# ***Revised Hydrologic Analysis:***
# *Proposed Site Redevelopment*
# *24 School Street*
# *Wayland, MA*

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***Original Submittal: September, 2017***
***Revised: May 2018***

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**Hydrologic Analysis (Revised May 2018)**
**Proposed Site Redevelopment**
**24 School Street, Wayland MA**

## Introduction

The project site is located on the northerly side of East Plain Street at the intersection of East Plain Street and School Street. The locus is shown on *Figure One: Locus Map, 24 School Street, Wayland MA.*

The subject parcel (Assessors' Map 52, Lot 189) has an area of 37,865 square feet (0.87 acres). The property is improved with a two-story house, a one-story barn, a detached garage, and a patio. The lot consists of mostly gravel, landscaped and lawn areas with moderate topographic relief across the site. The site slopes from higher elevations near School Street to the southwest with a maximum elevation differential on site of approximately ten-feet. A wetland is located west of the property and a portion of the lot falls within the 100' buffer zone.

According to the NRCS Soil Survey, the southerly portion of the lot consists of Narragansett Silt Loam (415B) soil series and are classified within hydrologic soil group A. Narragansett soils are a well drained glacial till that exhibit moderately high to high infiltration rates when saturated. The northerly portion of the site consists of Hinckley loamy sand soil group (253C). Hinckley soils are a very well-drained soil with good hydraulic conductivity. Runoff curve numbers for Hydrologic Soil Group B were used for the analysis based on soil conditions observed during field testing and the inconsistencies between hydrologic soil group and soil descriptions in the soil survey.

An on-site soil evaluation program consisting of twelve deep test holes was conducted on July 21 and August 21, 2014. DTH-1, 2, 3, 6, 7, 9, and 10 were all conducted on the north side of the lot. Results revealed the A horizon consisting of fine sandy loam at a depth of roughly 12 inches, the B horizon consisting of fine sandy loam to a depth of roughly 24 inches, with C horizons consisting of sandy loam at 60 inches and 120 inches respectively.

DTH-4 and 5 were conducted on the south side of the lot. DTH-4 had the A horizon at 28 inches, with the first 20 inches being fill. The B horizon consisted of fine sandy loam and had a depth of 40 inches. The C horizons consisted of sandy loam and were found at 86 and 116 inches respectively. DTH-5's A horizon consisting of fine sandy loam was found at 16 inches. The B horizon consisting of fine sandy loam was found at 34 inches. The C horizons consisting of sandy loam were found at 84 and 117 inches respectively.

DTH-11 and 12 were conducted on the east side of the lot. DTH-11 has fill to a depth 18 inches, with the A horizon of fine sandy loam at 30 inches, the B horizon of fine sandy loam at 36 inches, and the C horizons of sandy loam at 58 and 128 inches respectively. DTH-12 has fill to a depth of 54 inches, bypassing the A and B horizons, the C horizons of sandy loam were found at 82 and 114 inches respectively.

No refusal was observed in any of the test pits. Redoximorphic features were found in 10 of the 12 test pits at depths of 5 to 7 feet. The groundwater elevations varied from 155-feet to 162-feet.

The site redevelopment program includes the construction of two new multifamily dwellings, paved parking areas, storm water management system and supporting utilities. See site plans for details regarding the proposed development.

The property presently contains 8,780 square feet of impervious area. Redevelopment of the property will increase the amount of impervious area by adding 11,283 square feet for a total of 20,063 square feet.

## Drainage Approach

There are presently no controls in place to manage stormwater runoff rates or volumes. Stormwater runoff drains to the west and south to abutting properties and into East Plain Street. The goal of the proposed stormwater management system is to reduce runoff rates and volumes for all design storms compared to the existing condition and to promote groundwater recharge using a subsurface infiltration system and a rain garden.

The proposed subsurface infiltration system will be located under the parking lot between the two structures. The system will consist of 84 precast concrete infiltration galleys surrounded by two feet of double washed, crushed stone. The infiltration system will collect runoff from Post-Development Basin 4, which consists of the parking area and a portion of the proposed roof structures. The proposed infiltration system is designed to completely contain and recharge runoff from storms up to the 10-year storm. The proposed rain garden will collect and store runoff from Post-Development Basin 3A which consists of the easterly portion of the roof of Building A and the surrounding lawn and landscaped areas. The storm water management system will significantly reduce runoff rates and volumes from the subject parcel for all storm events.

Overall reductions in runoff rates and volumes can be found in the Model Results section of this report and detailed hydrologic analysis and basin models can be found in Appendix A.

## Hydrologic Analysis

A hydrologic analysis of the project has been performed to establish pre-development conditions, assess post-development impacts and evaluate the effectiveness of the proposed drainage infiltration systems. The analysis employs an SCS TR-55 hydrologic computer model and analyzes design storms with return periods of 2, 10, 25 and 100-years. An SCS Type 3 24-hour rainfall distribution pattern is used for the theoretical design storm. Time of concentration values were determined by the LAG Method or manually entered at five minutes for watersheds having relatively small areas or hydraulic lengths to allow for the use of a three-minute time interval for all hydrograph computations. Precipitation rates of 3.20, 4.73, 5.95 and 8.45-inches were used for the 2, 10, 25 and 100-year storm events respectively. Runoff curve numbers for Hydrologic Soil Group B were used for the analysis based on soil conditions observed during field

testing and the inconsistencies between hydrologic soil group and soil descriptions in the soil survey.

Existing Conditions

The existing conditions model analyzes the site as three drainage basins; Existing Conditions Basins One, Two, and Three.

Existing Conditions Basin 1 (E.C.B.-1) has an area of 15,276 square feet and flows in a southwesterly direction to Design Point A located at the west side of the property.

Existing Conditions Basin 2 (E.C.B.-2) has an area of 2,901 square feet and flows in a northeasterly direction to Design Point B located at the northeast side of the property.

Existing Conditions Basin 3 (E.C.B.-3) has an area of 19,688 square feet and flows in a southwesterly direction to Design Point C located at the southwest corner of the property.

The Existing Conditions Basins are shown on Figure Two, *Existing Conditions Watershed Delineation Plan* and information for all Existing Conditions Basins is listed on the plan and below.

*Existing Conditions Basin 1 (E.C.B.-1)*

Area = 15,276 square feet
Impervious Area = 2,205 square feet, curve number = 98.0
Lawn area (good condition) = 13,071 square feet, curve number = 61.0
Hydrologic soil group B
Weighted Curve Number = 66.4
Basin slope = 5.2%
Hydraulic length = 189 feet
Time of concentration = 5.4 minutes (LAG Method)

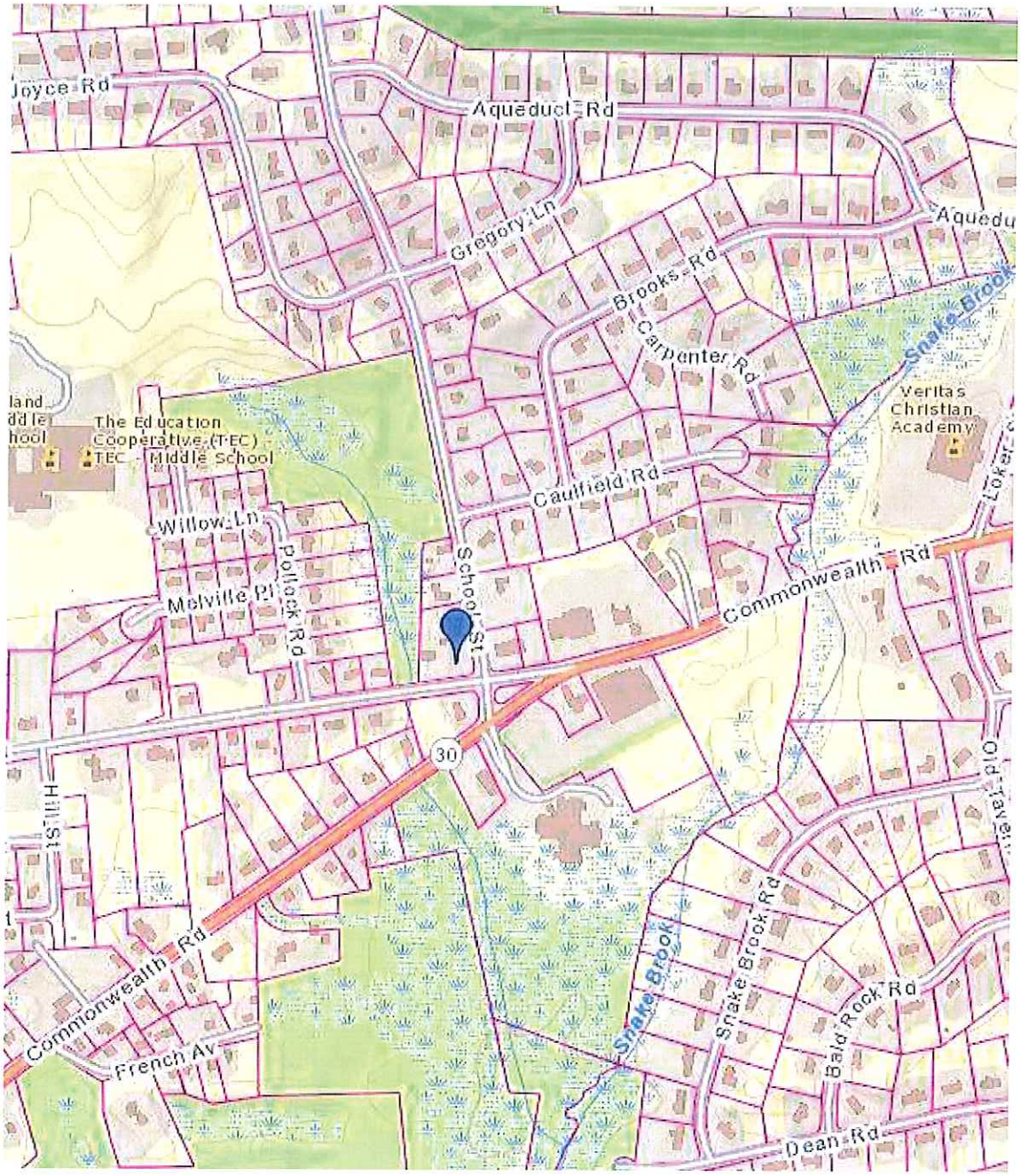
*Existing Conditions Basin 2 (E.C.B.-2)*

Area = 2,901 square feet
Impervious Area = 1,460 square feet, curve number = 98.0
Lawn area (good condition) = 1,440 square feet, curve number = 61.0
Hydrologic soil group B
Weighted Curve Number = 79.8
Basin slope = 1.9%
Hydraulic length = 68 feet
Time of concentration = 5 minutes (Manually Entered)

*Existing Conditions Basin 3 (E.C.B.-3)*

Area = 19,688 square feet
Impervious Area = 5,115 square feet, curve number = 98.0
Lawn area (good condition) = 14,573 square feet, curve number = 61.0

**Figure One: Locus Map, 24 School Street, Wayland MA**



## NOTES:

1. SUBJECT PARCEL IS SHOWN AS ASSESSORS MAP 52, LOT 189. RECORD TITLE FROM BOOK 31869, PAGE 55.

2. UTILITY LOCATIONS DEPICTED ON THIS PLAN, BOTH ABOVE- AND BELOW-GROUND, ARE BASED UPON DIRECT FIELD OBSERVATIONS MADE BY METROWEST ENGINEERING, INC. PERSONNEL DURING A FIELD SURVEY, RECORD PLAN LOCATIONS, OR DIGSAFE PAINT-INDICATORS. METROWEST ENGINEERING, INC. DOES NOT WARRANT THAT ALL UTILITIES ARE SHOWN OR THAT UTILITIES THAT ARE DEPICTED ARE SHOWN IN THE CORRECT LOCATION, OR WITH THE PROPER MATERIAL DESIGNATION. METROWEST ENGINEERING, INC. DOES NOT WARRANT OR PROVIDE AN EXPRESS OR IMPLIED WARRANTY THAT ALL SUBSURFACE IMPROVEMENTS ARE SHOWN OR ARE SHOWN CORRECTLY, INCLUDING, BUT NOT LIMITED TO, UTILITIES, UNDERGROUND VAULTS, UNDERGROUND TANKS OR CHAMBERS, BUNKERS, DUCT BANKS, AND/OR OTHER MAN-MADE IMPROVEMENTS THAT LIE BENEATH THE GROUND SURFACE AT THE TIME OF THE SURVEY.

3. CONTRACTOR IS SOLELY RESPONSIBLE FOR ESTABLISHING EXISTING LOCATIONS OF ALL SUB-SURFACE UTILITIES AND MAN-MADE IMPROVEMENTS AND FOR THE REQUIREMENTS TO REPLACE, RELOCATE OR REPAIR EXISTING UTILITIES IN THE EVENT OF DAMAGE OCCURRING DURING CONSTRUCTION. MWE IS NOT RESPONSIBLE OR LIABLE FOR DELAYS OR COSTS ASSOCIATED WITH REMOVING/REPLACING/RELOCATING OF EXISTING UTILITIES REGARDLESS OF WHETHER SAID UTILITIES ARE ACCURATELY DEPICTED ON THIS SURVEY.

4. THE PROPERTY DESCRIBED ON THIS SURVEY DOES NOT LIE WITHIN A SPECIAL FLOOD HAZARD AREA AS DEFINED BY THE FEDERAL EMERGENCY MANAGEMENT AGENCY; THE PROPERTY LIES WITHIN ZONE "X" OF THE FLOOD INSURANCE RATE MAP IDENTIFIED AS MAP NUMBER 25017C0528F, BEARING AN EFFECTIVE DATE OF JULY 7, 2014.

## BENCHMARKS

ELEVATIONS SHOWN ON THIS PLAN REFER TO RM 11 (ELEV.=163.84'), A CHISELED SQUARE IN THE NORTH HEADWALL OF THE CULVERT UNDER COMMONWEALTH ROAD FOR SNAKE BROOK N.G.V.D. 1929.)

| T.B.M. | DESCRIPTION | ELEVATION |
|---|---|---|
| C | DHN SET IN 14" BLACK LOCUST | 161.89' |
| D | DHN SET IN 10" NORWAY MAPLE | 168.74' |

## LEGEND

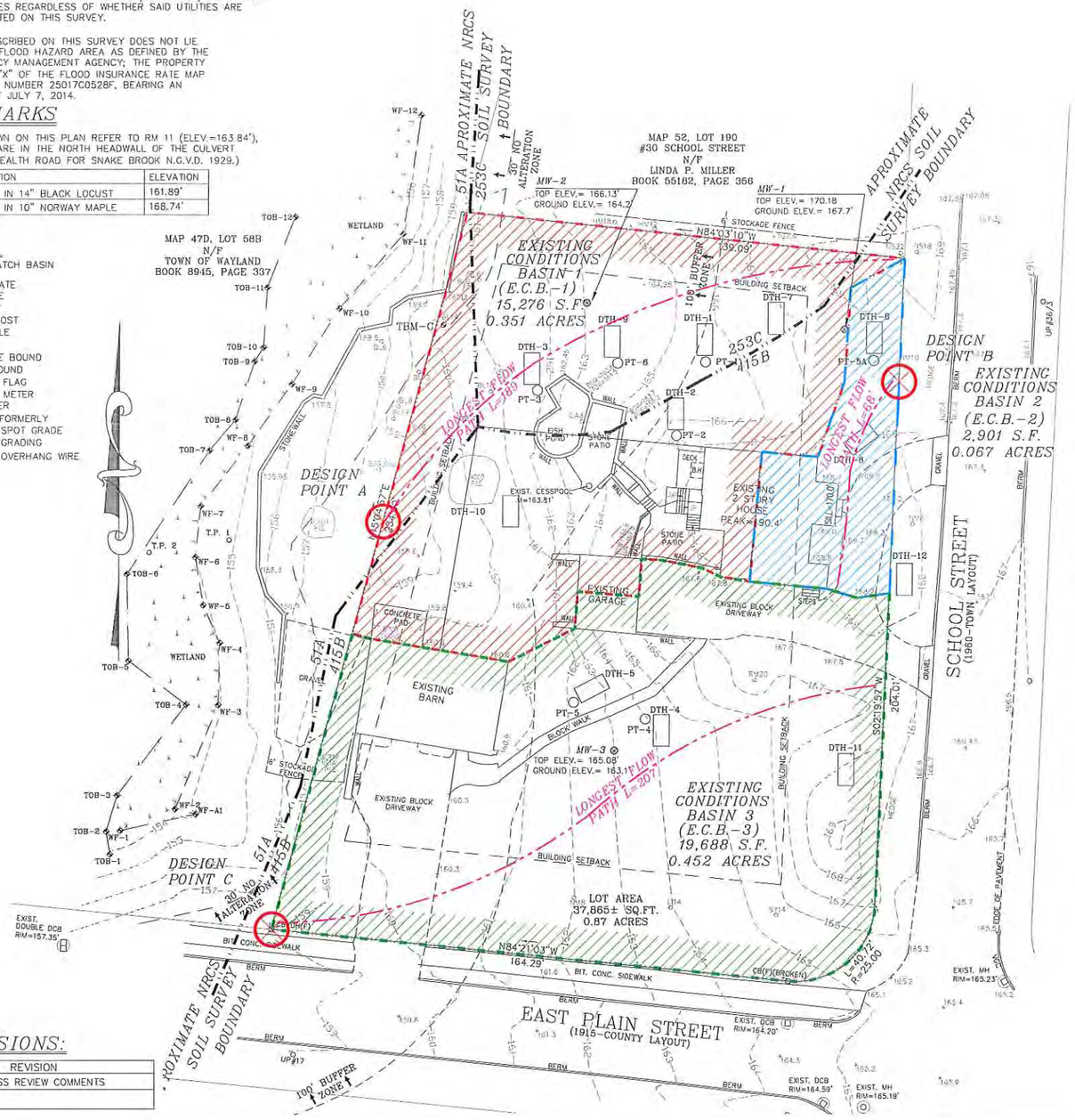
| | |
|---|---|
| DCB | DRAIN CATCH BASIN |
| HN | MANHOLE |
| WG | WATER GATE |
| GG | GAS GATE |
| | HYDRANT |
| U.P. | UTILITY POST |
| DH | DRILL HOLE |
| (F) | FOUND |
| CB | CONCRETE BOUND |
| SB | STONE BOUND |
| WF | WETLAND FLAG |
| E.M. | ELECTRIC METER |
| G.M. | GAS METER |
| N/F | NOW OR FORMERLY |
| +200.0 | EXISTING SPOT GRADE |
| 200 | EXISTING GRADING |
| | EXISTING OVERHANG WIRE |

## EXISTING TREE DESCRIPTION LEGEND

| CODE | DESCRIPTION |
|---|---|
| BL# | BALCK LOCUST |
| CA# | CRAB APPLE |
| HM# | HEMLOCK |
| LI# | LINDEN |
| NM# | NORWAY MAPLE |
| NS# | NORWAY SPRUCE |
| RM# | RED MAPLE |
| SY# | SYCAMORE |

DETAIL: TREE LOCATION, R014, TREE CODE, TREE DIAMETER

CONTRACTOR TO VERIFY ACTUAL LOCATION OF EXISTING UTILITY SERVICES IN THE FIELD PRIOR TO CONSTRUCTION (WATER, ELECTRICAL, ETC.) CALL DIG-SAFE BEFORE YOU DIG 811.




## REVISIONS:

| No. | DATE | REVISION |
|---|---|---|
| 1 | 11/04/17 | ADDRESS REVIEW COMMENTS |
| | | |

## SOIL TEST RESULTS

SOIL LOGS No:

| DTH-1 ELEV=165.7' | DTH-2 ELEV=165.9' | DTH-3 ELEV=161.7' | DTH-4 ELEV=164.1' | DTH-5 ELEV=162.6' |
|---|---|---|---|---|
| 0"-10" Ap FINE SANDY LOAM 10YR3/3<br>10"-24" Bw FINE SANDY LOAM 10YR5/6<br>24"-62" C1 SANDY LOAM 2.5Y5/3<br>62"-126" C2 SANDY LOAM 2.5Y5/4<br>NO STANDING OR WEEPING WATER<br>NO REFUSAL, C2 HORIZON IS TIGHT<br>REDOX @70" 7.5YR5/8 5%<br>ESTIMATED DESIGN GROUNDWATER=159.87' | 0"-22" Ap FINE SANDY LOAM 10YR3/3<br>22"-42" Bw FINE SANDY LOAM 10YR5/6<br>42"-96" C1 SANDY LOAM 2.5Y5/3<br>96"-118" C2 SILT LOAM 2.5Y6/3<br>WATER WEEPING @106"<br>NO STANDING WATER, NO REFUSAL<br>REDOX @80" 7.5YR5/8<br>ESTIMATED DESIGN GROUNDWATER=159.23' | 0"-10" Ap FINE SANDY LOAM 10YR3/3<br>10"-22" Bw FINE SANDY LOAM 10YR5/6<br>22"-84" C1 SANDY LOAM 2.5Y5/3<br>84"-110" C2 SILT LOAM 2.5Y6/3<br>NO STANDING WATER, NO REFUSAL<br>C2 HORIZON IS DAMP<br>REDOX @82" 7.5YR5/8<br>ESTIMATED DESIGN GROUNDWATER=154.87' | 0"-20" FILL<br>20"-28" Ap FINE SANDY LOAM 10YR3/3<br>28"-40" Bw FINE SANDY LOAM 10YR5/6<br>40"-86" C1 SANDY LOAM 2.5Y5/4<br>86"-116" C2 SANDY LOAM 2.5Y4/4<br>NO REFUSAL, NO STANDING OR WEEPING WATER<br>NO REDOX<br>ESTIMATED DESIGN GROUNDWATER=NONE | 0"-16" Ap FINE SANDY LOAM 10YR3/3<br>16"-34" Bw FINE SANDY LOAM 10YR5/6<br>34"-84" C1 SANDY LOAM 2.5Y5/4<br>84"-118" C2 SANDY LOAM 2.5Y4/3<br>WEEPING WATER @112"<br>NO REFUSAL<br>REDOX @72" 7.5YR5/8<br>ESTIMATED DESIGN GROUNDWATER=156.6' |
| DATE: JULY 31, 2014 | | | | |
| BY: BRIAN T. NELSON, SOIL EVALUATOR (METROWEST ENGINEERING, INC.) | | | | |
| INSPECTOR: BILL MURPHY, WAYLAND BOARD OF HEALTH | | | | |

## SOIL TEST RESULTS

SOIL LOGS No:

| DTH-6 ELEV=167.7' | DTH-7 ELEV=166.8' | DTH-8 ELEV=168.2' | DTH-9 ELEV=163.0' | DTH-10 ELEV=160.75' |
|---|---|---|---|---|
| 0"-14" Ap FINE SANDY LOAM 10YR3/3<br>14"-26" Bw FINE SANDY LOAM 10YR5/6<br>26"-64" C1 SANDY LOAM 2.5Y5/3<br>64"-122" C2 SANDY LOAM 2.5Y4/4<br>NO STANDING OR WEEPING WATER<br>NO REFUSAL<br>REDOX @70" 7.5YR5/8 5%<br>ESTIMATED DESIGN GROUNDWATER=161.87' | 0"-14" Ap FINE SANDY LOAM 10YR3/3<br>14"-32" Bw FINE SANDY LOAM 10YR5/6<br>32"-58" C1 SANDY LOAM 2.5Y5/3<br>58"-114" C2 SANDY LOAM 2.5Y5/4<br>NO STANDING OR WEEPING WATER<br>LENSES OF SILT LOAM FROM 76" DOWN<br>ESTIMATED DESIGN GROUNDWATER=NONE | 0"-26" FILL<br>26"-40" Bw FINE SANDY LOAM 10YR5/6<br>40"-78" C1 SANDY LOAM 2.5Y5/4<br>78"-108" C2 LOAMY SAND 2.5Y5/3<br>108"-126" C3 SILT LOAM 2.5Y6/3<br>C3 HORIZON IS DAMP<br>NO REFUSAL<br>REDOX @80" 7.5YR5/8 10%<br>ESTIMATED DESIGN GROUNDWATER=161.53' | 0"-16" Ap FINE SANDY LOAM 10YR3/3<br>16"-30" Bw FINE SANDY LOAM 10YR5/6<br>30"-46" Bc SANDY LOAM 2.5Y5/4<br>46"-98" C1 SANDY LOAM 2.5Y5/3<br>98"-118" C2 SANDY LOAM 2.5Y4/4<br>WATER STANDING @108"<br>WATER WEEPING @88"<br>REDOX SEEN @62", NO REFUSAL<br>ESTIMATED DESIGN GROUNDWATER=157.8' | 0"-15" Ap FINE SANDY LOAM 10YR3/3<br>15"-30" Bw FINE SANDY LOAM 10YR5/6<br>30"-66" C1 LOAMY SAND 2.5Y5/3<br>66"-112" C2 SILT LOAM 2.5Y5/4<br>WATER STANDING @100"<br>WATER WEEPING @98"<br>NO REFUSAL<br>REDOX SEEN @68" 7.5YR5/8 10%<br>ESTIMATED DESIGN GROUNDWATER=155.08' |

## PERCOLATION

| NO. | DEPTH | RATE | DATE | BY | WSP. |
|---|---|---|---|---|---|
| PT-1 | 60" | 8 MPI | 07/31/14 | B.N. | B.M. |
| PT-2 | 68" | 13 MPI | 07/31/14 | B.N. | B.M. |
| PT-3 | 50" | 10 MPI | 07/31/14 | B.N. | B.M. |
| PT-4 | 55" | MPI | 07/31/14 | B.N. | B.M. |
| PT-5 | 60" | MPI | 07/31/14 | B.N. | B.M. |

## PERCOLATION

| NO. | DEPTH | RATE | DATE | BY | WSP. |
|---|---|---|---|---|---|
| PT-5A | 54" | 10 MPI | 08/21/14 | B.N. | J.J. |
| PT-6 | 60" | 3 MPI | 08/21/14 | B.N. | J.J. |

| DTH-11 ELEV=166.0' | DTH-12 ELEV=168.2' |
|---|---|
| 0"-18" FILL<br>18"-30" Ap FINE SANDY LOAM 10YR3/3<br>30"-36" Bw FINE SANDY LOAM 10YR5/6<br>36"-58" C1 SANDY LOAM 2.5Y5/3<br>58"-128" C2 SANDY LOAM 2.5Y6/3<br>WATER STANDING @125"<br>NO WEEPING WATER<br>REDOX SEEN @60" 7.5YR5/8 5%<br>ESTIMATED DESIGN GROUNDWATER=161.0' | 0"-54" FILL<br>58"-82" C1 SANDY LOAM 2.5Y4/4<br>82"-114" C2 SANDY LOAM 2.5Y5/4<br>C2 HORIZON HAS LENSES OF SILT LOAM<br>NO STANDING OR WEEPING WATER<br>NO REFUSAL<br>REDOX SEEN @64" 7.5YR5/6<br>ESTIMATED DESIGN GROUNDWATER=161.0' |
| DATE: AUGUST 21, 2014 | |
| BY: BRIAN T. NELSON, SOIL EVALUATOR (METROWEST ENGINEERING, INC.) | |
| INSPECTOR: JULIA JUNGHANNS, WAYLAND BOARD OF HEALTH | |

## USDA SOIL CLASSIFICATION

| SOIL NUMBER | SOIL SERIES | HYDROLOGIC SOIL GROUP |
|---|---|---|
| 51A | SWANSEA MUCK | B/D |
| 253C | HINCKLEY LOAMY SAND | A |
| 415B | NARRAGANSETT SILT LOAM | B |

HYDROLOGIC SOIL CROUP B USED FOR ANALSYIS

SOILS ON SITE ARE SANDY LOAM TEXTURES AND CLASSIFIED WITHIN HYDROLOGIC SOIL GROUP B.

