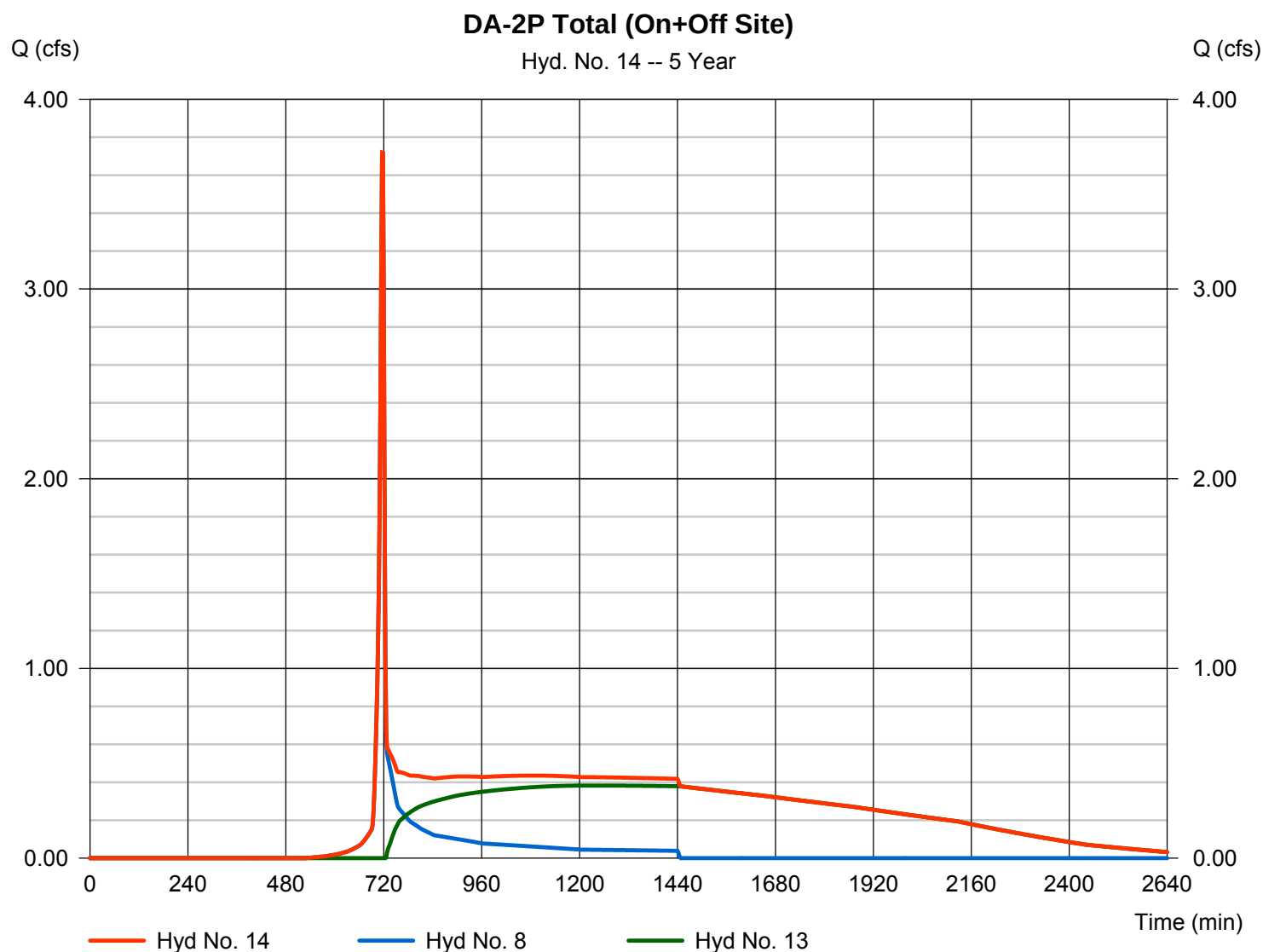
Thursday, 02 / 15 / 2018

## Hyd. No. 14

DA-2P Total (On+Off Site)

Hydrograph type = Combine  
Storm frequency = 5 yrs  
Time interval = 2 min  
Inflow hyds. = 8, 13

Peak discharge = 3.718 cfs  
Time to peak = 716 min  
Hyd. volume = 37,383 cuft  
Contrib. drain. area = 1.140 ac



# Hydrograph Report

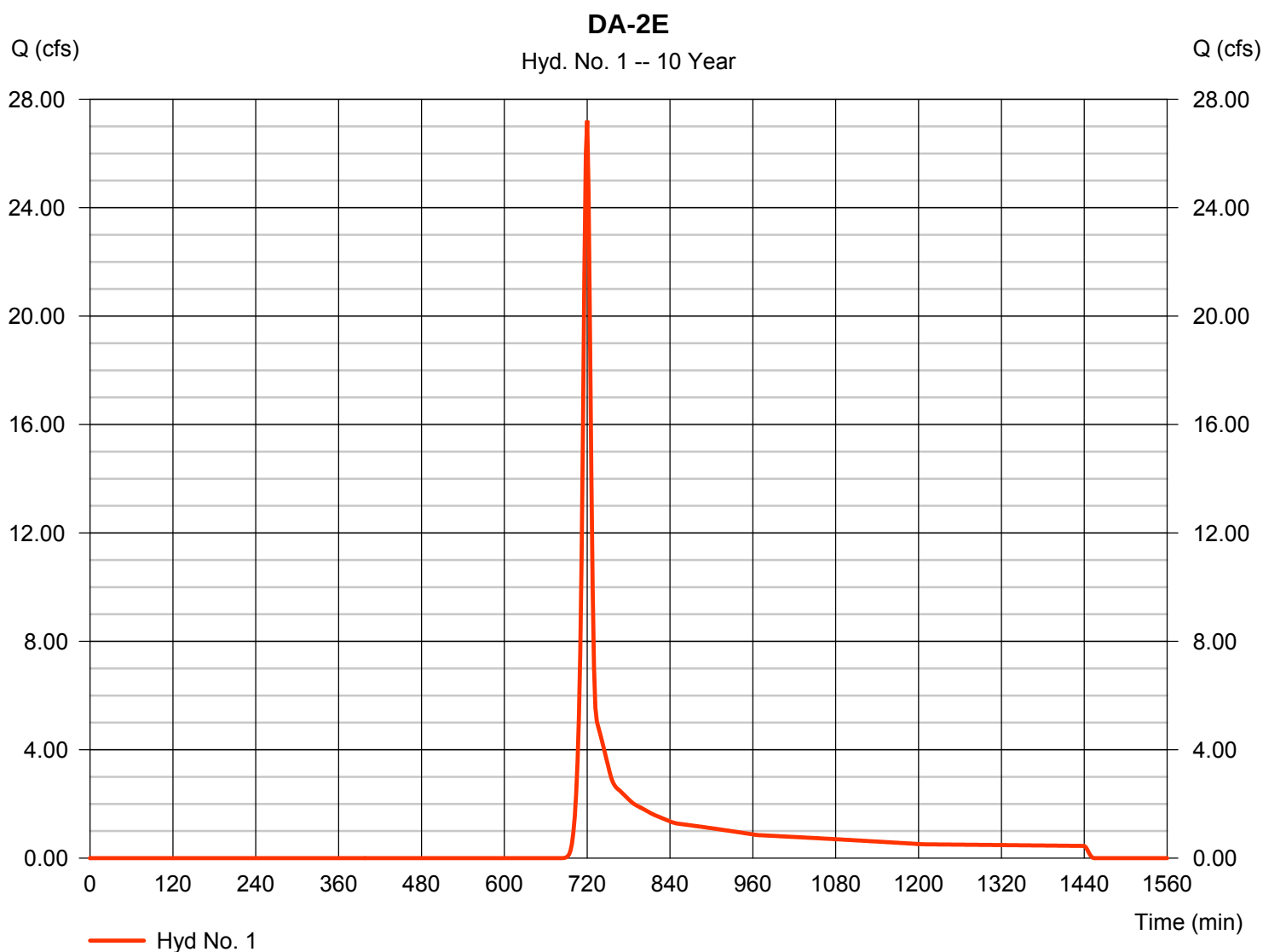
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

Thursday, 02 / 15 / 2018

## Hyd. No. 1

DA-2E

|                 |              |                    |               |
|-----------------|--------------|--------------------|---------------|
| Hydrograph type | = SCS Runoff | Peak discharge     | = 27.21 cfs   |
| Storm frequency | = 10 yrs     | Time to peak       | = 720 min     |
| Time interval   | = 2 min      | Hyd. volume        | = 64,916 cuft |
| Drainage area   | = 14.710 ac  | Curve number       | = 61          |
| Basin Slope     | = 0.0 %      | Hydraulic length   | = 0 ft        |
| Tc method       | = User       | Time of conc. (Tc) | = 8.40 min    |
| Total precip.   | = 4.74 in    | Distribution       | = Type II     |
| Storm duration  | = 24 hrs     | Shape factor       | = 484         |

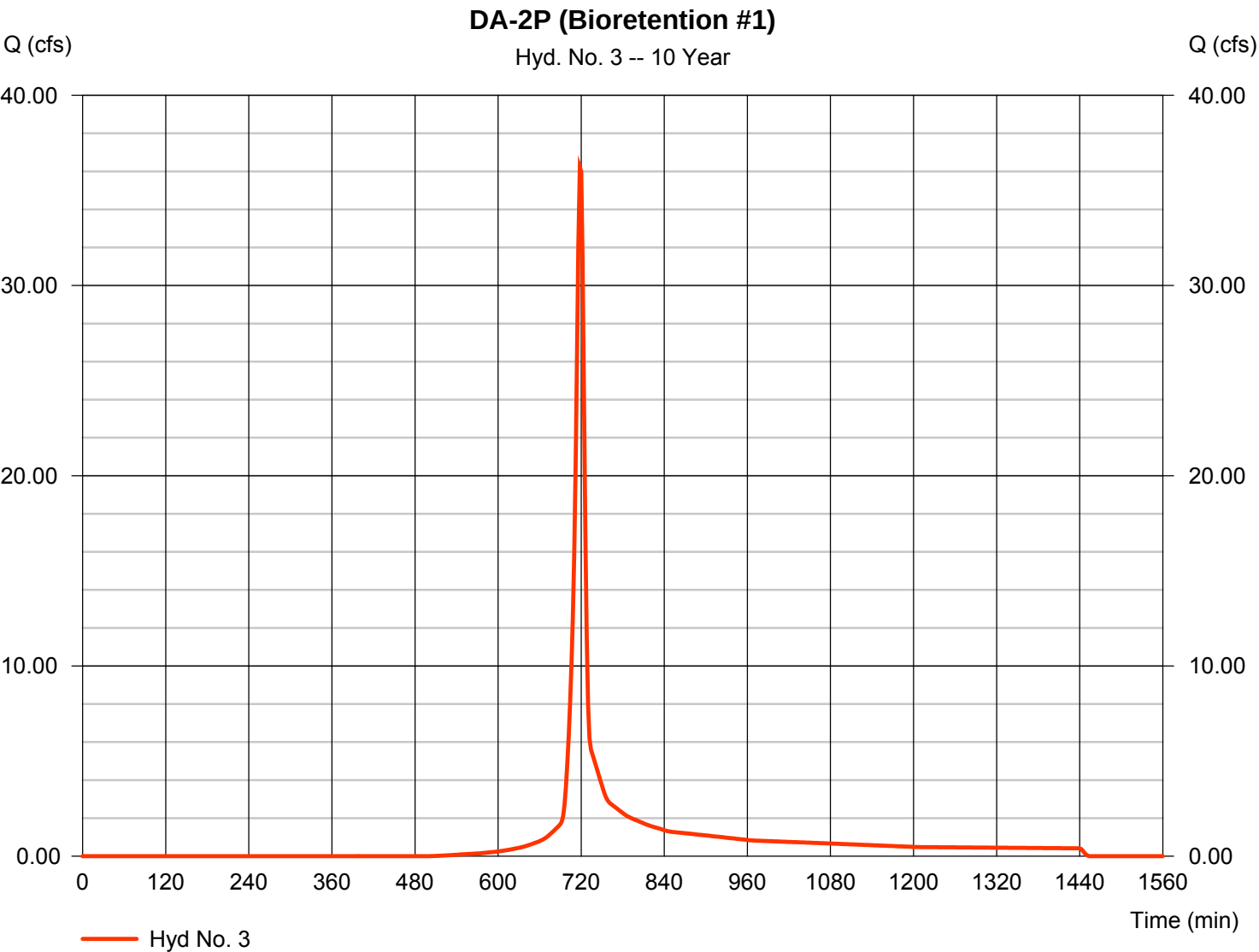


# Hydrograph Report

## Hyd. No. 3

DA-2P (Bioretention #1)

|                 |              |                    |               |
|-----------------|--------------|--------------------|---------------|
| Hydrograph type | = SCS Runoff | Peak discharge     | = 36.21 cfs   |
| Storm frequency | = 10 yrs     | Time to peak       | = 718 min     |
| Time interval   | = 2 min      | Hyd. volume        | = 82,831 cuft |
| Drainage area   | = 9.480 ac   | Curve number       | = 77          |
| Basin Slope     | = 0.0 %      | Hydraulic length   | = 0 ft        |
| Tc method       | = User       | Time of conc. (Tc) | = 7.90 min    |
| Total precip.   | = 4.74 in    | Distribution       | = Type II     |
| Storm duration  | = 24 hrs     | Shape factor       | = 484         |



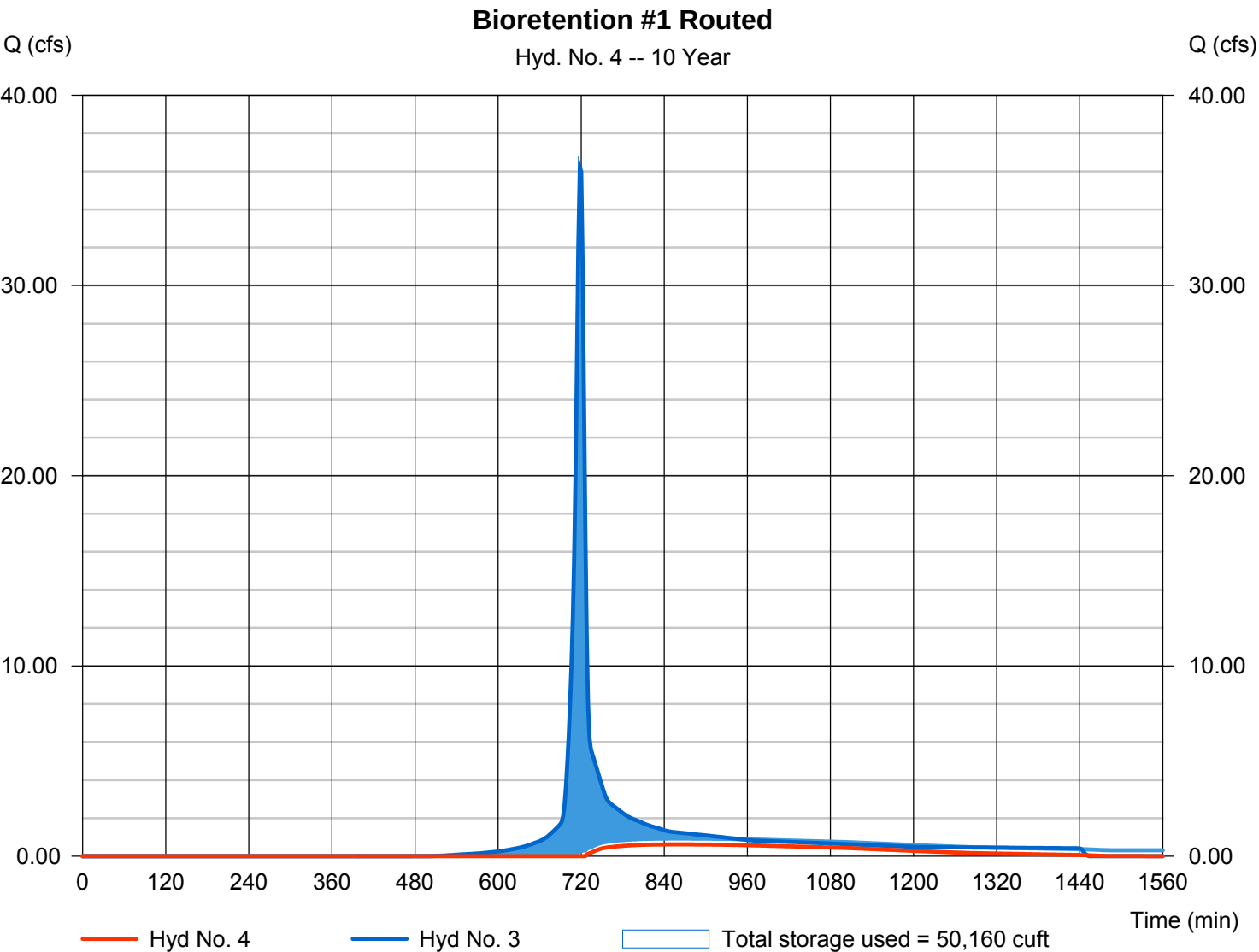
# Hydrograph Report

## Hyd. No. 4

### Bioretention #1 Routed

|                 |                               |                |               |
|-----------------|-------------------------------|----------------|---------------|
| Hydrograph type | = Reservoir                   | Peak discharge | = 0.617 cfs   |
| Storm frequency | = 10 yrs                      | Time to peak   | = 858 min     |
| Time interval   | = 2 min                       | Hyd. volume    | = 16,383 cuft |
| Inflow hyd. No. | = 3 - DA-2P (Bioretention #1) | Max. Elevation | = 431.63 ft   |
| Reservoir name  | = Bioretention Basin #1       | Max. Storage   | = 50,160 cuft |

Storage Indication method used. Exfiltration extracted from Outflow.



# Hydrograph Report

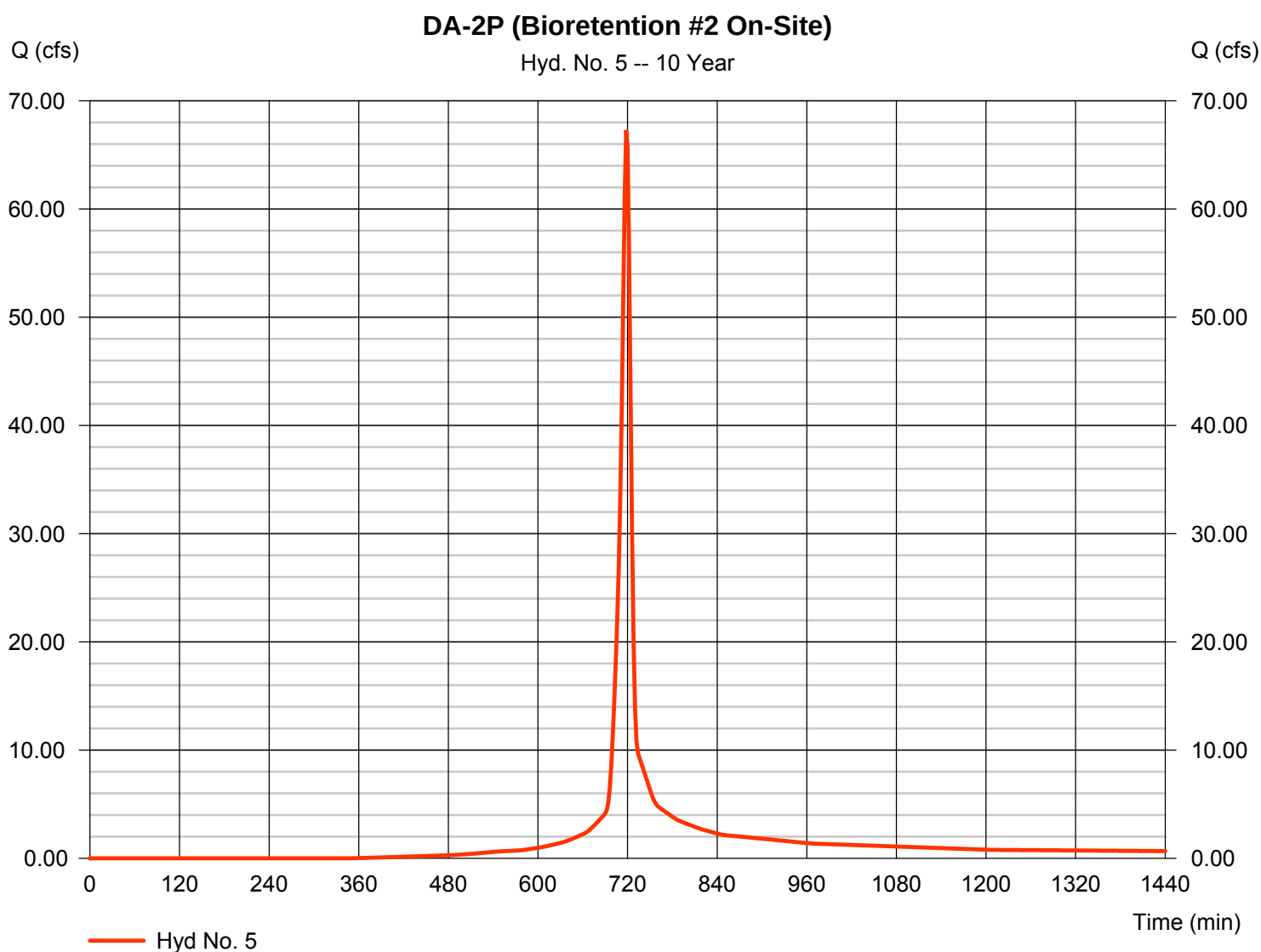
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

Thursday, 02 / 15 / 2018

## Hyd. No. 5

DA-2P (Bioretention #2 On-Site)

|                 |              |                    |                |
|-----------------|--------------|--------------------|----------------|
| Hydrograph type | = SCS Runoff | Peak discharge     | = 67.30 cfs    |
| Storm frequency | = 10 yrs     | Time to peak       | = 718 min      |
| Time interval   | = 2 min      | Hyd. volume        | = 156,496 cuft |
| Drainage area   | = 13.780 ac  | Curve number       | = 85           |
| Basin Slope     | = 0.0 %      | Hydraulic length   | = 0 ft         |
| Tc method       | = User       | Time of conc. (Tc) | = 8.00 min     |
| Total precip.   | = 4.74 in    | Distribution       | = Type II      |
| Storm duration  | = 24 hrs     | Shape factor       | = 484          |

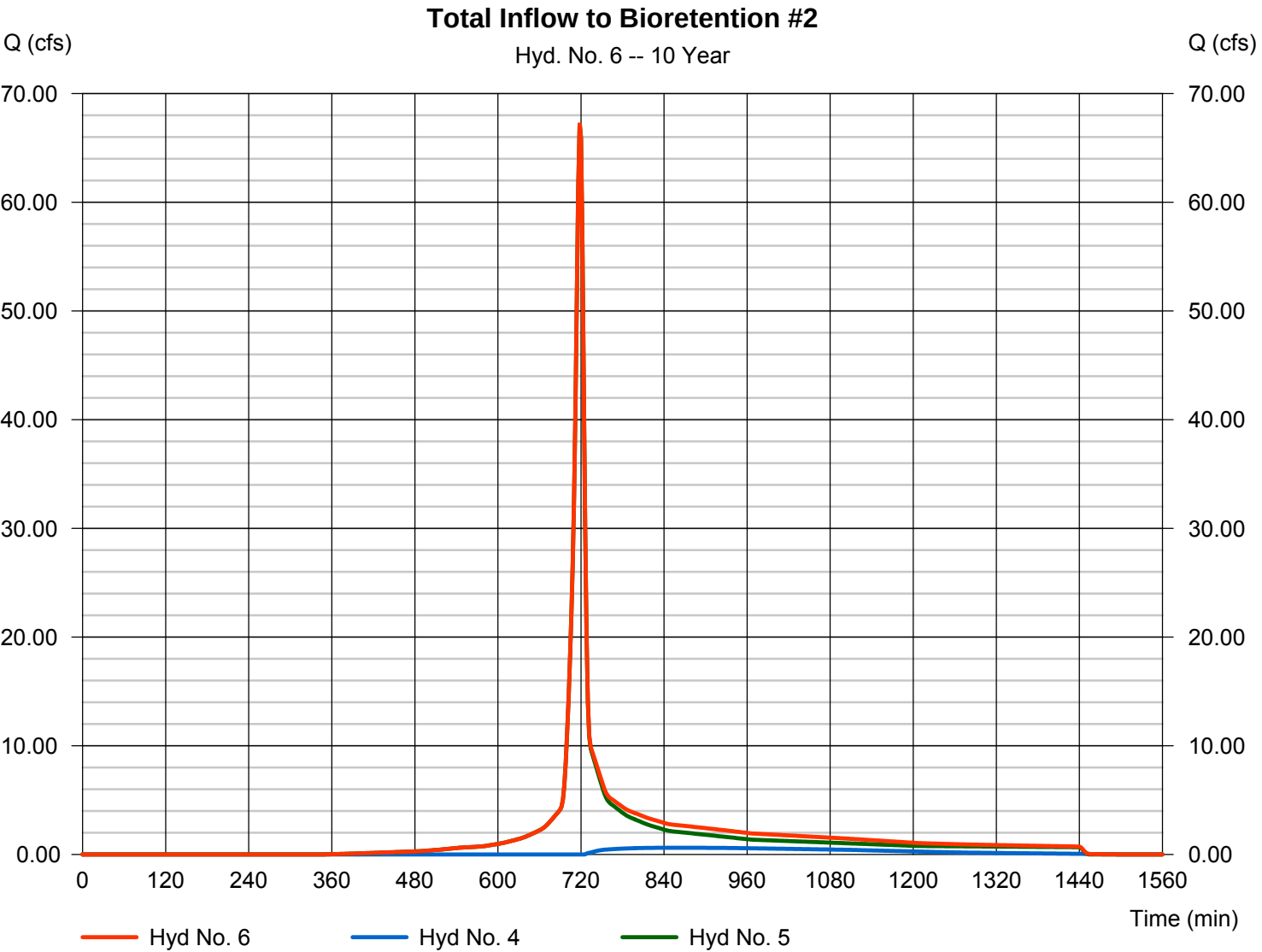


# Hydrograph Report

## Hyd. No. 6

Total Inflow to Bioretention #2

|                 |           |                      |                |
|-----------------|-----------|----------------------|----------------|
| Hydrograph type | = Combine | Peak discharge       | = 67.30 cfs    |
| Storm frequency | = 10 yrs  | Time to peak         | = 718 min      |
| Time interval   | = 2 min   | Hyd. volume          | = 172,879 cuft |
| Inflow hyds.    | = 4, 5    | Contrib. drain. area | = 13.780 ac    |





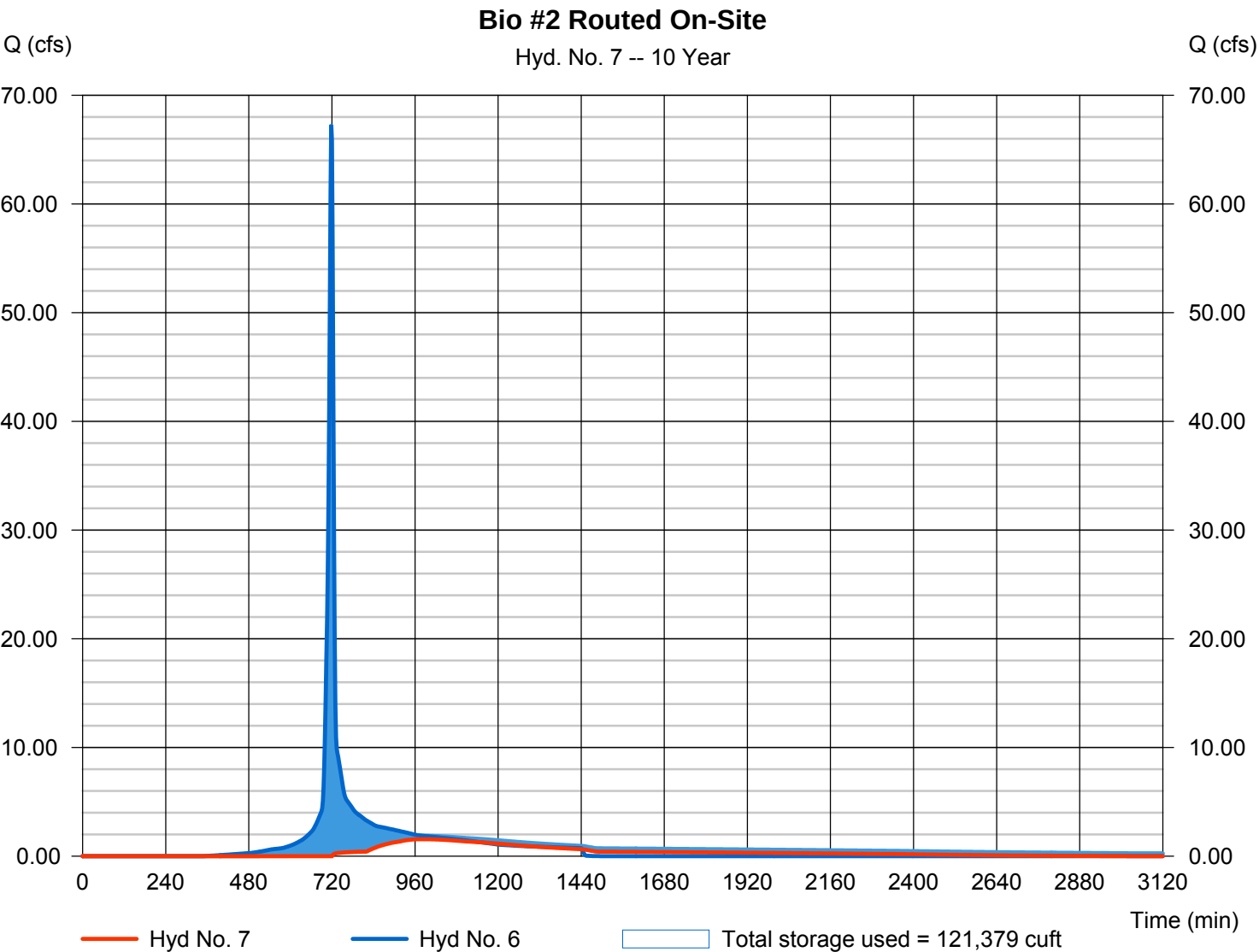
# Hydrograph Report

## Hyd. No. 7

Bio #2 Routed On-Site

|                 |                                       |                |                |
|-----------------|---------------------------------------|----------------|----------------|
| Hydrograph type | = Reservoir                           | Peak discharge | = 1.565 cfs    |
| Storm frequency | = 10 yrs                              | Time to peak   | = 984 min      |
| Time interval   | = 2 min                               | Hyd. volume    | = 65,531 cuft  |
| Inflow hyd. No. | = 6 - Total Inflow to Bioretention #2 | Max. Elevation | = 425.22 ft    |
| Reservoir name  | = Bioretention Basin #2               | Max. Storage   | = 121,379 cuft |

Storage Indication method used. Exfiltration extracted from Outflow.

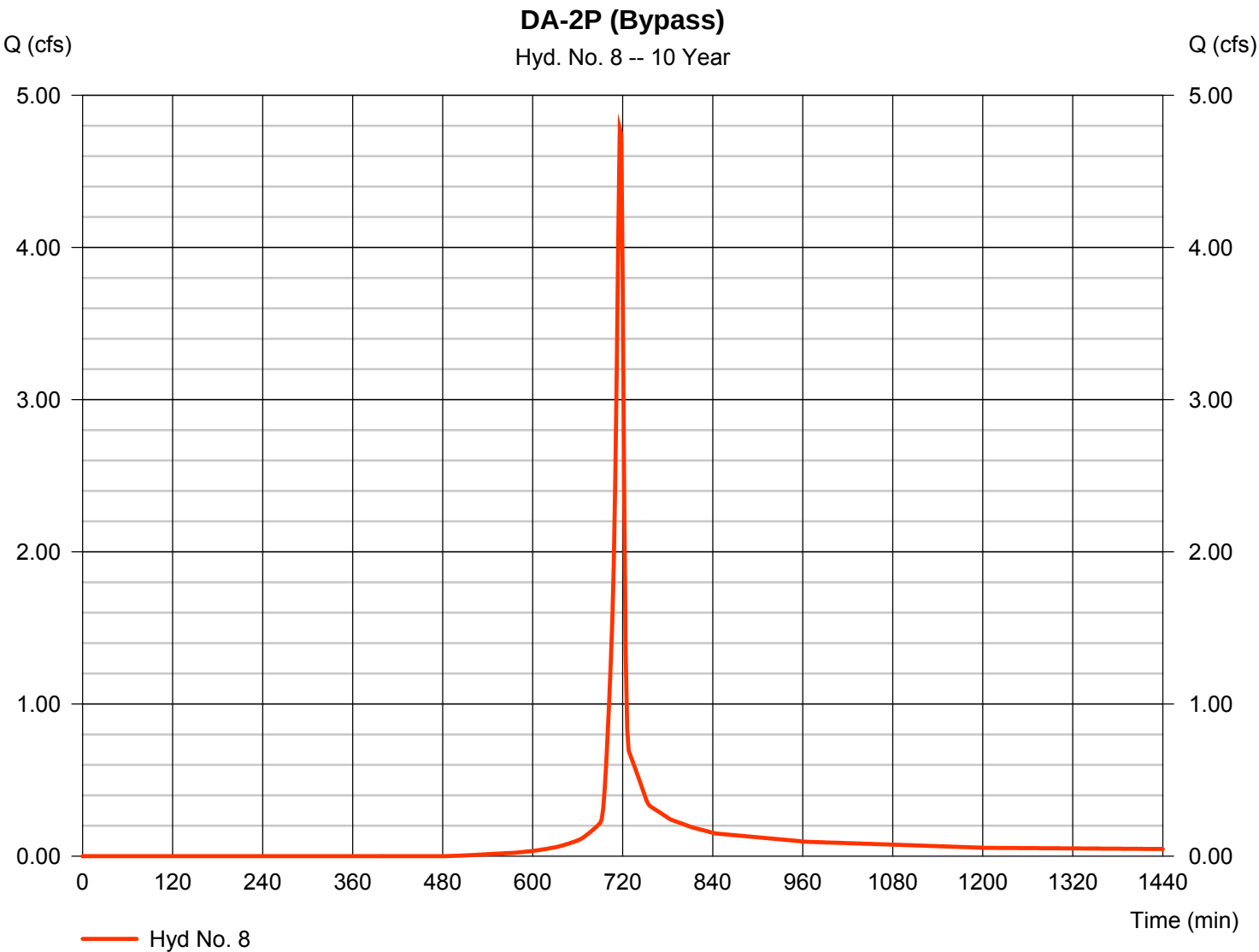


# Hydrograph Report

## Hyd. No. 8

DA-2P (Bypass)

|                 |              |                    |              |
|-----------------|--------------|--------------------|--------------|
| Hydrograph type | = SCS Runoff | Peak discharge     | = 4.781 cfs  |
| Storm frequency | = 10 yrs     | Time to peak       | = 716 min    |
| Time interval   | = 2 min      | Hyd. volume        | = 9,670 cuft |
| Drainage area   | = 1.140 ac   | Curve number       | = 78         |
| Basin Slope     | = 0.0 %      | Hydraulic length   | = 0 ft       |
| Tc method       | = User       | Time of conc. (Tc) | = 5.00 min   |
| Total precip.   | = 4.74 in    | Distribution       | = Type II    |
| Storm duration  | = 24 hrs     | Shape factor       | = 484        |



# Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

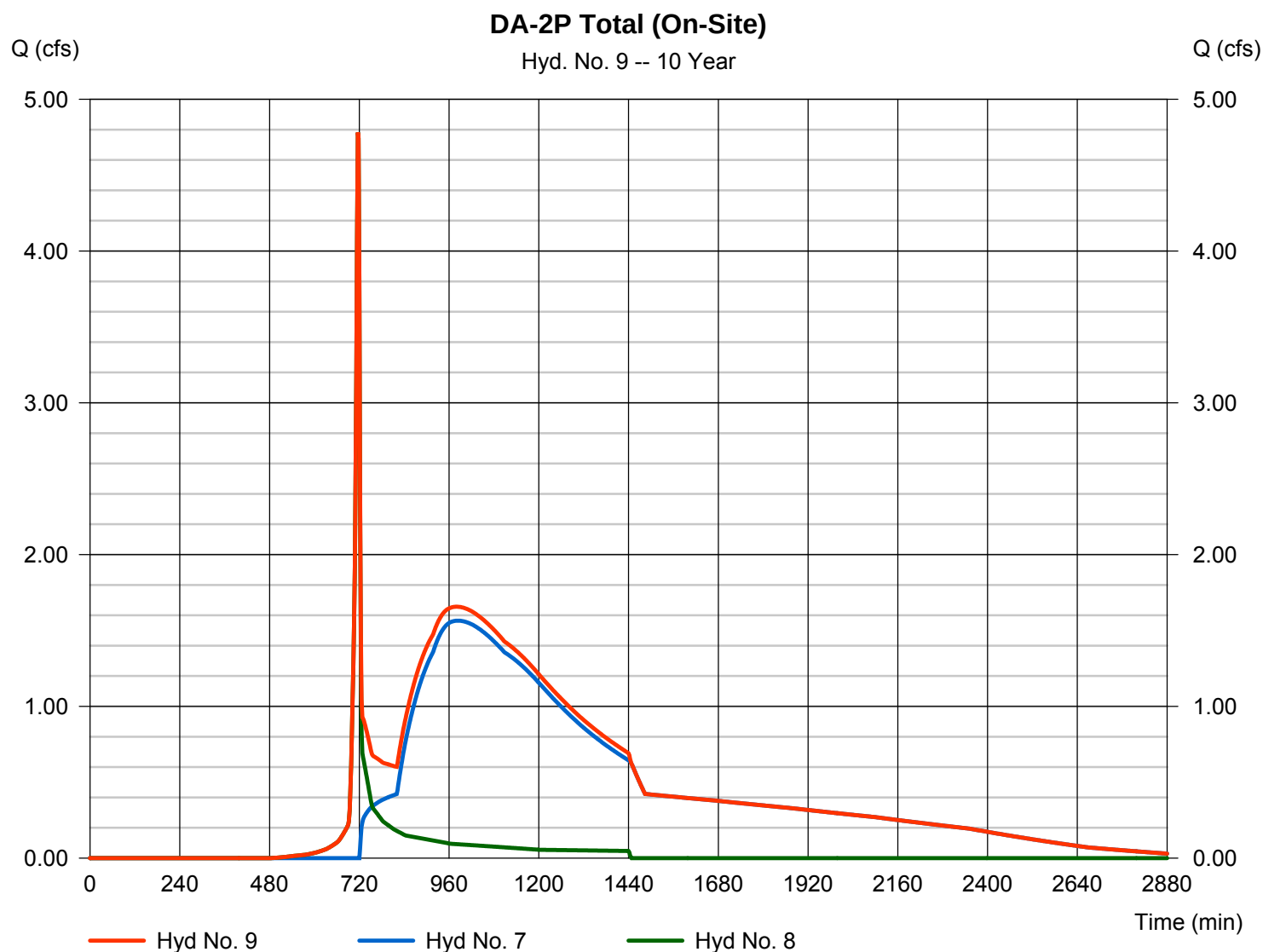
Thursday, 02 / 15 / 2018

## Hyd. No. 9

DA-2P Total (On-Site)

Hydrograph type = Combine  
Storm frequency = 10 yrs  
Time interval = 2 min  
Inflow hyds. = 7, 8

Peak discharge = 4.781 cfs  
Time to peak = 716 min  
Hyd. volume = 75,201 cuft  
Contrib. drain. area = 1.140 ac



# Hydrograph Report

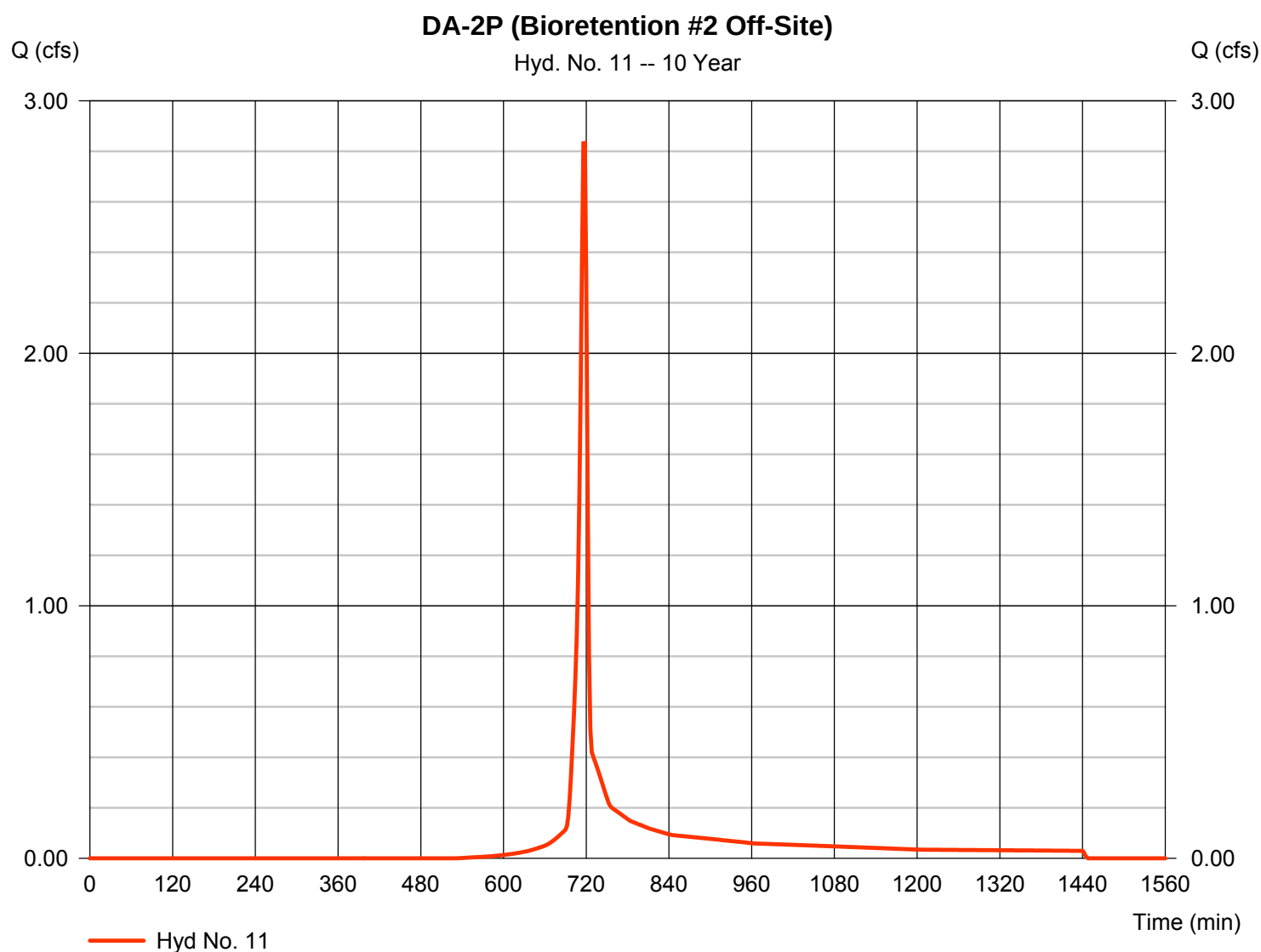
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

Thursday, 02 / 15 / 2018

## Hyd. No. 11

DA-2P (Bioretention #2 Off-Site)

|                 |              |                    |              |
|-----------------|--------------|--------------------|--------------|
| Hydrograph type | = SCS Runoff | Peak discharge     | = 2.833 cfs  |
| Storm frequency | = 10 yrs     | Time to peak       | = 718 min    |
| Time interval   | = 2 min      | Hyd. volume        | = 5,718 cuft |
| Drainage area   | = 0.750 ac   | Curve number       | = 75         |
| Basin Slope     | = 0.0 %      | Hydraulic length   | = 0 ft       |
| Tc method       | = User       | Time of conc. (Tc) | = 5.00 min   |
| Total precip.   | = 4.74 in    | Distribution       | = Type II    |
| Storm duration  | = 24 hrs     | Shape factor       | = 484        |

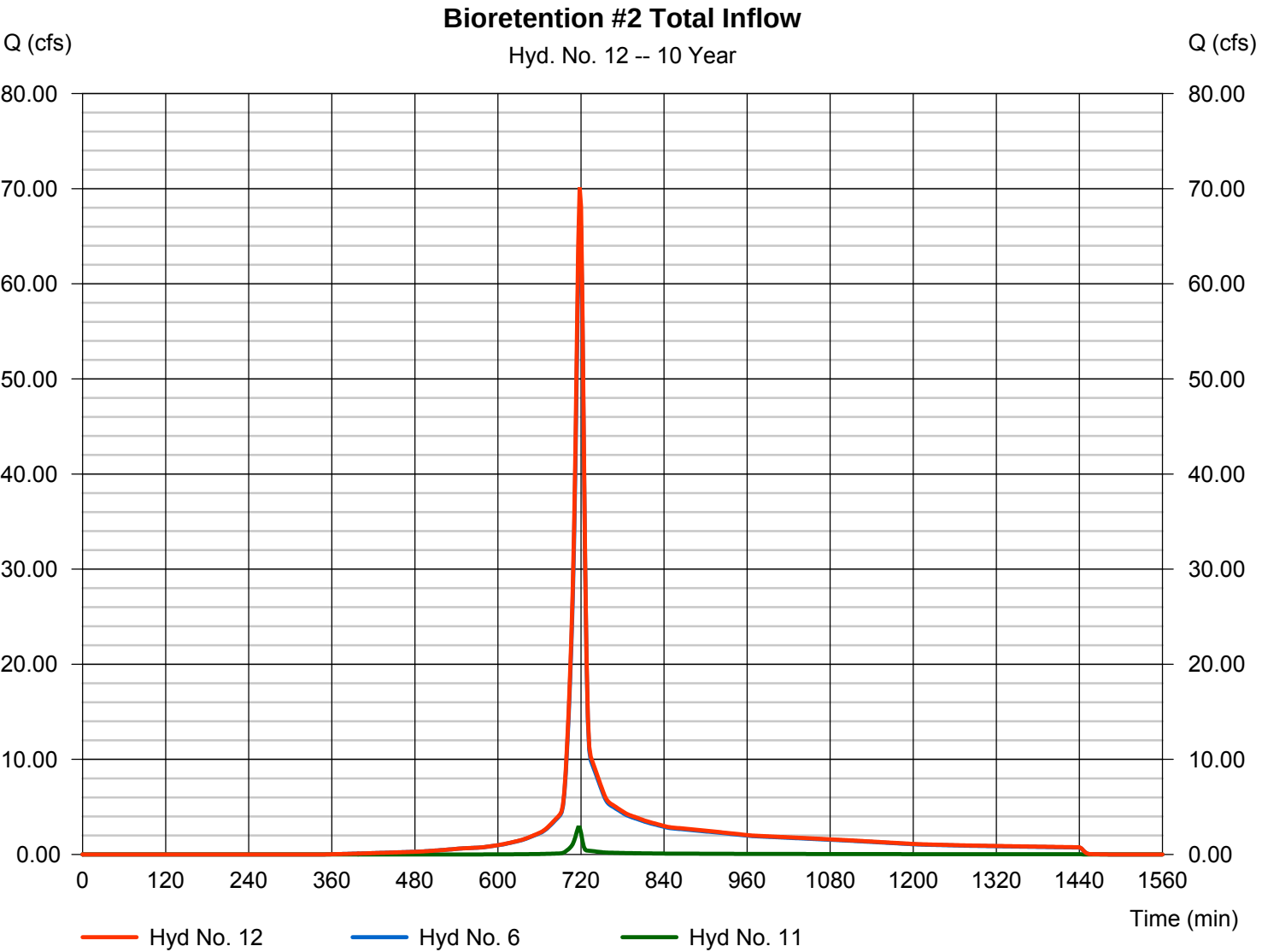


# Hydrograph Report

## Hyd. No. 12

### Bioretention #2 Total Inflow

|                 |           |                      |                |
|-----------------|-----------|----------------------|----------------|
| Hydrograph type | = Combine | Peak discharge       | = 70.13 cfs    |
| Storm frequency | = 10 yrs  | Time to peak         | = 718 min      |
| Time interval   | = 2 min   | Hyd. volume          | = 178,597 cuft |
| Inflow hyds.    | = 6, 11   | Contrib. drain. area | = 0.750 ac     |



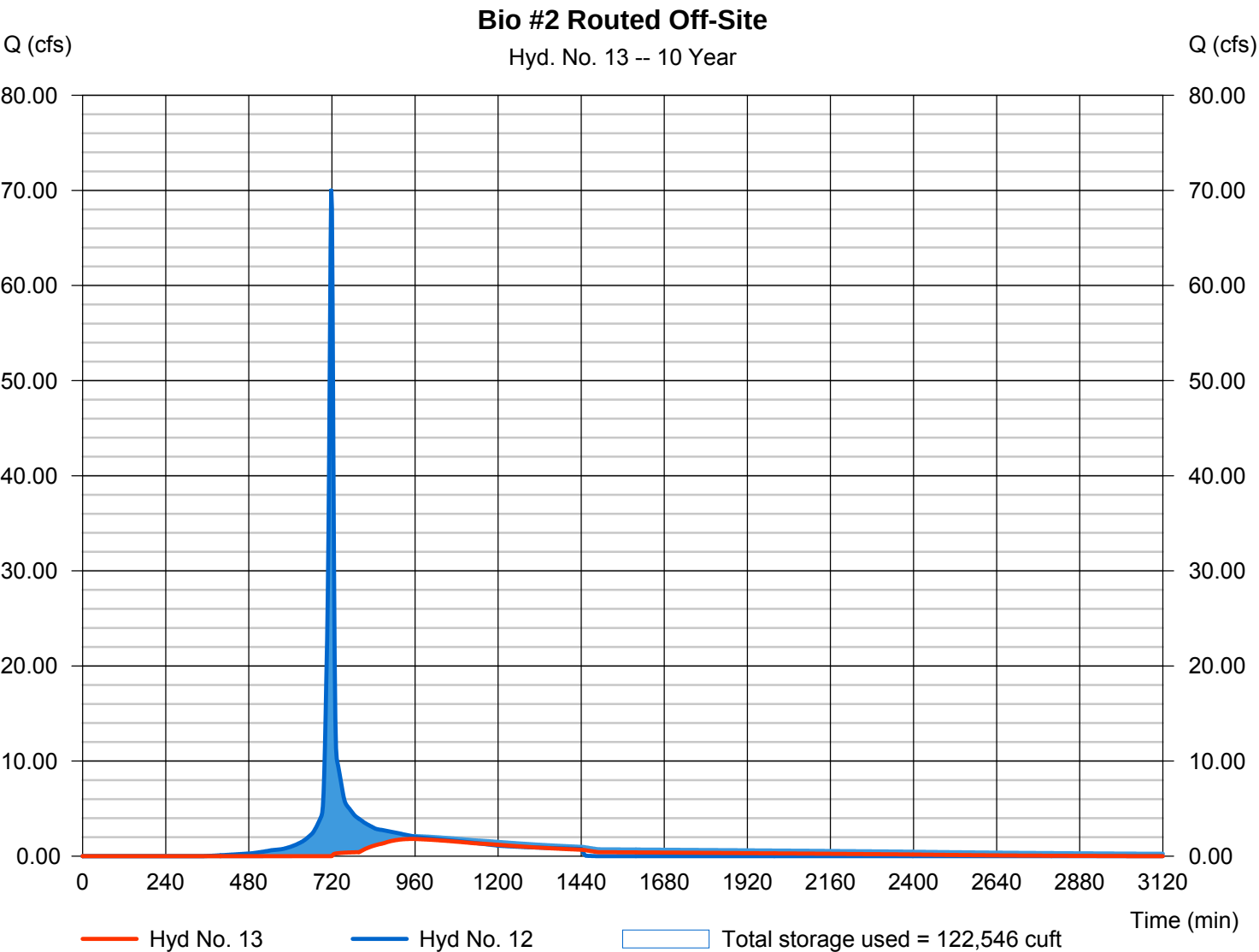
# Hydrograph Report

## Hyd. No. 13

Bio #2 Routed Off-Site

|                 |                                     |                |                |
|-----------------|-------------------------------------|----------------|----------------|
| Hydrograph type | = Reservoir                         | Peak discharge | = 1.809 cfs    |
| Storm frequency | = 10 yrs                            | Time to peak   | = 950 min      |
| Time interval   | = 2 min                             | Hyd. volume    | = 71,133 cuft  |
| Inflow hyd. No. | = 12 - Bioretention #2 Total Inflow | Max. Elevation | = 425.25 ft    |
| Reservoir name  | = Bioretention Basin #2             | Max. Storage   | = 122,546 cuft |

Storage Indication method used. Exfiltration extracted from Outflow.



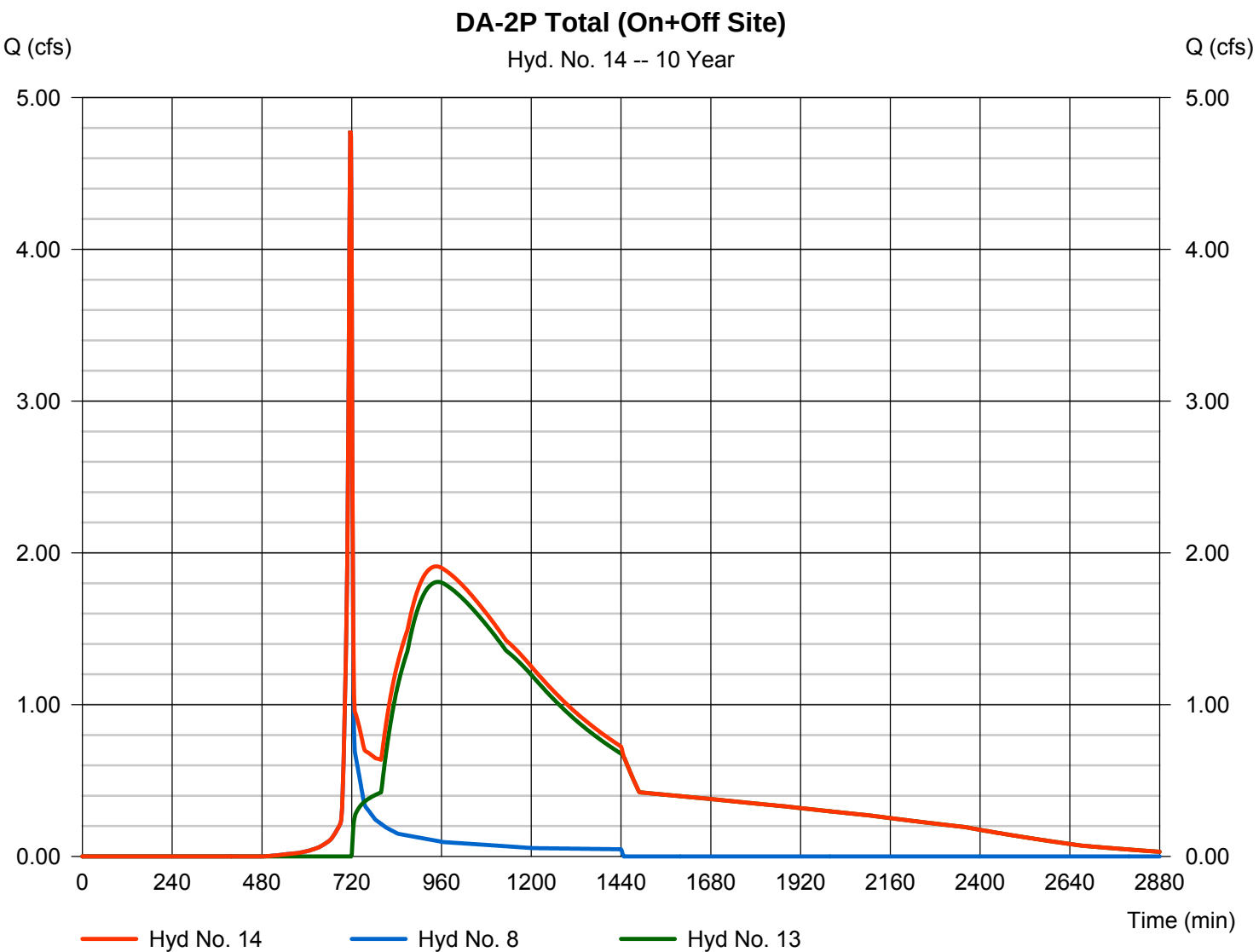


# Hydrograph Report

## Hyd. No. 14

DA-2P Total (On+Off Site)

|                 |           |                      |               |
|-----------------|-----------|----------------------|---------------|
| Hydrograph type | = Combine | Peak discharge       | = 4.781 cfs   |
| Storm frequency | = 10 yrs  | Time to peak         | = 716 min     |
| Time interval   | = 2 min   | Hyd. volume          | = 80,802 cuft |
| Inflow hyds.    | = 8, 13   | Contrib. drain. area | = 1.140 ac    |

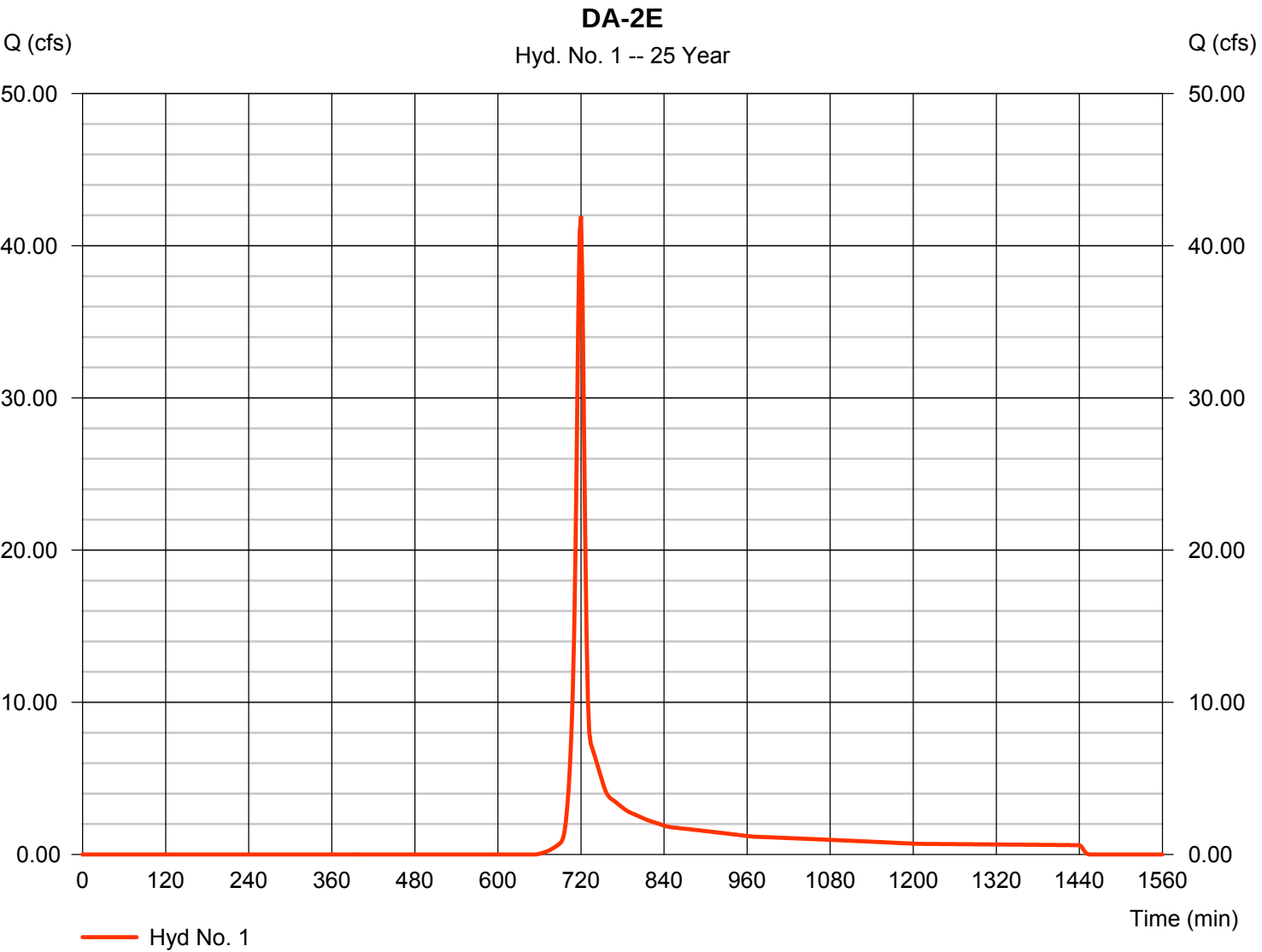


# Hydrograph Report

## Hyd. No. 1

DA-2E

|                 |              |                    |               |
|-----------------|--------------|--------------------|---------------|
| Hydrograph type | = SCS Runoff | Peak discharge     | = 41.93 cfs   |
| Storm frequency | = 25 yrs     | Time to peak       | = 720 min     |
| Time interval   | = 2 min      | Hyd. volume        | = 97,213 cuft |
| Drainage area   | = 14.710 ac  | Curve number       | = 61          |
| Basin Slope     | = 0.0 %      | Hydraulic length   | = 0 ft        |
| Tc method       | = User       | Time of conc. (Tc) | = 8.40 min    |
| Total precip.   | = 5.72 in    | Distribution       | = Type II     |
| Storm duration  | = 24 hrs     | Shape factor       | = 484         |

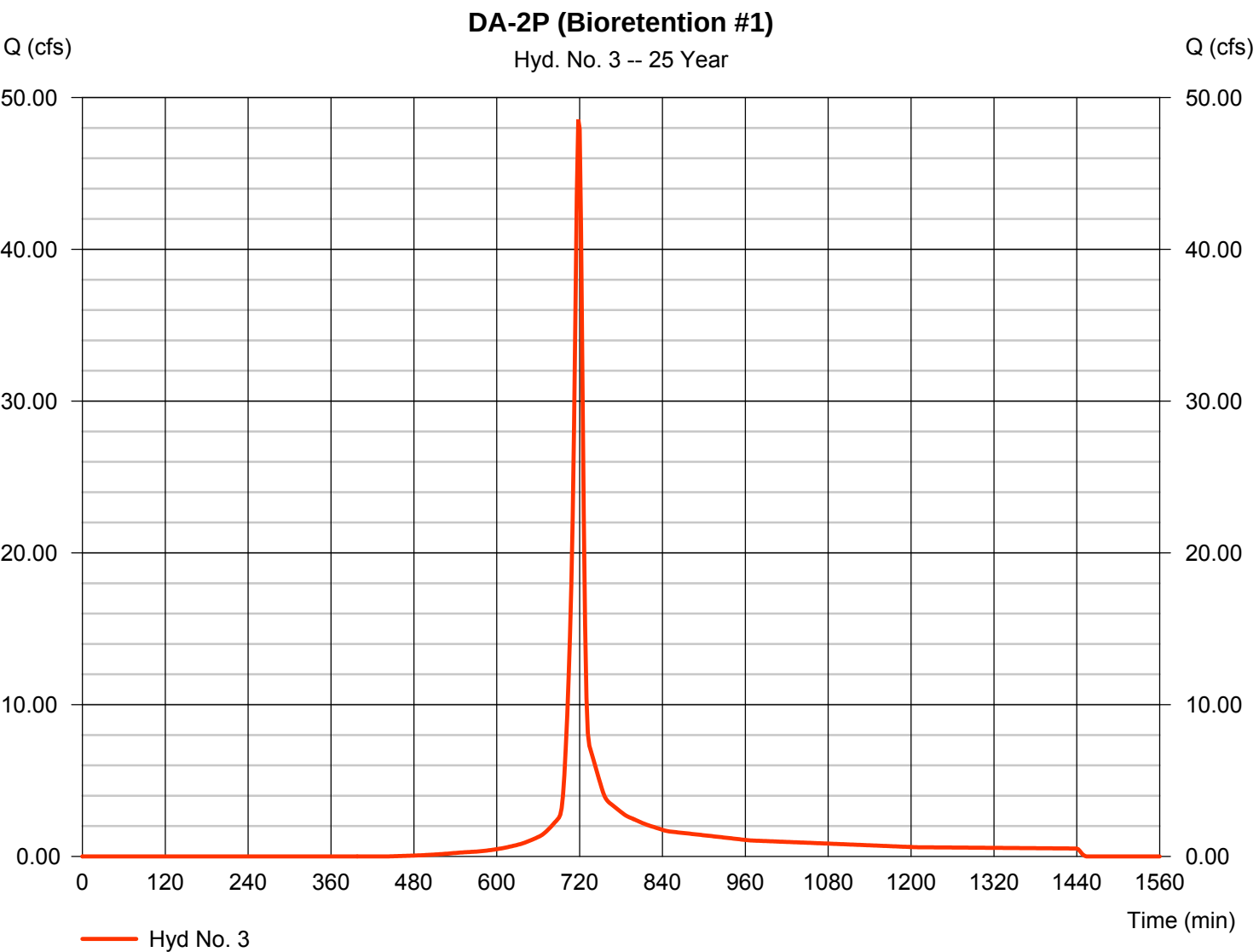


# Hydrograph Report

## Hyd. No. 3

DA-2P (Bioretention #1)

|                 |              |                    |                |
|-----------------|--------------|--------------------|----------------|
| Hydrograph type | = SCS Runoff | Peak discharge     | = 48.55 cfs    |
| Storm frequency | = 25 yrs     | Time to peak       | = 718 min      |
| Time interval   | = 2 min      | Hyd. volume        | = 111,351 cuft |
| Drainage area   | = 9.480 ac   | Curve number       | = 77           |
| Basin Slope     | = 0.0 %      | Hydraulic length   | = 0 ft         |
| Tc method       | = User       | Time of conc. (Tc) | = 7.90 min     |
| Total precip.   | = 5.72 in    | Distribution       | = Type II      |
| Storm duration  | = 24 hrs     | Shape factor       | = 484          |



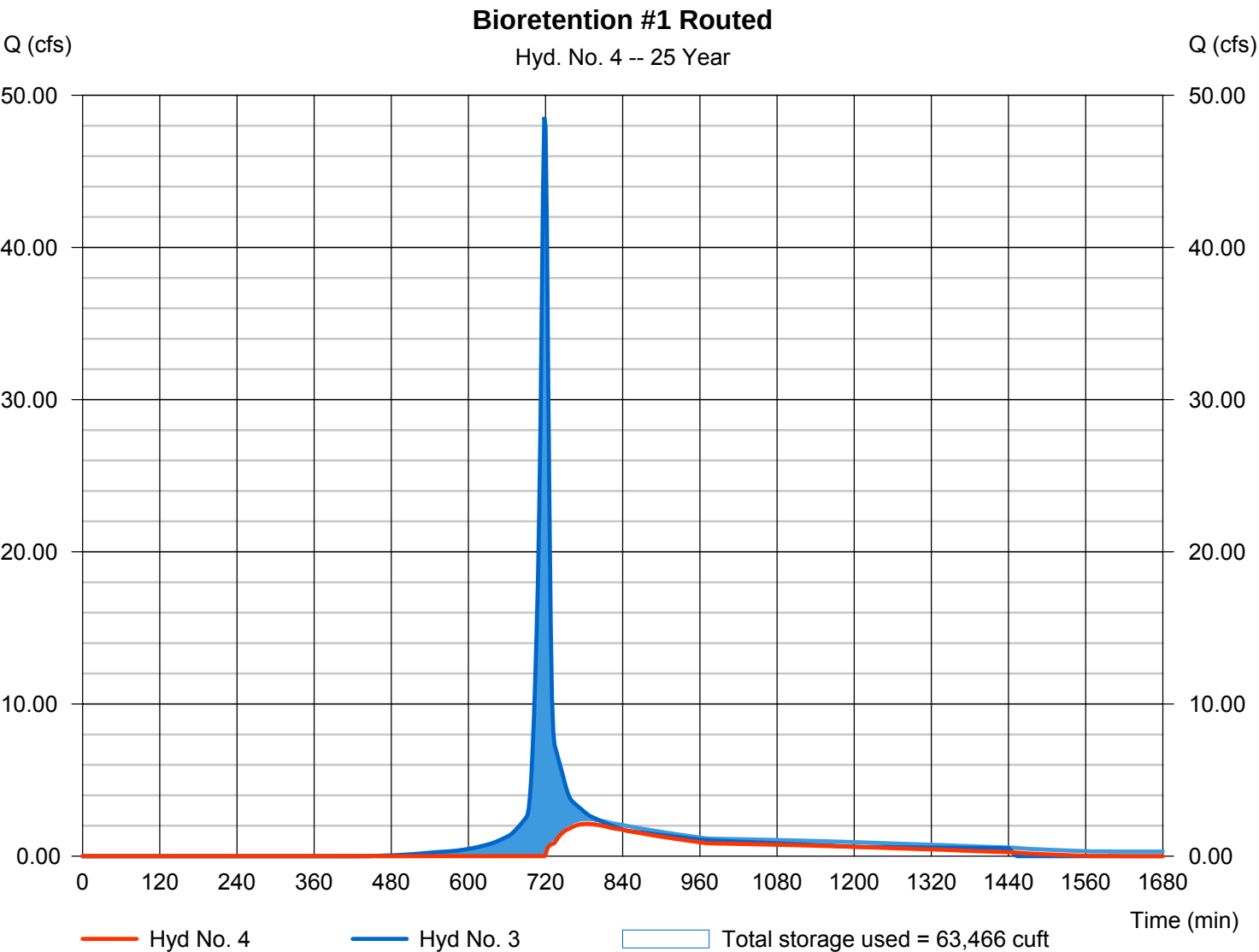
# Hydrograph Report

## Hyd. No. 4

### Bioretention #1 Routed

|                 |                               |                |               |
|-----------------|-------------------------------|----------------|---------------|
| Hydrograph type | = Reservoir                   | Peak discharge | = 2.127 cfs   |
| Storm frequency | = 25 yrs                      | Time to peak   | = 784 min     |
| Time interval   | = 2 min                       | Hyd. volume    | = 39,810 cuft |
| Inflow hyd. No. | = 3 - DA-2P (Bioretention #1) | Max. Elevation | = 432.23 ft   |
| Reservoir name  | = Bioretention Basin #1       | Max. Storage   | = 63,466 cuft |

Storage Indication method used. Exfiltration extracted from Outflow.



# Hydrograph Report

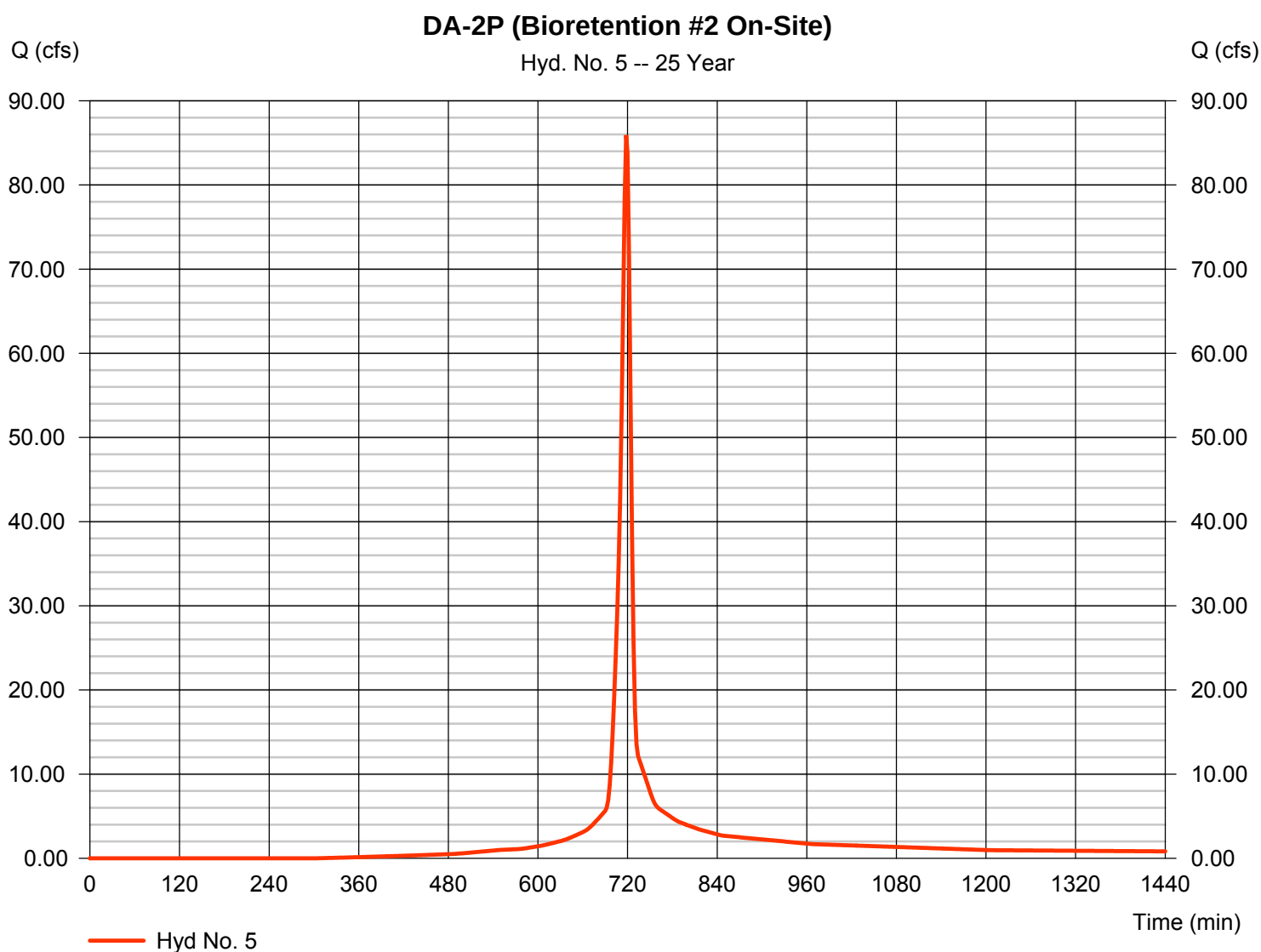
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

Thursday, 02 / 15 / 2018

## Hyd. No. 5

DA-2P (Bioretention #2 On-Site)

|                 |              |                    |                |
|-----------------|--------------|--------------------|----------------|
| Hydrograph type | = SCS Runoff | Peak discharge     | = 85.92 cfs    |
| Storm frequency | = 25 yrs     | Time to peak       | = 718 min      |
| Time interval   | = 2 min      | Hyd. volume        | = 202,037 cuft |
| Drainage area   | = 13.780 ac  | Curve number       | = 85           |
| Basin Slope     | = 0.0 %      | Hydraulic length   | = 0 ft         |
| Tc method       | = User       | Time of conc. (Tc) | = 8.00 min     |
| Total precip.   | = 5.72 in    | Distribution       | = Type II      |
| Storm duration  | = 24 hrs     | Shape factor       | = 484          |

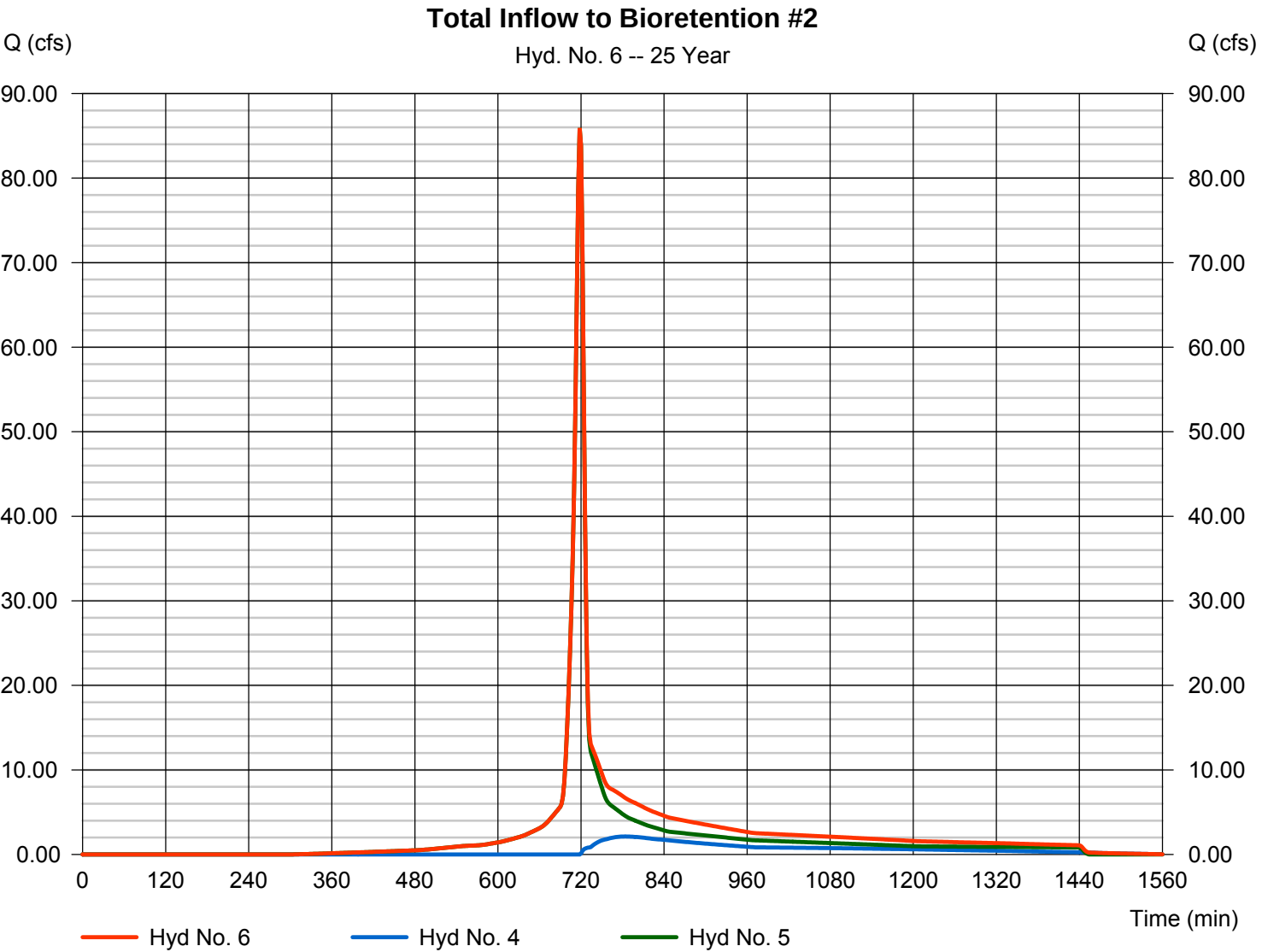


# Hydrograph Report

## Hyd. No. 6

Total Inflow to Bioretention #2

|                 |           |                      |                |
|-----------------|-----------|----------------------|----------------|
| Hydrograph type | = Combine | Peak discharge       | = 85.93 cfs    |
| Storm frequency | = 25 yrs  | Time to peak         | = 718 min      |
| Time interval   | = 2 min   | Hyd. volume          | = 241,847 cuft |
| Inflow hyds.    | = 4, 5    | Contrib. drain. area | = 13.780 ac    |





# Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

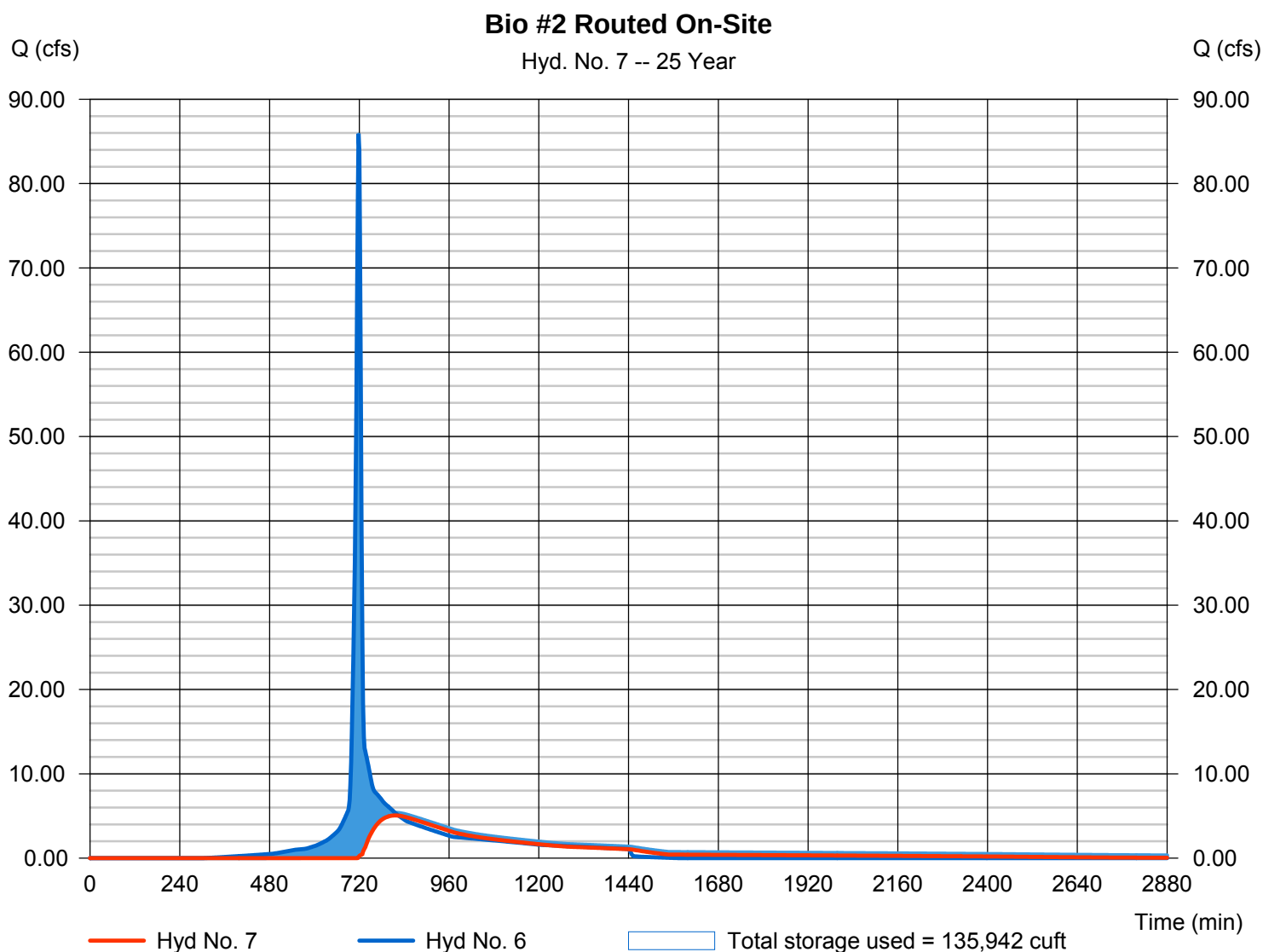
Thursday, 02 / 15 / 2018

## Hyd. No. 7

### Bio #2 Routed On-Site

|                 |                                       |                |                |
|-----------------|---------------------------------------|----------------|----------------|
| Hydrograph type | = Reservoir                           | Peak discharge | = 5.065 cfs    |
| Storm frequency | = 25 yrs                              | Time to peak   | = 816 min      |
| Time interval   | = 2 min                               | Hyd. volume    | = 132,881 cuft |
| Inflow hyd. No. | = 6 - Total Inflow to Bioretention #2 | Max. Elevation | = 425.59 ft    |
| Reservoir name  | = Bioretention Basin #2               | Max. Storage   | = 135,942 cuft |

Storage Indication method used. Exfiltration extracted from Outflow.



# Hydrograph Report

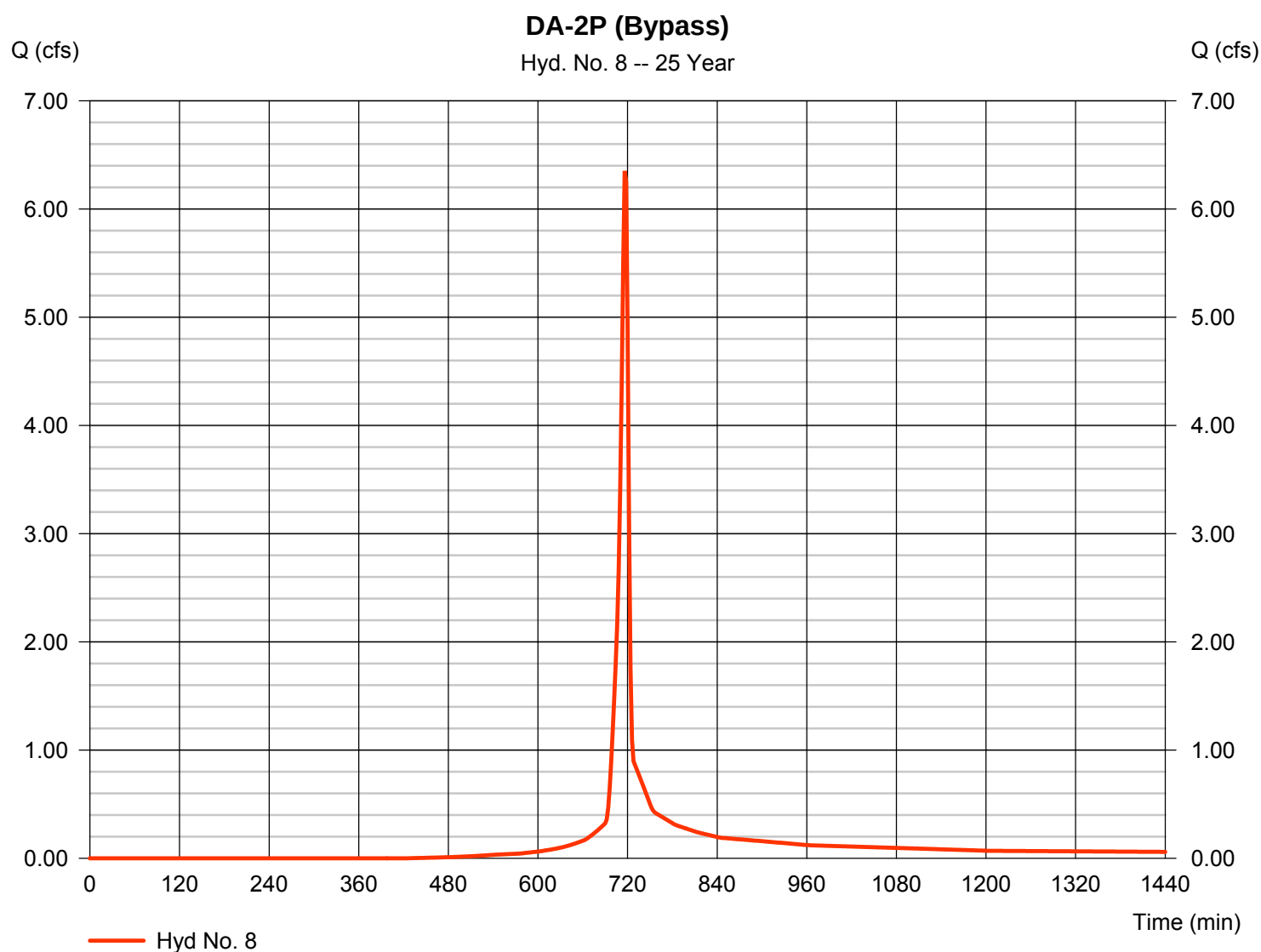
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

Thursday, 02 / 15 / 2018

## Hyd. No. 8

DA-2P (Bypass)

|                 |              |                    |               |
|-----------------|--------------|--------------------|---------------|
| Hydrograph type | = SCS Runoff | Peak discharge     | = 6.353 cfs   |
| Storm frequency | = 25 yrs     | Time to peak       | = 716 min     |
| Time interval   | = 2 min      | Hyd. volume        | = 12,930 cuft |
| Drainage area   | = 1.140 ac   | Curve number       | = 78          |
| Basin Slope     | = 0.0 %      | Hydraulic length   | = 0 ft        |
| Tc method       | = User       | Time of conc. (Tc) | = 5.00 min    |
| Total precip.   | = 5.72 in    | Distribution       | = Type II     |
| Storm duration  | = 24 hrs     | Shape factor       | = 484         |

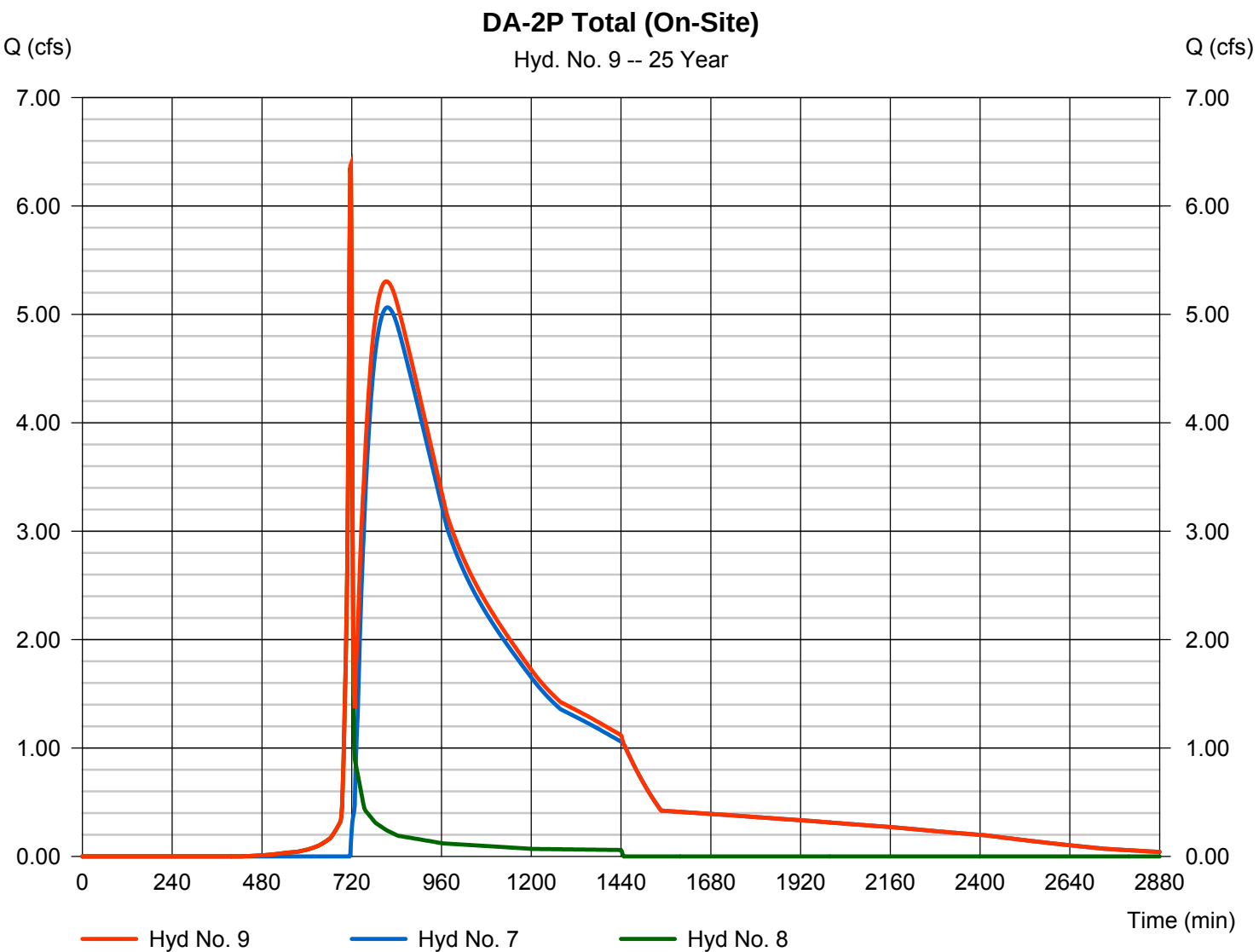


# Hydrograph Report

## Hyd. No. 9

DA-2P Total (On-Site)

|                 |           |                      |                |
|-----------------|-----------|----------------------|----------------|
| Hydrograph type | = Combine | Peak discharge       | = 6.384 cfs    |
| Storm frequency | = 25 yrs  | Time to peak         | = 718 min      |
| Time interval   | = 2 min   | Hyd. volume          | = 145,811 cuft |
| Inflow hyds.    | = 7, 8    | Contrib. drain. area | = 1.140 ac     |



# Hydrograph Report

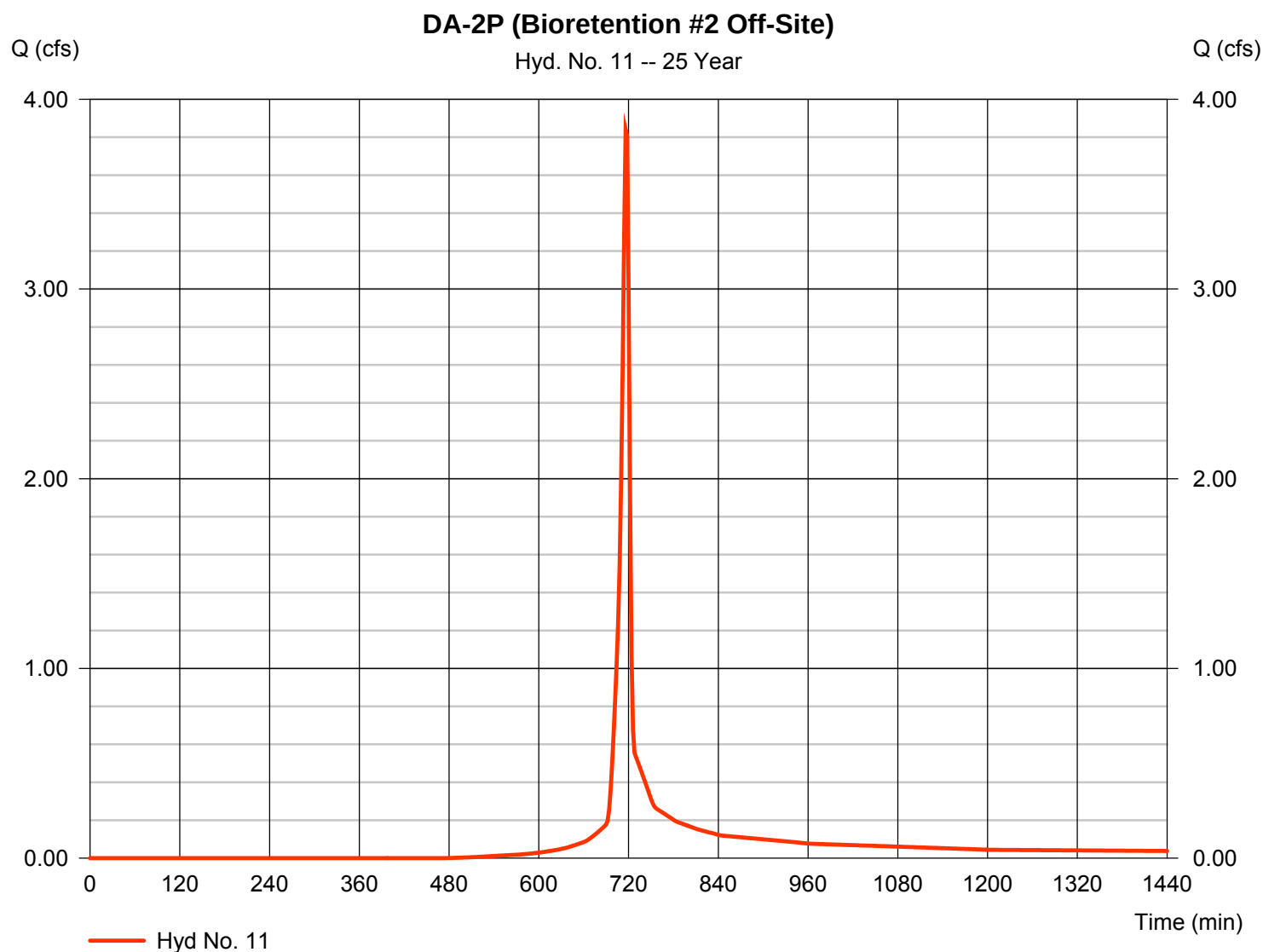
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

Thursday, 02 / 15 / 2018

## Hyd. No. 11

DA-2P (Bioretention #2 Off-Site)

|                 |              |                    |              |
|-----------------|--------------|--------------------|--------------|
| Hydrograph type | = SCS Runoff | Peak discharge     | = 3.840 cfs  |
| Storm frequency | = 25 yrs     | Time to peak       | = 716 min    |
| Time interval   | = 2 min      | Hyd. volume        | = 7,772 cuft |
| Drainage area   | = 0.750 ac   | Curve number       | = 75         |
| Basin Slope     | = 0.0 %      | Hydraulic length   | = 0 ft       |
| Tc method       | = User       | Time of conc. (Tc) | = 5.00 min   |
| Total precip.   | = 5.72 in    | Distribution       | = Type II    |
| Storm duration  | = 24 hrs     | Shape factor       | = 484        |

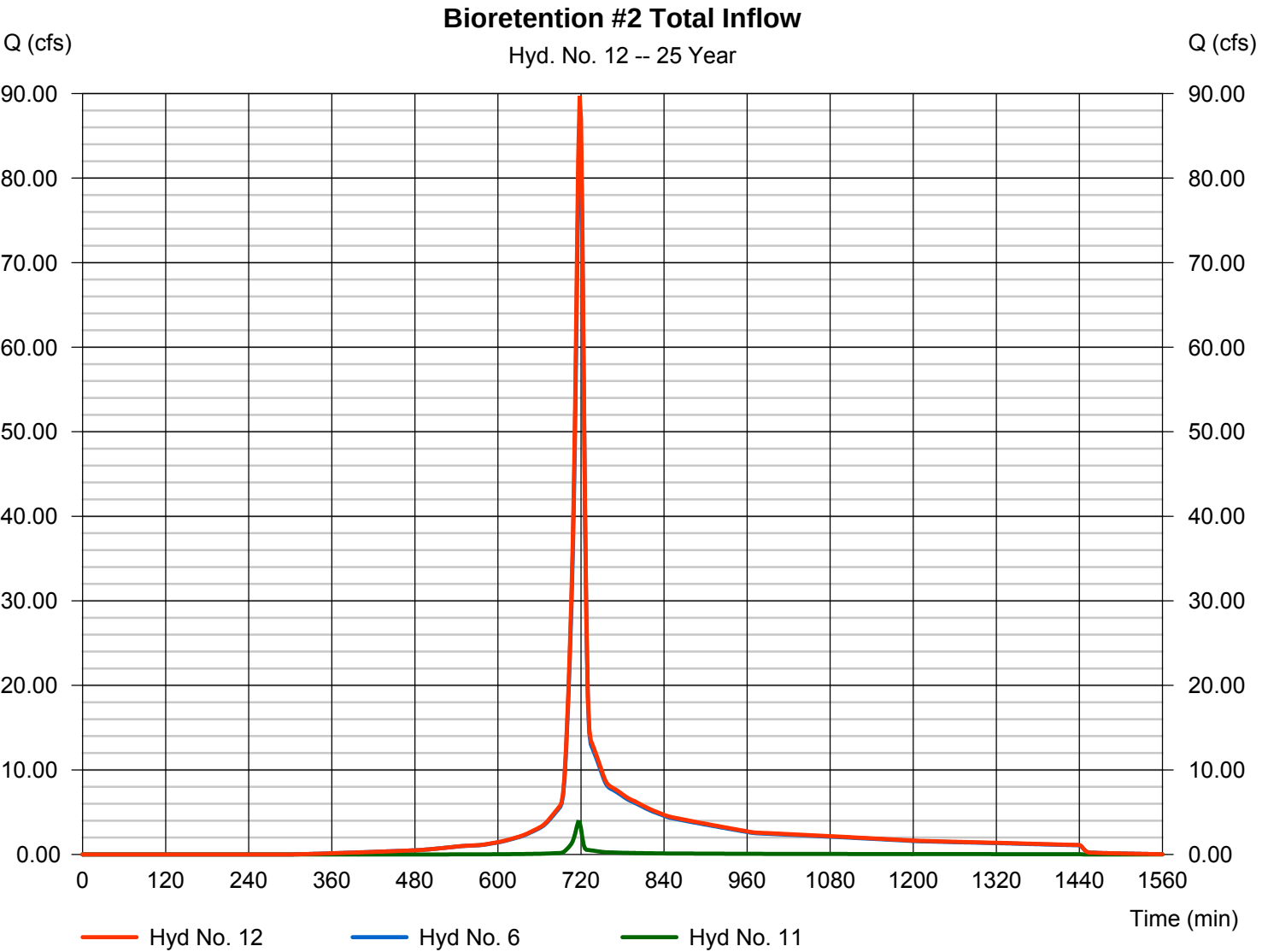


# Hydrograph Report

## Hyd. No. 12

### Bioretention #2 Total Inflow

|                 |           |                      |                |
|-----------------|-----------|----------------------|----------------|
| Hydrograph type | = Combine | Peak discharge       | = 89.73 cfs    |
| Storm frequency | = 25 yrs  | Time to peak         | = 718 min      |
| Time interval   | = 2 min   | Hyd. volume          | = 249,618 cuft |
| Inflow hyds.    | = 6, 11   | Contrib. drain. area | = 0.750 ac     |



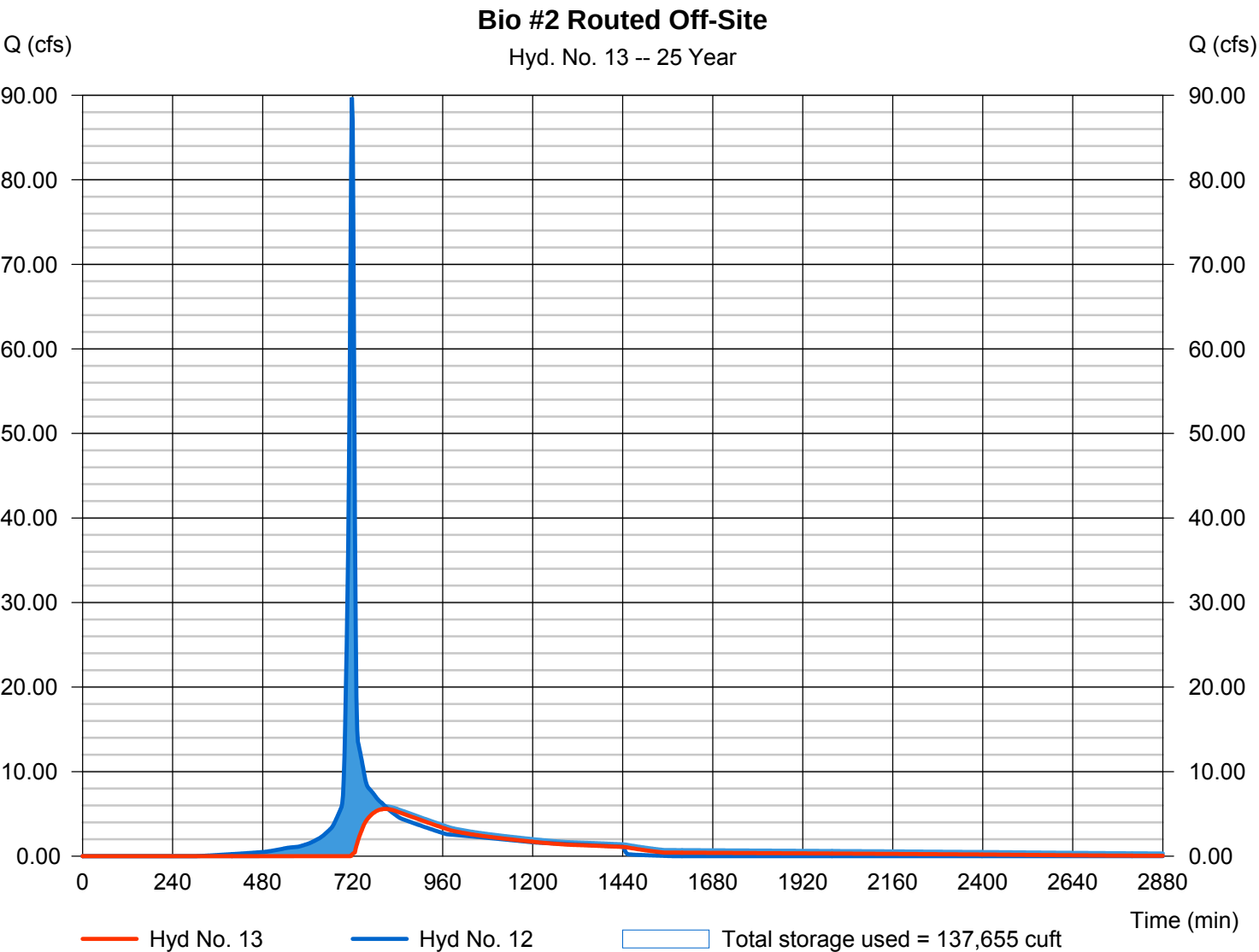
# Hydrograph Report

## Hyd. No. 13

Bio #2 Routed Off-Site

|                 |                                     |                |                |
|-----------------|-------------------------------------|----------------|----------------|
| Hydrograph type | = Reservoir                         | Peak discharge | = 5.588 cfs    |
| Storm frequency | = 25 yrs                            | Time to peak   | = 806 min      |
| Time interval   | = 2 min                             | Hyd. volume    | = 140,567 cuft |
| Inflow hyd. No. | = 12 - Bioretention #2 Total Inflow | Max. Elevation | = 425.63 ft    |
| Reservoir name  | = Bioretention Basin #2             | Max. Storage   | = 137,655 cuft |

Storage Indication method used. Exfiltration extracted from Outflow.

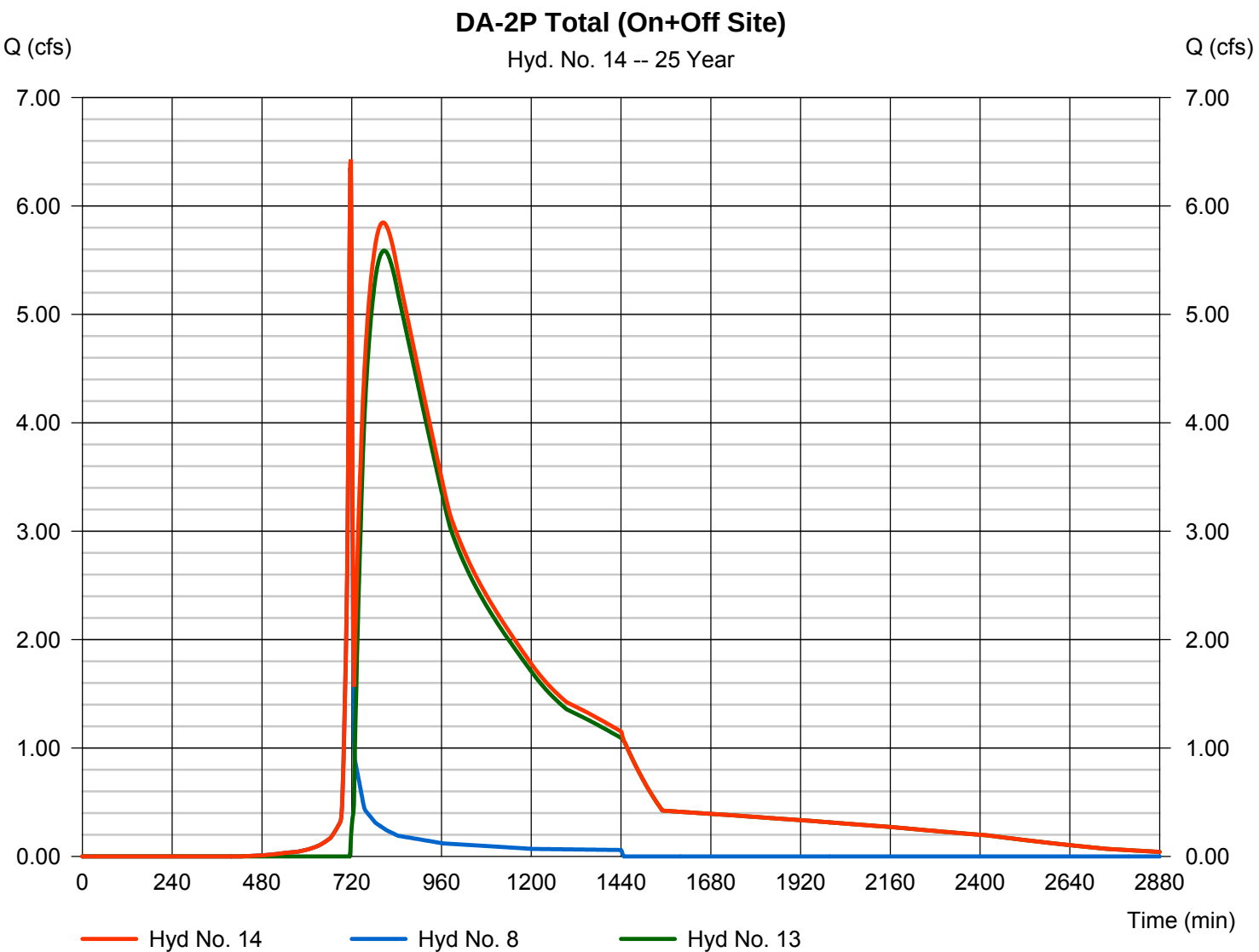


# Hydrograph Report

## Hyd. No. 14

DA-2P Total (On+Off Site)

|                 |           |                      |                |
|-----------------|-----------|----------------------|----------------|
| Hydrograph type | = Combine | Peak discharge       | = 6.429 cfs    |
| Storm frequency | = 25 yrs  | Time to peak         | = 718 min      |
| Time interval   | = 2 min   | Hyd. volume          | = 153,497 cuft |
| Inflow hyds.    | = 8, 13   | Contrib. drain. area | = 1.140 ac     |





# Hydrograph Report

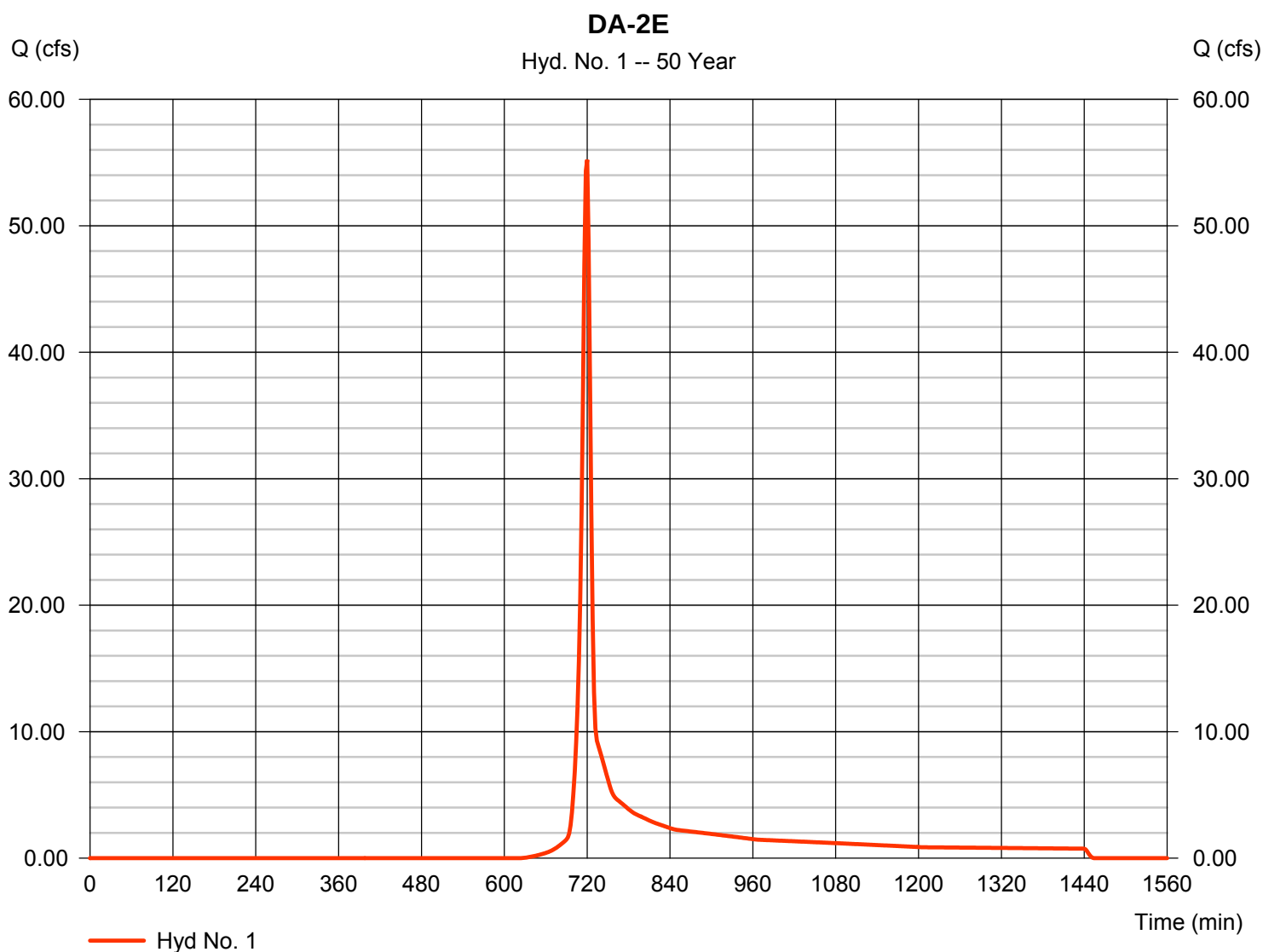
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

Thursday, 02 / 15 / 2018

## Hyd. No. 1

DA-2E

|                 |              |                    |                |
|-----------------|--------------|--------------------|----------------|
| Hydrograph type | = SCS Runoff | Peak discharge     | = 55.21 cfs    |
| Storm frequency | = 50 yrs     | Time to peak       | = 720 min      |
| Time interval   | = 2 min      | Hyd. volume        | = 126,825 cuft |
| Drainage area   | = 14.710 ac  | Curve number       | = 61           |
| Basin Slope     | = 0.0 %      | Hydraulic length   | = 0 ft         |
| Tc method       | = User       | Time of conc. (Tc) | = 8.40 min     |
| Total precip.   | = 6.54 in    | Distribution       | = Type II      |
| Storm duration  | = 24 hrs     | Shape factor       | = 484          |



# Hydrograph Report

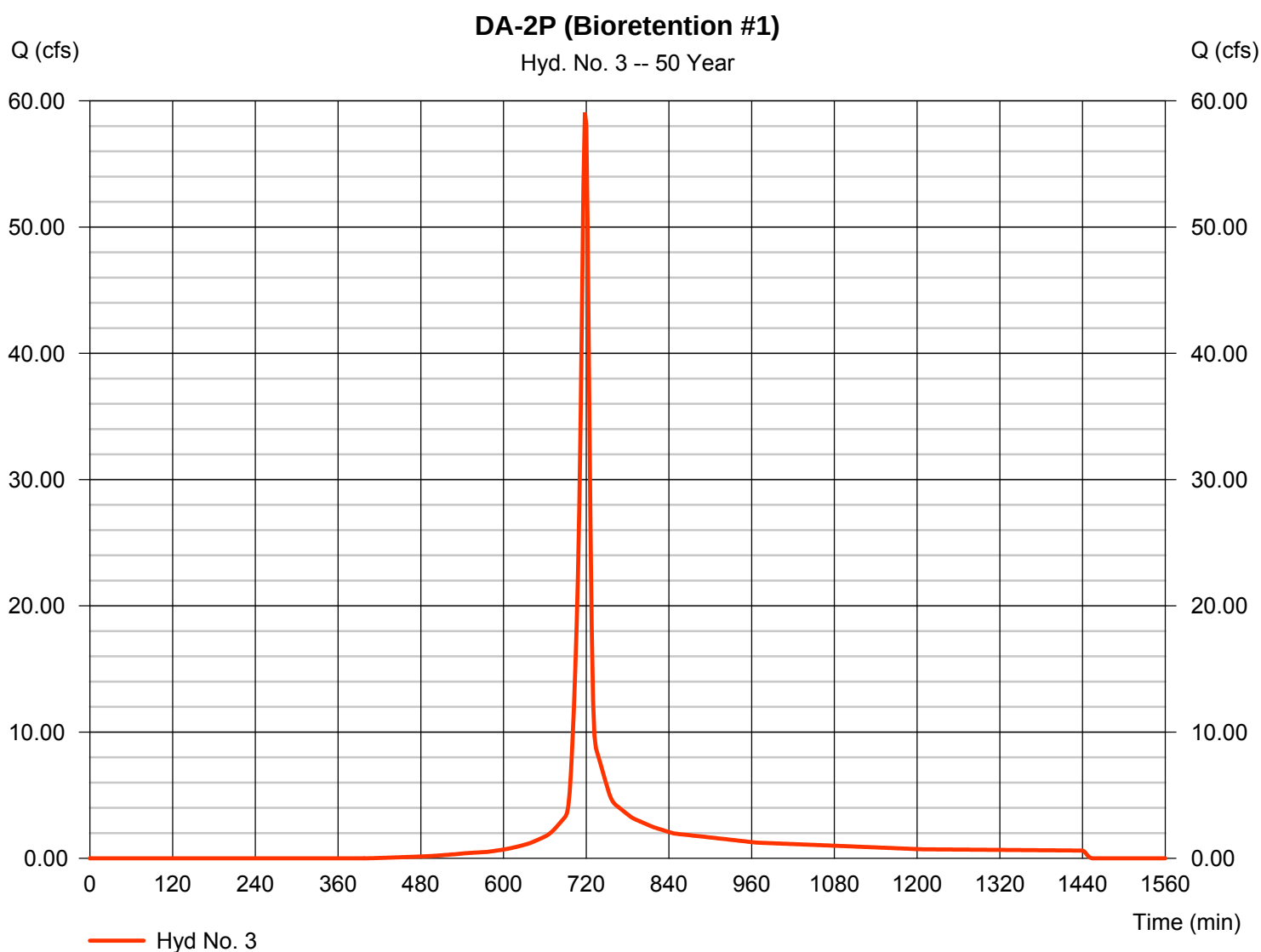
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

Thursday, 02 / 15 / 2018

## Hyd. No. 3

DA-2P (Bioretention #1)

|                 |              |                    |                |
|-----------------|--------------|--------------------|----------------|
| Hydrograph type | = SCS Runoff | Peak discharge     | = 59.09 cfs    |
| Storm frequency | = 50 yrs     | Time to peak       | = 718 min      |
| Time interval   | = 2 min      | Hyd. volume        | = 136,093 cuft |
| Drainage area   | = 9.480 ac   | Curve number       | = 77           |
| Basin Slope     | = 0.0 %      | Hydraulic length   | = 0 ft         |
| Tc method       | = User       | Time of conc. (Tc) | = 7.90 min     |
| Total precip.   | = 6.54 in    | Distribution       | = Type II      |
| Storm duration  | = 24 hrs     | Shape factor       | = 484          |



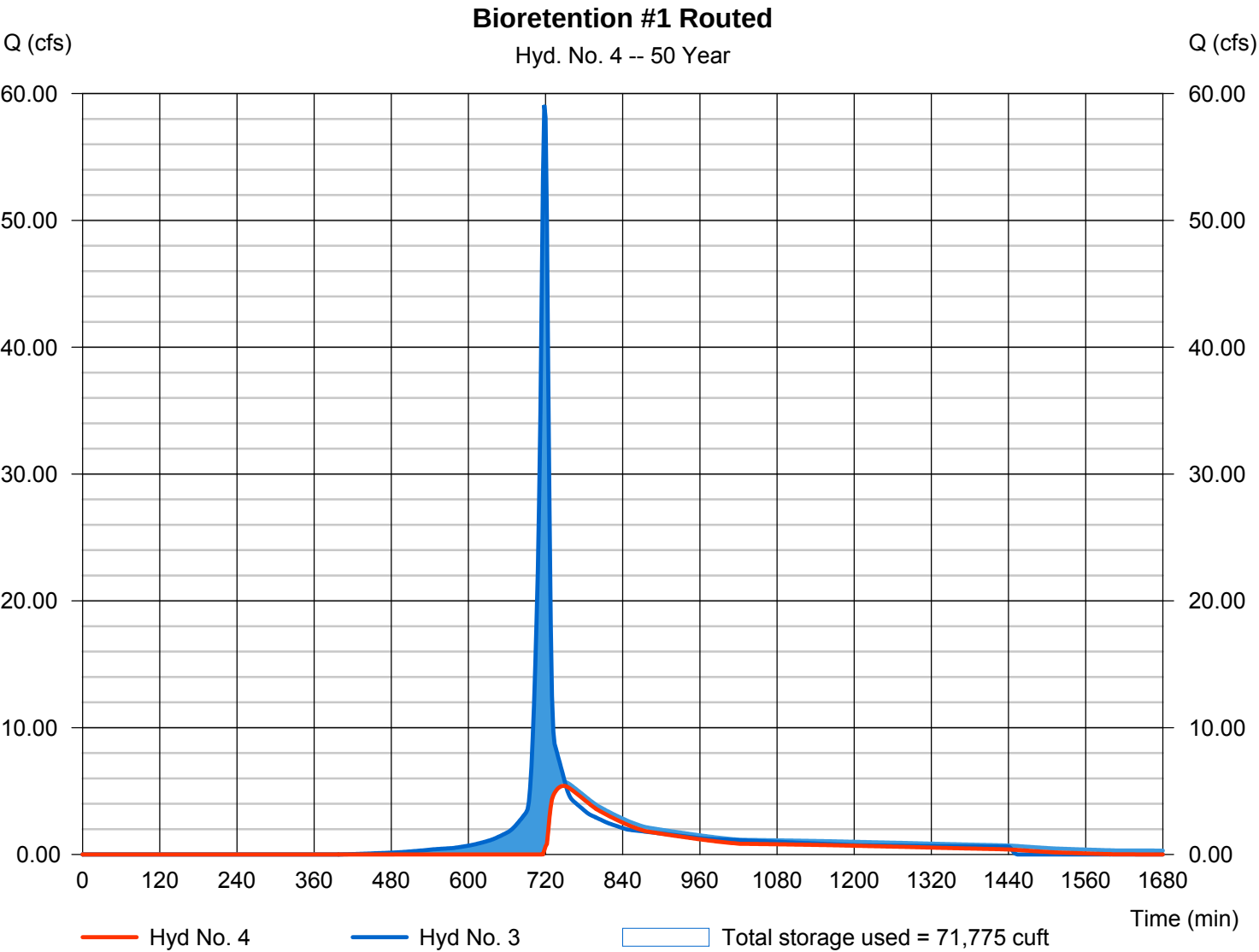
# Hydrograph Report

## Hyd. No. 4

### Bioretention #1 Routed

|                 |                               |                |               |
|-----------------|-------------------------------|----------------|---------------|
| Hydrograph type | = Reservoir                   | Peak discharge | = 5.412 cfs   |
| Storm frequency | = 50 yrs                      | Time to peak   | = 748 min     |
| Time interval   | = 2 min                       | Hyd. volume    | = 62,210 cuft |
| Inflow hyd. No. | = 3 - DA-2P (Bioretention #1) | Max. Elevation | = 432.57 ft   |
| Reservoir name  | = Bioretention Basin #1       | Max. Storage   | = 71,775 cuft |

Storage Indication method used. Exfiltration extracted from Outflow.



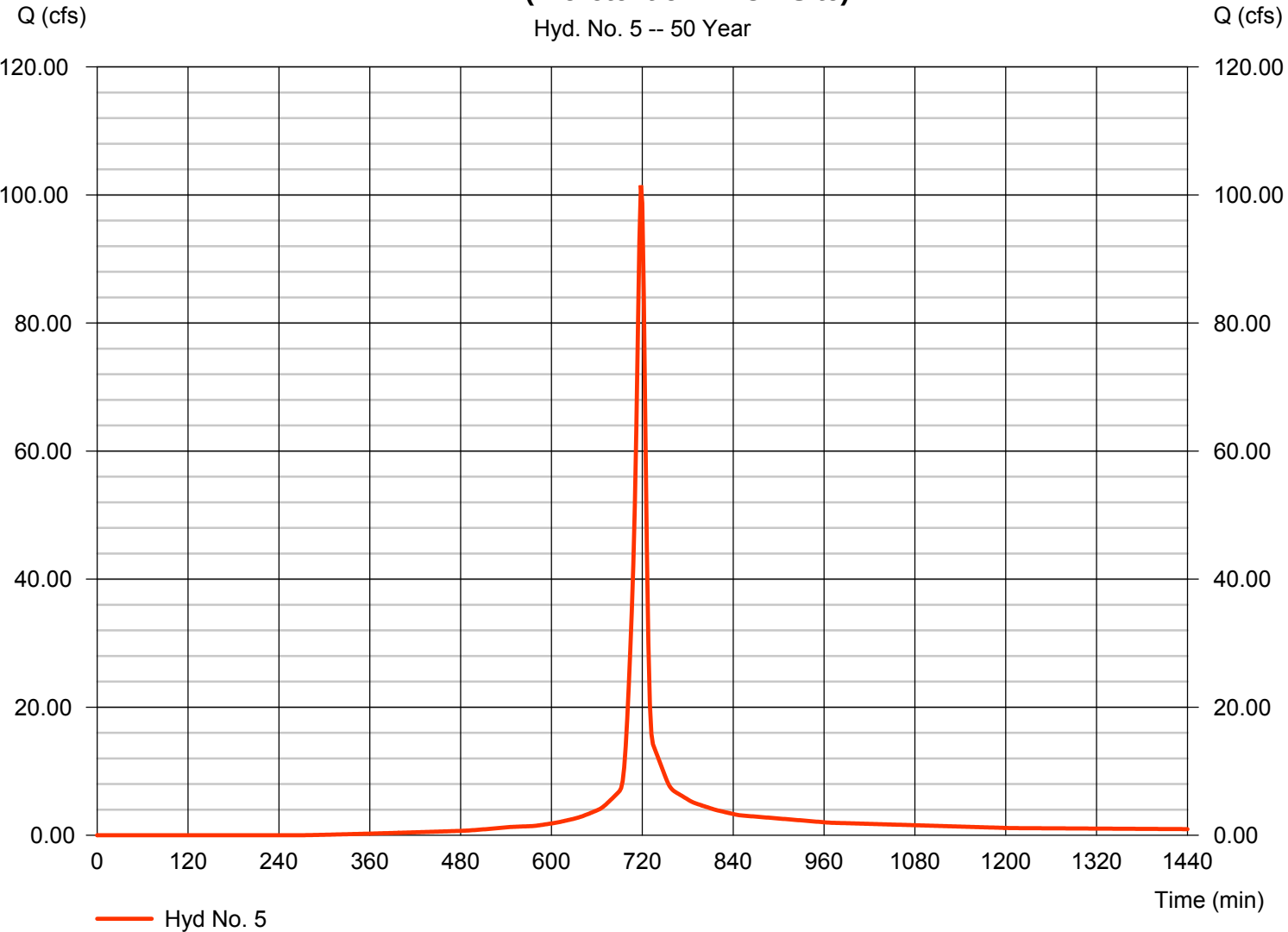
# Hydrograph Report

## Hyd. No. 5

DA-2P (Bioretention #2 On-Site)

|                 |   |            |                    |   |              |
|-----------------|---|------------|--------------------|---|--------------|
| Hydrograph type | = | SCS Runoff | Peak discharge     | = | 101.51 cfs   |
| Storm frequency | = | 50 yrs     | Time to peak       | = | 718 min      |
| Time interval   | = | 2 min      | Hyd. volume        | = | 240,802 cuft |
| Drainage area   | = | 13.780 ac  | Curve number       | = | 85           |
| Basin Slope     | = | 0.0 %      | Hydraulic length   | = | 0 ft         |
| Tc method       | = | User       | Time of conc. (Tc) | = | 8.00 min     |
| Total precip.   | = | 6.54 in    | Distribution       | = | Type II      |
| Storm duration  | = | 24 hrs     | Shape factor       | = | 484          |

DA-2P (Bioretention #2 On-Site)



# Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

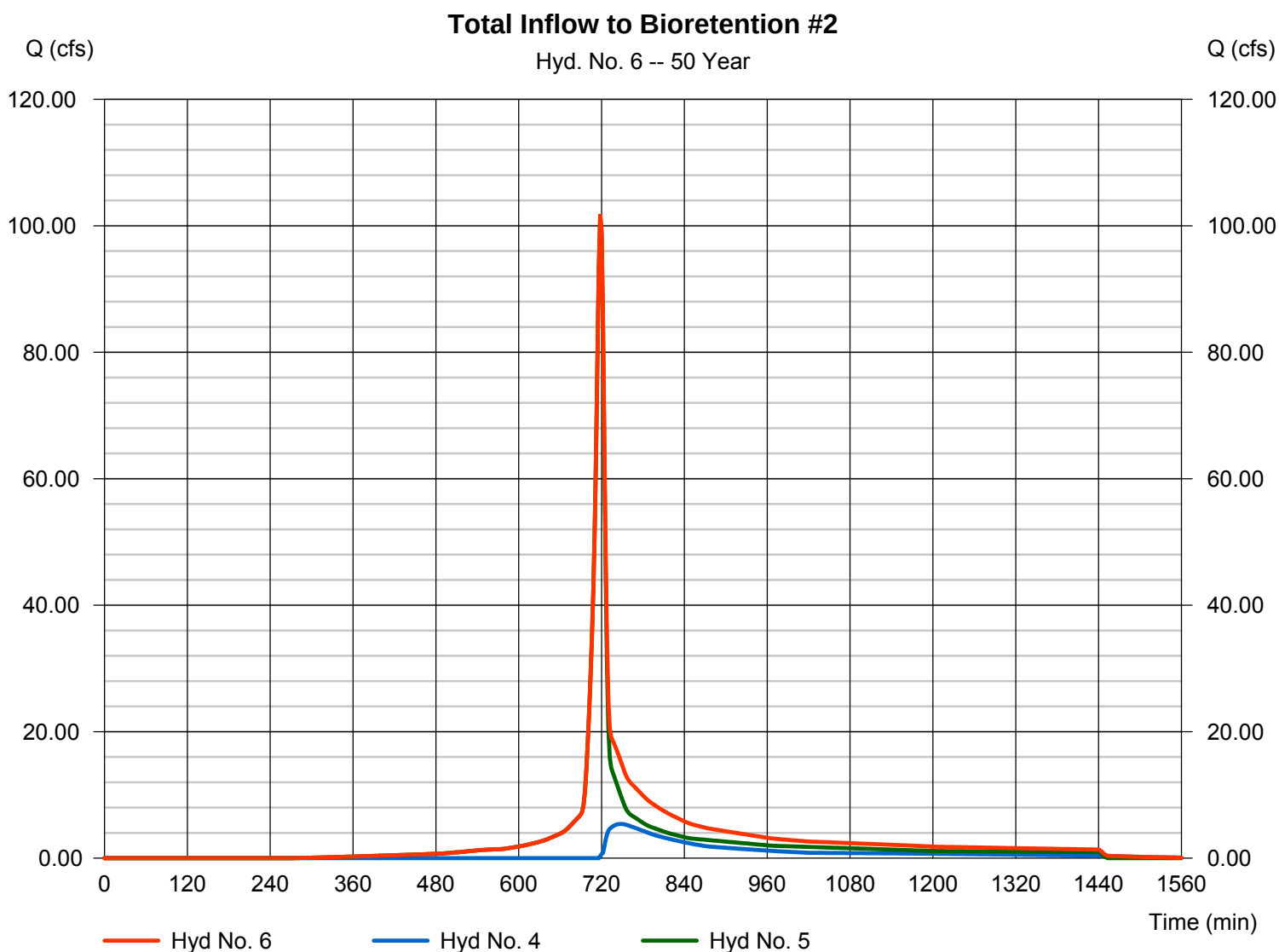
Thursday, 02 / 15 / 2018

## Hyd. No. 6

### Total Inflow to Bioretention #2

Hydrograph type = Combine  
Storm frequency = 50 yrs  
Time interval = 2 min  
Inflow hyds. = 4, 5

Peak discharge = 101.84 cfs  
Time to peak = 718 min  
Hyd. volume = 303,013 cuft  
Contrib. drain. area = 13.780 ac



# Hydrograph Report

## Hyd. No. 7

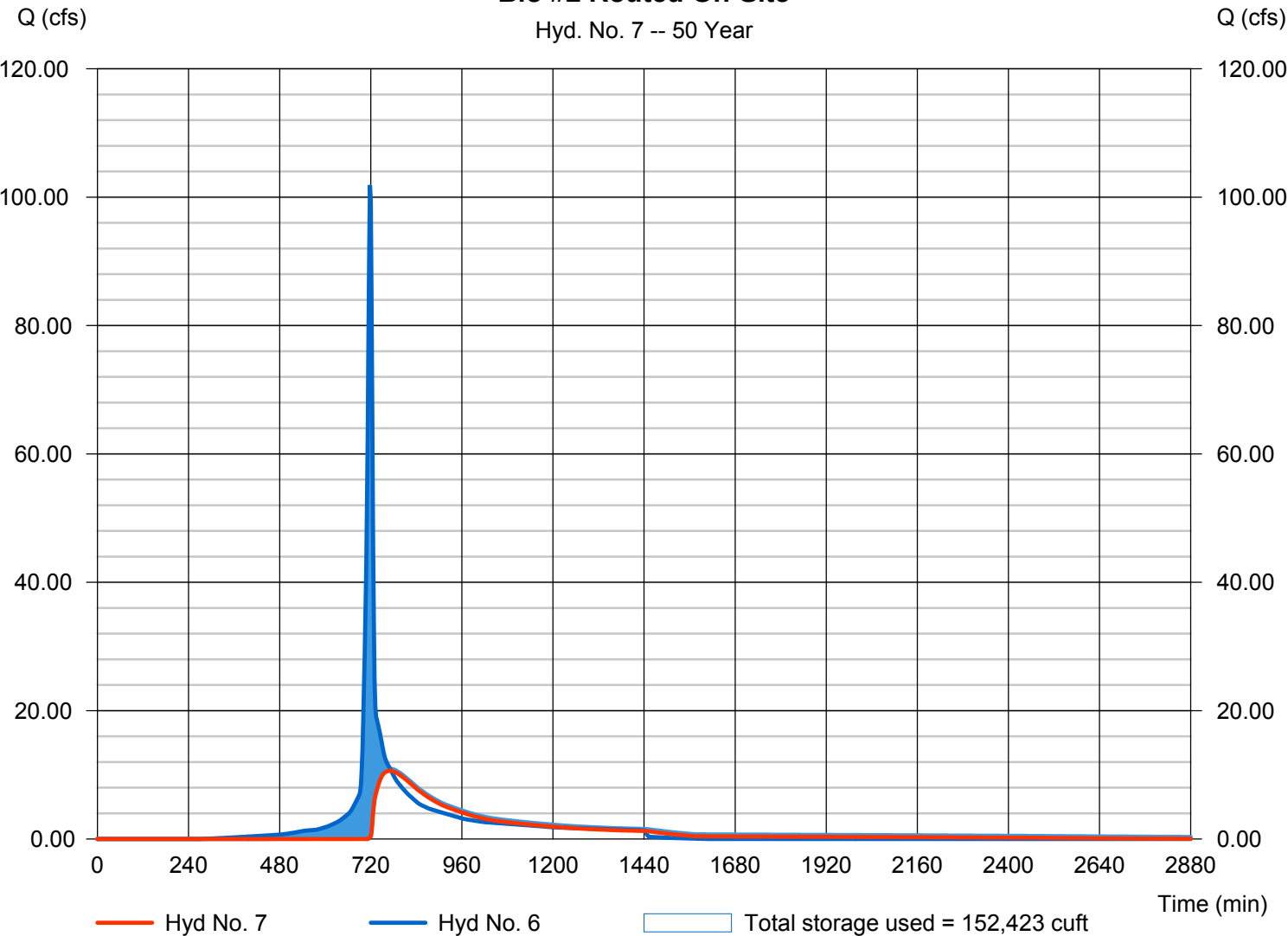
Bio #2 Routed On-Site

|                 |                                       |                |                |
|-----------------|---------------------------------------|----------------|----------------|
| Hydrograph type | = Reservoir                           | Peak discharge | = 10.65 cfs    |
| Storm frequency | = 50 yrs                              | Time to peak   | = 770 min      |
| Time interval   | = 2 min                               | Hyd. volume    | = 193,160 cuft |
| Inflow hyd. No. | = 6 - Total Inflow to Bioretention #2 | Max. Elevation | = 426.00 ft    |
| Reservoir name  | = Bioretention Basin #2               | Max. Storage   | = 152,423 cuft |

Storage Indication method used. Exfiltration extracted from Outflow.

### Bio #2 Routed On-Site

Hyd. No. 7 -- 50 Year



# Hydrograph Report

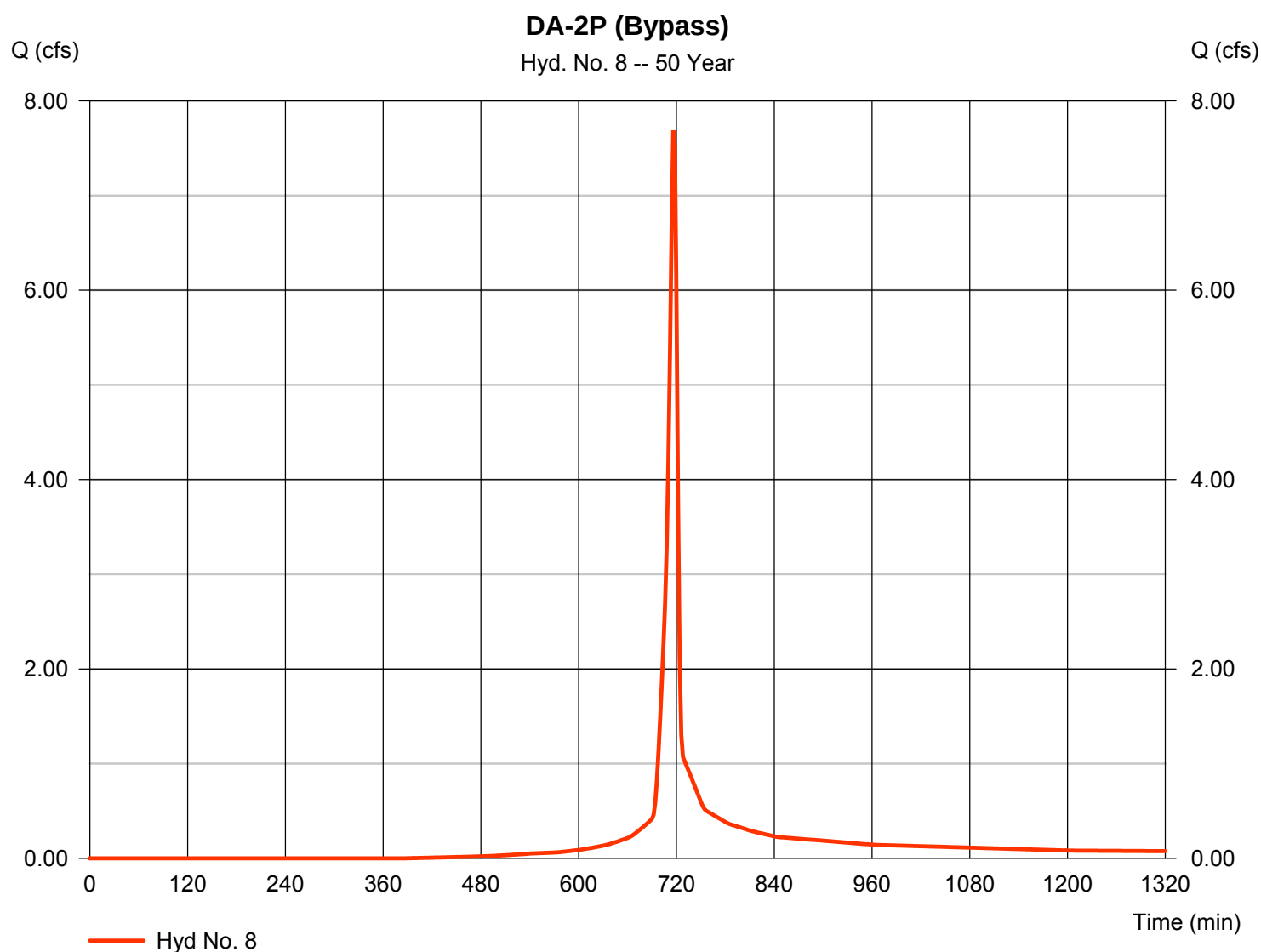
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

Thursday, 02 / 15 / 2018

## Hyd. No. 8

DA-2P (Bypass)

|                 |              |                    |               |
|-----------------|--------------|--------------------|---------------|
| Hydrograph type | = SCS Runoff | Peak discharge     | = 7.688 cfs   |
| Storm frequency | = 50 yrs     | Time to peak       | = 716 min     |
| Time interval   | = 2 min      | Hyd. volume        | = 15,750 cuft |
| Drainage area   | = 1.140 ac   | Curve number       | = 78          |
| Basin Slope     | = 0.0 %      | Hydraulic length   | = 0 ft        |
| Tc method       | = User       | Time of conc. (Tc) | = 5.00 min    |
| Total precip.   | = 6.54 in    | Distribution       | = Type II     |
| Storm duration  | = 24 hrs     | Shape factor       | = 484         |





# Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

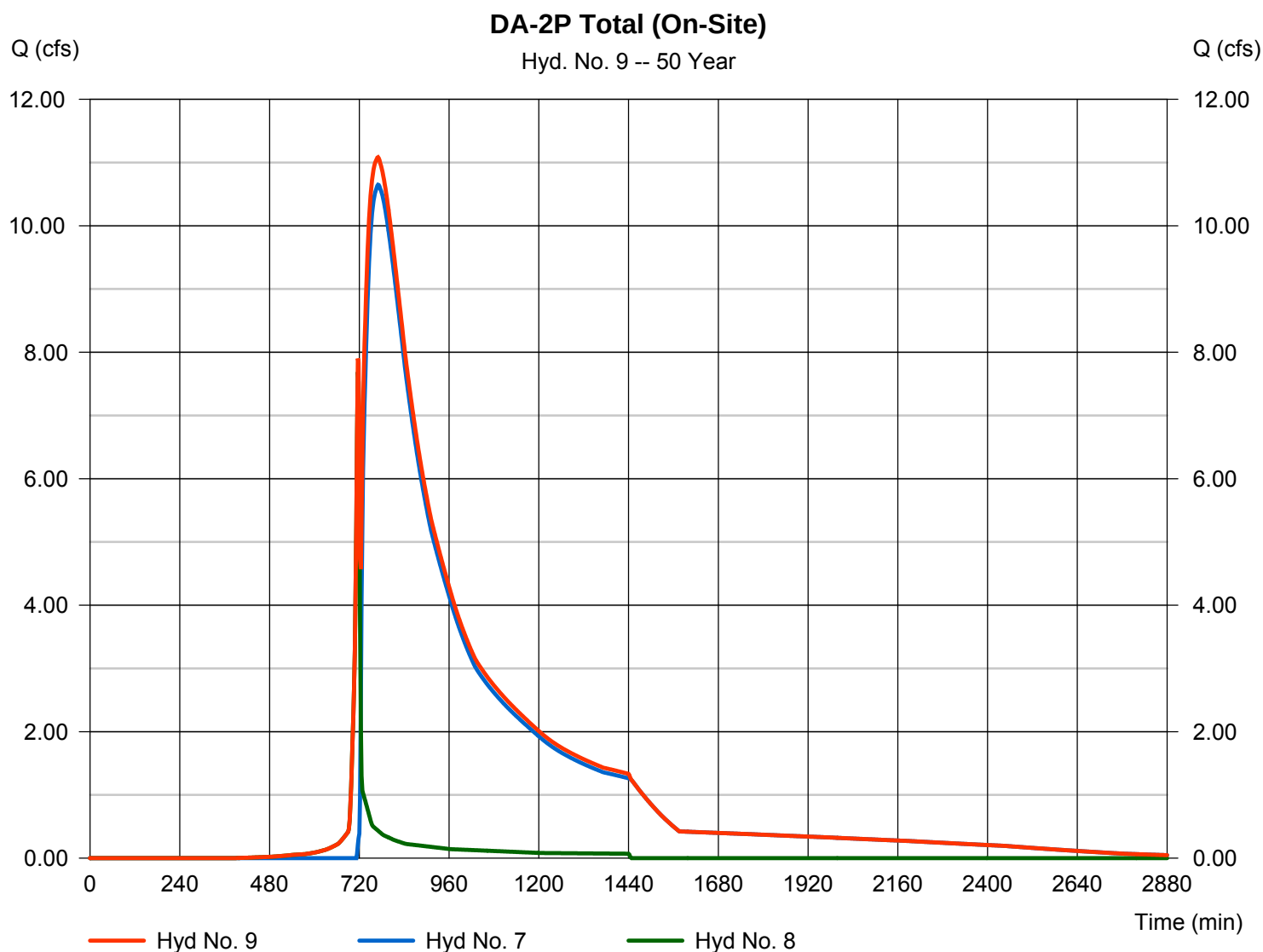
Thursday, 02 / 15 / 2018

## Hyd. No. 9

DA-2P Total (On-Site)

Hydrograph type = Combine  
Storm frequency = 50 yrs  
Time interval = 2 min  
Inflow hyds. = 7, 8

Peak discharge = 11.08 cfs  
Time to peak = 770 min  
Hyd. volume = 208,910 cuft  
Contrib. drain. area = 1.140 ac



# Hydrograph Report

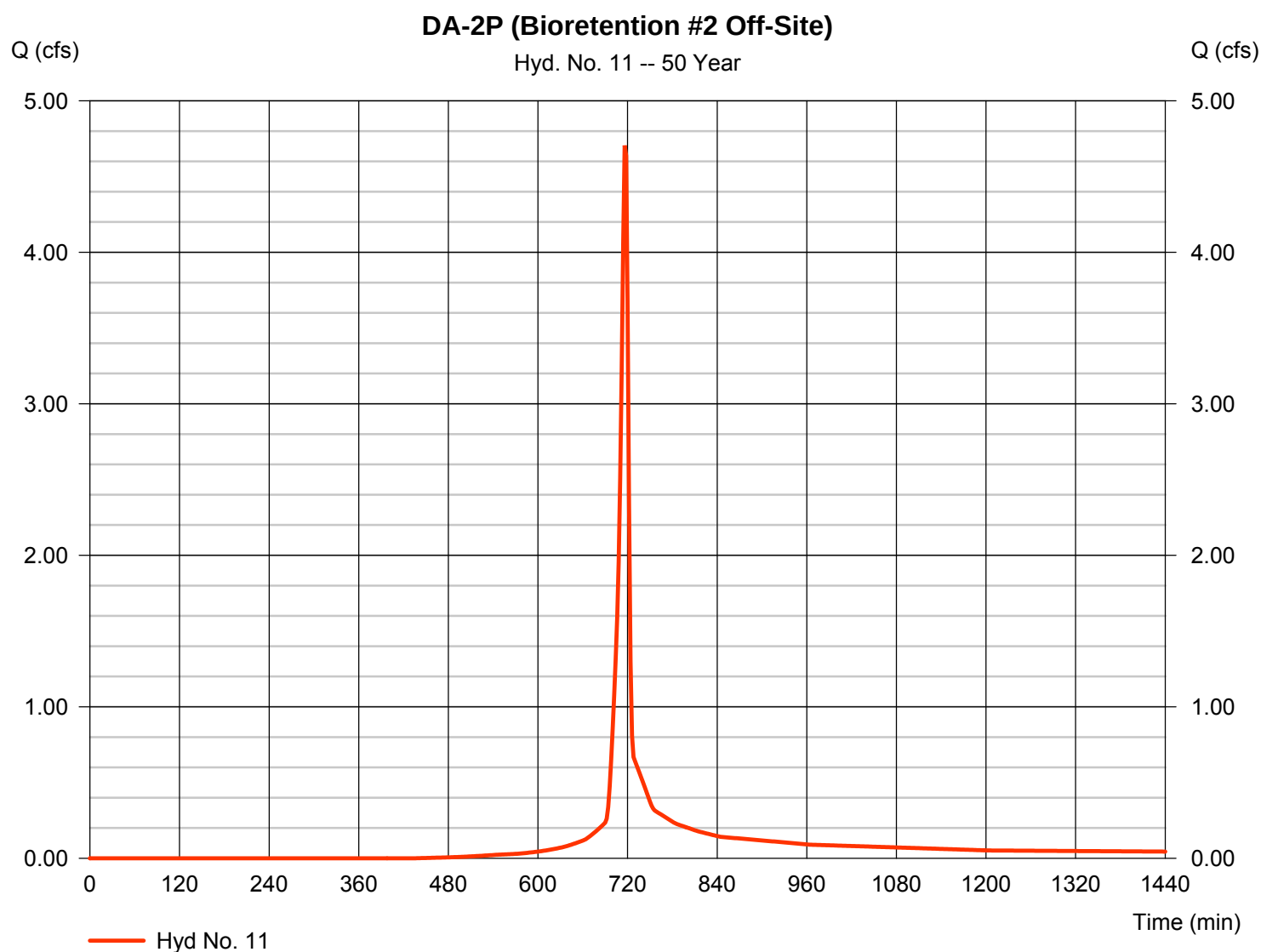
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

Thursday, 02 / 15 / 2018

## Hyd. No. 11

DA-2P (Bioretention #2 Off-Site)

|                 |              |                    |              |
|-----------------|--------------|--------------------|--------------|
| Hydrograph type | = SCS Runoff | Peak discharge     | = 4.705 cfs  |
| Storm frequency | = 50 yrs     | Time to peak       | = 716 min    |
| Time interval   | = 2 min      | Hyd. volume        | = 9,563 cuft |
| Drainage area   | = 0.750 ac   | Curve number       | = 75         |
| Basin Slope     | = 0.0 %      | Hydraulic length   | = 0 ft       |
| Tc method       | = User       | Time of conc. (Tc) | = 5.00 min   |
| Total precip.   | = 6.54 in    | Distribution       | = Type II    |
| Storm duration  | = 24 hrs     | Shape factor       | = 484        |



# Hydrograph Report

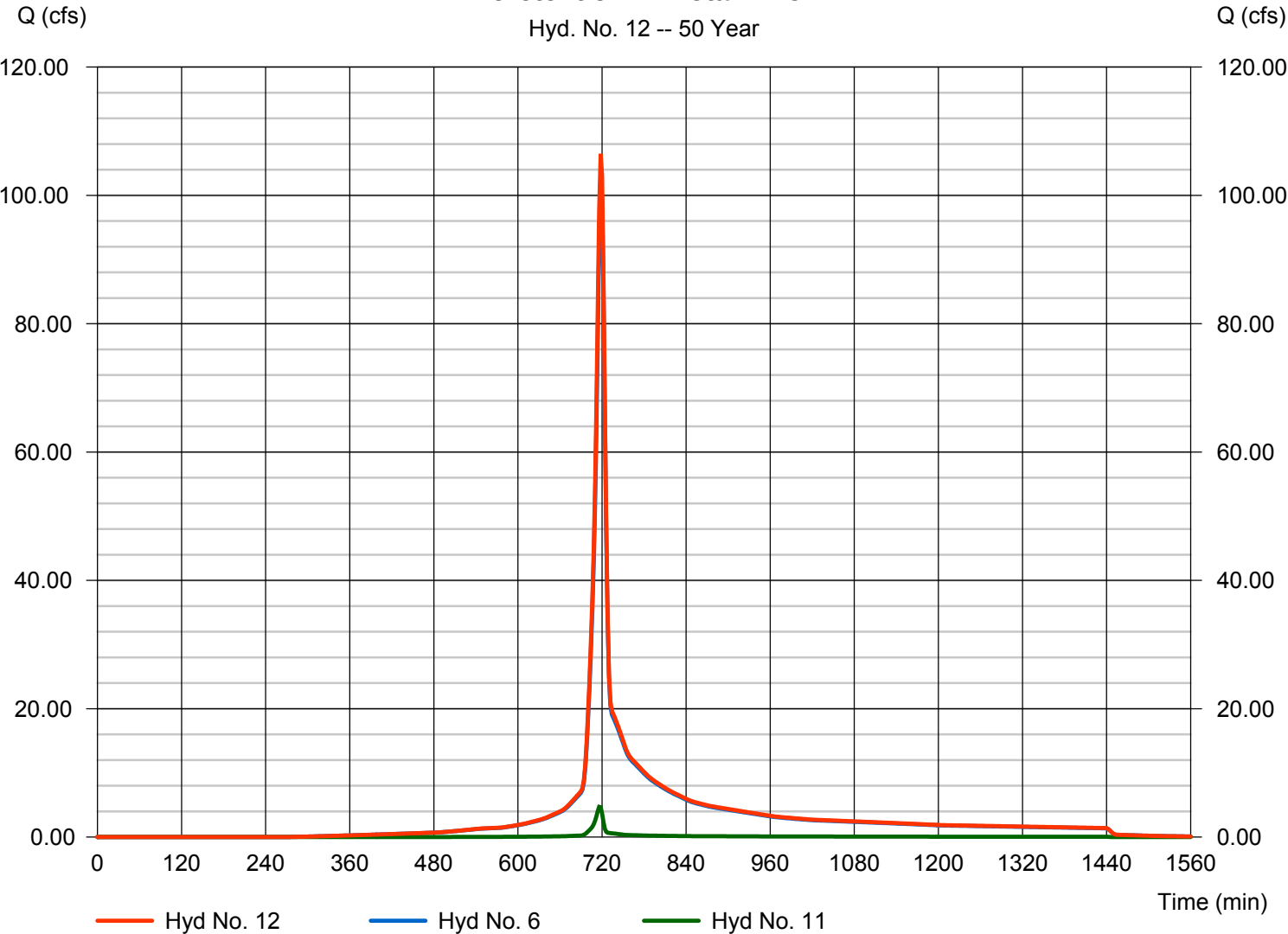
## Hyd. No. 12

### Bioretention #2 Total Inflow

|                 |           |                      |                |
|-----------------|-----------|----------------------|----------------|
| Hydrograph type | = Combine | Peak discharge       | = 106.47 cfs   |
| Storm frequency | = 50 yrs  | Time to peak         | = 718 min      |
| Time interval   | = 2 min   | Hyd. volume          | = 312,576 cuft |
| Inflow hyds.    | = 6, 11   | Contrib. drain. area | = 0.750 ac     |

### Bioretention #2 Total Inflow

Hyd. No. 12 -- 50 Year



# Hydrograph Report

## Hyd. No. 13

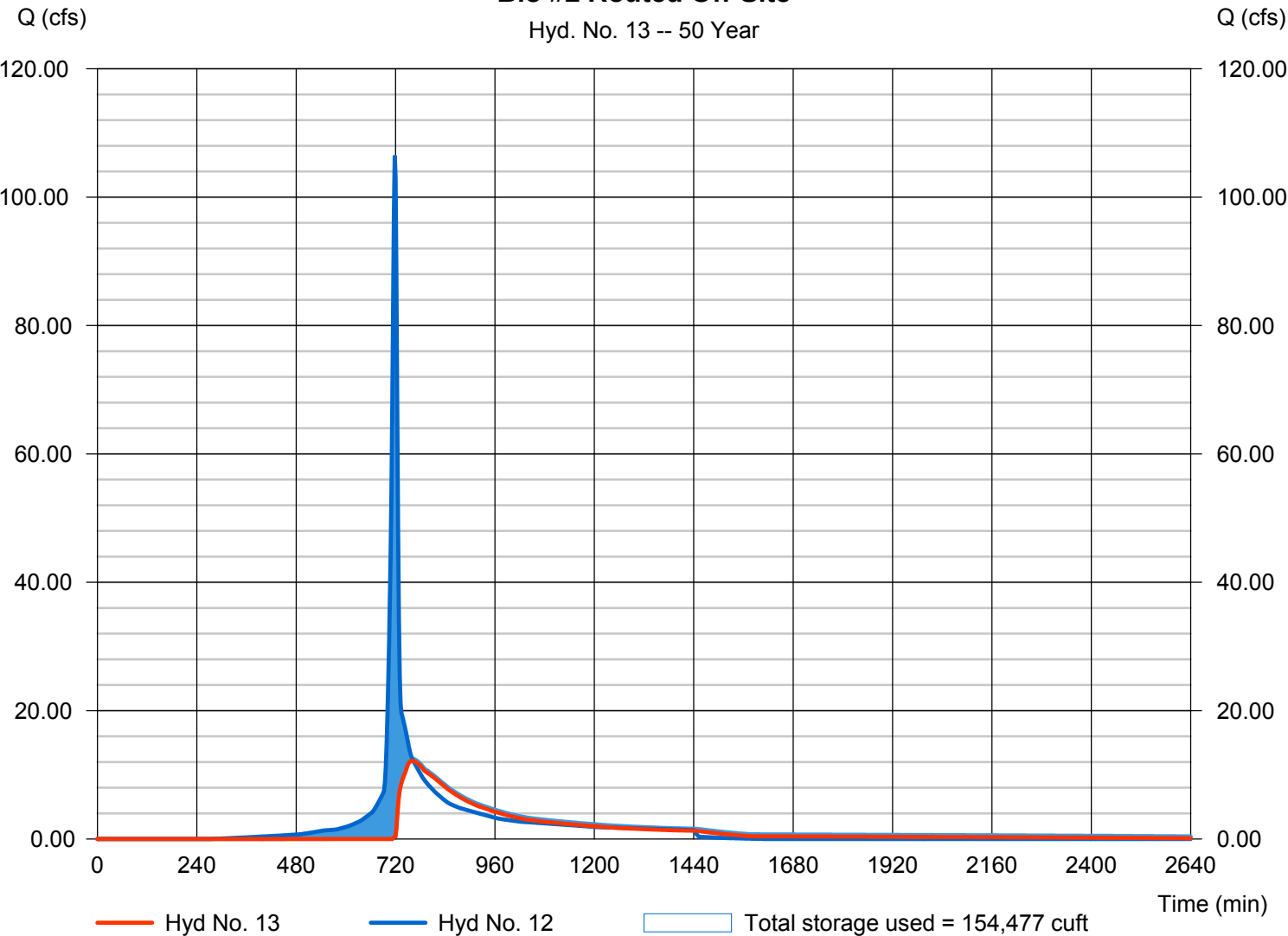
Bio #2 Routed Off-Site

|                 |                                     |                |                |
|-----------------|-------------------------------------|----------------|----------------|
| Hydrograph type | = Reservoir                         | Peak discharge | = 12.18 cfs    |
| Storm frequency | = 50 yrs                            | Time to peak   | = 760 min      |
| Time interval   | = 2 min                             | Hyd. volume    | = 202,648 cuft |
| Inflow hyd. No. | = 12 - Bioretention #2 Total Inflow | Max. Elevation | = 426.05 ft    |
| Reservoir name  | = Bioretention Basin #2             | Max. Storage   | = 154,477 cuft |

Storage Indication method used. Exfiltration extracted from Outflow.

### Bio #2 Routed Off-Site

Hyd. No. 13 -- 50 Year



# Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

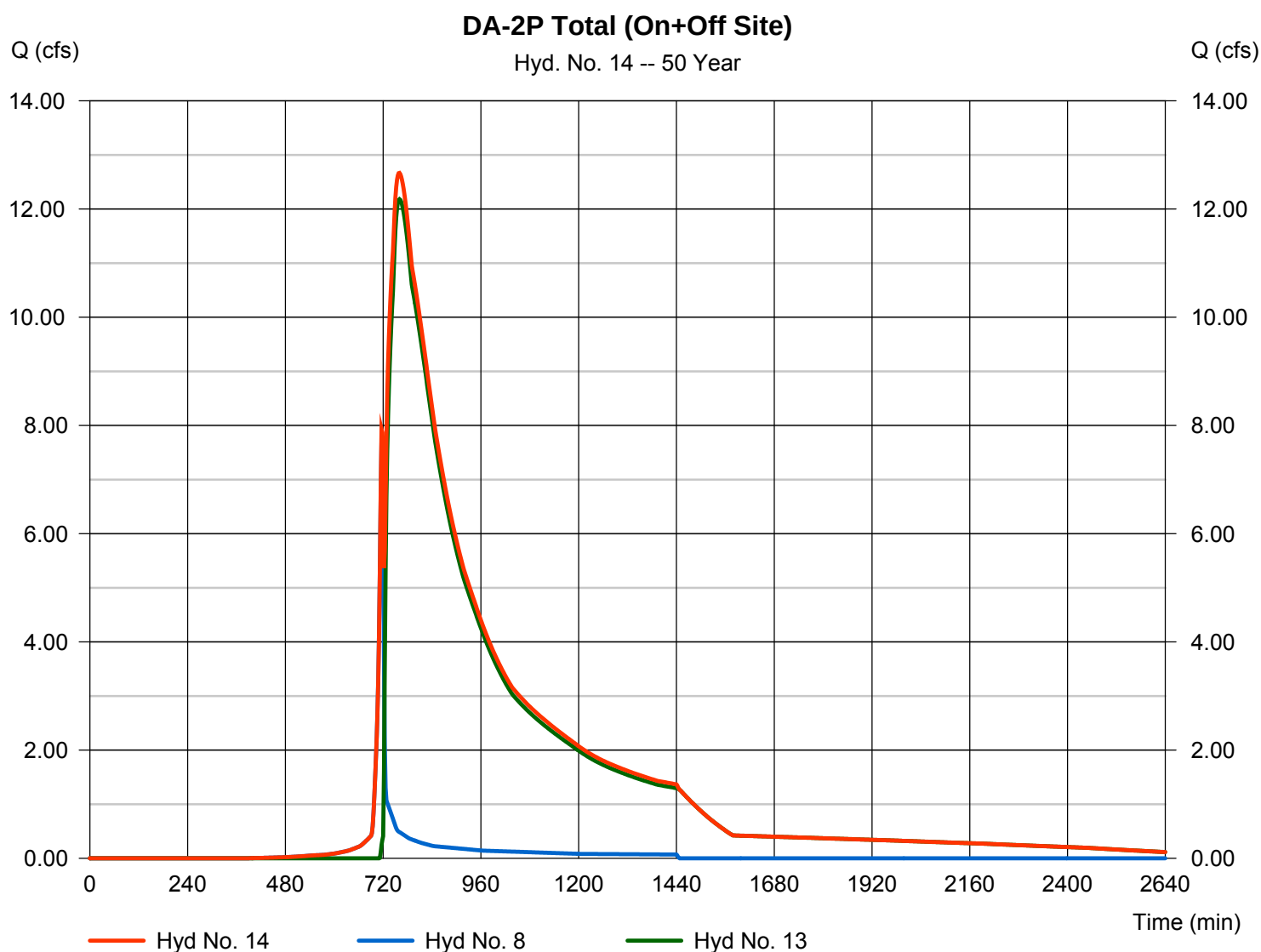
Thursday, 02 / 15 / 2018

## Hyd. No. 14

DA-2P Total (On+Off Site)

Hydrograph type = Combine  
Storm frequency = 50 yrs  
Time interval = 2 min  
Inflow hyds. = 8, 13

Peak discharge = 12.67 cfs  
Time to peak = 760 min  
Hyd. volume = 218,398 cuft  
Contrib. drain. area = 1.140 ac



# Hydrograph Report

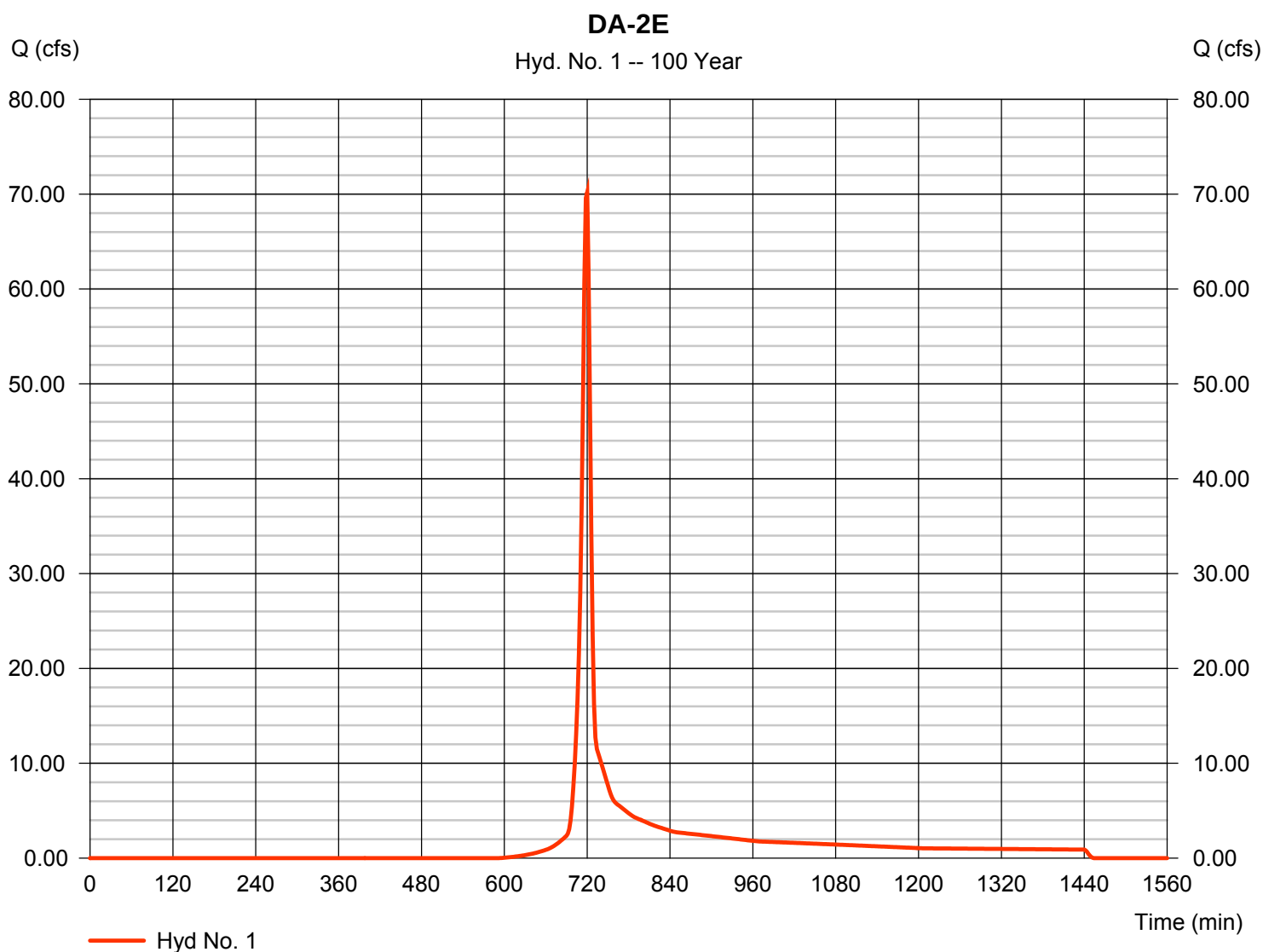
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

Thursday, 02 / 15 / 2018

## Hyd. No. 1

DA-2E

|                 |              |                    |                |
|-----------------|--------------|--------------------|----------------|
| Hydrograph type | = SCS Runoff | Peak discharge     | = 70.18 cfs    |
| Storm frequency | = 100 yrs    | Time to peak       | = 720 min      |
| Time interval   | = 2 min      | Hyd. volume        | = 160,667 cuft |
| Drainage area   | = 14.710 ac  | Curve number       | = 61           |
| Basin Slope     | = 0.0 %      | Hydraulic length   | = 0 ft         |
| Tc method       | = User       | Time of conc. (Tc) | = 8.40 min     |
| Total precip.   | = 7.42 in    | Distribution       | = Type II      |
| Storm duration  | = 24 hrs     | Shape factor       | = 484          |



# Hydrograph Report

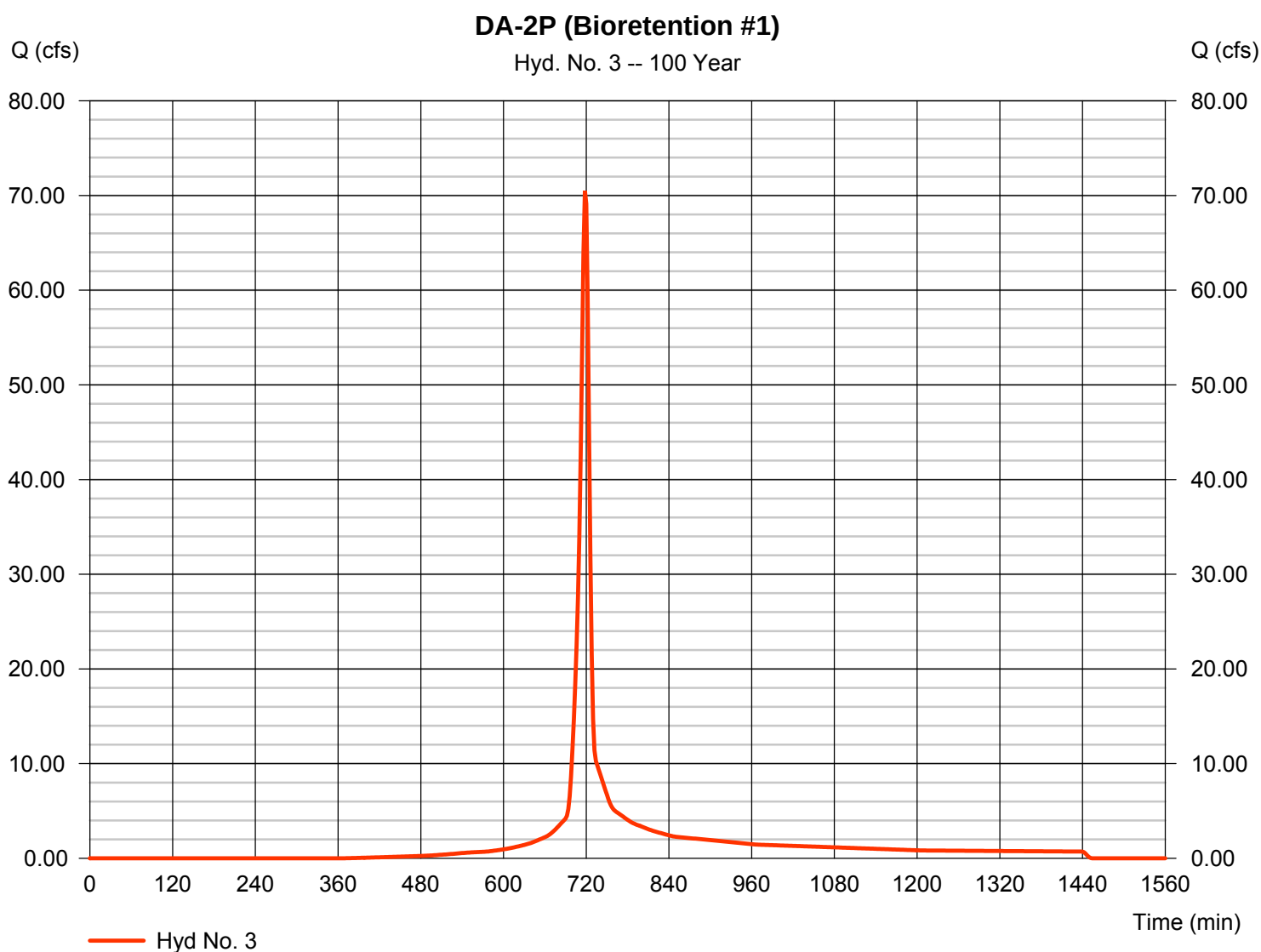
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

Thursday, 02 / 15 / 2018

## Hyd. No. 3

DA-2P (Bioretention #1)

|                 |              |                    |                |
|-----------------|--------------|--------------------|----------------|
| Hydrograph type | = SCS Runoff | Peak discharge     | = 70.50 cfs    |
| Storm frequency | = 100 yrs    | Time to peak       | = 718 min      |
| Time interval   | = 2 min      | Hyd. volume        | = 163,291 cuft |
| Drainage area   | = 9.480 ac   | Curve number       | = 77           |
| Basin Slope     | = 0.0 %      | Hydraulic length   | = 0 ft         |
| Tc method       | = User       | Time of conc. (Tc) | = 7.90 min     |
| Total precip.   | = 7.42 in    | Distribution       | = Type II      |
| Storm duration  | = 24 hrs     | Shape factor       | = 484          |





# Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

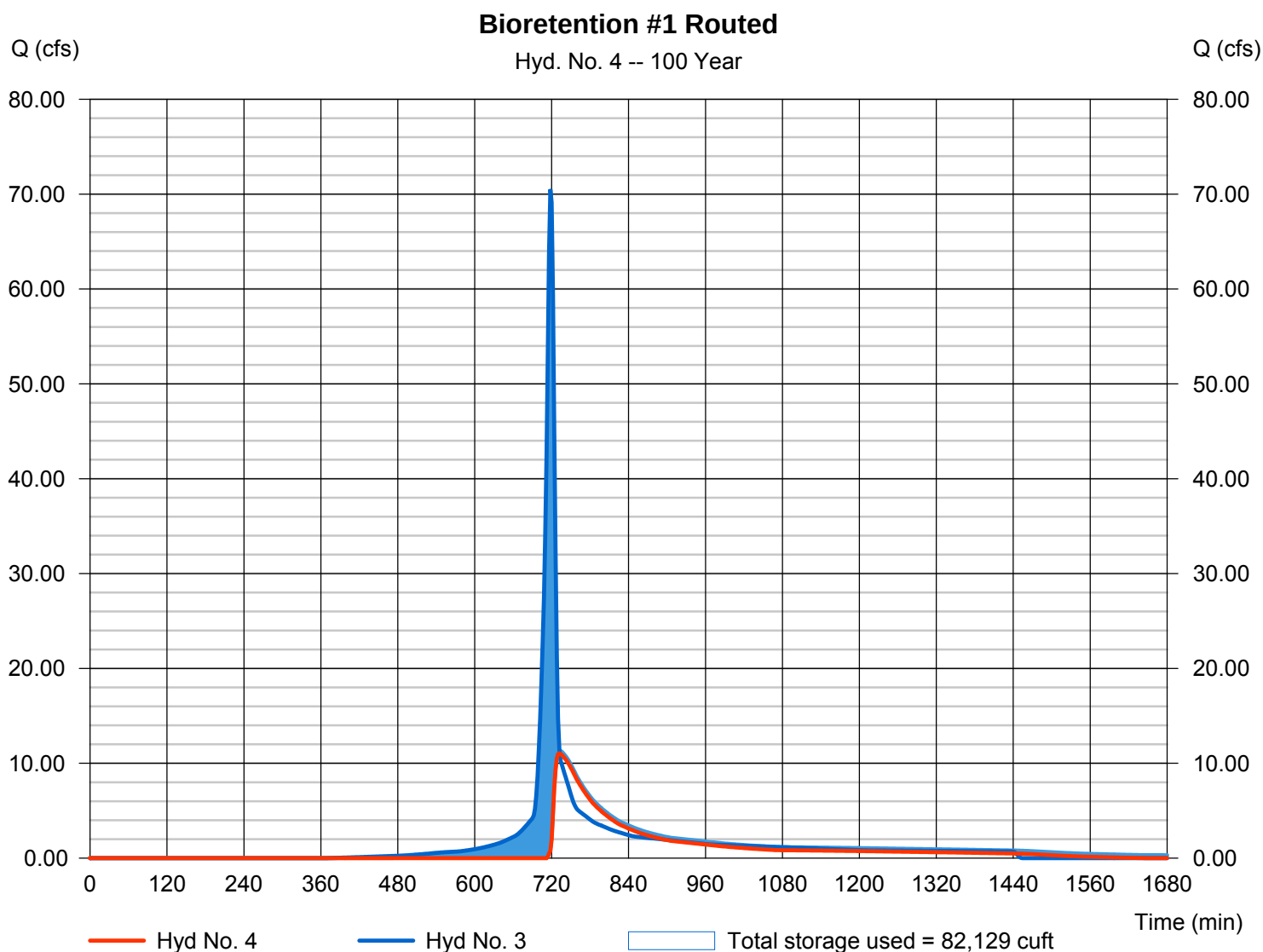
Thursday, 02 / 15 / 2018

## Hyd. No. 4

### Bioretention #1 Routed

|                 |                               |                |               |
|-----------------|-------------------------------|----------------|---------------|
| Hydrograph type | = Reservoir                   | Peak discharge | = 11.04 cfs   |
| Storm frequency | = 100 yrs                     | Time to peak   | = 732 min     |
| Time interval   | = 2 min                       | Hyd. volume    | = 87,090 cuft |
| Inflow hyd. No. | = 3 - DA-2P (Bioretention #1) | Max. Elevation | = 432.99 ft   |
| Reservoir name  | = Bioretention Basin #1       | Max. Storage   | = 82,129 cuft |

Storage Indication method used. Exfiltration extracted from Outflow.