## EXISTING CONDITIONS BASIN PROPERTIES:

### EXISTING CONDITIONS BASIN 1 (E.C.B.-1)

TOTAL BASIN AREA = 15,276 S.F. (0.351 ACRES)
HYDRAULIC LENGTH = 189 FEET
CHANGE IN ELEVATION = 9.8 FEET
BASIN SLOPE = 0.052 (5.2%)

| GROUND COVER | Cn | AREA (ACRES) | PRODUCT |
|---|---|---|---|
| IMPERVIOUS AREA = 2,205 S.F. (0.051 ACRES) | 98 | 0.051 | 5.000 |
| LAWN AREA (GOOD COND.) = 13,071 S.F. (0.300 ACRES) | 61 | 0.300 | 18.300 |
| | | SUM 0.351 | SUM 23.300 |

WEIGHTED CURVE NUMBER ($C_N$) = (23.300/0.351) = 66.4

### EXISTING CONDITIONS BASIN 2 (E.C.B.-2)

TOTAL BASIN AREA = 2,901 S.F. (0.067 ACRES)
HYDRAULIC LENGTH = 68 FEET
CHANGE IN ELEVATION = 1.3 FEET
BASIN SLOPE = 0.019 (1.9%)

| GROUND COVER | Cn | AREA (ACRES) | PRODUCT |
|---|---|---|---|
| IMPERVIOUS AREA = 1,460 S.F. (0.034 ACRES) | 98 | 0.034 | 3.332 |
| LAWN AREA (GOOD COND.) = 1,440 S.F. (0.033 ACRES) | 61 | 0.033 | 2.013 |
| | | SUM 0.067 | SUM 5.345 |

WEIGHTED CURVE NUMBER ($C_N$) = (5.345/0.067) = 79.8

### EXISTING CONDITIONS BASIN 3 (E.C.B.-3)

TOTAL BASIN AREA = 19,688 S.F. (0.452 ACRES)
HYDRAULIC LENGTH = 207 FEET
CHANGE IN ELEVATION = 8.8 FEET
BASIN SLOPE = 0.042 (4.2%)

| GROUND COVER | Cn | AREA (ACRES) | PRODUCT |
|---|---|---|---|
| IMPERVIOUS AREA = 5,115 S.F. (0.117 ACRES) | 98 | 0.117 | 11.466 |
| LAWN AREA (GOOD COND.) = 14,573 S.F. (0.334 ACRES) | 61 | 0.334 | 20.374 |
| | | SUM 0.452 | SUM 31.840 |

WEIGHTED CURVE NUMBER ($C_N$) = (31.840/0.452) = 70.4

EXISTING CONDITIONS - TOTAL IMPERVIOUS AREA = 8,780 S.F.
EXISTING CONDITIONS - TOTAL LAWN AREA = 29,085 S.F.

*FOR METROWEST ENGINEERING, INC.* *DATE*
*ROBERT A. GEMMA, P.E.(CIVIL) # 31967*
*P.L.S. # 37046*

GRAPHIC SCALE
1 inch = 20 ft.
20 0 10 20 40 ( FEET ) 80
0 4 10 20 ( METERS ) 30

# FIGURE TWO

# EXISTING CONDITIONS WATERSHED DELINEATION PLAN
#24 SCHOOL STREET
IN
WAYLAND, MASS

PREPARED FOR:
*CHADWICK HOMES*
*73 PELHAM ISLAND ROAD*
*WAYLAND, MA 01778*

PROPERTY OF:
*LINDA C. KNOWLES &*
*CARY W. RIDGE*
*24 SCHOOL STREET*
*WAYLAND, MA 01778*

ENGINEERS & SURVEYORS:
MWE
*METROWEST ENGINEERING, INC.*
*75 FRANKLIN STREET*
*FRAMINGHAM, MA 01702*
*TEL.: (508)626-0063*
*FAX: (508)875-6440*

| SHEET 1 OF 1 | | DATE: DECEMBER 19, 2016 |
|---|---|---|
| CALC'D BY: RAG | FIELD BK: 621 | CAD FILE: EC_HYDRO_R1.dwg |
| DRAFTER: | PROJECT: WY_SCH | DWG FILE: SK1121916_R1.dwg |

Hydrologic soil group B
Weighted Curve Number = 70.4
Basin slope = 4.2%
Hydraulic length = 207 feet
Time of concentration = 5.8 minutes (LAG Method)

Proposed Conditions

The proposed condition model analyzes the site as five Post-Development drainage basins, Post-Development Basins One through Four (including Basin 3A).

Post-Development Basin 1 (P.D.B.-1) has an area of 5,991 square feet and flows west to Design Point A located at the west of the property.

Post-Development Basin 2 (P.D.B.-2) has an area of 1,877 square feet and flows north to Design Point B located at the northeastern side of the property.

Post-Development Basin 3 (P.D.B.-3) has an area of 7,081 square feet and flows west to design point C located at the southwest corner of the property.

Post-Development Basin 3A (P.D.B.-3A) has an area of 5,856 square feet and flows into the proposed stone trench on the easterly side of Building A.

Post-Development Basin 4 (P.D.B.-4) has an area of 17,059 square feet and flows to the Proposed Infiltration System located at the center of the property.

The Proposed Conditions Basins are shown on Figure Three, *The Post Development Watershed Delineation Plan* and information for all Post Development Basins is listed on the plan and shown below.

*Post-Development Basin 1 (P.D.B.-1)*

Area = 5,991 square feet
Impervious area = 857 square feet; curve number = 98.0
Lawn area (good condition) = 3,815 square feet, curve number = 61.0
Landscaped area (good condition) = 1,323 square feet, curve number = 61.0
Hydrologic soil group B
Weighted Curve Number = 66.4
Basin slope = 4.4%
Hydraulic length = 222 feet
Time of concentration = 6.7 minutes (LAG Method)

*Post-Development Basin 2 (P.D.B.-2)*

Area = 1,877 square feet
Impervious area = 356 square feet; curve number = 98.0
Lawn area (good condition) = 880 square feet, curve number = 61.0
Landscaped area (good condition) = 640 square feet, curve number = 61.0

## NOTES:

1. SUBJECT PARCEL IS SHOWN AS ASSESSORS MAP 52, LOT 189. RECORD TITLE FROM BOOK 31869, PAGE 55.

2. UTILITY LOCATIONS DEPICTED ON THIS PLAN, BOTH ABOVE– AND BELOW–GROUND, ARE BASED UPON DIRECT FIELD OBSERVATIONS MADE BY METROWEST ENGINEERING, INC. PERSONNEL DURING A FIELD SURVEY, RECORD PLAN LOCATIONS, OR DIGSAFE PAINT–INDICATORS. METROWEST ENGINEERING, INC. DOES NOT WARRANT THAT ALL UTILITIES ARE SHOWN OR THAT UTILITIES THAT ARE DEPICTED ARE SHOWN IN THE CORRECT LOCATION, OR WITH THE PROPER MATERIAL DESIGNATION. METROWEST ENGINEERING, INC. DOES NOT WARRANT OR PROVIDE AN EXPRESS OR IMPLIED WARRANTY THAT ALL SUBSURFACE IMPROVEMENTS ARE SHOWN OR ARE SHOWN CORRECTLY, INCLUDING, BUT NOT LIMITED TO, UTILITIES, UNDERGROUND VAULTS, UNDERGROUND TANKS OR CHAMBERS, BUNKERS, DUCT BANKS, AND/OR OTHER MAN–MADE IMPROVEMENTS THAT LIE BENEATH THE GROUND SURFACE AT THE TIME OF THE SURVEY.

3. CONTRACTOR IS SOLELY RESPONSIBLE FOR ESTABLISHING EXISTING LOCATIONS OF ALL SUB–SURFACE UTILITIES AND MAN–MADE IMPROVEMENTS AND FOR THE REQUIREMENTS TO REPLACE, RELOCATE OR REPAIR EXISTING UTILITIES IN THE EVENT OF DAMAGE OCCURRING DURING CONSTRUCTION. MWE IS NOT RESPONSIBLE OR LIABLE FOR DELAYS OR COSTS ASSOCIATED WITH REMOVING/REPLACING/RELOCATING OF EXISTING UTILITIES REGARDLESS OF WHETHER SAID UTILITIES ARE ACCURATELY DEPICTED ON THIS SURVEY.

4. THE PROPERTY DESCRIBED ON THIS SURVEY DOES NOT LIE WITHIN A SPECIAL FLOOD HAZARD AREA AS DEFINED BY THE FEDERAL EMERGENCY MANAGEMENT AGENCY, THE PROPERTY LIES WITHIN ZONE "X" OF THE FLOOD INSURANCE RATE MAP IDENTIFIED AS MAP NUMBER 25017C0528F, BEARING AN EFFECTIVE DATE OF JULY 7, 2014.

## BENCHMARKS

ELEVATIONS SHOWN ON THIS PLAN REFER TO RM 11 (ELEV.=163.84'), A CHISELED SQUARE IN THE NORTH HEADWALL OF THE CULVERT UNDER COMMONWEALTH ROAD FOR SNAKE BROOK N.G.V.D. 1929.

| T.B.M. | DESCRIPTION | ELEVATION |
|---|---|---|
| C | DHN SET IN 14" BLACK LOCUST | 161.89' |
| D | DHN SET IN 10" NORWAY MAPLE | 168.74' |

CONTRACTOR TO VERIFY ACTUAL LOCATION OF EXISTING UTILITY SERVICES IN THE FIELD PRIOR TO CONSTRUCTION (WATER, ELECTRICAL, ETC.) CALL DIG–SAFE BEFORE YOU DIG 811.

## ZONING:

*RESIDENCE ZONE 20,000 – 120' FRONT*

MINIMUM LOT AREA= 20,000[15] S.F.
MINIMUM LOT COVERAGE= 20%
MINIMUM FRONTAGE= 200 FT.
SETBACKS:
FRONT LOT LINE= 30[2] FT.
FRONT ROW CENTER LINE= 55 FT.
SIDE YARD= 15[3] FT.
REAR YARD=30 FT.
MAX. HEIGHT = 35 FT./2½ STORIES

2) IF §198–702 SHALL REQUIRE A GREATER SETBACK OR PERMIT A LESSER SETBACK, THE PROVISIONS OF SAID §198–702 SHALL PREVAIL OVER THIS TABLE.

3) SIDE YARDS SHALL MEET THE REQUIREMENTS OF §§198–702.4 AND 703.2, AND THE REQUIRED MINIMUM SIDE YARD MAY BE REDUCED IN ACCORDANCE WITH PROVISIONS OF §198–703.2

15) MINIMUM FRONT YARD WIDTH SHALL BE CALCULATED IN ACCORDANCE WITH THE REQUIREMENTS OF §198–705.1 OF THE ZONING BYLAW.

## EXISTING TREE DESCRIPTION LEGEND

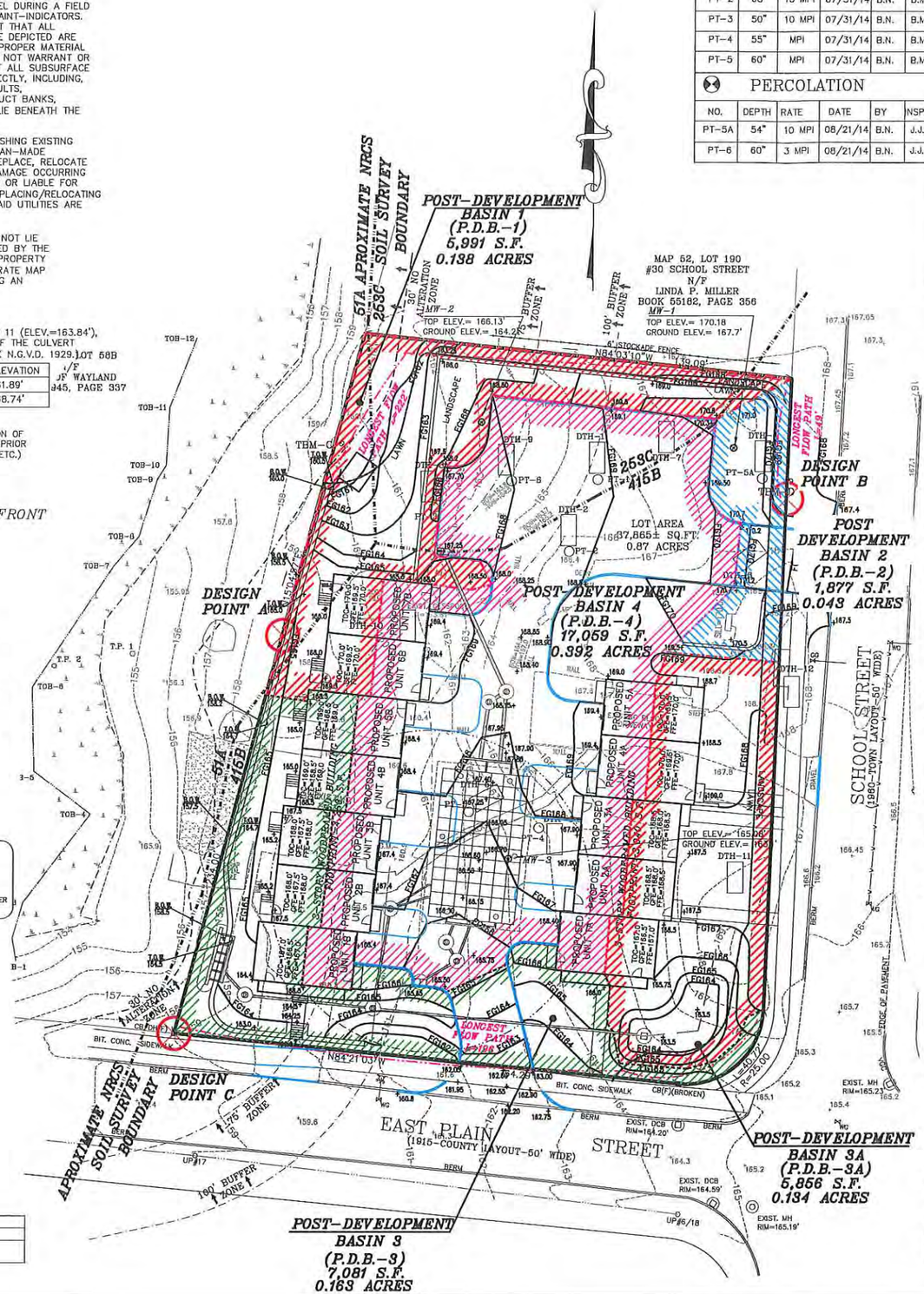
| CODE | DESCRIPTION |
|---|---|
| BL# | BALCK LOCUST |
| CA# | CRAB APPLE |
| HM# | HEMLOCK |
| LI# | LINDEN |
| NM# | NORWAY MAPLE |
| NS# | NORWAY SPRUCE |
| RM# | RED MAPLE |
| SY# | SYCAMORE |

DETAIL
TREE LOCATION
TREE CODE – RO 4 – TREE DIAMETER

## LEGEND

| | |
|---|---|
| DCB | DRAIN CATCH BASIN |
| HM | MANHOLE |
| WG | WATER GATE |
| GG | GAS GATE |
| | HYDRANT |
| U.P. | UTILITY POST |
| DH | DRILL HOLE |
| (F) | FOUND |
| CB | CONCRETE BOUND |
| SB | STONE BOUND |
| WF | WETLAND FLAG |
| E.M. | ELECTRIC METER |
| G.M. | GAS METER |
| N/F | NOW OR FORMERLY |
| +200.0 | EXISTING SPOT GRADE |
| ----200---- | EXISTING GRADING |
| | EXISTING OVERHANG WIRE |

| No. | DATE | REVISION |
|---|---|---|
| 2 | 07/29/15 | ADD TOP OF BANK |
| 3 | 11/01/16 | ADD ELEVATION DATUM REFERENCE REVISE WF#11, WF#12 |


APPROXIMATE NRCS SOIL SURVEY BOUNDARY
51A
253C
415B
POST–DEVELOPMENT BASIN 1 (P.D.B.–1) 5,991 S.F. 0.138 ACRES
POST–DEVELOPMENT BASIN 2 (P.D.B.–2) 1,877 S.F. 0.043 ACRES
POST–DEVELOPMENT BASIN 3 (P.D.B.–3) 7,081 S.F. 0.163 ACRES
POST–DEVELOPMENT BASIN 3A (P.D.B.–3A) 5,856 S.F. 0.134 ACRES
POST–DEVELOPMENT BASIN 4 (P.D.B.–4) 17,059 S.F. 0.392 ACRES
DESIGN POINT A
DESIGN POINT B
DESIGN POINT C
LOT AREA 37,865± SQ.FT. 0.87 ACRES
MAP 52, LOT 190
#30 SCHOOL STREET
N/F
LINDA P. MILLER
BOOK 55182, PAGE 356
LOT 68B
N/F
JF WAYLAND
B45, PAGE 337
SCHOOL STREET (1980–TOWN LAYOUT–50' WIDE)
EAST PLAIN STREET (1915–COUNTY LAYOUT–50' WIDE)
PROPOSED UNIT 1A
PROPOSED UNIT 1B
PROPOSED UNIT 2A
PROPOSED UNIT 2B
PROPOSED UNIT 3A
PROPOSED UNIT 3B
PROPOSED UNIT 4A
PROPOSED UNIT 4B
PROPOSED UNIT 5A
PROPOSED UNIT 5B
PROPOSED UNIT 6
PROPOSED UNIT 7
PROPOSED UNIT 8
PROPOSED UNIT 9
PROPOSED UNIT 10
PROPOSED UNIT 11
PROPOSED UNIT 12
PROPOSED UNIT 13
PROPOSED UNIT 14
PROPOSED UNIT 15
PROPOSED UNIT 16
PROPOSED UNIT 17
PROPOSED UNIT 18
PROPOSED UNIT

Hydrologic soil group B
Weighted Curve Number = 67.9
Basin slope = 1.0%
Hydraulic length = 49 feet
Time of concentration = 5.0 minutes (Manually Entered)

*Post-Development Basin 3 (P.D.B.-3)*

Area = 7,081 square feet
Impervious area = 2,745 square feet; curve number = 98.0
Lawn area (good condition) = 2,391 square feet, curve number = 61.0
Landscaped area (good condition) = 1,946 square feet, curve number = 61.0
Hydrologic soil group B
Weighted Curve Number = 75.3
Basin slope = 3.8%
Hydraulic length = 196 feet
Time of concentration = 5.0 minutes (Manually Entered)

*Post-Development Basin 3A (P.D.B.-3A)*

Area = 5,856 square feet
Impervious area = 2,745 square feet; curve number = 98.0
Lawn area (good condition) = 1,914 square feet, curve number = 61.0
Landscaped area (good condition) = 1,983 square feet, curve number = 61.0
Hydrologic soil group B
Weighted Curve Number = 73.5
Basin slope = n.a.
Hydraulic length = n.a.
Time of concentration = 5.0 minutes (Manually Entered)

*Post-Development Basin 4 (P.D.B.-4)*

Area = 17,059 square feet
Impervious area = 14,145 square feet; curve number = 98.0
Lawn area (good condition) = 1,402 square feet, curve number = 61.0
Landscaped area (good condition) = 1,511 square feet, curve number = 61.0
Hydrologic soil group B
Weighted Curve Number = 91.7
Basin slope = n.a.
Hydraulic length = n.a.
Time of concentration = 5.0 minutes (Manually Entered)

### *Drain Infiltration Systems*

*Proposed Infiltration System 1*

| | |
|---|---|
| Basic geometry: | 32.0 feet wide by 52.0 feet long |
| System type: | Shea Leaching Galleys; 360 gallons each |
| | Use 84 Galleys; 4-feet long by 4.5-feet wide by 3.0-feet high |
| | Surrounded by two feet of double washed, crushed stone |
| Infiltration rate: | 1.02 inches per hour over 1,664 square foot bed |

*Proposed Rain Garden*

| | |
|---|---|
| Basic geometry: | Irregular shaped basin |
| System type: | Constructed basin approximately 1.5-feet deep |
| | Total Storage approximately 742 cubic feet |
| Infiltration rate: | 1.02 inches per hour over 450 square foot bed area |

The proposed condition model analyzes the infiltration system using a reservoir-analysis method. Consistent with DEP stormwater management standards, design infiltration rates are based on the Rawls table for soils with sandy loam and loamy sand textures.

**Model Results**

The model results for the design points A, B and C are shown in Tables one through ten below:

**Table 1: Comparison of Pre and Post-Development Peak Runoff Rates at Design Point A**

| Drainage Basin | 2-year storm | 10-year storm | 25-year storm | 100-year storm |
|---|---|---|---|---|
| E.C.B.-1 | 0.19 c.f.s. | 0.54 c.f.s. | 0.86 c.f.s. | 1.59 c.f.s. |
| P.D.B.-1 | 0.08 c.f.s. | 0.21 c.f.s. | 0.34 c.f.s. | 0.63 c.f.s. |
| Difference | -0.11 c.f.s. | -0.33 c.f.s. | -0.52 c.f.s. | -0.96 c.f.s. |

**Table 2: Comparison of Pre and Post-Development Runoff Volumes at Design Point A**

| Drainage Basin | 2-year storm | 10-year storm | 25-year storm | 100-year storm |
|---|---|---|---|---|
| E.C.B.-1 | 789 c.f. | 1,881 c.f. | 2,913 c.f. | 5,287 c.f. |
| P.D.B.-1 | 310 c.f. | 740 c.f. | 1,145 c.f. | 2,079 c.f. |
| Difference | -479 c.f. | -1,141 c.f. | -1,768 c.f. | -3,208 c.f. |

**Table 3: Comparison of Pre and Post Development Peak Runoff Rates at Design Point B**

| Drainage Basin | 2-year storm | 10-year storm | 25-year storm | 100-year storm |
|---|---|---|---|---|
| E.C.B.-2 | 0.09 c.f.s. | 0.18 c.f.s. | 0.25 c.f.s. | 0.40 c.f.s. |
| P.D.B.-2 | 0.03 c.f.s. | 0.07 c.f.s. | 0.11 c.f.s. | 0.20 c.f.s. |
| Difference | -0.06 c.f.s. | -0.11 c.f.s. | -0.14 c.f.s. | -0.20 c.f.s. |

**Table 4: Comparison of Pre and Post-Development Runoff Volumes at Design Point B**

| Drainage Basin | 2-year storm | 10-year storm | 25-year storm | 100-year storm |
|---|---|---|---|---|
| E.C.B.-2 | 317 c.f. | 602 c.f. | 847 c.f. | 1,374 c.f. |
| P.D.B.-2 | 107 c.f. | 246 c.f. | 377 c.f. | 674 c.f. |
| Difference | -210 c.f. | -356 c.f. | -470 c.f. | -700 c.f. |

**Table 5: Comparison of Pre and Post Development Peak Runoff Rates at Design Point C**

| Drainage Basin | 2-year storm | 10-year storm | 25-year storm | 100-year storm |
|---|---|---|---|---|
| E.C.B.-3 | 0.35 c.f.s. | 0.85 c.f.s. | 1.29 c.f.s. | 2.26 c.f.s. |
| P.D.B.-3 + overflow | 0.18 c.f.s. | 0.59 c.f.s. | 1.13 c.f.s. | 2.97 c.f.s. |
| Difference | -0.17 c.f.s. | -0.27 c.f.s. | -0.16 c.f.s. | 0.71 c.f.s. |

**Table 6: Comparison of Pre and Post-Development Runoff Volumes at Design Point C**

| Drainage Basin | 2-year storm | 10-year storm | 25-year storm | 100-year storm |
|---|---|---|---|---|
| E.C.B.-3 | 1,304 c.f. | 2,875 c.f. | 4,311 c.f. | 7,539 c.f. |
| P.D.B.-3 + overflow | 672 c.f. | 2,761 c.f. | 4,916 c.f. | 9,778 c.f. |
| Difference | -632 c.f. | -114 c.f. | 605 c.f. | 2,239 c.f. |

**Table 7: Comparison of Total Pre and Post Development Peak Runoff Rates Leaving the Project Site**

| Drainage Basin | 2-year storm | 10-year storm | 25-year storm | 100-year storm |
|---|---|---|---|---|
| Total Existing | 0.64 c.f.s. | 1.57 c.f.s. | 2.41 c.f.s. | 4.26 c.f.s. |
| Total Proposed | 0.28 c.f.s. | 0.74 c.f.s. | 1.50 c.f.s. | 3.79 c.f.s. |
| Difference | -0.36 c.f.s. | -0.83 c.f.s. | -0.91 c.f.s. | -0.47 c.f.s. |

**Table 8: Comparison of Total Pre and Post-Development Runoff Volumes Leaving the Project Site**

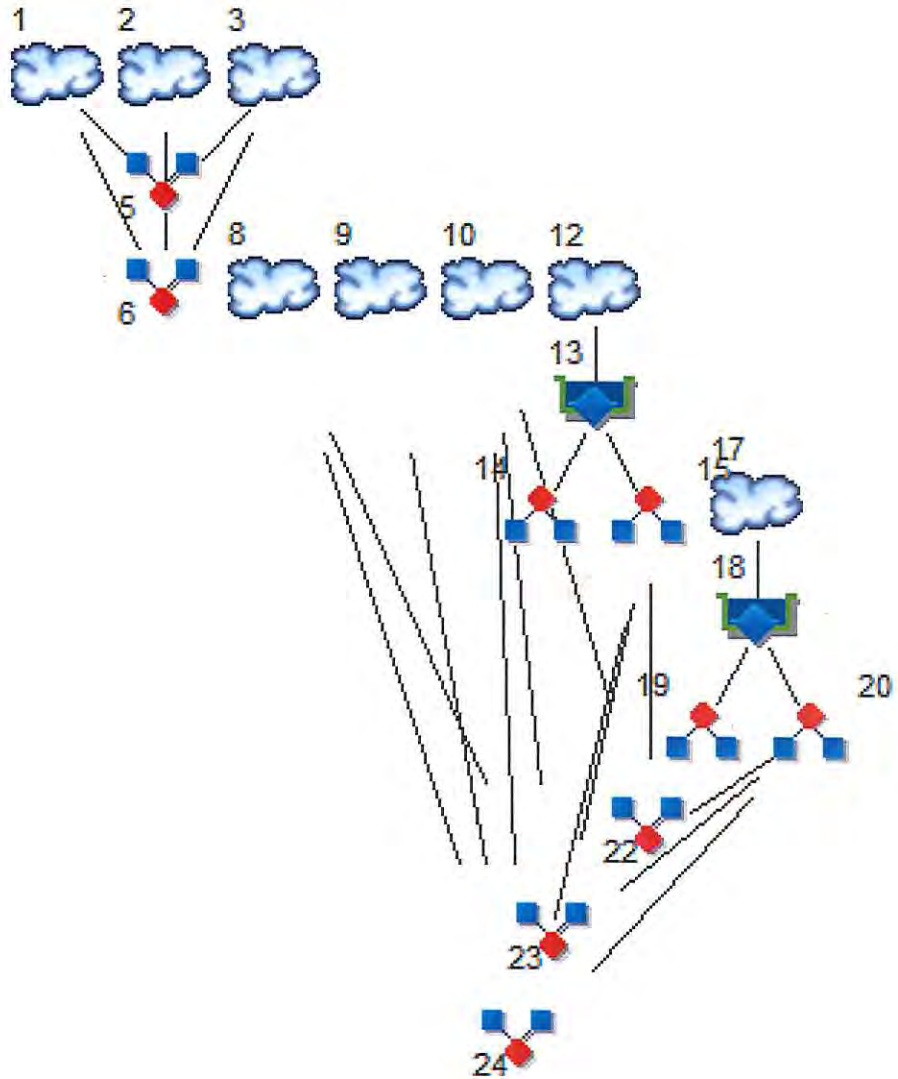
| Drainage Basin | 2-year storm | 10-year storm | 25-year storm | 100-year storm |
|---|---|---|---|---|
| Total Existing | 2,410 c.f. | 5,358 c.f. | 8,071 c.f. | 14,200 c.f. |
| Total Proposed | 1,088 c.f. | 3,747 c.f. | 6,438 c.f. | 12,531 c.f. |
| Difference | -1,322 c.f. | -1,611 c.f. | -1,633 c.f. | -1,669 c.f. |

## Conclusion

The results provided in Tables One through Eight demonstrate that the project, with the stormwater controls in place, will result in an overall decrease both in peak runoff rates and total runoff volume discharged from the project site. The project will impact neither the municipal stormwater drainage system or abutting properties.

Additionally, a portion of the proposed roof and the majority of driveway surfaces will be collected and recharged. The stormwater management system as designed is consistent with MADEP Stormwater Management Policy and accepted design practice.

# Appendix A:
# Hydrologic Assessment




## Legend

| Hyd. | Origin | Description |
|---|---|---|
| 1 | SCS Runoff | E.C.B.-1 |
| 2 | SCS Runoff | E.C.B.-2 |
| 3 | SCS Runoff | E.C.B.-3 |
| 5 | Combine | Flow to Wetlands |
| 6 | Combine | Total Existing |
| 8 | SCS Runoff | P.D.B.-1 |
| 9 | SCS Runoff | P.D.B.-2 |
| 10 | SCS Runoff | P.D.B.-3 |
| 12 | SCS Runoff | P.D.B.3A |
| 13 | Reservoir | Rain Garden |
| 14 | Diversion1 | Infiltration |
| 15 | Diversion2 | Overflow |
| 17 | SCS Runoff | P.D.B.-4 |
| 18 | Reservoir | Infiltration System |
| 19 | Diversion1 | Infiltration |
| 20 | Diversion2 | Overflow |
| 22 | Combine | Design Point C |
| 23 | Combine | Post Dev. Flow to Wetlands |
| 24 | Combine | Total Proposed |

# 2-Year Storm, Pre and Post-Development

# Hydrograph Summary Report

| Hyd. No. | Hydrograph type (origin) | Peak flow (cfs) | Time interval (min) | Time to peak (min) | Volume (cuft) | Inflow hyd(s) | Maximum elevation (ft) | Maximum storage (cuft) | Hydrograph description |
|---|---|---|---|---|---|---|---|---|---|
| 1 | SCS Runoff | 0.19 | 3 | 726 | 789 | ---- | ------ | ------ | E.C.B.-1 |
| 2 | SCS Runoff | 0.09 | 3 | 726 | 317 | ---- | ------ | ------ | E.C.B.-2 |
| 3 | SCS Runoff | 0.35 | 3 | 726 | 1,304 | ---- | ------ | ------ | E.C.B.-3 |
| 5 | Combine | 0.55 | 3 | 726 | 2,093 | 1, 3, | ------ | ------ | Flow to Wetlands |
| 6 | Combine | 0.64 | 3 | 726 | 2,410 | 1, 2, 3, | ------ | ------ | Total Existing |
| 8 | SCS Runoff | 0.08 | 3 | 726 | 310 | ---- | ------ | ------ | P.D.B.-1 |
| 9 | SCS Runoff | 0.03 | 3 | 726 | 107 | ---- | ------ | ------ | P.D.B.-2 |
| 10 | SCS Runoff | 0.18 | 3 | 726 | 616 | ---- | ------ | ------ | P.D.B.-3 |
| 12 | SCS Runoff | 0.13 | 3 | 726 | 457 | ---- | ------ | ------ | P.D.B.3A |
| 13 | Reservoir | 0.01 | 3 | 843 | 443 | 12 | 164.12 | 209 | Rain Garden |
| 14 | Diversion1 | 0.01 | 3 | 843 | 443 | 13 | ------ | ------ | Infiltration |
| 15 | Diversion2 | 0.00 | 3 | 1221 | 0 | 13 | ------ | ------ | Overflow |
| 17 | SCS Runoff | 0.91 | 3 | 726 | 3,098 | ---- | ------ | ------ | P.D.B.-4 |
| 18 | Reservoir | 0.06 | 3 | 843 | 3,094 | 17 | 163.81 | 1,657 | Infiltration System |
| 19 | Diversion1 | 0.05 | 3 | 843 | 3,039 | 18 | ------ | ------ | Infiltration |
| 20 | Diversion2 | 0.01 | 3 | 843 | 55 | 18 | ------ | ------ | Overflow |
| 22 | Combine | 0.18 | 3 | 726 | 672 | 10, 15, 20, | ------ | ------ | Design Point C |
| 23 | Combine | 0.25 | 3 | 726 | 982 | 8, 10, 15, 20, | ------ | ------ | Post Dev. Flow to Wetlands |
| 24 | Combine | 0.28 | 3 | 726 | 1,088 | 8, 9, 10, 15, 20, | ------ | ------ | Total Proposed |

# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

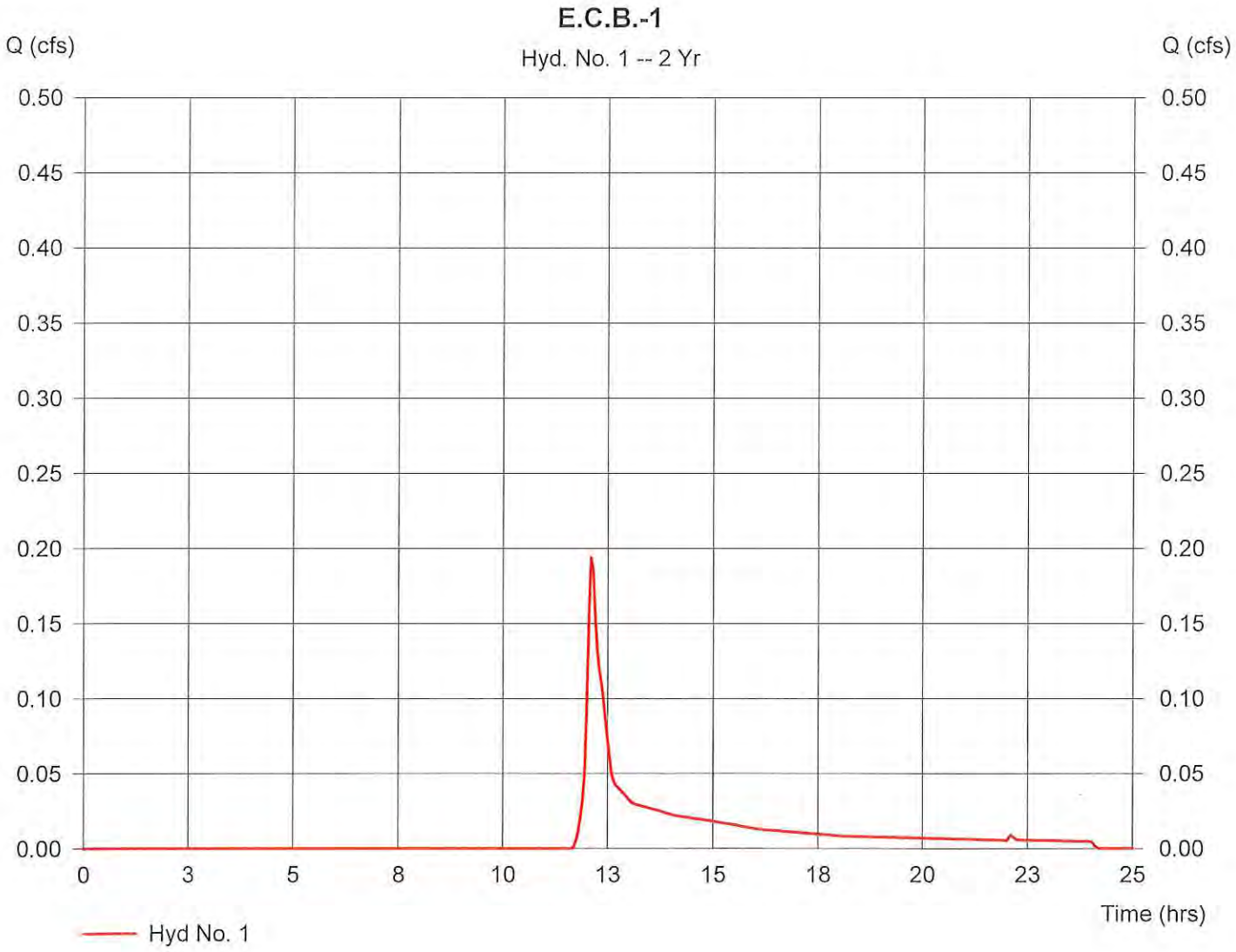
Monday, May 7 2018, 8:27 PM

## Hyd. No. 1

E.C.B.-1

| | | | |
|---|---|---|---|
| Hydrograph type | = SCS Runoff | Peak discharge | = 0.19 cfs |
| Storm frequency | = 2 yrs | Time interval | = 3 min |
| Drainage area | = 0.35 ac | Curve number | = 66.4 |
| Basin Slope | = 5.2 % | Hydraulic length | = 189 ft |
| Tc method | = LAG | Time of conc. (Tc) | = 5.407852 min |
| Total precip. | = 3.20 in | Distribution | = Type III |
| Storm duration | = 24 hrs | Shape factor | = 484 |

Hydrograph Volume = 789 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

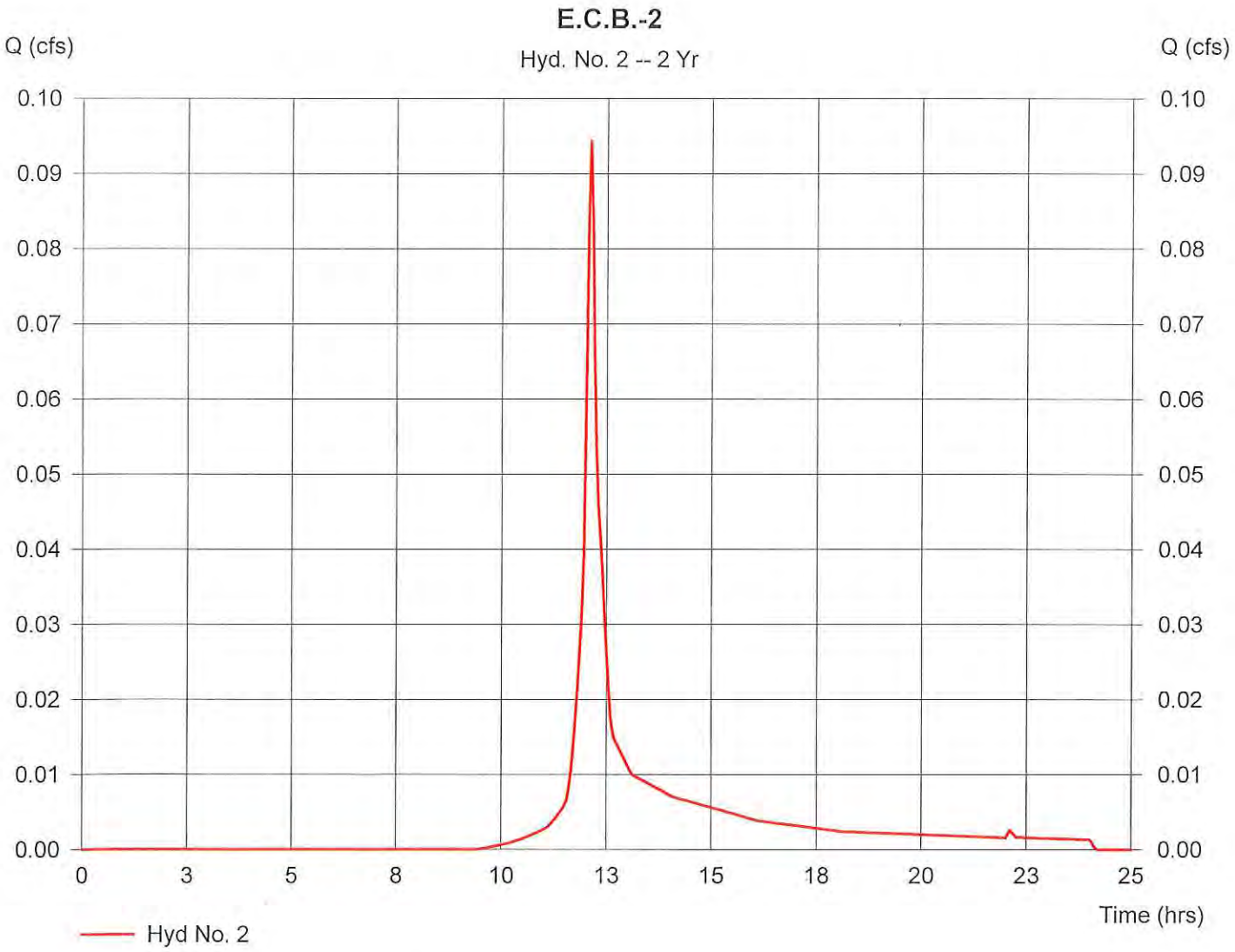
Monday, May 7 2018, 8:27 PM

## Hyd. No. 2

E.C.B.-2

| | | | |
|---|---|---|---|
| Hydrograph type | = SCS Runoff | Peak discharge | = 0.09 cfs |
| Storm frequency | = 2 yrs | Time interval | = 3 min |
| Drainage area | = 0.07 ac | Curve number | = 79.8 |
| Basin Slope | = 1.9 % | Hydraulic length | = 68 ft |
| Tc method | = USER | Time of conc. (Tc) | = 5 min |
| Total precip. | = 3.20 in | Distribution | = Type III |
| Storm duration | = 24 hrs | Shape factor | = 484 |

Hydrograph Volume = 317 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

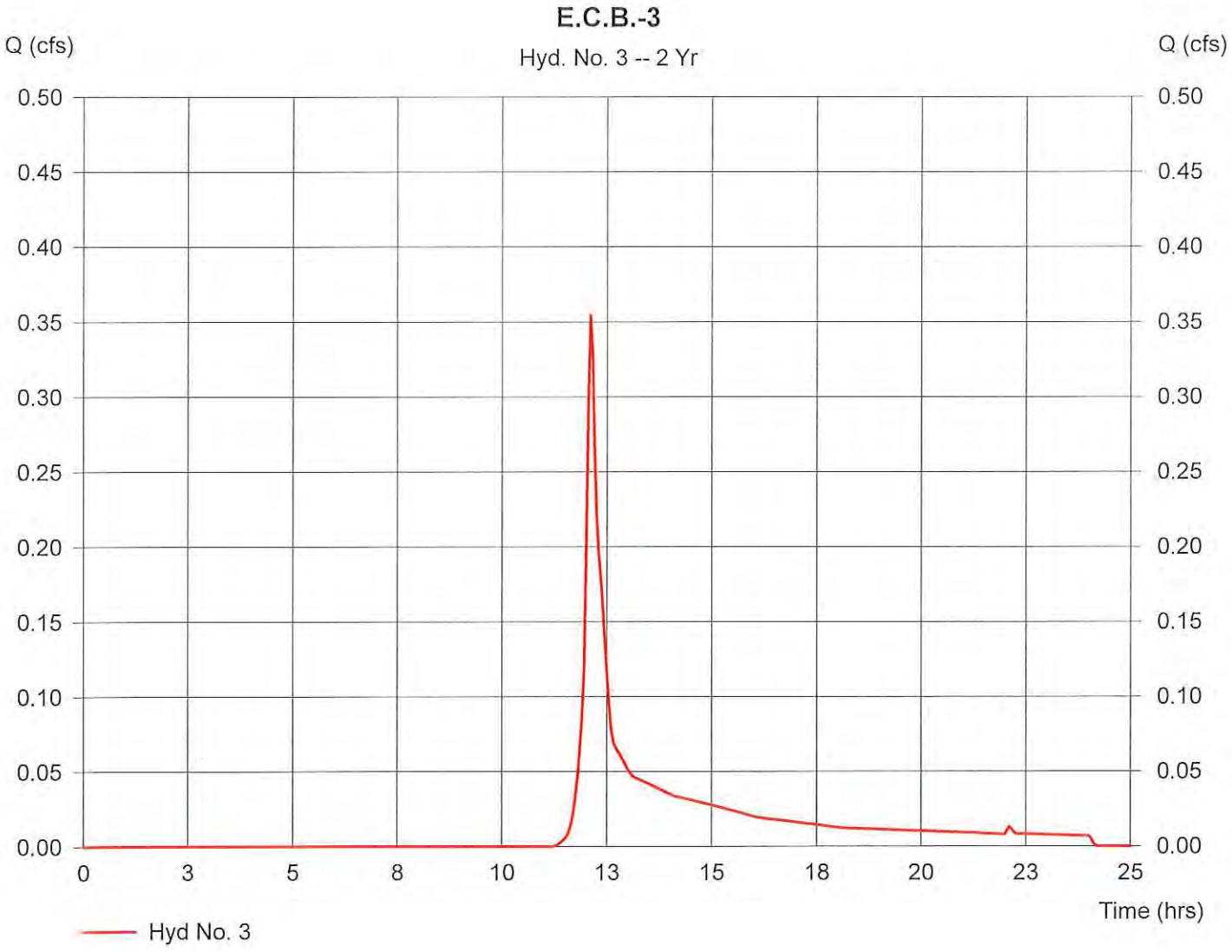
Monday, May 7 2018, 8:27 PM

## Hyd. No. 3

E.C.B.-3

| | | | |
|---|---|---|---|
| Hydrograph type | = SCS Runoff | Peak discharge | = 0.35 cfs |
| Storm frequency | = 2 yrs | Time interval | = 3 min |
| Drainage area | = 0.45 ac | Curve number | = 70.4 |
| Basin Slope | = 4.2 % | Hydraulic length | = 207 ft |
| Tc method | = LAG | Time of conc. (Tc) | = 5.817464 min |
| Total precip. | = 3.20 in | Distribution | = Type III |
| Storm duration | = 24 hrs | Shape factor | = 484 |

Hydrograph Volume = 1,304 cuft



# Hydrograph Plot

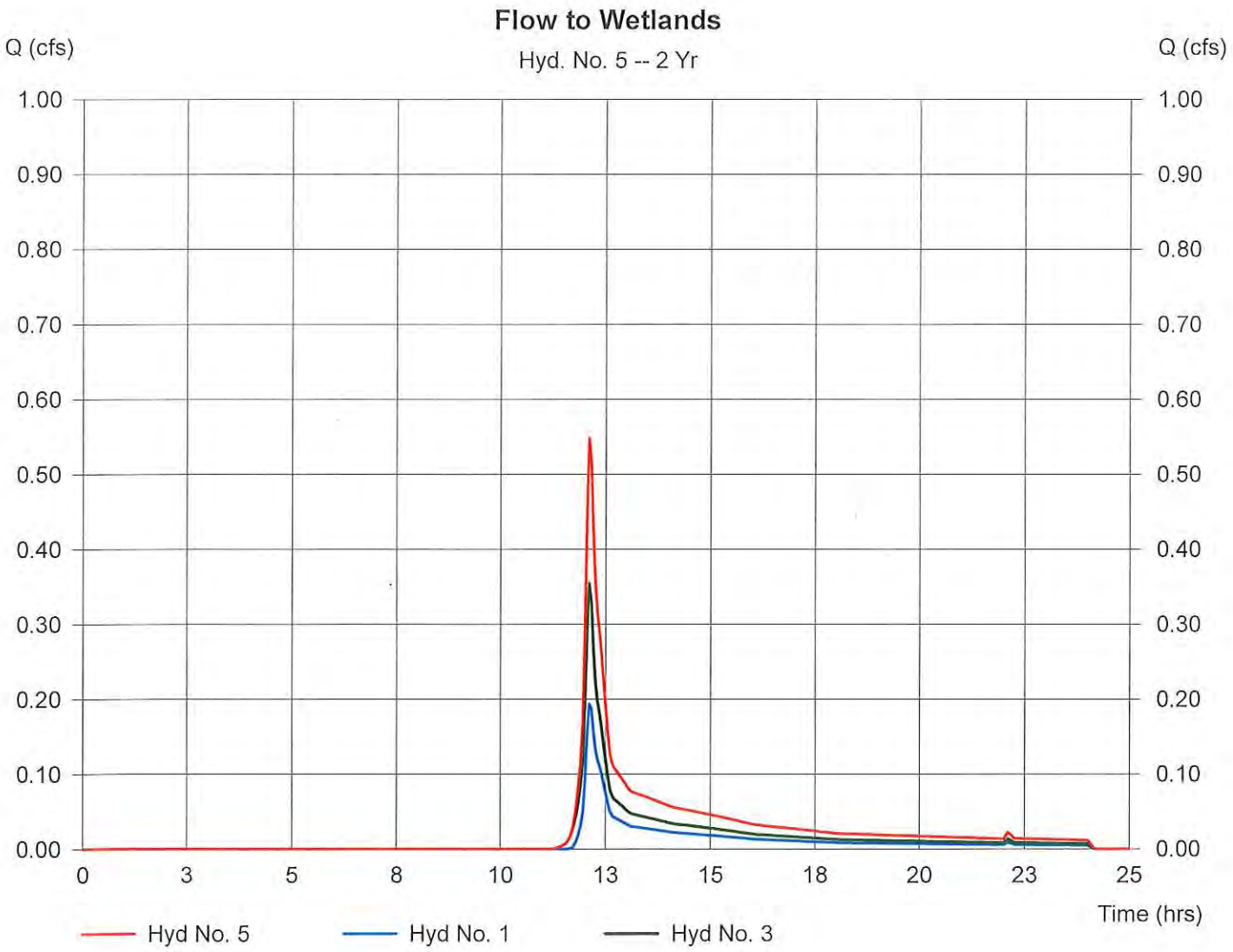


## Hyd. No. 5

Flow to Wetlands

| | | | |
|---|---|---|---|
| Hydrograph type | = Combine | Peak discharge | = 0.55 cfs |
| Storm frequency | = 2 yrs | Time interval | = 3 min |
| Inflow hyds. | = 1, 3 | | |