# Hydrograph Report

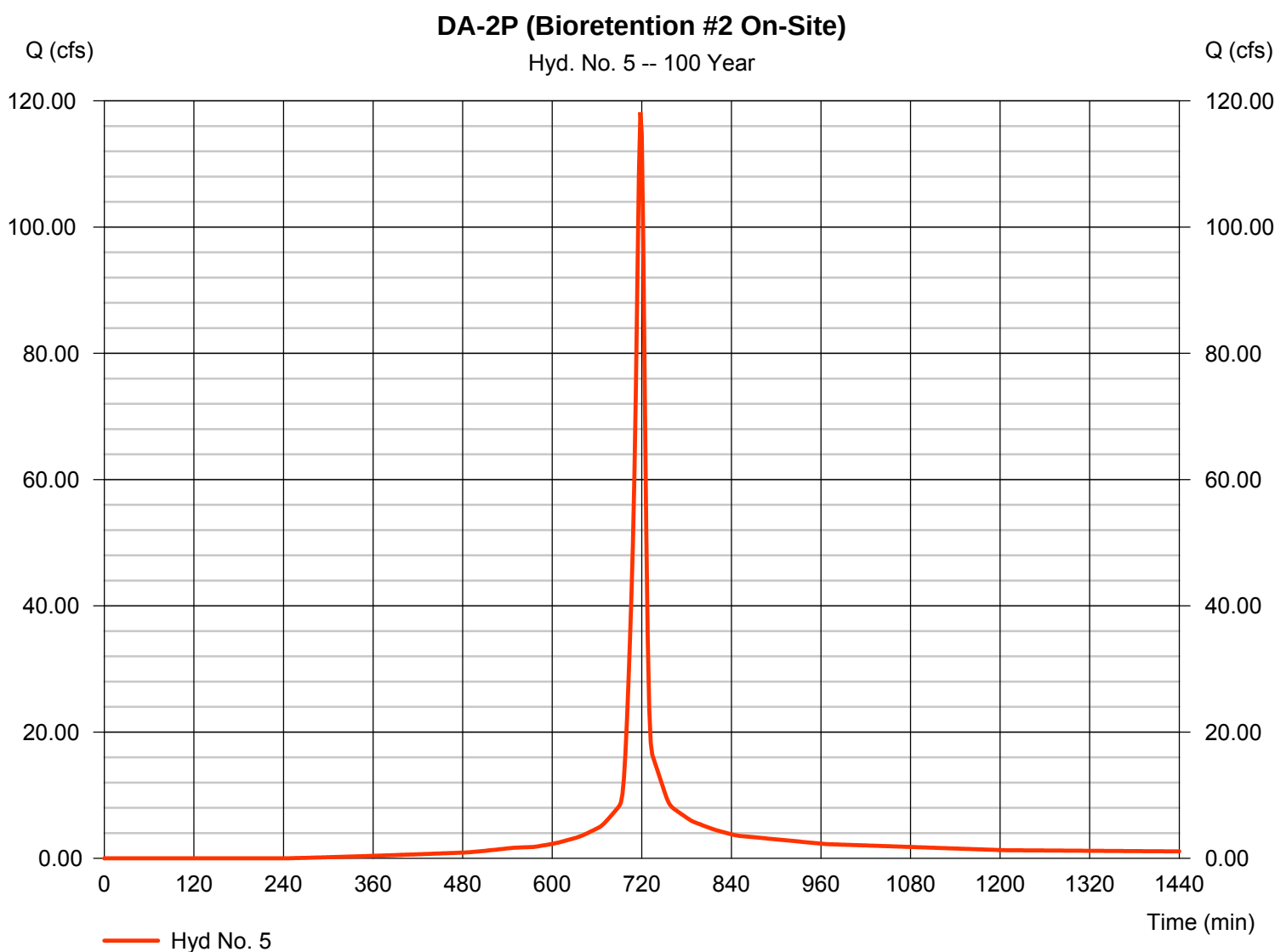
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

Thursday, 02 / 15 / 2018

## Hyd. No. 5

DA-2P (Bioretention #2 On-Site)

|                 |              |                    |                |
|-----------------|--------------|--------------------|----------------|
| Hydrograph type | = SCS Runoff | Peak discharge     | = 118.19 cfs   |
| Storm frequency | = 100 yrs    | Time to peak       | = 718 min      |
| Time interval   | = 2 min      | Hyd. volume        | = 282,869 cuft |
| Drainage area   | = 13.780 ac  | Curve number       | = 85           |
| Basin Slope     | = 0.0 %      | Hydraulic length   | = 0 ft         |
| Tc method       | = User       | Time of conc. (Tc) | = 8.00 min     |
| Total precip.   | = 7.42 in    | Distribution       | = Type II      |
| Storm duration  | = 24 hrs     | Shape factor       | = 484          |



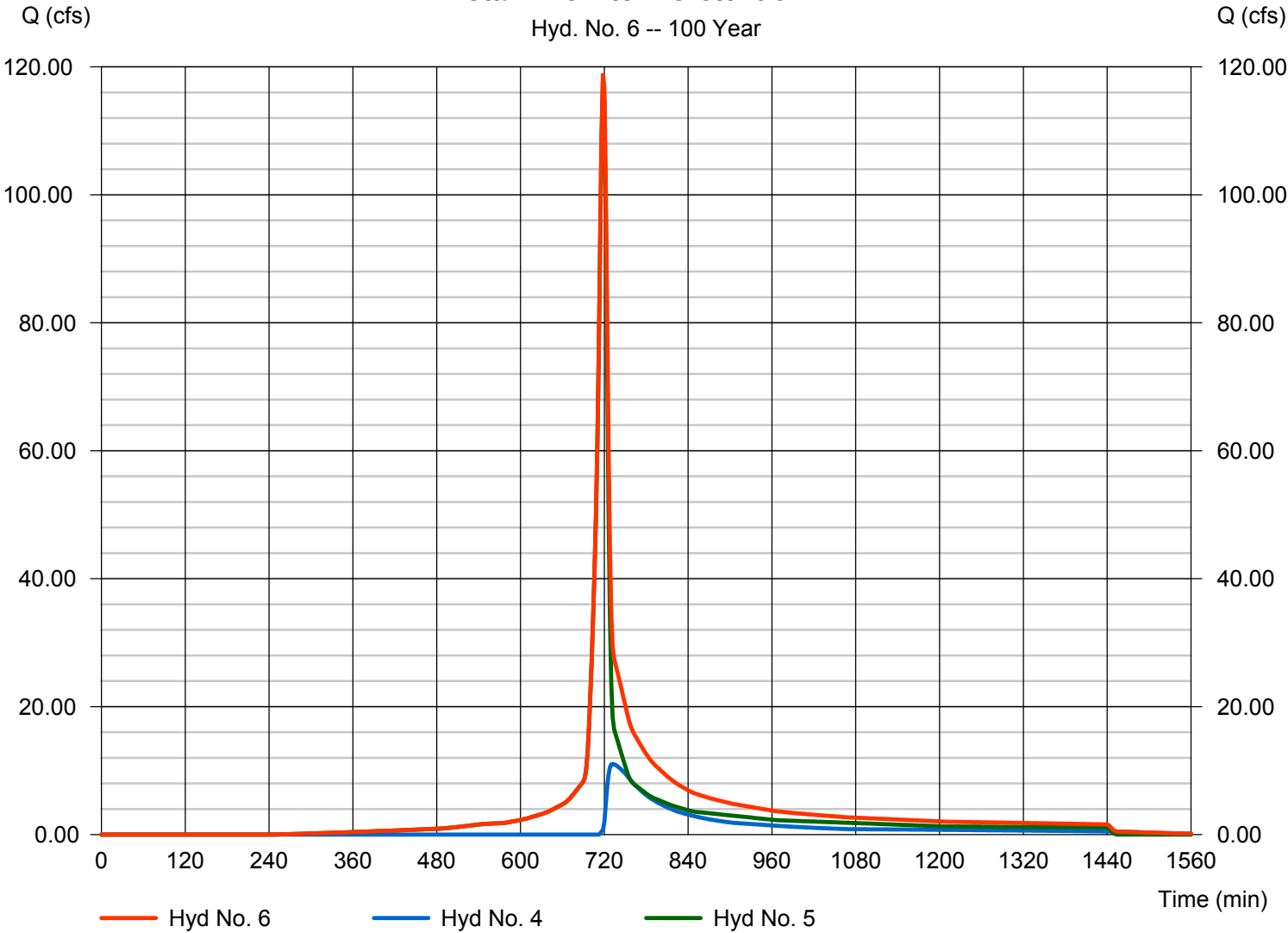
# Hydrograph Report

## Hyd. No. 6

Total Inflow to Bioretention #2

|                 |           |                      |                |
|-----------------|-----------|----------------------|----------------|
| Hydrograph type | = Combine | Peak discharge       | = 118.96 cfs   |
| Storm frequency | = 100 yrs | Time to peak         | = 718 min      |
| Time interval   | = 2 min   | Hyd. volume          | = 369,959 cuft |
| Inflow hyds.    | = 4, 5    | Contrib. drain. area | = 13.780 ac    |

Total Inflow to Bioretention #2



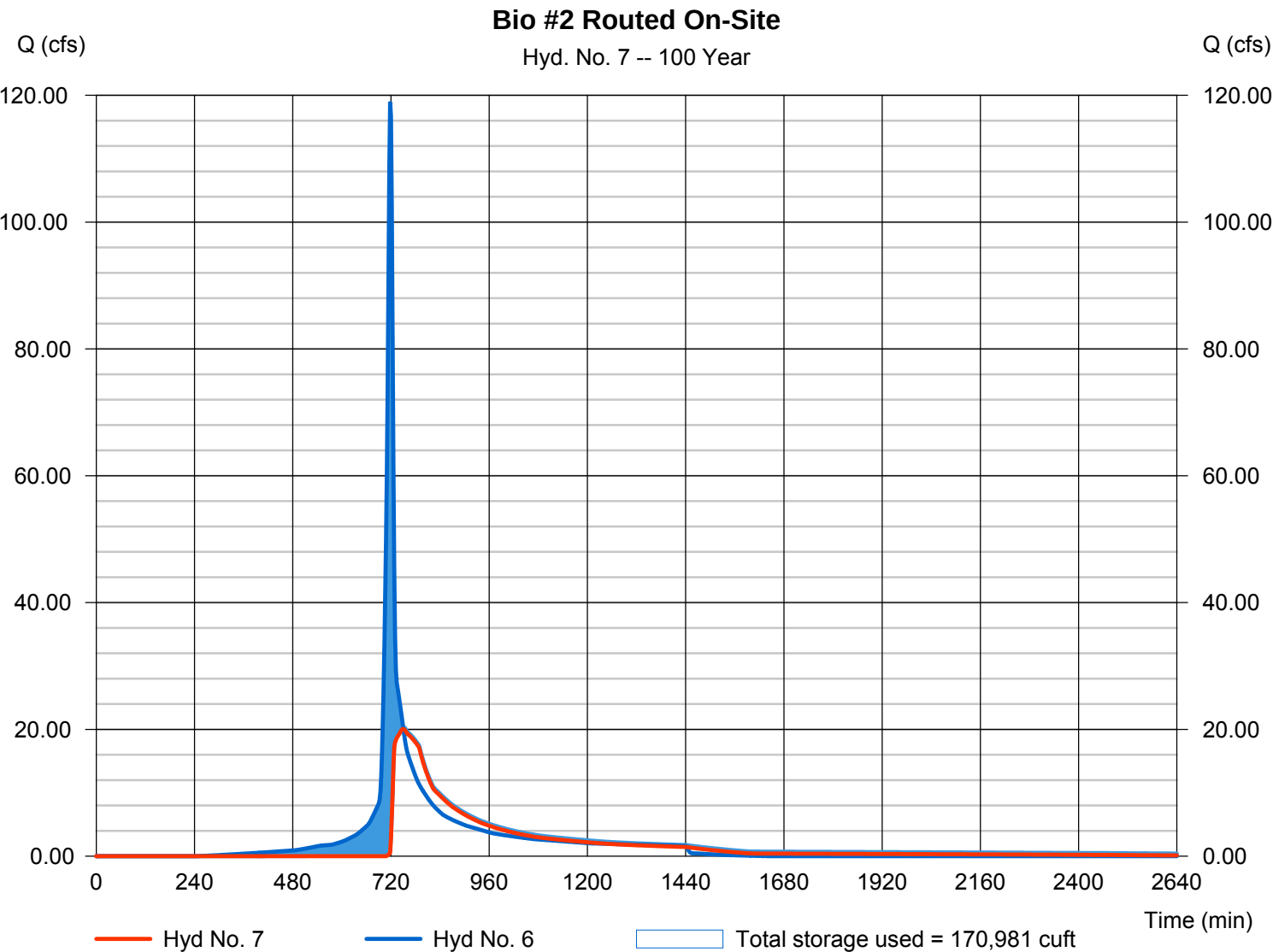
# Hydrograph Report

## Hyd. No. 7

Bio #2 Routed On-Site

|                 |                                       |                |                |
|-----------------|---------------------------------------|----------------|----------------|
| Hydrograph type | = Reservoir                           | Peak discharge | = 20.06 cfs    |
| Storm frequency | = 100 yrs                             | Time to peak   | = 750 min      |
| Time interval   | = 2 min                               | Hyd. volume    | = 259,290 cuft |
| Inflow hyd. No. | = 6 - Total Inflow to Bioretention #2 | Max. Elevation | = 426.43 ft    |
| Reservoir name  | = Bioretention Basin #2               | Max. Storage   | = 170,981 cuft |

Storage Indication method used. Exfiltration extracted from Outflow.



# Hydrograph Report

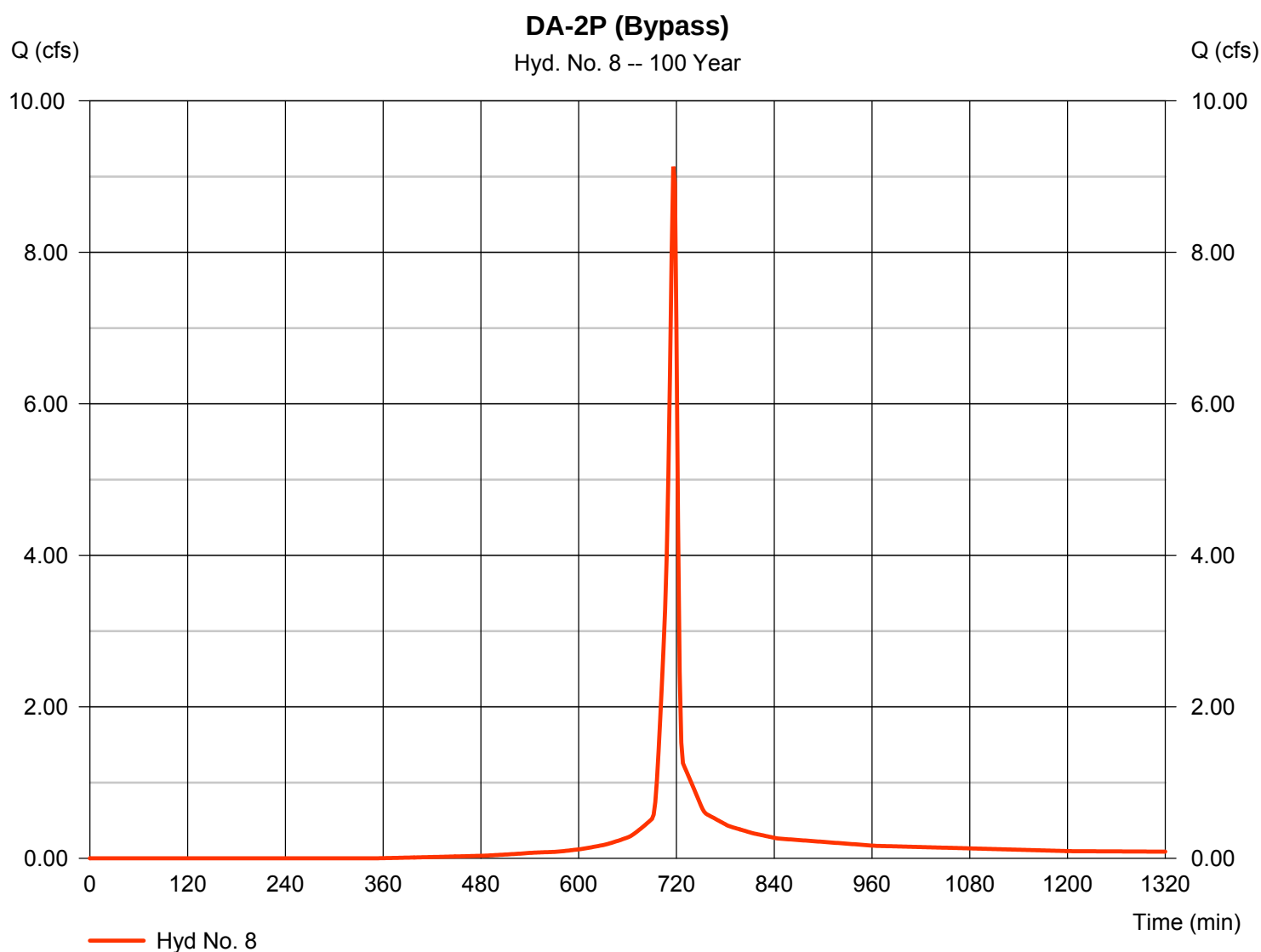
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

Thursday, 02 / 15 / 2018

## Hyd. No. 8

DA-2P (Bypass)

|                 |              |                    |               |
|-----------------|--------------|--------------------|---------------|
| Hydrograph type | = SCS Runoff | Peak discharge     | = 9.132 cfs   |
| Storm frequency | = 100 yrs    | Time to peak       | = 716 min     |
| Time interval   | = 2 min      | Hyd. volume        | = 18,845 cuft |
| Drainage area   | = 1.140 ac   | Curve number       | = 78          |
| Basin Slope     | = 0.0 %      | Hydraulic length   | = 0 ft        |
| Tc method       | = User       | Time of conc. (Tc) | = 5.00 min    |
| Total precip.   | = 7.42 in    | Distribution       | = Type II     |
| Storm duration  | = 24 hrs     | Shape factor       | = 484         |



# Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

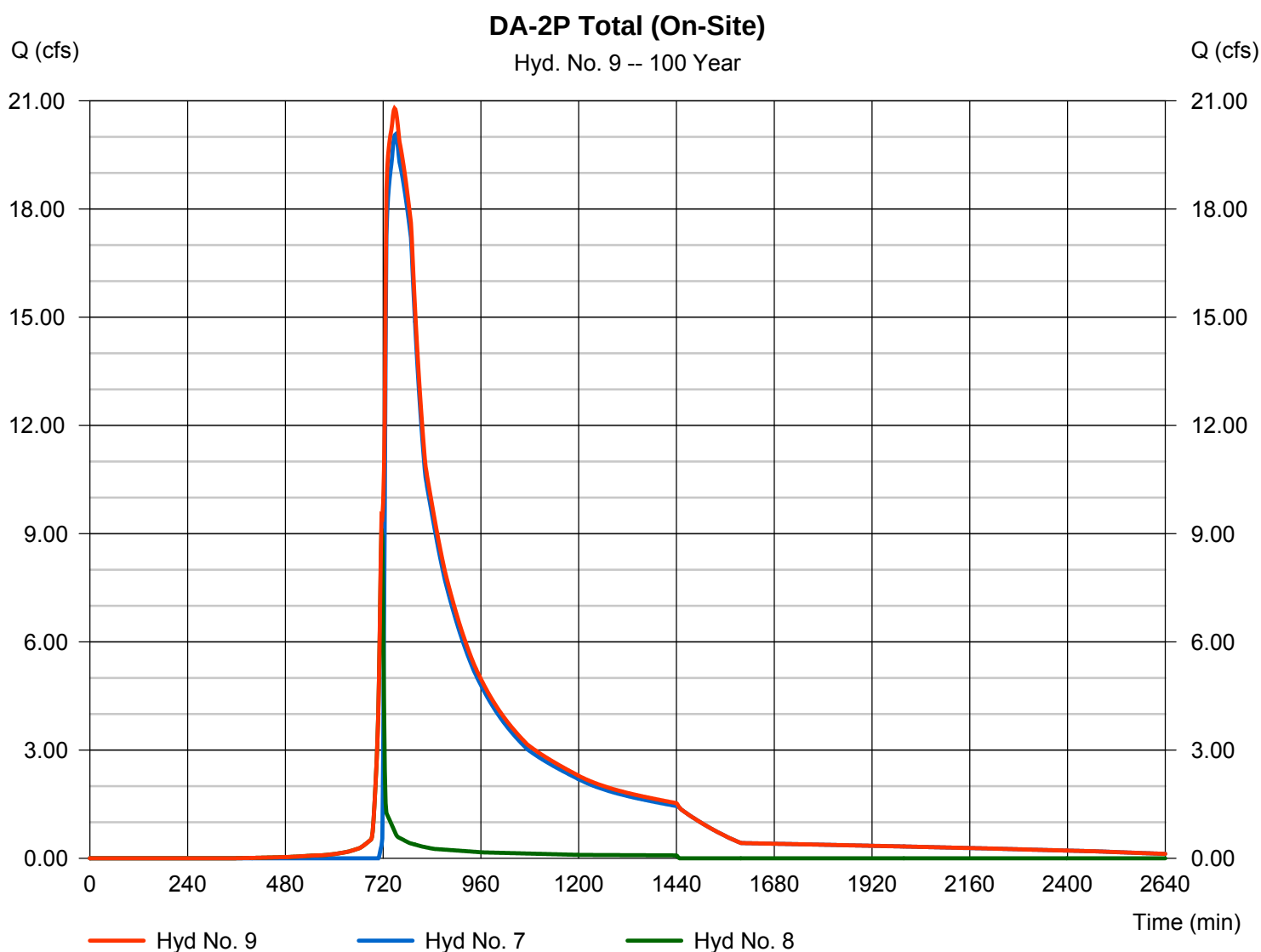
Thursday, 02 / 15 / 2018

## Hyd. No. 9

DA-2P Total (On-Site)

Hydrograph type = Combine  
Storm frequency = 100 yrs  
Time interval = 2 min  
Inflow hyds. = 7, 8

Peak discharge = 20.79 cfs  
Time to peak = 748 min  
Hyd. volume = 278,134 cuft  
Contrib. drain. area = 1.140 ac



# Hydrograph Report

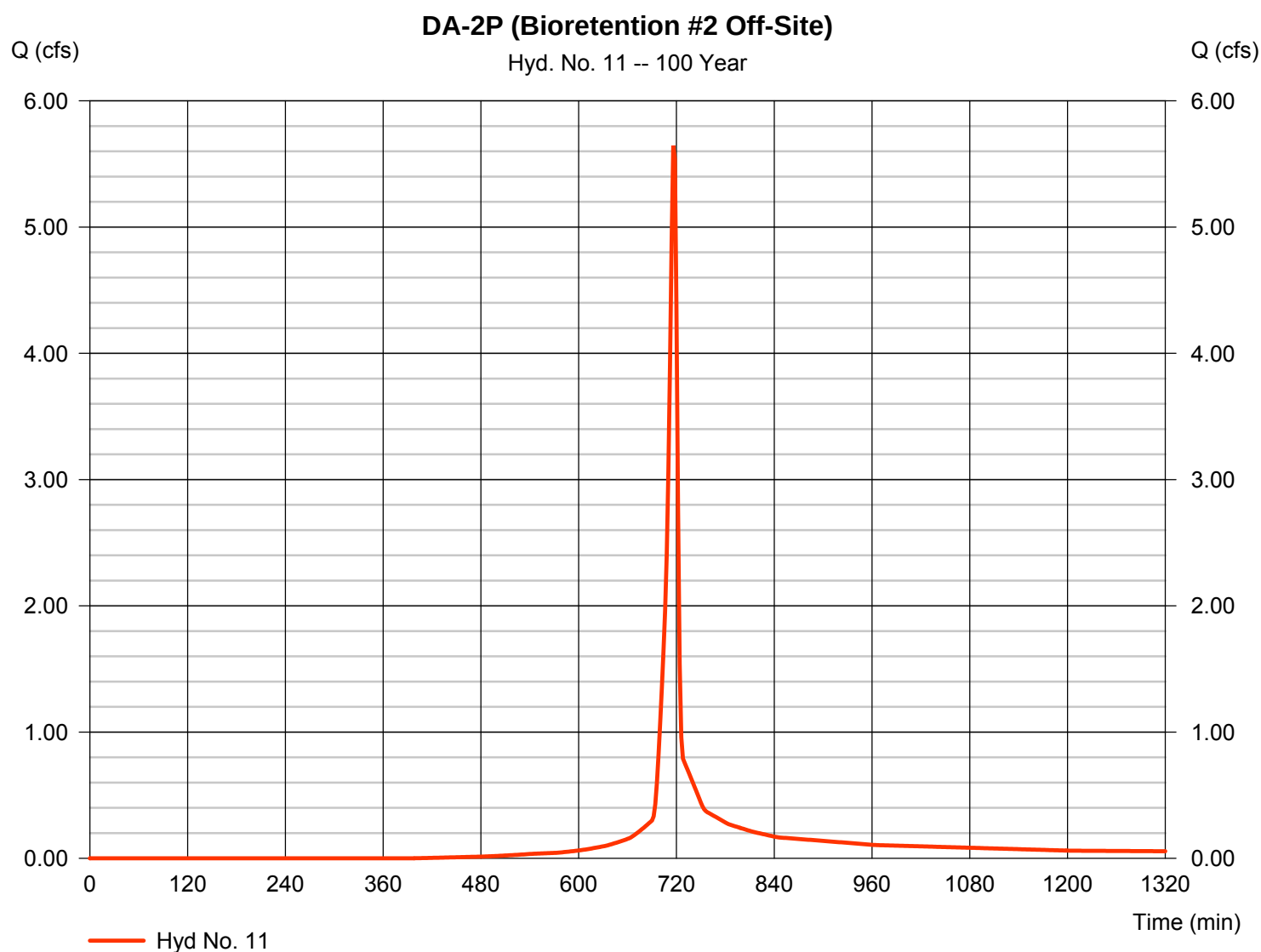
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

Thursday, 02 / 15 / 2018

## Hyd. No. 11

DA-2P (Bioretention #2 Off-Site)

|                 |              |                    |               |
|-----------------|--------------|--------------------|---------------|
| Hydrograph type | = SCS Runoff | Peak discharge     | = 5.645 cfs   |
| Storm frequency | = 100 yrs    | Time to peak       | = 716 min     |
| Time interval   | = 2 min      | Hyd. volume        | = 11,541 cuft |
| Drainage area   | = 0.750 ac   | Curve number       | = 75          |
| Basin Slope     | = 0.0 %      | Hydraulic length   | = 0 ft        |
| Tc method       | = User       | Time of conc. (Tc) | = 5.00 min    |
| Total precip.   | = 7.42 in    | Distribution       | = Type II     |
| Storm duration  | = 24 hrs     | Shape factor       | = 484         |





# Hydrograph Report

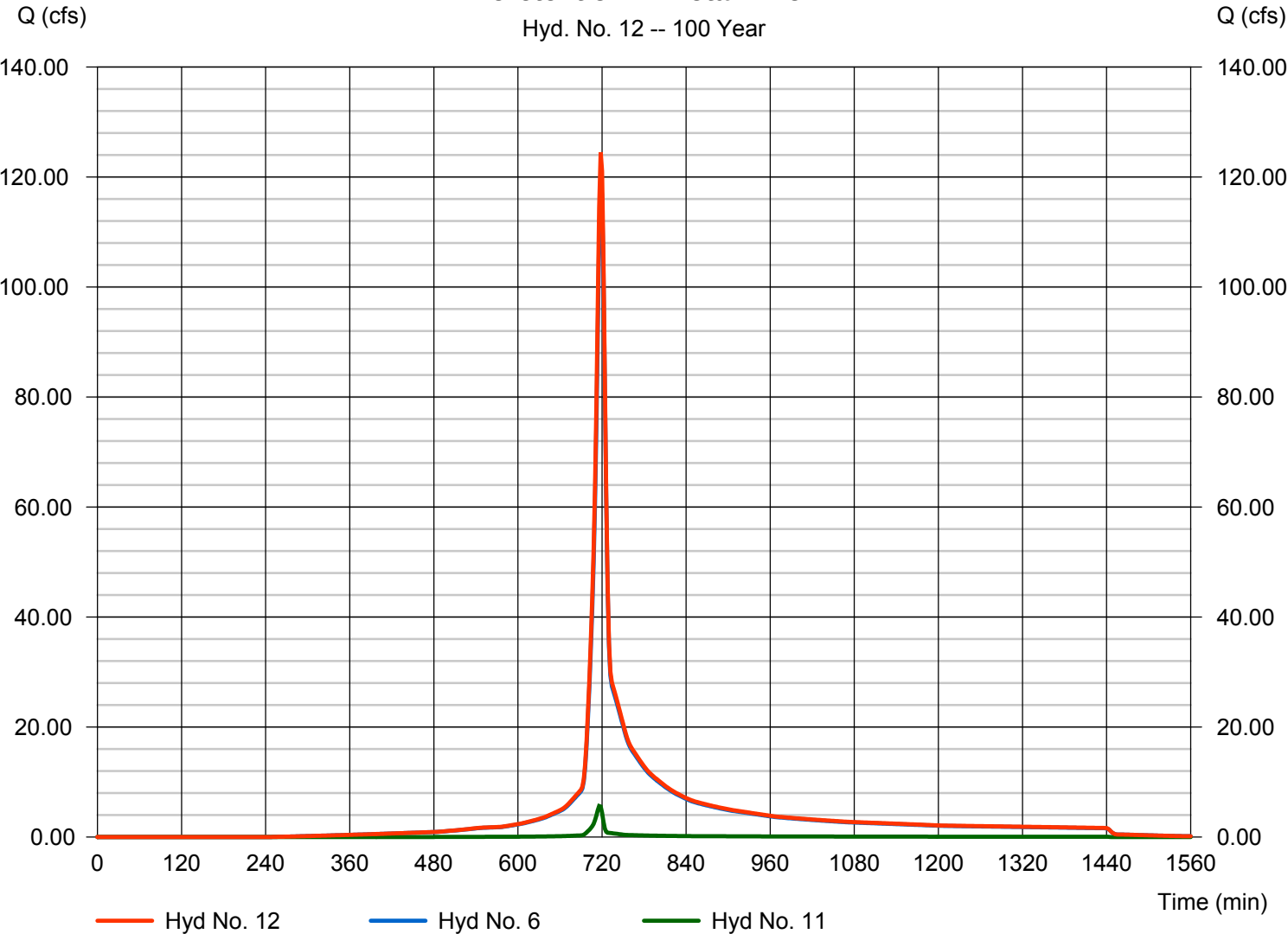
## Hyd. No. 12

### Bioretention #2 Total Inflow

|                 |           |                      |                |
|-----------------|-----------|----------------------|----------------|
| Hydrograph type | = Combine | Peak discharge       | = 124.49 cfs   |
| Storm frequency | = 100 yrs | Time to peak         | = 718 min      |
| Time interval   | = 2 min   | Hyd. volume          | = 381,500 cuft |
| Inflow hyds.    | = 6, 11   | Contrib. drain. area | = 0.750 ac     |

### Bioretention #2 Total Inflow

Hyd. No. 12 -- 100 Year



# Hydrograph Report

## Hyd. No. 13

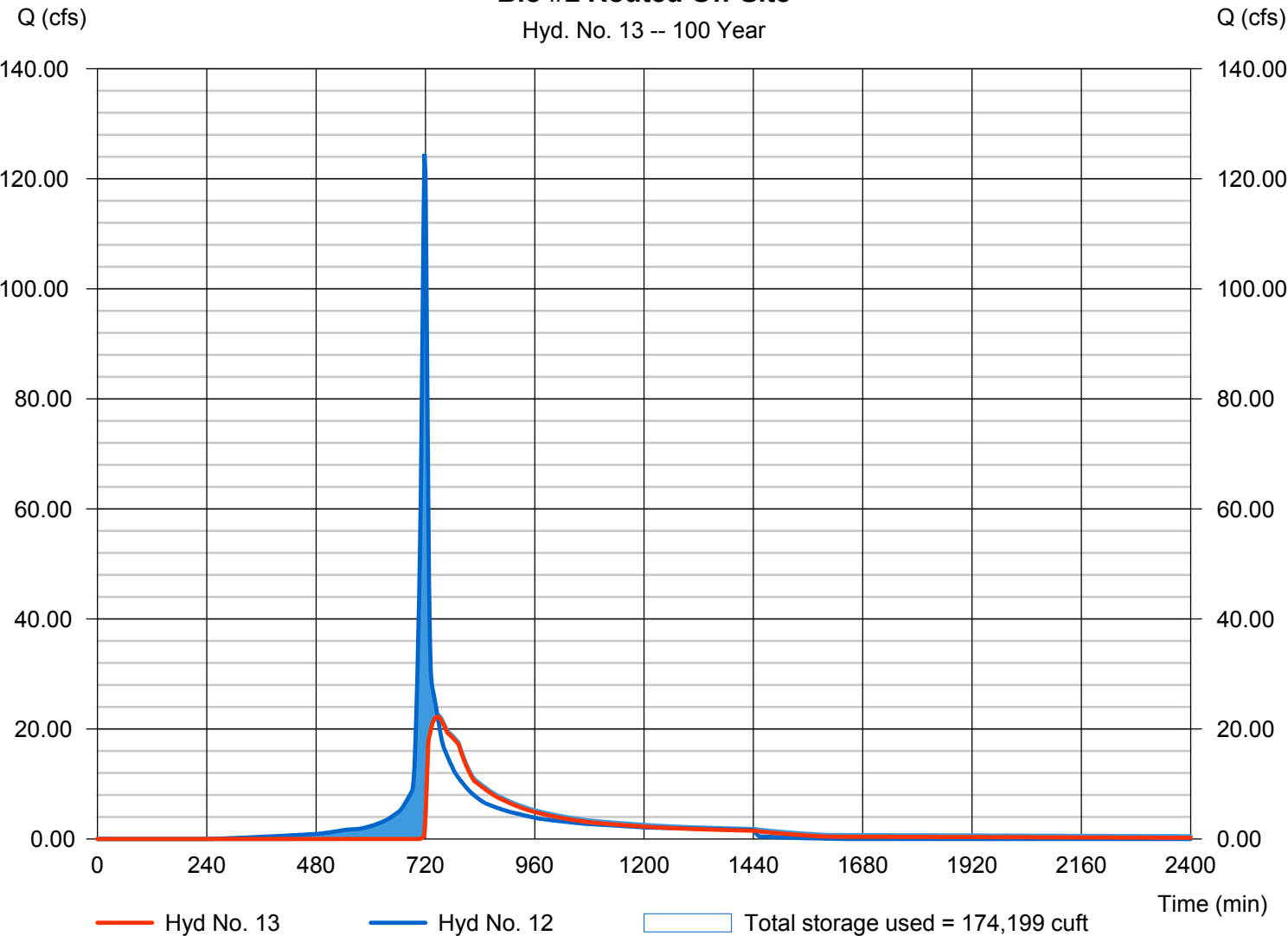
Bio #2 Routed Off-Site

|                 |                                     |                |                |
|-----------------|-------------------------------------|----------------|----------------|
| Hydrograph type | = Reservoir                         | Peak discharge | = 22.23 cfs    |
| Storm frequency | = 100 yrs                           | Time to peak   | = 746 min      |
| Time interval   | = 2 min                             | Hyd. volume    | = 270,761 cuft |
| Inflow hyd. No. | = 12 - Bioretention #2 Total Inflow | Max. Elevation | = 426.50 ft    |
| Reservoir name  | = Bioretention Basin #2             | Max. Storage   | = 174,199 cuft |

Storage Indication method used. Exfiltration extracted from Outflow.

### Bio #2 Routed Off-Site

Hyd. No. 13 -- 100 Year



# Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v10.5

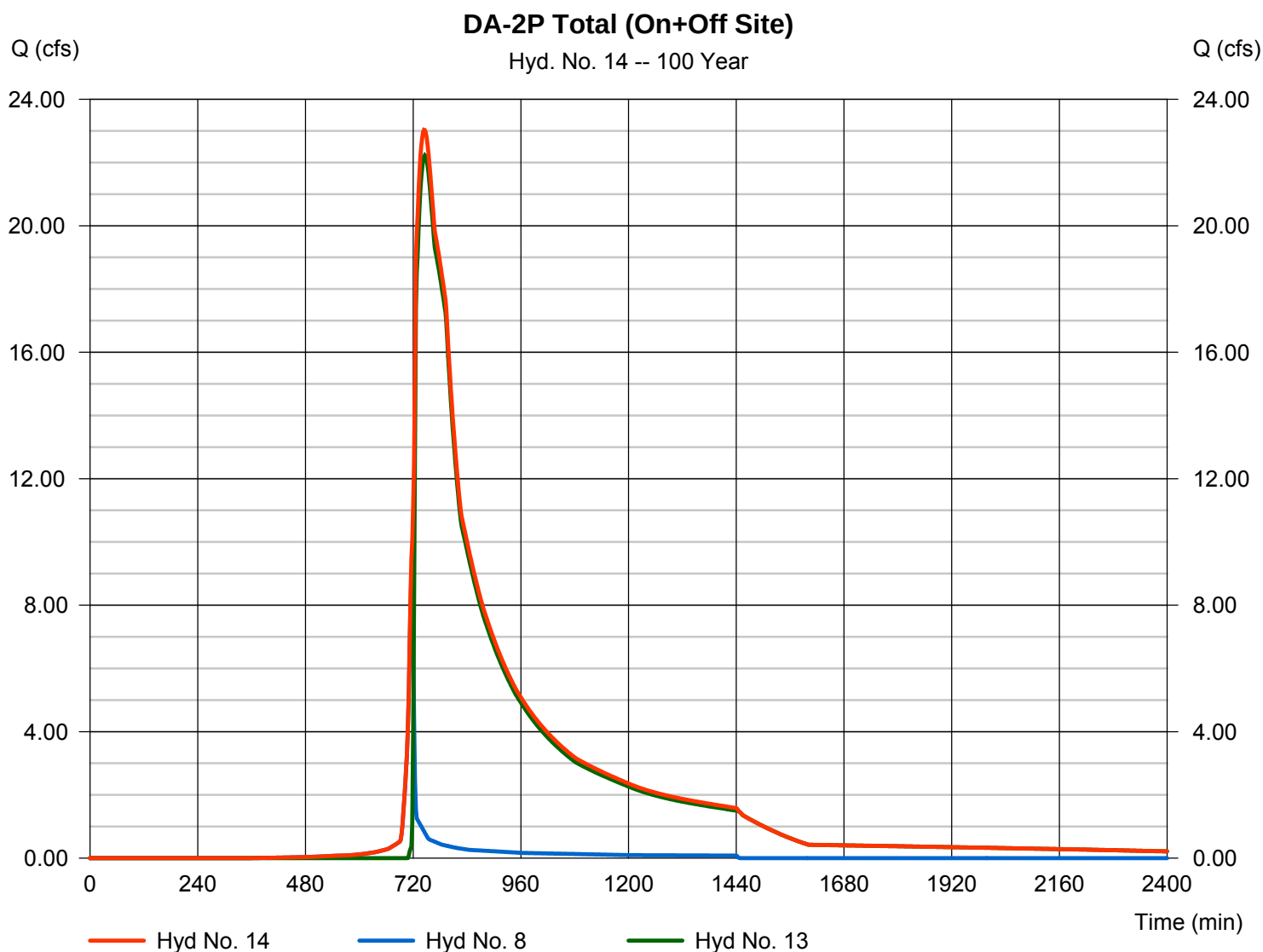
Thursday, 02 / 15 / 2018

## Hyd. No. 14

DA-2P Total (On+Off Site)

Hydrograph type = Combine  
Storm frequency = 100 yrs  
Time interval = 2 min  
Inflow hyds. = 8, 13

Peak discharge = 23.03 cfs  
Time to peak = 744 min  
Hyd. volume = 289,606 cuft  
Contrib. drain. area = 1.140 ac



## Storm Drainage

---



**NOAA Atlas 14, Volume 2, Version 3**  
**Location name: Chester Springs, Pennsylvania,**  
**US\***

**Latitude: 40.0831°, Longitude: -75.6887°**

**Elevation: 451 ft\***

\* source: Google Maps



**POINT PRECIPITATION FREQUENCY ESTIMATES**

G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M.Yekta, and D. Riley

NOAA, National Weather Service, Silver Spring, Maryland

[PF\\_tabular](#) | [PF\\_graphical](#) | [Maps\\_&\\_aerials](#)

**PF tabular**

| <b>PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches/hour)<sup>1</sup></b> |                                            |                               |                               |                               |                               |                               |                               |                               |                               |                               |
|---------------------------------------------------------------------------------------------------------------------|--------------------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
| <b>Duration</b>                                                                                                     | <b>Average recurrence interval (years)</b> |                               |                               |                               |                               |                               |                               |                               |                               |                               |
|                                                                                                                     | <b>1</b>                                   | <b>2</b>                      | <b>5</b>                      | <b>10</b>                     | <b>25</b>                     | <b>50</b>                     | <b>100</b>                    | <b>200</b>                    | <b>500</b>                    | <b>1000</b>                   |
| <b>5-min</b>                                                                                                        | <b>4.16</b><br>(3.80-4.57)                 | <b>4.96</b><br>(4.52-5.45)    | <b>5.78</b><br>(5.27-6.35)    | <b>6.37</b><br>(5.80-6.97)    | <b>7.02</b><br>(6.36-7.69)    | <b>7.46</b><br>(6.72-8.17)    | <b>7.88</b><br>(7.07-8.64)    | <b>8.24</b><br>(7.37-9.05)    | <b>8.64</b><br>(7.66-9.48)    | <b>8.92</b><br>(7.85-9.83)    |
| <b>10-min</b>                                                                                                       | <b>3.33</b><br>(3.04-3.65)                 | <b>3.97</b><br>(3.62-4.36)    | <b>4.63</b><br>(4.22-5.08)    | <b>5.09</b><br>(4.63-5.57)    | <b>5.60</b><br>(5.07-6.13)    | <b>5.94</b><br>(5.35-6.50)    | <b>6.27</b><br>(5.62-6.87)    | <b>6.53</b><br>(5.84-7.17)    | <b>6.83</b><br>(6.05-7.50)    | <b>7.02</b><br>(6.19-7.73)    |
| <b>15-min</b>                                                                                                       | <b>2.77</b><br>(2.53-3.04)                 | <b>3.32</b><br>(3.04-3.65)    | <b>3.90</b><br>(3.56-4.28)    | <b>4.29</b><br>(3.91-4.70)    | <b>4.73</b><br>(4.28-5.18)    | <b>5.02</b><br>(4.52-5.49)    | <b>5.28</b><br>(4.73-5.79)    | <b>5.50</b><br>(4.91-6.03)    | <b>5.74</b><br>(5.08-6.30)    | <b>5.88</b><br>(5.18-6.47)    |
| <b>30-min</b>                                                                                                       | <b>1.90</b><br>(1.74-2.09)                 | <b>2.29</b><br>(2.10-2.52)    | <b>2.77</b><br>(2.53-3.04)    | <b>3.11</b><br>(2.83-3.41)    | <b>3.50</b><br>(3.17-3.84)    | <b>3.78</b><br>(3.40-4.14)    | <b>4.05</b><br>(3.62-4.43)    | <b>4.28</b><br>(3.82-4.69)    | <b>4.56</b><br>(4.04-5.01)    | <b>4.76</b><br>(4.19-5.24)    |
| <b>60-min</b>                                                                                                       | <b>1.19</b><br>(1.08-1.30)                 | <b>1.44</b><br>(1.31-1.58)    | <b>1.78</b><br>(1.62-1.95)    | <b>2.02</b><br>(1.84-2.22)    | <b>2.33</b><br>(2.11-2.55)    | <b>2.56</b><br>(2.30-2.80)    | <b>2.79</b><br>(2.50-3.05)    | <b>3.00</b><br>(2.68-3.29)    | <b>3.27</b><br>(2.90-3.59)    | <b>3.47</b><br>(3.06-3.83)    |
| <b>2-hr</b>                                                                                                         | <b>0.706</b><br>(0.638-0.784)              | <b>0.858</b><br>(0.774-0.952) | <b>1.06</b><br>(0.961-1.18)   | <b>1.23</b><br>(1.10-1.36)    | <b>1.43</b><br>(1.28-1.59)    | <b>1.60</b><br>(1.42-1.77)    | <b>1.76</b><br>(1.56-1.95)    | <b>1.93</b><br>(1.69-2.13)    | <b>2.15</b><br>(1.86-2.38)    | <b>2.32</b><br>(1.99-2.57)    |
| <b>3-hr</b>                                                                                                         | <b>0.512</b><br>(0.463-0.569)              | <b>0.620</b><br>(0.560-0.690) | <b>0.773</b><br>(0.696-0.858) | <b>0.889</b><br>(0.799-0.986) | <b>1.04</b><br>(0.931-1.15)   | <b>1.16</b><br>(1.03-1.28)    | <b>1.28</b><br>(1.13-1.42)    | <b>1.40</b><br>(1.23-1.55)    | <b>1.56</b><br>(1.35-1.73)    | <b>1.69</b><br>(1.45-1.87)    |
| <b>6-hr</b>                                                                                                         | <b>0.318</b><br>(0.287-0.354)              | <b>0.384</b><br>(0.348-0.428) | <b>0.477</b><br>(0.430-0.531) | <b>0.551</b><br>(0.496-0.612) | <b>0.655</b><br>(0.585-0.725) | <b>0.737</b><br>(0.654-0.815) | <b>0.824</b><br>(0.725-0.910) | <b>0.915</b><br>(0.797-1.01)  | <b>1.04</b><br>(0.893-1.15)   | <b>1.14</b><br>(0.965-1.26)   |
| <b>12-hr</b>                                                                                                        | <b>0.192</b><br>(0.173-0.215)              | <b>0.231</b><br>(0.209-0.260) | <b>0.289</b><br>(0.260-0.323) | <b>0.336</b><br>(0.302-0.376) | <b>0.404</b><br>(0.359-0.450) | <b>0.461</b><br>(0.406-0.512) | <b>0.523</b><br>(0.455-0.580) | <b>0.589</b><br>(0.506-0.653) | <b>0.683</b><br>(0.576-0.758) | <b>0.761</b><br>(0.632-0.843) |
| <b>24-hr</b>                                                                                                        | <b>0.112</b><br>(0.103-0.123)              | <b>0.135</b><br>(0.124-0.148) | <b>0.169</b><br>(0.155-0.186) | <b>0.197</b><br>(0.180-0.216) | <b>0.238</b><br>(0.216-0.261) | <b>0.273</b><br>(0.246-0.298) | <b>0.309</b><br>(0.278-0.337) | <b>0.349</b><br>(0.311-0.380) | <b>0.406</b><br>(0.359-0.443) | <b>0.454</b><br>(0.398-0.495) |
| <b>2-day</b>                                                                                                        | <b>0.065</b><br>(0.059-0.072)              | <b>0.079</b><br>(0.072-0.087) | <b>0.098</b><br>(0.090-0.109) | <b>0.115</b><br>(0.104-0.126) | <b>0.138</b><br>(0.124-0.151) | <b>0.156</b><br>(0.141-0.172) | <b>0.176</b><br>(0.158-0.194) | <b>0.198</b><br>(0.176-0.217) | <b>0.228</b><br>(0.201-0.251) | <b>0.253</b><br>(0.221-0.278) |
| <b>3-day</b>                                                                                                        | <b>0.046</b><br>(0.042-0.051)              | <b>0.055</b><br>(0.050-0.061) | <b>0.069</b><br>(0.063-0.076) | <b>0.080</b><br>(0.073-0.089) | <b>0.096</b><br>(0.087-0.106) | <b>0.109</b><br>(0.098-0.120) | <b>0.123</b><br>(0.110-0.135) | <b>0.138</b><br>(0.123-0.151) | <b>0.159</b><br>(0.140-0.175) | <b>0.176</b><br>(0.154-0.193) |
| <b>4-day</b>                                                                                                        | <b>0.036</b><br>(0.033-0.040)              | <b>0.043</b><br>(0.040-0.048) | <b>0.054</b><br>(0.049-0.060) | <b>0.063</b><br>(0.057-0.070) | <b>0.075</b><br>(0.068-0.083) | <b>0.085</b><br>(0.077-0.094) | <b>0.096</b><br>(0.086-0.106) | <b>0.108</b><br>(0.096-0.118) | <b>0.124</b><br>(0.109-0.136) | <b>0.137</b><br>(0.120-0.151) |
| <b>7-day</b>                                                                                                        | <b>0.024</b><br>(0.022-0.026)              | <b>0.029</b><br>(0.027-0.032) | <b>0.036</b><br>(0.033-0.039) | <b>0.041</b><br>(0.038-0.045) | <b>0.049</b><br>(0.045-0.054) | <b>0.056</b><br>(0.051-0.061) | <b>0.063</b><br>(0.057-0.068) | <b>0.070</b><br>(0.063-0.076) | <b>0.081</b><br>(0.072-0.088) | <b>0.089</b><br>(0.079-0.097) |
| <b>10-day</b>                                                                                                       | <b>0.019</b><br>(0.018-0.021)              | <b>0.023</b><br>(0.021-0.025) | <b>0.028</b><br>(0.026-0.030) | <b>0.032</b><br>(0.029-0.035) | <b>0.038</b><br>(0.035-0.041) | <b>0.042</b><br>(0.039-0.046) | <b>0.047</b><br>(0.043-0.051) | <b>0.052</b><br>(0.047-0.056) | <b>0.058</b><br>(0.053-0.063) | <b>0.064</b><br>(0.057-0.069) |
| <b>20-day</b>                                                                                                       | <b>0.013</b><br>(0.012-0.014)              | <b>0.015</b><br>(0.014-0.017) | <b>0.018</b><br>(0.017-0.020) | <b>0.021</b><br>(0.019-0.022) | <b>0.024</b><br>(0.022-0.026) | <b>0.026</b><br>(0.024-0.028) | <b>0.029</b><br>(0.027-0.031) | <b>0.031</b><br>(0.029-0.034) | <b>0.035</b><br>(0.032-0.037) | <b>0.037</b><br>(0.034-0.040) |
| <b>30-day</b>                                                                                                       | <b>0.011</b><br>(0.010-0.011)              | <b>0.013</b><br>(0.012-0.014) | <b>0.015</b><br>(0.014-0.016) | <b>0.016</b><br>(0.015-0.018) | <b>0.019</b><br>(0.017-0.020) | <b>0.020</b><br>(0.019-0.021) | <b>0.022</b><br>(0.020-0.023) | <b>0.023</b><br>(0.022-0.025) | <b>0.025</b><br>(0.023-0.027) | <b>0.027</b><br>(0.025-0.029) |
| <b>45-day</b>                                                                                                       | <b>0.009</b><br>(0.009-0.010)              | <b>0.011</b><br>(0.010-0.011) | <b>0.012</b><br>(0.012-0.013) | <b>0.014</b><br>(0.013-0.014) | <b>0.015</b><br>(0.014-0.016) | <b>0.016</b><br>(0.015-0.017) | <b>0.017</b><br>(0.016-0.018) | <b>0.018</b><br>(0.017-0.019) | <b>0.019</b><br>(0.018-0.021) | <b>0.020</b><br>(0.019-0.022) |
| <b>60-day</b>                                                                                                       | <b>0.008</b><br>(0.008-0.009)              | <b>0.010</b><br>(0.009-0.010) | <b>0.011</b><br>(0.010-0.012) | <b>0.012</b><br>(0.011-0.013) | <b>0.013</b><br>(0.013-0.014) | <b>0.014</b><br>(0.013-0.015) | <b>0.015</b><br>(0.014-0.016) | <b>0.016</b><br>(0.015-0.017) | <b>0.017</b><br>(0.016-0.018) | <b>0.017</b><br>(0.016-0.018) |

<sup>1</sup> Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).  
Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.  
Please refer to NOAA Atlas 14 document for more information.

[Back to Top](#)

## Runoff Calculations C Worksheet

Project: Byers - Commercial Tract

Description: Proposed Inlet Drainage Areas

| Drainage Area                        | Land Use Description | C    | Area (Acres) | Total Area (Acres) | Weighted C |
|--------------------------------------|----------------------|------|--------------|--------------------|------------|
| <b>EXISTING INELTS   RESIDENTIAL</b> |                      |      |              |                    |            |
| IN24                                 | Impervious           | 0.99 | 0.04         | 0.06               | 0.74       |
|                                      | Pervious             | 0.25 | 0.02         |                    |            |
| IN25                                 | Impervious           | 0.99 | 0.42         | 0.58               | 0.79       |
|                                      | Pervious             | 0.25 | 0.16         |                    |            |
| IN26                                 | Impervious           | 0.99 | 0.26         | 0.34               | 0.82       |
|                                      | Pervious             | 0.25 | 0.08         |                    |            |
| IN27                                 | Impervious           | 0.99 | 0.11         | 0.11               | 0.99       |
|                                      | Pervious             | 0.25 |              |                    |            |
| IN28                                 | Impervious           | 0.99 | 0.08         | 0.09               | 0.91       |
|                                      | Pervious             | 0.25 | 0.01         |                    |            |
| IN29                                 | Impervious           | 0.99 | 0.16         | 0.25               | 0.72       |
|                                      | Pervious             | 0.25 | 0.09         |                    |            |
| IN30                                 | Impervious           | 0.99 | 0.07         | 0.11               | 0.72       |
|                                      | Pervious             | 0.25 | 0.04         |                    |            |
| IN31                                 | Impervious           | 0.99 | 0.01         | 0.02               | 0.62       |
|                                      | Pervious             | 0.25 | 0.01         |                    |            |
| IN32                                 | Impervious           | 0.99 | 0.11         | 0.13               | 0.88       |
|                                      | Pervious             | 0.25 | 0.02         |                    |            |
| IN33                                 | Impervious           | 0.99 | 0.56         | 0.59               | 0.95       |
|                                      | Pervious             | 0.25 | 0.03         |                    |            |
| IN34                                 | Impervious           | 0.99 | 0.02         | 0.02               | 0.99       |
|                                      | Pervious             | 0.25 |              |                    |            |
| IN37                                 | Impervious           | 0.99 | 0.04         | 0.04               | 0.99       |
|                                      | Pervious             | 0.25 |              |                    |            |
| IN38                                 | Impervious           | 0.99 | 0.16         | 0.22               | 0.79       |
|                                      | Pervious             | 0.25 | 0.06         |                    |            |
| IN39                                 | Impervious           | 0.99 | 0.02         | 0.02               | 0.99       |
|                                      | Pervious             | 0.25 |              |                    |            |
| IN41                                 | Impervious           | 0.99 | 0.05         | 0.05               | 0.99       |
|                                      | Pervious             | 0.25 |              |                    |            |

## Runoff Calculations C Worksheet

Project: Byers - Commercial Tract

Description: Proposed Inlet Drainage Areas

| Drainage Area                         | Land Use Description | C    | Area (Acres) | Total Area (Acres) | Weighted C |
|---------------------------------------|----------------------|------|--------------|--------------------|------------|
| IN42                                  | Impervious           | 0.99 | 0.07         | 0.07               | 0.99       |
|                                       | Pervious             | 0.25 |              |                    |            |
| IN43                                  | Impervious           | 0.99 | 0.02         | 0.02               | 0.99       |
|                                       | Pervious             | 0.25 |              |                    |            |
| IN48                                  | Impervious           | 0.99 | 0.19         | 0.99               | 0.39       |
|                                       | Pervious             | 0.25 | 0.80         |                    |            |
| IN49                                  | Impervious           | 0.99 | 0.14         | 0.52               | 0.45       |
|                                       | Pervious             | 0.25 | 0.38         |                    |            |
| IN58                                  | Impervious           | 0.99 | 0.73         | 1.38               | 0.64       |
|                                       | Pervious             | 0.25 | 0.65         |                    |            |
| PROPOSED INLETS   COMMERCIAL PHASE 2A |                      |      |              |                    |            |
| IN35                                  | Impervious           | 0.99 | 0.04         | 0.20               | 0.40       |
|                                       | Pervious             | 0.25 | 0.16         |                    |            |
| IN36                                  | Impervious           | 0.99 | 0.04         | 0.09               | 0.58       |
|                                       | Pervious             | 0.25 | 0.05         |                    |            |
| IN40                                  | Impervious           | 0.99 | 0.13         | 0.19               | 0.76       |
|                                       | Pervious             | 0.25 | 0.06         |                    |            |
| IN44                                  | Impervious           | 0.99 | 0.10         | 0.20               | 0.62       |
|                                       | Pervious             | 0.25 | 0.10         |                    |            |
| IN45                                  | Impervious           | 0.99 | 0.02         | 0.06               | 0.50       |
|                                       | Pervious             | 0.25 | 0.04         |                    |            |
| IN46                                  | Impervious           | 0.99 | 0.05         | 0.08               | 0.71       |
|                                       | Pervious             | 0.25 | 0.03         |                    |            |
| RD01A (IN203 OUTFALL)                 | Impervious           | 0.99 | 0.18         | 0.18               | 0.99       |
|                                       | Pervious             | 0.25 | 0.00         |                    |            |
| RD01B (IN 201 OUTFALL)                | Impervious           | 0.99 | 0.17         | 0.17               | 0.99       |
|                                       | Pervious             | 0.25 | 0.00         |                    |            |
| RD01C (MH03 OUTFALL)                  | Impervious           | 0.99 | 0.18         | 0.18               | 0.99       |
|                                       | Pervious             | 0.25 | 0.00         |                    |            |
| RD01D (MH02 OUTFALL)                  | Impervious           | 0.99 | 0.15         | 0.15               | 0.99       |
|                                       | Pervious             | 0.25 | 0.00         |                    |            |
| RD02 (MH01 OUTFALL)                   | Impervious           | 0.99 | 0.23         | 0.23               | 0.99       |
|                                       | Pervious             | 0.25 | 0.00         |                    |            |
| RD03 (IN220 OUTFALL)                  | Impervious           | 0.99 | 0.05         | 0.05               | 0.98       |
|                                       | Pervious             | 0.25 | 0.00         |                    |            |
| TD201                                 | Impervious           | 0.99 | 0.03         | 0.03               | 0.97       |
|                                       | Pervious             | 0.25 | 0.00         |                    |            |
| IN201                                 | Impervious           | 0.99 | 0.11         | 0.14               | 0.83       |
|                                       | Pervious             | 0.25 | 0.03         |                    |            |
| IN202                                 | Impervious           | 0.99 | 0.11         | 0.17               | 0.73       |
|                                       | Pervious             | 0.25 | 0.06         |                    |            |
| IN203                                 | Impervious           | 0.99 | 0.09         | 0.15               | 0.69       |
|                                       | Pervious             | 0.25 | 0.06         |                    |            |
| IN204                                 | Impervious           | 0.99 | 0.07         | 0.14               | 0.62       |
|                                       | Pervious             | 0.25 | 0.07         |                    |            |
| IN205                                 | Impervious           | 0.99 | 0.08         | 0.12               | 0.74       |
|                                       | Pervious             | 0.25 | 0.04         |                    |            |
| IN206                                 | Impervious           | 0.99 | 0.03         | 0.05               | 0.69       |
|                                       | Pervious             | 0.25 | 0.02         |                    |            |
| IN207                                 | Impervious           | 0.99 | 0.24         | 0.29               | 0.86       |
|                                       | Pervious             | 0.25 | 0.05         |                    |            |

## Runoff Calculations C Worksheet

Project: Byers - Commercial Tract

Description: Proposed Inlet Drainage Areas

| Drainage Area | Land Use Description | C    | Area (Acres) | Total Area (Acres) | Weighted C |
|---------------|----------------------|------|--------------|--------------------|------------|
| IN208         | Impervious           | 0.99 | 0.20         | 0.51               | 0.54       |
|               | Pervious             | 0.25 | 0.31         |                    |            |
| IN209         | Impervious           | 0.99 | 0.45         | 0.52               | 0.89       |
|               | Pervious             | 0.25 | 0.07         |                    |            |
| IN210         | Impervious           | 0.99 | 0.19         | 0.53               | 0.52       |
|               | Pervious             | 0.25 | 0.34         |                    |            |
| IN211         | Impervious           | 0.99 | 0.38         | 0.45               | 0.87       |
|               | Pervious             | 0.25 | 0.07         |                    |            |
| IN212         | Impervious           | 0.99 | 0.18         | 0.31               | 0.68       |
|               | Pervious             | 0.25 | 0.13         |                    |            |
| IN213         | Impervious           | 0.99 | 0.38         | 0.46               | 0.86       |
|               | Pervious             | 0.25 | 0.08         |                    |            |
| IN214         | Impervious           | 0.99 | 0.37         | 0.45               | 0.86       |
|               | Pervious             | 0.25 | 0.08         |                    |            |
| IN215         | Impervious           | 0.99 | 0.16         | 0.22               | 0.79       |
|               | Pervious             | 0.25 | 0.06         |                    |            |
| IN216         | Impervious           | 0.99 | 0.18         | 0.28               | 0.73       |
|               | Pervious             | 0.25 | 0.10         |                    |            |
| IN217         | Impervious           | 0.99 | 0.01         | 1.09               | 0.26       |
|               | Pervious             | 0.25 | 1.08         |                    |            |
| IN218         | Impervious           | 0.99 | 0.00         | 1.31               | 0.25       |
|               | Pervious             | 0.25 | 1.31         |                    |            |
| IN219         | Impervious           | 0.99 | 0.35         | 0.59               | 0.69       |
|               | Pervious             | 0.25 | 0.24         |                    |            |
| IN220         | Impervious           | 0.99 | 0.08         | 0.10               | 0.84       |
|               | Pervious             | 0.25 | 0.02         |                    |            |
| IN221         | Impervious           | 0.99 | 0.03         | 0.03               | 0.97       |
|               | Pervious             | 0.25 | 0.00         |                    |            |
| YD201         | Impervious           | 0.99 |              | 0.05               | 0.25       |
|               | Pervious             | 0.25 | 0.05         |                    |            |



## Peak Discharge Calculations

Project: Byers - Commercial Tract

Description: Curb Break and Swale Flows

### Runoff Coefficients

|                   |      |
|-------------------|------|
| Open Space, Lawns | 0.26 |
| Meadow            | 0.22 |
| Impervious        | 0.98 |
|                   |      |
|                   |      |

NOAA - Chester Springs IDF  
Conversion Factor,  $k^*$   
 $*Q = k CIA$

### Catchment Areas

| Name     | Tc (min.) | Groundcover Areas (Ac.) |            | Total Area (Ac) | C    | Q (cfs) |         |
|----------|-----------|-------------------------|------------|-----------------|------|---------|---------|
|          |           | Open Space, Lawns       | Impervious |                 |      | 2-year  | 10-year |
| CB201    | 5.00      |                         | 0.05       | 0.05            | 0.98 | 0.25    | 0.31    |
| CB202    | 5.00      |                         | 0.05       | 0.05            | 0.98 | 0.25    | 0.31    |
| CB203    | 5.00      |                         | 0.12       | 0.12            | 0.98 | 0.59    | 0.76    |
| CB204    | 5.00      |                         | 0.17       | 0.17            | 0.98 | 0.83    | 1.07    |
| CB205    | 5.00      |                         | 0.19       | 0.19            | 0.98 | 0.93    | 1.20    |
| CB206    | 5.00      |                         | 0.19       | 0.19            | 0.98 | 0.93    | 1.20    |
| CB207    | 5.00      |                         | 0.15       | 0.15            | 0.98 | 0.74    | 0.94    |
| CB208    | 5.00      |                         | 0.20       | 0.20            | 0.98 | 0.98    | 1.26    |
| CB209    | 5.00      |                         | 0.16       | 0.16            | 0.98 | 0.78    | 1.01    |
|          |           |                         |            |                 |      |         |         |
| Swale 11 | 5.00      | 0.04                    | 0.05       | 0.09            | 0.66 | 0.30    | 0.38    |
| Swale 12 | 5.00      | 0.04                    | 0.05       | 0.09            | 0.66 | 0.30    | 0.38    |
| Swale 13 | 5.00      | 0.03                    | 0.12       | 0.15            | 0.84 | 0.63    | 0.81    |

## Curb Break Calculations - Sumped

Project Name: Byers - Commercial Tract

Description: Curb Break - CB201

### Calculate Net Flow $Q_{NET}$

$$\begin{aligned} Q &= 0.31 \text{ cfs (from catchment area)} \\ &+ \\ Q_{BYPASS} &= 0.00 \text{ cfs} \\ &= \\ Q_{NET} &= 0.31 \text{ cfs} \end{aligned}$$

### Calculate Flow Depth (At Opening) $Q = C * L * H^{(3/2)}$

$$\begin{aligned} Q &= 0.31 \text{ cfs} \\ L &= 5.00 \text{ Opening Length} \\ C &= 3.1 \\ H &= 0.07 \text{ ft (flow depth at opening)} \end{aligned}$$

### Calculate Discharge Velocity $V = 1.486/n * R^{2/3} * S^{1/2}$

$$\begin{aligned} Q &= 0.31 \text{ cfs} \\ R &= 0.07 \text{ ft} \\ S &= 0.3300 \text{ ft/ft (down-slope of curb break)} \\ n &= -0.0479 \text{ Manning's n-value} \\ V &= -3.07 \text{ fps} \end{aligned}$$

Riprap (R-2)

Spillway Lining

d50 = 1.50 in



4.50

Max. Allowable Velocity

## Curb Break Calculations - Sumped

Project Name: Byers - Commercial Tract

Description: Curb Break - CB202

### Calculate Net Flow $Q_{NET}$

$$\begin{aligned} Q &= \boxed{0.31} \text{ cfs (from catchment area)} \\ &+ \\ Q_{BYPASS} &= \boxed{0.00} \text{ cfs} \\ &= \\ Q_{NET} &= \boxed{0.31} \text{ cfs} \end{aligned}$$

### Calculate Flow Depth (At Opening) $Q = C * L * H^{(3/2)}$

$$\begin{aligned} Q &= \boxed{0.31} \text{ cfs} \\ L &= \boxed{5.00} \text{ Opening Length} \\ C &= \boxed{3.1} \\ H &= \boxed{0.07} \text{ ft (flow depth at opening)} \end{aligned}$$

### Calculate Discharge Velocity $V = 1.486/n * R^{2/3} * S^{1/2}$

$$\begin{aligned} Q &= \boxed{0.31} \text{ cfs} \\ R &= \boxed{0.07} \text{ ft} \\ S &= \boxed{0.3300} \text{ ft/ft (down-slope of curb break)} \\ n &= \boxed{-0.0479} \text{ Manning's n-value} \\ V &= \boxed{-3.07} \text{ fps} \end{aligned}$$

Riprap (R-2)

Spillway Lining

d50 = 1.50 in



4.50

Max. Allowable Velocity

## Curb Break Calculations - Sumped

Project Name: Byers - Commercial Tract

Description: Curb Break - CB203

### Calculate Net Flow $Q_{NET}$

$$\begin{aligned} Q &= \boxed{0.76} \text{ cfs (from catchment area)} \\ &+ \\ Q_{BYPASS} &= \boxed{0.00} \text{ cfs} \\ &= \\ Q_{NET} &= \boxed{0.76} \text{ cfs} \end{aligned}$$

### Calculate Flow Depth (At Opening) $Q = C * L * H^{(3/2)}$

$$\begin{aligned} Q &= \boxed{0.76} \text{ cfs} \\ L &= \boxed{5.00} \text{ Opening Length} \\ C &= \boxed{3.1} \\ H &= \boxed{0.13} \text{ ft (flow depth at opening)} \end{aligned}$$

### Calculate Discharge Velocity $V = 1.486/n * R^{2/3} * S^{1/2}$

$$\begin{aligned} Q &= \boxed{0.76} \text{ cfs} \\ R &= \boxed{0.13} \text{ ft} \\ S &= \boxed{0.3300} \text{ ft/ft (down-slope of curb break)} \\ n &= \boxed{0.0644} \text{ Manning's n-value} \\ V &= \boxed{3.35} \text{ fps} \end{aligned}$$

Riprap (R-2)

Spillway Lining

d50 = 1.50 in



4.50

Max. Allowable Velocity

## Curb Break Calculations - Sumped

Project Name: Byers - Commercial Tract

Description: Curb Break - CB204

### Calculate Net Flow $Q_{NET}$

$$\begin{aligned} Q &= \boxed{1.07} \text{ cfs (from catchment area)} \\ &+ \\ Q_{BYPASS} &= \boxed{0.00} \text{ cfs} \\ &= \\ Q_{NET} &= \boxed{1.07} \text{ cfs} \end{aligned}$$

### Calculate Flow Depth (At Opening) $Q = C * L * H^{(3/2)}$

$$\begin{aligned} Q &= \boxed{1.07} \text{ cfs} \\ L &= \boxed{5.00} \text{ Opening Length} \\ C &= \boxed{3.1} \\ H &= \boxed{0.17} \text{ ft (flow depth at opening)} \end{aligned}$$

### Calculate Discharge Velocity $V = 1.486/n * R^{2/3} * S^{1/2}$

$$\begin{aligned} Q &= \boxed{1.07} \text{ cfs} \\ R &= \boxed{0.16} \text{ ft} \\ S &= \boxed{0.3300} \text{ ft/ft (down-slope of curb break)} \\ n &= \boxed{0.0613} \text{ Manning's n-value} \\ V &= \boxed{4.06} \text{ fps} \end{aligned}$$

Riprap (R-2)

Spillway Lining

d50 = 1.50 in



4.50

Max. Allowable Velocity

## Curb Break Calculations - Sumped

Project Name: Byers - Commercial Tract

Description: Curb Break - CB205

### Calculate Net Flow $Q_{NET}$

$$\begin{aligned}
 Q &= \boxed{1.20} \text{ cfs (from catchment area)} \\
 &+ \\
 Q_{BYPASS} &= \boxed{0.00} \text{ cfs} \\
 &= \\
 Q_{NET} &= \boxed{1.20} \text{ cfs}
 \end{aligned}$$

### Calculate Flow Depth (At Opening) $Q = C * L * H^{(3/2)}$

$$\begin{aligned}
 Q &= \boxed{1.20} \text{ cfs} \\
 L &= \boxed{5.00} \text{ Opening Length} \\
 C &= \boxed{3.1} \\
 H &= \boxed{0.18} \text{ ft (flow depth at opening)}
 \end{aligned}$$

### Calculate Discharge Velocity $V = 1.486/n * R^{2/3} * S^{1/2}$

$$\begin{aligned}
 Q &= \boxed{1.20} \text{ cfs} \\
 R &= \boxed{0.17} \text{ ft} \\
 S &= \boxed{0.3300} \text{ ft/ft (down-slope of curb break)} \\
 n &= \boxed{0.0600} \text{ Manning's n-value} \\
 V &= \boxed{4.36} \text{ fps}
 \end{aligned}$$

Riprap (R-2)

Spillway Lining

d50 = 1.50 in



4.50

Max. Allowable Velocity

## Curb Break Calculations - Sumped

Project Name: Byers - Commercial Tract

Description: Curb Break - CB206

### Calculate Net Flow $Q_{NET}$

$$\begin{aligned} Q &= \boxed{1.20} \text{ cfs (from catchment area)} \\ &+ \\ Q_{BYPASS} &= \boxed{0.00} \text{ cfs} \\ &= \\ Q_{NET} &= \boxed{1.20} \text{ cfs} \end{aligned}$$

### Calculate Flow Depth (At Opening) $Q = C * L * H^{(3/2)}$

$$\begin{aligned} Q &= \boxed{1.20} \text{ cfs} \\ L &= \boxed{5.00} \text{ Opening Length} \\ C &= \boxed{3.1} \\ H &= \boxed{0.18} \text{ ft (flow depth at opening)} \end{aligned}$$

### Calculate Discharge Velocity $V = 1.486/n * R^{2/3} * S^{1/2}$

$$\begin{aligned} Q &= \boxed{1.20} \text{ cfs} \\ R &= \boxed{0.17} \text{ ft} \\ S &= \boxed{0.3300} \text{ ft/ft (down-slope of curb break)} \\ n &= \boxed{0.0600} \text{ Manning's n-value} \\ V &= \boxed{4.36} \text{ fps} \end{aligned}$$

Riprap (R-2)

Spillway Lining

d50 = 1.50 in



4.50

Max. Allowable Velocity

## Curb Break Calculations - Sumped

Project Name: Byers - Commercial Tract

Description: Curb Break - CB207

### Calculate Net Flow $Q_{NET}$

$$\begin{aligned}
 Q &= \boxed{0.94} \text{ cfs (from catchment area)} \\
 &+ \\
 Q_{BYPASS} &= \boxed{0.00} \text{ cfs} \\
 &= \\
 Q_{NET} &= \boxed{0.94} \text{ cfs}
 \end{aligned}$$

### Calculate Flow Depth (At Opening) $Q = C * L * H^{(3/2)}$

$$\begin{aligned}
 Q &= \boxed{0.94} \text{ cfs} \\
 L &= \boxed{5.00} \text{ Opening Length} \\
 C &= \boxed{3.1} \\
 H &= \boxed{0.15} \text{ ft (flow depth at opening)}
 \end{aligned}$$

### Calculate Discharge Velocity $V = 1.486/n * R^{2/3} * S^{1/2}$

$$\begin{aligned}
 Q &= \boxed{0.94} \text{ cfs} \\
 R &= \boxed{0.15} \text{ ft} \\
 S &= \boxed{0.3300} \text{ ft/ft (down-slope of curb break)} \\
 n &= \boxed{0.0628} \text{ Manning's n-value} \\
 V &= \boxed{3.76} \text{ fps}
 \end{aligned}$$

Riprap (R-2) Spillway Lining

d50 = 1.50 in



4.50

Max. Allowable Velocity



## Curb Break Calculations - Sumped

Project Name: Byers - Commercial Tract

Description: Curb Break - CB208

### Calculate Net Flow $Q_{NET}$

Q =  cfs (from catchment area)  
 +  
 $Q_{BYPASS}$  =  cfs  
 =  
 $Q_{NET}$  =  cfs

### Calculate Flow Depth (At Opening) $Q = C * L * H^{(3/2)}$

Q =  cfs  
 L =  Opening Length  
 C =   
 H =  ft (flow depth at opening)

### Calculate Discharge Velocity $V = 1.486/n * R^{2/3} * S^{1/2}$

Q =  cfs  
 R =  ft  
 S =  ft/ft (down-slope of curb break)  
 n =  Manning's n-value  
 V =  fps

Spillway Lining

d50 = 3.00 in



Max. Allowable Velocity

## Curb Break Calculations - Sumped

Project Name: Byers - Commercial Tract

Description: Curb Break - CB209

### Calculate Net Flow $Q_{NET}$

$$\begin{aligned} Q &= \boxed{1.01} \text{ cfs (from catchment area)} \\ &+ \\ Q_{BYPASS} &= \boxed{0.00} \text{ cfs} \\ &= \\ Q_{NET} &= \boxed{1.01} \text{ cfs} \end{aligned}$$

### Calculate Flow Depth (At Opening) $Q = C * L * H^{(3/2)}$

$$\begin{aligned} Q &= \boxed{1.01} \text{ cfs} \\ L &= \boxed{5.00} \text{ Opening Length} \\ C &= \boxed{3.1} \\ H &= \boxed{0.16} \text{ ft (flow depth at opening)} \end{aligned}$$

### Calculate Discharge Velocity $V = 1.486/n * R^{2/3} * S^{1/2}$

$$\begin{aligned} Q &= \boxed{1.01} \text{ cfs} \\ R &= \boxed{0.15} \text{ ft} \\ S &= \boxed{0.3300} \text{ ft/ft (down-slope of curb break)} \\ n &= \boxed{0.0618} \text{ Manning's n-value} \\ V &= \boxed{3.94} \text{ fps} \end{aligned}$$

Riprap (R-2)

Spillway Lining

d50 = 1.50 in



4.50

Max. Allowable Velocity

**Scenario: 25-Year**  
**Current Time Step: 0.000Hr**  
**Catch Basin FlexTable: Inlet Report**

| Label | Inlet                 | Inlet Location | Ground Elevation (ft) | Rim Elevation (ft) | Invert Out (ft) | Inlet Bottom El. (ft) | Inlet DA (acres) | Inlet C | Inlet Intensity (in/h) | Inlet Tc (min) | Local Surface Flow (ft <sup>3</sup> /s) | Carryover Rational Flow (ft <sup>3</sup> /s) | Known Flow (ft <sup>3</sup> /s) |
|-------|-----------------------|----------------|-----------------------|--------------------|-----------------|-----------------------|------------------|---------|------------------------|----------------|-----------------------------------------|----------------------------------------------|---------------------------------|
| IN24  | PADOT Type 'C'        | In Sag         | 454.69                | 454.69             | 451.57          | 451.57                | 0.060            | 0.740   | 7.020                  | 5.000          | 0.31                                    | 0.00                                         | 0.00                            |
| IN25  | PADOT Type 'C'        | On Grade       | 454.82                | 454.82             | 451.33          | 451.33                | 0.580            | 0.790   | 7.020                  | 5.000          | 3.24                                    | 0.00                                         | 0.00                            |
| IN26  | PADOT Type 'C'        | On Grade       | 454.82                | 454.82             | 450.98          | 450.98                | 0.340            | 0.820   | 7.020                  | 5.000          | 1.97                                    | 0.00                                         | 0.00                            |
| IN27  | PADOT Type 'C'        | In Sag         | 462.18                | 462.18             | 459.43          | 459.43                | 0.110            | 0.990   | 7.020                  | 5.000          | 0.77                                    | 0.00                                         | 0.00                            |
| IN28  | PADOT Type 'C'        | On Grade       | 453.53                | 453.53             | 446.96          | 446.96                | 0.090            | 0.910   | 7.020                  | 5.000          | 0.58                                    | 1.95                                         | 0.00                            |
| IN29  | PADOT Type 'C'        | On Grade       | 453.88                | 453.88             | 451.13          | 451.13                | 0.250            | 0.720   | 7.020                  | 5.000          | 1.27                                    | 0.00                                         | 0.00                            |
| IN30  | PADOT Type 'C'        | In Sag         | 451.11                | 451.11             | 448.36          | 448.36                | 0.110            | 0.720   | 7.020                  | 5.000          | 0.56                                    | 0.93                                         | 0.00                            |
| IN31  | PADOT Type 'C'        | In Sag         | 451.12                | 451.12             | 448.05          | 448.05                | 0.020            | 0.620   | 7.020                  | 5.000          | 0.09                                    | 0.00                                         | 0.00                            |
| IN32  | PADOT Type 'C'        | In Sag         | 451.09                | 451.09             | 448.34          | 448.34                | 0.130            | 0.880   | 7.020                  | 5.000          | 0.81                                    | 0.00                                         | 0.00                            |
| IN33  | PADOT Type 'C'        | On Grade       | 449.81                | 449.81             | 445.46          | 445.46                | 0.590            | 0.950   | 7.020                  | 5.000          | 3.97                                    | 0.33                                         | 0.00                            |
| IN34  | PADOT Type 'C'        | On Grade       | 449.81                | 449.81             | 447.06          | 447.06                | 0.020            | 0.990   | 7.020                  | 5.000          | 0.14                                    | 0.00                                         | 0.00                            |
| IN34A | PADOT Type 'C'        | In Sag         | 447.52                | 447.52             | 443.85          | 443.85                | (N/A)            | (N/A)   | 7.020                  | 0.000          | 0.00                                    | 0.00                                         | 0.00                            |
| IN35  | PADOT Type 'C'        | On Grade       | 444.64                | 444.64             | 438.42          | 438.42                | 0.200            | 0.400   | 7.020                  | 5.000          | 0.57                                    | 1.92                                         | 0.00                            |
| IN36  | PADOT Type 'C'        | On Grade       | 444.64                | 444.64             | 438.08          | 438.08                | 0.090            | 0.580   | 7.020                  | 5.000          | 0.37                                    | 0.00                                         | 0.00                            |
| IN37  | PADOT Type 'C'        | On Grade       | 440.89                | 440.89             | 436.71          | 436.71                | 0.040            | 0.990   | 7.020                  | 5.000          | 0.28                                    | 0.03                                         | 0.00                            |
| IN38  | PADOT Type 'C'        | On Grade       | 440.89                | 440.89             | 437.97          | 437.97                | 0.220            | 0.790   | 7.020                  | 5.000          | 1.23                                    | 0.90                                         | 0.00                            |
| IN39  | PADOT Type 'C'        | On Grade       | 438.96                | 438.96             | 430.82          | 430.82                | 0.020            | 0.990   | 7.020                  | 5.000          | 0.14                                    | 0.02                                         | 0.00                            |
| IN40  | PADOT Type 'C'        | On Grade       | 438.96                | 438.96             | 431.13          | 431.13                | 0.190            | 0.760   | 7.020                  | 5.000          | 1.02                                    | 0.72                                         | 0.00                            |
| IN41  | PADOT Type 'C'        | On Grade       | 436.28                | 436.28             | 433.53          | 433.53                | 0.050            | 0.990   | 7.020                  | 5.000          | 0.35                                    | 0.00                                         | 0.00                            |
| IN42  | PADOT Type 'C'        | On Grade       | 436.28                | 436.28             | 433.25          | 433.25                | 0.070            | 0.990   | 7.020                  | 5.000          | 0.49                                    | 0.54                                         | 0.00                            |
| IN43  | PADOT Type 'C'        | On Grade       | 434.45                | 434.45             | 430.18          | 430.18                | 0.020            | 0.990   | 7.020                  | 5.000          | 0.14                                    | 0.23                                         | 0.00                            |
| IN44  | PADOT Type 'C'        | On Grade       | 433.22                | 433.22             | 428.64          | 428.64                | 0.200            | 0.620   | 7.020                  | 5.000          | 0.88                                    | 0.03                                         | 0.00                            |
| IN45  | PADOT Type 'C'        | In Sag         | 432.00                | 432.00             | 428.25          | 428.25                | 0.060            | 0.500   | 7.020                  | 5.000          | 0.21                                    | 0.19                                         | 0.00                            |
| IN46  | PADOT Type 'C'        | In Sag         | 431.90                | 431.90             | 429.17          | 429.17                | 0.080            | 0.710   | 7.020                  | 5.000          | 0.40                                    | 0.03                                         | 0.00                            |
| IN48  | PADOT Type 'M'        | In Sag         | 454.87                | 454.87             | 452.12          | 452.12                | 0.990            | 0.390   | 7.020                  | 5.000          | 2.73                                    | 0.00                                         | 0.00                            |
| IN49  | PADOT Type 'M'        | In Sag         | 451.28                | 451.28             | 446.94          | 446.94                | 0.520            | 0.450   | 7.020                  | 5.000          | 1.66                                    | 0.00                                         | 0.00                            |
| IN201 | PADOT Type 'C'        | In Sag         | 439.24                | 439.24             | 430.27          | 430.27                | 0.310            | 0.918   | 7.020                  | 5.000          | 2.01                                    | 0.00                                         | 0.00                            |
| IN202 | PADOT Type 'C'        | In Sag         | 441.05                | 441.05             | 435.68          | 435.68                | 0.170            | 0.730   | 7.020                  | 5.000          | 0.88                                    | 0.00                                         | 0.00                            |
| IN203 | PADOT Type 'C'        | In Sag         | 441.05                | 441.05             | 436.64          | 436.64                | 0.330            | 0.854   | 7.020                  | 5.000          | 1.99                                    | 0.00                                         | 0.00                            |
| IN204 | PADOT Type 'C'        | In Sag         | 441.05                | 441.05             | 438.05          | 438.05                | 0.140            | 0.620   | 7.020                  | 5.000          | 0.61                                    | 0.00                                         | 0.00                            |
| IN205 | PADOT Type 'C'        | In Sag         | 439.63                | 439.63             | 435.79          | 435.79                | 0.120            | 0.740   | 7.020                  | 5.000          | 0.63                                    | 0.00                                         | 0.00                            |
| IN206 | PADOT Type 'C'        | In Sag         | 439.52                | 439.52             | 436.77          | 436.77                | 0.050            | 0.690   | 7.020                  | 5.000          | 0.24                                    | 0.00                                         | 0.00                            |
| IN207 | PADOT Type 'C'        | In Sag         | 434.65                | 434.65             | 422.15          | 422.15                | 0.290            | 0.860   | 7.020                  | 5.000          | 1.76                                    | 0.00                                         | 0.00                            |
| IN208 | PADOT Type 'C'        | In Sag         | 434.57                | 434.57             | 423.84          | 423.84                | 0.510            | 0.540   | 7.020                  | 5.000          | 1.95                                    | 0.00                                         | 0.00                            |
| IN209 | PADOT Type 'M'        | In Sag         | 434.31                | 434.31             | 425.52          | 425.52                | 0.520            | 0.890   | 7.020                  | 5.000          | 3.27                                    | 0.00                                         | 0.00                            |
| IN210 | PADOT Type 'C'        | In Sag         | 435.24                | 435.24             | 425.32          | 425.32                | 0.530            | 0.520   | 7.020                  | 5.000          | 1.95                                    | 0.00                                         | 0.00                            |
| IN211 | PADOT Type 'M'        | In Sag         | 435.11                | 435.11             | 427.00          | 427.00                | 0.450            | 0.870   | 7.020                  | 5.000          | 2.77                                    | 0.00                                         | 0.00                            |
| IN212 | PADOT Type 'C'        | In Sag         | 435.26                | 435.26             | 426.80          | 426.80                | 0.310            | 0.680   | 7.020                  | 5.000          | 1.49                                    | 0.00                                         | 0.00                            |
| IN213 | PADOT Type 'M'        | In Sag         | 435.13                | 435.13             | 428.47          | 428.47                | 0.460            | 0.860   | 7.020                  | 5.000          | 2.80                                    | 0.00                                         | 0.00                            |
| IN214 | PADOT Type 'C'        | In Sag         | 435.13                | 435.13             | 428.69          | 428.69                | 0.450            | 0.860   | 7.020                  | 5.000          | 2.74                                    | 0.00                                         | 0.00                            |
| IN215 | PADOT Type 'C'        | In Sag         | 438.12                | 438.12             | 430.45          | 430.45                | 0.220            | 0.790   | 7.020                  | 5.000          | 1.23                                    | 0.00                                         | 0.00                            |
| IN216 | PADOT Type 'C'        | In Sag         | 440.17                | 440.17             | 436.00          | 436.00                | 0.280            | 0.730   | 7.020                  | 5.000          | 1.45                                    | 0.00                                         | 0.00                            |
| IN217 | PADOT Type 'M'        | In Sag         | 434.00                | 434.00             | 430.50          | 430.50                | 1.090            | 0.260   | 7.020                  | 5.000          | 2.01                                    | 0.00                                         | 0.00                            |
| IN218 | PADOT Type 'M'        | In Sag         | 434.56                | 434.56             | 431.55          | 431.55                | 1.310            | 0.250   | 7.020                  | 5.000          | 2.32                                    | 0.00                                         | 0.00                            |
| IN219 | PADOT Double Type 'C' | In Sag         | 443.25                | 443.25             | 440.50          | 440.50                | 0.590            | 0.690   | 7.020                  | 5.000          | 2.88                                    | 0.00                                         | 0.00                            |
| IN220 | PADOT Type 'C'        | In Sag         | 445.95                | 445.95             | 440.02          | 440.02                | 0.150            | 0.887   | 7.020                  | 5.000          | 0.94                                    | 0.00                                         | 0.00                            |
| IN221 | PADOT Type 'C'        | In Sag         | 447.35                | 447.35             | 441.72          | 441.72                | 0.030            | 0.970   | 7.020                  | 5.000          | 0.21                                    | 0.00                                         | 0.00                            |
| OS01  | PADOT Type 'M'        | In Sag         | 429.00                | 433.00             | 423.79          | 423.79                | (N/A)            | (N/A)   | 7.020                  | 0.000          | 0.00                                    | 0.00                                         | 0.00                            |
| OS02  | PADOT Type 'M'        | In Sag         | 423.00                | 426.00             | 420.23          | 420.23                | (N/A)            | (N/A)   | 7.020                  | 0.000          | 0.00                                    | 0.00                                         | 0.00                            |
| TD201 | PADOT Type 'M'        | In Sag         | 438.45                | 438.45             | 436.42          | 436.42                | 0.030            | 0.970   | 7.020                  | 5.000          | 0.21                                    | 0.00                                         | 0.00                            |
| YD201 | PADOT Type 'C'        | In Sag         | 445.65                | 445.65             | 442.49          | 442.49                | 0.050            | 0.250   | 7.020                  | 5.000          | 0.09                                    | 0.00                                         | 0.00                            |

R:\15\PC1511921\Technical\Stormwater & E&S\Rev 0\StormCAD\Byers Station\_Storm-0.stc

Scenario: 25-Year  
Current Time Step: 0.000Hr  
Catch Basin FlexTable: Gutter Spread

| Label | Inlet                 | Inlet Location | Ground Elevation (ft) | Rim Elevation (ft) | Local Surface Flow (ft <sup>2</sup> /s) | Carryover Rational Flow (ft <sup>3</sup> /s) | Total Surface Flow to Inlet (ft <sup>2</sup> /s) | Capture Efficiency (Calculated) (%) | Intercepted Rational Flow (ft <sup>3</sup> /s) | Bypassed Rational Flow (ft <sup>3</sup> /s) | Bypass Target | Gutter Depth (in) | Gutter Spread (ft) | Cross Slope (ft/ft) | Longitudinal Slope (ft/ft) |
|-------|-----------------------|----------------|-----------------------|--------------------|-----------------------------------------|----------------------------------------------|--------------------------------------------------|-------------------------------------|------------------------------------------------|---------------------------------------------|---------------|-------------------|--------------------|---------------------|----------------------------|
| IN24  | PADOT Type 'C'        | In Sag         | 454.69                | 454.69             | 0.31                                    | 0.00                                         | 0.31                                             | 100.0                               | 0.31                                           | 0.00                                        | (N/A)         | 0.5               | 2.2                | 0.0200              | (N/A)                      |
| IN25  | PADOT Type 'C'        | On Grade       | 454.82                | 454.82             | 3.24                                    | 0.00                                         | 3.24                                             | 59.6                                | 0.1                                            | 1.31                                        | IN28          | 2.2               | 9.1                | 0.0200              | 0.0200                     |
| IN26  | PADOT Type 'C'        | On Grade       | 454.82                | 454.82             | 1.97                                    | 0.00                                         | 1.97                                             | 67.3                                | 1.33                                           | 0.65                                        | IN28          | 1.8               | 7.6                | 0.0200              | 0.0200                     |
| IN27  | PADOT Type 'C'        | In Sag         | 462.18                | 462.18             | 0.77                                    | 0.00                                         | 0.77                                             | 100.0                               | 0.77                                           | 0.00                                        | (N/A)         | 1.1               | 4.7                | 0.0200              | (N/A)                      |
| IN28  | PADOT Type 'C'        | On Grade       | 453.53                | 453.53             | 0.56                                    | 1.95                                         | 2.53                                             | 1.61                                | 0.93                                           | 0.93                                        | IN30          | 2.0               | 8.3                | 0.0200              | 0.0200                     |
| IN29  | PADOT Type 'C'        | On Grade       | 453.88                | 453.88             | 1.27                                    | 0.00                                         | 1.27                                             | 74.1                                | 0.94                                           | 0.33                                        | IN33          | 1.5               | 6.4                | 0.0200              | 0.0200                     |
| IN30  | PADOT Type 'C'        | In Sag         | 451.11                | 451.11             | 0.56                                    | 0.93                                         | 1.49                                             | 100.0                               | 1.49                                           | 0.00                                        | (N/A)         | 1.8               | 7.4                | 0.0200              | (N/A)                      |
| IN31  | PADOT Type 'C'        | In Sag         | 451.12                | 451.12             | 0.09                                    | 0.00                                         | 0.09                                             | 100.0                               | 0.09                                           | 0.00                                        | (N/A)         | 0.0               | 0.1                | 0.0200              | (N/A)                      |
| IN32  | PADOT Type 'C'        | In Sag         | 451.09                | 451.09             | 0.81                                    | 0.00                                         | 0.81                                             | 100.0                               | 0.81                                           | 0.00                                        | (N/A)         | 1.2               | 4.8                | 0.0200              | (N/A)                      |
| IN33  | PADOT Type 'C'        | On Grade       | 449.81                | 449.81             | 3.97                                    | 0.33                                         | 4.30                                             | 55.3                                | 2.38                                           | 1.92                                        | IN35          | 2.4               | 10.1               | 0.0200              | 0.0200                     |
| IN34  | PADOT Type 'C'        | On Grade       | 449.81                | 449.81             | 0.14                                    | 0.00                                         | 0.14                                             | 98.3                                | 0.14                                           | 0.00                                        | IN36          | 0.7               | 2.8                | 0.0200              | 0.0200                     |
| IN34A | PADOT Type 'C'        | In Sag         | 447.52                | 447.52             | 0.00                                    | 0.00                                         | 0.00                                             | 100.0                               | 0.00                                           | 0.00                                        | (N/A)         | 0.0               | 0.0                | 0.0200              | 0.0200                     |
| IN35  | PADOT Type 'C'        | On Grade       | 444.64                | 444.64             | 0.57                                    | 1.92                                         | 2.49                                             | 63.7                                | 1.58                                           | 0.90                                        | IN38          | 2.0               | 8.2                | 0.0200              | 0.0200                     |
| IN36  | PADOT Type 'C'        | On Grade       | 444.64                | 444.64             | 0.37                                    | 0.00                                         | 0.37                                             | 90.7                                | 0.34                                           | 0.03                                        | IN37          | 1.0               | 4.0                | 0.0200              | 0.0200                     |
| IN37  | PADOT Type 'C'        | On Grade       | 440.89                | 440.89             | 0.28                                    | 0.03                                         | 0.31                                             | 92.4                                | 0.29                                           | 0.02                                        | IN39          | 0.9               | 3.8                | 0.0200              | 0.0200                     |
| IN38  | PADOT Type 'C'        | On Grade       | 440.89                | 440.89             | 1.23                                    | 0.90                                         | 2.13                                             | 66.1                                | 1.41                                           | 0.72                                        | IN40          | 1.9               | 7.8                | 0.0200              | 0.0200                     |
| IN39  | PADOT Type 'C'        | On Grade       | 438.96                | 438.96             | 0.14                                    | 0.02                                         | 0.16                                             | 97.5                                | 0.16                                           | 0.00                                        | IN41          | 0.7               | 3.0                | 0.0200              | 0.0200                     |
| IN40  | PADOT Type 'C'        | On Grade       | 438.96                | 438.96             | 1.02                                    | 0.72                                         | 1.74                                             | 69.2                                | 1.21                                           | 0.54                                        | IN42          | 1.7               | 7.2                | 0.0200              | 0.0200                     |
| IN41  | PADOT Type 'C'        | On Grade       | 436.28                | 436.28             | 0.35                                    | 0.00                                         | 0.35                                             | 91.2                                | 0.32                                           | 0.03                                        | IN44          | 1.0               | 4.0                | 0.0200              | 0.0200                     |
| IN42  | PADOT Type 'C'        | On Grade       | 436.28                | 436.28             | 0.49                                    | 0.54                                         | 1.03                                             | 77.3                                | 0.79                                           | 0.23                                        | IN43          | 1.4               | 5.9                | 0.0200              | 0.0200                     |
| IN43  | PADOT Type 'C'        | On Grade       | 434.45                | 434.45             | 0.14                                    | 0.23                                         | 0.37                                             | 90.6                                | 0.34                                           | 0.03                                        | IN46          | 1.0               | 4.0                | 0.0200              | 0.0200                     |
| IN44  | PADOT Type 'C'        | On Grade       | 433.22                | 433.22             | 0.88                                    | 0.03                                         | 0.91                                             | 79.1                                | 0.72                                           | 0.19                                        | IN45          | 1.4               | 5.6                | 0.0200              | 0.0200                     |
| IN45  | PADOT Type 'C'        | In Sag         | 432.00                | 432.00             | 0.21                                    | 0.19                                         | 0.40                                             | 100.0                               | 0.40                                           | 0.00                                        | (N/A)         | 0.7               | 2.8                | 0.0200              | (N/A)                      |
| IN46  | PADOT Type 'C'        | In Sag         | 431.90                | 431.90             | 0.40                                    | 0.03                                         | 0.44                                             | 100.0                               | 0.44                                           | 0.00                                        | (N/A)         | 0.7               | 3.0                | 0.0200              | (N/A)                      |
| IN48  | PADOT Type 'M'        | In Sag         | 454.87                | 454.87             | 2.73                                    | 0.00                                         | 2.73                                             | 100.0                               | 2.73                                           | 0.00                                        | (N/A)         | 3.2               | 13.2               | 0.0200              | (N/A)                      |
| IN49  | PADOT Type 'M'        | In Sag         | 451.28                | 451.28             | 1.66                                    | 0.00                                         | 1.66                                             | 100.0                               | 1.66                                           | 0.00                                        | (N/A)         | 2.4               | 9.9                | 0.0200              | (N/A)                      |
| IN201 | PADOT Type 'C'        | In Sag         | 439.24                | 439.24             | 2.01                                    | 0.00                                         | 2.01                                             | 100.0                               | 2.01                                           | 0.00                                        | (N/A)         | 2.2               | 9.1                | 0.0200              | (N/A)                      |
| IN202 | PADOT Type 'C'        | In Sag         | 441.05                | 441.05             | 0.88                                    | 0.00                                         | 0.88                                             | 100.0                               | 0.88                                           | 0.00                                        | (N/A)         | 1.2               | 5.1                | 0.0200              | (N/A)                      |
| IN203 | PADOT Type 'C'        | In Sag         | 441.05                | 441.05             | 1.99                                    | 0.00                                         | 1.99                                             | 100.0                               | 1.99                                           | 0.00                                        | (N/A)         | 2.2               | 9.0                | 0.0200              | (N/A)                      |
| IN204 | PADOT Type 'C'        | In Sag         | 441.05                | 441.05             | 0.61                                    | 0.00                                         | 0.61                                             | 100.0                               | 0.61                                           | 0.00                                        | (N/A)         | 0.9               | 3.9                | 0.0200              | (N/A)                      |
| IN205 | PADOT Type 'C'        | In Sag         | 439.63                | 439.63             | 0.63                                    | 0.00                                         | 0.63                                             | 100.0                               | 0.63                                           | 0.00                                        | (N/A)         | 1.0               | 4.0                | 0.0200              | (N/A)                      |
| IN206 | PADOT Type 'C'        | In Sag         | 439.52                | 439.52             | 0.24                                    | 0.00                                         | 0.24                                             | 100.0                               | 0.24                                           | 0.00                                        | (N/A)         | 0.3               | 1.2                | 0.0200              | (N/A)                      |
| IN207 | PADOT Type 'C'        | In Sag         | 434.65                | 434.65             | 1.76                                    | 0.00                                         | 1.76                                             | 100.0                               | 1.76                                           | 0.00                                        | (N/A)         | 2.0               | 8.3                | 0.0200              | (N/A)                      |
| IN208 | PADOT Type 'C'        | In Sag         | 434.57                | 434.57             | 1.95                                    | 0.00                                         | 1.95                                             | 100.0                               | 1.95                                           | 0.00                                        | (N/A)         | 2.1               | 8.9                | 0.0200              | (N/A)                      |
| IN209 | PADOT Type 'M'        | In Sag         | 434.31                | 434.31             | 3.27                                    | 0.00                                         | 3.27                                             | 100.0                               | 3.27                                           | 0.00                                        | (N/A)         | 3.5               | 14.7               | 0.0200              | (N/A)                      |
| IN210 | PADOT Type 'C'        | In Sag         | 435.24                | 435.24             | 1.95                                    | 0.00                                         | 1.95                                             | 100.0                               | 1.95                                           | 0.00                                        | (N/A)         | 2.1               | 8.9                | 0.0200              | (N/A)                      |
| IN211 | PADOT Type 'M'        | In Sag         | 435.11                | 435.11             | 2.77                                    | 0.00                                         | 2.77                                             | 100.0                               | 2.77                                           | 0.00                                        | (N/A)         | 3.2               | 13.3               | 0.0200              | (N/A)                      |
| IN212 | PADOT Type 'C'        | In Sag         | 435.26                | 435.26             | 1.49                                    | 0.00                                         | 1.49                                             | 100.0                               | 1.49                                           | 0.00                                        | (N/A)         | 1.8               | 7.4                | 0.0200              | (N/A)                      |
| IN213 | PADOT Type 'M'        | In Sag         | 435.13                | 435.13             | 2.80                                    | 0.00                                         | 2.80                                             | 100.0                               | 2.80                                           | 0.00                                        | (N/A)         | 3.2               | 13.4               | 0.0200              | (N/A)                      |
| IN214 | PADOT Type 'C'        | In Sag         | 435.13                | 435.13             | 2.74                                    | 0.00                                         | 2.74                                             | 100.0                               | 2.74                                           | 0.00                                        | (N/A)         | 2.7               | 11.2               | 0.0200              | (N/A)                      |
| IN215 | PADOT Type 'C'        | In Sag         | 438.12                | 438.12             | 1.23                                    | 0.00                                         | 1.23                                             | 100.0                               | 1.23                                           | 0.00                                        | (N/A)         | 1.6               | 6.5                | 0.0200              | (N/A)                      |
| IN216 | PADOT Type 'C'        | In Sag         | 440.17                | 440.17             | 1.45                                    | 0.00                                         | 1.45                                             | 100.0                               | 1.45                                           | 0.00                                        | (N/A)         | 1.7               | 7.3                | 0.0200              | (N/A)                      |
| IN217 | PADOT Type 'M'        | In Sag         | 434.00                | 434.00             | 2.01                                    | 0.00                                         | 2.01                                             | 100.0                               | 2.01                                           | 0.00                                        | (N/A)         | 2.7               | 11.0               | 0.0200              | (N/A)                      |
| IN218 | PADOT Type 'M'        | In Sag         | 434.56                | 434.56             | 2.32                                    | 0.00                                         | 2.32                                             | 100.0                               | 2.32                                           | 0.00                                        | (N/A)         | 2.9               | 12.0               | 0.0200              | (N/A)                      |
| IN219 | PADOT Double Type 'C' | In Sag         | 443.25                | 443.25             | 2.88                                    | 0.00                                         | 2.88                                             | 100.0                               | 2.88                                           | 0.00                                        | (N/A)         | 2.3               | 9.5                | 0.0200              | (N/A)                      |
| IN220 | PADOT Type 'C'        | In Sag         | 445.95                | 445.95             | 0.94                                    | 0.00                                         | 0.94                                             | 100.0                               | 0.94                                           | 0.00                                        | (N/A)         | 1.3               | 5.4                | 0.0200              | (N/A)                      |
| IN221 | PADOT Type 'C'        | In Sag         | 447.35                | 447.35             | 0.21                                    | 0.00                                         | 0.21                                             | 100.0                               | 0.21                                           | 0.00                                        | (N/A)         | 0.1               | 0.4                | 0.0200              | (N/A)                      |
| OS01  | PADOT Type 'M'        | In Sag         | 429.00                | 429.00             | 0.00                                    | 0.00                                         | 0.00                                             | 100.0                               | 0.00                                           | 0.00                                        | (N/A)         | 0.0               | 0.0                | 0.0200              | (N/A)                      |
| OS02  | PADOT Type 'M'        | In Sag         | 423.00                | 423.00             | 0.00                                    | 0.00                                         | 0.00                                             | 100.0                               | 0.00                                           | 0.00                                        | (N/A)         | 0.0               | 0.0                | 0.0200              | (N/A)                      |
| TD201 | PADOT Type 'M'        | In Sag         | 438.45                | 438.45             | 0.21                                    | 0.00                                         | 0.21                                             | 100.0                               | 0.21                                           | 0.00                                        | (N/A)         | 0.9               | 3.6                | 0.0200              | (N/A)                      |
| YD201 | PADOT Type 'C'        | In Sag         | 445.65                | 445.65             | 0.09                                    | 0.00                                         | 0.09                                             | 100.0                               | 0.09                                           | 0.00                                        | (N/A)         | 0.0               | 0.1                | 0.0200              | (N/A)                      |

R:\15\PC1511921\Technical\Stormwater & E&S\Rev 0\StormCAD\Byers Station\_Storm-0.stc

Scenario: 25-Year  
Current Time Step: 0.000Hr  
Conduit FlexTable: Pipe Report

| Upstream<br>Struct. | Downstream<br>Struct. | Size    | Material                          | L (ft) | S (ft/ft) | Q<br>(ft <sup>3</sup> /s) | System<br>Q<br>(ft <sup>3</sup> /s) | Avg.<br>V<br>(ft/s) | Up.<br>Invert<br>(ft) | Up.<br>Cover<br>(ft) | Up.<br>Gr.<br>Elev.<br>(ft) | HGL<br>In (ft) | EGL<br>In (ft) | Down.<br>Invert<br>(ft) | Down.<br>Cover<br>(ft) | Down.<br>Gr.<br>Elev.<br>(ft) | HGL<br>Out<br>(ft) | EGL<br>Out<br>(ft) |
|---------------------|-----------------------|---------|-----------------------------------|--------|-----------|---------------------------|-------------------------------------|---------------------|-----------------------|----------------------|-----------------------------|----------------|----------------|-------------------------|------------------------|-------------------------------|--------------------|--------------------|
| IN24                | IN25                  | 15 inch | Corrugated HDPE (Smooth Interior) | 14.0   | 0.0050    | 6.06                      | 3.01                                | 4.23                | 451.57                | 1.87                 | 454.69                      | 452.35         | 452.57         | 451.50                  | 2.07                   | 454.82                        | 452.34             | 452.52             |
| IN25                | IN26                  | 15 inch | Corrugated HDPE (Smooth Interior) | 24.0   | 0.0075    | 4.95                      | 4.91                                | 5.50                | 451.33                | 2.24                 | 454.82                      | 452.26         | 452.65         | 451.15                  | 2.42                   | 454.82                        | 452.34             | 452.53             |
| IN28                | MH02                  | 18 inch | Corrugated HDPE (Smooth Interior) | 24.0   | 0.0129    | 12.93                     | 10.56                               | 8.16                | 446.96                | 5.07                 | 453.53                      | 448.21         | 448.91         | 446.65                  | 5.40                   | 453.55                        | 447.95             | 448.60             |
| IN29                | MH02                  | 15 inch | Corrugated HDPE (Smooth Interior) | 21.0   | 0.0157    | 8.77                      | 0.94                                | 4.67                | 451.13                | 1.50                 | 453.88                      | 451.51         | 451.65         | 450.80                  | 1.50                   | 453.55                        | 451.08             | 451.40             |
| IN30                | MH03                  | 15 inch | Corrugated HDPE (Smooth Interior) | 16.0   | 0.0256    | 11.20                     | 1.49                                | 6.34                | 448.36                | 1.50                 | 451.11                      | 448.92         | 449.04         | 447.95                  | 2.34                   | 449.03                        | 449.03             | 449.03             |
| MH03                | IN28                  | 15 inch | Corrugated HDPE (Smooth Interior) | 114.0  | 0.0050    | 4.95                      | 2.36                                | 3.99                | 447.78                | 2.51                 | 451.54                      | 448.97         | 449.03         | 447.21                  | 5.07                   | 453.53                        | 448.85             | 448.90             |
| IN31                | MH03                  | 15 inch | Corrugated HDPE (Smooth Interior) | 20.0   | 0.0050    | 4.95                      | 0.89                                | 3.06                | 448.05                | 1.82                 | 451.12                      | 448.99         | 449.00         | 447.95                  | 2.34                   | 451.54                        | 448.99             | 449.00             |
| IN32                | IN31                  | 15 inch | Corrugated HDPE (Smooth Interior) | 24.0   | 0.0050    | 4.95                      | 0.81                                | 2.97                | 448.34                | 1.50                 | 451.09                      | 449.00         | 449.02         | 448.22                  | 1.65                   | 451.12                        | 449.00             | 449.02             |
| MH02                | IN33                  | 18 inch | Corrugated HDPE (Smooth Interior) | 64.0   | 0.0133    | 13.11                     | 11.44                               | 8.36                | 446.48                | 5.57                 | 453.55                      | 447.77         | 448.55         | 446.63                  | 2.68                   | 449.81                        | 446.98             | 447.71             |
| IN34                | IN33                  | 15 inch | Corrugated HDPE (Smooth Interior) | 24.0   | 0.0050    | 4.95                      | 0.14                                | 1.76                | 447.06                | 1.50                 | 449.81                      | 447.63         | 447.63         | 446.94                  | 1.62                   | 449.81                        | 447.63             | 447.71             |
| IN33                | IN34A                 | 18 inch | Corrugated HDPE (Smooth Interior) | 42.0   | 0.0343    | 21.07                     | 13.76                               | 12.70               | 445.46                | 2.85                 | 449.81                      | 446.83         | 447.86         | 444.02                  | 2.00                   | 447.52                        | 445.45             | 446.42             |
| IN35                | IN35                  | 18 inch | Corrugated HDPE (Smooth Interior) | 55.0   | 0.0402    | 22.81                     | 15.29                               | 13.83               | 443.85                | 2.17                 | 447.52                      | 445.26         | 446.48         | 441.64                  | 1.50                   | 444.64                        | 442.61             | 445.09             |
| IN38                | IN38                  | 15 inch | Corrugated HDPE (Smooth Interior) | 23.0   | 0.0052    | 5.05                      | 4.27                                | 4.62                | 437.97                | 1.67                 | 440.89                      | 438.85         | 439.18         | 437.85                  | 1.79                   | 440.89                        | 438.69             | 439.06             |
| IN36                | IN37                  | 24 inch | Corrugated HDPE (Smooth Interior) | 123.0  | 0.0071    | 20.61                     | 18.18                               | 7.40                | 438.08                | 4.56                 | 444.64                      | 439.62         | 440.38         | 437.21                  | 1.68                   | 440.89                        | 438.67             | 439.52             |
| IN40                | IN39                  | 18 inch | Corrugated HDPE (Smooth Interior) | 22.0   | 0.0050    | 8.05                      | 3.50                                | 4.40                | 431.13                | 6.33                 | 438.96                      | 431.84         | 432.12         | 431.02                  | 6.44                   | 438.96                        | 431.71             | 432.01             |
| IN42                | IN42                  | 15 inch | Corrugated HDPE (Smooth Interior) | 64.0   | 0.0331    | 12.74                     | 1.11                                | 6.37                | 433.25                | 1.78                 | 436.28                      | 433.66         | 433.82         | 431.13                  | 2.07                   | 434.45                        | 431.38             | 432.01             |
| IN41                | IN42                  | 15 inch | Corrugated HDPE (Smooth Interior) | 22.0   | 0.0050    | 4.95                      | 0.32                                | 2.40                | 433.53                | 1.50                 | 436.28                      | 433.75         | 433.83         | 433.42                  | 1.61                   | 436.28                        | 433.73             | 433.76             |
| IN24                | IN43                  | 24 inch | Corrugated HDPE (Smooth Interior) | 25.0   | 0.0048    | 16.98                     | 2.01                                | 3.63                | 430.50                | 1.50                 | 434.00                      | 430.99         | 431.17         | 430.38                  | 2.07                   | 434.45                        | 430.89             | 431.05             |
| IN217               | IN43                  | 24 inch | Corrugated HDPE (Smooth Interior) | 25.0   | 0.0048    | 16.98                     | 2.01                                | 3.63                | 430.50                | 1.50                 | 434.00                      | 430.99         | 431.17         | 430.38                  | 2.07                   | 434.45                        | 430.89             | 431.05             |
| IN207               | EW03                  | 30 inch | Corrugated HDPE (Smooth Interior) | 15.0   | 0.0100    | 44.43                     | 21.96                               | 4.47                | 422.15                | 10.00                | 434.65                      | 425.69         | 426.00         | 422.00                  | 3.50                   | 428.00                        | 425.65             | 425.96             |
| OS01                | MH19                  | 18 inch | Corrugated HDPE (Smooth Interior) | 36.0   | 0.0050    | 8.05                      | 3.37                                | 1.91                | 423.79                | 3.71                 | 429.00                      | 425.71         | 425.77         | 423.61                  | 11.14                  | 436.25                        | 425.68             | 425.74             |
| MH19                | IN40                  | 18 inch | Corrugated HDPE (Smooth Interior) | 100.0  | 0.0141    | 13.51                     | 3.37                                | 1.91                | 423.41                | 11.34                | 436.25                      | 425.63         | 425.68         | 422.00                  | 4.50                   | 428.00                        | 425.54             | 425.60             |
| IN49                | IN34A                 | 15 inch | Corrugated HDPE (Smooth Interior) | 54.0   | 0.0402    | 14.03                     | 1.66                                | 7.66                | 446.94                | 3.09                 | 451.28                      | 447.45         | 447.64         | 444.77                  | 1.50                   | 447.52                        | 446.23             | 446.26             |
| IN218               | IN40                  | 18 inch | Corrugated HDPE (Smooth Interior) | 44.0   | 0.0050    | 8.05                      | 2.32                                | 3.94                | 431.55                | 1.51                 | 434.56                      | 432.13         | 432.13         | 431.33                  | 6.13                   | 438.96                        | 431.93             | 432.12             |
| IN48                | IN24                  | 15 inch | Corrugated HDPE (Smooth Interior) | 76.0   | 0.0050    | 4.95                      | 2.73                                | 4.13                | 432.12                | 1.50                 | 454.87                      | 452.78         | 453.05         | 451.74                  | 1.70                   | 454.69                        | 452.41             | 452.67             |
| IN36                | IN36                  | 24 inch | Corrugated HDPE (Smooth Interior) | 22.0   | 0.0077    | 21.54                     | 17.90                               | 7.67                | 438.42                | 4.22                 | 444.64                      | 440.19         | 440.76         | 438.25                  | 4.39                   | 444.64                        | 440.13             | 440.66             |
| OS02                | EW02                  | 18 inch | Corrugated HDPE (Smooth Interior) | 45.0   | 0.0051    | 8.14                      | 4.88                                | 4.81                | 420.23                | 1.27                 | 420.00                      | 421.08         | 421.43         | 420.00                  | 13.50                  | 435.00                        | 420.84             | 421.20             |
| IN26                | IN26                  | 15 inch | Corrugated HDPE (Smooth Interior) | 60.0   | 0.0150    | 8.57                      | 6.79                                | 7.75                | 450.98                | 2.59                 | 454.82                      | 452.03         | 452.62         | 450.08                  | 2.20                   | 453.53                        | 450.93             | 451.84             |
| IN27                | MH04                  | 15 inch | Corrugated HDPE (Smooth Interior) | 17.0   | 0.0053    | 5.09                      | 0.77                                | 2.99                | 459.43                | 1.50                 | 462.18                      | 459.77         | 459.64         | 459.34                  | 2.05                   | 462.64                        | 459.67             | 459.81             |
| IN43                | IN44                  | 24 inch | Corrugated HDPE (Smooth Interior) | 50.0   | 0.0124    | 27.29                     | 3.42                                | 5.93                | 430.18                | 2.27                 | 434.45                      | 430.83         | 431.06         | 429.56                  | 1.66                   | 433.22                        | 430.04             | 430.58             |
| MH04                | IN26                  | 15 inch | Corrugated HDPE (Smooth Interior) | 280.0  | 0.0245    | 10.96                     | 0.77                                | 5.14                | 459.17                | 2.22                 | 462.64                      | 459.51         | 459.64         | 452.30                  | 1.27                   | 454.82                        | 452.52             | 452.94             |
| YD201               | IN221                 | 12 inch | PVC                               | 26.0   | 0.0200    | 6.55                      | 0.09                                | 2.92                | 442.49                | 2.16                 | 445.65                      | 442.61         | 442.65         | 441.97                  | 4.38                   | 447.35                        | 442.05             | 442.18             |
| IN220               | IN220                 | 15 inch | Corrugated HDPE (Smooth Interior) | 75.0   | 0.0200    | 9.90                      | 0.29                                | 3.59                | 441.72                | 4.38                 | 447.35                      | 441.93         | 442.00         | 440.22                  | 4.48                   | 445.95                        | 440.48             | 440.52             |
| IN35                | IN220                 | 15 inch | Corrugated HDPE (Smooth Interior) | 85.0   | 0.0100    | 7.00                      | 1.21                                | 4.27                | 440.02                | 4.68                 | 445.95                      | 440.45         | 440.61         | 439.17                  | 4.22                   | 444.64                        | 440.29             | 440.31             |
| IN219               | IN38                  | 15 inch | Corrugated HDPE (Smooth Interior) | 56.0   | 0.0421    | 14.37                     | 2.88                                | 9.15                | 440.50                | 1.50                 | 443.25                      | 441.18         | 441.46         | 438.14                  | 1.50                   | 440.89                        | 438.92             | 439.12             |
| IN214               | IN214                 | 18 inch | Corrugated HDPE (Smooth Interior) | 156.0  | 0.0100    | 11.38                     | 4.84                                | 6.18                | 430.45                | 6.17                 | 438.12                      | 431.30         | 431.64         | 428.89                  | 4.74                   | 435.13                        | 430.04             | 430.21             |
| IN212               | IN212                 | 30 inch | Corrugated HDPE (Smooth Interior) | 89.0   | 0.0100    | 11.38                     | 7.40                                | 6.86                | 428.69                | 4.94                 | 435.13                      | 429.74         | 430.23         | 427.80                  | 5.96                   | 435.26                        | 428.68             | 429.41             |
| IN212               | IN212                 | 30 inch | Corrugated HDPE (Smooth Interior) | 128.0  | 0.0100    | 44.43                     | 11.45                               | 7.59                | 426.80                | 5.96                 | 435.26                      | 427.93         | 428.37         | 425.52                  | 7.22                   | 435.24                        | 426.69             | 427.09             |
| IN208               | IN208                 | 30 inch | Corrugated HDPE (Smooth Interior) | 128.0  | 0.0100    | 44.43                     | 15.78                               | 8.28                | 425.32                | 7.42                 | 435.24                      | 426.66         | 427.20         | 424.04                  | 8.03                   | 434.57                        | 426.08             | 426.29             |
| IN207               | IN207                 | 30 inch | Corrugated HDPE (Smooth Interior) | 105.0  | 0.0100    | 44.43                     | 20.50                               | 8.87                | 423.84                | 8.23                 | 434.57                      | 426.05         | 426.36         | 422.79                  | 9.36                   | 434.65                        | 425.87             | 426.14             |
| IN39                | IN215                 | 18 inch | Corrugated HDPE (Smooth Interior) | 33.0   | 0.0052    | 8.17                      | 3.64                                | 4.49                | 430.82                | 6.64                 | 438.96                      | 431.55         | 431.83         | 430.65                  | 5.97                   | 438.12                        | 431.50             | 431.69             |
| IN213               | IN212                 | 18 inch | Corrugated HDPE (Smooth Interior) | 8.5    | 0.0788    | 31.95                     | 2.80                                | 11.12               | 427.07                | 6.64                 | 438.13                      | 429.11         | 429.35         | 427.80                  | 5.96                   | 435.26                        | 428.18             | 429.18             |
| IN211               | IN210                 | 18 inch | Corrugated HDPE (Smooth Interior) | 8.5    | 0.0800    | 32.18                     | 2.77                                | 11.15               | 427.00                | 6.61                 | 435.11                      | 427.63         | 427.87         | 426.32                  | 7.42                   | 435.24                        | 426.69             | 427.70             |
| IN208               | IN208                 | 18 inch | Corrugated HDPE (Smooth Interior) | 8.5    | 0.0800    | 32.18                     | 3.27                                | 11.71               | 425.52                | 7.29                 | 434.31                      | 426.21         | 426.47         | 424.84                  | 8.23                   | 434.57                        | 426.33             | 426.58             |
| IN203               | IN203                 | 15 inch | Corrugated HDPE (Smooth Interior) | 121.5  | 0.0100    | 6.98                      | 0.61                                | 3.50                | 438.05                | 1.75                 | 441.05                      | 437.28         | 437.53         | 438.88                  | 2.96                   | 441.05                        | 437.31             | 437.34             |
| IN202               | IN202                 | 15 inch | Corrugated HDPE (Smooth Interior) | 76.0   | 0.0100    | 7.00                      | 2.55                                | 5.25                | 436.64                | 3.16                 | 441.05                      | 437.28         | 437.53         | 438.88                  | 3.92                   | 441.05                        | 436.40             | 436.83             |
| IN201               | EW04                  | 15 inch | Corrugated HDPE (Smooth Interior) | 189.0  | 0.0100    | 7.00                      | 3.57                                | 5.73                | 435.68                | 4.12                 | 441.05                      | 436.44         | 436.76         | 433.79                  | 4.20                   | 439.24                        | 434.42             | 434.93             |
| IN205               | IN205                 | 15 inch | Corrugated HDPE (Smooth Interior) | 27.0   | 0.0100    | 7.00                      | 6.21                                | 6.73                | 430.27                | 7.72                 | 439.24                      | 431.28         | 431.46         | 430.00                  | 2.75                   | 439.24                        | 430.92             | 431.56             |
| IN201               | IN201                 | 15 inch | Corrugated HDPE (Smooth Interior) | 53.0   | 0.0051    | 4.99                      | 0.24                                | 2.11                | 436.77                | 1.50                 | 439.52                      | 436.96         | 437.03         | 436.50                  | 1.88                   | 439.63                        | 436.69             | 436.76             |
| IN205               | IN201                 | 15 inch | Corrugated HDPE (Smooth Interior) | 74.0   | 0.0100    | 7.00                      | 0.86                                | 3.87                | 435.79                | 2.59                 | 439.52                      | 436.15         | 436.28         | 435.05                  | 2.94                   | 439.24                        | 435.35             | 435.58             |
| IN216               | MH03                  | 30 inch | Corrugated HDPE (Smooth Interior) | 64.0   | 0.0050    | 31.42                     | 23.51                               | 7.02                | 436.00                | 1.67                 | 440.17                      | 437.65         | 438.38         | 435.68                  | 2.83                   | 441.01                        | 437.48             | 438.08             |
| MH03                | MH03                  | 30 inch | Corrugated HDPE (Smooth Interior) | 349.0  | 0.0050    | 31.46                     | 24.52                               | 7.09                | 435.51                | 3.00                 | 441.01                      | 437.20         | 437.56         | 433.76                  | 4.31                   | 440.57                        | 435.42             | 436.20             |
| MH02                | MH01                  | 30 inch | Corrugated HDPE (Smooth Interior) | 42.0   | 0.0050    | 31.42                     | 24.56                               | 7.08                | 431.12                | 6.95                 | 440.57                      | 432.81         | 433.95         | 430.91                  | 5.18                   | 438.59                        | 432.80             | 433.39             |
| MH01                | EW05                  | 30 inch | Corrugated HDPE (Smooth Interior) | 148.0  | 0.0050    | 31.42                     | 24.76                               | 7.09                | 430.74                | 5.35                 | 438.59                      | 432.44         | 433.19         | 430.00                  | 7.50                   | 440.00                        | 431.67             | 432.45             |
| IN37                | IN216                 | 30 inch | Corrugated HDPE (Smooth Interior) | 35.0   | 0.0154    | 55.19                     | 22.22                               | 10.64               | 436.71                | 1.68                 | 440.89                      | 438.31         | 439.01         | 436.17                  | 1.50                   | 440.17                        | 437.93             | 438.49             |
| TD201               | IN202                 | 8 inch  | PVC                               | 32.0   | 0.0050    | 1.11                      | 0.21                                | 2.43                | 436.42                | 1.36                 | 438.45                      | 436.63         | 436.70         | 436.26                  | 4.12                   | 441.05                        | 436.60             | 436.62             |

|      |      |         |                                   |       |        |       |      |      |        |      |        |        |        |        |      |        |        |        |
|------|------|---------|-----------------------------------|-------|--------|-------|------|------|--------|------|--------|--------|--------|--------|------|--------|--------|--------|
| IN44 | IN45 | 24 inch | Corrugated HDPE (Smooth Interior) | 38.0  | 0.0050 | 17.33 | 4.10 | 4.52 | 428.64 | 2.58 | 433.22 | 429.35 | 429.61 | 428.45 | 1.55 | 432.00 | 429.11 | 429.43 |
| IN45 | MH27 | 24 inch | Corrugated HDPE (Smooth Interior) | 174.0 | 0.0050 | 17.33 | 4.90 | 4.74 | 428.25 | 1.75 | 432.00 | 429.03 | 429.32 | 427.38 | 6.62 | 436.00 | 428.11 | 428.46 |
| MH27 | MH28 | 24 inch | Corrugated HDPE (Smooth Interior) | 174.0 | 0.0100 | 24.51 | 4.77 | 6.04 | 427.18 | 6.82 | 436.00 | 427.95 | 428.23 | 425.44 | 1.56 | 429.00 | 426.04 | 426.61 |
| MH28 | EW09 | 24 inch | Corrugated HDPE (Smooth Interior) | 21.0  | 0.0052 | 17.74 | 4.67 | 4.76 | 422.11 | 4.89 | 429.00 | 422.87 | 423.15 | 422.00 | 2.00 | 426.00 | 422.71 | 423.05 |
| IN46 | IN45 | 15 inch | Corrugated HDPE (Smooth Interior) | 34.0  | 0.0050 | 4.95  | 0.44 | 2.49 | 429.17 | 1.48 | 431.90 | 429.43 | 429.52 | 429.00 | 1.75 | 432.00 | 429.25 | 429.35 |

R:\15\PC\151192\1\Technical\Stormwater & E&S\Rev 0\StormCAD\Byers Station\_Storm-0.stc

**Scenario: 50-Year**  
**Current Time Step: 0.000Hr**  
**Catch Basin FlexTable: Inlet Report**

| Label | Inlet                 | Inlet Location | Ground Elevation (ft) | Rim Elevation (ft) | Invert Out (ft) | Inlet Bottom El. (ft) | Inlet DA (acres) | Inlet C | Inlet Intensity (in/h) | Inlet Tc (min) | Local Surface Flow (ft <sup>3</sup> /s) | Carryover Rational Flow (ft <sup>3</sup> /s) | Known Flow (ft <sup>3</sup> /s) |
|-------|-----------------------|----------------|-----------------------|--------------------|-----------------|-----------------------|------------------|---------|------------------------|----------------|-----------------------------------------|----------------------------------------------|---------------------------------|
| IN24  | PADOT Type 'C'        | In Sag         | 454.69                | 454.69             | 451.57          | 451.57                | 0.060            | 0.740   | 7.460                  | 5.000          | 0.33                                    | 0.00                                         | 0.00                            |
| IN25  | PADOT Type 'C'        | On Grade       | 454.82                | 454.82             | 451.33          | 451.33                | 0.580            | 0.790   | 7.460                  | 5.000          | 3.45                                    | 0.00                                         | 0.00                            |
| IN26  | PADOT Type 'C'        | On Grade       | 454.82                | 454.82             | 450.98          | 450.98                | 0.340            | 0.820   | 7.460                  | 5.000          | 2.10                                    | 0.00                                         | 0.00                            |
| IN27  | PADOT Type 'C'        | In Sag         | 462.18                | 462.18             | 459.43          | 459.43                | 0.110            | 0.990   | 7.460                  | 5.000          | 0.82                                    | 0.00                                         | 0.00                            |
| IN28  | PADOT Type 'C'        | On Grade       | 453.53                | 453.53             | 446.96          | 446.96                | 0.090            | 0.910   | 7.460                  | 5.000          | 0.62                                    | 2.13                                         | 0.00                            |
| IN29  | PADOT Type 'C'        | On Grade       | 453.88                | 453.88             | 451.13          | 451.13                | 0.250            | 0.720   | 7.460                  | 5.000          | 1.35                                    | 0.00                                         | 0.00                            |
| IN30  | PADOT Type 'C'        | In Sag         | 451.11                | 451.11             | 448.36          | 448.36                | 0.110            | 0.720   | 7.460                  | 5.000          | 0.60                                    | 1.04                                         | 0.00                            |
| IN31  | PADOT Type 'C'        | In Sag         | 451.12                | 451.12             | 448.05          | 448.05                | 0.020            | 0.620   | 7.460                  | 5.000          | 0.09                                    | 0.00                                         | 0.00                            |
| IN32  | PADOT Type 'C'        | In Sag         | 451.09                | 451.09             | 448.34          | 448.34                | 0.130            | 0.880   | 7.460                  | 5.000          | 0.86                                    | 0.00                                         | 0.00                            |
| IN33  | PADOT Type 'C'        | On Grade       | 449.81                | 449.81             | 445.46          | 445.46                | 0.590            | 0.950   | 7.460                  | 5.000          | 4.21                                    | 0.36                                         | 0.00                            |
| IN34  | PADOT Type 'C'        | On Grade       | 449.81                | 449.81             | 447.06          | 447.06                | 0.020            | 0.990   | 7.460                  | 5.000          | 0.15                                    | 0.00                                         | 0.00                            |
| IN34A | PADOT Type 'C'        | In Sag         | 447.52                | 447.52             | 443.85          | 443.85                | (N/A)            | (N/A)   | 7.460                  | 0.000          | 0.00                                    | 0.00                                         | 0.00                            |
| IN35  | PADOT Type 'C'        | On Grade       | 444.64                | 444.64             | 438.42          | 438.42                | 0.200            | 0.400   | 7.460                  | 5.000          | 0.60                                    | 2.09                                         | 0.00                            |
| IN36  | PADOT Type 'C'        | On Grade       | 444.64                | 444.64             | 438.08          | 438.08                | 0.090            | 0.580   | 7.460                  | 5.000          | 0.39                                    | 0.00                                         | 0.00                            |
| IN37  | PADOT Type 'C'        | On Grade       | 440.89                | 440.89             | 436.71          | 436.71                | 0.040            | 0.990   | 7.460                  | 5.000          | 0.30                                    | 0.04                                         | 0.00                            |
| IN38  | PADOT Type 'C'        | On Grade       | 440.89                | 440.89             | 437.97          | 437.97                | 0.220            | 0.790   | 7.460                  | 5.000          | 1.31                                    | 1.01                                         | 0.00                            |
| IN39  | PADOT Type 'C'        | On Grade       | 438.96                | 438.96             | 430.82          | 430.82                | 0.020            | 0.990   | 7.460                  | 5.000          | 0.15                                    | 0.03                                         | 0.00                            |
| IN40  | PADOT Type 'C'        | On Grade       | 438.96                | 438.96             | 431.13          | 431.13                | 0.190            | 0.760   | 7.460                  | 5.000          | 1.09                                    | 0.82                                         | 0.00                            |
| IN41  | PADOT Type 'C'        | On Grade       | 436.28                | 436.28             | 433.53          | 433.53                | 0.050            | 0.990   | 7.460                  | 5.000          | 0.37                                    | 0.01                                         | 0.00                            |
| IN42  | PADOT Type 'C'        | On Grade       | 436.28                | 436.28             | 433.25          | 433.25                | 0.070            | 0.990   | 7.460                  | 5.000          | 0.52                                    | 0.61                                         | 0.00                            |
| IN43  | PADOT Type 'C'        | On Grade       | 434.45                | 434.45             | 430.18          | 430.18                | 0.020            | 0.990   | 7.460                  | 5.000          | 0.15                                    | 0.27                                         | 0.00                            |
| IN44  | PADOT Type 'C'        | On Grade       | 433.22                | 433.22             | 428.64          | 428.64                | 0.200            | 0.620   | 7.460                  | 5.000          | 0.93                                    | 0.04                                         | 0.00                            |
| IN45  | PADOT Type 'C'        | In Sag         | 432.00                | 432.00             | 428.25          | 428.25                | 0.060            | 0.500   | 7.460                  | 5.000          | 0.23                                    | 0.21                                         | 0.00                            |
| IN46  | PADOT Type 'C'        | In Sag         | 431.90                | 431.90             | 429.17          | 429.17                | 0.080            | 0.710   | 7.460                  | 5.000          | 0.43                                    | 0.05                                         | 0.00                            |
| IN48  | PADOT Type 'M'        | In Sag         | 454.87                | 454.87             | 452.12          | 452.12                | 0.990            | 0.390   | 7.460                  | 5.000          | 2.90                                    | 0.00                                         | 0.00                            |
| IN49  | PADOT Type 'M'        | In Sag         | 451.28                | 451.28             | 446.94          | 446.94                | 0.520            | 0.450   | 7.460                  | 5.000          | 1.76                                    | 0.00                                         | 0.00                            |
| IN201 | PADOT Type 'C'        | In Sag         | 439.24                | 439.24             | 430.27          | 430.27                | 0.310            | 0.918   | 7.460                  | 5.000          | 2.14                                    | 0.00                                         | 0.00                            |
| IN202 | PADOT Type 'C'        | In Sag         | 441.05                | 441.05             | 435.68          | 435.68                | 0.170            | 0.730   | 7.460                  | 5.000          | 0.93                                    | 0.00                                         | 0.00                            |
| IN203 | PADOT Type 'C'        | In Sag         | 441.05                | 441.05             | 436.64          | 436.64                | 0.330            | 0.854   | 7.460                  | 5.000          | 2.12                                    | 0.00                                         | 0.00                            |
| IN204 | PADOT Type 'C'        | In Sag         | 441.05                | 441.05             | 438.05          | 438.05                | 0.140            | 0.620   | 7.460                  | 5.000          | 0.65                                    | 0.00                                         | 0.00                            |
| IN205 | PADOT Type 'C'        | In Sag         | 439.63                | 439.63             | 435.79          | 435.79                | 0.120            | 0.740   | 7.460                  | 5.000          | 0.67                                    | 0.00                                         | 0.00                            |
| IN206 | PADOT Type 'C'        | In Sag         | 439.52                | 439.52             | 436.77          | 436.77                | 0.050            | 0.690   | 7.460                  | 5.000          | 0.26                                    | 0.00                                         | 0.00                            |
| IN207 | PADOT Type 'C'        | In Sag         | 434.65                | 434.65             | 422.15          | 422.15                | 0.290            | 0.860   | 7.460                  | 5.000          | 1.88                                    | 0.00                                         | 0.00                            |
| IN208 | PADOT Type 'C'        | In Sag         | 434.57                | 434.57             | 423.84          | 423.84                | 0.510            | 0.540   | 7.460                  | 5.000          | 2.07                                    | 0.00                                         | 0.00                            |
| IN209 | PADOT Type 'M'        | In Sag         | 434.31                | 434.31             | 425.52          | 425.52                | 0.520            | 0.890   | 7.460                  | 5.000          | 3.48                                    | 0.00                                         | 0.00                            |
| IN210 | PADOT Type 'C'        | In Sag         | 435.24                | 435.24             | 425.32          | 425.32                | 0.530            | 0.520   | 7.460                  | 5.000          | 2.07                                    | 0.00                                         | 0.00                            |
| IN211 | PADOT Type 'M'        | In Sag         | 435.11                | 435.11             | 427.00          | 427.00                | 0.450            | 0.870   | 7.460                  | 5.000          | 2.94                                    | 0.00                                         | 0.00                            |
| IN212 | PADOT Type 'C'        | In Sag         | 435.26                | 435.26             | 426.80          | 426.80                | 0.310            | 0.680   | 7.460                  | 5.000          | 1.59                                    | 0.00                                         | 0.00                            |
| IN213 | PADOT Type 'M'        | In Sag         | 435.13                | 435.13             | 428.47          | 428.47                | 0.460            | 0.860   | 7.460                  | 5.000          | 2.97                                    | 0.00                                         | 0.00                            |
| IN214 | PADOT Type 'C'        | In Sag         | 435.13                | 435.13             | 428.69          | 428.69                | 0.450            | 0.860   | 7.460                  | 5.000          | 2.91                                    | 0.00                                         | 0.00                            |
| IN215 | PADOT Type 'C'        | In Sag         | 438.12                | 438.12             | 430.45          | 430.45                | 0.220            | 0.790   | 7.460                  | 5.000          | 1.31                                    | 0.00                                         | 0.00                            |
| IN216 | PADOT Type 'C'        | In Sag         | 440.17                | 440.17             | 436.00          | 436.00                | 0.280            | 0.730   | 7.460                  | 5.000          | 1.54                                    | 0.00                                         | 0.00                            |
| IN217 | PADOT Type 'M'        | In Sag         | 434.00                | 434.00             | 430.50          | 430.50                | 1.090            | 0.260   | 7.460                  | 5.000          | 2.13                                    | 0.00                                         | 0.00                            |
| IN218 | PADOT Type 'M'        | In Sag         | 434.56                | 434.56             | 431.55          | 431.55                | 1.310            | 0.250   | 7.460                  | 5.000          | 2.46                                    | 0.00                                         | 0.00                            |
| IN219 | PADOT Double Type 'C' | In Sag         | 443.25                | 443.25             | 440.50          | 440.50                | 0.590            | 0.690   | 7.460                  | 5.000          | 3.06                                    | 0.00                                         | 0.00                            |
| IN220 | PADOT Type 'C'        | In Sag         | 445.95                | 445.95             | 440.02          | 440.02                | 0.150            | 0.887   | 7.460                  | 5.000          | 1.00                                    | 0.00                                         | 0.00                            |
| IN221 | PADOT Type 'C'        | In Sag         | 447.35                | 447.35             | 441.72          | 441.72                | 0.030            | 0.970   | 7.460                  | 5.000          | 0.22                                    | 0.00                                         | 0.00                            |
| OS01  | PADOT Type 'M'        | In Sag         | 429.00                | 433.00             | 423.79          | 423.79                | (N/A)            | (N/A)   | 7.460                  | 0.000          | 0.00                                    | 0.00                                         | 0.00                            |
| OS02  | PADOT Type 'M'        | In Sag         | 423.00                | 426.00             | 420.23          | 420.23                | (N/A)            | (N/A)   | 7.460                  | 0.000          | 0.00                                    | 0.00                                         | 0.00                            |
| TD201 | PADOT Type 'M'        | In Sag         | 438.45                | 438.45             | 436.42          | 436.42                | 0.030            | 0.970   | 7.460                  | 5.000          | 0.22                                    | 0.00                                         | 0.00                            |
| YD201 | PADOT Type 'C'        | In Sag         | 445.65                | 445.65             | 442.49          | 442.49                | 0.050            | 0.250   | 7.460                  | 5.000          | 0.09                                    | 0.00                                         | 0.00                            |

R:\15\PC1511921\Technical\Stormwater & E&S\Rev 0\StormCAD\Byers Station\_Storm-0.stc

**Scenario: 50-Year  
Current Time Step: 0.000Hr  
Catch Basin FlexTable: Gutter Spread**

| Label | Inlet                 | Inlet Location | Ground Elevation (ft) | Rim Elevation (ft) | Local Surface Flow (ft <sup>2</sup> /s) | Carryover Rational Flow (ft <sup>3</sup> /s) | Total Surface Flow to Inlet (ft <sup>2</sup> /s) | Capture Efficiency (Calculated) (%) | Intercepted Rational Flow (ft <sup>3</sup> /s) | Bypassed Rational Flow (ft <sup>3</sup> /s) | Bypass Target | Gutter Depth (in) | Gutter Spread (ft) | Cross Slope (ft/ft) | Longitudinal Slope (ft/ft) |
|-------|-----------------------|----------------|-----------------------|--------------------|-----------------------------------------|----------------------------------------------|--------------------------------------------------|-------------------------------------|------------------------------------------------|---------------------------------------------|---------------|-------------------|--------------------|---------------------|----------------------------|
| IN24  | PADOT Type 'C'        | In Sag         | 454.69                | 454.69             | 0.33                                    | 0.00                                         | 0.33                                             | 100.0                               | 0.33                                           | 0.00                                        | (N/A)         | 0.6               | 2.3                | 0.0200              | (N/A)                      |
| IN25  | PADOT Type 'C'        | On Grade       | 454.82                | 454.82             | 3.45                                    | 0.00                                         | 3.45                                             | 58.7                                | 2.02                                           | 1.42                                        | IN28          | 2.2               | 9.3                | 0.0200              | 0.0200                     |
| IN26  | PADOT Type 'C'        | On Grade       | 454.82                | 454.82             | 2.10                                    | 0.00                                         | 2.10                                             | 66.4                                | 1.39                                           | 0.71                                        | IN28          | 1.9               | 7.7                | 0.0200              | 0.0200                     |
| IN27  | PADOT Type 'C'        | In Sag         | 462.18                | 462.18             | 0.82                                    | 0.00                                         | 0.82                                             | 100.0                               | 0.82                                           | 0.00                                        | (N/A)         | 1.2               | 4.9                | 0.0200              | (N/A)                      |
| IN28  | PADOT Type 'C'        | On Grade       | 453.53                | 453.53             | 0.62                                    | 2.13                                         | 2.75                                             | 62.2                                | 1.71                                           | 1.04                                        | IN30          | 2.1               | 8.6                | 0.0200              | 0.0200                     |
| IN29  | PADOT Type 'C'        | On Grade       | 453.88                | 453.88             | 1.35                                    | 0.00                                         | 1.35                                             | 73.1                                | 0.99                                           | 0.36                                        | IN33          | 1.6               | 6.6                | 0.0200              | 0.0200                     |
| IN30  | PADOT Type 'C'        | In Sag         | 451.11                | 451.11             | 0.60                                    | 1.04                                         | 1.63                                             | 100.0                               | 1.63                                           | 0.00                                        | (N/A)         | 1.9               | 7.9                | 0.0200              | (N/A)                      |
| IN31  | PADOT Type 'C'        | In Sag         | 451.12                | 451.12             | 0.09                                    | 0.00                                         | 0.09                                             | 100.0                               | 0.09                                           | 0.00                                        | (N/A)         | 0.0               | 0.1                | 0.0200              | (N/A)                      |
| IN32  | PADOT Type 'C'        | In Sag         | 451.09                | 451.09             | 0.86                                    | 0.00                                         | 0.86                                             | 100.0                               | 0.86                                           | 0.00                                        | (N/A)         | 1.2               | 5.0                | 0.0200              | (N/A)                      |
| IN33  | PADOT Type 'C'        | On Grade       | 449.81                | 449.81             | 4.21                                    | 0.36                                         | 4.58                                             | 54.4                                | 2.49                                           | 2.09                                        | IN35          | 2.5               | 10.4               | 0.0200              | 0.0200                     |
| IN34  | PADOT Type 'C'        | On Grade       | 449.81                | 449.81             | 0.15                                    | 0.00                                         | 0.15                                             | 98.0                                | 0.15                                           | 0.00                                        | IN36          | 0.7               | 2.9                | 0.0200              | 0.0200                     |
| IN34A | PADOT Type 'C'        | In Sag         | 447.52                | 447.52             | 0.00                                    | 0.00                                         | 0.00                                             | 100.0                               | 0.00                                           | 0.00                                        | (N/A)         | 0.0               | 0.0                | 0.0200              | (N/A)                      |
| IN35  | PADOT Type 'C'        | On Grade       | 444.64                | 444.64             | 0.60                                    | 2.09                                         | 2.69                                             | 62.5                                | 1.68                                           | 1.01                                        | IN38          | 2.0               | 8.5                | 0.0200              | 0.0200                     |
| IN36  | PADOT Type 'C'        | On Grade       | 444.64                | 444.64             | 0.39                                    | 0.00                                         | 0.40                                             | 90.0                                | 0.36                                           | 0.04                                        | IN37          | 1.0               | 4.1                | 0.0200              | 0.0200                     |
| IN37  | PADOT Type 'C'        | On Grade       | 440.89                | 440.89             | 0.30                                    | 0.04                                         | 0.34                                             | 91.7                                | 0.31                                           | 0.03                                        | IN39          | 0.9               | 3.9                | 0.0200              | 0.0200                     |
| IN38  | PADOT Type 'C'        | On Grade       | 440.89                | 440.89             | 1.31                                    | 1.01                                         | 2.32                                             | 64.8                                | 1.50                                           | 0.82                                        | IN40          | 1.9               | 8.0                | 0.0200              | 0.0200                     |
| IN39  | PADOT Type 'C'        | On Grade       | 438.96                | 438.96             | 0.15                                    | 0.03                                         | 0.18                                             | 97.1                                | 0.17                                           | 0.01                                        | IN41          | 0.7               | 3.1                | 0.0200              | 0.0200                     |
| IN40  | PADOT Type 'C'        | On Grade       | 438.96                | 438.96             | 1.09                                    | 0.82                                         | 1.90                                             | 67.9                                | 1.29                                           | 0.61                                        | IN42          | 1.8               | 7.5                | 0.0200              | 0.0200                     |
| IN41  | PADOT Type 'C'        | On Grade       | 436.28                | 436.28             | 0.37                                    | 0.01                                         | 0.38                                             | 90.5                                | 0.34                                           | 0.04                                        | IN44          | 1.0               | 4.1                | 0.0200              | 0.0200                     |
| IN42  | PADOT Type 'C'        | On Grade       | 436.28                | 436.28             | 0.52                                    | 0.61                                         | 1.13                                             | 75.8                                | 0.86                                           | 0.27                                        | IN43          | 1.5               | 6.1                | 0.0200              | 0.0200                     |
| IN43  | PADOT Type 'C'        | On Grade       | 434.45                | 434.45             | 0.15                                    | 0.27                                         | 0.42                                             | 89.2                                | 0.38                                           | 0.05                                        | IN46          | 1.0               | 4.2                | 0.0200              | 0.0200                     |
| IN44  | PADOT Type 'C'        | On Grade       | 433.22                | 433.22             | 0.93                                    | 0.04                                         | 0.97                                             | 78.2                                | 0.76                                           | 0.21                                        | IN45          | 1.4               | 5.8                | 0.0200              | 0.0200                     |
| IN45  | PADOT Type 'C'        | On Grade       | 432.00                | 432.00             | 0.23                                    | 0.21                                         | 0.44                                             | 100.0                               | 0.44                                           | 0.00                                        | (N/A)         | 0.7               | 3.0                | 0.0200              | (N/A)                      |
| IN46  | PADOT Type 'C'        | In Sag         | 431.90                | 431.90             | 0.43                                    | 0.05                                         | 0.47                                             | 100.0                               | 0.47                                           | 0.00                                        | (N/A)         | 0.8               | 3.2                | 0.0200              | (N/A)                      |
| IN48  | PADOT Type 'M'        | In Sag         | 454.87                | 454.87             | 2.90                                    | 0.00                                         | 2.90                                             | 100.0                               | 2.90                                           | 0.00                                        | (N/A)         | 3.3               | 13.7               | 0.0200              | (N/A)                      |
| IN49  | PADOT Type 'M'        | In Sag         | 451.28                | 451.28             | 1.76                                    | 0.00                                         | 1.76                                             | 100.0                               | 1.76                                           | 0.00                                        | (N/A)         | 2.5               | 10.3               | 0.0200              | (N/A)                      |
| IN201 | PADOT Type 'C'        | In Sag         | 439.24                | 439.24             | 2.14                                    | 0.00                                         | 2.14                                             | 100.0                               | 2.14                                           | 0.00                                        | (N/A)         | 2.3               | 9.5                | 0.0200              | (N/A)                      |
| IN202 | PADOT Type 'C'        | In Sag         | 441.05                | 441.05             | 0.93                                    | 0.00                                         | 0.93                                             | 100.0                               | 0.93                                           | 0.00                                        | (N/A)         | 1.3               | 5.4                | 0.0200              | (N/A)                      |
| IN203 | PADOT Type 'C'        | In Sag         | 441.05                | 441.05             | 2.12                                    | 0.00                                         | 2.12                                             | 100.0                               | 2.12                                           | 0.00                                        | (N/A)         | 2.3               | 9.4                | 0.0200              | (N/A)                      |
| IN204 | PADOT Type 'C'        | In Sag         | 441.05                | 441.05             | 0.65                                    | 0.00                                         | 0.65                                             | 100.0                               | 0.65                                           | 0.00                                        | (N/A)         | 1.0               | 4.1                | 0.0200              | (N/A)                      |
| IN205 | PADOT Type 'C'        | In Sag         | 439.63                | 439.63             | 0.67                                    | 0.00                                         | 0.67                                             | 100.0                               | 0.67                                           | 0.00                                        | (N/A)         | 1.0               | 4.2                | 0.0200              | (N/A)                      |
| IN206 | PADOT Type 'C'        | In Sag         | 439.52                | 439.52             | 0.26                                    | 0.00                                         | 0.26                                             | 100.0                               | 0.26                                           | 0.00                                        | (N/A)         | 0.4               | 1.5                | 0.0200              | (N/A)                      |
| IN207 | PADOT Type 'C'        | In Sag         | 434.65                | 434.65             | 1.88                                    | 0.00                                         | 1.88                                             | 100.0                               | 1.88                                           | 0.00                                        | (N/A)         | 2.1               | 8.7                | 0.0200              | (N/A)                      |
| IN208 | PADOT Type 'C'        | In Sag         | 434.57                | 434.57             | 2.07                                    | 0.00                                         | 2.07                                             | 100.0                               | 2.07                                           | 0.00                                        | (N/A)         | 2.2               | 9.3                | 0.0200              | (N/A)                      |
| IN209 | PADOT Type 'M'        | In Sag         | 434.31                | 434.31             | 3.48                                    | 0.00                                         | 3.48                                             | 100.0                               | 3.48                                           | 0.00                                        | (N/A)         | 3.7               | 15.3               | 0.0200              | (N/A)                      |
| IN210 | PADOT Type 'C'        | In Sag         | 435.24                | 435.24             | 2.07                                    | 0.00                                         | 2.07                                             | 100.0                               | 2.07                                           | 0.00                                        | (N/A)         | 2.2               | 9.3                | 0.0200              | (N/A)                      |
| IN211 | PADOT Type 'M'        | In Sag         | 435.11                | 435.11             | 2.94                                    | 0.00                                         | 2.94                                             | 100.0                               | 2.94                                           | 0.00                                        | (N/A)         | 3.3               | 13.8               | 0.0200              | (N/A)                      |
| IN212 | PADOT Type 'C'        | In Sag         | 435.26                | 435.26             | 1.59                                    | 0.00                                         | 1.59                                             | 100.0                               | 1.59                                           | 0.00                                        | (N/A)         | 1.9               | 7.7                | 0.0200              | (N/A)                      |
| IN213 | PADOT Type 'M'        | In Sag         | 435.13                | 435.13             | 2.97                                    | 0.00                                         | 2.97                                             | 100.0                               | 2.97                                           | 0.00                                        | (N/A)         | 3.3               | 13.9               | 0.0200              | (N/A)                      |
| IN214 | PADOT Type 'C'        | In Sag         | 435.13                | 435.13             | 2.91                                    | 0.00                                         | 2.91                                             | 100.0                               | 2.91                                           | 0.00                                        | (N/A)         | 2.8               | 11.6               | 0.0200              | (N/A)                      |
| IN215 | PADOT Type 'C'        | In Sag         | 438.12                | 438.12             | 1.31                                    | 0.00                                         | 1.31                                             | 100.0                               | 1.31                                           | 0.00                                        | (N/A)         | 1.6               | 6.8                | 0.0200              | (N/A)                      |
| IN216 | PADOT Type 'C'        | In Sag         | 440.17                | 440.17             | 1.54                                    | 0.00                                         | 1.54                                             | 100.0                               | 1.54                                           | 0.00                                        | (N/A)         | 1.8               | 7.6                | 0.0200              | (N/A)                      |
| IN217 | PADOT Type 'M'        | In Sag         | 434.00                | 434.00             | 2.13                                    | 0.00                                         | 2.13                                             | 100.0                               | 2.13                                           | 0.00                                        | (N/A)         | 2.7               | 11.4               | 0.0200              | (N/A)                      |
| IN218 | PADOT Type 'M'        | In Sag         | 434.56                | 434.56             | 2.46                                    | 0.00                                         | 2.46                                             | 100.0                               | 2.46                                           | 0.00                                        | (N/A)         | 3.0               | 12.5               | 0.0200              | (N/A)                      |
| IN219 | PADOT Double Type 'C' | In Sag         | 443.25                | 443.25             | 3.06                                    | 0.00                                         | 3.06                                             | 100.0                               | 3.06                                           | 0.00                                        | (N/A)         | 2.4               | 9.9                | 0.0200              | (N/A)                      |
| IN220 | PADOT Type 'C'        | In Sag         | 445.95                | 445.95             | 1.00                                    | 0.00                                         | 1.00                                             | 100.0                               | 1.00                                           | 0.00                                        | (N/A)         | 1.4               | 5.6                | 0.0200              | (N/A)                      |
| IN221 | PADOT Type 'C'        | In Sag         | 447.35                | 447.35             | 0.22                                    | 0.00                                         | 0.22                                             | 100.0                               | 0.22                                           | 0.00                                        | (N/A)         | 0.2               | 0.7                | 0.0200              | (N/A)                      |
| OS01  | PADOT Type 'M'        | In Sag         | 429.00                | 429.00             | 0.00                                    | 0.00                                         | 0.00                                             | 100.0                               | 0.00                                           | 0.00                                        | (N/A)         | 0.0               | 0.0                | 0.0200              | (N/A)                      |
| OS02  | PADOT Type 'M'        | In Sag         | 423.00                | 423.00             | 0.00                                    | 0.00                                         | 0.00                                             | 100.0                               | 0.00                                           | 0.00                                        | (N/A)         | 0.0               | 0.0                | 0.0200              | (N/A)                      |
| TD201 | PADOT Type 'M'        | In Sag         | 438.45                | 438.45             | 0.22                                    | 0.00                                         | 0.22                                             | 100.0                               | 0.22                                           | 0.00                                        | (N/A)         | 0.9               | 3.7                | 0.0200              | (N/A)                      |
| YD201 | PADOT Type 'C'        | In Sag         | 445.65                | 445.65             | 0.09                                    | 0.00                                         | 0.09                                             | 100.0                               | 0.09                                           | 0.00                                        | (N/A)         | 0.0               | 0.1                | 0.0200              | (N/A)                      |

R:\15\PC1511921\Technical\Stormwater &amp; E&amp;S\Rev 0\StormCAD\Byers Station\_Storm-0.stc



Scenario: 50-Year  
Current Time Step: 0.000Hr  
Conduit FlexTable: Pipe Report

| Upstream<br>Struct. | Downstream<br>Struct. | Size    | Material                          | L (ft) | S (ft/ft) | Q<br>(ft <sup>3</sup> /s) | System<br>Q<br>(ft <sup>3</sup> /s) | Avg.<br>V<br>(ft/s) | Up.<br>Invert<br>(ft) | Up.<br>Cover<br>(ft) | Up.<br>Gr.<br>Elev.<br>(ft) | HGL<br>In (ft) | EGL<br>In (ft) | Down.<br>Invert<br>(ft) | Down.<br>Cover<br>(ft) | Down.<br>Gr.<br>Elev.<br>(ft) | HGL<br>Out<br>(ft) | EGL<br>Out<br>(ft) |
|---------------------|-----------------------|---------|-----------------------------------|--------|-----------|---------------------------|-------------------------------------|---------------------|-----------------------|----------------------|-----------------------------|----------------|----------------|-------------------------|------------------------|-------------------------------|--------------------|--------------------|
| IN24                | IN25                  | 15 inch | Corrugated HDPE (Smooth Interior) | 14.0   | 0.0050    | 6.96                      | 3.20                                | 4.29                | 451.57                | 1.87                 | 454.69                      | 452.43         | 452.63         | 451.50                  | 2.07                   | 454.82                        | 452.42             | 452.59             |
| IN25                | IN26                  | 15 inch | Corrugated HDPE (Smooth Interior) | 24.0   | 0.0075    | 4.05                      | 5.18                                | 5.55                | 451.33                | 2.24                 | 454.82                      | 452.34         | 452.71         | 451.15                  | 2.42                   | 454.82                        | 452.28             | 452.59             |
| IN28                | MH02                  | 18 inch | Corrugated HDPE (Smooth Interior) | 24.0   | 0.0129    | 12.93                     | 11.21                               | 8.24                | 446.96                | 5.07                 | 453.53                      | 448.24         | 449.00         | 446.65                  | 5.40                   | 453.55                        | 448.00             | 448.69             |
| IN29                | MH02                  | 15 inch | Corrugated HDPE (Smooth Interior) | 21.0   | 0.0157    | 8.77                      | 0.99                                | 4.74                | 451.13                | 1.50                 | 453.88                      | 451.52         | 451.66         | 450.80                  | 1.50                   | 453.55                        | 451.09             | 451.42             |
| IN30                | MH03                  | 15 inch | Corrugated HDPE (Smooth Interior) | 16.0   | 0.0256    | 11.20                     | 1.63                                | 6.51                | 448.36                | 1.50                 | 451.11                      | 449.08         | 449.16         | 447.95                  | 2.34                   | 451.54                        | 449.12             | 449.15             |
| MH03                | IN28                  | 15 inch | Corrugated HDPE (Smooth Interior) | 114.0  | 0.0050    | 4.95                      | 2.56                                | 2.09                | 447.78                | 2.51                 | 451.54                      | 449.09         | 449.16         | 447.21                  | 5.07                   | 453.53                        | 448.94             | 449.00             |
| IN31                | MH03                  | 15 inch | Corrugated HDPE (Smooth Interior) | 20.0   | 0.0050    | 4.95                      | 0.95                                | 3.11                | 448.05                | 1.82                 | 451.12                      | 449.11         | 449.12         | 447.95                  | 2.34                   | 451.54                        | 449.11             | 449.12             |
| IN32                | IN31                  | 15 inch | Corrugated HDPE (Smooth Interior) | 24.0   | 0.0050    | 4.95                      | 0.86                                | 3.03                | 448.34                | 1.50                 | 451.09                      | 449.12         | 449.14         | 448.22                  | 1.65                   | 451.12                        | 449.12             | 449.13             |
| MH02                | IN33                  | 18 inch | Corrugated HDPE (Smooth Interior) | 64.0   | 0.0133    | 13.11                     | 12.13                               | 8.42                | 446.48                | 5.57                 | 453.55                      | 447.80         | 448.64         | 446.63                  | 2.68                   | 449.81                        | 447.02             | 447.80             |
| IN34                | IN33                  | 15 inch | Corrugated HDPE (Smooth Interior) | 24.0   | 0.0050    | 4.95                      | 0.15                                | 1.79                | 447.06                | 1.50                 | 449.81                      | 447.74         | 447.74         | 446.94                  | 1.62                   | 449.81                        | 447.74             | 447.74             |
| IN33                | IN34A                 | 18 inch | Corrugated HDPE (Smooth Interior) | 42.0   | 0.0343    | 21.07                     | 14.56                               | 12.86               | 445.46                | 2.85                 | 449.81                      | 446.86         | 447.98         | 444.02                  | 2.00                   | 447.52                        | 445.49             | 446.55             |
| IN35                | IN34A                 | 18 inch | Corrugated HDPE (Smooth Interior) | 55.0   | 0.0402    | 22.81                     | 16.19                               | 14.00               | 443.85                | 2.17                 | 447.52                      | 445.28         | 446.63         | 441.64                  | 1.50                   | 444.64                        | 442.65             | 445.20             |
| IN38                | IN37                  | 15 inch | Corrugated HDPE (Smooth Interior) | 23.0   | 0.0052    | 5.05                      | 4.54                                | 4.66                | 437.97                | 1.67                 | 440.89                      | 438.89         | 439.23         | 437.85                  | 1.79                   | 440.89                        | 438.71             | 439.11             |
| IN36                | IN37                  | 24 inch | Corrugated HDPE (Smooth Interior) | 123.0  | 0.0071    | 20.61                     | 19.25                               | 7.45                | 438.08                | 4.56                 | 444.64                      | 439.66         | 440.47         | 437.21                  | 1.68                   | 440.89                        | 438.79             | 439.60             |
| IN40                | IN39                  | 18 inch | Corrugated HDPE (Smooth Interior) | 22.0   | 0.0050    | 8.05                      | 3.73                                | 4.47                | 431.13                | 6.33                 | 438.96                      | 431.87         | 432.16         | 431.02                  | 6.44                   | 438.96                        | 431.74             | 432.05             |
| IN42                | IN41                  | 15 inch | Corrugated HDPE (Smooth Interior) | 64.0   | 0.0331    | 12.74                     | 1.19                                | 6.51                | 433.25                | 1.78                 | 436.28                      | 433.68         | 433.84         | 431.13                  | 2.07                   | 434.45                        | 431.39             | 432.05             |
| IN41                | IN42                  | 15 inch | Corrugated HDPE (Smooth Interior) | 22.0   | 0.0050    | 4.95                      | 0.34                                | 2.31                | 433.53                | 1.50                 | 436.28                      | 433.76         | 433.84         | 433.42                  | 1.61                   | 436.28                        | 433.75             | 433.78             |
| IN217               | IN43                  | 24 inch | Corrugated HDPE (Smooth Interior) | 25.0   | 0.0048    | 16.98                     | 2.13                                | 3.69                | 430.50                | 1.50                 | 434.00                      | 431.01         | 431.19         | 430.38                  | 2.07                   | 434.45                        | 430.91             | 431.07             |
| IN207               | EW03                  | 30 inch | Corrugated HDPE (Smooth Interior) | 15.0   | 0.0100    | 44.43                     | 23.16                               | 4.72                | 422.15                | 10.00                | 434.65                      | 426.12         | 426.47         | 422.00                  | 3.50                   | 428.00                        | 426.08             | 426.43             |
| OS01                | MH19                  | 18 inch | Corrugated HDPE (Smooth Interior) | 36.0   | 0.0050    | 8.05                      | 7.68                                | 4.35                | 423.79                | 3.71                 | 429.00                      | 426.86         | 427.16         | 423.61                  | 11.14                  | 436.25                        | 426.70             | 426.99             |
| MH19                | IN44                  | 15 inch | Corrugated HDPE (Smooth Interior) | 100.0  | 0.0141    | 13.51                     | 7.68                                | 4.35                | 423.41                | 11.34                | 436.25                      | 426.39         | 426.68         | 422.00                  | 4.50                   | 428.00                        | 425.93             | 426.22             |
| IN49                | IN34A                 | 15 inch | Corrugated HDPE (Smooth Interior) | 54.0   | 0.0402    | 14.03                     | 1.76                                | 7.80                | 446.94                | 3.09                 | 451.28                      | 447.47         | 447.67         | 441.73                  | 1.50                   | 447.52                        | 446.36             | 446.39             |
| IN218               | IN40                  | 18 inch | Corrugated HDPE (Smooth Interior) | 44.0   | 0.0050    | 8.05                      | 2.46                                | 4.00                | 431.55                | 1.51                 | 434.56                      | 432.14         | 432.37         | 431.33                  | 6.13                   | 438.96                        | 431.95             | 432.15             |
| IN48                | IN24                  | 15 inch | Corrugated HDPE (Smooth Interior) | 76.0   | 0.0050    | 4.95                      | 2.90                                | 4.19                | 432.12                | 1.50                 | 454.87                      | 452.81         | 453.08         | 451.74                  | 1.70                   | 454.69                        | 452.48             | 452.71             |
| IN36                | IN35                  | 24 inch | Corrugated HDPE (Smooth Interior) | 22.0   | 0.0077    | 21.54                     | 18.96                               | 7.74                | 438.42                | 4.22                 | 444.64                      | 440.31         | 440.90         | 438.25                  | 4.39                   | 444.64                        | 440.21             | 440.78             |
| OS02                | EW02                  | 18 inch | Corrugated HDPE (Smooth Interior) | 45.0   | 0.0051    | 8.14                      | 10.16                               | 5.75                | 420.23                | 1.27                 | 421.69                      | 421.69         | 422.00         | 420.00                  | 13.50                  | 435.00                        | 421.23             | 421.90             |
| IN26                | IN26                  | 15 inch | Corrugated HDPE (Smooth Interior) | 60.0   | 0.0150    | 8.57                      | 7.17                                | 7.82                | 450.98                | 2.59                 | 454.82                      | 452.05         | 452.69         | 450.08                  | 2.20                   | 453.53                        | 450.96             | 451.89             |
| IN27                | MH04                  | 15 inch | Corrugated HDPE (Smooth Interior) | 17.0   | 0.0053    | 5.09                      | 0.82                                | 3.04                | 459.43                | 1.50                 | 462.18                      | 459.78         | 459.91         | 459.34                  | 2.05                   | 462.64                        | 459.68             | 459.82             |
| IN43                | IN44                  | 24 inch | Corrugated HDPE (Smooth Interior) | 50.0   | 0.0124    | 27.29                     | 3.66                                | 6.05                | 430.18                | 2.27                 | 434.45                      | 430.85         | 431.09         | 429.56                  | 1.66                   | 433.22                        | 430.06             | 430.61             |
| MH04                | IN26                  | 15 inch | Corrugated HDPE (Smooth Interior) | 280.0  | 0.0245    | 10.96                     | 0.82                                | 5.24                | 459.17                | 2.22                 | 462.64                      | 459.52         | 459.65         | 452.30                  | 1.27                   | 454.82                        | 452.53             | 452.96             |
| YD201               | IN221                 | 12 inch | PVC                               | 26.0   | 0.0200    | 6.55                      | 0.09                                | 3.00                | 442.49                | 2.16                 | 445.65                      | 442.61         | 442.66         | 441.97                  | 4.38                   | 447.35                        | 442.05             | 442.19             |
| IN221               | IN220                 | 15 inch | Corrugated HDPE (Smooth Interior) | 75.0   | 0.0200    | 9.90                      | 0.31                                | 3.67                | 441.72                | 4.38                 | 447.35                      | 441.94         | 442.01         | 440.22                  | 4.48                   | 445.95                        | 440.49             | 440.53             |
| IN220               | IN35                  | 15 inch | Corrugated HDPE (Smooth Interior) | 85.0   | 0.0100    | 7.00                      | 1.29                                | 4.35                | 440.02                | 4.68                 | 445.95                      | 440.47         | 440.63         | 439.17                  | 4.22                   | 444.64                        | 440.42             | 440.44             |
| IN219               | IN38                  | 15 inch | Corrugated HDPE (Smooth Interior) | 56.0   | 0.0421    | 14.37                     | 3.06                                | 9.31                | 440.50                | 1.50                 | 443.25                      | 441.20         | 441.49         | 438.14                  | 1.50                   | 440.89                        | 438.96             | 439.16             |
| IN214               | IN214                 | 18 inch | Corrugated HDPE (Smooth Interior) | 156.0  | 0.0100    | 11.38                     | 5.15                                | 6.28                | 430.45                | 6.17                 | 438.12                      | 431.32         | 431.68         | 428.89                  | 4.74                   | 435.13                        | 430.10             | 430.28             |
| IN212               | IN212                 | 30 inch | Corrugated HDPE (Smooth Interior) | 89.0   | 0.0100    | 11.38                     | 7.88                                | 6.95                | 428.69                | 4.94                 | 435.13                      | 429.78         | 430.29         | 427.80                  | 5.96                   | 435.26                        | 428.72             | 429.47             |
| IN210               | IN208                 | 30 inch | Corrugated HDPE (Smooth Interior) | 128.0  | 0.0100    | 44.43                     | 12.18                               | 7.72                | 426.80                | 5.96                 | 435.26                      | 427.97         | 428.42         | 425.52                  | 7.22                   | 435.24                        | 426.74             | 427.15             |
| IN208               | IN210                 | 30 inch | Corrugated HDPE (Smooth Interior) | 128.0  | 0.0100    | 44.43                     | 16.79                               | 8.42                | 425.32                | 7.42                 | 435.24                      | 426.71         | 427.27         | 424.04                  | 8.03                   | 434.65                        | 426.63             | 426.81             |
| IN207               | IN207                 | 30 inch | Corrugated HDPE (Smooth Interior) | 105.0  | 0.0100    | 44.43                     | 21.81                               | 4.44                | 423.84                | 8.23                 | 434.57                      | 426.60         | 426.90         | 422.79                  | 9.36                   | 434.65                        | 426.34             | 426.65             |
| IN39                | IN215                 | 18 inch | Corrugated HDPE (Smooth Interior) | 33.0   | 0.0052    | 8.17                      | 3.88                                | 4.57                | 430.82                | 6.64                 | 438.96                      | 431.57         | 431.87         | 430.65                  | 5.97                   | 438.12                        | 431.54             | 431.74             |
| IN213               | IN212                 | 18 inch | Corrugated HDPE (Smooth Interior) | 8.5    | 0.0788    | 31.95                     | 2.97                                | 11.32               | 427.07                | 6.61                 | 435.13                      | 429.13         | 429.38         | 427.80                  | 5.96                   | 435.26                        | 428.19             | 429.21             |
| IN211               | IN210                 | 18 inch | Corrugated HDPE (Smooth Interior) | 8.5    | 0.0800    | 32.18                     | 2.94                                | 11.35               | 427.00                | 6.61                 | 435.11                      | 427.65         | 427.90         | 426.32                  | 7.42                   | 435.24                        | 427.01             | 427.22             |
| IN209               | IN208                 | 18 inch | Corrugated HDPE (Smooth Interior) | 8.5    | 0.0800    | 32.18                     | 3.48                                | 11.92               | 425.52                | 7.29                 | 434.31                      | 426.84         | 426.91         | 424.84                  | 8.23                   | 434.57                        | 426.84             | 426.90             |
| IN203               | IN203                 | 15 inch | Corrugated HDPE (Smooth Interior) | 121.5  | 0.0100    | 6.98                      | 0.65                                | 3.57                | 438.05                | 1.75                 | 441.05                      | 437.37         | 438.48         | 436.84                  | 2.96                   | 441.05                        | 437.33             | 437.37             |
| IN202               | IN202                 | 15 inch | Corrugated HDPE (Smooth Interior) | 76.0   | 0.0100    | 7.00                      | 2.71                                | 3.54                | 436.64                | 3.16                 | 441.05                      | 437.30         | 437.56         | 435.88                  | 3.92                   | 441.05                        | 436.42             | 436.86             |
| IN201               | EW04                  | 15 inch | Corrugated HDPE (Smooth Interior) | 189.0  | 0.0100    | 7.00                      | 3.79                                | 5.82                | 435.68                | 4.12                 | 441.05                      | 436.47         | 436.80         | 433.79                  | 4.20                   | 439.24                        | 434.45             | 434.97             |
| IN206               | IN205                 | 15 inch | Corrugated HDPE (Smooth Interior) | 27.0   | 0.0100    | 7.00                      | 6.61                                | 5.82                | 430.27                | 7.72                 | 439.24                      | 431.30         | 431.88         | 430.00                  | 2.75                   | 439.24                        | 430.97             | 431.62             |
| IN205               | IN205                 | 15 inch | Corrugated HDPE (Smooth Interior) | 53.0   | 0.0051    | 4.99                      | 0.26                                | 2.14                | 436.77                | 1.50                 | 439.52                      | 436.97         | 437.04         | 436.50                  | 1.88                   | 439.63                        | 436.69             | 436.77             |
| IN201               | IN201                 | 15 inch | Corrugated HDPE (Smooth Interior) | 74.0   | 0.0100    | 7.00                      | 0.91                                | 3.94                | 435.79                | 2.59                 | 439.63                      | 436.16         | 436.30         | 435.05                  | 2.94                   | 439.24                        | 435.35             | 435.60             |
| MH03                | MH03                  | 30 inch | Corrugated HDPE (Smooth Interior) | 64.0   | 0.0050    | 31.42                     | 24.91                               | 7.10                | 436.00                | 1.67                 | 440.17                      | 437.70         | 438.46         | 435.68                  | 2.83                   | 441.01                        | 437.55             | 438.17             |
| MH02                | MH01                  | 30 inch | Corrugated HDPE (Smooth Interior) | 349.0  | 0.0050    | 31.46                     | 25.98                               | 7.16                | 435.51                | 3.00                 | 441.01                      | 437.25         | 438.04         | 433.76                  | 4.31                   | 440.57                        | 435.49             | 436.29             |
| MH01                | EW05                  | 30 inch | Corrugated HDPE (Smooth Interior) | 42.0   | 0.0050    | 31.42                     | 26.03                               | 7.15                | 431.12                | 6.95                 | 440.57                      | 432.94         | 433.66         | 430.91                  | 5.18                   | 438.59                        | 432.87             | 433.49             |
| IN37                | IN216                 | 30 inch | Corrugated HDPE (Smooth Interior) | 148.0  | 0.0050    | 31.42                     | 26.24                               | 7.17                | 430.74                | 5.35                 | 438.59                      | 432.49         | 433.28         | 430.00                  | 7.50                   | 440.00                        | 431.75             | 432.84             |
| TD201               | IN202                 | 8 inch  | PVC                               | 35.0   | 0.0154    | 55.19                     | 23.54                               | 10.80               | 436.71                | 1.68                 | 440.89                      | 438.36         | 439.09         | 436.17                  | 1.50                   | 440.17                        | 438.00             | 438.58             |
|                     |                       |         |                                   | 32.0   | 0.0050    | 1.11                      | 0.22                                | 2.47                | 436.42                | 1.36                 | 438.45                      | 436.64         | 436.71         | 436.26                  | 4.12                   | 441.05                        | 436.64             | 436.66             |

|      |      |         |                                   |       |        |       |      |      |        |      |        |        |        |        |      |        |        |        |
|------|------|---------|-----------------------------------|-------|--------|-------|------|------|--------|------|--------|--------|--------|--------|------|--------|--------|--------|
| IN44 | IN45 | 24 inch | Corrugated HDPE (Smooth Interior) | 38.0  | 0.0050 | 17.33 | 4.38 | 4.60 | 428.64 | 2.58 | 433.22 | 429.38 | 429.65 | 428.45 | 1.55 | 432.00 | 429.19 | 429.46 |
| IN45 | MH27 | 24 inch | Corrugated HDPE (Smooth Interior) | 174.0 | 0.0050 | 17.33 | 5.24 | 4.83 | 428.25 | 1.75 | 432.00 | 429.06 | 429.36 | 427.38 | 6.62 | 436.00 | 428.13 | 428.50 |
| MH27 | MH28 | 24 inch | Corrugated HDPE (Smooth Interior) | 174.0 | 0.0100 | 24.51 | 5.11 | 6.16 | 427.18 | 6.82 | 436.00 | 427.98 | 428.27 | 425.44 | 1.56 | 429.00 | 426.06 | 426.65 |
| MH28 | EW09 | 24 inch | Corrugated HDPE (Smooth Interior) | 21.0  | 0.0052 | 17.74 | 5.01 | 4.85 | 422.11 | 4.89 | 429.00 | 422.90 | 423.19 | 422.00 | 2.00 | 426.00 | 422.73 | 423.09 |
| IN46 | IN45 | 15 inch | Corrugated HDPE (Smooth Interior) | 34.0  | 0.0050 | 4.95  | 0.47 | 2.54 | 429.17 | 1.48 | 431.90 | 429.44 | 429.53 | 429.00 | 1.75 | 432.00 | 429.26 | 429.36 |

R:\15\PC\151192\1\Technical\Stormwater & E&S\Rev 0\StormCAD\Byers Station\_Storm-0.stc

**Scenario: 100-Year**  
**Current Time Step: 0.00Hr**  
**Catch Basin FlexTable: Inlet Report**

| Label | Inlet                 | Inlet Location | Ground Elevation (ft) | Rim Elevation (ft) | Invert Out (ft) | Inlet Bottom El. (ft) | Inlet DA (acres) | Inlet C | Inlet Intensity (in/h) | Inlet Tc (min) | Local Surface Flow (ft <sup>2</sup> /s) | Carryover Rational Flow (ft <sup>3</sup> /s) | Known Flow (ft <sup>3</sup> /s) |
|-------|-----------------------|----------------|-----------------------|--------------------|-----------------|-----------------------|------------------|---------|------------------------|----------------|-----------------------------------------|----------------------------------------------|---------------------------------|
| IN24  | PADOT Type 'C'        | In Sag         | 454.69                | 454.69             | (N/A)           | 451.57                | 0.060            | 0.740   | (N/A)                  | (N/A)          | (N/A)                                   | (N/A)                                        | 0.00                            |
| IN25  | PADOT Type 'C'        | On Grade       | 454.82                | 454.82             | (N/A)           | 451.33                | 0.580            | 0.790   | (N/A)                  | (N/A)          | (N/A)                                   | (N/A)                                        | 0.00                            |
| IN26  | PADOT Type 'C'        | On Grade       | 454.82                | 454.82             | (N/A)           | 450.98                | 0.340            | 0.820   | (N/A)                  | (N/A)          | (N/A)                                   | (N/A)                                        | 0.00                            |
| IN27  | PADOT Type 'C'        | In Sag         | 462.18                | 462.18             | (N/A)           | 459.43                | 0.110            | 0.990   | (N/A)                  | (N/A)          | (N/A)                                   | (N/A)                                        | 0.00                            |
| IN28  | PADOT Type 'C'        | On Grade       | 453.53                | 453.53             | (N/A)           | 446.96                | 0.090            | 0.910   | (N/A)                  | (N/A)          | (N/A)                                   | (N/A)                                        | 0.00                            |
| IN29  | PADOT Type 'C'        | On Grade       | 453.88                | 453.88             | (N/A)           | 451.13                | 0.250            | 0.720   | (N/A)                  | (N/A)          | (N/A)                                   | (N/A)                                        | 0.00                            |
| IN30  | PADOT Type 'C'        | In Sag         | 451.11                | 451.11             | (N/A)           | 448.36                | 0.110            | 0.720   | (N/A)                  | (N/A)          | (N/A)                                   | (N/A)                                        | 0.00                            |
| IN31  | PADOT Type 'C'        | In Sag         | 451.12                | 451.12             | (N/A)           | 448.05                | 0.020            | 0.620   | (N/A)                  | (N/A)          | (N/A)                                   | (N/A)                                        | 0.00                            |
| IN32  | PADOT Type 'C'        | In Sag         | 451.09                | 451.09             | (N/A)           | 448.34                | 0.130            | 0.880   | (N/A)                  | (N/A)          | (N/A)                                   | (N/A)                                        | 0.00                            |
| IN33  | PADOT Type 'C'        | On Grade       | 449.81                | 449.81             | (N/A)           | 445.46                | 0.590            | 0.950   | (N/A)                  | (N/A)          | (N/A)                                   | (N/A)                                        | 0.00                            |
| IN34  | PADOT Type 'C'        | On Grade       | 449.81                | 449.81             | (N/A)           | 447.06                | 0.020            | 0.990   | (N/A)                  | (N/A)          | (N/A)                                   | (N/A)                                        | 0.00                            |
| IN34A | PADOT Type 'C'        | In Sag         | 447.52                | 447.52             | (N/A)           | 443.85                | (N/A)            | (N/A)   | (N/A)                  | (N/A)          | (N/A)                                   | (N/A)                                        | 0.00                            |
| IN35  | PADOT Type 'C'        | On Grade       | 444.64                | 444.64             | (N/A)           | 438.42                | 0.200            | 0.400   | (N/A)                  | (N/A)          | (N/A)                                   | (N/A)                                        | 0.00                            |
| IN36  | PADOT Type 'C'        | On Grade       | 444.64                | 444.64             | (N/A)           | 438.08                | 0.090            | 0.580   | (N/A)                  | (N/A)          | (N/A)                                   | (N/A)                                        | 0.00                            |
| IN37  | PADOT Type 'C'        | On Grade       | 440.89                | 440.89             | (N/A)           | 436.71                | 0.040            | 0.990   | (N/A)                  | (N/A)          | (N/A)                                   | (N/A)                                        | 0.00                            |
| IN38  | PADOT Type 'C'        | On Grade       | 440.89                | 440.89             | (N/A)           | 437.97                | 0.220            | 0.790   | (N/A)                  | (N/A)          | (N/A)                                   | (N/A)                                        | 0.00                            |
| IN39  | PADOT Type 'C'        | On Grade       | 438.96                | 438.96             | (N/A)           | 430.82                | 0.020            | 0.990   | (N/A)                  | (N/A)          | (N/A)                                   | (N/A)                                        | 0.00                            |
| IN40  | PADOT Type 'C'        | On Grade       | 438.96                | 438.96             | (N/A)           | 431.13                | 0.190            | 0.760   | (N/A)                  | (N/A)          | (N/A)                                   | (N/A)                                        | 0.00                            |
| IN41  | PADOT Type 'C'        | On Grade       | 436.28                | 436.28             | (N/A)           | 433.53                | 0.050            | 0.990   | (N/A)                  | (N/A)          | (N/A)                                   | (N/A)                                        | 0.00                            |
| IN42  | PADOT Type 'C'        | On Grade       | 436.28                | 436.28             | (N/A)           | 433.25                | 0.070            | 0.990   | (N/A)                  | (N/A)          | (N/A)                                   | (N/A)                                        | 0.00                            |
| IN43  | PADOT Type 'C'        | On Grade       | 434.45                | 434.45             | (N/A)           | 430.18                | 0.020            | 0.990   | (N/A)                  | (N/A)          | (N/A)                                   | (N/A)                                        | 0.00                            |
| IN44  | PADOT Type 'C'        | On Grade       | 433.22                | 433.22             | (N/A)           | 428.64                | 0.200            | 0.620   | (N/A)                  | (N/A)          | (N/A)                                   | (N/A)                                        | 0.00                            |
| IN45  | PADOT Type 'C'        | In Sag         | 432.00                | 432.00             | (N/A)           | 428.25                | 0.060            | 0.500   | (N/A)                  | (N/A)          | (N/A)                                   | (N/A)                                        | 0.00                            |
| IN46  | PADOT Type 'C'        | In Sag         | 431.90                | 431.90             | (N/A)           | 429.17                | 0.080            | 0.710   | (N/A)                  | (N/A)          | (N/A)                                   | (N/A)                                        | 0.00                            |
| IN48  | PADOT Type 'M'        | In Sag         | 454.87                | 454.87             | (N/A)           | 452.12                | 0.990            | 0.390   | (N/A)                  | (N/A)          | (N/A)                                   | (N/A)                                        | 0.00                            |
| IN49  | PADOT Type 'M'        | In Sag         | 451.28                | 451.28             | (N/A)           | 446.94                | 0.520            | 0.450   | (N/A)                  | (N/A)          | (N/A)                                   | (N/A)                                        | 0.00                            |
| IN201 | PADOT Type 'C'        | In Sag         | 439.24                | 439.24             | (N/A)           | 430.27                | 0.310            | 0.918   | (N/A)                  | (N/A)          | (N/A)                                   | (N/A)                                        | 0.00                            |
| IN202 | PADOT Type 'C'        | In Sag         | 441.05                | 441.05             | (N/A)           | 435.68                | 0.170            | 0.730   | (N/A)                  | (N/A)          | (N/A)                                   | (N/A)                                        | 0.00                            |
| IN203 | PADOT Type 'C'        | In Sag         | 441.05                | 441.05             | (N/A)           | 436.64                | 0.330            | 0.854   | (N/A)                  | (N/A)          | (N/A)                                   | (N/A)                                        | 0.00                            |
| IN204 | PADOT Type 'C'        | In Sag         | 441.05                | 441.05             | (N/A)           | 438.05                | 0.140            | 0.620   | (N/A)                  | (N/A)          | (N/A)                                   | (N/A)                                        | 0.00                            |
| IN205 | PADOT Type 'C'        | In Sag         | 439.63                | 439.63             | (N/A)           | 435.79                | 0.120            | 0.740   | (N/A)                  | (N/A)          | (N/A)                                   | (N/A)                                        | 0.00                            |
| IN206 | PADOT Type 'C'        | In Sag         | 439.52                | 439.52             | (N/A)           | 436.77                | 0.050            | 0.690   | (N/A)                  | (N/A)          | (N/A)                                   | (N/A)                                        | 0.00                            |
| IN207 | PADOT Type 'C'        | In Sag         | 434.65                | 434.65             | (N/A)           | 422.15                | 0.290            | 0.860   | (N/A)                  | (N/A)          | (N/A)                                   | (N/A)                                        | 0.00                            |
| IN208 | PADOT Type 'C'        | In Sag         | 434.57                | 434.57             | (N/A)           | 423.84                | 0.510            | 0.540   | (N/A)                  | (N/A)          | (N/A)                                   | (N/A)                                        | 0.00                            |
| IN209 | PADOT Type 'M'        | In Sag         | 434.31                | 434.31             | (N/A)           | 425.52                | 0.520            | 0.890   | (N/A)                  | (N/A)          | (N/A)                                   | (N/A)                                        | 0.00                            |
| IN210 | PADOT Type 'C'        | In Sag         | 435.24                | 435.24             | (N/A)           | 425.32                | 0.530            | 0.520   | (N/A)                  | (N/A)          | (N/A)                                   | (N/A)                                        | 0.00                            |
| IN211 | PADOT Type 'M'        | In Sag         | 435.11                | 435.11             | (N/A)           | 427.00                | 0.450            | 0.870   | (N/A)                  | (N/A)          | (N/A)                                   | (N/A)                                        | 0.00                            |
| IN212 | PADOT Type 'C'        | In Sag         | 435.26                | 435.26             | (N/A)           | 426.80                | 0.310            | 0.680   | (N/A)                  | (N/A)          | (N/A)                                   | (N/A)                                        | 0.00                            |
| IN213 | PADOT Type 'M'        | In Sag         | 435.13                | 435.13             | (N/A)           | 428.47                | 0.460            | 0.860   | (N/A)                  | (N/A)          | (N/A)                                   | (N/A)                                        | 0.00                            |
| IN214 | PADOT Type 'C'        | In Sag         | 435.13                | 435.13             | (N/A)           | 428.69                | 0.450            | 0.860   | (N/A)                  | (N/A)          | (N/A)                                   | (N/A)                                        | 0.00                            |
| IN215 | PADOT Type 'C'        | In Sag         | 438.12                | 438.12             | (N/A)           | 430.45                | 0.220            | 0.790   | (N/A)                  | (N/A)          | (N/A)                                   | (N/A)                                        | 0.00                            |
| IN216 | PADOT Type 'C'        | In Sag         | 440.17                | 440.17             | (N/A)           | 436.00                | 0.280            | 0.730   | (N/A)                  | (N/A)          | (N/A)                                   | (N/A)                                        | 0.00                            |
| IN217 | PADOT Type 'M'        | In Sag         | 434.00                | 434.00             | (N/A)           | 430.50                | 1.090            | 0.260   | (N/A)                  | (N/A)          | (N/A)                                   | (N/A)                                        | 0.00                            |
| IN218 | PADOT Type 'M'        | In Sag         | 434.56                | 434.56             | (N/A)           | 431.55                | 1.310            | 0.250   | (N/A)                  | (N/A)          | (N/A)                                   | (N/A)                                        | 0.00                            |
| IN219 | PADOT Double Type 'C' | In Sag         | 443.25                | 443.25             | (N/A)           | 440.50                | 0.590            | 0.690   | (N/A)                  | (N/A)          | (N/A)                                   | (N/A)                                        | 0.00                            |
| IN220 | PADOT Type 'C'        | In Sag         | 445.95                | 445.95             | (N/A)           | 440.02                | 0.150            | 0.887   | (N/A)                  | (N/A)          | (N/A)                                   | (N/A)                                        | 0.00                            |
| IN221 | PADOT Type 'C'        | In Sag         | 447.35                | 447.35             | (N/A)           | 441.72                | 0.030            | 0.970   | (N/A)                  | (N/A)          | (N/A)                                   | (N/A)                                        | 0.00                            |
| OS01  | PADOT Type 'M'        | In Sag         | 429.00                | 433.00             | (N/A)           | 423.79                | (N/A)            | (N/A)   | (N/A)                  | (N/A)          | (N/A)                                   | (N/A)                                        | 0.00                            |
| OS02  | PADOT Type 'M'        | In Sag         | 423.00                | 426.00             | (N/A)           | 420.23                | (N/A)            | (N/A)   | (N/A)                  | (N/A)          | (N/A)                                   | (N/A)                                        | 0.00                            |
| TD201 | PADOT Type 'M'        | In Sag         | 438.45                | 438.45             | (N/A)           | 436.42                | 0.030            | 0.970   | (N/A)                  | (N/A)          | (N/A)                                   | (N/A)                                        | 0.00                            |
| YD201 | PADOT Type 'C'        | In Sag         | 445.65                | 445.65             | (N/A)           | 442.49                | 0.050            | 0.250   | (N/A)                  | (N/A)          | (N/A)                                   | (N/A)                                        | 0.00                            |

R:\15\PC1511921\Technical\Stormwater & E&S\Rev 0\StormCAD\Byers Station\_Storm-0.stc

**Scenario: 100-Year  
Current Time Step: 0.000Hr  
Catch Basin FlexTable: Gutter Spread**

| Label | Inlet                 | Inlet Location | Ground Elevation (ft) | Rim Elevation (ft) | Local Surface Flow (ft <sup>2</sup> /s) | Carryover Rational Flow (ft <sup>3</sup> /s) | Total Surface Flow to Inlet (ft <sup>2</sup> /s) | Capture Efficiency (Calculated) (%) | Intercepted Rational Flow (ft <sup>3</sup> /s) | Bypassed Rational Flow (ft <sup>3</sup> /s) | Bypass Target | Gutter Depth (in) | Gutter Spread (ft) | Cross Slope (ft/ft) | Longitudinal Slope (ft/ft) |
|-------|-----------------------|----------------|-----------------------|--------------------|-----------------------------------------|----------------------------------------------|--------------------------------------------------|-------------------------------------|------------------------------------------------|---------------------------------------------|---------------|-------------------|--------------------|---------------------|----------------------------|
| IN24  | PADOT Type 'C'        | In Sag         | 454.69                | 454.69             | 0.35                                    | 0.00                                         | 0.35                                             | 100.0                               | 0.35                                           | 0.00                                        | (N/A)         | 0.6               | 2.5                | 0.0200              | (N/A)                      |
| IN25  | PADOT Type 'C'        | On Grade       | 454.82                | 454.82             | 3.64                                    | 0.00                                         | 3.64                                             | 57.8                                | 2.11                                           | 1.53                                        | IN28          | 2.3               | 9.5                | 0.0200              | 0.0200                     |
| IN26  | PADOT Type 'C'        | On Grade       | 454.82                | 454.82             | 2.21                                    | 0.00                                         | 2.21                                             | 65.5                                | 1.45                                           | 0.76                                        | IN28          | 1.9               | 7.9                | 0.0200              | 0.0200                     |
| IN27  | PADOT Type 'C'        | In Sag         | 462.18                | 462.18             | 0.86                                    | 0.00                                         | 0.86                                             | 100.0                               | 0.86                                           | 0.00                                        | (N/A)         | 1.2               | 5.1                | 0.0200              | (N/A)                      |
| IN28  | PADOT Type 'C'        | On Grade       | 453.53                | 453.53             | 0.65                                    | 2.30                                         | 2.95                                             | 61.1                                | 1.80                                           | 1.15                                        | IN30          | 2.1               | 8.8                | 0.0200              | 0.0200                     |
| IN29  | PADOT Type 'C'        | On Grade       | 453.88                | 453.88             | 1.43                                    | 0.00                                         | 1.43                                             | 72.3                                | 1.03                                           | 0.40                                        | IN33          | 1.6               | 6.7                | 0.0200              | 0.0200                     |
| IN30  | PADOT Type 'C'        | In Sag         | 451.11                | 451.11             | 0.63                                    | 1.15                                         | 1.78                                             | 100.0                               | 1.78                                           | 0.00                                        | (N/A)         | 2.0               | 8.3                | 0.0200              | (N/A)                      |
| IN31  | PADOT Type 'C'        | In Sag         | 451.12                | 451.12             | 0.10                                    | 0.00                                         | 0.10                                             | 100.0                               | 0.10                                           | 0.00                                        | (N/A)         | 0.0               | 0.1                | 0.0200              | (N/A)                      |
| IN32  | PADOT Type 'C'        | In Sag         | 451.09                | 451.09             | 0.91                                    | 0.00                                         | 0.91                                             | 100.0                               | 0.91                                           | 0.00                                        | (N/A)         | 1.3               | 5.2                | 0.0200              | (N/A)                      |
| IN33  | PADOT Type 'C'        | On Grade       | 449.81                | 449.81             | 4.45                                    | 0.40                                         | 4.85                                             | 53.5                                | 2.60                                           | 2.25                                        | IN35          | 2.5               | 10.6               | 0.0200              | 0.0200                     |
| IN34  | PADOT Type 'C'        | On Grade       | 449.81                | 449.81             | 0.16                                    | 0.00                                         | 0.16                                             | 0.16                                | 0.15                                           | 0.00                                        | IN36          | 0.7               | 2.9                | 0.0200              | 0.0200                     |
| IN34A | PADOT Type 'C'        | In Sag         | 447.52                | 447.52             | 0.00                                    | 0.00                                         | 0.00                                             | 100.0                               | 0.00                                           | 0.00                                        | (N/A)         | 0.0               | 0.0                | 0.0200              | 0.0200                     |
| IN35  | PADOT Type 'C'        | On Grade       | 444.64                | 444.64             | 0.64                                    | 2.25                                         | 2.89                                             | 61.4                                | 1.77                                           | 1.12                                        | IN38          | 2.1               | 8.7                | 0.0200              | 0.0200                     |
| IN36  | PADOT Type 'C'        | On Grade       | 444.64                | 444.64             | 0.41                                    | 0.00                                         | 0.42                                             | 89.4                                | 0.37                                           | 0.04                                        | IN37          | 1.0               | 4.2                | 0.0200              | 0.0200                     |
| IN37  | PADOT Type 'C'        | On Grade       | 440.89                | 440.89             | 0.31                                    | 0.04                                         | 0.36                                             | 91.1                                | 0.33                                           | 0.03                                        | IN39          | 1.0               | 4.0                | 0.0200              | 0.0200                     |
| IN38  | PADOT Type 'C'        | On Grade       | 440.89                | 440.89             | 1.38                                    | 1.12                                         | 2.50                                             | 63.6                                | 1.59                                           | 0.91                                        | IN40          | 2.0               | 8.3                | 0.0200              | 0.0200                     |
| IN39  | PADOT Type 'C'        | On Grade       | 438.96                | 438.96             | 0.16                                    | 0.03                                         | 0.19                                             | 96.7                                | 0.18                                           | 0.01                                        | IN41          | 0.8               | 3.1                | 0.0200              | 0.0200                     |
| IN40  | PADOT Type 'C'        | On Grade       | 438.96                | 438.96             | 1.15                                    | 0.91                                         | 2.05                                             | 66.7                                | 1.37                                           | 0.68                                        | IN42          | 1.8               | 7.7                | 0.0200              | 0.0200                     |
| IN41  | PADOT Type 'C'        | On Grade       | 436.28                | 436.28             | 0.39                                    | 0.01                                         | 0.40                                             | 89.9                                | 0.36                                           | 0.04                                        | IN44          | 1.0               | 4.2                | 0.0200              | 0.0200                     |
| IN42  | PADOT Type 'C'        | On Grade       | 436.28                | 436.28             | 0.55                                    | 0.68                                         | 1.24                                             | 74.5                                | 0.92                                           | 0.31                                        | IN43          | 1.5               | 6.3                | 0.0200              | 0.0200                     |
| IN43  | PADOT Type 'C'        | On Grade       | 434.45                | 434.45             | 0.16                                    | 0.31                                         | 0.47                                             | 87.9                                | 0.41                                           | 0.06                                        | IN46          | 1.1               | 4.4                | 0.0200              | 0.0200                     |
| IN44  | PADOT Type 'C'        | On Grade       | 433.22                | 433.22             | 0.98                                    | 0.04                                         | 1.03                                             | 77.3                                | 0.79                                           | 0.23                                        | IN45          | 1.4               | 5.9                | 0.0200              | 0.0200                     |
| IN45  | PADOT Type 'C'        | In Sag         | 432.00                | 432.00             | 0.24                                    | 0.23                                         | 0.47                                             | 100.0                               | 0.47                                           | 0.00                                        | (N/A)         | 0.8               | 3.2                | 0.0200              | (N/A)                      |
| IN46  | PADOT Type 'C'        | In Sag         | 431.90                | 431.90             | 0.45                                    | 0.06                                         | 0.51                                             | 100.0                               | 0.51                                           | 0.00                                        | (N/A)         | 0.8               | 3.4                | 0.0200              | (N/A)                      |
| IN48  | PADOT Type 'M'        | In Sag         | 454.87                | 454.87             | 3.07                                    | 0.00                                         | 3.07                                             | 100.0                               | 3.07                                           | 0.00                                        | (N/A)         | 3.4               | 14.2               | 0.0200              | (N/A)                      |
| IN49  | PADOT Type 'M'        | In Sag         | 451.28                | 451.28             | 1.86                                    | 0.00                                         | 1.86                                             | 100.0                               | 1.86                                           | 0.00                                        | (N/A)         | 2.5               | 10.6               | 0.0200              | (N/A)                      |
| IN201 | PADOT Type 'C'        | In Sag         | 439.24                | 439.24             | 2.26                                    | 0.00                                         | 2.26                                             | 100.0                               | 2.26                                           | 0.00                                        | (N/A)         | 2.4               | 9.8                | 0.0200              | (N/A)                      |
| IN202 | PADOT Type 'C'        | In Sag         | 441.05                | 441.05             | 0.99                                    | 0.00                                         | 0.99                                             | 100.0                               | 0.99                                           | 0.00                                        | (N/A)         | 1.3               | 5.6                | 0.0200              | (N/A)                      |
| IN203 | PADOT Type 'C'        | In Sag         | 441.05                | 441.05             | 2.24                                    | 0.00                                         | 2.24                                             | 100.0                               | 2.24                                           | 0.00                                        | (N/A)         | 2.3               | 9.8                | 0.0200              | (N/A)                      |
| IN204 | PADOT Type 'C'        | In Sag         | 441.05                | 441.05             | 0.69                                    | 0.00                                         | 0.69                                             | 100.0                               | 0.69                                           | 0.00                                        | (N/A)         | 1.0               | 4.3                | 0.0200              | (N/A)                      |
| IN205 | PADOT Type 'C'        | In Sag         | 439.63                | 439.63             | 0.71                                    | 0.00                                         | 0.71                                             | 100.0                               | 0.71                                           | 0.00                                        | (N/A)         | 1.0               | 4.4                | 0.0200              | (N/A)                      |
| IN206 | PADOT Type 'C'        | In Sag         | 439.52                | 439.52             | 0.27                                    | 0.00                                         | 0.27                                             | 100.0                               | 0.27                                           | 0.00                                        | (N/A)         | 0.4               | 1.8                | 0.0200              | (N/A)                      |
| IN207 | PADOT Type 'C'        | In Sag         | 434.65                | 434.65             | 1.98                                    | 0.00                                         | 1.98                                             | 100.0                               | 1.98                                           | 0.00                                        | (N/A)         | 2.2               | 9.0                | 0.0200              | (N/A)                      |
| IN208 | PADOT Type 'C'        | In Sag         | 434.57                | 434.57             | 2.19                                    | 0.00                                         | 2.19                                             | 100.0                               | 2.19                                           | 0.00                                        | (N/A)         | 2.3               | 9.6                | 0.0200              | (N/A)                      |
| IN209 | PADOT Type 'M'        | In Sag         | 434.31                | 434.31             | 3.68                                    | 0.00                                         | 3.68                                             | 100.0                               | 3.68                                           | 0.00                                        | (N/A)         | 3.8               | 15.8               | 0.0200              | (N/A)                      |
| IN210 | PADOT Type 'C'        | In Sag         | 435.24                | 435.24             | 2.19                                    | 0.00                                         | 2.19                                             | 100.0                               | 2.19                                           | 0.00                                        | (N/A)         | 2.3               | 9.6                | 0.0200              | (N/A)                      |
| IN211 | PADOT Type 'M'        | In Sag         | 435.11                | 435.11             | 3.11                                    | 0.00                                         | 3.11                                             | 100.0                               | 3.11                                           | 0.00                                        | (N/A)         | 3.4               | 14.3               | 0.0200              | (N/A)                      |
| IN212 | PADOT Type 'C'        | In Sag         | 435.26                | 435.26             | 1.67                                    | 0.00                                         | 1.67                                             | 100.0                               | 1.67                                           | 0.00                                        | (N/A)         | 1.9               | 8.0                | 0.0200              | (N/A)                      |
| IN213 | PADOT Type 'M'        | In Sag         | 435.13                | 435.13             | 3.14                                    | 0.00                                         | 3.14                                             | 100.0                               | 3.14                                           | 0.00                                        | (N/A)         | 3.5               | 14.4               | 0.0200              | (N/A)                      |
| IN214 | PADOT Type 'C'        | In Sag         | 435.13                | 435.13             | 3.07                                    | 0.00                                         | 3.07                                             | 100.0                               | 3.07                                           | 0.00                                        | (N/A)         | 2.9               | 12.1               | 0.0200              | (N/A)                      |
| IN215 | PADOT Type 'C'        | In Sag         | 438.12                | 438.12             | 1.38                                    | 0.00                                         | 1.38                                             | 100.0                               | 1.38                                           | 0.00                                        | (N/A)         | 1.7               | 7.0                | 0.0200              | (N/A)                      |
| IN216 | PADOT Type 'C'        | In Sag         | 440.17                | 440.17             | 1.62                                    | 0.00                                         | 1.62                                             | 100.0                               | 1.62                                           | 0.00                                        | (N/A)         | 1.9               | 7.9                | 0.0200              | (N/A)                      |
| IN217 | PADOT Type 'M'        | In Sag         | 434.00                | 434.00             | 2.25                                    | 0.00                                         | 2.25                                             | 100.0                               | 2.25                                           | 0.00                                        | (N/A)         | 2.8               | 11.8               | 0.0200              | (N/A)                      |
| IN218 | PADOT Type 'M'        | In Sag         | 434.56                | 434.56             | 2.60                                    | 0.00                                         | 2.60                                             | 100.0                               | 2.60                                           | 0.00                                        | (N/A)         | 3.1               | 12.9               | 0.0200              | (N/A)                      |
| IN219 | PADOT Double Type 'C' | In Sag         | 443.25                | 443.25             | 3.23                                    | 0.00                                         | 3.23                                             | 100.0                               | 3.23                                           | 0.00                                        | (N/A)         | 2.4               | 10.2               | 0.0200              | (N/A)                      |
| IN220 | PADOT Type 'C'        | In Sag         | 445.95                | 445.95             | 1.06                                    | 0.00                                         | 1.06                                             | 100.0                               | 1.06                                           | 0.00                                        | (N/A)         | 1.4               | 5.9                | 0.0200              | (N/A)                      |
| IN221 | PADOT Type 'C'        | In Sag         | 447.35                | 447.35             | 0.23                                    | 0.00                                         | 0.23                                             | 100.0                               | 0.23                                           | 0.00                                        | (N/A)         | 0.2               | 0.9                | 0.0200              | (N/A)                      |
| OS01  | PADOT Type 'M'        | In Sag         | 429.00                | 429.00             | 0.00                                    | 0.00                                         | 0.00                                             | 100.0                               | 0.00                                           | 0.00                                        | (N/A)         | 0.0               | 0.0                | 0.0200              | (N/A)                      |
| OS02  | PADOT Type 'M'        | In Sag         | 423.00                | 423.00             | 0.00                                    | 0.00                                         | 0.00                                             | 100.0                               | 0.00                                           | 0.00                                        | (N/A)         | 0.0               | 0.0                | 0.0200              | (N/A)                      |
| TD201 | PADOT Type 'M'        | In Sag         | 438.45                | 438.45             | 0.23                                    | 0.00                                         | 0.23                                             | 100.0                               | 0.23                                           | 0.00                                        | (N/A)         | 0.9               | 3.7                | 0.0200              | (N/A)                      |
| YD201 | PADOT Type 'C'        | In Sag         | 445.65                | 445.65             | 0.10                                    | 0.00                                         | 0.10                                             | 100.0                               | 0.10                                           | 0.00                                        | (N/A)         | 0.0               | 0.1                | 0.0200              | (N/A)                      |

R:\15\PC1511921\Technical\Stormwater &amp; E&amp;S\Rev 0\StormCAD\Byers Station\_Storm-0.stc

Scenario: 100-Year  
Current Time Step: 0.000Hr  
Conduit FlexTable: Pipe Report

| Upstream<br>Struct. | Downstream<br>Struct. | Size    | Material                          | L (ft) | S (ft/ft) | Q<br>(ft <sup>3</sup> /s) | System<br>Q<br>(ft <sup>3</sup> /s) | Avg.<br>V<br>(ft/s) | Up.<br>Invert<br>(ft) | Up.<br>Cover<br>(ft) | Up.<br>Gr.<br>Elev.<br>(ft) | HGL<br>In (ft) | EGL<br>In (ft) | Down.<br>Invert<br>(ft) | Down.<br>Cover<br>(ft) | Down.<br>Gr.<br>Elev.<br>(ft) | HGL<br>Out<br>(ft) | EGL<br>Out<br>(ft) |
|---------------------|-----------------------|---------|-----------------------------------|--------|-----------|---------------------------|-------------------------------------|---------------------|-----------------------|----------------------|-----------------------------|----------------|----------------|-------------------------|------------------------|-------------------------------|--------------------|--------------------|
| IN24                | IN25                  | 15 inch | Corrugated HDPE (Smooth Interior) | 14.0   | 0.0050    | 6.96                      | 3.38                                | 4.34                | 451.57                | 1.87                 | 454.69                      | 452.51         | 452.69         | 451.50                  | 2.07                   | 454.82                        | 452.49             | 452.65             |
| IN25                | IN26                  | 15 inch | Corrugated HDPE (Smooth Interior) | 24.0   | 0.0075    | 4.05                      | 5.45                                | 5.59                | 451.33                | 2.24                 | 454.82                      | 452.41         | 452.77         | 451.15                  | 2.42                   | 454.82                        | 452.32             | 452.64             |
| IN28                | MH02                  | 18 inch | Corrugated HDPE (Smooth Interior) | 24.0   | 0.0129    | 12.93                     | 11.87                               | 8.30                | 446.96                | 5.07                 | 453.53                      | 448.27         | 449.09         | 446.65                  | 5.40                   | 453.55                        | 448.04             | 448.79             |
| IN29                | MH02                  | 15 inch | Corrugated HDPE (Smooth Interior) | 21.0   | 0.0157    | 8.77                      | 1.03                                | 449.67              | 451.13                | 1.50                 | 453.88                      | 451.53         | 451.67         | 450.80                  | 1.50                   | 453.55                        | 451.10             | 451.43             |
| IN30                | MH03                  | 15 inch | Corrugated HDPE (Smooth Interior) | 16.0   | 0.0256    | 11.20                     | 1.78                                | 6.67                | 448.36                | 1.50                 | 451.11                      | 449.23         | 449.29         | 447.95                  | 2.34                   | 451.54                        | 449.27             | 449.27             |
| MH03                | IN28                  | 15 inch | Corrugated HDPE (Smooth Interior) | 114.0  | 0.0050    | 4.95                      | 2.76                                | 2.25                | 447.78                | 2.51                 | 451.54                      | 449.20         | 449.28         | 447.21                  | 5.07                   | 453.53                        | 449.03             | 449.11             |
| IN31                | MH03                  | 15 inch | Corrugated HDPE (Smooth Interior) | 20.0   | 0.0050    | 4.95                      | 1.00                                | 3.16                | 448.05                | 1.82                 | 451.12                      | 449.23         | 449.24         | 447.95                  | 2.34                   | 451.54                        | 449.23             | 449.24             |
| IN32                | IN31                  | 15 inch | Corrugated HDPE (Smooth Interior) | 24.0   | 0.0050    | 4.95                      | 0.91                                | 3.07                | 448.34                | 1.50                 | 451.09                      | 449.24         | 449.26         | 448.22                  | 1.65                   | 451.12                        | 449.24             | 449.25             |
| MH02                | IN33                  | 18 inch | Corrugated HDPE (Smooth Interior) | 64.0   | 0.0133    | 13.11                     | 12.83                               | 8.46                | 446.48                | 5.57                 | 453.55                      | 447.83         | 448.74         | 446.63                  | 2.68                   | 449.81                        | 447.06             | 447.91             |
| IN34                | IN33                  | 15 inch | Corrugated HDPE (Smooth Interior) | 24.0   | 0.0050    | 4.95                      | 0.15                                | 1.83                | 447.06                | 1.50                 | 449.81                      | 447.85         | 447.85         | 446.94                  | 1.62                   | 449.81                        | 447.85             | 447.85             |
| IN33                | IN34A                 | 18 inch | Corrugated HDPE (Smooth Interior) | 42.0   | 0.0343    | 21.07                     | 15.37                               | 13.01               | 445.46                | 2.85                 | 449.81                      | 446.87         | 448.10         | 444.02                  | 2.00                   | 447.52                        | 445.52             | 446.70             |
| IN35                | IN34A                 | 18 inch | Corrugated HDPE (Smooth Interior) | 55.0   | 0.0402    | 22.81                     | 17.09                               | 14.16               | 443.85                | 2.17                 | 447.52                      | 445.29         | 446.78         | 441.64                  | 1.50                   | 444.64                        | 442.69             | 445.31             |
| IN38                | IN35                  | 15 inch | Corrugated HDPE (Smooth Interior) | 23.0   | 0.0052    | 5.05                      | 4.80                                | 4.69                | 437.97                | 1.67                 | 440.89                      | 438.93         | 439.28         | 437.85                  | 1.79                   | 440.89                        | 438.74             | 439.15             |
| IN36                | IN37                  | 24 inch | Corrugated HDPE (Smooth Interior) | 123.0  | 0.0071    | 20.61                     | 20.32                               | 7.48                | 438.08                | 4.56                 | 444.64                      | 439.70         | 440.56         | 437.21                  | 1.68                   | 440.89                        | 438.87             | 439.70             |
| IN39                | IN39                  | 18 inch | Corrugated HDPE (Smooth Interior) | 22.0   | 0.0050    | 8.05                      | 3.94                                | 4.53                | 431.13                | 6.33                 | 438.96                      | 431.89         | 432.19         | 431.02                  | 6.44                   | 438.96                        | 431.76             | 432.08             |
| IN42                | IN42                  | 15 inch | Corrugated HDPE (Smooth Interior) | 64.0   | 0.0331    | 12.74                     | 1.27                                | 6.64                | 433.25                | 1.78                 | 436.28                      | 433.70         | 433.86         | 431.13                  | 2.07                   | 434.45                        | 431.40             | 432.08             |
| IN41                | IN42                  | 15 inch | Corrugated HDPE (Smooth Interior) | 22.0   | 0.0050    | 4.95                      | 0.36                                | 2.35                | 433.53                | 1.50                 | 436.28                      | 433.76         | 433.84         | 433.42                  | 1.61                   | 436.28                        | 433.77             | 433.79             |
| IN24                | IN41                  | 24 inch | Corrugated HDPE (Smooth Interior) | 25.0   | 0.0048    | 16.98                     | 2.25                                | 3.75                | 430.50                | 1.50                 | 434.00                      | 431.02         | 431.21         | 430.38                  | 2.07                   | 434.45                        | 430.94             | 431.09             |
| IN207               | EW03                  | 30 inch | Corrugated HDPE (Smooth Interior) | 15.0   | 0.0100    | 44.43                     | 24.51                               | 4.99                | 422.15                | 10.00                | 434.65                      | 426.30         | 426.68         | 422.00                  | 3.50                   | 428.00                        | 426.25             | 426.64             |
| OS01                | MH19                  | 18 inch | Corrugated HDPE (Smooth Interior) | 36.0   | 0.0050    | 8.05                      | 11.04                               | 6.25                | 423.79                | 3.71                 | 429.00                      | 428.44         | 429.04         | 423.61                  | 11.14                  | 436.25                        | 428.10             | 428.71             |
| MH19                | IN36                  | 18 inch | Corrugated HDPE (Smooth Interior) | 100.0  | 0.0141    | 13.51                     | 11.04                               | 6.25                | 423.41                | 11.34                | 436.25                      | 427.33         | 427.94         | 422.00                  | 4.50                   | 428.00                        | 426.39             | 427.00             |
| IN49                | IN34A                 | 15 inch | Corrugated HDPE (Smooth Interior) | 54.0   | 0.0402    | 14.03                     | 1.86                                | 7.93                | 446.94                | 3.09                 | 451.28                      | 447.46         | 447.69         | 444.77                  | 1.50                   | 447.52                        | 446.49             | 446.52             |
| IN218               | IN40                  | 18 inch | Corrugated HDPE (Smooth Interior) | 44.0   | 0.0050    | 8.05                      | 2.60                                | 4.06                | 431.55                | 1.51                 | 434.56                      | 432.16         | 433.16         | 431.33                  | 6.13                   | 438.96                        | 431.98             | 432.18             |
| IN24                | IN24                  | 15 inch | Corrugated HDPE (Smooth Interior) | 76.0   | 0.0050    | 4.95                      | 3.07                                | 4.25                | 432.12                | 1.50                 | 454.87                      | 452.83         | 453.11         | 451.74                  | 1.70                   | 454.69                        | 452.55             | 452.76             |
| IN35                | EW02                  | 24 inch | Corrugated HDPE (Smooth Interior) | 22.0   | 0.0077    | 21.54                     | 20.02                               | 6.37                | 438.42                | 4.22                 | 444.64                      | 441.48         | 441.08         | 438.25                  | 4.39                   | 444.64                        | 440.30             | 440.93             |
| OS02                | EW02                  | 18 inch | Corrugated HDPE (Smooth Interior) | 45.0   | 0.0051    | 8.14                      | 21.61                               | 12.23               | 420.23                | 1.27                 | 423.00                      | 423.11         | 425.44         | 420.00                  | 13.50                  | 435.00                        | 421.48             | 423.82             |
| IN26                | IN26                  | 15 inch | Corrugated HDPE (Smooth Interior) | 60.0   | 0.0150    | 8.57                      | 7.53                                | 7.88                | 450.98                | 2.59                 | 454.82                      | 452.07         | 452.75         | 450.08                  | 2.20                   | 453.53                        | 451.00             | 451.94             |
| IN27                | MH04                  | 15 inch | Corrugated HDPE (Smooth Interior) | 17.0   | 0.0053    | 5.09                      | 0.86                                | 3.10                | 459.43                | 1.50                 | 462.18                      | 459.79         | 459.93         | 459.34                  | 2.05                   | 462.64                        | 459.69             | 459.84             |
| IN43                | IN44                  | 24 inch | Corrugated HDPE (Smooth Interior) | 50.0   | 0.0124    | 27.29                     | 3.89                                | 6.16                | 430.18                | 2.27                 | 434.45                      | 430.87         | 431.13         | 429.56                  | 1.66                   | 433.22                        | 430.08             | 430.65             |
| MH04                | IN26                  | 15 inch | Corrugated HDPE (Smooth Interior) | 280.0  | 0.0245    | 10.96                     | 0.86                                | 5.31                | 459.17                | 2.22                 | 462.64                      | 459.66         | 462.30         | 452.30                  | 1.27                   | 454.82                        | 452.54             | 452.98             |
| YD201               | IN221                 | 12 inch | PVC                               | 26.0   | 0.0200    | 6.55                      | 0.10                                | 3.04                | 442.49                | 2.16                 | 445.65                      | 442.62         | 442.66         | 441.97                  | 4.38                   | 447.35                        | 442.06             | 442.20             |
| IN220               | IN220                 | 15 inch | Corrugated HDPE (Smooth Interior) | 75.0   | 0.0200    | 9.90                      | 0.33                                | 3.72                | 441.72                | 4.38                 | 447.35                      | 441.94         | 442.02         | 440.22                  | 4.48                   | 445.95                        | 440.54             | 440.56             |
| IN35                | IN220                 | 15 inch | Corrugated HDPE (Smooth Interior) | 85.0   | 0.0100    | 7.00                      | 1.36                                | 4.42                | 440.02                | 4.68                 | 445.95                      | 440.51         | 440.66         | 439.17                  | 4.22                   | 444.64                        | 440.57             | 440.59             |
| IN219               | IN38                  | 15 inch | Corrugated HDPE (Smooth Interior) | 56.0   | 0.0421    | 14.37                     | 3.23                                | 9.45                | 440.50                | 1.50                 | 443.25                      | 441.22         | 441.52         | 438.14                  | 1.50                   | 440.89                        | 439.00             | 439.20             |
| IN214               | IN214                 | 18 inch | Corrugated HDPE (Smooth Interior) | 156.0  | 0.0100    | 11.38                     | 5.45                                | 6.37                | 430.45                | 6.17                 | 438.12                      | 431.35         | 431.73         | 428.89                  | 4.74                   | 435.13                        | 430.15             | 430.34             |
| IN212               | IN212                 | 30 inch | Corrugated HDPE (Smooth Interior) | 89.0   | 0.0100    | 11.38                     | 8.33                                | 7.03                | 428.69                | 4.94                 | 435.13                      | 429.81         | 430.35         | 427.80                  | 5.96                   | 435.26                        | 428.75             | 429.52             |
| IN208               | IN208                 | 30 inch | Corrugated HDPE (Smooth Interior) | 128.0  | 0.0100    | 44.43                     | 12.88                               | 7.84                | 426.80                | 5.96                 | 435.26                      | 428.01         | 428.47         | 425.52                  | 7.22                   | 435.24                        | 426.78             | 427.20             |
| IN210               | IN208                 | 30 inch | Corrugated HDPE (Smooth Interior) | 128.0  | 0.0100    | 44.43                     | 17.75                               | 8.54                | 425.32                | 7.42                 | 435.24                      | 426.75         | 427.33         | 424.04                  | 8.03                   | 434.57                        | 426.87             | 427.07             |
| IN207               | IN207                 | 30 inch | Corrugated HDPE (Smooth Interior) | 105.0  | 0.0100    | 44.43                     | 23.06                               | 4.70                | 423.84                | 8.23                 | 434.57                      | 426.84         | 427.18         | 422.79                  | 9.36                   | 434.65                        | 426.55             | 426.90             |
| IN39                | IN215                 | 18 inch | Corrugated HDPE (Smooth Interior) | 33.0   | 0.0052    | 8.17                      | 4.11                                | 4.63                | 430.82                | 6.64                 | 438.96                      | 431.60         | 431.90         | 430.65                  | 5.97                   | 438.12                        | 431.58             | 431.78             |
| IN213               | IN212                 | 18 inch | Corrugated HDPE (Smooth Interior) | 8.5    | 0.0788    | 31.95                     | 3.14                                | 11.50               | 428.47                | 6.64                 | 438.13                      | 429.14         | 429.40         | 421.80                  | 5.96                   | 435.26                        | 428.20             | 429.24             |
| IN211               | IN210                 | 18 inch | Corrugated HDPE (Smooth Interior) | 8.5    | 0.0800    | 32.18                     | 3.11                                | 11.53               | 427.00                | 6.61                 | 435.11                      | 427.67         | 427.93         | 426.32                  | 7.42                   | 435.24                        | 427.06             | 427.26             |
| IN209               | IN208                 | 18 inch | Corrugated HDPE (Smooth Interior) | 8.5    | 0.0800    | 32.18                     | 3.68                                | 2.08                | 425.52                | 7.29                 | 434.31                      | 427.43         | 427.40         | 424.84                  | 8.23                   | 434.57                        | 427.13             | 427.19             |
| IN203               | IN203                 | 15 inch | Corrugated HDPE (Smooth Interior) | 121.5  | 0.0100    | 6.98                      | 0.69                                | 3.62                | 438.05                | 1.75                 | 441.05                      | 438.37         | 438.49         | 438.84                  | 2.96                   | 441.05                        | 437.35             | 437.39             |
| IN202               | IN202                 | 15 inch | Corrugated HDPE (Smooth Interior) | 76.0   | 0.0100    | 7.00                      | 2.86                                | 5.41                | 436.64                | 3.16                 | 441.05                      | 437.32         | 437.59         | 438.88                  | 3.92                   | 441.05                        | 436.44             | 436.89             |
| EW04                | IN201                 | 15 inch | Corrugated HDPE (Smooth Interior) | 189.0  | 0.0100    | 7.00                      | 4.01                                | 5.90                | 435.68                | 4.12                 | 441.05                      | 436.49         | 436.84         | 433.79                  | 4.20                   | 439.24                        | 434.47             | 435.01             |
| IN201               | IN201                 | 15 inch | Corrugated HDPE (Smooth Interior) | 27.0   | 0.0100    | 7.00                      | 6.98                                | 6.50                | 430.27                | 7.72                 | 439.24                      | 431.33         | 431.95         | 430.00                  | 2.75                   | 439.24                        | 431.02             | 431.68             |
| IN206               | IN205                 | 15 inch | Corrugated HDPE (Smooth Interior) | 53.0   | 0.0051    | 4.99                      | 0.27                                | 2.18                | 436.77                | 1.50                 | 439.52                      | 436.97         | 437.04         | 436.50                  | 1.88                   | 439.63                        | 436.70             | 436.77             |
| IN201               | IN201                 | 15 inch | Corrugated HDPE (Smooth Interior) | 74.0   | 0.0100    | 7.00                      | 0.96                                | 4.00                | 435.79                | 2.59                 | 439.63                      | 436.18         | 436.31         | 435.05                  | 2.94                   | 439.24                        | 435.36             | 435.61             |
| MH03                | MH03                  | 30 inch | Corrugated HDPE (Smooth Interior) | 64.0   | 0.0050    | 31.42                     | 26.32                               | 7.17                | 436.00                | 1.67                 | 440.17                      | 437.75         | 438.55         | 435.68                  | 2.83                   | 441.01                        | 437.63             | 438.27             |
| MH02                | MH01                  | 30 inch | Corrugated HDPE (Smooth Interior) | 349.0  | 0.0050    | 31.46                     | 27.45                               | 7.22                | 435.51                | 3.00                 | 441.01                      | 437.32         | 438.13         | 433.76                  | 4.31                   | 440.57                        | 435.55             | 436.38             |
| MH01                | EW05                  | 30 inch | Corrugated HDPE (Smooth Interior) | 42.0   | 0.0050    | 31.42                     | 27.52                               | 7.22                | 431.12                | 6.95                 | 440.57                      | 433.07         | 433.77         | 430.91                  | 5.18                   | 438.59                        | 432.97             | 433.60             |
| IN37                | IN216                 | 30 inch | Corrugated HDPE (Smooth Interior) | 148.0  | 0.0050    | 31.42                     | 27.74                               | 7.23                | 430.74                | 5.35                 | 438.59                      | 432.56         | 433.38         | 430.00                  | 7.50                   | 440.00                        | 431.80             | 432.64             |
| TD201               | IN202                 | 8 inch  | PVC                               | 35.0   | 0.0154    | 55.19                     | 24.87                               | 10.95               | 436.71                | 1.68                 | 440.89                      | 438.47         | 439.17         | 436.17                  | 1.50                   | 440.17                        | 438.07             | 438.67             |
|                     |                       |         |                                   | 32.0   | 0.0050    | 1.11                      | 0.23                                | 2.51                | 436.42                | 1.36                 | 438.45                      | 436.66         | 436.72         | 436.26                  | 4.12                   | 441.05                        | 436.67             | 436.69             |

|      |      |         |                                   |       |        |       |      |      |        |      |        |        |        |        |      |        |        |        |
|------|------|---------|-----------------------------------|-------|--------|-------|------|------|--------|------|--------|--------|--------|--------|------|--------|--------|--------|
| IN44 | IN45 | 24 inch | Corrugated HDPE (Smooth Interior) | 38.0  | 0.0050 | 17.33 | 4.65 | 4.68 | 428.64 | 2.58 | 433.22 | 429.40 | 429.68 | 428.45 | 1.55 | 432.00 | 429.23 | 429.49 |
| IN45 | MH27 | 24 inch | Corrugated HDPE (Smooth Interior) | 174.0 | 0.0050 | 17.33 | 5.58 | 4.92 | 428.25 | 1.75 | 432.00 | 429.08 | 429.40 | 427.38 | 6.62 | 436.00 | 428.16 | 428.54 |
| MH27 | MH28 | 24 inch | Corrugated HDPE (Smooth Interior) | 174.0 | 0.0100 | 24.51 | 5.44 | 6.27 | 427.18 | 6.82 | 436.00 | 428.00 | 428.31 | 425.44 | 1.56 | 429.00 | 426.08 | 426.69 |
| MH28 | EW09 | 24 inch | Corrugated HDPE (Smooth Interior) | 21.0  | 0.0052 | 17.74 | 5.33 | 4.94 | 422.11 | 4.89 | 429.00 | 422.92 | 423.23 | 422.00 | 2.00 | 426.00 | 422.76 | 423.13 |
| IN46 | IN45 | 15 inch | Corrugated HDPE (Smooth Interior) | 34.0  | 0.0050 | 4.95  | 0.51 | 2.60 | 429.17 | 1.48 | 431.90 | 429.45 | 429.55 | 429.00 | 1.75 | 432.00 | 429.27 | 429.38 |

R:\15\PC\151192\1\Technical\Stormwater & E&S\Rev 0\StormCAD\Byers Station\_Storm-0.stc

## Appendix A

---



June 29, 2016  
Project No. 28272.01

BPG Development Company, L.P.  
3815 West Chester Pike  
Cottage #8  
Newtown Square, PA 19073

c/o  
Robert Dwyer  
LandTrust Properties Inc.  
721 Old State Road  
Berwyn, Pa. 19312

Phone: (610) 996-6600  
Fax: (610) 644-0530  
Email: [bob@landtrustprop.com](mailto:bob@landtrustprop.com)

**Re: Stormwater Infiltration Testing  
Byers Station – 5C  
Upper Uwchlan Township  
Chester County, Pennsylvania**

Dear Mr. Dwyer:

Earth Engineering Incorporated (EEI) has completed infiltration testing to provide data for the design of the proposed stormwater management system at the above-referenced project. The data consists of soil descriptions and infiltration rates within the proposed stormwater management areas, as designated on the plans provided by Bohler Engineering, Incorporated (Civil Engineer). The scope of work for this project included an exploratory test boring and test pit operation, infiltration testing, and an evaluation of the subsurface conditions. This letter presents the results of our work.

It is noted that EEI previously conducted a field investigation at this site in October of 2015, and issued a *Preliminary Report of Geotechnical Investigation*, EEI Project Number 28272.00, on October 30, 2015. Therefore, this current investigation has been performed to supplement the information collected during EEI's previous investigation.

## **I. SITE DESCRIPTION**

The subject site is located at the northeast corner of the intersection of Pottstown Pike (State Route 100) and Station Boulevard in Upper Uwchlan Township, Chester County, Pennsylvania. The proposed construction area is a triangularly-shaped parcel that is bordered to the north and northeast by Graphite Mine Road, to the south by Station Boulevard, and to the west by Pottstown Pike. The site is primarily covered by grass, tall weeds, and sparse brush with a cluster of trees near the central portion of the site. An asphalt-covered driveway exists within the southwest portion of the site, and two (2) stormwater basins exist along the eastern

**Corporate Headquarters**  
115 W Germantown Pike, Suite 200  
East Norriton, PA 19401  
(610) 277-0880 FAX 277-0878

*Southern New Jersey*  
(856) 768-1001 FAX 768-1144

*Central Pennsylvania*  
(717) 697-5701 FAX 697-5702

*Lehigh Valley*  
(610) 967-4540 FAX 967-4488

[eei@earthengineering.com](mailto:eei@earthengineering.com)

[www.earthengineering.com](http://www.earthengineering.com)



edge of the property. It has been reported by others that the site was previously used as a staging area for adjacent site including soil stockpile and borrow pit areas. Consequently, several stockpiles ranging in approximate height from 6.0 to 15.0 feet currently exist across the site. No evidence of underground or overhead utilities was observed on site during the field investigation.

The proposed development area exhibits an irregularly terraced ground surface including runoff trenches and the aforementioned soil stockpiles. In general, the topography of the site slopes from the north gently to steeply downward to the south. According to the ground surface elevations surveyed by Control Point Associates, Incorporated (Surveyor) during the recent field investigation, the maximum relief across the investigated area of the site is approximately forty (40) feet. This relief corresponds to elevations across the site ranging from approximately 421.0 to 461.0 feet. It is noted that elevation data collected during EEI's previous investigation was not considered for topographic analysis due to the earthwork operations conducted on site after 2007.

## **II. FIELD INVESTIGATION**

### **A. Infiltration Exploratory Test Pits**

According to the provided plans, several proposed stormwater management areas located throughout the site were evaluated for potential infiltration utilizing test pit exploration. Consequently, a total of seventeen (17) test pits – designated as TP-201, TP-203 through TP-216, TP-218, and TP-221 – were excavated on June 14<sup>th</sup> through June 17<sup>th</sup>, 2016 by Wayne Carmint Landscaping of King of Prussia, Pennsylvania utilizing a Case CX210 trackhoe. The test pits were excavated to a depths ranging from 4.0 to 13.5 feet below the existing ground surface. As coordinated prior to the field investigation, the Civil Engineer provided EEI with approximate proposed test depths ranging from 1.0 to 10.0 feet below existing grades at the noted locations. The test pit depths extended below the proposed infiltration depths to investigate potential limiting zones. A limiting zone is defined as a horizon or condition of the soil or underlying strata which includes:

- A seasonal high water table, whether perched or regional, determined by direct observation of the water table or soil mottling;
- Rock with open joints, fractures or solution channels, masses of loose rock fragments including gravel, with insufficient fine soil to fill the voids between the fragments;
- Rock formation, other stratum, or soil condition which is so slowly permeable that it effectively limits the downward passage of effluent. This includes soils horizons with measured infiltration rates of 0.10 inches per hour or less.

The test pit locations were field located and the ground surface elevations were surveyed by the Surveyor. Supervision and monitoring of the excavations were performed by a representative of EEI. The test pit locations are shown on the *Testing Location Plan*, EEI Drawing No. 28272.01-B-101, which is included with this letter report. *Test Pit Logs*, containing descriptions and depths of the materials encountered, are also enclosed.

### **B. Double Ring Infiltrometer Tests**

Based upon visual observations of the encountered subsurface conditions, as well as monitoring of the excavation rates, evidence of limiting zones was found to exist at nine (9) test pit locations in the form of potentially restrictive FILL II materials and/or very dense weathered rock. The existing FILL II materials were determined to be potentially restrictive per the criteria listed in the previous report section. FILL II materials were encountered at five (5) test pit locations – TP-201, TP-208, TP-209, TP-215, and TP-218 – at initial depths ranging from 0.3 to 4.0 feet below existing grades, and was observed to depths ranging from 1.0 to 8.0 feet. Very dense weathered rock was encountered at four (4) test pit locations – TP-203, TP-206, TP-210, and TP-221 – at initial depths ranging from 4.3 to 9.0 feet, and was observed to depths ranging from 10.0 to 13.5 feet. Consequently, infiltration test depths were adjusted at six (6) locations to situate the tests within suitable soils above recorded limiting zone elevations. At the remaining eleven (11) test pit locations, the infiltration tests were conducted as originally proposed.

As previously coordinated with the Civil Engineer, EEI proposed two (2) infiltration tests adjacent to each applicable test pit location. As a result, a total of thirty-four (34) double ring infiltrometer tests were conducted within the proposed stormwater management areas to determine infiltration rates for the on-site soils. Following completion of the test pit program, the infiltration test holes were excavated utilizing the aforementioned trackhoe to depths ranging from 0.5 to 9.3 feet below the existing ground surface. The infiltration testing was performed utilizing double ring infiltrometers with inner and outer rings measuring 4.0 and 8.0 inches, respectively. The locations of the infiltration test holes are shown on the enclosed *Testing Location Plan*. *Infiltration Testing Logs*, containing details of the double ring infiltrometer tests, are also included with this letter report.

### **C. Infiltration Exploratory Test Borings**

According to the provided plans, several additional stormwater management areas located throughout the site were evaluated for potential infiltration utilizing test boring exploration. EEI evaluated these areas using the test boring method due to the extensive proposed excavation depths, which were not practical or feasible utilizing the aforementioned trackhoe. Six (6) test borings – designated as B-202, B-217, B-219, B-220, B-222, and B-223 – were performed on June 20<sup>th</sup> and June 21<sup>st</sup>, 2016 by TRC of Cinnaminson, New Jersey utilizing an *Acker Soil XLS* all-terrain vehicle (ATV) rubber track-mounted drill rig. The test borings were advanced using two (2) inch outer diameter split-barrel samplers and three and one quarter (3.25) inch inner diameter hollow stem augers. Split-barrel samples were conducted in accordance with ASTM standard D1586. Standard Penetration Test (SPT) values were recorded for each split-barrel sample. An SPT value, which is a measure of soil density and

consistency, is the number of blows required to drive a two (2) inch outer diameter split-barrel sampler six (6) inches using a one-hundred and forty (140) pound weight dropped thirty (30) inches. The number of blows required to advance the sampler over the twelve (12) inch interval from six (6) to eighteen (18) inches is considered the N-value. The hammer system utilized for this investigation was an automatic trip hammer.

The exploratory borings were continuously sampled within the target infiltration zone to depths ranging from 14.0 to 25.0 feet below existing grade. At the boring locations, the Civil Engineer provided EEI with approximate proposed test depths ranging from 10.5 to 16.5 feet below the existing ground surface. The test boring depths extended below the proposed infiltration depths to investigate potential limiting zones as previously defined in this letter report.

The test borings were field located and the ground surface elevations were surveyed by the Surveyor. Supervision and monitoring of the test boring operation were performed by a representative of EEI. The locations of the test borings are shown on the referenced *Testing Location Plan. Boring Logs*, detailing the subsurface conditions and depths of the materials encountered, are enclosed with this letter report.

#### **D. Cased Borehole Infiltration Tests**

Based upon the N-values recorded during sampling and monitoring of the drilling rates, as well as visual observations of the encountered subsurface conditions, evidence of limiting zones was found to exist at three (3) boring locations in the form of potentially restrictive FILL II materials, groundwater, and/or very dense weathered rock. FILL II materials were encountered at only one (1) boring location, B-202, at an initial depth of 5.5 feet below existing grade, and was observed to a depth of 23.5 feet. Groundwater was encountered at two (2) boring locations, B-202 and B-222, at depths of 23.7 and 11.2 feet, respectively. Very dense weathered rock was encountered at two (2) boring locations, B-222 and B-223, at initial depths of 1.5 and 16.0 feet, respectively, and was observed to depths of 14.1 and 16.8 feet. Consequently, testing was eliminated at one (1) boring location, B-222, under the direction of the Civil Engineer due to the excessive deviation between the initial limiting zone elevation (448.8 feet) and the proposed test elevation (438.5 feet). At the remaining five (5) boring locations, the infiltration tests were conducted as originally proposed. However, it is noted that an infiltration test was conducted at one (1) location, B-202, within an identified limiting zone (FILL II materials) in an effort to verify soil conditions designated by EEI as potentially restrictive.

As coordinated with the Civil Engineer, EEI proposed one (1) infiltration test adjacent to each applicable test boring. As a result, a total of five (5) cased borehole infiltration tests were conducted within the proposed stormwater management areas to determine infiltration rates for the on-site soils. Following completion of the test boring program, eight (8) inch diameter infiltration test holes were drilled to depths ranging from 9.9 to 16.3 feet below the existing ground surface. Three (3) inch inner-diameter open-bottom solid casings were then installed and seated two inches into residual soils at the bottom of the boreholes. Granular bentonite was packed around the annulus of the casings and hydrated. Soil cuttings were then placed and compacted above the bentonite seal. Upon completion of the installation, infiltration testing

was conducted inside each sealed casing. The locations of the cased borehole infiltration tests are shown on the referenced *Testing Location Plan* included with this letter report. *Infiltration Testing Logs*, containing details of the cased borehole infiltration tests conducted, are also enclosed.

### **III. SUBSURFACE CONDITIONS**

#### **A. Geology**

According to the Pennsylvania Geological Survey, *Atlas of Preliminary Geologic Quadrangle Maps of Pennsylvania*, Fourth Series, Downingtown, PA Quadrangle, 1978, the site is underlain by a formation of graphitic gneiss (denoted with geologic symbol *gg*).

As noted in the Pennsylvania Topographic and Geologic Survey, *Engineering Characteristics of the Rocks of Pennsylvania*, Fourth (4<sup>th</sup>) Series, Revised 1982, the graphitic gneiss formation is composed of a light to medium-gray metamorphic rock. Minerals typically associated with this rock type include quartz, orthoclase feldspar, hornblende, biotite, and graphite. The graphite occurs as flakes 1 to 2 millimeters in diameter which are larger than the usual grain size of the rock. Banding is distinct and quite common. Bands are flaggy in thickness. Joints display a platy pattern and are well developed, moderately to highly abundant, regular, moderately to closely spaced, open, and steeply dipping to vertical. This rock type is characteristically deeply weathered, resulting in a relatively thick overlying soil mantle. Ease of excavation ranges from easy, in the highly weathered to completely weathered rock, to very difficult in the moderately weathered to fresh bedrock. The residual soils of this formation typically exhibit good surface drainage. Joint openings of the underlying rock type provide a moderate secondary porosity and low permeability.

#### **B. Soil**

The soil conditions observed during the field investigation were examined and visually classified by EEI in the field. Based upon these observations, a generalized soil profile has been developed. Two (2) materials designated as FILL and two (2) naturally-occurring strata were characterized to exist at the recently investigated locations. It is noted that the subsurface conditions encountered during this investigation were generally consistent with those described in EEI's *Preliminary Report of Geotechnical Investigation* previously compiled for the subject site. However, FILL STOCKPILE and FILL III, as defined in the referenced report, were not encountered at any of the test boring or test pit locations within the depths explored. A surface layer of topsoil was encountered at seventeen (17) locations to depths ranging from 0.2 to 0.4 feet below existing grades. Additionally, a remnant topsoil layer was observed beneath existing FILL I materials at test pit TP-213 from 7.5 to 8.0 feet. Based upon the materials observed during the field investigation, residual soils typical of the various weathering stages of the underlying graphitic gneiss were encountered at this site. The subsurface information is further detailed on the *Test Pit Logs* and *Boring Logs*, which are included with this report.

### **C. Bedrock**

Bedrock was not encountered at any of the twenty-three (23) investigated locations within the depths explored. Bedrock is defined herein as auger/bucket refusal within residual materials where the drilling/excavating equipment encounters the moderately weathered to fresh bedrock surface. However, very dense weathered rock, as indicated by hard drilling/excavating rates and/or N-values of greater than 50 blows per foot, was encountered at six (6) locations at initial depths ranging from 1.5 to 16.0 feet. The depths to very dense weathered rock and bedrock with corresponding elevations are shown in the following table.

| <b>TABLE I<br/>DEPTHS TO VERY DENSE WEATHERED ROCK AND BEDROCK</b> |                                        |                                                              |                                                               |                                            |                                             |
|--------------------------------------------------------------------|----------------------------------------|--------------------------------------------------------------|---------------------------------------------------------------|--------------------------------------------|---------------------------------------------|
| <b>Location</b>                                                    | <b>Ground Surface Elevation (feet)</b> | <b>Approximate Depth to Very Dense Weathered Rock (feet)</b> | <b>Approximate Very Dense Weathered Rock Elevation (feet)</b> | <b>Approximate Depth to Bedrock (feet)</b> | <b>Approximate Bedrock Elevation (feet)</b> |
| TP-203                                                             | 449.2                                  | 9.0                                                          | 440.2                                                         | >13.5                                      | -                                           |
| TP-206                                                             | 432.8                                  | 8.0                                                          | 424.8                                                         | >10.0                                      | -                                           |
| TP-210                                                             | 455.3                                  | 7.0                                                          | 448.3                                                         | >10.0                                      | -                                           |
| TP-221                                                             | 445.6                                  | 4.3                                                          | 441.3                                                         | >11.0                                      | -                                           |
| B-222                                                              | 450.3                                  | 1.5                                                          | 448.8                                                         | >14.1                                      | -                                           |
| B-223                                                              | 452.2                                  | 16.0                                                         | 436.2                                                         | >16.8                                      | -                                           |

It is important to note that bedrock and very dense weathered rock are considered limiting zones for infiltration. According to the preliminary design criteria, difficulties with very dense weathered rock should be expected within the potential infiltration areas at the locations and depths shown in the preceding table.

### **D. Groundwater**

Groundwater, which is considered a limiting zone for infiltration, was initially encountered at two (2) locations, borings B-202 and B-222, at depths of 24.3 and 11.7 feet below existing grade, respectively. Each of the investigated locations was left open prior to backfilling to facilitate long-term groundwater readings. Temporary groundwater monitoring wells were installed at borings B-202 and B-219 to further facilitate long-term groundwater readings. Subsequent readings were attempted, and recorded where possible, at time intervals ranging from 1.5 to 5.0 hours after completion. Consequently, results of the subsequent readings indicated the presence of groundwater at a total of two (2) locations within the depths explored. Subsequent groundwater readings were recorded at depths of 23.7 feet at B-202 and 11.2 feet at B-222. The depths and corresponding elevations at which groundwater was observed are presented in the following table. Groundwater level readings are also shown on the *Test Pit Logs* and *Boring Logs* included with this report.

| <b>TABLE II<br/>GROUNDWATER OBSERVATIONS</b> |                                        |                                                        |                                             |                                                           |                                                |
|----------------------------------------------|----------------------------------------|--------------------------------------------------------|---------------------------------------------|-----------------------------------------------------------|------------------------------------------------|
| <b>Location</b>                              | <b>Ground Surface Elevation (feet)</b> | <b><sup>1.)</sup> Initial Groundwater Depth (feet)</b> | <b>Initial Groundwater Elevation (feet)</b> | <b><sup>1.)</sup> Subsequent Groundwater Depth (feet)</b> | <b>Subsequent Groundwater Elevation (feet)</b> |
| B-202                                        | 461.3                                  | 24.3                                                   | 437.0                                       | 23.7                                                      | 437.6                                          |
| B-222                                        | 450.3                                  | 11.7                                                   | 438.6                                       | 11.2                                                      | 439.1                                          |

<sup>1.)</sup> Groundwater depths were measured from existing site grades at the time of the investigation.

According to the preliminary site design available, groundwater issues should not be anticipated during the proposed construction activities throughout the majority of the subject site. However, difficulties associated with groundwater should be expected during construction of any potential stormwater management components within the areas of the investigated locations noted in the preceding table. It should be noted that these observations were conducted at the time of the field investigation. Groundwater observations may fluctuate with daily, seasonal, and climatic variations.

#### **IV. SUMMARY AND INFILTRATION TEST RESULTS**

Several potential stormwater management areas were investigated within the proposed development area. As noted in previous sections of this report, thirty-four (34) double ring infiltrometer tests and five (5) cased borehole infiltration tests were conducted within the areas identified by the Civil Engineer on the provided plans. At one (1) of the investigated locations, boring B-222, EEI determined that infiltration was not feasible due to a limiting zone conflict and testing was, therefore, eliminated from the scope of work. The following table summarizes the types and depths of the limiting zones observed during the field investigation. Additional details regarding the soils and limiting zones are provided on the enclosed *Test Pit Logs* and *Boring Logs*.

| <b>TABLE III<br/>COMPARISON OF LIMITING ZONES AND INFILTRATION DEPTHS</b> |                                        |                                           |                                                   |                                        |                                       |
|---------------------------------------------------------------------------|----------------------------------------|-------------------------------------------|---------------------------------------------------|----------------------------------------|---------------------------------------|
| <b>Location</b>                                                           | <b>Ground Surface Elevation (feet)</b> | <b>Limiting Zone Description</b>          | <b><sup>1.)</sup> Limiting Zone Depths (feet)</b> | <b>Limiting Zone Elevations (feet)</b> | <b>Infiltration Test Depth (feet)</b> |
| TP-201                                                                    | 459.3                                  | Potentially restrictive FILL II materials | 3.5 to 6.0                                        | 455.8 to 453.3                         | 9.3                                   |
| TP-203                                                                    | 449.2                                  | Very dense weathered rock                 | 9.0 to 13.5                                       | 440.2 to 435.7                         | 6.7                                   |
| TP-204                                                                    | 438.2                                  | None encountered                          | -                                                 | -                                      | 1.2                                   |
| TP-205                                                                    | 435.1                                  | None encountered                          | -                                                 | -                                      | 8.1                                   |
| TP-206                                                                    | 432.8                                  | Very dense weathered rock                 | 8.0 to 10.0                                       | 424.8 to 422.8                         | 5.8                                   |

| <b>TABLE III</b><br><b>COMPARISON OF LIMITING ZONES AND INFILTRATION DEPTHS</b> |                                        |                                           |                                                   |                                        |                                       |
|---------------------------------------------------------------------------------|----------------------------------------|-------------------------------------------|---------------------------------------------------|----------------------------------------|---------------------------------------|
| <b>Location</b>                                                                 | <b>Ground Surface Elevation (feet)</b> | <b>Limiting Zone Description</b>          | <b><sup>1.)</sup> Limiting Zone Depths (feet)</b> | <b>Limiting Zone Elevations (feet)</b> | <b>Infiltration Test Depth (feet)</b> |
| TP-207                                                                          | 424.1                                  | None encountered                          | -                                                 | -                                      | 4.6                                   |
| TP-208                                                                          | 420.8                                  | Potentially restrictive FILL II materials | 0.3 to 1.0                                        | 420.5 to 419.8                         | 1.3                                   |
| TP-209                                                                          | 421.0                                  | Potentially restrictive FILL II materials | 0.4 to 1.5                                        | 420.6 to 419.5                         | 1.5                                   |
| TP-210                                                                          | 455.3                                  | Very dense weathered rock                 | 7.0 to 10.0                                       | 448.3 to 445.3                         | 4.8                                   |
| TP-211                                                                          | 440.1                                  | None encountered                          | -                                                 | -                                      | 3.3                                   |
| TP-212                                                                          | 443.3                                  | None encountered                          | -                                                 | -                                      | 2.5                                   |
| TP-213                                                                          | 450.8                                  | None encountered                          | -                                                 | -                                      | 6.0                                   |
| TP-214                                                                          | 443.5                                  | None encountered                          | -                                                 | -                                      | 0.5                                   |
| TP-215                                                                          | 449.0                                  | Potentially restrictive FILL II materials | 4.0 to 8.0                                        | 445.0 to 441.0                         | 3.0                                   |
| TP-216                                                                          | 438.3                                  | None encountered                          | -                                                 | -                                      | 6.3                                   |
| TP-218                                                                          | 430.1                                  | Potentially restrictive FILL II materials | 1.5 to 3.3                                        | 428.6 to 426.8                         | 5.6                                   |
| TP-221                                                                          | 445.6                                  | Very dense weathered rock                 | 4.3 to 11.0                                       | 441.3 to 434.6                         | 2.1                                   |
| B-202                                                                           | 461.3                                  | Potentially restrictive FILL II materials | 5.5 to 23.5                                       | 455.8 to 437.8                         | 16.3                                  |
|                                                                                 |                                        | Groundwater                               | 23.7                                              | 437.6                                  |                                       |
| B-217                                                                           | 434.5                                  | None encountered                          | -                                                 | -                                      | 10.0                                  |
| B-219                                                                           | 439.5                                  | None encountered                          | -                                                 | -                                      | 15.0                                  |
| B-220                                                                           | 434.4                                  | None encountered                          | -                                                 | -                                      | 9.9                                   |
| B-222                                                                           | 450.3                                  | Very dense weathered rock                 | 1.5 to 14.1                                       | 448.8 to 436.2                         | No test                               |
|                                                                                 |                                        | Groundwater                               | 11.2                                              | 439.1                                  |                                       |
| B-223                                                                           | 452.2                                  | Very dense weathered rock                 | 16.0 to 16.8                                      | 436.2 to 435.4                         | 13.7                                  |

<sup>1.)</sup> Depths of limiting zones and infiltration tests were measured from existing site grades at the time of the investigation.

As previously discussed, the infiltration tests were seated at depths ranging from 0.5 to 16.3 feet below the existing ground surface. All testing procedures and calculations were performed according to *Appendix C* of the *Pennsylvania Stormwater Best Management Practices (PA BMP) Manual*. The following tables summarize the infiltration data obtained during this investigation for each test location. Further detailed field testing data is provided on the *Infiltration Testing Logs* included with this letter report.

**TABLE IV  
INFILTRATION RATES AT TEST LOCATIONS  
DOUBLE RING INFILTROMETER METHOD**

| <b>Infiltration<br/>Test<br/>Number</b> | <b>Ground<br/>Surface<br/>Elevation<br/>(feet)</b> | <b><sup>1.)</sup> Infiltration<br/>Test Depth<br/>(feet)</b> | <b>Infiltration<br/>Test<br/>Elevation<br/>(feet)</b> | <b>Test<br/>Interval<br/>(minutes)</b> | <b>Final Drop<br/>in Water<br/>Level<br/>(inches)</b> | <b><sup>2.)</sup> Infiltration<br/>Rate<br/>(inches/hour)</b> |
|-----------------------------------------|----------------------------------------------------|--------------------------------------------------------------|-------------------------------------------------------|----------------------------------------|-------------------------------------------------------|---------------------------------------------------------------|
| DR-201A                                 | 459.3                                              | 9.3                                                          | 450.0                                                 | 30                                     | 0.625                                                 | 1.25                                                          |
| DR-201B                                 | 459.3                                              | 9.3                                                          | 450.0                                                 | 30                                     | 0.500                                                 | 1.00                                                          |
| DR-203A                                 | 449.2                                              | 6.7                                                          | 442.5                                                 | 10                                     | 1.125                                                 | 6.75                                                          |
| DR-203B                                 | 449.2                                              | 6.7                                                          | 442.5                                                 | 10                                     | 1.250                                                 | 7.50                                                          |
| DR-204A                                 | 438.2                                              | 1.2                                                          | 437.0                                                 | 30                                     | 0.375                                                 | 0.75                                                          |
| DR-204B                                 | 438.2                                              | 1.2                                                          | 437.0                                                 | 30                                     | 0.125                                                 | 0.25                                                          |
| DR-205A                                 | 435.1                                              | 8.1                                                          | 427.0                                                 | 10                                     | 1.000                                                 | 6.00                                                          |
| DR-205B                                 | 435.1                                              | 8.1                                                          | 427.0                                                 | 10                                     | 1.250                                                 | 7.50                                                          |
| DR-206A                                 | 432.8                                              | 5.8                                                          | 427.0                                                 | 30                                     | 0.500                                                 | 1.00                                                          |
| DR-206B                                 | 432.8                                              | 5.8                                                          | 427.0                                                 | 30                                     | 0.375                                                 | 0.75                                                          |
| DR-207A                                 | 424.1                                              | 4.6                                                          | 419.5                                                 | 30                                     | 0.750                                                 | 1.50                                                          |
| DR-207B                                 | 424.1                                              | 4.6                                                          | 419.5                                                 | 30                                     | 0.500                                                 | 1.00                                                          |
| DR-208A                                 | 420.8                                              | 1.3                                                          | 419.5                                                 | 30                                     | 1.000                                                 | 2.00                                                          |
| DR-208B                                 | 420.8                                              | 1.3                                                          | 419.5                                                 | 30                                     | 0.625                                                 | 1.25                                                          |
| DR-209A                                 | 421.0                                              | 1.5                                                          | 419.5                                                 | 30                                     | 0.125                                                 | 0.25                                                          |
| DR-209B                                 | 421.0                                              | 1.5                                                          | 419.5                                                 | 30                                     | 0.000                                                 | 0.00                                                          |
| DR-210A                                 | 455.3                                              | 4.8                                                          | 450.5                                                 | 10                                     | 1.125                                                 | 6.75                                                          |
| DR-210B                                 | 455.3                                              | 4.8                                                          | 450.5                                                 | 10                                     | 1.500                                                 | 9.00                                                          |
| DR-211A                                 | 440.1                                              | 3.3                                                          | 436.8                                                 | 10                                     | 0.375                                                 | 2.25                                                          |
| DR-211B                                 | 440.1                                              | 3.3                                                          | 436.8                                                 | 10                                     | 0.625                                                 | 3.75                                                          |
| DR-212A                                 | 443.3                                              | 2.5                                                          | 440.8                                                 | 30                                     | 0.125                                                 | 0.25                                                          |
| DR-212B                                 | 443.3                                              | 2.5                                                          | 440.8                                                 | 30                                     | 0.250                                                 | 0.50                                                          |
| DR-213A                                 | 450.8                                              | 6.0                                                          | 444.8                                                 | 10                                     | 0.625                                                 | 3.75                                                          |
| DR-213B                                 | 450.8                                              | 6.0                                                          | 444.8                                                 | 10                                     | 0.750                                                 | 4.50                                                          |
| DR-214A                                 | 443.5                                              | 0.5                                                          | 443.0                                                 | 30                                     | 0.125                                                 | 0.25                                                          |
| DR-214B                                 | 443.5                                              | 0.5                                                          | 443.0                                                 | 30                                     | 0.375                                                 | 0.75                                                          |
| DR-215A                                 | 449.0                                              | 3.0                                                          | 446.0                                                 | 30                                     | 0.500                                                 | 1.00                                                          |
| DR-215B                                 | 449.0                                              | 3.0                                                          | 446.0                                                 | 30                                     | 0.250                                                 | 0.50                                                          |
| DR-216A                                 | 438.3                                              | 6.3                                                          | 432.0                                                 | 30                                     | 0.750                                                 | 1.50                                                          |



| TABLE IV<br>INFILTRATION RATES AT TEST LOCATIONS<br>DOUBLE RING INFILTROMETER METHOD |                                 |                                               |                                    |                         |                                    |                                                |
|--------------------------------------------------------------------------------------|---------------------------------|-----------------------------------------------|------------------------------------|-------------------------|------------------------------------|------------------------------------------------|
| Infiltration Test Number                                                             | Ground Surface Elevation (feet) | <sup>1.)</sup> Infiltration Test Depth (feet) | Infiltration Test Elevation (feet) | Test Interval (minutes) | Final Drop in Water Level (inches) | <sup>2.)</sup> Infiltration Rate (inches/hour) |
| DR-216B                                                                              | 438.3                           | 6.3                                           | 432.0                              | 30                      | 1.125                              | 2.25                                           |
| DR-218A                                                                              | 430.1                           | 5.6                                           | 424.5                              | 30                      | 0.375                              | 0.75                                           |
| DR-218B                                                                              | 430.1                           | 5.6                                           | 424.5                              | 30                      | 0.250                              | 0.50                                           |
| DR-221A                                                                              | 445.6                           | 2.1                                           | 443.5                              | 10                      | 0.375                              | 2.25                                           |
| DR-221B                                                                              | 445.6                           | 2.1                                           | 443.5                              | 10                      | 0.500                              | 3.00                                           |

<sup>1.)</sup> Infiltration test depths were measured from existing site grades at the time of the investigation.

<sup>2.)</sup> The infiltration rates are field measured values and do not include a factor of safety for design purposes.

| TABLE V<br>INFILTRATION RATES AT TEST LOCATIONS<br>CASED BOREHOLE INFILTRATION TEST METHOD |                                 |                                               |                                    |                         |                                    |                                                |
|--------------------------------------------------------------------------------------------|---------------------------------|-----------------------------------------------|------------------------------------|-------------------------|------------------------------------|------------------------------------------------|
| Infiltration Test Number                                                                   | Ground Surface Elevation (feet) | <sup>1.)</sup> Infiltration Test Depth (feet) | Infiltration Test Elevation (feet) | Test Interval (minutes) | Final Drop in Water Level (inches) | <sup>2.)</sup> Infiltration Rate (inches/hour) |
| IT-202                                                                                     | 461.3                           | 16.3                                          | 445.0                              | 30                      | 0.24                               | 0.07                                           |
| IT-217                                                                                     | 434.5                           | 10.0                                          | 424.5                              | 30                      | 0.84                               | 0.26                                           |
| IT-219                                                                                     | 439.5                           | 15.0                                          | 424.5                              | 30                      | 0.48                               | 0.14                                           |
| IT-220                                                                                     | 434.4                           | 9.9                                           | 424.5                              | 30                      | 0.36                               | 0.11                                           |
| IT-223                                                                                     | 452.2                           | 13.7                                          | 438.5                              | 30                      | 0.36                               | 0.11                                           |

<sup>1.)</sup> Infiltration test depths were measured from existing site grades at the time of the investigation.

<sup>2.)</sup> The infiltration rates are field measured values and do not include a factor of safety for design purposes.

The infiltration tests were situated within existing FILL I and FILL II materials, and Stratum I soils, which generally consist of sandy silt to silty sand. As indicated in the previous table, the measured infiltration rates at the locations where infiltration testing was determined to be feasible ranged from 0.00 to 9.00 inches per hour. In accordance with the referenced *PA BMP Manual*, the required range of measured infiltration rates for soils to be suitable for stormwater infiltration spans from 0.10 to 10.00 inches per hour. Additionally, stormwater management facilities should typically maintain a minimum buffer of 2.0 feet above the underlying limiting zone. It is emphasized that the rates shown in the preceding table are field measured values and do not include a safety factor for design purposes. The determination of appropriate design values and factors of safety for the stormwater management system is the responsibility of Civil Engineer. According to the referenced *PA BMP Manual*, a minimum factor of safety of 2.0 is recommended for most cases.

Based upon the materials observed and the data acquired at the site, subsurface conditions at twelve (12) of the investigated locations include limiting zone conflicts. Additionally, testing was eliminated at B-222 due to a very shallow limiting zone conflict, and field tests at two (2) locations, TP-209 and B-202, yielded infiltration rates that preclude stormwater infiltration. Consequently, the results of the investigation are generally unfavorable for infiltration in the vicinity of the above-referenced locations according to the preliminary design criteria in relation to the recommended guidelines.

However, no limiting zones were observed at eleven (11) of the investigated locations within the depths explored. Furthermore, the tests at twenty (20) locations exhibited the minimum limiting zone buffer and yielded infiltration rates that support stormwater infiltration. Therefore, the results at those locations are generally favorable for infiltration throughout the majority of the site, although the proposed grading scheme and design criteria will require some adjustments. Based on the overall testing results and observations of the soil conditions, infiltration is generally feasible at this site.

## **V. LIMITATIONS**

The information contained in this letter is based upon the subsurface data collected and on details stated in this letter. Should conditions arise which differ from those specifically stated herein, our office should be notified immediately so that our conclusions can be reviewed and revised, if necessary.

The scope of work regarding the stormwater infiltration aspects of this project was limited to data acquisition and recommendations regarding the suitability of the existing soils for infiltration. This report offers no facts or opinions related to potential impacts resulting from infiltrating stormwater at this location on surrounding areas. Unless specifically indicated to the contrary in this report, the scope of work for this project does not include any considerations of potential site pollution, contamination, or other environmental issues. This report offers no facts or opinions related to potential pollution or contamination of the site. Furthermore, no recommendations or conclusions related to geotechnical conditions at the site are discussed or inferred herein.

It is emphasized that this analysis was conducted for the stormwater management system associated with the proposed mixed use development to be situated on the Byers Station 5C property located at the intersection of Pottstown Pike and Station Boulevard in Upper Uwchlan Township, Chester County, Pennsylvania. EEI does not assume any responsibility in using this report for drainage system consideration or designs other than at the specific site addressed.



Sincerely,  
**EARTH ENGINEERING INCORPORATED**

A handwritten signature in black ink, appearing to read "Chris Ardizzi".

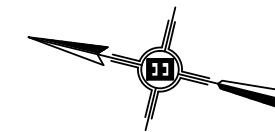
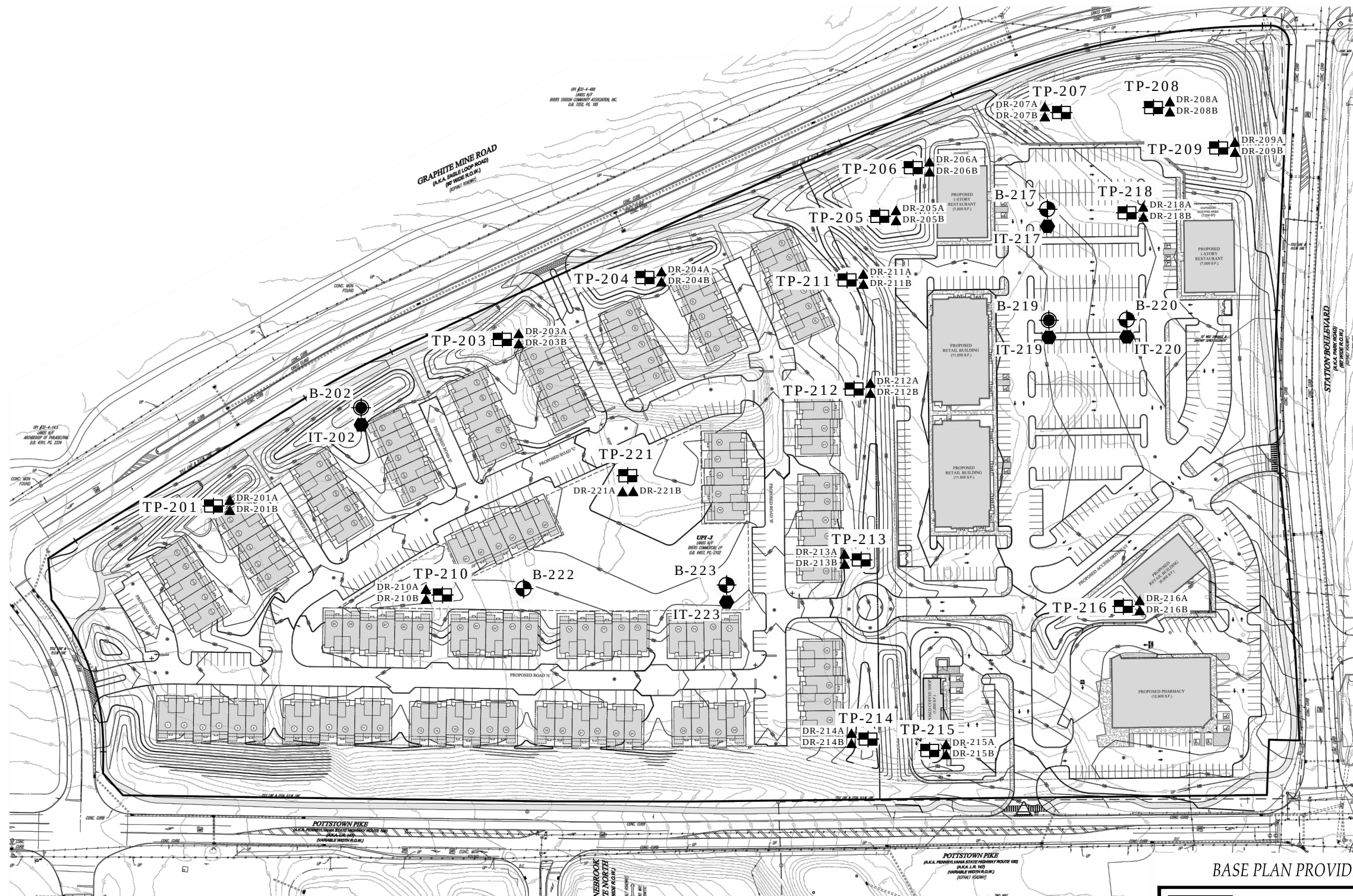
Chris Ardizzi  
Senior Geologist

A handwritten signature in black ink, appearing to read "Patrick McNamara".

Patrick McNamara, P.E.  
Director – Geotechnical Investigations

Enclosures

***ENCLOSURES***



BASE PLAN PROVIDED BY: Bohler Engineering, Inc.

150 120 90 60 30 0 150 300



GRAPHIC SCALE: 1" = 150'

KEY:



INDICATES APPROXIMATE TEST BORING LOCATION



INDICATES APPROXIMATE TEST BORING LOCATION INCLUDING GROUNDWATER OBSERVATION WELL



INDICATES APPROXIMATE CASSED BOREHOLE TEST LOCATION



INDICATES APPROXIMATE TEST PIT LOCATION



INDICATES APPROXIMATE DOUBLE RING INFILTRIMETER TEST LOCATION



**EARTH  
ENGINEERING  
INCORPORATED**  
Geotechnical Engineers & Geologists

115 W. Germantown Pike  
East Norriton, PA 19401  
(610) 277-0880  
FAX (610) 277-0878  
www.earthengineering.com

TESTING LOCATION PLAN

PREPARED FOR

BYERS STATION 5C

UPPER UWCHLAN TOWNSHIP CHESTER COUNTY PENNSYLVANIA

Scale: 1" = 150' Date: 6-29-2016 Drawn By: CMA Checked By: PMM

Drawing Number: 28272.01-B-101 Approved By: PMM



**EARTH  
ENGINEERING  
INCORPORATED**  
*Geotechnical Engineers & Geologists*

# TEST PIT LOG

|                       |                      |
|-----------------------|----------------------|
| PIT NO.:              | <b>TP-201</b>        |
| SHEET:                | <b>1</b> OF <b>1</b> |
| START DATE:           | <b>6/17/16</b>       |
| END DATE:             | <b>6/17/16</b>       |
| SURFACE<br>ELEV. (FT) | <b>459.3</b>         |

PROJECT NAME: Byers Station 5C

PROJECT LOCATION: Upper Uwchlan Township, Chester County, Pennsylvania

PROJECT NUMBER: 28272.01

INSPECTOR NAME: C. Ardizzi

EQUIPMENT: Case CX210 Trackhoe

EXCAVATOR NAME/COMPANY: J. Toepel/Wayne Carmint Landscaping

WATER DEPTH: Dry TIME: 0.25 hr DATE: 6/17/2016

CHECKED BY: P. McNamara DATE: 6/28/2016

WATER DEPTH: Dry TIME: 3.50 hrs DATE: 6/17/2016

| DEPTH (FT) | USCS  | H <sub>2</sub> O CONTENT<br>** | GRAPHIC LOG | DESCRIPTION                                                                                                                   | REMARKS                                                                                                                                                 |
|------------|-------|--------------------------------|-------------|-------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
|            |       |                                |             | DEPTH<br>ELEVATION                                                                                                            |                                                                                                                                                         |
| 0.3        |       |                                |             | 0.3 Topsoil (3")<br>459.0<br>Sandy silt to silty sand; trace gravel, roots, organics, concrete;<br>brown, dark brown (FILL I) | Loose to medium dense; dry to moist; easy excavating                                                                                                    |
|            | ml/sm | d/m                            |             |                                                                                                                               |                                                                                                                                                         |
| 3.5        |       |                                |             | 3.5<br>455.8<br>Clayey silt to sandy silt; some organics; trace gravel, wood,<br>roots; dark gray (FILL II)                   | Loose; moist; easy excavating                                                                                                                           |
|            | ml    | m                              |             |                                                                                                                               |                                                                                                                                                         |
| 6.0        |       |                                |             | 6.0<br>453.3<br>Sandy silt to silty sand; trace gravel, mica; orange brown, brown,<br>tan, gray (Decomposed Gneiss)           | Medium dense; moist; easy to moderate excavating                                                                                                        |
|            | ml/sm | m                              |             |                                                                                                                               |                                                                                                                                                         |
| 13.5       |       |                                |             | 13.5<br>445.8                                                                                                                 | End of test pit at 13.5'                                                                                                                                |
|            |       |                                |             |                                                                                                                               | LIMITING ZONES: Potentially restrictive FILL<br>II materials 3.5' - 6.0'; Infiltration test situated at<br>9.3' below existing grade (elevation 450.0') |

\*\* D = DRY, M = MOIST, W = WET





**EARTH  
ENGINEERING  
INCORPORATED**  
*Geotechnical Engineers & Geologists*

# TEST PIT LOG

|                       |                      |
|-----------------------|----------------------|
| PIT NO.:              | <b>TP-203</b>        |
| SHEET:                | <b>1</b> OF <b>1</b> |
| START DATE:           | <b>6/17/16</b>       |
| END DATE:             | <b>6/17/16</b>       |
| SURFACE<br>ELEV. (FT) | <b>449.2</b>         |

PROJECT NAME: Byers Station 5C

PROJECT LOCATION: Upper Uwchlan Township, Chester County, Pennsylvania

PROJECT NUMBER: 28272.01

INSPECTOR NAME: C. Ardizzi

EQUIPMENT: Case CX210 Trackhoe

EXCAVATOR NAME/COMPANY: J. Toepel/Wayne Carmint Landscaping

WATER DEPTH: Dry TIME: 0.25 hr DATE: 6/17/2016

CHECKED BY: P. McNamara DATE: 6/28/2016 WATER DEPTH: Dry TIME: 4.50 hrs DATE: 6/17/2016

| DEPTH (FT) | USCS  | H <sub>2</sub> O CONTENT<br>** | GRAPHIC LOG | DESCRIPTION                                                                                                        | REMARKS                                                                                                                            |
|------------|-------|--------------------------------|-------------|--------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|
|            |       |                                |             | DEPTH<br>ELEVATION                                                                                                 |                                                                                                                                    |
| 0.3        |       |                                |             | 0.3 Topsoil (3")<br>448.9<br>Sandy silt to silty sand; trace gravel, roots, cobbles, crushed stone; brown (FILL I) | Loose to medium dense; dry to moist; easy excavating                                                                               |
| 6.0        | ml/sm | d/m                            |             | 6.0<br>443.2<br>Silty sand; trace gravel, mica; brown, tan, orange brown (Decomposed Gneiss)                       | Medium dense; moist; easy to moderate excavating                                                                                   |
| 9.0        | sm    | m                              |             | 9.0<br>440.2<br>Silty sand; some gravel, cobbles; saprolitic; brown, dark brown, gray (Weathered Gneiss)           | Very dense; dry to moist; hard excavating                                                                                          |
| 13.5       | sm    | d/m                            |             | 13.5<br>435.7                                                                                                      | End of test pit at 13.5'                                                                                                           |
|            |       |                                |             |                                                                                                                    | LIMITING ZONES: Very dense weathered rock 9.0' - 13.5'; Infiltration test situated at 6.7' below existing grade (elevation 442.5') |

\*\* D = DRY, M = MOIST, W = WET



**EARTH  
ENGINEERING  
INCORPORATED**  
*Geotechnical Engineers & Geologists*

# TEST PIT LOG

|                       |                      |
|-----------------------|----------------------|
| PIT NO.:              | <b>TP-204</b>        |
| SHEET:                | <b>1</b> OF <b>1</b> |
| START DATE:           | <b>6/17/16</b>       |
| END DATE:             | <b>6/17/16</b>       |
| SURFACE<br>ELEV. (FT) | <b>438.2</b>         |

PROJECT NAME: Byers Station 5C

PROJECT LOCATION: Upper Uwchlan Township, Chester County, Pennsylvania

PROJECT NUMBER: 28272.01

INSPECTOR NAME: C. Ardizzi

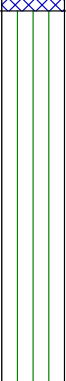
EQUIPMENT: Case CX210 Trackhoe

EXCAVATOR NAME/COMPANY: J. Toepel/Wayne Carmint Landscaping

WATER DEPTH: Dry TIME: 0.25 hr DATE: 6/17/2016

CHECKED BY: P. McNamara DATE: 6/28/2016

WATER DEPTH: Dry TIME: 5.00 hrs DATE: 6/17/2016

| DEPTH (FT) | USCS  | ** H <sub>2</sub> O CONTENT | GRAPHIC LOG                                                                        | DESCRIPTION                                                                                 | REMARKS                                                                                                         |
|------------|-------|-----------------------------|------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|
|            |       |                             |                                                                                    | DEPTH<br>ELEVATION                                                                          |                                                                                                                 |
| 0.2        |       |                             |                                                                                    | 0.2 Topsoil (2") 438.0                                                                      |                                                                                                                 |
|            | ml    | d/m                         |   | Sandy silt; trace gravel, roots, cobbles; brown (FILL I)                                    | Loose; dry to moist; easy excavating                                                                            |
| 1.0        |       |                             |                                                                                    | 1.0 437.2                                                                                   |                                                                                                                 |
|            |       |                             |                                                                                    | Sandy silt to silty sand; trace gravel, mica; orange brown, brown, gray (Decomposed Gneiss) | Loose to medium dense; moist; easy excavating                                                                   |
|            | ml/sm | m                           |  |                                                                                             |                                                                                                                 |
| 6.0        |       |                             |                                                                                    | 6.0 432.2                                                                                   | End of test pit at 6.0'                                                                                         |
|            |       |                             |                                                                                    |                                                                                             | LIMITING ZONES: None encountered;<br>Infiltration test situated at 1.2' below existing grade (elevation 437.0') |

\*\* D = DRY, M = MOIST, W = WET





**EARTH  
ENGINEERING  
INCORPORATED**  
*Geotechnical Engineers & Geologists*

# TEST PIT LOG

|                       |         |
|-----------------------|---------|
| PIT NO.:              | TP-205  |
| SHEET:                | 1 OF 1  |
| START DATE:           | 6/14/16 |
| END DATE:             | 6/14/16 |
| SURFACE<br>ELEV. (FT) | 435.1   |

PROJECT NAME: Byers Station 5C

PROJECT LOCATION: Upper Uwchlan Township, Chester County, Pennsylvania

PROJECT NUMBER: 28272.01

INSPECTOR NAME: C. Ardizzi

EQUIPMENT: Case CX210 Trackhoe

EXCAVATOR NAME/COMPANY: J. Toepel/Wayne Carmint Landscaping

WATER DEPTH: Dry TIME: 0.25 hr DATE: 6/14/2016

CHECKED BY: P. McNamara DATE: 6/28/2016

WATER DEPTH: Dry TIME: 4.50 hrs DATE: 6/14/2016

| DEPTH (FT) | USCS  | ** H <sub>2</sub> O CONTENT | GRAPHIC LOG | DESCRIPTION                                                                               | REMARKS                                                                                                         |
|------------|-------|-----------------------------|-------------|-------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|
|            |       |                             |             | DEPTH<br>ELEVATION                                                                        |                                                                                                                 |
| 0.3        |       |                             |             | 0.3 Topsoil (3") 434.8                                                                    |                                                                                                                 |
|            |       |                             |             | Sandy silt to silty sand; trace gravel, roots, cobbles, organics; brown (FILL I)          | Loose to medium dense; dry to moist; easy excavating                                                            |
|            | ml/sm | d/m                         |             |                                                                                           |                                                                                                                 |
| 3.5        |       |                             |             | 3.5 431.6                                                                                 |                                                                                                                 |
|            |       |                             |             | Sandy silt to silty sand; trace clay, gravel; orange brown, red brown (Decomposed Gneiss) | Medium dense; moist; easy to moderate excavating                                                                |
|            | ml/sm | m                           |             |                                                                                           |                                                                                                                 |
| 12.0       |       |                             |             | 12.0 423.1                                                                                |                                                                                                                 |
|            |       |                             |             |                                                                                           | End of test pit at 12.0'                                                                                        |
|            |       |                             |             |                                                                                           | LIMITING ZONES: None encountered;<br>Infiltration test situated at 8.1' below existing grade (elevation 427.0') |

\*\* D = DRY, M = MOIST, W = WET



**EARTH  
ENGINEERING  
INCORPORATED**  
*Geotechnical Engineers & Geologists*

# TEST PIT LOG

|                       |         |
|-----------------------|---------|
| PIT NO.:              | TP-206  |
| SHEET:                | 1 OF 1  |
| START DATE:           | 6/14/16 |
| END DATE:             | 6/14/16 |
| SURFACE<br>ELEV. (FT) | 432.8   |

PROJECT NAME: Byers Station 5C

PROJECT LOCATION: Upper Uwchlan Township, Chester County, Pennsylvania

PROJECT NUMBER: 28272.01

INSPECTOR NAME: C. Ardizzi

EQUIPMENT: Case CX210 Trackhoe

EXCAVATOR NAME/COMPANY: J. Toepel/Wayne Carmint Landscaping

WATER DEPTH: Dry TIME: 0.25 hr DATE: 6/14/2016

CHECKED BY: P. McNamara DATE: 6/28/2016 WATER DEPTH: Dry TIME: 3.50 hrs DATE: 6/14/2016

| DEPTH (FT) | USCS  | H <sub>2</sub> O CONTENT<br>** | GRAPHIC LOG | DEPTH | ELEVATION | DESCRIPTION                                                                                        | REMARKS                                                                                                                            |
|------------|-------|--------------------------------|-------------|-------|-----------|----------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|
| 0.4        |       |                                |             | 0.4   | 432.4     | Topsoil (5")                                                                                       |                                                                                                                                    |
|            | ml/sm | d/m                            |             |       |           | Sandy silt to silty sand; trace gravel, roots, organics, glass; brown (FILL I)                     | Loose to medium dense; dry to moist; easy excavating                                                                               |
| 3.5        |       |                                |             | 3.5   | 429.3     | Sandy silt to silty sand; trace gravel; orange brown, red brown, gray (Decomposed Gneiss)          | Medium dense; moist; easy to moderate excavating                                                                                   |
|            | ml/sm | m                              |             |       |           |                                                                                                    |                                                                                                                                    |
| 8.0        |       |                                |             | 8.0   | 424.8     | Silty sand; some gravel, cobbles; trace boulders; saprolitic; brown, dark brown (Weathered Gneiss) | Very dense; dry to moist; hard excavating                                                                                          |
|            | sm    | d/m                            |             |       |           |                                                                                                    |                                                                                                                                    |
| 10.0       |       |                                |             | 10.0  | 422.8     |                                                                                                    | End of test pit at 10.0'                                                                                                           |
|            |       |                                |             |       |           |                                                                                                    | LIMITING ZONES: Very dense weathered rock 8.0' - 10.0'; Infiltration test situated at 5.8' below existing grade (elevation 427.0') |

\*\* D = DRY, M = MOIST, W = WET



**EARTH  
ENGINEERING  
INCORPORATED**  
*Geotechnical Engineers & Geologists*

# TEST PIT LOG

|                       |                      |
|-----------------------|----------------------|
| PIT NO.:              | <b>TP-207</b>        |
| SHEET:                | <b>1</b> OF <b>1</b> |
| START DATE:           | <b>6/15/16</b>       |
| END DATE:             | <b>6/15/16</b>       |
| SURFACE<br>ELEV. (FT) | <b>424.1</b>         |

PROJECT NAME: Byers Station 5C

PROJECT LOCATION: Upper Uwchlan Township, Chester County, Pennsylvania

PROJECT NUMBER: 28272.01

INSPECTOR NAME: C. Ardizzi

EQUIPMENT: Case CX210 Trackhoe

EXCAVATOR NAME/COMPANY: J. Toepel/Wayne Carmint Landscaping

WATER DEPTH: Dry TIME: 0.25 hr DATE: 6/15/2016

CHECKED BY: P. McNamara DATE: 6/28/2016

WATER DEPTH: Dry TIME: 3.00 hrs DATE: 6/15/2016

| DEPTH (FT) | USCS  | ** H <sub>2</sub> O CONTENT | GRAPHIC LOG | DESCRIPTION                                                                                                           | REMARKS                                                                                                            |
|------------|-------|-----------------------------|-------------|-----------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|
|            |       |                             |             | DEPTH<br>ELEVATION                                                                                                    |                                                                                                                    |
| 0.2        |       |                             |             | 0.2 Topsoil (2")<br>423.9<br>Sandy silt to silty sand; trace clay, gravel, roots, cobbles,<br>asphalt; brown (FILL I) | Loose to medium dense; moist; easy<br>excavating                                                                   |
|            | ml/sm | m                           |             |                                                                                                                       |                                                                                                                    |
| 3.5        |       |                             |             | 3.5<br>420.6<br>Sandy silt to silty sand; trace gravel, mica; brown, orange brown,<br>red brown (Decomposed Gneiss)   | Medium dense; moist; easy to moderate<br>excavating                                                                |
|            | ml/sm | m                           |             |                                                                                                                       |                                                                                                                    |
| 8.0        |       |                             |             | 8.0<br>416.1                                                                                                          | End of test pit at 8.0'                                                                                            |
|            |       |                             |             |                                                                                                                       | LIMITING ZONES: None encountered;<br>Infiltration test situated at 4.6' below existing<br>grade (elevation 419.5') |

\*\* D = DRY, M = MOIST, W = WET



**EARTH  
ENGINEERING  
INCORPORATED**  
*Geotechnical Engineers & Geologists*

# TEST PIT LOG

|                       |                      |
|-----------------------|----------------------|
| PIT NO.:              | <b>TP-208</b>        |
| SHEET:                | <b>1</b> OF <b>1</b> |
| START DATE:           | <b>6/15/16</b>       |
| END DATE:             | <b>6/15/16</b>       |
| SURFACE<br>ELEV. (FT) | <b>420.8</b>         |

PROJECT NAME: Byers Station 5C

PROJECT LOCATION: Upper Uwchlan Township, Chester County, Pennsylvania

PROJECT NUMBER: 28272.01

INSPECTOR NAME: C. Ardizzi

EQUIPMENT: Case CX210 Trackhoe

EXCAVATOR NAME/COMPANY: J. Toepel/Wayne Carmint Landscaping

CHECKED BY: P. McNamara DATE: 6/28/2016

WATER DEPTH: Dry TIME: 0.25 hr DATE: 6/15/2016

WATER DEPTH: Dry TIME: 4.25 hrs DATE: 6/15/2016

| DEPTH (FT) | USCS  | H <sub>2</sub> O CONTENT<br>** | GRAPHIC LOG | DESCRIPTION                                                                                       | REMARKS                                                                                                                                           |
|------------|-------|--------------------------------|-------------|---------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
|            |       |                                |             | DEPTH<br>ELEVATION                                                                                |                                                                                                                                                   |
| 0.3        |       |                                |             | 0.3 Topsoil (4") 420.5                                                                            |                                                                                                                                                   |
| 1.0        | ml    | m                              |             | 1.0 Clayey silt; some organics; trace gravel, roots, brick; dark gray, dark brown (FILL II) 419.8 | Loose; moist; easy excavating                                                                                                                     |
|            |       |                                |             | Sandy silt to silty sand; trace gravel, mica; brown, orange brown, gray (Decomposed Gneiss)       | Loose to medium dense; moist; easy excavating                                                                                                     |
| 4.0        | ml/sm | m                              |             | 4.0 416.8                                                                                         | End of test pit at 4.0'                                                                                                                           |
|            |       |                                |             |                                                                                                   | LIMITING ZONES: Potentially restrictive FILL II materials 0.3' - 1.0'; Infiltration test situated at 1.3' below existing grade (elevation 419.5') |

\*\* D = DRY, M = MOIST, W = WET



# EARTH ENGINEERING INCORPORATED

*Geotechnical Engineers & Geologists*

## TEST PIT LOG

|                       |         |
|-----------------------|---------|
| PIT NO.:              | TP-209  |
| SHEET:                | 1 OF 1  |
| START DATE:           | 6/15/16 |
| END DATE:             | 6/15/16 |
| SURFACE<br>ELEV. (FT) | 421.0   |

PROJECT NAME: Byers Station 5C

PROJECT LOCATION: Upper Uwchlan Township, Chester County, Pennsylvania

PROJECT NUMBER: 28272.01

INSPECTOR NAME: C. Ardizzi

EQUIPMENT: Case CX210 Trackhoe

EXCAVATOR NAME/COMPANY: J. Toepel/Wayne Carmint Landscaping

CHECKED BY: P. McNamara DATE: 6/28/2016

WATER DEPTH: Dry TIME: 0.25 hr DATE: 6/15/2016

WATER DEPTH: Dry TIME: 5.00 hrs DATE: 6/15/2016

| DEPTH (FT) | USCS | H <sub>2</sub> O CONTENT<br>** | GRAPHIC LOG | DESCRIPTION                                                                                           | REMARKS                                                                                                                                           |
|------------|------|--------------------------------|-------------|-------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
|            |      |                                |             | DEPTH<br>ELEVATION                                                                                    |                                                                                                                                                   |
| 0.4        |      |                                |             | 0.4 Topsoil (5") 420.6                                                                                |                                                                                                                                                   |
|            | ml   | m                              |             | Clayey silt to sandy silt; some organics; trace gravel, roots, brick; dark gray, dark brown (FILL II) | Loose; moist; easy excavating                                                                                                                     |
| 1.5        |      |                                |             | 1.5 419.5                                                                                             |                                                                                                                                                   |
|            | ml   | m                              |             | Sandy silt; trace clay, gravel; orange brown, red brown, gray (Decomposed Gneiss)                     | Loose to medium dense; moist; easy excavating                                                                                                     |
| 4.0        |      |                                |             | 4.0 417.0                                                                                             |                                                                                                                                                   |
|            |      |                                |             |                                                                                                       | End of test pit at 4.0'                                                                                                                           |
|            |      |                                |             |                                                                                                       | LIMITING ZONES: Potentially restrictive FILL II materials 0.4' - 1.5'; Infiltration test situated at 1.5' below existing grade (elevation 419.5') |

\*\* D = DRY, M = MOIST, W = WET



**EARTH  
ENGINEERING  
INCORPORATED**  
*Geotechnical Engineers & Geologists*

# TEST PIT LOG

|                       |         |
|-----------------------|---------|
| PIT NO.:              | TP-210  |
| SHEET:                | 1 OF 1  |
| START DATE:           | 6/16/16 |
| END DATE:             | 6/16/16 |
| SURFACE<br>ELEV. (FT) | 455.3   |

PROJECT NAME: Byers Station 5C

PROJECT LOCATION: Upper Uwchlan Township, Chester County, Pennsylvania

PROJECT NUMBER: 28272.01

INSPECTOR NAME: C. Ardizzi

EQUIPMENT: Case CX210 Trackhoe

EXCAVATOR NAME/COMPANY: J. Toepel/Wayne Carmint Landscaping

WATER DEPTH: Dry TIME: 0.25 hr DATE: 6/16/2016

CHECKED BY: P. McNamara DATE: 6/28/2016 WATER DEPTH: Dry TIME: 3.50 hrs DATE: 6/16/2016

| DEPTH (FT) | USCS  | ** H <sub>2</sub> O CONTENT | GRAPHIC LOG | DESCRIPTION                                                                   | REMARKS                                                                                                                            |
|------------|-------|-----------------------------|-------------|-------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|
|            |       |                             |             | DEPTH<br>ELEVATION                                                            |                                                                                                                                    |
| 0.2        |       |                             |             | 0.2 Topsoil (2") 455.1                                                        |                                                                                                                                    |
| 0.8        | ml/sm | d/m                         |             | 0.8 Sandy silt; trace gravel, roots, organics; brown, gray (FILL I) 454.5     | Loose; dry to moist; easy excavating                                                                                               |
|            | sm    | m                           |             | Silty sand; trace gravel, mica; orange brown, brown, gray (Decomposed Gneiss) | Medium dense; moist; easy to moderate excavating                                                                                   |
| 7.0        |       |                             |             | 7.0 448.3                                                                     |                                                                                                                                    |
|            | sm    | d/m                         |             | Silty sand; some gravel, cobbles; saprolitic; brown, gray (Weathered Gneiss)  | Very dense; dry to moist; hard excavating                                                                                          |
| 10.0       |       |                             |             | 10.0 445.3                                                                    |                                                                                                                                    |
|            |       |                             |             |                                                                               | End of test pit at 10.0'                                                                                                           |
|            |       |                             |             |                                                                               | LIMITING ZONES: Very dense weathered rock 7.0' - 10.0'; Infiltration test situated at 4.8' below existing grade (elevation 450.5') |

\*\* D = DRY, M = MOIST, W = WET



**EARTH  
ENGINEERING  
INCORPORATED**  
*Geotechnical Engineers & Geologists*

# TEST PIT LOG

|                       |                      |
|-----------------------|----------------------|
| PIT NO.:              | <b>TP-211</b>        |
| SHEET:                | <b>1</b> OF <b>1</b> |
| START DATE:           | <b>6/14/16</b>       |
| END DATE:             | <b>6/14/16</b>       |
| SURFACE<br>ELEV. (FT) | <b>440.1</b>         |

PROJECT NAME: Byers Station 5C

PROJECT LOCATION: Upper Uwchlan Township, Chester County, Pennsylvania

PROJECT NUMBER: 28272.01

INSPECTOR NAME: C. Ardizzi

EQUIPMENT: Case CX210 Trackhoe

EXCAVATOR NAME/COMPANY: J. Toepel/Wayne Carmint Landscaping

WATER DEPTH: Dry TIME: 0.25 hr DATE: 6/14/2016

CHECKED BY: P. McNamara DATE: 6/28/2016

WATER DEPTH: Dry TIME: 3.75 hrs DATE: 6/14/2016

| DEPTH (FT) | USCS  | ** H <sub>2</sub> O CONTENT | GRAPHIC LOG | DESCRIPTION                                                                                                                                | REMARKS                                                                                                         |
|------------|-------|-----------------------------|-------------|--------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|
| 0.2        |       |                             |             | DEPTH ELEVATION<br>0.2 Topsoil (2") 439.9<br>Sandy silt to silty sand; trace gravel, roots, cobbles, plastic; brown, orange brown (FILL I) | Loose to medium dense; moist; easy excavating                                                                   |
| 4.0        | ml/sm | m                           |             | 4.0 436.1<br>Sandy silt; trace gravel, clay; orange brown, red brown, gray (Decomposed Gneiss)                                             | Loose to medium dense; moist; easy to moderate excavating                                                       |
| 7.5        | ml    | m                           |             | 7.5 432.6<br>End of test pit at 7.5'                                                                                                       | LIMITING ZONES: None encountered;<br>Infiltration test situated at 3.3' below existing grade (elevation 436.8') |

\*\* D = DRY, M = MOIST, W = WET



**EARTH  
ENGINEERING  
INCORPORATED**  
*Geotechnical Engineers & Geologists*

# TEST PIT LOG

|                       |                      |
|-----------------------|----------------------|
| PIT NO.:              | <b>TP-212</b>        |
| SHEET:                | <b>1</b> OF <b>1</b> |
| START DATE:           | <b>6/14/16</b>       |
| END DATE:             | <b>6/14/16</b>       |
| SURFACE<br>ELEV. (FT) | <b>443.3</b>         |

PROJECT NAME: Byers Station 5C

PROJECT LOCATION: Upper Uwchlan Township, Chester County, Pennsylvania

PROJECT NUMBER: 28272.01

INSPECTOR NAME: C. Ardizzi

EQUIPMENT: Case CX210 Trackhoe

EXCAVATOR NAME/COMPANY: J. Toepel/Wayne Carmint Landscaping

WATER DEPTH: Dry TIME: 0.25 hr DATE: 6/14/2016

CHECKED BY: P. McNamara DATE: 6/28/2016

WATER DEPTH: Dry TIME: 4.50 hrs DATE: 6/14/2016

| DEPTH (FT) | USCS  | ** H <sub>2</sub> O CONTENT | GRAPHIC LOG | DESCRIPTION                                                                                                | REMARKS                                                                                                         |
|------------|-------|-----------------------------|-------------|------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|
|            |       |                             |             | DEPTH<br>ELEVATION                                                                                         |                                                                                                                 |
| 0.3        |       |                             |             | 0.3 Topsoil (3")<br>443.0<br>Sandy silt to silty sand; trace gravel, organics, cobbles; brown (FILL I)     | Loose to medium dense; dry to moist; easy excavating                                                            |
|            | ml/sm | d/m                         |             |                                                                                                            |                                                                                                                 |
| 3.3        |       |                             |             | 3.3<br>440.0<br>Sandy silt to silty sand; trace gravel; orange brown, brown, red brown (Decomposed Gneiss) | Loose to medium dense; moist; easy to moderate excavating                                                       |
|            | ml/sm | m                           |             |                                                                                                            |                                                                                                                 |
| 6.5        |       |                             |             | 6.5<br>436.8                                                                                               | End of test pit at 6.5'                                                                                         |
|            |       |                             |             |                                                                                                            | LIMITING ZONES: None encountered;<br>Infiltration test situated at 2.5' below existing grade (elevation 440.8') |

\*\* D = DRY, M = MOIST, W = WET





**EARTH  
ENGINEERING  
INCORPORATED**  
*Geotechnical Engineers & Geologists*

# TEST PIT LOG

|                       |                      |
|-----------------------|----------------------|
| PIT NO.:              | <b>TP-213</b>        |
| SHEET:                | <b>1</b> OF <b>1</b> |
| START DATE:           | <b>6/16/16</b>       |
| END DATE:             | <b>6/16/16</b>       |
| SURFACE<br>ELEV. (FT) | <b>450.8</b>         |

PROJECT NAME: Byers Station 5C

PROJECT LOCATION: Upper Uwchlan Township, Chester County, Pennsylvania

PROJECT NUMBER: 28272.01

INSPECTOR NAME: C. Ardizzi

EQUIPMENT: Case CX210 Trackhoe

EXCAVATOR NAME/COMPANY: J. Toepel/Wayne Carmint Landscaping

WATER DEPTH: Dry TIME: 0.25 hr DATE: 6/16/2016

CHECKED BY: P. McNamara DATE: 6/28/2016

WATER DEPTH: Dry TIME: 3.50 hrs DATE: 6/16/2016

| DEPTH (FT) | USCS | ** H <sub>2</sub> O CONTENT | GRAPHIC LOG | DESCRIPTION                                                                                                 | REMARKS                                                                                                                                                     |
|------------|------|-----------------------------|-------------|-------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
|            |      |                             |             | DEPTH<br>ELEVATION                                                                                          |                                                                                                                                                             |
| 0.3        |      |                             |             | 0.3 Topsoil (3")<br>Sandy silt to silty sand; trace gravel, roots, organics, brick;<br>brown, gray (FILL I) | 450.5<br>Loose to medium dense; moist; easy excavating                                                                                                      |
| 7.5        |      |                             |             | 7.5 Remnant topsoil                                                                                         | 443.3                                                                                                                                                       |
| 8.0        |      |                             |             | 8.0 Sandy silt to silty sand; trace gravel, mica; tan, orange brown,<br>red brown, gray (Decomposed Gneiss) | 442.8<br>Medium dense; moist; easy to moderate excavating                                                                                                   |
| 11.0       |      |                             |             | 11.0                                                                                                        | 439.8<br>End of test pit at 11.0'<br><br>LIMITING ZONES: None encountered;<br>Infiltration test situated at 6.0' below existing<br>grade (elevation 444.8') |

\*\* D = DRY, M = MOIST, W = WET



**EARTH  
ENGINEERING  
INCORPORATED**  
*Geotechnical Engineers & Geologists*

# TEST PIT LOG

|                       |                      |
|-----------------------|----------------------|
| PIT NO.:              | <b>TP-214</b>        |
| SHEET:                | <b>1</b> OF <b>1</b> |
| START DATE:           | <b>6/16/16</b>       |
| END DATE:             | <b>6/16/16</b>       |
| SURFACE<br>ELEV. (FT) | <b>443.5</b>         |

PROJECT NAME: Byers Station 5C

PROJECT LOCATION: Upper Uwchlan Township, Chester County, Pennsylvania

PROJECT NUMBER: 28272.01

INSPECTOR NAME: C. Ardizzi

EQUIPMENT: Case CX210 Trackhoe

EXCAVATOR NAME/COMPANY: J. Toepel/Wayne Carmint Landscaping

WATER DEPTH: Dry TIME: 0.25 hr DATE: 6/16/2016

CHECKED BY: P. McNamara DATE: 6/28/2016 WATER DEPTH: Dry TIME: 4.00 hrs DATE: 6/16/2016

| DEPTH (FT) | USCS  | ** H <sub>2</sub> O CONTENT | GRAPHIC LOG | DESCRIPTION                                                                                                          | REMARKS                                                                                                            |
|------------|-------|-----------------------------|-------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|
|            |       |                             |             | DEPTH<br>ELEVATION                                                                                                   |                                                                                                                    |
| 0.2        |       |                             |             | 0.2 Topsoil (2")<br>443.3<br>Sandy silt to silty sand; trace gravel, roots, concrete, cobbles;<br>brown (FILL I)     | Loose to medium dense; moist; easy excavating                                                                      |
| 2.5        | ml/sm | m                           |             | 2.5<br>441.0<br>Sandy silt to silty sand; trace gravel, mica; orange brown, brown,<br>dark brown (Decomposed Gneiss) | Medium dense; moist; easy to moderate excavating                                                                   |
| 5.0        | ml/sm | m                           |             | 5.0<br>438.5                                                                                                         | End of test pit at 5.0'                                                                                            |
|            |       |                             |             |                                                                                                                      | LIMITING ZONES: None encountered;<br>Infiltration test situated at 0.5' below existing<br>grade (elevation 443.0') |

\*\* D = DRY, M = MOIST, W = WET



# TEST PIT LOG

PIT NO.: TP-215  
SHEET: 1 OF 1  
START DATE: 6/16/16  
END DATE: 6/16/16  
SURFACE  
ELEV. (FT) 449.0

PROJECT LOCATION: Upper Uwchlan Township, Chester County, Pennsylvania

INSPECTOR NAME: C. Ardizzi

EXCAVATOR NAME/COMPANY: J. Toepel/Wayne Carmint Landscaping

WATER DEPTH: Dry TIME: 0.25 hr DATE: 6/16/2016

CHECKED BY: P. McNamara    DATE: 6/28/2016    WATER DEPTH: Dry    TIME: 4.50 hrs    DATE: 6/16/2016

| DEPTH (FT) | USCS  | H <sub>2</sub> O CONTENT<br>** | GRAPHIC LOG | DESCRIPTION                                                                     | REMARKS                                                                                                                                           |
|------------|-------|--------------------------------|-------------|---------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| 0.0        |       |                                |             | DEPTH                                                                           | ELEVATION                                                                                                                                         |
| 0.0        |       |                                |             | Sandy silt to silty sand; trace gravel, organics, cobbles; brown, gray (FILL I) | Loose to medium dense; moist; easy excavating                                                                                                     |
| 4.0        | ml/sm | m                              |             | 4.0                                                                             | 445.0                                                                                                                                             |
| 4.0        |       |                                |             | Sandy silt; some organics; trace clay, gravel, roots; dark gray (FILL II)       | Loose; moist; easy excavating                                                                                                                     |
| 8.0        | ml    | m                              |             | 8.0                                                                             | 441.0                                                                                                                                             |
| 8.0        |       |                                |             |                                                                                 | End of test pit at 8.0'                                                                                                                           |
|            |       |                                |             |                                                                                 | LIMITING ZONES: Potentially restrictive FILL II materials 4.0' - 8.0'; Infiltration test situated at 3.0' below existing grade (elevation 446.0') |

\* D = DRY, M = MOIST, W = WET



**EARTH  
ENGINEERING  
INCORPORATED**  
*Geotechnical Engineers & Geologists*

# TEST PIT LOG

|                       |                      |
|-----------------------|----------------------|
| PIT NO.:              | <b>TP-216</b>        |
| SHEET:                | <b>1</b> OF <b>1</b> |
| START DATE:           | <b>6/15/16</b>       |
| END DATE:             | <b>6/15/16</b>       |
| SURFACE<br>ELEV. (FT) | <b>438.3</b>         |

PROJECT NAME: Byers Station 5C

PROJECT LOCATION: Upper Uwchlan Township, Chester County, Pennsylvania

PROJECT NUMBER: 28272.01

INSPECTOR NAME: C. Ardizzi

EQUIPMENT: Case CX210 Trackhoe

EXCAVATOR NAME/COMPANY: J. Toepel/Wayne Carmint Landscaping

WATER DEPTH: Dry TIME: 0.25 hr DATE: 6/15/2016

CHECKED BY: P. McNamara DATE: 6/28/2016

WATER DEPTH: Dry TIME: 4.50 hrs DATE: 6/15/2016

| DEPTH (FT) | USCS  | ** H <sub>2</sub> O CONTENT | GRAPHIC LOG | DESCRIPTION                                                                                                        | REMARKS                                                                                                         |
|------------|-------|-----------------------------|-------------|--------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|
|            |       |                             |             | DEPTH<br>ELEVATION                                                                                                 |                                                                                                                 |
| 0.2        |       |                             |             | 0.2 Topsoil (2")<br>438.1<br>Sandy silt to silty sand; trace gravel, roots, plastic, crushed stone; brown (FILL I) | Loose; dry to moist; easy excavating                                                                            |
|            | ml/sm | d/m                         |             |                                                                                                                    |                                                                                                                 |
| 4.0        |       |                             |             | 4.0<br>434.3<br>Silty sand; trace gravel; tan, brown, orange brown, gray (Decomposed Gneiss)                       | Medium dense; dry to moist; easy to moderate excavating                                                         |
|            | sm    | d/m                         |             |                                                                                                                    |                                                                                                                 |
| 10.5       |       |                             |             | 10.5<br>427.8                                                                                                      | End of test pit at 10.5'                                                                                        |
|            |       |                             |             |                                                                                                                    | LIMITING ZONES: None encountered;<br>Infiltration test situated at 6.3' below existing grade (elevation 432.0') |

\*\* D = DRY, M = MOIST, W = WET



**EARTH  
ENGINEERING  
INCORPORATED**  
*Geotechnical Engineers & Geologists*

# TEST PIT LOG

|                       |                      |
|-----------------------|----------------------|
| PIT NO.:              | <b>TP-218</b>        |
| SHEET:                | <b>1</b> OF <b>1</b> |
| START DATE:           | <b>6/15/16</b>       |
| END DATE:             | <b>6/15/16</b>       |
| SURFACE<br>ELEV. (FT) | <b>430.1</b>         |

PROJECT NAME: Byers Station 5C

PROJECT LOCATION: Upper Uwchlan Township, Chester County, Pennsylvania

PROJECT NUMBER: 28272.01

INSPECTOR NAME: C. Ardizzi

EQUIPMENT: Case CX210 Trackhoe

EXCAVATOR NAME/COMPANY: J. Toepel/Wayne Carmint Landscaping

WATER DEPTH: Dry TIME: 0.25 hr DATE: 6/15/2016

CHECKED BY: P. McNamara DATE: 6/28/2016

WATER DEPTH: Dry TIME: 3.75 hrs DATE: 6/15/2016

| DEPTH (FT) | USCS  | H <sub>2</sub> O CONTENT<br>** | GRAPHIC LOG                                                                        | DESCRIPTION                                                                                        | REMARKS                                                                                                                                           |
|------------|-------|--------------------------------|------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
|            |       |                                |                                                                                    | DEPTH<br>ELEVATION                                                                                 |                                                                                                                                                   |
| 0.2        |       |                                |                                                                                    | 0.2 Topsoil (2")<br>429.9                                                                          |                                                                                                                                                   |
|            | ml/sm | d/m                            |   | Sandy silt to silty sand; trace gravel, roots, cobbles; brown (FILL I)                             | Loose to medium dense; dry to moist; easy excavating                                                                                              |
| 1.5        |       |                                |                                                                                    | 1.5<br>428.6                                                                                       |                                                                                                                                                   |
|            | ml    | m                              |   | Sandy silt; some organics; trace clay, gravel, wood, brick; gray, dark gray (FILL II)              | Loose; moist; easy excavating                                                                                                                     |
| 3.3        |       |                                |                                                                                    | 3.3<br>426.8                                                                                       |                                                                                                                                                   |
|            | ml/sm | m                              |  | Sandy silt to silty sand; trace gravel, mica; brown, orange brown, gray, white (Decomposed Gneiss) | Medium dense; moist; easy to moderate excavating                                                                                                  |
| 10.0       |       |                                |                                                                                    | 10.0<br>420.1                                                                                      |                                                                                                                                                   |
|            |       |                                |                                                                                    |                                                                                                    | End of test pit at 10.0'                                                                                                                          |
|            |       |                                |                                                                                    |                                                                                                    | LIMITING ZONES: Potentially restrictive FILL II materials 1.5' - 3.3'; Infiltration test situated at 5.6' below existing grade (elevation 424.5') |

\*\* D = DRY, M = MOIST, W = WET



**EARTH  
ENGINEERING  
INCORPORATED**  
*Geotechnical Engineers & Geologists*

# TEST PIT LOG

|                       |                      |
|-----------------------|----------------------|
| PIT NO.:              | <b>TP-221</b>        |
| SHEET:                | <b>1</b> OF <b>1</b> |
| START DATE:           | <b>6/16/16</b>       |
| END DATE:             | <b>6/16/16</b>       |
| SURFACE<br>ELEV. (FT) | <b>445.6</b>         |

PROJECT NAME: Byers Station 5C

PROJECT LOCATION: Upper Uwchlan Township, Chester County, Pennsylvania

PROJECT NUMBER: 28272.01

INSPECTOR NAME: C. Ardizzi

EQUIPMENT: Case CX210 Trackhoe

EXCAVATOR NAME/COMPANY: J. Toepel/Wayne Carmint Landscaping

WATER DEPTH: Dry TIME: 0.25 hr DATE: 6/16/2016

CHECKED BY: P. McNamara DATE: 6/28/2016 WATER DEPTH: Dry TIME: 4.25 hrs DATE: 6/16/2016

| DEPTH (FT) | USCS  | H <sub>2</sub> O CONTENT<br>** | GRAPHIC LOG | DEPTH<br>ELEVATION | DESCRIPTION                                                                              | REMARKS                                                                                                                            |
|------------|-------|--------------------------------|-------------|--------------------|------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|
| 0.2        |       |                                |             | 0.2 445.4          | Topsoil (2")                                                                             |                                                                                                                                    |
|            | ml/sm | m                              |             |                    | Sandy silt; trace gravel, roots, organics; brown (FILL I)                                | Loose; moist; easy excavating                                                                                                      |
| 1.0        |       |                                |             | 1.0 444.6          |                                                                                          |                                                                                                                                    |
|            | ml/sm | m                              |             |                    | Sandy silt to silty sand; trace gravel; orange brown, brown, gray (Decomposed Gneiss)    | Medium dense; moist; easy to moderate excavating                                                                                   |
| 4.3        |       |                                |             | 4.3 441.3          |                                                                                          |                                                                                                                                    |
|            | sm    | d/m                            |             |                    | Silty sand; some gravel, cobbles; saprolitic; brown, dark brown, gray (Weathered Gneiss) | Very dense; dry to moist; hard excavating                                                                                          |
| 11.0       |       |                                |             | 11.0 434.6         |                                                                                          |                                                                                                                                    |
|            |       |                                |             |                    |                                                                                          | End of test pit at 11.0'                                                                                                           |
|            |       |                                |             |                    |                                                                                          | LIMITING ZONES: Very dense weathered rock 4.3' - 11.0'; Infiltration test situated at 2.1' below existing grade (elevation 443.5') |

\*\* D = DRY, M = MOIST, W = WET

# BORING LOG

|                       |                      |
|-----------------------|----------------------|
| BORING NO.            | <b>B-202</b>         |
| SHEET                 | <b>1</b> OF <b>1</b> |
| DATE: START           | <b>6/20/16</b>       |
| END                   | <b>6/20/16</b>       |
| SURFACE<br>ELEV. (FT) | <b>461.3</b>         |

PROJECT NAME Byers Station 5C PROJECT LOCATION Upper Uwchlan Township, Chester County, Pennsylvania  
 PROJECT NUMBER 28272.01 INSPECTOR NAME C. Ardizzi  
 EQUIPMENT USED Acker Soil XLS ATV-Mounted Drill Rig DRILLER NAME/COMPANY R. Crum/TRC  
 DRILLING METHODS 2.0" O.D. split spoon sampling - 5.0' interval sampling 0.0' - 5.0' / Continuous sampling 5.0' - 25.0'  
 AUGER: SIZE: 3.25" I.D. HSA ; TOTAL DEPTH: 25.0' ; WATER: DEPTH: \*24.3 TIME: 0.25 hr DATE: 6/20/2016  
 CHECKED BY: P. McNamara ; DATE: 6/28/2016 DEPTH: 23.7' TIME: 4.00 hrs DATE: 6/20/2016  
 NOT ENCOUNTERED ☐

| DEPTH (FT) | SAMPLE NO./<br>TYPE/CORE RUN | BLOWS/0.5 FT.<br>ON SAMPLER | RECOVERY<br>(Ft.) | RECOVERY (%) | USCS<br>RQD (%) | AASHTO | H <sub>2</sub> O CONTENT | GRAPHIC LOG | DESCRIPTION                                                             | REMARKS                                                                                                                                                                   |
|------------|------------------------------|-----------------------------|-------------------|--------------|-----------------|--------|--------------------------|-------------|-------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0.0        |                              | 4                           |                   |              |                 | ml/sm  |                          |             | DEPTH ELEVATION                                                         |                                                                                                                                                                           |
|            | S-1                          | 3                           | 1.6'              | -            |                 | d/m    |                          |             | Sandy silt to silty sand; trace gravel, roots, concrete; brown (FILL I) | Easy drilling 0.0' - 23.0'                                                                                                                                                |
| 2.0        |                              | 4                           |                   |              |                 |        |                          |             |                                                                         |                                                                                                                                                                           |
|            |                              |                             |                   |              |                 |        |                          |             |                                                                         |                                                                                                                                                                           |
| 5.0        |                              | 6                           |                   |              |                 | ml     |                          |             |                                                                         |                                                                                                                                                                           |
|            | S-2                          | 5                           | 1.8'              | -            |                 | m      |                          |             | 5.5 455.8                                                               | Clayey silt to sandy silt; some organics; trace gravel, roots, wood, brick; dark gray, brown (FILL II)                                                                    |
| 7.0        |                              | 4                           |                   |              |                 |        |                          |             |                                                                         |                                                                                                                                                                           |
|            | S-3                          | 6                           | 1.6'              | -            |                 | m      |                          |             |                                                                         |                                                                                                                                                                           |
| 9.0        |                              | 5                           |                   |              |                 |        |                          |             |                                                                         |                                                                                                                                                                           |
|            | S-4                          | 4                           | 1.8'              | -            |                 | m      |                          |             |                                                                         |                                                                                                                                                                           |
| 11.0       |                              | 3                           |                   |              |                 |        |                          |             |                                                                         |                                                                                                                                                                           |
|            | S-5                          | 7                           | 1.5'              | -            |                 | m      |                          |             |                                                                         |                                                                                                                                                                           |
| 13.0       |                              | 6                           |                   |              |                 |        |                          |             |                                                                         |                                                                                                                                                                           |
|            | S-6                          | 4                           | 1.3'              | -            |                 | m      |                          |             |                                                                         |                                                                                                                                                                           |
| 15.0       |                              | 4                           |                   |              |                 |        |                          |             |                                                                         |                                                                                                                                                                           |
|            | S-7                          | 2                           | 1.6'              | -            |                 | m      |                          |             |                                                                         |                                                                                                                                                                           |
| 17.0       |                              | 2                           |                   |              |                 |        |                          |             |                                                                         |                                                                                                                                                                           |
|            | S-8                          | 5                           | 1.8'              | -            |                 | m      |                          |             |                                                                         | *Temporary groundwater monitoring well installed to 25.0'                                                                                                                 |
| 19.0       |                              | 2                           |                   |              |                 |        |                          |             |                                                                         |                                                                                                                                                                           |
|            | S-9                          | 3                           | 1.8'              | -            |                 | m      |                          |             |                                                                         |                                                                                                                                                                           |
| 21.0       |                              | 5                           |                   |              |                 |        |                          |             |                                                                         |                                                                                                                                                                           |
|            | S-10                         | 6                           | 1.8'              | -            |                 | m      |                          |             |                                                                         | LIMITING ZONES: Potentially restrictive FILL II materials 5.5' - 23.5'; Groundwater at 23.7'; Infiltration test situated at 16.3' below existing grade (elevation 445.0') |
| 23.0       |                              | 5                           |                   |              |                 |        |                          |             |                                                                         |                                                                                                                                                                           |
|            | S-11                         | 3                           | 1.5'              | -            |                 | m/w    |                          |             | 23.5 437.8                                                              |                                                                                                                                                                           |
| 25.0       |                              | 5                           |                   |              |                 |        |                          |             | 25.0 436.3                                                              | End of boring at 25.0'                                                                                                                                                    |
|            |                              | 9                           |                   |              |                 |        |                          |             |                                                                         |                                                                                                                                                                           |

\*\* D = DRY, M = MOIST, W = WET



**EARTH  
ENGINEERING  
INCORPORATED**  
*Geotechnical Engineers & Geologists*

# BORING LOG

|                       |                      |
|-----------------------|----------------------|
| BORING NO.            | <b>B-217</b>         |
| SHEET                 | <b>1</b> OF <b>1</b> |
| DATE: START           | <b>6/21/16</b>       |
| END                   | <b>6/21/16</b>       |
| SURFACE<br>ELEV. (FT) | <b>434.5</b>         |

PROJECT NAME **Byers Station 5C**

PROJECT LOCATION **Upper Uwchlan Township, Chester County, Pennsylvania**

PROJECT NUMBER **28272.01**

INSPECTOR NAME **C. Ardizzi**

EQUIPMENT USED **Acker Soil XLS ATV-Mounted Drill Rig**

DRILLER NAME/COMPANY **R. Crum/TRC**

DRILLING METHODS **2.0" O.D. split spoon sampling - Continuous sampling 0.0' - 14.0'**

AUGER: SIZE: **3.25" I.D. HSA** ; TOTAL DEPTH: **14.0'** ; WATER: DEPTH: **Dry** TIME: **0.25 hr** DATE: **6/21/2016**

CHECKED BY: **P. McNamara** ; DATE: **6/28/2016** DEPTH: **Dry** TIME: **3.75 hrs** DATE: **6/21/2016**

NOT ENCOUNTERED ☐

| DEPTH (FT) | SAMPLE NO./<br>TYPE/CORE RUN | BLOWS/0.5 FT.<br>ON SAMPLER | RECOVERY<br>(FT) | RECOVERY (%) | USCS<br>AASHTO | H <sub>2</sub> O CONTENT | GRAPHIC LOG                                                                         | DESCRIPTION                                                                                      | REMARKS                                                                                                             |
|------------|------------------------------|-----------------------------|------------------|--------------|----------------|--------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|
| 0.0        | S-1                          | 10<br>8<br>9<br>10          | 1.7'             | -            | ml/sm          | d/m                      |    | Sandy silt to silty sand; trace gravel, clay, roots, asphalt; brown, gray, dark brown (FILL I)   | Easy to moderate drilling 0.0' - 4.5'                                                                               |
| 2.0        | S-2                          | 9<br>8<br>8<br>8            | 1.8'             | -            | ml             | m                        |    |                                                                                                  |                                                                                                                     |
| 4.0        | S-3                          | 10<br>5<br>7<br>8           | 1.6'             | -            | ml             | m                        |    | 4.5                                                                                              | 430.0                                                                                                               |
| 6.0        | S-4                          | 9<br>9<br>8<br>10           | 1.8'             | -            | ml/sm          | m                        |    | Sandy silt to silty sand; trace gravel, mica; orange brown, brown, tan, gray (Decomposed Gneiss) | Easy drilling 4.5' - 7.5'                                                                                           |
| 8.0        | S-5                          | 13<br>10<br>11<br>13        | 1.6'             | -            | sm             | m                        |    |                                                                                                  | Moderate drilling 7.5' - 12.0'                                                                                      |
| 10.0       | S-6                          | 13<br>16<br>17<br>18        | 1.4'             | -            | sm             | m                        |    |                                                                                                  |                                                                                                                     |
| 12.0       | S-7                          | 17<br>18<br>13<br>10        | 1.7'             | -            | sm             | m                        |    |                                                                                                  |                                                                                                                     |
| 14.0       |                              |                             |                  |              |                |                          |  | 14.0                                                                                             | 420.5                                                                                                               |
|            |                              |                             |                  |              |                |                          |                                                                                     |                                                                                                  | End of boring at 14.0'                                                                                              |
|            |                              |                             |                  |              |                |                          |                                                                                     |                                                                                                  | LIMITING ZONES: None encountered;<br>Infiltration test situated at 10.0' below<br>existing grade (elevation 424.5') |

\*\* D = DRY, M = MOIST, W = WET



# BORING LOG

|                       |                      |
|-----------------------|----------------------|
| BORING NO.            | <b>B-219</b>         |
| SHEET                 | <b>1</b> OF <b>1</b> |
| DATE: START           | <b>6/21/16</b>       |
| END                   | <b>6/21/16</b>       |
| SURFACE<br>ELEV. (FT) | <b>439.5</b>         |

PROJECT NAME Byers Station 5C PROJECT LOCATION Upper Uwchlan Township, Chester County, Pennsylvania  
 PROJECT NUMBER 28272.01 INSPECTOR NAME C. Ardizzi  
 EQUIPMENT USED Acker Soil XLS ATV-Mounted Drill Rig DRILLER NAME/COMPANY R. Crum/TRC  
 DRILLING METHODS 2.0" O.D. split spoon sampling - 5.0' interval sampling 0.0' - 5.0' / Continuous sampling 5.0' - 19.0'  
 AUGER: SIZE: 3.25" I.D. HSA ; TOTAL DEPTH: 19.0' ; WATER: DEPTH: \*\*Dry TIME: 0.25 hr DATE: 6/21/2016  
 CHECKED BY: P. McNamara ; DATE: 6/28/2016 DEPTH: Dry TIME: 5.00 hrs DATE: 6/21/2016  
 NOT ENCOUNTERED ☐

| DEPTH (FT) | SAMPLE NO./<br>TYPE/CORE RUN | BLOWS/0.5 FT.<br>ON SAMPLER | RECOVERY<br>(Ft.) | RECOVERY (%) | USCS<br>RQD (%) | AASHTO | H <sub>2</sub> O CONTENT | GRAPHIC LOG | DESCRIPTION                                                                                                             | REMARKS                               |
|------------|------------------------------|-----------------------------|-------------------|--------------|-----------------|--------|--------------------------|-------------|-------------------------------------------------------------------------------------------------------------------------|---------------------------------------|
| 0.0        |                              | 8                           |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 1.0        | S-1                          | 10                          | 1.8'              | -            | ml/sm           |        | d/m                      |             | Sandy silt to silty sand; trace gravel, clay, roots; brown, orange brown (FILL I)                                       | Easy to moderate drilling 0.0' - 4.5' |
| 2.0        |                              | 6                           |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 3.0        |                              | 7                           |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 4.0        |                              |                             |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 5.0        |                              |                             |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 6.0        | S-2                          | 6                           | 1.6'              | -            | sm              |        | m                        |             | Sandy silt to silty sand; trace gravel, mica; tan, orange brown, brown, gray, dark brown, red brown (Decomposed Gneiss) | Easy drilling 4.5' - 17.0'            |
| 7.0        |                              | 5                           |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 8.0        | S-3                          | 6                           | 1.8'              | -            | ml/sm           |        | m                        |             |                                                                                                                         |                                       |
| 9.0        |                              | 4                           |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 10.0       | S-4                          | 5                           | 1.7'              | -            | ml/sm           |        | m                        |             |                                                                                                                         |                                       |
| 11.0       |                              | 4                           |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 12.0       | S-5                          | 5                           | 1.5'              | -            | ml/sm           |        | m                        |             |                                                                                                                         |                                       |
| 13.0       |                              | 5                           |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 14.0       | S-6                          | 5                           | 1.4'              | -            | ml              |        | m                        |             |                                                                                                                         |                                       |
| 15.0       |                              | 5                           |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 16.0       | S-7                          | 6                           | 1.6'              | -            | ml/sm           |        | m                        |             |                                                                                                                         |                                       |
| 17.0       |                              | 4                           |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 18.0       | S-8                          | 18                          | 1.4'              | -            | sm              |        | m                        |             |                                                                                                                         |                                       |
| 19.0       |                              | 10                          |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 20.0       |                              | 8                           |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 21.0       |                              | 15                          |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 22.0       |                              |                             |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 23.0       |                              |                             |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 24.0       |                              |                             |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 25.0       |                              |                             |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 26.0       |                              |                             |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 27.0       |                              |                             |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 28.0       |                              |                             |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 29.0       |                              |                             |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 30.0       |                              |                             |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 31.0       |                              |                             |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 32.0       |                              |                             |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 33.0       |                              |                             |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 34.0       |                              |                             |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 35.0       |                              |                             |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 36.0       |                              |                             |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 37.0       |                              |                             |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 38.0       |                              |                             |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 39.0       |                              |                             |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 40.0       |                              |                             |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 41.0       |                              |                             |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 42.0       |                              |                             |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 43.0       |                              |                             |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 44.0       |                              |                             |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 45.0       |                              |                             |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 46.0       |                              |                             |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 47.0       |                              |                             |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 48.0       |                              |                             |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 49.0       |                              |                             |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 50.0       |                              |                             |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 51.0       |                              |                             |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 52.0       |                              |                             |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 53.0       |                              |                             |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 54.0       |                              |                             |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 55.0       |                              |                             |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 56.0       |                              |                             |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 57.0       |                              |                             |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 58.0       |                              |                             |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 59.0       |                              |                             |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 60.0       |                              |                             |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 61.0       |                              |                             |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 62.0       |                              |                             |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 63.0       |                              |                             |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 64.0       |                              |                             |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 65.0       |                              |                             |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 66.0       |                              |                             |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 67.0       |                              |                             |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 68.0       |                              |                             |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 69.0       |                              |                             |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 70.0       |                              |                             |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 71.0       |                              |                             |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 72.0       |                              |                             |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 73.0       |                              |                             |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 74.0       |                              |                             |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 75.0       |                              |                             |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 76.0       |                              |                             |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 77.0       |                              |                             |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 78.0       |                              |                             |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 79.0       |                              |                             |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 80.0       |                              |                             |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 81.0       |                              |                             |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 82.0       |                              |                             |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 83.0       |                              |                             |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 84.0       |                              |                             |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 85.0       |                              |                             |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 86.0       |                              |                             |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 87.0       |                              |                             |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 88.0       |                              |                             |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 89.0       |                              |                             |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 90.0       |                              |                             |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 91.0       |                              |                             |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 92.0       |                              |                             |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 93.0       |                              |                             |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 94.0       |                              |                             |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 95.0       |                              |                             |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 96.0       |                              |                             |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 97.0       |                              |                             |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 98.0       |                              |                             |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 99.0       |                              |                             |                   |              |                 |        |                          |             |                                                                                                                         |                                       |
| 100.0      |                              |                             |                   |              |                 |        |                          |             |                                                                                                                         |                                       |

\*\* D = DRY, M = MOIST, W = WET



# EARTH ENGINEERING INCORPORATED

*Geotechnical Engineers & Geologists*

# BORING LOG

|                    |                      |
|--------------------|----------------------|
| BORING NO.         | <u>B-220</u>         |
| SHEET              | <u>1</u> OF <u>1</u> |
| DATE: START        | <u>6/21/16</u>       |
| END                | <u>6/21/16</u>       |
| SURFACE ELEV. (FT) | <u>434.4</u>         |

PROJECT NAME Byers Station 5C

PROJECT LOCATION Upper Uwchlan Township, Chester County, Pennsylvania

PROJECT NUMBER 28272.01

INSPECTOR NAME C. Ardizzi

EQUIPMENT USED Acker Soil XLS ATV-Mounted Drill Rig

DRILLER NAME/COMPANY R. Crum/TRC

DRILLING METHODS 2.0" O.D. split spoon sampling - Continuous sampling 0.0' - 14.0'

AUGER: SIZE: 3.25" I.D. HSA ; TOTAL DEPTH: 14.0' ; WATER: DEPTH: Dry TIME: 0.25 hr DATE: 6/21/2016

CHECKED BY: P. McNamara ; DATE: 6/28/2016 DEPTH: Dry TIME: 3.50 hrs DATE: 6/21/2016

NOT ENCOUNTERED ☐

| DEPTH (FT) | SAMPLE NO./<br>TYPE/CORE RUN | BLOWS/0.5 FT.<br>ON SAMPLER | RECOVERY<br>(FT) | RECOVERY (%) | USCS<br>AASHTO | H <sub>2</sub> O CONTENT | GRAPHIC LOG | DESCRIPTION                                                                                                        | REMARKS                                                                                                      |
|------------|------------------------------|-----------------------------|------------------|--------------|----------------|--------------------------|-------------|--------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|
| 0.0        |                              | 5                           |                  |              | ml/sm          |                          |             | DEPTH                                                                                                              | ELEVATION                                                                                                    |
| 0.0        | S-1                          | 7<br>11                     | 1.6'             | -            | d/m            |                          |             | Sandy silt to silty sand; trace gravel, clay, cobbles, roots, organics; brown, gray (FILL I)                       | Easy to moderate drilling 0.0' - 4.0'                                                                        |
| 2.0        |                              | 20<br>12                    |                  |              | ml/sm          |                          |             |                                                                                                                    |                                                                                                              |
| 2.0        | S-2                          | 13<br>12                    | 1.3'             | -            | d/m            |                          |             |                                                                                                                    |                                                                                                              |
| 4.0        |                              | 7<br>7                      |                  |              | ml             |                          |             | 4.0                                                                                                                | 430.4                                                                                                        |
| 4.0        | S-3                          | 8<br>11                     | 1.6'             | -            | m              |                          |             | Sandy silt to silty sand; trace gravel, clay, mica; orange brown, brown, red brown, dark brown (Decomposed Gneiss) | Easy drilling 4.0' - 12.0'                                                                                   |
| 6.0        |                              | 9<br>10                     |                  |              | ml             |                          |             |                                                                                                                    |                                                                                                              |
| 6.0        | S-4                          | 11<br>11                    | 1.8'             | -            | m              |                          |             |                                                                                                                    |                                                                                                              |
| 8.0        |                              | 7<br>5                      |                  |              | ml/sm          |                          |             |                                                                                                                    |                                                                                                              |
| 8.0        | S-5                          | 5<br>6                      | 1.8'             | -            | m              |                          |             |                                                                                                                    |                                                                                                              |
| 10.0       |                              | 11<br>7                     |                  |              | ml/sm          |                          |             |                                                                                                                    |                                                                                                              |
| 10.0       | S-6                          | 7<br>9                      | 1.6'             | -            | m              |                          |             |                                                                                                                    |                                                                                                              |
| 12.0       |                              | 11<br>6                     |                  |              | ml/sm          |                          |             |                                                                                                                    |                                                                                                              |
| 12.0       | S-7                          | 6<br>7                      | 1.8'             | -            | m              |                          |             |                                                                                                                    |                                                                                                              |
| 14.0       |                              | 7                           |                  |              |                |                          |             | 14.0                                                                                                               | 420.4                                                                                                        |
| 14.0       |                              |                             |                  |              |                |                          |             |                                                                                                                    | End of boring at 14.0'                                                                                       |
|            |                              |                             |                  |              |                |                          |             |                                                                                                                    | LIMITING ZONES: None encountered; Infiltration test situated at 9.9' below existing grade (elevation 424.5') |

\*\* D = DRY, M = MOIST, W = WET

# BORING LOG

|                       |                      |
|-----------------------|----------------------|
| BORING NO.            | <b>B-222</b>         |
| SHEET                 | <b>1</b> OF <b>1</b> |
| DATE: START           | <b>6/20/16</b>       |
| END                   | <b>6/20/16</b>       |
| SURFACE<br>ELEV. (FT) | <b>450.3</b>         |

PROJECT NAME Byers Station 5C PROJECT LOCATION Upper Uwchlan Township, Chester County, Pennsylvania  
 PROJECT NUMBER 28272.01 INSPECTOR NAME C. Ardizzi  
 EQUIPMENT USED Acker Soil XLS ATV-Mounted Drill Rig DRILLER NAME/COMPANY R. Crum/TRC  
 DRILLING METHODS 2.0" O.D. split spoon sampling - Continuous sampling 0.0' - 14.1'  
 AUGER: SIZE: 3.25" I.D. HSA ; TOTAL DEPTH: 14.1' ; WATER: DEPTH: 11.7' TIME: 0.25 hr DATE: 6/20/2016  
 CHECKED BY: P. McNamara ; DATE: 6/28/2016 DEPTH: 11.2' TIME: 2.50 hrs DATE: 6/20/2016  
 NOT ENCOUNTERED ☐

| DEPTH (FT) | SAMPLE NO./<br>TYPE/CORE RUN | BLOWS/0.5 FT.<br>ON SAMPLER | RECOVERY<br>(Ft.) | RECOVERY (%) | USCS<br>AASHTO | H <sub>2</sub> O CONTENT | GRAPHIC LOG | DESCRIPTION                                                                                                        | REMARKS                                                                                                                                                                                                           |
|------------|------------------------------|-----------------------------|-------------------|--------------|----------------|--------------------------|-------------|--------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0.0        |                              | 8                           |                   |              | ml/sm          |                          |             | DEPTH ELEVATION                                                                                                    |                                                                                                                                                                                                                   |
| 0.8        | S-1                          | 12                          | 1.6'              | -            | d/m            |                          |             | Sandy silt; trace gravel, roots, organics; brown (FILL I)                                                          | Easy drilling 0.0' - 0.8'                                                                                                                                                                                         |
| 1.5        |                              | 16                          |                   |              |                |                          |             | 449.5                                                                                                              |                                                                                                                                                                                                                   |
| 1.8        |                              | 50/3"                       |                   |              |                |                          |             | 448.8                                                                                                              | Moderate drilling 0.8' - 1.5'                                                                                                                                                                                     |
| 2.0        | S-2                          | 50/4"                       | 0.3'              | -            | sm             | d                        |             | Silty sand; trace gravel, mica; tan, brown, orange brown (Decomposed Gneiss)                                       | Hard drilling 1.5' - 14.0'                                                                                                                                                                                        |
| 2.3        |                              |                             |                   |              |                |                          |             | Silty sand; some gravel; trace mica, cobbles; saprolitic; brown, gray, orange brown, dark brown (Weathered Gneiss) |                                                                                                                                                                                                                   |
| 4.0        |                              |                             |                   |              |                |                          |             |                                                                                                                    |                                                                                                                                                                                                                   |
| 4.2        | S-3                          | 50/2"                       | 0.2'              | -            | sm             | d                        |             |                                                                                                                    |                                                                                                                                                                                                                   |
| 6.0        |                              |                             |                   |              |                |                          |             |                                                                                                                    |                                                                                                                                                                                                                   |
| 6.3        | S-4                          | 50/4"                       | 0.3'              | -            | sm             | d                        |             |                                                                                                                    |                                                                                                                                                                                                                   |
| 8.0        |                              |                             |                   |              |                |                          |             |                                                                                                                    |                                                                                                                                                                                                                   |
| 8.4        | S-5                          | 50/5"                       | 0.4'              | -            | sm             | d                        |             |                                                                                                                    |                                                                                                                                                                                                                   |
| 10.0       |                              |                             |                   |              |                |                          |             |                                                                                                                    |                                                                                                                                                                                                                   |
| 10.3       | S-6                          | 50/3"                       | 0.3'              | -            | sm             | d                        |             |                                                                                                                    |                                                                                                                                                                                                                   |
| 12.0       |                              |                             |                   |              |                |                          |             |                                                                                                                    |                                                                                                                                                                                                                   |
| 12.1       | S-7                          | 50/1"                       | 0.0'              | -            | NA             |                          |             |                                                                                                                    | *Groundwater encountered during drilling at 12.0'                                                                                                                                                                 |
| 14.0       |                              |                             |                   |              |                |                          |             |                                                                                                                    |                                                                                                                                                                                                                   |
| 14.1       | S-8                          | 50/1"                       | 0.1'              | -            | sm             | w                        |             | 14.1 436.2                                                                                                         | End of boring at 14.1'                                                                                                                                                                                            |
|            |                              |                             |                   |              |                |                          |             |                                                                                                                    | LIMITING ZONES: Very dense weathered rock 1.5' - 14.1'; Groundwater at 11.2'; Infiltration test eliminated due to excessive deviation (10.3') between initial limiting zone elevation and proposed test elevation |

\*\* D = DRY, M = MOIST, W = WET



# BORING LOG

BORING NO. B-223

SHEET 1 OF 1

DATE: START 6/20/16

END 6/20/16

SURFACE  
ELEV. (FT) 452.2

PROJECT NAME Byers Station 5C

PROJECT LOCATION Upper Uwchlan Township, Chester County, Pennsylvania

PROJECT NUMBER 28272.01

INSPECTOR NAME C. Ardizzi

EQUIPMENT USED Acker Soil XLS ATV-Mounted Drill Rig

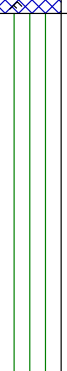
DRILLER NAME/COMPANY R. Crum/TRC

DRILLING METHODS 2.0" O.D. split spoon sampling - 5.0' interval sampling 0.0' - 6.0' / Continuous sampling 6.0' - 16.8'

AUGER: SIZE: 3.25" I.D. HSA ; TOTAL DEPTH: 16.8' ; WATER: DEPTH: Dry TIME: 0.25 hr DATE: 6/20/2016

CHECKED BY: P. McNamara ; DATE: 6/28/2016 DEPTH: Dry TIME: 1.50 hrs DATE: 6/20/2016

NOT ENCOUNTERED ☐

| DEPTH (FT) | SAMPLE NO./<br>TYPE/CORE RUN | BLOWS/0.5 FT.<br>ON SAMPLER | RECOVERY<br>(Ft.) | RECOVERY(%) | RQD (%) | USCS  | AASHTO | H <sub>2</sub> O CONTENT | GRAPHIC LOG                                                                         | DEPTH | ELEVATION | DESCRIPTION                                                                                                           | REMARKS                                                                                                                              |
|------------|------------------------------|-----------------------------|-------------------|-------------|---------|-------|--------|--------------------------|-------------------------------------------------------------------------------------|-------|-----------|-----------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|
| 0.0        |                              | 6                           |                   |             |         | ml/sm |        |                          |                                                                                     | 0.2   | 452.0     | Topsoil (2")                                                                                                          | Easy drilling 0.0' - 8.5'                                                                                                            |
| 2.0        | S-1                          | 9<br>8<br>8                 | 1.6'              | -           |         |       | d/m    |                          |   |       |           | Sandy silt to silty sand; trace to some gravel; trace roots, crushed stone, glass; brown, gray, orange brown (FILL I) |                                                                                                                                      |
| 6.0        |                              |                             |                   |             |         |       |        |                          |                                                                                     |       |           |                                                                                                                       |                                                                                                                                      |
| 8.0        | S-2                          | 5<br>4<br>4<br>5            | 0.0'              | -           |         |       | NA     |                          |                                                                                     |       |           |                                                                                                                       |                                                                                                                                      |
| 10.0       | S-3                          | 8<br>10<br>10<br>12         | 1.3'              | -           |         | ml/sm | m      |                          |  | 8.5   | 443.7     | Sandy silt to silty sand; trace gravel, mica; orange brown, tan, brown, gray, dark brown (Decomposed Gneiss)          | Easy to moderate drilling 8.5' - 16.0'                                                                                               |
| 12.0       | S-4                          | 7<br>9<br>10<br>10          | 1.7'              | -           |         | sm    | m      |                          |                                                                                     |       |           |                                                                                                                       |                                                                                                                                      |
| 14.0       | S-5                          | 10<br>15<br>17<br>25        | 1.5'              | -           |         | sm    | m      |                          |                                                                                     |       |           |                                                                                                                       |                                                                                                                                      |
| 16.0       | S-6                          | 18<br>16<br>17<br>14        | 1.3'              | -           |         | sm    | d/m    |                          |                                                                                     |       |           |                                                                                                                       |                                                                                                                                      |
| 16.8       | S-7                          | 37<br>50/4"                 | 0.7'              | -           |         | sm    | d      |                          |  | 16.0  | 436.2     | Silty sand; some gravel; trace mica; saprolitic; gray, brown (Weathered Gneiss)                                       | End of boring at 16.8'                                                                                                               |
|            |                              |                             |                   |             |         |       |        |                          |                                                                                     | 16.8  | 435.4     |                                                                                                                       | LIMITING ZONES: Very dense weathered rock 16.0' - 16.8'; Infiltration test situated at 13.7' below existing grade (elevation 438.5') |

\*\* D = DRY, M = MOIST, W = WET

## Double Ring Infiltrometer Test Results

| Test Hole Number | Surface Elevation (feet) | *Infiltration Depth (feet) | Drop in Water within Inner Ring during Presoak Period (inches) |            | Drop in Water within Inner Ring at Time (inches) |            |            |             |             | ** Infiltration Rate inches/hour |
|------------------|--------------------------|----------------------------|----------------------------------------------------------------|------------|--------------------------------------------------|------------|------------|-------------|-------------|----------------------------------|
|                  |                          |                            | 30 minutes                                                     | 60 minutes | 30 minutes                                       | 60 minutes | 90 minutes | 120 minutes | 150 minutes |                                  |
| DR-206A          | 432.8                    | 5.8                        | 1.250                                                          | 1.000      | 0.875                                            | 0.750      | 0.625      | 0.500       | 0.500       | 1.00                             |
| DR-206B          | 432.8                    | 5.8                        | 1.125                                                          | 0.750      | 0.625                                            | 0.500      | 0.375      | 0.375       | 0.375       | 0.75                             |
|                  |                          |                            |                                                                |            |                                                  |            |            |             |             |                                  |
| DR-212A          | 443.3                    | 2.5                        | 0.375                                                          | 0.250      | 0.250                                            | 0.125      | 0.125      | 0.125       |             | 0.25                             |
| DR-212B          | 443.3                    | 2.5                        | 0.750                                                          | 0.500      | 0.375                                            | 0.375      | 0.250      | 0.250       |             | 0.50                             |
|                  |                          |                            |                                                                |            |                                                  |            |            |             |             |                                  |
|                  |                          |                            |                                                                |            |                                                  |            |            |             |             |                                  |
|                  |                          |                            |                                                                |            |                                                  |            |            |             |             |                                  |
|                  |                          |                            |                                                                |            |                                                  |            |            |             |             |                                  |

| Test Hole Number | Surface Elevation (feet) | *Infiltration Depth (feet) | Drop in Water within Inner Ring during Presoak Period (inches) |            | Drop in Water within Inner Ring at Time (inches) |            |            |            |            | ** Infiltration Rate inches/hour |
|------------------|--------------------------|----------------------------|----------------------------------------------------------------|------------|--------------------------------------------------|------------|------------|------------|------------|----------------------------------|
|                  |                          |                            | 30 minutes                                                     | 60 minutes | 10 minutes                                       | 20 minutes | 30 minutes | 40 minutes | 50 minutes |                                  |
| DR-205A          | 435.1                    | 8.1                        | 6.000                                                          | 4.750      | 1.500                                            | 1.250      | 1.125      | 1.000      | 1.000      | 6.00                             |
| DR-205B          | 435.1                    | 8.1                        | 6.000                                                          | 5.375      | 1.750                                            | 1.500      | 1.375      | 1.250      | 1.250      | 7.50                             |
|                  |                          |                            |                                                                |            |                                                  |            |            |            |            |                                  |
| DR-211A          | 440.1                    | 3.3                        | 2.250                                                          | 1.750      | 0.625                                            | 0.500      | 0.375      | 0.375      |            | 2.25                             |
| DR-211B          | 440.1                    | 3.3                        | 3.000                                                          | 2.375      | 0.875                                            | 0.750      | 0.750      | 0.625      |            | 3.75                             |
|                  |                          |                            |                                                                |            |                                                  |            |            |            |            |                                  |
|                  |                          |                            |                                                                |            |                                                  |            |            |            |            |                                  |
|                  |                          |                            |                                                                |            |                                                  |            |            |            |            |                                  |

\* Infiltration depths were measured from existing site grades at the time of the investigation.

\*\* Measured infiltration rates do not include a factor of safety for the design infiltration rate.

Indicates the final reading that was used to determine the infiltration rate at the corresponding location.



115 West Germantown Pike  
PHONE 610-277-0880

East Norriton, PA 19401  
FAX 610-277-0878

## INFILTRATION TESTING LOG

Project Name: Byers Station 5C  
Project Number: 28272.01  
Date of Testing: 6/14/2016  
EEI Representative: C. Ardizzi  
Drawn/ Compiled by: C. Ardizzi  
Date Compiled: 6/29/2016

## Double Ring Infiltrometer Test Results

| Test Hole Number | Surface Elevation (feet) | *Infiltration Depth (feet) | Drop in Water within Inner Ring during Presoak Period (inches) |            | Drop in Water within Inner Ring at Time (inches) |            |            |             | ** Infiltration Rate inches/hour |
|------------------|--------------------------|----------------------------|----------------------------------------------------------------|------------|--------------------------------------------------|------------|------------|-------------|----------------------------------|
|                  |                          |                            | 30 minutes                                                     | 60 minutes | 30 minutes                                       | 60 minutes | 90 minutes | 120 minutes |                                  |
| DR-207A          | 424.1                    | 4.6                        | 1.625                                                          | 1.250      | 1.000                                            | 0.875      | 0.750      | 0.750       | 1.50                             |
| DR-207B          | 424.1                    | 4.6                        | 1.250                                                          | 0.875      | 0.750                                            | 0.625      | 0.625      | 0.500       | 1.00                             |
|                  |                          |                            |                                                                |            |                                                  |            |            |             |                                  |
| DR-208A          | 420.8                    | 1.3                        | 2.125                                                          | 1.750      | 1.375                                            | 1.250      | 1.125      | 1.000       | 2.00                             |
| DR-208B          | 420.8                    | 1.3                        | 1.500                                                          | 1.125      | 0.875                                            | 0.750      | 0.625      | 0.625       | 1.25                             |
|                  |                          |                            |                                                                |            |                                                  |            |            |             |                                  |
| DR-209A          | 421.0                    | 1.5                        | 0.875                                                          | 0.500      | 0.375                                            | 0.250      | 0.125      | 0.125       | 0.25                             |
| DR-209B          | 421.0                    | 1.5                        | 0.500                                                          | 0.250      | 0.125                                            | 0.125      | 0.000      | 0.000       | 0.00                             |

| Test Hole Number | Surface Elevation (feet) | *Infiltration Depth (feet) | Drop in Water within Inner Ring during Presoak Period (inches) |            | Drop in Water within Inner Ring at Time (inches) |            |            |             | ** Infiltration Rate inches/hour |
|------------------|--------------------------|----------------------------|----------------------------------------------------------------|------------|--------------------------------------------------|------------|------------|-------------|----------------------------------|
|                  |                          |                            | 30 minutes                                                     | 60 minutes | 30 minutes                                       | 60 minutes | 90 minutes | 120 minutes |                                  |
| DR-216A          | 438.3                    | 6.3                        | 1.500                                                          | 1.125      | 1.000                                            | 0.875      | 0.750      | 0.750       | 1.50                             |
| DR-216B          | 438.3                    | 6.3                        | 2.000                                                          | 1.500      | 1.250                                            | 1.250      | 1.125      | 1.125       | 2.25                             |
|                  |                          |                            |                                                                |            |                                                  |            |            |             |                                  |
| DR-218A          | 430.1                    | 5.6                        | 1.000                                                          | 0.625      | 0.500                                            | 0.500      | 0.375      | 0.375       | 0.75                             |
| DR-218B          | 430.1                    | 5.6                        | 0.625                                                          | 0.375      | 0.375                                            | 0.250      | 0.250      | 0.250       | 0.50                             |
|                  |                          |                            |                                                                |            |                                                  |            |            |             |                                  |
|                  |                          |                            |                                                                |            |                                                  |            |            |             |                                  |
|                  |                          |                            |                                                                |            |                                                  |            |            |             |                                  |

\* Infiltration depths were measured from existing site grades at the time of the investigation.

\*\* Measured infiltration rates do not include a factor of safety for the design infiltration rate.

Indicates the final reading that was used to determine the infiltration rate at the corresponding location.



115 West Germantown Pike  
PHONE 610-277-0880

East Norriton, PA 19401  
FAX 610-277-0878

## INFILTRATION TESTING LOG

Project Name: Byers Station 5C  
Project Number: 28272.01  
Date of Testing: 6/15/2016  
EEI Representative: C. Ardizzi  
Drawn/ Compiled by: C. Ardizzi  
Date Compiled: 6/29/2016

## Double Ring Infiltrometer Test Results

| Test Hole Number | Surface Elevation (feet) | *Infiltration Depth (feet) | Drop in Water within Inner Ring during Presoak Period (inches) |            | Drop in Water within Inner Ring at Time (inches) |            |            |             | ** Infiltration Rate inches/hour |
|------------------|--------------------------|----------------------------|----------------------------------------------------------------|------------|--------------------------------------------------|------------|------------|-------------|----------------------------------|
|                  |                          |                            | 30 minutes                                                     | 60 minutes | 30 minutes                                       | 60 minutes | 90 minutes | 120 minutes |                                  |
| DR-214A          | 443.5                    | 0.5                        | 0.500                                                          | 0.375      | 0.250                                            | 0.250      | 0.125      | 0.125       | 0.25                             |
| DR-214B          | 443.5                    | 0.5                        | 1.125                                                          | 0.750      | 0.625                                            | 0.500      | 0.375      | 0.375       | 0.75                             |
|                  |                          |                            |                                                                |            |                                                  |            |            |             |                                  |
| DR-215A          | 449.0                    | 3.0                        | 1.000                                                          | 0.875      | 0.750                                            | 0.625      | 0.500      | 0.500       | 1.00                             |
| DR-215B          | 449.0                    | 3.0                        | 0.500                                                          | 0.375      | 0.375                                            | 0.250      | 0.250      | 0.250       | 0.50                             |
|                  |                          |                            |                                                                |            |                                                  |            |            |             |                                  |
|                  |                          |                            |                                                                |            |                                                  |            |            |             |                                  |
|                  |                          |                            |                                                                |            |                                                  |            |            |             |                                  |

| Test Hole Number | Surface Elevation (feet) | *Infiltration Depth (feet) | Drop in Water within Inner Ring during Presoak Period (inches) |            | Drop in Water within Inner Ring at Time (inches) |            |            |            |            | ** Infiltration Rate inches/hour |
|------------------|--------------------------|----------------------------|----------------------------------------------------------------|------------|--------------------------------------------------|------------|------------|------------|------------|----------------------------------|
|                  |                          |                            | 30 minutes                                                     | 60 minutes | 10 minutes                                       | 20 minutes | 30 minutes | 40 minutes | 50 minutes |                                  |
| DR-210A          | 455.3                    | 4.8                        | 5.625                                                          | 4.250      | 1.500                                            | 1.375      | 1.250      | 1.125      | 1.125      | 6.75                             |
| DR-210B          | 455.3                    | 4.8                        | 6.000                                                          | 5.375      | 2.000                                            | 1.750      | 1.625      | 1.500      | 1.500      | 9.00                             |
|                  |                          |                            |                                                                |            |                                                  |            |            |            |            |                                  |
| DR-213A          | 450.8                    | 6.0                        | 3.125                                                          | 2.000      | 0.750                                            | 0.625      | 0.625      | 0.625      |            | 3.75                             |
| DR-213B          | 450.8                    | 6.0                        | 3.750                                                          | 2.250      | 0.875                                            | 0.750      | 0.750      | 0.750      |            | 4.50                             |
|                  |                          |                            |                                                                |            |                                                  |            |            |            |            |                                  |
| DR-221A          | 445.6                    | 2.1                        | 2.250                                                          | 2.000      | 0.625                                            | 0.500      | 0.500      | 0.375      | 0.375      | 2.25                             |
| DR-221B          | 445.6                    | 2.1                        | 2.875                                                          | 2.500      | 0.875                                            | 0.750      | 0.625      | 0.500      | 0.500      | 3.00                             |

\* Infiltration depths were measured from existing site grades at the time of the investigation.

\*\* Measured infiltration rates do not include a factor of safety for the design infiltration rate.

Indicates the final reading that was used to determine the infiltration rate at the corresponding location.



115 West Germantown Pike  
PHONE 610-277-0880

East Norriton, PA 19401  
FAX 610-277-0878

## INFILTRATION TESTING LOG

Project Name: Byers Station 5C  
Project Number: 28272.01  
Date of Testing: 6/16/2016  
EEI Representative: C. Ardizzi  
Drawn/ Compiled by: C. Ardizzi  
Date Compiled: 6/29/2016

## Double Ring Infiltrometer Test Results

| Test Hole Number | Surface Elevation (feet) | *Infiltration Depth (feet) | Drop in Water within Inner Ring during Presoak Period (inches) |            | Drop in Water within Inner Ring at Time (inches) |            |            |             |             | ** Infiltration Rate inches/hour |
|------------------|--------------------------|----------------------------|----------------------------------------------------------------|------------|--------------------------------------------------|------------|------------|-------------|-------------|----------------------------------|
|                  |                          |                            | 30 minutes                                                     | 60 minutes | 30 minutes                                       | 60 minutes | 90 minutes | 120 minutes | 150 minutes |                                  |
| DR-201A          | 459.3                    | 9.3                        | 1.750                                                          | 1.250      | 1.000                                            | 0.875      | 0.750      | 0.625       | 0.625       | 1.25                             |
| DR-201B          | 459.3                    | 9.3                        | 1.375                                                          | 1.000      | 0.750                                            | 0.625      | 0.625      | 0.500       | 0.500       | 1.00                             |
|                  |                          |                            |                                                                |            |                                                  |            |            |             |             |                                  |
| DR-204A          | 438.2                    | 1.2                        | 1.000                                                          | 0.750      | 0.625                                            | 0.500      | 0.375      | 0.375       |             | 0.75                             |
| DR-204B          | 438.2                    | 1.2                        | 0.500                                                          | 0.375      | 0.250                                            | 0.250      | 0.125      | 0.125       |             | 0.25                             |
|                  |                          |                            |                                                                |            |                                                  |            |            |             |             |                                  |
|                  |                          |                            |                                                                |            |                                                  |            |            |             |             |                                  |
|                  |                          |                            |                                                                |            |                                                  |            |            |             |             |                                  |
|                  |                          |                            |                                                                |            |                                                  |            |            |             |             |                                  |

| Test Hole Number | Surface Elevation (feet) | *Infiltration Depth (feet) | Drop in Water within Inner Ring during Presoak Period (inches) |            | Drop in Water within Inner Ring at Time (inches) |            |            |            |            | ** Infiltration Rate inches/hour |
|------------------|--------------------------|----------------------------|----------------------------------------------------------------|------------|--------------------------------------------------|------------|------------|------------|------------|----------------------------------|
|                  |                          |                            | 30 minutes                                                     | 60 minutes | 10 minutes                                       | 20 minutes | 30 minutes | 40 minutes | 50 minutes |                                  |
| DR-203A          | 449.2                    | 6.7                        | 4.500                                                          | 4.000      | 1.375                                            | 1.250      | 1.125      | 1.125      | 1.125      | 6.75                             |
| DR-203B          | 449.2                    | 6.7                        | 5.250                                                          | 4.625      | 1.625                                            | 1.500      | 1.375      | 1.250      | 1.250      | 7.50                             |
|                  |                          |                            |                                                                |            |                                                  |            |            |            |            |                                  |
|                  |                          |                            |                                                                |            |                                                  |            |            |            |            |                                  |
|                  |                          |                            |                                                                |            |                                                  |            |            |            |            |                                  |
|                  |                          |                            |                                                                |            |                                                  |            |            |            |            |                                  |
|                  |                          |                            |                                                                |            |                                                  |            |            |            |            |                                  |
|                  |                          |                            |                                                                |            |                                                  |            |            |            |            |                                  |
|                  |                          |                            |                                                                |            |                                                  |            |            |            |            |                                  |

\* Infiltration depths were measured from existing site grades at the time of the investigation.

\*\* Measured infiltration rates do not include a factor of safety for the design infiltration rate.

Indicates the final reading that was used to determine the infiltration rate at the corresponding location.



115 West Germantown Pike  
PHONE 610-277-0880

East Norriton, PA 19401  
FAX 610-277-0878

## INFILTRATION TESTING LOG

Project Name: Byers Station 5C  
Project Number: 28272.01  
Date of Testing: 6/17/2016  
EEI Representative: C. Ardizzi  
Drawn/ Compiled by: C. Ardizzi  
Date Compiled: 6/29/2016



## Infiltration Test Results - Cased Borehole Method

[illegible]

\* Infiltration depths were measured from existing site grades at the time of the investigation.

Indicates the final reading that was used to determine the infiltration rate at the corresponding location.

\*\* Infiltration Rate:  $K_v = [A/G * D * t] * \ln(H_1/H_2)$ , where

Kv = infiltration rate (in./hr.) at field saturation; A = casing cross-sectional area (in.<sup>2</sup>); D = casing diameter (in.); G = 2.75 (shape factor, dimensionless)  
t = time for head to change from H1 to H2 (hrs.); H1 = initial water column height (in.); H2 = initial water column height - final drop in water height (in.)

**NOTE:** Measured infiltration rates do not include a design safety factor.



**EARTH  
ENGINEERING  
INCORPORATED**

Geotechnical Engineers &amp; Geologists

115 West Germantown Pike  
East Norriton, PA 19401

PHONE 610-277-0880  
FAX 610-277-0878

**Drawn/Compiled by: C. Ardizzi**

**Date Compiled:** 6/29/2016

## INFILTRATION TESTING LOG



# SUBDIVISION / LAND DEVELOPMENT APPLICATION

☒ Preliminary Submittal

☐ Final Submittal

The undersigned hereby applies for review of the Plan submitted herewith and described below:

1. Name of Subdivision / Development: Jankowski Tract
2. Plan Dated: 08-08-2017 County Deed Book/Page No.
3. Name of property owner(s): Henry Jankowski parcel 32-1-30  
Sophie and David Pomanto parcels 32-1-30.1 & 25-6-58.1  
Address: Jankowski R.D. 2 Box 217 Chester Springs Pomanto 289 Black Horse Road Chester Springs  
State/Zip: Pa 19425 Phone No.:                       
Email:
4. Name of Applicant (If other than owner):  
Black Horse ELU, LLC  
Address: 485 Devon Park Drive, Suite 106 Wayne  
State/Zip: Pa. 19087 Phone No.: 484-588-5035  
Email: Jmostoller@envisionlanduse.com
5. Applicant's interest (If other than owner): equitable owner
6. Engineer, Architect, Surveyor, or Landscape Architect responsible for Plan.  
Edward B. Walsh & Assoc. Inc c/o Adam Brower  
Address: 125 Dowlin Forge Road Exton  
State/Zip: Pa. 19341 Phone No.: 610-903-0060  
Email: abrower@ebwalshinc.com
7. Total acreage: 40.655 Number of Lots: 55
8. Acreage of adjoining land in same ownership: (If any)
9. Describe Type of Development Planned: Construction of a connector road and internal  
road network to provide access to 55 proposed lots for single family homes. The site is being developed  
under the flexible development overlay requirements. Each lot will utilize public water and sanitary sewer.  
140 Pottstown Pike, Chester Springs, PA 19425  
Phone: (610) 458-9400 • Fax: (610) 458-0307  
www.upperuwchlan-pa.gov

- [One-half of the required plan submissions may be of a reduced size, i.e. 11 x 17]**

- 162-26.A to allow the internal roads to be 28 feet wide.