Hydrograph Volume = 2,093 cuft



# Hydrograph Plot



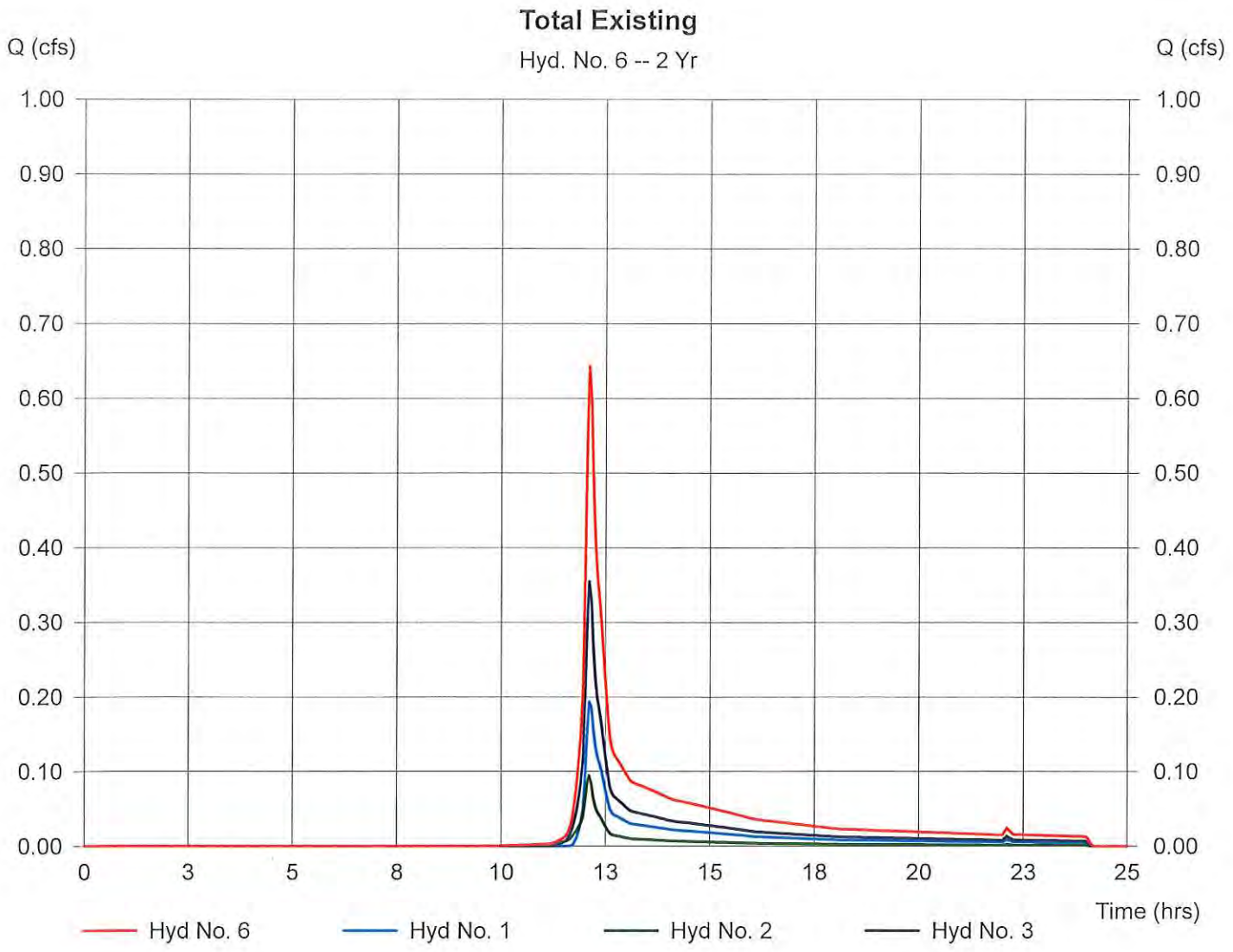
## Hyd. No. 6

Total Existing

Hydrograph type = Combine
Storm frequency = 2 yrs
Inflow hyds. = 1, 2, 3

Peak discharge = 0.64 cfs
Time interval = 3 min

Hydrograph Volume = 2,410 cuft



# Hydrograph Plot

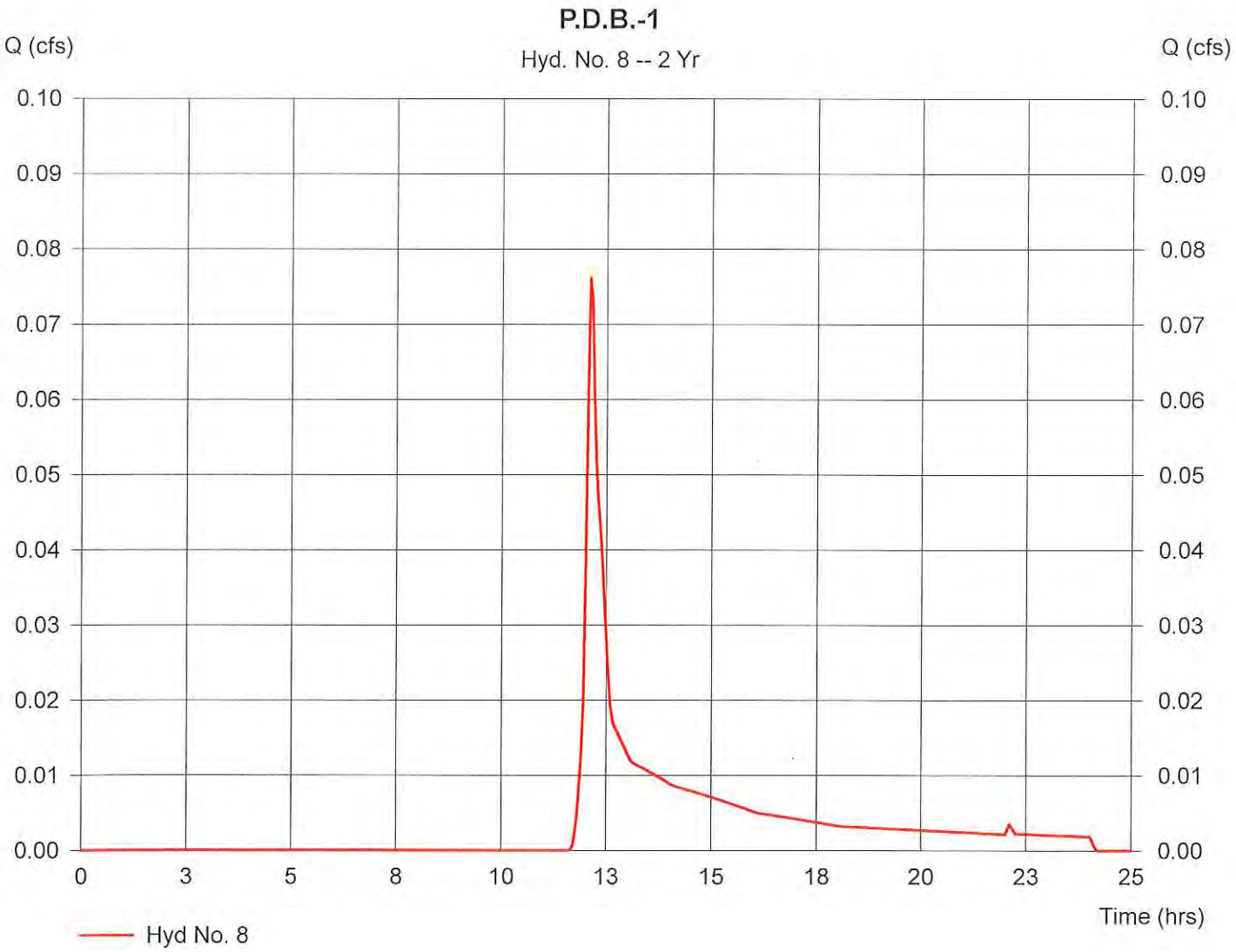


## Hyd. No. 8

P.D.B.-1

| | | | |
|---|---|---|---|
| Hydrograph type | = SCS Runoff | Peak discharge | = 0.08 cfs |
| Storm frequency | = 2 yrs | Time interval | = 3 min |
| Drainage area | = 0.14 ac | Curve number | = 66.4 |
| Basin Slope | = 4.4 % | Hydraulic length | = 222 ft |
| Tc method | = LAG | Time of conc. (Tc) | = 6.686719 min |
| Total precip. | = 3.20 in | Distribution | = Type III |
| Storm duration | = 24 hrs | Shape factor | = 484 |

Hydrograph Volume = 310 cuft



# Hydrograph Plot

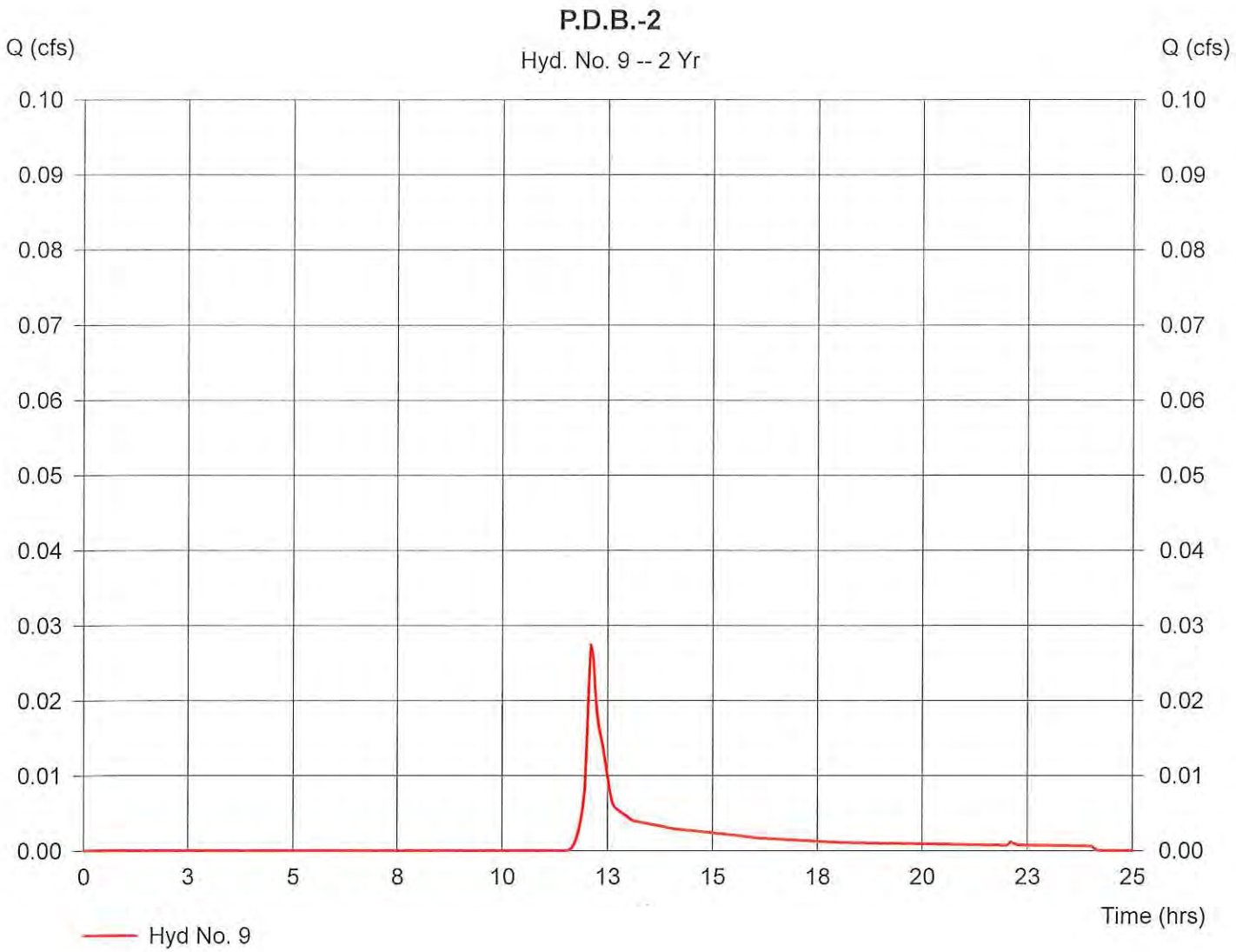


## Hyd. No. 9

P.D.B.-2

| | | | |
|---|---|---|---|
| Hydrograph type | = SCS Runoff | Peak discharge | = 0.03 cfs |
| Storm frequency | = 2 yrs | Time interval | = 3 min |
| Drainage area | = 0.04 ac | Curve number | = 67.9 |
| Basin Slope | = 1.0 % | Hydraulic length | = 49 ft |
| Tc method | = USER | Time of conc. (Tc) | = 5 min |
| Total precip. | = 3.20 in | Distribution | = Type III |
| Storm duration | = 24 hrs | Shape factor | = 484 |

Hydrograph Volume = 107 cuft



# Hydrograph Plot

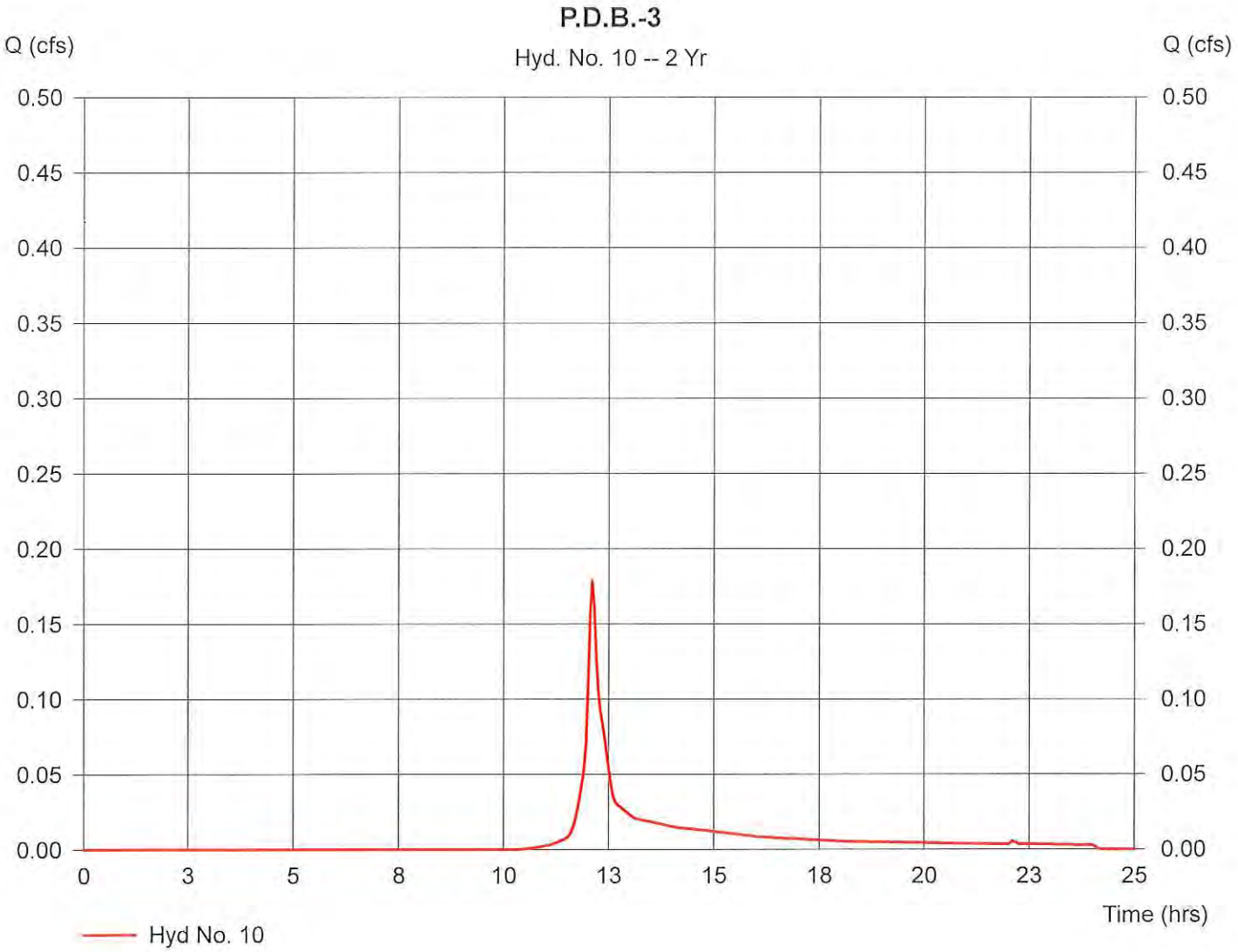


## Hyd. No. 10

P.D.B.-3

| | | | |
|---|---|---|---|
| Hydrograph type | = SCS Runoff | Peak discharge | = 0.18 cfs |
| Storm frequency | = 2 yrs | Time interval | = 3 min |
| Drainage area | = 0.16 ac | Curve number | = 75.3 |
| Basin Slope | = 3.8 % | Hydraulic length | = 196 ft |
| Tc method | = USER | Time of conc. (Tc) | = 5 min |
| Total precip. | = 3.20 in | Distribution | = Type III |
| Storm duration | = 24 hrs | Shape factor | = 484 |

Hydrograph Volume = 616 cuft



# Hydrograph Plot

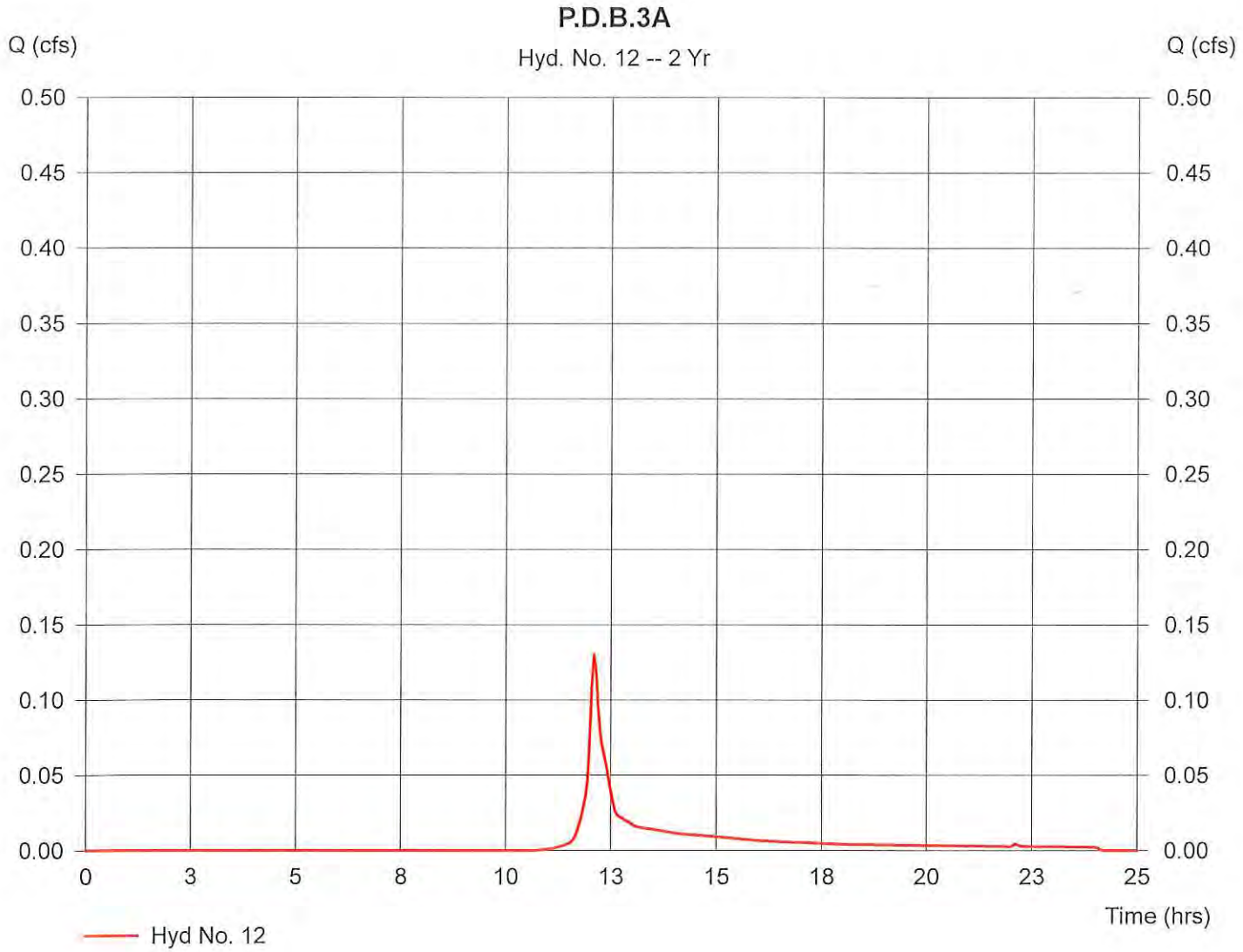


## Hyd. No. 12

P.D.B.3A

| | | | |
|---|---|---|---|
| Hydrograph type | = SCS Runoff | Peak discharge | = 0.13 cfs |
| Storm frequency | = 2 yrs | Time interval | = 3 min |
| Drainage area | = 0.13 ac | Curve number | = 73.5 |
| Basin Slope | = 2.0 % | Hydraulic length | = 100 ft |
| Tc method | = USER | Time of conc. (Tc) | = 5 min |
| Total precip. | = 3.20 in | Distribution | = Type III |
| Storm duration | = 24 hrs | Shape factor | = 484 |

Hydrograph Volume = 457 cuft



# Hydrograph Plot

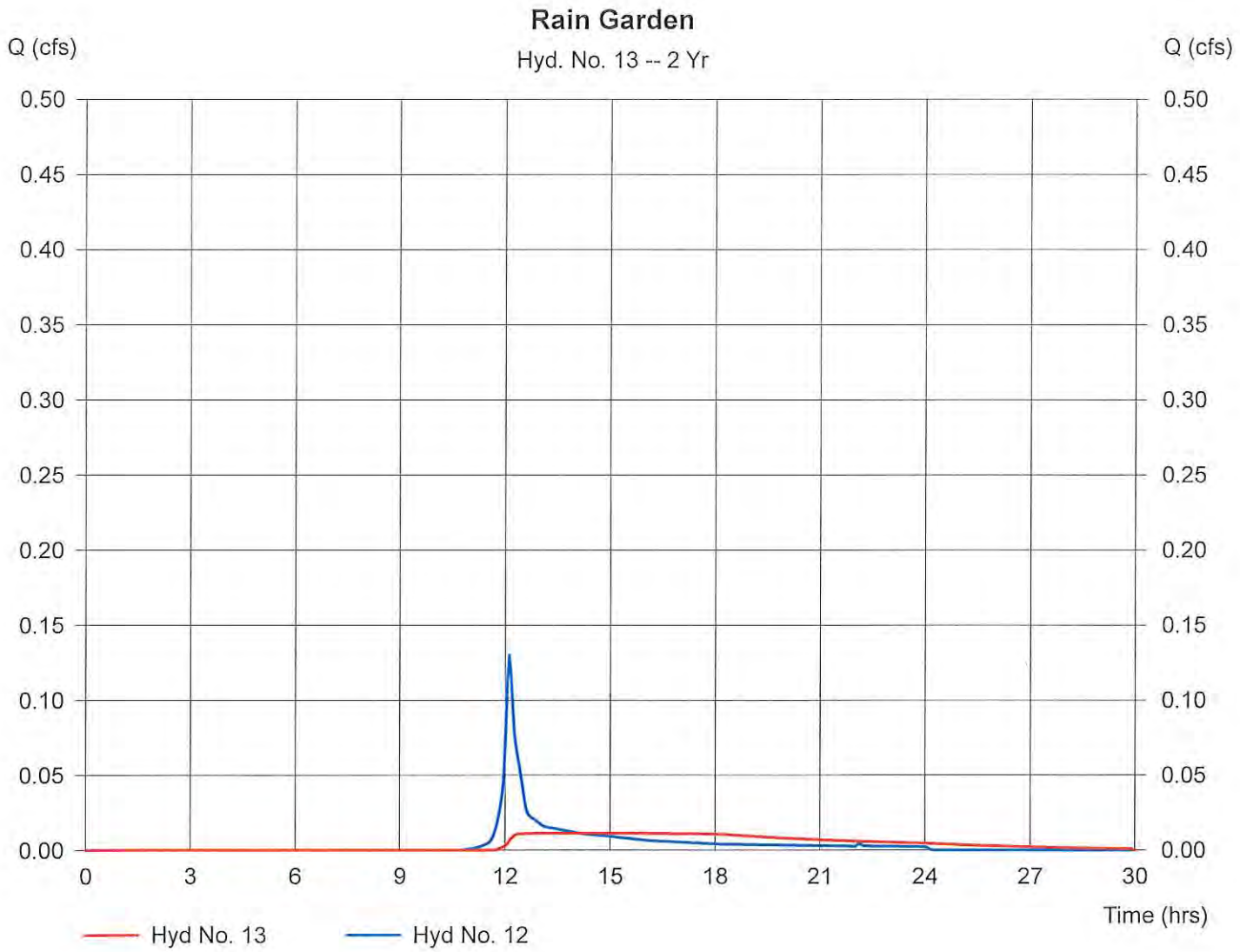
Hydraflow Hydrographs by Intelisolve | Monday, May 7 2018, 8:27 PM

## Hyd. No. 13

Rain Garden

| | | | |
|---|---|---|---|
| Hydrograph type | = Reservoir | Peak discharge | = 0.01 cfs |
| Storm frequency | = 2 yrs | Time interval | = 3 min |
| Inflow hyd. No. | = 12 | Max. Elevation | = 164.12 ft |
| Reservoir name | = Rain Garden | Max. Storage | = 209 cuft |

Storage Indication method used. | Hydrograph Volume = 443 cuft



# Pond Report

Hydraflow Hydrographs by Intelisolve

Monday, May 7 2018, 8:27 PM

## Pond No. 5 - Rain Garden

### Pond Data

Pond storage is based on known contour areas. Average end area method used.

### Stage / Storage Table

| Stage (ft) | Elevation (ft) | Contour area (sqft) | Incr. Storage (cuft) | Total storage (cuft) |
|---|---|---|---|---|
| 0.00 | 163.50 | 140 | 0 | 0 |
| 0.50 | 164.00 | 448 | 147 | 147 |
| 1.00 | 164.50 | 591 | 260 | 407 |
| 1.50 | 165.00 | 748 | 335 | 742 |

### Culvert / Orifice Structures

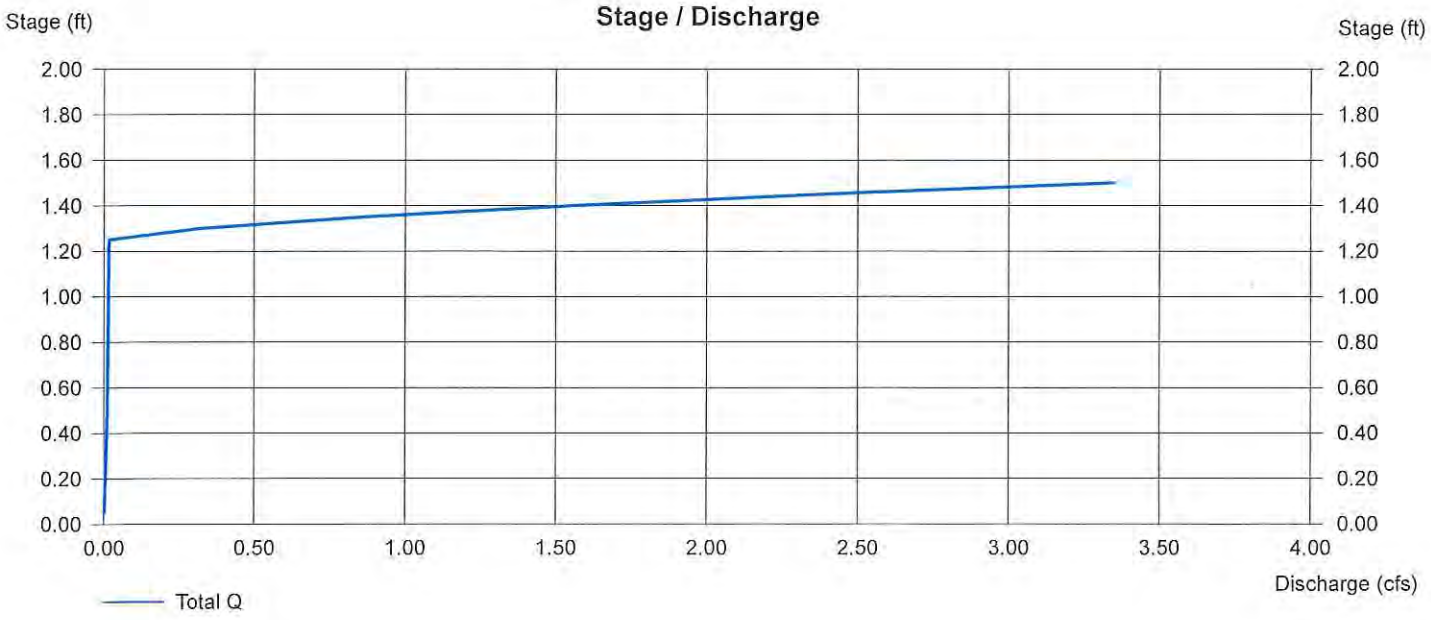
| | [A] | [B] | [C] | [D] |
|---|---|---|---|---|
| Rise (in) | = 0.00 | 0.00 | 0.00 | 0.00 |
| Span (in) | = 0.00 | 0.00 | 0.00 | 0.00 |
| No. Barrels | = 0 | 0 | 0 | 0 |
| Invert El. (ft) | = 0.00 | 0.00 | 0.00 | 0.00 |
| Length (ft) | = 0.00 | 0.00 | 0.00 | 0.00 |
| Slope (%) | = 0.00 | 0.00 | 0.00 | 0.00 |
| N-Value | = .000 | .000 | .000 | .000 |
| Orif. Coeff. | = 0.00 | 0.00 | 0.00 | 0.00 |
| Multi-Stage | = n/a | No | No | No |

### Weir Structures

| | [A] | [B] | [C] | [D] |
|---|---|---|---|---|
| Crest Len (ft) | = 8.00 | 0.00 | 0.00 | 0.00 |
| Crest El. (ft) | = 164.75 | 0.00 | 0.00 | 0.00 |
| Weir Coeff. | = 3.33 | 0.00 | 0.00 | 0.00 |
| Weir Type | = Rect | --- | --- | --- |
| Multi-Stage | = No | No | No | No |

Exfiltration = 1.020 in/hr (Contour) Tailwater Elev. = 0.00 ft

Note: Culvert/Orifice outflows have been analyzed under inlet and outlet control.



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

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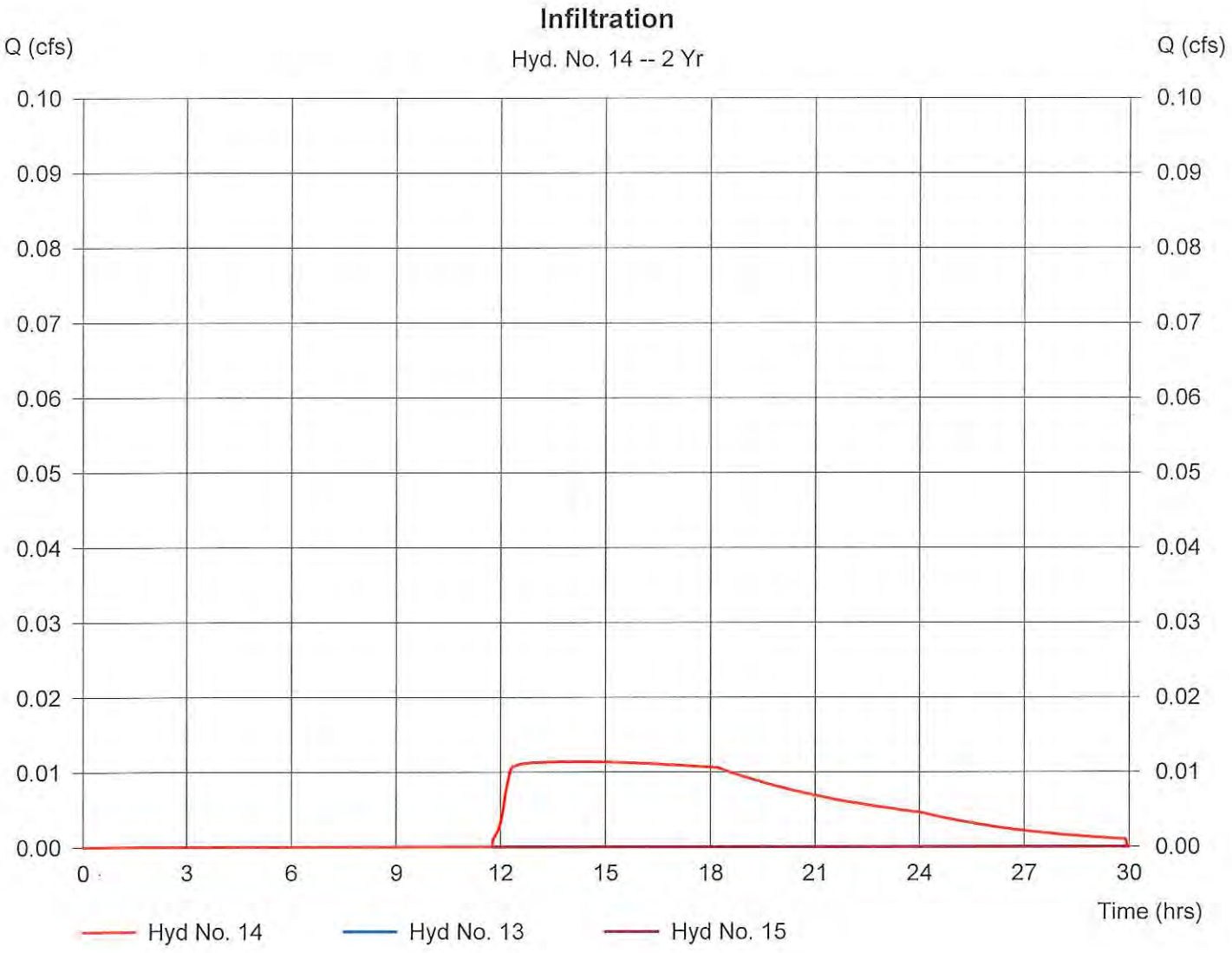
## Hyd. No. 14

Infiltration

| | | | |
|---|---|---|---|
| Hydrograph type | = Diversion1 | Peak discharge | = 0.01 cfs |
| Storm frequency | = 2 yrs | Time interval | = 3 min |
| Inflow hydrograph | = 13 | 2nd diverted hyd. | = 15 |
| Diversion method | = Pond - Rain Garden | Pond structure | = Exfiltration |

Hydrograph Volume = 443 cuft



# Hydrograph Plot

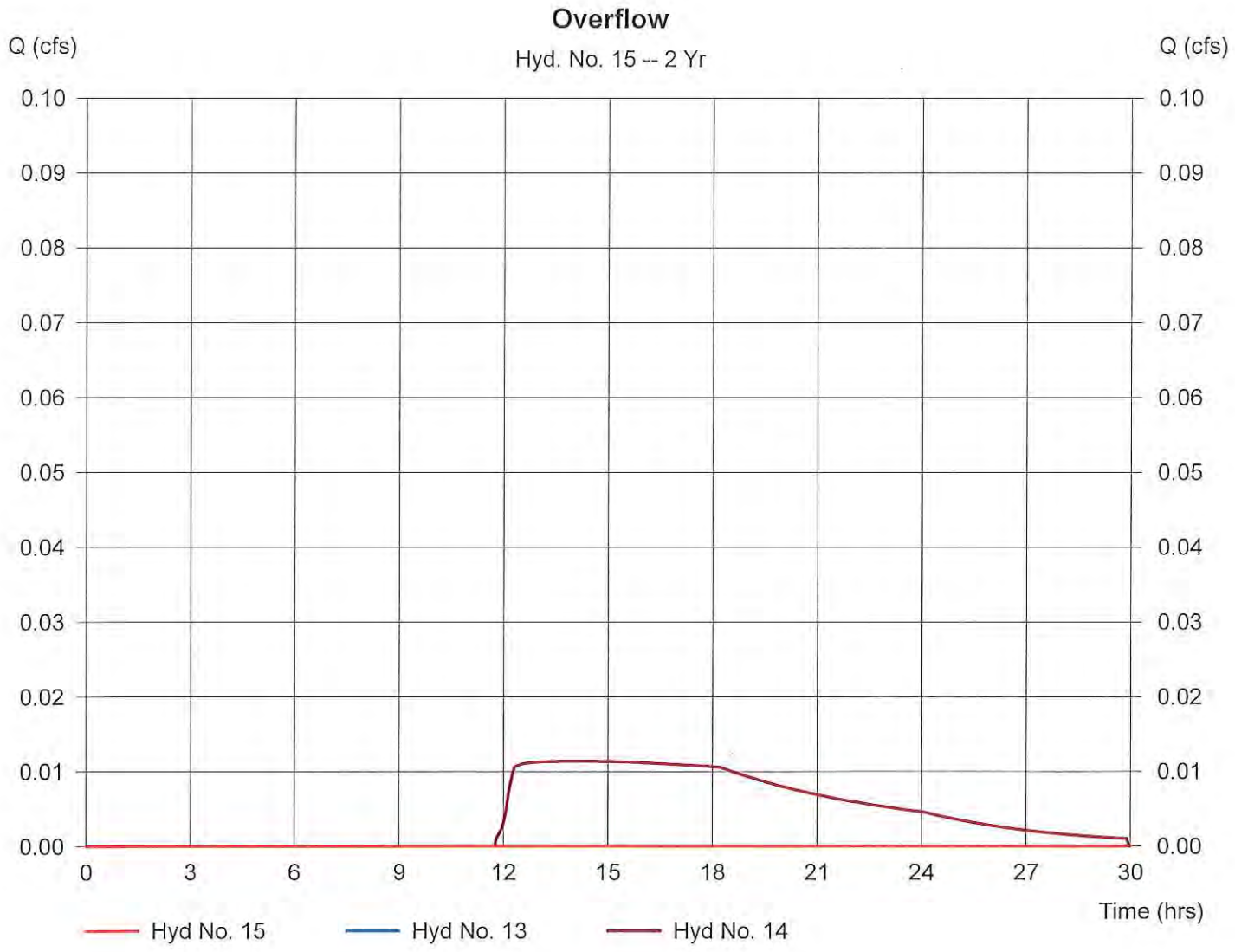


## Hyd. No. 15

Overflow

| | | | |
|---|---|---|---|
| Hydrograph type | = Diversion2 | Peak discharge | = 0.00 cfs |
| Storm frequency | = 2 yrs | Time interval | = 3 min |
| Inflow hydrograph | = 13 | 2nd diverted hyd. | = 14 |
| Diversion method | = Pond - Rain Garden | Pond structure | = Exfiltration |

Hydrograph Volume = 0 cuft



# Hydrograph Plot

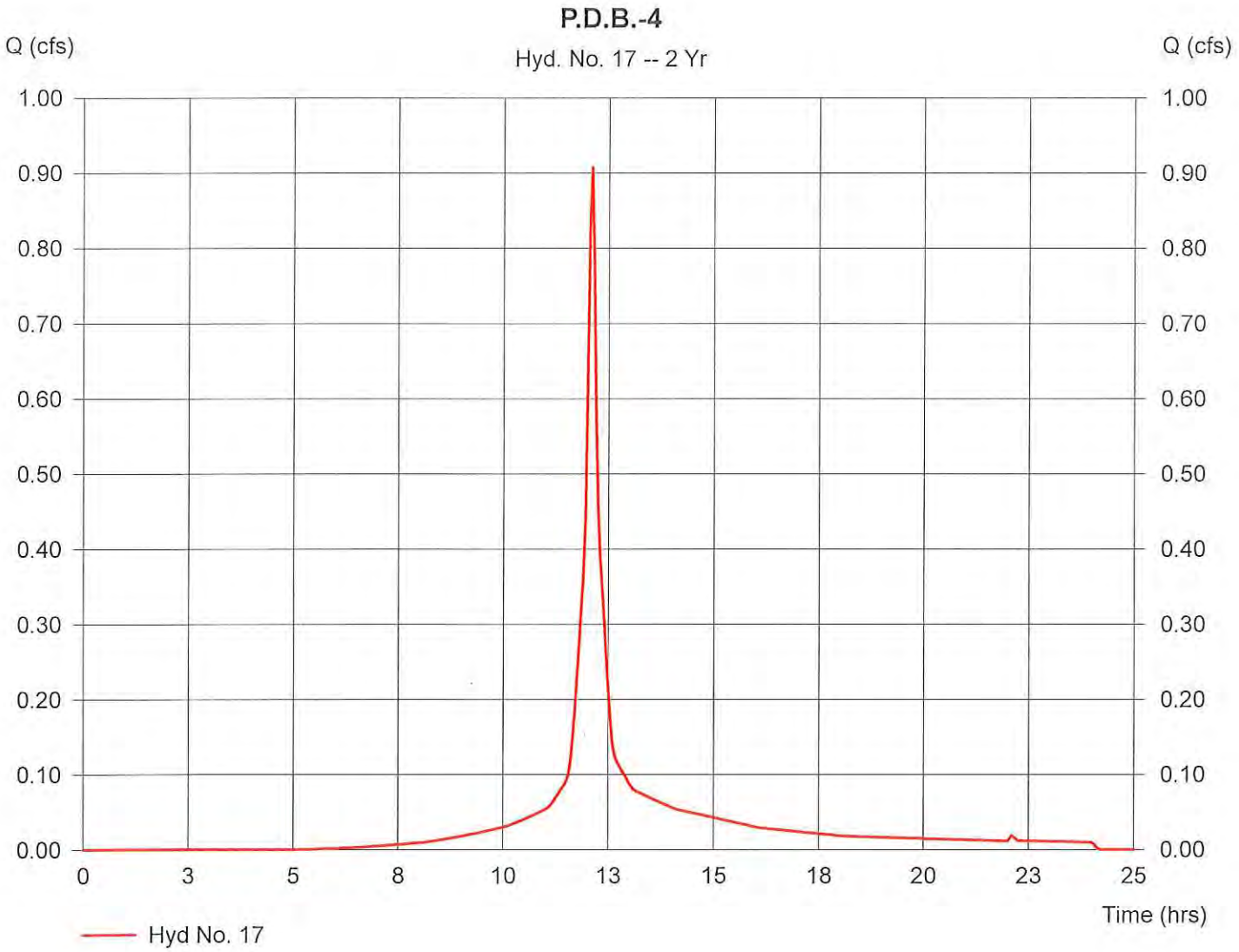


## Hyd. No. 17

P.D.B.-4

| | | | |
|---|---|---|---|
| Hydrograph type | = SCS Runoff | Peak discharge | = 0.91 cfs |
| Storm frequency | = 2 yrs | Time interval | = 3 min |
| Drainage area | = 0.39 ac | Curve number | = 91.7 |
| Basin Slope | = 2.0 % | Hydraulic length | = 100 ft |
| Tc method | = USER | Time of conc. (Tc) | = 5 min |
| Total precip. | = 3.20 in | Distribution | = Type III |
| Storm duration | = 24 hrs | Shape factor | = 484 |

Hydrograph Volume = 3,098 cuft



# Hydrograph Plot



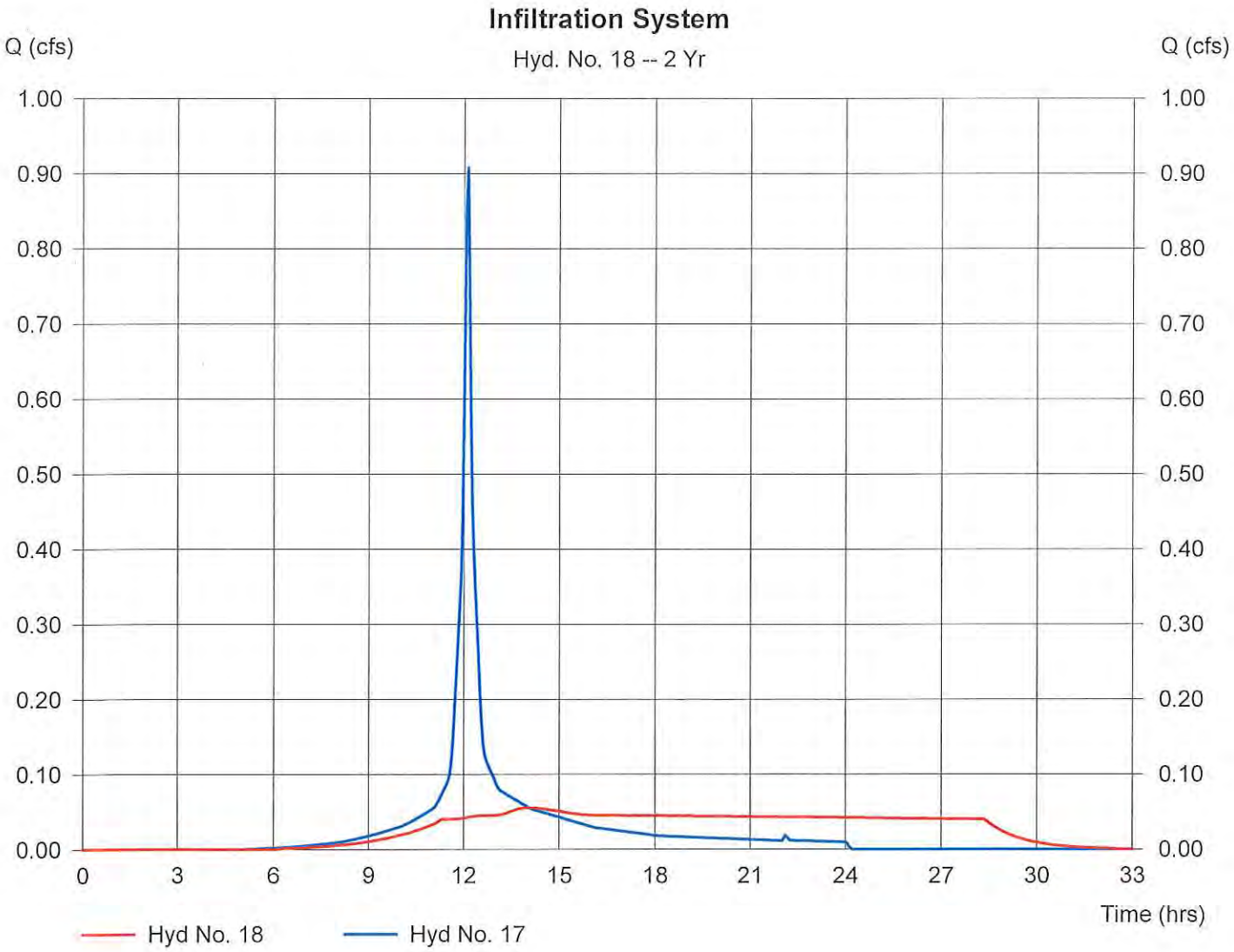
## Hyd. No. 18

Infiltration System

| | | | |
|---|---|---|---|
| Hydrograph type | = Reservoir | Peak discharge | = 0.06 cfs |
| Storm frequency | = 2 yrs | Time interval | = 3 min |
| Inflow hyd. No. | = 17 | Max. Elevation | = 163.81 ft |
| Reservoir name | = Infiltration System | Max. Storage | = 1,657 cuft |

Storage Indication method used.

Hydrograph Volume = 3,094 cuft



# Pond Report



## Pond No. 1 - Infiltration System

### Pond Data

Bottom LxW = 52.0 x 32.0 ft  Side slope = 0.0:1  Bottom elev. = 162.25 ft  Depth = 3.00 ft

### Stage / Storage Table

| Stage (ft) | Elevation (ft) | Contour area (sqft) | Incr. Storage (cuft)* | Total storage (cuft)* (*64.00% voids applied) |
|---|---|---|---|---|
| 0.00 | 162.25 | 1,664 | 0 | 0 |
| 0.15 | 162.40 | 1,664 | 160 | 160 |
| 0.30 | 162.55 | 1,664 | 160 | 319 |
| 0.45 | 162.70 | 1,664 | 160 | 479 |
| 0.60 | 162.85 | 1,664 | 160 | 639 |
| 0.75 | 163.00 | 1,664 | 160 | 799 |
| 0.90 | 163.15 | 1,664 | 160 | 958 |
| 1.05 | 163.30 | 1,664 | 160 | 1,118 |
| 1.20 | 163.45 | 1,664 | 160 | 1,278 |
| 1.35 | 163.60 | 1,664 | 160 | 1,438 |
| 1.50 | 163.75 | 1,664 | 160 | 1,597 |
| 1.65 | 163.90 | 1,664 | 160 | 1,757 |
| 1.80 | 164.05 | 1,664 | 160 | 1,917 |
| 1.95 | 164.20 | 1,664 | 160 | 2,077 |
| 2.10 | 164.35 | 1,664 | 160 | 2,236 |
| 2.25 | 164.50 | 1,664 | 160 | 2,396 |
| 2.40 | 164.65 | 1,664 | 160 | 2,556 |
| 2.55 | 164.80 | 1,664 | 160 | 2,716 |
| 2.70 | 164.95 | 1,664 | 160 | 2,875 |
| 2.85 | 165.10 | 1,664 | 160 | 3,035 |
| 3.00 | 165.25 | 1,664 | 160 | 3,195 |

### Culvert / Orifice Structures

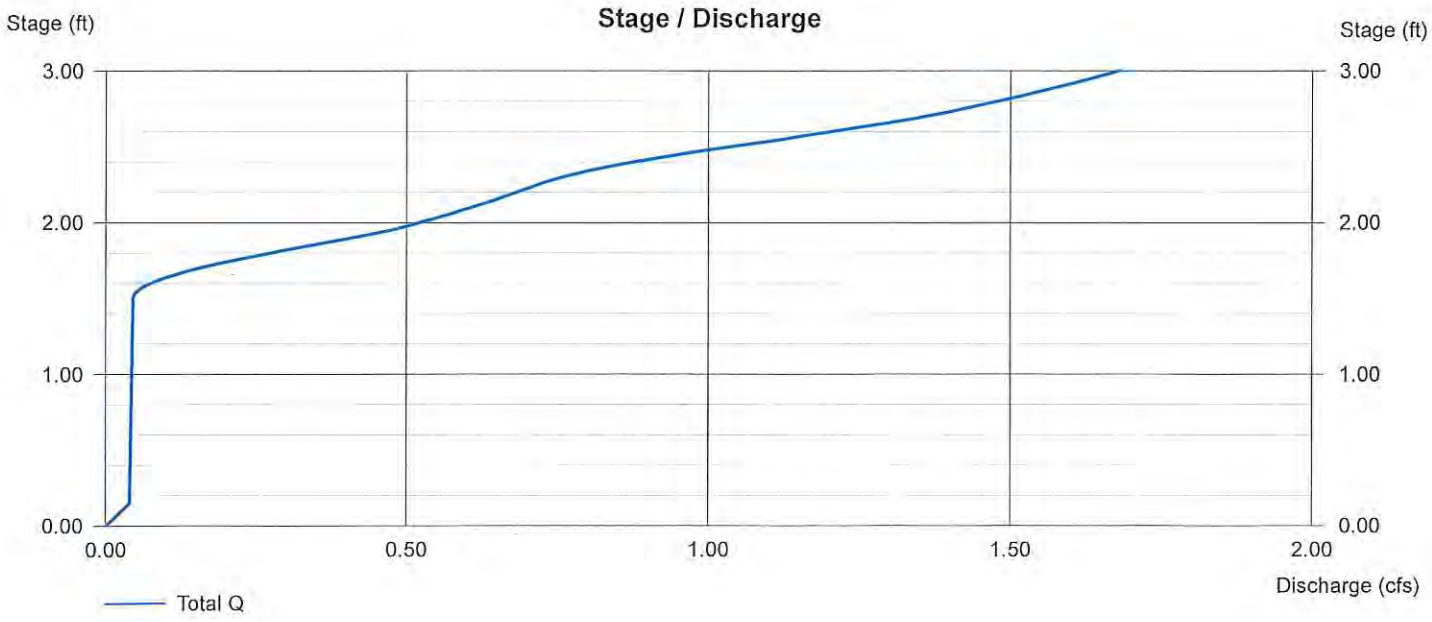
| | [A] | [B] | [C] | [D] |
|---|---|---|---|---|
| Rise (in) | = 6.00 | 6.00 | 0.00 | 0.00 |
| Span (in) | = 6.00 | 6.00 | 0.00 | 0.00 |
| No. Barrels | = 1 | 1 | 0 | 0 |
| Invert El. (ft) | = 163.75 | 164.50 | 0.00 | 0.00 |
| Length (ft) | = 50.00 | 50.00 | 0.00 | 0.00 |
| Slope (%) | = 2.00 | 2.00 | 0.00 | 0.00 |
| N-Value | = .013 | .013 | .000 | .000 |
| Orif. Coeff. | = 0.60 | 0.60 | 0.00 | 0.00 |
| Multi-Stage | = n/a | No | No | No |

### Weir Structures

| | [A] | [B] | [C] | [D] |
|---|---|---|---|---|
| Crest Len (ft) | = 0.00 | 0.00 | 0.00 | 0.00 |
| Crest El. (ft) | = 0.00 | 0.00 | 0.00 | 0.00 |
| Weir Coeff. | = 3.33 | 0.00 | 0.00 | 0.00 |
| Weir Type | = --- | --- | --- | --- |
| Multi-Stage | = No | No | No | No |

Exfiltration = 1.020 in/hr (Wet area)  Tailwater Elev. = 0.00 ft

Note: Culvert/Orifice outflows have been analyzed under inlet and outlet control.