162-41.A to allow sidewalk to be installed on one side of the street only.

- Signature of Property Owner or Applicant:**

By: John M. D. P. Inc.  
Date: 2/1/18

**\*Park & Recreation Fee per residence is levied. Contact Township Offices to determine amount.**

**1-2 Lots ..... \$250**

**3-5 Lots ..... \$500**

**Plus \$25 for each Lot over 3**

Over 5 Lots .....\$1000

Plus \$50 for each Lot over 5

**140 Pottstown Pike, Chester Springs, PA 19425**  
**Phone: (610) 458-0400 • Fax: (610) 458-0307**  
**[www.upperuwchlan-pa.gov](http://www.upperuwchlan-pa.gov)**



## ESCROW AGREEMENT

### CASH ESCROW AGREEMENT FOR ENGINEERING, PLAN REVIEW AND INSPECTION FEES, SOLICITOR'S FEES INCURRED IN CONNECTION WITH PLAN REVIEW AND DOCUMENT PREPARATION, AND ADMINISTRATION COSTS AND EXPENSES

THIS AGREEMENT made the 2nd day of February, 2018 between  
UPPER UWCHLAN TOWNSHIP and

Developer Black Horse ELU, LLC

Address 485 Devon Park Drive Suite 106 Wayne, Pa. 19087

Telephone: 484-588-5035 Fax 215-933-6800

Contact Person John Mostoller

Development Name / Title The Jankowski Tract

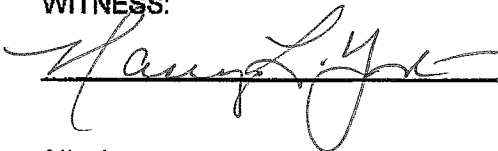
#### WITNESSETH:

1. Applicant has filed a Subdivision or Land Development application (or similar activity), together with plans and supporting documentation required by Upper Uwchlan Township Subdivision and Land Development Ordinance, as amended (hereafter "The Ordinance"), for a Subdivision or Development known as The Jankowski Tract.
2. The Applicant hereby authorizes and directs the Township's Engineer(s), Consultant(s), Solicitor and Planners to review the application, together with all plans, surveys, schedules, modules, design criteria impact statements and other documents submitted or required to be submitted hereafter as part of the application procedure, together with any and all amendments thereto, and to prepare a report of his findings and recommendations with respect to same for the Township as may be required in order to process and review the application both prior to and following issuance of any permits or plan approvals. In addition, the Applicant hereby authorizes and directs the Township's Engineer(s) to perform all inspections required, both during and following construction. Such reviews and inspections and all services performed relative thereto shall be carried out in accordance with good engineering practices, the requirements of the "The Ordinance" and the rules and regulations of the Township with respect thereto.
3. The creation of the escrow herein provided for shall in no way require the Township, its Engineer(s), Consultant(s), Solicitor or Planners to approve the Applicant's proposed Subdivision or Land Development application or any plan related thereto, either as originally submitted or as thereafter modified.
4. The Applicant hereby authorizes and directs the Township's Solicitor (if applicable) to review such portion of the plans and documents submitted with the application or submitted in conjunction with the application as the Township shall require, and to prepare or review such additional documentation, including reports, agreements, easement or other legal documents necessary to insure compliance with the provisions of the "The Ordinance".

5. The Applicant hereby deposits with the Township in an interest bearing Escrow Account the sum of \$5,000.00 as a security for the payment of all costs and expenses, charges and fees as hereinabove described which may be incurred by the Township. The Township shall not commence processing the Applicant's application until the required escrow deposit has been made with the Township. The amount of \$5,000.00 shall be the minimum amount on deposit with the Township at all times in order to guarantee payment for the aforementioned costs and expense, charges and fees. When the amount held in escrow is at or below said minimum amount as required by the Township, the Applicant shall be required to replenish the account within 21 calendar days of notification, in an amount to be decided by the Township but in no case shall be less than \$5,000.00 nor more than the initial fund requirement to insure that all costs, charges and expenses are paid in full. Failure to comply may result in a cessation of all inspection services. Any balances remaining shall be forthwith returned by the Township to the Applicant.
6. The Township acknowledges receipt of the sum abovementioned, agrees to hold that sum so deposited solely for the purposes outlined herein and to return any unused portion thereof to the Applicant in accordance with the terms and conditions set forth hereinabove.
7. The Township agrees and acknowledges the amount of fees and expenses charged to the Applicant on account of its Engineer(s)', Consultant(s)', Solicitor's and Planners' fees shall be equal to their hourly rate in effect with the Township at the time such services are performed. In the event the Applicant disputes the amount of any such review fee(s), the Applicant shall, no later than 100 days after the transmittal of the bill to the Applicant, notify the Municipality that such fees are disputed, and shall explain the basis of the objection to the fees. Failure of the Applicant to dispute a bill within 100 days shall be a waiver of the Applicant's right to arbitration of that bill.
8. The Applicant agrees that the above referenced charges and fees, together with administrative costs and expenses which the Township may incur as authorized and described hereinabove shall be paid from the escrow fund by the Township at the Township's sole discretion and without further approval of the Applicant.

IN WITNESS WHEREOF, the parties have executed this Agreement on the date first above mentioned and intending to be legally bound hereby, the Applicant acknowledging that he/it has received a true copy of this Agreement, the original being maintained by the Township.

WITNESS:



Attest

Secretary

APPLICANT

John Mostoller

(Print or type name of Applicant)

By:



President, General Partner,  
Proprietor, Owner or Authorized  
Representative

ATTEST:

BY: Upper Uwchlan Township

Gwen A. Jonik,  
Township Secretary

Cary B. Vargo  
Township Manager

**Return to:** Chester County Planning Commission  
601 Westtown Road-Suite 270  
P.O. Box 2747  
West Chester, PA 19380-0990

# Act 247 County Referral

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                   |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>To:</b> Chester County Planning Commission<br><b>Subject:</b> Request for review of a subdivision, land development proposal, ordinances, or comprehensive plans pursuant to the Pennsylvania Municipalities Planning Code, Act 247. This application must be completed by the applicant, and submitted by the municipality to the above address, along with one (1) complete set of plans and accompanying documents and the required fee for review (see reverse side) | <b>TO BE COMPLETED BY THE MUNICIPALITY</b><br><b>From:</b> (Municipality) _____<br><b>Date:</b> _____<br><b>Official's Name:</b> _____<br><b>Position:</b> _____<br><b>Official's signature:</b> _____<br><b>Applications with ORIGINAL signatures must be submitted to CCPC.</b> |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## TO BE COMPLETED BY THE APPLICANT

Development name (if applicable): Jankowski Tract Location: W. side of Rt 100 North of Font  
Owner's name: Henry Jankowski and Sophie and David Pomanto Phone #: \_\_\_\_\_  
Owner's address: RD 2 Box 217 Chester Springs and 289 Black Horse Road Chester Springs, Pa.  
Applicant's name: Black Horse ELU, LLC Phone #: 484-588-5035  
Applicant's address: 485 Devon Park Drive Suite 106 Wayne Pa 19087  
Architect/Engineer/Surveyor name: Edward B. Walsh & Assoc Phone #: 610-903-0060

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>TYPE OF REVIEW REQUESTED</b><br>(Check all appropriate boxes)<br><input type="checkbox"/> Unofficial sketch plan (no fee)<br><input checked="" type="checkbox"/> Subdivision plan<br><input type="checkbox"/> Land development plan<br><input type="checkbox"/> Planned residential development<br><input type="checkbox"/> Zoning ordinance (no fee)<br><input type="checkbox"/> Curative amendment (no fee)<br><input type="checkbox"/> Subdivision ordinance (no fee)<br><input type="checkbox"/> Comprehensive plan (no fee)<br><input type="checkbox"/> Other _____ | <b>REVIEW FEE</b><br>(Fee schedule on other side)<br><input checked="" type="checkbox"/> Attached \$ <u>1,450.00</u><br><input type="checkbox"/> Not applicable<br><br><b>TYPE OF PLAN</b><br><input type="checkbox"/> Unofficial sketch<br><input checked="" type="checkbox"/> Preliminary<br><input type="checkbox"/> Final | <b>TYPE OF SUBMISSION</b><br><input checked="" type="checkbox"/> New proposal<br><input type="checkbox"/> Revision to a prior proposal<br><input type="checkbox"/> Phase of a prior proposal<br><input type="checkbox"/> Amendment/revision to recorded plan is a new proposal<br><br>Tax parcel(s): # <u>32-1-30</u><br># <u>32-1-30.1</u><br># <u>25-6-58.1</u><br><br>Total area (gross acres): <u>40.655</u> |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

| <b>PLAN INFORMATION</b><br>Length of new roads: <u>3,205</u><br>Number of new parking spaces: <u>19</u><br>Ownership of roads:<br><input checked="" type="checkbox"/> Public <input type="checkbox"/> Private<br>Open space:<br><input type="checkbox"/> Public <input checked="" type="checkbox"/> Private<br>Acres:      Acres: <u>24.32</u><br>HOA responsible for common facilities/areas:<br><input checked="" type="checkbox"/> Yes <input type="checkbox"/> No<br>HOA documents provided:<br><input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>Traffic study included:<br><input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Not conducted | <table border="1" style="width:100%"><tr><th>LAND USE</th><th># of lots/units</th></tr><tr><td>Agriculture</td><td></td></tr><tr><td><input checked="" type="checkbox"/> Single family</td><td>55</td></tr><tr><td>Townhouses</td><td></td></tr><tr><td>Twin units</td><td></td></tr><tr><td>Apartments</td><td></td></tr><tr><td>Mobile homes</td><td></td></tr><tr><td>*Commercial</td><td></td></tr><tr><td>*Industrial</td><td></td></tr><tr><td>*Institutional</td><td></td></tr><tr><td>Other</td><td></td></tr></table> | LAND USE | # of lots/units | Agriculture |  | <input checked="" type="checkbox"/> Single family | 55 | Townhouses |  | Twin units |  | Apartments |  | Mobile homes |  | *Commercial |  | *Industrial |  | *Institutional |  | Other |  | <table border="1" style="width:100%"><tr><th>ZONING DISTRICT OF PROPOSAL</th><th>PROPOSED UTILITIES<br/>(Check appropriate boxes)</th></tr><tr><td>Existing: <u>R-2</u></td><td>Water    Sewer</td></tr><tr><td>Proposed: _____</td><td>Public    <input checked="" type="checkbox"/>    <input checked="" type="checkbox"/></td></tr><tr><td>Variances/<br/>Special exception<br/>granted: _____</td><td>On-site    <input type="checkbox"/>    <input type="checkbox"/></td></tr><tr><td></td><td>Package    <input type="checkbox"/>    <input type="checkbox"/></td></tr><tr><td></td><td>No new sewage<br/>disposal or water<br/>supply proposed <input type="checkbox"/></td></tr></table> | ZONING DISTRICT OF PROPOSAL | PROPOSED UTILITIES<br>(Check appropriate boxes) | Existing: <u>R-2</u> | Water    Sewer | Proposed: _____ | Public <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> | Variances/<br>Special exception<br>granted: _____ | On-site <input type="checkbox"/> <input type="checkbox"/> |  | Package <input type="checkbox"/> <input type="checkbox"/> |  | No new sewage<br>disposal or water<br>supply proposed <input type="checkbox"/> |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|-----------------|-------------|--|---------------------------------------------------|----|------------|--|------------|--|------------|--|--------------|--|-------------|--|-------------|--|----------------|--|-------|--|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|-------------------------------------------------|----------------------|----------------|-----------------|--------------------------------------------------------------------------------|---------------------------------------------------|-----------------------------------------------------------|--|-----------------------------------------------------------|--|--------------------------------------------------------------------------------|
| LAND USE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | # of lots/units                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |          |                 |             |  |                                                   |    |            |  |            |  |            |  |              |  |             |  |             |  |                |  |       |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                             |                                                 |                      |                |                 |                                                                                |                                                   |                                                           |  |                                                           |  |                                                                                |
| Agriculture                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |          |                 |             |  |                                                   |    |            |  |            |  |            |  |              |  |             |  |             |  |                |  |       |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                             |                                                 |                      |                |                 |                                                                                |                                                   |                                                           |  |                                                           |  |                                                                                |
| <input checked="" type="checkbox"/> Single family                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 55                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |          |                 |             |  |                                                   |    |            |  |            |  |            |  |              |  |             |  |             |  |                |  |       |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                             |                                                 |                      |                |                 |                                                                                |                                                   |                                                           |  |                                                           |  |                                                                                |
| Townhouses                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |          |                 |             |  |                                                   |    |            |  |            |  |            |  |              |  |             |  |             |  |                |  |       |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                             |                                                 |                      |                |                 |                                                                                |                                                   |                                                           |  |                                                           |  |                                                                                |
| Twin units                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |          |                 |             |  |                                                   |    |            |  |            |  |            |  |              |  |             |  |             |  |                |  |       |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                             |                                                 |                      |                |                 |                                                                                |                                                   |                                                           |  |                                                           |  |                                                                                |
| Apartments                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |          |                 |             |  |                                                   |    |            |  |            |  |            |  |              |  |             |  |             |  |                |  |       |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                             |                                                 |                      |                |                 |                                                                                |                                                   |                                                           |  |                                                           |  |                                                                                |
| Mobile homes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |          |                 |             |  |                                                   |    |            |  |            |  |            |  |              |  |             |  |             |  |                |  |       |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                             |                                                 |                      |                |                 |                                                                                |                                                   |                                                           |  |                                                           |  |                                                                                |
| *Commercial                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |          |                 |             |  |                                                   |    |            |  |            |  |            |  |              |  |             |  |             |  |                |  |       |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                             |                                                 |                      |                |                 |                                                                                |                                                   |                                                           |  |                                                           |  |                                                                                |
| *Industrial                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |          |                 |             |  |                                                   |    |            |  |            |  |            |  |              |  |             |  |             |  |                |  |       |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                             |                                                 |                      |                |                 |                                                                                |                                                   |                                                           |  |                                                           |  |                                                                                |
| *Institutional                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |          |                 |             |  |                                                   |    |            |  |            |  |            |  |              |  |             |  |             |  |                |  |       |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                             |                                                 |                      |                |                 |                                                                                |                                                   |                                                           |  |                                                           |  |                                                                                |
| Other                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |          |                 |             |  |                                                   |    |            |  |            |  |            |  |              |  |             |  |             |  |                |  |       |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                             |                                                 |                      |                |                 |                                                                                |                                                   |                                                           |  |                                                           |  |                                                                                |
| ZONING DISTRICT OF PROPOSAL                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | PROPOSED UTILITIES<br>(Check appropriate boxes)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |          |                 |             |  |                                                   |    |            |  |            |  |            |  |              |  |             |  |             |  |                |  |       |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                             |                                                 |                      |                |                 |                                                                                |                                                   |                                                           |  |                                                           |  |                                                                                |
| Existing: <u>R-2</u>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Water    Sewer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |          |                 |             |  |                                                   |    |            |  |            |  |            |  |              |  |             |  |             |  |                |  |       |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                             |                                                 |                      |                |                 |                                                                                |                                                   |                                                           |  |                                                           |  |                                                                                |
| Proposed: _____                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Public <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                 |          |                 |             |  |                                                   |    |            |  |            |  |            |  |              |  |             |  |             |  |                |  |       |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                             |                                                 |                      |                |                 |                                                                                |                                                   |                                                           |  |                                                           |  |                                                                                |
| Variances/<br>Special exception<br>granted: _____                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | On-site <input type="checkbox"/> <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |          |                 |             |  |                                                   |    |            |  |            |  |            |  |              |  |             |  |             |  |                |  |       |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                             |                                                 |                      |                |                 |                                                                                |                                                   |                                                           |  |                                                           |  |                                                                                |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Package <input type="checkbox"/> <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |          |                 |             |  |                                                   |    |            |  |            |  |            |  |              |  |             |  |             |  |                |  |       |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                             |                                                 |                      |                |                 |                                                                                |                                                   |                                                           |  |                                                           |  |                                                                                |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | No new sewage<br>disposal or water<br>supply proposed <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                 |          |                 |             |  |                                                   |    |            |  |            |  |            |  |              |  |             |  |             |  |                |  |       |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                             |                                                 |                      |                |                 |                                                                                |                                                   |                                                           |  |                                                           |  |                                                                                |

**\*Information to be filled in for Commercial, Industrial or Institutional land use ONLY**

\*Total square footage of addition to existing building: \_\_\_\_\_  
\*Total structure(s) sq. footage: \_\_\_\_\_

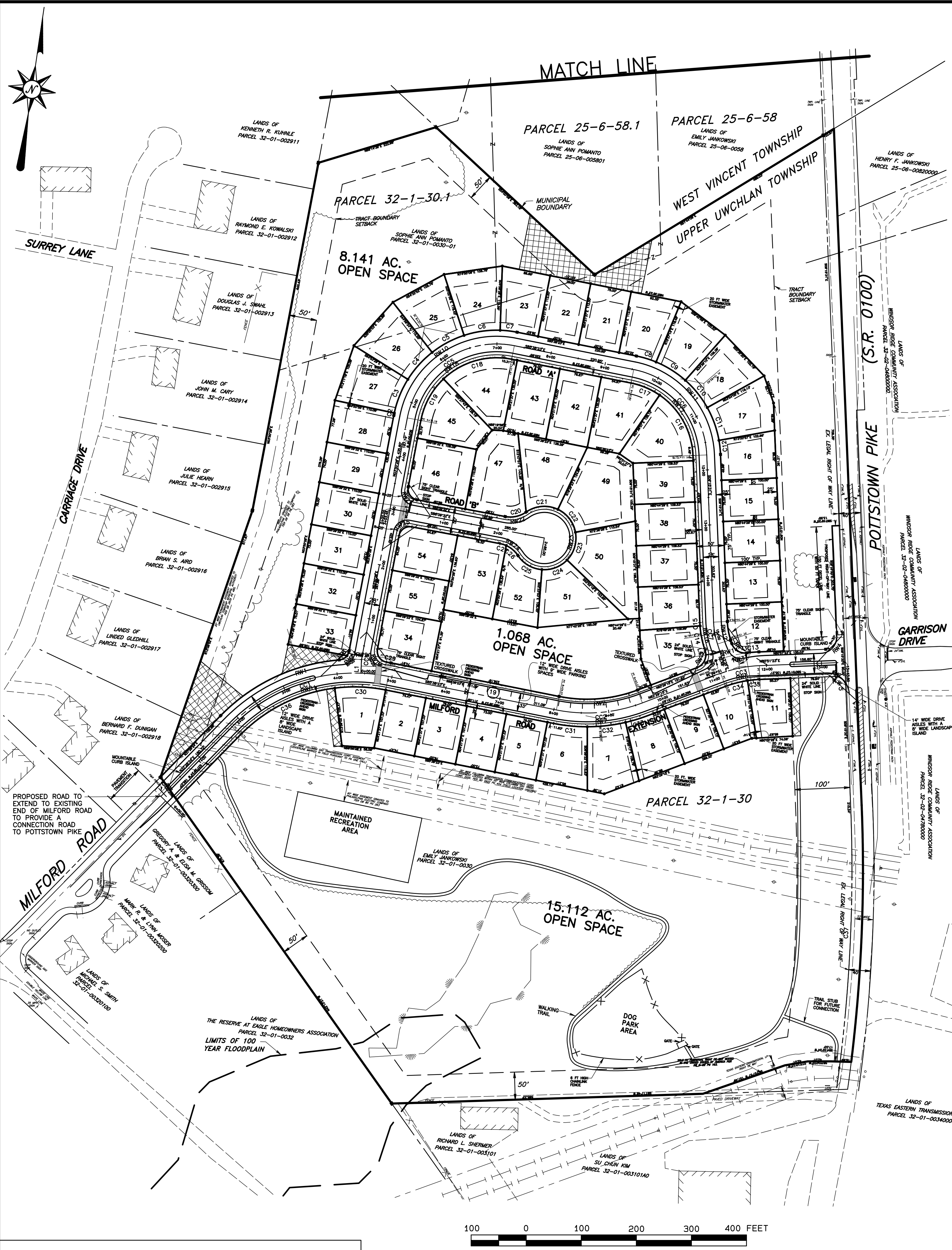
**ADDITIONAL INFORMATION (This plan has been submitted to):**

|                                                   |            |
|---------------------------------------------------|------------|
| <input type="checkbox"/> County Health Department | Date _____ |
| <input type="checkbox"/> PennDOT                  | Date _____ |
| <input type="checkbox"/> DEP                      | Date _____ |
| <input type="checkbox"/> Other _____              | Date _____ |

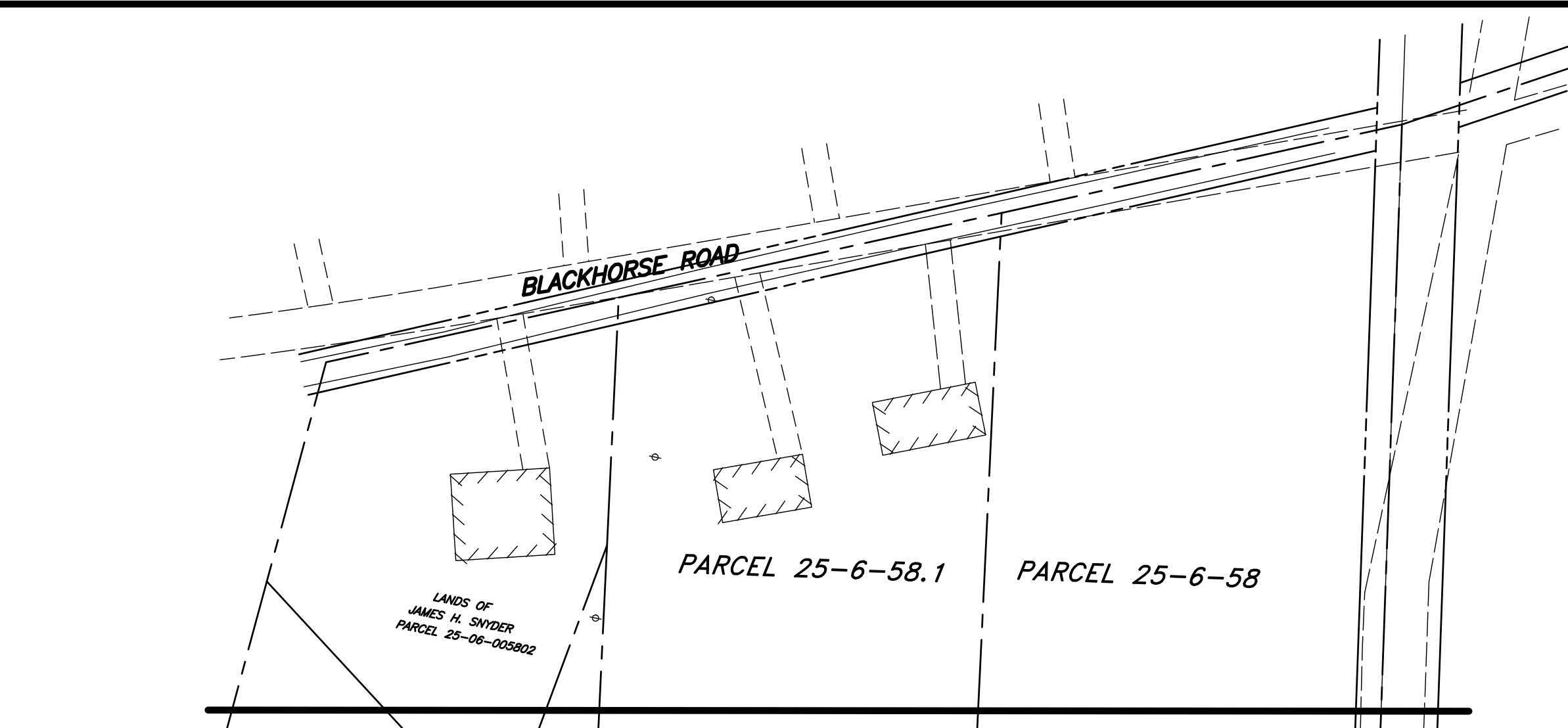
## THE TERM "LOTS"

The term "**LOTS**" includes conveyance, tracts or parcels of land for the purpose, whether immediate or future, of lease, transfer of ownership or building or development, as well as residue parcels, annexations, or the correction of lot lines.





UPI NUMBERS 32-1-30-30.1, 25-6-58.1



LOCATION MAP  
SCALE: 1"=2000'

| OPEN SPACE SUMMARY                                               |                                                                         |
|------------------------------------------------------------------|-------------------------------------------------------------------------|
| F-1 FLEXIBLE DEVELOPMENT OVERLAY DISTRICT                        |                                                                         |
| OPEN SPACE REQUIREMENTS:                                         |                                                                         |
| MINIMUM REQUIRED OPEN SPACE = PER Z.O. SECTION 200-72.D.(1),(a)  | 40% OF GROSS TRACT AREA                                                 |
| GROSS TRACT AREA                                                 | 40.655 AC                                                               |
| MINIMUM REQUIRED OPEN SPACE (40%)                                | 16.262 AC                                                               |
| TOTAL PROPOSED OPEN SPACE                                        |                                                                         |
| TOTAL OPEN SPACE PROVIDED                                        | 24.321 AC                                                               |
| NET OPEN SPACE DETERMINATION                                     |                                                                         |
| TOTAL OPEN SPACE AREA                                            | = 24.321 ACRES                                                          |
| AREA LESS THAN 100 FT WIDE                                       | = 0.677 ACRES                                                           |
| TOTAL AREA TO BE DEDUCTED                                        | = 0.677 ACRES                                                           |
| NET OPEN SPACE AREA                                              | = 23.644 ACRES, 58.16%                                                  |
| RESTRICTED OPEN SPACE                                            |                                                                         |
| REQUIRED                                                         | = 15% MIN. OF GROSS TRACT AREA<br>= 15% X 40.655 ACRES<br>= 6.098 ACRES |
| AREAS TO BE DEDUCTED FROM COUNTING TOWARDS RESTRICTED OPEN SPACE |                                                                         |
| IMPERVIOUS SURFACE                                               | 0.28 ACRES                                                              |
| FLOOD HAZARD AREA                                                | 0.39 ACRES (NOT INCLUDING WETLANDS)                                     |
| WETLANDS                                                         | 0.69 ACRES                                                              |
| >25% SLOPES                                                      | 0                                                                       |
| SEWAGE TREATMENT AREA                                            | 0                                                                       |
| TOTAL AREA DEDUCTED                                              | 1.37 ACRES                                                              |
| TOTAL QUALIFYING AREA                                            | 23.15 ACRES                                                             |

| ZONING DATA                                               |                                      |
|-----------------------------------------------------------|--------------------------------------|
| ZONING DISTRICT: R-2,<br>F-1 FLEXIBLE DEVELOPMENT OVERLAY |                                      |
| REQUIREMENTS                                              | REQUIRED                             |
| MINIMUM LOT SIZE                                          | 7,500 SF                             |
| MINIMUM LOT WIDTH                                         | 75 FT TYPICAL                        |
| MINIMUM LOT DEPTH                                         | 100 FT                               |
| MINIMUM BUILDING SEPARATIONS                              | >20 FT                               |
| MINIMUM FRONT YARD (TO CARTWAY)                           | 25 FT                                |
| MINIMUM REAR YARD (TO SIDEWALK)                           | 20 FT                                |
| MINIMUM SIDE YARD (MIN/ACCR)                              | 5 FT/20 FT                           |
| BUILDING SEPARATION REAR TO REAR                          | 50 FT                                |
| MINIMUM REAR TO REAR OR REAR TO SIDE                      | 50 FT                                |
| MAXIMUM IMPERVIOUS COVER                                  | 45%                                  |
| LOTS >7,000 SF                                            | <45%                                 |
| TRACT PERIMETER SETBACK                                   | 50 FT                                |
| TRACT BOUNDARY (MIN)                                      | 100 FT                               |
| ROUTE 100 (MIN)                                           | 100 FT                               |
| MINIMUM PARKING RATIO                                     | 2 SPACES PER D.U., 2 SPACES PER D.U. |

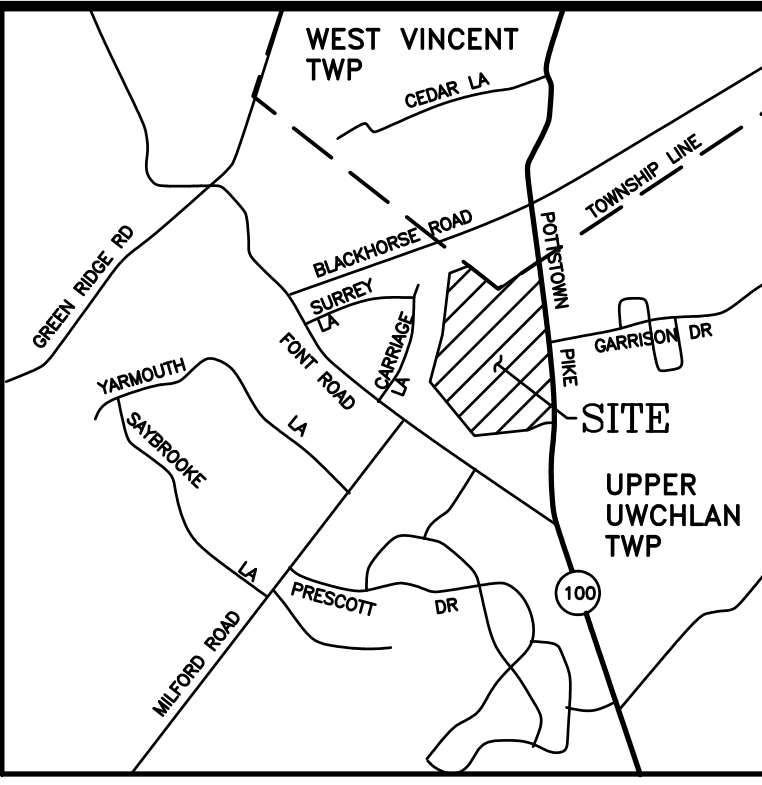
| DENSITY CALCULATIONS                                                                                                                                      |                                      |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| F-1 FLEXIBLE DEVELOPMENT OVERLAY DISTRICT                                                                                                                 |                                      |
| GROSS TRACT AREA                                                                                                                                          | 40.655 AC (UPPER UWCHLAN TOWNSHIP)   |
| CALCULATION OF NET TRACT AREA                                                                                                                             |                                      |
| GROSS TRACT AREA LESS EXISTING ROAD RIGHTS OF WAY,<br>75% OF WETLAND AREAS, FLOODPLAINS, AREA IN WEST VINCENT<br>AND EXISTING EASEMENTS AND RIGHTS OF WAY |                                      |
| GROSS TRACT AREA                                                                                                                                          | 40.655 AC                            |
| EXISTING ROAD RIGHT OF WAY                                                                                                                                | (- )0.776 AC                         |
| BASE TRACT AREA                                                                                                                                           | 39.879 AC                            |
| 75% OF WETLAND & FLOODPLAIN<br>EXISTING EASEMENTS<br>PROHIBITIVE SLOPES                                                                                   | (- )0.810 AC<br>(- )2.694 AC<br>0 AC |
| NET TRACT AREA                                                                                                                                            | 36.375 AC                            |
| REQUIRED OPEN SPACE<br>= 40% x GROSS TRACT AREA                                                                                                           | 16.262 AC                            |
| PROVIDED OPEN SPACE (NET)                                                                                                                                 | 23.644 AC                            |
| % NET OPEN SPACE PROVIDED                                                                                                                                 | 58.16%                               |

|                                                                        |                                                  |
|------------------------------------------------------------------------|--------------------------------------------------|
| DENSITY CALCULATION:                                                   |                                                  |
| BASE DENSITY                                                           | 1.1 D.U. x NTA (1.1 D.U. x 36.375 AC)<br>40 D.U. |
| BONUS DENSITY:                                                         |                                                  |
| +BONUS FOR O.S.<br>(18.16% ADDITIONAL O.S.x2 = 36.32% x 40 DU = 15 DU) | 15 D.U.                                          |
| TOTAL NUMBER D.U. PERMITTED                                            | 55 D.U.                                          |
| TOTAL NUMBER D.U. PROPOSED                                             | 55 D.U.                                          |

| SUBDIVISION AND LAND DEVELOPMENT<br>ORDINANCE WAIVER REQUESTS |                                                                                                                        |
|---------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|
| 1. SECTION 162-28.A:                                          | RELIEF IS REQUESTED TO ALLOW THE INTERNAL ROADS<br>TO BE 28 FT WIDE IN LIEU OF THE REQUIRED 32 FT WIDE<br>AS REQUIRED. |
| 2. SECTION 162-41.A:                                          | RELIEF IS REQUESTED TO ALLOW SIDEWALK ON ONE SIDE<br>OF THE STREET ONLY IN LIEU OF BOTH SIDES AS REQUIRED.             |

CERTIFICATE OF CONFORMANCE  
I hereby certify that to the best of my knowledge,  
these plans are in conformity with engineering, zoning,  
building, sanitation and other applicable township  
ordinances and regulations.  
Adam J. Brower, P.E.

| LEGEND                                               |                                                         |
|------------------------------------------------------|---------------------------------------------------------|
| TRACT BOUNDARY                                       | EXISTING STRUCTURE                                      |
| LOT & PROPOSED RIGHT OF WAY BOUNDARY                 | OPEN SPACE AREA <100 FT IN WIDTH OR WITHIN 25' OF BLDG. |
| BUILDING SETBACK LINES                               | EXISTING EDGE PAVEMENT                                  |
| EASEMENT BOUNDARY                                    | WETLANDS BOUNDARY                                       |
| PIPELINE                                             | PROPOSED SIDEWALK                                       |
| ELECTRIC LINE                                        | PROPOSED CROSSWALK                                      |
| WATER LINE                                           |                                                         |
| SHEET INDEX                                          |                                                         |
| OVERALL TITLE PLAN                                   | 1                                                       |
| TITLE PLANS                                          | 2-3                                                     |
| EXISTING FEATURES PLAN                               | 4                                                       |
| OVERALL CONSTRUCTION IMPROVEMENT PLAN                | 5                                                       |
| CONSTRUCTION IMPROVEMENT PLANS                       | 6-7                                                     |
| OVERALL EROSION & SEDIMENTATION CONTROL PLAN         | 8                                                       |
| EROSION & SEDIMENTATION CONTROL PLANS                | 9-10                                                    |
| OVERALL POST CONSTRUCTION STORMWATER MANAGEMENT PLAN | 11                                                      |
| POST CONSTRUCTION STORMWATER MANAGEMENT PLANS        | 12-13                                                   |
| OPEN SPACE PLAN                                      | 14                                                      |
| UTILITY PLANS                                        | 15-16                                                   |
| OVERALL LANDSCAPE PLAN                               | 17                                                      |
| LANDSCAPE PLANS                                      | 20-22                                                   |
| PROFILE SHEETS                                       | 23-26                                                   |
| DETAIL SHEETS                                        |                                                         |



LOCATION MAP  
SCALE: 1"=2000'

COMMONWEALTH OF PENNSYLVANIA  
COUNTY OF CHESTER  
SS:  
On the \_\_\_\_\_ day of \_\_\_\_\_ A.D. 20\_\_\_\_  
before me, the subscriber, a Notary Public of the Commonwealth  
of Pennsylvania, residing in \_\_\_\_\_ who  
personally appeared \_\_\_\_\_  
acknowledges himself to be the \_\_\_\_\_  
and that as such to do so, he executed the foregoing plan by  
signing his name by himself as \_\_\_\_\_  
that he is the owner of the designated land, that necessary  
approval of the plan has been obtained and is endorsed thereon  
and that he desires that the foregoing plan may be duly recorded.

Notary Public \_\_\_\_\_  
My Commission Expires \_\_\_\_\_

COMMONWEALTH OF PENNSYLVANIA  
COUNTY OF CHESTER  
SS:  
On the \_\_\_\_\_ day of \_\_\_\_\_ A.D. 20\_\_\_\_  
before me, the subscriber, a Notary Public of the Commonwealth  
of Pennsylvania, residing in \_\_\_\_\_ who  
personally appeared \_\_\_\_\_  
acknowledges himself to be the \_\_\_\_\_  
and that as such to do so, he executed the foregoing plan by  
signing his name by himself as \_\_\_\_\_  
that he is the owner of the designated land, that necessary  
approval of the plan has been obtained and is endorsed thereon  
and that he desires that the foregoing plan may be duly recorded.

Notary Public \_\_\_\_\_  
My Commission Expires \_\_\_\_\_

REVIEWED by the Planning Commission of Upper Uwchlan  
Township, Chester County, Pa., this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_.

APPROVED by the Board of Supervisors of Upper Uwchlan  
Township, Chester County, Pa., this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_.

REVIEWED by the Chester County Planning Commission  
this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_.

Secretary \_\_\_\_\_

APPROVED by the Upper Uwchlan Township Engineer;  
\_\_\_\_\_  
Date \_\_\_\_\_

Recorded in the Office of the Recorder of Deeds  
of Chester County at West Chester, Pennsylvania in  
Plan book \_\_\_\_\_ Page \_\_\_\_\_ on the  
\_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_.

(Deputy) Recorder of Deeds \_\_\_\_\_

RECORD OWNER  
PARCEL 32-1-30  
HENRY JANKOWSKI  
R.D. 2 BOX 217  
CHESTER SPRINGS, PA 19425

EQUITABLE OWNER/APPLICANT  
BLACK HORSE ELU, LLC  
485 DEVON PARK DRIVE  
WAYNE, PA 19087  
484-588-5035

PARCELS 32-1-30.1 &  
25-6-58.1  
SOPHIE ANN & DAVID POMANTO  
289 BLACK HORSE ROAD  
CHESTER SPRINGS, PA 19425

## PRELIMINARY/FINAL PLAN OVERALL TITLE PLAN

2. 9-8-17 REVISED PER TWP. ENGINEER LETTER DATED 9-8-17.  
1. 8-18-17 REVISED ROADWAY IMPROVEMENTS.

SUBDIVISION PLAN  
FOR  
**JANKOWSKI TRACT**

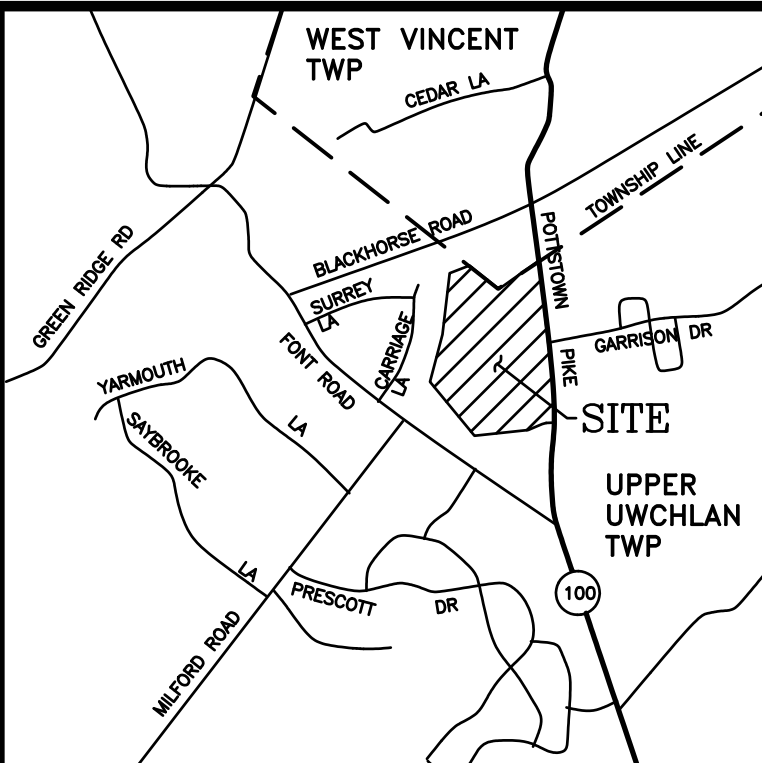
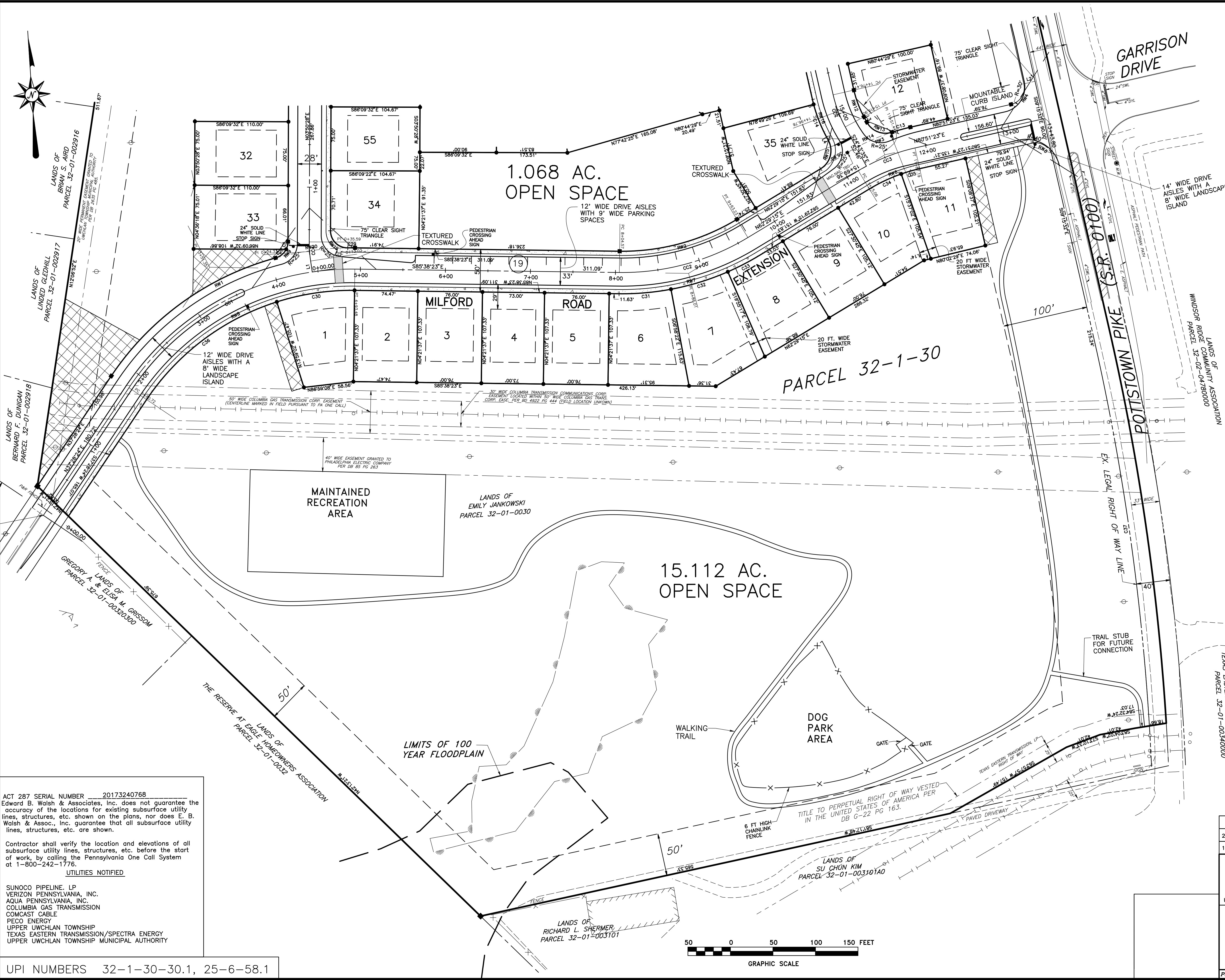
UPPER UWCHLAN TOWNSHIP  
CHESTER COUNTY, PA.

Edward B. Walsh & Associates, Inc.  
CIVIL ENGINEERS & SURVEYORS  
**LIONVILLE PROFESSIONAL CENTER**  
125 Dowlan Forge Rd.  
Eaton, Pennsylvania 19341  
Phone: 610-903-0060  
Fax: 610-903-0080

Project- 4272  
Date- 8-8-17  
Scale- 1"= 100'  
Drawn- SLM  
Checked- AIB  
Sheet- 1 OF 26

Plotted: 2/1/2018 File: F:\JB\4272\4272-B3.pro





LOCATION MAP  
SCALE: 1"=2000'

- GENERAL NOTES**
- IT IS PROPOSED TO DEVELOP THE 40.655 ACRE TRACT TO PROVIDE 55 SINGLE FAMILY HOMES.
  - THE LOTS WILL BE SERVED WITH THE PUBLIC WATER AND SANITARY SEWER SYSTEMS.
  - THE PROPOSED INTERNAL ROADS ARE PROVIDED WITH A 28 FOOT WIDE CARRYWAY. A WAIVER OF THE SLD CODE WILL BE REQUESTED FOR CONSIDERATION.
  - THE ELECTRIC TRANSMISSION LINE ALONG THE WESTERN PORTION OF THE TRACT DOES NOT HAVE AN EASEMENT ASSOCIATED WITH IT. IT IS PROPOSED TO BE RELOCATED.
  - THE PROPOSED OPEN SPACE AREA WILL BE OWNED AND MAINTAINED BY A HOMEOWNERS ASSOCIATION THAT WILL BE CREATED FOR THE PROPOSED COMMUNITY. OPEN SPACE MANAGEMENT IS NOTED ON THE OPEN SPACE PLAN. THE OPEN SPACE WILL NOT BE OPEN TO THE GENERAL PUBLIC WITH THE EXCEPTION OF PUBLIC USE OF THE WALKING PATH.
  - THE PROPOSED ROADS WILL BE OFFERED FOR DEDICATION TO UPPER UWCHLAN TOWNSHIP. THE LANDSCAPE ISLANDS ARE TO BE MAINTAINED BY THE HOMEOWNERS ASSOCIATION.
  - A BOUNDARY SURVEY WAS PERFORMED BY EDWARD B. WALSH & ASSOCIATES IN JULY 2016. A TITLE REPORT PREPARED BY FIRST AMERICAN TITLE COMPANY WAS REVIEWED FOR ANY ENCROACHMENTS OR EASEMENTS LOCATED IN THE PARCELS PROPOSED FOR DEVELOPMENT. SURVEY DATUM = NGVD 29, BENCHMARK = SAN SEWER MH IN MILFORD RD.
  - THE EXISTING FEATURES AND TOPOGRAPHY WERE SURVEYED BY HORIZON ENGINEERING IN 2004 AND SUPPLEMENTED WITH ADDITIONAL SURVEYING PERFORMED BY EDWARD B. WALSH & ASSOCIATES IN OCTOBER 2017.
  - THE SOILS BOUNDARIES AND CLASSIFICATIONS NOTED ARE TAKEN FROM THE USDA SOIL SURVEY MAPPING.
  - A WETLAND DELINEATION WAS PERFORMED BY EDWARD B. WALSH & ASSOCIATES IN JUNE 2017.
  - THE SITE CONTAINS AN AREA CONTAINED IN THE 100 YEAR FLOODPLAIN AS SHOWN ON FIRM 4502R00000, EFFECTIVE 9/29/17.
  - A HIGHWAY OCCUPANCY PERMIT IS REQUIRED PURSUANT TO SECTION 420 OF THE ACT OF JUNE 1, 1945 (PL 1242, NO. 428) KNOWN AS THE "STATE HIGHWAY LAW", FOR THE INTERSECTION WITH POTISTOWN PIKE.
  - CONCRETE MONUMENTS TO BE SET AT TRACT CORNERS AND ALSO PROPOSED RIGHT OF WAY AT LOCATIONS WITH THE "S" SYMBOL. IRON PINS TO BE SET AT ALL PROPOSED LOT CORNERS AT THE LOCATIONS WITH THE "•" SYMBOL.
  - AN AS-BUILT SURVEY OF ALL STORMWATER MANAGEMENT FACILITIES MUST BE PERFORMED AND PROVIDED TO THE TOWNSHIP. ANY DISCREPANCIES BETWEEN THE AS-BUILT AND DESIGN MUST BE ADDRESSED.
  - STORM WATER MANAGEMENT INFORMATION:  
THE STORM WATER MANAGEMENT FACILITIES SHOWN ON THIS PLAN HAVE BEEN DESIGNED ASSUMING AN IMPERVIOUS SURFACE OF 500 SQ. FT. GREATER THAN WHAT IS PROVIDED IN THE IMPERVIOUS COVER FOR EACH LOT. ANY LOT WHERE THE COVERAGE IS EXCEEDED, ADDITIONAL STORMWATER MANAGEMENT PROVISIONS AND CALCULATIONS WILL BE REQUIRED AND WILL BE SUBMITTED AND APPROVED BY THE TOWNSHIP ENGINEER PRIOR TO THE ISSUANCE OF A BUILDING PERMIT.
  - ANY/ALL STORM WATER CONVEYANCE SYSTEM(S) AND DETENTION FACILITIES SHOWN ON THESE PLANS ARE A BASIC AND PERPETUAL PART OF THE STORM WATER MANAGEMENT SYSTEM FOR THIS TOWNSHIP. AND, AS SUCH, ARE TO BE PROTECTED, MAINTAINED AND PRESERVED IN ACCORDANCE WITH THE APPROVED FINAL PLAN. THE TOWNSHIP AND/OR ITS AGENTS MAY RESERVE THE PRIVILEGE TO ENTER UPON SUCH LANDS FROM TIME TO TIME FOR THE PURPOSE OF INSPECTION OF SAID STORM WATER MANAGEMENT FACILITIES IN ORDER TO DETERMINE THAT THE STRUCTURAL DESIGN AND INTEGRITY ARE BEING MAINTAINED PROPERLY.
  - NOTHING SHALL BE PERMITTED TO BE SET ON, PLACED OR PLANTED WITHIN, THE AREA OF ANY UTILITY OR STORM WATER EASEMENT EXCEPT LAWNS OR SUITABLE LOW GROUND COVER.
  - THE FEATURES TO BE PROVIDED IN THE PROPOSED DOG PARK MUST BE PROVIDED FOR REVIEW PRIOR TO FINAL PLAN APPROVAL.

ACT 287 SERIAL NUMBER 20173240768  
Edward B. Walsh & Associates, Inc. does not guarantee the accuracy of the locations for existing subsurface utility lines, structures, etc. shown on the plans, nor does E. B. Walsh & Assoc., Inc. guarantee that all subsurface utility lines, structures, etc. are shown.

Contractor shall verify the location and elevations of all subsurface utility lines, structures, etc. before the start of work, by calling the Pennsylvania One Call System at 1-800-242-1778.

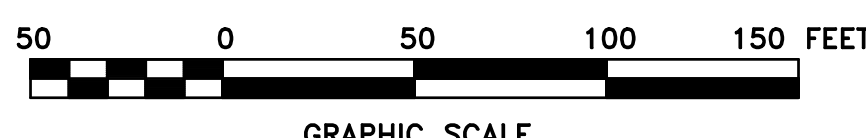
- UTILITIES NOTIFIED**
- SUNOCO PIPELINE, LP
  - VERIZON PENNSYLVANIA, INC.
  - AQUA PENNSYLVANIA, INC.
  - COLUMBIA GAS TRANSMISSION
  - COMCAST CABLE
  - PECO ENERGY
  - UPPER UWCHLAN TOWNSHIP
  - TEXAS EASTERN TRANSMISSION/SPECTRA ENERGY
  - UPPER UWCHLAN TOWNSHIP MUNICIPAL AUTHORITY

UPI NUMBERS 32-1-30-30.1, 25-6-58.1

PRELIMINARY/FINAL PLAN  
TITLE PLAN

2. 9-8-17 REVISED PER TWP. ENGINEER LETTER DATED 9-8-17.  
1. 8-18-17 REVISED ROADWAY IMPROVEMENTS.

|                                                                                                                                |                     |
|--------------------------------------------------------------------------------------------------------------------------------|---------------------|
| SUBDIVISION PLAN<br>FOR<br><b>JANKOWSKI TRACT</b>                                                                              |                     |
| UPPER UWCHLAN TOWNSHIP                                                                                                         | CHESTER COUNTY, PA. |
| Edward B. Walsh & Associates, Inc.                                                                                             |                     |
| CIVIL ENGINEERS & SURVEYORS                                                                                                    |                     |
| LIONVILLE PROFESSIONAL CENTER<br>125 Dowlan Forge Rd.<br>Eaton, Pennsylvania 19341<br>Phone: 610-903-0060<br>Fax: 610-903-0080 |                     |
| Project-- 4272                                                                                                                 | Date-- 8-8-17       |
| Scale-- 1"= 50'                                                                                                                | Drawn-- ALB         |
| Checked-- SLM                                                                                                                  | Sheet-- 2 OF 26     |





| ROAD CENTERLINE CURVE DATA |         |           |         |               |         |
|----------------------------|---------|-----------|---------|---------------|---------|
| CURVE                      | RADIUS  | DELTA     | ARC     | CHORD BEARING | CHORD   |
| CC1                        | 315.00' | 56°53'13" | 312.75' | N65°55'01"E   | 300.06' |
| CC2                        | 285.22' | 31°52'23" | 158.66' | N78°25'26"E   | 156.63' |
| CC3                        | 225.00' | 18°22'08" | 72.13'  | N71°40'19"E   | 71.83'  |
| L1                         |         |           | 13.03'  | N04°46'38"W   |         |
| CC4                        | 150.00' | 8°37'06"  | 22.56'  | N00°28'05"W   | 22.54'  |
| CC5                        | 165.00' | 90°31'09" | 260.68' | N49°06'03"E   | 234.40' |
| CC6                        | 165.00' | 76°22'52" | 219.96' | S47°26'57"E   | 204.03' |
| CC7                        | 150.00' | 15°28'04" | 40.49'  | S16°59'33"E   | 40.37'  |

| ROAD RIGHT-OF-WAY CURVE DATA |         |           |         |               |         |
|------------------------------|---------|-----------|---------|---------------|---------|
| CURVE                        | RADIUS  | DELTA     | ARC     | CHORD BEARING | CHORD   |
| RW1                          | 340.00' | 56°53'13" | 337.57' | N65°55'01"E   | 323.88' |
| RW2                          | 260.22' | 31°52'23" | 144.76' | N78°25'26"E   | 142.90' |
| RW3                          | 250.00' | 18°22'08" | 80.15'  | N71°40'19"E   | 79.81'  |
| RW4                          | 20.00'  | 90°45'08" | 31.68'  | N35°29'01"E   | 28.47'  |
| L2                           |         |           | 13.55'  | N80°44'28"E   |         |
| RW5                          | 20.00'  | 89°53'05" | 31.38'  | S54°12'05"E   | 28.26'  |
| RW6                          | 200.00' | 18°22'08" | 64.12'  | S71°40'19"W   | 63.85'  |
| RW7                          | 310.22' | 31°52'23" | 172.57' | S78°25'26"W   | 170.36' |
| RW8                          | 290.00' | 56°53'13" | 287.93' | S65°55'01"W   | 276.23' |
| RW9                          | 20.00'  | 74°33'32" | 26.03'  | N41°07'14"E   | 24.23'  |
| RW10                         | 190.00' | 90°31'09" | 300.17' | N49°06'03"E   | 269.92' |
| RW11                         | 190.00' | 76°22'52" | 253.29' | S47°26'57"E   | 234.95' |
| RW12                         | 125.00' | 15°28'04" | 33.75'  | S16°59'33"E   | 33.64'  |
| L3                           |         |           | 7.05'   | S24°43'35"E   |         |
| RW13                         | 25.00'  | 79°31'36" | 34.70'  | N64°29'23"W   | 31.98'  |
| RW14                         | 250.00' | 13°15'43" | 57.87'  | S69°07'06"W   | 57.74'  |
| RW15                         | 25.00'  | 87°12'50" | 38.05'  | S18°52'50"W   | 34.49'  |
| L4                           |         |           | 4.57'   | N24°43'35"W   |         |
| RW16                         | 175.00' | 15°28'04" | 47.24'  | N16°59'33"W   | 47.10'  |
| RW17                         | 140.00' | 76°22'52" | 186.63' | N47°26'57"W   | 173.12' |
| RW18                         | 140.00' | 90°31'09" | 221.18' | S49°06'03"W   | 198.89' |
| RW19                         | 20.00'  | 90°55'51" | 31.74'  | S41°37'28"E   | 28.51'  |
| RW20                         | 340.00' | 14°30'36" | 86.10'  | S65°39'18"W   | 85.87'  |
| RW21                         | 20.00'  | 90°00'00" | 31.42'  | S41°09'32"E   | 28.28'  |
| RW22                         | 50.00'  | 45°45'33" | 39.93'  | N70°57'41"E   | 38.88'  |
| RW23                         | 57.50'  | 27°13'07" | 272.49' | S03°50'28"W   | 80.23'  |
| RW24                         | 50.00'  | 45°45'34" | 39.93'  | N63°16'45"E   | 38.88'  |
| RW25                         | 20.00'  | 90°00'00" | 31.42'  | S48°50'28"W   | 28.28'  |

| LOT CURVE DATA |          |           |         |               |         |
|----------------|----------|-----------|---------|---------------|---------|
| CURVE          | RADIUS   | DELTA     | ARC     | CHORD BEARING | CHORD   |
| C1             | 20.00'   | 28°43'39" | 9.33'   | S17°12'17"W   | 8.25'   |
| C2             | 190.00'  | 1°18'42"  | 4.35'   | S04°29'49"W   | 4.35'   |
| C3             | 190.00'  | 19°57'21" | 66.18'  | S15°07'51"W   | 65.84'  |
| C4             | 190.00'  | 19°57'05" | 66.16'  | S35°05'03"W   | 65.83'  |
| C5             | 190.00'  | 19°54'31" | 66.02'  | S55°05'51"W   | 65.69'  |
| C6             | 190.00'  | 20°03'26" | 66.51'  | S74°59'49"W   | 66.17'  |
| C7             | 190.00'  | 9°20'06"  | 30.96'  | S89°41'35"W   | 30.92'  |
| C8             | 190.00'  | 11°17'34" | 37.45'  | N79°59'36"W   | 37.39'  |
| C9             | 190.00'  | 18°56'58" | 62.84'  | N84°55'19"W   | 62.55'  |
| C10            | 190.00'  | 19°17'56" | 64.00'  | N44°44'52"W   | 63.70'  |
| C11            | 190.00'  | 19°06'52" | 63.39'  | N26°32'29"W   | 63.09'  |
| C12            | 190.00'  | 74°33'32" | 25.62'  | N13°07'17"W   | 25.60'  |
| C13            | 250.00'  | 508°24"   | 22.28'  | S78°18'11"W   | 22.28'  |
| C14            | 175.00'  | 13°33'01" | 41.39'  | S17°57'04"E   | 41.29'  |
| C15            | 175.00'  | 1°55'03"  | 5.86'   | S101°30'2"E   | 5.86'   |
| C16            | 140.00'  | 53°08'22" | 129.84' | S38°49'42"E   | 125.24' |
| C17            | 140.00'  | 2°14'29"  | 56.79'  | S74°01'08"E   | 56.40'  |
| C18            | 140.00'  | 54°49'21" | 133.96' | N66°56'57"E   | 128.90' |
| C19            | 140.00'  | 35°41'49" | 87.22'  | N21°41'22"E   | 85.82'  |
| C20            | 50.00'   | 45°45'33" | 39.93'  | S70°57'41"W   | 38.88'  |
| C21            | 57.50'   | 60°24'28" | 60.62'  | S78°17'08"W   | 57.85'  |
| C22            | 57.50'   | 54°07'05" | 54.31'  | N44°27'04"E   | 52.31'  |
| C23            | 57.50'   | 54°31'14" | 54.72'  | N09°52'04"E   | 52.67'  |
| C24            | 57.50'   | 50°18'25" | 50.49'  | N62°18'59"E   | 48.88'  |
| C25            | 57.50'   | 52°09'54" | 52.35'  | S66°28'45"E   | 50.56'  |
| C26            | 50.00'   | 32°14'41" | 28.14'  | S56°31'19"E   | 27.77'  |
| C27            | 50.00'   | 13°30'52" | 11.79'  | S79°24'06"E   | 11.77'  |
| C28            | 20.00'   | 47°49'53" | 16.70'  | S44°29'03"E   | 16.22'  |
| C29            | 127.00'  | 1°27'01"  | 8.61'   | N86°21'53"W   | 8.61'   |
| C30            | 290.00'  | 18°20'40" | 92.85'  | N85°11'18"E   | 92.45'  |
| C31            | 310.22'  | 11°19'59" | 61.36'  | N88°41'38"E   | 61.26'  |
| C32            | 310.22'  | 12°56'58" | 70.11'  | N87°33'11"E   | 69.96'  |
| C33            | 310.22'  | 7°35'29"  | 41.10'  | N66°16'59"E   | 41.07'  |
| C34            | 200.00'  | 11°53'43" | 41.52'  | N68°26'06"E   | 41.45'  |
| C35            | 200.00'  | 6°28'25"  | 22.60'  | N73°37'10"E   | 22.58'  |
| C36            | 290.00'  | 38°33'34" | 195.08' | N54°44'41"E   | 191.42' |
| C37            | 2844.93' | 9°22'39"  | 465.63' | S04°34'11"E   | 465.11' |

IMPERVIOUS COVER

| Lot No. | Lot Area (Sq. Ft.) | 45% Proposed Imperv. Cover (Sq. Ft.) | Plan Proposed Imperv. Cover (Sq. Ft.) |
|---------|--------------------|--------------------------------------|---------------------------------------|
| 1       | 8,158              | 3,671                                | 2,182                                 |
| 2       | 7,992              | 3,596                                | 2,326                                 |
| 3       | 8,157              | 3,670                                | 2,182                                 |
| 4       | 7,835              | 3,526                                | 2,326                                 |
| 5       | 8,157              | 3,671                                | 2,182                                 |
| 6       | 9,261              | 4,140                                | 2,338                                 |
| 7       | 9,675              | 4,354                                | 2,406                                 |
| 8       | 8,591              | 3,866                                | 2,290                                 |
| 9       | 7,989              | 3,595                                | 2,290                                 |
| 10      | 7,713              | 3,471                                | 2,290                                 |
| 11      | 7,596              | 3,418                                | 2,272                                 |
| 12      | 8,621              | 3,879                                | 2,128                                 |
| 13      | 7,500              | 3,375                                | 2,244                                 |
| 14      | 7,500              | 3,375                                | 2,302                                 |
| 15      | 7,500              | 3,375                                | 2,128                                 |
| 16      | 7,968              | 3,586                                | 2,244                                 |
| 17      | 9,118              | 4,103                                | 2,300                                 |
| 18      | 9,164              | 4,124                                | 2,146                                 |
| 19      | 9,028              | 4,063                                | 2,244                                 |
| 20      | 9,177              | 4,130                                | 2,282                                 |
| 21      | 8,438              | 3,797                                | 2,146                                 |
| 22      | 8,438              | 3,797                                | 2,282                                 |
| 23      | 8,860              | 4,032                                | 2,282                                 |
| 24      | 9,791              | 4,406                                | 2,146                                 |
| 25      | 9,668              | 4,351                                | 2,244                                 |
| 26      | 9,644              | 4,340                                | 2,282                                 |
| 27      | 9,360              | 4,212                                | 2,164                                 |
| 28      | 8,360              | 3,762                                | 2,244                                 |
| 29      | 8,140              | 3,663                                | 2,282                                 |
| 30      | 8,580              | 3,861                                | 2,128                                 |
| 31      | 7,920              | 3,564                                | 2,244                                 |
| 32      | 8,250              | 3,712                                | 2,282                                 |
| 33      | 8,281              | 3,726                                | 2,128                                 |
| 34      | 8,991              | 4,046                                | 2,290                                 |
| 35      | 9,608              | 4,324                                | 2,344                                 |
| 36      | 8,416              | 3,787                                | 2,374                                 |
| 37      | 8,215              | 3,697                                | 2,326                                 |
| 38      | 8,215              | 3,697                                | 2,334                                 |
| 39      | 8,215              | 3,697                                | 2,336                                 |
| 40      | 10,109             | 4,549                                | 2,254                                 |
| 41      | 11,099             | 4,994                                | 2,462                                 |
| 42      | 9,967              | 4,485                                | 2,424                                 |
| 43      | 10,070             | 4,621                                | 2,462                                 |
| 44      | 10,686             | 4,809                                | 2,326                                 |
| 45      | 9,919              | 4,463                                | 2,334                                 |
| 46      | 11,914             | 5,361                                | 2,372                                 |
| 47      | 13,235             | 5,956                                | 2,398                                 |
| 48      | 11,593             | 5,217                                | 2,508                                 |
| 49      | 15,488             | 6,970                                | 2,606                                 |
| 50      | 14,926             | 6,717                                | 2,326                                 |
| 51      | 13,667             | 6,150                                | 2,370                                 |
| 52      | 8,953              | 4,029                                | 2,624                                 |
| 53      | 12,318             | 5,543                                | 2,362                                 |
| 54      | 8,705              | 3,918                                | 2,334                                 |
| 55      | 7,850              | 3,532                                | 2,444                                 |

PRELIMINARY/FINAL PLAN  
TITLE PLAN

2. 9-8-17 REVISED PER TWP. ENGINEER LETTER DATED 9-8-17.

1. 8-18-17 REVISED ROADWAY IMPROVEMENTS.

SUBDIVISION PLAN  
FOR  
JANKOWSKI TRACT

UPPER UWCHLAN TOWNSHIP  
CHESTER COUNTY, PA.

Edward B. Walsh & Associates, Inc.  
CIVIL ENGINEERS & SURVEYORS

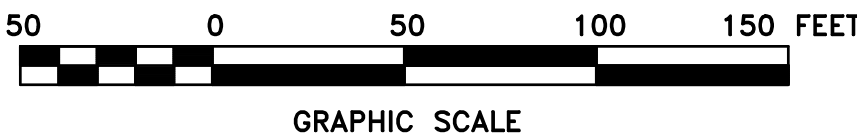
LIONVILLE PROFESSIONAL CENTER  
125 Dowlan Forge Rd.  
Exton, Pennsylvania 19341  
Phone: 610-903-0060  
Fax: 610-903-0080



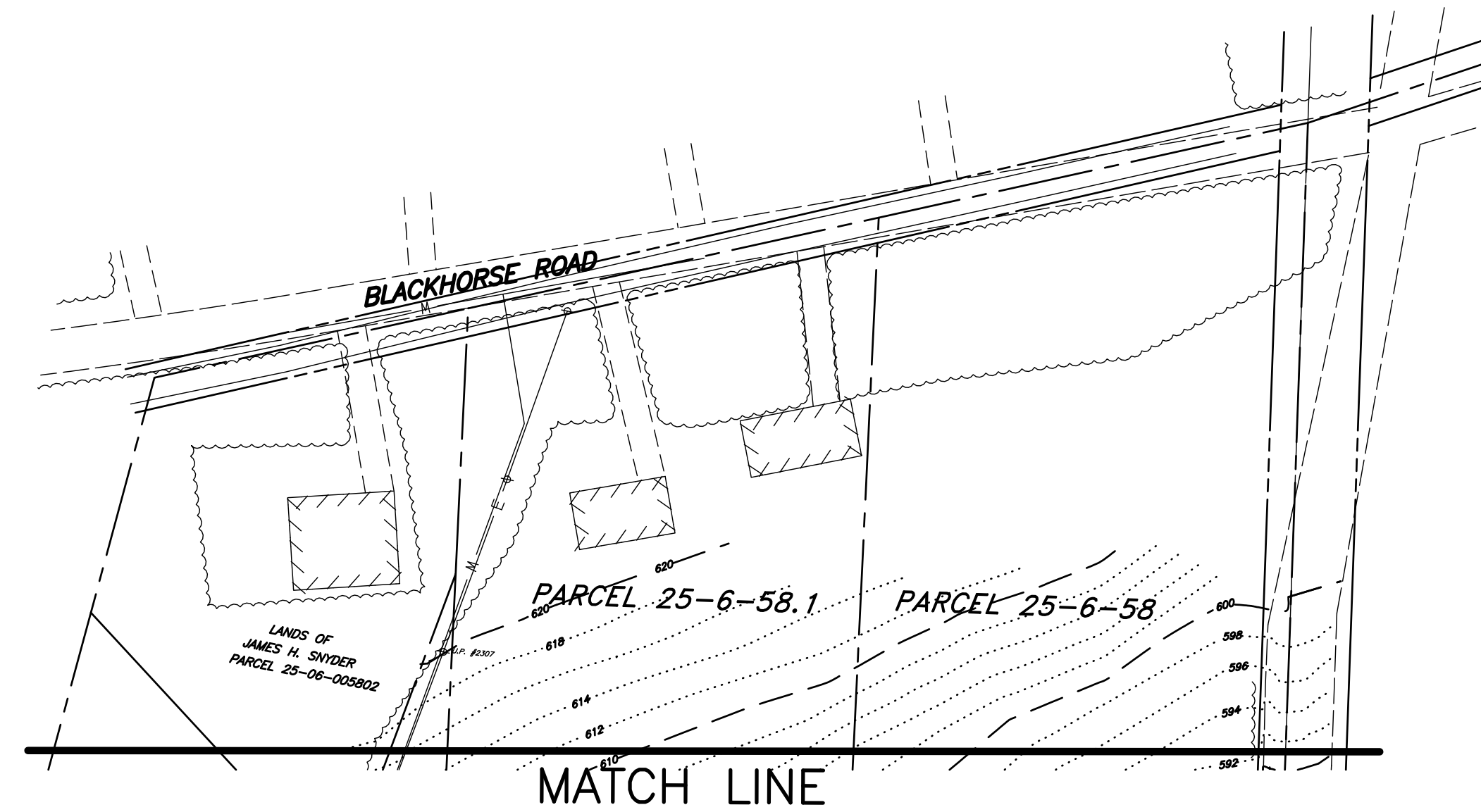
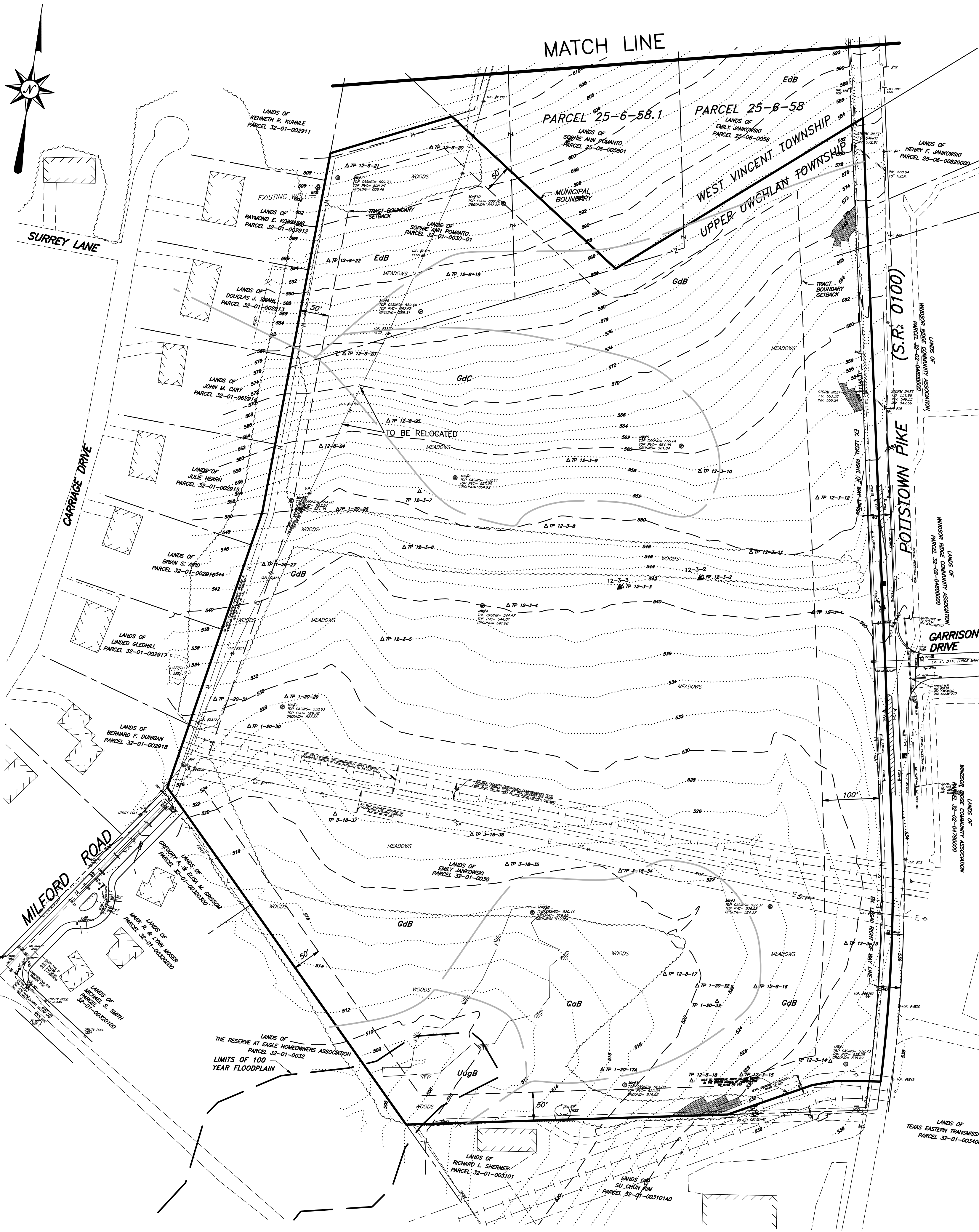
Project- 4272  
Date- 8-8-17  
Scale- 1"= 50'  
Drawn- SLJ  
Checked- AJB  
Sheet- 3 OF 26

Plotted: 2/1/2018 File: F:\JBA\4272\4272-B3.pro

UPI NUMBERS 32-1-30-30.1, 25-6-58.1







#### SOILS CLASSIFICATION DATA

CdB - CALIFON LOAM, 3 TO 8 PERCENT SLOPES, HYDROLOGIC SOIL GROUP D  
EdB - EDGE MONT CHANNERY LOAM, 3 TO 8 PERCENT SLOPES, HYDROLOGIC SOIL GROUP A  
GdB - GLADSTONE GRAVELLY LOAM, 3 TO 8 PERCENT SLOPES, HYDROLOGIC SOIL GROUP B  
GdC - GLADSTONE GRAVELLY LOAM, 8 TO 15 PERCENT SLOPES, HYDROLOGIC SOIL GROUP B  
UuGB - URBAN LAND-UDORTHENTS, SHIST AND GNEISS COMPLEX, 8 TO 25 PERCENT SLOPES, HYDROLOGIC SOIL GROUP C

#### LEGEND

|     |     |     |                                   |
|-----|-----|-----|-----------------------------------|
| --- | 430 | --- | EXISTING INDEX CONTOUR            |
| --- | --- | --- | EXISTING INTERIOR CONTOUR         |
| --- | --- | --- | EXISTING INLET                    |
| --- | --- | --- | EXISTING STORM SEWER PIPE         |
| --- | --- | --- | EXISTING STORM MANHOLE            |
| --- | --- | --- | EXISTING SANITARY MANHOLE         |
| --- | --- | --- | EXISTING SANITARY SEWER PIPE      |
| --- | --- | --- | EXISTING GAS LINE                 |
| --- | --- | --- | EXISTING ELECTRIC LINE            |
| --- | --- | --- | EXISTING WATER LINE               |
| --- | --- | --- | PIPELINE                          |
| --- | --- | --- | EASEMENT BOUNDARY                 |
| --- | --- | --- | SOILS LINE                        |
| --- | --- | --- | EXISTING EDGE PAVEMENT            |
| --- | --- | --- | EXISTING CURB                     |
| --- | --- | --- | EXISTING SIGN                     |
| --- | --- | --- | WETLANDS BOUNDARY LINE            |
| --- | --- | --- | LIMITS OF 100 YEAR FLOODPLAIN     |
| --- | --- | --- | EXISTING EDGE OF WOODLANDS        |
| --- | --- | --- | PRECAUTIONARY SLOPES<br>15% - 25% |
| --- | --- | --- | EXISTING STRUCTURE                |

## PRELIMINARY/FINAL PLAN EXISTING FEATURES PLAN

2. 9-8-17 REVISED PER TWP. ENGINEER LETTER DATED 9-8-17.  
1. 8-18-17 REVISED ROADWAY IMPROVEMENTS.

### SUBDIVISION PLAN FOR JANKOWSKI TRACT

UPPER UWCHLAN TOWNSHIP CHESTER COUNTY, PA.

Edward B. Walsh & Associates, Inc.  
CIVIL ENGINEERS & SURVEYORS

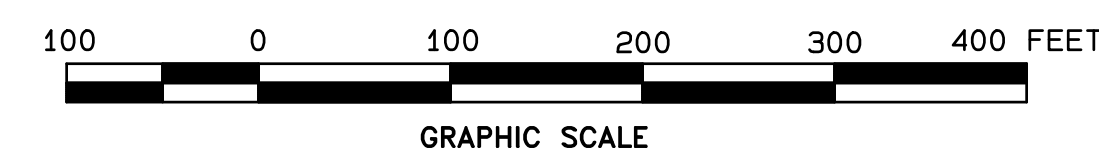
LIONVILLE PROFESSIONAL CENTER  
125 Dowlan Forge Rd.  
Eaton, Pennsylvania 19341  
Phone: 610-903-0060  
Fax: 610-903-0080



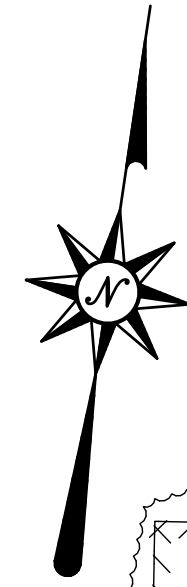
Project- 4272  
Date- 8-8-17  
Scale- 1" = 100'  
Drawn- SLM  
Checked- AJB  
Sheet- 4 OF 26

Plotted: 2/1/2018 File: F:\B\4272\4272-B3.pro

UPI NUMBERS 32-1-30-30.1, 25-6-58.1







SURREY LANE

CARRIAGE DRIVE

MILFORD ROAD

LANDS OF THE RESERVE AT EAGLE HOMEOWNERS ASSOCIATION  
PARCEL 32-01-0032

UPI NUMBERS 32-1-30-30.1, 25-6-58.1

MATCH LINE

PARCEL 25-6-58.1

PARCEL 25-6-58

LANDS OF SCOTT ANN ROMANTO  
PARCEL 25-06-005801

LANDS OF EMILY JANKOWSKI  
PARCEL 25-06-005802

LANDS OF HENRY F. JANKOWSKI  
PARCEL 25-06-005803

LANDS OF JAMES H. SWYDER  
PARCEL 25-06-005804

LANDS OF JAMES H. SWYDER  
PARCEL 25-06-005805

LANDS OF JAMES H. SWYDER  
PARCEL 25-06-005806

LANDS OF JAMES H. SWYDER  
PARCEL 25-06-005807

LANDS OF JAMES H. SWYDER  
PARCEL 25-06-005808

LANDS OF JAMES H. SWYDER  
PARCEL 25-06-005809

LANDS OF JAMES H. SWYDER  
PARCEL 25-06-005810

LANDS OF JAMES H. SWYDER  
PARCEL 25-06-005811

LANDS OF JAMES H. SWYDER  
PARCEL 25-06-005812

LANDS OF JAMES H. SWYDER  
PARCEL 25-06-005813

LANDS OF JAMES H. SWYDER  
PARCEL 25-06-005814

LANDS OF JAMES H. SWYDER  
PARCEL 25-06-005815

LANDS OF JAMES H. SWYDER  
PARCEL 25-06-005816

LANDS OF JAMES H. SWYDER  
PARCEL 25-06-005817

LANDS OF JAMES H. SWYDER  
PARCEL 25-06-005818

LANDS OF JAMES H. SWYDER  
PARCEL 25-06-005819

LANDS OF JAMES H. SWYDER  
PARCEL 25-06-005820

LANDS OF JAMES H. SWYDER  
PARCEL 25-06-005821

LANDS OF JAMES H. SWYDER  
PARCEL 25-06-005822

LANDS OF JAMES H. SWYDER  
PARCEL 25-06-005823

LANDS OF JAMES H. SWYDER  
PARCEL 25-06-005824

LANDS OF JAMES H. SWYDER  
PARCEL 25-06-005825

LANDS OF JAMES H. SWYDER  
PARCEL 25-06-005826

LANDS OF JAMES H. SWYDER  
PARCEL 25-06-005827

LANDS OF JAMES H. SWYDER  
PARCEL 25-06-005828

LANDS OF JAMES H. SWYDER  
PARCEL 25-06-005829

LANDS OF JAMES H. SWYDER  
PARCEL 25-06-005830

LANDS OF JAMES H. SWYDER  
PARCEL 25-06-005831

LANDS OF JAMES H. SWYDER  
PARCEL 25-06-005832

LANDS OF JAMES H. SWYDER  
PARCEL 25-06-005833

LANDS OF JAMES H. SWYDER  
PARCEL 25-06-005834

LANDS OF JAMES H. SWYDER  
PARCEL 25-06-005835

LANDS OF JAMES H. SWYDER  
PARCEL 25-06-005836

LANDS OF JAMES H. SWYDER  
PARCEL 25-06-005837

LANDS OF JAMES H. SWYDER  
PARCEL 25-06-005838

LANDS OF JAMES H. SWYDER  
PARCEL 25-06-005839

LANDS OF JAMES H. SWYDER  
PARCEL 25-06-005840

LANDS OF JAMES H. SWYDER  
PARCEL 25-06-005841

LANDS OF JAMES H. SWYDER  
PARCEL 25-06-005842

LANDS OF JAMES H. SWYDER  
PARCEL 25-06-005843

POTTSVILLE PIKE (S.R. 0100)

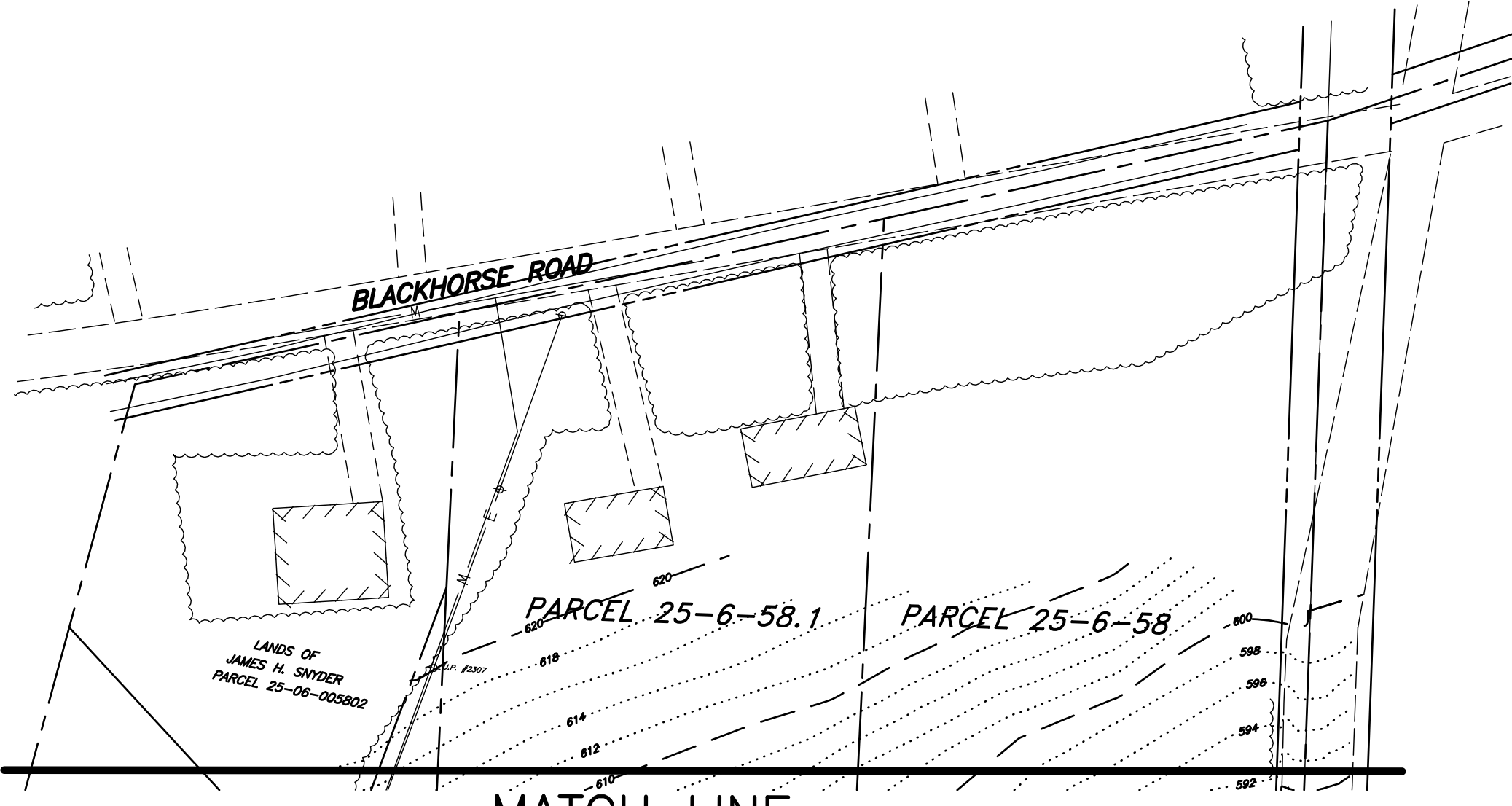
GARRISON DRIVE

STORMWATER MANAGEMENT AREA

BIO RETENTION BASIN #2

DOG PARK AREA

LANDS OF TEXAS EASTERN TRANSMISSION CORP.  
PARCEL 32-01-00340000



MATCH LINE

SOILS CLASSIFICATION DATA

- CoB - CALIFON LOAM, 3 TO 8 PERCENT SLOPES, HYDROLOGIC SOIL GROUP D
- EoB - EDGE MONT CHANNERY LOAM, 3 TO 8 PERCENT SLOPES, HYDROLOGIC SOIL GROUP A
- GdB - GLADSTONE GRAVELLY LOAM, 3 TO 8 PERCENT SLOPES, HYDROLOGIC SOIL GROUP B
- GdC - GLADSTONE GRAVELLY LOAM, 8 TO 15 PERCENT SLOPES, HYDROLOGIC SOIL GROUP B
- UuB - URBAN LAND-UDORTHENTS, SHIST AND GNEISS COMPLEX, 8 TO 25 PERCENT SLOPES, HYDROLOGIC SOIL GROUP C

| LEGEND |                                |
|--------|--------------------------------|
| ---    | EXISTING INDEX CONTOUR         |
| ---    | EXISTING INTERIOR CONTOUR      |
| ---    | PROPOSED CONTOUR               |
| ---    | PROPOSED SPOT ELEVATION        |
| ---    | EXISTING INLET                 |
| ---    | PROPOSED INLET                 |
| ---    | EXISTING STORM SEWER PIPE      |
| ---    | PROPOSED STORM SEWER PIPE      |
| ---    | EXISTING STORM MANHOLE         |
| ---    | PROPOSED STORM MANHOLE         |
| ---    | EXISTING SANITARY MANHOLE      |
| ---    | PROPOSED SANITARY MANHOLE      |
| ---    | EXISTING SANITARY SEWER PIPE   |
| ---    | PROPOSED SANITARY SEWER PIPE   |
| ---    | EXISTING GAS LINE              |
| ---    | EXISTING ELECTRIC LINE         |
| ---    | PROPOSED MONUMENT              |
| ---    | EXISTING WATER LINE            |
| ---    | PROPOSED WATER LINE            |
| ---    | PIPELINE                       |
| ---    | EASEMENT BOUNDARY              |
| ---    | SOILS LINE                     |
| ---    | EXISTING EDGE PAVEMENT         |
| ---    | EXISTING CURB                  |
| ---    | PROPOSED CURB                  |
| ---    | EXISTING SIGN                  |
| ---    | PROPOSED SIGN                  |
| ---    | PROPOSED D-W ENDWALL           |
| ---    | WETLANDS BOUNDARY LINE         |
| ---    | LIMITS OF 100 YEAR FLOODPLAIN  |
| ---    | EXISTING EDGE OF WOODLANDS     |
| ---    | PRECAUTIONARY SLOPES 15% - 25% |
| ---    | EXISTING STRUCTURE             |
| ---    | PROPOSED BUILDING              |

PRELIMINARY/FINAL PLAN  
OVERALL  
CONSTRUCTION IMPROVEMENT PLAN

2. 9-8-17 REVISED PER TWP. ENGINEER LETTER DATED 9-8-17.  
1. 8-18-17 REVISED ROADWAY IMPROVEMENTS.

SUBDIVISION PLAN  
FOR  
**JANKOWSKI TRACT**

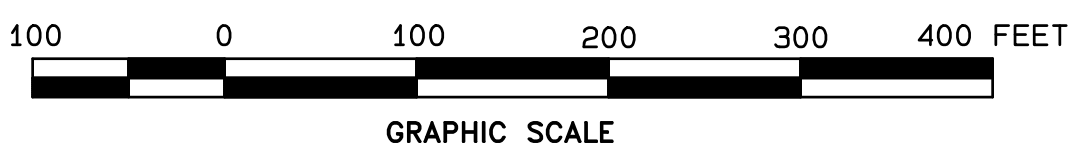
UPPER UWCHLAN TOWNSHIP  
CHESTER COUNTY, PA.

Edward B. Walsh & Associates, Inc.  
CIVIL ENGINEERS & SURVEYORS

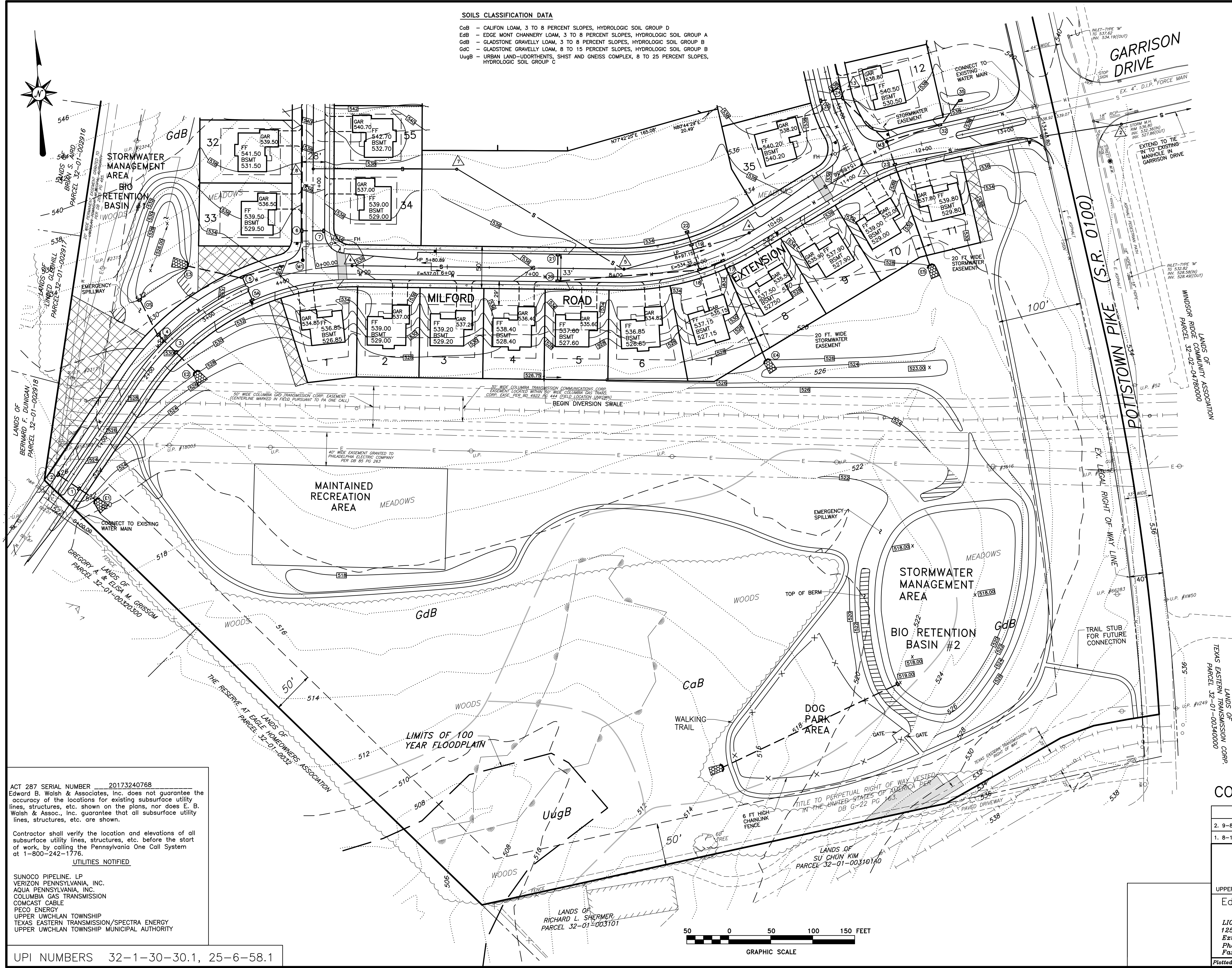
**LIONVILLE PROFESSIONAL CENTER**  
125 Dowlan Forge Rd.  
Eaton, Pennsylvania 19341  
Phone: 610-903-0060  
Fax: 610-903-0080

Plotted: 2/1/2018 File: F:\JB\4272\4272-B3.pro

Project- 4272  
Date- 8-8-17  
Scale- 1"= 100'  
Drawn- SLM  
Checked- AJB  
Sheet- 5 OF 26







**SOILS CLASSIFICATION DATA**

CaB - CALIFON LOAM, 3 TO 8 PERCENT SLOPES, HYDROLOGIC SOIL GROUP D  
EdB - EDGE MONT CHANNERY LOAM, 3 TO 8 PERCENT SLOPES, HYDROLOGIC SOIL GROUP A  
GdB - GLADSTONE GRAVELLY LOAM, 3 TO 8 PERCENT SLOPES, HYDROLOGIC SOIL GROUP B  
GdB - GLADSTONE GRAVELLY LOAM, 8 TO 15 PERCENT SLOPES, HYDROLOGIC SOIL GROUP B  
UuGB - URBAN LAND-UDORTHENTS, SHIST AND GNEISS COMPLEX, 8 TO 25 PERCENT SLOPES, HYDROLOGIC SOIL GROUP C

| LEGEND |                                   |
|--------|-----------------------------------|
|        | EXISTING INDEX CONTOUR            |
|        | EXISTING INTERIOR CONTOUR         |
|        | PROPOSED CONTOUR                  |
|        | PROPOSED SPOT ELEVATION           |
|        | EXISTING INLET                    |
|        | PROPOSED INLET                    |
|        | EXISTING STORM SEWER PIPE         |
|        | PROPOSED STORM SEWER PIPE         |
|        | EXISTING STORM MANHOLE            |
|        | PROPOSED STORM MANHOLE            |
|        | EXISTING SANITARY MANHOLE         |
|        | PROPOSED SANITARY MANHOLE         |
|        | EXISTING SANITARY SEWER PIPE      |
|        | PROPOSED SANITARY SEWER PIPE      |
|        | EXISTING GAS LINE                 |
|        | EXISTING ELECTRIC LINE            |
|        | PROPOSED MONUMENT                 |
|        | EXISTING WATER LINE               |
|        | PROPOSED WATER LINE               |
|        | PIPELINE                          |
|        | EASEMENT BOUNDARY                 |
|        | SOILS LINE                        |
|        | EXISTING EDGE PAVEMENT            |
|        | EXISTING CURB                     |
|        | PROPOSED CURB                     |
|        | EXISTING SIGN                     |
|        | PROPOSED SIGN                     |
|        | PROPOSED D-W ENDWALL              |
|        | WETLANDS BOUNDARY LINE            |
|        | LIMITS OF 100 YEAR FLOODPLAIN     |
|        | EXISTING EDGE OF WOODLANDS        |
|        | PRECAUTIONARY SLOPES<br>15% - 25% |
|        | EXISTING STRUCTURE                |
|        | PROPOSED BUILDING                 |

ACT 287 SERIAL NUMBER 20173240768  
Edward B. Walsh & Associates, Inc. does not guarantee the accuracy of the locations for existing subsurface utility lines, structures, etc. shown on the plans, nor does E. B. Walsh & Assoc., Inc. guarantee that all subsurface utility lines, structures, etc. are shown.

Contractor shall verify the location and elevations of all subsurface utility lines, structures, etc. before the start of work, by calling the Pennsylvania One Call System at 1-800-242-1778.

**UTILITIES NOTIFIED**

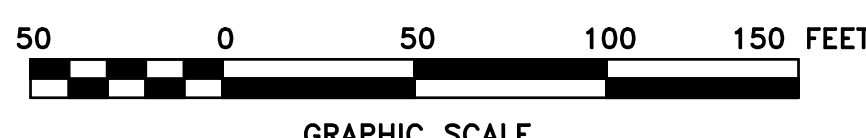
SUNOCO PIPELINE, LP  
VERIZON PENNSYLVANIA, INC.  
AQUA PENNSYLVANIA, INC.  
COLUMBIA GAS TRANSMISSION  
COMCAST CABLE  
PECO ENERGY  
UPPER UWCHLAN TOWNSHIP  
TEXAS EASTERN TRANSMISSION/SPECTRA ENERGY  
UPPER UWCHLAN TOWNSHIP MUNICIPAL AUTHORITY

UPI NUMBERS 32-1-30-30.1, 25-6-58.1

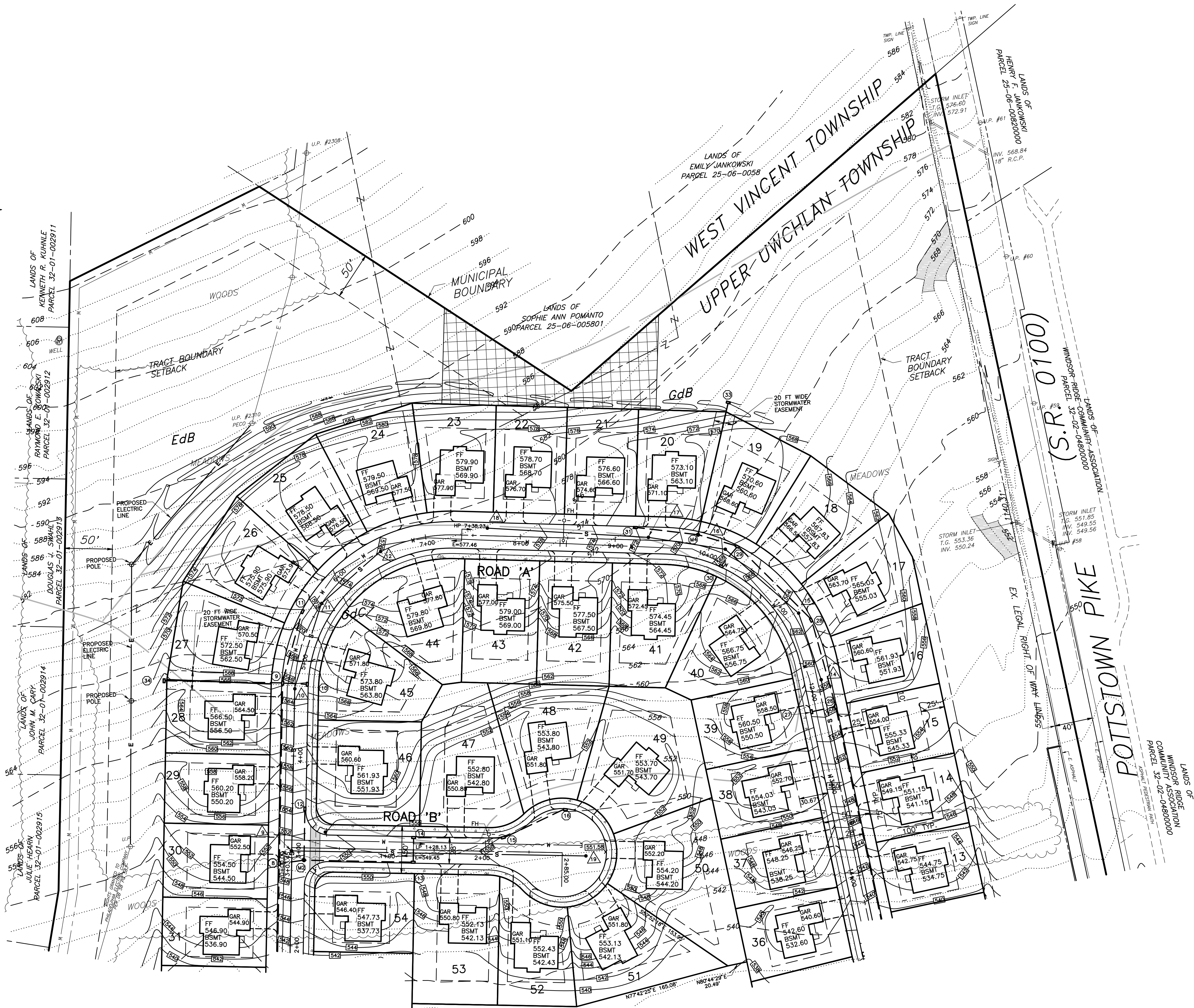
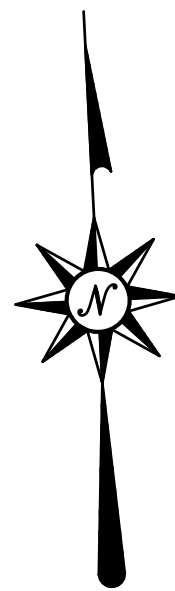
## PRELIMINARY/FINAL PLAN CONSTRUCTION IMPROVEMENT PLAN

2. 9-8-17 REVISED PER TWP. ENGINEER LETTER DATED 9-8-17.  
1. 8-18-17 REVISED ROADWAY IMPROVEMENTS.

|                                                                                                                                |                               |
|--------------------------------------------------------------------------------------------------------------------------------|-------------------------------|
| SUBDIVISION PLAN<br>FOR<br><b>JANKOWSKI TRACT</b>                                                                              |                               |
| UPPER UWCHLAN TOWNSHIP                                                                                                         | CHESTER COUNTY, PA.           |
| Edward B. Walsh & Associates, Inc.                                                                                             |                               |
| CIVIL ENGINEERS & SURVEYORS                                                                                                    |                               |
| LIONVILLE PROFESSIONAL CENTER<br>125 Dowlan Forge Rd.<br>Eaton, Pennsylvania 19341<br>Phone: 610-903-0060<br>Fax: 610-903-0080 |                               |
| Project- 4272                                                                                                                  | Date- 8-8-17                  |
| Scale- 1" = 50'                                                                                                                | Drawn- ALM                    |
| Checked- AUB                                                                                                                   | Sheet- 6 OF 26                |
| Plotted: 2/1/2018                                                                                                              | File: F:\JBA\4272\4272-B3.pro |







| LEGEND |                                   |
|--------|-----------------------------------|
|        | EXISTING INDEX CONTOUR            |
|        | EXISTING INTERIOR CONTOUR         |
|        | PROPOSED CONTOUR                  |
|        | PROPOSED SPOT ELEVATION           |
|        | EXISTING INLET                    |
|        | PROPOSED INLET                    |
|        | EXISTING STORM SEWER PIPE         |
|        | PROPOSED STORM SEWER PIPE         |
|        | EXISTING STORM MANHOLE            |
|        | PROPOSED STORM MANHOLE            |
|        | EXISTING SANITARY MANHOLE         |
|        | PROPOSED SANITARY MANHOLE         |
|        | EXISTING SANITARY SEWER PIPE      |
|        | PROPOSED SANITARY SEWER PIPE      |
|        | EXISTING GAS LINE                 |
|        | EXISTING ELECTRIC LINE            |
|        | PROPOSED MONUMENT                 |
|        | EXISTING WATER LINE               |
|        | PROPOSED WATER LINE               |
|        | PIPELINE                          |
|        | EASEMENT BOUNDARY                 |
|        | SOILS LINE                        |
|        | EXISTING EDGE PAVEMENT            |
|        | EXISTING CURB                     |
|        | PROPOSED CURB                     |
|        | EXISTING SIGN                     |
|        | PROPOSED SIGN                     |
|        | PROPOSED D-W ENDWALL              |
|        | WETLANDS BOUNDARY LINE            |
|        | LIMITS OF 100 YEAR FLOODPLAIN     |
|        | EXISTING EDGE OF WOODLANDS        |
|        | PRECAUTIONARY SLOPES<br>15% - 25% |
|        | EXISTING STRUCTURE                |
|        | PROPOSED BUILDING                 |

**SOILS CLASSIFICATION DATA**

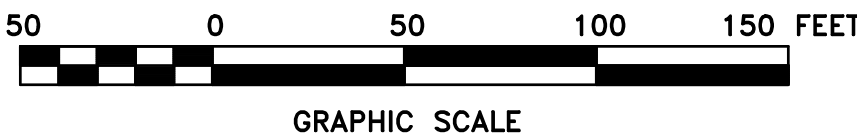
GdB - CALIFORN LOAM, 3 TO 8 PERCENT SLOPES, HYDROLOGIC SOIL GROUP D  
EdB - EDGE MONT CHANNERY LOAM, 3 TO 8 PERCENT SLOPES, HYDROLOGIC SOIL GROUP A  
GdB - GLADSTONE GRAVELLY LOAM, 3 TO 8 PERCENT SLOPES, HYDROLOGIC SOIL GROUP B  
GdB - GLADSTONE GRAVELLY LOAM, 8 TO 15 PERCENT SLOPES, HYDROLOGIC SOIL GROUP B  
UugB - URBAN LAND-UDORTHENTS, SHIST AND GNEISS COMPLEX, 8 TO 25 PERCENT SLOPES, HYDROLOGIC SOIL GROUP C

PRELIMINARY/FINAL PLAN  
CONSTRUCTION IMPROVEMENT PLAN

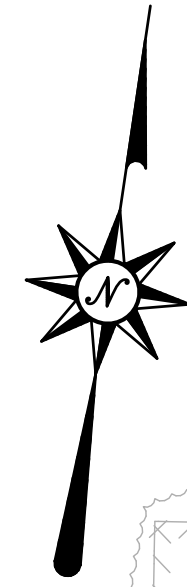
2. 9-8-17 REVISED PER TWP. ENGINEER LETTER DATED 9-8-17.  
1. 8-18-17 REVISED ROADWAY IMPROVEMENTS.

| SUBDIVISION PLAN<br>FOR<br>JANKOWSKI TRACT                                                                                     |                               |
|--------------------------------------------------------------------------------------------------------------------------------|-------------------------------|
| UPPER UWCHLAN TOWNSHIP                                                                                                         | CHESTER COUNTY, PA.           |
| Edward B. Walsh & Associates, Inc.                                                                                             |                               |
| CIVIL ENGINEERS & SURVEYORS                                                                                                    |                               |
| LIONVILLE PROFESSIONAL CENTER<br>125 Dowlan Forge Rd.<br>Exton, Pennsylvania 19341<br>Phone: 610-903-0060<br>Fax: 610-903-0080 |                               |
|                                                                                                                                |                               |
| Plotted: 2/1/2018                                                                                                              | File: F:\JBA\4272\4272-B3.pro |
| Project--                                                                                                                      | 4272                          |
| Date--                                                                                                                         | 8-8-17                        |
| Scale--                                                                                                                        | 1"= 50'                       |
| Drawn--                                                                                                                        | SLM                           |
| Checked--                                                                                                                      | AJB                           |
| Sheet--                                                                                                                        | 7 OF 26                       |

UPI NUMBERS 32-1-30-30.1, 25-6-58.1

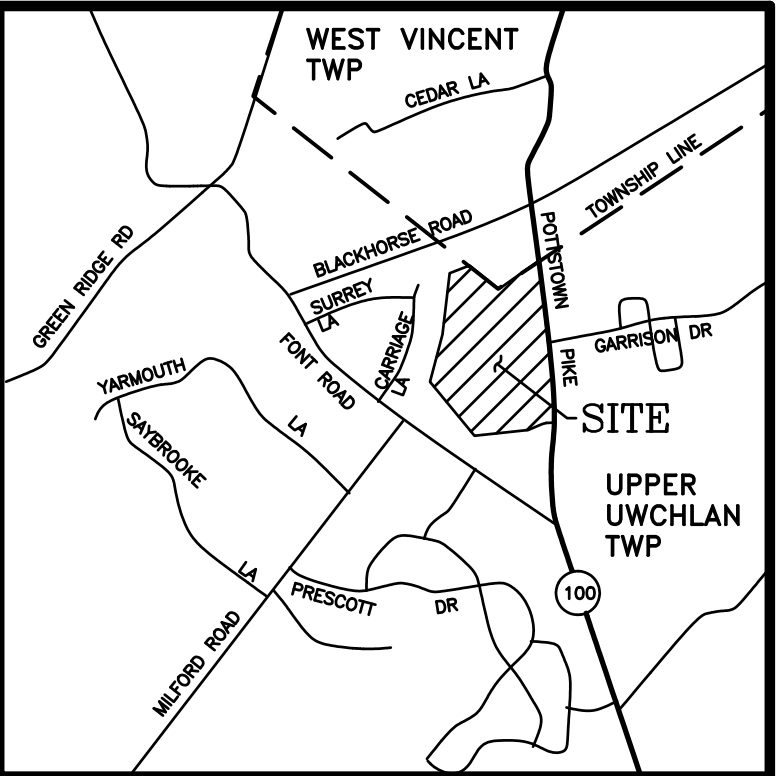






MATCH LINE

MATCH LINE



LOCATION MAP

SCALE: 1"=2000'



#### TYPICAL LOT CONSTRUCTION SEQUENCE

1. INSTALL STABILIZED ROCK CONSTRUCTION ENTRANCE.
2. INSTALL FILTER SOCK AT LOCATIONS SHOWN ON LOTS.
3. PERFORM CLEARING AND GRUBBING WHERE NECESSARY.
4. BEGIN TO REMOVE TOPSOIL FROM AREA TO BE DISTURBED STOCKPILE TOPSOIL AT LOCATION SHOWN. STOCKPILE HEIGHT NOT TO EXCEED 35 FEET AND SIDE SLOPES TO BE 2:1 OR FLATTER. UPON COMPLETION OF TOPSOIL REMOVAL, SEED AND MULCH STOCKPILE WITH TEMPORARY SEED MIX AND INSTALL SILT FENCE.
5. BEGIN EARTHMOVING FOR DRIVEWAY SUBGRADE AND HOUSE.
6. BEGIN CONSTRUCTION OF HOUSE, AS SOON AS GRADING IS COMPLETE, STABILIZE DISTURBED AREAS IMMEDIATELY WITH PERMANENT SEED MIX AND MULCH.
7. INSTALL WATER, SEWER SERVICE AND UTILITIES REQUIRED TO SERVICE THE LOT.
8. PAVE DRIVEWAY WITH WEARING COURSE.
9. PAVE DRIVEWAY WITH WEARING COURSE.
10. UPON COMPLETION OF HOUSE CONSTRUCTION STABILIZE ALL DISTURBED AREAS WITH PERMANENT SEED MIX AND MULCH.
11. REMOVE ALL FILTER SOCK AND STABILIZE ANY AREAS THAT ARE DISTURBED.

#### CONSTRUCTION SEQUENCE

1. ALL EARTH DISTURBANCE ACTIVITIES SHALL PROCEED IN ACCORDANCE WITH THE FOLLOWING SEQUENCE. EACH STAGE SHALL BE COMPLETED BEFORE ANY FOLLOWING STAGE IS INITIATED. CLEARING AND GRUBBING SHALL BE LIMITED ONLY TO THOSE AREAS DESCRIBED IN EACH STAGE.
2. AT LEAST 7 DAYS BEFORE STARTING ANY EARTH DISTURBANCE ACTIVITIES, THE OPERATOR SHALL INVITE ALL CONTRACTORS INVOLVED IN THOSE ACTIVITIES, INCLUDING THE LAND OWNER, ALL APPROPRIATE MUNICIPAL OFFICIALS, THE EROSION AND SEDIMENTATION CONTROL PLAN PREPARER AND A REPRESENTATIVE OF THE CHESTER COUNTY CONSERVATION DISTRICT, TO AN ON-SITE PRE-CONSTRUCTION MEETING. NOTE THAT THE CESSATION OF ACTIVITY FOR 4 DAYS OR LONGER REQUIRES TEMPORARY STABILIZATION.
3. INSTALL STABILIZED ROCK CONSTRUCTION ENTRANCE.
4. CLEAR AND GRUB ONLY AREAS NECESSARY FOR SEDIMENT BASIN AND DIVERSION SWALE CONSTRUCTION.
5. REMOVE TOPSOIL IN AREA OF TEMPORARY SWALE AND SEDIMENTATION BASIN. STOCKPILE IN LOCATION SHOWN.
6. CONSTRUCT SEDIMENT BASINS AND MAKE OPERATIONAL.
7. CONSTRUCT TEMPORARY DIVERSION SWALE #1, STABILIZE WITH EROSION CONTROL BLANKET AND MAKE OPERATIONAL.
8. COMPLETE SITE CLEARING FOR ROAD AND LOT CONSTRUCTION.
9. COMPLETE TOPSOIL REMOVAL FROM AREA TO BE DISTURBED FOR ROAD AND LOT CONSTRUCTION. STOCKPILE IN LOCATION SHOWN. STOCKPILE HEIGHT NOT TO EXCEED 35 FEET AND SIDE SLOPES ARE TO BE 2:1 MAXIMUM. STABILIZE WITH TEMPORARY SEED MIX AND MULCH.
10. PERFORM ROUGH GRADING FOR CONSTRUCTION OF ROADWAY AND PORTIONS OF LOTS FOR HOUSE PADS.
11. IMMEDIATELY FOLLOWING LOT GRADING, STABILIZE DISTURBED AREAS ON LOTS WITH PERMANENT SEED MIX AND MULCH.
12. INSTALL SANITARY SEWER CONVEYANCE SYSTEM.
13. INSTALL STORM WATER CONVEYANCE SYSTEM AND MAKE OPERATIONAL. INSTALL INLET PROTECTION ON INLETS.
14. INSTALL CURBING.
15. INSTALL WATER MAIN.
16. INSTALL UTILITIES TO SERVICE THE LOTS.
17. INSTALL STONE BASE COURSE ON ROAD.
18. BEGIN CONSTRUCTION OF HOUSE ON LOTS, (REFER TO TYPICAL LOT CONSTRUCTION SEQUENCE).
19. STABILIZE ROAD SHOULDER AREAS.
20. INSTALL BINDER COURSE ON ROADS.
21. FOLLOWING LOT CONSTRUCTION, INSTALL STREET TREES AND STABILIZE DISTURBED AREAS.
22. UPON STABILIZATION OF ALL DISTURBED AREAS WITH A MINIMUM COVER OF 70% VEGETATION, HAVE INSPECTION PERFORMED BY CHESTER COUNTY CONSERVATION DISTRICT TO VERIFY THAT THE FILTER SOCK CAN BE REMOVED.
23. REMOVE SILT FENCE AND CONVERT SEDIMENT BASIN TO PERMANENT BASIN (REFER TO SEQUENCE ON E&S DETAIL SHEET).
24. THIS IS A CRITICAL BMP THAT MUST BE INSPECTED BY A PA LICENSED ENGINEER. THE PROJECT ENGINEER MUST PERFORM AN INSPECTION OF ALL PCSWM BMP'S TO ENSURE THEY ARE FUNCTIONING PER DESIGN.
25. THIS IS A CRITICAL BMP THAT MUST BE INSPECTED BY A PA LICENSED ENGINEER. A NOTICE OF NPDES PERMIT TERMINATION MUST BE SUBMITTED TO THE CHESTER COUNTY CONSERVATION DISTRICT UPON STABILIZATION AND FINAL COMPLETION OF THE PROJECT.

#### SOILS CLASSIFICATION DATA

- CaB - CALIFORN LOAM, 3 TO 8 PERCENT SLOPES, HYDROLOGIC SOIL GROUP D  
EdB - EDGE MONT CHANNERY LOAM, 3 TO 8 PERCENT SLOPES, HYDROLOGIC SOIL GROUP A  
GdB - GLADSTONE GRAVELLY LOAM, 3 TO 8 PERCENT SLOPES, HYDROLOGIC SOIL GROUP B  
GdC - GLADSTONE GRAVELLY LOAM, 8 TO 15 PERCENT SLOPES, HYDROLOGIC SOIL GROUP B  
UuGB - URBAN LAND-UDORTHENTS, SHIST AND GNEISS COMPLEX, 8 TO 25 PERCENT SLOPES, HYDROLOGIC SOIL GROUP C

#### EROSION & SEDIMENTATION CONTROL LEGEND

- TRACT/NPDES BOUNDARY (EXCEPT WHERE NOTED BEYOND BOUNDARY)
- LIMIT OF DISTURBANCE
- TEMPORARY CONTOUR
- 18" SILT FENCE
- FILTER SOCK ROAD CONSTRUCTION
- FILTER SOCK HOUSE CONSTRUCTION
- ORANGE CONSTRUCTION FENCE
- INLET PROTECTION
- TOPSOIL STOCKPILE
- TEMPORARY RISER
- ROCK CONSTR. ENTRANCE
- EROSION CONTROL BLANKET
- DRAINAGE AREA BOUNDARY LINE

#### LEGEND

- EXISTING INDEX CONTOUR
- EXISTING INTERIOR CONTOUR
- PROPOSED CONTOUR
- PROPOSED SPOT ELEVATION
- EXISTING INLET
- PROPOSED INLET
- EXISTING STORM SEWER PIPE
- PROPOSED STORM SEWER PIPE
- EXISTING STORM MANHOLE
- PROPOSED STORM MANHOLE
- EXISTING SANITARY MANHOLE
- PROPOSED SANITARY MANHOLE
- EXISTING SANITARY SEWER PIPE
- PROPOSED SANITARY SEWER PIPE
- EXISTING GAS LINE
- EXISTING ELECTRIC LINE
- PROPOSED MONUMENT
- EXISTING WATER LINE
- PROPOSED WATER LINE
- PIPELINE
- EASEMENT BOUNDARY
- SOILS LINE
- EXISTING EDGE PAVEMENT
- EXISTING CURB
- PROPOSED CURB
- EXISTING SIGN
- PROPOSED SIGN
- PROPOSED D-W ENDWALL
- WETLANDS BOUNDARY LINE
- LIMITS OF 100 YEAR FLOODPLAIN
- EXISTING EDGE OF WOODLANDS
- PRECAUTIONARY SLOPES 15% - 25%
- EXISTING STRUCTURE
- PROPOSED BUILDING

## PRELIMINARY/FINAL PLAN OVERALL EROSION & SEDIMENTATION CONTROL PLAN

2. 9-8-17 REVISED PER TWP. ENGINEER LETTER DATED 9-8-17.

1. 8-18-17 REVISED ROADWAY IMPROVEMENTS.

### SUBDIVISION PLAN FOR JANKOWSKI TRACT

UPPER UWCHLAN TOWNSHIP CHESTER COUNTY, PA.

Edward B. Walsh & Associates, Inc.  
CIVIL ENGINEERS & SURVEYORS

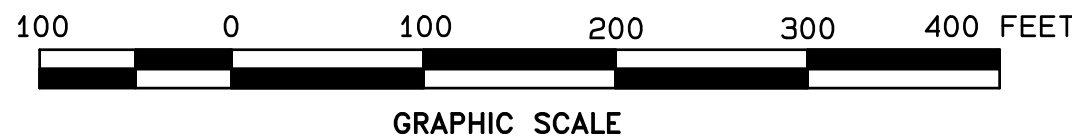
LIONVILLE PROFESSIONAL CENTER  
125 Dowlan Forge Rd.  
Eaton, Pennsylvania 19341  
Phone: 610-903-0060  
Fax: 610-903-0080



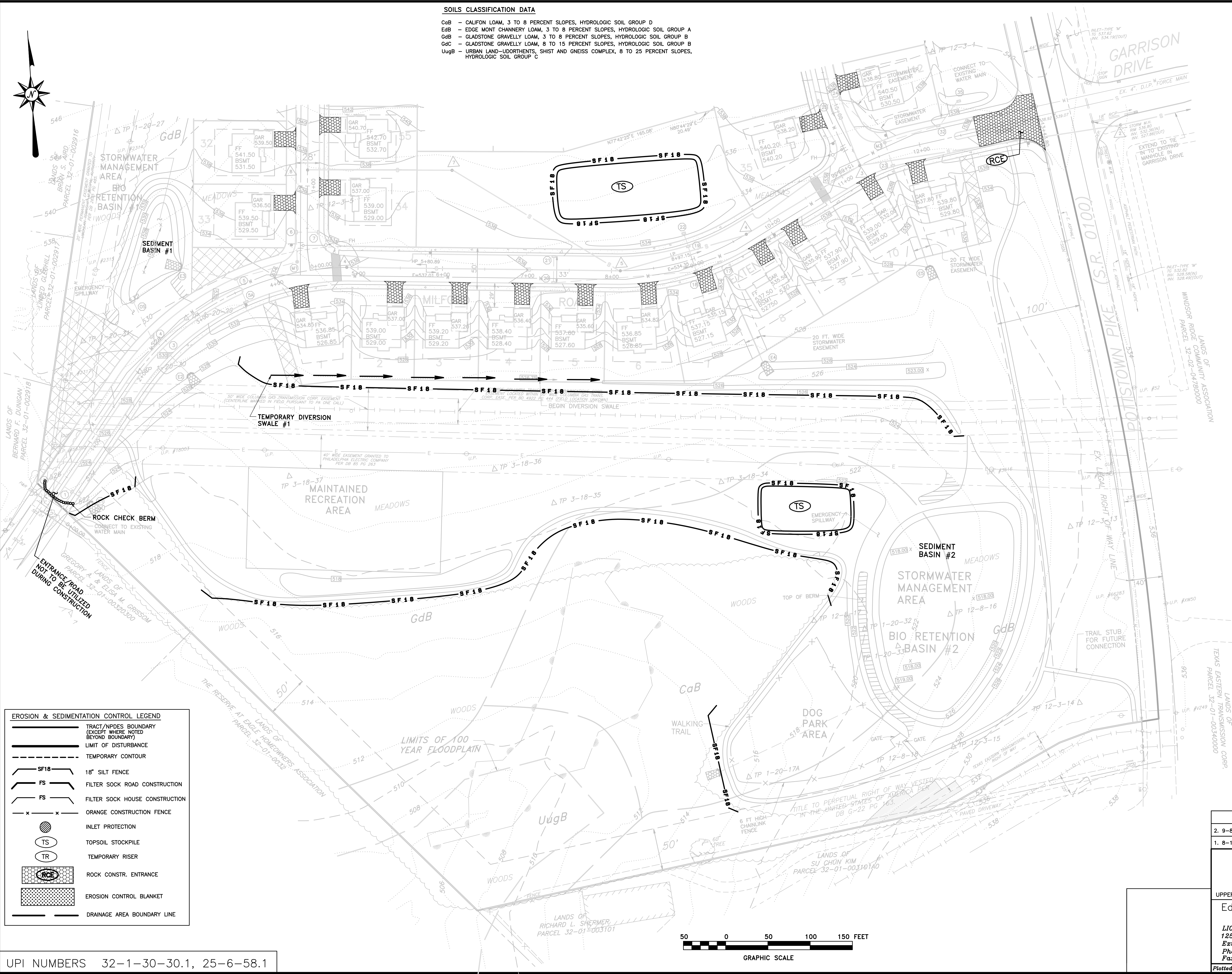
Project- 4272  
Date- 8-8-17  
Scale- 1"= 100'  
Drawn- SLM  
Checked- AIB  
Sheet- 8 OF 26

Plotted: 2/1/2018 File: F:\JB\4272\4272-B3.pr

UPI NUMBERS 32-1-30-30.1, 25-6-58.1

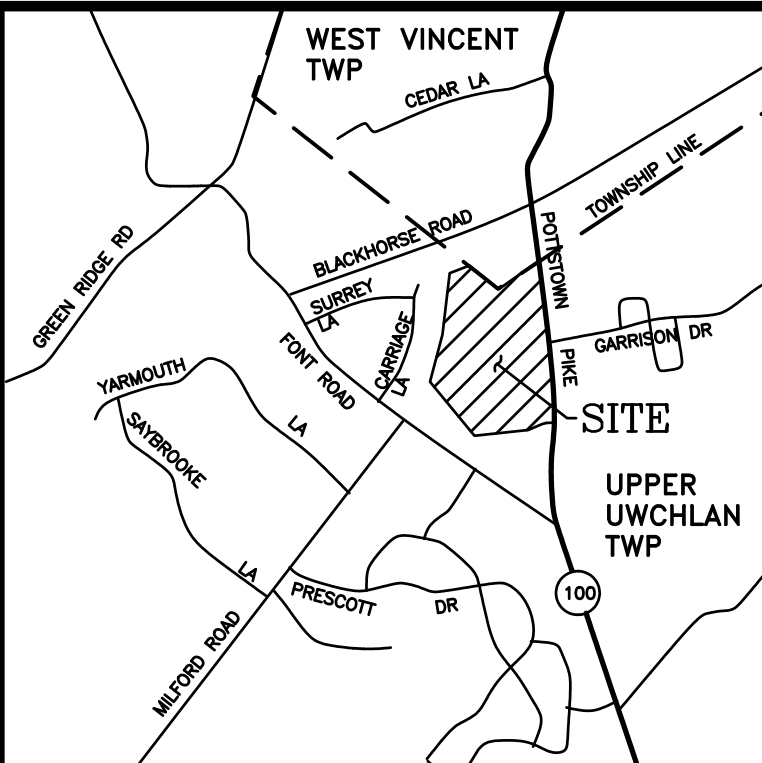






**SOILS CLASSIFICATION DATA**

CaB - CALIFON LOAM, 3 TO 8 PERCENT SLOPES, HYDROLOGIC SOIL GROUP D  
EdB - EDGE MONT CHANNERY LOAM, 3 TO 8 PERCENT SLOPES, HYDROLOGIC SOIL GROUP A  
GdB - GLADSTONE GRAVELLY LOAM, 8 TO 15 PERCENT SLOPES, HYDROLOGIC SOIL GROUP B  
GdC - GLADSTONE GRAVELLY LOAM, 8 TO 15 PERCENT SLOPES, HYDROLOGIC SOIL GROUP B  
UgB - URBAN LAND-UDORTMENTS, SHIST AND GNEISS COMPLEX, 8 TO 25 PERCENT SLOPES, HYDROLOGIC SOIL GROUP C



**LOCATION MAP**  
SCALE: 1"=2000'

| LEGEND |                                |
|--------|--------------------------------|
| ---    | EXISTING INDEX CONTOUR         |
| ---    | EXISTING INTERIOR CONTOUR      |
| ---    | PROPOSED CONTOUR               |
| 52.68  | PROPOSED SPOT ELEVATION        |
| □      | EXISTING INLET                 |
| □      | PROPOSED INLET                 |
| ---    | EXISTING STORM SEWER PIPE      |
| ---    | PROPOSED STORM SEWER PIPE      |
| ○      | EXISTING STORM MANHOLE         |
| ○      | PROPOSED STORM MANHOLE         |
| ○      | EXISTING SANITARY MANHOLE      |
| ○      | PROPOSED SANITARY MANHOLE      |
| ---    | EXISTING SANITARY SEWER PIPE   |
| ---    | PROPOSED SANITARY SEWER PIPE   |
| ---    | EXISTING GAS LINE              |
| ---    | EXISTING ELECTRIC LINE         |
| ■      | PROPOSED MONUMENT              |
| ---    | EXISTING WATER LINE            |
| ---    | PROPOSED WATER LINE            |
| ---    | PIPELINE                       |
| ---    | EASEMENT BOUNDARY              |
| ---    | SOILS LINE                     |
| ---    | EXISTING EDGE PAVEMENT         |
| ---    | EXISTING CURB                  |
| ---    | PROPOSED CURB                  |
| ---    | EXISTING SIGN                  |
| ---    | PROPOSED SIGN                  |
| ---    | PROPOSED D-W ENDWALL           |
| ---    | WETLANDS BOUNDARY LINE         |
| ---    | LIMITS OF 100 YEAR FLOODPLAIN  |
| ---    | EXISTING EDGE OF WOODLANDS     |
| ---    | PRECAUTIONARY SLOPES 15% - 25% |
| ---    | EXISTING STRUCTURE             |
| ---    | PROPOSED BUILDING              |

| EROSION & SEDIMENTATION CONTROL LEGEND |                                                             |
|----------------------------------------|-------------------------------------------------------------|
| ---                                    | TRACT/ADJACES BOUNDARY (EXCEPT WHERE NOTED BEYOND BOUNDARY) |
| ---                                    | LIMIT OF DISTURBANCE                                        |
| ---                                    | TEMPORARY CONTOUR                                           |
| SF18                                   | 18" SILT FENCE                                              |
| FS                                     | FILTER SOCK ROAD CONSTRUCTION                               |
| FS                                     | FILTER SOCK HOUSE CONSTRUCTION                              |
| x x                                    | ORANGE CONSTRUCTION FENCE                                   |
| ○                                      | INLET PROTECTION                                            |
| TS                                     | TOPSOIL STOCKPILE                                           |
| TR                                     | TEMPORARY RISER                                             |
| RCE                                    | ROCK CONSTR. ENTRANCE                                       |
| ---                                    | EROSION CONTROL BLANKET                                     |
| ---                                    | DRAINAGE AREA BOUNDARY LINE                                 |

## PRELIMINARY/FINAL PLAN EROSION & SEDIMENTATION CONTROL PLAN

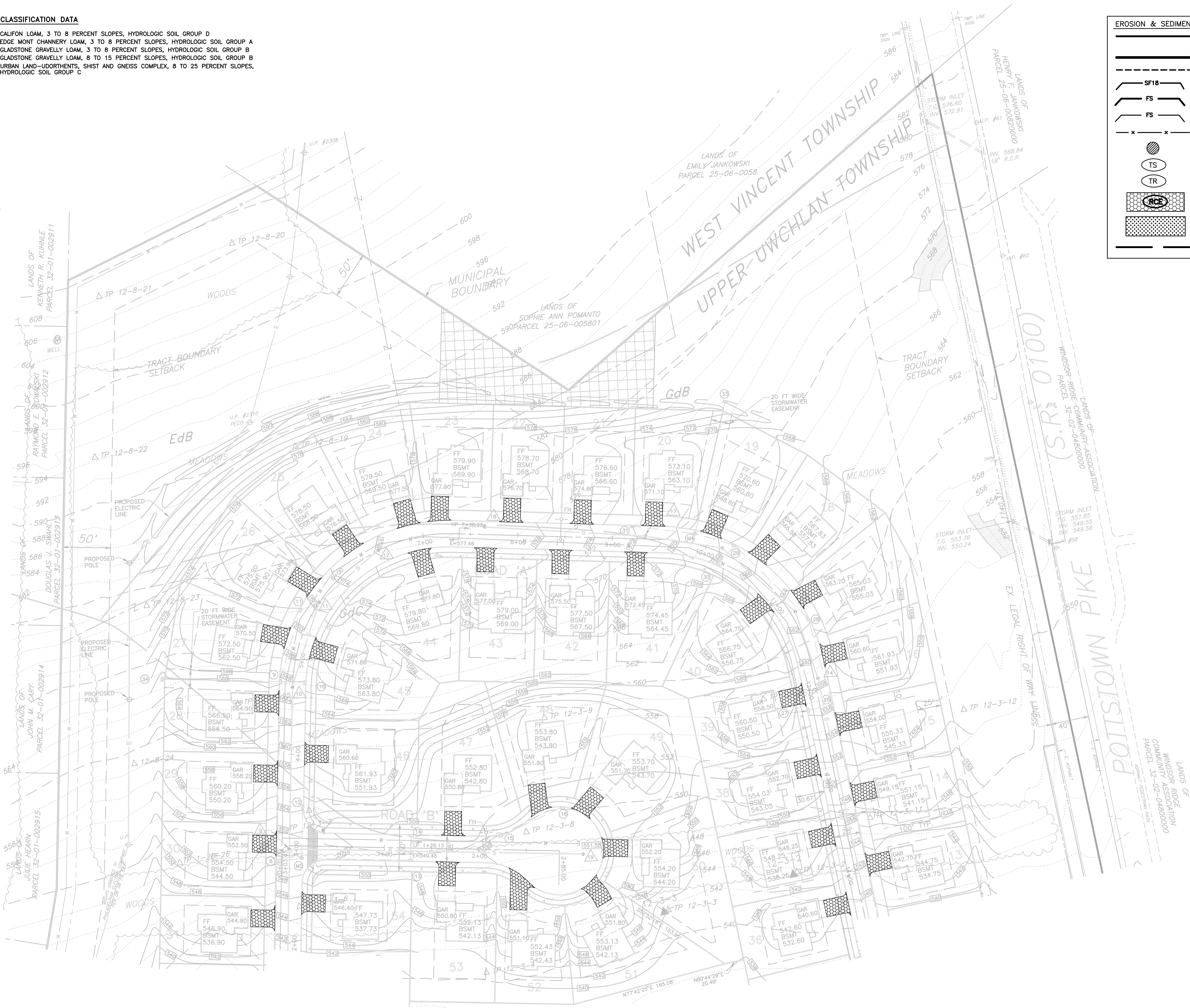
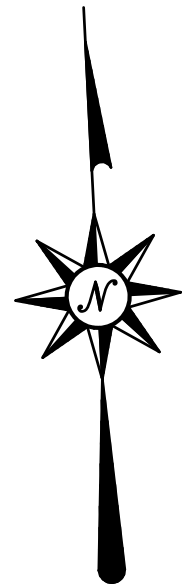
|                                                                                                                                |                             |
|--------------------------------------------------------------------------------------------------------------------------------|-----------------------------|
| 2. 9-8-17 REVISED PER TWP. ENGINEER LETTER DATED 9-8-17.                                                                       |                             |
| 1. 8-18-17 REVISED ROADWAY IMPROVEMENTS.                                                                                       |                             |
| SUBDIVISION PLAN<br>FOR<br><b>JANKOWSKI TRACT</b>                                                                              |                             |
| UPPER UWCHLAN TOWNSHIP                                                                                                         | CHESTER COUNTY, PA.         |
| Edward B. Walsh & Associates, Inc.                                                                                             |                             |
| CIVIL ENGINEERS & SURVEYORS                                                                                                    |                             |
| LIONVILLE PROFESSIONAL CENTER<br>125 Dowlan Forge Rd.<br>Eaton, Pennsylvania 19341<br>Phone: 610-903-0060<br>Fax: 610-903-0080 |                             |
| Plotted: 2/1/2018                                                                                                              | File: F:\B\4272\4272-B3.pro |
| Project- 4272                                                                                                                  | Date- 8-8-17                |
| Scale- 1"= 50'                                                                                                                 | Drawn- SLM                  |
| Checked- AJB                                                                                                                   | Sheet- 9 OF 26              |

UPI NUMBERS 32-1-30-30.1, 25-6-58.1

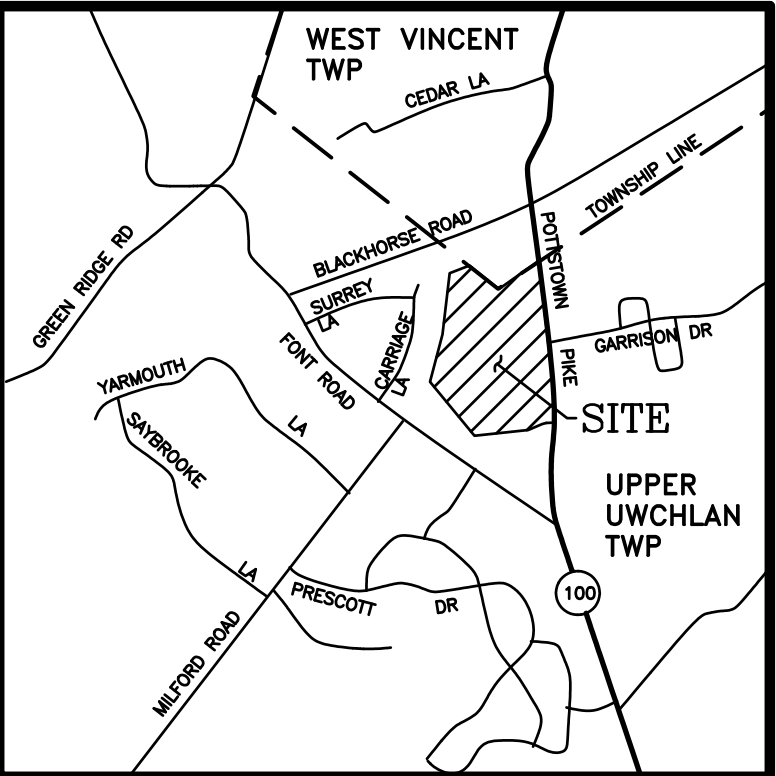


SOILS CLASSIFICATION DATA

CoB - CALIFON LOAM, 3 TO 8 PERCENT SLOPES, HYDROLOGIC SOIL GROUP D  
EdB - EDGE MONT CHANNERY LOAM, 3 TO 8 PERCENT SLOPES, HYDROLOGIC SOIL GROUP A  
GdB - GLADSTONE GRAVELLY LOAM, 3 TO 8 PERCENT SLOPES, HYDROLOGIC SOIL GROUP B  
GdC - GLADSTONE GRAVELLY LOAM, 8 TO 15 PERCENT SLOPES, HYDROLOGIC SOIL GROUP B  
UugB - URBAN LAND-UDORTMENTS, SHIST AND GNEISS COMPLEX, 8 TO 25 PERCENT SLOPES, HYDROLOGIC SOIL GROUP C



| EROSION & SEDIMENTATION CONTROL LEGEND |                                                           |
|----------------------------------------|-----------------------------------------------------------|
|                                        | TRACT/NPDES BOUNDARY (EXCEPT WHERE NOTED BEYOND BOUNDARY) |
|                                        | LIMIT OF DISTURBANCE                                      |
|                                        | TEMPORARY CONTOUR                                         |
|                                        | 18" SILT FENCE                                            |
|                                        | FILTER SOCK ROAD CONSTRUCTION                             |
|                                        | FILTER SOCK HOUSE CONSTRUCTION                            |
|                                        | ORANGE CONSTRUCTION FENCE                                 |
|                                        | INLET PROTECTION                                          |
|                                        | TOPSOIL STOCKPILE                                         |
|                                        | TEMPORARY RISER                                           |
|                                        | ROCK CONSTR. ENTRANCE                                     |
|                                        | EROSION CONTROL BLANKET                                   |
|                                        | DRAINAGE AREA BOUNDARY LINE                               |



LOCATION MAP

SCALE: 1"=2000'

| LEGEND |                                |
|--------|--------------------------------|
|        | EXISTING INDEX CONTOUR         |
|        | EXISTING INTERIOR CONTOUR      |
|        | PROPOSED CONTOUR               |
|        | PROPOSED SPOT ELEVATION        |
|        | EXISTING INLET                 |
|        | PROPOSED INLET                 |
|        | EXISTING STORM SEWER PIPE      |
|        | PROPOSED STORM SEWER PIPE      |
|        | EXISTING STORM MANHOLE         |
|        | PROPOSED STORM MANHOLE         |
|        | EXISTING SANITARY MANHOLE      |
|        | PROPOSED SANITARY MANHOLE      |
|        | EXISTING SANITARY SEWER PIPE   |
|        | PROPOSED SANITARY SEWER PIPE   |
|        | EXISTING GAS LINE              |
|        | EXISTING ELECTRIC LINE         |
|        | PROPOSED MONUMENT              |
|        | EXISTING WATER LINE            |
|        | PROPOSED WATER LINE            |
|        | PIPELINE                       |
|        | EASEMENT BOUNDARY              |
|        | SOILS LINE                     |
|        | EXISTING EDGE PAVEMENT         |
|        | EXISTING CURB                  |
|        | PROPOSED CURB                  |
|        | EXISTING SIGN                  |
|        | PROPOSED SIGN                  |
|        | PROPOSED D-W ENDWALL           |
|        | WETLANDS BOUNDARY LINE         |
|        | LIMITS OF 100 YEAR FLOODPLAIN  |
|        | EXISTING EDGE OF WOODLANDS     |
|        | PRECAUTIONARY SLOPES 15% - 25% |
|        | EXISTING STRUCTURE             |
|        | PROPOSED BUILDING              |

PRELIMINARY/FINAL PLAN  
EROSION & SEDIMENTATION  
CONTROL PLAN

2. 9-8-17 REVISED PER TWP. ENGINEER LETTER DATED 9-8-17.

1. 8-18-17 REVISED ROADWAY IMPROVEMENTS.

SUBDIVISION PLAN  
FOR  
JANKOWSKI TRACT

UPPER UWCHLAN TOWNSHIP CHESTER COUNTY, PA.

Edward B. Walsh & Associates, Inc.

CIVIL ENGINEERS & SURVEYORS

LIONVILLE PROFESSIONAL CENTER

125 Dowlin Forge Rd.

Exton, Pennsylvania 19341

Phone: 610-903-0060

Fax: 610-903-0080



Project-- 4272

Date-- 8-8-17

Scale-- 1"= 50'

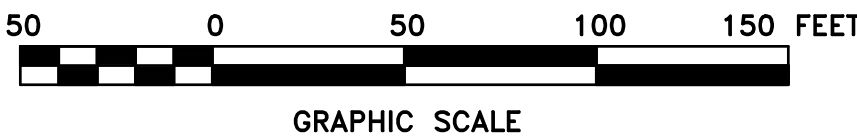
Drawn-- SLM

Checked-- AJB

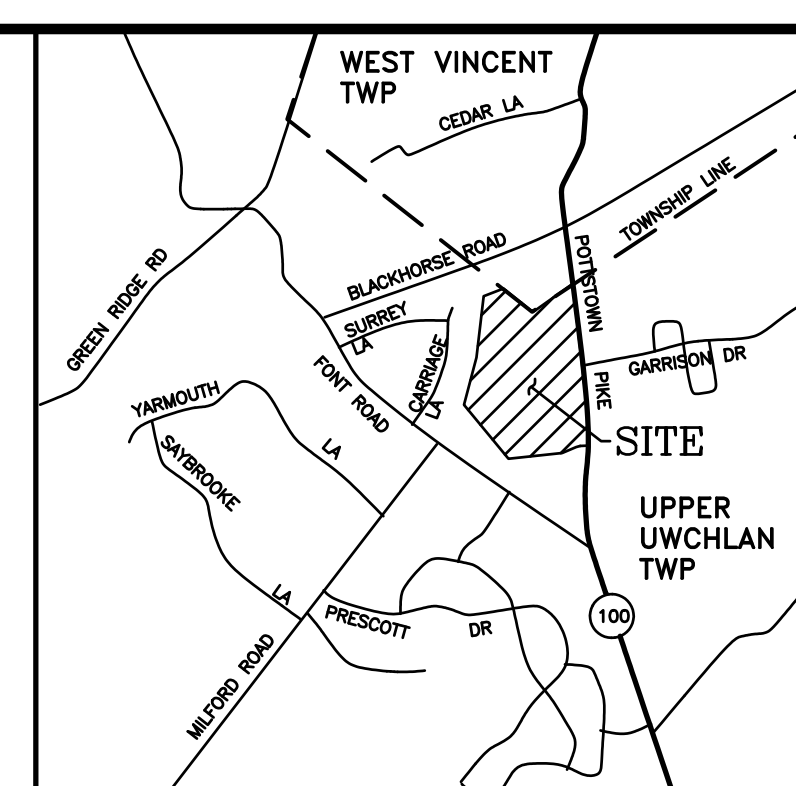
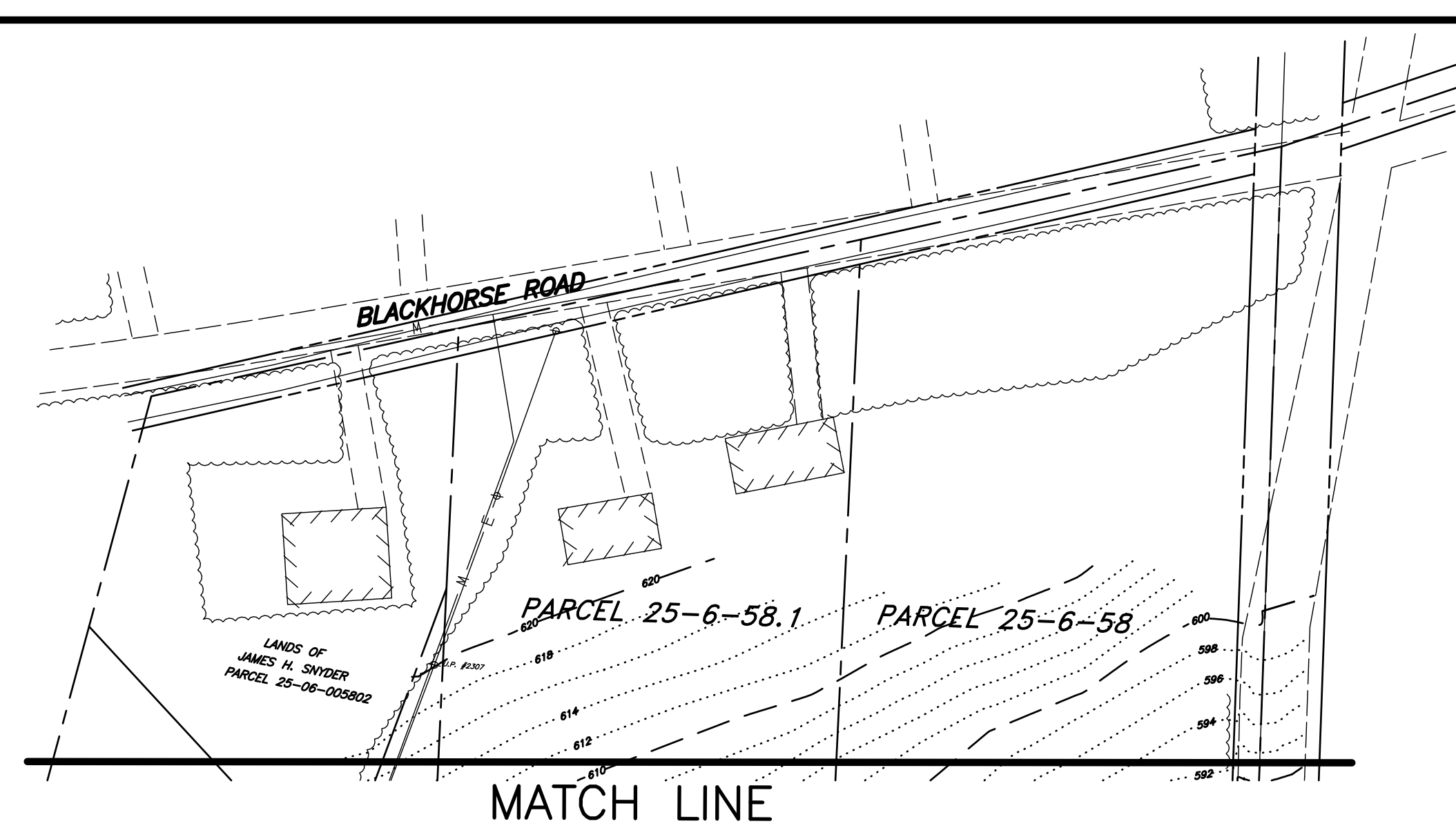
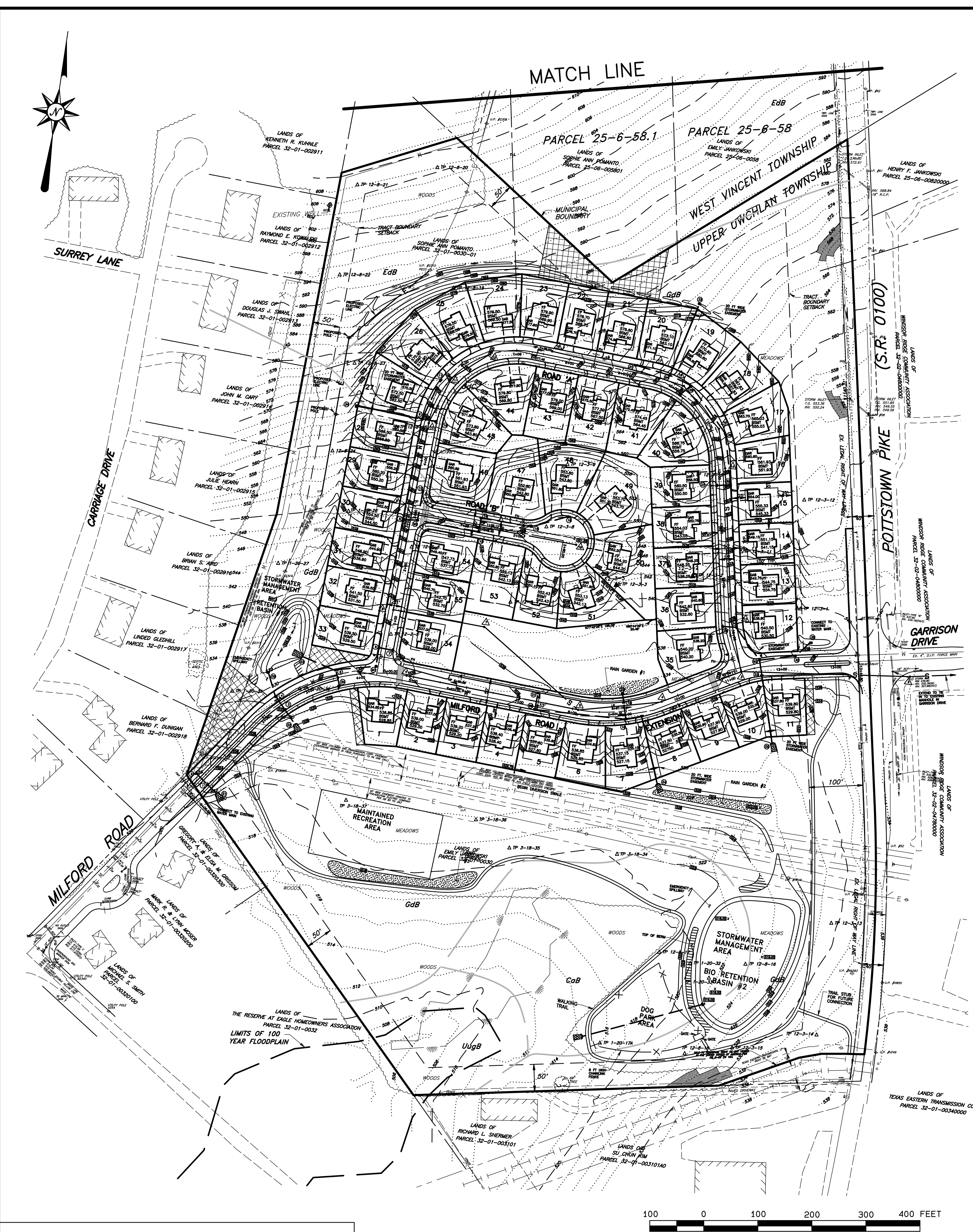
Sheet-- 10 OF 26

Plotted: 2/1/2018 File: F:\JB\4272\4272-B3.pro

UPI NUMBERS 32-1-30-30.1, 25-6-58.1







LOCATION MAP  
SCALE: 1"=2000'

SOILS CLASSIFICATION DATA

- CaB - CALIFON LOAM, 3 TO 8 PERCENT SLOPES, HYDROLOGIC SOIL GROUP D
- EdB - EDGE MONT CHANNERY LOAM, 3 TO 8 PERCENT SLOPES, HYDROLOGIC SOIL GROUP A
- GdB - GLADSTONE GRAVELLY LOAM, 3 TO 8 PERCENT SLOPES, HYDROLOGIC SOIL GROUP B
- GdC - GLADSTONE GRAVELLY LOAM, 8 TO 15 PERCENT SLOPES, HYDROLOGIC SOIL GROUP B
- UuGB - URBAN LAND-UDORTHENTS, SHIST AND GNEISS COMPLEX, 8 TO 25 PERCENT SLOPES, HYDROLOGIC SOIL GROUP C

POST-CONSTRUCTION MAINTENANCE PROGRAM:

A homeowner's association will be created for this project, said association shall be responsible for the maintenance and care of the open space area as well as the cross lot storm sewer system and bioretention basin.

Bio-filter areas and forebays to be planted with appropriate seeding mixtures as specified and provided with prepared bed consisting of 2"-ft. depth of prepared soil consisting of 50% topsoil and 50% hardwood mulch. If areas are disturbed in future, appropriate care must be taken to avoid puncturing the liner, and soil preparation and seeding specifications on this plan must be complied with.

RAIN GARDENS/BIORETENTION AREAS:

- Inspections shall be performed annually to evaluate sediment buildup, erosion, vegetative conditions, etc.
- Sediment shall be removed from bioretention BMPs when accumulation exceeds one inch. Debris and trash shall be disposed of at suitable disposal/recycling sites and must comply with all state, local and federal waste regulations.
- Pruning and weeding may be required until vegetation is established. Weeds should be removed by hand.
- Detritus may need to be removed approximately twice per year. Dead, diseased or noxious plant species should be replaced. Perennial plantings may be cut down at the end of the growing season.
- Mulch should be replaced when erosion is evident. Mulch should be replenished annually, and mulch replacement of the entire area may be required every 2 to 3 years.
- If infiltration becomes significantly reduced or if infiltration capacity should diminish significantly, the top few inches of discolored material shall be removed and replaced with fresh material. If necessary the soils should be amended, filled, or replaced. Light-weight equipment should be used for this maintenance work and if compaction of the basin bottom soils should occur, these should be tilled to restore their original infiltration capability. The rain garden should be revegetated per the original planting/seeding plan.
- Watering may be required during periods of extended drought.
- The basin should not be mowed on a regular basis.
- Plantings should be inspected for health twice per year.

NATURAL BASIN OPERATION AND MAINTENANCE NOTES:

- During the construction phase of the project, the permittee shall be responsible for the proper construction, stabilization and maintenance of all erosion and sedimentation control measures. The permittee shall also be responsible for the proper construction, operation and maintenance of all post construction stormwater management BMPs identified in the PCSWM plan. The homeowners association will assume responsibility for the operation and maintenance responsibilities of all post construction stormwater management BMPs located in phase 1.
- All inspections of post construction stormwater management BMPs shall be performed by the appointed representative of the homeowners association. The operation and maintenance requirements for the post construction stormwater management BMPs proposed for this project include the following:

BIO RETENTION BASINS:

- The basin shall be inspected quarterly and after major rainfall events.
- The purpose of the inspection is to ascertain the operational condition and safety of the facility, particularly the condition of the embankment, outlet structure, trash rack, riprap aprons, inlets, forebay, and other safety related items.
- Structures shall be cleared immediately of all debris that prevents proper operation.
- Sediment in the forebay shall be removed when it has accumulated to a depth of 6".
- Sediment removal shall be performed when the basin is completely dry. However, to clean the forebay, draining or pumping and a possible temporary partial drawdown of the pool area may be required.
- Sediment should be disposed of properly, and once sediment is removed, disturbed areas need to be immediately restabilized and revegetated.
- If riprap stone is found to be dislodged or eroded areas are noted, the sediment forebay lining and/or basin inlet areas shall be restored.
- Trimming of vegetation should be performed as necessary to sustain the system, but all detritus must be removed from the basin.
- Vegetation shall be inspected annually for invasive plant species and these shall be removed.
- Vegetation shall be inspected annually for erosion.
- Vegetative cover should be at a minimum of 95 percent. If vegetative cover is reduced by 10%, vegetation should be reestablished.
- The outside pond embankment shall be mowed on a semi-annual basis.

| LEGEND |                                   |
|--------|-----------------------------------|
| ---    | EXISTING INDEX CONTOUR            |
| ---    | EXISTING INTERIOR CONTOUR         |
| ---    | PROPOSED CONTOUR                  |
| ---    | PROPOSED SPOT ELEVATION           |
| ---    | EXISTING INLET                    |
| ---    | PROPOSED INLET                    |
| ---    | EXISTING STORM SEWER PIPE         |
| ---    | PROPOSED STORM SEWER PIPE         |
| ---    | EXISTING STORM MANHOLE            |
| ---    | PROPOSED STORM MANHOLE            |
| ---    | EXISTING SANITARY MANHOLE         |
| ---    | PROPOSED SANITARY MANHOLE         |
| ---    | EXISTING SANITARY SEWER PIPE      |
| ---    | PROPOSED SANITARY SEWER PIPE      |
| ---    | EXISTING GAS LINE                 |
| ---    | EXISTING ELECTRIC LINE            |
| ---    | PROPOSED MONUMENT                 |
| ---    | EXISTING WATER LINE               |
| ---    | PROPOSED WATER LINE               |
| ---    | PIPELINE                          |
| ---    | EASEMENT BOUNDARY                 |
| ---    | SOILS LINE                        |
| ---    | EXISTING EDGE PAVEMENT            |
| ---    | EXISTING CURB                     |
| ---    | PROPOSED CURB                     |
| ---    | EXISTING SIGN                     |
| ---    | PROPOSED SIGN                     |
| ---    | PROPOSED D-W ENDWALL              |
| ---    | WETLANDS BOUNDARY LINE            |
| ---    | LIMITS OF 100 YEAR FLOODPLAIN     |
| ---    | EXISTING EDGE OF WOODLANDS        |
| ---    | PRECAUTIONARY SLOPES<br>15% - 25% |
| ---    | EXISTING STRUCTURE                |
| ---    | PROPOSED BUILDING                 |
| ---    | RAIN GARDEN AREA                  |

PRELIMINARY/FINAL PLAN  
OVERALL  
POST CONSTRUCTION  
STORMWATER MANAGEMENT PLAN

2. 9-8-17 REVISED PER TWP. ENGINEER LETTER DATED 9-8-17.  
1. 8-18-17 REVISED ROADWAY IMPROVEMENTS.

SUBDIVISION PLAN  
FOR  
**JANKOWSKI TRACT**

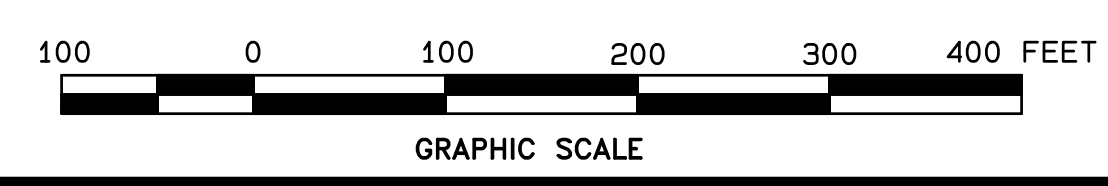
UPPER UWCHLAN TOWNSHIP  
Edward B. Walsh & Associates, Inc.  
CIVIL ENGINEERS & SURVEYORS  
LIONVILLE PROFESSIONAL CENTER  
125 Dowlan Forge Rd.  
Eaton, Pennsylvania 19341  
Phone: 610-903-0060  
Fax: 610-903-0080  
Plotted: 2/1/2018

CHESTER COUNTY, PA.  
Project-- 4272  
Date-- 8-8-17  
Scale-- 1"= 100'  
Drawn-- ALM  
Checked-- AJB  
Sheet-- 11 OF 26

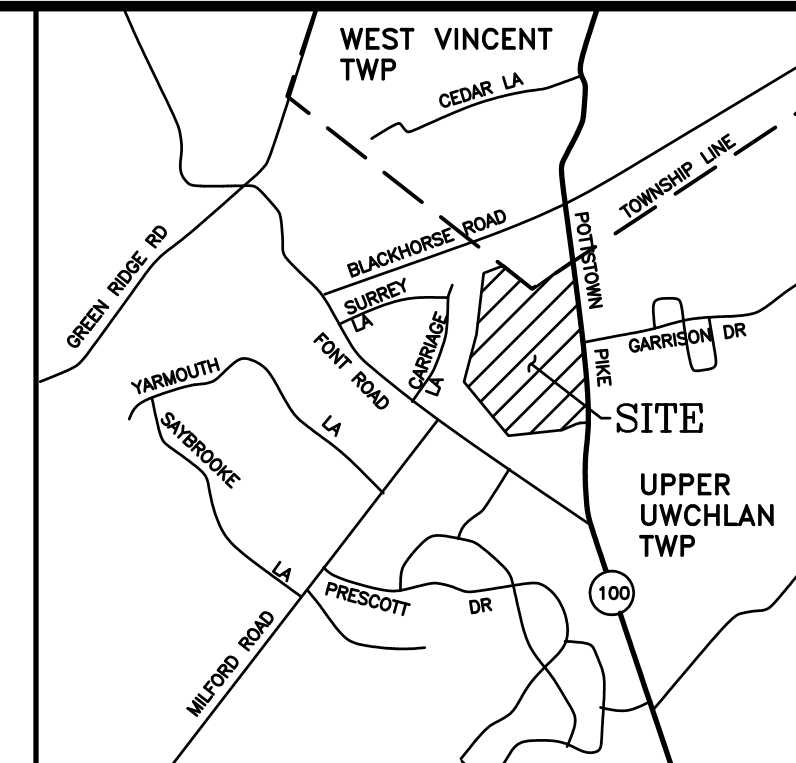
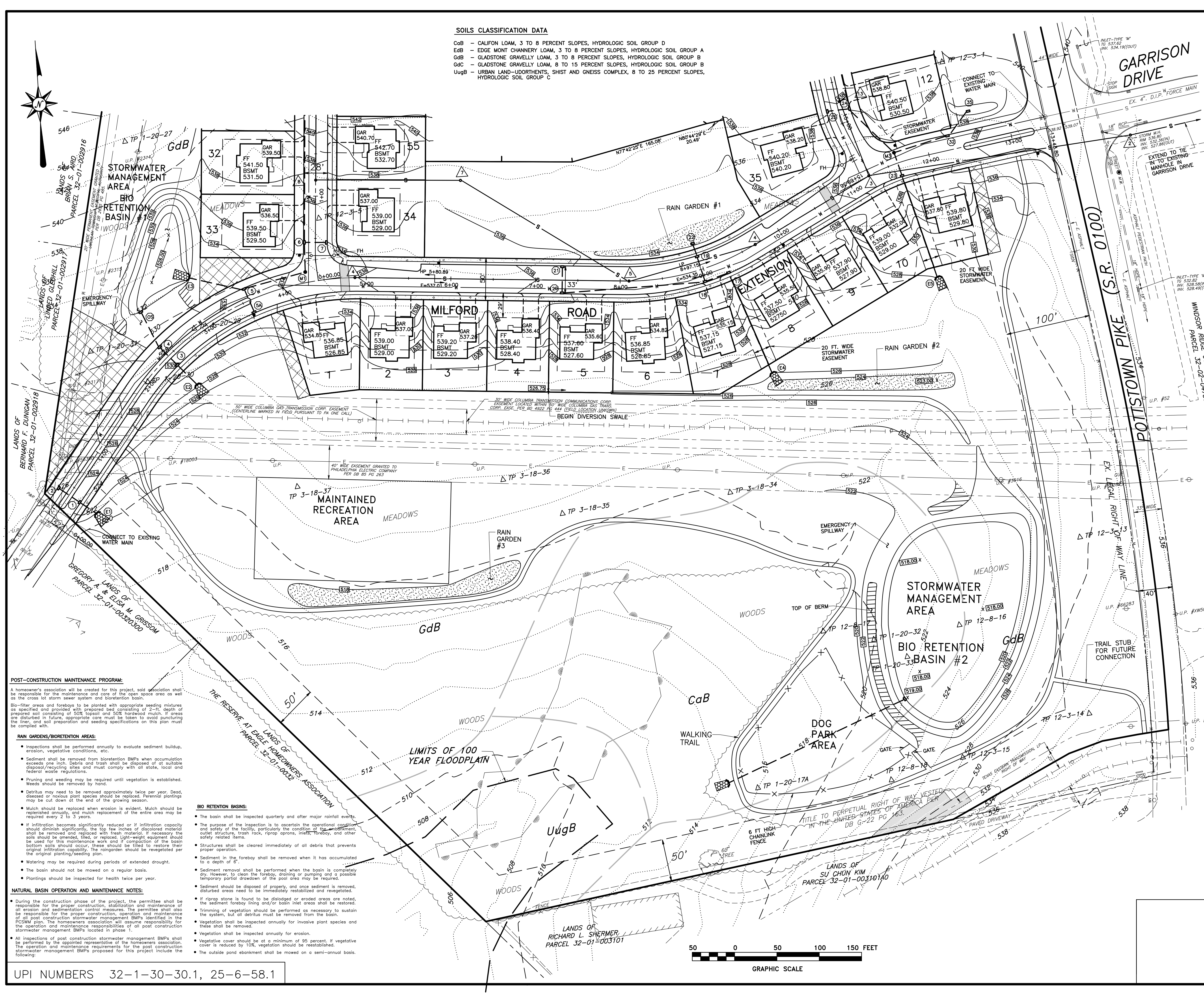
**EBW**

F:\J\B\4272\B3.prc

UPI NUMBERS 32-1-30-30.1, 25-6-58.1







| LEGEND |                                |
|--------|--------------------------------|
| ---    | EXISTING INDEX CONTOUR         |
| ---    | EXISTING INTERIOR CONTOUR      |
| ---    | PROPOSED CONTOUR               |
| ---    | PROPOSED SPOT ELEVATION        |
| ---    | EXISTING INLET                 |
| ---    | PROPOSED INLET                 |
| ---    | EXISTING STORM SEWER PIPE      |
| ---    | PROPOSED STORM SEWER PIPE      |
| ---    | EXISTING STORM MANHOLE         |
| ---    | PROPOSED STORM MANHOLE         |
| ---    | EXISTING SANITARY MANHOLE      |
| ---    | PROPOSED SANITARY MANHOLE      |
| ---    | EXISTING SANITARY SEWER PIPE   |
| ---    | PROPOSED SANITARY SEWER PIPE   |
| ---    | EXISTING GAS LINE              |
| ---    | EXISTING ELECTRIC LINE         |
| ---    | PROPOSED MONUMENT              |
| ---    | EXISTING WATER LINE            |
| ---    | PROPOSED WATER LINE            |
| ---    | PIPELINE                       |
| ---    | EASEMENT BOUNDARY              |
| ---    | SOILS LINE                     |
| ---    | EXISTING EDGE PAVEMENT         |
| ---    | EXISTING CURB                  |
| ---    | PROPOSED CURB                  |
| ---    | EXISTING SIGN                  |
| ---    | PROPOSED SIGN                  |
| ---    | PROPOSED D-W ENDWALL           |
| ---    | WETLANDS BOUNDARY LINE         |
| ---    | LIMITS OF 100 YEAR FLOODPLAIN  |
| ---    | EXISTING EDGE OF WOODLANDS     |
| ---    | PRECAUTIONARY SLOPES 15% - 25% |
| ---    | EXISTING STRUCTURE             |
| ---    | PROPOSED BUILDING              |
| ---    | RAIN GARDEN AREA               |

**POST-CONSTRUCTION MAINTENANCE PROGRAM:**

A homeowner's association will be created for this project, and association shall be responsible for the maintenance and care of the open space area as well as the cross lot storm sewer system and bioretention basin.

Bio-filter areas and forebays to be planted with appropriate seeding mixtures as specified and provided with prepared bed consisting of 2"-4" depth of prepared soil consisting of 50% topsoil and 50% hardwood mulch. If areas are disturbed in future, appropriate care must be taken to avoid puncturing the liner, and soil preparation and seeding specifications on this plan must be complied with.

- RAIN GARDENS/BIORETENTION AREAS:**
- Inspections shall be performed annually to evaluate sediment buildup, erosion, vegetative conditions, etc.
  - Sediment shall be removed from bioretention BMPs when accumulation exceeds one inch. Debris and trash shall be disposed of at suitable disposal/recycling sites and must comply with all state, local and federal waste regulations.
  - Pruning and weeding may be required until vegetation is established. Weeds should be removed by hand.
  - Detritus may need to be removed approximately twice per year. Dead, diseased or noxious plant species should be replaced. Perennial plantings may be cut down at the end of the growing season.
  - Mulch should be replaced when erosion is evident. Mulch should be replenished annually, and mulch replacement of the entire area may be required every 2 to 3 years.
  - If infiltration becomes significantly reduced or if infiltration capacity should diminish significantly, the top few inches of discolorated material shall be removed and replaced with fresh material. If necessary the soil should be amended, filled, or replaced. Light-weight equipment should be used for this maintenance work and if compaction of the basin bottom soils should occur, these should be filled to restore their original infiltration capability. The rain garden should be revegetated per the original planting/seeding plan.
  - Watering may be required during periods of extended drought.
  - The basin should not be mowed on a regular basis.
  - Plantings should be inspected for health twice per year.

- NATURAL BASIN OPERATION AND MAINTENANCE NOTES:**
- During the construction phase of the project, the permittee shall be responsible for the proper construction, stabilization and maintenance of all erosion and sedimentation control measures. The permittee shall also be responsible for the proper construction, operation and maintenance of all post construction stormwater management BMPs identified in the PCSWM plan. The homeowner's association will assume responsibility for the operation and maintenance responsibilities of all post construction stormwater management BMPs located in phase 1.
  - All inspections of post construction stormwater management BMPs shall be performed by the appointed representative of the homeowner's association. The operation and maintenance requirements for the post construction stormwater management BMPs proposed for this project include the following:

- BIO RETENTION BASINS:**
- The basin shall be inspected quarterly and after major rainfall events.
  - The purpose of the inspection is to ascertain the operational condition and safety of the facility, particularly the condition of the inlet/outlet structure, trash rack, riprap aprons, inlets, forebay, and other safety related items.
  - Structures shall be cleared immediately of all debris that prevents proper operation.
  - Sediment in the forebay shall be removed when it has accumulated to a depth of 6".
  - Sediment removal shall be performed when the basin is completely dry. However, to clean the forebay, draining or pumping and a possible temporary partial drawdown of the pool area may be required.
  - Sediment should be disposed of properly, and once sediment is removed, disturbed areas need to be immediately restabilized and revegetated.
  - If riprap stone is found to be dislodged or eroded areas are noted, the sediment forebay lining and/or basin inlet areas shall be restored.
  - Trimming of vegetation should be performed as necessary to sustain the system, but all detritus must be removed from the basin.
  - Vegetation shall be inspected annually for invasive plant species and these shall be removed.
  - Vegetation shall be inspected annually for erosion.
  - Vegetative cover should be at a minimum of 95 percent. If vegetative cover is reduced by 10%, vegetation should be reestablished.
  - The outside pond embankment shall be mowed on a semi-annual basis.

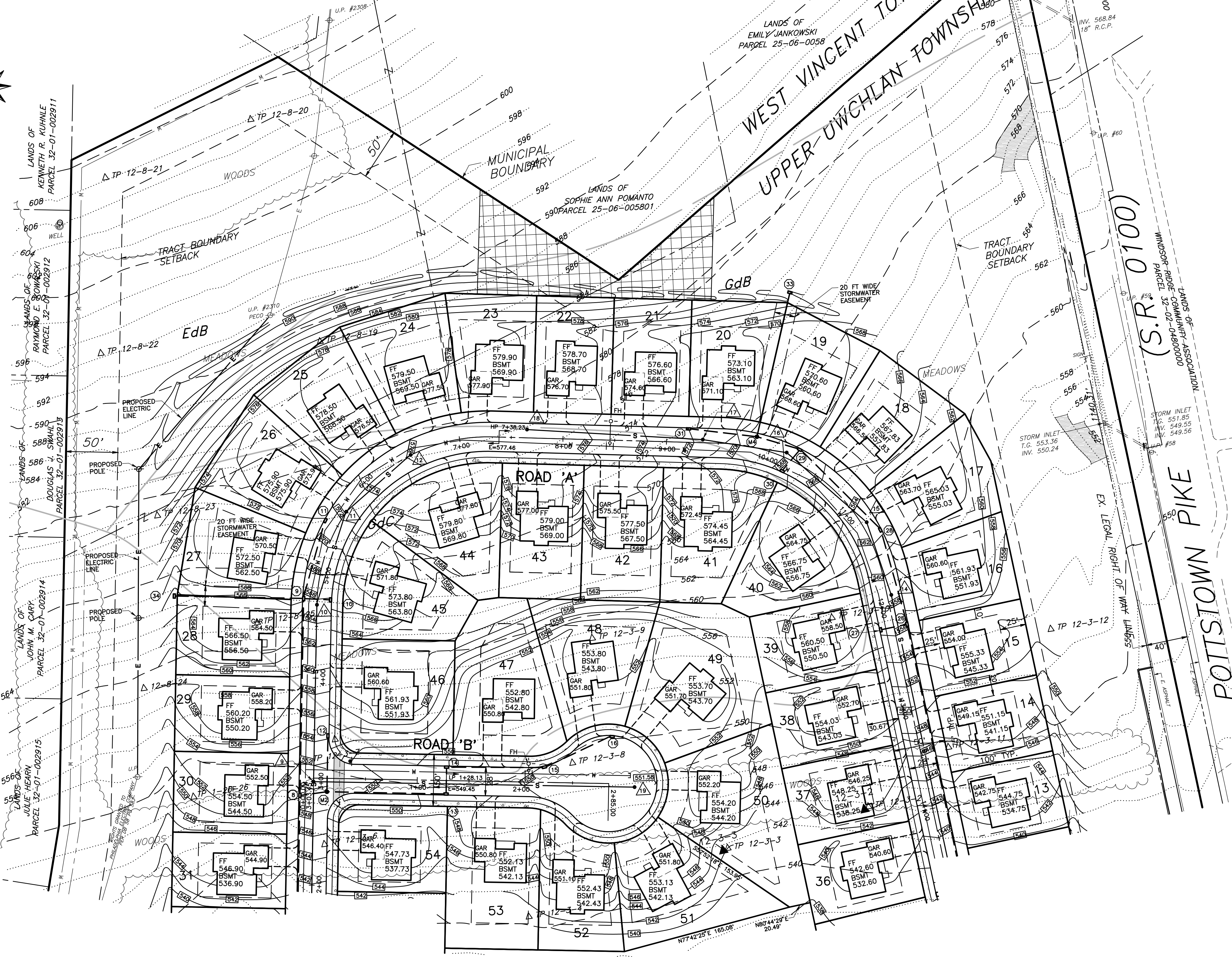
# PRELIMINARY/FINAL PLAN POST CONSTRUCTION STORMWATER MANAGEMENT PLAN

|                                                                                                                                |                  |
|--------------------------------------------------------------------------------------------------------------------------------|------------------|
| 2. 9-8-17 REVISED PER TWP. ENGINEER LETTER DATED 9-8-17.                                                                       |                  |
| 1. 8-18-17 REVISED ROADWAY IMPROVEMENTS.                                                                                       |                  |
| SUBDIVISION PLAN<br>FOR<br><b>JANKOWSKI TRACT</b>                                                                              |                  |
| UPPER UWCHLAN TOWNSHIP<br>CHESTER COUNTY, PA.                                                                                  |                  |
| Edward B. Walsh & Associates, Inc.<br>CIVIL ENGINEERS & SURVEYORS                                                              |                  |
| LIONVILLE PROFESSIONAL CENTER<br>125 Dowlan Forge Rd.<br>Eaton, Pennsylvania 19341<br>Phone: 610-903-0060<br>Fax: 610-903-0080 |                  |
| Plotted: 2/1/2018 File: F:\J\4272\4272-B3.pro                                                                                  |                  |
| Project-- 4272                                                                                                                 | Date-- 8-8-17    |
| Scale-- 1"= 50'                                                                                                                | Drawn-- SLM      |
| Checked-- AUB                                                                                                                  | Sheet-- 12 OF 26 |



# SOILS CLASSIFICATION DATA

CdB - CALIFON LOAM, 3 TO 8 PERCENT SLOPES, HYDROLOGIC SOIL GROUP D  
 EdB - EDGE MONT CHANNERY LOAM, 3 TO 8 PERCENT SLOPES, HYDROLOGIC SOIL GROUP A  
 GdB - GLADSTONE GRAVELLY LOAM, 3 TO 8 PERCENT SLOPES, HYDROLOGIC SOIL GROUP B  
 GdC - GLADSTONE GRAVELLY LOAM, 8 TO 15 PERCENT SLOPES, HYDROLOGIC SOIL GROUP B  
 UugB - URBAN LAND-UDORTHENTS, SHIST AND GNEISS COMPLEX, 8 TO 25 PERCENT SLOPES, HYDROLOGIC SOIL GROUP C



## POST-CONSTRUCTION MAINTENANCE PROGRAM:

A homeowner's association will be created for this project, said association shall be responsible for the maintenance and care of the open space area as well as the cross lot storm sewer system and bioretention basin.

Bio-filter areas and forebays to be planted with appropriate seeding mixtures as specified and provided with prepared bed consisting of 2"-4" depth of prepared soil consisting of 50% topsoil and 50% hardwood mulch. If areas are disturbed in future, appropriate care must be taken to avoid puncturing the liner, and soil preparation and seeding specifications on this plan must be complied with.

### RAIN GARDENS/BIORETENTION AREAS:

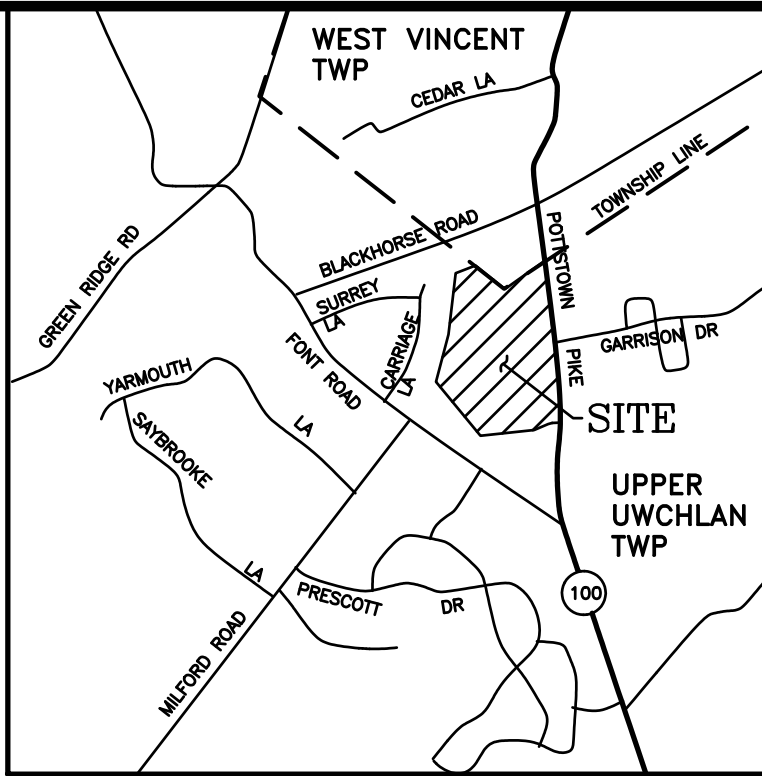
- Inspections shall be performed annually to evaluate sediment buildup, erosion, vegetative conditions, etc.
- Sediment shall be removed from bioretention BMPs when accumulation exceeds one inch. Debris and trash shall be disposed of at suitable disposal/recycling sites and must comply with all state, local and federal waste regulations.
- Pruning and weeding may be required until vegetation is established. Weeds should be removed by hand.
- Detritus may need to be removed approximately twice per year. Dead, diseased or noxious plant species should be replaced. Perennial plantings may be cut down at the end of the growing season.
- Mulch should be replaced when erosion is evident. Mulch should be replenished annually, and mulch replacement of the entire area may be required every 2 to 3 years.
- If infiltration becomes significantly reduced or if infiltration capacity should diminish significantly, the top few inches of discolored material shall be removed and replaced with fresh material. If necessary the soils should be amended, tilled, or replaced. Light-weight equipment should be used for this maintenance work and if compaction of the basin bottom soils should occur, these should be tilled to restore their original infiltration capability. The rain garden should be revegetated per the original planting/seeding plan.
- Watering may be required during periods of extended drought.
- The basin should not be mowed on a regular basis.
- Plantings should be inspected for health twice per year.

### NATURAL BASIN OPERATION AND MAINTENANCE NOTES:

- During the construction phase of the project, the permittee shall be responsible for the proper construction, stabilization and maintenance of all erosion and sedimentation control measures. The permittee shall also be responsible for the proper construction, operation and maintenance of all post construction stormwater management BMPs identified in the PCSWM plan. The homeowners association will assume responsibility for the operation and maintenance responsibilities of all post construction stormwater management BMPs located in phase 1.
- All inspections of post construction stormwater management BMPs shall be performed by the appointed representative of the homeowners association. The operation and maintenance requirements for the post construction stormwater management BMPs proposed for this project include the following:
  - The basin shall be inspected quarterly and after major rainfall events.
  - The purpose of the inspection is to ascertain the operational condition and safety of the facility, particularly the condition of the embankment, outlet structure, trash rack, riprap aprons, inlets, forebay, and other safety related items.
  - Structures shall be cleared immediately of all debris that prevents proper operation.
  - Sediment in the forebay shall be removed when it has accumulated to a depth of 6".
  - Sediment removal shall be performed when the basin is completely dry. However, to clean the forebay, draining or pumping and a possible temporary partial drawdown of the pool area may be required.
  - Sediment should be disposed of properly, and once sediment is removed, disturbed areas need to be immediately restabilized and revegetated.
  - If riprap stone is found to be dislodged or eroded areas are noted, the sediment forebay lining and/or basin inlet areas shall be restored.
  - Trimming of vegetation should be performed as necessary to sustain the system, but all detritus must be removed from the basin.
  - Vegetation shall be inspected annually for invasive plant species and these shall be removed.
  - Vegetation shall be inspected annually for erosion.
  - Vegetative cover should be at a minimum of 95 percent. If vegetative cover is reduced by 10%, vegetation should be reestablished.
  - The outside pond embankment shall be mowed on a semi-annual basis.

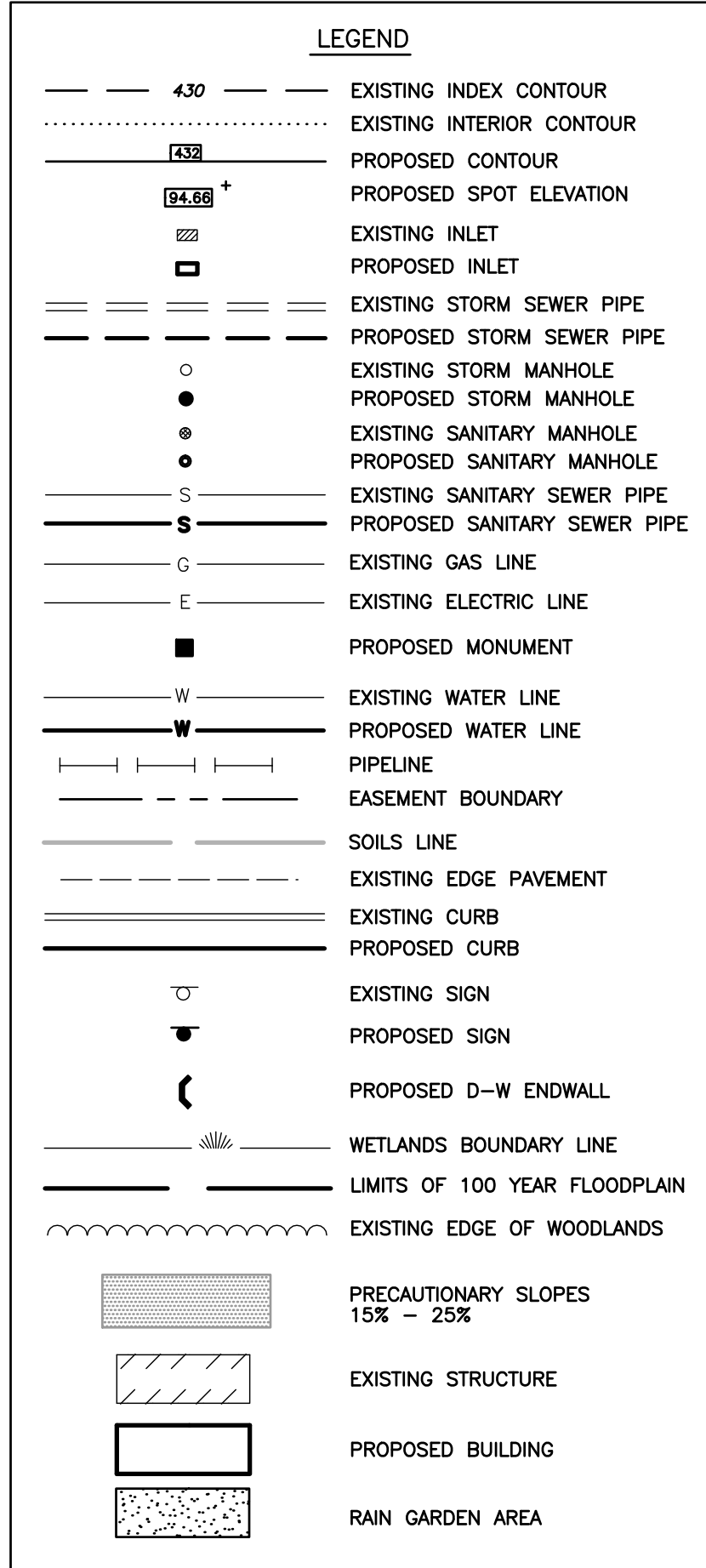
### BIO RETENTION BASINS:

- The basin shall be inspected quarterly and after major rainfall events.
- The purpose of the inspection is to ascertain the operational condition and safety of the facility, particularly the condition of the embankment, outlet structure, trash rack, riprap aprons, inlets, forebay, and other safety related items.
- Structures shall be cleared immediately of all debris that prevents proper operation.
- Sediment in the forebay shall be removed when it has accumulated to a depth of 6".
- Sediment removal shall be performed when the basin is completely dry. However, to clean the forebay, draining or pumping and a possible temporary partial drawdown of the pool area may be required.
- Sediment should be disposed of properly, and once sediment is removed, disturbed areas need to be immediately restabilized and revegetated.
- If riprap stone is found to be dislodged or eroded areas are noted, the sediment forebay lining and/or basin inlet areas shall be restored.
- Trimming of vegetation should be performed as necessary to sustain the system, but all detritus must be removed from the basin.
- Vegetation shall be inspected annually for invasive plant species and these shall be removed.
- Vegetation shall be inspected annually for erosion.
- Vegetative cover should be at a minimum of 95 percent. If vegetative cover is reduced by 10%, vegetation should be reestablished.
- The outside pond embankment shall be mowed on a semi-annual basis.



## LOCATION MAP

SCALE: 1"=2000'



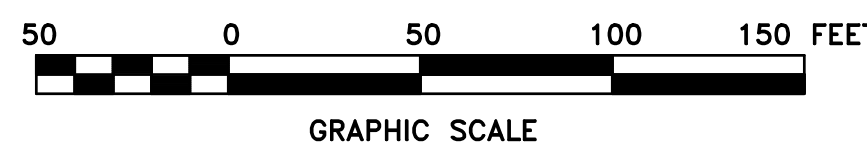
## PRELIMINARY/FINAL PLAN POST CONSTRUCTION STORMWATER MANAGEMENT PLAN

2. 9-8-17 REVISED PER TWP. ENGINEER LETTER DATED 9-8-17.

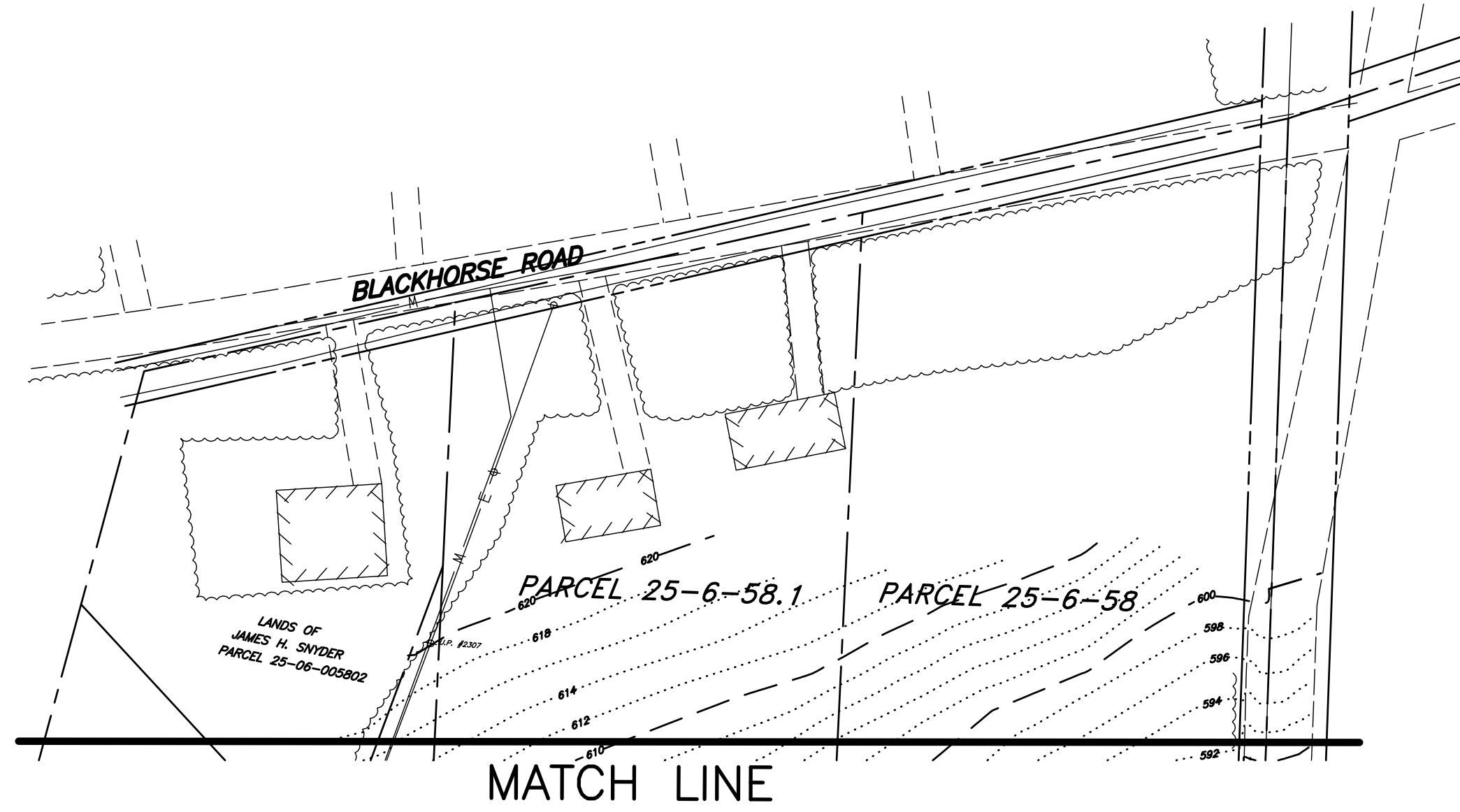
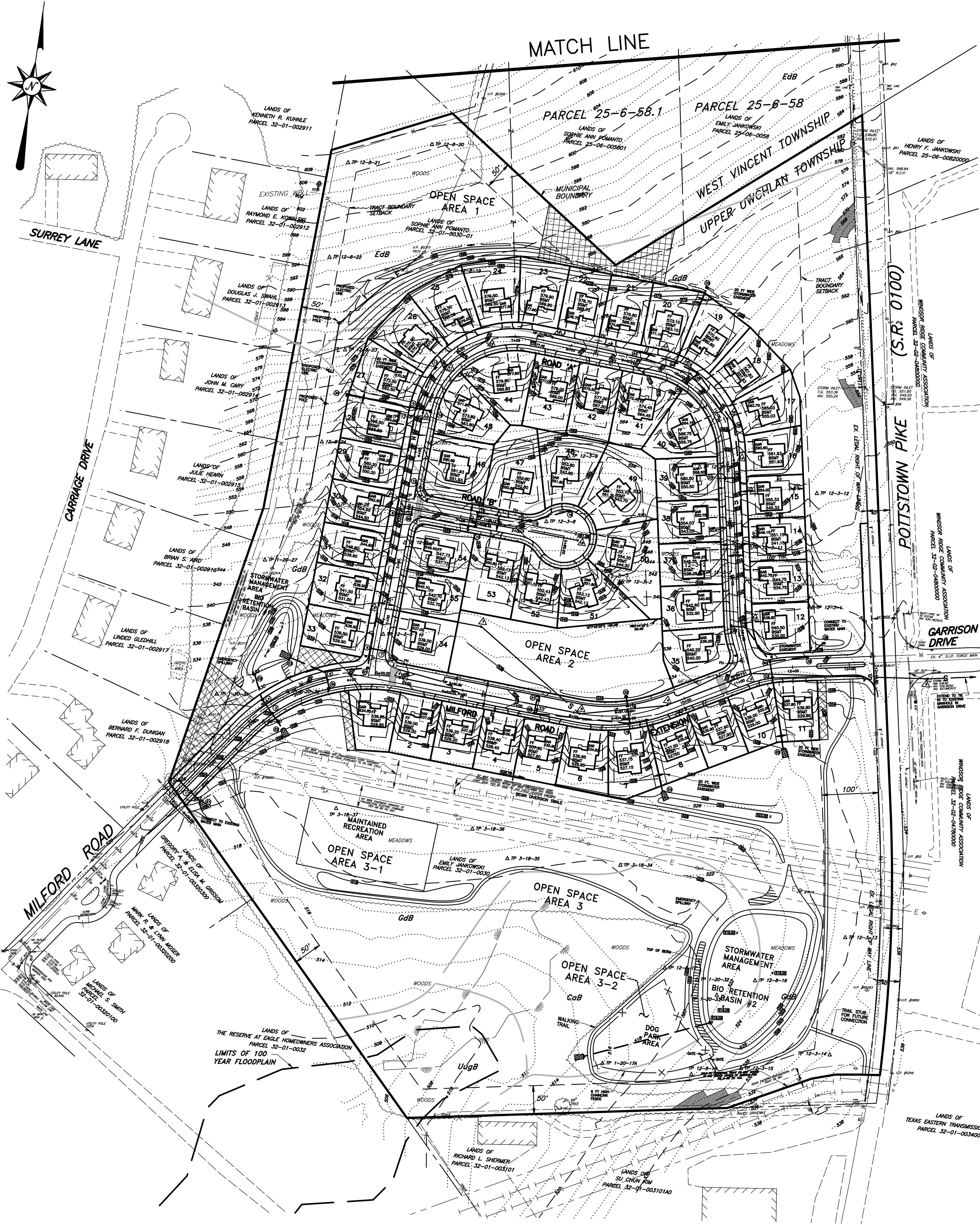
1. 8-18-17 REVISED ROADWAY IMPROVEMENTS.

|                                                                                                                                |                             |
|--------------------------------------------------------------------------------------------------------------------------------|-----------------------------|
| SUBDIVISION PLAN<br>FOR<br><b>JANKOWSKI TRACT</b>                                                                              |                             |
| UPPER UWCHLAN TOWNSHIP                                                                                                         | CHESTER COUNTY, PA.         |
| Edward B. Walsh & Associates, Inc.                                                                                             |                             |
| CIVIL ENGINEERS & SURVEYORS                                                                                                    | Project- 4272               |
| Date- 8-8-17                                                                                                                   |                             |
| Scale- 1"= 50'                                                                                                                 |                             |
| Drawn- SLM                                                                                                                     |                             |
| Checked- AJB                                                                                                                   |                             |
| Sheet- 13 OF 26                                                                                                                |                             |
| LIONVILLE PROFESSIONAL CENTER<br>125 Dowlan Forge Rd.<br>Eaton, Pennsylvania 19341<br>Phone: 610-903-0060<br>Fax: 610-903-0080 |                             |
| Plotted: 2/1/2018                                                                                                              | File: F:\B\4272\4272-B3.pro |

UPI NUMBERS 32-1-30-30.1, 25-6-58.1







**OPEN SPACE OWNERSHIP AND MANAGEMENT RESPONSIBILITIES:**

THE COMMON OPEN SPACE AREAS ARE GENERALLY COMPRISED OF WOODLANDS, LAWN AREAS, MEADOWS AND STREET TREES AND BUFFER PLANTINGS. STORMWATER MANAGEMENT AREAS ARE LOCATED WITHIN OPEN SPACE ON THE PROPERTY. THE OPEN SPACE WILL PROVIDE PASSIVE RECREATIONAL OPPORTUNITIES AND AN UNSTRUCTURED ACTIVE AREA FOR THE JANKOWSKI TRACT COMMUNITY. THE OPEN SPACE AREAS WILL BE OWNED AND MAINTAINED THROUGH THE JANKOWSKI TRACT HOMEOWNERS ASSOCIATION (HOA) OR A PROFESSIONAL MANAGEMENT COMPANY SELECTED BY THE HOA. THE FEES FOR THE MAINTENANCE OF THE OPEN SPACE WILL BE PART OF THE ANNUAL COMMUNITY ASSESSMENT AND SHARED EQUITABLY AMONG THE MEMBERS. THE HOA WILL CONTRACT WITH A QUALIFIED LANDSCAPE COMPANY FOR THE MAINTENANCE OF THE OPEN SPACE AREAS. IN THE EVENT THAT THE HOA DOES NOT MAINTAIN THE COMMON OPEN SPACE IN ACCORDANCE WITH THE FINAL OPEN SPACE MANAGEMENT PLAN, UPPER UWCHLAN TOWNSHIP WILL HAVE THE ABILITY TO PERFORM THE MAINTENANCE AND CHARGE OR LIEN THE HOMEOWNERS ASSOCIATION FOR THE COSTS INCURRED IN THEIR TOWNSHIP.

**OPEN SPACE MANAGEMENT TECHNIQUES**

IN ORDER TO ENSURE THAT THE MAINTENANCE CONTINUES TO MEET THE NEEDS OF THE SITE AND CURRENT HORTICULTURAL PRACTICES, THE JANKOWSKI TRACT HOMEOWNERS ASSOCIATION (HOA) SHALL CONTRACT WITH A REGISTERED LANDSCAPE ARCHITECT, CERTIFIED ARBORIST OR NATURALIST TO ANNUALLY PERFORM A GENERAL INSPECTION OF THE COMMON OPEN SPACE AREAS AND ASSOCIATED FACILITIES WITHIN THE OPEN SPACE THAT ARE MAINTAINED BY THE HOA. THE HOA SHALL ENGAGE A LICENSED PROFESSIONAL STORMWATER MANAGEMENT FACILITY MAINTENANCE SPECIALIST TO INSURE PROPER PERFORMANCE. A REPORT OUTLINING THE CONSULTANT(S) FINDINGS AND RECOMMENDATIONS, CONSISTENT WITH THE STANDARDS CONTAINED HEREIN, WILL BE SUBMITTED TO THE HOA. THE HOA SHALL IMPLEMENT THE RECOMMENDATIONS WITHIN ONE YEAR OF THE ISSUANCE OF THE REPORT.

- ANNUAL INSPECTIONS**  
ALL FENCES, WALLS, WALKS OR STRUCTURES SHOULD BE INSPECTED ANNUALLY FOR DEFECTS AND SITUATIONS THAT WOULD BE HAZARDOUS TO USERS. NORMAL MAINTENANCE AND REPAIRS SHALL BE DONE IN A TIMELY MANNER, AND IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS AND INSTRUCTIONS.
- WOODLANDS**  
THE WOODLANDS ARE TO BE LEFT IN THEIR NATURAL STATE AND MAINTAINED TO A LIMITED DEGREE TO PRESERVE THEIR HEALTH AND STABILITY. LIVE AND DEAD TREES SHALL NOT BE CUT DOWN UNLESS THEY POSE A THREAT TO HUMAN SAFETY. DEAD TREES, FALLEN LEAVES AND LIMBS SHALL NOT BE REMOVED, BUT LEFT TO DECOMPOSE ON THE FOREST FLOOR FOR PROMOTION OF WILDLIFE HABITAT AND HEALTHY SOIL PRODUCTION. THE REMOVAL OF NATIVE, NON-INVASIVE TREES, SHRUBS, SEEDLINGS, AND GROUND COVER SHALL BE REMOVED IF THEY ARE THREATENING THE OVERALL HEALTH OF THE WOODLANDS. INVASIVE VINES ALONG THE FIRST FIFTEEN FEET OF THE WOODLAND EDGES AND IN FOREST GAPS SHALL BE REMOVED ANNUALLY. LOGGING, FIRES AND DUMPING ARE PROHIBITED.
- MEADOWS**  
MEADOWS ARE ANY AREAS NOT MAINTAINED AS LAWN THROUGHOUT THE COMMON OPEN SPACE, AS WELL AS STORMWATER MANAGEMENT AREAS. MOW MEADOWS IN EARLY SPRING USING A LARGE DECK MOWER WITH A SECOND MID-SUMMER MOWING DURING THE FIRST MAINTENANCE YEAR. MOW MEADOWS THREE TIMES PER YEAR IN EARLY SPRING, SUMMER AND FALL AND CONTINUE WITH SELECTIVE TREATMENT FOR INVASIVE SPECIES IN THE SECOND AND SUBSEQUENT YEARS OF MAINTENANCE. SUPPLEMENT MEADOW PLANTINGS BY OVERSEEDING AS NECESSARY.
- LAWN AREAS**  
LAWNS SHALL BE MAINTAINED REGULARLY DURING THE GROWING SEASON. THE LAWNS SHOULD BE MOWED AS LITTLE OR AS OFTEN AS NECESSARY IN ORDER TO MAINTAIN THE GRASS AT A HEIGHT OF 2.5-4 INCHES. LAWN AREA MAINTENANCE MAY REQUIRE THE APPLICATION OF FERTILIZER, HERBICIDES AND PESTICIDES ON A REGULAR BASIS THROUGHOUT THE GROWING SEASON. THE APPLICATION OF FERTILIZER AND LIME SHALL BE IN ACCORDANCE WITH A SCHEDULE RECOMMENDED BY THE PENNSYLVANIA STATE COOPERATIVE EXTENSION SERVICE THAT IS BASED ON THE RESULTS OF SOIL TESTS CONDUCTED BY THE SERVICE. LAWN AREAS MAY BE TOPPED DRESSED ANNUALLY WITH EITHER ORGANIC OR SYNTHETIC FERTILIZING MATERIALS OR AS MAY BE RECOMMENDED IN A PROFESSIONAL'S REPORT TO THE HOA. LAWNS SHOULD BE AERATED EVERY FIVE YEARS.
- ORNAMENTAL PLANTINGS**  
THE TREATMENT OF INDIVIDUAL PLANTS, INCLUDING STREET TREES, BUFFER AREAS AND SHRUB BEDS SHOULD BE PERFORMED ON AN AS-NEEDED BASIS, AND MAY INCLUDE PEST AND WEED MANAGEMENT, PRUNING, OR REPLACEMENT. ANY PLANTINGS THAT HAVE FIFTY PERCENT (50%) OR MORE DEAD WOOD ARE CONSIDERED DEAD, AND SHOULD BE REPLACED. SEE THE LANDSCAPE PLAN FOR ORIGINAL PLANT LIST, WHICH MAY BE USED AS A REFERENCE FOR REPLACEMENT PLANT MATERIAL. ALL REPLACEMENT PLANTS SHOULD BE HARDY, TOLERANT OF THE SITE'S MICRO-CLIMATE, BE DEER RESISTANT SPECIES, BE CONSIDERED HORTICULTURALLY ACCEPTABLE (NO KNOWN DISEASES OR PROBLEMS), AND PREFERABLY OFFER HIGH WILDLIFE VALUE AT THE TIME OF REPLACEMENT. PLANT RECOMMENDATIONS SHOULD BE INCLUDED IN THE ANNUAL INSPECTION REPORT.
- UPPER UWCHLAN TOWNSHIP AND/OR ITS AGENTS SHALL BE GIVEN THE RIGHT AND PRIVILEGE TO ENTER UPON THE SITE FROM TIME TO TIME FOR THE PURPOSE OF INSPECTION OF THE STORMWATER MANAGEMENT SYSTEMS IN ORDER TO DETERMINE THAT THE STRUCTURAL AND DESIGN INTEGRITY IS BEING MAINTAINED BY THE OWNER, AND IF NECESSARY, TO MAKE EMERGENCY REPAIRS.**

**OPEN SPACE MODIFICATIONS:**

IN ORDER TO ALLOW FOR THE CHANGING NEEDS INHERENT IN THE PERPETUAL MANAGEMENT OF LAND, REVISIONS TO THE OPEN SPACE PLAN AND ITS MANAGEMENT MAY BE REVISED WHEN APPROVED BY THE BOARD OF SUPERVISORS. A REQUESTED REVISION MUST BE SUBMITTED TO THE BOARD IN WRITTEN FORM. APPROVAL OF SUCH REQUEST BY THE BOARD SHALL NOT BE UNREASONABLY WITHHELD OR DELAYED, SO LONG AS THE PROPOSED CHANGE IS FEASIBLE AND CONSISTENT WITH THE PURPOSES OF PRESERVATION OF OPEN SPACE SET FORTH IN THIS ARTICLE AND SO LONG AS THE PLAN FOR SUCH CHANGE AVOIDS A LIKELIHOOD OF THE OBLIGATION FOR MANAGEMENT AND MAINTENANCE OF THE LAND FALLING UPON THE TOWNSHIP WITHOUT THE CONSENT OF THE BOARD OF SUPERVISORS.

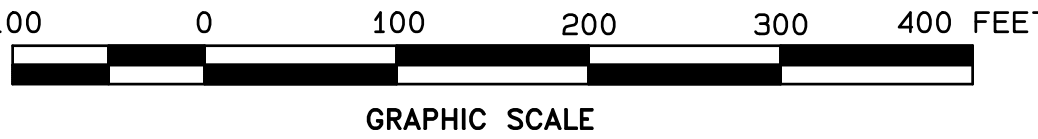
**OPEN SPACE AREAS**

- OPEN SPACE AREA 1 = WOODS AND MEADOW
- OPEN SPACE AREA 2 = LAWN AREA
- OPEN SPACE AREA 3 = WOODS & MEADOW
- OPEN SPACE AREAS 3-1 & 2 = LAWN AREAS

**PRELIMINARY/FINAL PLAN  
OPEN SPACE  
MANAGEMENT PLAN**

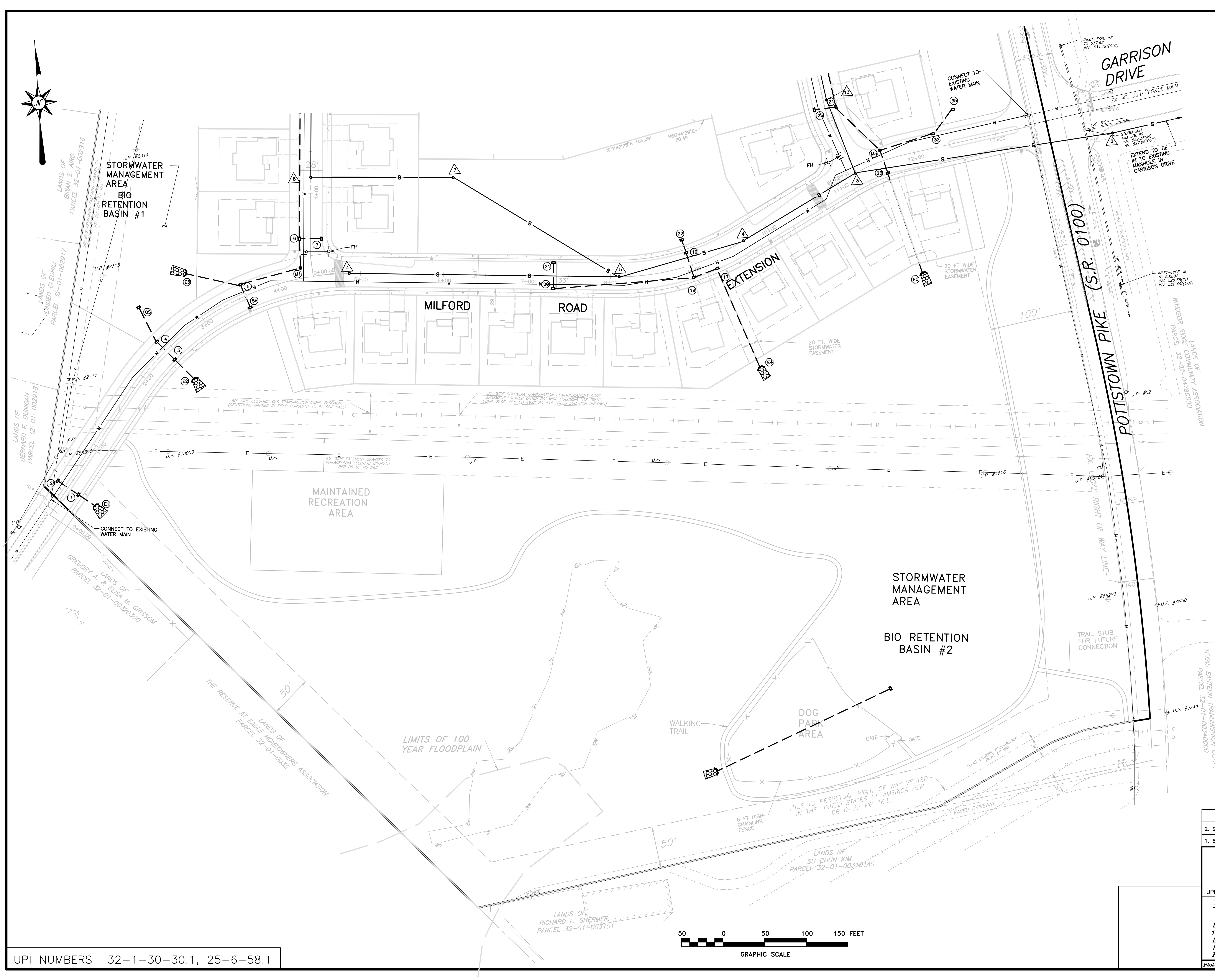
2. 9-8-17 REVISED PER TWP. ENGINEER LETTER DATED 9-8-17.  
1. 8-18-17 REVISED ROADWAY IMPROVEMENTS.

|                                                                                                                                |                               |
|--------------------------------------------------------------------------------------------------------------------------------|-------------------------------|
| SUBDIVISION PLAN<br>FOR<br><b>JANKOWSKI TRACT</b>                                                                              |                               |
| UPPER UWCHLAN TOWNSHIP<br>CHESTER COUNTY, PA.                                                                                  |                               |
| Edward B. Walsh & Associates, Inc.<br>CIVIL ENGINEERS & SURVEYORS                                                              |                               |
| LIONVILLE PROFESSIONAL CENTER<br>125 Dowlan Forge Rd.<br>Eaton, Pennsylvania 19341<br>Phone: 610-903-0060<br>Fax: 610-903-0080 |                               |
|                                                                                                                                |                               |
| Plotted: 2/1/2018                                                                                                              | File: F:\J\B\4272\4272-B3.pro |
| Project-- 4272                                                                                                                 | Date-- 8-8-17                 |
| Scale-- 1"= 100'                                                                                                               | Drawn-- SLM                   |
| Checked-- AUB                                                                                                                  | Sheet-- 14 OF 26              |



UPI NUMBERS 32-1-30-30.1, 25-6-58.1

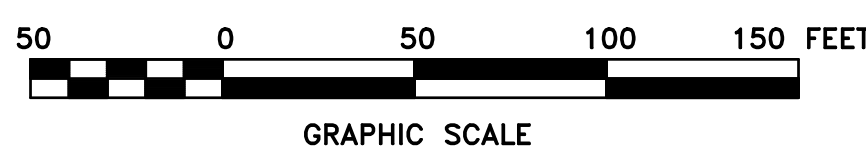




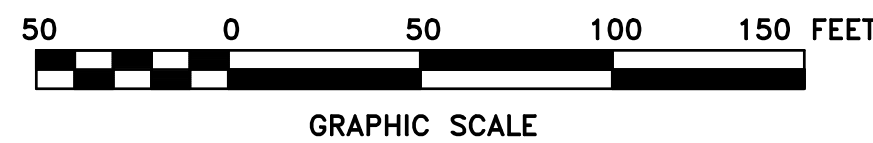
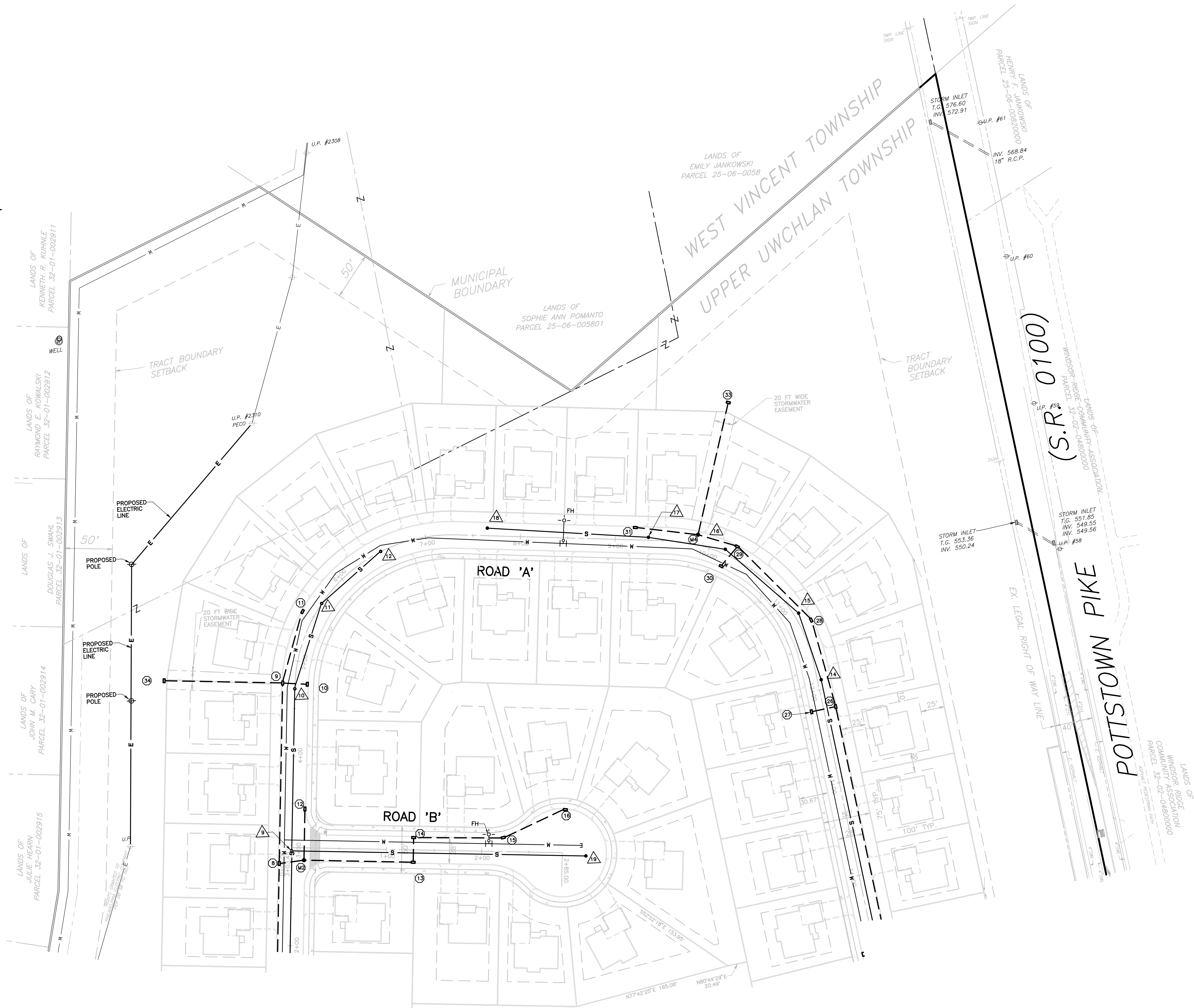
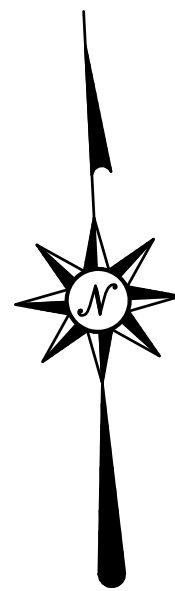
PRELIMINARY/FINAL PLAN  
UTILITY PLAN

|                                                                                                                                |                     |
|--------------------------------------------------------------------------------------------------------------------------------|---------------------|
| 2. 9-8-17 REVISED PER TWP. ENGINEER LETTER DATED 9-8-17.                                                                       |                     |
| 1. 8-18-17 REVISED ROADWAY IMPROVEMENTS.                                                                                       |                     |
| SUBDIVISION PLAN<br>FOR<br>JANKOWSKI TRACT                                                                                     |                     |
| UPPER UWCHLAN TOWNSHIP                                                                                                         | CHESTER COUNTY, PA. |
| Edward B. Walsh & Associates, Inc.                                                                                             |                     |
| CIVIL ENGINEERS & SURVEYORS                                                                                                    |                     |
| LIONVILLE PROFESSIONAL CENTER<br>125 DOWLIN FORGE RD.<br>EXTON, PENNSYLVANIA 19341<br>Phone: 610-903-0060<br>Fax: 610-903-0080 |                     |
| Plotted: 2/1/2018    File: F:\B\4272\4272-B3.pro                                                                               |                     |
| Project-- 4272                                                                                                                 | Date-- 8-8-17       |
| Scale-- 1"= 50'                                                                                                                | Drawn-- SLM         |
| Checked-- AJB                                                                                                                  | Sheet-- 15 OF 26    |

UPI NUMBERS 32-1-30-30.1, 25-6-58.1







PRELIMINARY/FINAL PLAN  
UTILITY PLAN

2. 9-8-17 REVISED PER TWP. ENGINEER LETTER DATED 9-8-17.

1. 8-18-17 REVISED ROADWAY IMPROVEMENTS.

SUBDIVISION PLAN  
FOR  
**JANKOWSKI TRACT**

UPPER UWCHLAN TOWNSHIP CHESTER COUNTY, PA.

Edward B. Walsh & Associates, Inc.  
CIVIL ENGINEERS & SURVEYORS

LIONVILLE PROFESSIONAL CENTER  
125 Dowlan Forge Rd.  
Exton, Pennsylvania 19341  
Phone: 610-903-0060  
Fax: 610-903-0080

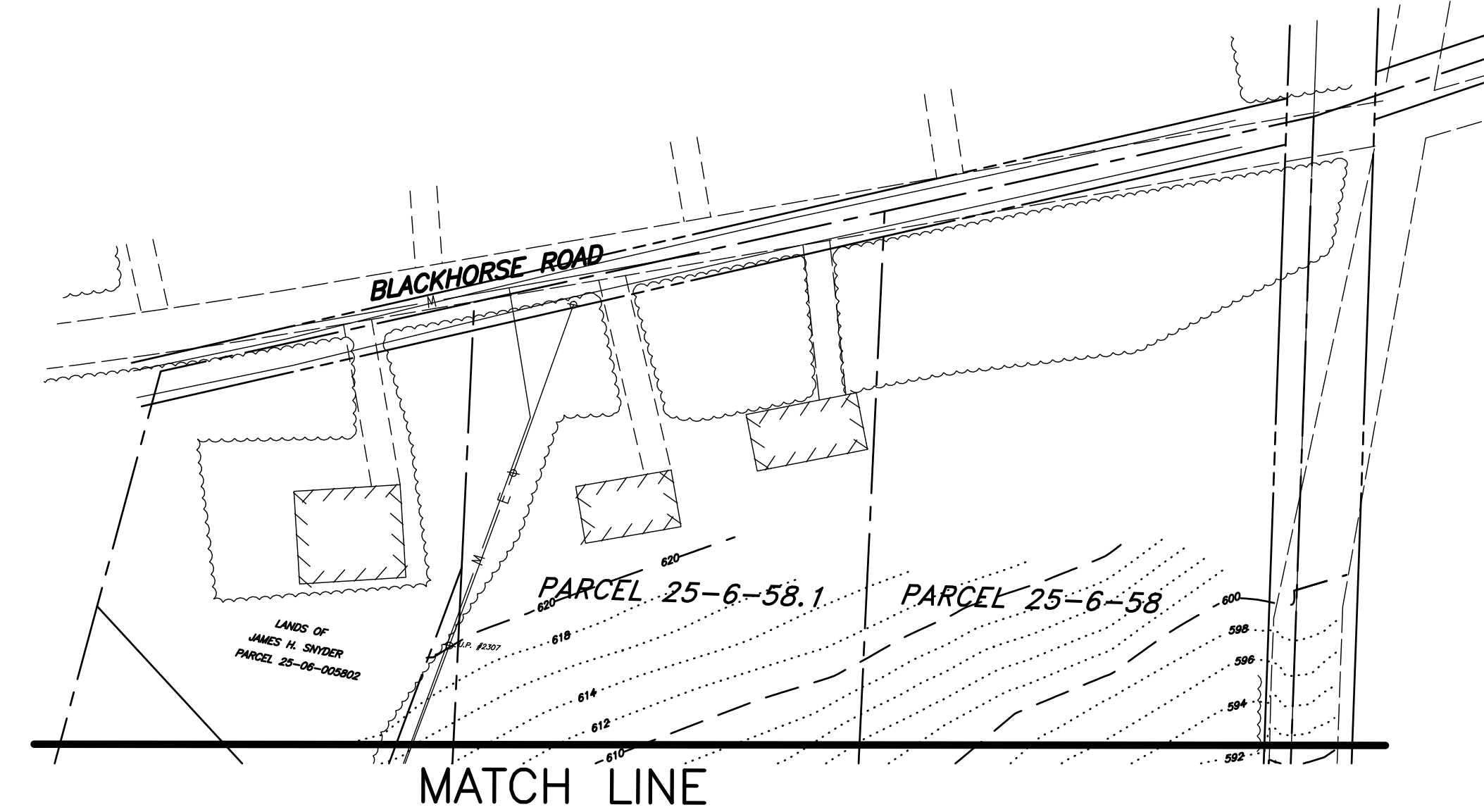
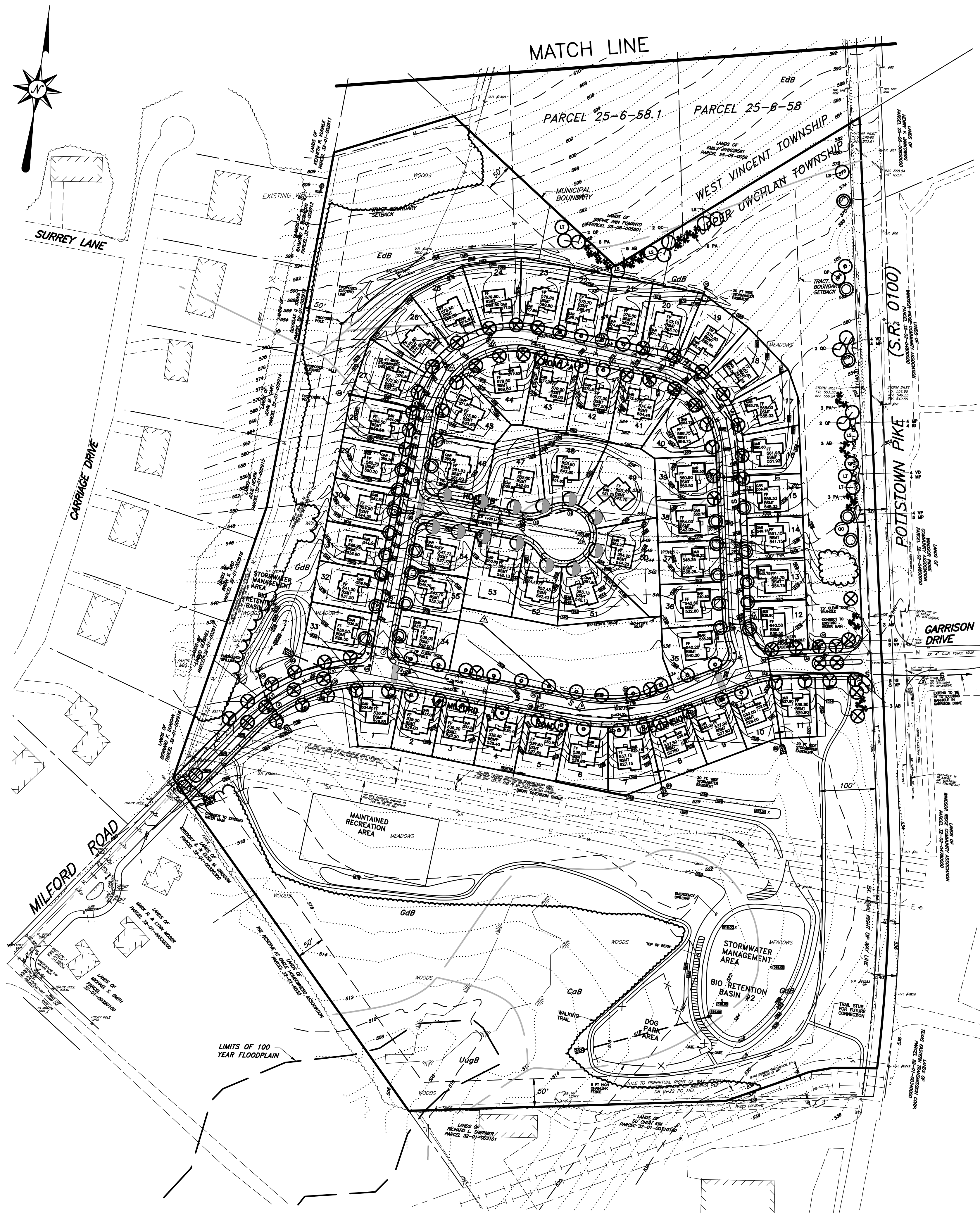


Project- 4272  
Date- 8-8-17  
Scale- 1" = 50'  
Drawn- SLM  
Checked- AJB  
Sheet- 16 OF 26

Plotted: 2/1/2018 File: F:\B\4272\4272-B3.pro

UPI NUMBERS 32-1-30-30.1, 25-6-58.1

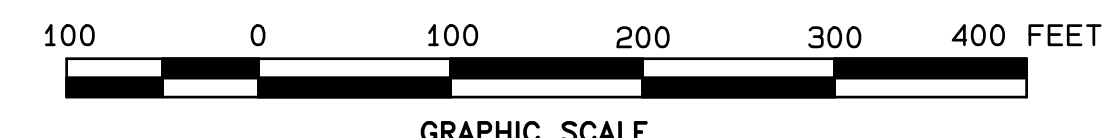




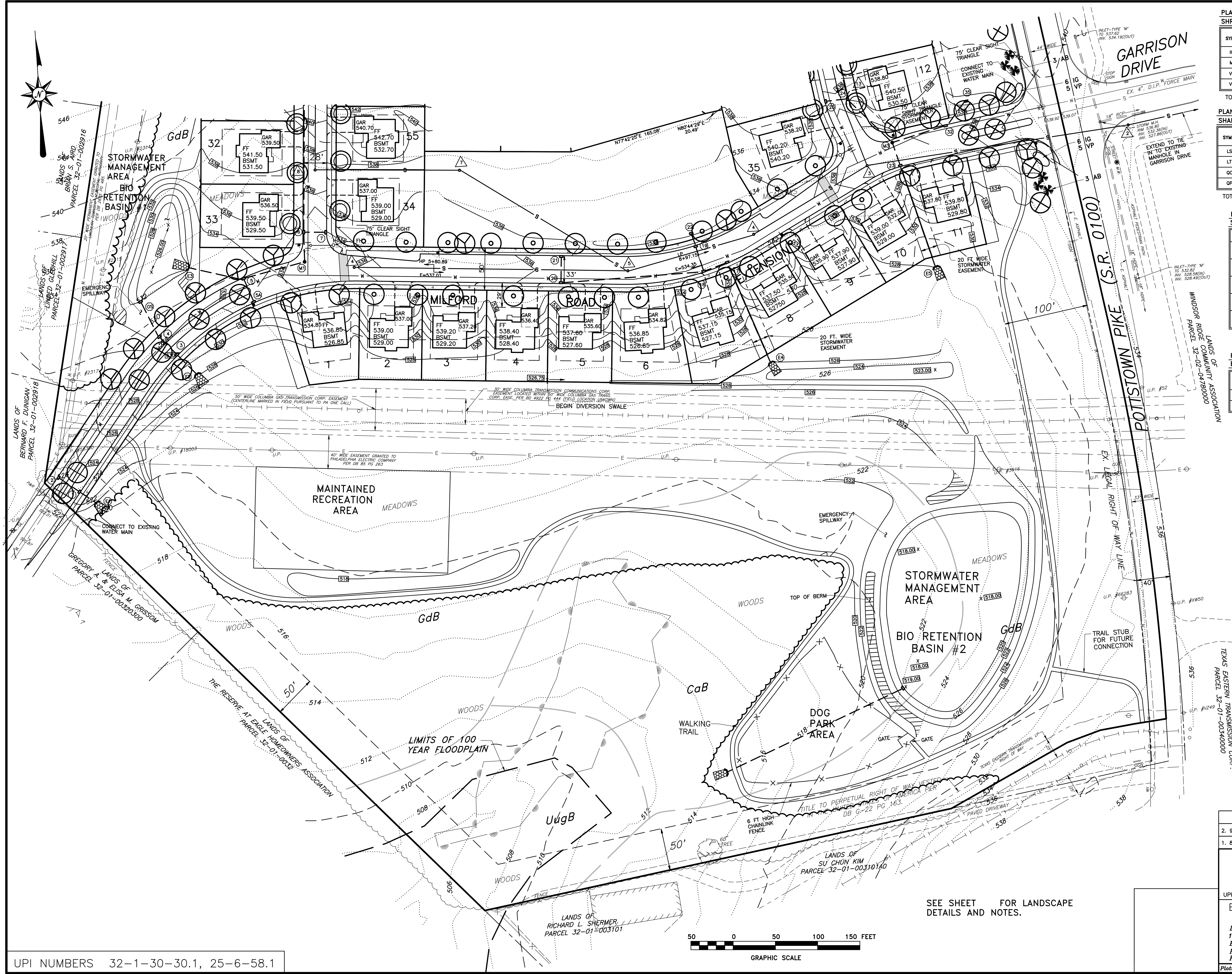
PRELIMINARY/FINAL PLAN  
OVERALL  
LANDSCAPE PLAN

|                                                          |                              |
|----------------------------------------------------------|------------------------------|
| 2. 9-8-17 REVISED PER TWP. ENGINEER LETTER DATED 9-8-17. |                              |
| 1. 8-18-17 REVISED ROADWAY IMPROVEMENTS.                 |                              |
| SUBDIVISION PLAN<br>FOR<br>JANKOWSKI TRACT               |                              |
| UPPER UWCHLAN TOWNSHIP                                   | CHESTER COUNTY, PA.          |
| Edward B. Walsh & Associates, Inc.                       |                              |
| CIVIL ENGINEERS & SURVEYORS                              |                              |
| LIONVILLE PROFESSIONAL CENTER                            |                              |
| 125 Dowlon Forge Rd.                                     |                              |
| Eaton, Pennsylvania 19341                                |                              |
| Phone: 610-903-0060                                      |                              |
| Fax: 610-903-0080                                        |                              |
| Plotted: 2/1/2018                                        | File: F:\JB\4272\4272-B3.pro |
| Project- 4272                                            | Date- 8-8-17                 |
| Scale- 1"= 100'                                          | Drawn- SLM                   |
| Checked- AJB                                             | Sheet- 17 OF 26              |

UPI NUMBERS 32-1-30-30.1, 25-6-58.1







PLANT SCHEDULE  
SHRUBS

| SYMBOL | QTY. | BOTANICAL NAME       | COMMON NAME       | HEIGHT    | CONDITION |
|--------|------|----------------------|-------------------|-----------|-----------|
| IG     | 16   | Ilex Glabra          | Inkberry          | 2'-2 1/2' | B & B     |
| MP     | 17   | Myrica Pennsylvanica | Northern Bayberry | 2'-2 1/2' | B & B     |
| VD     | 8    | Viburnum Dilatatum   | Linden Viburnum   | 2'-2 1/2' | B & B     |
| VP     | 14   | Viburnum Pragnese    | Prague Viburnum   | 2'-2 1/2' | B & B     |

TOTAL = 55

PLANT SCHEDULE  
SHADE TREES

| SYMBOL | QTY. | BOTANICAL NAME          | COMMON NAME       | HEIGHT  | CALIPER   | CONDITION |
|--------|------|-------------------------|-------------------|---------|-----------|-----------|
| LS     | 4    | Liquidambar             | Seedless Sweetgum | 14'-16' | 3"-3 1/2" | B & B     |
| LT     | 5    | Liriodendron Tulipifera | Tulip Tree        | 14'-16' | 3"-3 1/2" | B & B     |
| QC     | 5    | Quercus Coccinea        | Scarlet Oak       | 14'-16' | 3"-3 1/2" | B & B     |
| QP     | 7    | Quercus Palustris       | Pin Oak           | 14'-16' | 3"-3 1/2" | B & B     |

TOTAL = 21

PLANT SCHEDULE  
STREET TREES

| SYMBOL | QTY. | BOTANICAL NAME                       | COMMON NAME                 | HEIGHT  | CALIPER   | CONDITION |
|--------|------|--------------------------------------|-----------------------------|---------|-----------|-----------|
| 33     | 33   | Acer Rubrum Red Sunset               | Red Sunset Maple            | 14'-16' | 3"-3 1/2" | B & B     |
| 28     | 28   | Ulmus Americana Princeton            | Princeton Elm               | 14'-16' | 3"-3 1/2" | B & B     |
| 13     | 13   | Tilia Cordata Greenspire             | Greenspire Linden           | 14'-16' | 3"-3 1/2" | B & B     |
| 36     | 36   | Platanus x Acerfolia "Bloodgood"     | Bloodgood London Plane Tree | 14'-16' | 3"-3 1/2" | B & B     |
| 28     | 28   | Gleditsia Triac Inermis "True Shade" | Trueshade Honeylocust       | 14'-16' | 3"-3 1/2" | B & B     |

TOTAL = 138

PLANT SCHEDULE  
EVERGREEN TREES

| SYMBOL | QTY. | BOTANICAL NAME | COMMON NAME   | HEIGHT | CONDITION |
|--------|------|----------------|---------------|--------|-----------|
| AB     | 14   | Abies Concolor | White Fir     | 7'-8'  | B & B     |
| PA     | 18   | Picea Abies    | Norway Spruce | 7'-8'  | B & B     |

TRACT BOUNDARY LANDSCAPE REQUIREMENTS

| TRACT BOUNDARY          | DECIDUOUS TREES | EVERGREEN TREES | SHRUBS  |
|-------------------------|-----------------|-----------------|---------|
| * 675 FT                | 7               | 14              | 54      |
| * 820 FT                | 9               | 17              | 66      |
| * 1,150 FT              | 12              | 23              | 92      |
| * 225 FT                | 3               | 5               | 18      |
| 300 FT                  | 3 (3)           | 6 (6)           | 24      |
| 510 FT                  | 6 (6)           | 11 (11)         | 41      |
| POTLSTOWN PIKE 1,100 FT | 22 (22)         | 11 (11)         | 55 (55) |

\* EXCLUDED FROM REQUIRED PLANTINGS BECAUSE OF EXISTING VEGETATION  
( ) LANDSCAPING PROVIDED

LANDSCAPE REQUIREMENTS

| STREET TREES                      | MILFORD ROAD EXTENSION = 1,344 LF |
|-----------------------------------|-----------------------------------|
| STREET TREES REQUIRED = 54        |                                   |
| ROAD "A" = 1,520 LF               |                                   |
| STREET TREES REQUIRED = 61        |                                   |
| ROAD "B" = 317 LF                 |                                   |
| STREET TREES REQUIRED = 13        |                                   |
| TOTAL STREET TREES REQUIRED = 128 |                                   |

LANDSCAPE LEGEND

|  |                         |
|--|-------------------------|
|  | EXISTING TREE MASS      |
|  | PROPOSED DECIDUOUS TREE |
|  | PROPOSED EVERGREEN TREE |

PRELIMINARY/FINAL PLAN  
LANDSCAPE PLAN

2. 9-8-17 REVISED PER TWP. ENGINEER LETTER DATED 9-8-17.  
1. 8-18-17 REVISED ROADWAY IMPROVEMENTS.

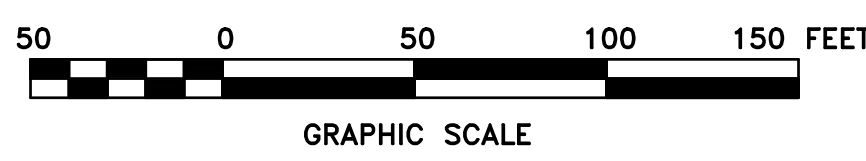
SUBDIVISION PLAN  
FOR  
**JANKOWSKI TRACT**

UPPER UWCHLAN TOWNSHIP  
Edward B. Walsh & Associates, Inc.  
CIVIL ENGINEERS & SURVEYORS  
LIONVILLE PROFESSIONAL CENTER  
125 Dowlan Forge Rd.  
Eaton, Pennsylvania 19341  
Phone: 610-903-0060  
Fax: 610-903-0080  
Plotted: 2/1/2018

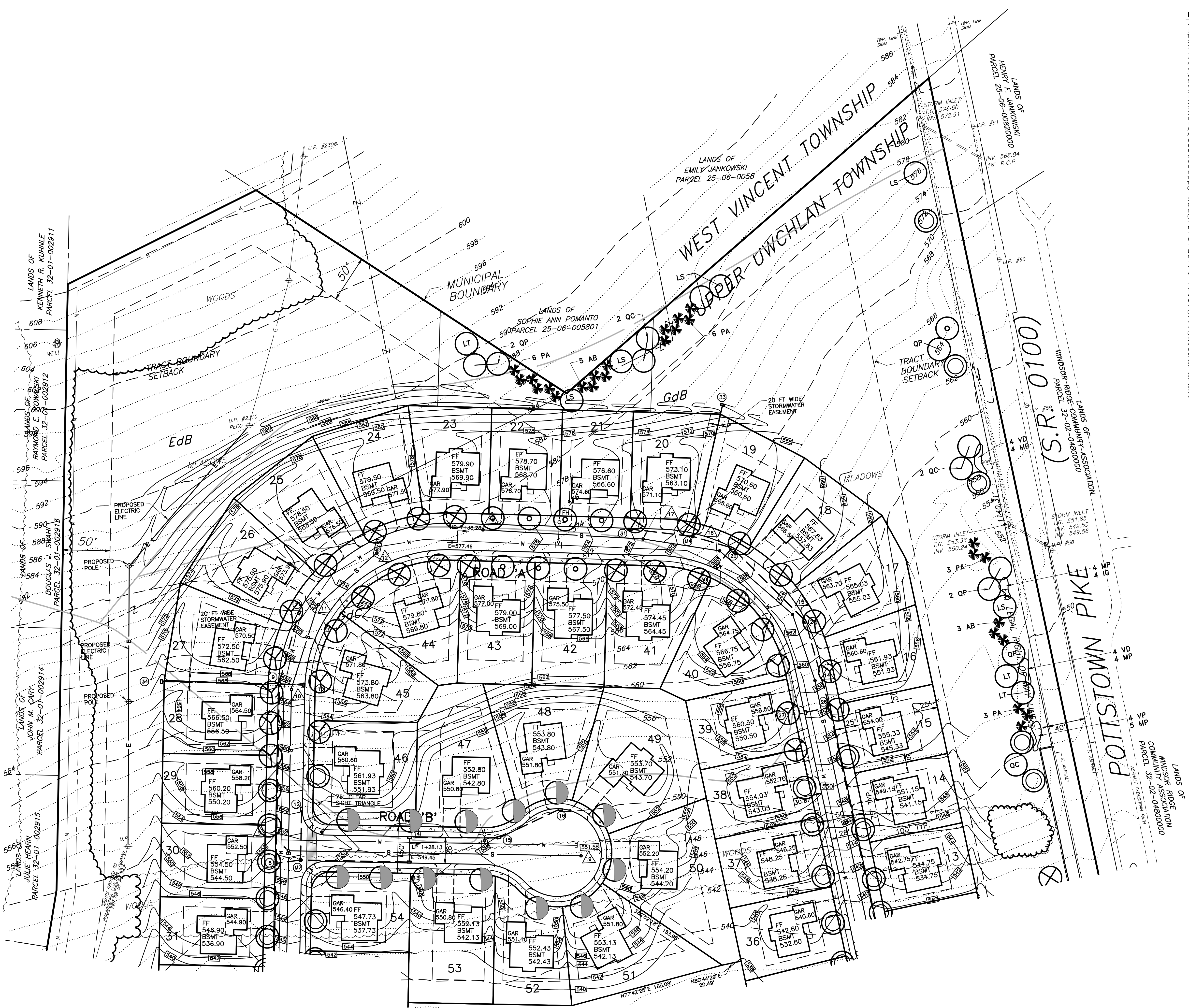
CHESTER COUNTY, PA.  
Project- 4272  
Date- 8-8-17  
Scale- 1" = 50'  
Drawn- SLM  
Checked- AJB  
Sheet- 18 OF 26  
File: F:\JBA\4272\4272-B3.pro

UPI NUMBERS 32-1-30-30.1, 25-6-58.1

SEE SHEET FOR LANDSCAPE  
DETAILS AND NOTES.







50 0 50 100 150 FEET

GRAPHIC SCALE

Diagram illustrating the typical evergreen tree planting detail, showing the tree, trunk, root ball, and surrounding materials. The diagram includes the following components and dimensions:

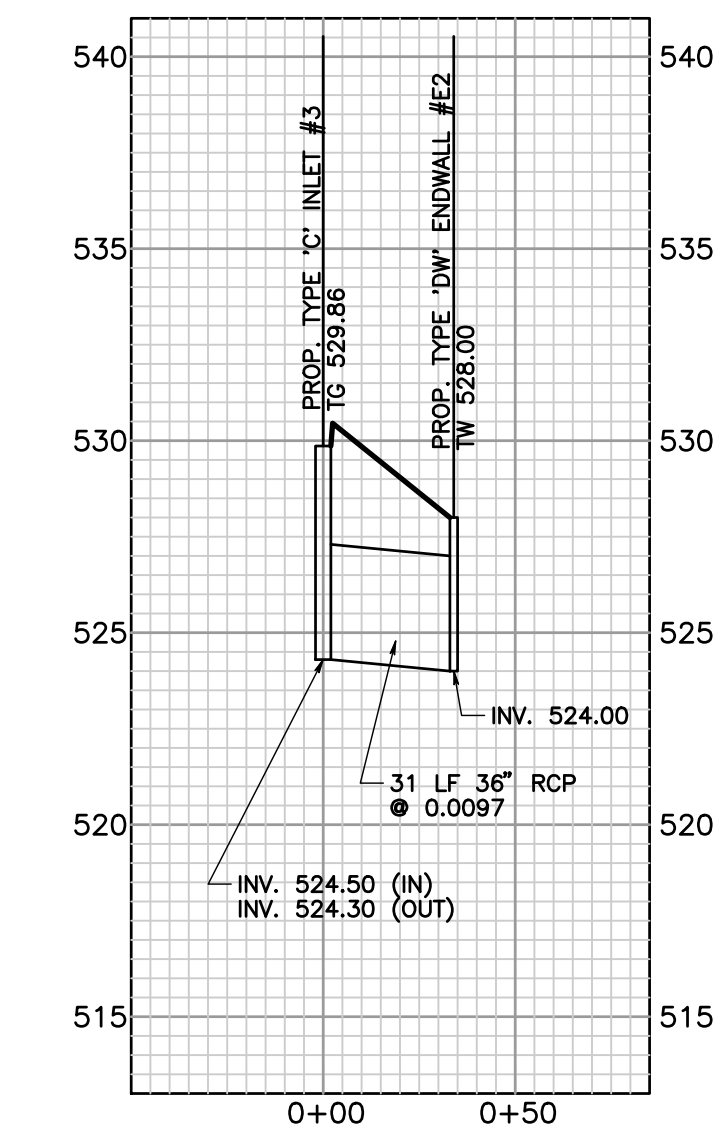
- PRUNE AS DIRECTED
- RUBBER BASE
- FLEXIBLE STRAPS
- NOTE: ALL MATERIALS AS SPECIFIED
- 6" TOPSOIL
- 3" MULCH
- REMOVE BURLAP FROM TOP 1/3 OF BALL
- 2"x4"x3' WOOD STAKES (3 PER TREE)
- BACKFILL MATERIAL 6" MIN.
- 1'-0" ALL SIDES

**TYPICAL EVERGREEN TREE PLANTING DETAIL**

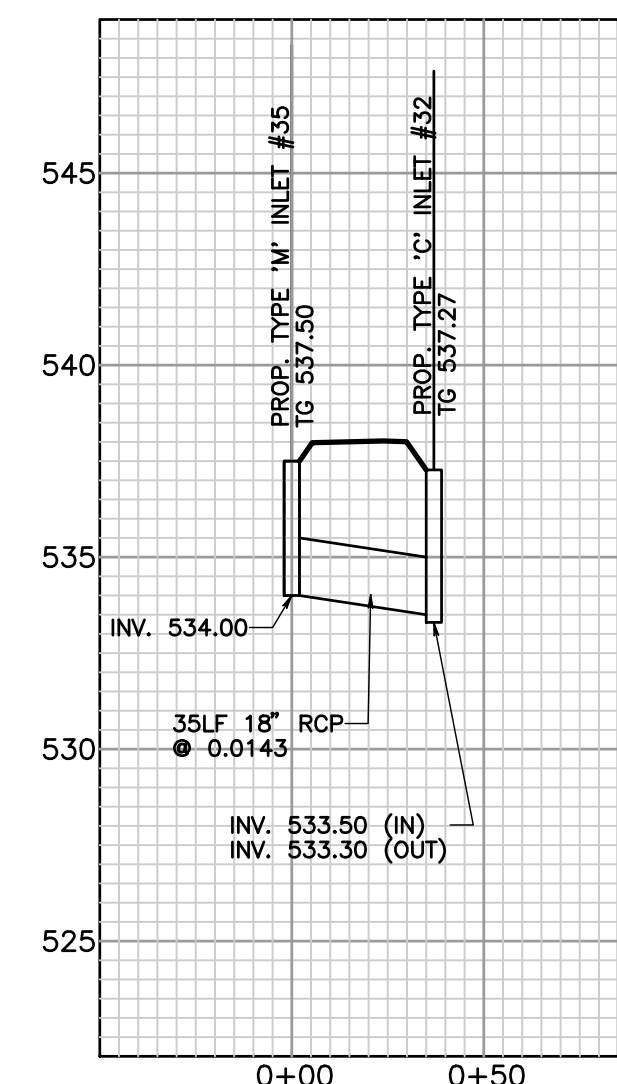
NOT TO SCALE

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                              |                 |      |              |        |               |          |               |     |                 |     |               |          |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|-----------------|------|--------------|--------|---------------|----------|---------------|-----|-----------------|-----|---------------|----------|
| 2. 9-8-17 REVISED PER TWP. ENGINEER LETTER DATED 9-8-17.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                              |                 |      |              |        |               |          |               |     |                 |     |               |          |
| 1. 8-8-17 REVISED ROADWAY IMPROVEMENTS.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                              |                 |      |              |        |               |          |               |     |                 |     |               |          |
| <div style="margin-bottom: 10px;">SUBDIVISION PLAN<br/>FOR</div> <div style="font-size: 2em; font-weight: bold; margin-bottom: 10px;">JANKOWSKI TRACT</div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                              |                 |      |              |        |               |          |               |     |                 |     |               |          |
| UPPER UWCHLAN TOWNSHIP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | CHESTER COUNTY, PA.          |                 |      |              |        |               |          |               |     |                 |     |               |          |
| <div style="display: flex; justify-content: space-between; align-items: center;"> <div style="flex: 1;"> <p style="font-size: 1.2em; font-weight: bold; margin: 0;">Edward B. Walsh &amp; Associates, Inc.</p> <p style="margin: 5px 0 0 20px;">CIVIL ENGINEERS &amp; SURVEYORS</p> <p style="margin: 5px 0 0 20px;"><b>LIONVILLE PROFESSIONAL CENTER</b></p> <p style="margin: 5px 0 0 20px;">125 Dowlin Forge Rd.</p> <p style="margin: 5px 0 0 20px;">Ezton, Pennsylvania 19341</p> <p style="margin: 5px 0 0 20px;">Phone: 610-903-0060</p> <p style="margin: 5px 0 0 20px;">Fax: 610-903-0080</p> </div> <div style="flex: 0.2; text-align: center;">  </div> <div style="flex: 0.8; border: 1px solid black; padding: 5px;"> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 2px 5px;"><b>Project-</b></td> <td style="padding: 2px 5px;">4272</td> </tr> <tr> <td style="padding: 2px 5px;"><b>Date-</b></td> <td style="padding: 2px 5px;">8-8-17</td> </tr> <tr> <td style="padding: 2px 5px;"><b>Scale-</b></td> <td style="padding: 2px 5px;">1" = 50'</td> </tr> <tr> <td style="padding: 2px 5px;"><b>Drawn-</b></td> <td style="padding: 2px 5px;">SLM</td> </tr> <tr> <td style="padding: 2px 5px;"><b>Checked-</b></td> <td style="padding: 2px 5px;">AJB</td> </tr> <tr> <td style="padding: 2px 5px;"><b>Sheet-</b></td> <td style="padding: 2px 5px;">19 OF 26</td> </tr> </table> </div> </div> |                              | <b>Project-</b> | 4272 | <b>Date-</b> | 8-8-17 | <b>Scale-</b> | 1" = 50' | <b>Drawn-</b> | SLM | <b>Checked-</b> | AJB | <b>Sheet-</b> | 19 OF 26 |
| <b>Project-</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 4272                         |                 |      |              |        |               |          |               |     |                 |     |               |          |
| <b>Date-</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 8-8-17                       |                 |      |              |        |               |          |               |     |                 |     |               |          |
| <b>Scale-</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 1" = 50'                     |                 |      |              |        |               |          |               |     |                 |     |               |          |
| <b>Drawn-</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | SLM                          |                 |      |              |        |               |          |               |     |                 |     |               |          |
| <b>Checked-</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | AJB                          |                 |      |              |        |               |          |               |     |                 |     |               |          |
| <b>Sheet-</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 19 OF 26                     |                 |      |              |        |               |          |               |     |                 |     |               |          |
| Plotted: 2/1/2018                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | File: F:\JB\4272\4272-B3.pro |                 |      |              |        |               |          |               |     |                 |     |               |          |

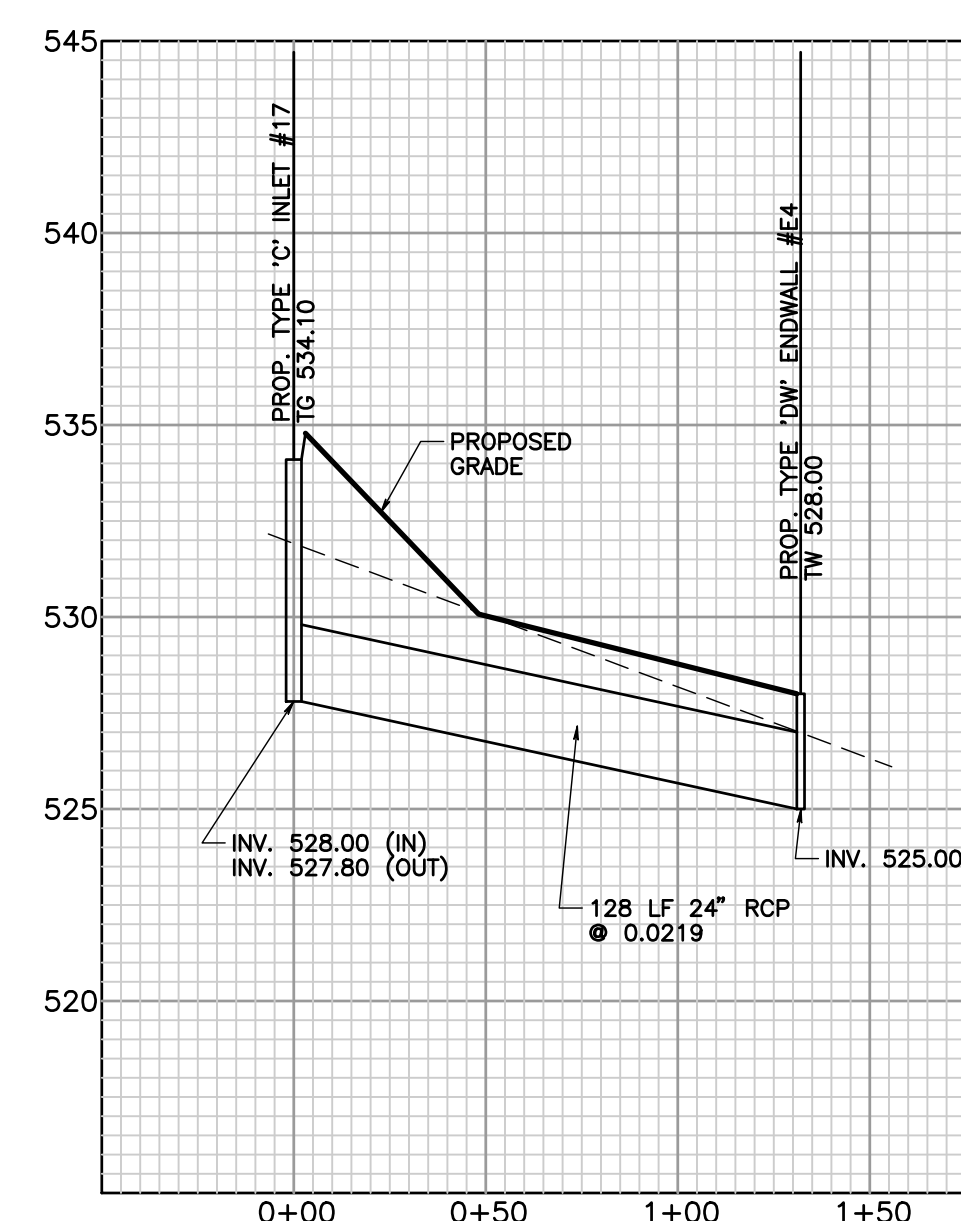




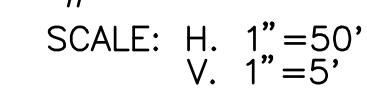
SCALE: H. 1"=50'  
V. 1"=5'



SCALE: H. 1"=50'  
V. 1"=5'

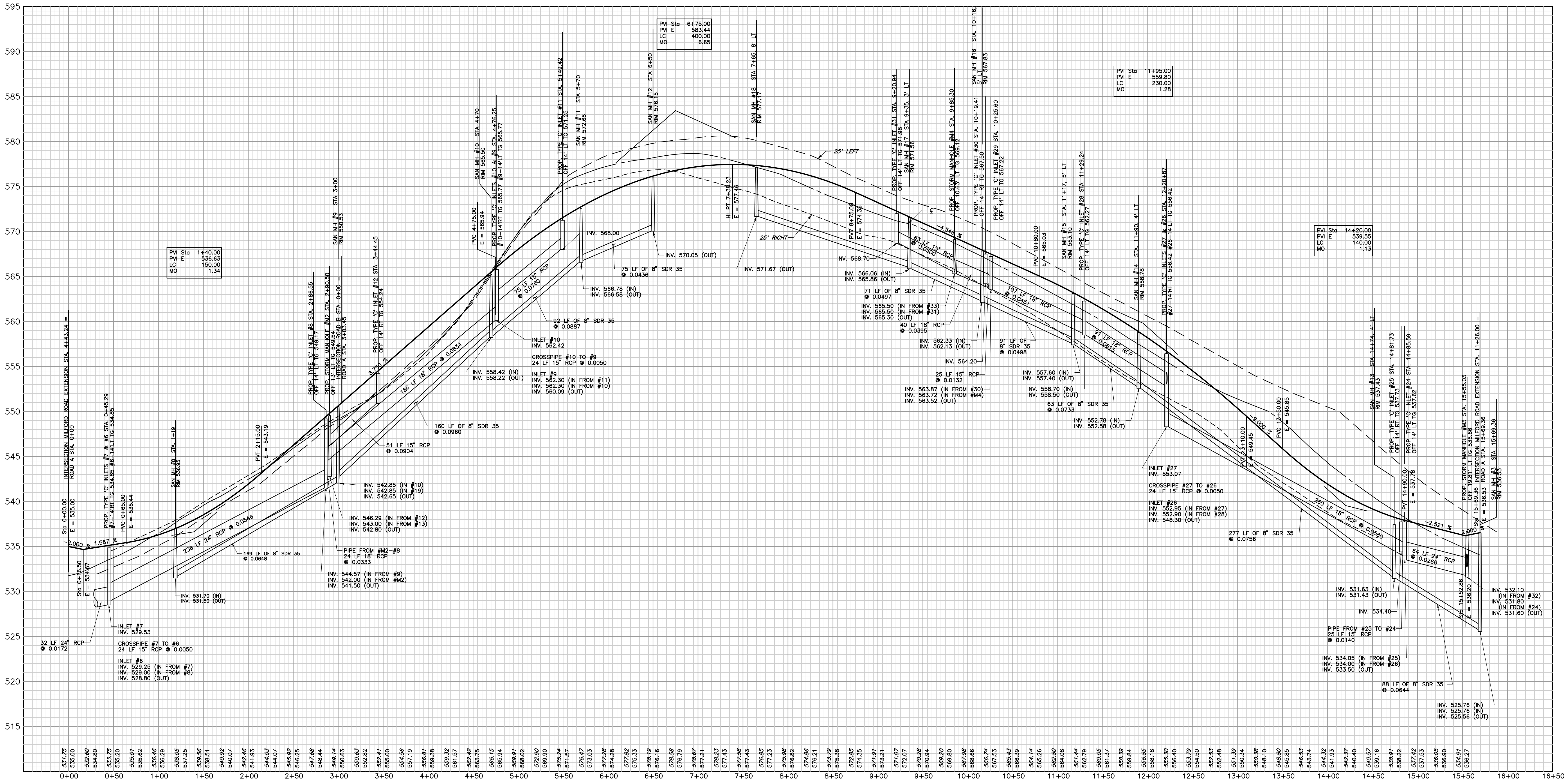


SCALE: H. 1"=50'  
V. 1"=5'



|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                    |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2. 9-8-17 REVISED PER TWP. ENGINEER LETTER DATED 9-8-17.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                    |
| 1. 8-18-17 REVISED ROADWAY IMPROVEMENTS.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                    |
| <div style="font-size: 1.2em; margin-bottom: 10px;">SUBDIVISION PLAN</div> <div style="font-size: 1.2em; margin-bottom: 10px;">FOR</div> <div style="font-size: 2.5em; margin-bottom: 10px;"><b>JANKOWSKI TRACT</b></div> <div style="display: flex; justify-content: space-between; font-size: 0.8em; margin-top: 20px;"> <span>UPPER UWCHLAN TOWNSHIP</span> <span>CHESTER COUNTY, PA.</span> </div>                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                    |
| <div style="display: flex; justify-content: space-between;"> <div style="width: 60%;"> <p style="font-size: 1.2em; margin: 0;"><b>Edward B. Walsh &amp; Associates, Inc.</b></p> <p style="margin: 0;">CIVIL ENGINEERS &amp; SURVEYORS</p> <p style="margin: 0;"><b>LIONVILLE PROFESSIONAL CENTER</b></p> <p style="margin: 0;">125 Doulin Forge Rd.</p> <p style="margin: 0;">Eaton, Pennsylvania 19341</p> <p style="margin: 0;">Phone: 610-903-0060</p> <p style="margin: 0;">Fax: 610-903-0080</p> </div> <div style="width: 35%; text-align: center;">  </div> </div> |                                                                                                                                                                                                                                    |
| <b>Plotted:</b> 2/1/2018 <b>File:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <div style="border: 1px solid black; padding: 5px;"> <p><b>Project-</b> 4272</p> <p><b>Date-</b> 8-8-17</p> <p><b>Scale-</b> AS NOTED</p> <p><b>Drawn-</b> SLM</p> <p><b>Checked-</b> AJB</p> <p><b>Sheet-</b> 20 OF 26</p> </div> |
| <span style="font-size: 1.2em;">F:\B\4272\4272-B3.pro</span>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                    |



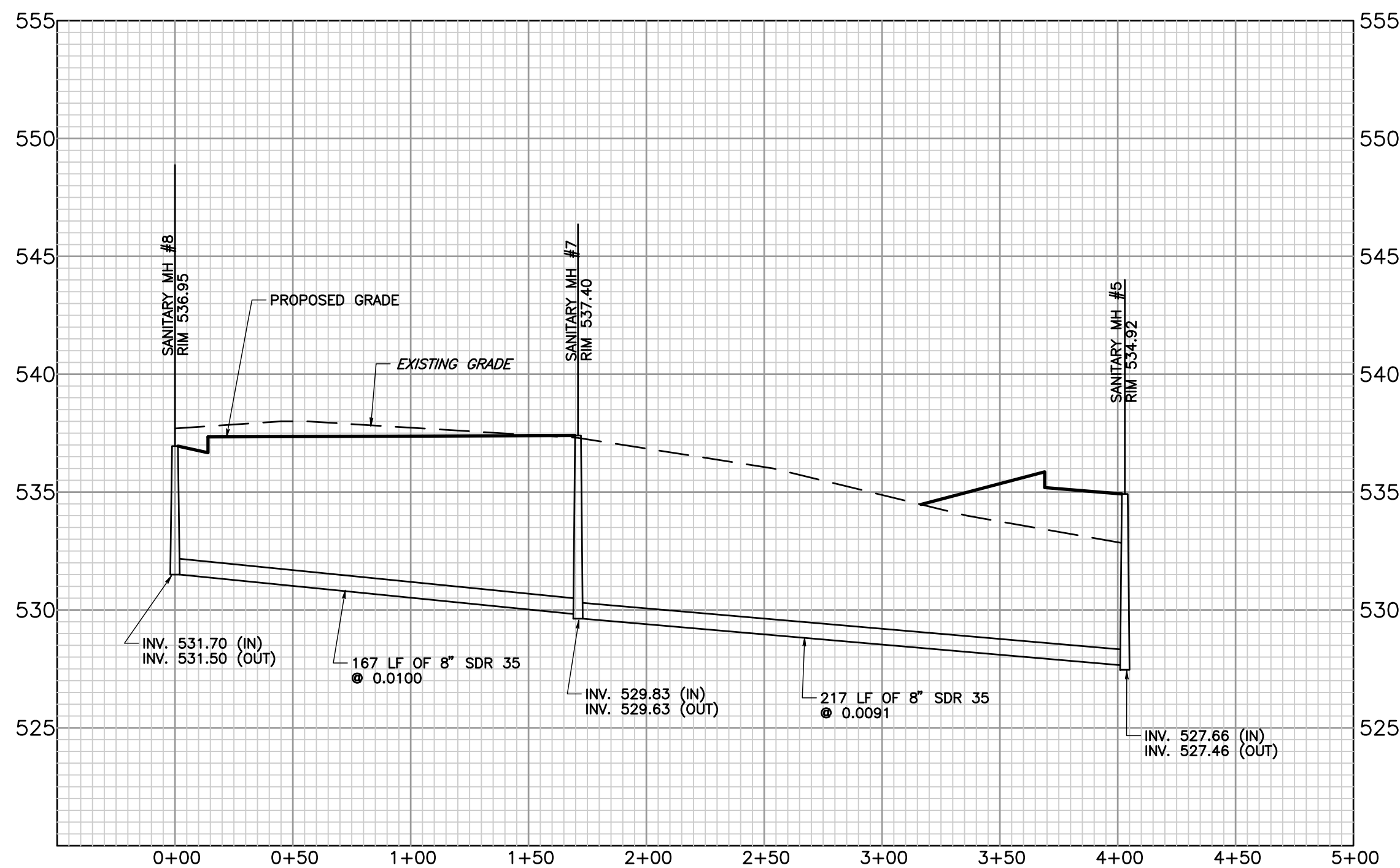


ROAD 'A'  
SCALE: H. 1"=50'  
V. 1"=5'

## PRELIMINARY/FINAL PLAN PROFILE SHEET

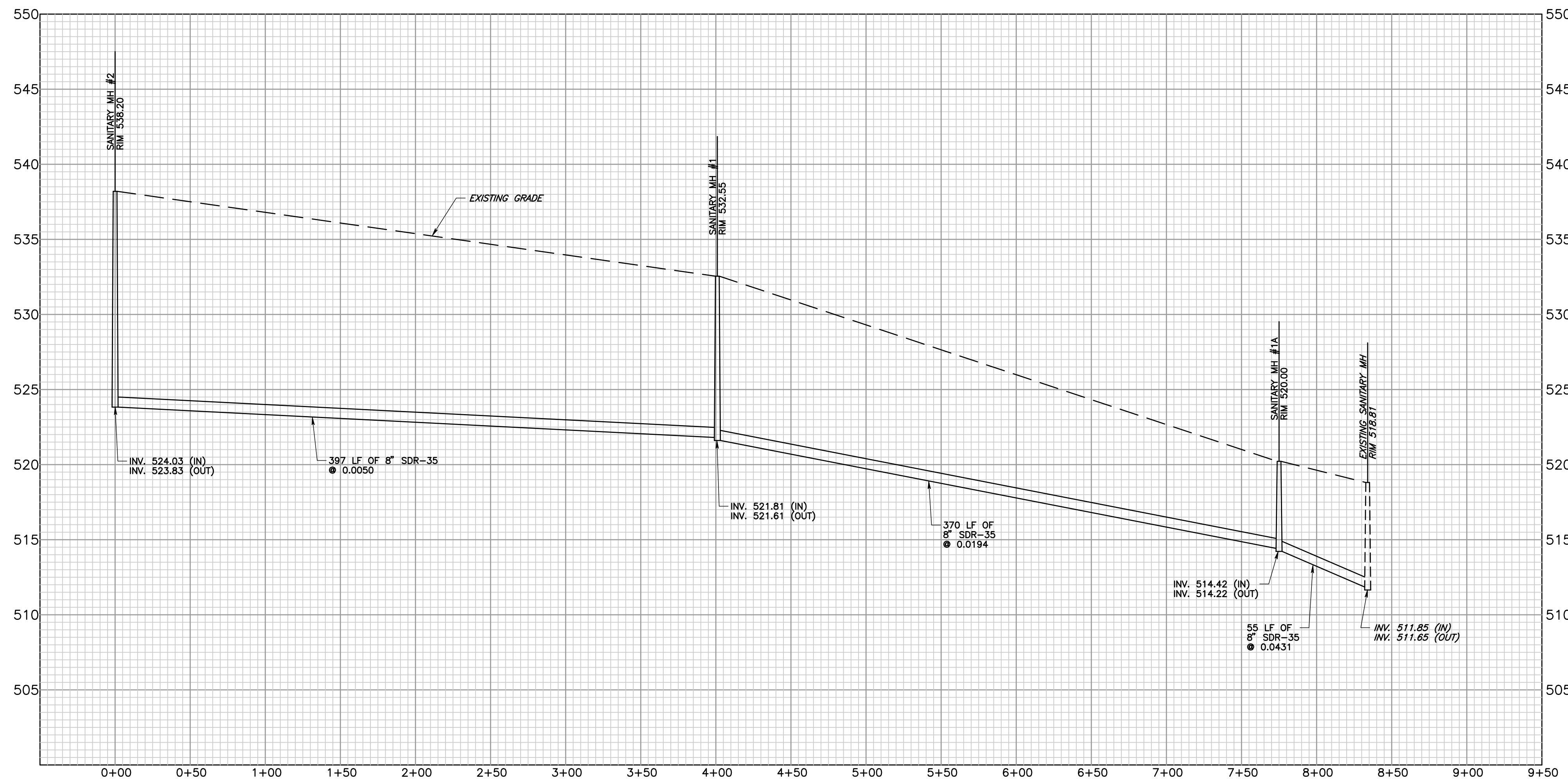
|                                                                                                                                |                             |
|--------------------------------------------------------------------------------------------------------------------------------|-----------------------------|
| 2. 9-8-17 REVISED PER TWP. ENGINEER LETTER DATED 9-8-17.                                                                       |                             |
| 1. 8-18-17 REVISED ROADWAY IMPROVEMENTS.                                                                                       |                             |
| SUBDIVISION PLAN<br>FOR<br><b>JANKOWSKI TRACT</b>                                                                              |                             |
| UPPER UWCHLAN TOWNSHIP                                                                                                         | CHESTER COUNTY, PA.         |
| Edward B. Walsh & Associates, Inc.                                                                                             |                             |
| CIVIL ENGINEERS & SURVEYORS                                                                                                    |                             |
| LIONVILLE PROFESSIONAL CENTER<br>125 Dowlan Forge Rd.<br>Exton, Pennsylvania 19341<br>Phone: 610-903-0060<br>Fax: 610-903-0080 |                             |
|                                           |                             |
| Plotted: 2/1/2018                                                                                                              | File: F:\J\4272\4272-B3.pro |
| Project--                                                                                                                      | 4272                        |
| Date--                                                                                                                         | 8-8-17                      |
| Scale--                                                                                                                        | AS NOTED                    |
| Drawn--                                                                                                                        | SLM                         |
| Checked--                                                                                                                      | AJB                         |
| Sheet--                                                                                                                        | 21 OF 26                    |





SANITARY SEWER MH #8 TO #5

SCALE: H. 1"=50'  
V. 1"=5'



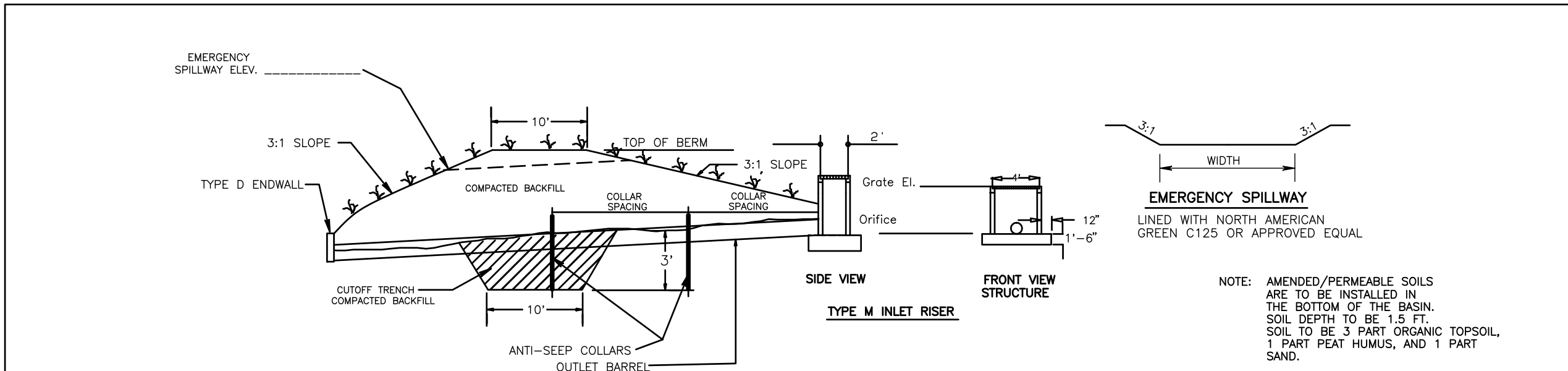
SANITARY SEWER MH #2 TO EXISTING

SCALE: H. 1"=50'  
V. 1"=5'

PRELIMINARY/FINAL PLAN  
PROFILE SHEET

|                                                          |                              |
|----------------------------------------------------------|------------------------------|
| 2. 9-8-17 REVISED PER TWP. ENGINEER LETTER DATED 9-8-17. |                              |
| 1. 8-18-17 REVISED ROADWAY IMPROVEMENTS.                 |                              |
| SUBDIVISION PLAN<br>FOR<br>JANKOWSKI TRACT               |                              |
| UPPER UWCHLAN TOWNSHIP                                   | CHESTER COUNTY, PA.          |
| Edward B. Walsh & Associates, Inc.                       |                              |
| CIVIL ENGINEERS & SURVEYORS                              | Project- 4272                |
| LIONVILLE PROFESSIONAL CENTER                            | Date- 8-8-17                 |
| 125 Dowlan Forge Rd.                                     | Scale- AS NOTED              |
| Exton, Pennsylvania 19341                                | Drawn- SLM                   |
| Phone: 610-903-0060                                      | Checked- AJB                 |
| Fax: 610-903-0080                                        | Sheet- 22 OF 26              |
| Plotted: 2/1/2018                                        | File: F:\JB\4272\4272-B3.pro |

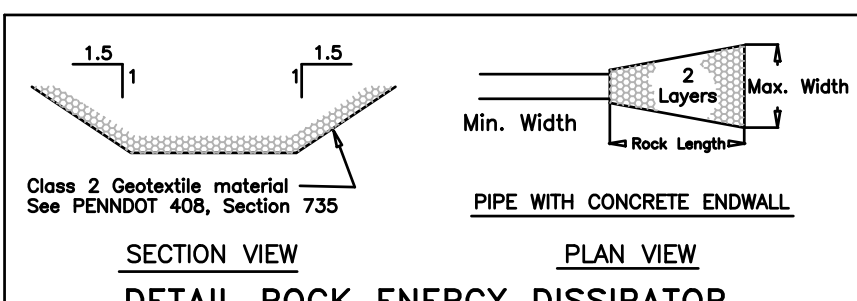
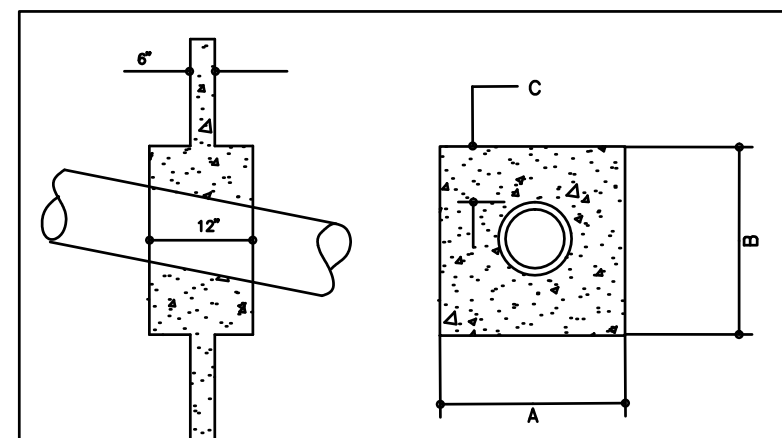




**BASIN EMBANKMENT CROSS SECTION**  
Not to Scale

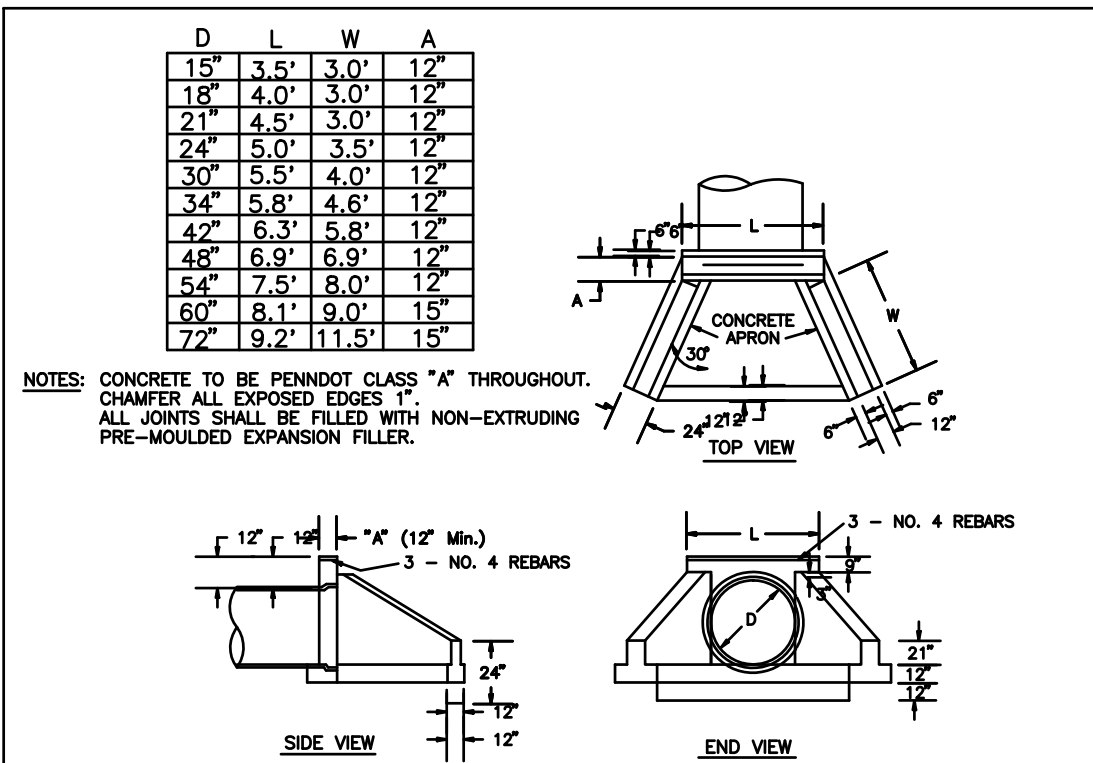
**DETENTION BASIN TABULATION**

| BASIN # | TOP OF BERM ELEV. | EMERGENCY SPILLWAY ELEV. | EMERGENCY SPILLWAY WIDTH (FT) | RISER GRATE ELEV. | ORIFICE SIZE AND ELEV. | BARREL SIZE AND TYPE | BARREL LENGTH | BARREL SLOPE | BARREL INV. (IN) | BARREL INV. (OUT) | BASIN BOTTOM |
|---------|-------------------|--------------------------|-------------------------------|-------------------|------------------------|----------------------|---------------|--------------|------------------|-------------------|--------------|
| 1       | 533.00            | 531.60                   | 75                            | 530.00            | 6" @ 527.00            | 36" RCP              | 125 LF        | 1.0%         | 527.00           | 525.75            | 527.00       |
| 2       | 524.50            | 523.10                   | 102                           | 522.00            | 2" @ 519.00            | 24" RCP              | 226 LF        | 1.0%         | 519.00           | 516.74            | 519.00       |



**ROCK ENERGY DISSIPATOR TABULATION**

| ENDWALL NO. | LENGTH | MIN. WIDTH | MAX. WIDTH | AVE. SIZE | GRADATION (M.S.A. NO.) | PLACEMENT THICKNESS |
|-------------|--------|------------|------------|-----------|------------------------|---------------------|
| E1          | 8'     | 3.75'      | 11.75'     | 3"        | R-3                    | 9"                  |
| E2          | 20'    | 9.0'       | 29'        | 9"        | R-5                    | 27"                 |
| E3          | 26'    | 7.5'       | 17.9'      | 3"        | R-3                    | 9"                  |
| E4          | 12'    | 6.0'       | 18'        | 6"        | R-4                    | 18"                 |
| E5          | 14'    | 6.0'       | 20'        | 6"        | R-4                    | 18"                 |



**WETLAND SEED MIXTURE: ERNMW-120.**

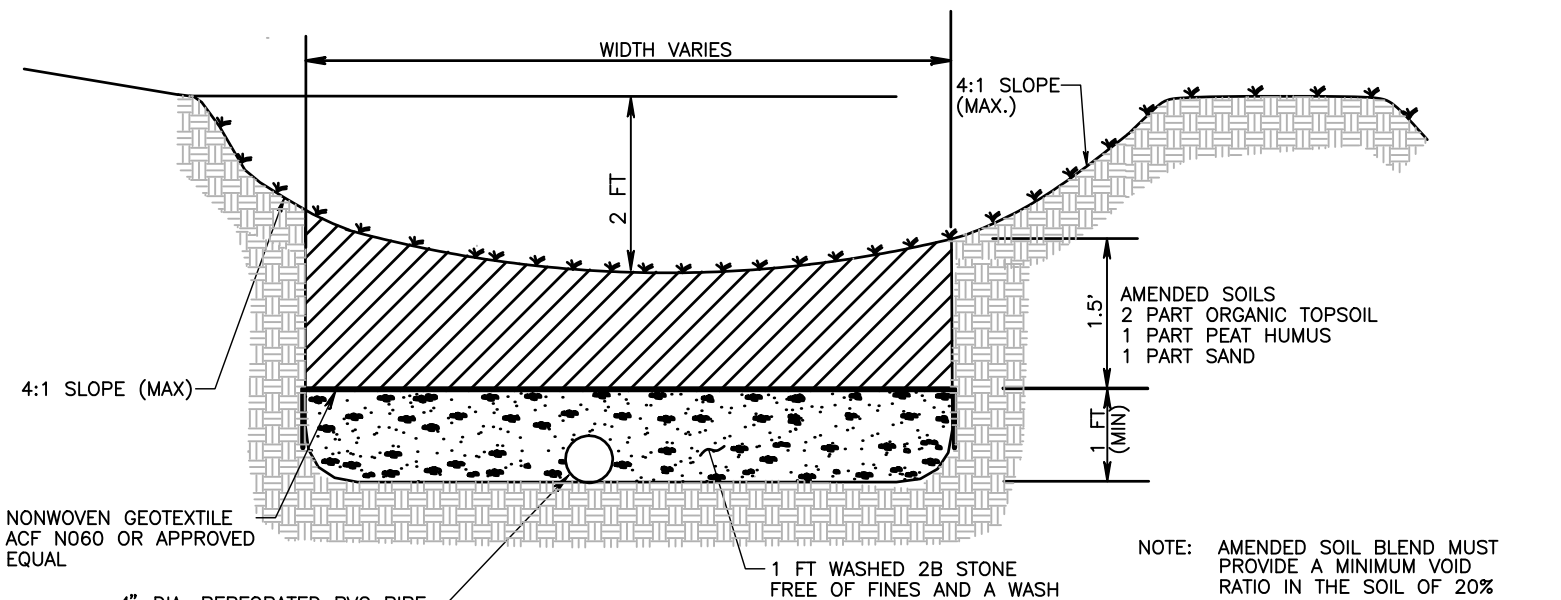
**Botanical Name**  
Coxes virginica  
Elymus virginicus  
Verberna hastata  
Coxes crinita  
Coxes lurida  
Glyceria grandis  
Glyceria striata  
Juncus effusus  
Scirpus cyperinus  
Sporangium americanum  
Sporangium eurycarpum  
Scirpus atrovirens  
Coxes comosa  
Coxes gynandra  
Coxes lupulina  
Glyceria canadensis

**Common Name**  
Fox Sedge  
Virginia Wild Rye  
Blue Vervain  
Fringed (Nodding) Sedge  
Lurid (Shallow) Sedge  
American Mannagrass  
Fowl Mannagrass  
Soft Rush  
Wool Grass  
Eastern Lesser Bur Reed  
Giant Bur Reed  
Green Burrush  
Cosmos (Bristly) Sedge  
Nodding Sedge  
Hop Sedge  
Rattlesnake Grass

Seeding rate: 15 bulk lbs per acre or 1/3-1/2 lbs per 1,000 ft<sup>2</sup>.

**ERNST CONSERVATION SEED**  
9008 MERGER PIKE  
MEADVILLE, PA 16335  
www.ernstseed.com

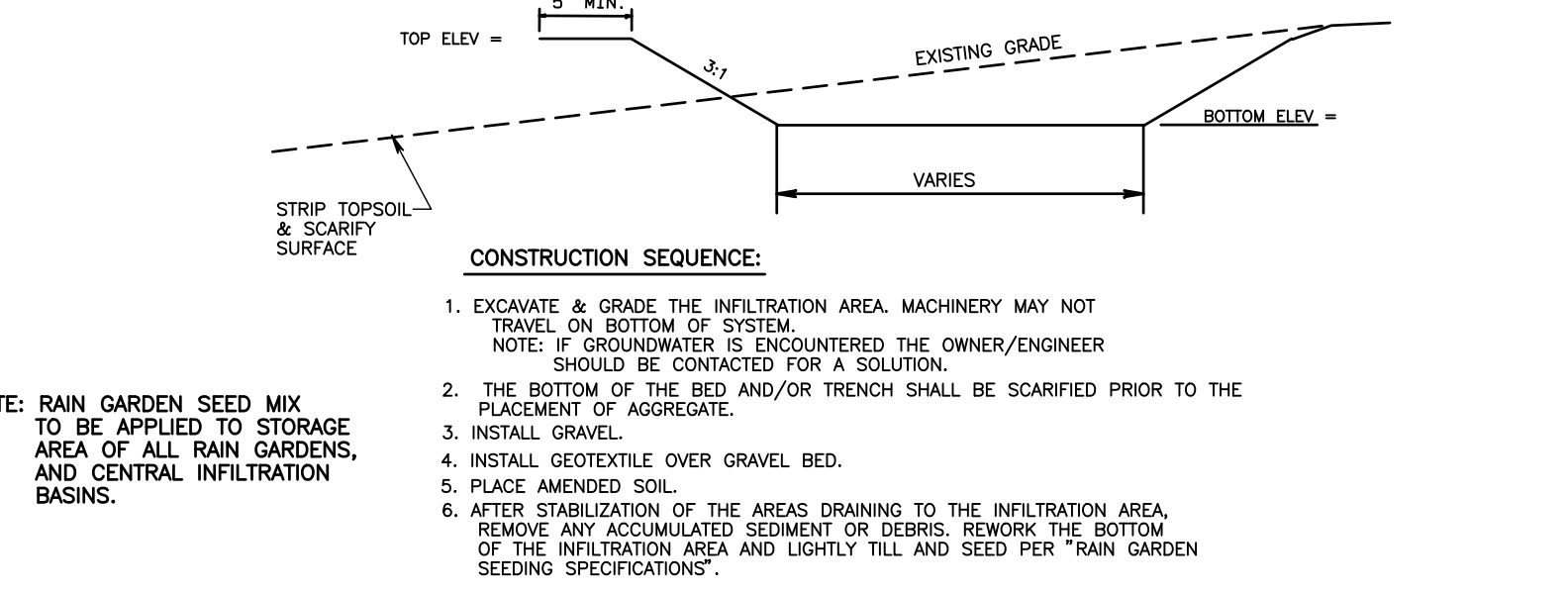
1-800-873-3321 Fax (814) 336-5191



**RAIN GARDEN**  
NOT TO SCALE

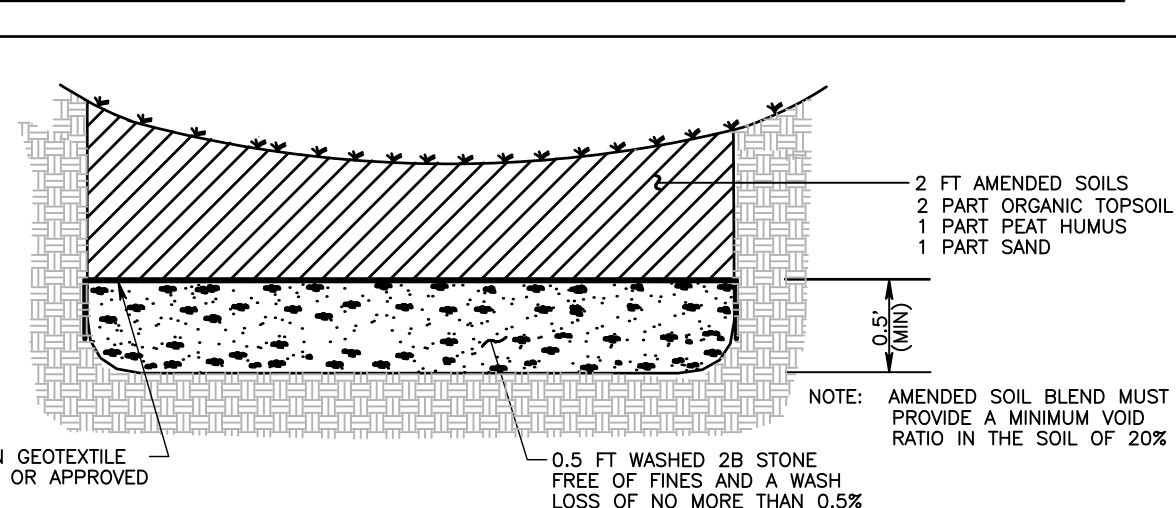
**RAIN GARDEN SPECIFICATIONS**

| RAIN GARDEN | TOP OF SYSTEM ELEVATION | BOTTOM OF PONDING AREA/STORAGE AREA (ELEVATION) | OVERFLOW SPILLWAY ELEVATION | OVERFLOW SPILLWAY WIDTH |
|-------------|-------------------------|-------------------------------------------------|-----------------------------|-------------------------|
| 1           | 534.00                  | 533.00                                          | ---                         | ---                     |
| 2           | 524.00                  | 523.00                                          | ---                         | ---                     |
| 3           | 518.00                  | 517.00                                          | ---                         | ---                     |

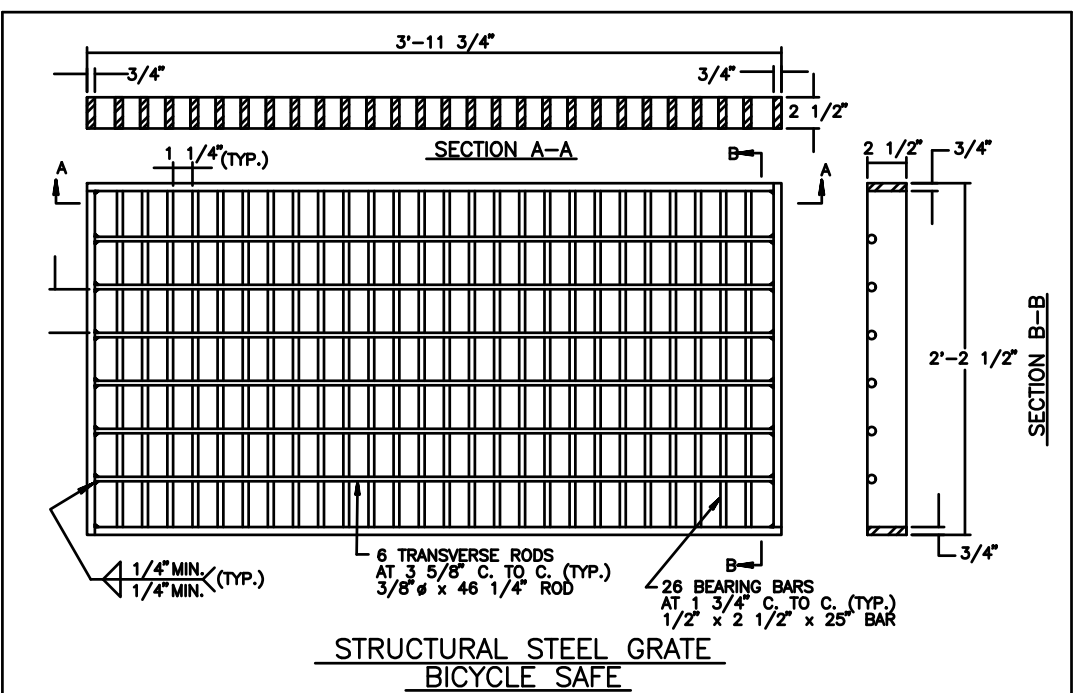
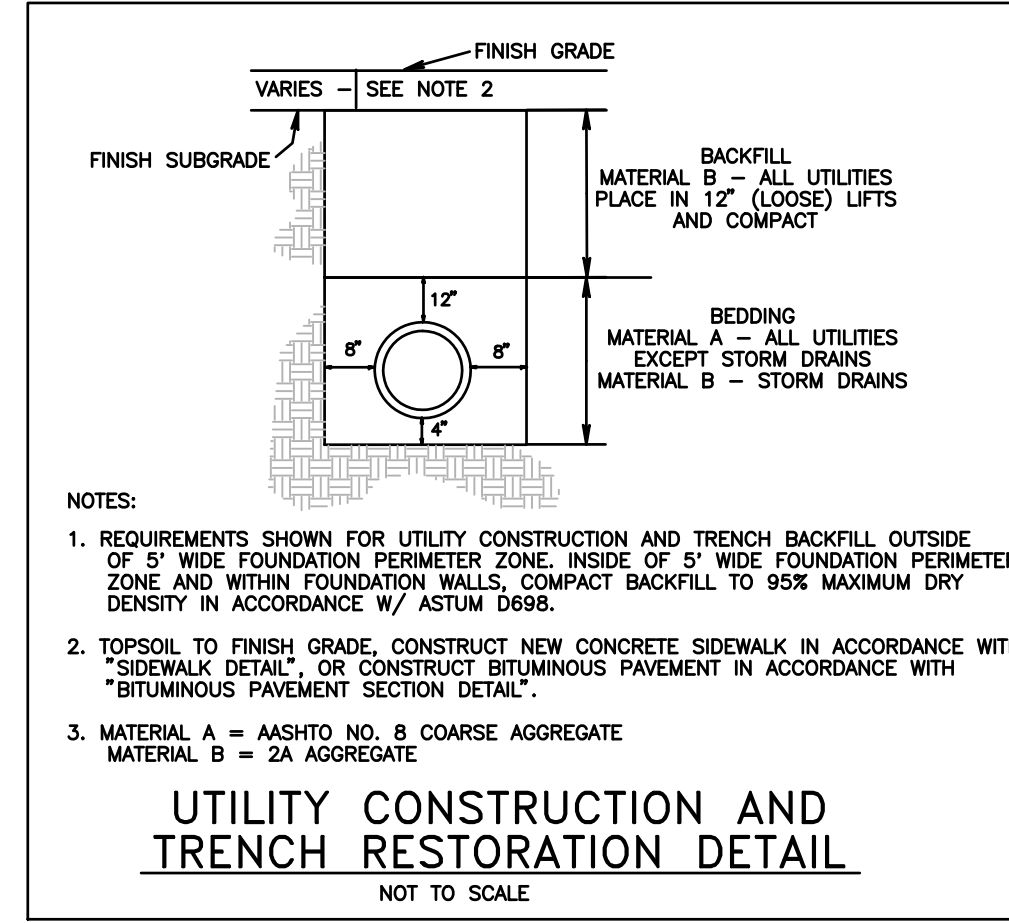
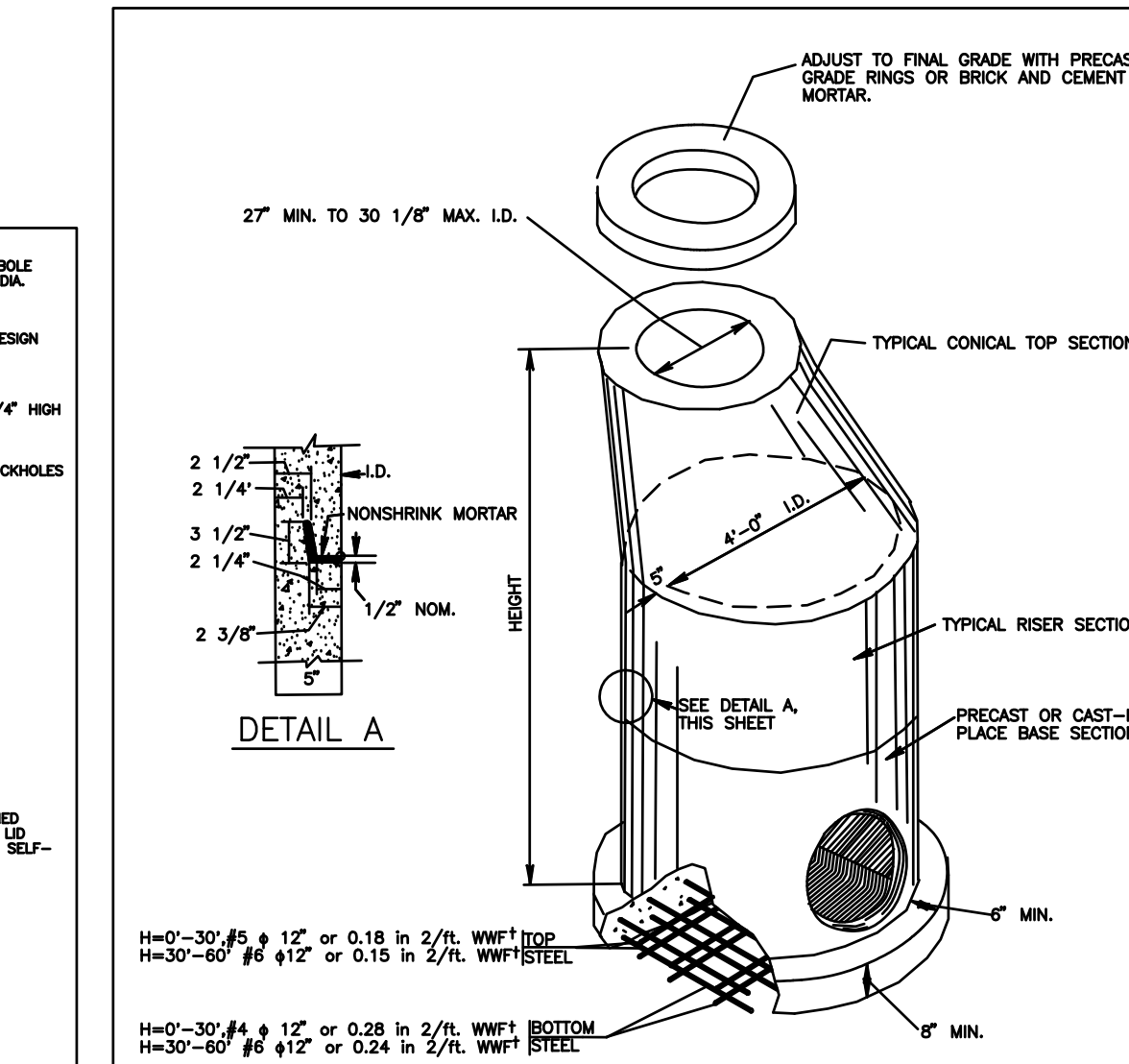


**STORMWATER MANAGEMENT FACILITY CONSTRUCTION NOTES**

- AREAS TO BE USED FOR STORMWATER INFILTRATION (HEREAFTER, "SUBJECT AREAS") SHALL BE DELIMITED WITH ORANGE SAFETY FENCE PRIOR TO START OF CONSTRUCTION.
- COMPACTION OF THE SUBJECT AREAS IS PROHIBITED. EQUIPMENT AND OTHER TRAFFIC SHALL BE PROHIBITED FROM TRAVELING OVER THE SUBJECT AREAS EXCEPT AS PROVIDED FOR HEREIN. HEAVY EQUIPMENT SHALL BE USED AROUND THE PERIMETER OF THE SUBJECT AREAS FOR THE PURPOSES OF EXCAVATION AND TO SUPPLY SOILS AND AGGREGATE. IN THESE CASES ONLY HAND HELED EQUIPMENT SHALL BE USED WITHIN THE SUBJECT AREAS.
- THE BOTTOM OF RAIN GARDENS SHALL BE SCARIFIED IMMEDIATELY PRIOR TO THE PLACEMENT OF THE GEOTEXTILE FABRIC OR THE LOWEST AGGREGATE SEPARATION LAYER (WHICHEVER IS IN CONTACT WITH THE BOTTOM OF THE BED).
- ONLY UNWASHED, CLEAN AGGREGATE, FREE OF FINES, SLATE, SHALE, CLAY, SILT, AND VEGETATIVE MATERIAL SHALL BE USED. THE AGGREGATE SHALL HAVE A MINIMUM VOID RATIO OF 40% AND A WASH LOSS OF NO MORE THAN 0.5%. THESE VALUES APPLY TO BOTH THE AGGREGATE TO THE BED AND ANY AGGREGATE USED AS A SEPARATION LAYER. THE SUPPLIER OF THE AGGREGATE SHALL PROVIDE CERTIFICATION OF THE VOID RATIO OF THE AGGREGATE DELIVERED TO THE SITE. THE DESIGN ENGINEER SHALL VERIFY THAT THE VOID RATIO MEETS OR EXCEEDS THE REQUIREMENTS OF THE DESIGN AND SUBMIT SUCH VERIFICATION TO THE TOWNSHIP.
- WHEREVER DRAINAGE FILTER FABRIC IS SPECIFIED, IT SHALL BE PLACED IN ACCORDANCE WITH THE MANUFACTURER'S DIRECTIONS, INCLUDING PIPE PENETRATIONS, AND SHALL OVERLAP A MINIMUM OF EIGHTEEN (18) INCHES.
- SUBJECT AREAS SHALL BE PROTECTED DURING CONSTRUCTION. SEDIMENT SHALL NOT BE ALLOWED TO BE WASHED BACK INTO SUBJECT AREAS WHEN THE BOTTOM OF THE FACILITY IS OPEN OR WHEN TO RE-ACCOMMODATE. DURING SITE CONSTRUCTION, THE TOWNSHIP DEPARTMENT OF PUBLIC WORKS SHALL BE PROTECTED FROM SEDIMENTATION USING STORM INLET PROTECTION IN CONFORMANCE WITH THE PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION (PADEP) CHAPTER 102 REGULATIONS, AS AMENDED, AND THE EROSION AND SEDIMENTATION POLLUTION CONTROL MANUAL, AS AMENDED. INLET PROTECTION SHALL REMAIN UNTIL THE CONTRIBUTORY DRAINAGE AREA HAS ACHIEVED FULL STABILIZATION.
- IF SEDIMENT DOES ENTER INTO A SUBJECT AREA, THE CONTRACTOR SHALL CLEAN OUT THE SEDIMENT TO THE TOWNSHIP'S SATISFACTION. THIS MAY REQUIRE THE RECONSTRUCTION OF PORTIONS OF OR ALL OF THE ENTIRE SYSTEM.
- A MINIMUM 2-FOOT SEPARATION SHALL BE PROVIDED BETWEEN THE SEASONAL HIGH GROUNDWATER TABLE AND/OR BEDROCK, AND THE BOTTOM OF THE INFILTRATION FACILITY. IF GROUNDWATER AND/OR BEDROCK ARE ENCOUNTERED WITHIN THE 2-FOOT ZONE DURING CONSTRUCTION, THE DEVELOPER, THE DESIGN ENGINEER, THE TOWNSHIP ENGINEER, OR THE ACTUAL SITE CONDITIONS THE DESIGN ENGINEER SHALL SUBMIT REVISIONS TO THE TOWNSHIP AND TOWNSHIP ENGINEER FOR REVIEW AND APPROVAL.
- THE DEVELOPER SHALL TEST INFILTRATION FACILITIES TO CONFIRM THAT THEY FUNCTION AS DESIGNED PRIOR TO TRANSFERRING RESPONSIBILITY TO THE PROPERTY OWNER. THIS SHALL BE ACCOMPLISHED BY FILLING THE INFILTRATION FACILITY TO A DEPTH OF 1/4 OF ITS DESIGN DEPTH OR TO A DEPTH OF 6" (WHICHEVER IS GREATER), AND MEASURING THE AMOUNT OF TIME IT TAKES TO COMPLETELY DEWATER. THE TESTING SHALL BE WITNESSED BY THE TOWNSHIP ENGINEER. THE DEVELOPER SHALL PROVIDE A REPORT TO THE TOWNSHIP VERIFYING THE TESTING RESULTS AND COMPARING THE RESULTS TO THE DESIGN CRITERIA RELATIVE TO THE PREDICTED TIME TO DEWATER THE PROPORTIONATE DEPTH OF WATER USED FOR THE TEST.



**BIOFILTRATION BASIN**  
**AMENDED SOILS/STONE CROSS SECTION**  
NOT TO SCALE



**NOTES**

- CONSTRUCT INLET BOXES IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408, SECTION 605.
- PROVIDE INLET BOXES WITH 24" x 45" STANDARD OPENING TO ACCOMMODATE THE STANDARD TOP COMPONENTS.
- FOR CAST-IN-PLACE OR PRECAST CONSTRUCTION, PROVIDE 6" INLET WALLS UNLESS, OTHERWISE INDICATED.
- INLETS THAT EXCEED THE MAXIMUM HEIGHT SHOWN SHALL REQUIRE SPECIAL DETAILS AND DESIGN FOR THE INLET WALLS AND BASE. CONSTRUCT INLETS THAT EXCEED 5 FEET IN HEIGHT WITH STEPS SIMILAR TO MANHOLES. SEE RC-39.
- LOCATE PIPE OR PIPES, AS INDICATED, WITH THE INLET BOTTOM SHAPED TO CHANNEL THE FLOW TOWARD THE OUTLET PIPE.
- PLACE #4 REINFORCEMENT BARS, MINIMUM 12 INCHES LONG, SPACED AT 12 INCHES C. TO C., AS DOWELS BETWEEN THE INLET BASE AND WALLS WHEN THE CONCRETE WALLS AND INLET BASE ARE NOT CONSTRUCTED MONOLITHICALLY. THE DOWELS MAY BE ELIMINATED IF AN ALTERNATE JOINT IS CONSTRUCTED AS SHOWN IN DETAILS A & B.
- FOR CAST-IN-PLACE CONSTRUCTION, WHEN THE BASE IS CONSTRUCTED MONOLITHICALLY WITH THE VERTICAL WALLS, PROVIDE 3 INCH MINIMUM FROM THE BOTTOM OF THE PIPE TO THE BOTTOM OF THE INLET BOX.
- FOR PIPE DIAMETERS LARGER THAN 48" R.C.C.P. OR 54" C.M.P. USE A MODIFIED INLET BOX.
- FOR PIPE DIAMETERS LARGER THAN 48" R.C.C.P. OR 54" C.M.P. IN THE LONG DIRECTION OR LARGER THAN 36" IN THE SHORT DIRECTION, A SPECIAL DETAIL AND DESIGN IS REQUIRED.
- FOR INLETS OTHER THAN AS SHOWN ON THE STANDARDS, PROVIDE REINFORCEMENT BASED ON HS25 LOADING AND IN ACCORDANCE WITH 408 SPECIFICATIONS.
- CONSTRUCTION JOINTS AND KEYS MAY BE CONSTRUCTED UPWARDS OR DOWNWARDS. JOINTS AND KEYS ARE TO BE THOROUGHLY CLEANED BEFORE PLACING NEXT CONCRETE SEGMENT.

**COMMONWEALTH OF PENNSYLVANIA**  
**DEPARTMENT OF TRANSPORTATION**  
**BUREAU OF DESIGN**

**INLETS**  
**STANDARD INLET BOXES**  
**(PRECAST)**

RECOMMENDED M.B. 30.000 RECOMMENDED M.B. 30.000 SHT. 1A OF 10  
DIRECTOR, BUREAU OF DESIGN CHIEF ENGINEER RC-34M

## PRELIMINARY/FINAL PLAN DETAIL SHEET

2. 9-8-17 REVISED PER TWP. ENGINEER LETTER DATED 9-8-17.

1. 8-18-17 REVISED ROADWAY IMPROVEMENTS.

**SUBDIVISION PLAN FOR JANKOWSKI TRACT**

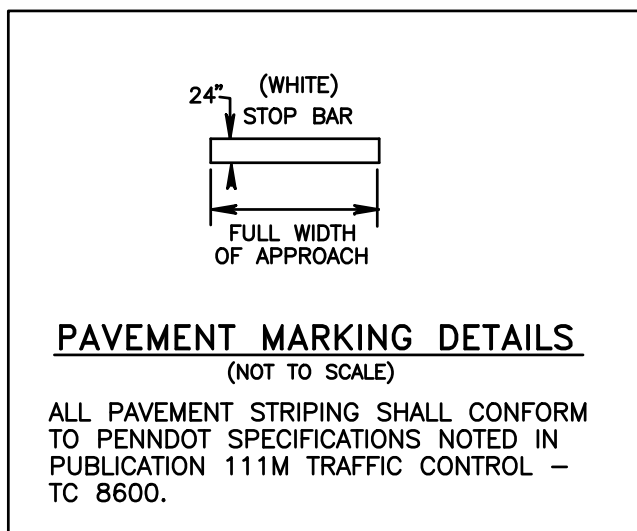
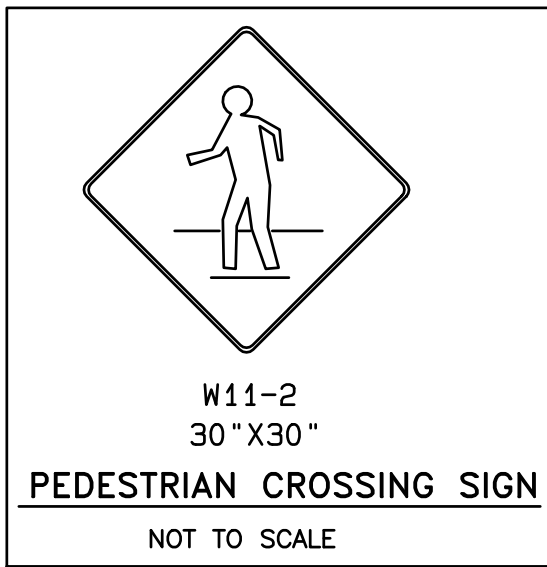
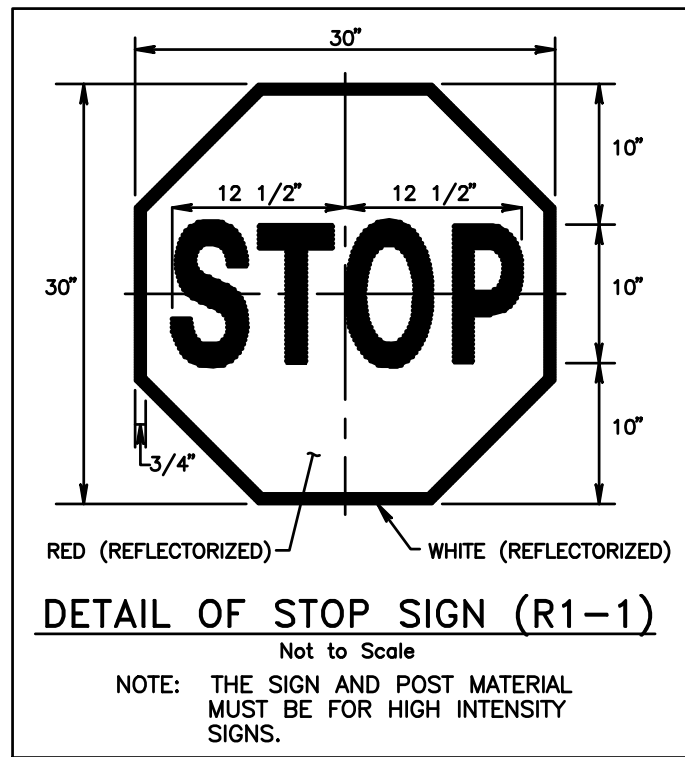
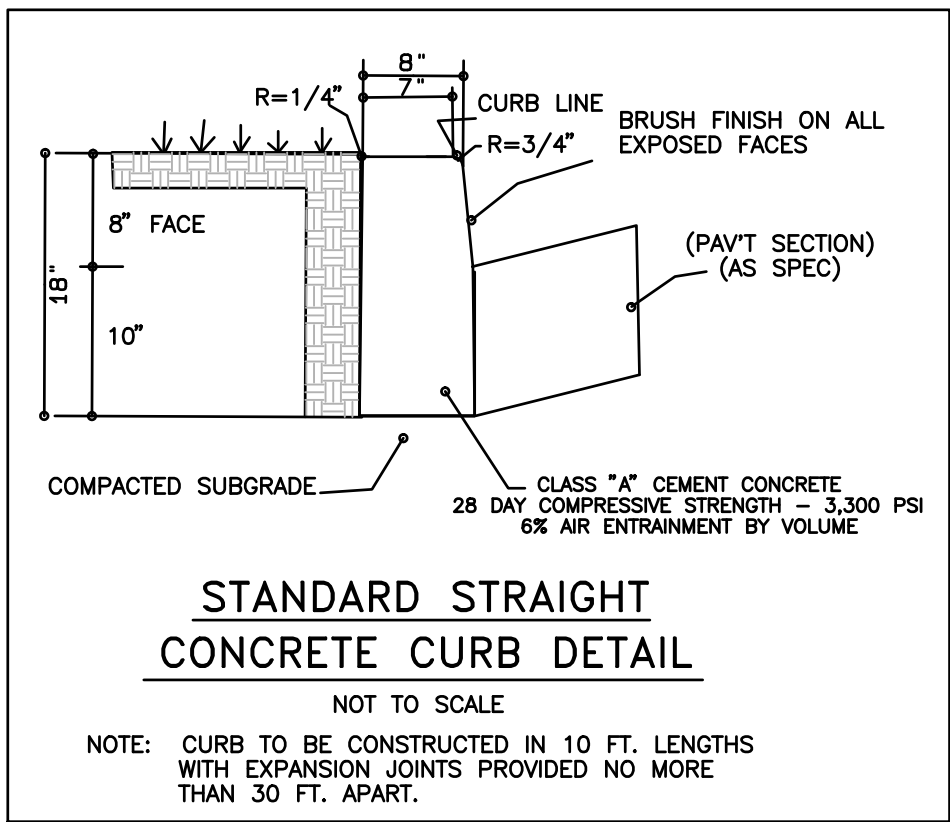
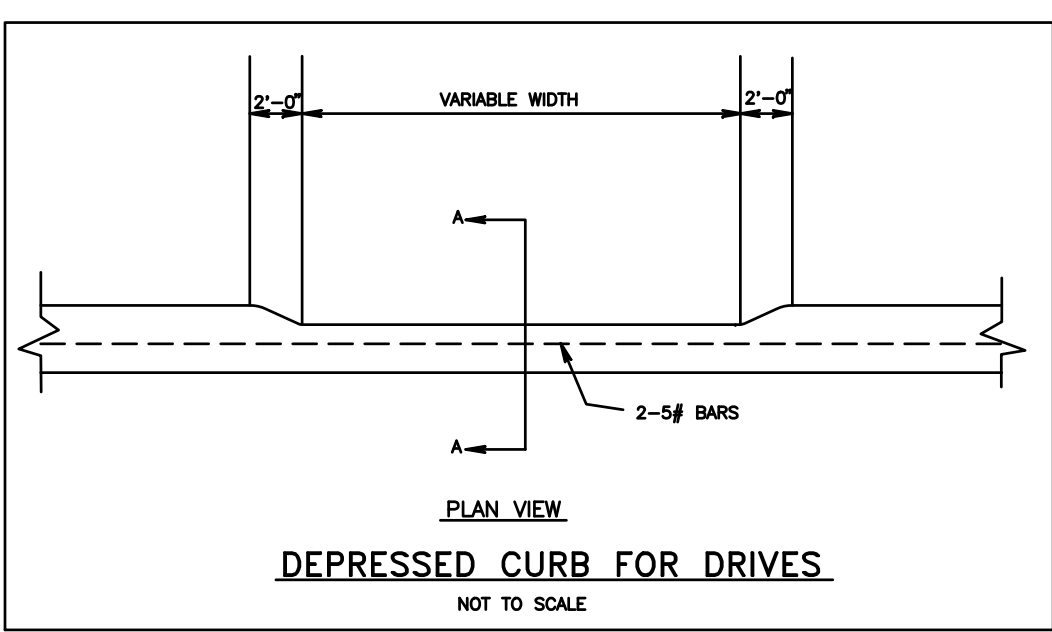
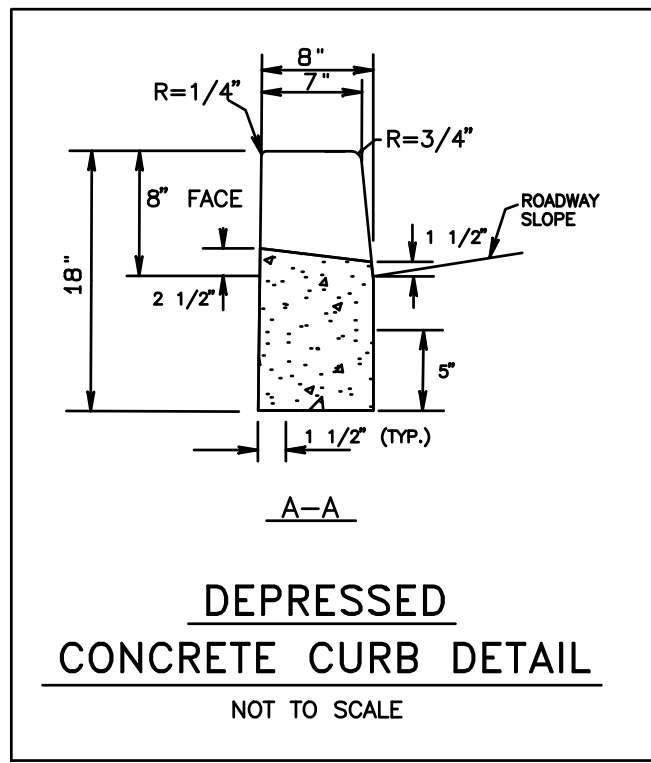
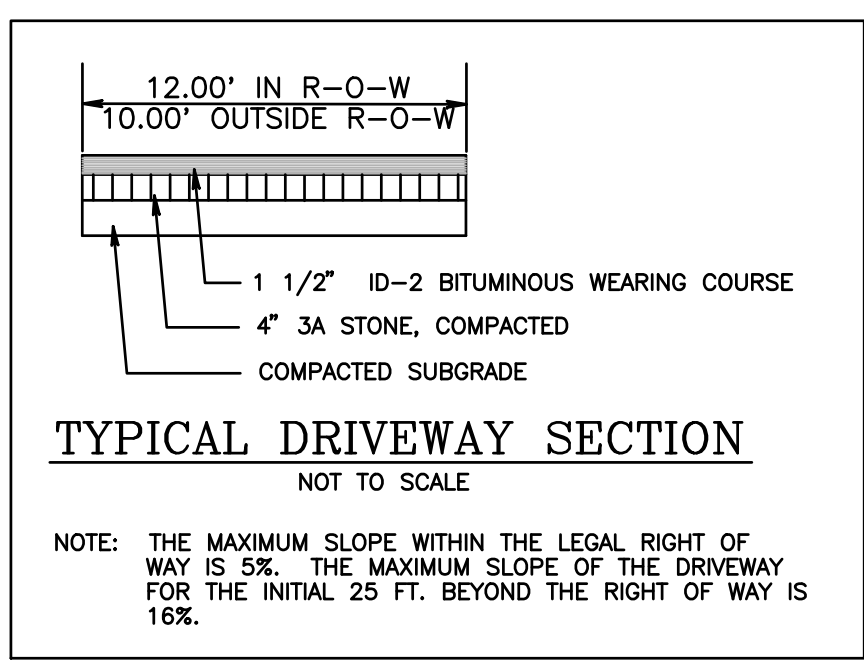
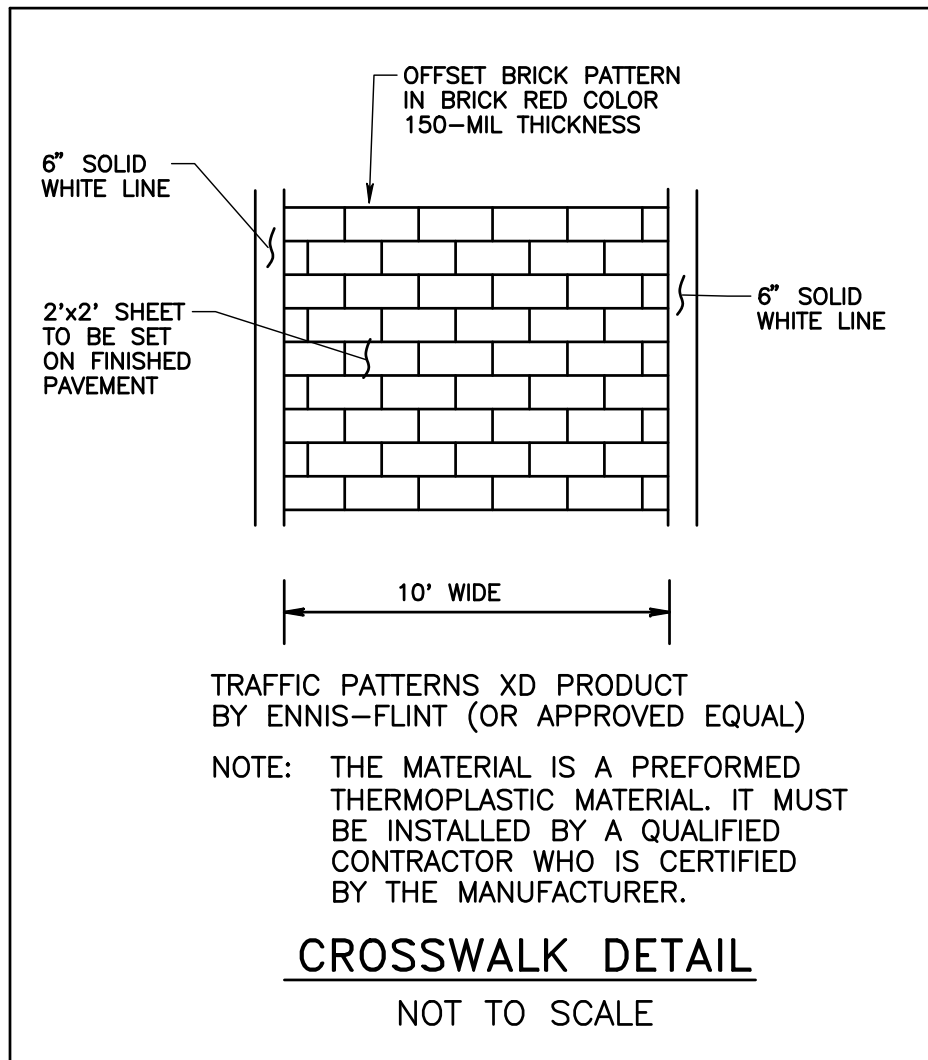
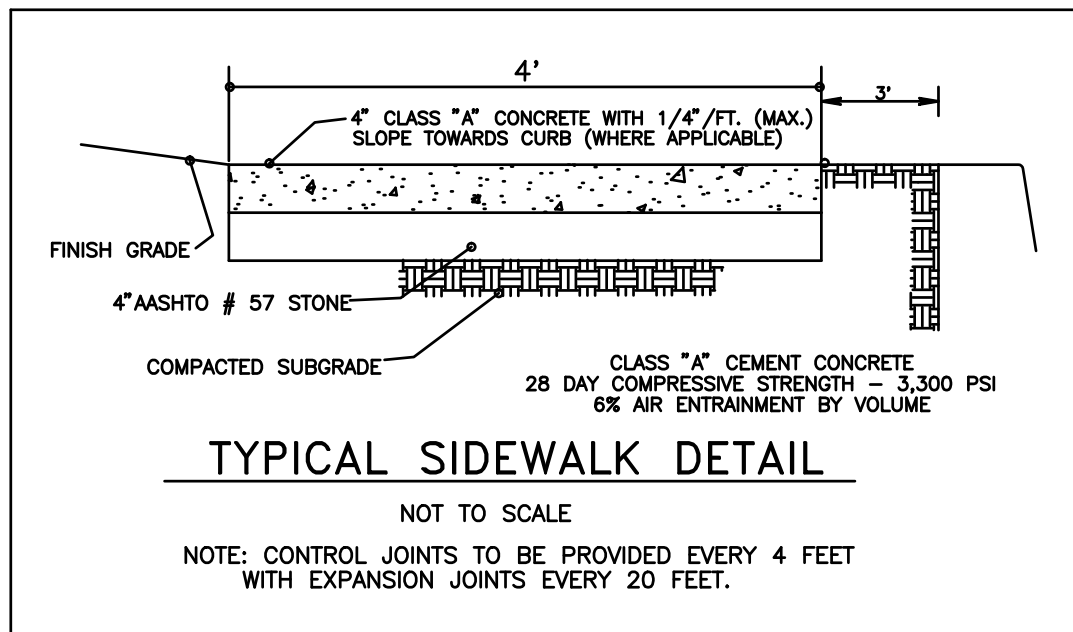
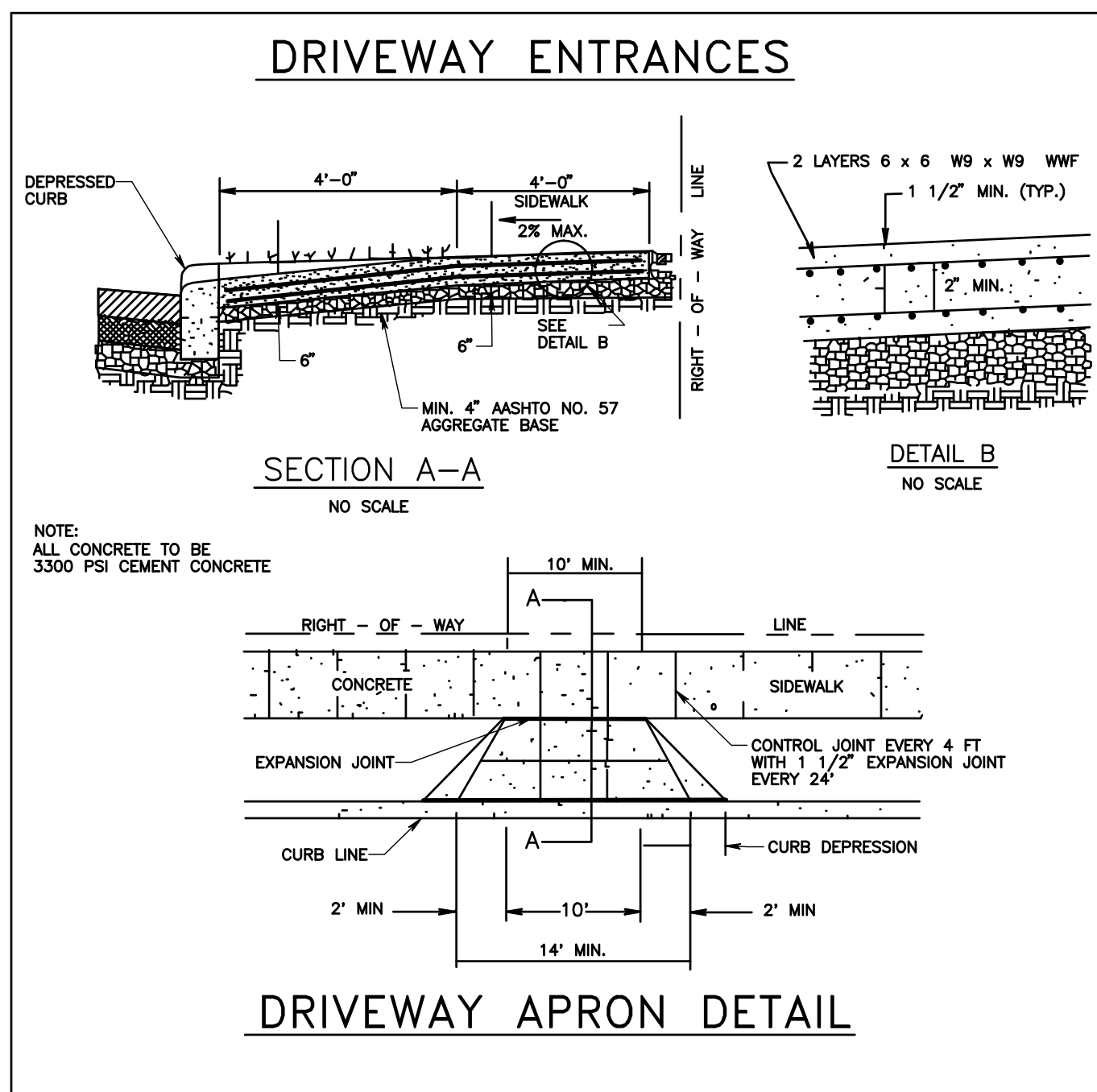
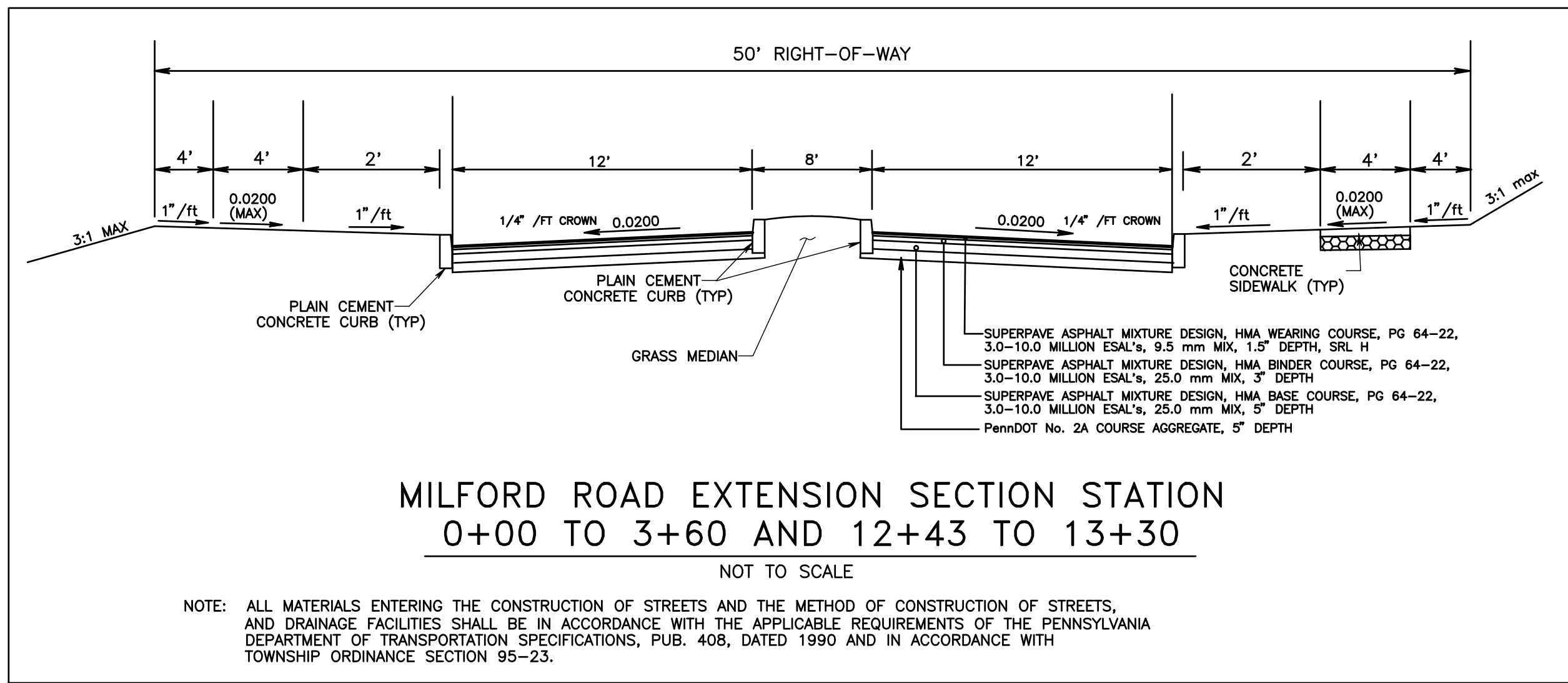
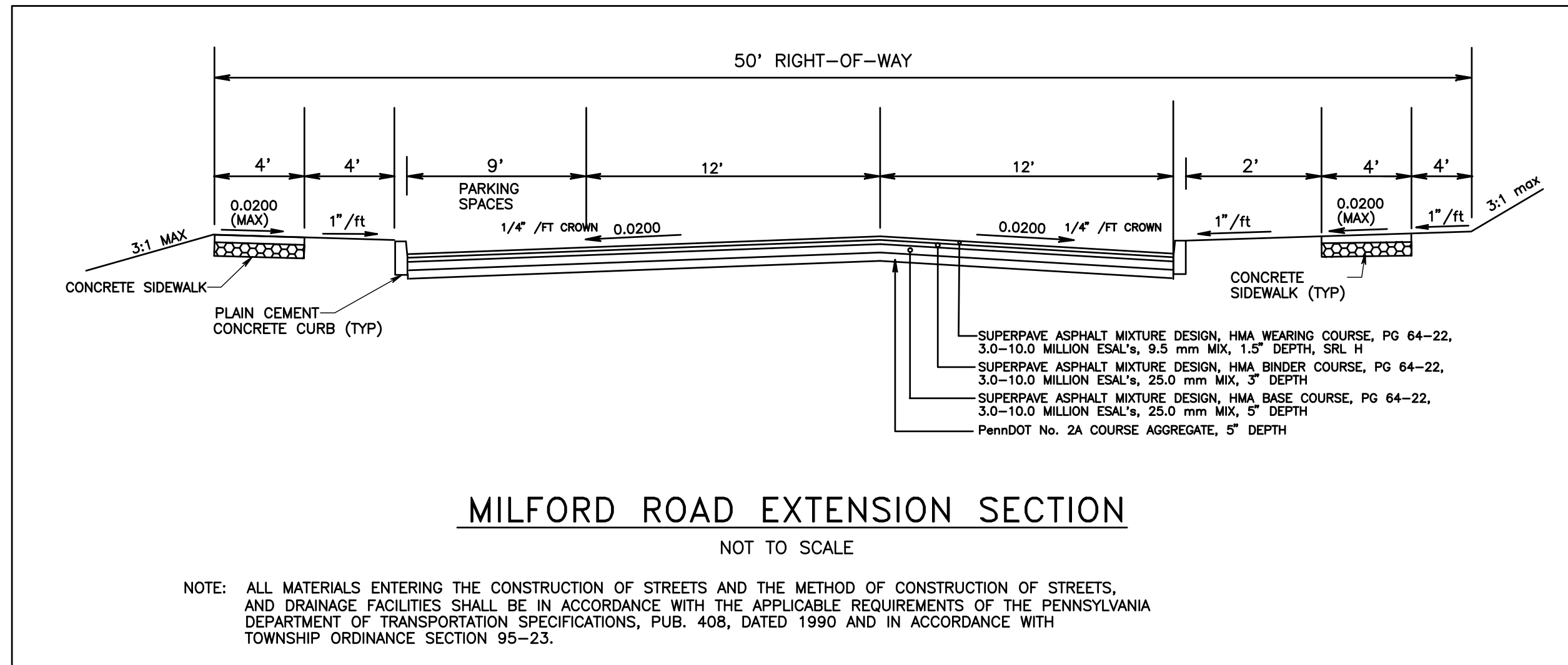
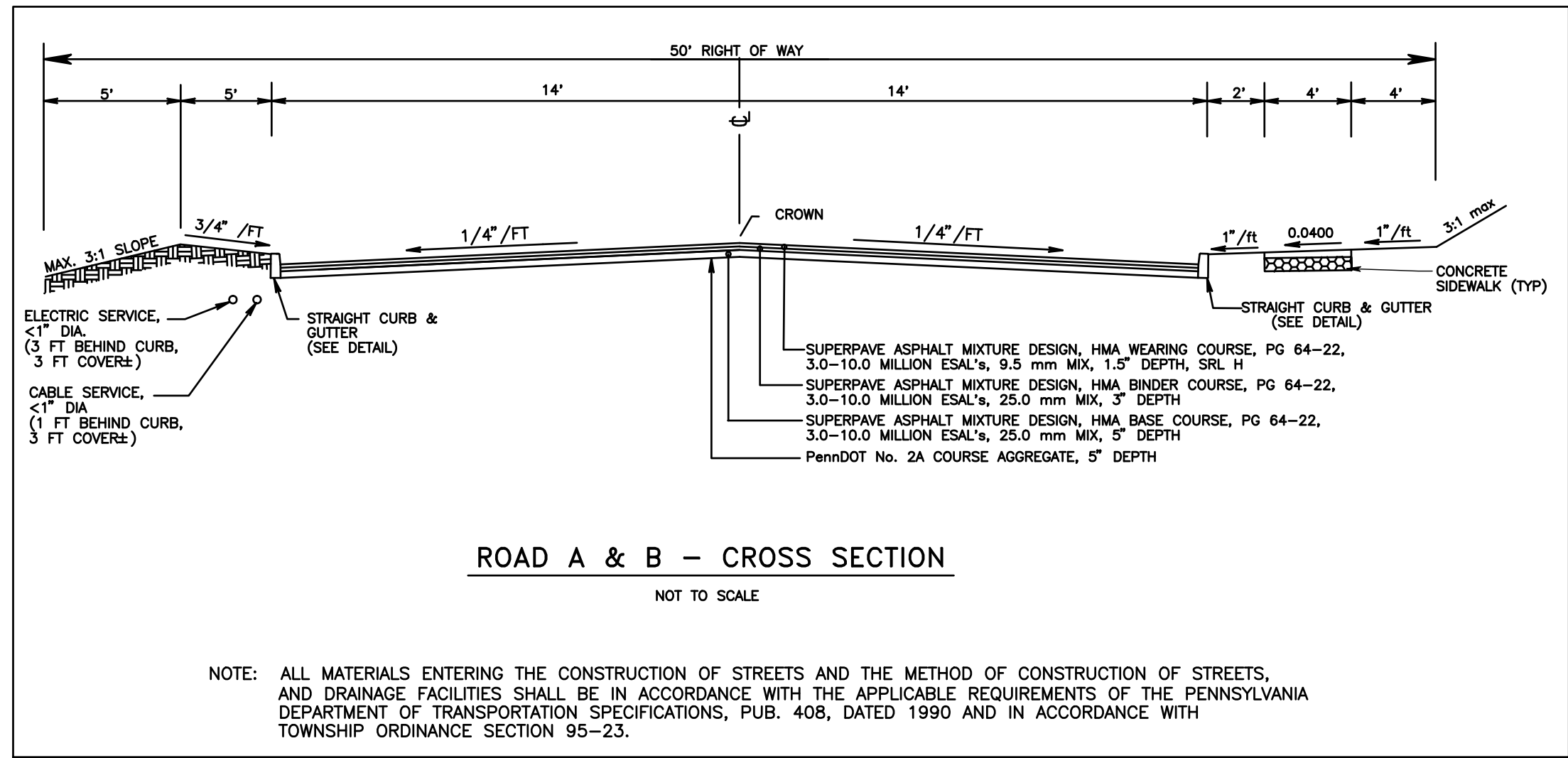
UPPER UWCHLAN TOWNSHIP CHESTER COUNTY, PA.