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

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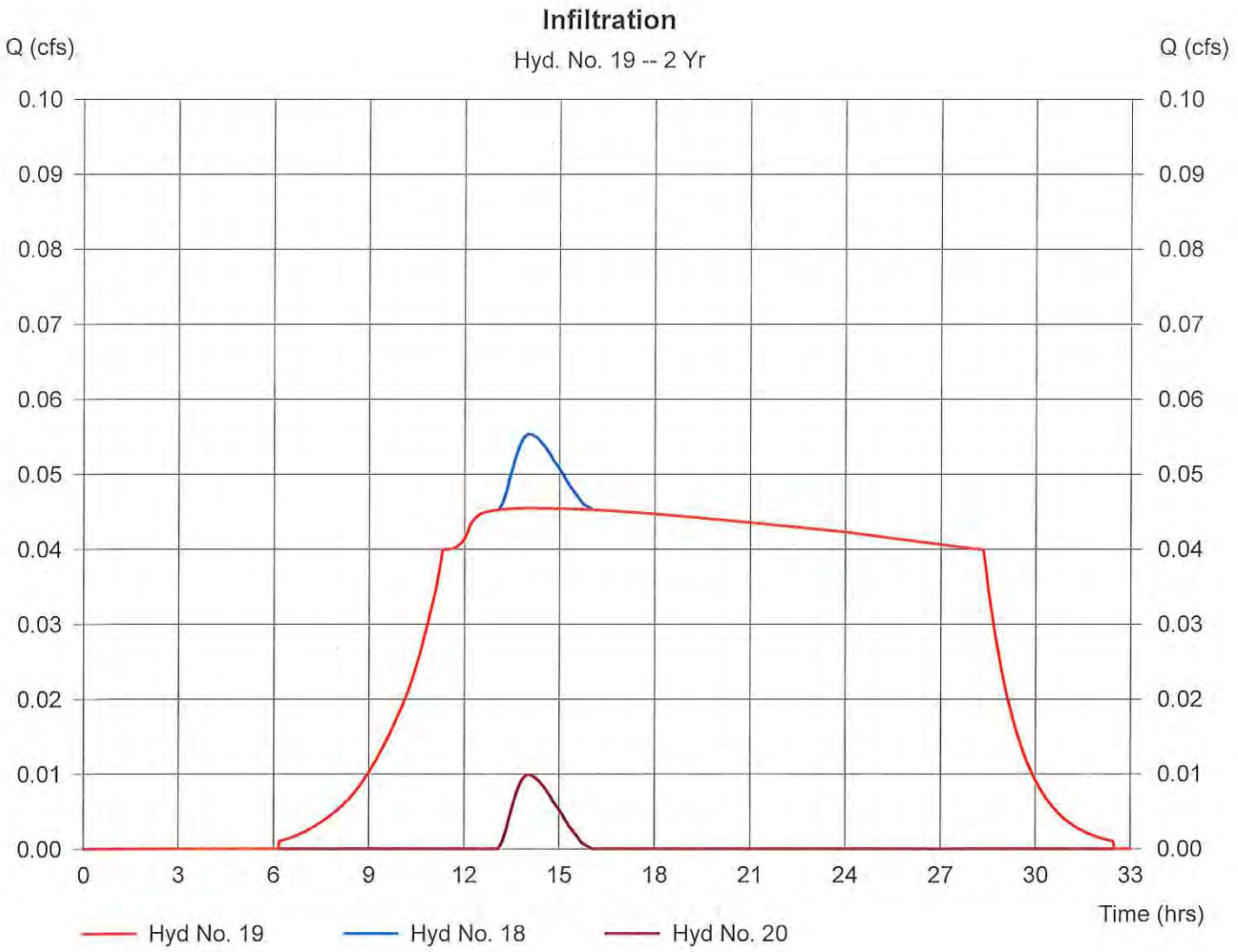
## Hyd. No. 19

Infiltration

| | | | |
|---|---|---|---|
| Hydrograph type | = Diversion1 | Peak discharge | = 0.05 cfs |
| Storm frequency | = 2 yrs | Time interval | = 3 min |
| Inflow hydrograph | = 18 | 2nd diverted hyd. | = 20 |
| Diversion method | = Pond - Infiltration System | Pond structure | = Exfiltration |

Hydrograph Volume = 3,039 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

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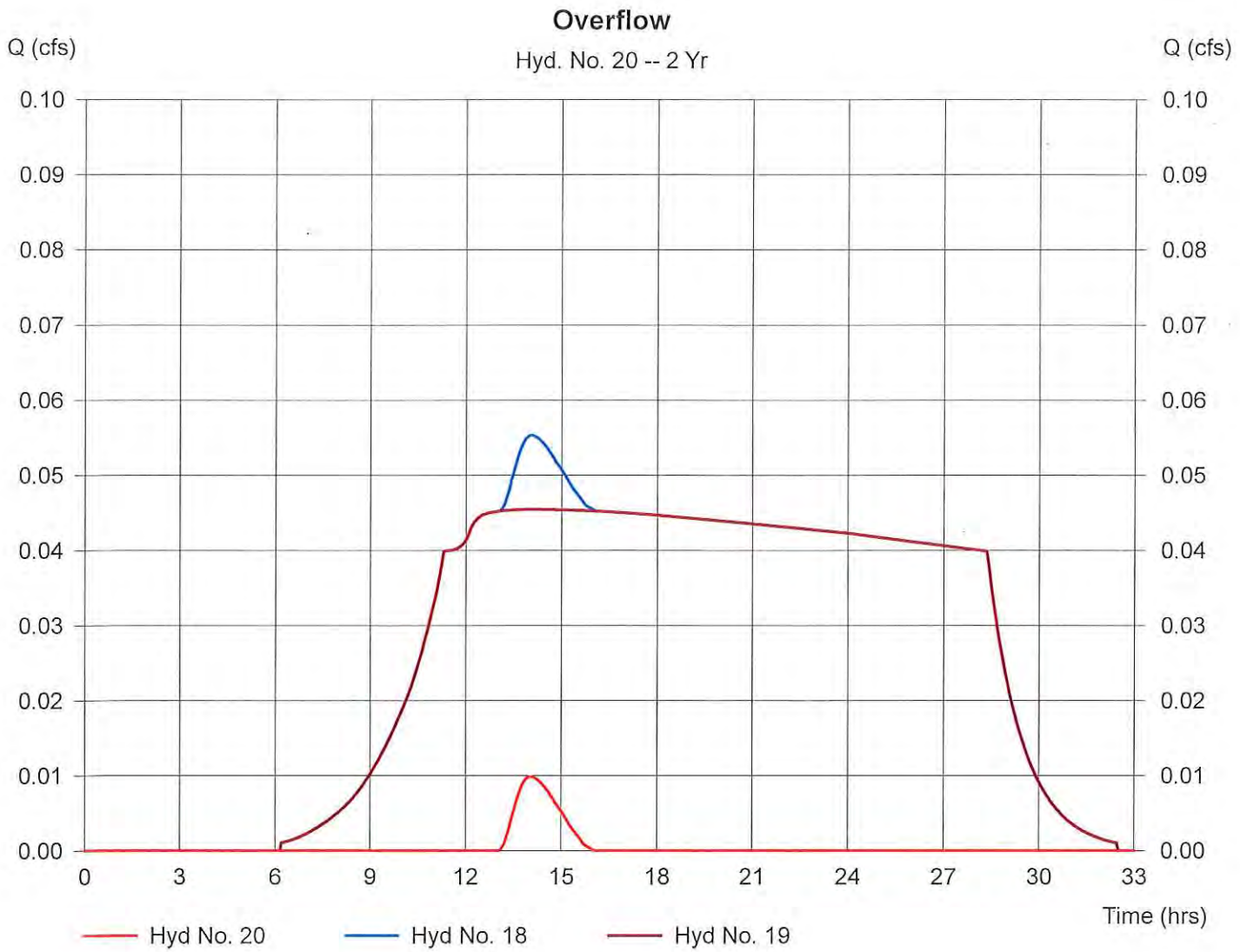
## Hyd. No. 20

Overflow

| | | | |
|---|---|---|---|
| Hydrograph type | = Diversion2 | Peak discharge | = 0.01 cfs |
| Storm frequency | = 2 yrs | Time interval | = 3 min |
| Inflow hydrograph | = 18 | 2nd diverted hyd. | = 19 |
| Diversion method | = Pond - Infiltration System | Pond structure | = Exfiltration |

Hydrograph Volume = 55 cuft



# Hydrograph Plot



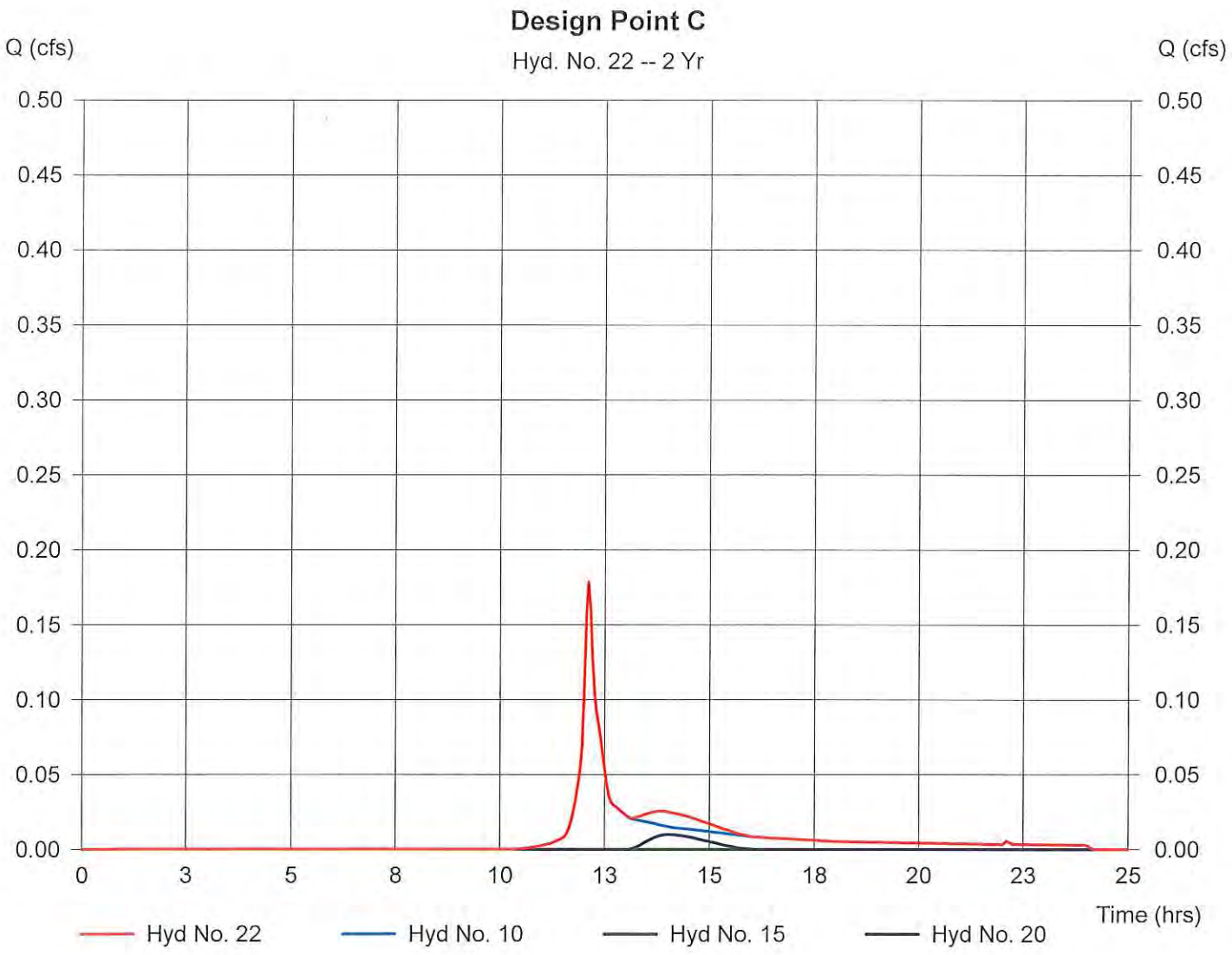
## Hyd. No. 22

Design Point C

Hydrograph type = Combine
Storm frequency = 2 yrs
Inflow hyds. = 10, 15, 20

Peak discharge = 0.18 cfs
Time interval = 3 min

Hydrograph Volume = 672 cuft



# Hydrograph Plot



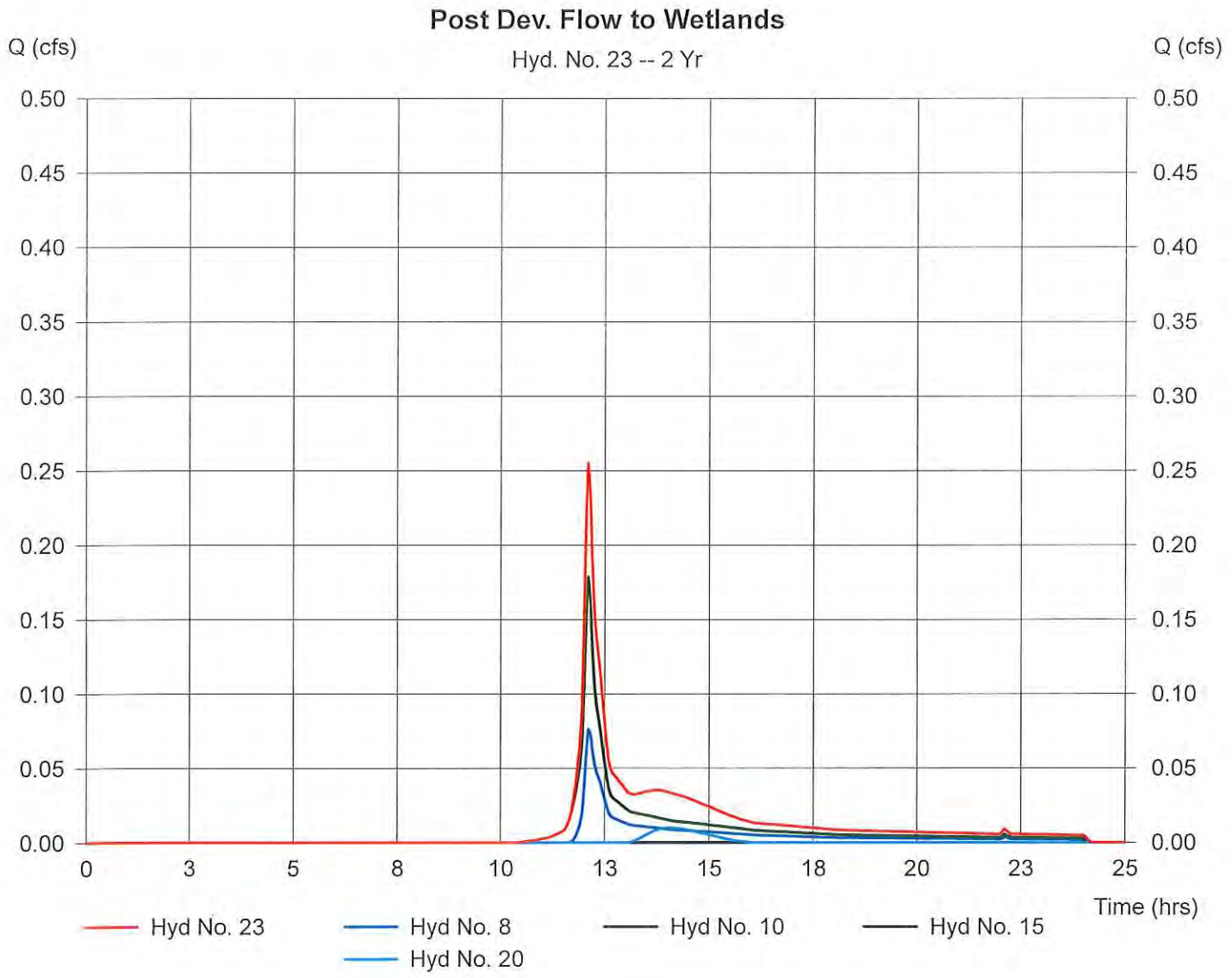
## Hyd. No. 23

Post Dev. Flow to Wetlands

Hydrograph type = Combine
Storm frequency = 2 yrs
Inflow hyds. = 8, 10, 15, 20

Peak discharge = 0.25 cfs
Time interval = 3 min

Hydrograph Volume = 982 cuft



# Hydrograph Plot



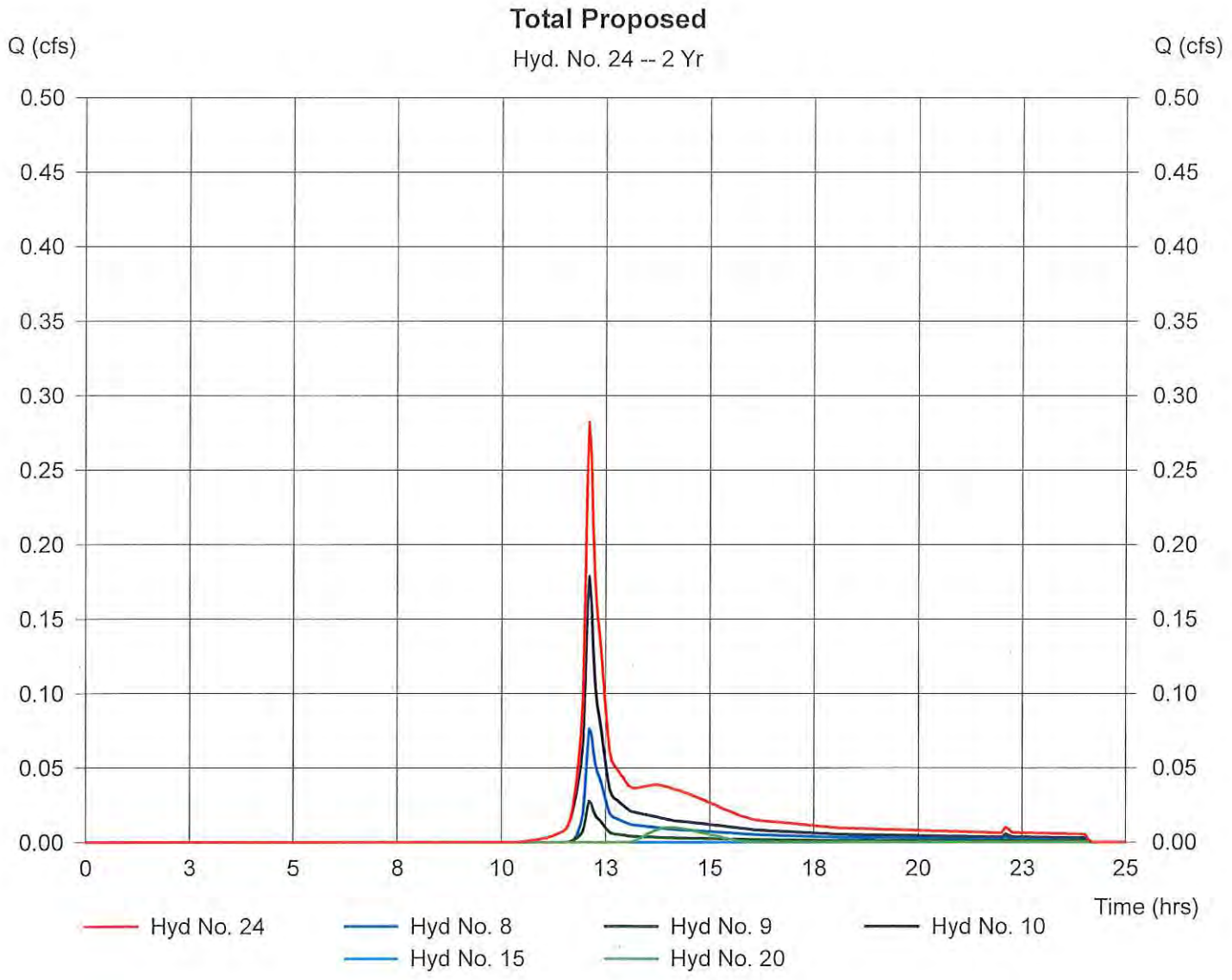
## Hyd. No. 24

Total Proposed

Hydrograph type = Combine
Storm frequency = 2 yrs
Inflow hyds. = 8, 9, 10, 15, 20

Peak discharge = 0.28 cfs
Time interval = 3 min

Hydrograph Volume = 1,088 cuft



# 10-Year Storm, Pre and Post-Development

# Hydrograph Summary Report

| Hyd. No. | Hydrograph type (origin) | Peak flow (cfs) | Time interval (min) | Time to peak (min) | Volume (cuft) | Inflow hyd(s) | Maximum elevation (ft) | Maximum storage (cuft) | Hydrograph description |
|---|---|---|---|---|---|---|---|---|---|
| 1 | SCS Runoff | 0.54 | 3 | 726 | 1,881 | ---- | ------ | ------ | E.C.B.-1 |
| 2 | SCS Runoff | 0.18 | 3 | 726 | 602 | ---- | ------ | ------ | E.C.B.-2 |
| 3 | SCS Runoff | 0.85 | 3 | 726 | 2,875 | ---- | ------ | ------ | E.C.B.-3 |
| 5 | Combine | 1.39 | 3 | 726 | 4,756 | 1, 3, | ------ | ------ | Flow to Wetlands |
| 6 | Combine | 1.57 | 3 | 726 | 5,358 | 1, 2, 3, | ------ | ------ | Total Existing |
| 8 | SCS Runoff | 0.21 | 3 | 726 | 740 | ---- | ------ | ------ | P.D.B.-1 |
| 9 | SCS Runoff | 0.07 | 3 | 726 | 246 | ---- | ------ | ------ | P.D.B.-2 |
| 10 | SCS Runoff | 0.38 | 3 | 726 | 1,252 | ---- | ------ | ------ | P.D.B.-3 |
| 12 | SCS Runoff | 0.29 | 3 | 726 | 955 | ---- | ------ | ------ | P.D.B.3A |
| 13 | Reservoir | 0.02 | 3 | 915 | 941 | 12 | 164.70 | 542 | Rain Garden |
| 14 | Diversion1 | 0.02 | 3 | 915 | 941 | 13 | ------ | ------ | Infiltration |
| 15 | Diversion2 | 0.00 | 3 | 915 | 0 | 13 | ------ | ------ | Overflow |
| 17 | SCS Runoff | 1.45 | 3 | 726 | 5,061 | ---- | ------ | ------ | P.D.B.-4 |
| 18 | Reservoir | 0.49 | 3 | 744 | 5,057 | 17 | 164.21 | 2,089 | Infiltration System |
| 19 | Diversion1 | 0.05 | 3 | 744 | 3,548 | 18 | ------ | ------ | Infiltration |
| 20 | Diversion2 | 0.44 | 3 | 744 | 1,510 | 18 | ------ | ------ | Overflow |
| 22 | Combine | 0.59 | 3 | 741 | 2,761 | 10, 15, 20, | ------ | ------ | Design Point C |
| 23 | Combine | 0.70 | 3 | 738 | 3,501 | 8, 10, 15, 20, | ------ | ------ | Post Dev. Flow to Wetlands |
| 24 | Combine | 0.74 | 3 | 738 | 3,747 | 8, 9, 10, 15, 20, | ------ | ------ | Total Proposed |

# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

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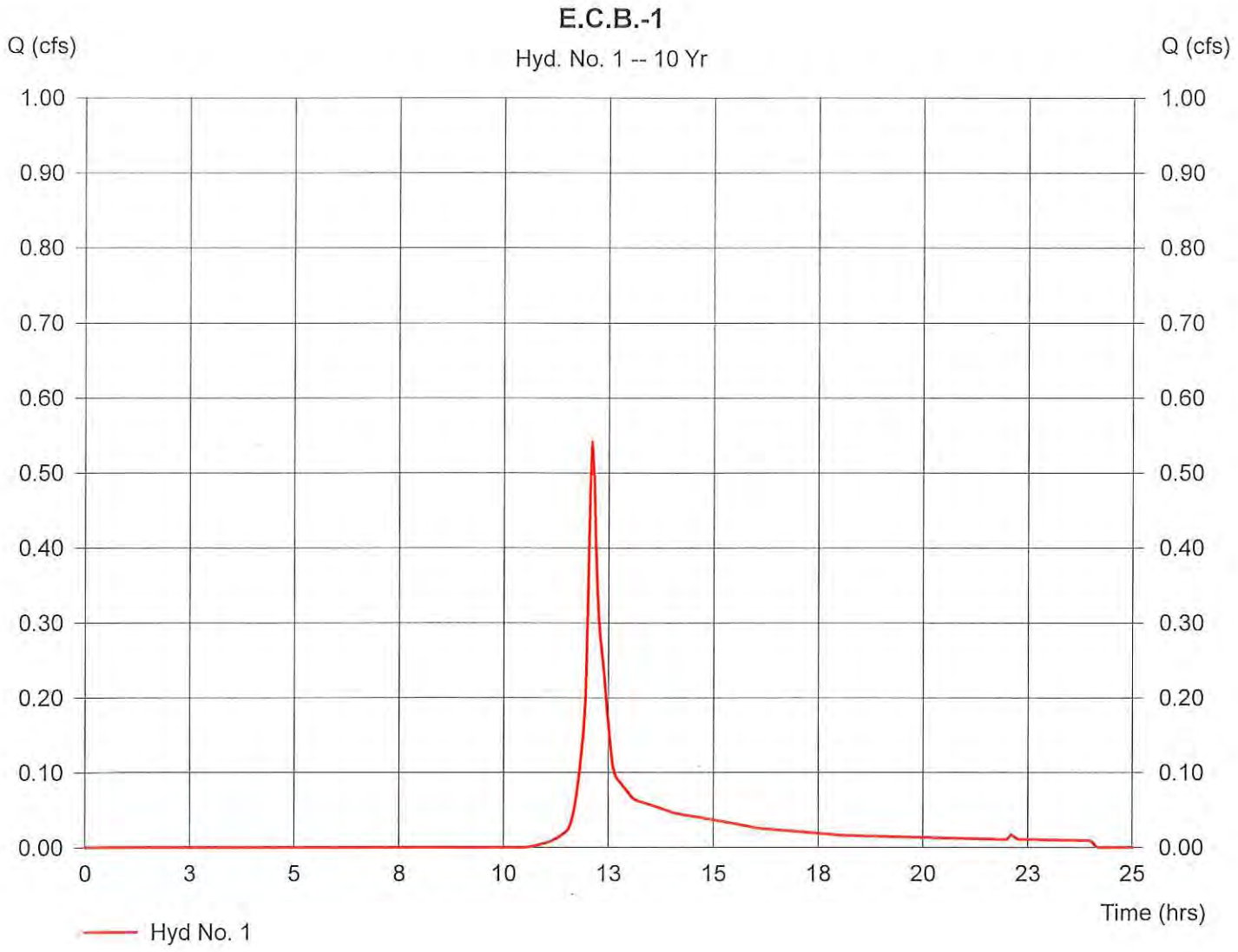
## Hyd. No. 1

E.C.B.-1

| | | | |
|---|---|---|---|
| Hydrograph type | = SCS Runoff | Peak discharge | = 0.54 cfs |
| Storm frequency | = 10 yrs | Time interval | = 3 min |
| Drainage area | = 0.35 ac | Curve number | = 66.4 |
| Basin Slope | = 5.2 % | Hydraulic length | = 189 ft |
| Tc method | = LAG | Time of conc. (Tc) | = 5.407852 min |
| Total precip. | = 4.73 in | Distribution | = Type III |
| Storm duration | = 24 hrs | Shape factor | = 484 |

Hydrograph Volume = 1,881 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

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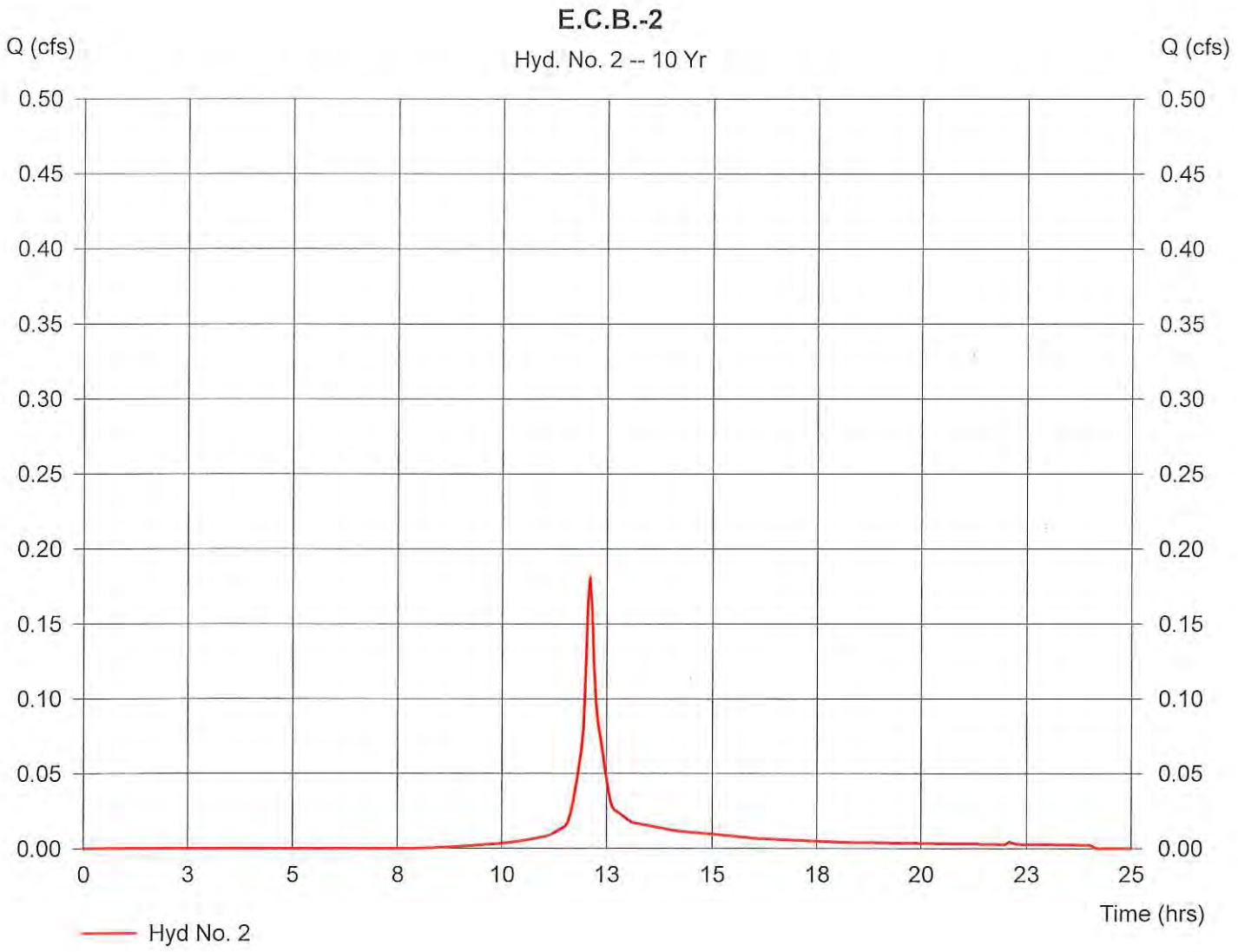
## Hyd. No. 2

E.C.B.-2

| | | | |
|---|---|---|---|
| Hydrograph type | = SCS Runoff | Peak discharge | = 0.18 cfs |
| Storm frequency | = 10 yrs | Time interval | = 3 min |
| Drainage area | = 0.07 ac | Curve number | = 79.8 |
| Basin Slope | = 1.9 % | Hydraulic length | = 68 ft |
| Tc method | = USER | Time of conc. (Tc) | = 5 min |
| Total precip. | = 4.73 in | Distribution | = Type III |
| Storm duration | = 24 hrs | Shape factor | = 484 |

Hydrograph Volume = 602 cuft



# Hydrograph Plot

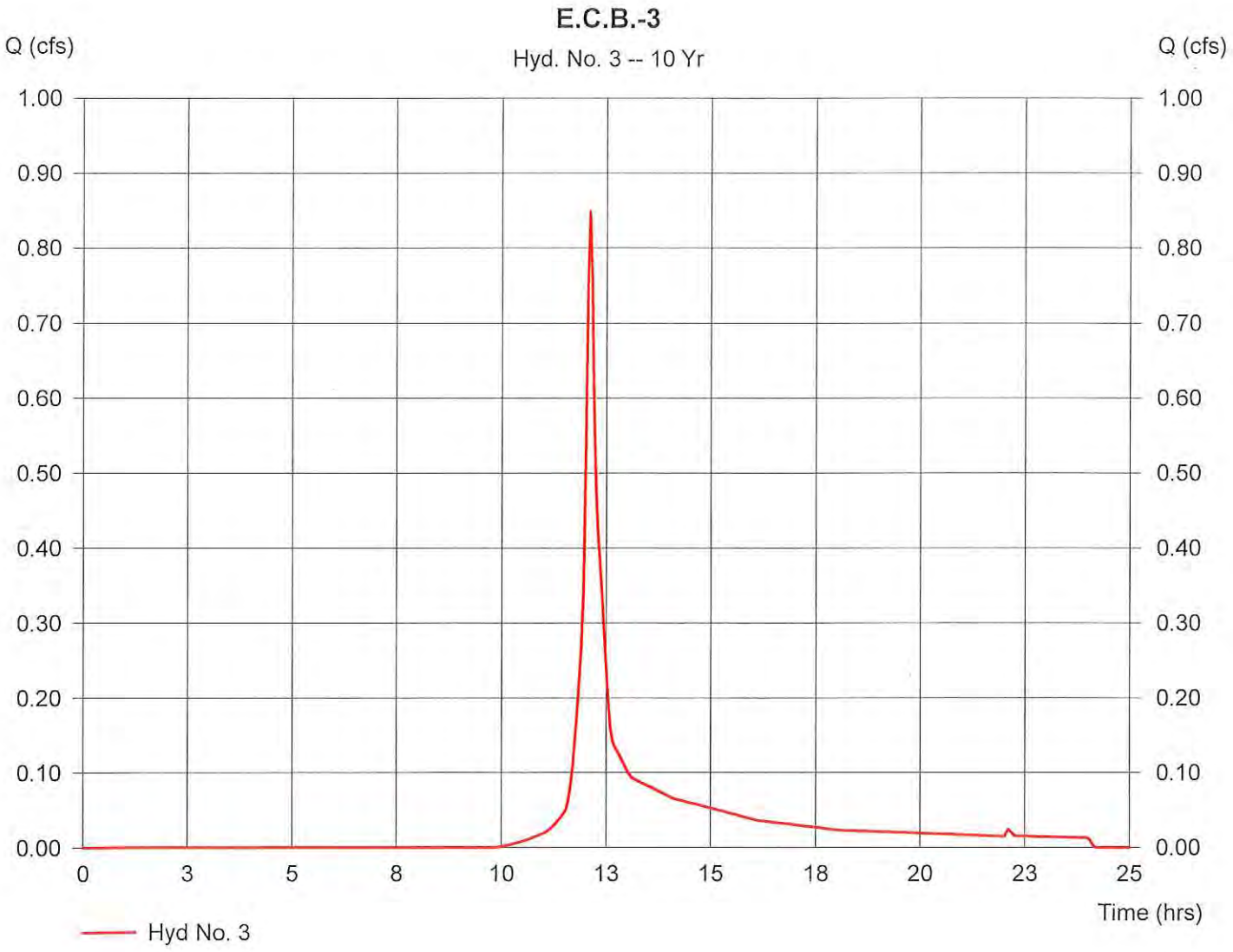


## Hyd. No. 3

E.C.B.-3

| | | | |
|---|---|---|---|
| Hydrograph type | = SCS Runoff | Peak discharge | = 0.85 cfs |
| Storm frequency | = 10 yrs | Time interval | = 3 min |
| Drainage area | = 0.45 ac | Curve number | = 70.4 |
| Basin Slope | = 4.2 % | Hydraulic length | = 207 ft |
| Tc method | = LAG | Time of conc. (Tc) | = 5.817464 min |
| Total precip. | = 4.73 in | Distribution | = Type III |
| Storm duration | = 24 hrs | Shape factor | = 484 |

Hydrograph Volume = 2,875 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

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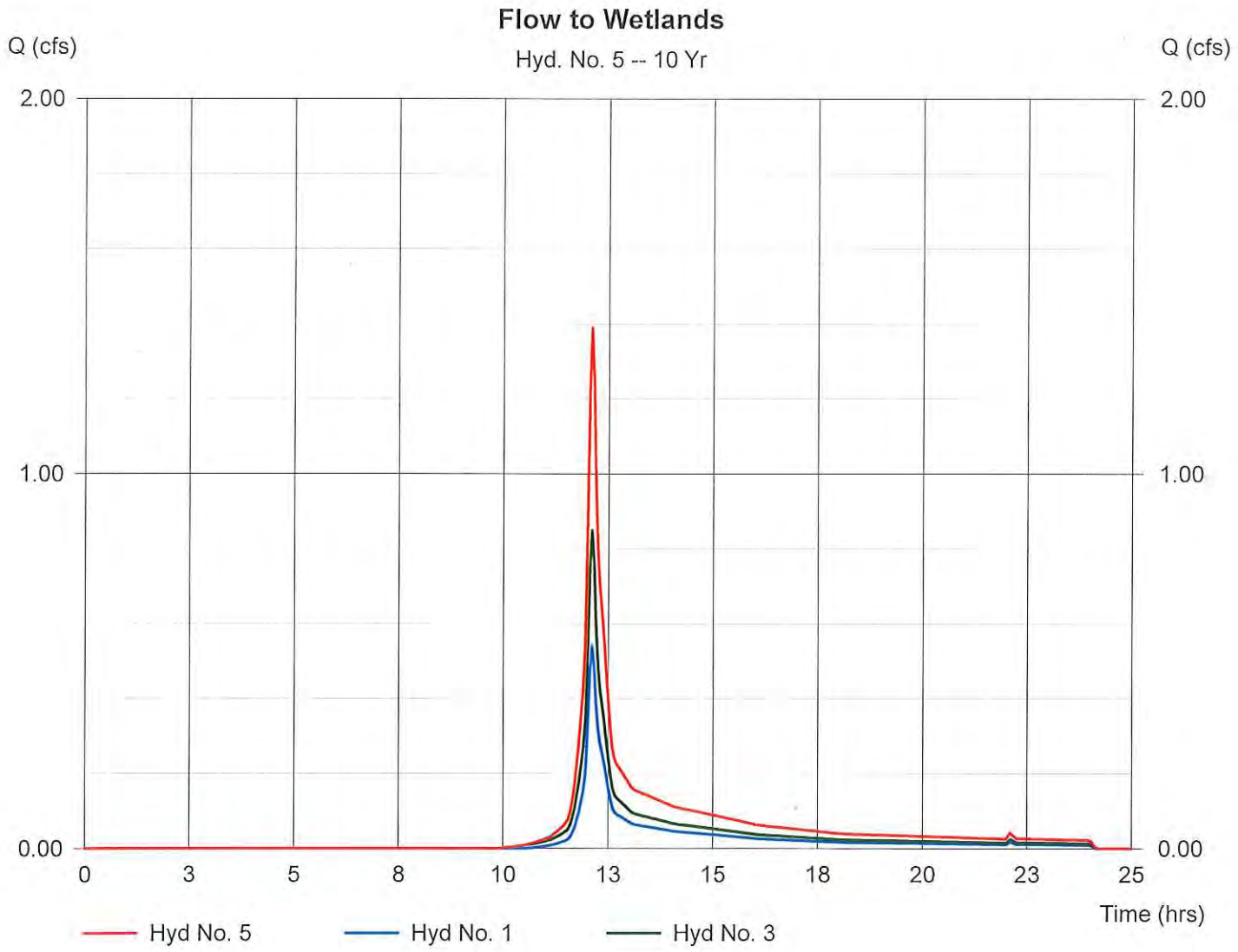
## Hyd. No. 5

Flow to Wetlands

| | | | |
|---|---|---|---|
| Hydrograph type | = Combine | Peak discharge | = 1.39 cfs |
| Storm frequency | = 10 yrs | Time interval | = 3 min |
| Inflow hyds. | = 1, 3 | | |

Hydrograph Volume = 4,756 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

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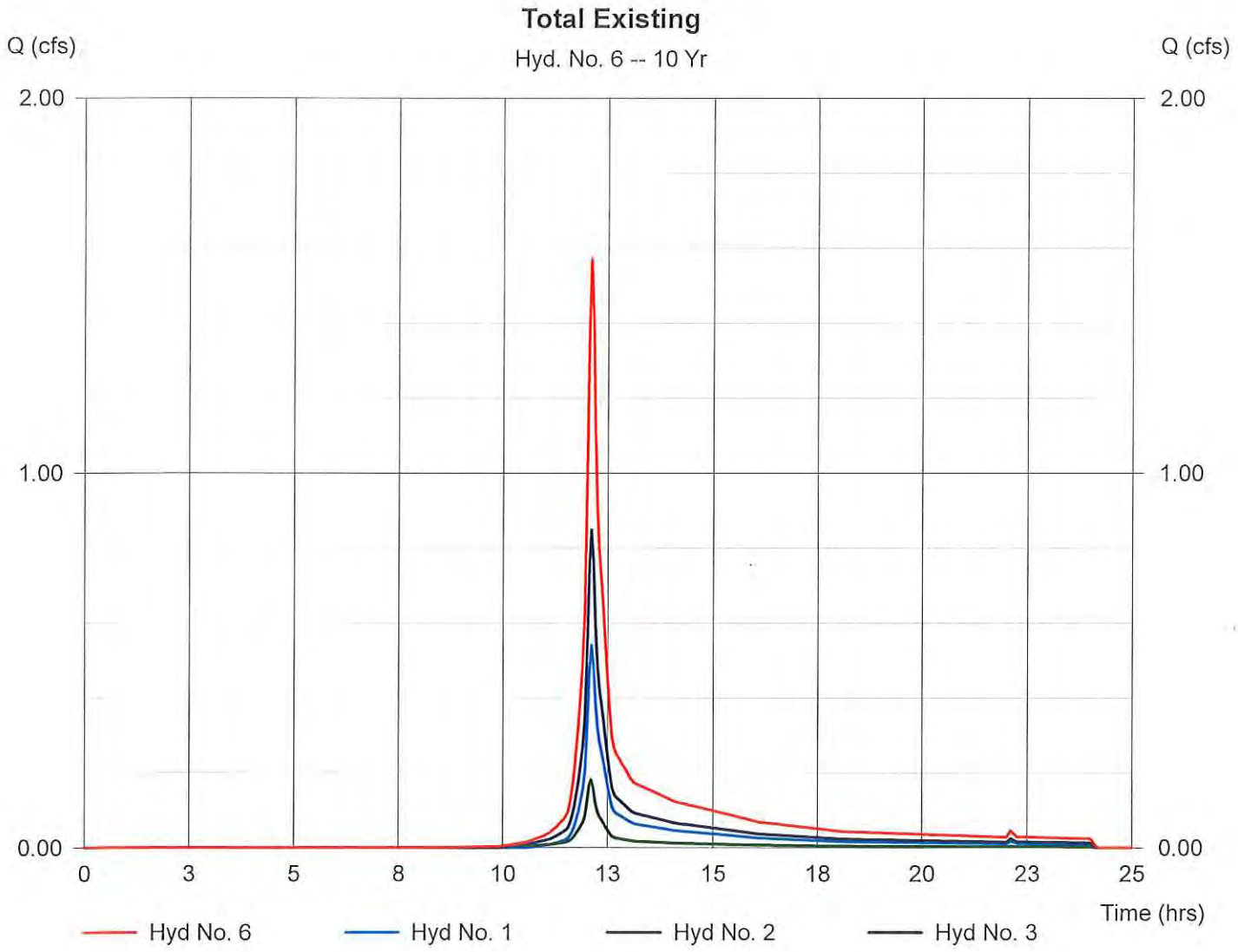
## Hyd. No. 6

Total Existing

Hydrograph type = Combine
Storm frequency = 10 yrs
Inflow hyds. = 1, 2, 3

Peak discharge = 1.57 cfs
Time interval = 3 min

Hydrograph Volume = 5,358 cuft



# Hydrograph Plot

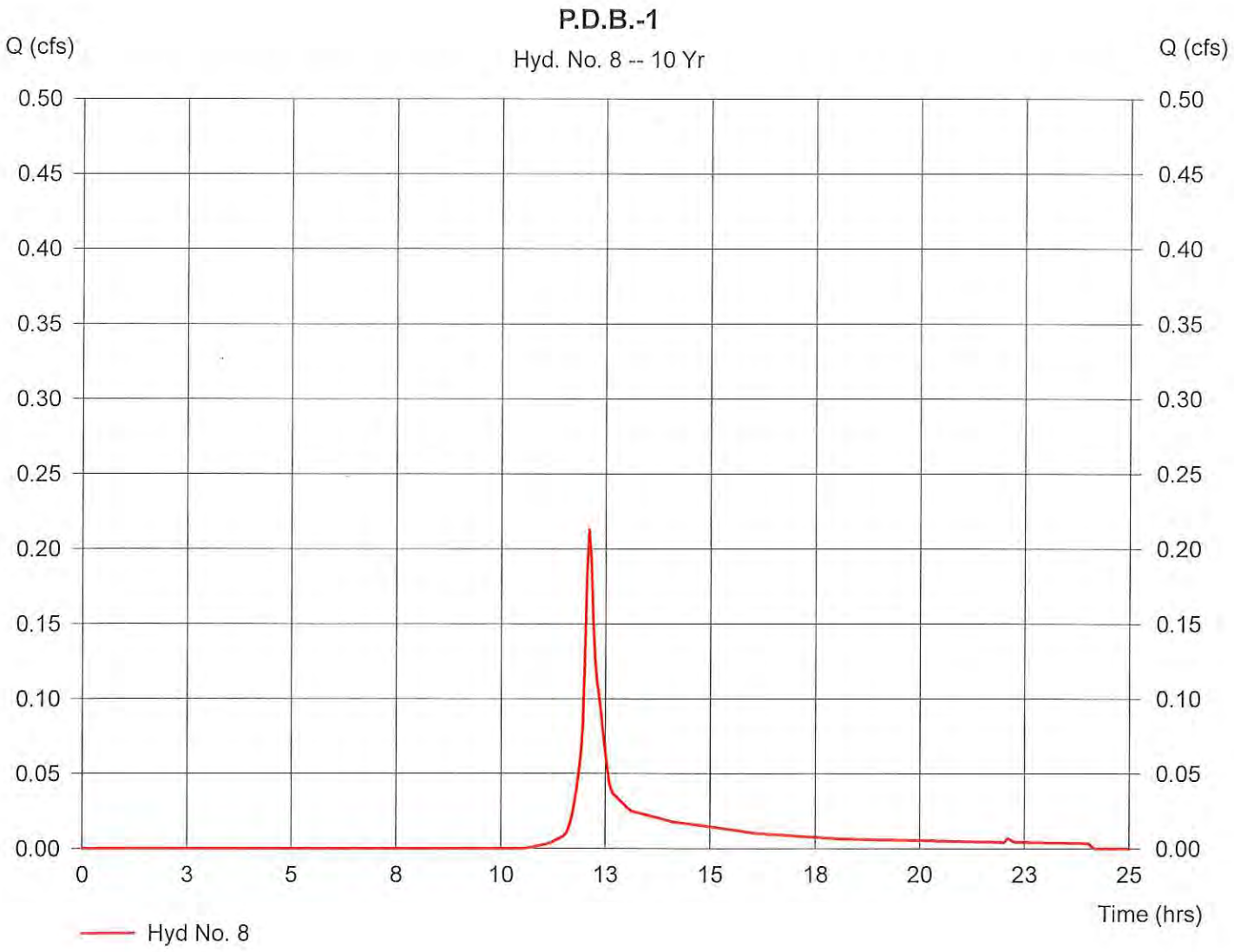


## Hyd. No. 8

P.D.B.-1

| | | | |
|---|---|---|---|
| Hydrograph type | = SCS Runoff | Peak discharge | = 0.21 cfs |
| Storm frequency | = 10 yrs | Time interval | = 3 min |
| Drainage area | = 0.14 ac | Curve number | = 66.4 |
| Basin Slope | = 4.4 % | Hydraulic length | = 222 ft |
| Tc method | = LAG | Time of conc. (Tc) | = 6.686719 min |
| Total precip. | = 4.73 in | Distribution | = Type III |
| Storm duration | = 24 hrs | Shape factor | = 484 |

Hydrograph Volume = 740 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

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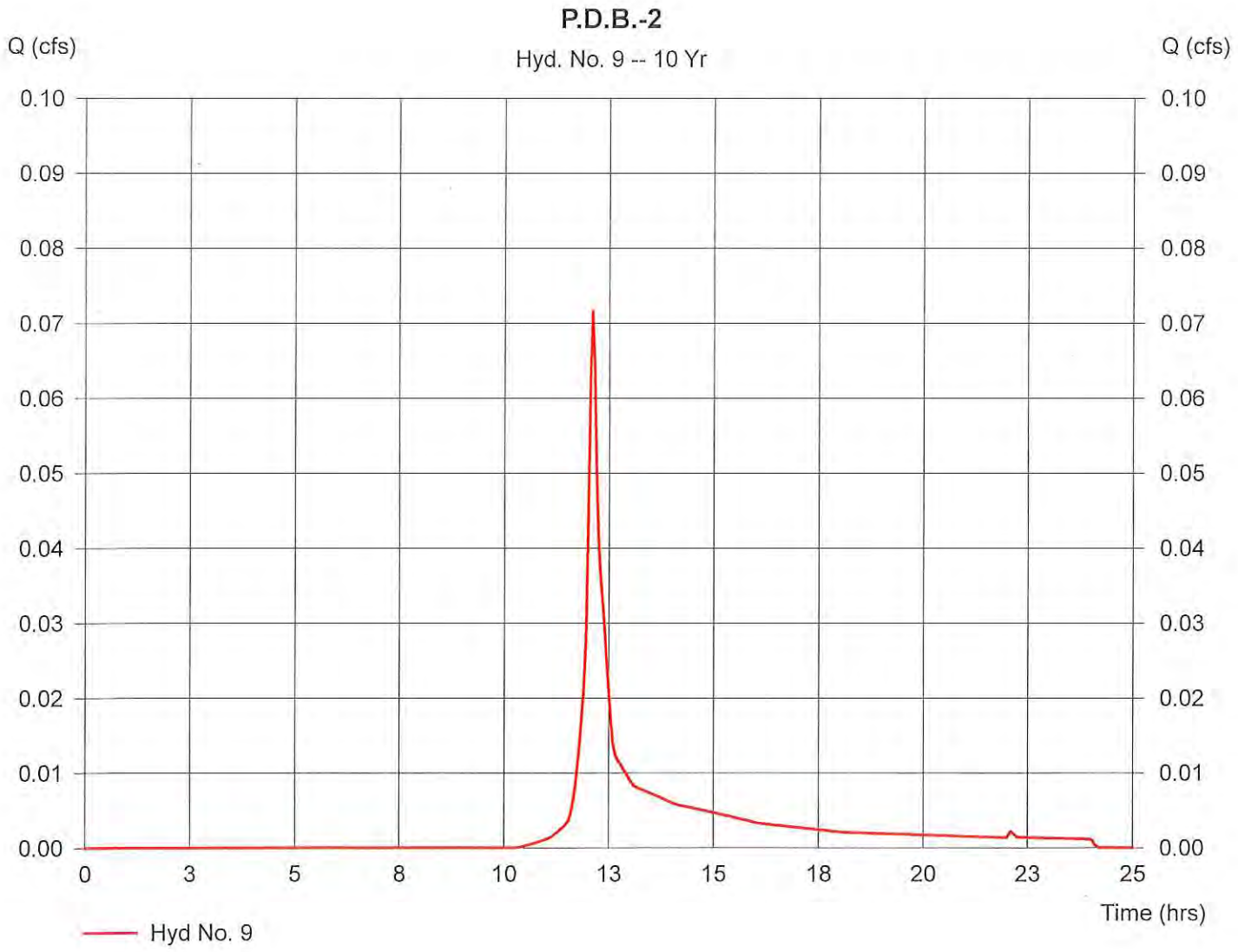
## Hyd. No. 9

P.D.B.-2

| | | | |
|---|---|---|---|
| Hydrograph type | = SCS Runoff | Peak discharge | = 0.07 cfs |
| Storm frequency | = 10 yrs | Time interval | = 3 min |
| Drainage area | = 0.04 ac | Curve number | = 67.9 |
| Basin Slope | = 1.0 % | Hydraulic length | = 49 ft |
| Tc method | = USER | Time of conc. (Tc) | = 5 min |
| Total precip. | = 4.73 in | Distribution | = Type III |
| Storm duration | = 24 hrs | Shape factor | = 484 |

Hydrograph Volume = 246 cuft



# Hydrograph Plot

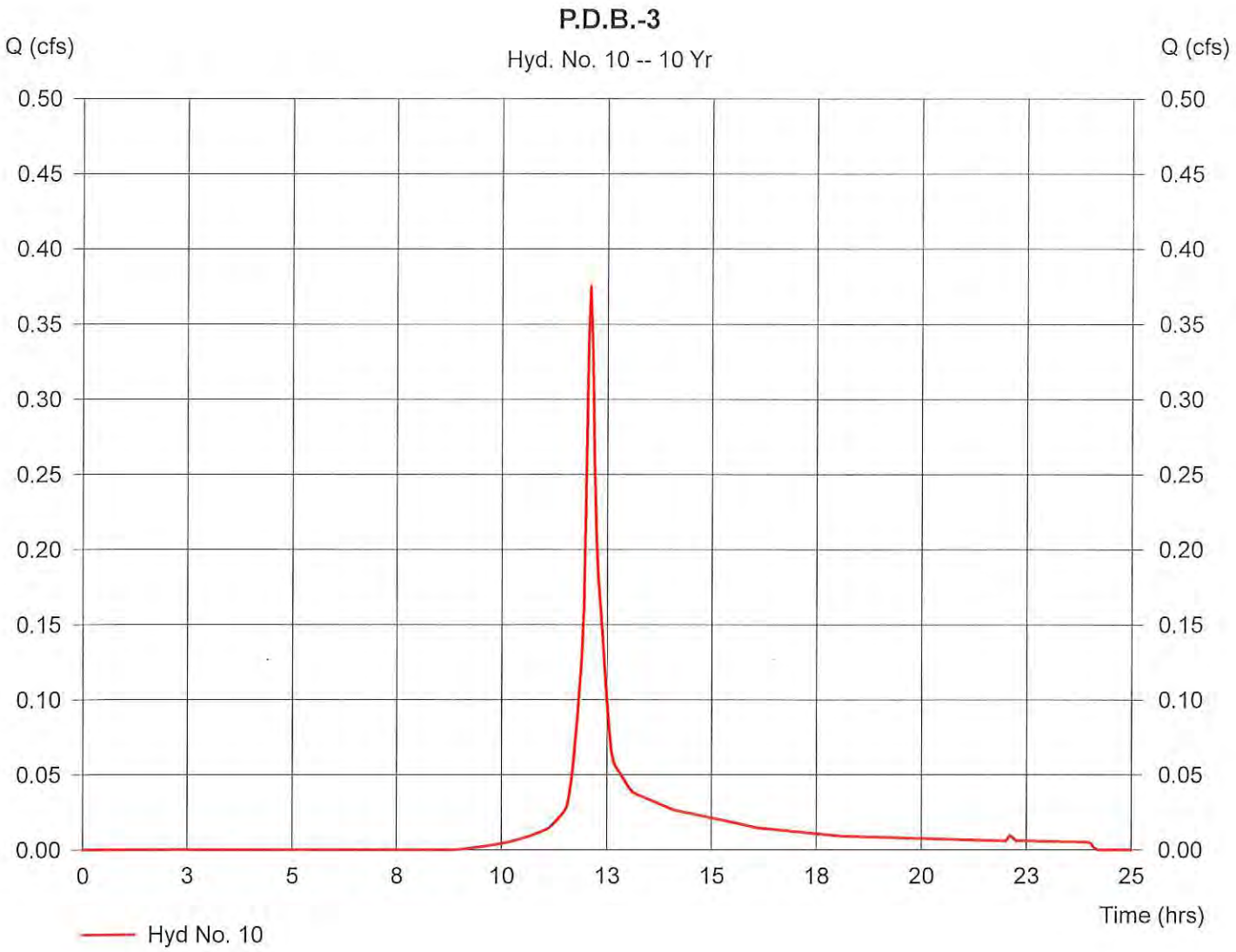


## Hyd. No. 10

P.D.B.-3

| | | | |
|---|---|---|---|
| Hydrograph type | = SCS Runoff | Peak discharge | = 0.38 cfs |
| Storm frequency | = 10 yrs | Time interval | = 3 min |
| Drainage area | = 0.16 ac | Curve number | = 75.3 |
| Basin Slope | = 3.8 % | Hydraulic length | = 196 ft |
| Tc method | = USER | Time of conc. (Tc) | = 5 min |
| Total precip. | = 4.73 in | Distribution | = Type III |
| Storm duration | = 24 hrs | Shape factor | = 484 |