Edward B. Walsh & Associates, Inc.  
CIVIL ENGINEERS & SURVEYORS  
LIONVILLE PROFESSIONAL CENTER  
125 Dowlan Forge Rd.  
Eaton, Pennsylvania 19341  
Phone: 610-903-0060  
Fax: 610-903-0080

**Project- 4272**  
**Date- 8-8-17**  
**Scale- AS NOTED**  
**Drawn- SLM**  
**Checked- AJB**  
**Sheet- 23 OF 26**

**Plotted: 2/1/2018 File: F:\A\4272\4272-B3.pro**

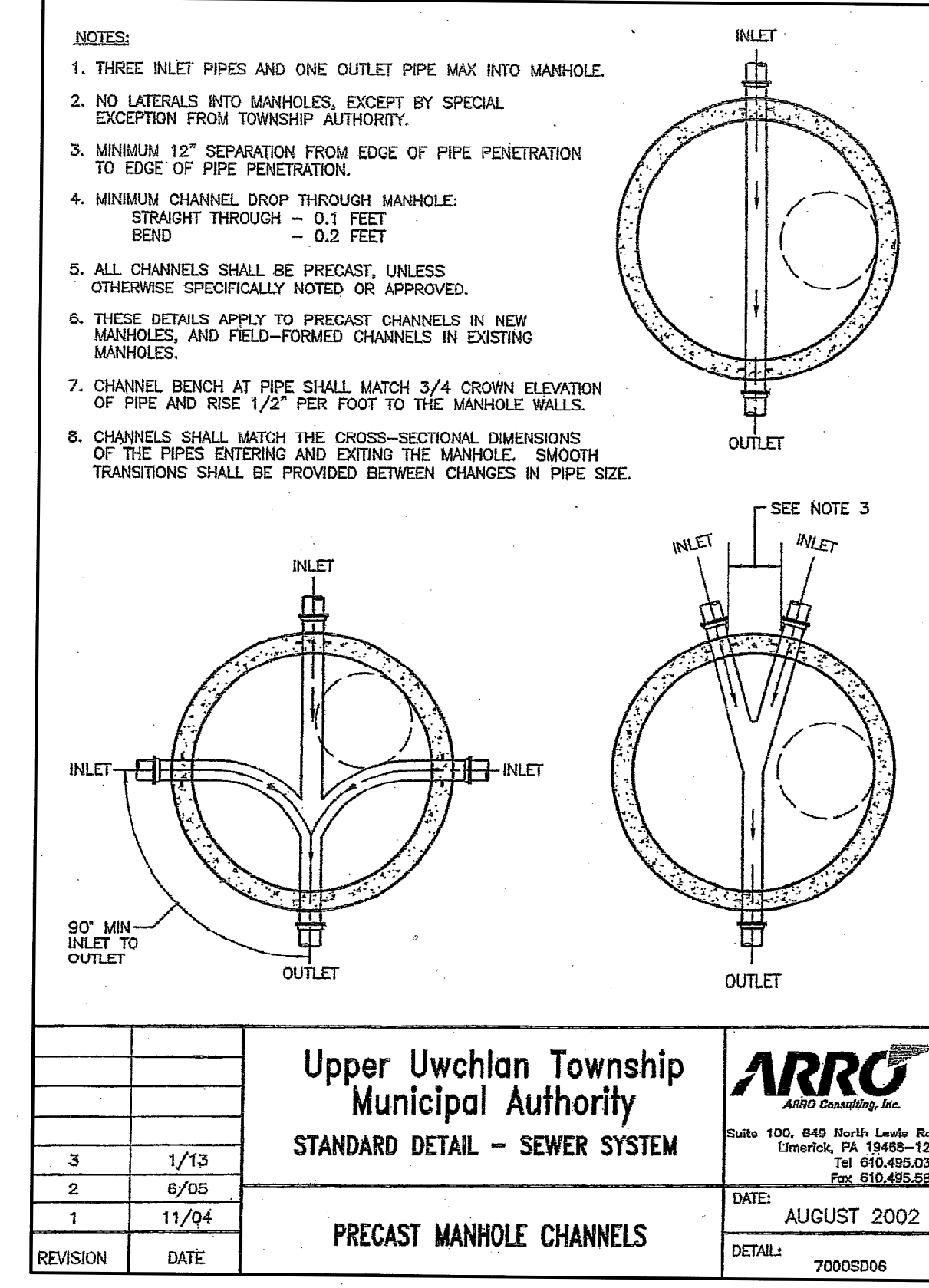
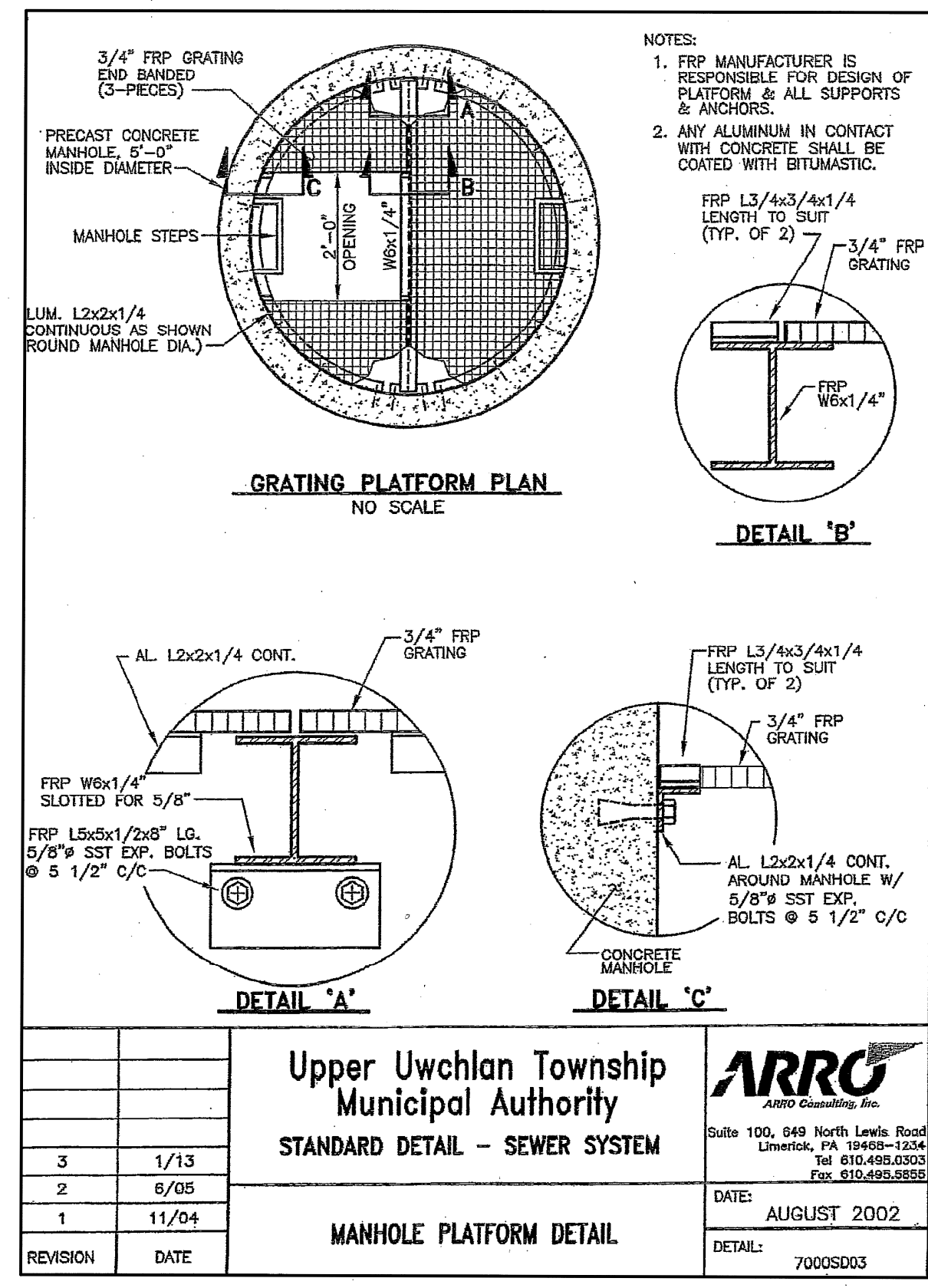
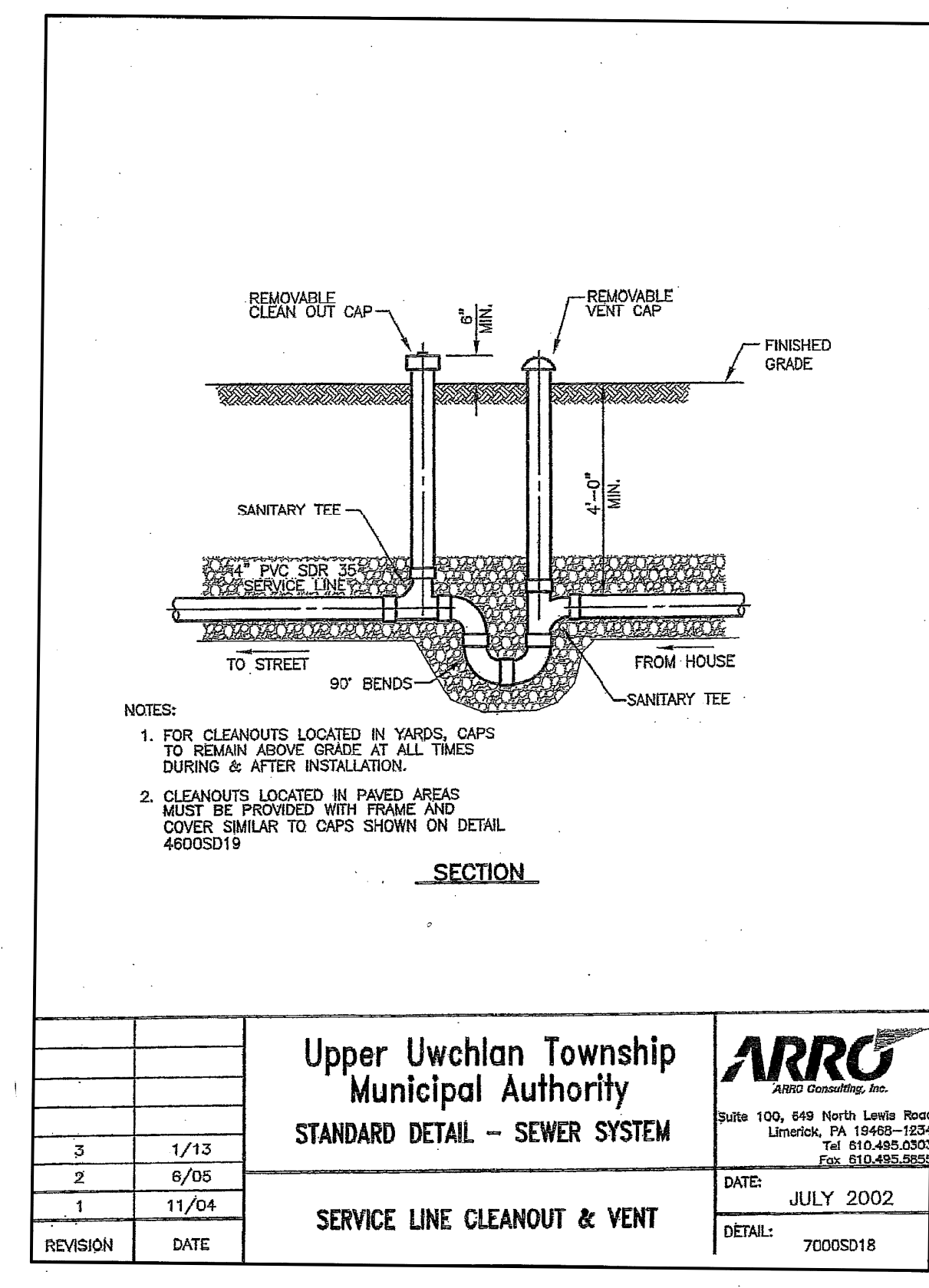
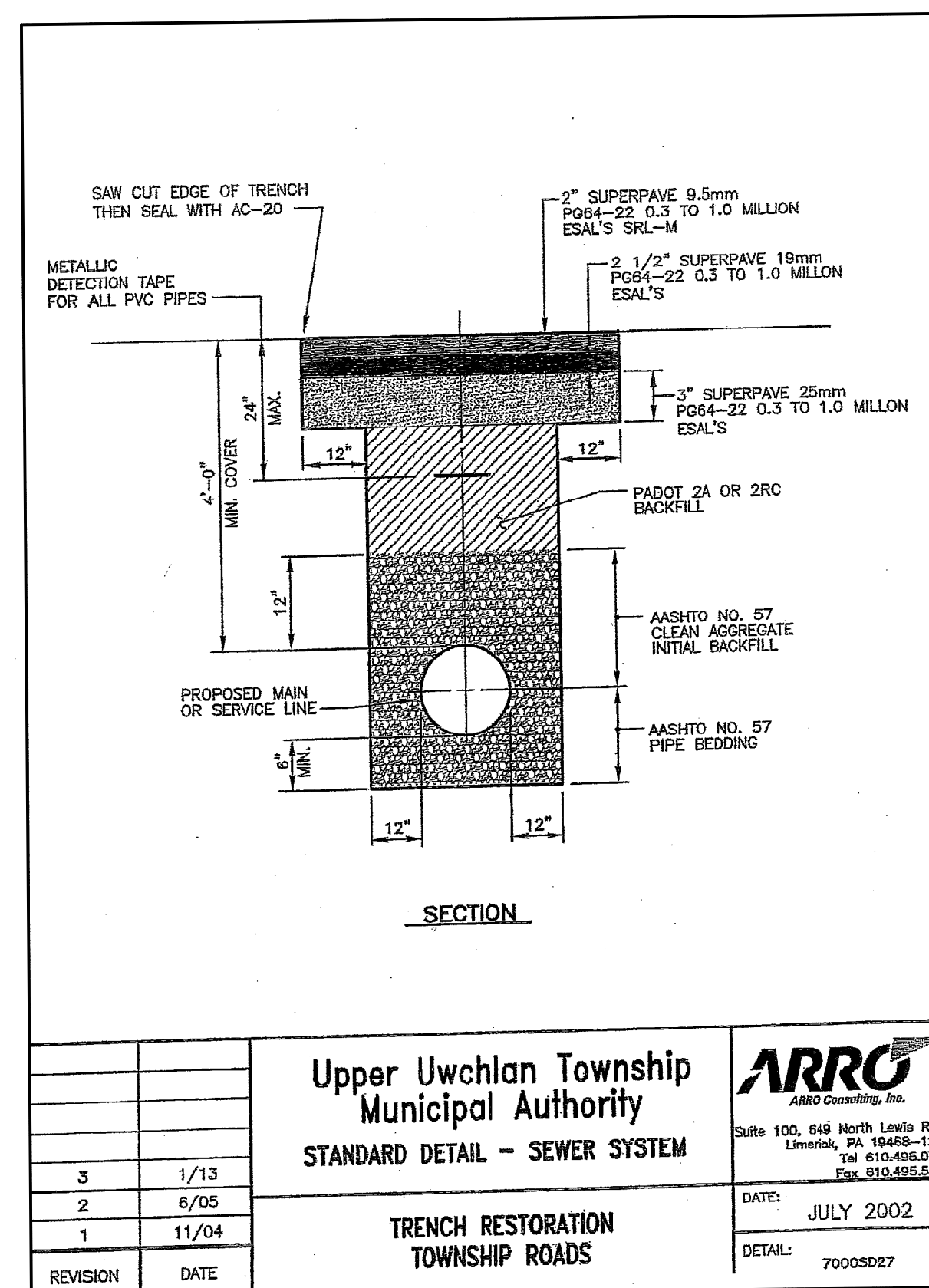
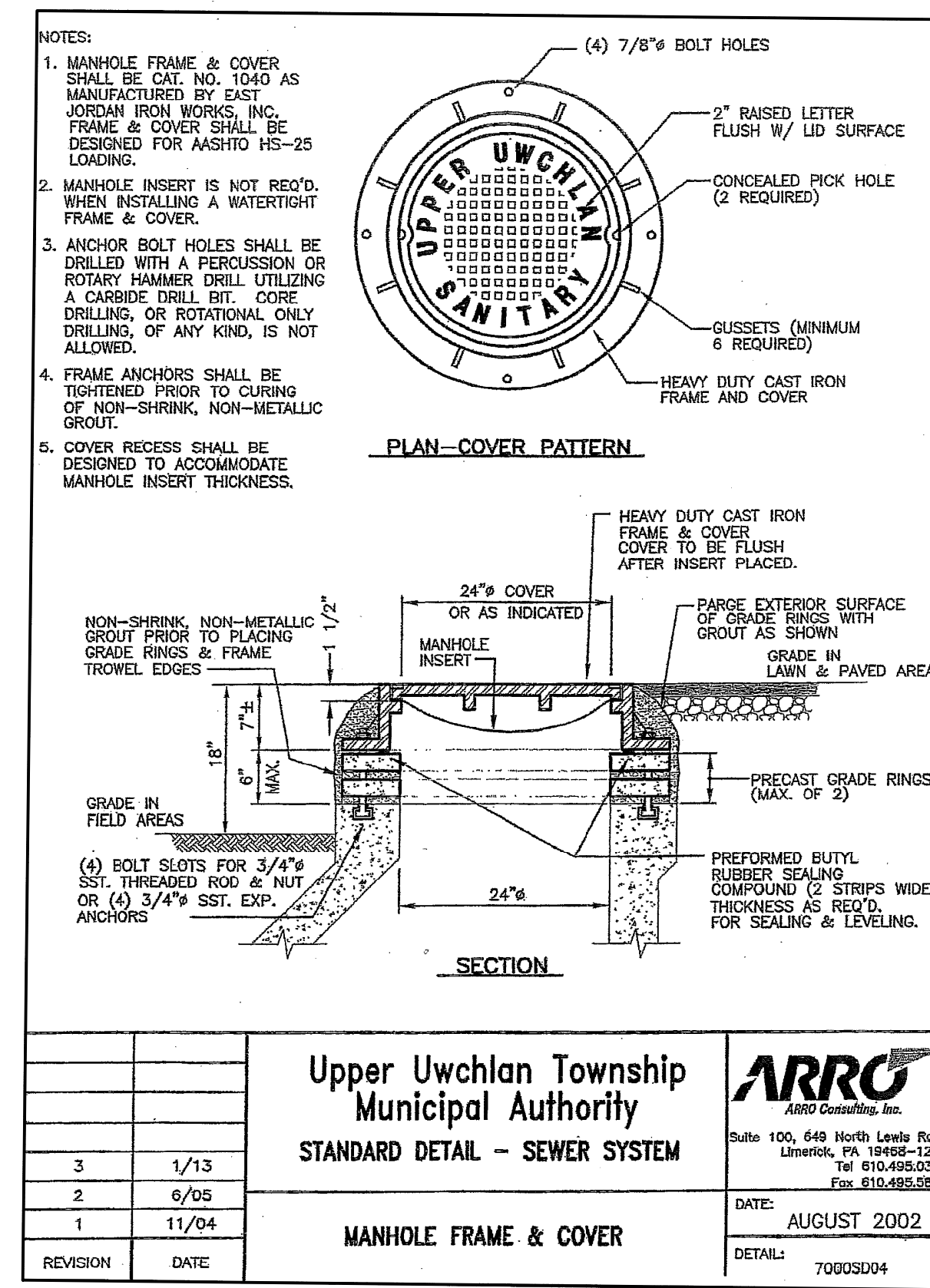
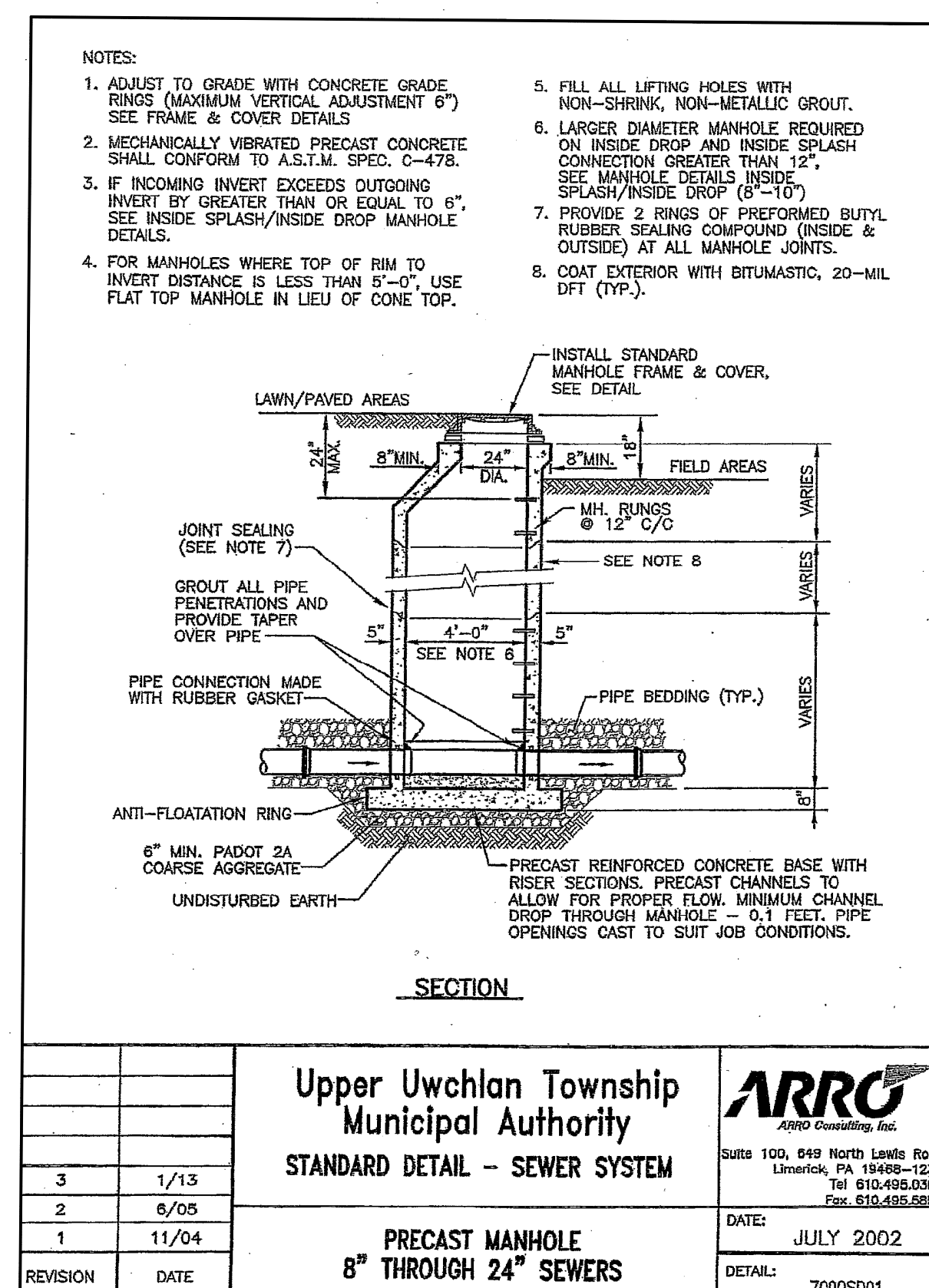
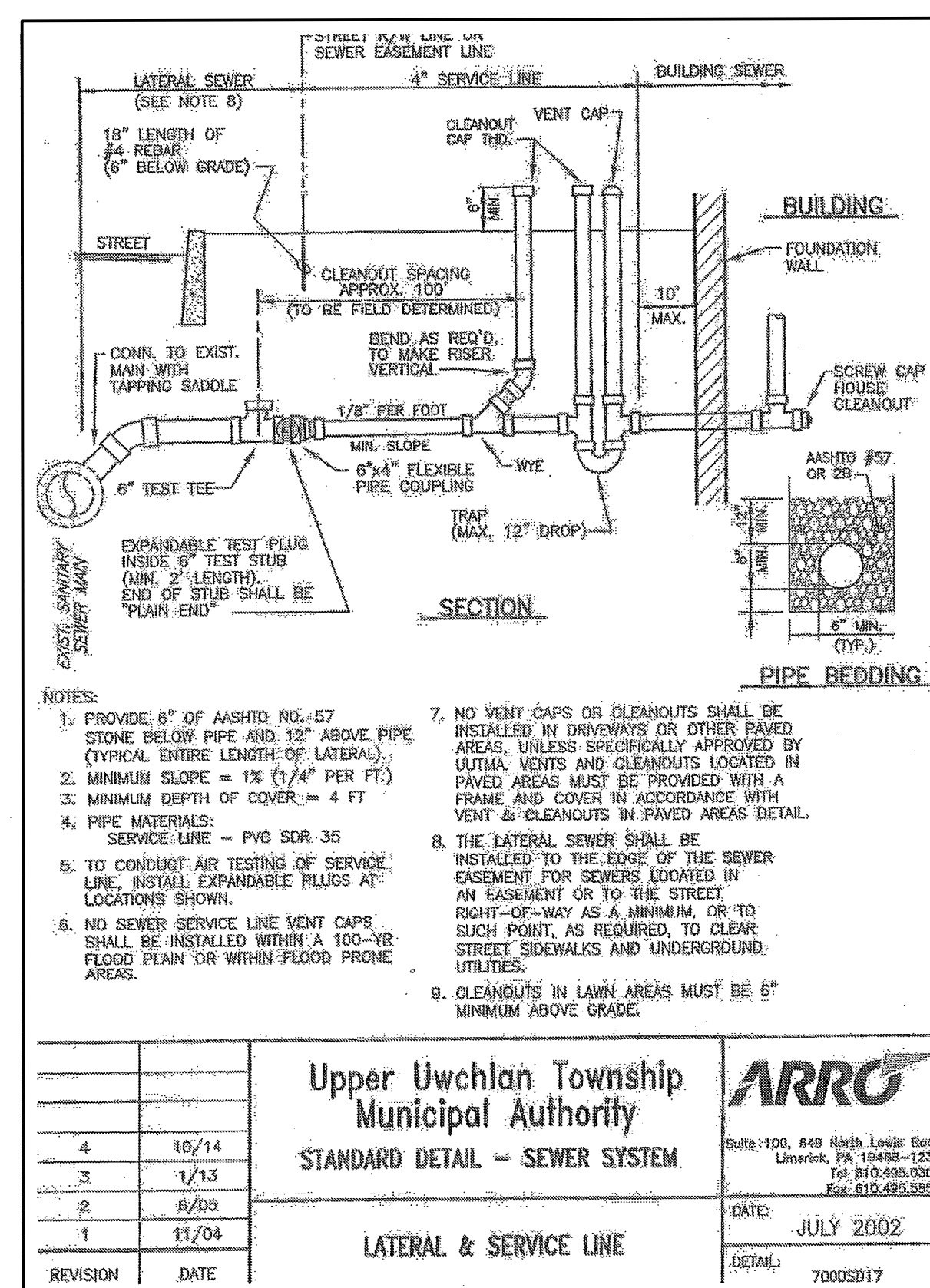
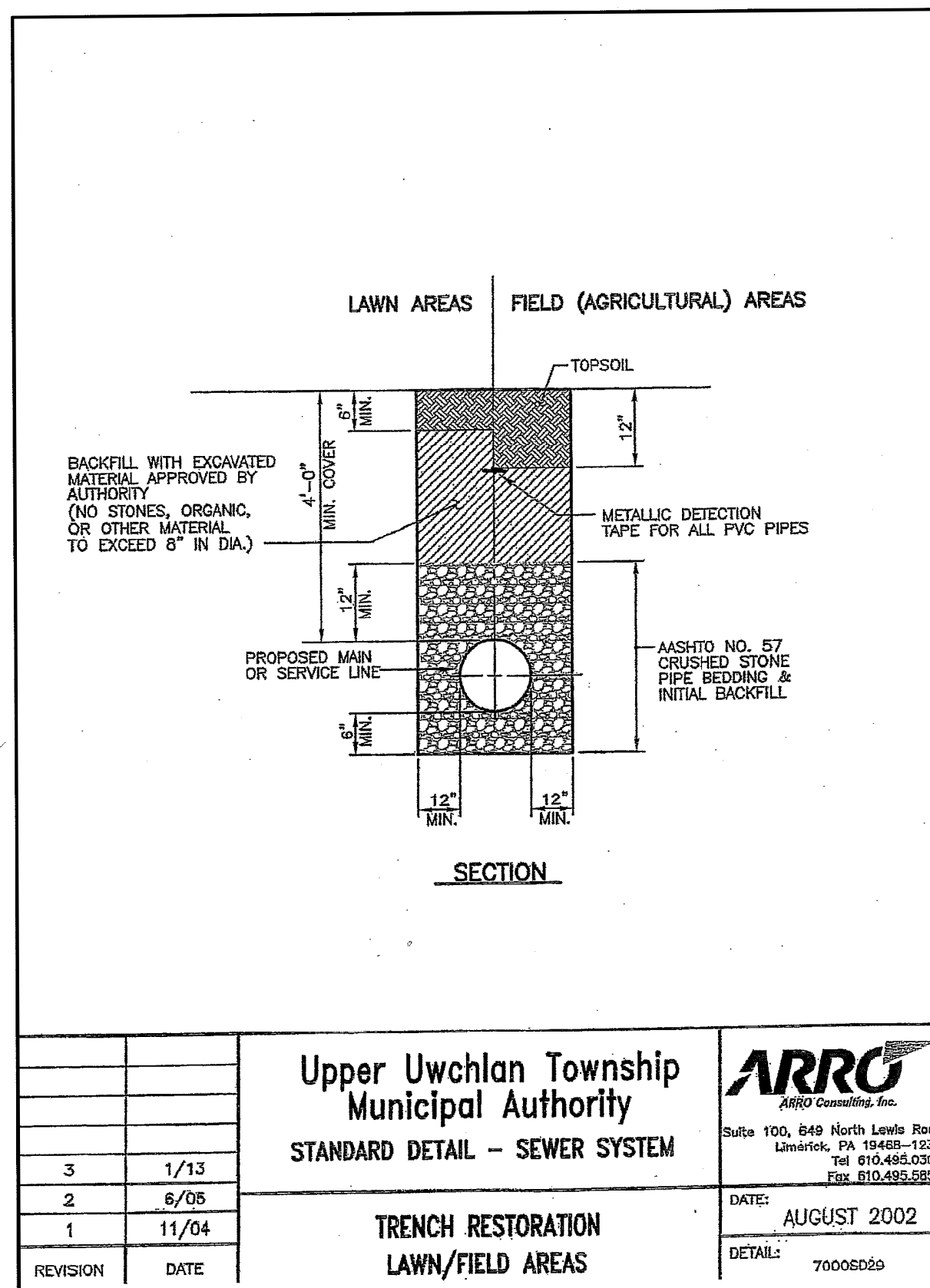




PRELIMINARY/FINAL PLAN  
DETAIL SHEET

|                                                                                                                                |                              |
|--------------------------------------------------------------------------------------------------------------------------------|------------------------------|
| 2. 9-8-17 REVISED PER TWP. ENGINEER LETTER DATED 9-8-17.                                                                       |                              |
| 1. 8-18-17 REVISED ROADWAY IMPROVEMENTS.                                                                                       |                              |
| SUBDIVISION PLAN<br>FOR<br>JANKOWSKI TRACT                                                                                     |                              |
| UPPER UWCHLAN TOWNSHIP                                                                                                         | CHESTER COUNTY, PA.          |
| Edward B. Walsh & Associates, Inc.                                                                                             |                              |
| CIVIL ENGINEERS & SURVEYORS                                                                                                    |                              |
| LIONVILLE PROFESSIONAL CENTER<br>125 Dowlin Forge Rd.<br>Eaton, Pennsylvania 19341<br>Phone: 610-903-0060<br>Fax: 610-903-0080 |                              |
| Project- 4272                                                                                                                  | Date- 8-8-17                 |
| Scale- AS NOTED                                                                                                                | Drawn- SLM                   |
| Checked- AJB                                                                                                                   | Sheet- 24 OF 26              |
| Plotted: 2/1/2018                                                                                                              | File: F:\JB\4272\4272-B3.pro |





# PRELIMINARY/FINAL PLAN SANITARY SEWER DETAIL SHEET

|                                                                                                                                |                     |
|--------------------------------------------------------------------------------------------------------------------------------|---------------------|
| 2. 9-8-17 REVISED PER TWP. ENGINEER LETTER DATED 9-8-17.                                                                       |                     |
| 1. 8-18-17 REVISED ROADWAY IMPROVEMENTS.                                                                                       |                     |
| SUBDIVISION PLAN<br>FOR<br>JANKOWSKI TRACT                                                                                     |                     |
| UPPER UWCHLAN TOWNSHIP                                                                                                         | CHESTER COUNTY, PA. |
| Edward B. Walsh & Associates, Inc.                                                                                             |                     |
| CIVIL ENGINEERS & SURVEYORS                                                                                                    |                     |
| LIONVILLE PROFESSIONAL CENTER<br>125 DOWLIN FORGE RD.<br>EXTON, PENNSYLVANIA 19341<br>Phone: 610-903-0060<br>Fax: 610-903-0080 |                     |
| Project-- 4272                                                                                                                 | Date-- 8-8-17       |
| Scale-- AS NOTED                                                                                                               | Drawn-- SLM         |
| Checked-- AJB                                                                                                                  | Sheet-- 25 OF 26    |





**HYDROLOGICAL STUDY**  
**FOR**  
**JANKOWSKI TRACT SUBDIVISION**

**UPPER UWCHLAN TOWNSHIP**  
**CHESTER COUNTY, PA**

**PREPARED BY**  
**EDWARD B. WALSH & ASSOC., INC.**  
**125 DOWLIN FORGE ROAD**  
**LIONVILLE PROFESSIONAL CENTER**  
**EXTON, PA 19341-1550**  
**610-903-0060**

**January 31, 2018**

BLANK SHEET



## **TABLE OF CONTENTS**

|                                                                        |            |
|------------------------------------------------------------------------|------------|
| <i>Project Narrative</i>                                               | 1-2        |
| <i>NOAA Atlas 14 Data Rational</i>                                     | 3 to 6     |
| <i>Inlet TC calcs</i>                                                  | 7-8        |
| <i>Conveyance</i>                                                      | 9 to 23    |
| <i>Endwall Calculations</i>                                            | 24 to 28   |
| <i>NOAA Atlas 14 Data SCS</i>                                          | 29 to 32   |
| <i>Basin Outlet Configuration and Stage/Storage Relationship Table</i> |            |
| <i>Peak Flow Summary</i>                                               |            |
| <i>Hydrograph and Routing Output</i>                                   | 33 to 105  |
| <i>Emergency and Collar design</i>                                     | 106 to 109 |
| <i>Worksheet #4</i>                                                    | 110        |
| <i>SWM Volume Control</i>                                              | 111-112    |

BLANK SHEET

### Project Narrative:

Envision Land Use is proposing to develop the 40.6 acre tract of ground on the west side of Pottstown Pike opposite Garrison Drive. The tract is comprised of several parcels which will be combined. A portion of two parcels is also located in West Vincent Township; they will be subdivided. The portions of the parcels located in West Vincent are not included in the project. It is proposed to create 55 lots for individual single family homes. The proposed access to the site will be provided via a road extension of Milford Road, to the west, to a proposed intersection with Pottstown Pike. The homes will utilize public sanitary sewer and potable water. The site design is being developed to comply with the Township zoning requirements.

### Existing Features:

The majority of the area to be improved is utilized for agricultural purposes with some woodland area in the southern portion of the site. The site has a moderate to mild slope towards the southern end of the site where there is an existing drainage channel which flows to the south where it exits the site. There are wetlands located around the existing channel. The soils found on site include Edgemont and Gladstone. The soils may contain hydric characteristics. The site geology does not indicate any characteristics that would be a concern for groundwater contamination as a result of construction.

### Stormwater Management:

The increase in the rate and volume of runoff will be managed by multiple BMP's. The rate of runoff is being controlled through the use of two detention basins. The systems have been designed to control the rate of all storms from the 1 year up to and including the 100 year storm to less than pre developed rates as required by the Township Stormwater Management Ordinance. The hydroflow program was utilized to perform the analysis. The SCS method was utilized for the rate of flow and volume reduction analysis. The predeveloped analysis considered the area to be disturbed as meadow. For volume control the site utilizes several systems, a stone recharge bed and several rain gardens. The systems and site design provide the following:

- The underground stone recharge bed and rain gardens ensure the volume of runoff to the Waters of the Commonwealth does not increase for all storms up to and including the two year event.
- The layout minimizes the proposed impervious surfaces.
- The BMP systems will ensure that degradation does not occur.
- The stormwater management system will maintain the hydrology and water quality that flows down gradient from the proposed improvements and therefore will protect the integrity of the stream channels

- The proposed stormwater system maintains / protects the physical, biological, and chemical qualities of the receiving stream by providing multiple / differing BMPS.
- The project has been designed to minimize soil compaction and avoid clearing beyond what is necessary.
- The project maintains the existing drainage features.
- The BMP's that are provided for the site minimizes the change in stormwater runoff and prevents thermal impacts by avoiding ponding for extended periods of time and discharges to meadow area to further cool the runoff prior to discharging to a watercourse.
- As the site currently discharges to an existing drainage channel a non-discharge system is not possible.

### **Discharge Analysis:**

The site has one watershed / point of interest (POI), which is the drainage swale and wetland area that discharges from the site on the Southern Border. The stormwater systems have been designed to ensure the volume and rate control meet DEP and Township Act 167 stormwater management ordinance requirements.

### **Erosion and Sedimentation Control:**

The site design includes erosion control devices to ensure that sediment does not leave the work area during construction. Silt fence will be installed below the areas to be disturbed. A rock construction entrance and concrete washout will be provided at the site access. Two sediment basins will be installed to manage the majority of the site to be disturbed including the area to be exposed for the longest period. The project will be developed in one phase. The E & S controls will reduce the flow rate leaving the work zone to ensure erosive conditions do not occur. The site drains to an existing drainage channel; therefore a non-discharge alternative is not possible. As the flow rate to the channel will be reduced the velocity of the flow leaving the site will be reduced and therefore ensure erosive conditions do not occur. The discharge from the sediment trap will be to established grass / meadow area. This will cool the runoff prior to discharge from the site and therefore address thermal concerns.

The plan has been designed to minimize the extent and duration of earth disturbance by providing multiple aspects of construction at the same time. It maximizes the protection of existing drainage features by maintaining the existing drainage are. Soil compaction is limited to the area to be disturbed. The vegetated swales, recharge bed, rain garden and porous pavement prevents an increase in stormwater runoff. The management of the runoff and discharge to grass areas also avoids thermal issues.



**NOAA Atlas 14, Volume 2, Version 3**  
**Location name: Upper Uwchlan Twp,**  
**Pennsylvania, USA\***  
**Latitude: 40.1008°, Longitude: -75.6968°**  
**Elevation: 559.49 ft\*\***

\* source: ESRI Maps

\*\* source: USGS



**POINT PRECIPITATION FREQUENCY ESTIMATES**

G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M. Yekta, and D. Riley

NOAA, National Weather Service, Silver Spring, Maryland

[PF\\_tabular](#) | [PF\\_graphical](#) | [Maps & aerals](#)

**PF tabular**

| <b>PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches/hour)<sup>1</sup></b> |                                            |                               |                               |                               |                               |                               |                               |                               |                               |                               |
|---------------------------------------------------------------------------------------------------------------------|--------------------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
| <b>Duration</b>                                                                                                     | <b>Average recurrence interval (years)</b> |                               |                               |                               |                               |                               |                               |                               |                               |                               |
|                                                                                                                     | <b>1</b>                                   | <b>2</b>                      | <b>5</b>                      | <b>10</b>                     | <b>25</b>                     | <b>50</b>                     | <b>100</b>                    | <b>200</b>                    | <b>500</b>                    | <b>1000</b>                   |
| <b>5-min</b>                                                                                                        | <b>4.15</b><br>(3.79-4.56)                 | <b>4.94</b><br>(4.51-5.44)    | <b>5.77</b><br>(5.26-6.34)    | <b>6.35</b><br>(5.77-6.96)    | <b>7.01</b><br>(6.34-7.68)    | <b>7.44</b><br>(6.70-8.15)    | <b>7.87</b><br>(7.04-8.62)    | <b>8.22</b><br>(7.34-9.02)    | <b>8.62</b><br>(7.63-9.46)    | <b>8.89</b><br>(7.82-9.79)    |
| <b>10-min</b>                                                                                                       | <b>3.32</b><br>(3.03-3.64)                 | <b>3.95</b><br>(3.61-4.34)    | <b>4.62</b><br>(4.21-5.07)    | <b>5.08</b><br>(4.62-5.57)    | <b>5.58</b><br>(5.05-6.11)    | <b>5.93</b><br>(5.33-6.49)    | <b>6.25</b><br>(5.60-6.85)    | <b>6.52</b><br>(5.82-7.15)    | <b>6.81</b><br>(6.04-7.48)    | <b>7.00</b><br>(6.17-7.71)    |
| <b>15-min</b>                                                                                                       | <b>2.76</b><br>(2.52-3.04)                 | <b>3.32</b><br>(3.02-3.64)    | <b>3.90</b><br>(3.55-4.28)    | <b>4.28</b><br>(3.90-4.69)    | <b>4.72</b><br>(4.27-5.17)    | <b>5.00</b><br>(4.50-5.48)    | <b>5.27</b><br>(4.72-5.77)    | <b>5.48</b><br>(4.90-6.02)    | <b>5.72</b><br>(5.06-6.27)    | <b>5.86</b><br>(5.16-6.45)    |
| <b>30-min</b>                                                                                                       | <b>1.90</b><br>(1.73-2.08)                 | <b>2.29</b><br>(2.09-2.51)    | <b>2.77</b><br>(2.52-3.04)    | <b>3.10</b><br>(2.82-3.40)    | <b>3.49</b><br>(3.16-3.83)    | <b>3.77</b><br>(3.39-4.13)    | <b>4.03</b><br>(3.61-4.42)    | <b>4.27</b><br>(3.81-4.68)    | <b>4.55</b><br>(4.03-4.99)    | <b>4.74</b><br>(4.18-5.22)    |
| <b>60-min</b>                                                                                                       | <b>1.18</b><br>(1.08-1.30)                 | <b>1.44</b><br>(1.31-1.58)    | <b>1.77</b><br>(1.62-1.95)    | <b>2.02</b><br>(1.84-2.21)    | <b>2.33</b><br>(2.11-2.55)    | <b>2.55</b><br>(2.30-2.80)    | <b>2.78</b><br>(2.49-3.04)    | <b>2.99</b><br>(2.67-3.28)    | <b>3.26</b><br>(2.89-3.58)    | <b>3.46</b><br>(3.05-3.81)    |
| <b>2-hr</b>                                                                                                         | <b>0.704</b><br>(0.636-0.782)              | <b>0.856</b><br>(0.772-0.950) | <b>1.06</b><br>(0.958-1.18)   | <b>1.22</b><br>(1.10-1.36)    | <b>1.43</b><br>(1.28-1.58)    | <b>1.60</b><br>(1.42-1.77)    | <b>1.76</b><br>(1.55-1.95)    | <b>1.92</b><br>(1.69-2.13)    | <b>2.15</b><br>(1.86-2.38)    | <b>2.32</b><br>(1.99-2.57)    |
| <b>3-hr</b>                                                                                                         | <b>0.511</b><br>(0.461-0.569)              | <b>0.619</b><br>(0.558-0.689) | <b>0.771</b><br>(0.694-0.857) | <b>0.887</b><br>(0.796-0.985) | <b>1.04</b><br>(0.928-1.15)   | <b>1.16</b><br>(1.03-1.28)    | <b>1.28</b><br>(1.13-1.41)    | <b>1.40</b><br>(1.23-1.55)    | <b>1.56</b><br>(1.35-1.73)    | <b>1.68</b><br>(1.45-1.87)    |
| <b>6-hr</b>                                                                                                         | <b>0.318</b><br>(0.287-0.354)              | <b>0.383</b><br>(0.347-0.427) | <b>0.476</b><br>(0.429-0.530) | <b>0.550</b><br>(0.495-0.612) | <b>0.653</b><br>(0.583-0.725) | <b>0.736</b><br>(0.652-0.814) | <b>0.823</b><br>(0.723-0.909) | <b>0.913</b><br>(0.795-1.01)  | <b>1.04</b><br>(0.891-1.15)   | <b>1.14</b><br>(0.963-1.26)   |
| <b>12-hr</b>                                                                                                        | <b>0.192</b><br>(0.173-0.215)              | <b>0.231</b><br>(0.208-0.259) | <b>0.288</b><br>(0.260-0.323) | <b>0.336</b><br>(0.301-0.375) | <b>0.404</b><br>(0.358-0.450) | <b>0.461</b><br>(0.405-0.511) | <b>0.522</b><br>(0.454-0.580) | <b>0.588</b><br>(0.505-0.652) | <b>0.682</b><br>(0.575-0.757) | <b>0.759</b><br>(0.631-0.842) |
| <b>24-hr</b>                                                                                                        | <b>0.112</b><br>(0.103-0.123)              | <b>0.135</b><br>(0.124-0.148) | <b>0.169</b><br>(0.155-0.186) | <b>0.197</b><br>(0.180-0.216) | <b>0.238</b><br>(0.216-0.261) | <b>0.272</b><br>(0.246-0.298) | <b>0.309</b><br>(0.278-0.337) | <b>0.349</b><br>(0.311-0.380) | <b>0.406</b><br>(0.359-0.443) | <b>0.454</b><br>(0.397-0.495) |
| <b>2-day</b>                                                                                                        | <b>0.065</b><br>(0.059-0.072)              | <b>0.079</b><br>(0.072-0.087) | <b>0.098</b><br>(0.090-0.109) | <b>0.115</b><br>(0.104-0.126) | <b>0.138</b><br>(0.124-0.151) | <b>0.156</b><br>(0.141-0.172) | <b>0.176</b><br>(0.158-0.194) | <b>0.198</b><br>(0.176-0.217) | <b>0.228</b><br>(0.201-0.251) | <b>0.253</b><br>(0.221-0.278) |
| <b>3-day</b>                                                                                                        | <b>0.046</b><br>(0.042-0.051)              | <b>0.055</b><br>(0.050-0.061) | <b>0.069</b><br>(0.063-0.076) | <b>0.080</b><br>(0.073-0.089) | <b>0.096</b><br>(0.087-0.106) | <b>0.109</b><br>(0.098-0.120) | <b>0.123</b><br>(0.110-0.135) | <b>0.138</b><br>(0.122-0.152) | <b>0.159</b><br>(0.140-0.175) | <b>0.176</b><br>(0.154-0.194) |
| <b>4-day</b>                                                                                                        | <b>0.036</b><br>(0.033-0.040)              | <b>0.043</b><br>(0.040-0.048) | <b>0.054</b><br>(0.049-0.060) | <b>0.063</b><br>(0.057-0.070) | <b>0.075</b><br>(0.068-0.083) | <b>0.085</b><br>(0.077-0.094) | <b>0.096</b><br>(0.086-0.106) | <b>0.108</b><br>(0.096-0.119) | <b>0.124</b><br>(0.109-0.136) | <b>0.137</b><br>(0.120-0.151) |
| <b>7-day</b>                                                                                                        | <b>0.024</b><br>(0.022-0.026)              | <b>0.029</b><br>(0.027-0.032) | <b>0.036</b><br>(0.033-0.039) | <b>0.041</b><br>(0.038-0.045) | <b>0.049</b><br>(0.045-0.054) | <b>0.056</b><br>(0.051-0.061) | <b>0.063</b><br>(0.057-0.068) | <b>0.070</b><br>(0.063-0.076) | <b>0.081</b><br>(0.072-0.088) | <b>0.089</b><br>(0.079-0.097) |
| <b>10-day</b>                                                                                                       | <b>0.019</b><br>(0.018-0.021)              | <b>0.023</b><br>(0.021-0.025) | <b>0.028</b><br>(0.026-0.031) | <b>0.032</b><br>(0.029-0.035) | <b>0.038</b><br>(0.035-0.041) | <b>0.042</b><br>(0.039-0.046) | <b>0.047</b><br>(0.043-0.051) | <b>0.052</b><br>(0.047-0.056) | <b>0.058</b><br>(0.053-0.063) | <b>0.064</b><br>(0.057-0.069) |
| <b>20-day</b>                                                                                                       | <b>0.013</b><br>(0.012-0.014)              | <b>0.015</b><br>(0.014-0.017) | <b>0.018</b><br>(0.017-0.020) | <b>0.021</b><br>(0.019-0.022) | <b>0.024</b><br>(0.022-0.026) | <b>0.026</b><br>(0.024-0.028) | <b>0.029</b><br>(0.027-0.031) | <b>0.031</b><br>(0.029-0.034) | <b>0.035</b><br>(0.032-0.037) | <b>0.037</b><br>(0.034-0.040) |
| <b>30-day</b>                                                                                                       | <b>0.011</b><br>(0.010-0.012)              | <b>0.013</b><br>(0.012-0.014) | <b>0.015</b><br>(0.014-0.016) | <b>0.016</b><br>(0.015-0.018) | <b>0.019</b><br>(0.017-0.020) | <b>0.020</b><br>(0.019-0.022) | <b>0.022</b><br>(0.020-0.023) | <b>0.023</b><br>(0.022-0.025) | <b>0.025</b><br>(0.023-0.027) | <b>0.027</b><br>(0.025-0.029) |
| <b>45-day</b>                                                                                                       | <b>0.009</b><br>(0.009-0.010)              | <b>0.011</b><br>(0.010-0.011) | <b>0.012</b><br>(0.012-0.013) | <b>0.014</b><br>(0.013-0.014) | <b>0.015</b><br>(0.014-0.016) | <b>0.016</b><br>(0.015-0.017) | <b>0.017</b><br>(0.016-0.018) | <b>0.018</b><br>(0.017-0.019) | <b>0.019</b><br>(0.018-0.021) | <b>0.020</b><br>(0.019-0.022) |
| <b>60-day</b>                                                                                                       | <b>0.008</b><br>(0.008-0.009)              | <b>0.010</b><br>(0.009-0.010) | <b>0.011</b><br>(0.010-0.012) | <b>0.012</b><br>(0.011-0.013) | <b>0.013</b><br>(0.013-0.014) | <b>0.014</b><br>(0.013-0.015) | <b>0.015</b><br>(0.014-0.016) | <b>0.016</b><br>(0.015-0.017) | <b>0.017</b><br>(0.016-0.018) | <b>0.017</b><br>(0.016-0.018) |

<sup>1</sup> Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

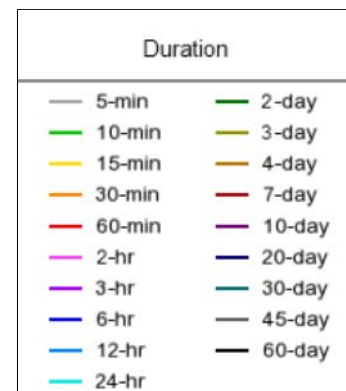
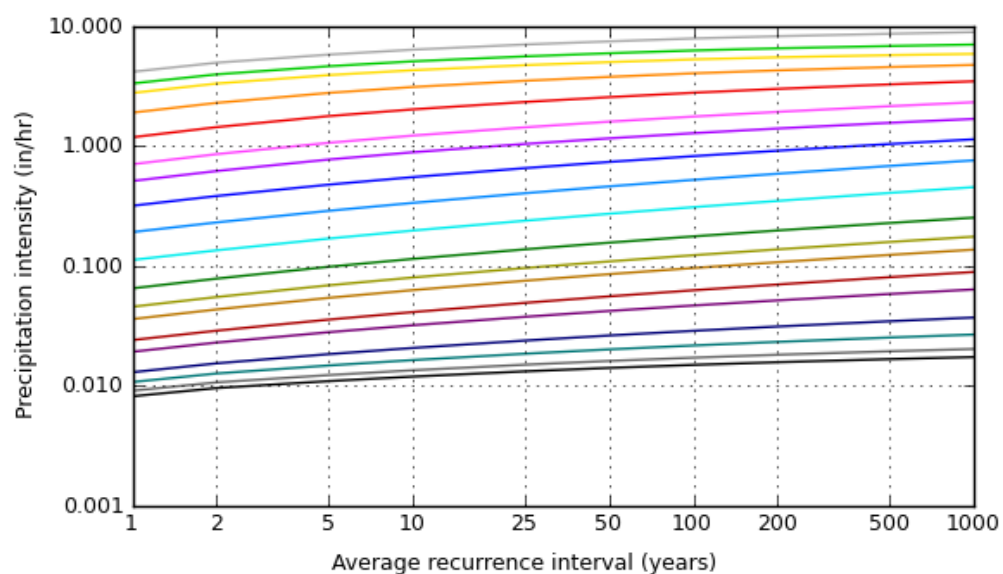
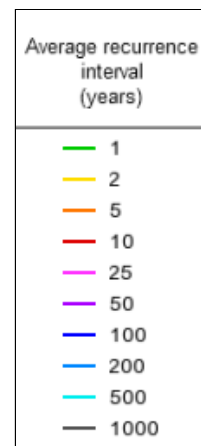
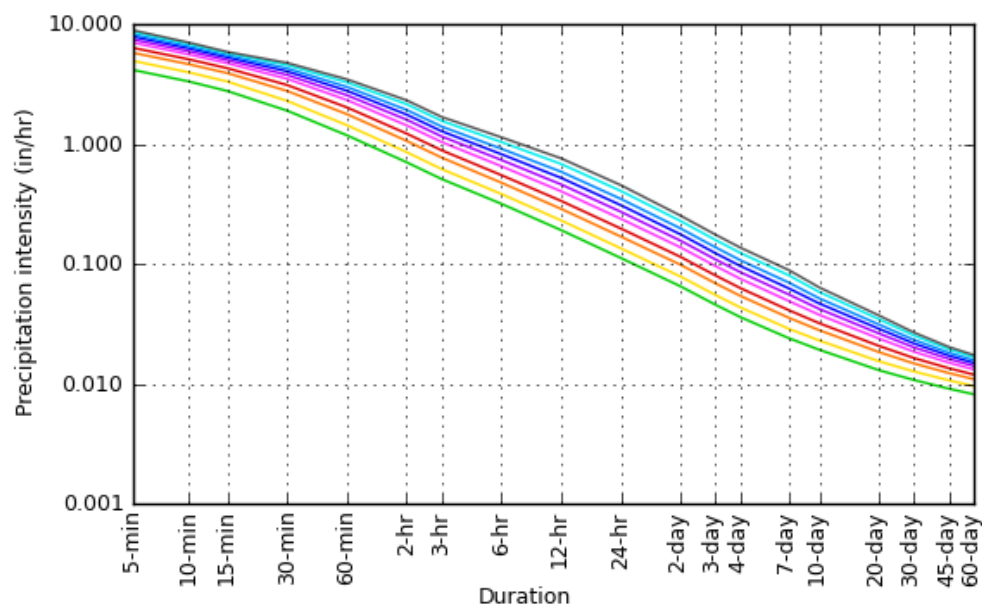
Please refer to NOAA Atlas 14 document for more information.

[Back to Top](#)

## PF graphical

### PDS-based intensity-duration-frequency (IDF) curves

Latitude: 40.1008°, Longitude: -75.6968°



NOAA Atlas 14, Volume 2, Version 3

Created (GMT): Mon Jan 15 18:35:28 2018

[Back to Top](#)

## Maps & aeriels

Small scale terrain





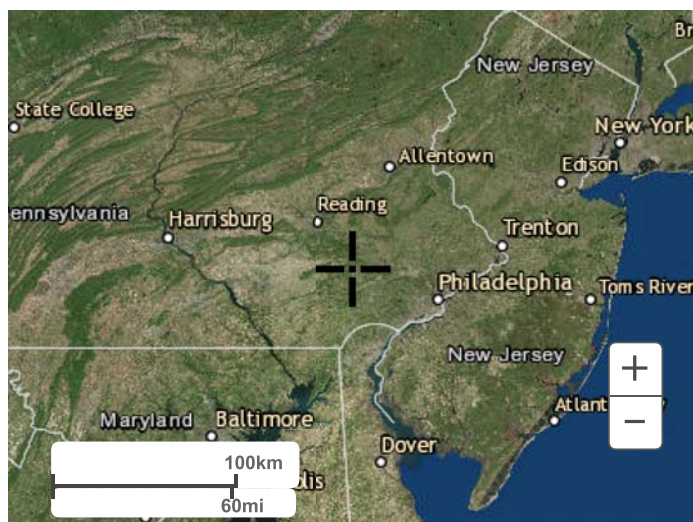
Large scale terrain



Large scale map



Large scale aerial



[Back to Top](#)

---

[US Department of Commerce](#)  
[National Oceanic and Atmospheric Administration](#)  
[National Weather Service](#)  
[National Water Center](#)  
1325 East West Highway  
Silver Spring, MD 20910  
Questions?: [HDSC.Questions@noaa.gov](mailto:HDSC.Questions@noaa.gov)

[Disclaimer](#)



EDWARD B. WALSH & ASSOCIATES, INC.  
Complete Civil Engineering Design / Consultation Services

# RATIONAL METHOD HYDROLOGIC DATA FOR WATERSHED RUNOFF COMPUTATIONS

DATE: 1/15/2018  
BY: MF

JOB NO.: 4272 PROJECT: JANKOWSKI TRACT TOWNSHIP: UPPER UWCHLAN TWP.  
DESCRIPTION: INLET #34

|              |        |             |                         |     |     |
|--------------|--------|-------------|-------------------------|-----|-----|
| COVER:       | GRASS  | 828 FEET    |                         |     |     |
| FLOW LENGTH: |        | 9%          |                         | 6.3 | MIN |
| AVE. SLOPE:  |        | 2.2 FT/SEC  |                         |     |     |
| VELOCITY =   |        |             | **TC= $\frac{828}{132}$ |     |     |
| COVER:       | GRASS  | 0 FEET      |                         |     |     |
| FLOW LENGTH: |        | 4.20%       |                         | 0.0 | MIN |
| AVE. SLOPE:  |        | 1.5 FT/SEC  |                         |     |     |
| VELOCITY =   |        |             | **TC= $\frac{0}{90}$    |     |     |
| COVER:       | PIPE   | 0 FEET      |                         |     |     |
| FLOW LENGTH: |        | 12.00%      |                         | 0.0 | MIN |
| AVE. SLOPE:  |        | 12 FT/SEC   |                         |     |     |
| VELOCITY =   |        |             | **TC= $\frac{0}{720}$   |     |     |
| COVER:       | STREAM | 0 FEET      |                         |     |     |
| FLOW LENGTH: |        | 0.00%       |                         | 0.0 | MIN |
| AVE. SLOPE:  |        | 9.38 FT/SEC |                         |     |     |
| VELOCITY =   |        |             | **TC= $\frac{0}{562.8}$ |     |     |

TC (TOTAL) = 6.3 MIN.



EDWARD B. WALSH & ASSOCIATES, INC.  
Complete Civil Engineering Design / Consultation Services

# RATIONAL METHOD

## HYDROLOGIC DATA FOR WATERSHED

### RUNOFF COMPUTATIONS

DATE: 1/15/2018  
BY: MF

TOWNSHIP: UPPER UWCHLAN TWP.

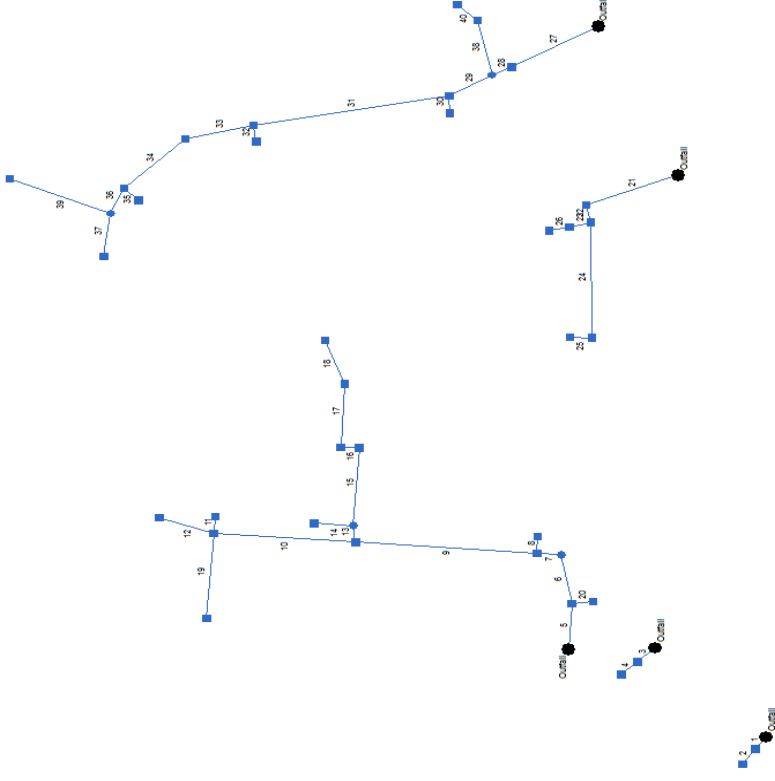
JOB NO.: 4272 PROJECT: JANKOWSKI TRACT  
DESCRIPTION: INLET #35

|              |             |  |  |  |  |
|--------------|-------------|--|--|--|--|
| COVER:       | GRASS       |  |  |  |  |
| FLOW LENGTH: | 1530 FEET   |  |  |  |  |
| AVE. SLOPE:  | 7%          |  |  |  |  |
| VELOCITY =   | 1.5 FT/SEC  |  |  |  |  |
| COVER:       | GRASS       |  |  |  |  |
| FLOW LENGTH: | 0 FEET      |  |  |  |  |
| AVE. SLOPE:  | 4.20%       |  |  |  |  |
| VELOCITY =   | 1.5 FT/SEC  |  |  |  |  |
| COVER:       | PIPE        |  |  |  |  |
| FLOW LENGTH: | 0 FEET      |  |  |  |  |
| AVE. SLOPE:  | 12.00%      |  |  |  |  |
| VELOCITY =   | 12 FT/SEC   |  |  |  |  |
| COVER:       | STREAM      |  |  |  |  |
| FLOW LENGTH: | 0 FEET      |  |  |  |  |
| AVE. SLOPE:  | 0.00%       |  |  |  |  |
| VELOCITY =   | 9.38 FT/SEC |  |  |  |  |

|       |       |   |      |     |
|-------|-------|---|------|-----|
| **TC= | 1530  | = | 17.0 | MIN |
|       | 90    |   |      |     |
| **TC= | 0     | = | 0.0  | MIN |
|       | 90    |   |      |     |
| **TC= | 0     | = | 0.0  | MIN |
|       | 720   |   |      |     |
| **TC= | 0     | = | 0.0  | MIN |
|       | 562.8 |   |      |     |

TC (TOTAL) = 17.0 MIN.

## Hydraflow Plan View



# Storm Sewer Inventory Report

| Line No.                            | Alignment      |                  |                  |           | Flow Data     |                |                  |                  | Physical Data       |                |                   |                |           |             |                  | Line ID          |                    |
|-------------------------------------|----------------|------------------|------------------|-----------|---------------|----------------|------------------|------------------|---------------------|----------------|-------------------|----------------|-----------|-------------|------------------|------------------|--------------------|
|                                     | Dnstr line No. | Line length (ft) | Defl angle (deg) | Junc type | Known Q (cfs) | Drng area (ac) | Runoff coeff (C) | Inlet time (min) | Invert EI Dn (ft)   | Line slope (%) | Invert EI Up (ft) | Line size (in) | Line type | N value (n) | J-loss coeff (K) |                  | Inlet/ Rim EI (ft) |
| 1                                   | End            | 22.0             | -141.4           | Comb      | 0.00          | 0.11           | 0.79             | 5.0              | 518.75              | 1.36           | 519.05            | 15             | Cir       | 0.013       | 0.00             | 522.74           | 1 to E1            |
| 2                                   | 1              | 28.0             | -0.6             | Comb      | 0.00          | 0.18           | 0.55             | 5.0              | 519.25              | 0.50           | 519.39            | 15             | Cir       | 0.013       | 0.00             | 522.74           | 2 to 1             |
| 3                                   | End            | 31.0             | -131.0           | Comb      | 0.00          | 0.21           | 0.81             | 5.0              | 524.00              | 0.97           | 524.30            | 36             | Cir       | 0.013       | 0.00             | 529.86           | 3 to E2            |
| 4                                   | 3              | 28.0             | 0.2              | Comb      | 52.58         | 0.30           | 0.49             | 5.0              | 524.50              | 1.29           | 524.86            | 36             | Cir       | 0.013       | 0.00             | 529.86           | 4 to 3             |
| 5                                   | End            | 66.0             | 4.3              | Comb      | 0.00          | 0.36           | 0.58             | 5.0              | 527.00              | 0.53           | 527.35            | 30             | Cir       | 0.013       | 0.00             | 532.64           | 5 to E3            |
| 6                                   | 5              | 72.0             | -15.7            | MH        | 0.00          | 0.00           | 0.00             | 5.0              | 527.55              | 0.56           | 527.95            | 30             | Cir       | 0.013       | 0.00             | 534.43           | M1 to 5            |
| 7                                   | 6              | 32.0             | -75.4            | Comb      | 0.00          | 0.36           | 0.65             | 5.0              | 528.25              | 1.72           | 528.80            | 24             | Cir       | 0.013       | 0.00             | 534.85           | 6 to M1            |
| 8                                   | 7              | 24.0             | 90.2             | Comb      | 0.00          | 0.41           | 0.69             | 5.0              | 529.25              | 1.17           | 529.53            | 15             | Cir       | 0.013       | 0.00             | 534.85           | 7 to 6             |
| 9                                   | 7              | 238.0            | 0.7              | Comb      | 0.00          | 0.31           | 0.64             | 5.0              | 529.00              | 5.25           | 541.50            | 24             | Cir       | 0.013       | 0.00             | 549.17           | 8 to 6             |
| 10                                  | 9              | 186.0            | 0.0              | Comb      | 0.00          | 0.11           | 0.68             | 5.0              | 544.57              | 8.34           | 560.09            | 18             | Cir       | 0.013       | 0.00             | 565.77           | 9 to 8             |
| 11                                  | 10             | 24.0             | 91.2             | Comb      | 0.00          | 0.16           | 0.84             | 5.0              | 562.30              | 0.50           | 562.42            | 15             | Cir       | 0.013       | 0.00             | 565.77           | 10 to 9            |
| 12                                  | 10             | 75.0             | 13.7             | Comb      | 0.00          | 0.39           | 0.64             | 5.0              | 562.30              | 7.60           | 568.00            | 15             | Cir       | 0.013       | 0.00             | 571.25           | 11 to 9            |
| 13                                  | 9              | 24.0             | 79.1             | MH        | 0.00          | 0.00           | 0.00             | 5.0              | 542.00              | 3.33           | 542.80            | 18             | Cir       | 0.013       | 0.00             | 549.54           | M2 to 8            |
| 14                                  | 13             | 51.0             | -79.1            | Comb      | 0.00          | 0.21           | 0.64             | 5.0              | 546.29              | 9.04           | 550.90            | 15             | Cir       | 0.013       | 0.00             | 554.24           | 12 to M2           |
| 15                                  | 13             | 112.0            | 11.1             | Comb      | 0.00          | 0.29           | 0.83             | 5.0              | 543.00              | 1.79           | 545.00            | 18             | Cir       | 0.013       | 0.00             | 549.17           | 13 to M2           |
| 16                                  | 15             | 24.0             | -92.0            | Comb      | 0.00          | 0.79           | 0.50             | 5.0              | 545.20              | 0.71           | 545.37            | 18             | Cir       | 0.013       | 0.00             | 549.17           | 14 to 13           |
| 17                                  | 16             | 91.0             | 91.0             | Comb      | 0.00          | 0.78           | 0.51             | 5.0              | 545.57              | 0.97           | 546.45            | 18             | Cir       | 0.013       | 0.00             | 549.99           | 15 to 14           |
| 18                                  | 17             | 68.0             | -25.6            | Comb      | 0.00          | 0.55           | 0.50             | 5.0              | 546.70              | 1.18           | 547.50            | 15             | Cir       | 0.013       | 0.00             | 550.81           | 16 to 15           |
| 19                                  | 10             | 123.0            | -89.5            | DrGrt     | 0.00          | 4.11           | 0.35             | 6.0              | 560.29              | 1.39           | 562.00            | 18             | Cir       | 0.013       | 0.00             | 565.50           | 34 to 9            |
| 20                                  | 5              | 28.0             | 79.4             | Comb      | 0.00          | 0.04           | 0.52             | 5.0              | 529.00              | 1.07           | 529.30            | 15             | Cir       | 0.013       | 0.00             | 532.64           | 5A TO 5            |
| 21                                  | End            | 128.0            | -109.8           | Comb      | 0.00          | 0.16           | 0.88             | 5.0              | 525.00              | 2.19           | 527.80            | 24             | Cir       | 0.013       | 0.00             | 534.10           | 17 to E4           |
| Project File: 4272-CONVEYANCE-2.stm |                |                  |                  |           |               |                |                  |                  | Number of lines: 40 |                |                   |                |           |             |                  | Date: 02-01-2018 | 10                 |



# Storm Sewer Inventory Report

| Line No.                            | Alignment      |                  |                  |           | Flow Data     |                |                  |                  | Physical Data       |                |                   |                |           |             |                  | Line ID          |                    |
|-------------------------------------|----------------|------------------|------------------|-----------|---------------|----------------|------------------|------------------|---------------------|----------------|-------------------|----------------|-----------|-------------|------------------|------------------|--------------------|
|                                     | Dnstr line No. | Line length (ft) | Defl angle (deg) | Junc type | Known Q (cfs) | Drng area (ac) | Runoff coeff (C) | Inlet time (min) | Invert El Dn (ft)   | Line slope (%) | Invert El Up (ft) | Line size (in) | Line type | N value (n) | J-loss coeff (K) |                  | Inlet/ Rim El (ft) |
| 22                                  | 21             | 26.0             | -84.1            | Comb      | 0.00          | 0.15           | 0.87             | 5.0              | 528.00              | 0.77           | 528.20            | 24             | Cir       | 0.013       | 0.00             | 534.02           | 18 to 17           |
| 23                                  | 22             | 29.0             | 91.3             | Comb      | 0.00          | 0.64           | 0.65             | 5.0              | 528.40              | 0.69           | 528.60            | 24             | Cir       | 0.013       | 0.00             | 534.02           | 19 to 18           |
| 24                                  | 22             | 166.0            | 13.5             | Comb      | 0.00          | 0.11           | 0.84             | 5.0              | 528.95              | 1.57           | 531.55            | 15             | Cir       | 0.013       | 0.00             | 535.39           | 20 to 18           |
| 25                                  | 24             | 29.0             | 92.8             | Comb      | 0.00          | 0.13           | 0.72             | 5.0              | 531.75              | 0.86           | 532.00            | 15             | Cir       | 0.013       | 0.00             | 535.39           | 21 to 20           |
| 26                                  | 23             | 27.0             | 1.1              | DrGrt     | 0.00          | 3.22           | 0.42             | 5.0              | 528.80              | 2.59           | 529.50            | 24             | Cir       | 0.013       | 0.00             | 533.50           | 22 to 19           |
| 27                                  | End            | 127.0            | -117.2           | Comb      | 0.00          | 0.13           | 0.86             | 5.0              | 526.00              | 3.94           | 531.00            | 24             | Cir       | 0.013       | 0.00             | 536.58           | 23 to E5           |
| 28                                  | 27             | 28.0             | 2.7              | MH        | 0.00          | 0.00           | 0.00             | 5.0              | 531.20              | 1.43           | 531.60            | 24             | Cir       | 0.013       | 0.00             | 536.66           | M3 to 23           |
| 29                                  | 28             | 64.0             | -3.5             | Comb      | 0.00          | 0.42           | 0.69             | 5.0              | 531.80              | 2.66           | 533.50            | 24             | Cir       | 0.013       | 0.00             | 537.62           | 24 to M3           |
| 30                                  | 29             | 25.0             | -64.6            | Comb      | 0.00          | 0.42           | 0.69             | 5.0              | 534.05              | 1.40           | 534.40            | 15             | Cir       | 0.013       | 0.00             | 537.73           | 25 to 24           |
| 31                                  | 29             | 260.0            | 18.6             | Comb      | 0.00          | 0.13           | 0.63             | 5.0              | 534.00              | 5.50           | 548.30            | 18             | Cir       | 0.013       | 0.00             | 556.42           | 26 to 24           |
| 32                                  | 31             | 24.0             | -89.9            | Comb      | 0.00          | 0.20           | 0.74             | 5.0              | 552.95              | 0.50           | 553.07            | 15             | Cir       | 0.013       | 0.00             | 556.42           | 27 to 26           |
| 33                                  | 31             | 91.0             | -3.2             | Comb      | 0.00          | 0.20           | 0.62             | 5.0              | 552.90              | 6.15           | 558.50            | 18             | Cir       | 0.013       | 0.00             | 562.27           | 28 to 26           |
| 34                                  | 33             | 107.0            | -28.8            | Comb      | 0.00          | 0.20           | 0.68             | 5.0              | 558.70              | 4.50           | 563.52            | 18             | Cir       | 0.013       | 0.00             | 567.22           | 29 to 28           |
| 35                                  | 34             | 25.0             | -96.1            | Comb      | 0.00          | 0.20           | 0.83             | 5.0              | 563.87              | 1.32           | 564.20            | 15             | Cir       | 0.013       | 0.00             | 567.50           | 30 to 29           |
| 36                                  | 34             | 40.0             | -22.6            | MH        | 0.00          | 0.00           | 0.00             | 5.0              | 563.72              | 3.95           | 565.30            | 18             | Cir       | 0.013       | 0.00             | 569.12           | M4 to 29           |
| 37                                  | 36             | 63.0             | -17.7            | DrGrt     | 0.00          | 0.24           | 0.68             | 5.0              | 565.55              | 5.00           | 568.70            | 15             | Cir       | 0.013       | 0.00             | 571.98           | 31 to M4           |
| 38                                  | 28             | 81.0             | 100.9            | Comb      | 0.00          | 0.71           | 0.61             | 5.0              | 532.10              | 1.48           | 533.30            | 18             | Cir       | 0.013       | 0.00             | 537.27           | 32 to M3           |
| 39                                  | 36             | 141.0            | 84.5             | DrGrt     | 0.00          | 3.18           | 0.39             | 5.0              | 565.50              | 1.19           | 567.18            | 18             | Cir       | 0.013       | 0.00             | 573.50           | 33 to M4           |
| 40                                  | 38             | 35.0             | -36.9            | DrGrt     | 0.00          | 3.08           | 0.39             | 17.0             | 533.50              | 1.43           | 534.00            | 18             | Cir       | 0.013       | 0.00             | 537.50           | 35 to 32           |
| Project File: 4272-CONVEYANCE-2.stm |                |                  |                  |           |               |                |                  |                  | Number of lines: 40 |                |                   |                |           |             |                  | Date: 02-01-2018 | 11                 |

# Storm Sewer Summary Report

12

Page 1

| Line No.                                                                                                                                          | Line ID  | Flow rate (cfs) | Line size (in) | Line length (ft) | Invert EL Dn (ft) | Invert EL Up (ft) | Line slope (%)      | HGL down (ft) | HGL up (ft) | Minor loss (ft)      | HGL Junct (ft) | Dns line No. |
|---------------------------------------------------------------------------------------------------------------------------------------------------|----------|-----------------|----------------|------------------|-------------------|-------------------|---------------------|---------------|-------------|----------------------|----------------|--------------|
| 1                                                                                                                                                 | 1 to E1  | 1.45            | 15 c           | 22.0             | 518.75            | 519.05            | 1.364               | 519.23        | 519.53      | n/a                  | 519.53 j       | End          |
| 2                                                                                                                                                 | 2 to 1   | 0.78            | 15 c           | 28.0             | 519.25            | 519.39            | 0.500               | 519.70        | 519.75      | n/a                  | 519.75 j       | 1            |
| 3                                                                                                                                                 | 3 to E2  | 55.07           | 36 c           | 31.0             | 524.00            | 524.30            | 0.968               | 526.37        | 526.67      | n/a                  | 526.67         | End          |
| 4                                                                                                                                                 | 4 to 3   | 53.74           | 36 c           | 28.0             | 524.50            | 524.86            | 1.286               | 527.09        | 527.20      | 0.00                 | 527.20         | 3            |
| 5                                                                                                                                                 | 5 to E3  | 28.85           | 30 c           | 66.0             | 527.00            | 527.35            | 0.530               | 531.55*       | 531.88*     | 0.00                 | 531.88         | End          |
| 6                                                                                                                                                 | M1 to 5  | 28.92           | 30 c           | 72.0             | 527.55            | 527.95            | 0.556               | 531.88*       | 532.24*     | 0.00                 | 532.24         | 5            |
| 7                                                                                                                                                 | 6 to M1  | 28.99           | 24 c           | 32.0             | 528.25            | 528.80            | 1.719               | 532.24*       | 531.92*     | n/a                  | 533.25 i       | 6            |
| 8                                                                                                                                                 | 7 to 6   | 2.22            | 15 c           | 24.0             | 529.25            | 529.53            | 1.167               | 533.25*       | 533.27*     | 0.00                 | 533.27         | 7            |
| 9                                                                                                                                                 | 8 to 6   | 25.82           | 24 c           | 238.0            | 529.00            | 541.50            | 5.252               | 533.25        | 543.29      | n/a                  | 543.29 j       | 7            |
| 10                                                                                                                                                | 9 to 8   | 14.00           | 18 c           | 186.0            | 544.57            | 560.09            | 8.344               | 545.29        | 561.47      | n/a                  | 561.47 j       | 9            |
| 11                                                                                                                                                | 10 to 9  | 1.06            | 15 c           | 24.0             | 562.30            | 562.42            | 0.500               | 562.71        | 562.83      | n/a                  | 562.83 j       | 10           |
| 12                                                                                                                                                | 11 to 9  | 1.96            | 15 c           | 75.0             | 562.30            | 568.00            | 7.600               | 562.58        | 568.56      | n/a                  | 568.56 j       | 10           |
| 13                                                                                                                                                | M2 to 8  | 10.74           | 18 c           | 24.0             | 542.00            | 542.80            | 3.333               | 543.89        | 544.05      | 0.00                 | 544.05         | 9            |
| 14                                                                                                                                                | 12 to M2 | 1.06            | 15 c           | 51.0             | 546.29            | 550.90            | 9.039               | 546.49        | 551.31      | n/a                  | 551.31 j       | 13           |
| 15                                                                                                                                                | 13 to M2 | 9.87            | 18 c           | 112.0            | 543.00            | 545.00            | 1.786               | 544.29        | 546.20      | n/a                  | 546.20 j       | 13           |
| 16                                                                                                                                                | 14 to 13 | 8.09            | 18 c           | 24.0             | 545.20            | 545.37            | 0.708               | 546.53        | 546.65      | n/a                  | 547.06 i       | 15           |
| 17                                                                                                                                                | 15 to 14 | 5.19            | 18 c           | 91.0             | 545.57            | 546.45            | 0.967               | 547.06        | 547.32      | n/a                  | 547.32 j       | 16           |
| 18                                                                                                                                                | 16 to 15 | 2.16            | 15 c           | 68.0             | 546.70            | 547.50            | 1.176               | 547.64        | 548.09      | n/a                  | 548.09 j       | 17           |
| 19                                                                                                                                                | 34 to 9  | 10.77           | 18 c           | 123.0            | 560.29            | 562.00            | 1.390               | 561.95        | 563.25      | n/a                  | 563.25 j       | 10           |
| 20                                                                                                                                                | 5A TO 5  | 0.16            | 15 c           | 28.0             | 529.00            | 529.30            | 1.071               | 532.41*       | 532.41*     | 0.00                 | 532.41         | 5            |
| 21                                                                                                                                                | 17 to E4 | 16.27           | 24 c           | 128.0            | 525.00            | 527.80            | 2.187               | 529.57*       | 530.23*     | 0.00                 | 530.23         | End          |
| 22                                                                                                                                                | 18 to 17 | 15.30           | 24 c           | 26.0             | 528.00            | 528.20            | 0.769               | 530.28*       | 530.40*     | 0.00                 | 530.40         | 21           |
| 23                                                                                                                                                | 19 to 18 | 13.84           | 24 c           | 29.0             | 528.40            | 528.60            | 0.689               | 530.43        | 530.53      | 0.00                 | 530.53         | 22           |
| 24                                                                                                                                                | 20 to 18 | 1.45            | 15 c           | 166.0            | 528.95            | 531.55            | 1.566               | 530.75        | 532.03      | n/a                  | 532.03 j       | 22           |
| 25                                                                                                                                                | 21 to 20 | 0.74            | 15 c           | 29.0             | 531.75            | 532.00            | 0.862               | 532.20        | 532.34      | n/a                  | 532.34 j       | 24           |
| 26                                                                                                                                                | 22 to 19 | 10.64           | 24 c           | 27.0             | 528.80            | 529.50            | 2.593               | 530.66        | 530.66      | n/a                  | 530.66 j       | 23           |
| 27                                                                                                                                                | 23 to E5 | 22.48           | 24 c           | 127.0            | 526.00            | 531.00            | 3.937               | 532.91*       | 534.17*     | 0.00                 | 534.17         | End          |
| 28                                                                                                                                                | M3 to 23 | 21.94           | 24 c           | 28.0             | 531.20            | 531.60            | 1.428               | 534.20*       | 533.81*     | n/a                  | 534.57 i       | 27           |
| 29                                                                                                                                                | 24 to M3 | 19.42           | 24 c           | 64.0             | 531.80            | 533.50            | 2.656               | 534.57        | 535.06      | n/a                  | 535.06 j       | 28           |
| 30                                                                                                                                                | 25 to 24 | 2.28            | 15 c           | 25.0             | 534.05            | 534.40            | 1.400               | 535.85*       | 535.89*     | 0.00                 | 535.89         | 29           |
| 31                                                                                                                                                | 26 to 24 | 15.45           | 18 c           | 260.0            | 534.00            | 548.30            | 5.500               | 535.06        | 549.72      | n/a                  | 549.72 j       | 29           |
| 32                                                                                                                                                | 27 to 26 | 1.16            | 15 c           | 24.0             | 552.95            | 553.07            | 0.500               | 553.38        | 553.50      | 0.00                 | 553.50         | 31           |
| Project File: 4272-CONVEYANCE-2.stm                                                                                                               |          |                 |                |                  |                   |                   | Number of lines: 40 |               |             | Run Date: 02-01-2018 |                |              |
| NOTES: c = cir; e = ellip; b = box; Return period = 100 Yrs. ; *Surcharged (HGL above crown). ; i - Inlet control. ; j - Line contains hyd. jump. |          |                 |                |                  |                   |                   |                     |               |             |                      |                |              |

# Storm Sewer Summary Report

| Line No.                                                                                                                                          | Line ID  | Flow rate (cfs) | Line size (in) | Line length (ft) | Invert EL Dn (ft) | Invert EL Up (ft) | Line slope (%)      | HGL down (ft) | HGL up (ft) | Minor loss (ft)      | HGL Junct (ft) | Dns line No. |
|---------------------------------------------------------------------------------------------------------------------------------------------------|----------|-----------------|----------------|------------------|-------------------|-------------------|---------------------|---------------|-------------|----------------------|----------------|--------------|
| 33                                                                                                                                                | 28 to 26 | 13.81           | 18 c           | 91.0             | 552.90            | 558.50            | 6.154               | 553.68        | 559.88      | n/a                  | 559.88 j       | 31           |
| 34                                                                                                                                                | 29 to 28 | 13.02           | 18 c           | 107.0            | 558.70            | 563.52            | 4.505               | 560.06        | 564.88      | n/a                  | 564.88 j       | 33           |
| 35                                                                                                                                                | 30 to 29 | 1.31            | 15 c           | 25.0             | 563.87            | 564.20            | 1.320               | 565.79*       | 565.80*     | 0.00                 | 565.80         | 34           |
| 36                                                                                                                                                | M4 to 29 | 10.77           | 18 c           | 40.0             | 563.72            | 565.30            | 3.950               | 565.23        | 566.55      | n/a                  | 566.55 j       | 34           |
| 37                                                                                                                                                | 31 to M4 | 1.28            | 15 c           | 63.0             | 565.55            | 568.70            | 5.000               | 567.26        | 569.15      | n/a                  | 569.15 j       | 36           |
| 38                                                                                                                                                | 32 to M3 | 8.45            | 18 c           | 81.0             | 532.10            | 533.30            | 1.481               | 534.57*       | 535.10*     | 0.00                 | 535.10         | 28           |
| 39                                                                                                                                                | 33 to M4 | 9.75            | 18 c           | 141.0            | 565.50            | 567.18            | 1.191               | 566.80        | 568.37      | n/a                  | 568.37 j       | 36           |
| 40                                                                                                                                                | 35 to 32 | 6.24            | 18 c           | 35.0             | 533.50            | 534.00            | 1.429               | 535.26        | 535.36      | 0.00                 | 535.36         | 38           |
| Project File: 4272-CONVEYANCE-2.stm                                                                                                               |          |                 |                |                  |                   |                   | Number of lines: 40 |               |             | Run Date: 02-01-2018 |                |              |
| NOTES: c = cir; e = ellip; b = box; Return period = 100 Yrs. ; *Surcharged (HGL above crown). ; i - Inlet control. ; j - Line contains hyd. jump. |          |                 |                |                  |                   |                   |                     |               |             |                      |                |              |

# Storm Sewer Tabulation

| Station                                                                         |         | Len   | Drng Area |       | Rnoff coeff | Area x C |       | Tc    |       | Rain (l) | Total flow | Cap full | Vel    | Pipe |       | Invert Elev |        | HGL Elev |        | Grnd / Rim Elev |        | Line ID              |
|---------------------------------------------------------------------------------|---------|-------|-----------|-------|-------------|----------|-------|-------|-------|----------|------------|----------|--------|------|-------|-------------|--------|----------|--------|-----------------|--------|----------------------|
| Line                                                                            | To Line | (ft)  | Incr      | Total | (C)         | Incr     | Total | Inlet | Syst  | (in/hr)  | (cfs)      | (cfs)    | (ft/s) | Size | Slope | Up          | Dn     | Up       | Dn     | Up              | Dn     |                      |
|                                                                                 |         |       | (ac)      | (ac)  |             |          |       | (min) | (min) |          |            |          |        | (in) | (%)   | (ft)        | (ft)   | (ft)     | (ft)   | (ft)            | (ft)   |                      |
| 1                                                                               | End     | 22.0  | 0.11      | 0.29  | 0.79        | 0.09     | 0.19  | 5.0   | 5.2   | 7.8      | 1.45       | 7.54     | 3.32   | 15   | 1.36  | 519.05      | 518.75 | 519.53   | 519.23 | 522.74          | 522.00 | 1 to E1              |
| 2                                                                               | 1       | 28.0  | 0.18      | 0.18  | 0.55        | 0.10     | 0.10  | 5.0   | 5.0   | 7.9      | 0.78       | 4.57     | 2.34   | 15   | 0.50  | 519.39      | 519.25 | 519.75   | 519.70 | 522.74          | 522.74 | 2 to 1               |
| 3                                                                               | End     | 31.0  | 0.21      | 0.51  | 0.81        | 0.17     | 0.32  | 5.0   | 5.1   | 7.8      | 55.07      | 65.61    | 9.20   | 36   | 0.97  | 524.30      | 524.00 | 526.67   | 526.37 | 529.86          | 528.00 | 3 to E2              |
| 4                                                                               | 3       | 28.0  | 0.30      | 0.30  | 0.49        | 0.15     | 0.15  | 5.0   | 5.0   | 7.9      | 53.74      | 75.62    | 8.70   | 36   | 1.29  | 524.86      | 524.50 | 527.20   | 527.09 | 529.86          | 529.86 | 4 to 3               |
| 5                                                                               | End     | 66.0  | 0.36      | 8.87  | 0.58        | 0.21     | 4.29  | 5.0   | 8.5   | 6.7      | 28.85      | 29.86    | 5.88   | 30   | 0.53  | 527.35      | 527.00 | 531.88   | 531.55 | 532.64          | 532.00 | 5 to E3              |
| 6                                                                               | 5       | 72.0  | 0.00      | 8.47  | 0.00        | 0.00     | 4.06  | 5.0   | 7.1   | 7.1      | 28.92      | 30.57    | 5.89   | 30   | 0.56  | 527.95      | 527.55 | 532.24   | 531.88 | 534.43          | 532.64 | M1 to 5              |
| 7                                                                               | 6       | 32.0  | 0.36      | 8.47  | 0.65        | 0.23     | 4.06  | 5.0   | 7.0   | 7.1      | 28.99      | 29.65    | 9.23   | 24   | 1.72  | 528.80      | 528.25 | 531.92   | 532.24 | 534.85          | 534.43 | 6 to M1              |
| 8                                                                               | 7       | 24.0  | 0.41      | 0.41  | 0.69        | 0.28     | 0.28  | 5.0   | 5.0   | 7.9      | 2.22       | 6.98     | 1.81   | 15   | 1.17  | 529.53      | 529.25 | 533.27   | 533.25 | 534.85          | 534.85 | 7 to 6               |
| 9                                                                               | 7       | 238.0 | 0.31      | 7.70  | 0.64        | 0.20     | 3.54  | 5.0   | 6.6   | 7.3      | 25.82      | 51.83    | 8.47   | 24   | 5.25  | 541.50      | 529.00 | 543.29   | 533.25 | 549.17          | 534.85 | 8 to 6               |
| 10                                                                              | 9       | 186.0 | 0.11      | 4.77  | 0.68        | 0.07     | 1.90  | 5.0   | 6.3   | 7.4      | 14.00      | 30.33    | 12.47  | 18   | 8.34  | 560.09      | 544.57 | 561.47   | 545.29 | 565.77          | 549.17 | 9 to 8               |
| 11                                                                              | 10      | 24.0  | 0.16      | 0.16  | 0.84        | 0.13     | 0.13  | 5.0   | 5.0   | 7.9      | 1.06       | 4.57     | 2.99   | 15   | 0.50  | 562.42      | 562.30 | 562.83   | 562.71 | 565.77          | 565.77 | 10 to 9              |
| 12                                                                              | 10      | 75.0  | 0.39      | 0.39  | 0.64        | 0.25     | 0.25  | 5.0   | 5.0   | 7.9      | 1.96       | 17.80    | 6.57   | 15   | 7.60  | 568.00      | 562.30 | 568.56   | 562.58 | 571.25          | 565.77 | 11 to 9              |
| 13                                                                              | 9       | 24.0  | 0.00      | 2.62  | 0.00        | 0.00     | 1.44  | 5.0   | 6.1   | 7.4      | 10.74      | 19.17    | 6.45   | 18   | 3.33  | 542.80      | 542.00 | 544.05   | 543.89 | 549.54          | 549.17 | M2 to 8              |
| 14                                                                              | 13      | 51.0  | 0.21      | 0.21  | 0.64        | 0.13     | 0.13  | 5.0   | 5.0   | 7.9      | 1.06       | 19.41    | 5.71   | 15   | 9.04  | 550.90      | 546.29 | 551.31   | 546.49 | 554.24          | 549.54 | 12 to M2             |
| 15                                                                              | 13      | 112.0 | 0.29      | 2.41  | 0.83        | 0.24     | 1.31  | 5.0   | 5.8   | 7.5      | 9.87       | 14.03    | 6.31   | 18   | 1.79  | 545.00      | 543.00 | 546.20   | 544.29 | 549.17          | 549.54 | 13 to M2             |
| 16                                                                              | 15      | 24.0  | 0.79      | 2.12  | 0.50        | 0.40     | 1.07  | 5.0   | 5.8   | 7.6      | 8.09       | 8.84     | 4.99   | 18   | 0.71  | 545.37      | 545.20 | 546.65   | 546.53 | 549.17          | 549.17 | 14 to 13             |
| 17                                                                              | 16      | 91.0  | 0.78      | 1.33  | 0.51        | 0.40     | 0.67  | 5.0   | 5.4   | 7.7      | 5.19       | 10.33    | 3.91   | 18   | 0.97  | 546.45      | 545.57 | 547.32   | 547.06 | 549.99          | 549.17 | 15 to 14             |
| 18                                                                              | 17      | 68.0  | 0.55      | 0.55  | 0.50        | 0.28     | 0.28  | 5.0   | 5.0   | 7.9      | 2.16       | 7.00     | 2.99   | 15   | 1.18  | 547.50      | 546.70 | 548.09   | 547.64 | 550.81          | 549.99 | 16 to 15             |
| 19                                                                              | 10      | 123.0 | 4.11      | 4.11  | 0.35        | 1.44     | 1.44  | 6.0   | 6.0   | 7.5      | 10.77      | 12.38    | 6.47   | 18   | 1.39  | 562.00      | 560.29 | 563.25   | 561.95 | 565.50          | 565.77 | 34 to 9              |
| 20                                                                              | 5       | 28.0  | 0.04      | 0.04  | 0.52        | 0.02     | 0.02  | 5.0   | 5.0   | 7.9      | 0.16       | 6.68     | 0.13   | 15   | 1.07  | 529.30      | 529.00 | 532.41   | 532.41 | 532.64          | 532.64 | 5A TO 5              |
| 21                                                                              | End     | 128.0 | 0.16      | 4.41  | 0.88        | 0.14     | 2.23  | 5.0   | 6.5   | 7.3      | 16.27      | 33.45    | 5.18   | 24   | 2.19  | 527.80      | 525.00 | 530.23   | 529.57 | 534.10          | 527.00 | 17 to E4             |
| Project File: 4272-CONVEYANCE-2.stm                                             |         |       |           |       |             |          |       |       |       |          |            |          |        |      |       |             |        |          |        |                 |        | Run Date: 02-01-2018 |
| Number of lines: 40                                                             |         |       |           |       |             |          |       |       |       |          |            |          |        |      |       |             |        |          |        |                 |        |                      |
| NOTES: Intensity = 30.79 / (Inlet time + 6.10) ^ 0.57; Return period = 100 Yrs. |         |       |           |       |             |          |       |       |       |          |            |          |        |      |       |             |        |          |        |                 |        | 14                   |

# Storm Sewer Tabulation

| Station                                                                         |            | Len<br>(ft) | Drng Area    |               | Rnoff<br>coeff<br>(C) | Area x C |       | Tc             |               | Rain<br>(l)<br>(in/hr) | Total<br>flow<br>(cfs) | Cap<br>full<br>(cfs) | Vel<br>(ft/s) | Pipe         |              | Invert Elev |            | HGL Elev   |            | Grnd / Rim Elev |            | Line ID                     |
|---------------------------------------------------------------------------------|------------|-------------|--------------|---------------|-----------------------|----------|-------|----------------|---------------|------------------------|------------------------|----------------------|---------------|--------------|--------------|-------------|------------|------------|------------|-----------------|------------|-----------------------------|
| Line                                                                            | To<br>Line |             | Incr<br>(ac) | Total<br>(ac) |                       | Incr     | Total | Inlet<br>(min) | Syst<br>(min) |                        |                        |                      |               | Size<br>(in) | Slope<br>(%) | Up<br>(ft)  | Dn<br>(ft) | Up<br>(ft) | Dn<br>(ft) | Up<br>(ft)      | Dn<br>(ft) |                             |
| 22                                                                              | 21         | 26.0        | 0.15         | 4.25          | 0.87                  | 0.13     | 2.08  | 5.0            | 6.4           | 7.3                    | 15.30                  | 19.84                | 4.87          | 24           | 0.77         | 528.20      | 528.00     | 530.40     | 530.28     | 534.02          | 534.10     | 18 to 17                    |
| 23                                                                              | 22         | 29.0        | 0.64         | 3.86          | 0.65                  | 0.42     | 1.77  | 5.0            | 5.1           | 7.8                    | 13.84                  | 18.78                | 4.43          | 24           | 0.69         | 528.60      | 528.40     | 530.53     | 530.43     | 534.02          | 534.02     | 19 to 18                    |
| 24                                                                              | 22         | 166.0       | 0.11         | 0.24          | 0.84                  | 0.09     | 0.19  | 5.0            | 5.2           | 7.8                    | 1.45                   | 8.08                 | 2.25          | 15           | 1.57         | 531.55      | 528.95     | 532.03     | 530.75     | 535.39          | 534.02     | 20 to 18                    |
| 25                                                                              | 24         | 29.0        | 0.13         | 0.13          | 0.72                  | 0.09     | 0.09  | 5.0            | 5.0           | 7.9                    | 0.74                   | 6.00                 | 2.28          | 15           | 0.86         | 532.00      | 531.75     | 532.34     | 532.20     | 535.39          | 535.39     | 21 to 20                    |
| 26                                                                              | 23         | 27.0        | 3.22         | 3.22          | 0.42                  | 1.35     | 1.35  | 5.0            | 5.0           | 7.9                    | 10.64                  | 36.42                | 4.58          | 24           | 2.59         | 529.50      | 528.80     | 530.66     | 530.66     | 533.50          | 534.02     | 22 to 19                    |
| 27                                                                              | End        | 127.0       | 0.13         | 9.11          | 0.86                  | 0.11     | 4.39  | 5.0            | 17.5          | 5.1                    | 22.48                  | 44.88                | 7.16          | 24           | 3.94         | 531.00      | 526.00     | 534.17     | 532.91     | 536.58          | 530.00     | 23 to E5                    |
| 28                                                                              | 27         | 28.0        | 0.00         | 8.98          | 0.00                  | 0.00     | 4.27  | 5.0            | 17.4          | 5.1                    | 21.94                  | 27.03                | 6.99          | 24           | 1.43         | 531.60      | 531.20     | 533.81     | 534.20     | 536.66          | 536.58     | M3 to 23                    |
| 29                                                                              | 28         | 64.0        | 0.42         | 5.19          | 0.69                  | 0.29     | 2.64  | 5.0            | 6.4           | 7.4                    | 19.42                  | 36.86                | 6.78          | 24           | 2.66         | 533.50      | 531.80     | 535.06     | 534.57     | 537.62          | 536.66     | 24 to M3                    |
| 30                                                                              | 29         | 25.0        | 0.42         | 0.42          | 0.69                  | 0.29     | 0.29  | 5.0            | 5.0           | 7.9                    | 2.28                   | 7.64                 | 1.86          | 15           | 1.40         | 534.40      | 534.05     | 535.89     | 535.85     | 537.73          | 537.62     | 25 to 24                    |
| 31                                                                              | 29         | 260.0       | 0.13         | 4.35          | 0.63                  | 0.08     | 2.06  | 5.0            | 6.0           | 7.5                    | 15.45                  | 24.63                | 10.25         | 18           | 5.50         | 548.30      | 534.00     | 549.72     | 535.06     | 556.42          | 537.62     | 26 to 24                    |
| 32                                                                              | 31         | 24.0        | 0.20         | 0.20          | 0.74                  | 0.15     | 0.15  | 5.0            | 5.0           | 7.9                    | 1.16                   | 4.57                 | 3.09          | 15           | 0.50         | 553.07      | 552.95     | 553.50     | 553.38     | 556.42          | 556.42     | 27 to 26                    |
| 33                                                                              | 31         | 91.0        | 0.20         | 4.02          | 0.62                  | 0.12     | 1.83  | 5.0            | 5.8           | 7.6                    | 13.81                  | 26.05                | 11.51         | 18           | 6.15         | 558.50      | 552.90     | 559.88     | 553.68     | 562.27          | 556.42     | 28 to 26                    |
| 34                                                                              | 33         | 107.0       | 0.20         | 3.82          | 0.68                  | 0.14     | 1.71  | 5.0            | 5.6           | 7.6                    | 13.02                  | 22.29                | 7.74          | 18           | 4.50         | 563.52      | 558.70     | 564.88     | 560.06     | 567.22          | 562.27     | 29 to 28                    |
| 35                                                                              | 34         | 25.0        | 0.20         | 0.20          | 0.83                  | 0.17     | 0.17  | 5.0            | 5.0           | 7.9                    | 1.31                   | 7.42                 | 1.06          | 15           | 1.32         | 564.20      | 563.87     | 565.80     | 565.79     | 567.50          | 567.22     | 30 to 29                    |
| 36                                                                              | 34         | 40.0        | 0.00         | 3.42          | 0.00                  | 0.00     | 1.40  | 5.0            | 5.5           | 7.7                    | 10.77                  | 20.87                | 6.46          | 18           | 3.95         | 565.30      | 563.72     | 566.55     | 565.23     | 569.12          | 567.22     | M4 to 29                    |
| 37                                                                              | 36         | 63.0        | 0.24         | 0.24          | 0.68                  | 0.16     | 0.16  | 5.0            | 5.0           | 7.9                    | 1.28                   | 14.44                | 2.12          | 15           | 5.00         | 568.70      | 565.55     | 569.15     | 567.26     | 571.98          | 569.12     | 31 to M4                    |
| 38                                                                              | 28         | 81.0        | 0.71         | 3.79          | 0.61                  | 0.43     | 1.63  | 5.0            | 17.2          | 5.2                    | 8.45                   | 12.78                | 4.78          | 18           | 1.48         | 533.30      | 532.10     | 535.10     | 534.57     | 537.27          | 536.66     | 32 to M3                    |
| 39                                                                              | 36         | 141.0       | 3.18         | 3.18          | 0.39                  | 1.24     | 1.24  | 5.0            | 5.0           | 7.9                    | 9.75                   | 11.46                | 6.23          | 18           | 1.19         | 567.18      | 565.50     | 568.37     | 566.80     | 573.50          | 569.12     | 33 to M4                    |
| 40                                                                              | 38         | 35.0        | 3.08         | 3.08          | 0.39                  | 1.20     | 1.20  | 17.0           | 17.0          | 5.2                    | 6.24                   | 12.55                | 3.62          | 18           | 1.43         | 534.00      | 533.50     | 535.36     | 535.26     | 537.50          | 537.27     | 35 to 32                    |
| Project File: 4272-CONVEYANCE-2.stm                                             |            |             |              |               |                       |          |       |                |               |                        |                        |                      |               |              |              |             |            |            |            |                 |            | Run Date: 02-01-2018        |
| Number of lines: 40                                                             |            |             |              |               |                       |          |       |                |               |                        |                        |                      |               |              |              |             |            |            |            |                 |            | 15                          |
| NOTES: Intensity = 30.79 / (Inlet time + 6.10) ^ 0.57; Return period = 100 Yrs. |            |             |              |               |                       |          |       |                |               |                        |                        |                      |               |              |              |             |            |            |            |                 |            | Hydraflow Storm Sewers 2005 |

# Inlet Report

| Line No | Inlet ID | Q = C/A (cfs) | Q carry (cfs) | Q capt (cfs) | Q byp (cfs) | Junc type | Curb Inlet |        |             | Grate Inlet |        |            | Gutter |            |            |       |            |             |            |             | Inlet      |             |           | Byp line No |
|---------|----------|---------------|---------------|--------------|-------------|-----------|------------|--------|-------------|-------------|--------|------------|--------|------------|------------|-------|------------|-------------|------------|-------------|------------|-------------|-----------|-------------|
|         |          |               |               |              |             |           | Ht (in)    | L (ft) | area (sqft) | L (ft)      | W (ft) | So (ft/ft) | W (ft) | Sw (ft/ft) | Sx (ft/ft) | n     | Depth (ft) | Spread (ft) | Depth (ft) | Spread (ft) | Depth (ft) | Spread (ft) | Depr (in) |             |
| 1       | 1        | 0.68          | 0.14          | 0.67         | 0.15        | Comb      | 6.0        | 4.00   | 0.00        | 4.00        | 2.00   | 0.023      | 2.00   | 0.020      | 0.020      | 0.013 | 0.11       | 5.50        | 0.11       | 5.35        | 0.11       | 5.35        | 0.00      | Off         |
| 2       | 2        | 0.78          | 0.00          | 0.64         | 0.14        | Comb      | 6.0        | 4.00   | 0.00        | 4.00        | 2.00   | 0.023      | 2.00   | 0.020      | 0.020      | 0.013 | 0.11       | 5.50        | 0.11       | 5.25        | 0.11       | 5.25        | 0.00      | 1           |
| 3       | 3        | 1.34          | 39.87         | 11.66        | 29.55       | Comb      | 6.0        | 4.00   | 0.00        | 4.00        | 2.00   | 0.012      | 2.00   | 0.020      | 0.020      | 0.013 | 0.53       | 26.50       | 0.52       | 26.05       | 0.52       | 26.05       | 0.00      | Off         |
| 4       | 4        | 53.74*        | 0.00          | 13.86        | 39.87       | Comb      | 6.0        | 4.00   | 0.00        | 4.00        | 2.00   | 0.012      | 2.00   | 0.020      | 0.020      | 0.013 | 0.58       | 29.00       | 0.57       | 28.75       | 0.57       | 28.75       | 0.00      | 3           |
| 5       | 5        | 1.64          | 0.00          | 1.16         | 0.48        | Comb      | 6.0        | 4.00   | 0.00        | 4.00        | 2.00   | 0.024      | 2.00   | 0.020      | 0.020      | 0.013 | 0.14       | 7.00        | 0.14       | 6.85        | 0.14       | 6.85        | 0.00      | Off         |
| 6       | M1       | 0.00          | 1.17          | 0.00         | 1.17        | MH        | 0.0        | 0.00   | 0.00        | 0.00        | 0.00   | Sag        | 0.00   | 0.000      | 0.000      | 0.000 | 0.00       | 0.00        | 0.00       | 0.00        | 0.00       | 0.00        | 0.00      | Off         |
| 7       | 6        | 1.84          | 1.23          | 1.89         | 1.17        | Comb      | 6.0        | 4.00   | 0.00        | 4.00        | 2.00   | 0.036      | 2.00   | 0.020      | 0.020      | 0.013 | 0.17       | 8.50        | 0.16       | 8.05        | 0.16       | 8.05        | 0.00      | 6           |
| 8       | 7        | 2.22          | 0.00          | 1.47         | 0.75        | Comb      | 6.0        | 4.00   | 0.00        | 4.00        | 2.00   | 0.036      | 2.00   | 0.020      | 0.020      | 0.013 | 0.15       | 7.50        | 0.14       | 7.10        | 0.14       | 7.10        | 0.00      | 7           |
| 9       | 8        | 1.56          | 0.28          | 1.36         | 0.48        | Comb      | 6.0        | 4.00   | 0.00        | 4.00        | 2.00   | 0.087      | 2.00   | 0.020      | 0.020      | 0.013 | 0.12       | 6.00        | 0.11       | 5.65        | 0.11       | 5.65        | 0.00      | 7           |
| 10      | 9        | 0.59          | 0.72          | 1.03         | 0.28        | Comb      | 6.0        | 4.00   | 0.00        | 4.00        | 2.00   | 0.087      | 2.00   | 0.020      | 0.020      | 0.013 | 0.10       | 5.00        | 0.10       | 4.95        | 0.10       | 4.95        | 0.00      | 9           |
| 11      | 10       | 1.06          | 0.00          | 0.88         | 0.18        | Comb      | 6.0        | 4.00   | 0.00        | 4.00        | 2.00   | 0.087      | 2.00   | 0.020      | 0.020      | 0.013 | 0.10       | 5.00        | 0.09       | 4.60        | 0.09       | 4.60        | 0.00      | 10          |
| 12      | 11       | 1.96          | 0.00          | 1.41         | 0.55        | Comb      | 6.0        | 4.00   | 0.00        | 4.00        | 2.00   | 0.087      | 2.00   | 0.020      | 0.020      | 0.013 | 0.12       | 6.00        | 0.12       | 5.75        | 0.12       | 5.75        | 0.00      | 10          |
| 13      | M2       | 0.00          | 0.19          | 0.00         | 0.19        | MH        | 0.0        | 0.00   | 0.00        | 0.00        | 0.00   | Sag        | 0.00   | 0.000      | 0.000      | 0.000 | 0.00       | 0.00        | 0.00       | 0.00        | 0.00       | 0.00        | 0.00      | Off         |
| 14      | 12       | 1.06          | 0.00          | 0.87         | 0.19        | Comb      | 6.0        | 4.00   | 0.00        | 4.00        | 2.00   | 0.088      | 2.00   | 0.020      | 0.020      | 0.013 | 0.10       | 5.00        | 0.09       | 4.55        | 0.09       | 4.55        | 0.00      | 13          |
| 15      | 13       | 1.89          | 0.00          | 1.89         | 0.00        | Comb      | 6.0        | 4.00   | 0.64        | 4.00        | 2.00   | Sag        | 2.00   | 0.020      | 0.020      | 0.000 | 0.15       | 7.50        | 0.15       | 7.50        | 0.15       | 7.50        | 0.00      | Off         |
| 16      | 14       | 3.11          | 1.60          | 4.71         | 0.00        | Comb      | 6.0        | 4.00   | 1.60        | 4.00        | 2.00   | Sag        | 2.00   | 0.020      | 0.020      | 0.000 | 0.34       | 17.00       | 0.34       | 17.00       | 0.34       | 17.00       | 0.00      | Off         |
| 17      | 15       | 3.13          | 0.71          | 2.24         | 1.60        | Comb      | 6.0        | 4.00   | 0.00        | 4.00        | 2.00   | 0.011      | 2.00   | 0.020      | 0.020      | 0.013 | 0.22       | 11.00       | 0.22       | 10.90       | 0.22       | 10.90       | 0.00      | 16          |
| 18      | 16       | 2.16          | 0.00          | 1.45         | 0.71        | Comb      | 6.0        | 4.00   | 0.00        | 4.00        | 2.00   | 0.011      | 2.00   | 0.020      | 0.020      | 0.013 | 0.18       | 9.00        | 0.18       | 8.80        | 0.18       | 8.80        | 0.00      | 17          |
| 19      | 34       | 10.77         | 0.00          | 10.77        | 0.00        | DrGrt     | 0.0        | 0.00   | 4.00        | 4.00        | 2.00   | Sag        | 2.00   | 0.020      | 0.020      | 0.000 | 0.59       | 60.61       | 0.59       | 60.61       | 0.59       | 60.61       | 0.00      | Off         |
| 20      | 5A       | 0.16          | 0.00          | 0.16         | 0.00        | Comb      | 6.0        | 4.00   | 0.00        | 4.00        | 2.00   | 0.023      | 2.00   | 0.020      | 0.020      | 0.013 | 0.06       | 3.00        | 0.06       | 2.95        | 0.06       | 2.95        | 0.00      | 5           |
| 21      | 17       | 1.11          | 0.00          | 0.85         | 0.26        | Comb      | 6.0        | 4.00   | 0.00        | 4.00        | 2.00   | 0.010      | 2.00   | 0.020      | 0.020      | 0.013 | 0.14       | 7.00        | 0.14       | 6.95        | 0.14       | 6.95        | 0.00      | Off         |
| 22      | 18       | 1.03          | 0.17          | 1.19         | 0.00        | Comb      | 6.0        | 4.00   | 4.00        | 4.00        | 2.00   | Sag        | 2.00   | 0.020      | 0.020      | 0.000 | 0.14       | 7.00        | 0.14       | 7.00        | 0.14       | 7.00        | 0.00      | Off         |

Project File: 4272-CONVEYANCE-2.stm

Run Date: 02-01-2018

NOTES: Inlet N-Values = 0.013 ; Intensity = 30.79 / (inlet time + 6.10) ^ 0.57; Return period = 100 Yrs. ; \* Indicates Known Q added



# Inlet Report

| Line No | Inlet ID | Q =<br>CIA<br>(cfs) | Q<br>carry<br>(cfs) | Q<br>capt<br>(cfs) | Q<br>byp<br>(cfs) | Junc<br>type | Curb Inlet |           | Grate Inlet    |           |           | Gutter |      |       |       |       |       |      |       | Inlet |       |      | Byp<br>line<br>No |
|---------|----------|---------------------|---------------------|--------------------|-------------------|--------------|------------|-----------|----------------|-----------|-----------|--------|------|-------|-------|-------|-------|------|-------|-------|-------|------|-------------------|
|         |          |                     |                     |                    |                   |              | Ht<br>(in) | L<br>(ft) | area<br>(sqft) | L<br>(ft) | W<br>(ft) |        |      |       |       |       |       |      |       |       |       |      |                   |
| 23      | 19       | 3.27                | 0.00                | 3.27               | 0.00              | Comb         | 6.0        | 4.00      | 4.00           | 4.00      | 2.00      | Sag    | 2.00 | 0.020 | 0.020 | 0.020 | 0.000 | 0.27 | 13.50 | 0.27  | 13.50 | 0.00 | Off               |
| 24      | 20       | 0.73                | 0.13                | 0.69               | 0.17              | Comb         | 6.0        | 4.00      | 0.00           | 4.00      | 2.00      | 0.013  | 2.00 | 0.020 | 0.020 | 0.013 | 0.13  | 0.12 | 6.50  | 0.12  | 6.05  | 0.00 | 22                |
| 25      | 21       | 0.74                | 0.00                | 0.61               | 0.13              | Comb         | 6.0        | 4.00      | 0.00           | 4.00      | 2.00      | 0.013  | 2.00 | 0.020 | 0.020 | 0.013 | 0.12  | 0.11 | 6.00  | 0.11  | 5.70  | 0.00 | 24                |
| 26      | 22       | 10.64               | 0.00                | 10.64              | 0.00              | DrGrt        | 0.0        | 0.00      | 4.00           | 4.00      | 2.00      | Sag    | 2.00 | 0.020 | 0.020 | 0.000 | 0.58  | 0.58 | 60.11 | 0.58  | 60.11 | 0.00 | Off               |
| 27      | 23       | 0.88                | 0.00                | 0.88               | 0.00              | Comb         | 6.0        | 4.00      | 4.00           | 4.00      | 2.00      | Sag    | 2.00 | 0.020 | 0.020 | 0.000 | 0.12  | 0.12 | 6.00  | 0.12  | 6.00  | 0.00 | Off               |
| 28      | M3       | 0.00                | 2.68                | 0.00               | 2.68              | MH           | 0.0        | 0.00      | 0.00           | 0.00      | 0.00      | Sag    | 0.00 | 0.000 | 0.000 | 0.000 | 0.00  | 0.00 | 0.00  | 0.00  | 0.00  | 0.00 | Off               |
| 29      | 24       | 2.28                | 0.99                | 1.98               | 1.29              | Comb         | 6.0        | 4.00      | 0.00           | 4.00      | 2.00      | 0.039  | 2.00 | 0.020 | 0.020 | 0.013 | 0.17  | 0.16 | 8.50  | 0.16  | 8.10  | 0.00 | 28                |
| 30      | 25       | 2.28                | 0.00                | 1.52               | 0.76              | Comb         | 6.0        | 4.00      | 0.00           | 4.00      | 2.00      | 0.039  | 2.00 | 0.020 | 0.020 | 0.013 | 0.15  | 0.14 | 7.50  | 0.14  | 7.10  | 0.00 | 29                |
| 31      | 26       | 0.64                | 0.54                | 0.95               | 0.23              | Comb         | 6.0        | 4.00      | 0.00           | 4.00      | 2.00      | 0.073  | 2.00 | 0.020 | 0.020 | 0.013 | 0.10  | 0.10 | 5.00  | 0.10  | 4.95  | 0.00 | 29                |
| 32      | 27       | 1.16                | 0.00                | 0.93               | 0.23              | Comb         | 6.0        | 4.00      | 0.00           | 4.00      | 2.00      | 0.073  | 2.00 | 0.020 | 0.020 | 0.013 | 0.10  | 0.10 | 5.00  | 0.10  | 4.90  | 0.00 | 31                |
| 33      | 28       | 0.98                | 0.35                | 1.01               | 0.31              | Comb         | 6.0        | 4.00      | 0.00           | 4.00      | 2.00      | 0.056  | 2.00 | 0.020 | 0.020 | 0.013 | 0.11  | 0.11 | 5.50  | 0.11  | 5.40  | 0.00 | 31                |
| 34      | 29       | 1.07                | 0.31                | 1.03               | 0.35              | Comb         | 6.0        | 4.00      | 0.00           | 4.00      | 2.00      | 0.045  | 2.00 | 0.020 | 0.020 | 0.013 | 0.12  | 0.11 | 6.00  | 0.11  | 5.70  | 0.00 | 33                |
| 35      | 30       | 1.31                | 0.00                | 0.99               | 0.31              | Comb         | 6.0        | 4.00      | 0.00           | 4.00      | 2.00      | 0.045  | 2.00 | 0.020 | 0.020 | 0.013 | 0.12  | 0.11 | 6.00  | 0.11  | 5.60  | 0.00 | 34                |
| 36      | M4       | 0.00                | 0.28                | 0.00               | 0.28              | MH           | 0.0        | 0.00      | 0.00           | 0.00      | 0.00      | Sag    | 0.00 | 0.000 | 0.000 | 0.000 | 0.00  | 0.00 | 0.00  | 0.00  | 0.00  | 0.00 | Off               |
| 37      | 31       | 1.28                | 0.00                | 1.00               | 0.28              | DrGrt        | 0.0        | 0.00      | 0.00           | 4.00      | 2.00      | 0.045  | 2.00 | 0.020 | 0.020 | 0.013 | 0.13  | 0.13 | 15.00 | 0.13  | 15.00 | 0.00 | 36                |
| 38      | 32       | 3.41                | 0.00                | 2.01               | 1.39              | Comb         | 6.0        | 4.00      | 0.00           | 4.00      | 2.00      | 0.019  | 2.00 | 0.020 | 0.020 | 0.013 | 0.19  | 0.19 | 9.50  | 0.19  | 9.40  | 0.00 | 28                |
| 39      | 33       | 9.75                | 0.00                | 9.75               | 0.00              | DrGrt        | 0.0        | 0.00      | 4.00           | 4.00      | 2.00      | Sag    | 2.00 | 0.020 | 0.020 | 0.000 | 0.55  | 0.55 | 56.85 | 0.55  | 56.85 | 0.00 | Off               |
| 40      | 35       | 6.24                | 0.00                | 6.24               | 0.00              | DrGrt        | 0.0        | 0.00      | 4.00           | 4.00      | 2.00      | Sag    | 2.00 | 0.020 | 0.020 | 0.000 | 0.41  | 0.41 | 42.70 | 0.41  | 42.70 | 0.00 | Off               |

Project File: 4272-CONVEYANCE-2.stm

Run Date: 02-01-2018

NOTES: Inlet N-Values = 0.013 ; Intensity = 30.79 / (inlet time + 6.10) ^ 0.57; Return period = 100 Yrs. ; \* Indicates Known Q added

FL-DOT Report

| Line No | To Line | Type of struc | n - value | Len (ft) | Drainage Area                      |                  |                 | Time of conc (min) | Time of flow in sect (min) | Inten (l) (in/hr) | Total CA | Add Q      | Inlet elev (ft) | Elev of HGL |         |           | Rise Span | HGL Pipe | Actual    |           | Date: 02-01-2018 |           |            |           |           |                    |                |                  |
|---------|---------|---------------|-----------|----------|------------------------------------|------------------|-----------------|--------------------|----------------------------|-------------------|----------|------------|-----------------|-------------|---------|-----------|-----------|----------|-----------|-----------|------------------|-----------|------------|-----------|-----------|--------------------|----------------|------------------|
|         |         |               |           |          | C1 = 0.95<br>C2 = 0.35<br>C3 = 0.2 | Incre- ment (ac) | Sub- total (ac) |                    |                            |                   |          |            |                 | Sum CA      | Up (ft) | Down (ft) |           |          | Fall (ft) | Size (in) |                  | Slope (%) | Vel (ft/s) | Cap (cfs) | Full Flow | Frequency: 100 yrs |                |                  |
|         |         |               |           |          |                                    |                  |                 |                    |                            |                   |          | Total flow |                 |             |         |           |           |          |           |           |                  |           |            |           |           |                    | Elev of Invert | Line description |
|         |         |               |           |          |                                    |                  |                 |                    |                            |                   |          |            |                 |             |         |           |           |          |           |           |                  |           |            |           |           |                    |                |                  |

|    |     |      |       |       |                      |                      |                      |      |      |     |      |                |        |                            |                            |                      |                 |               |                |                |         |
|----|-----|------|-------|-------|----------------------|----------------------|----------------------|------|------|-----|------|----------------|--------|----------------------------|----------------------------|----------------------|-----------------|---------------|----------------|----------------|---------|
| 1  | End | Comb | 0.013 | 22.0  | 0.08<br>0.03<br>0.00 | 0.14<br>0.15<br>0.00 | 0.13<br>0.05<br>0.00 | 5.20 | 0.11 | 7.8 | 0.19 | 0.00<br>1.45   | 522.74 | 519.53<br>520.30<br>519.05 | 519.23<br>520.00<br>518.75 | 0.30<br>0.30<br>0.30 | 15<br>15<br>Cir | 1.36<br>1.36  | 3.32<br>6.14   | 1.45<br>7.54   | 1 to E1 |
| 2  | 1   | Comb | 0.013 | 28.0  | 0.06<br>0.12<br>0.00 | 0.06<br>0.12<br>0.00 | 0.06<br>0.04<br>0.00 | 5.00 | 0.20 | 7.9 | 0.10 | 0.00<br>0.78   | 522.74 | 519.75<br>520.64<br>519.39 | 519.70<br>520.50<br>519.25 | 0.05<br>0.14         | 15<br>Cir       | 0.18<br>0.50  | 2.34<br>3.72   | 0.78<br>4.57   | 2 to 1  |
| 3  | End | Comb | 0.013 | 31.0  | 0.16<br>0.05<br>0.00 | 0.23<br>0.28<br>0.00 | 0.22<br>0.10<br>0.00 | 5.05 | 0.06 | 7.8 | 0.32 | 0.00<br>55.07  | 529.86 | 526.67<br>527.30<br>524.30 | 526.37<br>527.00<br>524.00 | 0.30<br>0.30<br>0.30 | 36<br>36<br>Cir | 0.95<br>0.97  | 9.20<br>9.28   | 55.07<br>65.61 | 3 to E2 |
| 4  | 3   | Comb | 0.013 | 28.0  | 0.07<br>0.23<br>0.00 | 0.07<br>0.23<br>0.00 | 0.07<br>0.08<br>0.00 | 5.00 | 0.05 | 7.9 | 0.15 | 52.58<br>53.74 | 529.86 | 527.20<br>527.86<br>524.86 | 527.09<br>527.50<br>524.50 | 0.11<br>0.36         | 36<br>Cir       | 0.40<br>1.29  | 8.70<br>10.70  | 53.74<br>75.62 | 4 to 3  |
| 5  | End | Comb | 0.013 | 66.0  | 0.14<br>0.22<br>0.00 | 2.00<br>6.87<br>0.00 | 1.90<br>2.40<br>0.00 | 8.50 | 0.19 | 6.7 | 4.29 | 0.00<br>28.85  | 532.64 | 531.88<br>529.85<br>527.35 | 531.55<br>529.50<br>527.00 | 0.33<br>0.30<br>0.35 | 30<br>30<br>Cir | 0.50<br>0.53  | 5.88<br>6.08   | 28.85<br>29.86 | 5 to E3 |
| 6  | 5   | MH   | 0.013 | 72.0  | 0.00<br>0.00<br>0.00 | 1.85<br>6.62<br>0.00 | 1.76<br>2.32<br>0.00 | 7.09 | 0.20 | 7.1 | 4.06 | 0.00<br>28.92  | 534.43 | 532.24<br>530.45<br>527.95 | 531.88<br>530.05<br>527.55 | 0.36<br>0.30<br>0.40 | 30<br>30<br>Cir | 0.50<br>0.56  | 5.89<br>6.23   | 28.92<br>30.57 | M1 to 5 |
| 7  | 6   | Comb | 0.013 | 32.0  | 0.18<br>0.18<br>0.00 | 1.85<br>6.62<br>0.00 | 1.76<br>2.32<br>0.00 | 7.03 | 0.06 | 7.1 | 4.06 | 0.00<br>28.99  | 534.85 | 531.92<br>530.80<br>528.80 | 532.24<br>530.25<br>528.25 | -0.31<br>24<br>0.55  | 24<br>Cir       | -0.98<br>1.72 | 9.23<br>9.44   | 28.99<br>29.65 | 6 to M1 |
| 8  | 7   | Comb | 0.013 | 24.0  | 0.23<br>0.18<br>0.00 | 0.23<br>0.18<br>0.00 | 0.22<br>0.06<br>0.00 | 5.00 | 0.22 | 7.9 | 0.28 | 0.00<br>2.22   | 534.85 | 533.27<br>530.78<br>529.53 | 533.25<br>530.50<br>529.25 | 0.03<br>0.28         | 15<br>Cir       | 0.12<br>1.17  | 2.22<br>6.98   |                | 7 to 6  |
| 9  | 7   | Comb | 0.013 | 238.0 | 0.15<br>0.16<br>0.00 | 1.44<br>6.26<br>0.00 | 1.37<br>2.19<br>0.00 | 6.57 | 0.47 | 7.3 | 3.54 | 0.00<br>25.82  | 549.17 | 543.29<br>543.50<br>541.50 | 533.25<br>531.00<br>529.00 | 10.04<br>24<br>12.50 | 24<br>Cir       | 4.22<br>5.25  | 8.47<br>16.50  | 25.82<br>51.83 | 8 to 6  |
| 10 | 9   | Comb | 0.013 | 186.0 | 0.06<br>0.05<br>0.00 | 0.41<br>4.36<br>0.00 | 0.39<br>1.53<br>0.00 | 6.32 | 0.25 | 7.4 | 1.90 | 0.00<br>14.00  | 565.77 | 561.47<br>561.59<br>560.09 | 545.29<br>546.07<br>544.57 | 16.18<br>18<br>15.52 | 18<br>Cir       | 8.70<br>8.34  | 12.47<br>17.17 | 14.00<br>30.33 | 9 to 8  |

NOTES: Intensity = 30.79 / (Inlet time + 6.10) ^ 0.57 (in/hr)

Project File: 4272-CONVEYANCE-2.stm

FL-DOT Report

| Line No | To Line | Type of struc | n - value | Len (ft) | Drainage Area                      |                      |                      | Time of conc (min) | Time of flow in sect (min) | Inten (l) (in/hr) | Total CA | Add Q         | Inlet elev (ft) | Elev of HGL                |                            |                      | Rise Span       | HGL Pipe      | Actual         |              | Date: 02-01-2018<br>Frequency: 100 yrs<br>Proj: 4272-CONVEYANCE |           |            |           |                  |         |      |      |           |                       |
|---------|---------|---------------|-----------|----------|------------------------------------|----------------------|----------------------|--------------------|----------------------------|-------------------|----------|---------------|-----------------|----------------------------|----------------------------|----------------------|-----------------|---------------|----------------|--------------|-----------------------------------------------------------------|-----------|------------|-----------|------------------|---------|------|------|-----------|-----------------------|
|         |         |               |           |          | C1 = 0.95<br>C2 = 0.35<br>C3 = 0.2 | Incre-ment (ac)      | Sub-total (ac)       |                    |                            |                   |          |               |                 | Sum CA                     | Up (ft)                    | Down (ft)            |                 |               | Fall (ft)      | Size (in)    |                                                                 | Slope (%) | Vel (ft/s) | Cap (cfs) | Line description |         |      |      |           |                       |
|         |         |               |           |          |                                    |                      |                      |                    |                            |                   |          | Total flow    |                 |                            |                            |                      |                 |               |                |              |                                                                 |           |            |           |                  | Q (cfs) | Span | Pipe | Full Flow | Proj: 4272-CONVEYANCE |
|         |         |               |           |          |                                    |                      |                      |                    |                            |                   |          |               |                 |                            |                            |                      |                 |               |                |              |                                                                 |           |            |           |                  |         |      |      |           |                       |
| 11      | 10      | Comb          | 0.013     | 24.0     | 0.13<br>0.03<br>0.00               | 0.13<br>0.03<br>0.00 | 0.12<br>0.01<br>0.00 | 5.00               | 0.13                       | 7.9               | 0.13     | 0.00<br>1.06  | 565.77          | 562.83<br>563.67<br>562.42 | 562.71<br>563.55<br>562.30 | 0.12<br>0.12<br>0.12 | 15<br>15<br>Cir | 0.52<br>0.50  | 2.99<br>3.72   | 1.06<br>4.57 | 10 to 9                                                         |           |            |           |                  |         |      |      |           |                       |
| 12      | 10      | Comb          | 0.013     | 75.0     | 0.19<br>0.20<br>0.00               | 0.19<br>0.20<br>0.00 | 0.18<br>0.07<br>0.00 | 5.00               | 0.19                       | 7.9               | 0.25     | 0.00<br>1.96  | 571.25          | 568.56<br>569.25<br>568.00 | 562.58<br>563.55<br>562.30 | 5.98<br>15<br>Cir    | 7.97<br>7.60    | 6.57<br>14.51 | 1.96<br>17.80  | 11 to 9      |                                                                 |           |            |           |                  |         |      |      |           |                       |
| 13      | 9       | MH            | 0.013     | 24.0     | 0.00<br>0.00<br>0.00               | 0.88<br>1.74<br>0.00 | 0.84<br>0.61<br>0.00 | 6.14               | 0.06                       | 7.4               | 1.44     | 0.00<br>10.74 | 549.54          | 544.05<br>544.30<br>542.80 | 543.89<br>543.50<br>542.00 | 0.16<br>18<br>Cir    | 0.65<br>3.33    | 6.45<br>10.85 | 10.74<br>19.17 | M2 to 8      |                                                                 |           |            |           |                  |         |      |      |           |                       |
| 14      | 13      | Comb          | 0.013     | 51.0     | 0.10<br>0.11<br>0.00               | 0.10<br>0.11<br>0.00 | 0.10<br>0.04<br>0.00 | 5.00               | 0.15                       | 7.9               | 0.13     | 0.00<br>1.06  | 554.24          | 551.31<br>552.15<br>550.90 | 546.49<br>547.54<br>546.29 | 4.82<br>15<br>Cir    | 9.46<br>9.04    | 5.71<br>15.82 | 1.06<br>19.41  | 12 to M2     |                                                                 |           |            |           |                  |         |      |      |           |                       |
| 15      | 13      | Comb          | 0.013     | 112.0    | 0.23<br>0.06<br>0.00               | 0.78<br>1.63<br>0.00 | 0.74<br>0.57<br>0.00 | 5.85               | 0.30                       | 7.5               | 1.31     | 0.00<br>9.87  | 549.17          | 546.20<br>546.50<br>545.00 | 544.29<br>544.50<br>543.00 | 1.91<br>18<br>Cir    | 1.71<br>1.79    | 6.31<br>7.94  | 9.87<br>14.03  | 13 to M2     |                                                                 |           |            |           |                  |         |      |      |           |                       |
| 16      | 15      | Comb          | 0.013     | 24.0     | 0.20<br>0.59<br>0.00               | 0.55<br>1.57<br>0.00 | 0.52<br>0.55<br>0.00 | 5.77               | 0.08                       | 7.6               | 1.07     | 0.00<br>8.09  | 549.17          | 546.65<br>546.87<br>545.37 | 546.53<br>546.70<br>545.20 | 0.12<br>18<br>Cir    | 0.48<br>0.71    | 4.99<br>5.00  | 8.09<br>8.84   | 14 to 13     |                                                                 |           |            |           |                  |         |      |      |           |                       |
| 17      | 16      | Comb          | 0.013     | 91.0     | 0.21<br>0.57<br>0.00               | 0.35<br>0.98<br>0.00 | 0.33<br>0.34<br>0.00 | 5.38               | 0.39                       | 7.7               | 0.67     | 0.00<br>5.19  | 549.99          | 547.32<br>547.95<br>546.45 | 547.06<br>547.07<br>545.57 | 0.26<br>18<br>Cir    | 0.29<br>0.97    | 3.91<br>5.84  | 5.19<br>10.33  | 15 to 14     |                                                                 |           |            |           |                  |         |      |      |           |                       |
| 18      | 17      | Comb          | 0.013     | 68.0     | 0.14<br>0.41<br>0.00               | 0.14<br>0.41<br>0.00 | 0.13<br>0.14<br>0.00 | 5.00               | 0.38                       | 7.9               | 0.28     | 0.00<br>2.16  | 550.81          | 548.09<br>548.75<br>547.50 | 547.64<br>547.95<br>546.70 | 0.45<br>15<br>Cir    | 0.66<br>1.18    | 2.99<br>5.71  | 2.16<br>7.00   | 16 to 15     |                                                                 |           |            |           |                  |         |      |      |           |                       |
| 19      | 10      | DrGr          | 0.013     | 123.0    | 0.03<br>4.08<br>0.00               | 0.03<br>4.08<br>0.00 | 0.03<br>1.43<br>0.00 | 6.00               | 0.32                       | 7.5               | 1.44     | 0.00<br>10.77 | 565.50          | 563.25<br>563.50<br>562.00 | 561.95<br>561.79<br>560.29 | 1.31<br>18<br>Cir    | 1.06<br>1.39    | 6.47<br>7.01  | 10.77<br>12.38 | 34 to 9      |                                                                 |           |            |           |                  |         |      |      |           |                       |
| 20      | 5       | Comb          | 0.013     | 28.0     | 0.01<br>0.03<br>0.00               | 0.01<br>0.03<br>0.00 | 0.01<br>0.01<br>0.00 | 5.00               | 3.50                       | 7.9               | 0.02     | 0.00<br>0.16  | 532.64          | 532.41<br>530.55<br>529.30 | 532.41<br>530.25<br>529.00 | 0.00<br>15<br>Cir    | 0.00<br>1.07    | 0.13<br>5.45  | 0.16<br>6.68   | 5A TO 5      |                                                                 |           |            |           |                  |         |      |      |           |                       |

NOTES: Intensity = 30.79 / (Inlet time + 6.10) ^ 0.57 (in/hr)

Project File: 4272-CONVEYANCE-2.stm

FL-DOT Report

| Line No | To Line | Type of struc | n - value | Len   | Drainage Area                      |                      |                      | Time of conc (min) | Time of flow in sect (min) | Inten (l) (in/hr) | Total CA | Add Q         | Inlet elev (ft) | Elev of HGL                |                            |                    | Rise            | HGL           | Actual        |                    | Date: 02-01-2018 |         |           |           |            |           |                  |
|---------|---------|---------------|-----------|-------|------------------------------------|----------------------|----------------------|--------------------|----------------------------|-------------------|----------|---------------|-----------------|----------------------------|----------------------------|--------------------|-----------------|---------------|---------------|--------------------|------------------|---------|-----------|-----------|------------|-----------|------------------|
|         |         |               |           |       | C1 = 0.95<br>C2 = 0.35<br>C3 = 0.2 | Incre-ment (ac)      | Sub-total (ac)       |                    |                            |                   |          | Sum CA        |                 | Total flow                 | Span                       | Pipe               |                 |               | Full Flow     | Frequency: 100 yrs |                  |         |           |           |            |           |                  |
|         |         |               |           |       |                                    |                      |                      |                    |                            |                   |          |               |                 |                            |                            |                    |                 |               |               |                    |                  | Q (cfs) | Size (in) | Slope (%) | Vel (ft/s) | Cap (cfs) | Line description |
|         |         |               |           |       |                                    |                      |                      |                    |                            |                   |          |               |                 |                            |                            |                    |                 |               |               |                    |                  |         |           |           |            |           |                  |
| 21      | End     | Comb          | 0.013     | 128.0 | 0.14<br>0.02<br>0.00               | 1.12<br>3.29<br>0.00 | 1.06<br>1.15<br>0.00 | 6.53               | 0.41                       | 7.3               | 2.23     | 0.00<br>16.27 | 534.10          | 530.23<br>529.80<br>527.80 | 529.57<br>527.00<br>525.00 | 0.66<br>2.80       | 24<br>24<br>Cir | 0.52<br>2.19  | 5.18<br>10.65 | 16.27<br>33.45     | 17 to E4         |         |           |           |            |           |                  |
| 22      | 21      | Comb          | 0.013     | 26.0  | 0.13<br>0.02<br>0.00               | 0.98<br>3.27<br>0.00 | 0.93<br>1.14<br>0.00 | 6.44               | 0.09                       | 7.3               | 2.08     | 0.00<br>15.30 | 534.02          | 530.40<br>530.20<br>528.20 | 530.28<br>530.00<br>528.00 | 0.12<br>24<br>Cir  | 24<br>24<br>Cir | 0.46<br>0.77  | 4.87<br>6.31  | 15.30<br>19.84     | 18 to 17         |         |           |           |            |           |                  |
| 23      | 22      | Comb          | 0.013     | 29.0  | 0.32<br>0.32<br>0.00               | 0.68<br>3.18<br>0.00 | 0.65<br>1.11<br>0.00 | 5.10               | 0.11                       | 7.8               | 1.77     | 0.00<br>13.84 | 534.02          | 530.53<br>530.60<br>528.60 | 530.43<br>530.40<br>528.40 | 0.10<br>24<br>Cir  | 24<br>24<br>Cir | 0.33<br>0.69  | 4.43<br>5.98  | 13.84<br>18.78     | 19 to 18         |         |           |           |            |           |                  |
| 24      | 22      | Comb          | 0.013     | 166.0 | 0.09<br>0.02<br>0.00               | 0.17<br>0.07<br>0.00 | 0.16<br>0.02<br>0.00 | 5.21               | 1.23                       | 7.8               | 0.19     | 0.00<br>1.45  | 535.39          | 532.03<br>532.80<br>531.55 | 530.75<br>530.20<br>528.95 | 1.28<br>15<br>Cir  | 15<br>15<br>Cir | 0.77<br>1.57  | 2.25<br>6.59  | 1.45<br>8.08       | 20 to 18         |         |           |           |            |           |                  |
| 25      | 24      | Comb          | 0.013     | 29.0  | 0.08<br>0.05<br>0.00               | 0.08<br>0.05<br>0.00 | 0.08<br>0.02<br>0.00 | 5.00               | 0.21                       | 7.9               | 0.09     | 0.00<br>0.74  | 535.39          | 532.34<br>533.25<br>532.00 | 532.20<br>533.00<br>531.75 | 0.15<br>15<br>Cir  | 15<br>15<br>Cir | 0.50<br>0.86  | 2.28<br>4.89  | 0.74<br>6.00       | 21 to 20         |         |           |           |            |           |                  |
| 26      | 23      | DrGrt         | 0.013     | 27.0  | 0.36<br>2.86<br>0.00               | 0.36<br>2.86<br>0.00 | 0.34<br>1.00<br>0.00 | 5.00               | 0.10                       | 7.9               | 1.35     | 0.00<br>10.64 | 533.50          | 530.66<br>531.50<br>529.50 | 530.66<br>530.80<br>528.80 | 0.00<br>24<br>Cir  | 24<br>24<br>Cir | -0.01<br>2.59 | 4.58<br>11.59 | 10.94<br>36.42     | 22 to 19         |         |           |           |            |           |                  |
| 27      | End     | Comb          | 0.013     | 127.0 | 0.11<br>0.02<br>0.00               | 1.98<br>7.13<br>0.00 | 1.88<br>2.50<br>0.00 | 17.51              | 0.30                       | 5.1               | 4.39     | 0.00<br>22.48 | 536.58          | 534.17<br>533.00<br>531.00 | 532.91<br>528.00<br>526.00 | 1.26<br>24<br>Cir  | 24<br>24<br>Cir | 0.99<br>3.94  | 7.16<br>14.29 | 22.48<br>44.88     | 23 to E5         |         |           |           |            |           |                  |
| 28      | 27      | MH            | 0.013     | 28.0  | 0.00<br>0.00<br>0.00               | 1.87<br>7.11<br>0.00 | 1.78<br>2.49<br>0.00 | 17.44              | 0.07                       | 5.1               | 4.27     | 0.00<br>21.94 | 536.66          | 533.81<br>533.60<br>531.60 | 534.20<br>533.20<br>531.20 | -0.39<br>24<br>Cir | 24<br>24<br>Cir | -1.39<br>1.43 | 6.99<br>8.60  | 21.94<br>27.03     | M3 to 23         |         |           |           |            |           |                  |
| 29      | 28      | Comb          | 0.013     | 64.0  | 0.24<br>0.18<br>0.00               | 1.35<br>3.84<br>0.00 | 1.28<br>1.34<br>0.00 | 6.38               | 0.16                       | 7.4               | 2.64     | 0.00<br>19.42 | 537.62          | 535.06<br>535.50<br>533.50 | 534.57<br>533.80<br>531.80 | 0.49<br>24<br>Cir  | 24<br>24<br>Cir | 0.76<br>2.66  | 6.78<br>11.73 | 19.42<br>36.86     | 24 to M3         |         |           |           |            |           |                  |
| 30      | 29      | Comb          | 0.013     | 25.0  | 0.24<br>0.18<br>0.00               | 0.24<br>0.18<br>0.00 | 0.23<br>0.06<br>0.00 | 5.00               | 0.22                       | 7.9               | 0.29     | 0.00<br>2.28  | 537.73          | 535.89<br>535.65<br>534.40 | 535.85<br>535.30<br>534.05 | 0.03<br>15<br>Cir  | 15<br>15<br>Cir | 0.12<br>1.40  | 1.86<br>6.23  | 2.28<br>7.64       | 25 to 24         |         |           |           |            |           |                  |

NOTES: Intensity = 30.79 / (Inlet time + 6.10) ^ 0.57 (in/hr)

Project File: 4272-CONVEYANCE-2.stm

FL-DOT Report

| Line No | To Line | Type of struc | n - value | Len (ft) | Drainage Area                      |                      |                      | Time of conc (min) | Time of flow in sect (min) | Inten (l) (in/hr) | Total CA | Add Q         | Inlet elev (ft) | Elev of HGL                |                            |                      | Rise Span | HGL Pipe     | Actual                  |           | Date: 02-01-2018<br>Frequency: 100 yrs<br>Proj: 4272-CONVEYANCE |            |           |           |            |      |      |
|---------|---------|---------------|-----------|----------|------------------------------------|----------------------|----------------------|--------------------|----------------------------|-------------------|----------|---------------|-----------------|----------------------------|----------------------------|----------------------|-----------|--------------|-------------------------|-----------|-----------------------------------------------------------------|------------|-----------|-----------|------------|------|------|
|         |         |               |           |          | C1 = 0.95<br>C2 = 0.35<br>C3 = 0.2 | Incre-ment (ac)      | Sub-total (ac)       |                    |                            |                   |          | Sum CA        |                 | Up (ft)                    | Down (ft)                  | Fall (ft)            |           |              | Size (in)               | Slope (%) |                                                                 | Vel (ft/s) | Cap (cfs) | Full Flow |            |      |      |
|         |         |               |           |          |                                    |                      |                      |                    |                            |                   |          |               |                 |                            |                            |                      |           |              |                         |           |                                                                 |            |           |           | Total flow | Span | Pipe |
|         |         |               |           |          |                                    |                      |                      |                    |                            |                   |          |               |                 |                            |                            |                      |           |              |                         |           |                                                                 |            |           |           |            |      |      |
| 31      | 29      | Comb          | 0.013     | 260.0    | 0.06<br>0.07<br>0.00               | 0.87<br>3.48<br>0.00 | 0.83<br>1.22<br>0.00 | 5.96               | 0.42                       | 7.5               | 2.06     | 0.00<br>15.45 | 556.42          | 549.72<br>549.80<br>548.30 | 535.06<br>535.50<br>534.00 | 14.66<br>18<br>14.30 | 18<br>Cir | 5.64<br>5.50 | 10.25<br>13.94<br>24.63 | 26 to 24  |                                                                 |            |           |           |            |      |      |
| 32      | 31      | Comb          | 0.013     | 24.0     | 0.13<br>0.07<br>0.00               | 0.13<br>0.07<br>0.00 | 0.12<br>0.02<br>0.00 | 5.00               | 0.13                       | 7.9               | 0.15     | 0.00<br>1.16  | 556.42          | 553.50<br>554.32<br>553.07 | 553.38<br>554.20<br>552.95 | 0.12<br>15<br>0.12   | 15<br>Cir | 0.52<br>0.50 | 3.09<br>3.72<br>4.57    | 27 to 26  |                                                                 |            |           |           |            |      |      |
| 33      | 31      | Comb          | 0.013     | 91.0     | 0.09<br>0.11<br>0.00               | 0.68<br>3.34<br>0.00 | 0.65<br>1.17<br>0.00 | 5.83               | 0.13                       | 7.6               | 1.83     | 0.00<br>13.81 | 562.27          | 559.88<br>560.00<br>558.50 | 553.68<br>554.40<br>552.90 | 6.20<br>18<br>5.60   | 18<br>Cir | 6.81<br>6.15 | 11.51<br>14.74<br>26.05 | 28 to 26  |                                                                 |            |           |           |            |      |      |
| 34      | 33      | Comb          | 0.013     | 107.0    | 0.11<br>0.09<br>0.00               | 0.59<br>3.23<br>0.00 | 0.56<br>1.13<br>0.00 | 5.60               | 0.23                       | 7.6               | 1.71     | 0.00<br>13.02 | 567.22          | 564.88<br>565.02<br>563.52 | 560.06<br>560.20<br>558.70 | 4.81<br>18<br>4.82   | 18<br>Cir | 4.50<br>4.50 | 7.74<br>12.61<br>22.29  | 29 to 28  |                                                                 |            |           |           |            |      |      |
| 35      | 34      | Comb          | 0.013     | 25.0     | 0.16<br>0.04<br>0.00               | 0.16<br>0.04<br>0.00 | 0.15<br>0.01<br>0.00 | 5.00               | 0.39                       | 7.9               | 0.17     | 0.00<br>1.31  | 567.50          | 565.80<br>565.45<br>564.20 | 565.79<br>565.12<br>563.87 | 0.01<br>15<br>0.33   | 15<br>Cir | 0.04<br>1.32 | 1.06<br>6.05<br>7.42    | 30 to 29  |                                                                 |            |           |           |            |      |      |
| 36      | 34      | MH            | 0.013     | 40.0     | 0.00<br>0.00<br>0.00               | 0.32<br>3.10<br>0.00 | 0.30<br>1.09<br>0.00 | 5.50               | 0.10                       | 7.7               | 1.40     | 0.00<br>10.77 | 569.12          | 566.55<br>566.80<br>565.30 | 565.23<br>565.22<br>563.72 | 1.32<br>18<br>1.58   | 18<br>Cir | 3.30<br>3.95 | 6.46<br>11.81<br>20.87  | M4 to 29  |                                                                 |            |           |           |            |      |      |
| 37      | 36      | DrGr          | 0.013     | 63.0     | 0.13<br>0.11<br>0.00               | 0.13<br>0.11<br>0.00 | 0.12<br>0.04<br>0.00 | 5.00               | 0.50                       | 7.9               | 0.16     | 0.00<br>1.28  | 571.98          | 569.15<br>569.95<br>568.70 | 567.26<br>566.80<br>565.55 | 1.89<br>15<br>3.15   | 15<br>Cir | 3.00<br>5.00 | 2.12<br>11.77<br>14.44  | 31 to M4  |                                                                 |            |           |           |            |      |      |
| 38      | 28      | Comb          | 0.013     | 81.0     | 0.31<br>0.40<br>0.00               | 0.52<br>3.27<br>0.00 | 0.49<br>1.14<br>0.00 | 17.16              | 0.28                       | 5.2               | 1.63     | 0.00<br>8.45  | 537.27          | 535.10<br>534.80<br>533.30 | 534.57<br>533.60<br>532.10 | 0.52<br>18<br>1.20   | 18<br>Cir | 0.65<br>1.48 | 4.78<br>7.23<br>12.78   | 32 to M3  |                                                                 |            |           |           |            |      |      |
| 39      | 36      | DrGr          | 0.013     | 141.0    | 0.19<br>2.99<br>0.00               | 0.19<br>2.99<br>0.00 | 0.18<br>1.05<br>0.00 | 5.00               | 0.38                       | 7.9               | 1.24     | 0.00<br>9.75  | 573.50          | 568.37<br>568.68<br>567.18 | 566.80<br>567.00<br>565.50 | 1.57<br>18<br>1.68   | 18<br>Cir | 1.11<br>1.19 | 6.23<br>6.49<br>11.46   | 33 to M4  |                                                                 |            |           |           |            |      |      |
| 40      | 38      | DrGr          | 0.013     | 35.0     | 0.21<br>2.87<br>0.00               | 0.21<br>2.87<br>0.00 | 0.20<br>1.00<br>0.00 | 17.00              | 0.16                       | 5.2               | 1.20     | 0.00<br>6.24  | 537.50          | 535.36<br>535.50<br>534.00 | 535.26<br>535.00<br>533.50 | 0.10<br>18<br>0.50   | 18<br>Cir | 0.27<br>1.43 | 3.62<br>7.10<br>12.55   | 35 to 32  |                                                                 |            |           |           |            |      |      |

NOTES: Intensity = 30.79 / (Inlet time + 6.10) ^ 0.57 (in/hr)

Project File: 4272-CONVEYANCE-2.stm

# Hydraulic Grade Line Computations

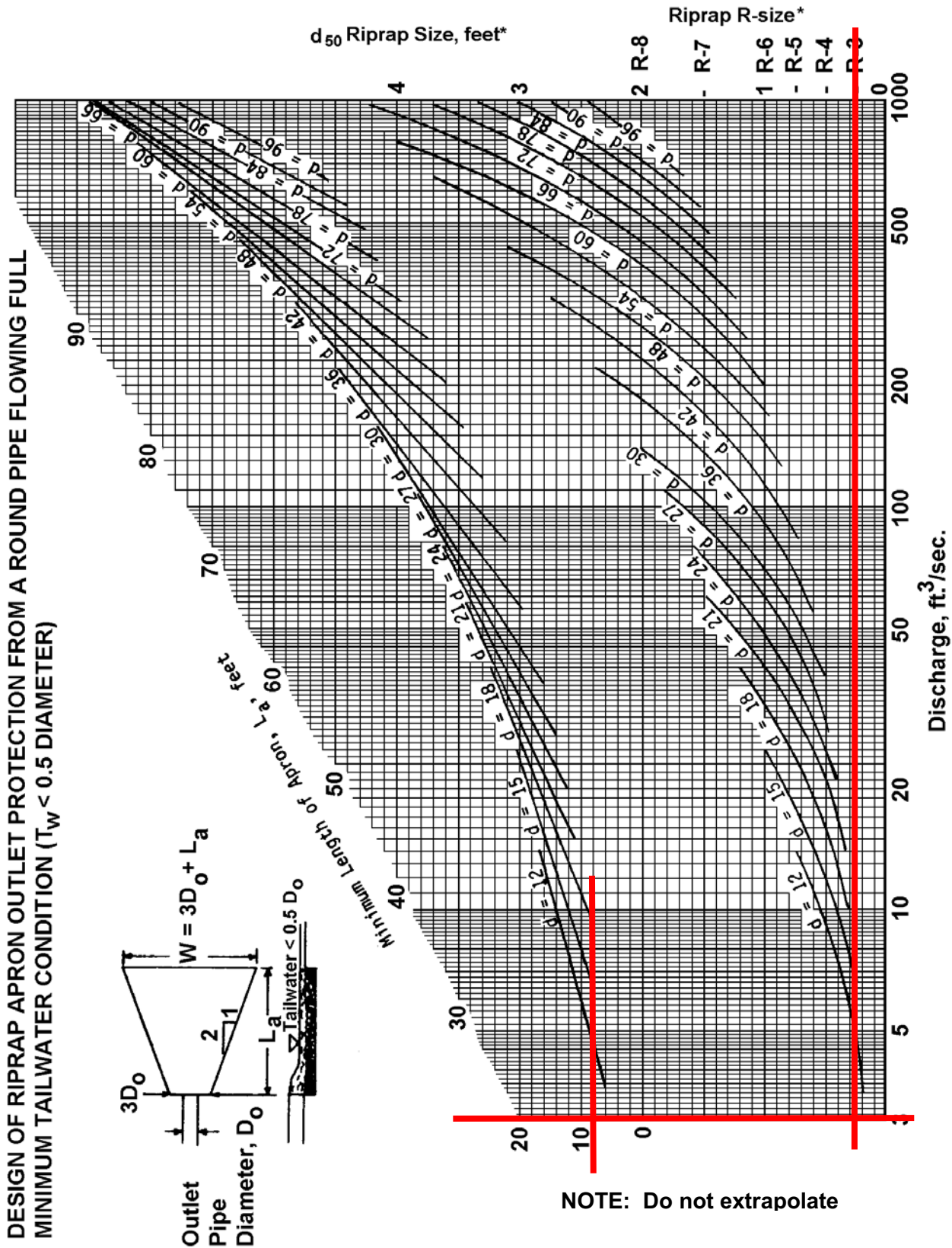
| Line                                                                                             | Size<br>(in) | Q<br>(cfs) | Downstream             |                     |               |                |               |                     |                     |           | Len<br>(ft)         | Upstream               |                     |               |                      |               |                     |                     |           | Check            |                       | JL<br>coeff<br>(K) | Minor<br>loss<br>(ft) |
|--------------------------------------------------------------------------------------------------|--------------|------------|------------------------|---------------------|---------------|----------------|---------------|---------------------|---------------------|-----------|---------------------|------------------------|---------------------|---------------|----------------------|---------------|---------------------|---------------------|-----------|------------------|-----------------------|--------------------|-----------------------|
|                                                                                                  |              |            | Invert<br>elev<br>(ft) | HGL<br>elev<br>(ft) | Depth<br>(ft) | Area<br>(sqft) | Vel<br>(ft/s) | Vel<br>head<br>(ft) | EGL<br>elev<br>(ft) | Sf<br>(%) |                     | Invert<br>elev<br>(ft) | HGL<br>elev<br>(ft) | Depth<br>(ft) | Area<br>(sqft)       | Vel<br>(ft/s) | Vel<br>head<br>(ft) | EGL<br>elev<br>(ft) | Sf<br>(%) | Ave<br>Sf<br>(%) | Enrgy<br>loss<br>(ft) |                    |                       |
| 1                                                                                                | 15           | 1.45       | 518.75                 | 519.23              | 0.48          | 0.44           | 3.32          | 0.17                | 519.40              | 0.508     | 22.0                | 519.05                 | 519.53 j            | 0.48**        | 0.44                 | 3.32          | 0.17                | 519.70              | 0.508     | 0.508            | n/a                   | 0.00               | 0.00                  |
| 2                                                                                                | 15           | 0.78       | 519.25                 | 519.70              | 0.45          | 0.39           | 1.98          | 0.06                | 519.76              | 0.194     | 28.0                | 519.39                 | 519.75 j            | 0.36**        | 0.29                 | 2.70          | 0.11                | 519.86              | 0.464     | 0.329            | 0.092                 | 0.00               | 0.00                  |
| 3                                                                                                | 36           | 55.07      | 524.00                 | 526.37              | 2.37          | 5.99           | 9.19          | 1.31                | 527.68              | 0.732     | 31.0                | 524.30                 | 526.67              | 2.37**        | 5.98                 | 9.21          | 1.32                | 527.98              | 0.735     | 0.733            | n/a                   | 0.00               | n/a                   |
| 4                                                                                                | 36           | 53.74      | 524.50                 | 527.09              | 2.59          | 6.48           | 8.29          | 1.07                | 528.16              | 0.599     | 28.0                | 524.86                 | 527.20              | 2.34**        | 5.91                 | 9.10          | 1.29                | 528.48              | 0.718     | 0.659            | n/a                   | 0.00               | 0.00                  |
| 5                                                                                                | 30           | 28.85      | 527.00                 | 531.55              | 2.50          | 4.91           | 5.88          | 0.54                | 532.09              | 0.495     | 66.0                | 527.35                 | 531.88              | 2.50          | 4.91                 | 5.88          | 0.54                | 532.41              | 0.495     | 0.495            | 0.327                 | 0.00               | 0.00                  |
| 6                                                                                                | 30           | 28.92      | 527.55                 | 531.88              | 2.50          | 4.91           | 5.89          | 0.54                | 532.42              | 0.498     | 72.0                | 527.95                 | 532.24              | 2.50          | 4.91                 | 5.89          | 0.54                | 532.78              | 0.497     | 0.497            | 0.358                 | 0.00               | 0.00                  |
| 7                                                                                                | 24           | 28.99      | 528.25                 | 532.24              | 2.00          | 3.14           | 9.23          | 1.32                | 533.56              | n/a       | 32.0                | 528.80                 | 531.92i             | 2.00          | 3.14                 | 9.23          | 1.32                | 533.25i             | n/a       | n/a              | -1.639                | 0.00               | n/a                   |
| 8                                                                                                | 15           | 2.22       | 529.25                 | 533.25              | 1.25          | 1.23           | 1.81          | 0.05                | 533.30              | 0.119     | 24.0                | 529.53                 | 533.27              | 1.25          | 1.23                 | 1.81          | 0.05                | 533.32              | 0.119     | 0.119            | 0.029                 | 0.00               | 0.00                  |
| 9                                                                                                | 24           | 25.82      | 529.00                 | 533.25              | 2.00          | 2.96           | 8.22          | 1.05                | 534.30              | 1.304     | 238                 | 541.50                 | 543.29 j            | 1.79**        | 2.96                 | 8.72          | 1.18                | 544.47              | 1.156     | 1.230            | n/a                   | 0.00               | 0.00                  |
| 10                                                                                               | 18           | 14.00      | 544.57                 | 545.29              | 0.72*         | 1.70           | 16.72         | 4.34                | 549.63              | 8.203     | 186                 | 560.09                 | 561.47 j            | 1.38**        | 1.70                 | 8.22          | 1.05                | 562.52              | 1.542     | 4.873            | n/a                   | 0.00               | 0.00                  |
| 11                                                                                               | 15           | 1.06       | 562.30                 | 562.71              | 0.41*         | 0.35           | 3.02          | 0.14                | 562.85              | 0.495     | 24.0                | 562.42                 | 562.83 j            | 0.41**        | 0.36                 | 2.97          | 0.14                | 562.97              | 0.476     | 0.486            | 0.117                 | 0.00               | 0.00                  |
| 12                                                                                               | 15           | 1.96       | 562.30                 | 562.58              | 0.28*         | 0.21           | 9.46          | 1.39                | 563.97              | 7.416     | 75.0                | 568.00                 | 568.56 j            | 0.56**        | 0.53                 | 3.68          | 0.21                | 568.77              | 0.539     | 3.977            | n/a                   | 0.00               | n/a                   |
| 13                                                                                               | 18           | 10.74      | 542.00                 | 543.89              | 1.50          | 1.77           | 6.08          | 0.57                | 544.47              | 1.046     | 24.0                | 542.80                 | 544.05              | 1.25**        | 1.57                 | 6.82          | 0.72                | 544.77              | 1.015     | 1.030            | n/a                   | 0.00               | 0.00                  |
| 14                                                                                               | 15           | 1.06       | 546.29                 | 546.49              | 0.20*         | 0.13           | 8.43          | 1.10                | 547.59              | 8.951     | 51.0                | 550.90                 | 551.31 j            | 0.41**        | 0.35                 | 3.00          | 0.14                | 551.45              | 0.489     | 4.720            | n/a                   | 0.00               | 0.00                  |
| 15                                                                                               | 18           | 9.87       | 543.00                 | 544.29              | 1.29          | 1.61           | 6.11          | 0.58                | 544.87              | 0.820     | 112                 | 545.00                 | 546.20 j            | 1.20**        | 1.51                 | 6.52          | 0.66                | 546.86              | 0.926     | 0.873            | n/a                   | 0.00               | n/a                   |
| 16                                                                                               | 18           | 8.09       | 545.20                 | 546.53              | 1.33          | 1.66           | 4.87          | 0.37                | 546.90              | n/a       | 24.0                | 545.37                 | 546.65i             | 1.26          | 1.58                 | 5.11          | 0.41                | 547.06i             | n/a       | n/a              | -0.253                | 0.00               | n/a                   |
| 17                                                                                               | 18           | 5.19       | 545.57                 | 547.06              | 1.49          | 1.76           | 2.94          | 0.13                | 547.19              | 0.225     | 91.0                | 546.45                 | 547.32 j            | 0.87**        | 1.06                 | 4.89          | 0.37                | 547.69              | 0.602     | 0.414            | n/a                   | 0.00               | n/a                   |
| 18                                                                                               | 15           | 2.16       | 546.70                 | 547.64              | 0.94          | 0.99           | 2.18          | 0.07                | 547.72              | 0.133     | 68.0                | 547.50                 | 548.09 j            | 0.59**        | 0.57                 | 3.81          | 0.23                | 548.31              | 0.552     | 0.342            | n/a                   | 0.00               | n/a                   |
| 19                                                                                               | 18           | 10.77      | 560.29                 | 561.95              | 1.50          | 1.77           | 6.10          | 0.58                | 562.52              | 1.053     | 123                 | 562.00                 | 563.25 j            | 1.25**        | 1.58                 | 6.83          | 0.73                | 563.98              | 1.019     | 1.036            | n/a                   | 0.00               | n/a                   |
| 20                                                                                               | 15           | 0.16       | 529.00                 | 532.41              | 1.25          | 1.23           | 0.13          | 0.00                | 532.41              | 0.001     | 28.0                | 529.30                 | 532.41              | 1.25          | 1.23                 | 0.13          | 0.00                | 532.41              | 0.001     | 0.001            | 0.000                 | 0.00               | 0.00                  |
| 21                                                                                               | 24           | 16.27      | 525.00                 | 529.57              | 2.00          | 3.14           | 5.18          | 0.42                | 529.99              | 0.518     | 128                 | 527.80                 | 530.23              | 2.00          | 3.14                 | 5.18          | 0.42                | 530.65              | 0.517     | 0.518            | 0.662                 | 0.00               | 0.00                  |
| Project File: 4272-CONVEYANCE-2.stm                                                              |              |            |                        |                     |               |                |               |                     |                     |           | Number of lines: 40 |                        |                     |               | Run Date: 02-01-2018 |               |                     |                     |           |                  |                       |                    |                       |
| Notes: * Normal depth assumed.; ** Critical depth.; j-Line contains hyd. jump.; i-Inlet control. |              |            |                        |                     |               |                |               |                     |                     |           |                     |                        |                     |               |                      |               |                     |                     |           |                  |                       | 22                 |                       |



# Hydraulic Grade Line Computations

| Line                                                                                             | Size<br>(in) | Q<br>(cfs) | Downstream             |                     |               |                |               |                     |                     |           | Len<br>(ft)         | Upstream               |                     |               |                      |               |                     |                     |           | Check            |                       | JL<br>coeff<br>(K) | Minor<br>loss<br>(ft) |
|--------------------------------------------------------------------------------------------------|--------------|------------|------------------------|---------------------|---------------|----------------|---------------|---------------------|---------------------|-----------|---------------------|------------------------|---------------------|---------------|----------------------|---------------|---------------------|---------------------|-----------|------------------|-----------------------|--------------------|-----------------------|
|                                                                                                  |              |            | Invert<br>elev<br>(ft) | HGL<br>elev<br>(ft) | Depth<br>(ft) | Area<br>(sqft) | Vel<br>(ft/s) | Vel<br>head<br>(ft) | EGL<br>elev<br>(ft) | Sf<br>(%) |                     | Invert<br>elev<br>(ft) | HGL<br>elev<br>(ft) | Depth<br>(ft) | Area<br>(sqft)       | Vel<br>(ft/s) | Vel<br>head<br>(ft) | EGL<br>elev<br>(ft) | Sf<br>(%) | Ave<br>Sf<br>(%) | Enrgy<br>loss<br>(ft) |                    |                       |
| 22                                                                                               | 24           | 15.30      | 528.00                 | 530.28              | 2.00          | 3.14           | 4.87          | 0.37                | 530.65              | 0.458     | 26.0                | 528.20                 | 530.40              | 2.00          | 3.14                 | 4.87          | 0.37                | 530.77              | 0.458     | 0.458            | 0.119                 | 0.00               | 0.00                  |
| 23                                                                                               | 24           | 13.84      | 528.40                 | 530.43              | 2.00          | 3.14           | 4.41          | 0.30                | 530.73              | 0.375     | 29.0                | 528.60                 | 530.53              | 1.93          | 3.11                 | 4.46          | 0.31                | 530.84              | 0.327     | 0.351            | 0.102                 | 0.00               | 0.00                  |
| 24                                                                                               | 15           | 1.45       | 528.95                 | 530.75              | 1.25          | 1.23           | 1.18          | 0.02                | 530.77              | 0.050     | 166                 | 531.55                 | 532.03 j            | 0.48**        | 0.44                 | 3.32          | 0.17                | 532.20              | 0.508     | 0.279            | n/a                   | 0.00               | n/a                   |
| 25                                                                                               | 15           | 0.74       | 531.75                 | 532.20              | 0.45          | 0.39           | 1.87          | 0.05                | 532.25              | 0.173     | 29.0                | 532.00                 | 532.34 j            | 0.34**        | 0.27                 | 2.69          | 0.11                | 532.46              | 0.478     | 0.325            | n/a                   | 0.00               | n/a                   |
| 26                                                                                               | 24           | 10.64      | 528.80                 | 530.66              | 1.86          | 3.04           | 3.50          | 0.19                | 530.85              | 0.191     | 27.0                | 529.50                 | 530.66 j            | 1.16**        | 1.88                 | 5.66          | 0.50                | 531.15              | 0.552     | 0.371            | n/a                   | 0.00               | n/a                   |
| 27                                                                                               | 24           | 22.48      | 526.00                 | 532.91              | 2.00          | 3.14           | 7.16          | 0.80                | 533.71              | 0.988     | 127                 | 531.00                 | 534.17              | 2.00          | 3.14                 | 7.16          | 0.80                | 534.96              | 0.988     | 0.988            | 1.255                 | 0.00               | 0.00                  |
| 28                                                                                               | 24           | 21.94      | 531.20                 | 534.20              | 2.00          | 3.14           | 6.99          | 0.76                | 534.96              | n/a       | 28.0                | 531.60                 | 533.81i             | 2.00          | 3.14                 | 6.98          | 0.76                | 534.57i             | n/a       | n/a              | -1.147                | 0.00               | n/a                   |
| 29                                                                                               | 24           | 19.42      | 531.80                 | 534.57              | 2.00          | 3.14           | 6.18          | 0.59                | 535.17              | 0.737     | 64.0                | 533.50                 | 535.06 j            | 1.56**        | 2.63                 | 7.38          | 0.85                | 535.91              | 0.812     | 0.774            | n/a                   | 0.00               | 0.00                  |
| 30                                                                                               | 15           | 2.28       | 534.05                 | 535.85              | 1.25          | 1.23           | 1.86          | 0.05                | 535.91              | 0.125     | 25.0                | 534.40                 | 535.89              | 1.25          | 1.23                 | 1.86          | 0.05                | 535.94              | 0.125     | 0.125            | 0.031                 | 0.00               | 0.00                  |
| 31                                                                                               | 18           | 15.45      | 534.00                 | 535.06              | 1.06          | 1.73           | 11.57         | 2.08                | 537.14              | 3.008     | 260                 | 548.30                 | 549.72 j            | 1.42**        | 1.73                 | 8.94          | 1.24                | 550.96              | 1.872     | 2.440            | n/a                   | 0.00               | 0.00                  |
| 32                                                                                               | 15           | 1.16       | 552.95                 | 553.38              | 0.43*         | 0.37           | 3.10          | 0.15                | 553.53              | 0.498     | 24.0                | 553.07                 | 553.50              | 0.43**        | 0.38                 | 3.07          | 0.15                | 553.65              | 0.481     | 0.490            | 0.117                 | 0.00               | 0.00                  |
| 33                                                                                               | 18           | 13.81      | 552.90                 | 553.68              | 0.78*         | 1.70           | 14.89         | 3.45                | 557.13              | 6.080     | 91.0                | 558.50                 | 559.88 j            | 1.38**        | 1.70                 | 8.13          | 1.03                | 560.91              | 1.502     | 3.791            | n/a                   | 0.00               | n/a                   |
| 34                                                                                               | 18           | 13.02      | 558.70                 | 560.06              | 1.36          | 1.68           | 7.73          | 0.93                | 560.99              | 1.345     | 107                 | 563.52                 | 564.88 j            | 1.36**        | 1.68                 | 7.75          | 0.93                | 565.81              | 1.349     | 1.347            | n/a                   | 0.00               | 0.00                  |
| 35                                                                                               | 15           | 1.31       | 563.87                 | 565.79              | 1.25          | 1.23           | 1.06          | 0.02                | 565.81              | 0.041     | 25.0                | 564.20                 | 565.80              | 1.25          | 1.23                 | 1.06          | 0.02                | 565.82              | 0.041     | 0.041            | 0.010                 | 0.00               | 0.00                  |
| 36                                                                                               | 18           | 10.77      | 563.72                 | 565.23              | 1.50          | 1.77           | 6.09          | 0.58                | 565.81              | 1.052     | 40.0                | 565.30                 | 566.55 j            | 1.25**        | 1.58                 | 6.83          | 0.73                | 567.28              | 1.018     | 1.035            | n/a                   | 0.00               | 0.00                  |
| 37                                                                                               | 15           | 1.28       | 565.55                 | 567.26              | 1.25          | 1.23           | 1.05          | 0.02                | 567.28              | 0.040     | 63.0                | 568.70                 | 569.15 j            | 0.45**        | 0.40                 | 3.19          | 0.16                | 569.31              | 0.500     | 0.270            | n/a                   | 0.00               | 0.00                  |
| 38                                                                                               | 18           | 8.45       | 532.10                 | 534.57              | 1.50          | 1.77           | 4.78          | 0.36                | 534.93              | 0.648     | 81.0                | 533.30                 | 535.10              | 1.50          | 1.77                 | 4.78          | 0.36                | 535.45              | 0.648     | 0.648            | 0.525                 | 0.00               | 0.00                  |
| 39                                                                                               | 18           | 9.75       | 565.50                 | 566.80              | 1.30          | 1.63           | 5.98          | 0.56                | 567.36              | 0.788     | 141                 | 567.18                 | 568.37 j            | 1.19**        | 1.51                 | 6.48          | 0.65                | 569.02              | 0.915     | 0.851            | n/a                   | 0.00               | 0.00                  |
| 40                                                                                               | 18           | 6.24       | 533.50                 | 535.26              | 1.50          | 1.77           | 3.53          | 0.19                | 535.45              | 0.353     | 35.0                | 534.00                 | 535.36              | 1.36          | 1.68                 | 3.71          | 0.21                | 535.57              | 0.309     | 0.331            | 0.116                 | 0.00               | 0.00                  |
| Project File: 4272-CONVEYANCE-2.stm                                                              |              |            |                        |                     |               |                |               |                     |                     |           | Number of lines: 40 |                        |                     |               | Run Date: 02-01-2018 |               |                     |                     |           |                  |                       |                    |                       |
| Notes: * Normal depth assumed.; ** Critical depth.; j-Line contains hyd. jump.; i-Inlet control. |              |            |                        |                     |               |                |               |                     |                     |           |                     |                        |                     |               |                      |               |                     |                     |           |                  |                       | 23                 |                       |

**FIGURE 9.3**  
**Riprap Apron Design, Minimum Tailwater Condition**



\* For discharge velocities exceeding Maximum Allowable for Riprap indicated, increase  $d_{50}$  stone size and/or provide velocity reduction device.

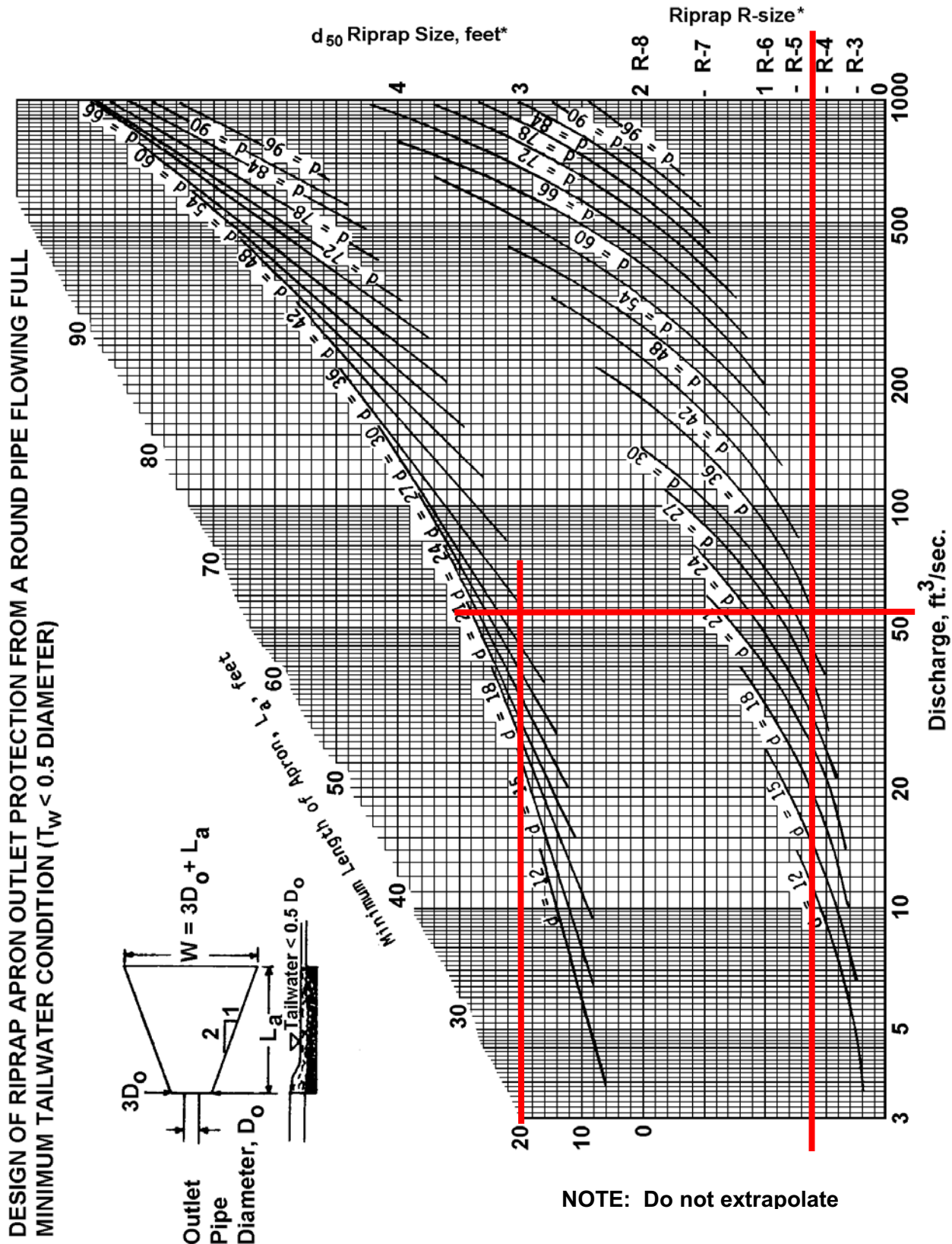
Adapted from USDA - NRCS

Not to be used for Box Culverts

Q100 = 1.45 CFS  
 $L_a = 8'$   
 MIN. WIDTH = 3.75'  
 MAX WIDTH = 11.75'

USE R-3 RIPRAP

**FIGURE 9.3**  
**Riprap Apron Design, Minimum Tailwater Condition**



\* For discharge velocities exceeding Maximum Allowable for Riprap indicated, increase  $d_{50}$  stone size and/or provide velocity reduction device.

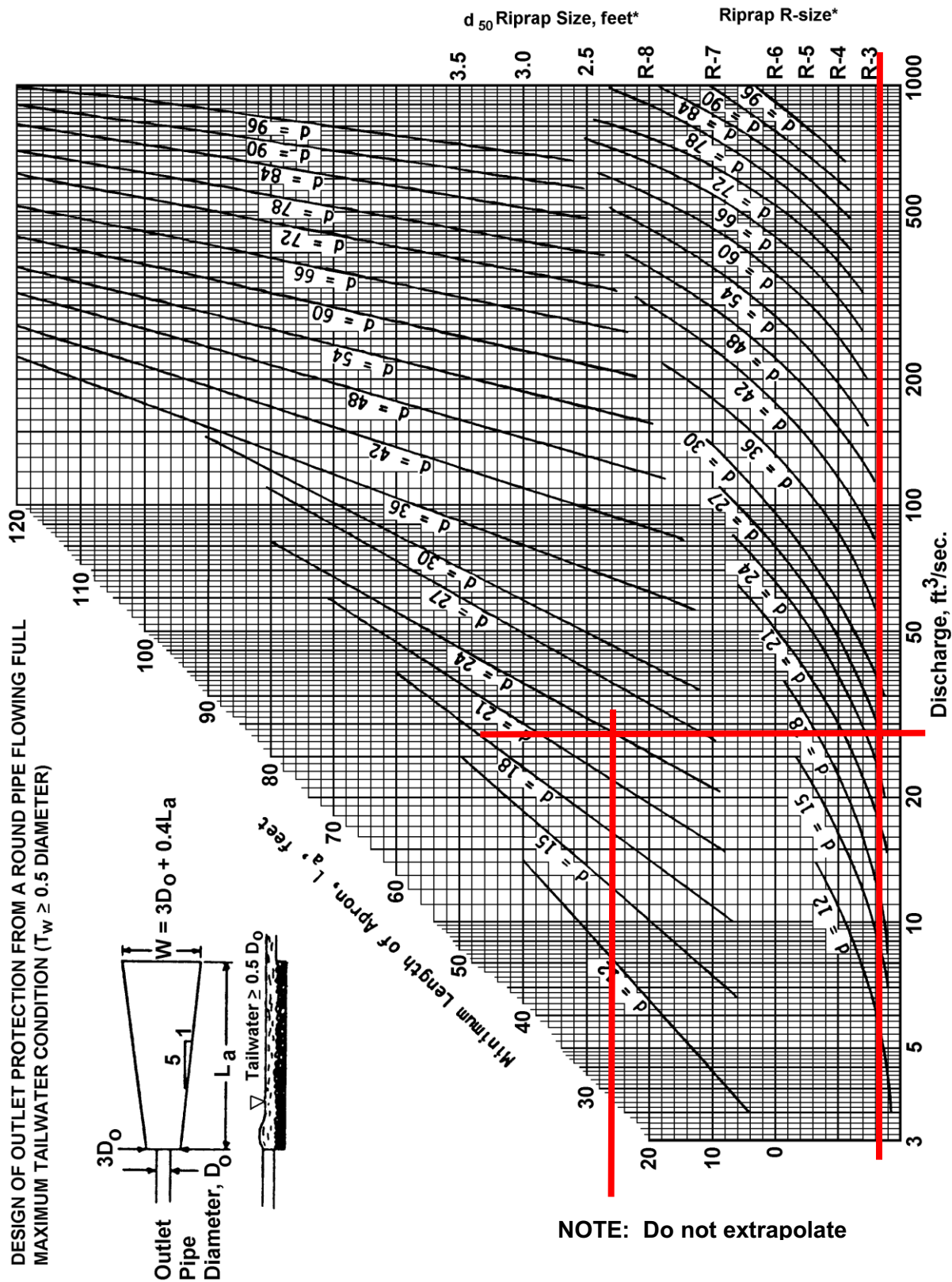
Adapted from USDA - NRCS

Not to be used for Box Culverts

Q100 = 55.07 CFS  
 $L_a = 20'$   
 MIN. WIDTH = 9.0'  
 MAX WIDTH = 29'

USE R-5 RIPRAP

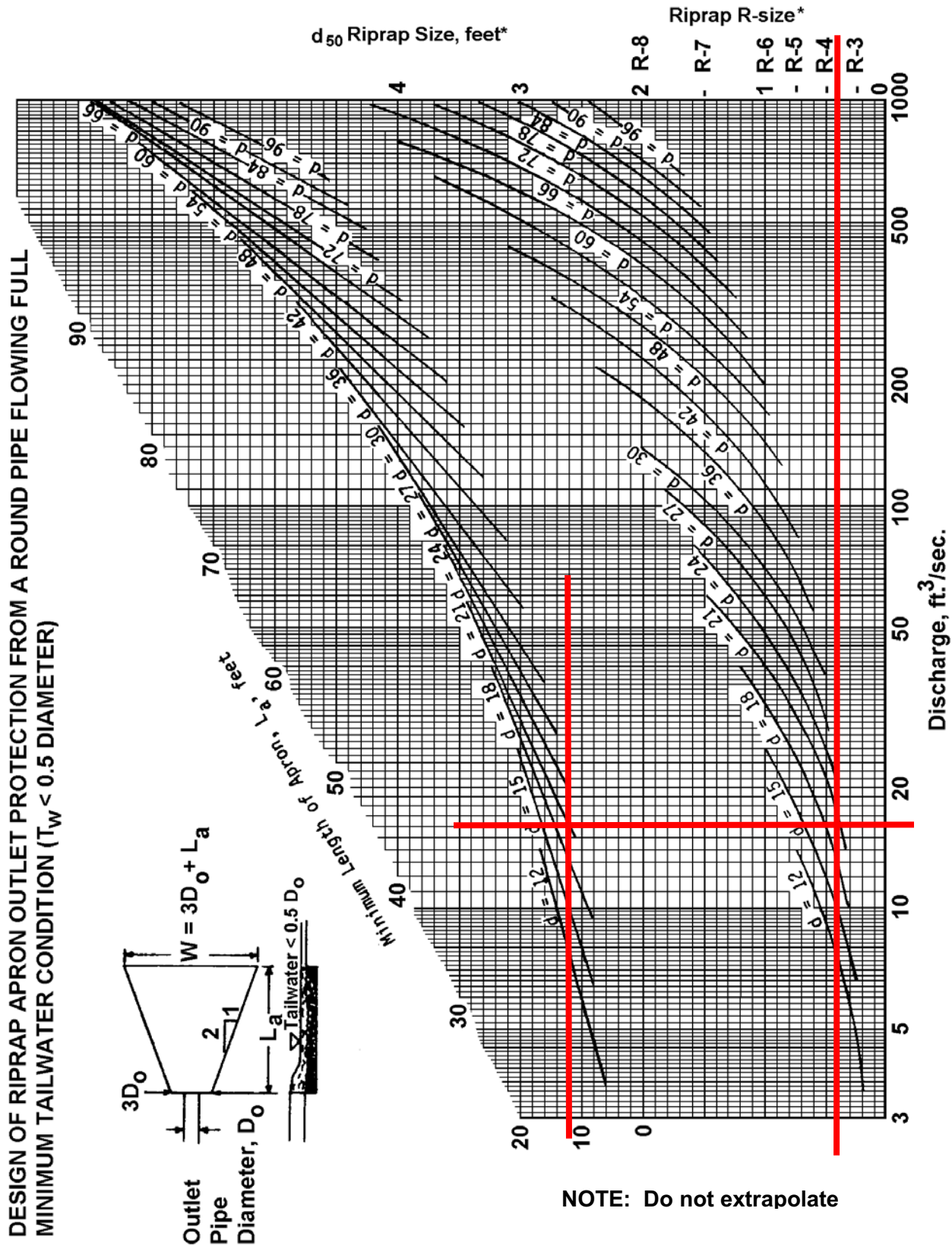
**FIGURE 9.4**  
**Riprap Apron Design, Maximum Tailwater Condition**



Q100 = 28.85 CFS  
 $L_a = 26'$   
 MIN. WIDTH = 7.5'  
 MAX WIDTH = 17.9'



**FIGURE 9.3**  
**Riprap Apron Design, Minimum Tailwater Condition**



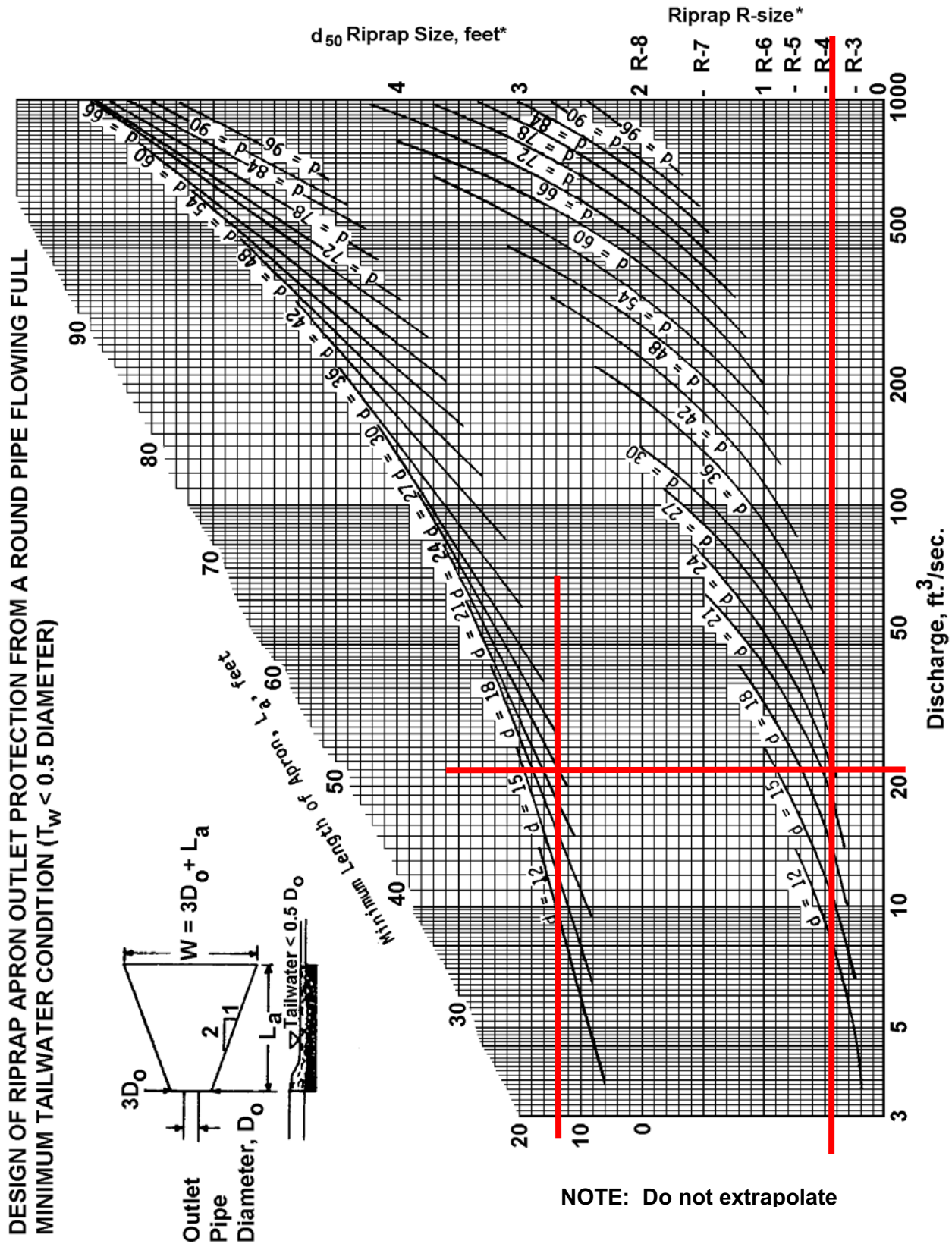
\* For discharge velocities exceeding Maximum Allowable for Riprap indicated, increase  $d_{50}$  stone size and/or provide velocity reduction device.

Not to be used for Box Culverts

Q100 = 16.27 CFS  
 $L_a = 12'$   
 MIN. WIDTH = 6.0'  
 MAX WIDTH = 18.0'

USE R-4 RIPRAP

**FIGURE 9.3**  
**Riprap Apron Design, Minimum Tailwater Condition**



\* For discharge velocities exceeding Maximum Allowable for Riprap indicated, increase  $d_{50}$  stone size and/or provide velocity reduction device.

Adapted from USDA - NRCS

Not to be used for Box Culverts

Q100 = 22.48 CFS  
 $L_a = 14'$   
 MIN. WIDTH = 6.0'  
 MAX WIDTH = 20.0'

USE R-4 RIPRAP





**NOAA Atlas 14, Volume 2, Version 3**  
**Location name: Upper Uwchlan Twp,**  
**Pennsylvania, USA\***  
**Latitude: 40.1008°, Longitude: -75.6968°**  
**Elevation: 559.49 ft\*\***

\* source: ESRI Maps  
 \*\* source: USGS



**POINT PRECIPITATION FREQUENCY ESTIMATES**

G.M. Bonnín, D. Martin, B. Lin, T. Parzybok, M. Yekta, and D. Riley

NOAA, National Weather Service, Silver Spring, Maryland

[PF\\_tabular](#) | [PF\\_graphical](#) | [Maps\\_&\\_aerials](#)

**PF tabular**

| <b>PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)<sup>1</sup></b> |                                            |                               |                               |                               |                               |                               |                               |                               |                               |                               |
|----------------------------------------------------------------------------------------------------------------|--------------------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
| <b>Duration</b>                                                                                                | <b>Average recurrence interval (years)</b> |                               |                               |                               |                               |                               |                               |                               |                               |                               |
|                                                                                                                | <b>1</b>                                   | <b>2</b>                      | <b>5</b>                      | <b>10</b>                     | <b>25</b>                     | <b>50</b>                     | <b>100</b>                    | <b>200</b>                    | <b>500</b>                    | <b>1000</b>                   |
| <b>5-min</b>                                                                                                   | <b>0.346</b><br>(0.316-0.380)              | <b>0.412</b><br>(0.376-0.453) | <b>0.481</b><br>(0.438-0.528) | <b>0.529</b><br>(0.481-0.580) | <b>0.584</b><br>(0.528-0.640) | <b>0.620</b><br>(0.558-0.679) | <b>0.656</b><br>(0.587-0.718) | <b>0.685</b><br>(0.612-0.752) | <b>0.718</b><br>(0.636-0.788) | <b>0.741</b><br>(0.652-0.816) |
| <b>10-min</b>                                                                                                  | <b>0.553</b><br>(0.505-0.607)              | <b>0.659</b><br>(0.602-0.724) | <b>0.770</b><br>(0.702-0.845) | <b>0.846</b><br>(0.770-0.928) | <b>0.930</b><br>(0.842-1.02)  | <b>0.988</b><br>(0.889-1.08)  | <b>1.04</b><br>(0.933-1.14)   | <b>1.09</b><br>(0.970-1.19)   | <b>1.14</b><br>(1.01-1.25)    | <b>1.17</b><br>(1.03-1.29)    |
| <b>15-min</b>                                                                                                  | <b>0.691</b><br>(0.631-0.759)              | <b>0.829</b><br>(0.756-0.910) | <b>0.974</b><br>(0.888-1.07)  | <b>1.07</b><br>(0.974-1.17)   | <b>1.18</b><br>(1.07-1.29)    | <b>1.25</b><br>(1.13-1.37)    | <b>1.32</b><br>(1.18-1.44)    | <b>1.37</b><br>(1.22-1.50)    | <b>1.43</b><br>(1.27-1.57)    | <b>1.46</b><br>(1.29-1.61)    |
| <b>30-min</b>                                                                                                  | <b>0.948</b><br>(0.865-1.04)               | <b>1.14</b><br>(1.05-1.26)    | <b>1.38</b><br>(1.26-1.52)    | <b>1.55</b><br>(1.41-1.70)    | <b>1.75</b><br>(1.58-1.91)    | <b>1.88</b><br>(1.70-2.06)    | <b>2.02</b><br>(1.81-2.21)    | <b>2.13</b><br>(1.91-2.34)    | <b>2.27</b><br>(2.02-2.50)    | <b>2.37</b><br>(2.09-2.61)    |
| <b>60-min</b>                                                                                                  | <b>1.18</b><br>(1.08-1.30)                 | <b>1.44</b><br>(1.31-1.58)    | <b>1.77</b><br>(1.62-1.95)    | <b>2.02</b><br>(1.84-2.21)    | <b>2.33</b><br>(2.11-2.55)    | <b>2.55</b><br>(2.30-2.80)    | <b>2.78</b><br>(2.49-3.04)    | <b>2.99</b><br>(2.67-3.28)    | <b>3.26</b><br>(2.89-3.58)    | <b>3.46</b><br>(3.05-3.81)    |
| <b>2-hr</b>                                                                                                    | <b>1.41</b><br>(1.27-1.56)                 | <b>1.71</b><br>(1.55-1.90)    | <b>2.12</b><br>(1.92-2.36)    | <b>2.44</b><br>(2.19-2.71)    | <b>2.86</b><br>(2.55-3.17)    | <b>3.19</b><br>(2.83-3.53)    | <b>3.52</b><br>(3.11-3.89)    | <b>3.85</b><br>(3.37-4.26)    | <b>4.29</b><br>(3.72-4.75)    | <b>4.63</b><br>(3.98-5.13)    |
| <b>3-hr</b>                                                                                                    | <b>1.53</b><br>(1.38-1.71)                 | <b>1.86</b><br>(1.68-2.07)    | <b>2.32</b><br>(2.08-2.58)    | <b>2.66</b><br>(2.39-2.96)    | <b>3.12</b><br>(2.79-3.46)    | <b>3.48</b><br>(3.09-3.85)    | <b>3.84</b><br>(3.39-4.25)    | <b>4.20</b><br>(3.68-4.65)    | <b>4.68</b><br>(4.06-5.19)    | <b>5.05</b><br>(4.34-5.61)    |
| <b>6-hr</b>                                                                                                    | <b>1.90</b><br>(1.72-2.12)                 | <b>2.30</b><br>(2.08-2.56)    | <b>2.85</b><br>(2.57-3.18)    | <b>3.30</b><br>(2.96-3.67)    | <b>3.91</b><br>(3.49-4.34)    | <b>4.41</b><br>(3.91-4.88)    | <b>4.93</b><br>(4.33-5.45)    | <b>5.47</b><br>(4.76-6.04)    | <b>6.22</b><br>(5.34-6.88)    | <b>6.81</b><br>(5.77-7.54)    |
| <b>12-hr</b>                                                                                                   | <b>2.31</b><br>(2.08-2.59)                 | <b>2.78</b><br>(2.51-3.13)    | <b>3.47</b><br>(3.13-3.89)    | <b>4.04</b><br>(3.62-4.52)    | <b>4.86</b><br>(4.32-5.42)    | <b>5.55</b><br>(4.88-6.16)    | <b>6.29</b><br>(5.47-6.99)    | <b>7.08</b><br>(6.09-7.85)    | <b>8.22</b><br>(6.93-9.12)    | <b>9.15</b><br>(7.60-10.1)    |
| <b>24-hr</b>                                                                                                   | <b>2.69</b><br>(2.47-2.96)                 | <b>3.24</b><br>(2.97-3.56)    | <b>4.06</b><br>(3.71-4.46)    | <b>4.74</b><br>(4.32-5.19)    | <b>5.72</b><br>(5.19-6.26)    | <b>6.54</b><br>(5.90-7.15)    | <b>7.42</b><br>(6.66-8.10)    | <b>8.37</b><br>(7.47-9.13)    | <b>9.75</b><br>(8.61-10.6)    | <b>10.9</b><br>(9.53-11.9)    |
| <b>2-day</b>                                                                                                   | <b>3.13</b><br>(2.85-3.45)                 | <b>3.77</b><br>(3.43-4.16)    | <b>4.73</b><br>(4.30-5.22)    | <b>5.50</b><br>(4.99-6.07)    | <b>6.60</b><br>(5.96-7.27)    | <b>7.51</b><br>(6.75-8.26)    | <b>8.47</b><br>(7.58-9.32)    | <b>9.49</b><br>(8.44-10.4)    | <b>11.0</b><br>(9.65-12.0)    | <b>12.1</b><br>(10.6-13.4)    |
| <b>3-day</b>                                                                                                   | <b>3.29</b><br>(3.00-3.64)                 | <b>3.97</b><br>(3.62-4.39)    | <b>4.97</b><br>(4.52-5.49)    | <b>5.77</b><br>(5.24-6.38)    | <b>6.92</b><br>(6.25-7.62)    | <b>7.86</b><br>(7.07-8.65)    | <b>8.85</b><br>(7.92-9.74)    | <b>9.91</b><br>(8.81-10.9)    | <b>11.4</b><br>(10.1-12.6)    | <b>12.6</b><br>(11.1-13.9)    |
| <b>4-day</b>                                                                                                   | <b>3.46</b><br>(3.15-3.84)                 | <b>4.17</b><br>(3.80-4.62)    | <b>5.21</b><br>(4.74-5.76)    | <b>6.05</b><br>(5.49-6.68)    | <b>7.23</b><br>(6.53-7.98)    | <b>8.21</b><br>(7.38-9.05)    | <b>9.24</b><br>(8.27-10.2)    | <b>10.3</b><br>(9.19-11.4)    | <b>11.9</b><br>(10.5-13.1)    | <b>13.1</b><br>(11.5-14.5)    |
| <b>7-day</b>                                                                                                   | <b>4.06</b><br>(3.72-4.44)                 | <b>4.86</b><br>(4.46-5.32)    | <b>6.00</b><br>(5.50-6.58)    | <b>6.94</b><br>(6.34-7.60)    | <b>8.28</b><br>(7.54-9.04)    | <b>9.38</b><br>(8.50-10.2)    | <b>10.5</b><br>(9.51-11.5)    | <b>11.8</b><br>(10.6-12.8)    | <b>13.5</b><br>(12.0-14.8)    | <b>15.0</b><br>(13.2-16.4)    |
| <b>10-day</b>                                                                                                  | <b>4.63</b><br>(4.27-5.03)                 | <b>5.53</b><br>(5.09-6.01)    | <b>6.73</b><br>(6.20-7.32)    | <b>7.70</b><br>(7.07-8.36)    | <b>9.04</b><br>(8.28-9.81)    | <b>10.1</b><br>(9.24-11.0)    | <b>11.2</b><br>(10.2-12.2)    | <b>12.4</b><br>(11.2-13.4)    | <b>14.0</b><br>(12.6-15.2)    | <b>15.3</b><br>(13.7-16.7)    |
| <b>20-day</b>                                                                                                  | <b>6.25</b><br>(5.81-6.74)                 | <b>7.42</b><br>(6.90-7.99)    | <b>8.84</b><br>(8.21-9.52)    | <b>9.96</b><br>(9.24-10.7)    | <b>11.5</b><br>(10.6-12.3)    | <b>12.6</b><br>(11.7-13.6)    | <b>13.8</b><br>(12.7-14.9)    | <b>15.0</b><br>(13.8-16.1)    | <b>16.6</b><br>(15.2-17.9)    | <b>17.9</b><br>(16.2-19.2)    |
| <b>30-day</b>                                                                                                  | <b>7.77</b><br>(7.30-8.29)                 | <b>9.16</b><br>(8.61-9.77)    | <b>10.7</b><br>(10.0-11.4)    | <b>11.8</b><br>(11.1-12.6)    | <b>13.4</b><br>(12.5-14.3)    | <b>14.5</b><br>(13.6-15.5)    | <b>15.7</b><br>(14.6-16.7)    | <b>16.8</b><br>(15.6-17.9)    | <b>18.3</b><br>(16.9-19.5)    | <b>19.3</b><br>(17.8-20.7)    |
| <b>45-day</b>                                                                                                  | <b>9.86</b><br>(9.33-10.5)                 | <b>11.6</b><br>(11.0-12.3)    | <b>13.3</b><br>(12.6-14.1)    | <b>14.6</b><br>(13.8-15.5)    | <b>16.2</b><br>(15.3-17.2)    | <b>17.5</b><br>(16.5-18.5)    | <b>18.6</b><br>(17.5-19.7)    | <b>19.7</b><br>(18.5-20.8)    | <b>21.0</b><br>(19.7-22.3)    | <b>22.0</b><br>(20.5-23.3)    |
| <b>60-day</b>                                                                                                  | <b>11.8</b><br>(11.2-12.5)                 | <b>13.8</b><br>(13.1-14.6)    | <b>15.8</b><br>(15.0-16.7)    | <b>17.3</b><br>(16.4-18.2)    | <b>19.1</b><br>(18.1-20.1)    | <b>20.4</b><br>(19.3-21.5)    | <b>21.6</b><br>(20.4-22.8)    | <b>22.7</b><br>(21.4-24.0)    | <b>24.1</b><br>(22.7-25.5)    | <b>25.1</b><br>(23.6-26.6)    |

<sup>1</sup> Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

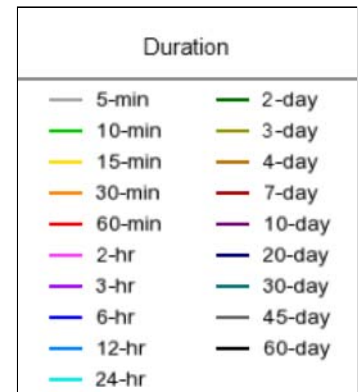
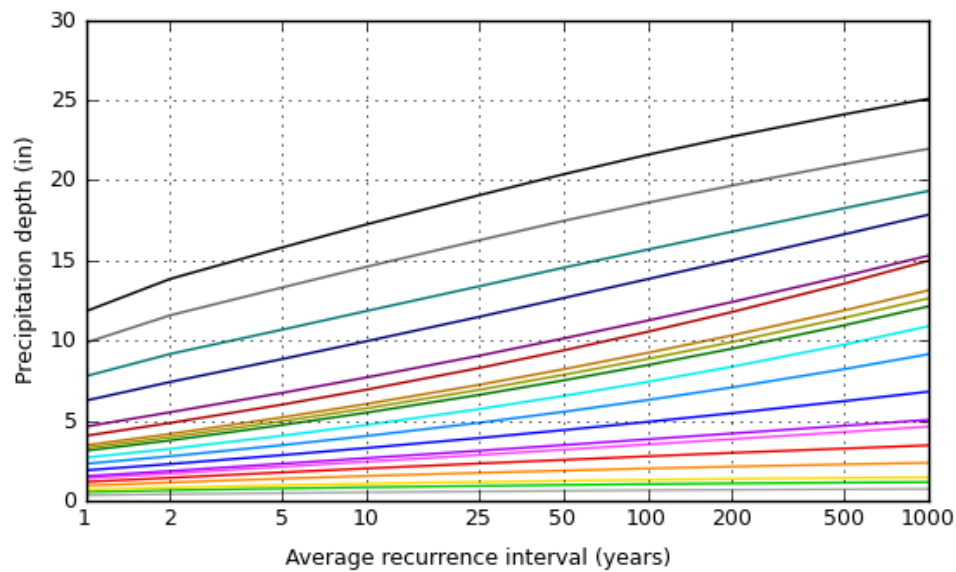
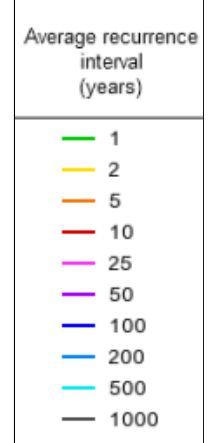
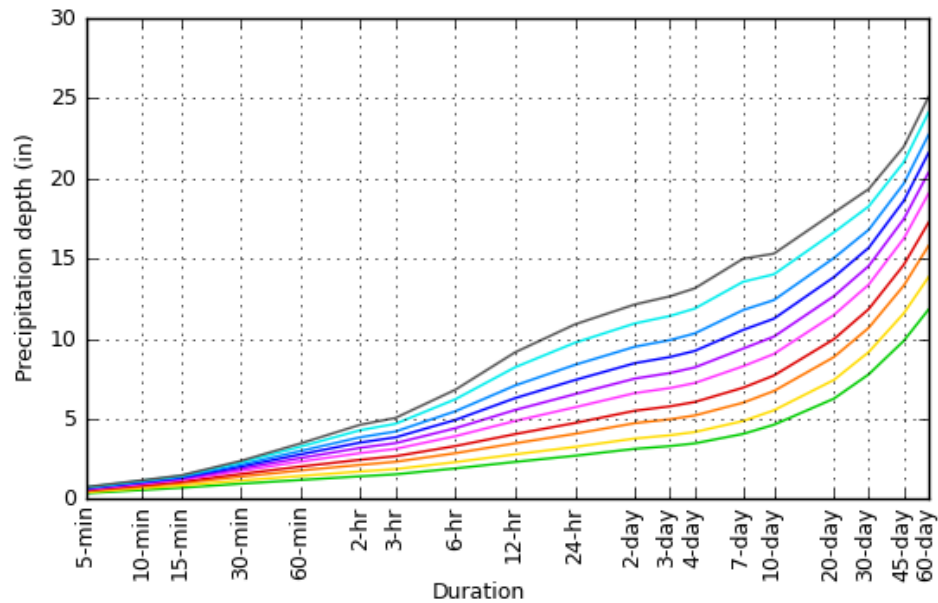
Please refer to NOAA Atlas 14 document for more information.

[Back to Top](#)

## PF graphical

### PDS-based depth-duration-frequency (DDF) curves

Latitude: 40.1008°, Longitude: -75.6968°



NOAA Atlas 14, Volume 2, Version 3

Created (GMT): Mon Jan 15 18:33:45 2018

[Back to Top](#)

## Maps & aerials

Small scale terrain



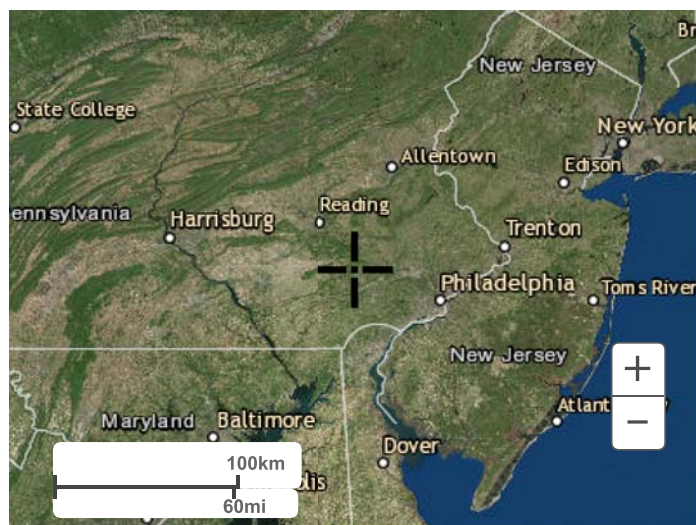
Large scale terrain



Large scale map



Large scale aerial



[Back to Top](#)

---

[US Department of Commerce](#)  
[National Oceanic and Atmospheric Administration](#)  
[National Weather Service](#)  
[National Water Center](#)  
1325 East West Highway  
Silver Spring, MD 20910  
Questions?: [HDSC.Questions@noaa.gov](mailto:HDSC.Questions@noaa.gov)

[Disclaimer](#)

# Hydrograph Return Period Recap

Hydraflow Hydrographs by Intelisolve v9.24

| Hyd. No.                 | Hydrograph type (origin) | Inflow Hyd(s) | Peak Outflow (cfs) |       |       |       |       |       |       |                       | Hydrograph description                  |
|--------------------------|--------------------------|---------------|--------------------|-------|-------|-------|-------|-------|-------|-----------------------|-----------------------------------------|
|                          |                          |               | 1-Yr               | 2-Yr  | 3-Yr  | 5-Yr  | 10-Yr | 25-Yr | 50-Yr | 100-Yr                |                                         |
| 1                        | SCS Runoff               | -----         | 2.575              | 8.092 | ----- | 20.32 | 32.79 | 52.98 | 71.44 | 92.60                 | Pre Dev Area                            |
| 2                        | SCS Runoff               | -----         | 0.000              | 0.000 | ----- | 0.000 | 0.022 | 0.092 | 0.298 | 1.090                 | Pre Undisturbed / Offsite north of lots |
| 3                        | Combine                  | 1, 2          | 2.575              | 8.092 | ----- | 20.32 | 32.79 | 52.98 | 71.46 | 93.23                 | Total Pre Dev Area                      |
| 5                        | SCS Runoff               | -----         | 0.373              | 2.897 | ----- | 10.03 | 18.00 | 31.16 | 43.36 | 57.41                 | POST TO SWM #1                          |
| 6                        | Reservoir                | 5             | 0.299              | 0.869 | ----- | 1.397 | 6.228 | 23.74 | 37.67 | 52.58                 | SWM Discharge                           |
| 9                        | SCS Runoff               | -----         | 5.695              | 11.54 | ----- | 22.36 | 32.49 | 48.40 | 62.73 | 78.96                 | POST TO SWM #2                          |
| 10                       | Reservoir                | 9             | 0.120              | 0.143 | ----- | 0.175 | 1.228 | 4.388 | 11.57 | 23.17                 | SWM #2 Discharge                        |
| 12                       | SCS Runoff               | -----         | 1.694              | 2.388 | ----- | 3.492 | 4.462 | 5.892 | 7.103 | 8.409                 | Post Dev Undetained Area                |
| 13                       | Combine                  | 6, 10, 12     | 1.702              | 2.531 | ----- | 4.415 | 6.976 | 25.49 | 41.29 | 56.82                 | Total Post Dev Discharge                |
| Proj. file: 4272-SWM.gpw |                          |               |                    |       |       |       |       |       |       | Thursday, Feb 1, 2018 |                                         |

# Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.24

| Hyd. No.     | Hydrograph type (origin) | Peak flow (cfs) | Time interval (min) | Time to peak (min) | Hyd. volume (cuft)    | Inflow hyd(s) | Maximum elevation (ft) | Total strge used (cuft) | Hydrograph description                  |
|--------------|--------------------------|-----------------|---------------------|--------------------|-----------------------|---------------|------------------------|-------------------------|-----------------------------------------|
| 1            | SCS Runoff               | 2.575           | 2                   | 728                | 19,466                | -----         | -----                  | -----                   | Pre Dev Area                            |
| 2            | SCS Runoff               | 0.000           | 2                   | n/a                | 0                     | -----         | -----                  | -----                   | Pre Undisturbed / Offsite north of lots |
| 3            | Combine                  | 2.575           | 2                   | 728                | 19,466                | 1, 2          | -----                  | -----                   | Total Pre Dev Area                      |
| 5            | SCS Runoff               | 0.373           | 2                   | 728                | 6,669                 | -----         | -----                  | -----                   | POST TO SWM #1                          |
| 6            | Reservoir                | 0.299           | 2                   | 756                | 6,665                 | 5             | 527.36                 | 362                     | SWM Discharge                           |
| 9            | SCS Runoff               | 5.695           | 2                   | 728                | 26,982                | -----         | -----                  | -----                   | POST TO SWM #2                          |
| 10           | Reservoir                | 0.120           | 2                   | 1454               | 25,926                | 9             | 520.44                 | 22,057                  | SWM #2 Discharge                        |
| 12           | SCS Runoff               | 1.694           | 2                   | 718                | 3,390                 | -----         | -----                  | -----                   | Post Dev Undetained Area                |
| 13           | Combine                  | 1.702           | 2                   | 718                | 35,982                | 6, 10, 12     | -----                  | -----                   | Total Post Dev Discharge                |
| 4272-SWM.gpw |                          |                 |                     |                    | Return Period: 1 Year |               |                        | Thursday, Feb 1, 2018   |                                         |



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.24

Thursday, Feb 1, 2018

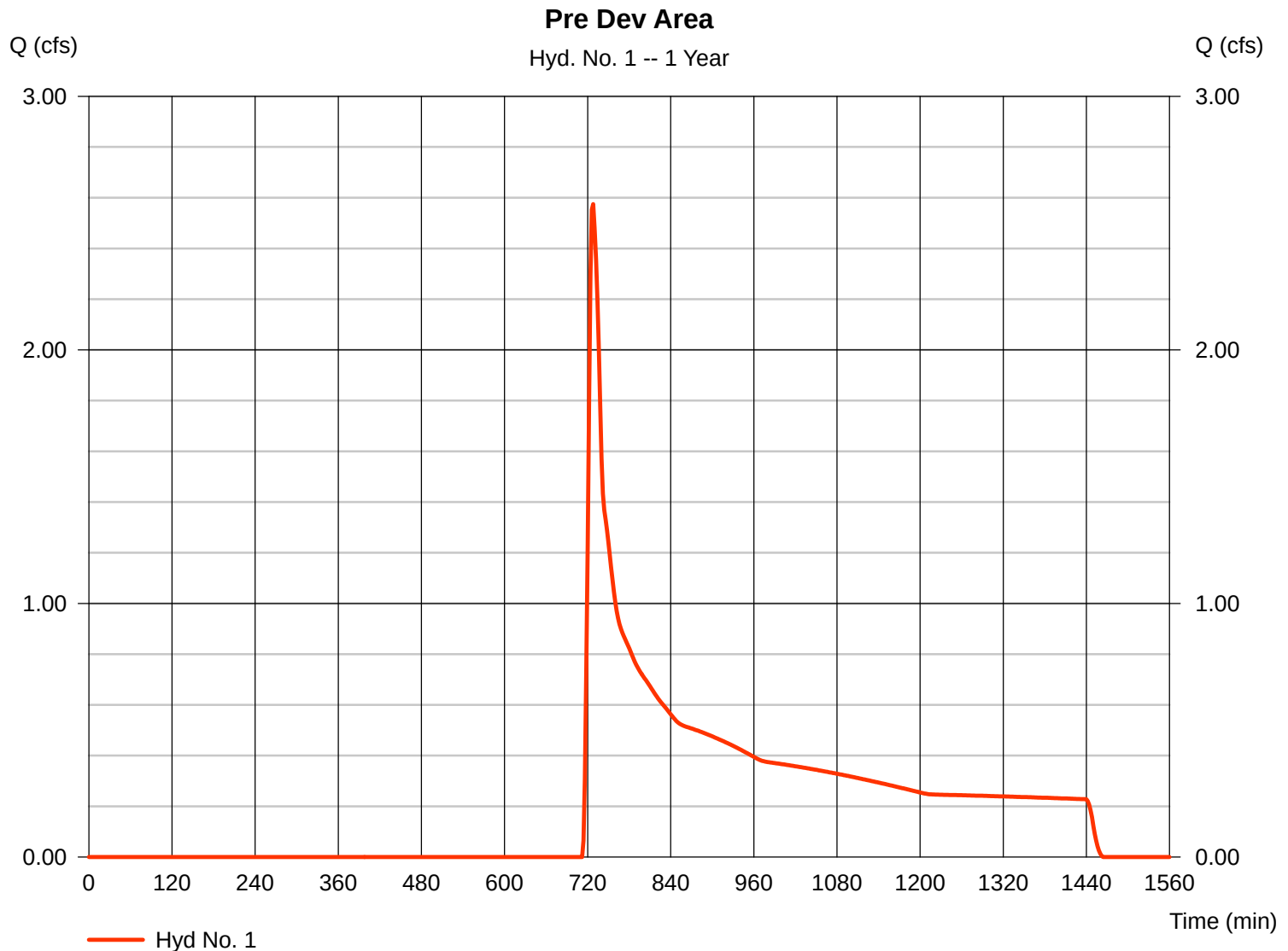
## Hyd. No. 1

### Pre Dev Area

Hydrograph type = SCS Runoff  
 Storm frequency = 1 yrs  
 Time interval = 2 min  
 Drainage area = 26.840 ac  
 Basin Slope = 0.0 %  
 Tc method = USER  
 Total precip. = 2.69 in  
 Storm duration = 24 hrs

Peak discharge = 2.575 cfs  
 Time to peak = 728 min  
 Hyd. volume = 19,466 cuft  
 Curve number = 59\*  
 Hydraulic length = 0 ft  
 Time of conc. (Tc) = 14.72 min  
 Distribution = Type II  
 Shape factor = 484

\* Composite (Area/CN) =  $[(26.420 \times 58) + (0.420 \times 98)] / 26.840$



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.24

Thursday, Feb 1, 2018

## Hyd. No. 2

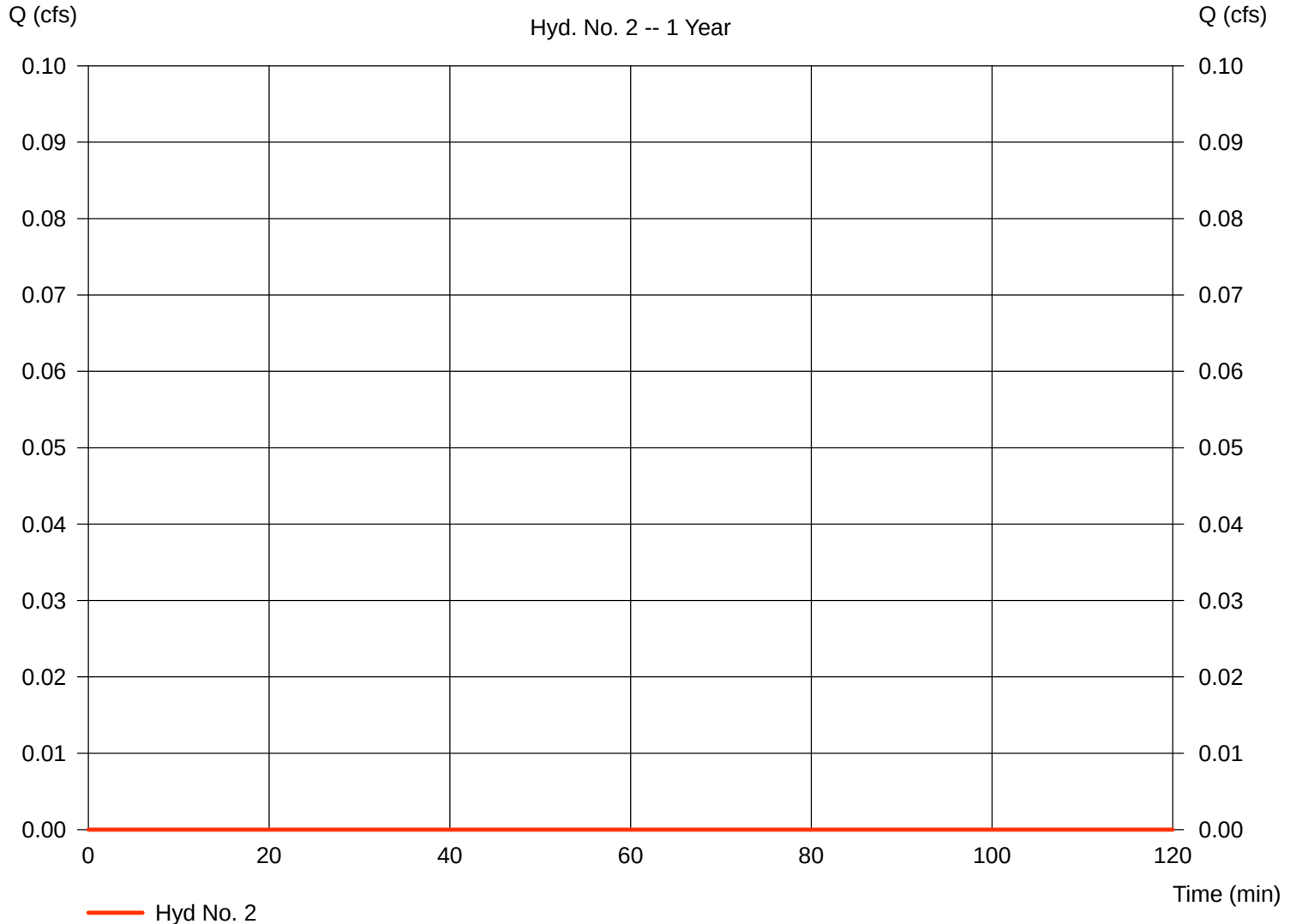
Pre Undisturbed / Offsite north of lots

Hydrograph type = SCS Runoff  
 Storm frequency = 1 yrs  
 Time interval = 2 min  
 Drainage area = 9.590 ac  
 Basin Slope = 0.0 %  
 Tc method = USER  
 Total precip. = 2.69 in  
 Storm duration = 24 hrs

Peak discharge = 0.000 cfs  
 Time to peak = n/a  
 Hyd. volume = 0 cuft  
 Curve number = 32\*  
 Hydraulic length = 0 ft  
 Time of conc. (Tc) = 15.56 min  
 Distribution = Type II  
 Shape factor = 484

\* Composite (Area/CN) =  $[(9.340 \times 30) + (0.250 \times 98)] / 9.590$

### Pre Undisturbed / Offsite north of lots



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.24

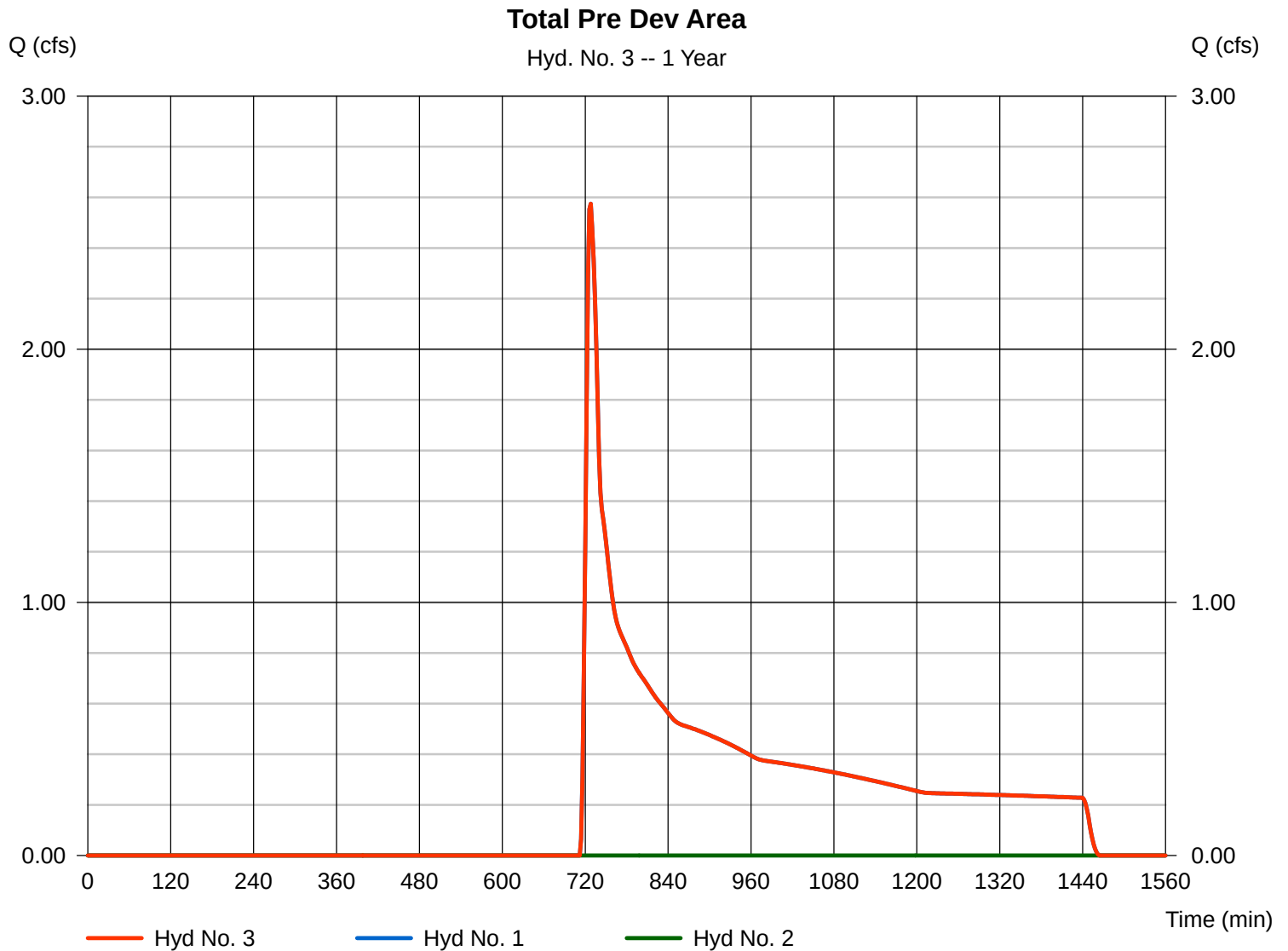
Thursday, Feb 1, 2018

## Hyd. No. 3

Total Pre Dev Area

Hydrograph type = Combine  
 Storm frequency = 1 yrs  
 Time interval = 2 min  
 Inflow hyds. = 1, 2

Peak discharge = 2.575 cfs  
 Time to peak = 728 min  
 Hyd. volume = 19,466 cuft  
 Contrib. drain. area = 36.430 ac



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.24

Thursday, Feb 1, 2018

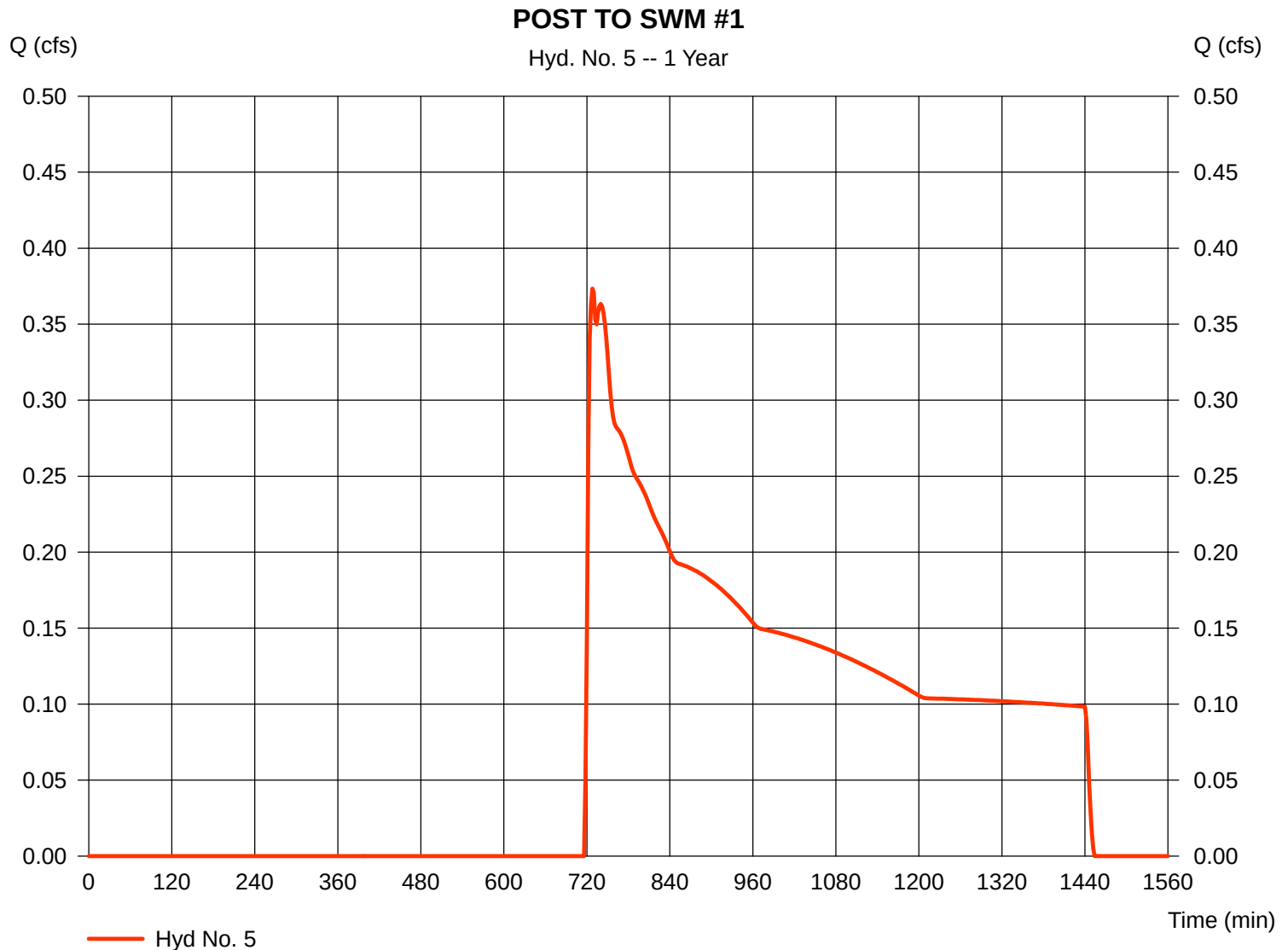
## Hyd. No. 5

### POST TO SWM #1

Hydrograph type = SCS Runoff  
 Storm frequency = 1 yrs  
 Time interval = 2 min  
 Drainage area = 15.290 ac  
 Basin Slope = 0.0 %  
 Tc method = USER  
 Total precip. = 2.69 in  
 Storm duration = 24 hrs

Peak discharge = 0.373 cfs  
 Time to peak = 728 min  
 Hyd. volume = 6,669 cuft  
 Curve number = 55\*  
 Hydraulic length = 0 ft  
 Time of conc. (Tc) = 8.80 min  
 Distribution = Type II  
 Shape factor = 484

\* Composite (Area/CN) =  $[(0.250 \times 98) + (2.050 \times 39) + (4.090 \times 30) + (1.990 \times 98) + (5.880 \times 61) + (1.030 \times 55)] / 15.290$



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.24

Thursday, Feb 1, 2018

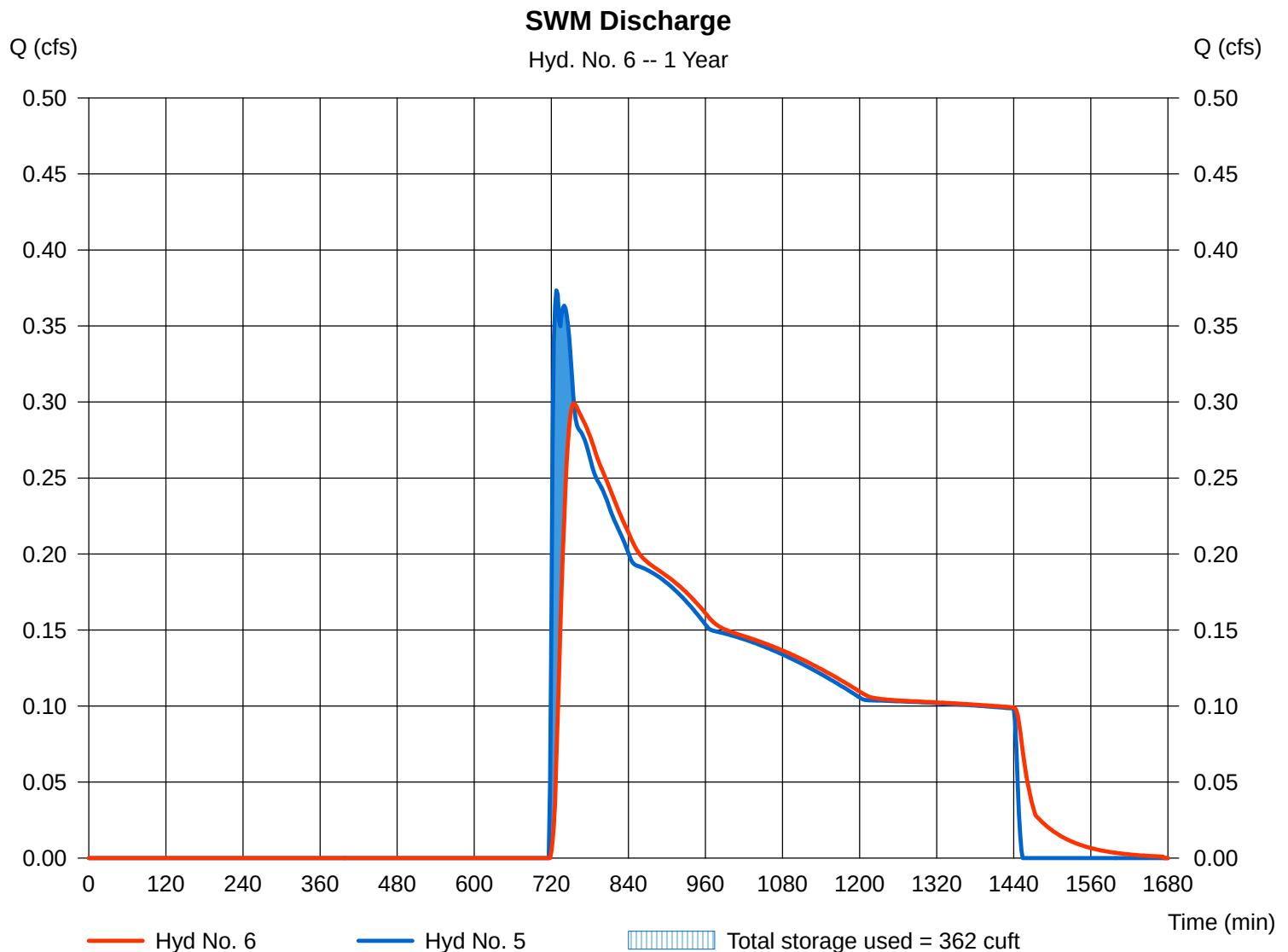
## Hyd. No. 6

### SWM Discharge

Hydrograph type = Reservoir  
 Storm frequency = 1 yrs  
 Time interval = 2 min  
 Inflow hyd. No. = 5 - POST TO SWM #1  
 Reservoir name = SWM 1

Peak discharge = 0.299 cfs  
 Time to peak = 756 min  
 Hyd. volume = 6,665 cuft  
 Max. Elevation = 527.36 ft  
 Max. Storage = 362 cuft

Storage Indication method used.



# Pond Report

Hydraflow Hydrographs by Intelisolve v9.24

Thursday, Feb 1, 2018

## Pond No. 2 - SWM 1

### Pond Data

**Contours** - User-defined contour areas. Conic method used for volume calculation. Beginning Elevation = 527.00 ft

### Stage / Storage Table

| Stage (ft) | Elevation (ft) | Contour area (sqft) | Incr. Storage (cuft) | Total storage (cuft) |
|------------|----------------|---------------------|----------------------|----------------------|
| 0.00       | 527.00         | 00                  | 0                    | 0                    |
| 1.00       | 528.00         | 3,022               | 1,007                | 1,007                |
| 2.00       | 529.00         | 4,126               | 3,559                | 4,567                |
| 3.00       | 530.00         | 5,230               | 4,667                | 9,233                |
| 4.00       | 531.00         | 6,412               | 5,810                | 15,044               |
| 5.00       | 532.00         | 7,594               | 6,994                | 22,038               |

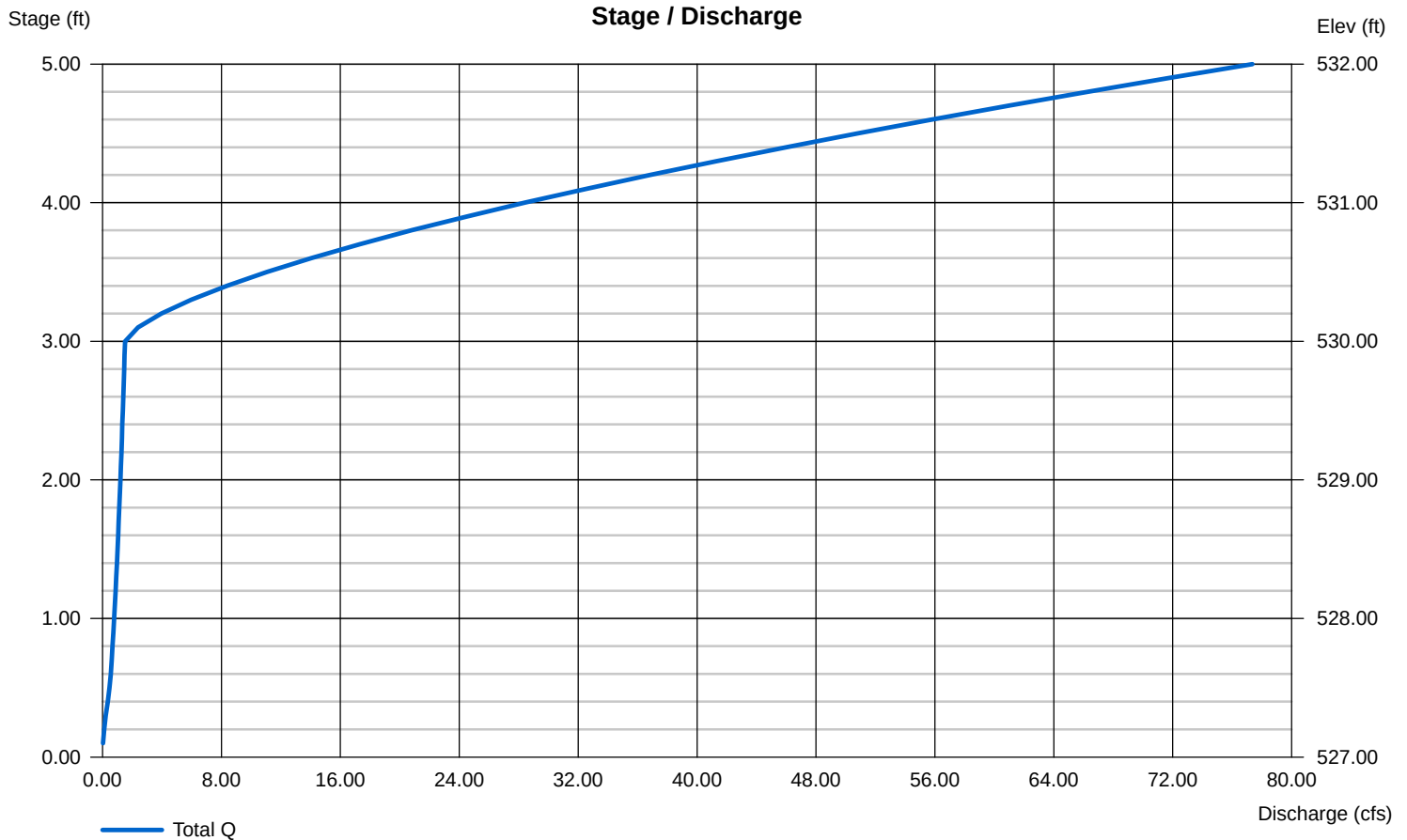
### Culvert / Orifice Structures

|                 | [A]      | [B]    | [C]  | [PrfRsr] |
|-----------------|----------|--------|------|----------|
| Rise (in)       | = 36.00  | 6.00   | 0.00 | 0.00     |
| Span (in)       | = 36.00  | 6.00   | 0.00 | 0.00     |
| No. Barrels     | = 1      | 1      | 0    | 0        |
| Invert El. (ft) | = 527.00 | 527.00 | 0.00 | 0.00     |
| Length (ft)     | = 125.00 | 0.00   | 0.00 | 0.00     |
| Slope (%)       | = 1.00   | 0.00   | 0.00 | n/a      |
| N-Value         | = .013   | .013   | .013 | n/a      |
| Orifice Coeff.  | = 0.60   | 0.60   | 0.60 | 0.60     |
| Multi-Stage     | = n/a    | Yes    | No   | No       |

### Weir Structures

|                | [A]                   | [B]  | [C]  | [D]  |
|----------------|-----------------------|------|------|------|
| Crest Len (ft) | = 8.00                | 0.00 | 0.00 | 0.00 |
| Crest El. (ft) | = 530.00              | 0.00 | 0.00 | 0.00 |
| Weir Coeff.    | = 3.33                | 3.33 | 3.33 | 3.33 |
| Weir Type      | = Rect                | ---  | ---  | ---  |
| Multi-Stage    | = No                  | No   | No   | No   |
| Exfil.(in/hr)  | = 0.000 (by Wet area) |      |      |      |
| TW Elev. (ft)  | = 0.00                |      |      |      |

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).





# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.24

Thursday, Feb 1, 2018

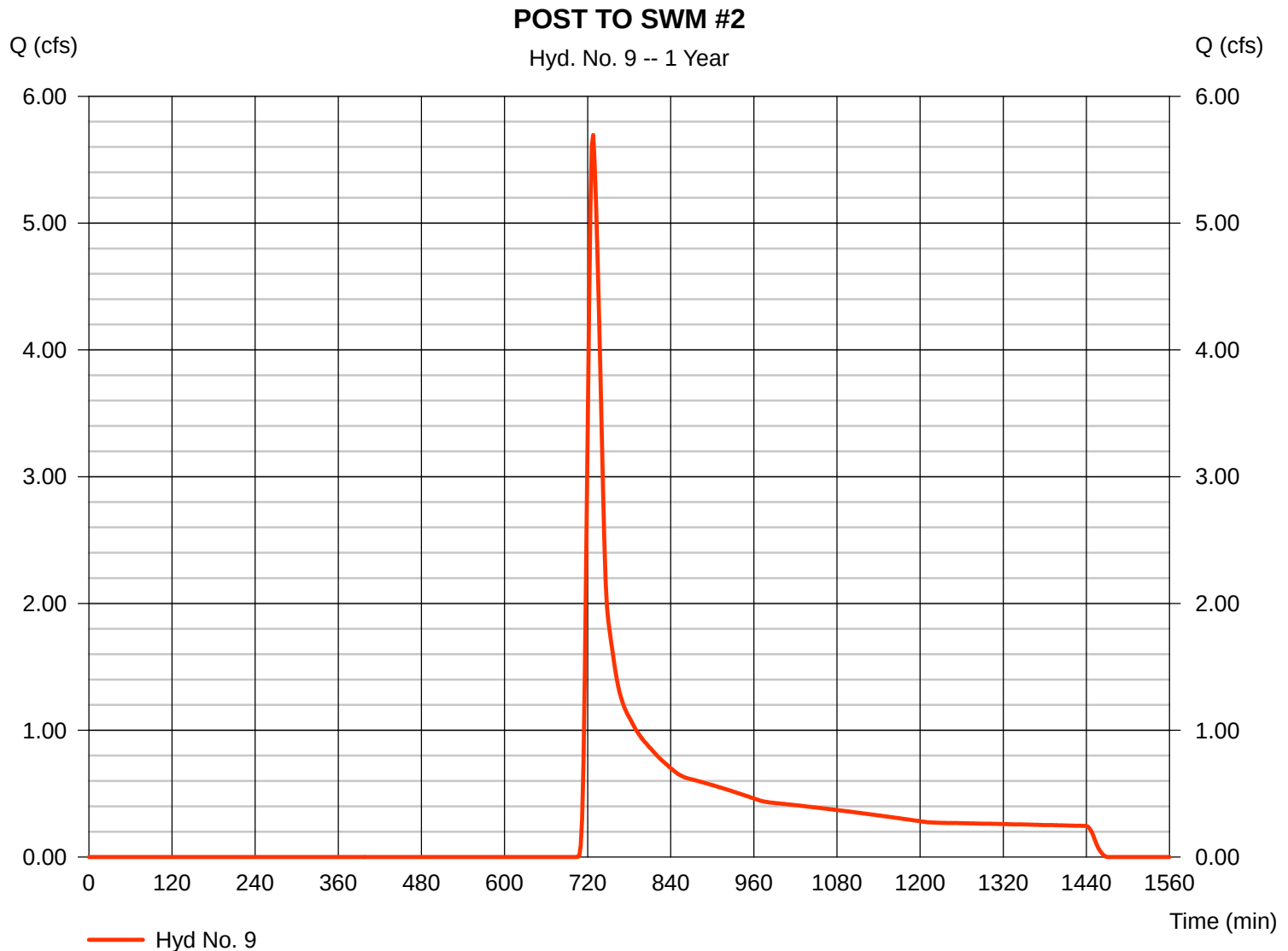
## Hyd. No. 9

### POST TO SWM #2

Hydrograph type = SCS Runoff  
 Storm frequency = 1 yrs  
 Time interval = 2 min  
 Drainage area = 19.990 ac  
 Basin Slope = 0.0 %  
 Tc method = USER  
 Total precip. = 2.69 in  
 Storm duration = 24 hrs

Peak discharge = 5.695 cfs  
 Time to peak = 728 min  
 Hyd. volume = 26,982 cuft  
 Curve number = 65\*  
 Hydraulic length = 0 ft  
 Time of conc. (Tc) = 17.00 min  
 Distribution = Type II  
 Shape factor = 484

\* Composite (Area/CN) =  $[(2.170 \times 39) + (0.530 \times 30) + (4.290 \times 98) + (8.920 \times 61) + (4.080 \times 58)] / 19.990$



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.24

Thursday, Feb 1, 2018

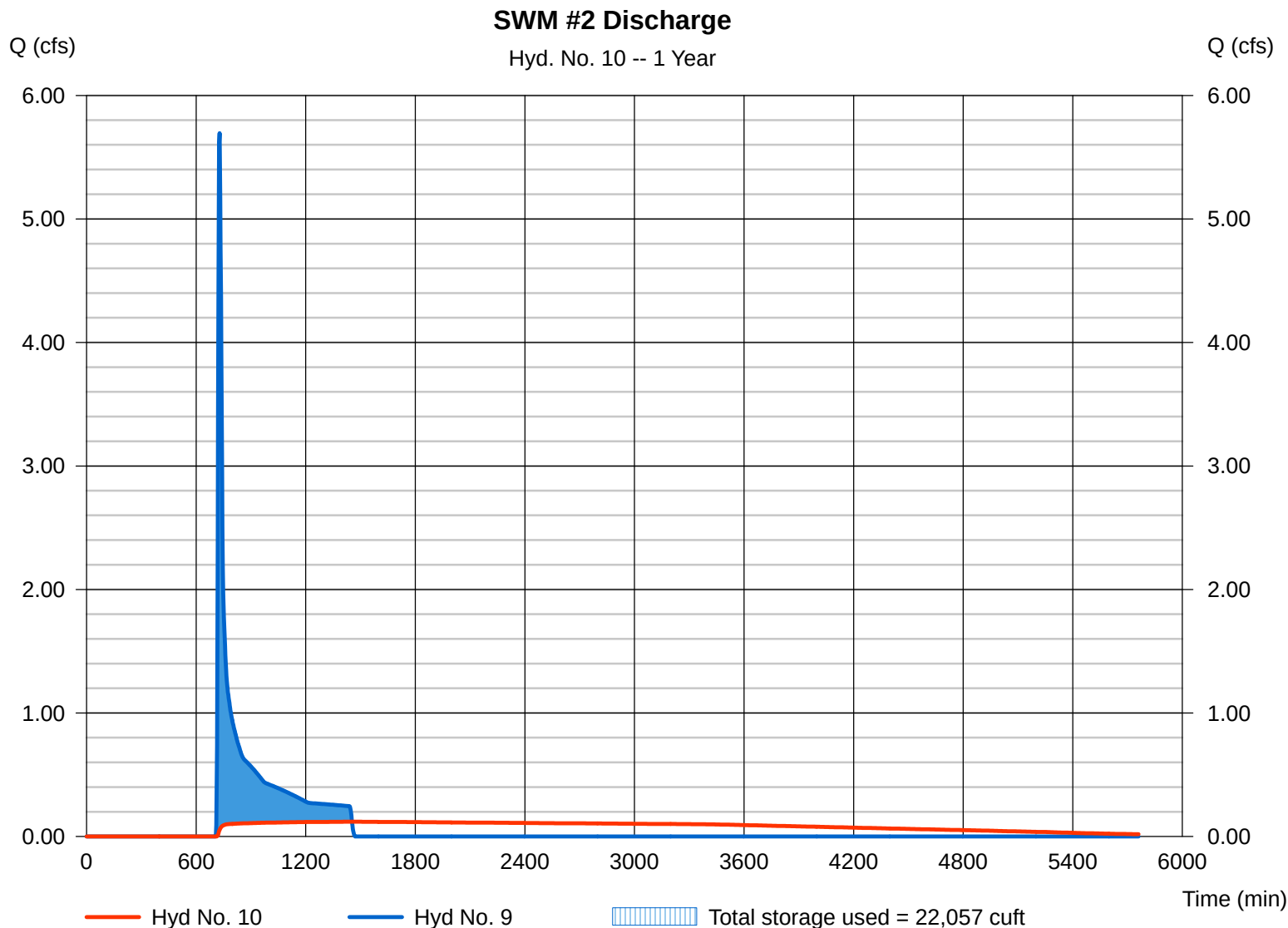
## Hyd. No. 10

### SWM #2 Discharge

Hydrograph type = Reservoir  
 Storm frequency = 1 yrs  
 Time interval = 2 min  
 Inflow hyd. No. = 9 - POST TO SWM #2  
 Reservoir name = SWM 2

Peak discharge = 0.120 cfs  
 Time to peak = 1454 min  
 Hyd. volume = 25,926 cuft  
 Max. Elevation = 520.44 ft  
 Max. Storage = 22,057 cuft

Storage Indication method used.



# Pond Report

## Pond No. 3 - SWM 2

### Pond Data

**Contours** - User-defined contour areas. Conic method used for volume calculation. Beginning Elevation = 519.00 ft

### Stage / Storage Table

| Stage (ft) | Elevation (ft) | Contour area (sqft) | Incr. Storage (cuft) | Total storage (cuft) |
|------------|----------------|---------------------|----------------------|----------------------|
| 0.00       | 519.00         | 00                  | 0                    | 0                    |
| 1.00       | 520.00         | 27,580              | 9,192                | 9,192                |
| 2.00       | 521.00         | 31,460              | 29,496               | 38,688               |
| 3.00       | 522.00         | 35,340              | 33,378               | 72,066               |
| 4.00       | 523.00         | 38,924              | 37,114               | 109,180              |
| 5.00       | 524.00         | 42,508              | 40,699               | 149,879              |

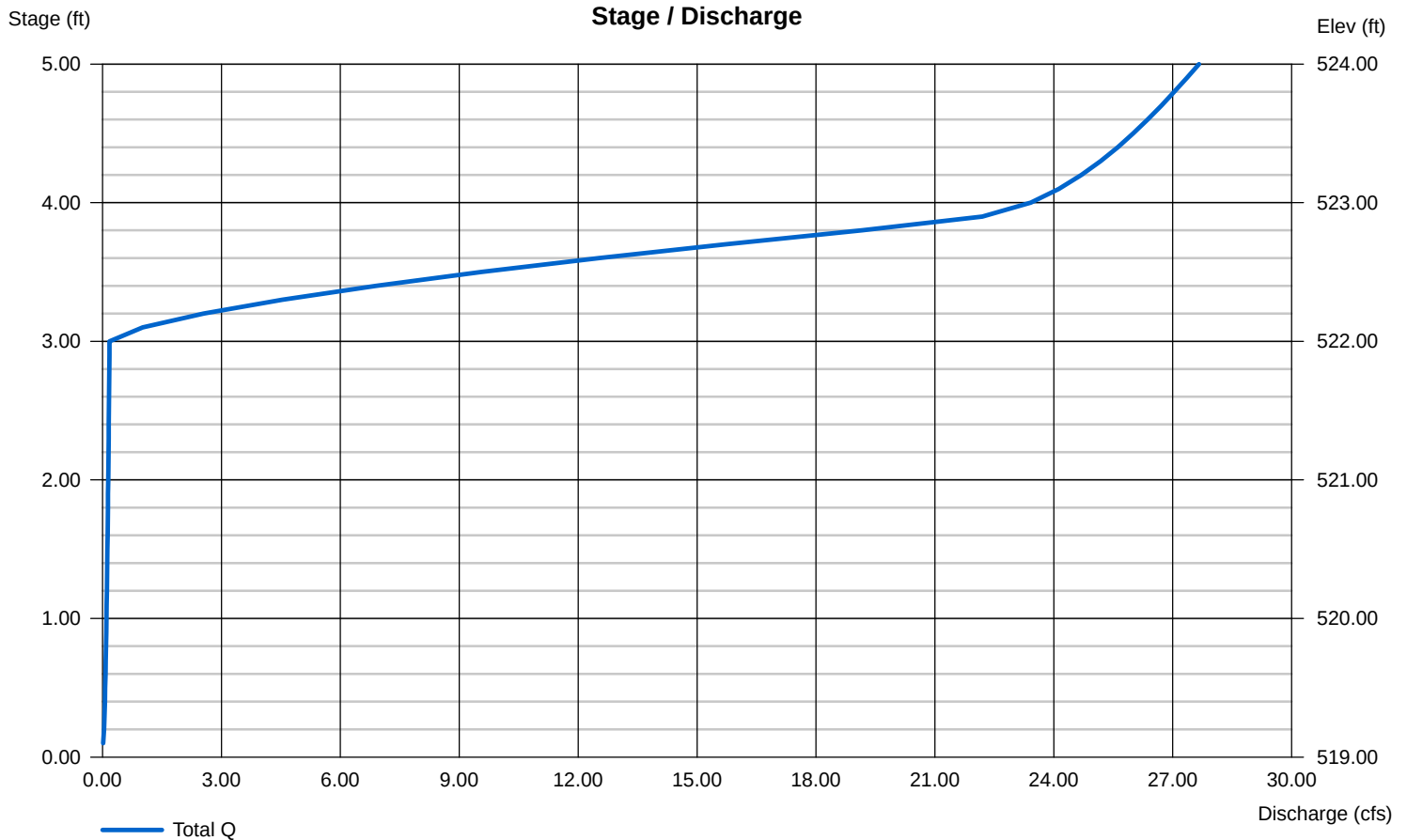
### Culvert / Orifice Structures

|                 | [A]      | [B]    | [C]  | [PrfRsr] |
|-----------------|----------|--------|------|----------|
| Rise (in)       | = 24.00  | 2.00   | 0.00 | 0.00     |
| Span (in)       | = 24.00  | 2.00   | 0.00 | 0.00     |
| No. Barrels     | = 1      | 1      | 0    | 0        |
| Invert El. (ft) | = 519.00 | 519.00 | 0.00 | 0.00     |
| Length (ft)     | = 226.00 | 0.00   | 0.00 | 0.00     |
| Slope (%)       | = 1.00   | 0.00   | 0.00 | n/a      |
| N-Value         | = .013   | .013   | .013 | n/a      |
| Orifice Coeff.  | = 0.60   | 0.60   | 0.60 | 0.60     |
| Multi-Stage     | = n/a    | Yes    | No   | No       |

### Weir Structures

|                | [A]                   | [B]  | [C]  | [D]  |
|----------------|-----------------------|------|------|------|
| Crest Len (ft) | = 8.00                | 0.00 | 0.00 | 0.00 |
| Crest El. (ft) | = 522.00              | 0.00 | 0.00 | 0.00 |
| Weir Coeff.    | = 3.33                | 3.33 | 3.33 | 3.33 |
| Weir Type      | = Rect                | ---  | ---  | ---  |
| Multi-Stage    | = Yes                 | No   | No   | No   |
| Exfil.(in/hr)  | = 0.000 (by Wet area) |      |      |      |
| TW Elev. (ft)  | = 0.00                |      |      |      |

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.24

Thursday, Feb 1, 2018

## Hyd. No. 12

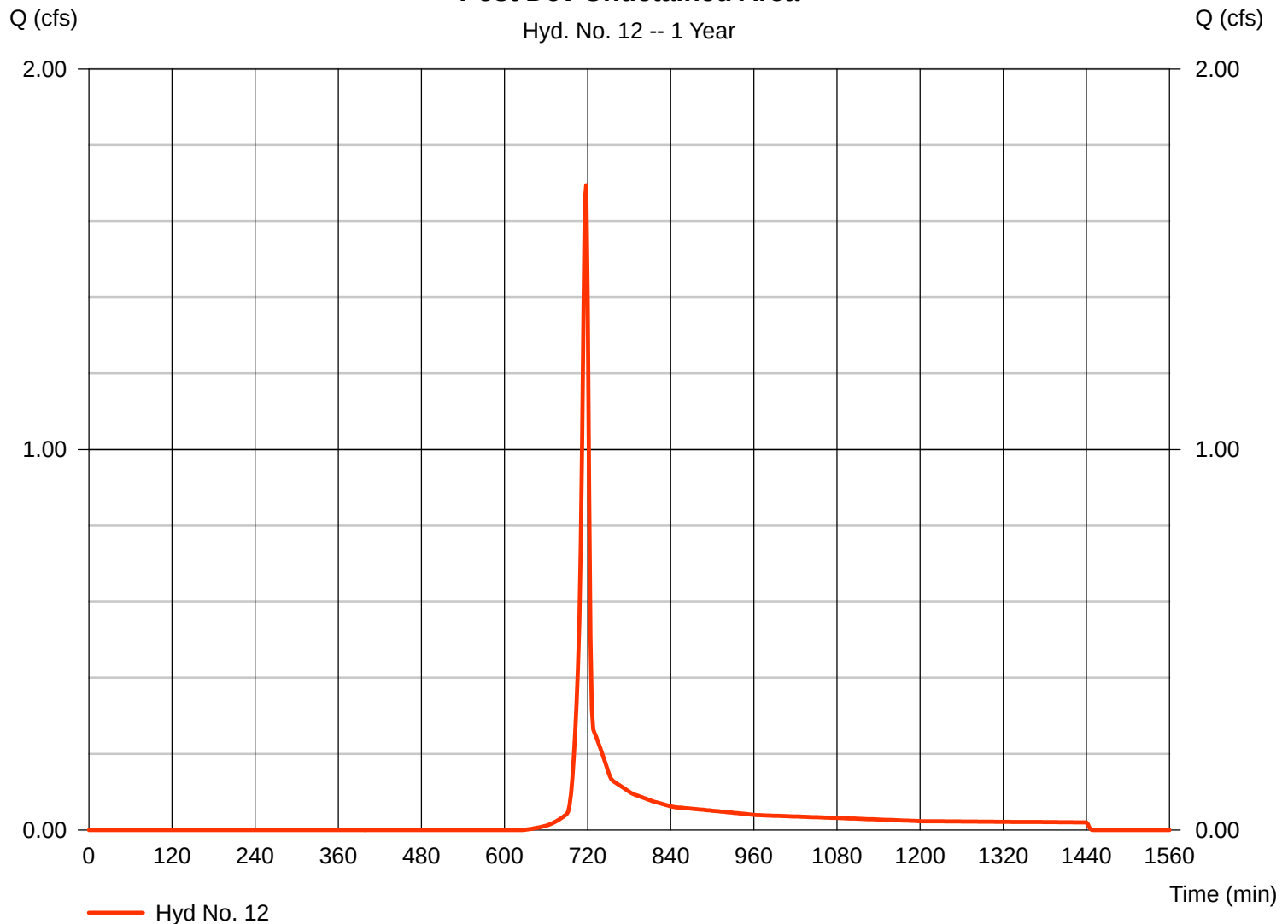
### Post Dev Undetained Area

Hydrograph type = SCS Runoff  
 Storm frequency = 1 yrs  
 Time interval = 2 min  
 Drainage area = 1.030 ac  
 Basin Slope = 0.0 %  
 Tc method = USER  
 Total precip. = 2.69 in  
 Storm duration = 24 hrs

Peak discharge = 1.694 cfs  
 Time to peak = 718 min  
 Hyd. volume = 3,390 cuft  
 Curve number = 79\*  
 Hydraulic length = 0 ft  
 Time of conc. (Tc) = 5.00 min  
 Distribution = Type II  
 Shape factor = 484

\* Composite (Area/CN) =  $[(0.540 \times 61) + (0.490 \times 98)] / 1.030$

### Post Dev Undetained Area



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.24

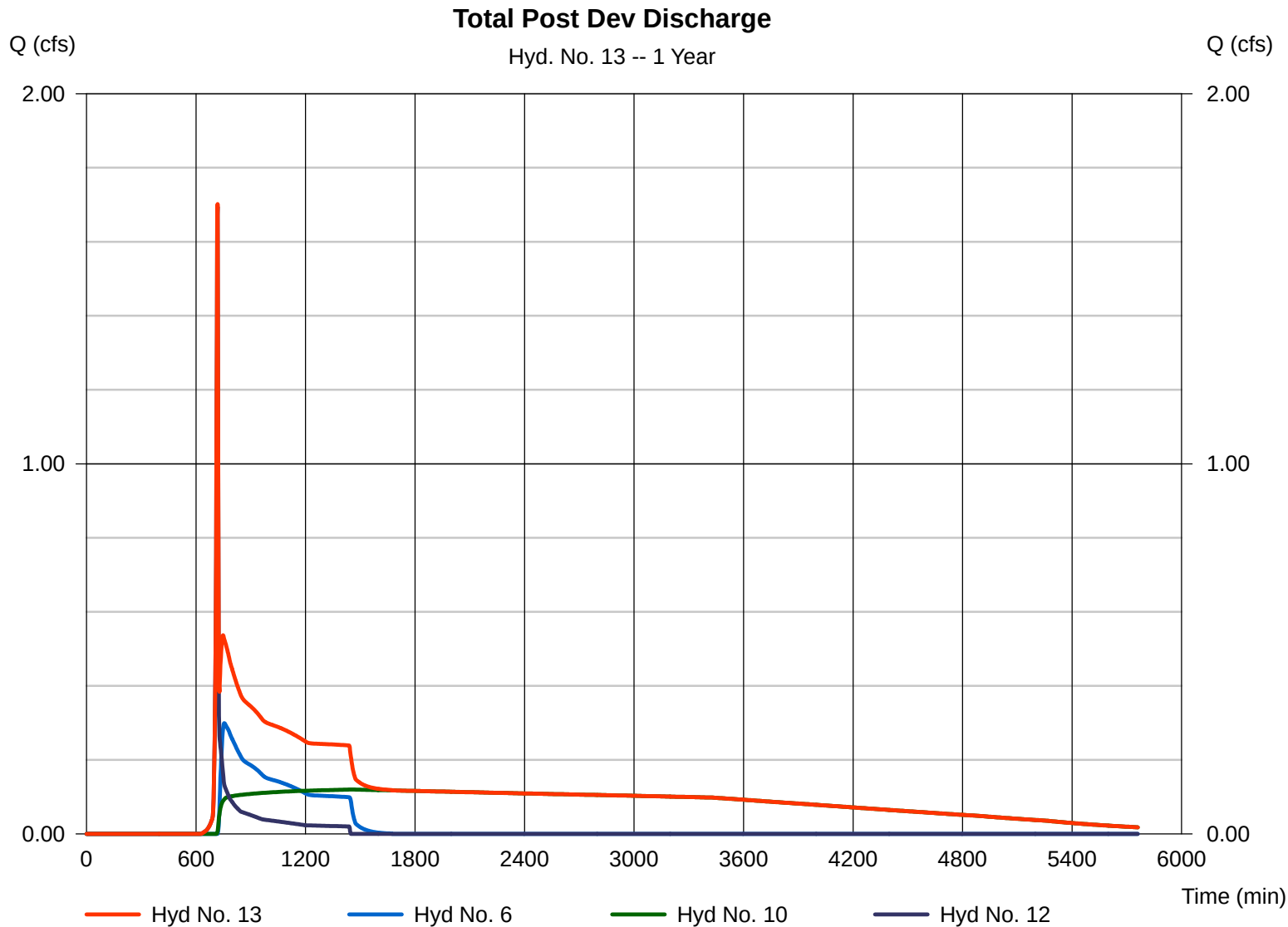
Thursday, Feb 1, 2018

## Hyd. No. 13

### Total Post Dev Discharge

Hydrograph type = Combine  
 Storm frequency = 1 yrs  
 Time interval = 2 min  
 Inflow hyds. = 6, 10, 12

Peak discharge = 1.702 cfs  
 Time to peak = 718 min  
 Hyd. volume = 35,982 cuft  
 Contrib. drain. area = 1.030 ac



# Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.24

| Hyd. No.     | Hydrograph type (origin) | Peak flow (cfs) | Time interval (min) | Time to peak (min) | Hyd. volume (cuft)    | Inflow hyd(s) | Maximum elevation (ft) | Total strge used (cuft) | Hydrograph description                  |
|--------------|--------------------------|-----------------|---------------------|--------------------|-----------------------|---------------|------------------------|-------------------------|-----------------------------------------|
| 1            | SCS Runoff               | 8.092           | 2                   | 726                | 36,954                | -----         | -----                  | -----                   | Pre Dev Area                            |
| 2            | SCS Runoff               | 0.000           | 2                   | n/a                | 0                     | -----         | -----                  | -----                   | Pre Undisturbed / Offsite north of lots |
| 3            | Combine                  | 8.092           | 2                   | 726                | 36,954                | 1, 2          | -----                  | -----                   | Total Pre Dev Area                      |
| 5            | SCS Runoff               | 2.897           | 2                   | 722                | 14,580                | -----         | -----                  | -----                   | POST TO SWM #1                          |
| 6            | Reservoir                | 0.869           | 2                   | 750                | 14,576                | 5             | 528.18                 | 1,637                   | SWM Discharge                           |
| 9            | SCS Runoff               | 11.54           | 2                   | 726                | 44,981                | -----         | -----                  | -----                   | POST TO SWM #2                          |
| 10           | Reservoir                | 0.143           | 2                   | 1454               | 36,802                | 9             | 521.01                 | 39,093                  | SWM #2 Discharge                        |
| 12           | SCS Runoff               | 2.388           | 2                   | 718                | 4,791                 | -----         | -----                  | -----                   | Post Dev Undetained Area                |
| 13           | Combine                  | 2.531           | 2                   | 718                | 56,169                | 6, 10, 12     | -----                  | -----                   | Total Post Dev Discharge                |
| 4272-SWM.gpw |                          |                 |                     |                    | Return Period: 2 Year |               |                        | Thursday, Feb 1, 2018   |                                         |



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.24

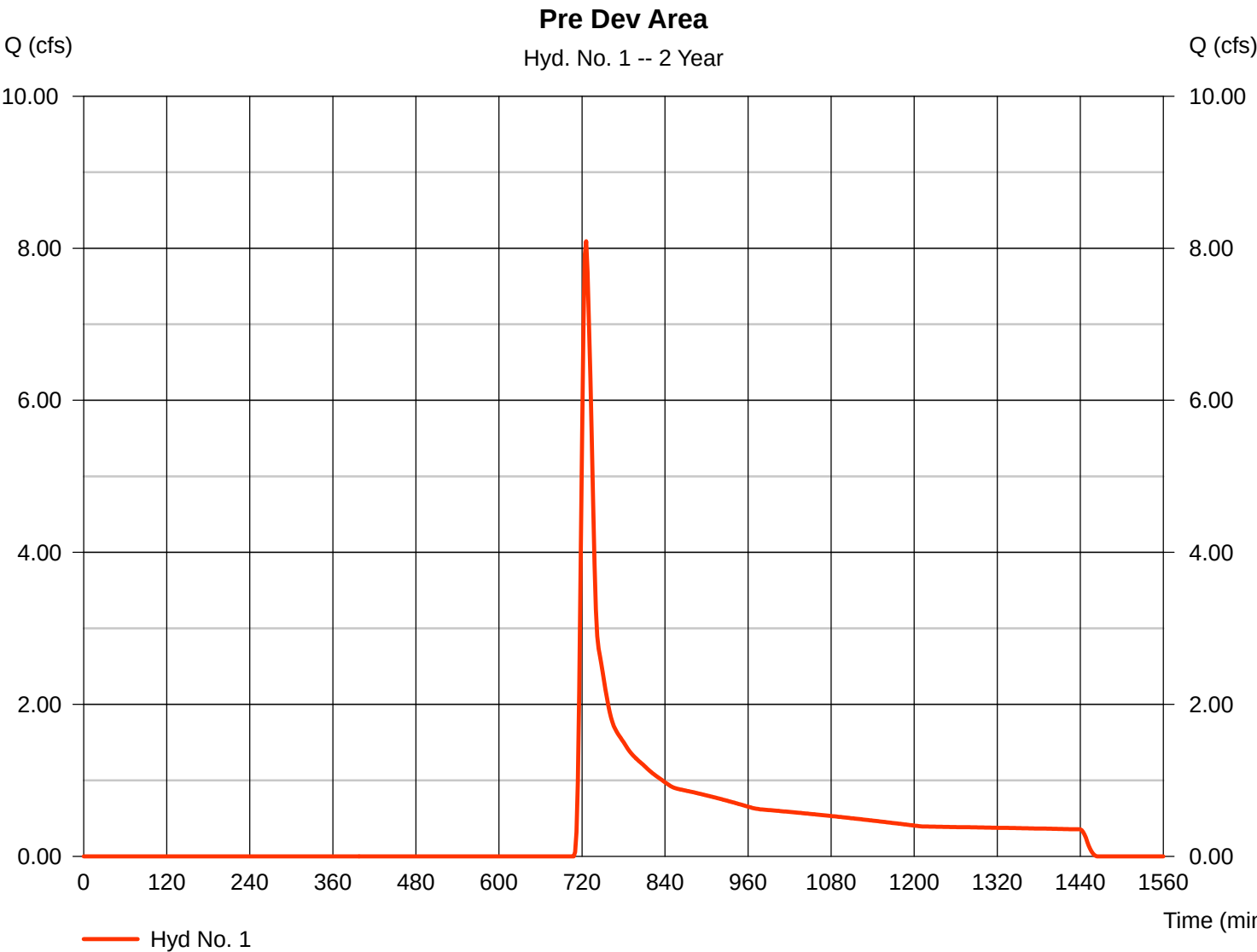
Thursday, Feb 1, 2018

## Hyd. No. 1

Pre Dev Area

|                 |   |            |                    |   |             |
|-----------------|---|------------|--------------------|---|-------------|
| Hydrograph type | = | SCS Runoff | Peak discharge     | = | 8.092 cfs   |
| Storm frequency | = | 2 yrs      | Time to peak       | = | 726 min     |
| Time interval   | = | 2 min      | Hyd. volume        | = | 36,954 cuft |
| Drainage area   | = | 26.840 ac  | Curve number       | = | 59*         |
| Basin Slope     | = | 0.0 %      | Hydraulic length   | = | 0 ft        |
| Tc method       | = | USER       | Time of conc. (Tc) | = | 14.72 min   |
| Total precip.   | = | 3.24 in    | Distribution       | = | Type II     |
| Storm duration  | = | 24 hrs     | Shape factor       | = | 484         |

\* Composite (Area/CN) = [(26.420 x 58) + (0.420 x 98)] / 26.840



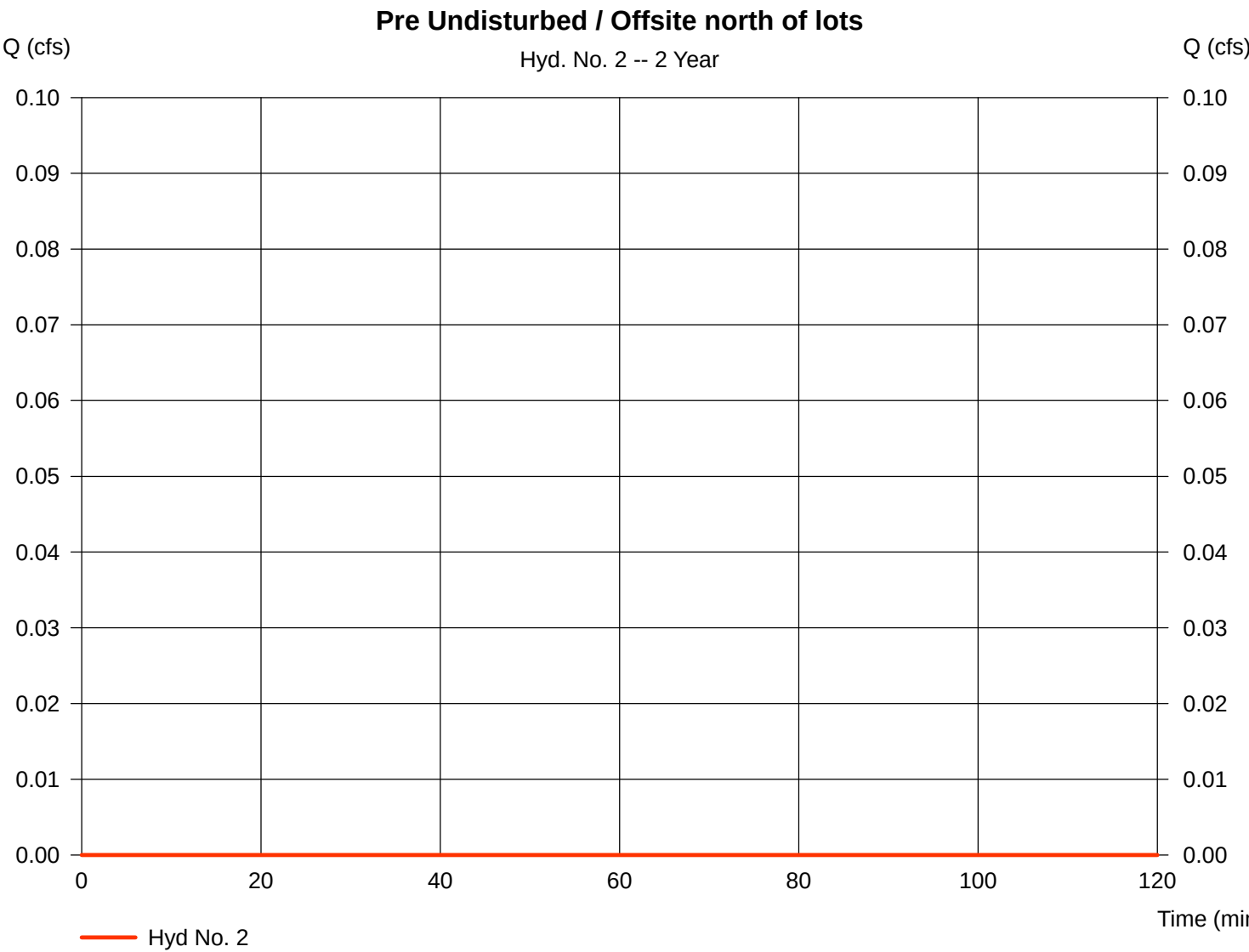
# Hydrograph Report

## Hyd. No. 2

Pre Undisturbed / Offsite north of lots

|                 |   |            |                    |   |           |
|-----------------|---|------------|--------------------|---|-----------|
| Hydrograph type | = | SCS Runoff | Peak discharge     | = | 0.000 cfs |
| Storm frequency | = | 2 yrs      | Time to peak       | = | n/a       |
| Time interval   | = | 2 min      | Hyd. volume        | = | 0 cuft    |
| Drainage area   | = | 9.590 ac   | Curve number       | = | 32*       |
| Basin Slope     | = | 0.0 %      | Hydraulic length   | = | 0 ft      |
| Tc method       | = | USER       | Time of conc. (Tc) | = | 15.56 min |
| Total precip.   | = | 3.24 in    | Distribution       | = | Type II   |
| Storm duration  | = | 24 hrs     | Shape factor       | = | 484       |

\* Composite (Area/CN) = [(9.340 x 30) + (0.250 x 98)] / 9.590



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.24

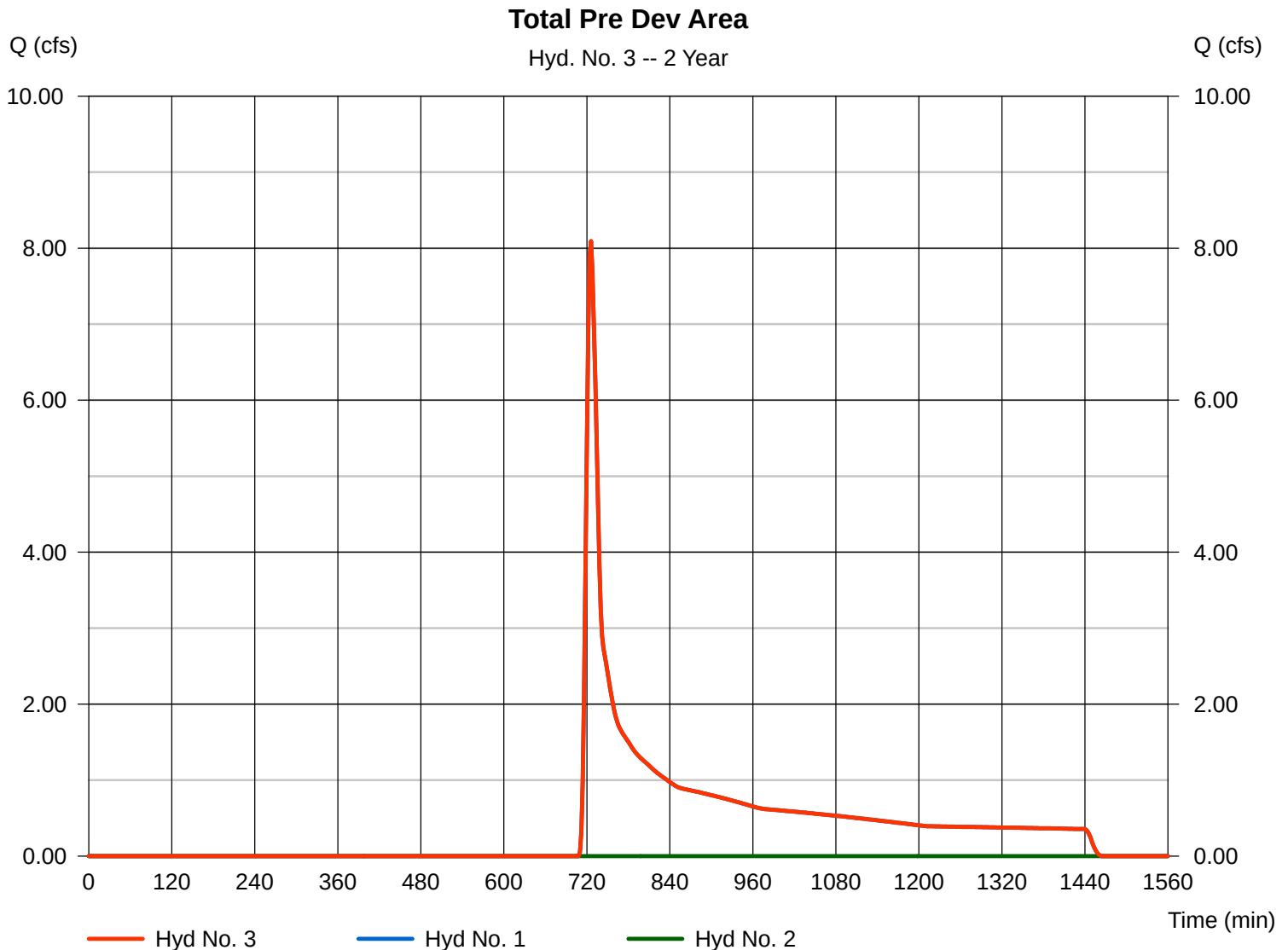
Thursday, Feb 1, 2018

## Hyd. No. 3

Total Pre Dev Area

Hydrograph type = Combine  
 Storm frequency = 2 yrs  
 Time interval = 2 min  
 Inflow hyds. = 1, 2

Peak discharge = 8.092 cfs  
 Time to peak = 726 min  
 Hyd. volume = 36,954 cuft  
 Contrib. drain. area = 36.430 ac



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.24

Thursday, Feb 1, 2018

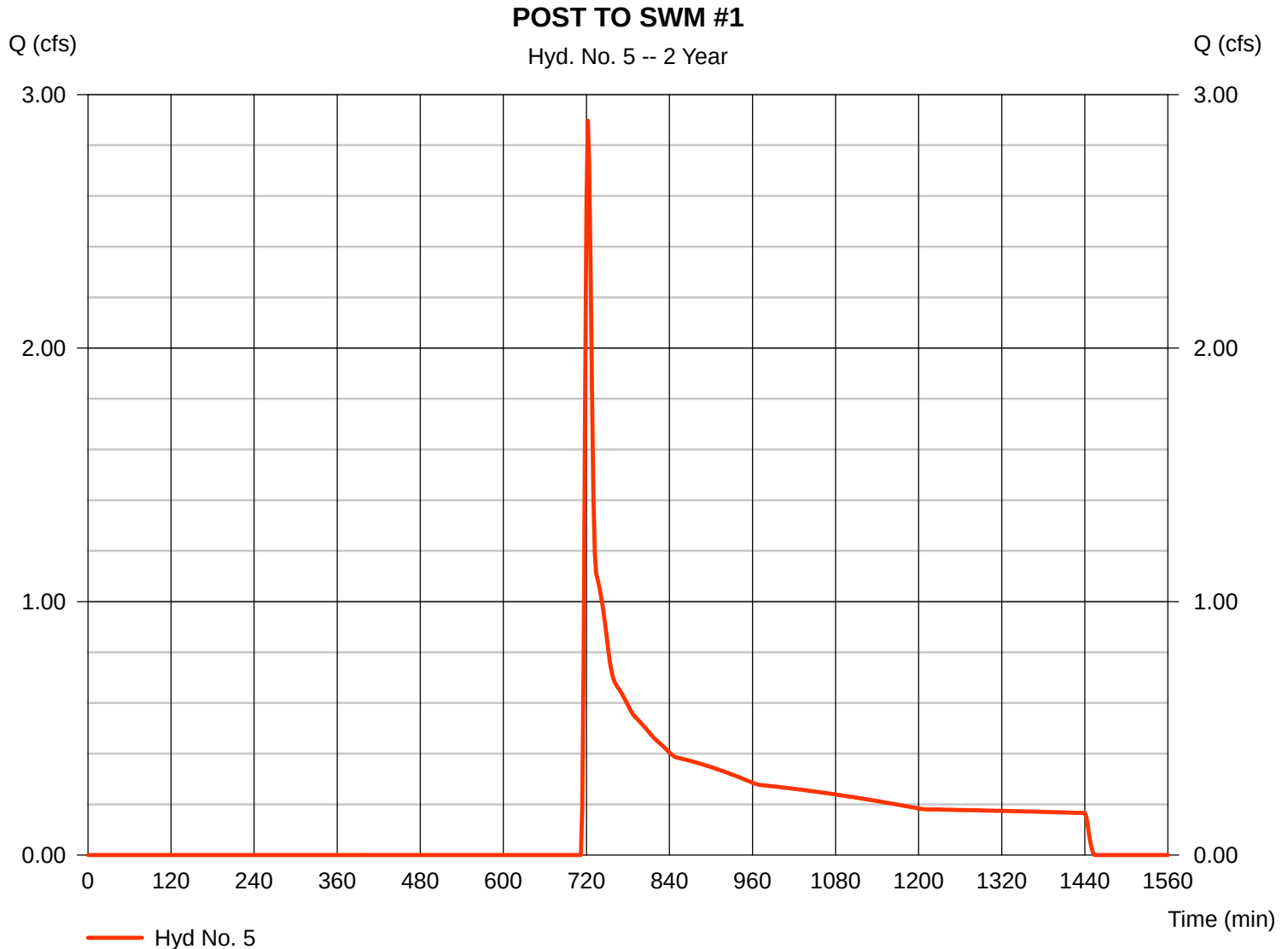
## Hyd. No. 5

### POST TO SWM #1

Hydrograph type = SCS Runoff  
 Storm frequency = 2 yrs  
 Time interval = 2 min  
 Drainage area = 15.290 ac  
 Basin Slope = 0.0 %  
 Tc method = USER  
 Total precip. = 3.24 in  
 Storm duration = 24 hrs

Peak discharge = 2.897 cfs  
 Time to peak = 722 min  
 Hyd. volume = 14,580 cuft  
 Curve number = 55\*  
 Hydraulic length = 0 ft  
 Time of conc. (Tc) = 8.80 min  
 Distribution = Type II  
 Shape factor = 484

\* Composite (Area/CN) =  $[(0.250 \times 98) + (2.050 \times 39) + (4.090 \times 30) + (1.990 \times 98) + (5.880 \times 61) + (1.030 \times 55)] / 15.290$



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.24

Thursday, Feb 1, 2018

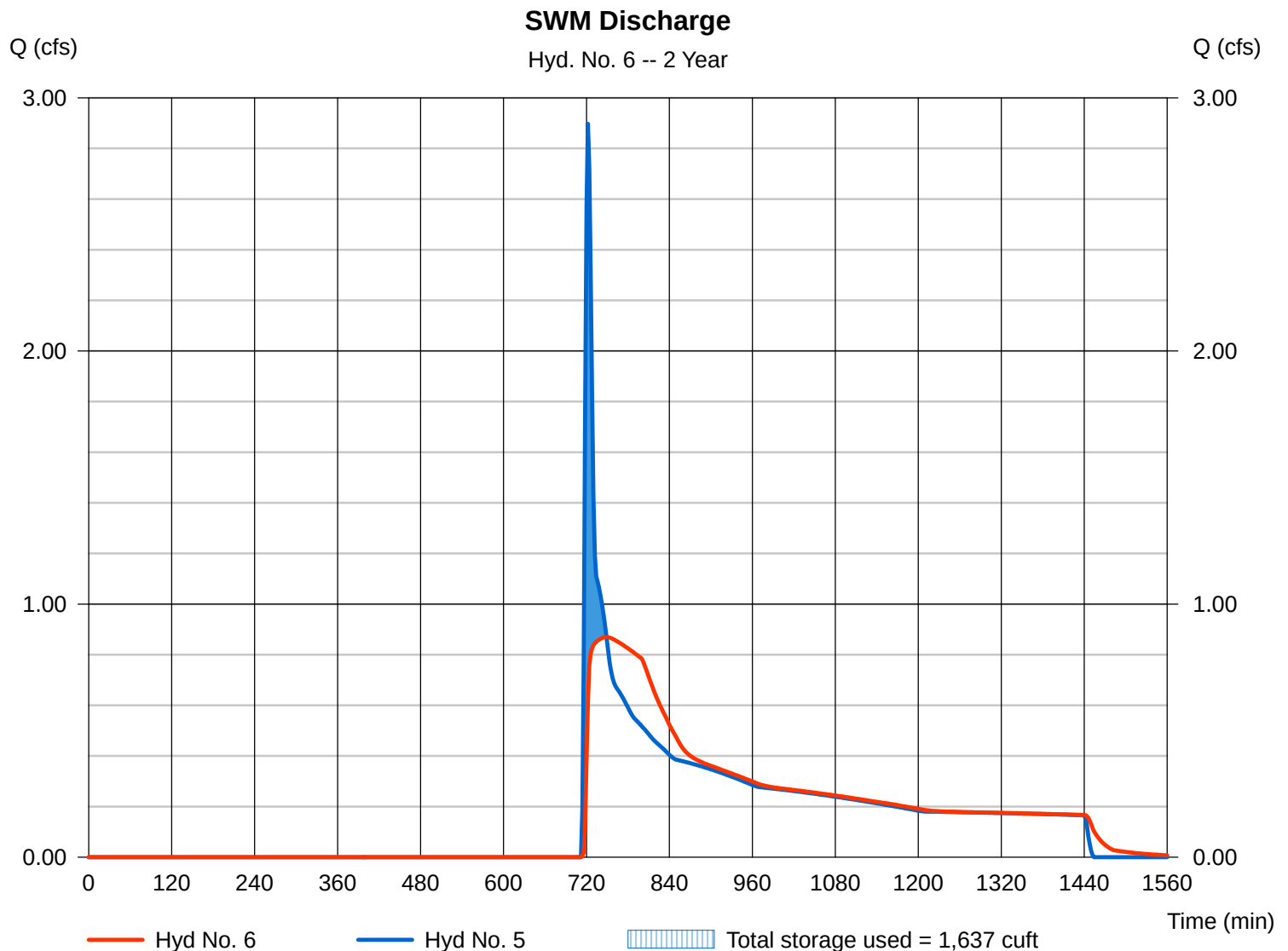
## Hyd. No. 6

### SWM Discharge

Hydrograph type = Reservoir  
 Storm frequency = 2 yrs  
 Time interval = 2 min  
 Inflow hyd. No. = 5 - POST TO SWM #1  
 Reservoir name = SWM 1

Peak discharge = 0.869 cfs  
 Time to peak = 750 min  
 Hyd. volume = 14,576 cuft  
 Max. Elevation = 528.18 ft  
 Max. Storage = 1,637 cuft

Storage Indication method used.



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.24

Thursday, Feb 1, 2018

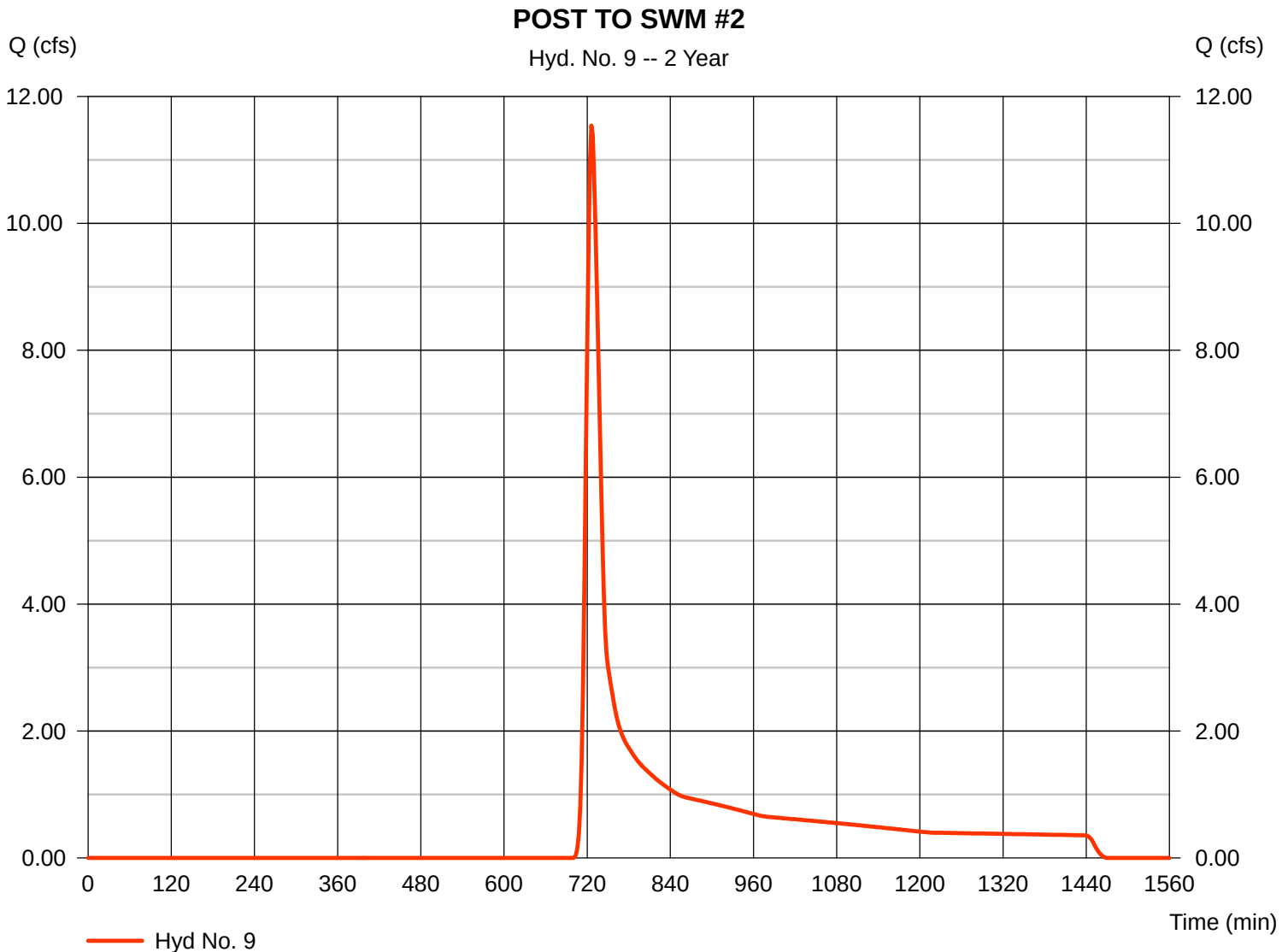
## Hyd. No. 9

### POST TO SWM #2

Hydrograph type = SCS Runoff  
 Storm frequency = 2 yrs  
 Time interval = 2 min  
 Drainage area = 19.990 ac  
 Basin Slope = 0.0 %  
 Tc method = USER  
 Total precip. = 3.24 in  
 Storm duration = 24 hrs

Peak discharge = 11.54 cfs  
 Time to peak = 726 min  
 Hyd. volume = 44,981 cuft  
 Curve number = 65\*  
 Hydraulic length = 0 ft  
 Time of conc. (Tc) = 17.00 min  
 Distribution = Type II  
 Shape factor = 484

\* Composite (Area/CN) =  $[(2.170 \times 39) + (0.530 \times 30) + (4.290 \times 98) + (8.920 \times 61) + (4.080 \times 58)] / 19.990$





# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.24

Thursday, Feb 1, 2018

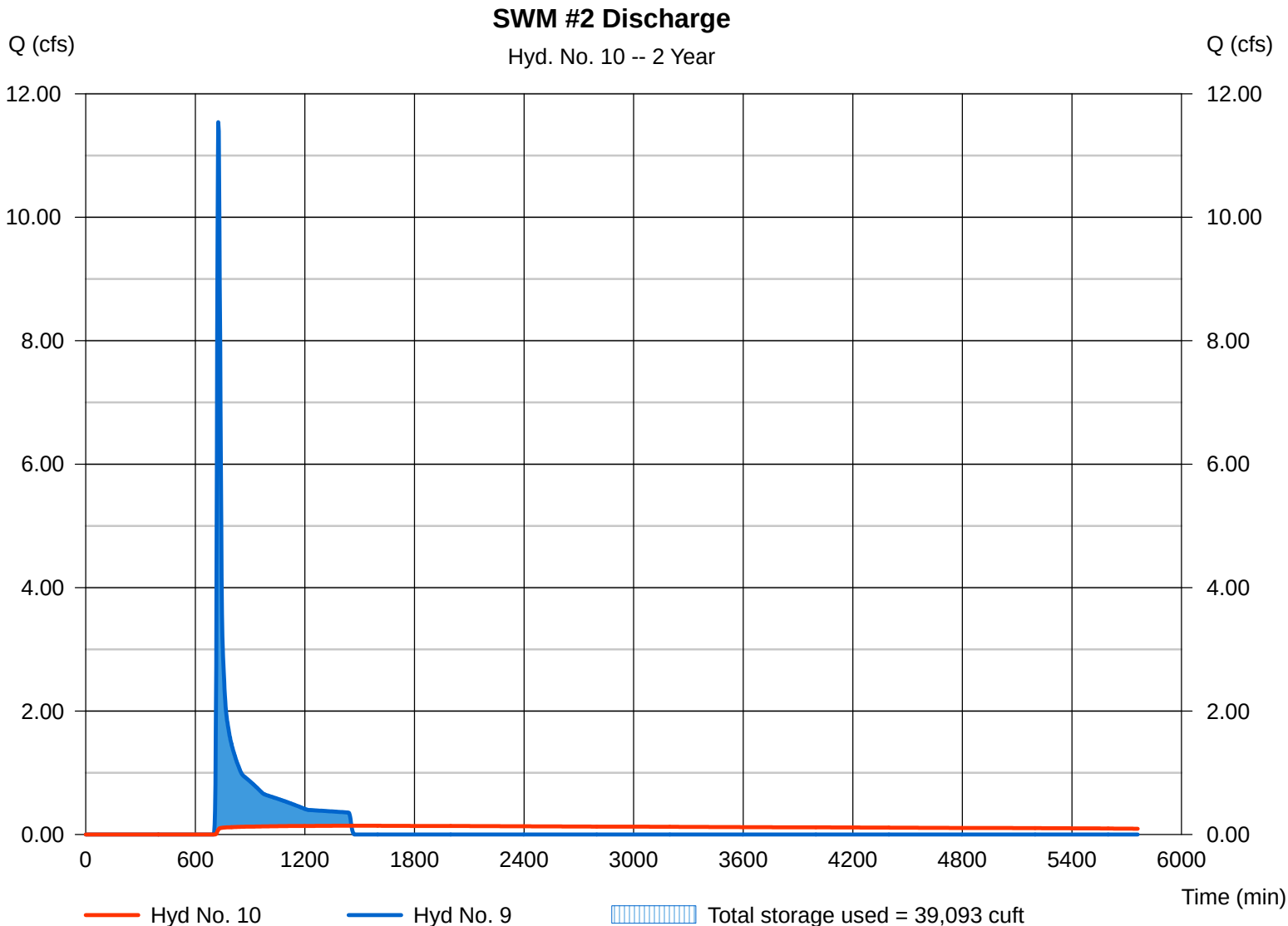
## Hyd. No. 10

### SWM #2 Discharge

Hydrograph type = Reservoir  
 Storm frequency = 2 yrs  
 Time interval = 2 min  
 Inflow hyd. No. = 9 - POST TO SWM #2  
 Reservoir name = SWM 2

Peak discharge = 0.143 cfs  
 Time to peak = 1454 min  
 Hyd. volume = 36,802 cuft  
 Max. Elevation = 521.01 ft  
 Max. Storage = 39,093 cuft

Storage Indication method used.



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.24

Thursday, Feb 1, 2018

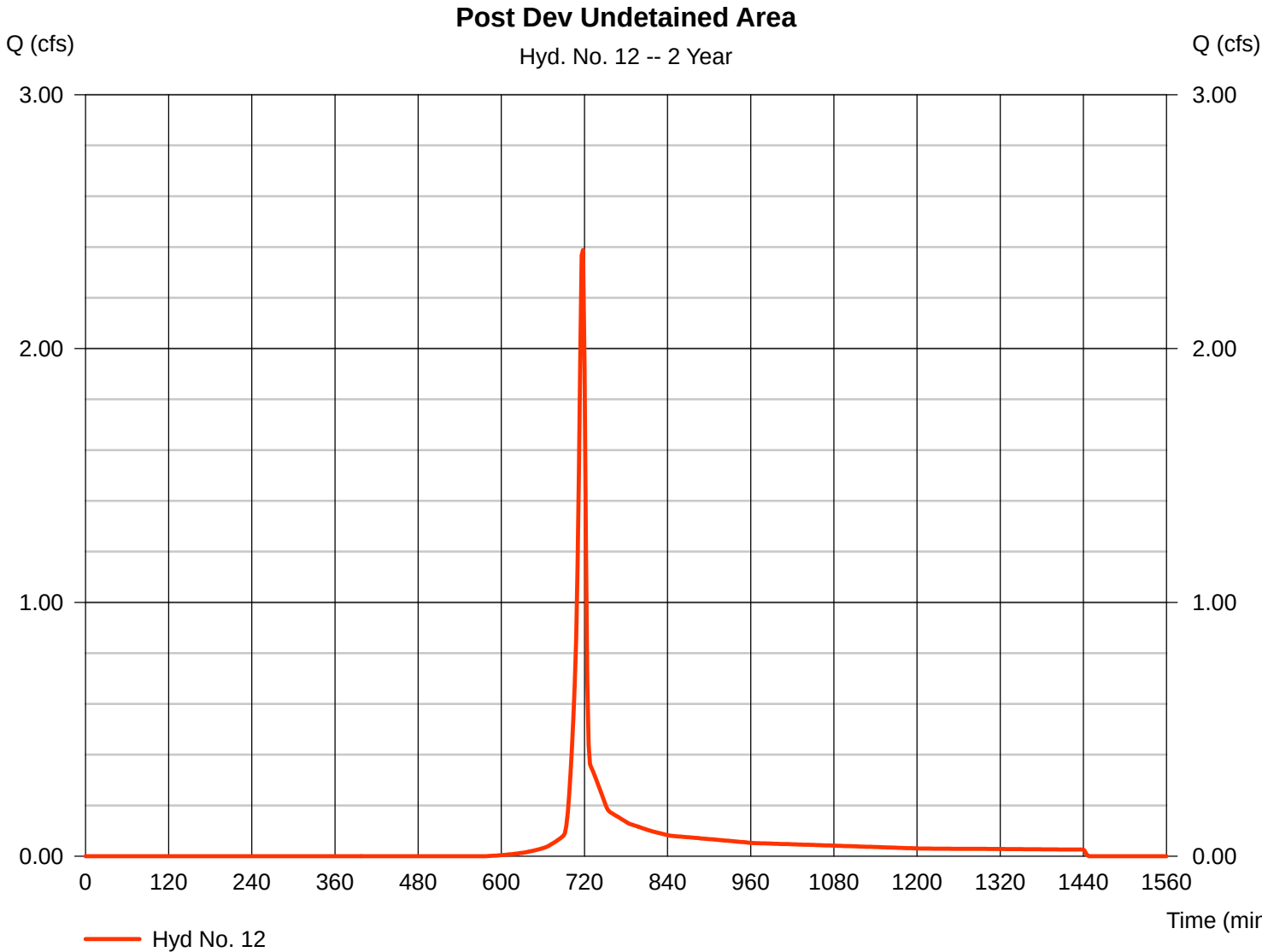
## Hyd. No. 12

Post Dev Undetained Area

Hydrograph type = SCS Runoff  
 Storm frequency = 2 yrs  
 Time interval = 2 min  
 Drainage area = 1.030 ac  
 Basin Slope = 0.0 %  
 Tc method = USER  
 Total precip. = 3.24 in  
 Storm duration = 24 hrs

Peak discharge = 2.388 cfs  
 Time to peak = 718 min  
 Hyd. volume = 4,791 cuft  
 Curve number = 79\*  
 Hydraulic length = 0 ft  
 Time of conc. (Tc) = 5.00 min  
 Distribution = Type II  
 Shape factor = 484

\* Composite (Area/CN) = [(0.540 x 61) + (0.490 x 98)] / 1.030



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.24

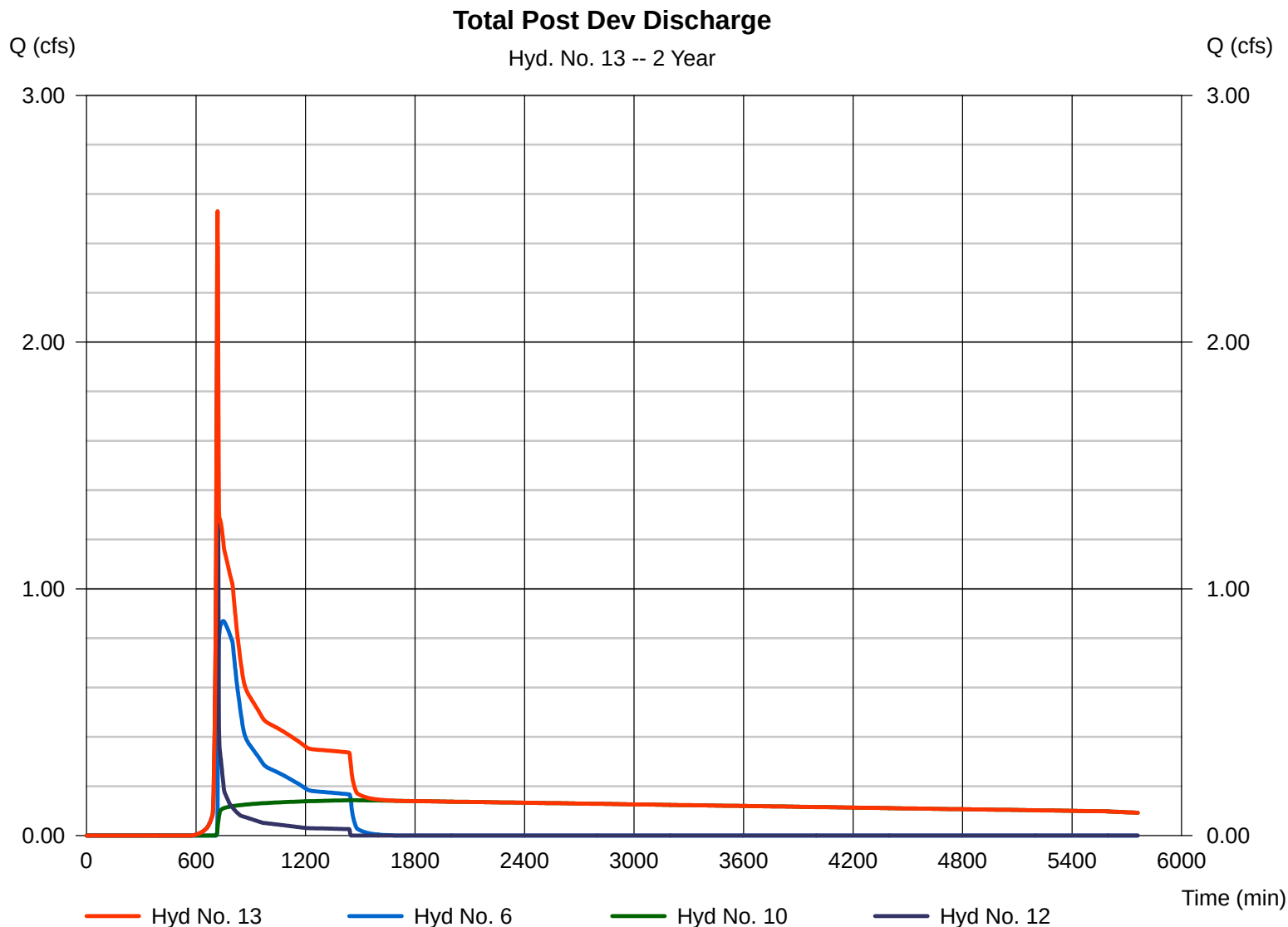
Thursday, Feb 1, 2018

## Hyd. No. 13

### Total Post Dev Discharge

Hydrograph type = Combine  
 Storm frequency = 2 yrs  
 Time interval = 2 min  
 Inflow hyds. = 6, 10, 12

Peak discharge = 2.531 cfs  
 Time to peak = 718 min  
 Hyd. volume = 56,169 cuft  
 Contrib. drain. area = 1.030 ac



# Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.24

| Hyd. No.     | Hydrograph type (origin) | Peak flow (cfs) | Time interval (min) | Time to peak (min) | Hyd. volume (cuft)    | Inflow hyd(s) | Maximum elevation (ft) | Total strge used (cuft) | Hydrograph description                  |
|--------------|--------------------------|-----------------|---------------------|--------------------|-----------------------|---------------|------------------------|-------------------------|-----------------------------------------|
| 1            | SCS Runoff               | 20.32           | 2                   | 724                | 70,399                | -----         | -----                  | -----                   | Pre Dev Area                            |
| 2            | SCS Runoff               | 0.000           | 2                   | n/a                | 0                     | -----         | -----                  | -----                   | Pre Undisturbed / Offsite north of lots |
| 3            | Combine                  | 20.32           | 2                   | 724                | 70,399                | 1, 2          | -----                  | -----                   | Total Pre Dev Area                      |
| 5            | SCS Runoff               | 10.03           | 2                   | 720                | 30,740                | -----         | -----                  | -----                   | POST TO SWM #1                          |
| 6            | Reservoir                | 1.397           | 2                   | 760                | 30,736                | 5             | 529.61                 | 7,401                   | SWM Discharge                           |
| 9            | SCS Runoff               | 22.36           | 2                   | 726                | 77,169                | -----         | -----                  | -----                   | POST TO SWM #2                          |
| 10           | Reservoir                | 0.175           | 2                   | 1456               | 46,896                | 9             | 521.94                 | 69,941                  | SWM #2 Discharge                        |
| 12           | SCS Runoff               | 3.492           | 2                   | 716                | 7,054                 | -----         | -----                  | -----                   | Post Dev Undetained Area                |
| 13           | Combine                  | 4.415           | 2                   | 718                | 84,685                | 6, 10, 12     | -----                  | -----                   | Total Post Dev Discharge                |
| 4272-SWM.gpw |                          |                 |                     |                    | Return Period: 5 Year |               |                        | Thursday, Feb 1, 2018   |                                         |

# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.24

Thursday, Feb 1, 2018

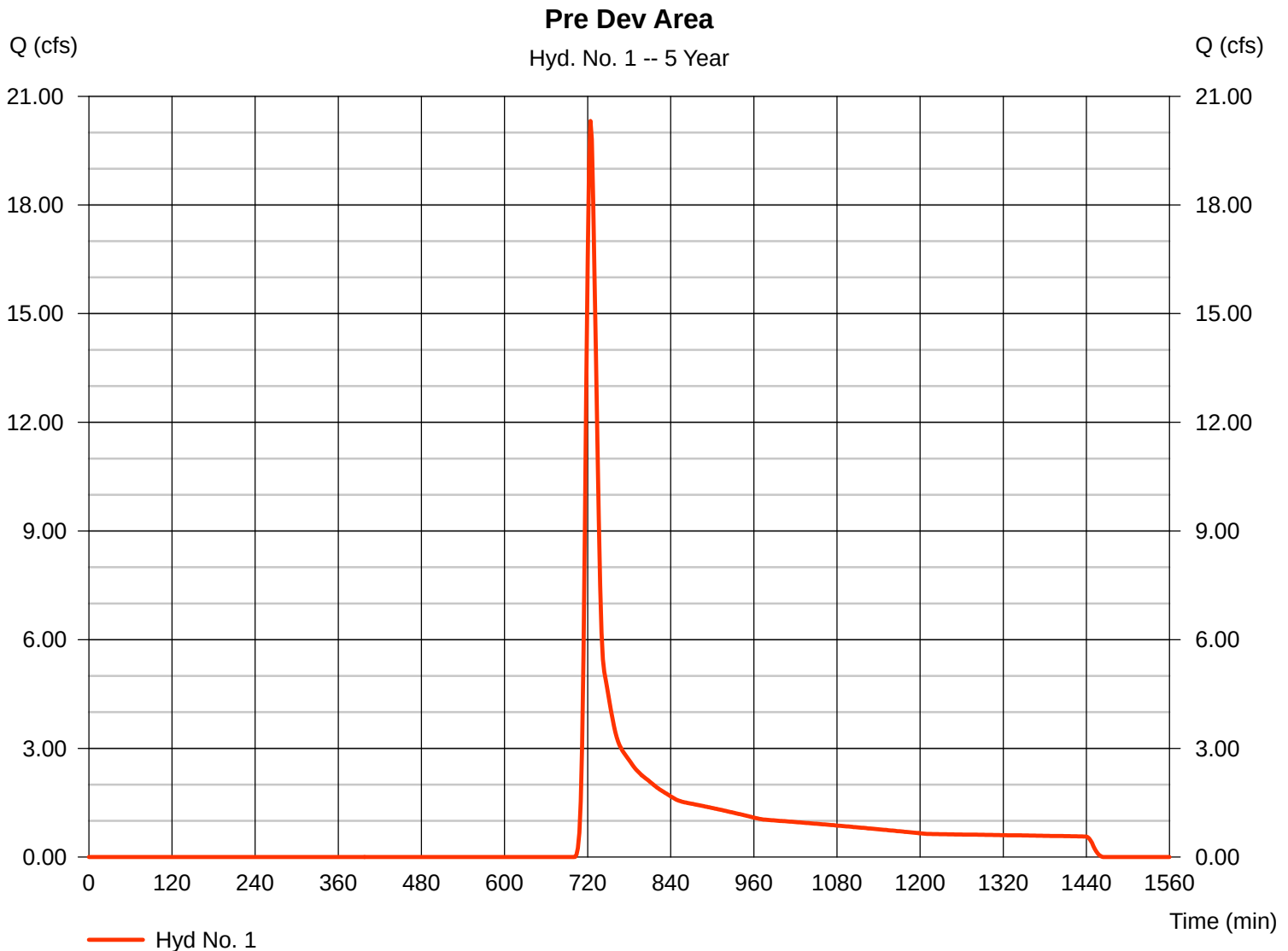
## Hyd. No. 1

### Pre Dev Area

Hydrograph type = SCS Runoff  
 Storm frequency = 5 yrs  
 Time interval = 2 min  
 Drainage area = 26.840 ac  
 Basin Slope = 0.0 %  
 Tc method = USER  
 Total precip. = 4.06 in  
 Storm duration = 24 hrs

Peak discharge = 20.32 cfs  
 Time to peak = 724 min  
 Hyd. volume = 70,399 cuft  
 Curve number = 59\*  
 Hydraulic length = 0 ft  
 Time of conc. (Tc) = 14.72 min  
 Distribution = Type II  
 Shape factor = 484

\* Composite (Area/CN) =  $[(26.420 \times 58) + (0.420 \times 98)] / 26.840$



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.24

Thursday, Feb 1, 2018

## Hyd. No. 2

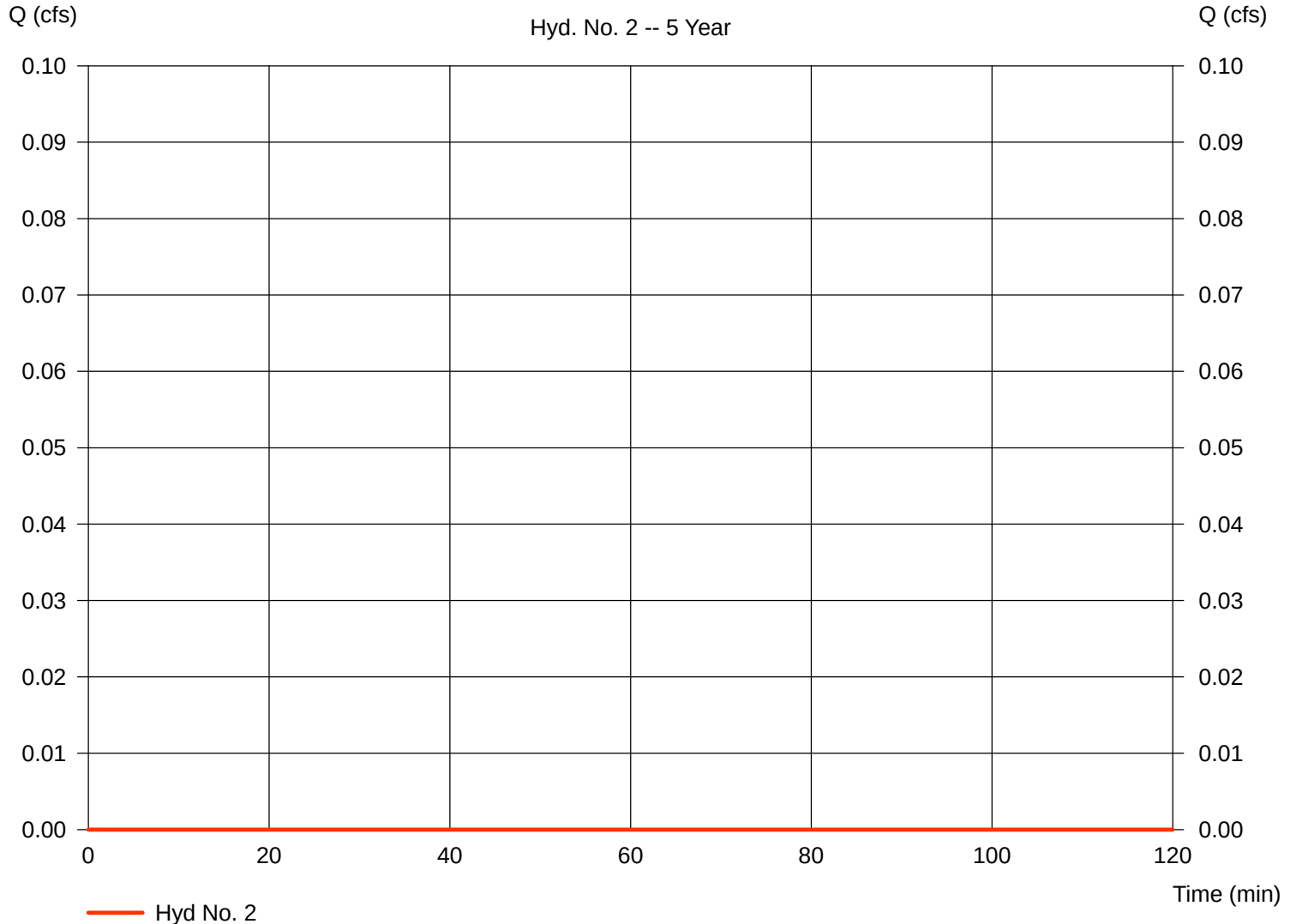
Pre Undisturbed / Offsite north of lots

Hydrograph type = SCS Runoff  
 Storm frequency = 5 yrs  
 Time interval = 2 min  
 Drainage area = 9.590 ac  
 Basin Slope = 0.0 %  
 Tc method = USER  
 Total precip. = 4.06 in  
 Storm duration = 24 hrs

Peak discharge = 0.000 cfs  
 Time to peak = n/a  
 Hyd. volume = 0 cuft  
 Curve number = 32\*  
 Hydraulic length = 0 ft  
 Time of conc. (Tc) = 15.56 min  
 Distribution = Type II  
 Shape factor = 484

\* Composite (Area/CN) =  $[(9.340 \times 30) + (0.250 \times 98)] / 9.590$

### Pre Undisturbed / Offsite north of lots





# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.24

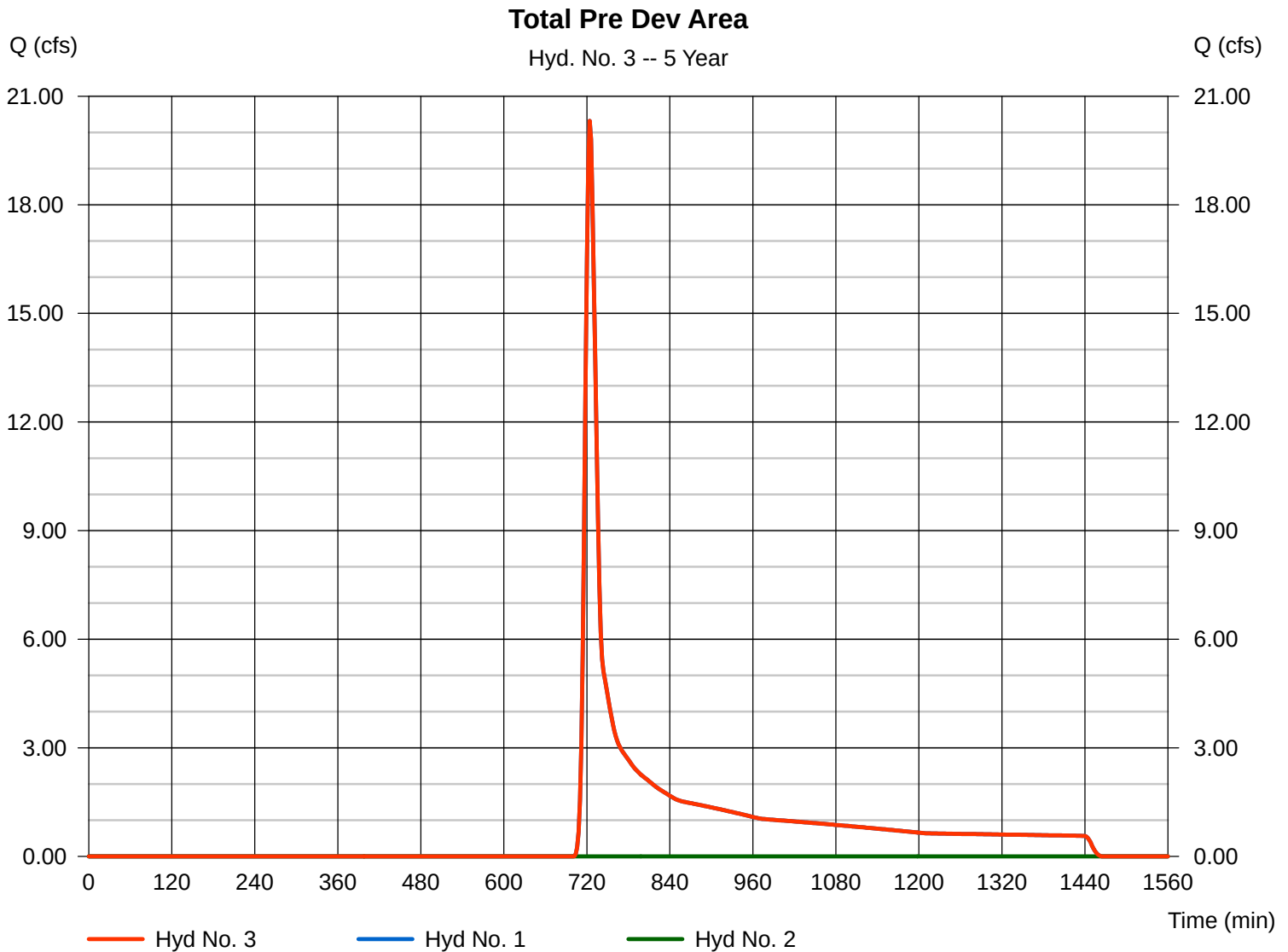
Thursday, Feb 1, 2018

## Hyd. No. 3

Total Pre Dev Area

Hydrograph type = Combine  
 Storm frequency = 5 yrs  
 Time interval = 2 min  
 Inflow hyds. = 1, 2

Peak discharge = 20.32 cfs  
 Time to peak = 724 min  
 Hyd. volume = 70,399 cuft  
 Contrib. drain. area = 36.430 ac



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.24

Thursday, Feb 1, 2018

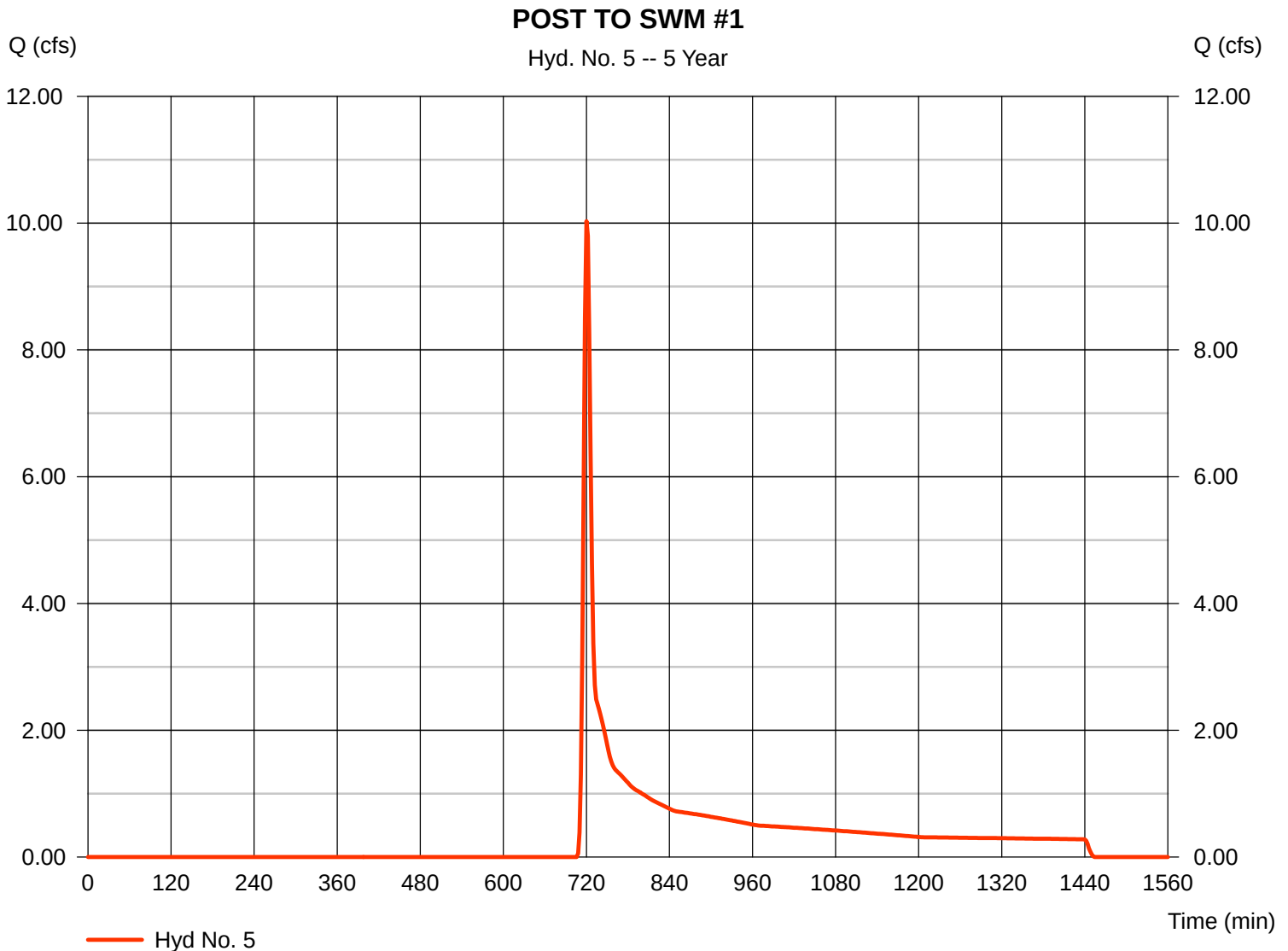
## Hyd. No. 5

### POST TO SWM #1

Hydrograph type = SCS Runoff  
 Storm frequency = 5 yrs  
 Time interval = 2 min  
 Drainage area = 15.290 ac  
 Basin Slope = 0.0 %  
 Tc method = USER  
 Total precip. = 4.06 in  
 Storm duration = 24 hrs

Peak discharge = 10.03 cfs  
 Time to peak = 720 min  
 Hyd. volume = 30,740 cuft  
 Curve number = 55\*  
 Hydraulic length = 0 ft  
 Time of conc. (Tc) = 8.80 min  
 Distribution = Type II  
 Shape factor = 484

\* Composite (Area/CN) =  $[(0.250 \times 98) + (2.050 \times 39) + (4.090 \times 30) + (1.990 \times 98) + (5.880 \times 61) + (1.030 \times 55)] / 15.290$



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.24

Thursday, Feb 1, 2018

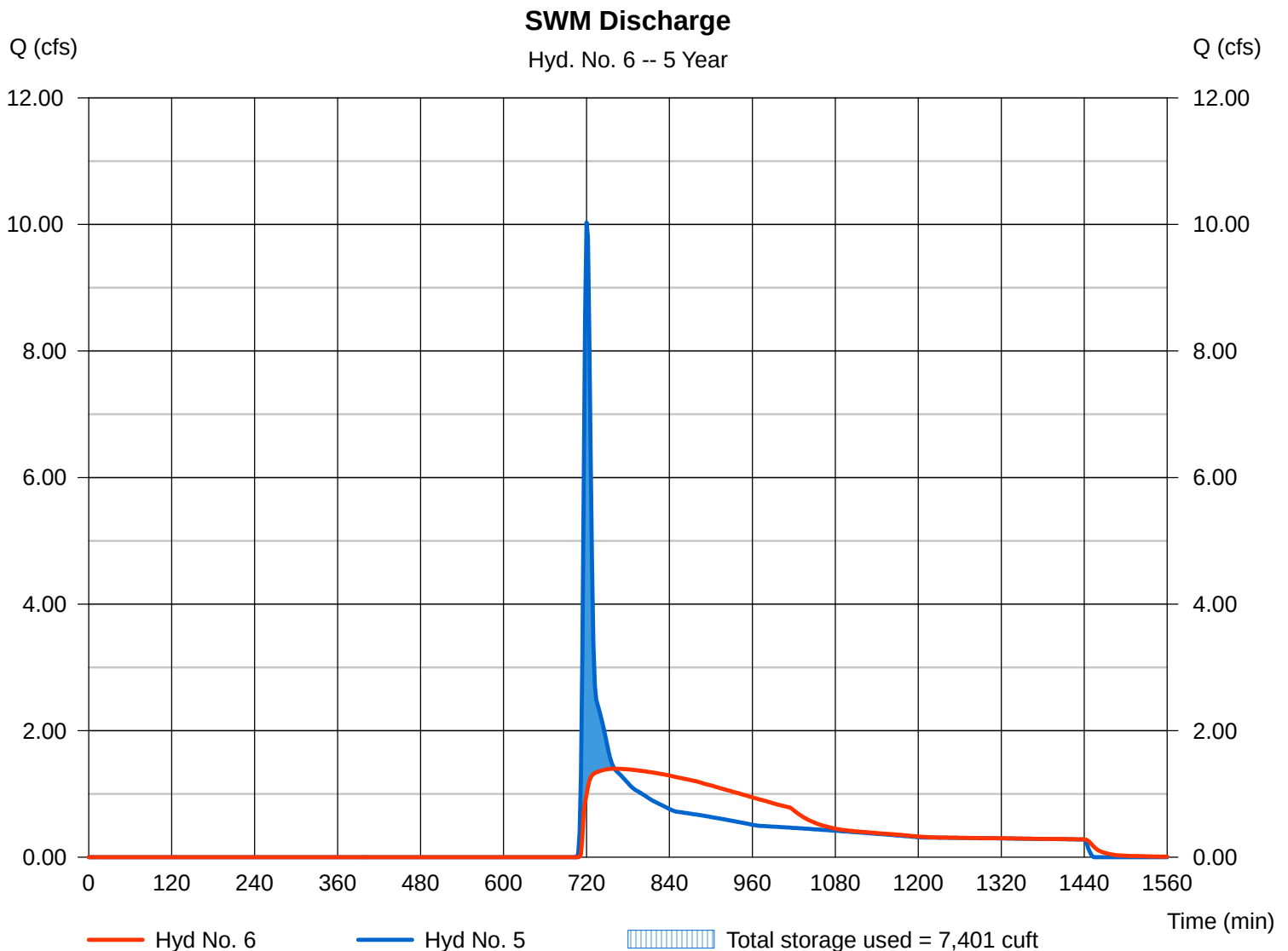
## Hyd. No. 6

### SWM Discharge

Hydrograph type = Reservoir  
 Storm frequency = 5 yrs  
 Time interval = 2 min  
 Inflow hyd. No. = 5 - POST TO SWM #1  
 Reservoir name = SWM 1

Peak discharge = 1.397 cfs  
 Time to peak = 760 min  
 Hyd. volume = 30,736 cuft  
 Max. Elevation = 529.61 ft  
 Max. Storage = 7,401 cuft

Storage Indication method used.



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.24

Thursday, Feb 1, 2018

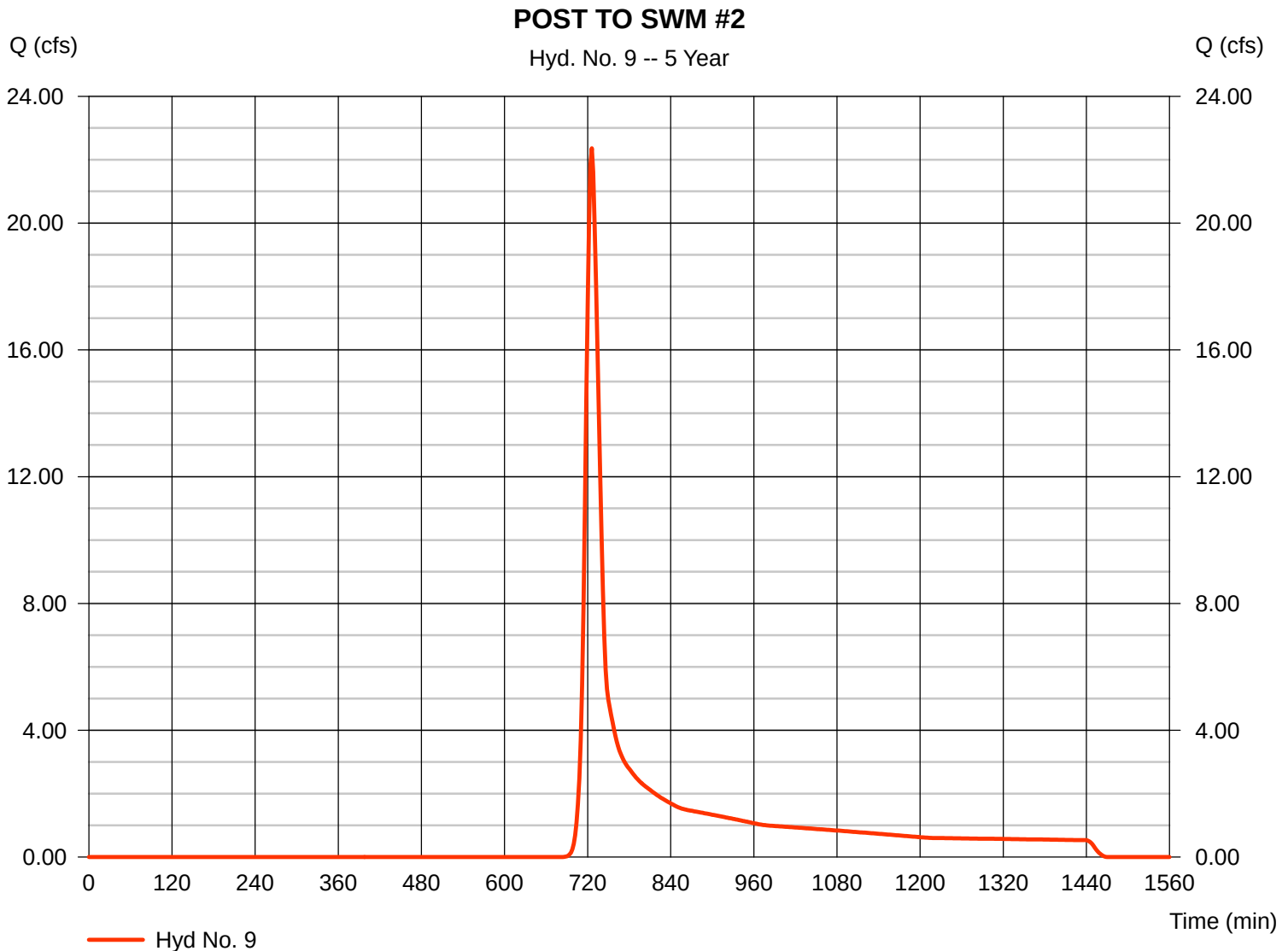
## Hyd. No. 9

### POST TO SWM #2

Hydrograph type = SCS Runoff  
 Storm frequency = 5 yrs  
 Time interval = 2 min  
 Drainage area = 19.990 ac  
 Basin Slope = 0.0 %  
 Tc method = USER  
 Total precip. = 4.06 in  
 Storm duration = 24 hrs

Peak discharge = 22.36 cfs  
 Time to peak = 726 min  
 Hyd. volume = 77,169 cuft  
 Curve number = 65\*  
 Hydraulic length = 0 ft  
 Time of conc. (Tc) = 17.00 min  
 Distribution = Type II  
 Shape factor = 484

\* Composite (Area/CN) =  $[(2.170 \times 39) + (0.530 \times 30) + (4.290 \times 98) + (8.920 \times 61) + (4.080 \times 58)] / 19.990$



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.24

Thursday, Feb 1, 2018

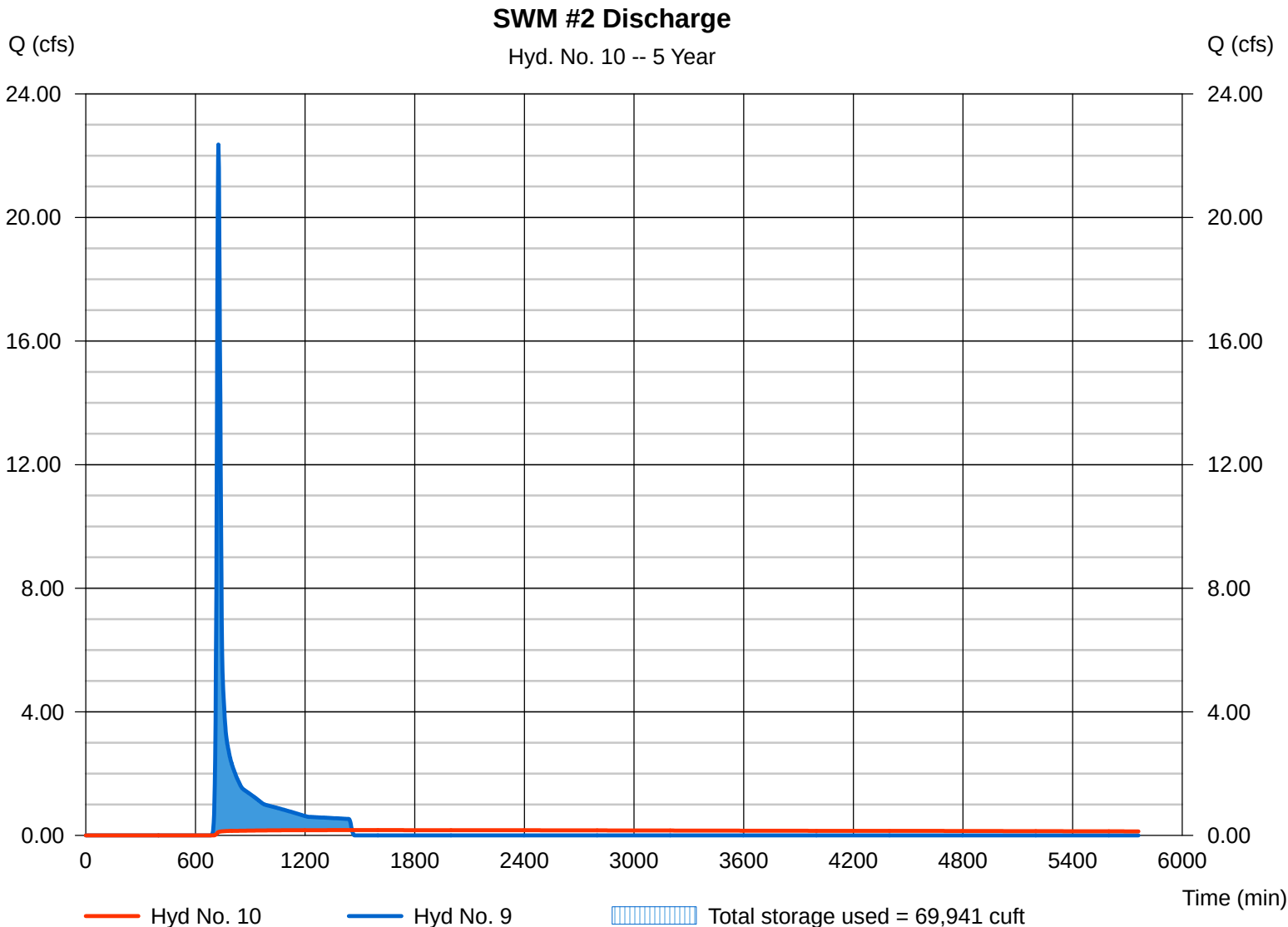
## Hyd. No. 10

### SWM #2 Discharge

Hydrograph type = Reservoir  
 Storm frequency = 5 yrs  
 Time interval = 2 min  
 Inflow hyd. No. = 9 - POST TO SWM #2  
 Reservoir name = SWM 2

Peak discharge = 0.175 cfs  
 Time to peak = 1456 min  
 Hyd. volume = 46,896 cuft  
 Max. Elevation = 521.94 ft  
 Max. Storage = 69,941 cuft

Storage Indication method used.



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.24

Thursday, Feb 1, 2018

## Hyd. No. 12

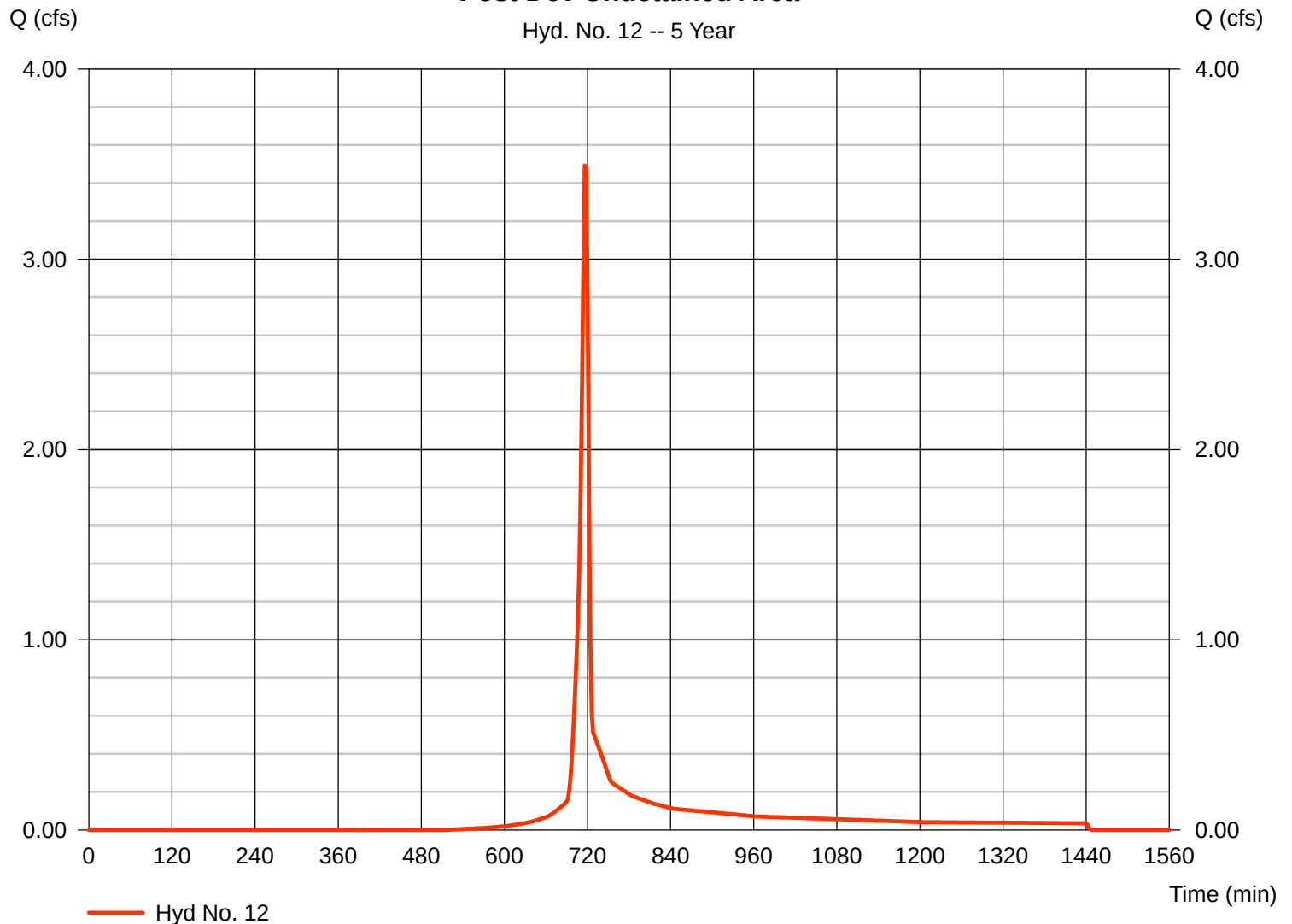
### Post Dev Undetained Area

Hydrograph type = SCS Runoff  
 Storm frequency = 5 yrs  
 Time interval = 2 min  
 Drainage area = 1.030 ac  
 Basin Slope = 0.0 %  
 Tc method = USER  
 Total precip. = 4.06 in  
 Storm duration = 24 hrs

Peak discharge = 3.492 cfs  
 Time to peak = 716 min  
 Hyd. volume = 7,054 cuft  
 Curve number = 79\*  
 Hydraulic length = 0 ft  
 Time of conc. (Tc) = 5.00 min  
 Distribution = Type II  
 Shape factor = 484

\* Composite (Area/CN) =  $[(0.540 \times 61) + (0.490 \times 98)] / 1.030$

### Post Dev Undetained Area





# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.24

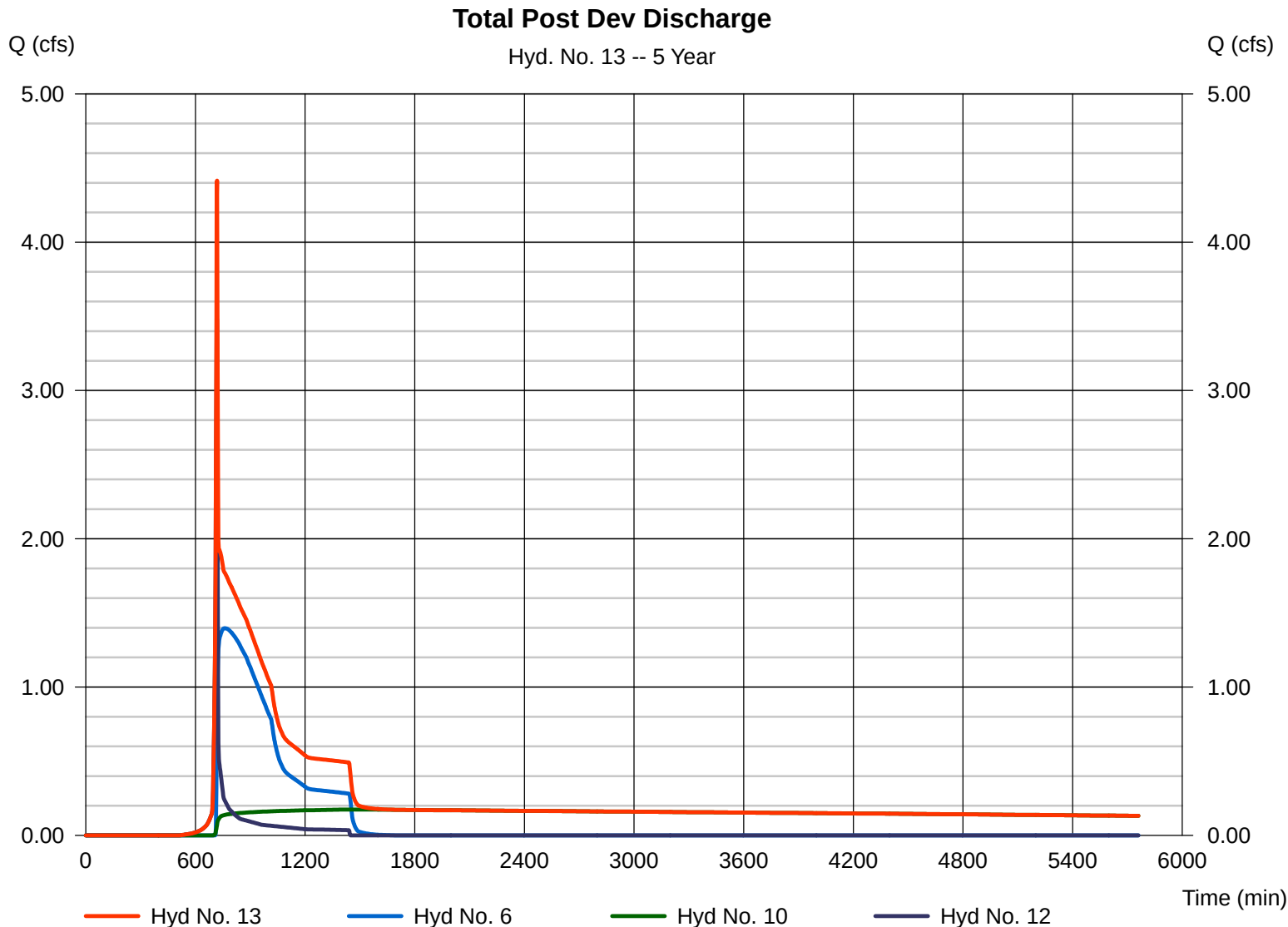
Thursday, Feb 1, 2018

## Hyd. No. 13

### Total Post Dev Discharge

Hydrograph type = Combine  
 Storm frequency = 5 yrs  
 Time interval = 2 min  
 Inflow hyds. = 6, 10, 12

Peak discharge = 4.415 cfs  
 Time to peak = 718 min  
 Hyd. volume = 84,685 cuft  
 Contrib. drain. area = 1.030 ac



# Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.24

| Hyd. No.     | Hydrograph type (origin) | Peak flow (cfs) | Time interval (min) | Time to peak (min) | Hyd. volume (cuft)     | Inflow hyd(s) | Maximum elevation (ft) | Total strge used (cuft) | Hydrograph description                  |
|--------------|--------------------------|-----------------|---------------------|--------------------|------------------------|---------------|------------------------|-------------------------|-----------------------------------------|
| 1            | SCS Runoff               | 32.79           | 2                   | 724                | 103,516                | -----         | -----                  | -----                   | Pre Dev Area                            |
| 2            | SCS Runoff               | 0.022           | 2                   | 1440               | 375                    | -----         | -----                  | -----                   | Pre Undisturbed / Offsite north of lots |
| 3            | Combine                  | 32.79           | 2                   | 724                | 103,891                | 1, 2          | -----                  | -----                   | Total Pre Dev Area                      |
| 5            | SCS Runoff               | 18.00           | 2                   | 720                | 47,361                 | -----         | -----                  | -----                   | POST TO SWM #1                          |
| 6            | Reservoir                | 6.228           | 2                   | 730                | 47,357                 | 5             | 530.32                 | 11,039                  | SWM Discharge                           |
| 9            | SCS Runoff               | 32.49           | 2                   | 726                | 107,615                | -----         | -----                  | -----                   | POST TO SWM #2                          |
| 10           | Reservoir                | 1.228           | 2                   | 1014               | 74,964                 | 9             | 522.11                 | 76,293                  | SWM #2 Discharge                        |
| 12           | SCS Runoff               | 4.462           | 2                   | 716                | 9,041                  | -----         | -----                  | -----                   | Post Dev Undetained Area                |
| 13           | Combine                  | 6.976           | 2                   | 730                | 131,362                | 6, 10, 12     | -----                  | -----                   | Total Post Dev Discharge                |
| 4272-SWM.gpw |                          |                 |                     |                    | Return Period: 10 Year |               |                        | Thursday, Feb 1, 2018   |                                         |

# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.24

Thursday, Feb 1, 2018

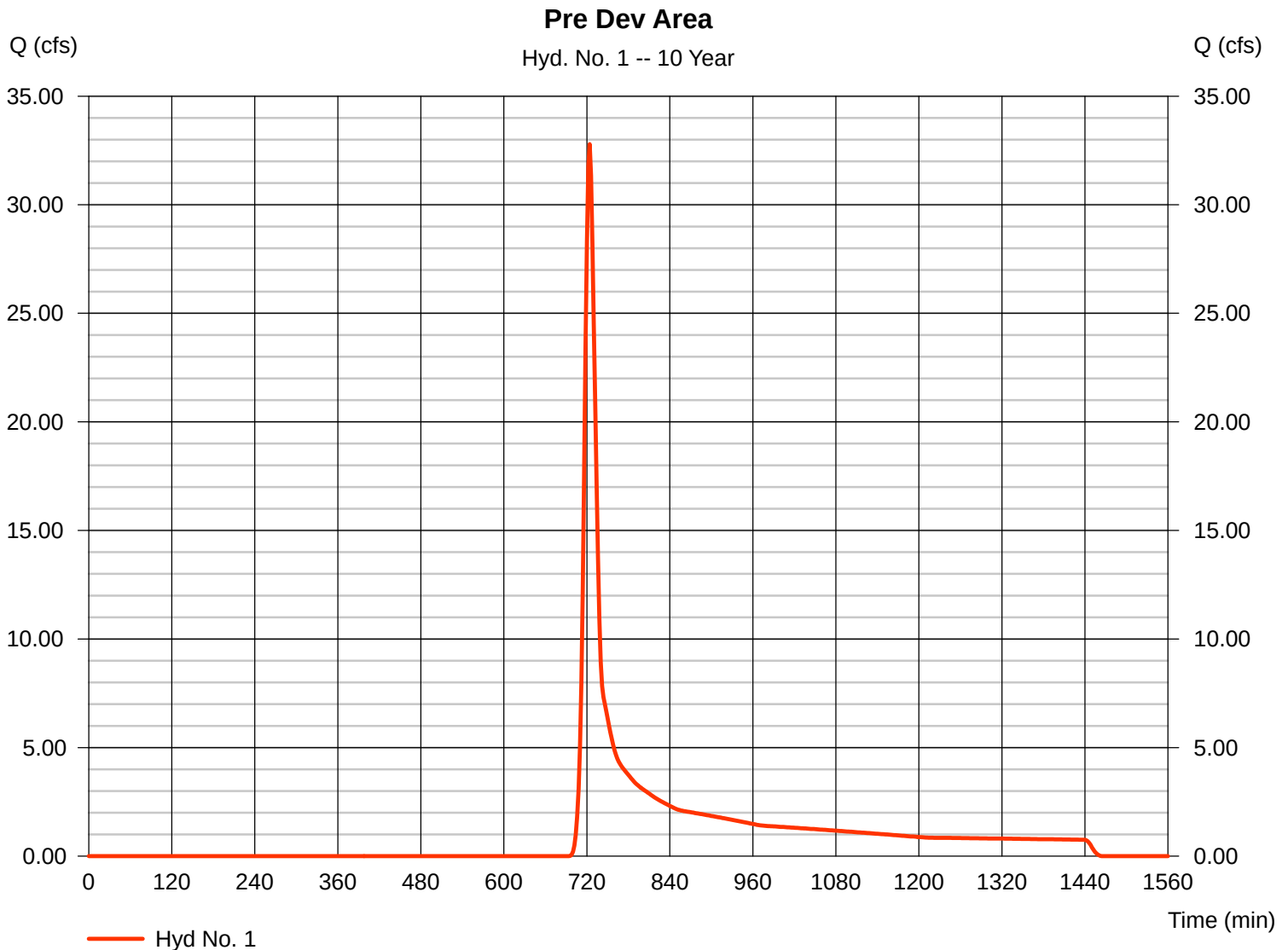
## Hyd. No. 1

### Pre Dev Area

Hydrograph type = SCS Runoff  
 Storm frequency = 10 yrs  
 Time interval = 2 min  
 Drainage area = 26.840 ac  
 Basin Slope = 0.0 %  
 Tc method = USER  
 Total precip. = 4.74 in  
 Storm duration = 24 hrs

Peak discharge = 32.79 cfs  
 Time to peak = 724 min  
 Hyd. volume = 103,516 cuft  
 Curve number = 59\*  
 Hydraulic length = 0 ft  
 Time of conc. (Tc) = 14.72 min  
 Distribution = Type II  
 Shape factor = 484

\* Composite (Area/CN) =  $[(26.420 \times 58) + (0.420 \times 98)] / 26.840$



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.24

Thursday, Feb 1, 2018

## Hyd. No. 2

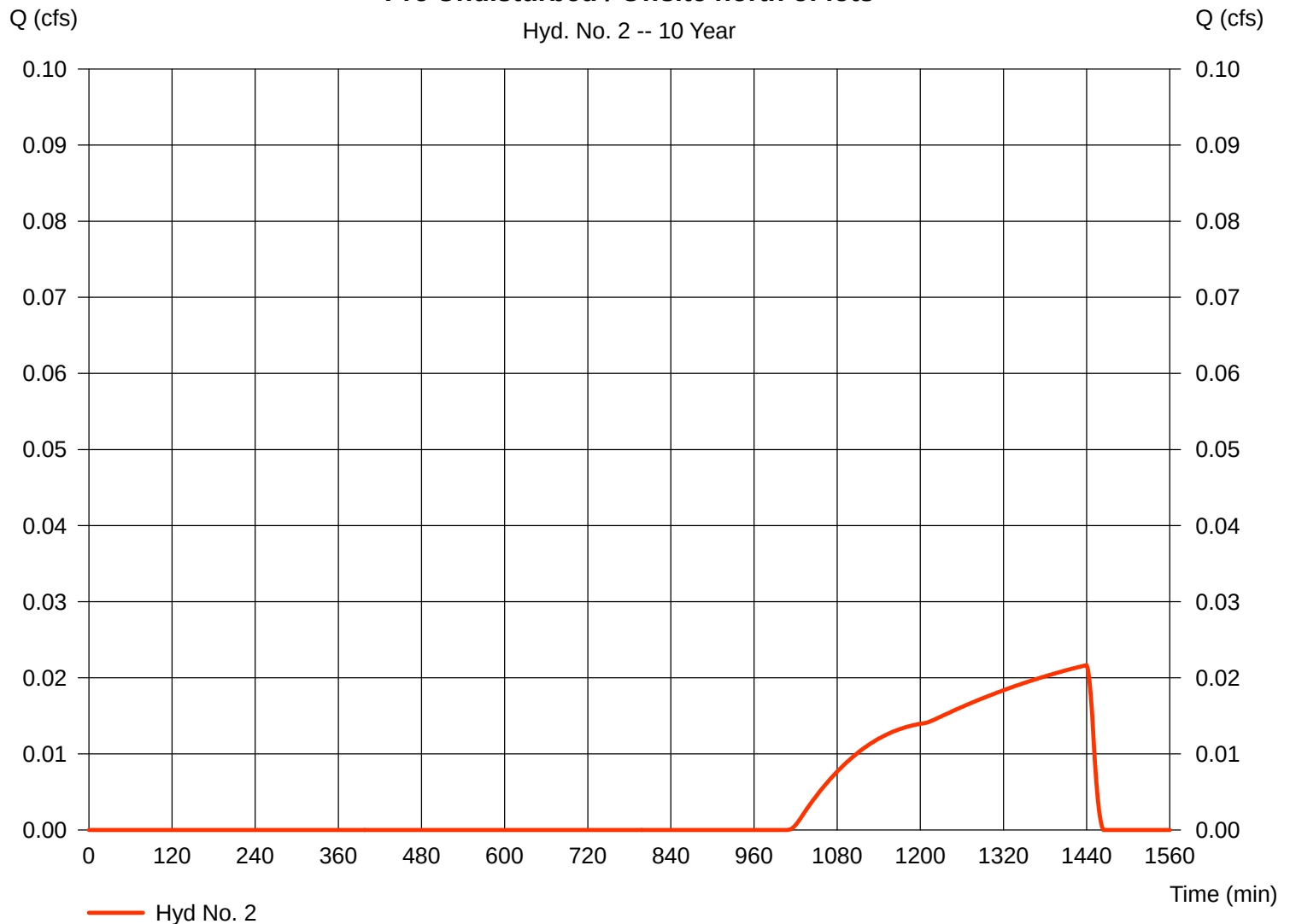
Pre Undisturbed / Offsite north of lots

Hydrograph type = SCS Runoff  
 Storm frequency = 10 yrs  
 Time interval = 2 min  
 Drainage area = 9.590 ac  
 Basin Slope = 0.0 %  
 Tc method = USER  
 Total precip. = 4.74 in  
 Storm duration = 24 hrs

Peak discharge = 0.022 cfs  
 Time to peak = 1440 min  
 Hyd. volume = 375 cuft  
 Curve number = 32\*  
 Hydraulic length = 0 ft  
 Time of conc. (Tc) = 15.56 min  
 Distribution = Type II  
 Shape factor = 484

\* Composite (Area/CN) =  $[(9.340 \times 30) + (0.250 \times 98)] / 9.590$

### Pre Undisturbed / Offsite north of lots



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.24

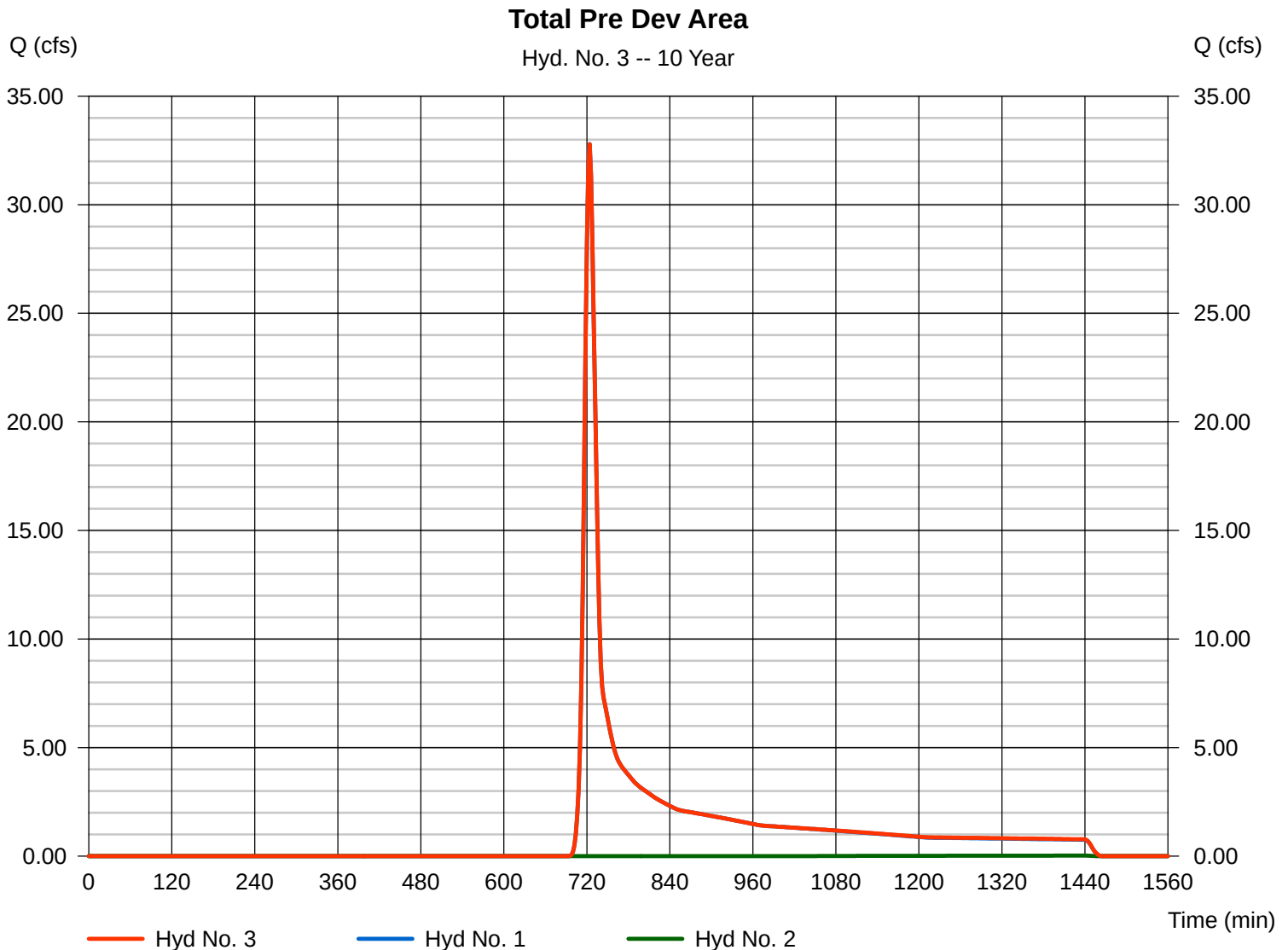
Thursday, Feb 1, 2018

## Hyd. No. 3

Total Pre Dev Area

Hydrograph type = Combine  
 Storm frequency = 10 yrs  
 Time interval = 2 min  
 Inflow hyds. = 1, 2

Peak discharge = 32.79 cfs  
 Time to peak = 724 min  
 Hyd. volume = 103,891 cuft  
 Contrib. drain. area = 36.430 ac



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.24

Thursday, Feb 1, 2018

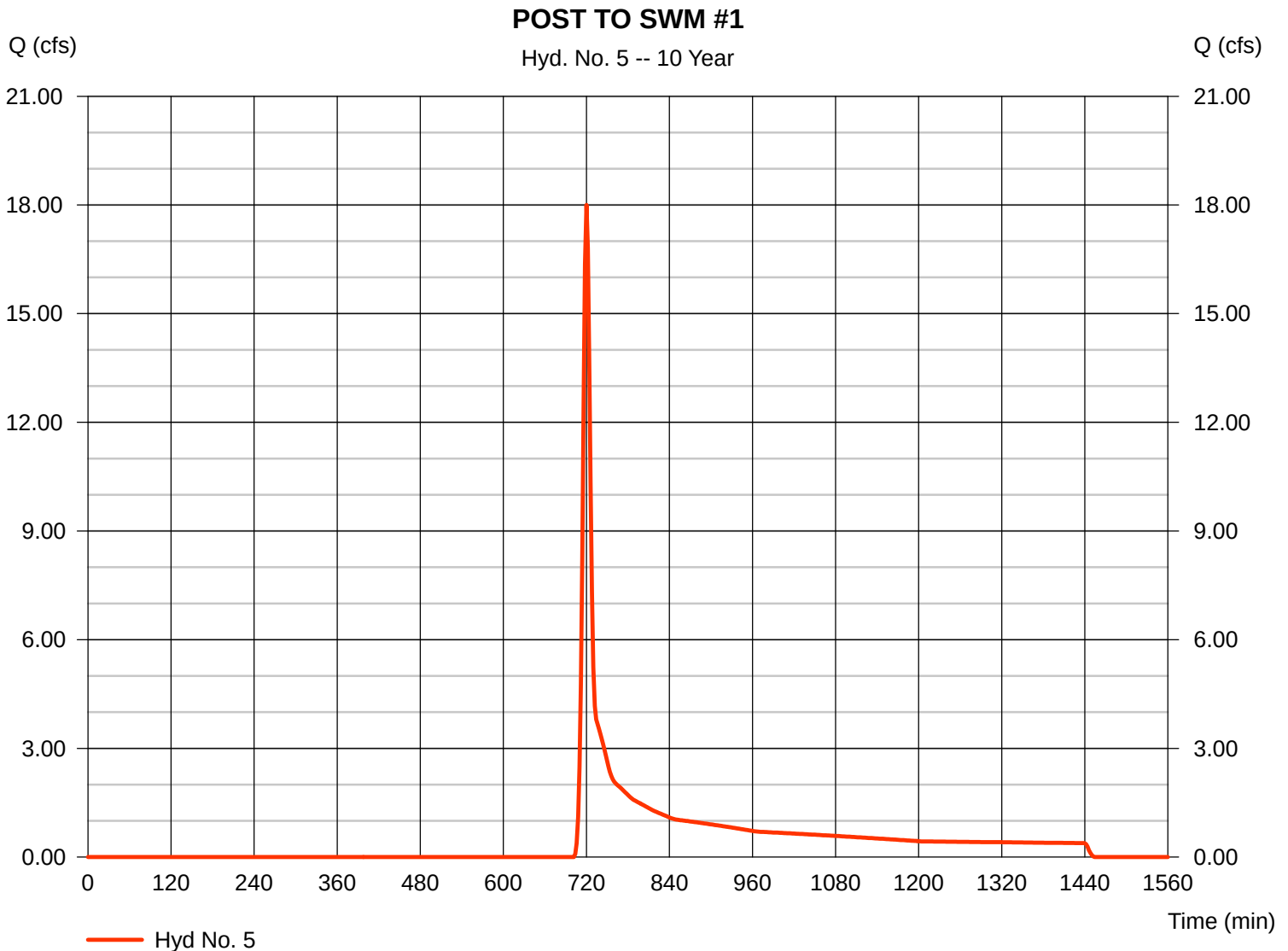
## Hyd. No. 5

### POST TO SWM #1

Hydrograph type = SCS Runoff  
 Storm frequency = 10 yrs  
 Time interval = 2 min  
 Drainage area = 15.290 ac  
 Basin Slope = 0.0 %  
 Tc method = USER  
 Total precip. = 4.74 in  
 Storm duration = 24 hrs

Peak discharge = 18.00 cfs  
 Time to peak = 720 min  
 Hyd. volume = 47,361 cuft  
 Curve number = 55\*  
 Hydraulic length = 0 ft  
 Time of conc. (Tc) = 8.80 min  
 Distribution = Type II  
 Shape factor = 484

\* Composite (Area/CN) =  $[(0.250 \times 98) + (2.050 \times 39) + (4.090 \times 30) + (1.990 \times 98) + (5.880 \times 61) + (1.030 \times 55)] / 15.290$





# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.24

Thursday, Feb 1, 2018

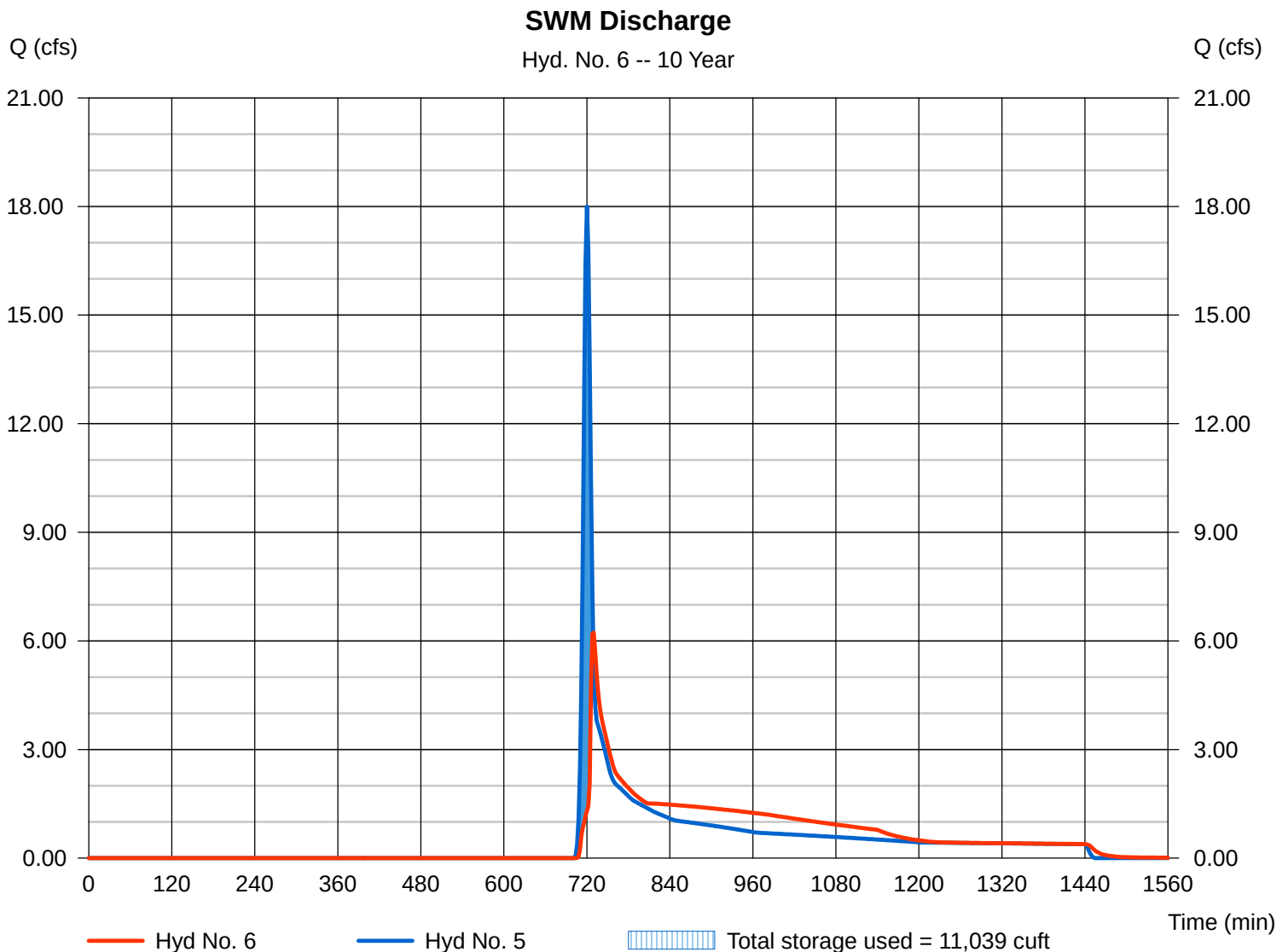
## Hyd. No. 6

### SWM Discharge

Hydrograph type = Reservoir  
 Storm frequency = 10 yrs  
 Time interval = 2 min  
 Inflow hyd. No. = 5 - POST TO SWM #1  
 Reservoir name = SWM 1

Peak discharge = 6.228 cfs  
 Time to peak = 730 min  
 Hyd. volume = 47,357 cuft  
 Max. Elevation = 530.32 ft  
 Max. Storage = 11,039 cuft

Storage Indication method used.



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.24

Thursday, Feb 1, 2018

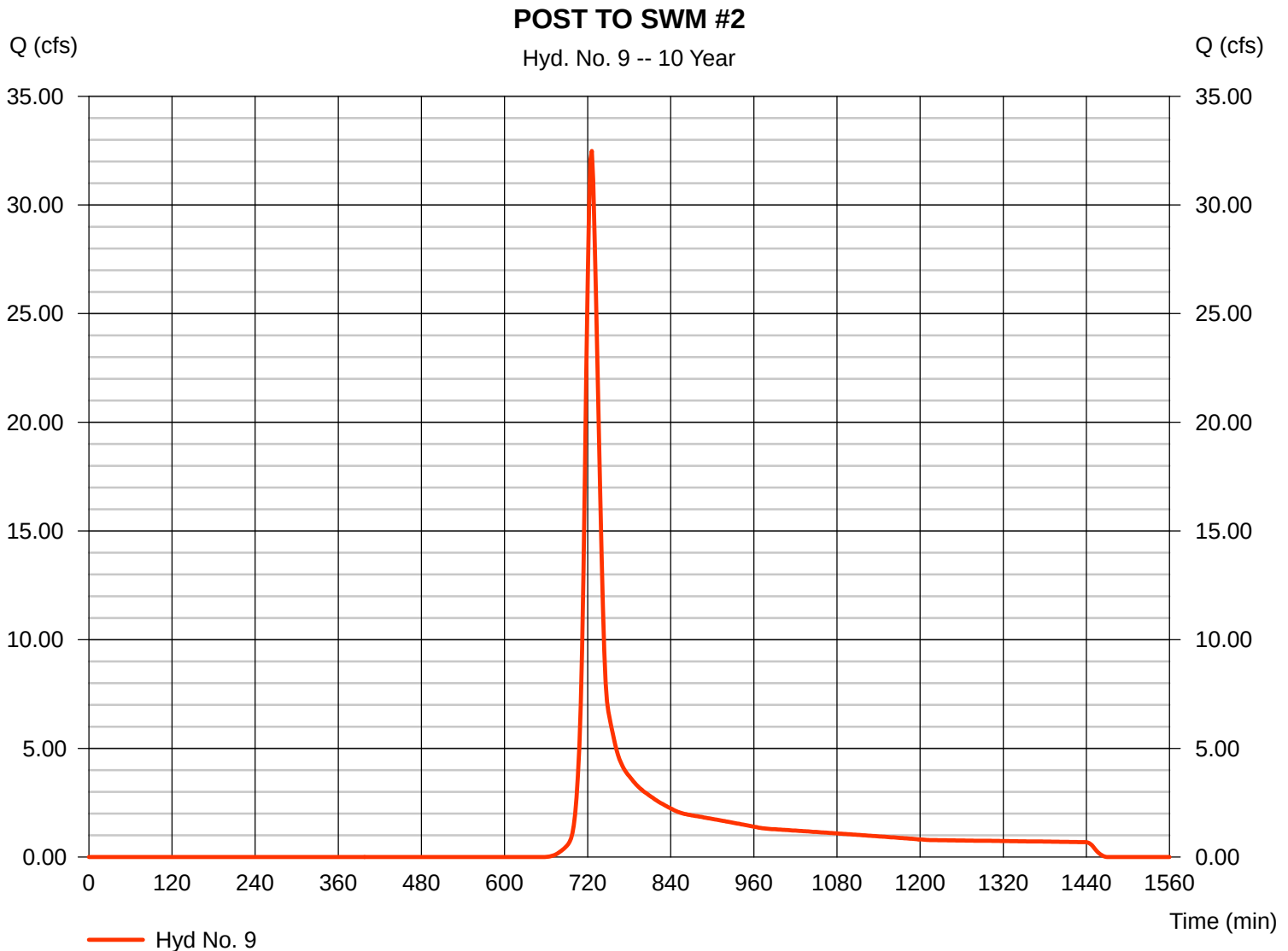
## Hyd. No. 9

### POST TO SWM #2

Hydrograph type = SCS Runoff  
 Storm frequency = 10 yrs  
 Time interval = 2 min  
 Drainage area = 19.990 ac  
 Basin Slope = 0.0 %  
 Tc method = USER  
 Total precip. = 4.74 in  
 Storm duration = 24 hrs

Peak discharge = 32.49 cfs  
 Time to peak = 726 min  
 Hyd. volume = 107,615 cuft  
 Curve number = 65\*  
 Hydraulic length = 0 ft  
 Time of conc. (Tc) = 17.00 min  
 Distribution = Type II  
 Shape factor = 484

\* Composite (Area/CN) =  $[(2.170 \times 39) + (0.530 \times 30) + (4.290 \times 98) + (8.920 \times 61) + (4.080 \times 58)] / 19.990$



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.24

Thursday, Feb 1, 2018

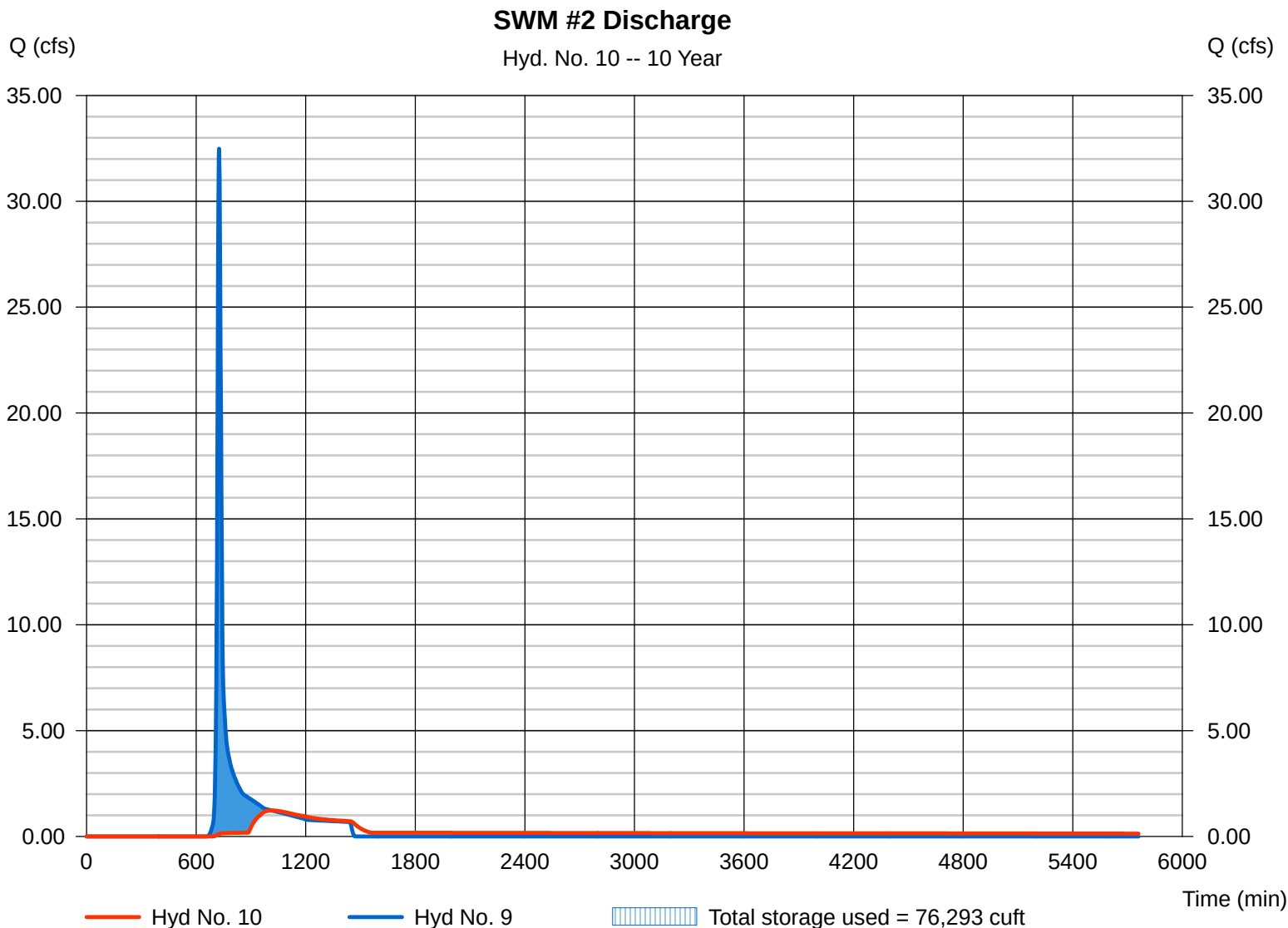
## Hyd. No. 10

### SWM #2 Discharge

Hydrograph type = Reservoir  
 Storm frequency = 10 yrs  
 Time interval = 2 min  
 Inflow hyd. No. = 9 - POST TO SWM #2  
 Reservoir name = SWM 2

Peak discharge = 1.228 cfs  
 Time to peak = 1014 min  
 Hyd. volume = 74,964 cuft  
 Max. Elevation = 522.11 ft  
 Max. Storage = 76,293 cuft

Storage Indication method used.



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.24

Thursday, Feb 1, 2018

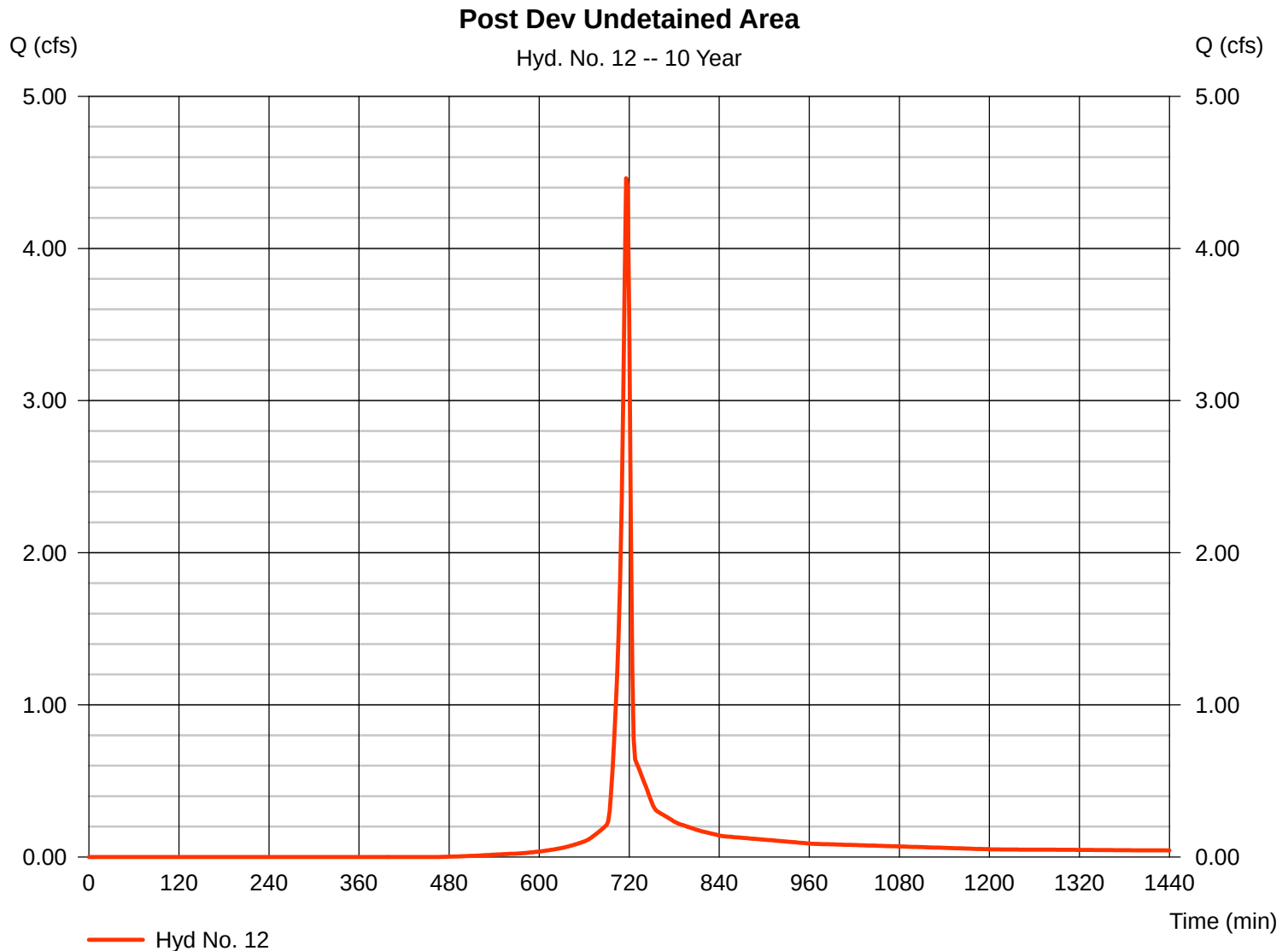
## Hyd. No. 12

### Post Dev Undetained Area

Hydrograph type = SCS Runoff  
 Storm frequency = 10 yrs  
 Time interval = 2 min  
 Drainage area = 1.030 ac  
 Basin Slope = 0.0 %  
 Tc method = USER  
 Total precip. = 4.74 in  
 Storm duration = 24 hrs

Peak discharge = 4.462 cfs  
 Time to peak = 716 min  
 Hyd. volume = 9,041 cuft  
 Curve number = 79\*  
 Hydraulic length = 0 ft  
 Time of conc. (Tc) = 5.00 min  
 Distribution = Type II  
 Shape factor = 484

\* Composite (Area/CN) =  $[(0.540 \times 61) + (0.490 \times 98)] / 1.030$



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.24

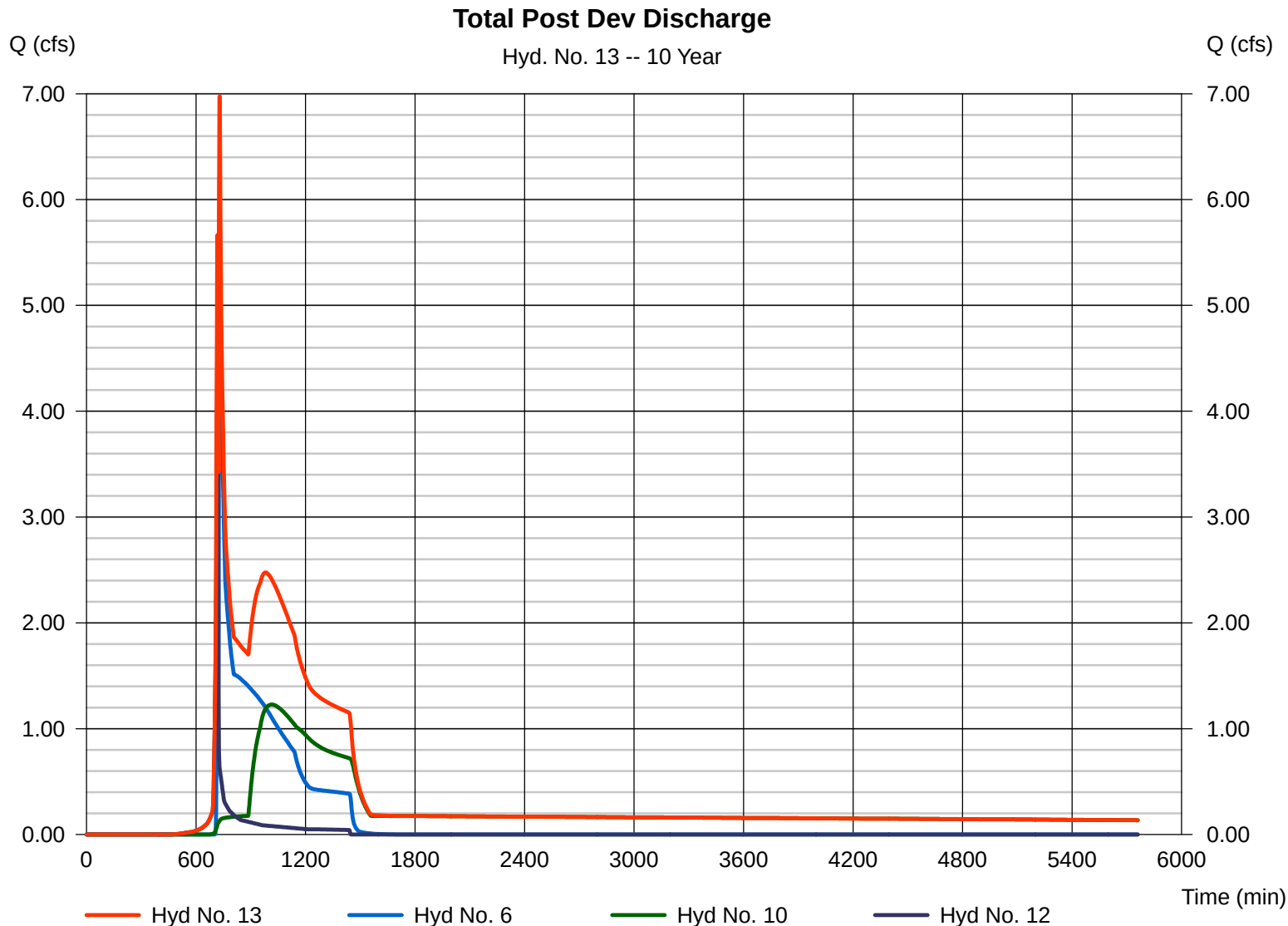
Thursday, Feb 1, 2018

## Hyd. No. 13

### Total Post Dev Discharge

Hydrograph type = Combine  
 Storm frequency = 10 yrs  
 Time interval = 2 min  
 Inflow hyds. = 6, 10, 12

Peak discharge = 6.976 cfs  
 Time to peak = 730 min  
 Hyd. volume = 131,362 cuft  
 Contrib. drain. area = 1.030 ac



# Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.24

| Hyd. No.     | Hydrograph type (origin) | Peak flow (cfs) | Time interval (min) | Time to peak (min) | Hyd. volume (cuft)     | Inflow hyd(s) | Maximum elevation (ft) | Total strge used (cuft) | Hydrograph description                  |
|--------------|--------------------------|-----------------|---------------------|--------------------|------------------------|---------------|------------------------|-------------------------|-----------------------------------------|
| 1            | SCS Runoff               | 52.98           | 2                   | 724                | 157,914                | -----         | -----                  | -----                   | Pre Dev Area                            |
| 2            | SCS Runoff               | 0.092           | 2                   | 920                | 3,228                  | -----         | -----                  | -----                   | Pre Undisturbed / Offsite north of lots |
| 3            | Combine                  | 52.98           | 2                   | 724                | 161,142                | 1, 2          | -----                  | -----                   | Total Pre Dev Area                      |
| 5            | SCS Runoff               | 31.16           | 2                   | 720                | 75,460                 | -----         | -----                  | -----                   | POST TO SWM #1                          |
| 6            | Reservoir                | 23.74           | 2                   | 724                | 75,457                 | 5             | 530.89                 | 14,345                  | SWM Discharge                           |
| 9            | SCS Runoff               | 48.40           | 2                   | 726                | 156,002                | -----         | -----                  | -----                   | POST TO SWM #2                          |
| 10           | Reservoir                | 4.388           | 2                   | 794                | 123,184                | 9             | 522.29                 | 82,919                  | SWM #2 Discharge                        |
| 12           | SCS Runoff               | 5.892           | 2                   | 716                | 12,025                 | -----         | -----                  | -----                   | Post Dev Undetained Area                |
| 13           | Combine                  | 25.49           | 2                   | 724                | 210,666                | 6, 10, 12     | -----                  | -----                   | Total Post Dev Discharge                |
| 4272-SWM.gpw |                          |                 |                     |                    | Return Period: 25 Year |               |                        | Thursday, Feb 1, 2018   |                                         |

# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.24

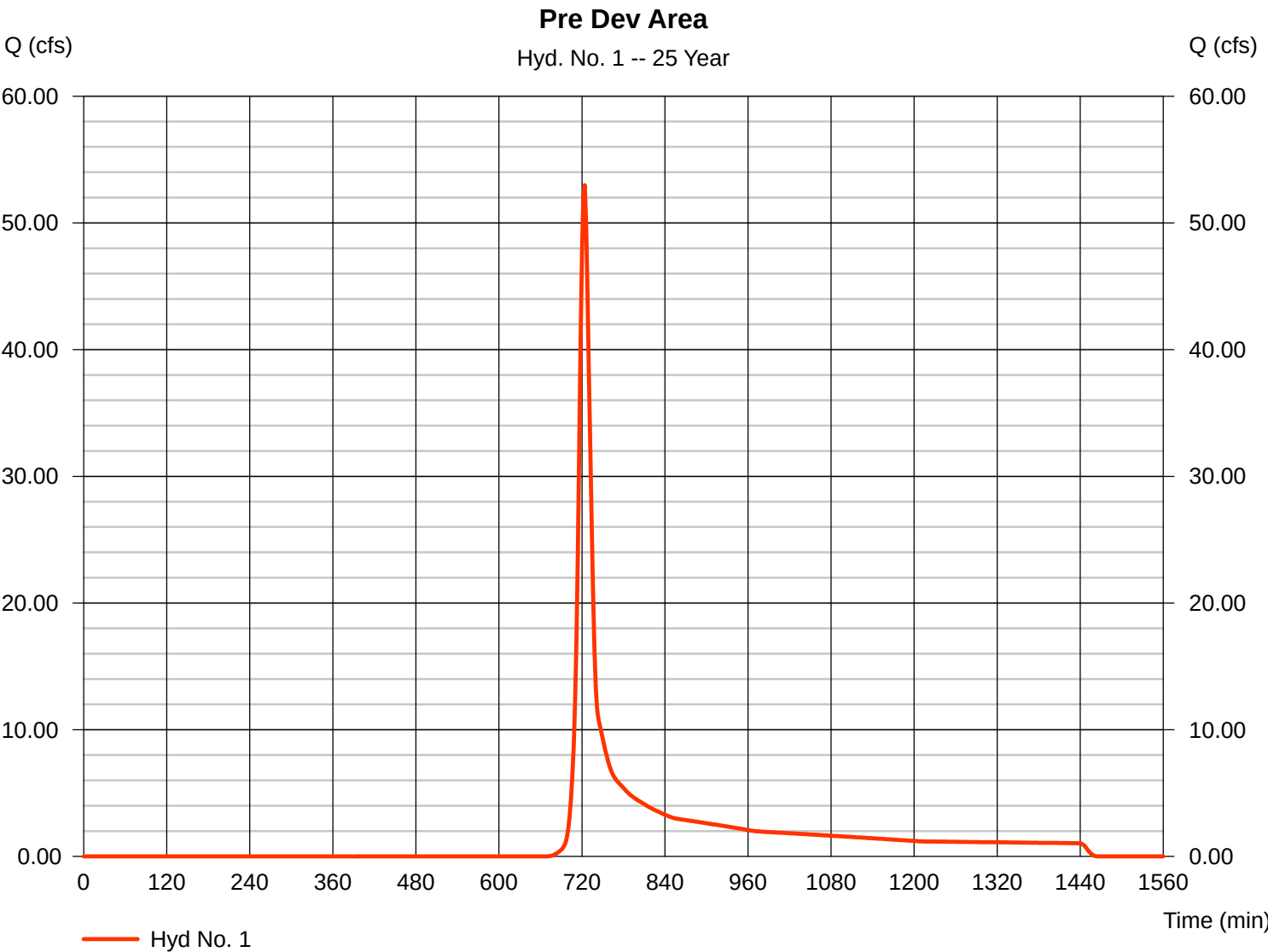
Thursday, Feb 1, 2018

## Hyd. No. 1

### Pre Dev Area

|                 |   |            |                    |   |              |
|-----------------|---|------------|--------------------|---|--------------|
| Hydrograph type | = | SCS Runoff | Peak discharge     | = | 52.98 cfs    |
| Storm frequency | = | 25 yrs     | Time to peak       | = | 724 min      |
| Time interval   | = | 2 min      | Hyd. volume        | = | 157,914 cuft |
| Drainage area   | = | 26.840 ac  | Curve number       | = | 59*          |
| Basin Slope     | = | 0.0 %      | Hydraulic length   | = | 0 ft         |
| Tc method       | = | USER       | Time of conc. (Tc) | = | 14.72 min    |
| Total precip.   | = | 5.72 in    | Distribution       | = | Type II      |
| Storm duration  | = | 24 hrs     | Shape factor       | = | 484          |

\* Composite (Area/CN) = [(26.420 x 58) + (0.420 x 98)] / 26.840





# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.24

Thursday, Feb 1, 2018

## Hyd. No. 2

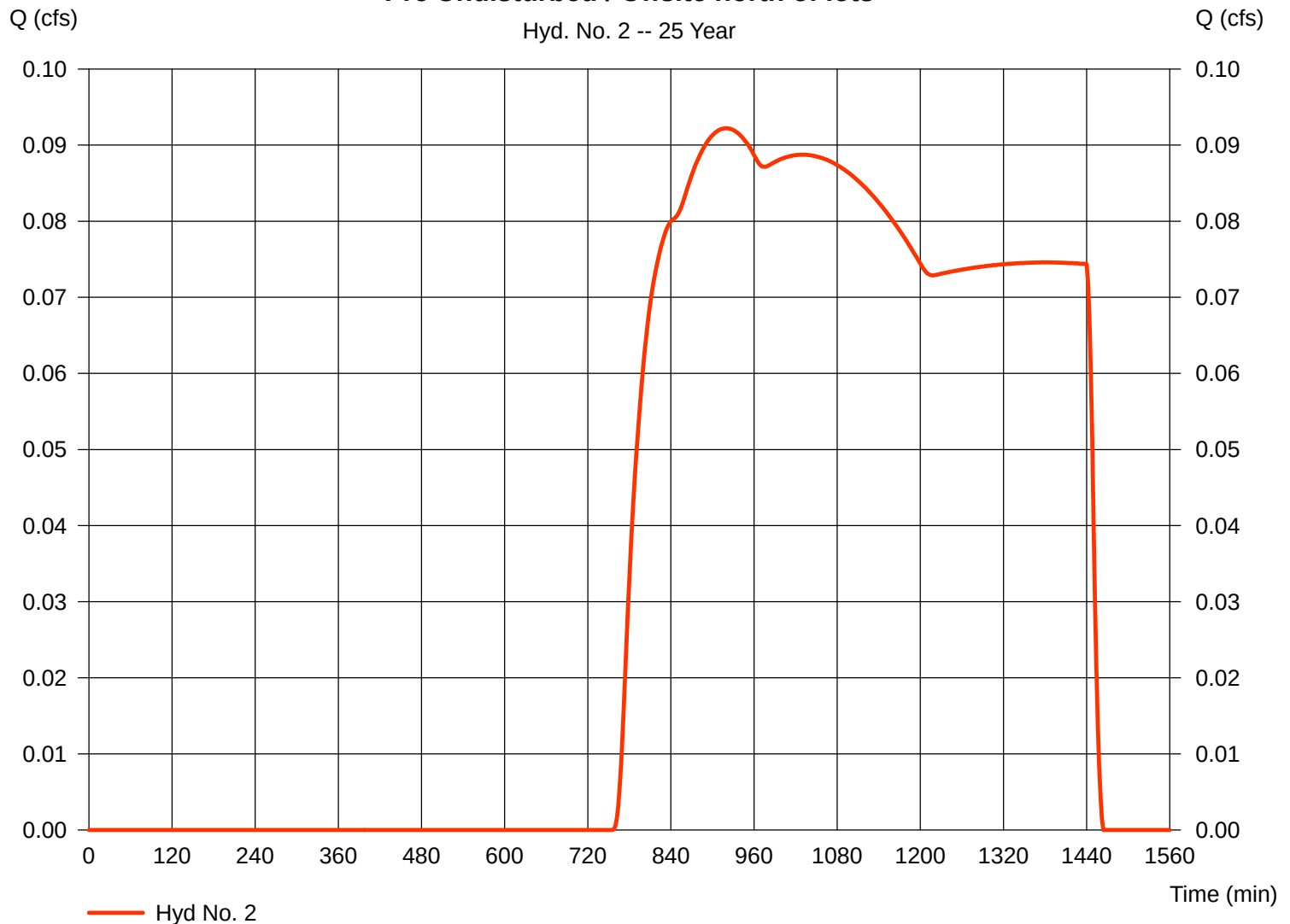
Pre Undisturbed / Offsite north of lots

Hydrograph type = SCS Runoff  
 Storm frequency = 25 yrs  
 Time interval = 2 min  
 Drainage area = 9.590 ac  
 Basin Slope = 0.0 %  
 Tc method = USER  
 Total precip. = 5.72 in  
 Storm duration = 24 hrs

Peak discharge = 0.092 cfs  
 Time to peak = 920 min  
 Hyd. volume = 3,228 cuft  
 Curve number = 32\*  
 Hydraulic length = 0 ft  
 Time of conc. (Tc) = 15.56 min  
 Distribution = Type II  
 Shape factor = 484

\* Composite (Area/CN) =  $[(9.340 \times 30) + (0.250 \times 98)] / 9.590$

### Pre Undisturbed / Offsite north of lots



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.24

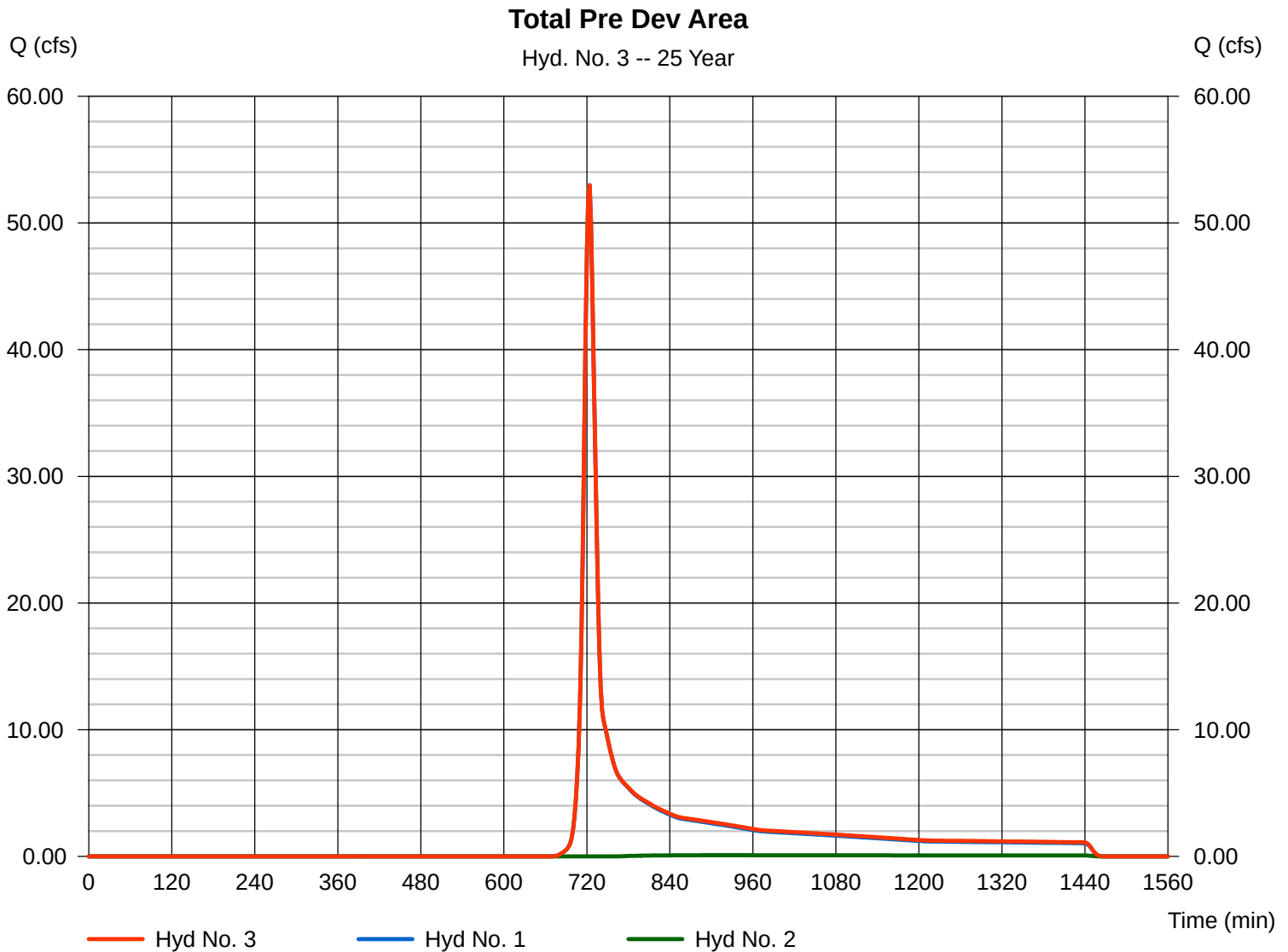
Thursday, Feb 1, 2018

## Hyd. No. 3

Total Pre Dev Area

Hydrograph type = Combine  
 Storm frequency = 25 yrs  
 Time interval = 2 min  
 Inflow hyds. = 1, 2

Peak discharge = 52.98 cfs  
 Time to peak = 724 min  
 Hyd. volume = 161,142 cuft  
 Contrib. drain. area = 36.430 ac



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.24

Thursday, Feb 1, 2018

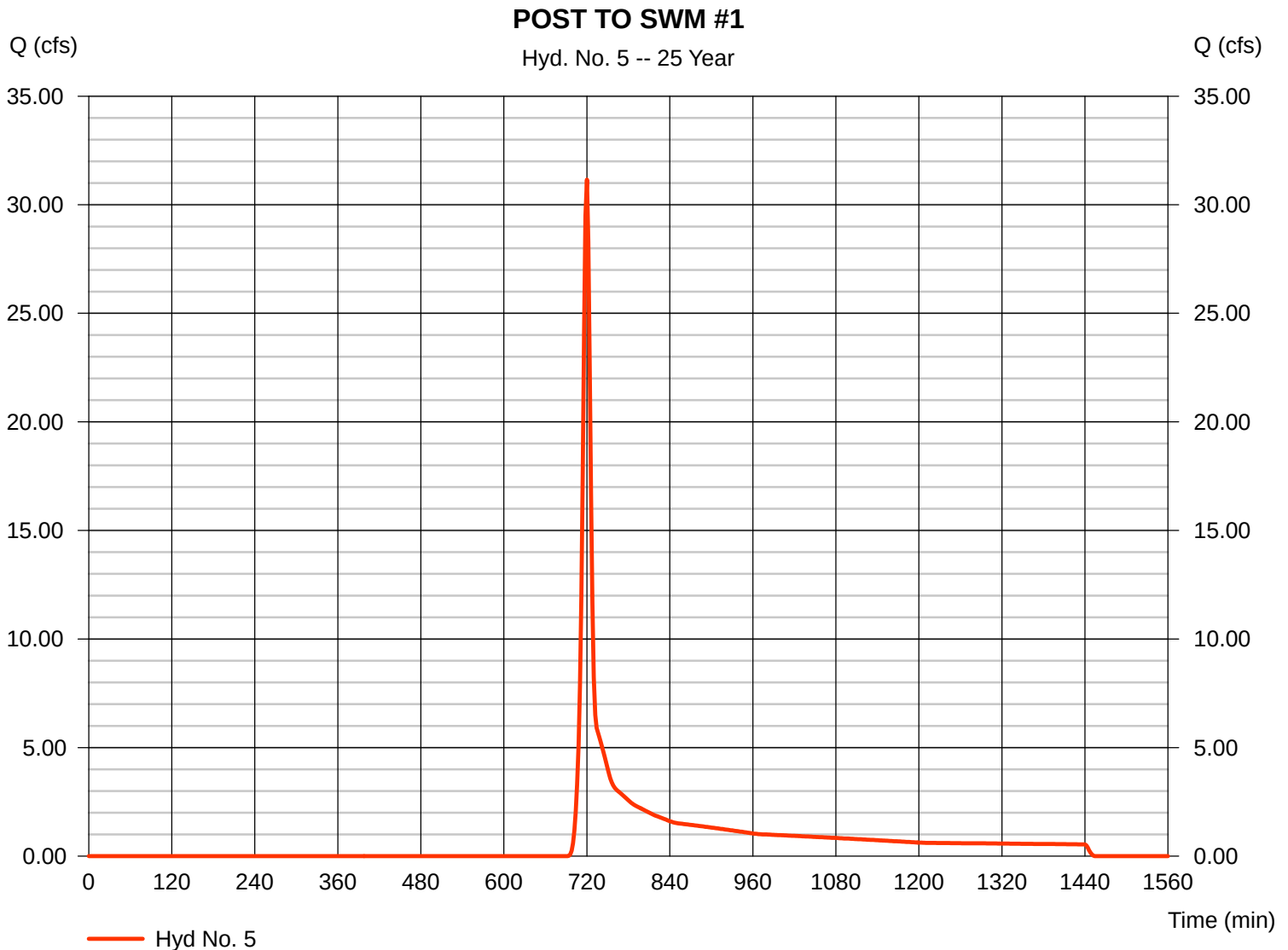
## Hyd. No. 5

### POST TO SWM #1

Hydrograph type = SCS Runoff  
 Storm frequency = 25 yrs  
 Time interval = 2 min  
 Drainage area = 15.290 ac  
 Basin Slope = 0.0 %  
 Tc method = USER  
 Total precip. = 5.72 in  
 Storm duration = 24 hrs

Peak discharge = 31.16 cfs  
 Time to peak = 720 min  
 Hyd. volume = 75,460 cuft  
 Curve number = 55\*  
 Hydraulic length = 0 ft  
 Time of conc. (Tc) = 8.80 min  
 Distribution = Type II  
 Shape factor = 484

\* Composite (Area/CN) =  $[(0.250 \times 98) + (2.050 \times 39) + (4.090 \times 30) + (1.990 \times 98) + (5.880 \times 61) + (1.030 \times 55)] / 15.290$



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.24

Thursday, Feb 1, 2018

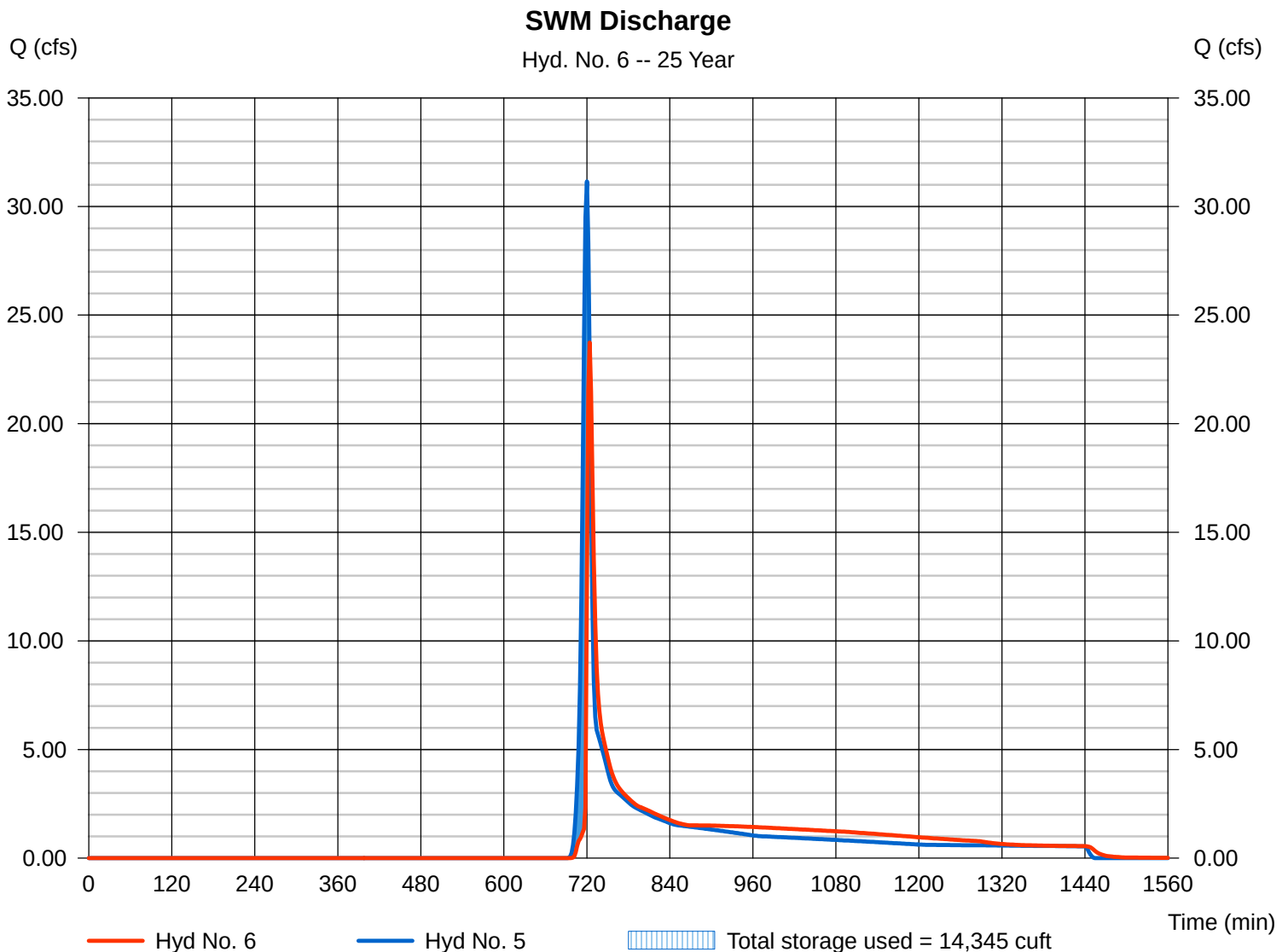
## Hyd. No. 6

### SWM Discharge

Hydrograph type = Reservoir  
 Storm frequency = 25 yrs  
 Time interval = 2 min  
 Inflow hyd. No. = 5 - POST TO SWM #1  
 Reservoir name = SWM 1

Peak discharge = 23.74 cfs  
 Time to peak = 724 min  
 Hyd. volume = 75,457 cuft  
 Max. Elevation = 530.89 ft  
 Max. Storage = 14,345 cuft

Storage Indication method used.



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.24

Thursday, Feb 1, 2018

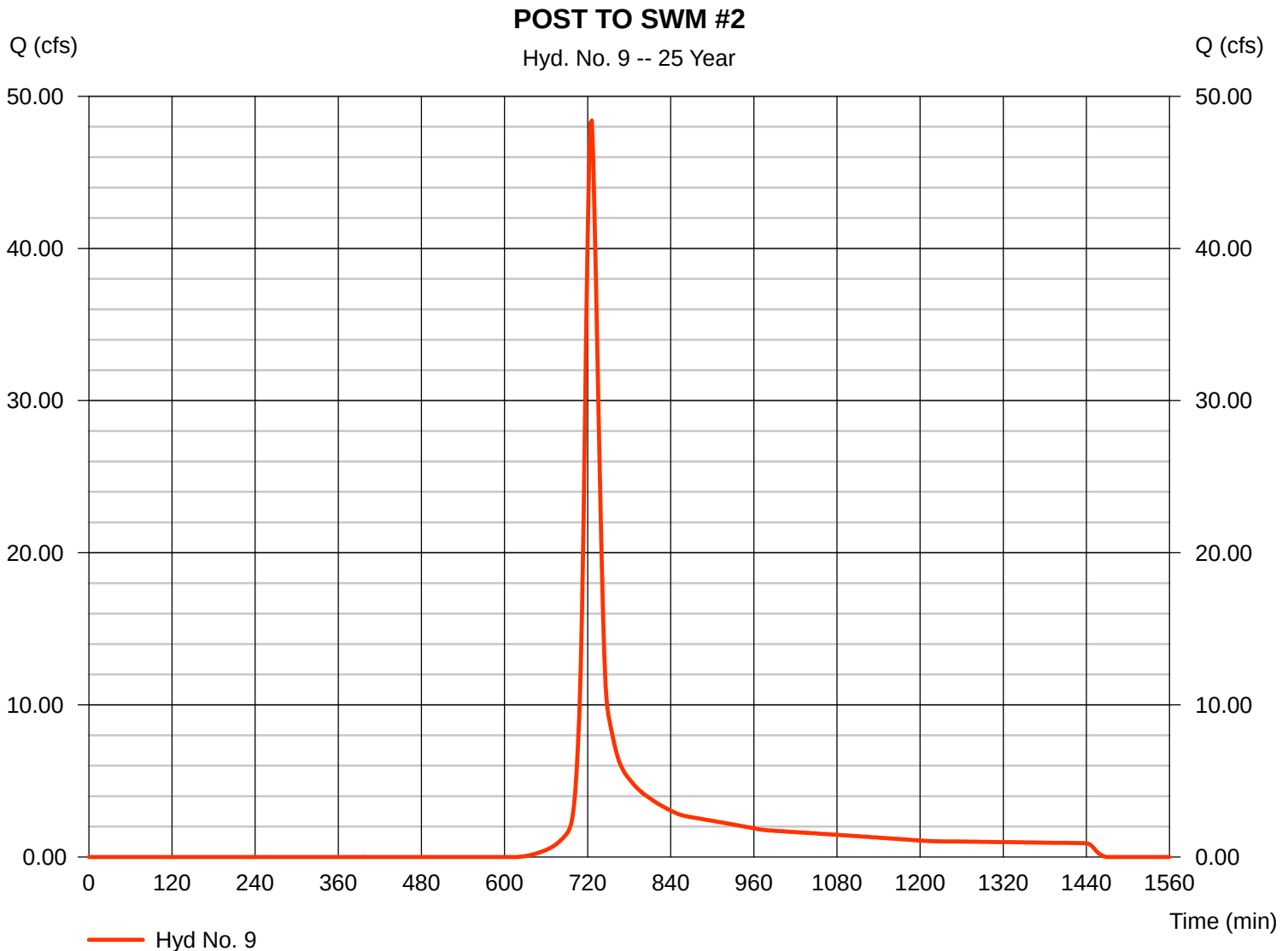
## Hyd. No. 9

### POST TO SWM #2

Hydrograph type = SCS Runoff  
 Storm frequency = 25 yrs  
 Time interval = 2 min  
 Drainage area = 19.990 ac  
 Basin Slope = 0.0 %  
 Tc method = USER  
 Total precip. = 5.72 in  
 Storm duration = 24 hrs

Peak discharge = 48.40 cfs  
 Time to peak = 726 min  
 Hyd. volume = 156,002 cuft  
 Curve number = 65\*  
 Hydraulic length = 0 ft  
 Time of conc. (Tc) = 17.00 min  
 Distribution = Type II  
 Shape factor = 484

\* Composite (Area/CN) =  $[(2.170 \times 39) + (0.530 \times 30) + (4.290 \times 98) + (8.920 \times 61) + (4.080 \times 58)] / 19.990$



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.24

Thursday, Feb 1, 2018

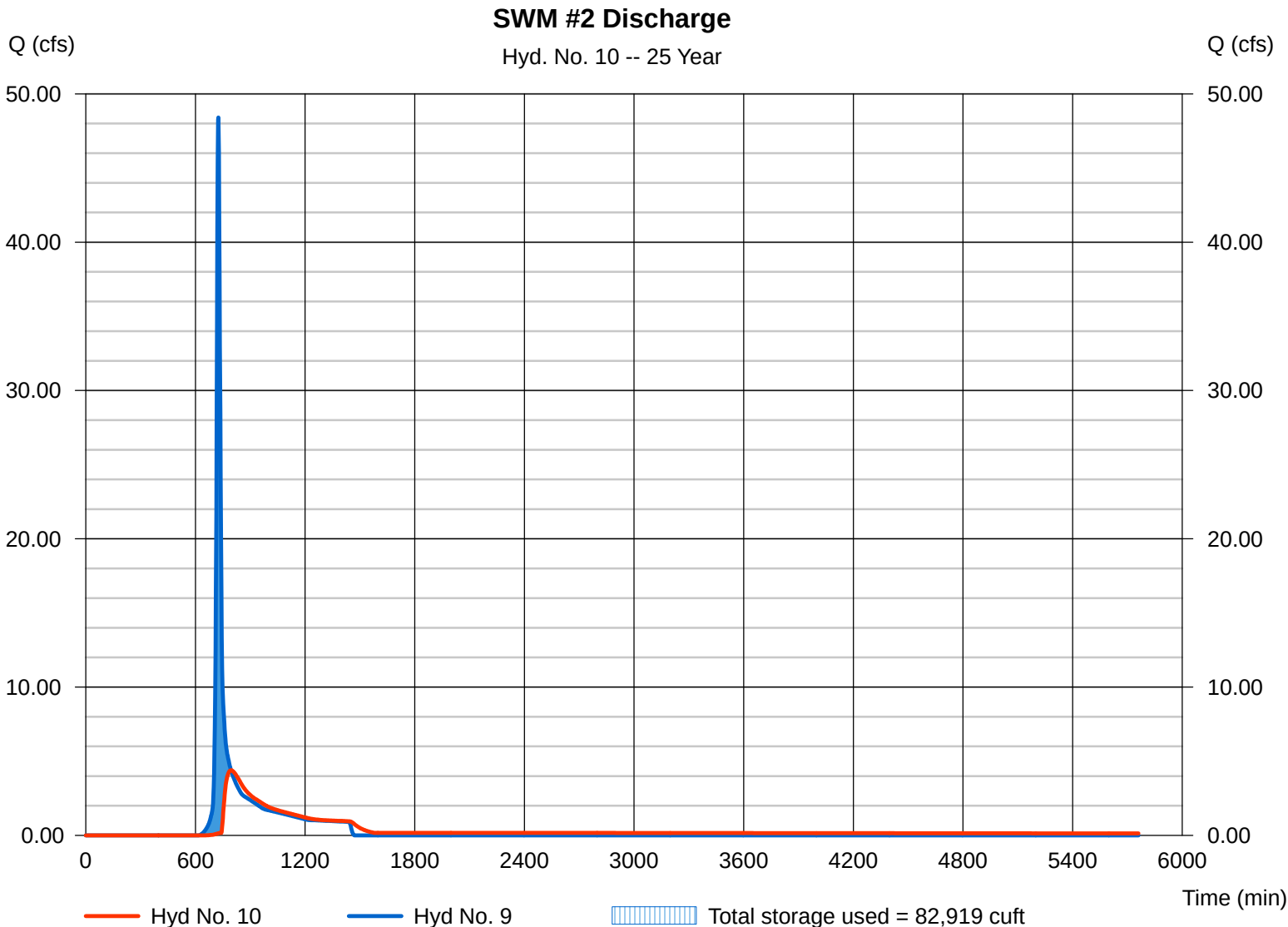
## Hyd. No. 10

### SWM #2 Discharge

Hydrograph type = Reservoir  
 Storm frequency = 25 yrs  
 Time interval = 2 min  
 Inflow hyd. No. = 9 - POST TO SWM #2  
 Reservoir name = SWM 2

Peak discharge = 4.388 cfs  
 Time to peak = 794 min  
 Hyd. volume = 123,184 cuft  
 Max. Elevation = 522.29 ft  
 Max. Storage = 82,919 cuft

Storage Indication method used.



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.24

Thursday, Feb 1, 2018

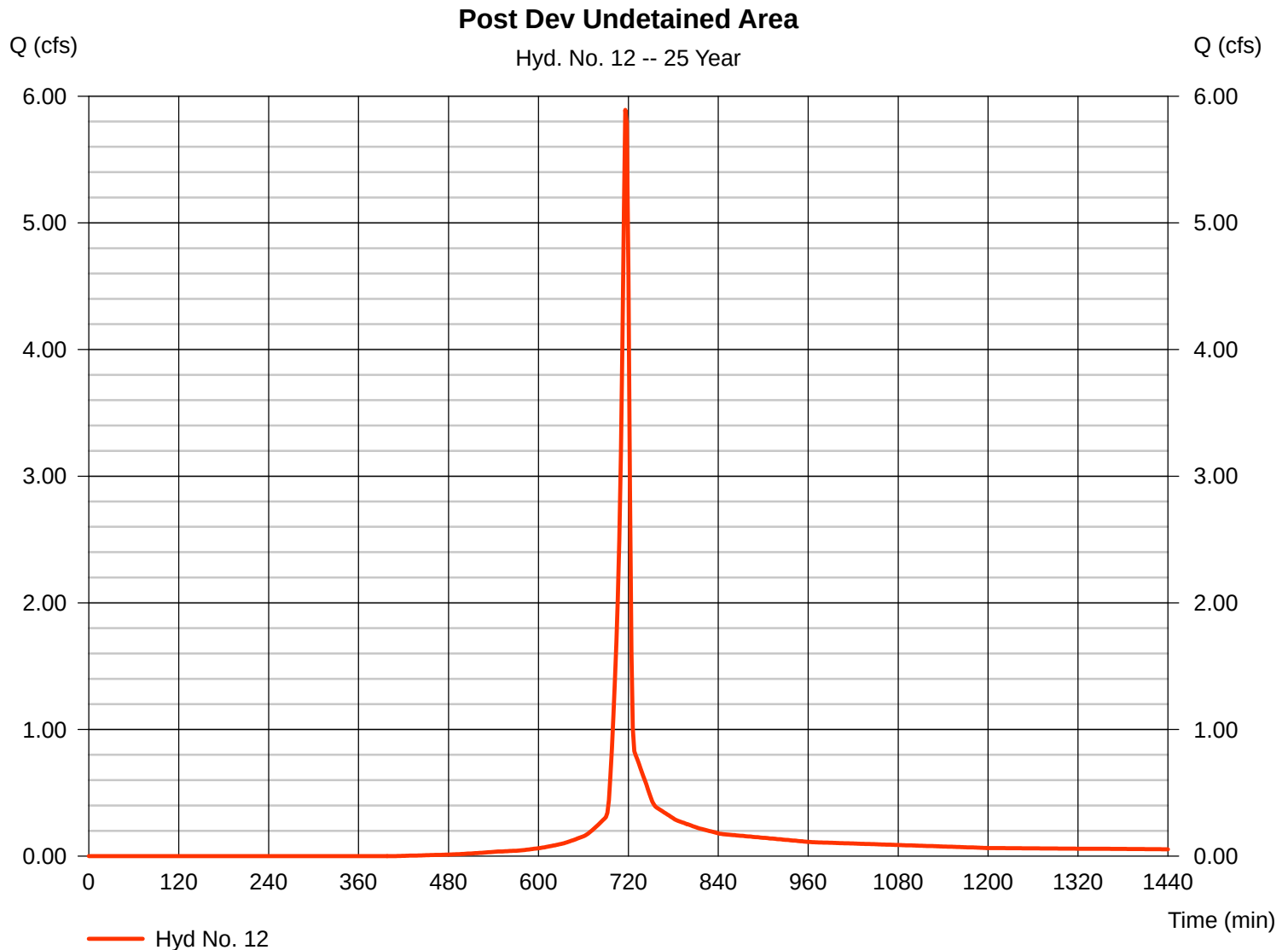
## Hyd. No. 12

### Post Dev Undetained Area

Hydrograph type = SCS Runoff  
 Storm frequency = 25 yrs  
 Time interval = 2 min  
 Drainage area = 1.030 ac  
 Basin Slope = 0.0 %  
 Tc method = USER  
 Total precip. = 5.72 in  
 Storm duration = 24 hrs

Peak discharge = 5.892 cfs  
 Time to peak = 716 min  
 Hyd. volume = 12,025 cuft  
 Curve number = 79\*  
 Hydraulic length = 0 ft  
 Time of conc. (Tc) = 5.00 min  
 Distribution = Type II  
 Shape factor = 484

\* Composite (Area/CN) =  $[(0.540 \times 61) + (0.490 \times 98)] / 1.030$





# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.24

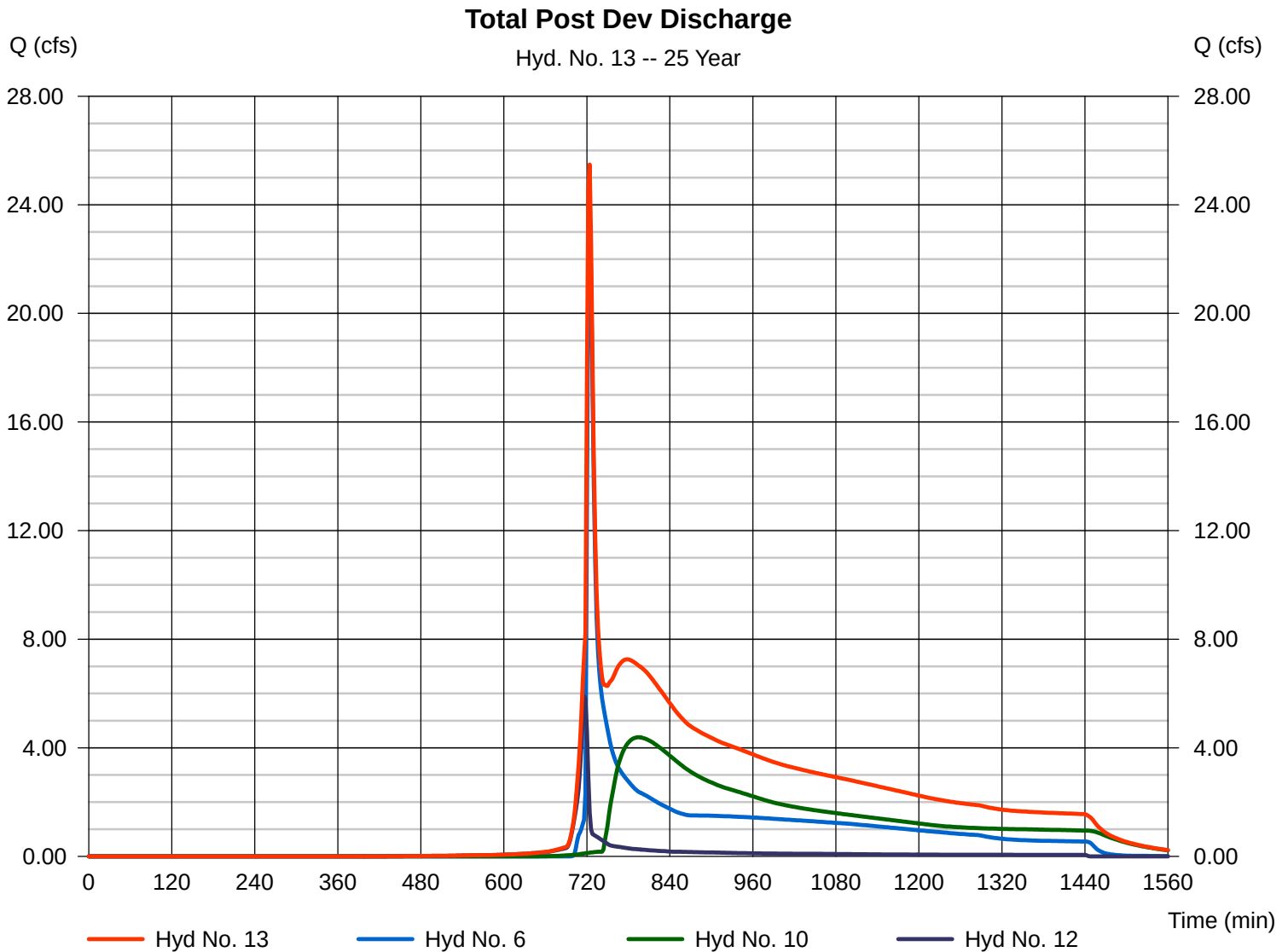
Thursday, Feb 1, 2018

## Hyd. No. 13

### Total Post Dev Discharge

Hydrograph type = Combine  
 Storm frequency = 25 yrs  
 Time interval = 2 min  
 Inflow hyds. = 6, 10, 12

Peak discharge = 25.49 cfs  
 Time to peak = 724 min  
 Hyd. volume = 210,666 cuft  
 Contrib. drain. area = 1.030 ac



# Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.24

| Hyd. No.     | Hydrograph type (origin) | Peak flow (cfs) | Time interval (min) | Time to peak (min) | Hyd. volume (cuft)     | Inflow hyd(s) | Maximum elevation (ft) | Total strge used (cuft) | Hydrograph description                  |
|--------------|--------------------------|-----------------|---------------------|--------------------|------------------------|---------------|------------------------|-------------------------|-----------------------------------------|
| 1            | SCS Runoff               | 71.44           | 2                   | 724                | 208,245                | -----         | -----                  | -----                   | Pre Dev Area                            |
| 2            | SCS Runoff               | 0.298           | 2                   | 752                | 7,561                  | -----         | -----                  | -----                   | Pre Undisturbed / Offsite north of lots |
| 3            | Combine                  | 71.46           | 2                   | 724                | 215,806                | 1, 2          | -----                  | -----                   | Total Pre Dev Area                      |
| 5            | SCS Runoff               | 43.36           | 2                   | 720                | 101,991                | -----         | -----                  | -----                   | POST TO SWM #1                          |
| 6            | Reservoir                | 37.67           | 2                   | 722                | 101,987                | 5             | 531.23                 | 16,572                  | SWM Discharge                           |
| 9            | SCS Runoff               | 62.73           | 2                   | 724                | 199,644                | -----         | -----                  | -----                   | POST TO SWM #2                          |
| 10           | Reservoir                | 11.57           | 2                   | 750                | 166,749                | 9             | 522.57                 | 93,138                  | SWM #2 Discharge                        |
| 12           | SCS Runoff               | 7.103           | 2                   | 716                | 14,601                 | -----         | -----                  | -----                   | Post Dev Undetained Area                |
| 13           | Combine                  | 41.29           | 2                   | 722                | 283,336                | 6, 10, 12     | -----                  | -----                   | Total Post Dev Discharge                |
| 4272-SWM.gpw |                          |                 |                     |                    | Return Period: 50 Year |               |                        | Thursday, Feb 1, 2018   |                                         |

# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.24

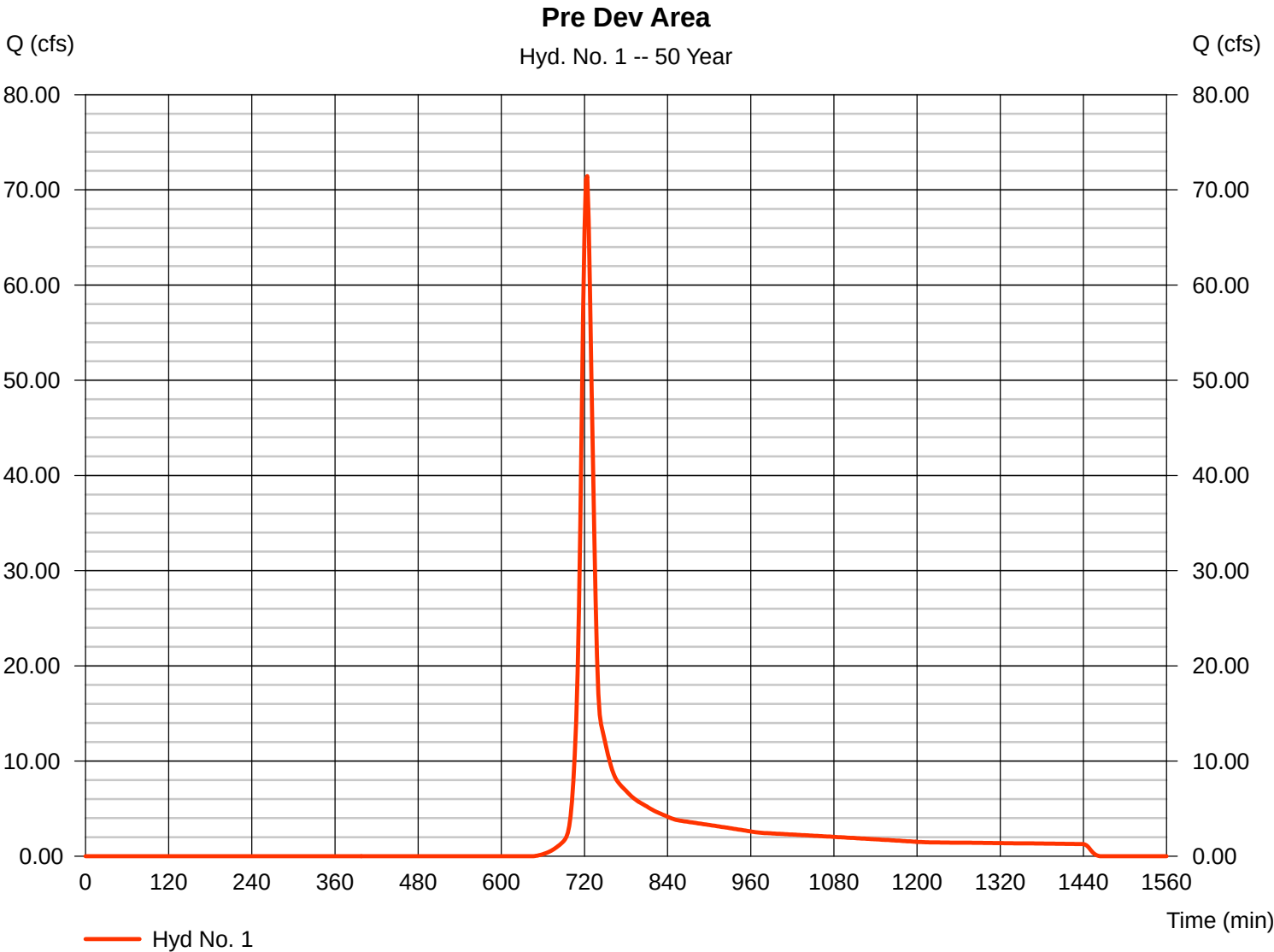
Thursday, Feb 1, 2018

## Hyd. No. 1

### Pre Dev Area

|                 |   |            |                    |   |              |
|-----------------|---|------------|--------------------|---|--------------|
| Hydrograph type | = | SCS Runoff | Peak discharge     | = | 71.44 cfs    |
| Storm frequency | = | 50 yrs     | Time to peak       | = | 724 min      |
| Time interval   | = | 2 min      | Hyd. volume        | = | 208,245 cuft |
| Drainage area   | = | 26.840 ac  | Curve number       | = | 59*          |
| Basin Slope     | = | 0.0 %      | Hydraulic length   | = | 0 ft         |
| Tc method       | = | USER       | Time of conc. (Tc) | = | 14.72 min    |
| Total precip.   | = | 6.54 in    | Distribution       | = | Type II      |
| Storm duration  | = | 24 hrs     | Shape factor       | = | 484          |

\* Composite (Area/CN) = [(26.420 x 58) + (0.420 x 98)] / 26.840



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.24

Thursday, Feb 1, 2018

## Hyd. No. 2

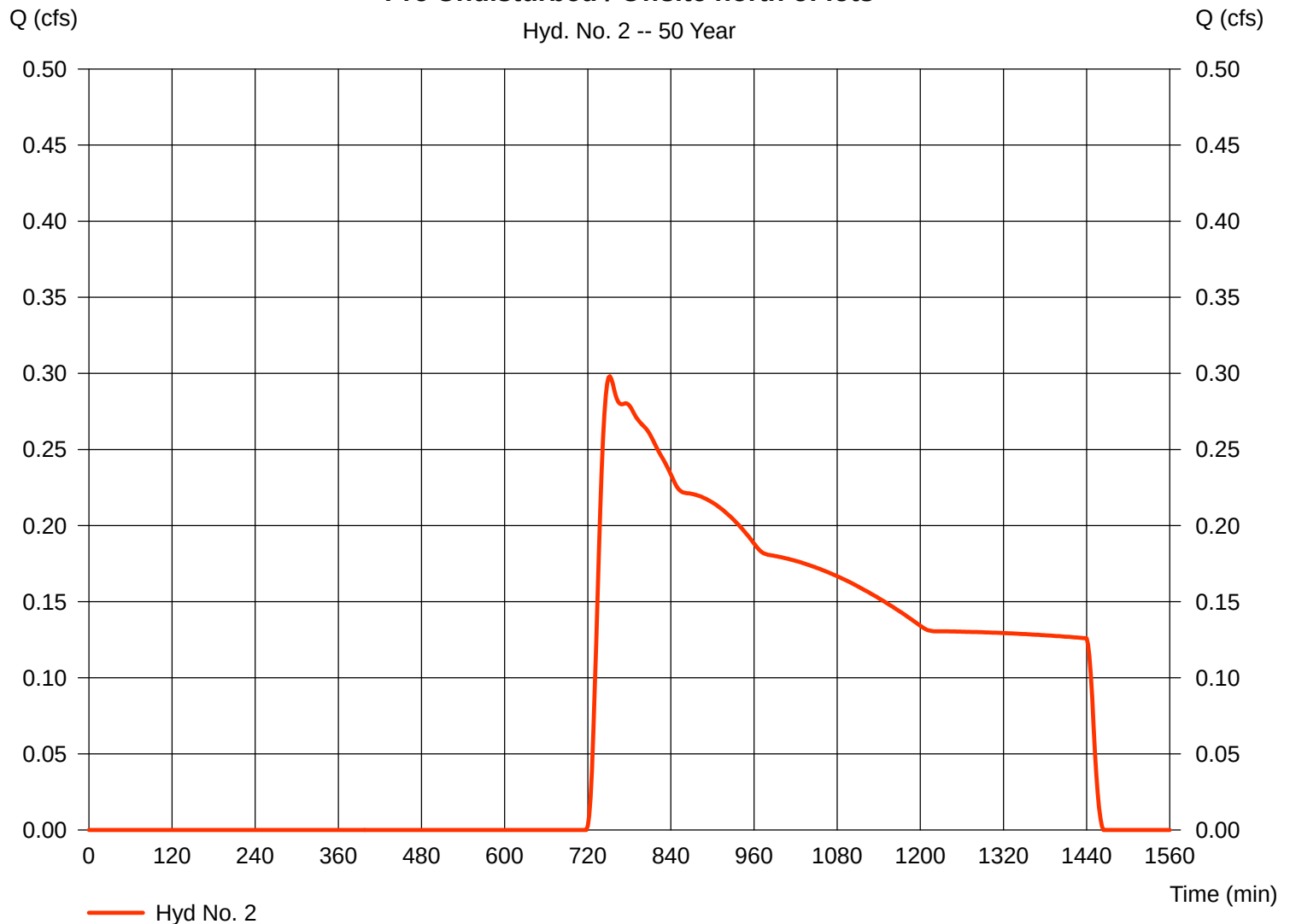
Pre Undisturbed / Offsite north of lots

Hydrograph type = SCS Runoff  
 Storm frequency = 50 yrs  
 Time interval = 2 min  
 Drainage area = 9.590 ac  
 Basin Slope = 0.0 %  
 Tc method = USER  
 Total precip. = 6.54 in  
 Storm duration = 24 hrs

Peak discharge = 0.298 cfs  
 Time to peak = 752 min  
 Hyd. volume = 7,561 cuft  
 Curve number = 32\*  
 Hydraulic length = 0 ft  
 Time of conc. (Tc) = 15.56 min  
 Distribution = Type II  
 Shape factor = 484

\* Composite (Area/CN) =  $[(9.340 \times 30) + (0.250 \times 98)] / 9.590$

### Pre Undisturbed / Offsite north of lots



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.24

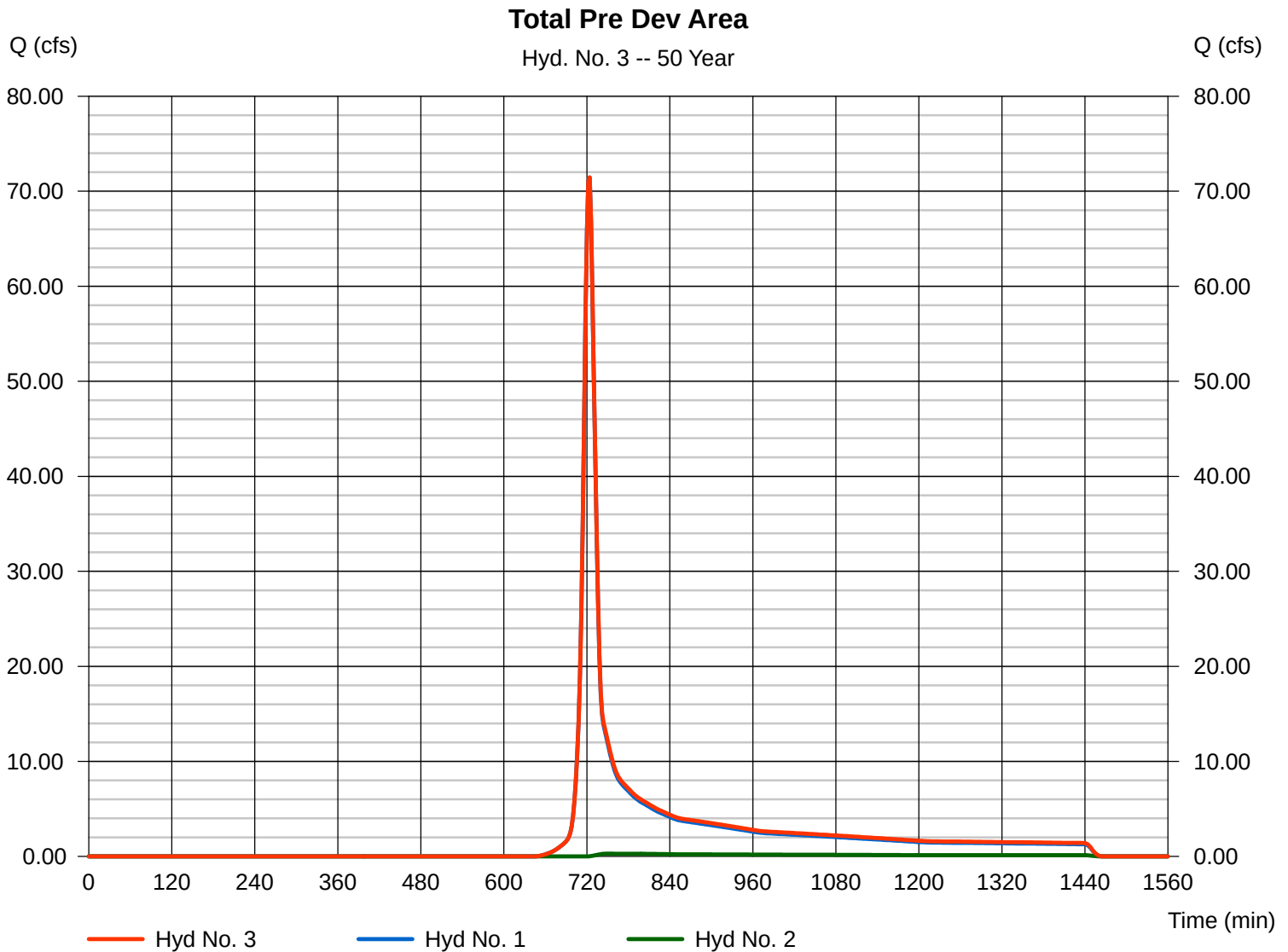
Thursday, Feb 1, 2018

## Hyd. No. 3

Total Pre Dev Area

Hydrograph type = Combine  
 Storm frequency = 50 yrs  
 Time interval = 2 min  
 Inflow hyds. = 1, 2

Peak discharge = 71.46 cfs  
 Time to peak = 724 min  
 Hyd. volume = 215,806 cuft  
 Contrib. drain. area = 36.430 ac



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.24

Thursday, Feb 1, 2018

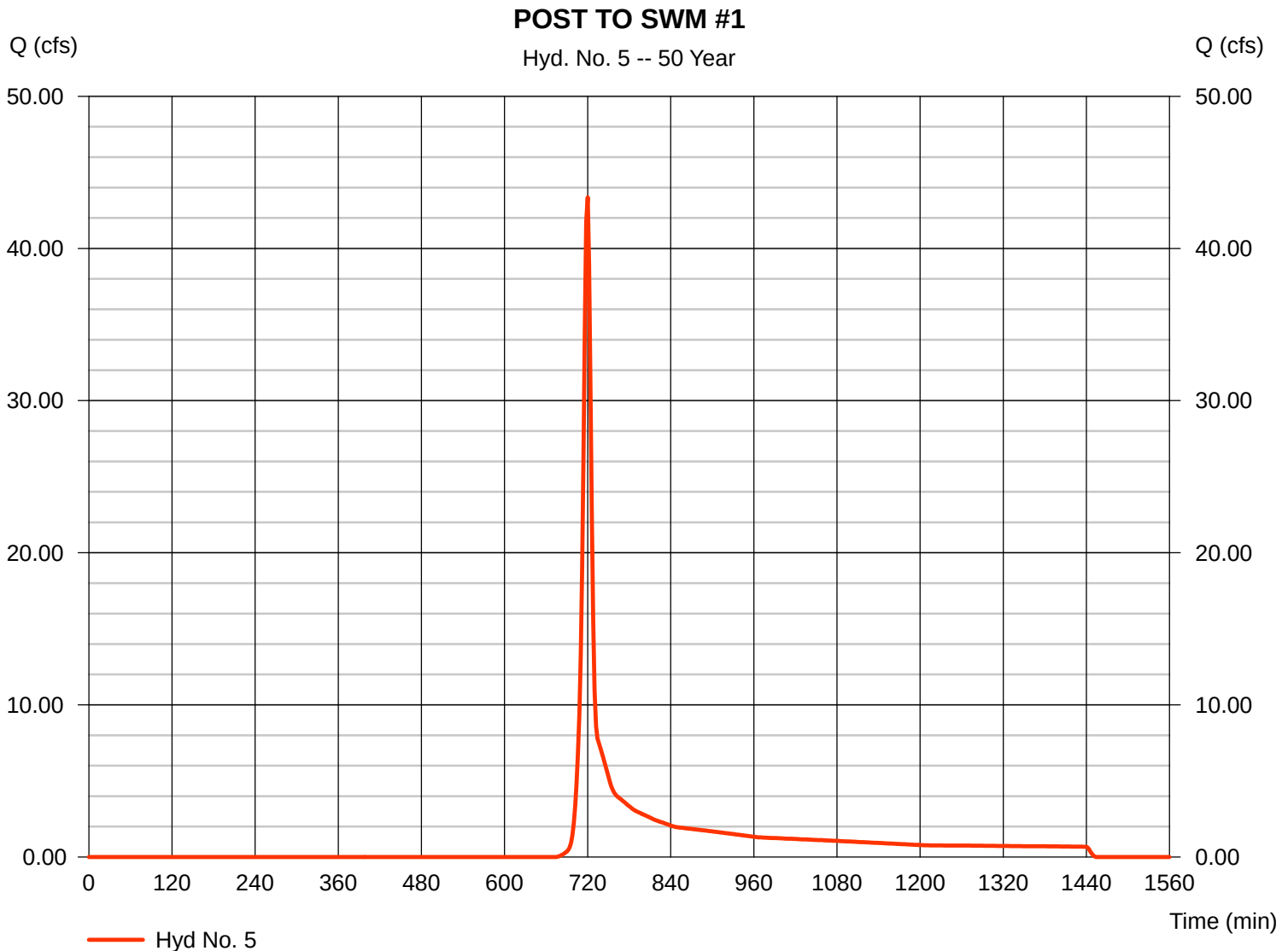
## Hyd. No. 5

### POST TO SWM #1

Hydrograph type = SCS Runoff  
 Storm frequency = 50 yrs  
 Time interval = 2 min  
 Drainage area = 15.290 ac  
 Basin Slope = 0.0 %  
 Tc method = USER  
 Total precip. = 6.54 in  
 Storm duration = 24 hrs

Peak discharge = 43.36 cfs  
 Time to peak = 720 min  
 Hyd. volume = 101,991 cuft  
 Curve number = 55\*  
 Hydraulic length = 0 ft  
 Time of conc. (Tc) = 8.80 min  
 Distribution = Type II  
 Shape factor = 484

\* Composite (Area/CN) =  $[(0.250 \times 98) + (2.050 \times 39) + (4.090 \times 30) + (1.990 \times 98) + (5.880 \times 61) + (1.030 \times 55)] / 15.290$



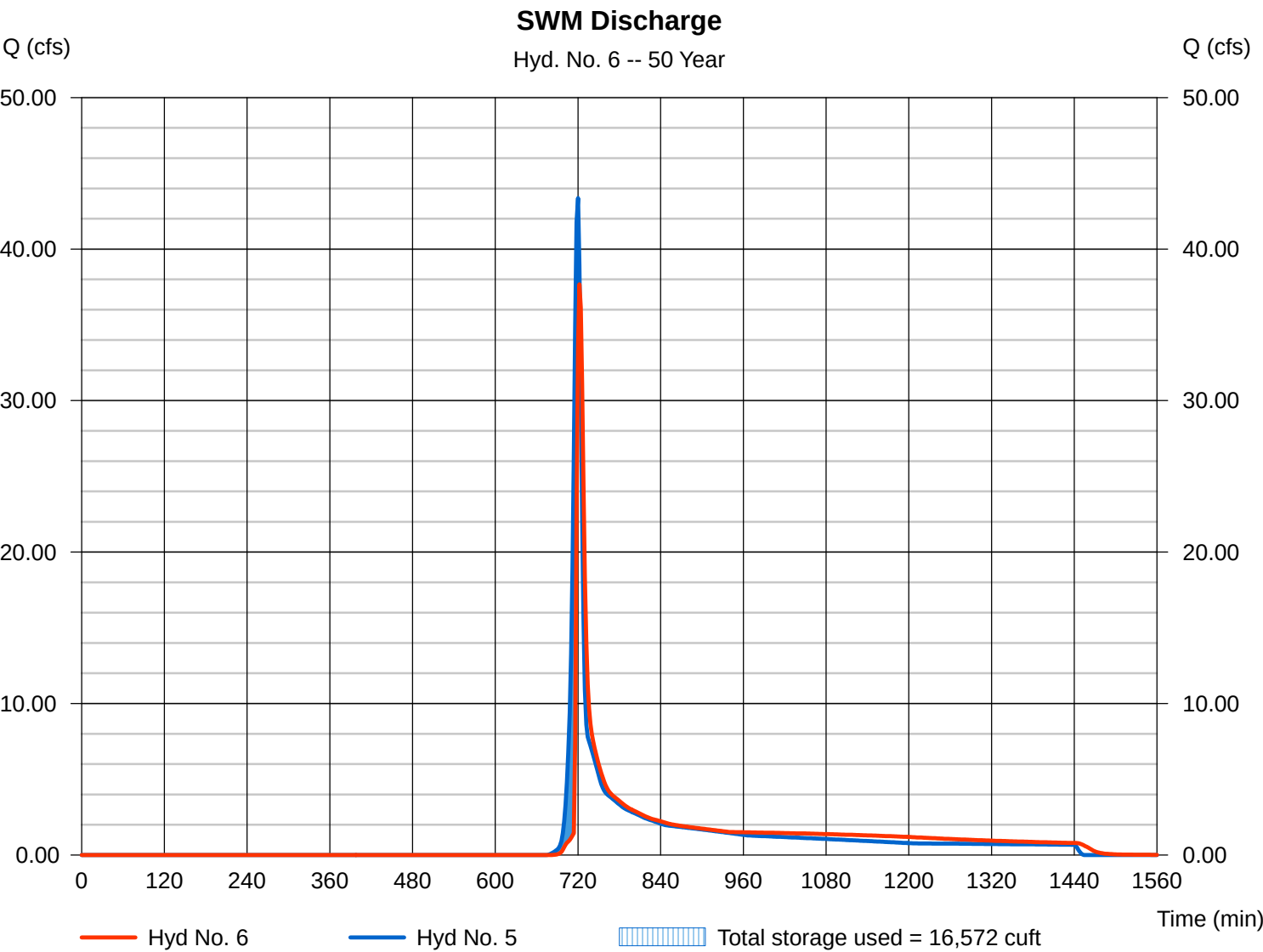
# Hydrograph Report

## Hyd. No. 6

### SWM Discharge

|                 |                      |                |                |
|-----------------|----------------------|----------------|----------------|
| Hydrograph type | = Reservoir          | Peak discharge | = 37.67 cfs    |
| Storm frequency | = 50 yrs             | Time to peak   | = 722 min      |
| Time interval   | = 2 min              | Hyd. volume    | = 101,987 cuft |
| Inflow hyd. No. | = 5 - POST TO SWM #1 | Max. Elevation | = 531.23 ft    |
| Reservoir name  | = SWM 1              | Max. Storage   | = 16,572 cuft  |

Storage Indication method used.





# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.24

Thursday, Feb 1, 2018

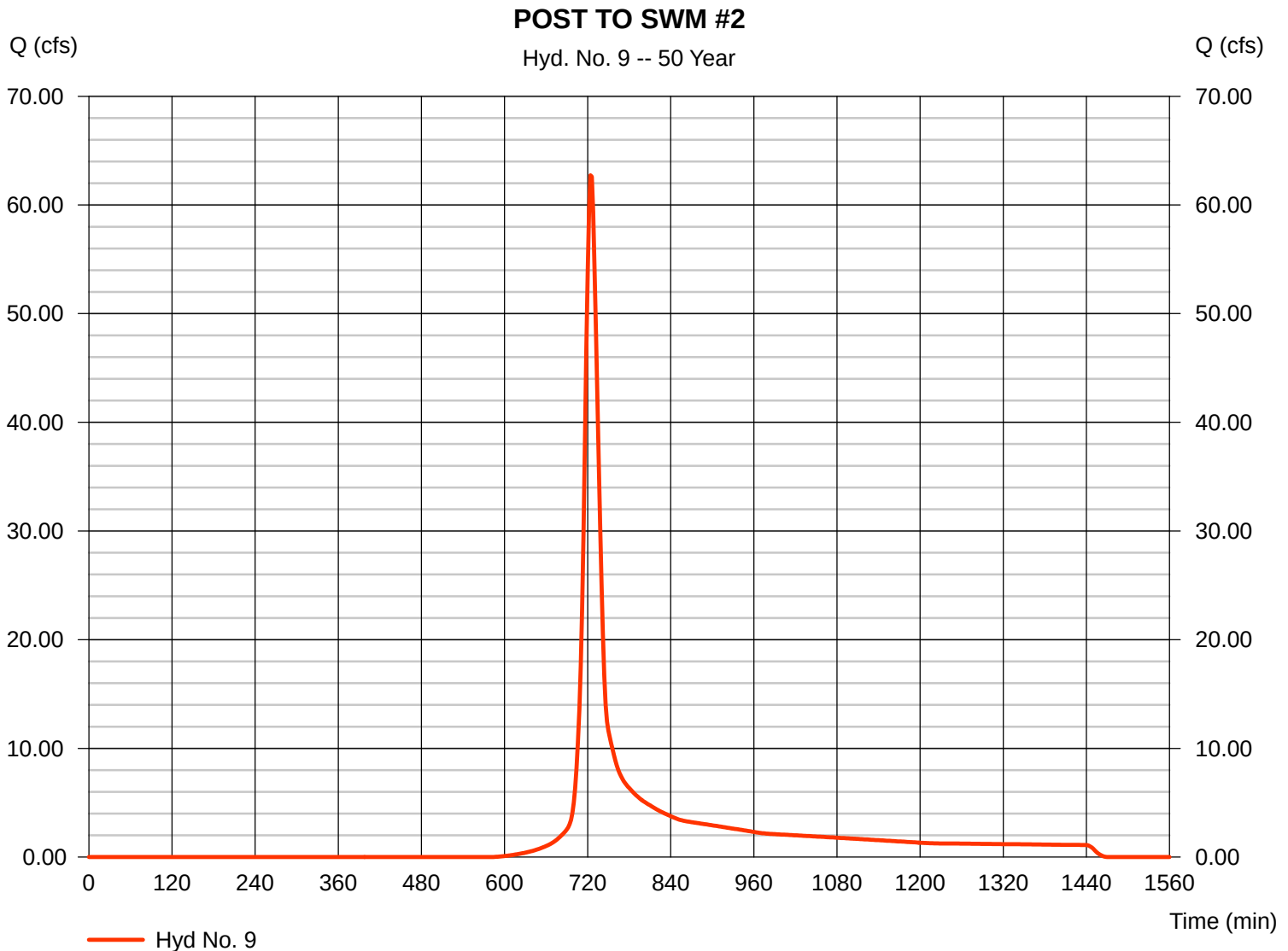
## Hyd. No. 9

### POST TO SWM #2

Hydrograph type = SCS Runoff  
 Storm frequency = 50 yrs  
 Time interval = 2 min  
 Drainage area = 19.990 ac  
 Basin Slope = 0.0 %  
 Tc method = USER  
 Total precip. = 6.54 in  
 Storm duration = 24 hrs

Peak discharge = 62.73 cfs  
 Time to peak = 724 min  
 Hyd. volume = 199,644 cuft  
 Curve number = 65\*  
 Hydraulic length = 0 ft  
 Time of conc. (Tc) = 17.00 min  
 Distribution = Type II  
 Shape factor = 484

\* Composite (Area/CN) =  $[(2.170 \times 39) + (0.530 \times 30) + (4.290 \times 98) + (8.920 \times 61) + (4.080 \times 58)] / 19.990$



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.24

Thursday, Feb 1, 2018

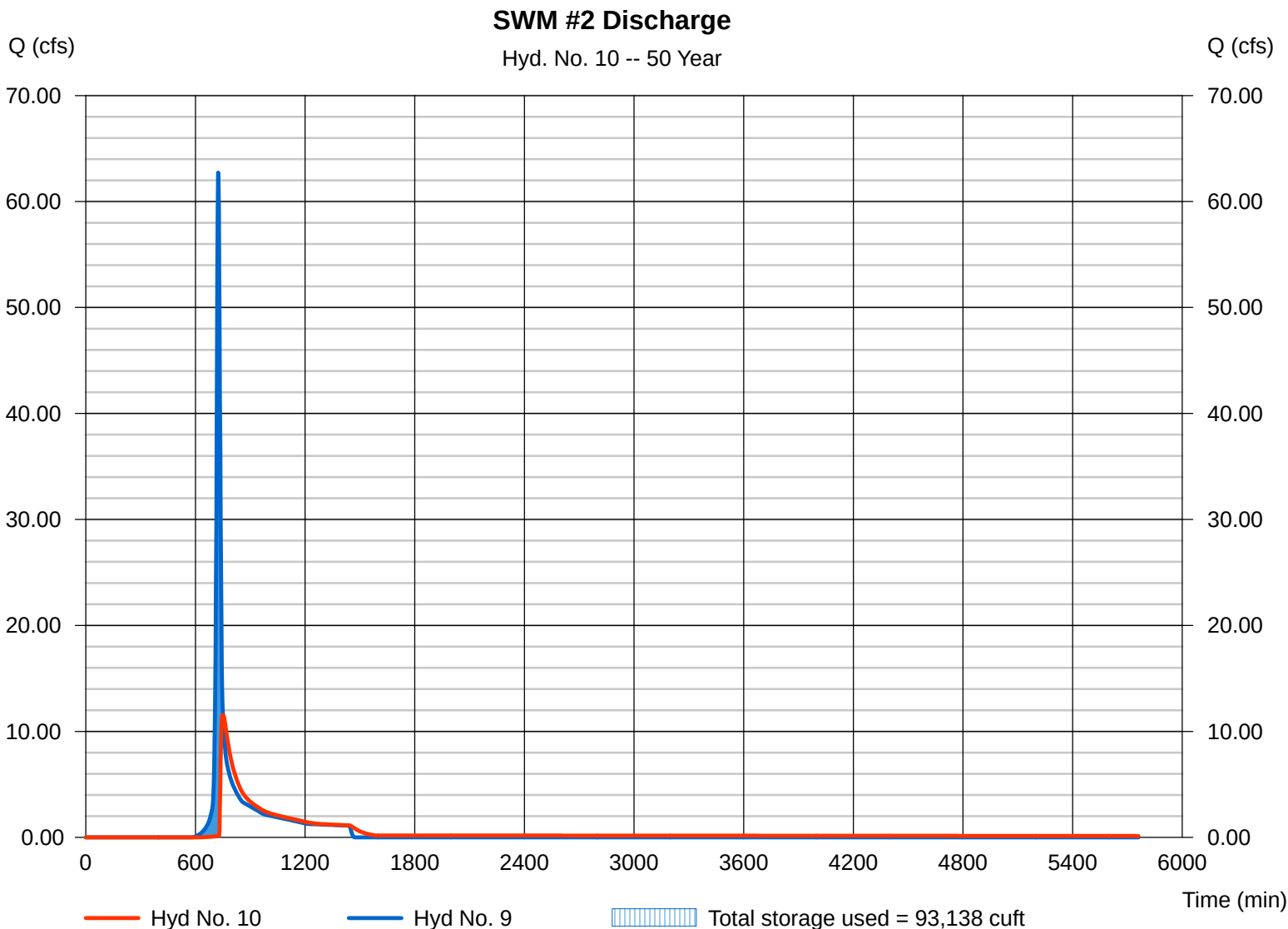
## Hyd. No. 10

### SWM #2 Discharge

Hydrograph type = Reservoir  
 Storm frequency = 50 yrs  
 Time interval = 2 min  
 Inflow hyd. No. = 9 - POST TO SWM #2  
 Reservoir name = SWM 2

Peak discharge = 11.57 cfs  
 Time to peak = 750 min  
 Hyd. volume = 166,749 cuft  
 Max. Elevation = 522.57 ft  
 Max. Storage = 93,138 cuft

Storage Indication method used.



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.24

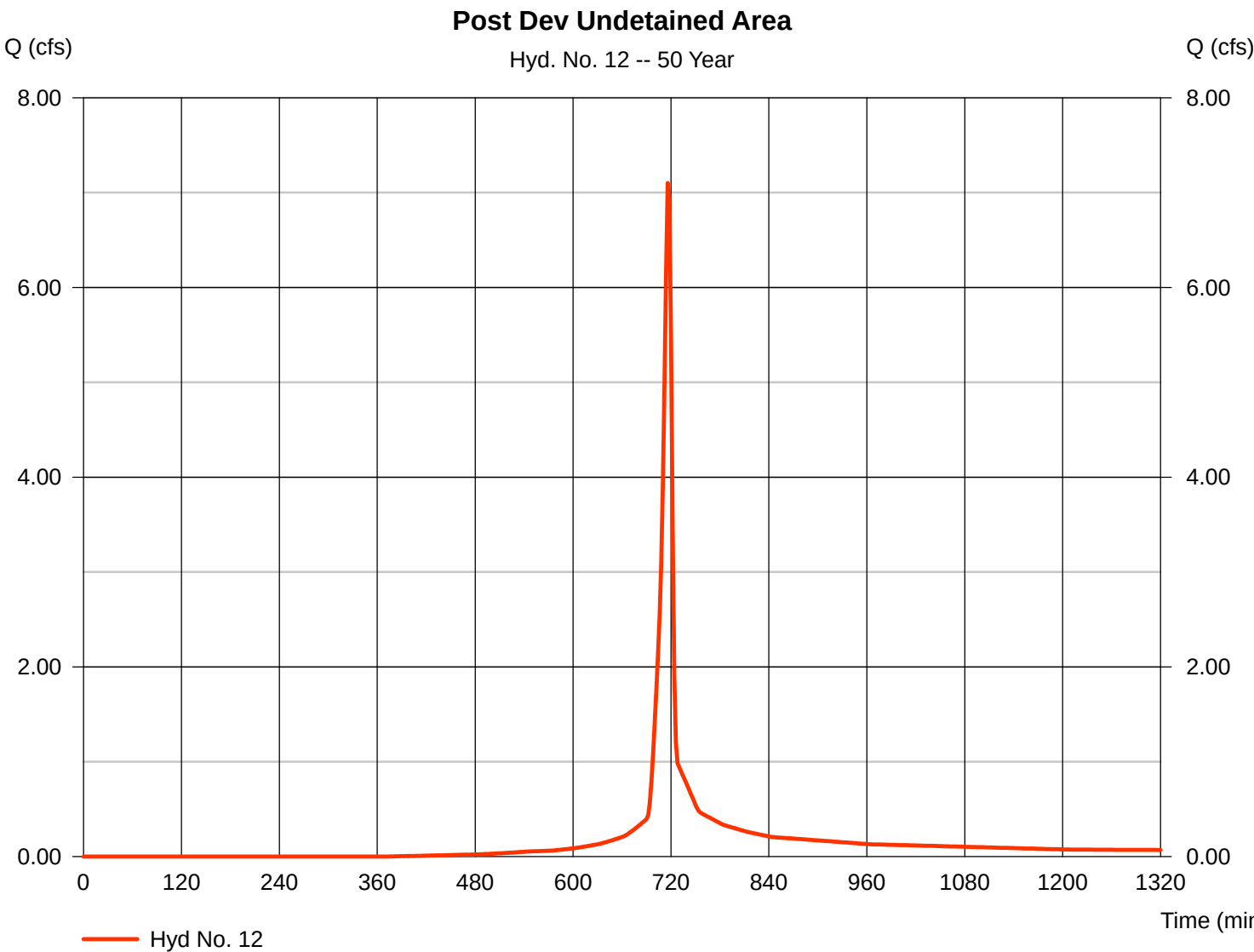
Thursday, Feb 1, 2018

## Hyd. No. 12

Post Dev Undetained Area

|                 |   |            |                    |   |             |
|-----------------|---|------------|--------------------|---|-------------|
| Hydrograph type | = | SCS Runoff | Peak discharge     | = | 7.103 cfs   |
| Storm frequency | = | 50 yrs     | Time to peak       | = | 716 min     |
| Time interval   | = | 2 min      | Hyd. volume        | = | 14,601 cuft |
| Drainage area   | = | 1.030 ac   | Curve number       | = | 79*         |
| Basin Slope     | = | 0.0 %      | Hydraulic length   | = | 0 ft        |
| Tc method       | = | USER       | Time of conc. (Tc) | = | 5.00 min    |
| Total precip.   | = | 6.54 in    | Distribution       | = | Type II     |
| Storm duration  | = | 24 hrs     | Shape factor       | = | 484         |

\* Composite (Area/CN) = [(0.540 x 61) + (0.490 x 98)] / 1.030



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.24

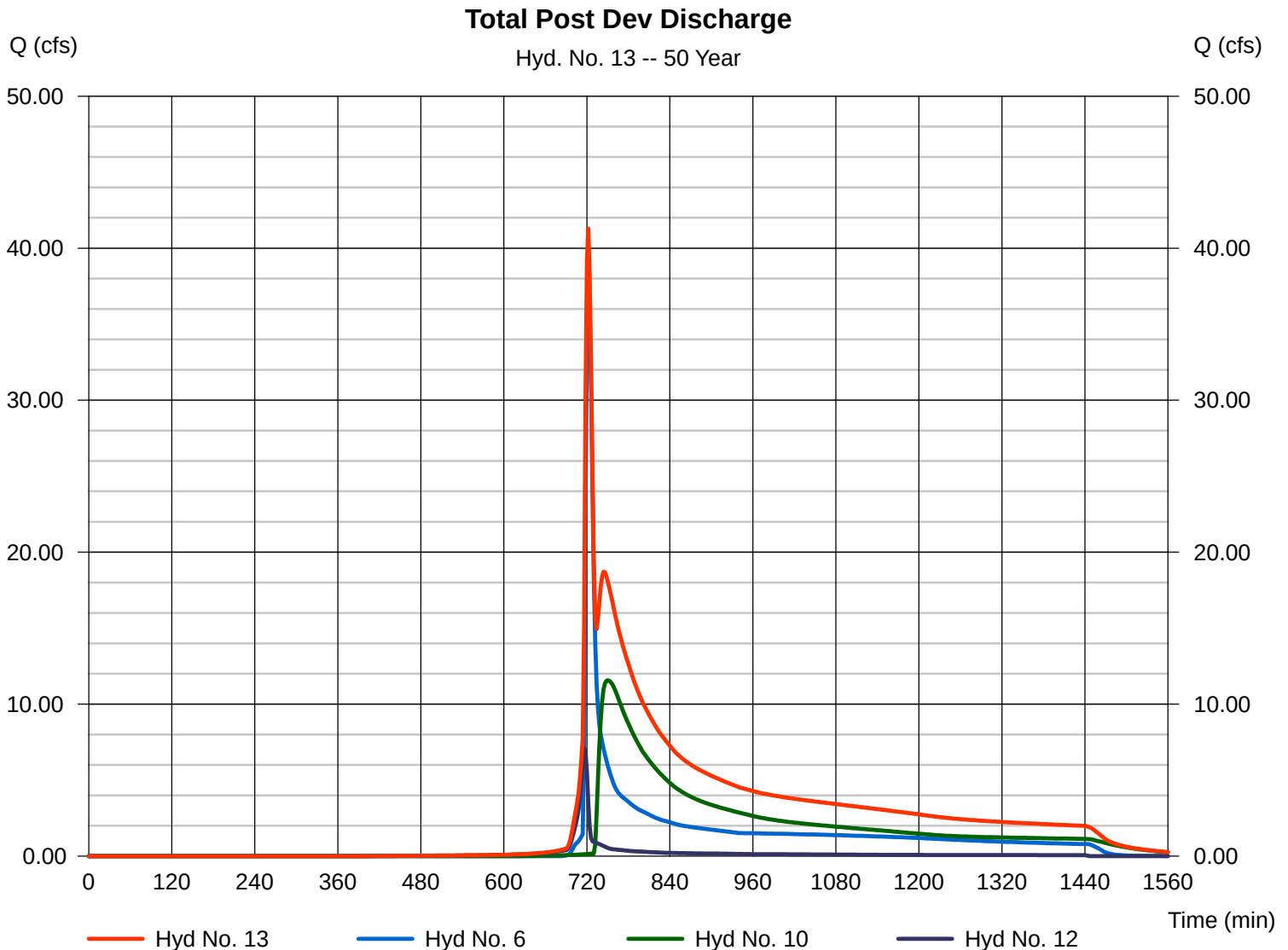
Thursday, Feb 1, 2018

## Hyd. No. 13

### Total Post Dev Discharge

Hydrograph type = Combine  
 Storm frequency = 50 yrs  
 Time interval = 2 min  
 Inflow hyds. = 6, 10, 12

Peak discharge = 41.29 cfs  
 Time to peak = 722 min  
 Hyd. volume = 283,336 cuft  
 Contrib. drain. area = 1.030 ac



# Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.24

| Hyd. No.     | Hydrograph type (origin) | Peak flow (cfs) | Time interval (min) | Time to peak (min) | Hyd. volume (cuft)      | Inflow hyd(s) | Maximum elevation (ft) | Total strge used (cuft) | Hydrograph description                  |
|--------------|--------------------------|-----------------|---------------------|--------------------|-------------------------|---------------|------------------------|-------------------------|-----------------------------------------|
| 1            | SCS Runoff               | 92.60           | 2                   | 722                | 266,134                 | -----         | -----                  | -----                   | Pre Dev Area                            |
| 2            | SCS Runoff               | 1.090           | 2                   | 732                | 13,965                  | -----         | -----                  | -----                   | Pre Undisturbed / Offsite north of lots |
| 3            | Combine                  | 93.23           | 2                   | 724                | 280,099                 | 1, 2          | -----                  | -----                   | Total Pre Dev Area                      |
| 5            | SCS Runoff               | 57.41           | 2                   | 720                | 132,941                 | -----         | -----                  | -----                   | POST TO SWM #1                          |
| 6            | Reservoir                | 52.58           | 2                   | 722                | 132,938                 | 5             | 531.55                 | 18,786                  | SWM Discharge                           |
| 9            | SCS Runoff               | 78.96           | 2                   | 724                | 248,947                 | -----         | -----                  | -----                   | POST TO SWM #2                          |
| 10           | Reservoir                | 23.17           | 2                   | 742                | 215,994                 | 9             | 522.98                 | 108,408                 | SWM #2 Discharge                        |
| 12           | SCS Runoff               | 8.409           | 2                   | 716                | 17,422                  | -----         | -----                  | -----                   | Post Dev Undetained Area                |
| 13           | Combine                  | 56.82           | 2                   | 722                | 366,354                 | 6, 10, 12     | -----                  | -----                   | Total Post Dev Discharge                |
| 4272-SWM.gpw |                          |                 |                     |                    | Return Period: 100 Year |               |                        | Thursday, Feb 1, 2018   |                                         |

# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.24

Thursday, Feb 1, 2018

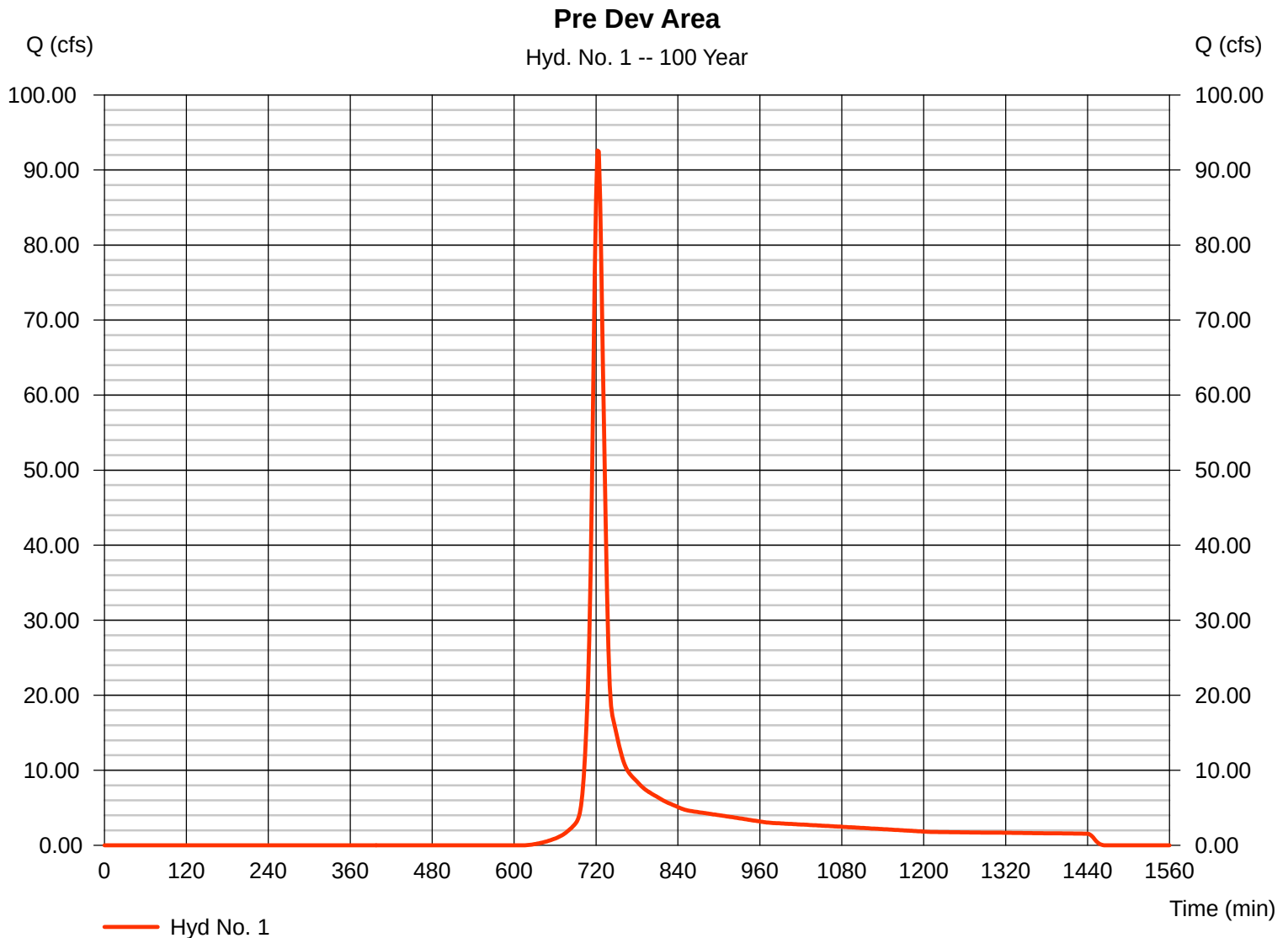
## Hyd. No. 1

### Pre Dev Area

Hydrograph type = SCS Runoff  
 Storm frequency = 100 yrs  
 Time interval = 2 min  
 Drainage area = 26.840 ac  
 Basin Slope = 0.0 %  
 Tc method = USER  
 Total precip. = 7.42 in  
 Storm duration = 24 hrs

Peak discharge = 92.60 cfs  
 Time to peak = 722 min  
 Hyd. volume = 266,134 cuft  
 Curve number = 59\*  
 Hydraulic length = 0 ft  
 Time of conc. (Tc) = 14.72 min  
 Distribution = Type II  
 Shape factor = 484

\* Composite (Area/CN) =  $[(26.420 \times 58) + (0.420 \times 98)] / 26.840$



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.24

Thursday, Feb 1, 2018

## Hyd. No. 2

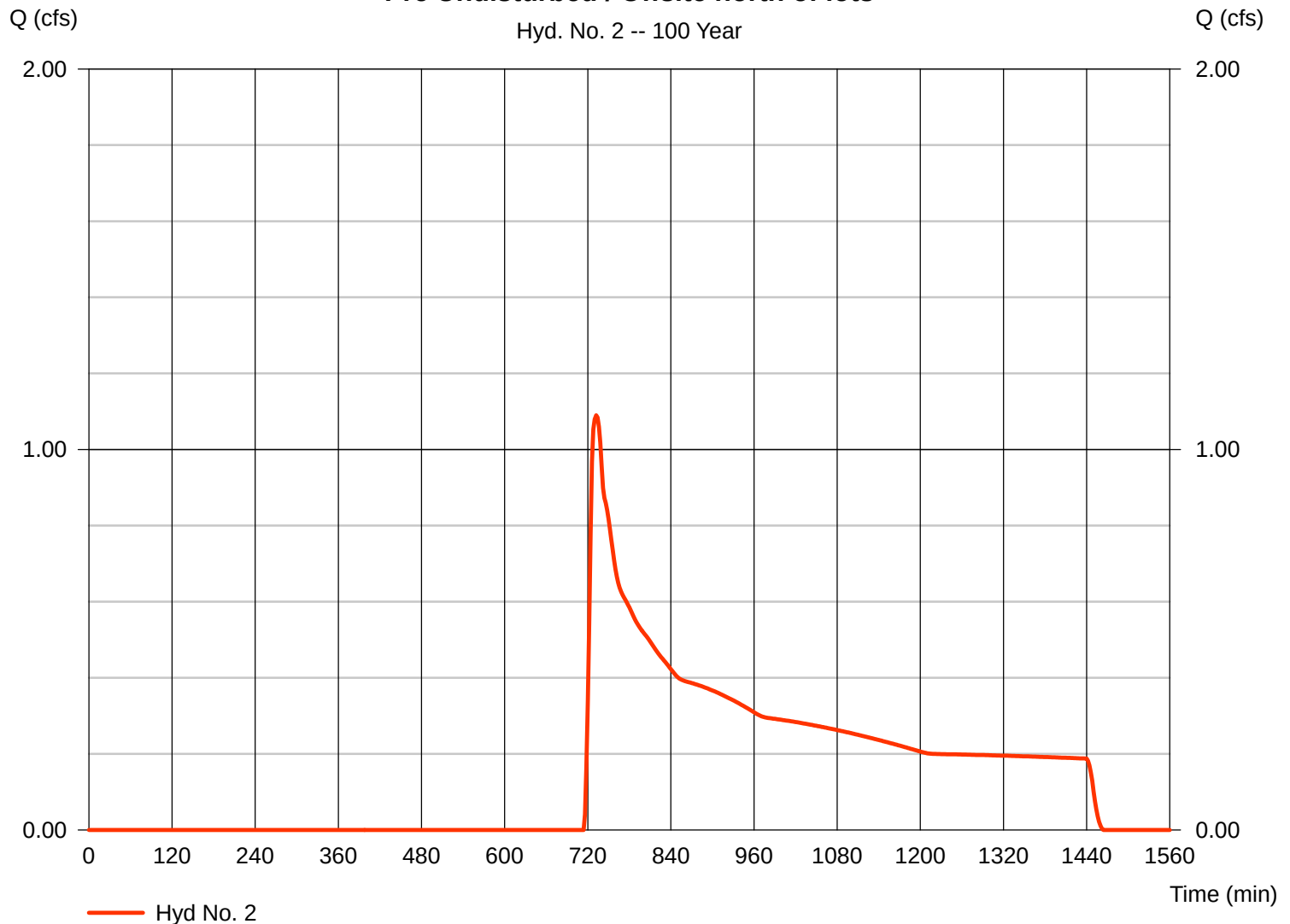
Pre Undisturbed / Offsite north of lots

Hydrograph type = SCS Runoff  
 Storm frequency = 100 yrs  
 Time interval = 2 min  
 Drainage area = 9.590 ac  
 Basin Slope = 0.0 %  
 Tc method = USER  
 Total precip. = 7.42 in  
 Storm duration = 24 hrs

Peak discharge = 1.090 cfs  
 Time to peak = 732 min  
 Hyd. volume = 13,965 cuft  
 Curve number = 32\*  
 Hydraulic length = 0 ft  
 Time of conc. (Tc) = 15.56 min  
 Distribution = Type II  
 Shape factor = 484

\* Composite (Area/CN) =  $[(9.340 \times 30) + (0.250 \times 98)] / 9.590$

### Pre Undisturbed / Offsite north of lots





# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.24

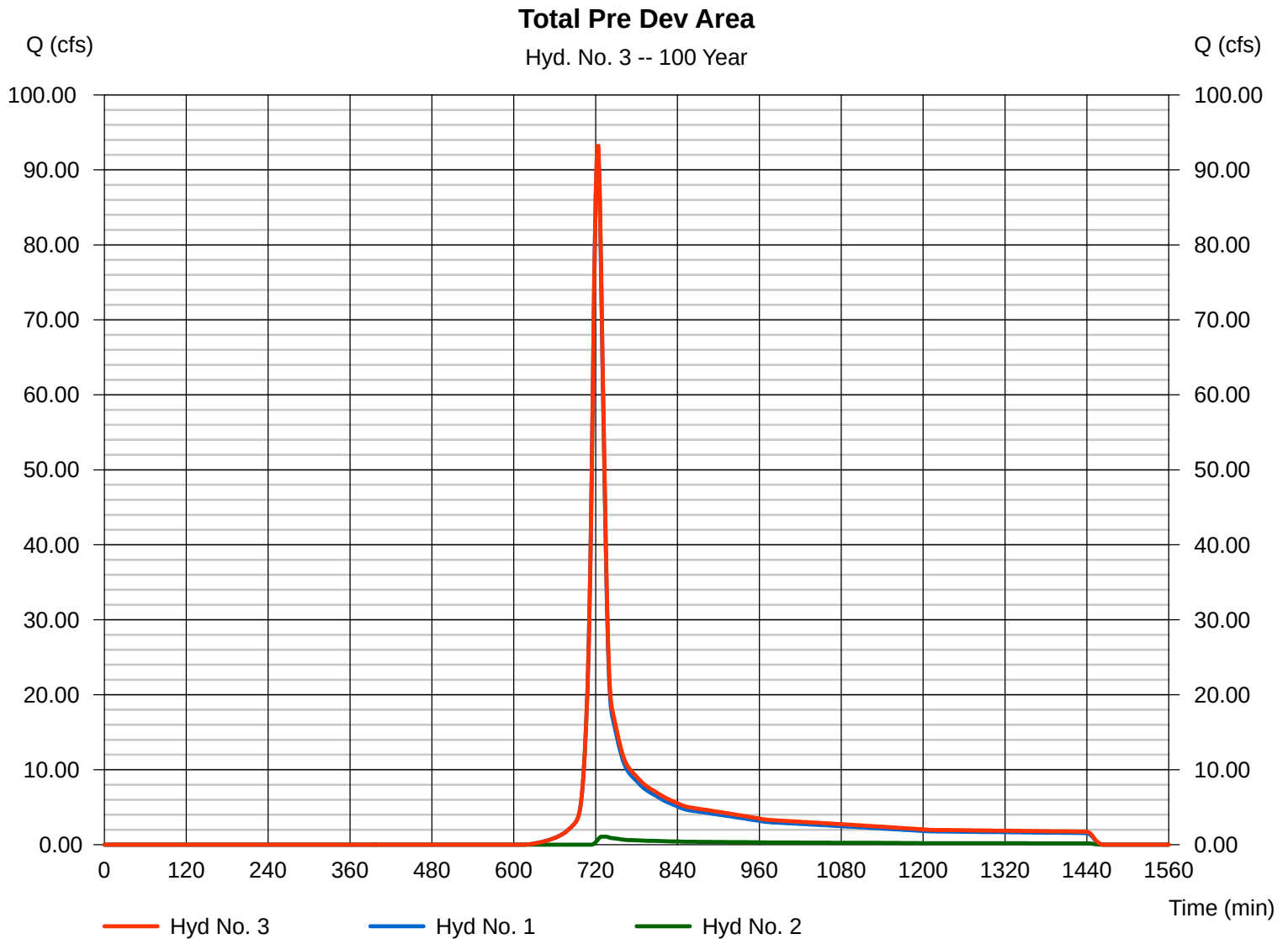
Thursday, Feb 1, 2018

## Hyd. No. 3

Total Pre Dev Area

Hydrograph type = Combine  
 Storm frequency = 100 yrs  
 Time interval = 2 min  
 Inflow hyds. = 1, 2

Peak discharge = 93.23 cfs  
 Time to peak = 724 min  
 Hyd. volume = 280,099 cuft  
 Contrib. drain. area = 36.430 ac



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.24

Thursday, Feb 1, 2018

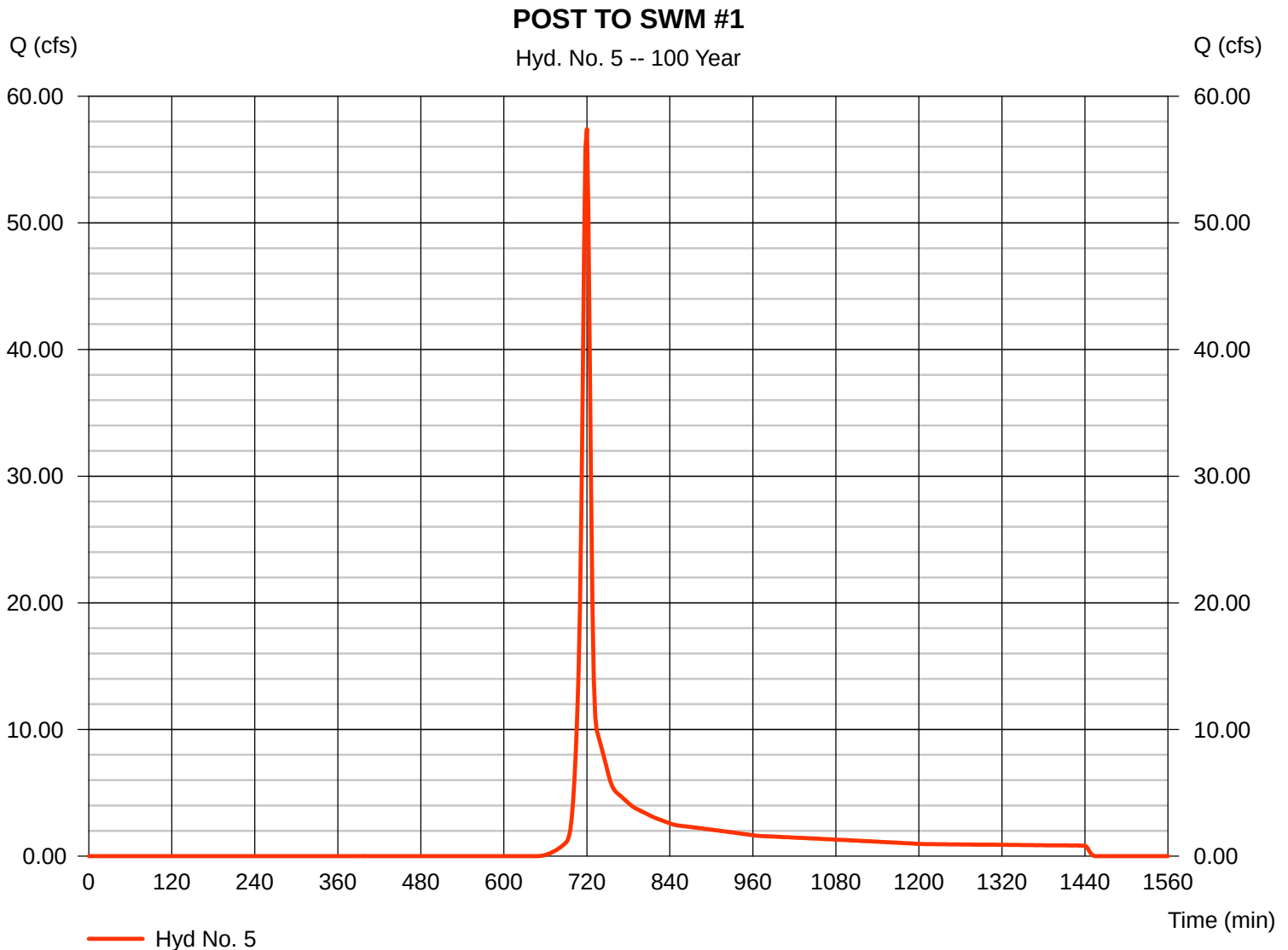
## Hyd. No. 5

### POST TO SWM #1

Hydrograph type = SCS Runoff  
 Storm frequency = 100 yrs  
 Time interval = 2 min  
 Drainage area = 15.290 ac  
 Basin Slope = 0.0 %  
 Tc method = USER  
 Total precip. = 7.42 in  
 Storm duration = 24 hrs

Peak discharge = 57.41 cfs  
 Time to peak = 720 min  
 Hyd. volume = 132,941 cuft  
 Curve number = 55\*  
 Hydraulic length = 0 ft  
 Time of conc. (Tc) = 8.80 min  
 Distribution = Type II  
 Shape factor = 484

\* Composite (Area/CN) =  $[(0.250 \times 98) + (2.050 \times 39) + (4.090 \times 30) + (1.990 \times 98) + (5.880 \times 61) + (1.030 \times 55)] / 15.290$



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.24

Thursday, Feb 1, 2018

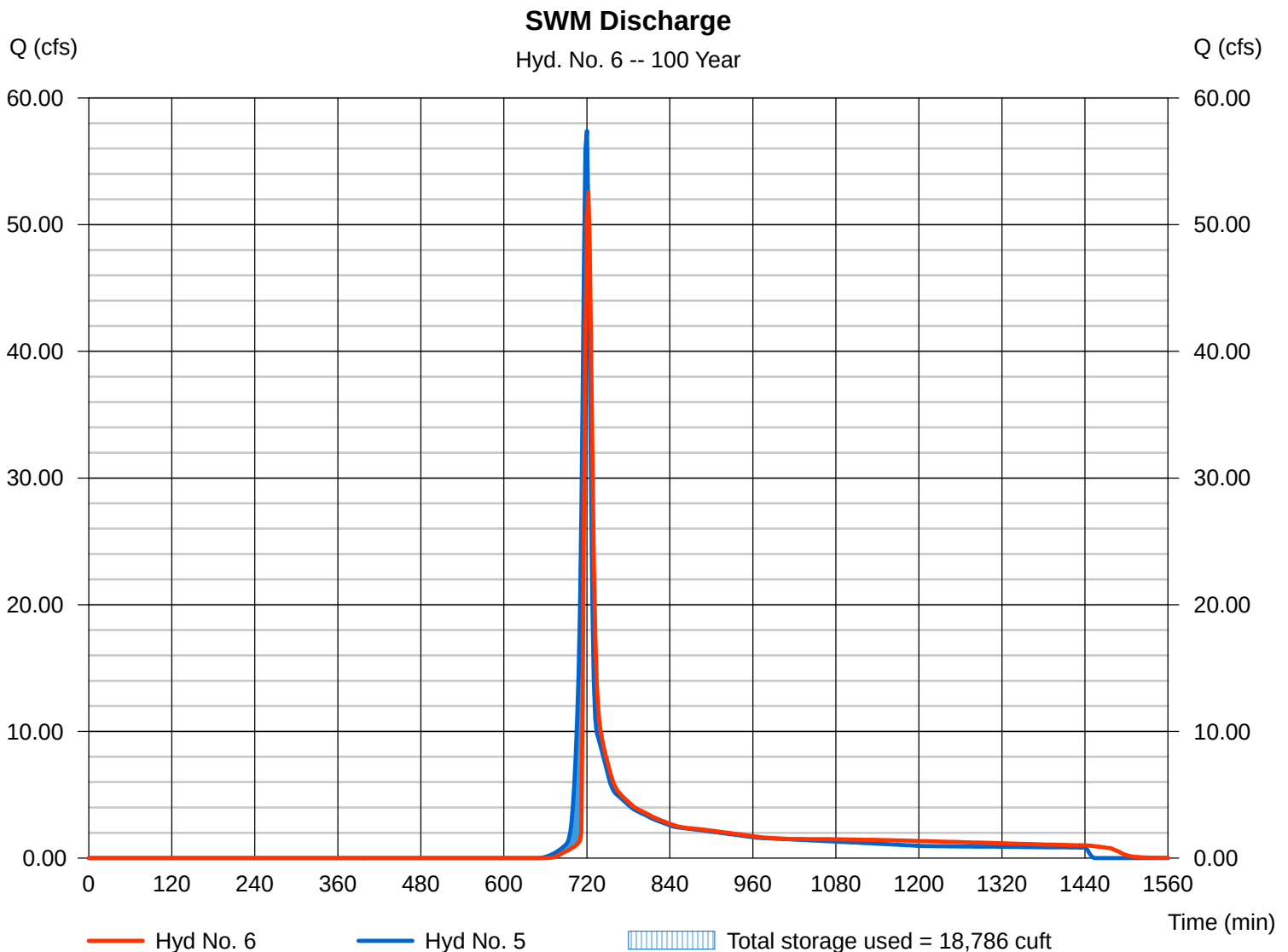
## Hyd. No. 6

### SWM Discharge

Hydrograph type = Reservoir  
 Storm frequency = 100 yrs  
 Time interval = 2 min  
 Inflow hyd. No. = 5 - POST TO SWM #1  
 Reservoir name = SWM 1

Peak discharge = 52.58 cfs  
 Time to peak = 722 min  
 Hyd. volume = 132,938 cuft  
 Max. Elevation = 531.55 ft  
 Max. Storage = 18,786 cuft

Storage Indication method used.



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.24

Thursday, Feb 1, 2018

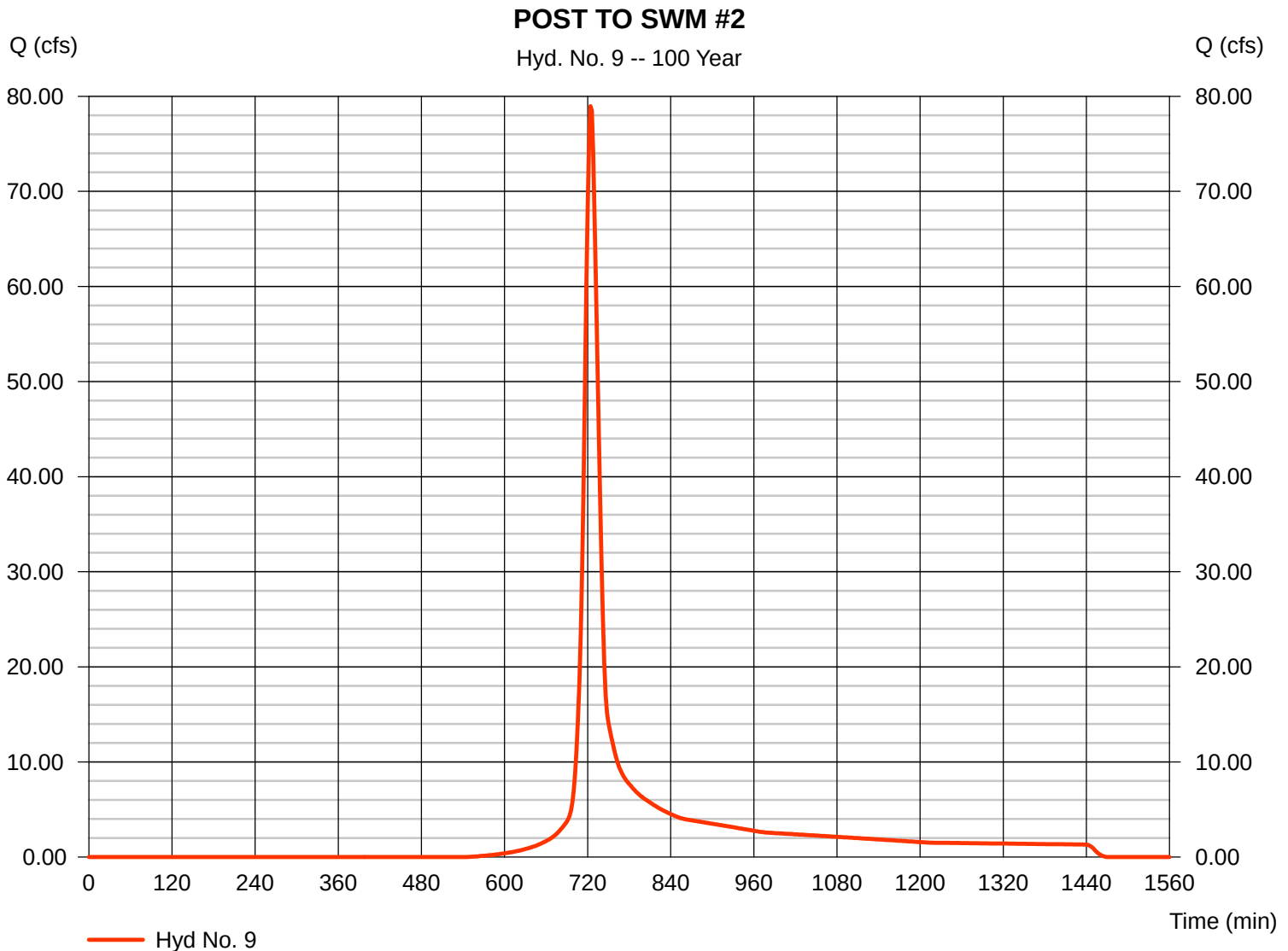
## Hyd. No. 9

### POST TO SWM #2

Hydrograph type = SCS Runoff  
 Storm frequency = 100 yrs  
 Time interval = 2 min  
 Drainage area = 19.990 ac  
 Basin Slope = 0.0 %  
 Tc method = USER  
 Total precip. = 7.42 in  
 Storm duration = 24 hrs

Peak discharge = 78.96 cfs  
 Time to peak = 724 min  
 Hyd. volume = 248,947 cuft  
 Curve number = 65\*  
 Hydraulic length = 0 ft  
 Time of conc. (Tc) = 17.00 min  
 Distribution = Type II  
 Shape factor = 484

\* Composite (Area/CN) =  $[(2.170 \times 39) + (0.530 \times 30) + (4.290 \times 98) + (8.920 \times 61) + (4.080 \times 58)] / 19.990$



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.24

Thursday, Feb 1, 2018

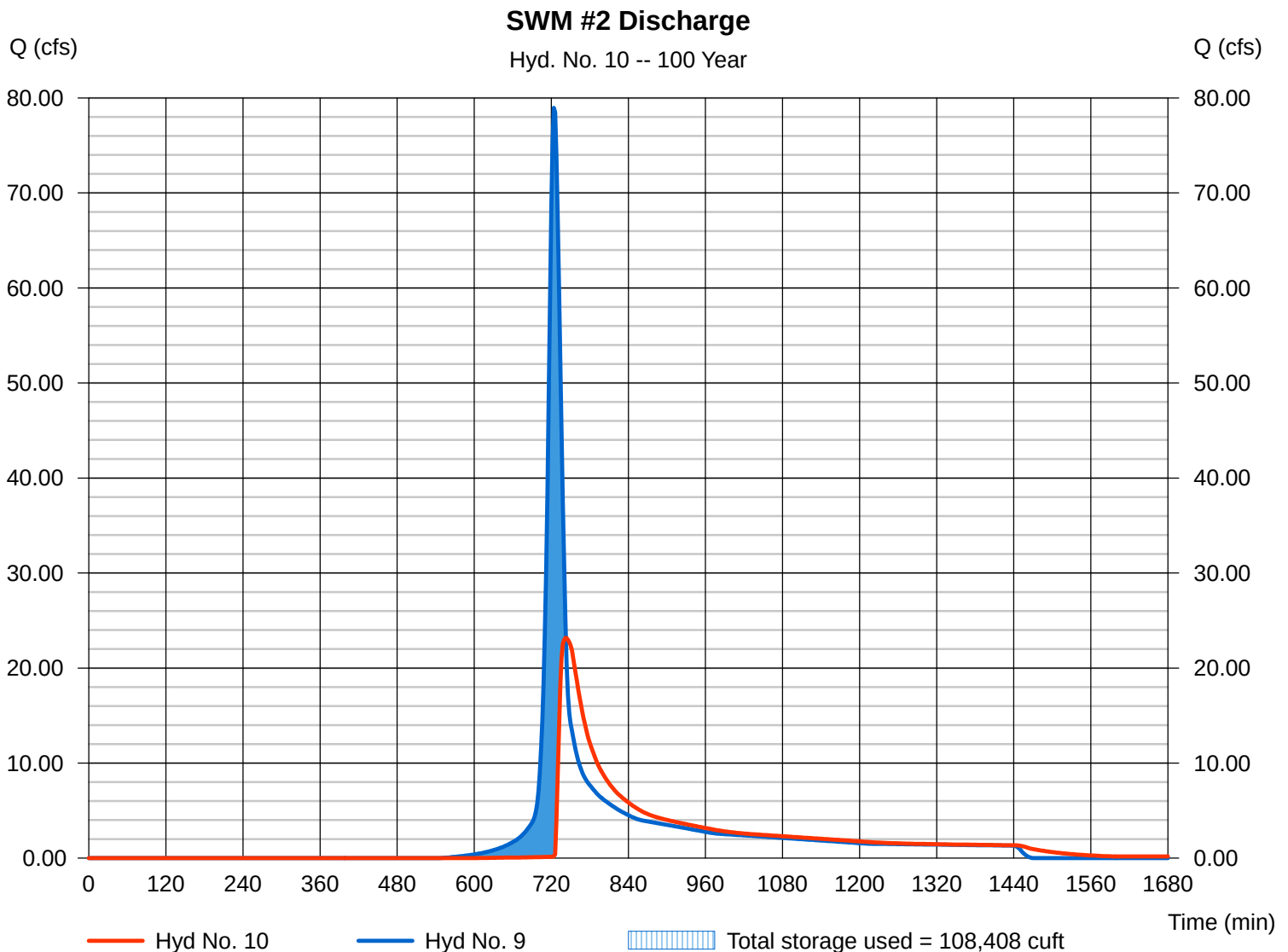
## Hyd. No. 10

### SWM #2 Discharge

Hydrograph type = Reservoir  
 Storm frequency = 100 yrs  
 Time interval = 2 min  
 Inflow hyd. No. = 9 - POST TO SWM #2  
 Reservoir name = SWM 2

Peak discharge = 23.17 cfs  
 Time to peak = 742 min  
 Hyd. volume = 215,994 cuft  
 Max. Elevation = 522.98 ft  
 Max. Storage = 108,408 cuft

Storage Indication method used.



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.24

Thursday, Feb 1, 2018

## Hyd. No. 12

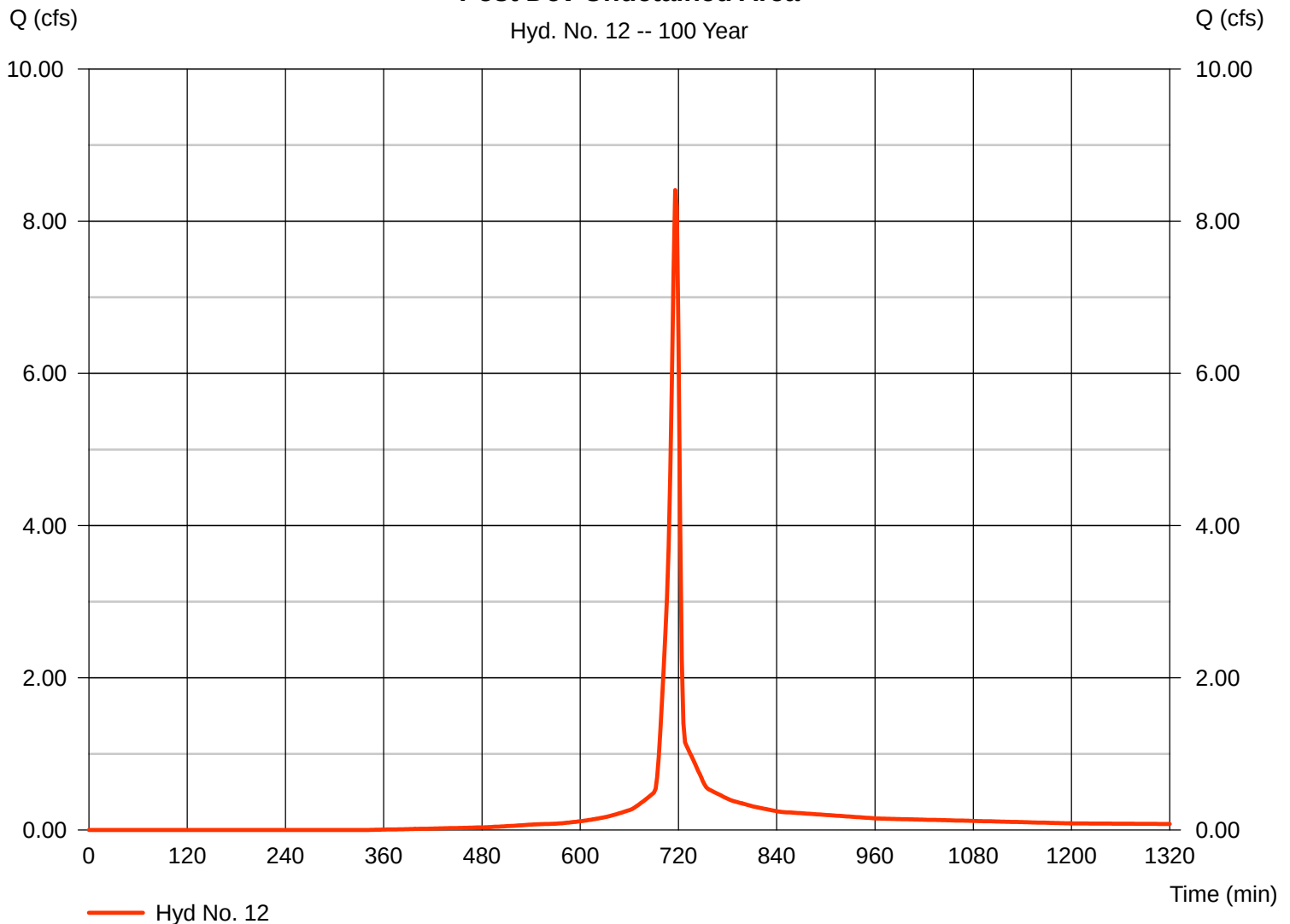
### Post Dev Undetained Area

Hydrograph type = SCS Runoff  
 Storm frequency = 100 yrs  
 Time interval = 2 min  
 Drainage area = 1.030 ac  
 Basin Slope = 0.0 %  
 Tc method = USER  
 Total precip. = 7.42 in  
 Storm duration = 24 hrs

Peak discharge = 8.409 cfs  
 Time to peak = 716 min  
 Hyd. volume = 17,422 cuft  
 Curve number = 79\*  
 Hydraulic length = 0 ft  
 Time of conc. (Tc) = 5.00 min  
 Distribution = Type II  
 Shape factor = 484

\* Composite (Area/CN) =  $[(0.540 \times 61) + (0.490 \times 98)] / 1.030$

### Post Dev Undetained Area



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.24

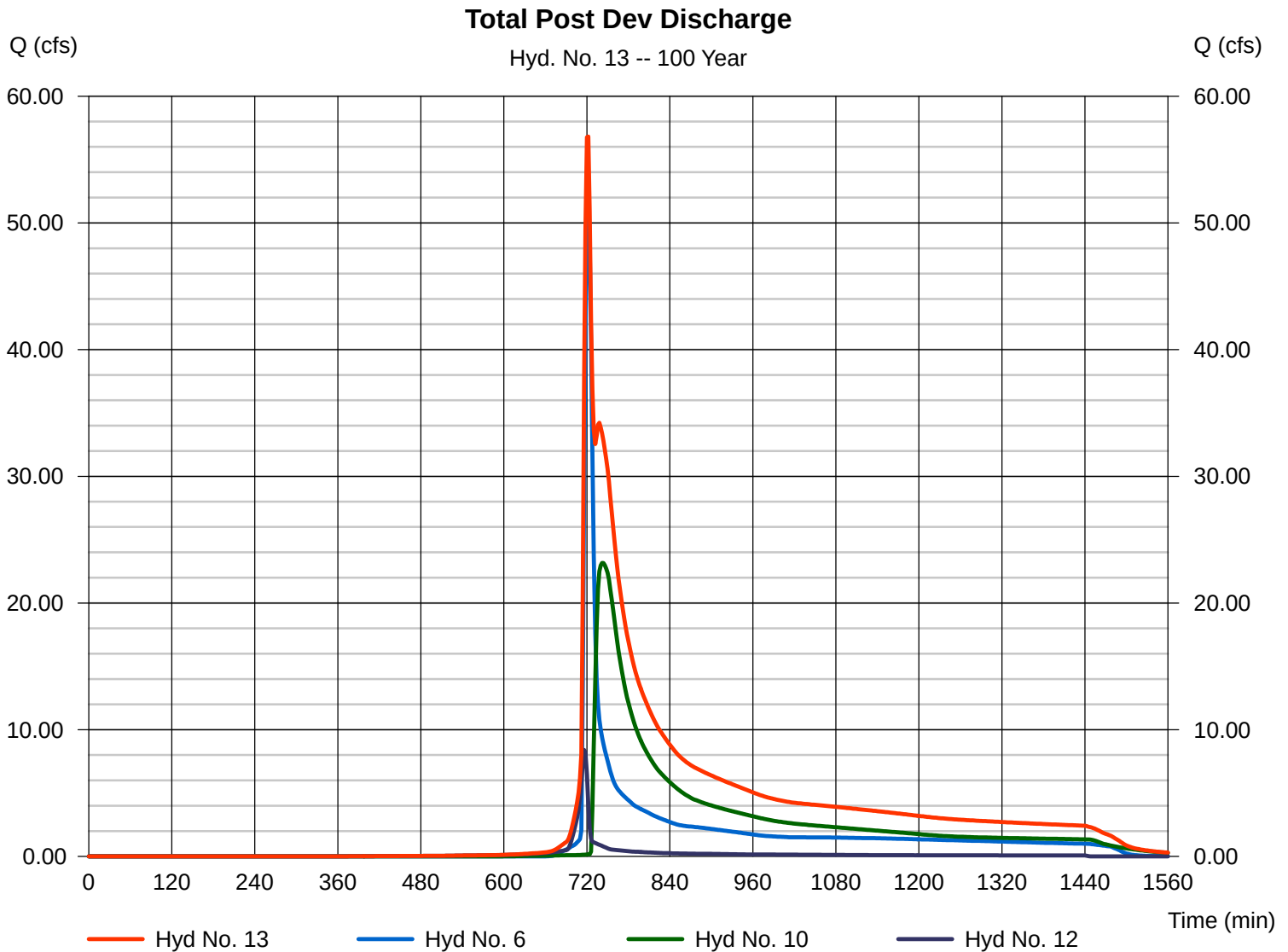
Thursday, Feb 1, 2018

## Hyd. No. 13

### Total Post Dev Discharge

Hydrograph type = Combine  
 Storm frequency = 100 yrs  
 Time interval = 2 min  
 Inflow hyds. = 6, 10, 12

Peak discharge = 56.82 cfs  
 Time to peak = 722 min  
 Hyd. volume = 366,354 cuft  
 Contrib. drain. area = 1.030 ac







EDWARD B. WALSH & ASSOCIATES, INC.  
Complete Civil Engineering Design / Consultation Services

DATE: 1/26/2018  
BY: AB

**JOB NO.:** 4272      **PROJECT:** Jankowski  
**DESCRIPTION:** Basin 1

## **SWM #1**

### **EMERGENCY SPILLWAY DESIGN**

#### **WEIR FLOW**

$$Q = C L H^{1.5}$$

$$Q = 3.1 \times L \times H^{1.5}$$

$$\text{LENGTH (L)} = 75 \text{ FT.}$$

$$\text{HEAD(H)} = 0.40 \text{ FT.}$$

$$Q = 58.82 \text{ cfs capacity}$$

$$\text{EMERGENCY SPILLWAY CAPACITY} = 58.42$$

$$\text{REQUIRED CAPACITY} = 57.41$$

$$\text{SPILLWAY ELEVATION} = 531.60$$

$$\text{SPILLWAY 100 YR WATER SURFACE ELEVATION} = 532.00$$

PROVIDE 01.0' OF FREEBOARD:

$$\text{TOP OF BERM} = 533.00$$

### **ANTI-SEEP COLLAR DESIGN**

#### **36" Outlet Pipe**

$$L_s = Y \times (Z+4) \times (1 + \text{slope} / (0.25 - \text{slope}))$$

$$Y = 4.55$$

$$Z = 3$$

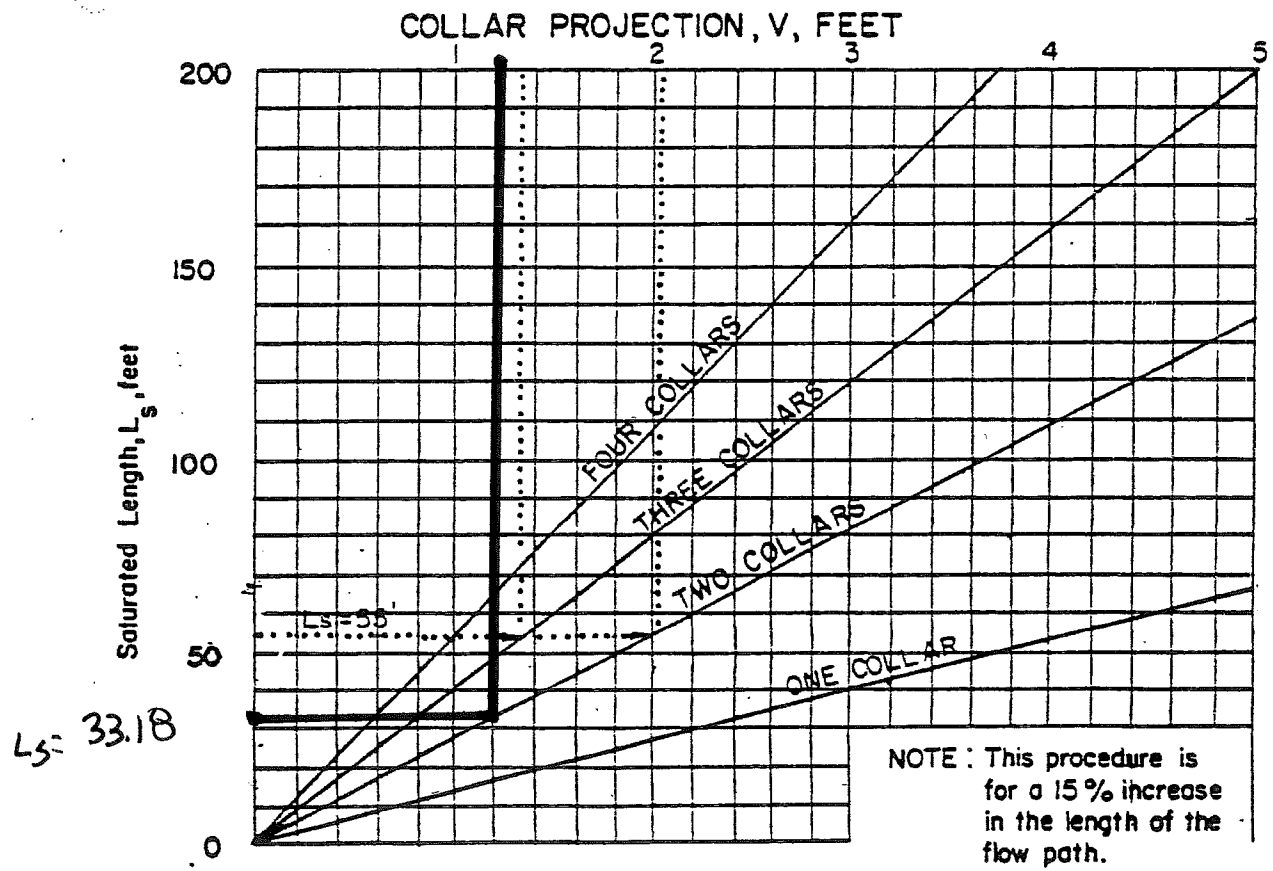
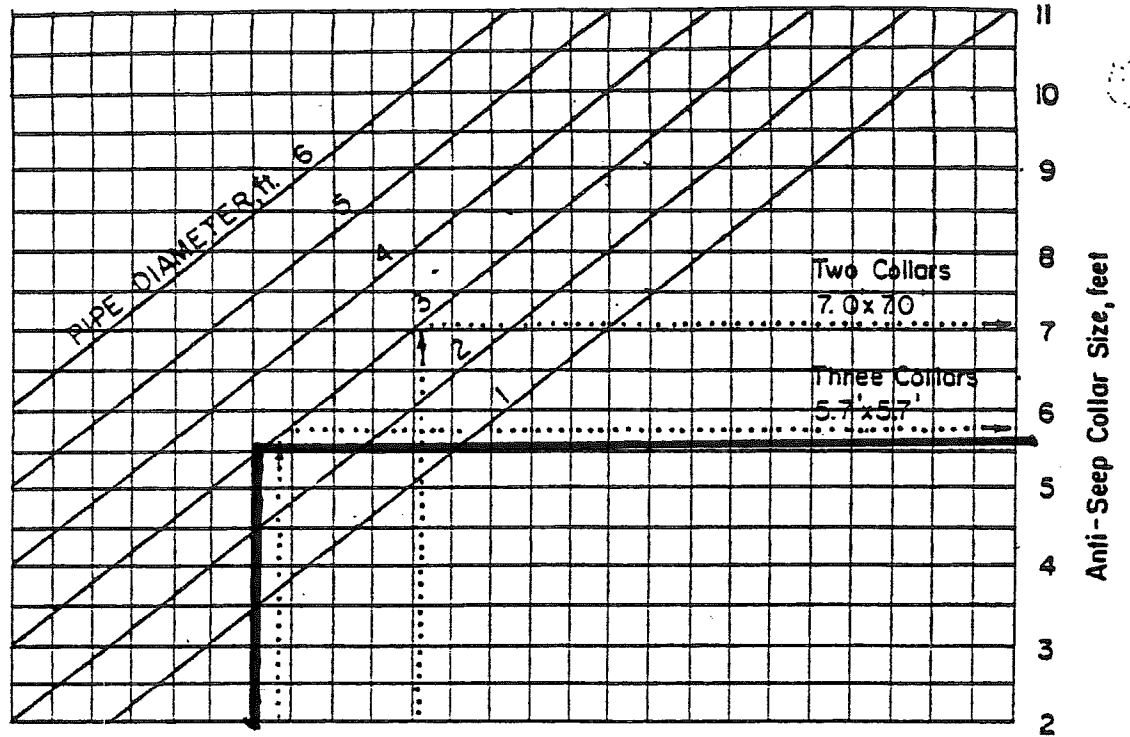
$$\text{Slope} = 0.01$$

Solve for:

$$L_s = \text{Saturated Length} = 33.18$$

Use 2 - 5.55' x 5.55' collar at  
11.09' and 22.18' from the outlet.

## ANTI-SEEP COLLAR DESIGN



Basin 1  
Two Collars 5.55' x 5.55'



EDWARD B. WALSH & ASSOCIATES, INC.  
*Complete Civil Engineering Design / Consultation Services*

DATE: 1/26/2018  
 BY: AB

**JOB NO.:** 4272 **PROJECT:** Jankowski  
**DESCRIPTION:** BASIN SWM #2

## **SWM #2**

### **EMERGENCY SPILLWAY DESIGN**

#### **WEIR FLOW**

$$Q = C L H^{1.5}$$

$$Q = 3.1 \times L \times H^{1.5}$$

$$\text{LENGTH (L)} = 102 \text{ FT.}$$

$$\text{HEAD(H)} = 0.40 \text{ FT.}$$

$$Q = 79.99 \text{ cfs}$$

$$\text{EMERGENCY SPILLWAY CAPACITY} = 79.99 \text{ cfs}$$

$$\text{REQUIRED CAPACITY} = 78.96 \text{ cfs}$$

$$\text{SPILLWAY ELEVATION} = 523.10$$

$$\text{SPILLWAY 100 YR WATER SURFACE ELEVATION} = 523.50$$

PROVIDE 1' OF FREEBOARD:

$$\text{TOP OF BERM} = 524.50$$

### **ANTI-SEEP COLLAR DESIGN**

#### 24" Outlet Pipe

$$L_s = Y \times (Z+4) \times (1 + \text{slope} / (0.25 - \text{slope}))$$

$$Y = 4$$

$$Z = 3$$

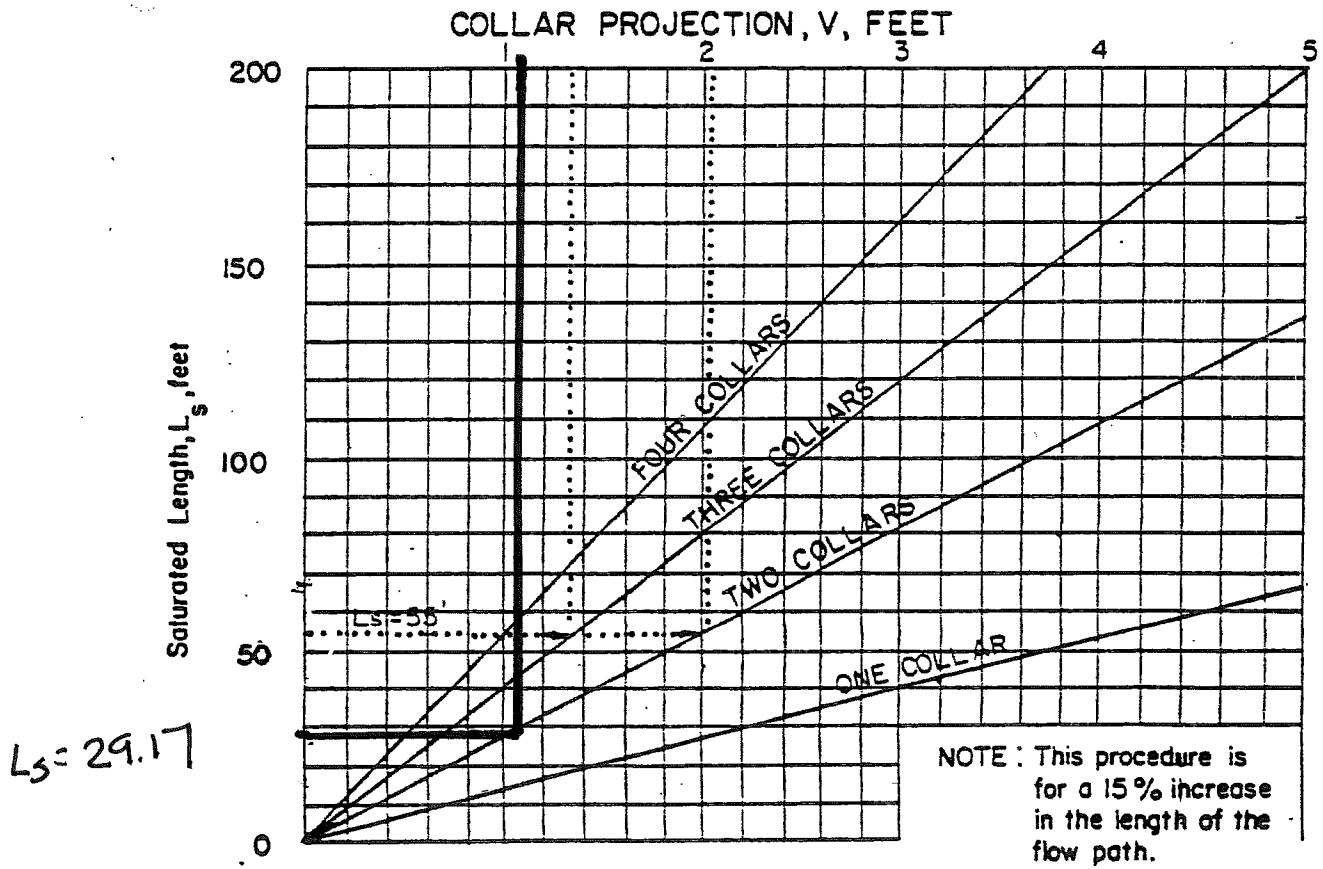
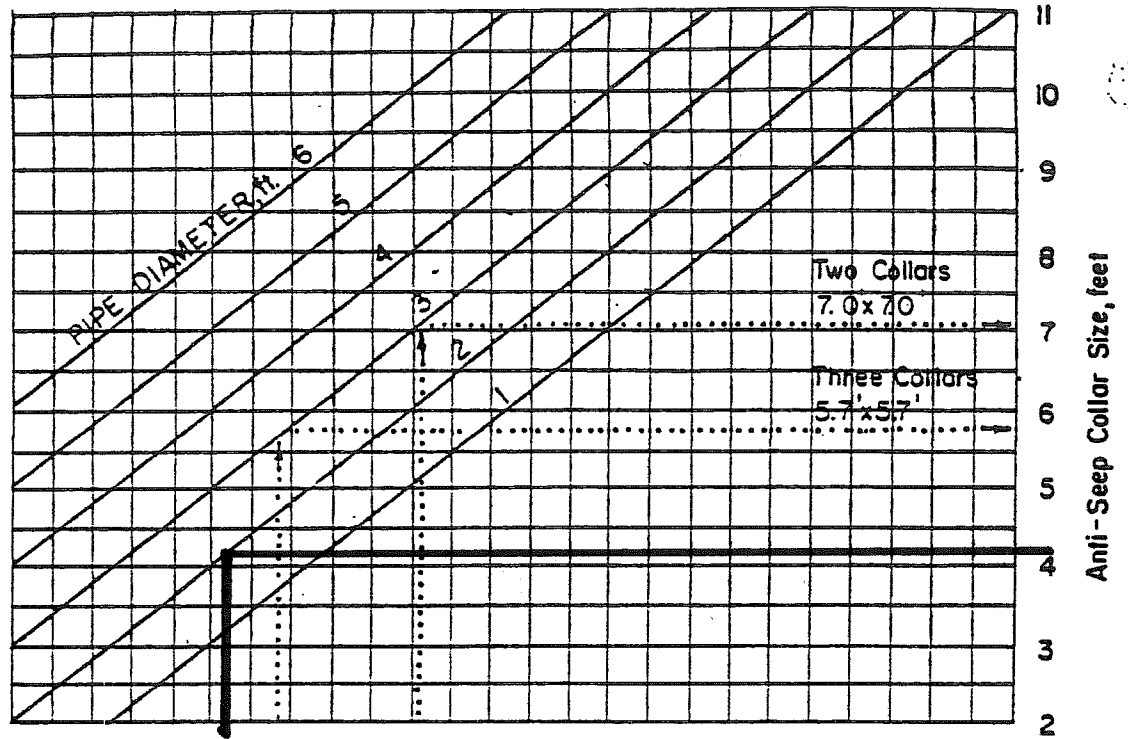
$$\text{Slope} = 0.01$$

Solve for:

$$L_s = \text{Saturated Length} = 29.17$$

Use 2 - 4.2' x 4.2' collars at  
 9.7' and 19.4' from the outlet.

## ANTI-SEEP COLLAR DESIGN



Basin 2

Two Collars 4.2 x 4.2 each

## POI #1

## WORKSHEET 4. CHANGE IN RUNOFF VOLUME FOR 2-YR STORM EVENT

PROJECT: Jankowski Tract

Drainage Area: 27.05 acres

2-Year Rainfall: 3.2 in

Total Site Area: \_\_\_\_\_ acres

Protected Site Area: \_\_\_\_\_ acres

Managed Area: 27.05 acres

## Existing Conditions:

| Cover Type / Condition | Soil Type | Area (sf) | Area (ac) | CN | S    | Ia 0.2*s | Q Runoff <sup>1</sup> (in) | Runoff Volume <sup>2</sup> (ft <sup>3</sup> ) |
|------------------------|-----------|-----------|-----------|----|------|----------|----------------------------|-----------------------------------------------|
| Meadow                 | B         | 1,178,298 | 27.05     | 58 | 7.24 | 1.45     | 0.341                      | 33504                                         |
|                        |           |           |           |    |      |          |                            |                                               |
| TOTAL:                 |           |           | 27.05     |    |      |          |                            | 33,504                                        |

## Developed Conditions:

| Cover Type / Condition | Soil Type | Area (sf) | Area (ac) | CN | S     | Ia 0.2*s | Q Runoff <sup>1</sup> (in) | Runoff Volume <sup>2</sup> (ft <sup>3</sup> ) |
|------------------------|-----------|-----------|-----------|----|-------|----------|----------------------------|-----------------------------------------------|
| Meadow                 | B         | 222,592   | 5.11      | 45 | 12.22 | 2.44     | 0.044                      | 816                                           |
| Lawn                   | B         | 668,210   | 15.34     | 61 | 6.39  | 1.28     | 0.444                      | 24722                                         |
| Impervious             | B         | 287,496   | 6.60      | 98 | 0.20  | 0.04     | 2.967                      | 71095                                         |
| TOTAL:                 |           |           | 27.05     |    |       |          |                            | 96,633                                        |

2-Year Volume Increase (ft<sup>3</sup>): **63,129**

2-Year Volume Increase = Developed Conditions Runoff Volume - Existing Conditions Runoff Volume

1. Runoff (in) =  $Q = (P - 0.2S)^2 / (P + 0.8S)$  where

P = 2-Year Rainfall (in)

S =  $(1000/CN) - 10$

2. Runoff Volume (CF) =  $Q \times \text{Area} \times 1/12$

Q = Runoff (in)

Area = Land Use Area (sq. ft.)

NOTE: Runoff volume must be calculated for EACH land use type/condition and HSGI. The use of a weighted CN value for volume calculations is not acceptable.

## STORMWATER MANAGEMENT VOLUME CONTROL

Infiltration testing was conducted in many locations in the overall tract. The testing consistently found soils with limiting factors or in areas without limiting zones the infiltration rate was less than the acceptable rate for infiltration systems per the DEP BMP manual. To provide volume control to meet Township and DEP CG-1 requirements, several BMP's are proposed. The following systems are proposed at the Jankowski Tract Subdivision:

- Rain Gardens 1 – 3
- Bioretention basins 1 -2
- Re-Vegetate (install all native trees)
- Amended soils

The volume associated with each BMP has been calculated and is noted below:

Volume Retained = Storage Area (above ground) + Voids in Amended Soils (1.5 foot depth)

- Rain Garden #1
 

|                 |   |                                                                                  |
|-----------------|---|----------------------------------------------------------------------------------|
| Storage Area    | = | 2,471 S.F.                                                                       |
| System Depth    | = | 1.00 feet (storage above ground in rain garden)                                  |
| Volume Retained | = | storage volume above ground in rain garden area + void area in amended soils     |
|                 | = | 2,471 CF + (2,471(surface area) x 1.5 ft deep x 0.20 Void Ratio in amended soil) |
|                 | = | 3,212 C.F.                                                                       |
- Rain Garden #2
 

|                 |   |                                              |
|-----------------|---|----------------------------------------------|
| Storage Area    | = | 2,640 S.F.                                   |
| System Depth    | = | 1 foot                                       |
| Volume Retained | = | 2,640 SF + (2,640 x 1.5ft x 0.20 Void Ratio) |
|                 | = | 3,628 C.F.                                   |
- Rain Garden #3
 

|                 |   |                                              |
|-----------------|---|----------------------------------------------|
| Storage Area    | = | 3,124 S.F.                                   |
| System Depth    | = | 1 foot                                       |
| Volume Retained | = | 3,124 SF + (3,124 x 1.5ft x 0.20 Void Ratio) |
|                 | = | 4,061 C.F.                                   |

Bioretention basins amended soils depth = 2.0 Ft.

- Bioretention Basin #1
 

|                                      |   |                                              |
|--------------------------------------|---|----------------------------------------------|
| Storage Area                         | = | 2,446 S.F.                                   |
| System Depth below outlet            | = | 1 foot                                       |
| Amended soils up to elevation 530.00 | = | area of 5,230 SF                             |
| Volume Retained                      | = | 2,446 SF + (5,230 x 2.0ft x 0.20 Void Ratio) |
|                                      | = | 4,538 C.F.                                   |
- Bioretention Basin #2
 

|                                      |   |                                                |
|--------------------------------------|---|------------------------------------------------|
| Storage Area                         | = | 23,892 S.F.                                    |
| System Depth below outlet            | = | 1 foot                                         |
| Amended soils up to elevation 523.00 | = | area of 38,924 SF                              |
| Volume Retained                      | = | 23,892 SF + (38,924 x 2.0ft x 0.20 Void Ratio) |
|                                      | = | 39,462 C.F.                                    |

Re-Vegetate:

## Proposed Trees:

|                 |   |           |
|-----------------|---|-----------|
| Deciduous Trees | = | 159 Trees |
| Evergreen Tree  | = | 32 Trees  |

|                 |   |                                   |
|-----------------|---|-----------------------------------|
| Volume Retained | = | $(159 \times 6) + (32 \times 10)$ |
|                 | = | 1,274 C.F.                        |

Amended Soils:

Area to have amended soils installed = 132,500 SF (not including rain garden areas)

Amended soils credit formula per DEP BMP Manual: 0.5inches per / ft \* area of amended soils  
= 5,521 CF

|                                                     |   |                    |
|-----------------------------------------------------|---|--------------------|
| <b>Total Volume Retained<br/>(proposed systems)</b> | = | <b>61,696 C.F.</b> |
|-----------------------------------------------------|---|--------------------|

|                        |   |                                                                       |
|------------------------|---|-----------------------------------------------------------------------|
| <b>Volume Required</b> | = | <b>61,692 C.F. (reflects a rooftop disconnect credit of 1,437 CF)</b> |
|------------------------|---|-----------------------------------------------------------------------|





## UPPER UWCHLAN TOWNSHIP

Planning Commission Meeting

February 8, 2018

Minutes

**DRAFT**

### In Attendance:

Bob Schoenberger, Chair, Sally Winterton, Vice-Chair, Joe Stoyack, Chad Adams, Bob Phillips, Jim Shrimp, Jim Dewees, Mary Lou Lowrie, P.E. – Gilmore & Associates, Cary Vargo, Township Manager, Gwen Jonik, Planning Commission Secretary

Bob Schoenberger called the meeting to order at 7:32 p.m. as a quorum was present.

### Struble Trail – Trailhead Improvements

Skip Brion, Esq., representing Chester County Facilities & Parks, Dave Stauffer - Chester County Facilities & Parks, and Nick Feola, Bursich Associates, were in attendance requesting the re-opening of the conditional use hearing to extend the Struble Trail across Dorlan Mill Road and into Marsh Creek State Park. The Planning Commission had suggested at their January 11, 2018 meeting that several members should visit the proposed Struble Trail extension site. The site visit took place January 16, 2018. Mr. Feola presented a revised Plan that addressed the Township consultants' comments, including fencing along both sides of the County's easement on the Shryock property, adding Shryock Bros. as a utility owner, and updated the legend. The County is requesting approval of a paved trail from the existing trailhead parking area to the crossing of Dorlan Mill Road, and after the crossing, the trail would be in a natural state, not paved, through the County easement to the State Park. Dave Stauffer advised that near the base of the water tower – within the easement section -- there's a slope caused by debris and concrete chunks that can be removed as a maintenance activity and not construction disturbance. Planning Commission members who walked the easement agreed that once the debris is removed it will be walkable.

Responses to Commission members' questions and to John Shelton's concerns regarding the trail within the County easement over the Shryock property included the following:

1. If and when the trail would get paved in the future, a retaining wall may be installed along a portion of the easement
2. The proposed fencing and trail signage will keep trail users on the trail;
3. The County does not propose paving the trail on the State Park side of Dorlan Mill Road as they're keeping it as a natural hiking trail;
4. The County easement over the Shryock property is 20' wide;
5. The County will remove the debris, the fence will be within the easement, the County will maintain the entire 20' wide easement in the same manner as they monitor and maintain the rest of the Struble Trail;
6. The trail will be a marked hiking trail – signs, directional arrows.

Joe Stoyack moved, seconded by Jim Shrimp, to recommend approval of the Struble Trail extension and improvements. The Motion carried unanimously.

### 160 Park Road "Eagle Village Parking Expansion" Land Development Plan

Alyson Zarro, Esq., Fred Gunther – property owner, and Joe Rusella – D.L. Howell, were in attendance. Ms. Zarro presented a land development plan for 160 Park Road (the property on Park Road between Route 100 and Little Conestoga Road) proposing an expanded paved

parking lot – 136 new spaces - accessed from Park Road, with street trees, a vegetated buffer along the western property line with the Waynebrook development and lighting compliant with Township ordinances. Also proposed is a 1-way access road/lane from the Pottstown Pike parking lot to the expanded Park Road parking lot, using coarse pavers. Landscaping would be added along the 1-way access lane and interspersed within the expanded parking area. The parking area is oversized for current uses. An overall concept for the property includes a restaurant, a bakery, and additional retail shops or office space.

Discussion included the following items:

1. The overall plan for the property includes additional 20,000-30,000 SF in a combination of business/commercial/retail uses. Current uses total approximately 28,500 SF.
2. The expanded parking area will be fenced; when it's full there will be no overflow parking.
3. Grass pavers are proposed for the 1-way driveway to reduce impervious coverage and retain the character of the property.
4. Lighting will comply with ordinances - decorative fixtures along the street and other fixtures within the parking area.
5. A 6' paved trail along Park Road.
6. Would a conditional use apply to both parcels or does ordinance for accessory use (parking lot) cross both parcels? This is shared parking for all uses on both parcels. Owner may consider combining both parcels into one.
7. Park Road traffic is congested; this should be studied again.
8. Traffic counts will be conducted with each new use on the parcels.

Waivers requested include:

1. Submission is a Preliminary and Final Plan;
2. Install curbing only where storm water management is necessary instead of entire parking area;
3. Landscaping along Little Conestoga Road and west end of property line with Waynebrook instead of along entire perimeter;
4. 10' wide landscaping within parking sections instead of 15';

Resident Don Tracy commented on the nuisances of last summer's beer garden on this property and questioned the relationship between this Plan and the approval of the beer garden. Ms. Zarro responded that this parking area Plan addresses most of the issues related to last summer's beer garden and will be used by the current uses on the property. Approval of this land development plan is separate from any approval for a beer garden this year.

Sally Winterton moved, seconded by Chad Adams, to recommend Preliminary/Final approval of the "Eagle Village Parking Expansion Plan". The Motion carried with 6 in favor and 1 opposed (Stoyack).

#### Jankowski Property Subdivision-Land Development Plan

Adam Brower, E.B. Walsh, John Mostellor, Black Horse ELU and Mr. and Mrs. Jankowski were in attendance. Mr. Brower presented the Subdivision-Land Development Plan for 55 single-family homes on the Jankowski Tract on the west side of Route 100 at the border with West Vincent Township, drafted in accordance with the conditional use approval granted to Black Horse ELU. Chad Adams moved, seconded by Jim Dewees, to accept the Plan for Township Consultants' review. The Motion carried unanimously.

#### Eagleview Corporate Center – Sketch Plan Introduction

Neal Fisher, Hankin Group, introduced sketch plans for 2 parcels on Sierra Drive in the Eagleview Corporate Center. The 2 parcels were created through the subdivision of Lot 1 in 2016.

Lot 1B Sketch Plan. The Lot currently contains an 80,000 SF building occupied by 3 businesses – Essential Medical, DSM, and Lungpacers. The sketch plan proposes a storage area for property maintenance equipment and supplies such as mulch, salt, etc. The structure will be 3-sided with a covering and the location is away from the existing building, across the wetlands and pipeline where it will be screened from Hickory Park and trail users. It will primarily serve Lot 1B. Storm water management will be provided along the driveway or modification of the existing basin.

Lot 1C Sketch Plan. Lot 1C is closer to Stockton Drive. A 113,000 SF flex building is proposed; “flex” meaning it can have various type uses such as office and/or warehouse. There will be 2 accesses from Sierra Drive, a U-shaped building with parking around the building and a hidden loading dock. The wastewater will flow to the pump station on 1C which goes to the Eagleview wastewater treatment facility.

Mr. Fisher advised that land development plans will be prepared and submitted.

#### Approval of Minutes

Sally Winterton moved, seconded by Bob Phillips, to approve as presented the minutes of the January 11, 2018 Planning Commission meeting. The Motion carried unanimously.

#### Open Session

Bob Schoenberger introduced Jeff Smith who will most likely be appointed to the Planning Commission by the Supervisors during their February meeting.

Joe Stoyack questioned the status of 5C commercial. Cary Vargo advised there are 3 tenants and we expect a land development plan will be submitted shortly.

Sally Winterton reiterated Joe Stoyack’s comment regarding eastbound Park Road traffic, turning or crossing over Route 100. Park Road should have a left turn light. Cary Vargo advised we’ll run a model to see if it’d be more efficient.

There was a brief discussion regarding bank and pharmacy drive-through service permitted in the Village District, but not for food/restaurants.

Bob Schoenberger announced the next schedule meeting of the Planning Commission is March 8, 2018 and he will not be able to attend.

#### Adjournment

Jim Dewees moved, seconded by Bob Phillips, to adjourn the meeting at 9:10 p.m. All were in favor.

Respectfully submitted,

Gwen A. Jonik  
Planning Commission Secretary