Hydrograph Volume = 1,252 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

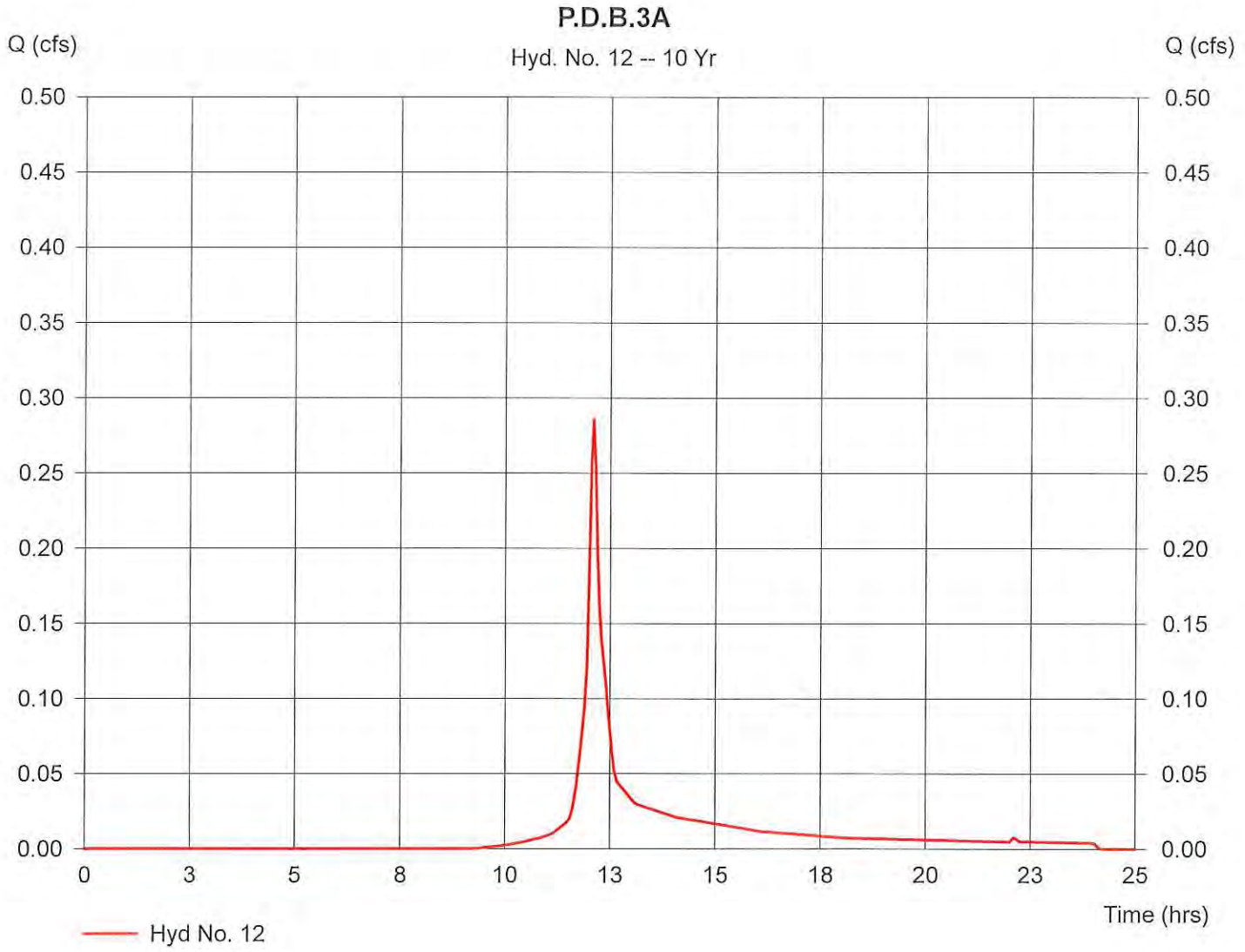
Monday, May 7 2018, 8:27 PM

## Hyd. No. 12

P.D.B.3A

| | | | |
|---|---|---|---|
| Hydrograph type | = SCS Runoff | Peak discharge | = 0.29 cfs |
| Storm frequency | = 10 yrs | Time interval | = 3 min |
| Drainage area | = 0.13 ac | Curve number | = 73.5 |
| Basin Slope | = 2.0 % | Hydraulic length | = 100 ft |
| Tc method | = USER | Time of conc. (Tc) | = 5 min |
| Total precip. | = 4.73 in | Distribution | = Type III |
| Storm duration | = 24 hrs | Shape factor | = 484 |

Hydrograph Volume = 955 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, May 7 2018, 8:27 PM

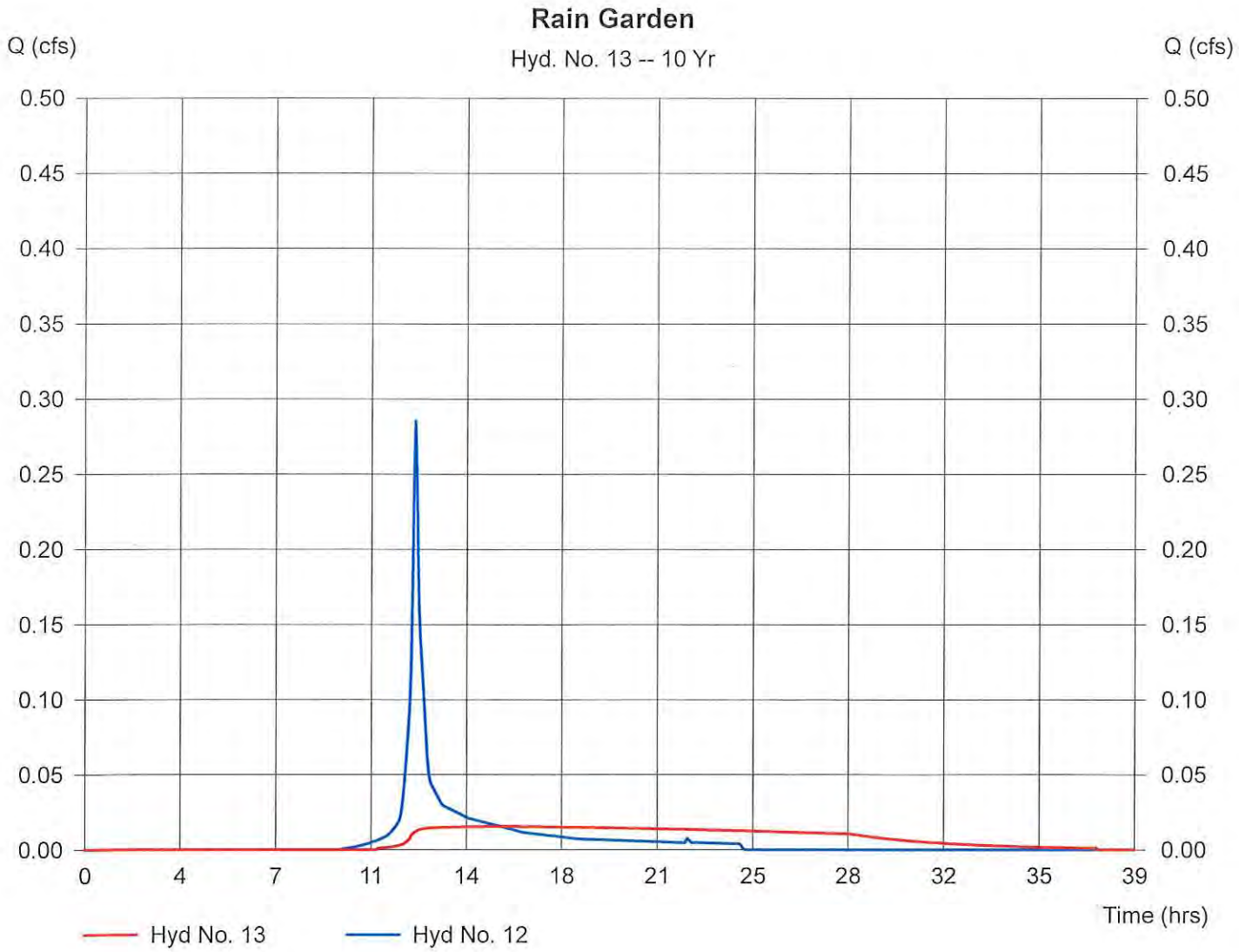
## Hyd. No. 13

Rain Garden

| | | | |
|---|---|---|---|
| Hydrograph type | = Reservoir | Peak discharge | = 0.02 cfs |
| Storm frequency | = 10 yrs | Time interval | = 3 min |
| Inflow hyd. No. | = 12 | Max. Elevation | = 164.70 ft |
| Reservoir name | = Rain Garden | Max. Storage | = 542 cuft |

Storage Indication method used.

Hydrograph Volume = 941 cuft



# Pond Report



## Pond No. 5 - Rain Garden

### Pond Data

Pond storage is based on known contour areas. Average end area method used.

### Stage / Storage Table

| Stage (ft) | Elevation (ft) | Contour area (sqft) | Incr. Storage (cuft) | Total storage (cuft) |
|---|---|---|---|---|
| 0.00 | 163.50 | 140 | 0 | 0 |
| 0.50 | 164.00 | 448 | 147 | 147 |
| 1.00 | 164.50 | 591 | 260 | 407 |
| 1.50 | 165.00 | 748 | 335 | 742 |

### Culvert / Orifice Structures

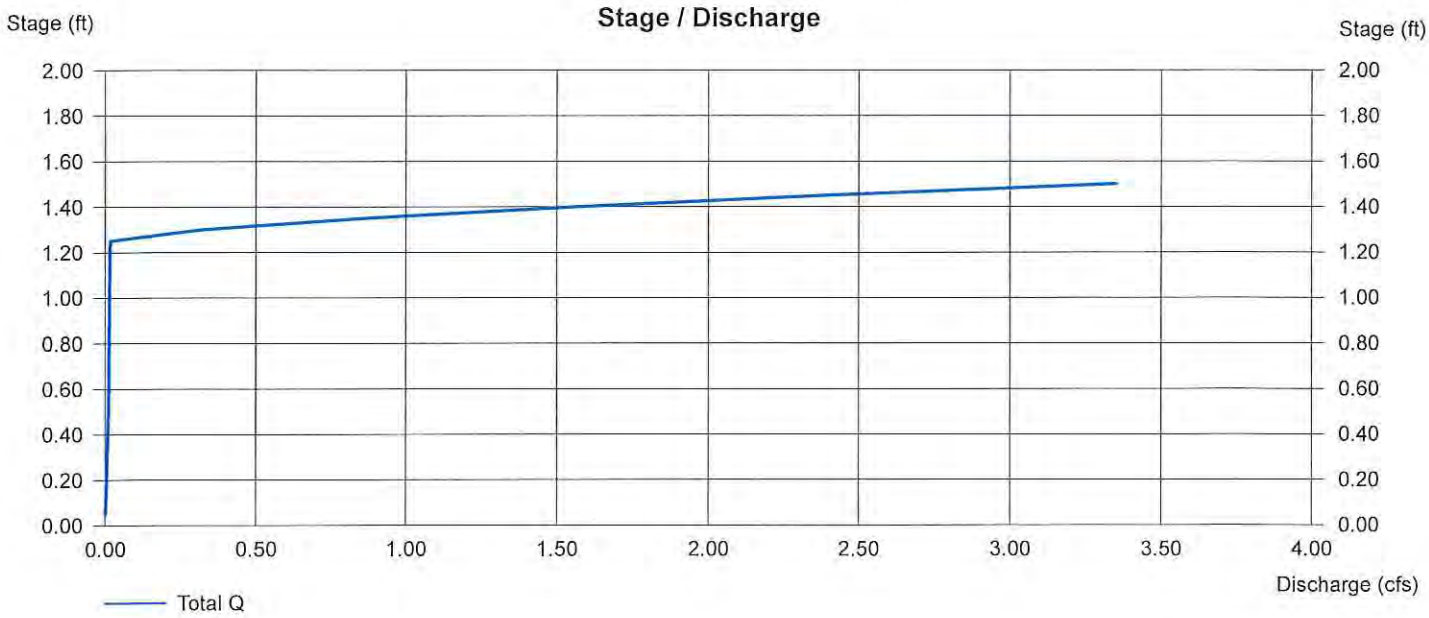
| | [A] | [B] | [C] | [D] |
|---|---|---|---|---|
| Rise (in) | = 0.00 | 0.00 | 0.00 | 0.00 |
| Span (in) | = 0.00 | 0.00 | 0.00 | 0.00 |
| No. Barrels | = 0 | 0 | 0 | 0 |
| Invert El. (ft) | = 0.00 | 0.00 | 0.00 | 0.00 |
| Length (ft) | = 0.00 | 0.00 | 0.00 | 0.00 |
| Slope (%) | = 0.00 | 0.00 | 0.00 | 0.00 |
| N-Value | = .000 | .000 | .000 | .000 |
| Orif. Coeff. | = 0.00 | 0.00 | 0.00 | 0.00 |
| Multi-Stage | = n/a | No | No | No |

### Weir Structures

| | [A] | [B] | [C] | [D] |
|---|---|---|---|---|
| Crest Len (ft) | = 8.00 | 0.00 | 0.00 | 0.00 |
| Crest El. (ft) | = 164.75 | 0.00 | 0.00 | 0.00 |
| Weir Coeff. | = 3.33 | 0.00 | 0.00 | 0.00 |
| Weir Type | = Rect | --- | --- | --- |
| Multi-Stage | = No | No | No | No |

Exfiltration = 1.020 in/hr (Contour) Tailwater Elev. = 0.00 ft

Note: Culvert/Orifice outflows have been analyzed under inlet and outlet control.



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

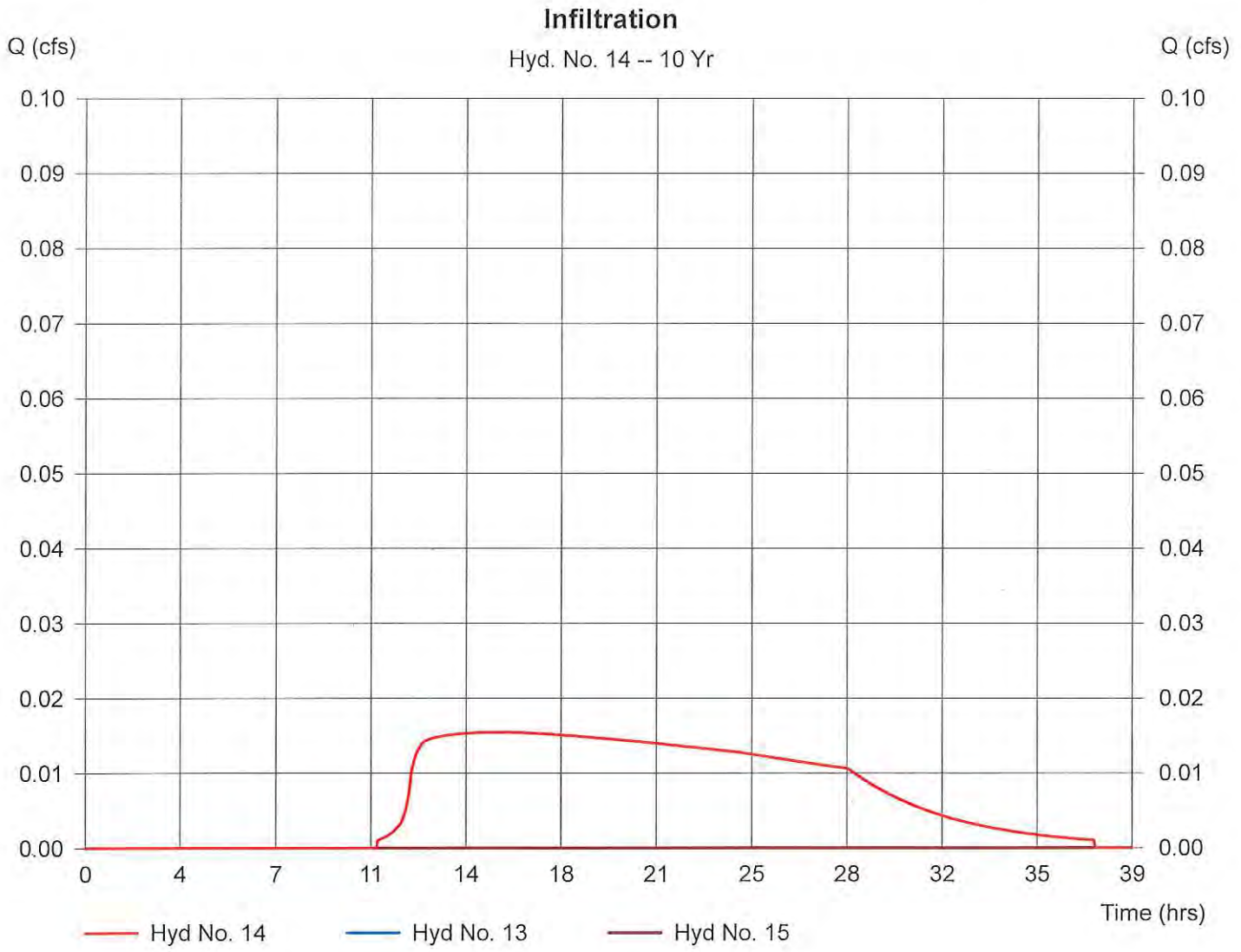
Monday, May 7 2018, 8:27 PM

## Hyd. No. 14

Infiltration

| | | | |
|---|---|---|---|
| Hydrograph type | = Diversion1 | Peak discharge | = 0.02 cfs |
| Storm frequency | = 10 yrs | Time interval | = 3 min |
| Inflow hydrograph | = 13 | 2nd diverted hyd. | = 15 |
| Diversion method | = Pond - Rain Garden | Pond structure | = Exfiltration |

Hydrograph Volume = 941 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

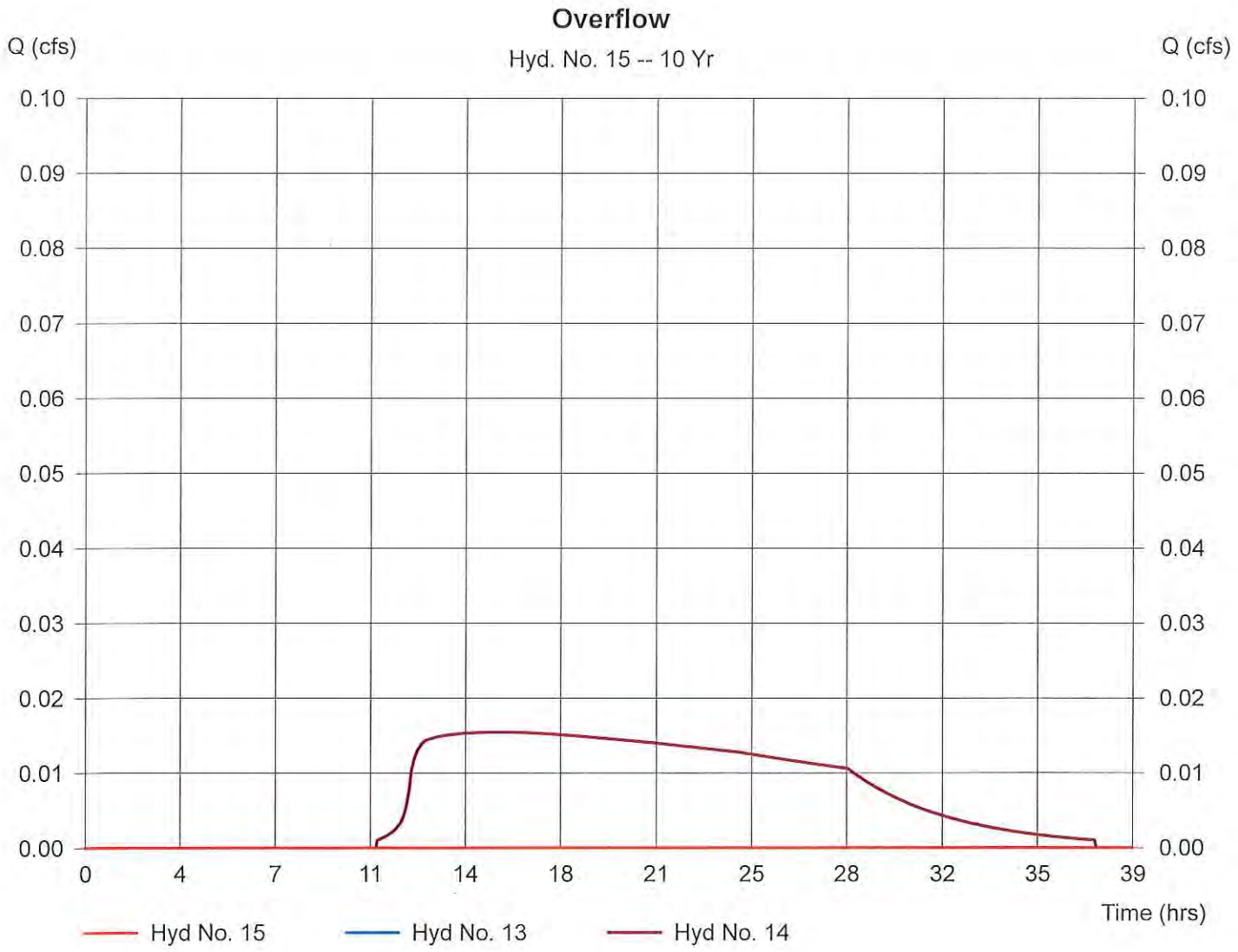
Monday, May 7 2018, 8:27 PM

## Hyd. No. 15

Overflow

| | | | |
|---|---|---|---|
| Hydrograph type | = Diversion2 | Peak discharge | = 0.00 cfs |
| Storm frequency | = 10 yrs | Time interval | = 3 min |
| Inflow hydrograph | = 13 | 2nd diverted hyd. | = 14 |
| Diversion method | = Pond - Rain Garden | Pond structure | = Exfiltration |

Hydrograph Volume = 0 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

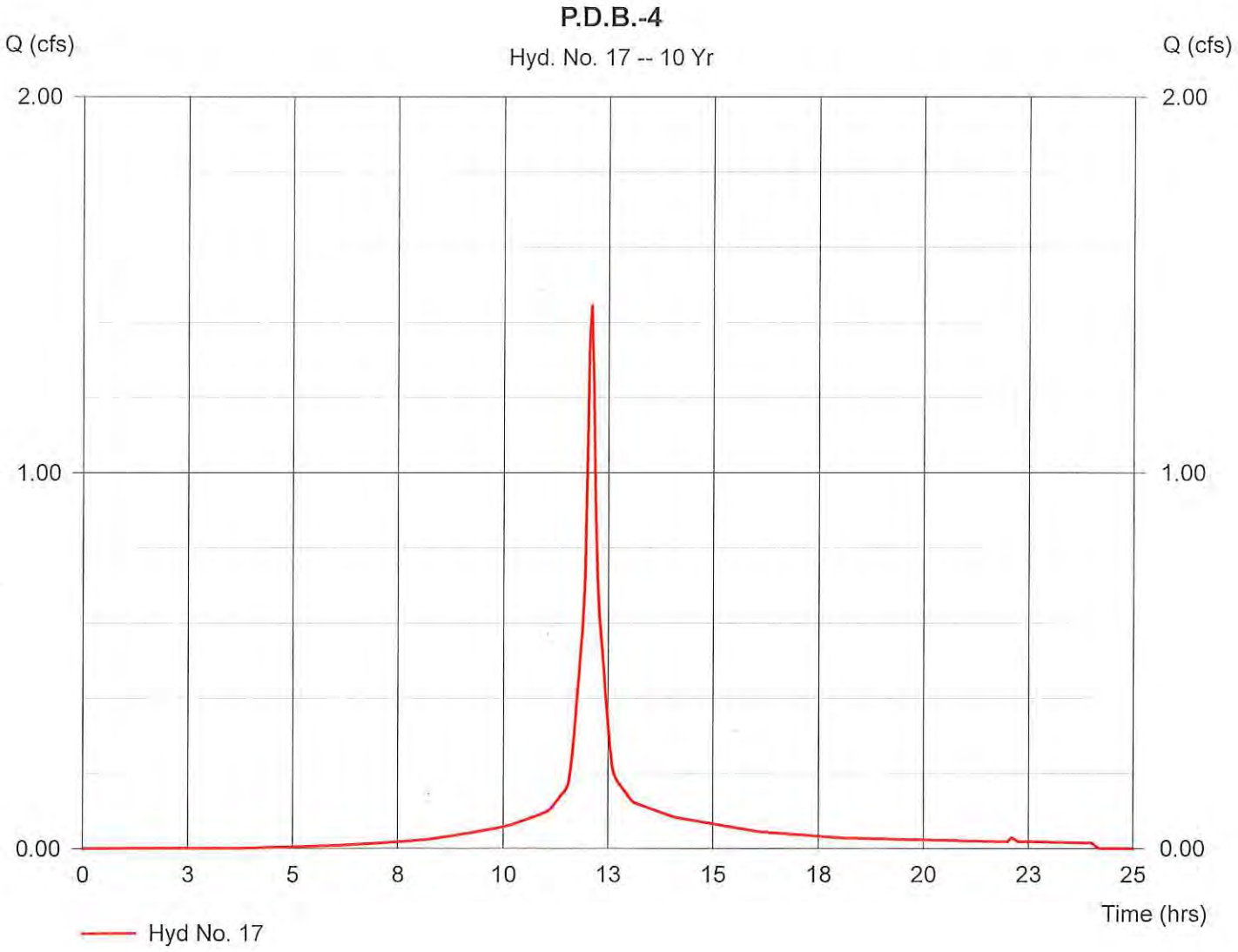
Monday, May 7 2018, 8:27 PM

## Hyd. No. 17

P.D.B.-4

| | | | |
|---|---|---|---|
| Hydrograph type | = SCS Runoff | Peak discharge | = 1.45 cfs |
| Storm frequency | = 10 yrs | Time interval | = 3 min |
| Drainage area | = 0.39 ac | Curve number | = 91.7 |
| Basin Slope | = 2.0 % | Hydraulic length | = 100 ft |
| Tc method | = USER | Time of conc. (Tc) | = 5 min |
| Total precip. | = 4.73 in | Distribution | = Type III |
| Storm duration | = 24 hrs | Shape factor | = 484 |

Hydrograph Volume = 5,061 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, May 7 2018, 8:27 PM

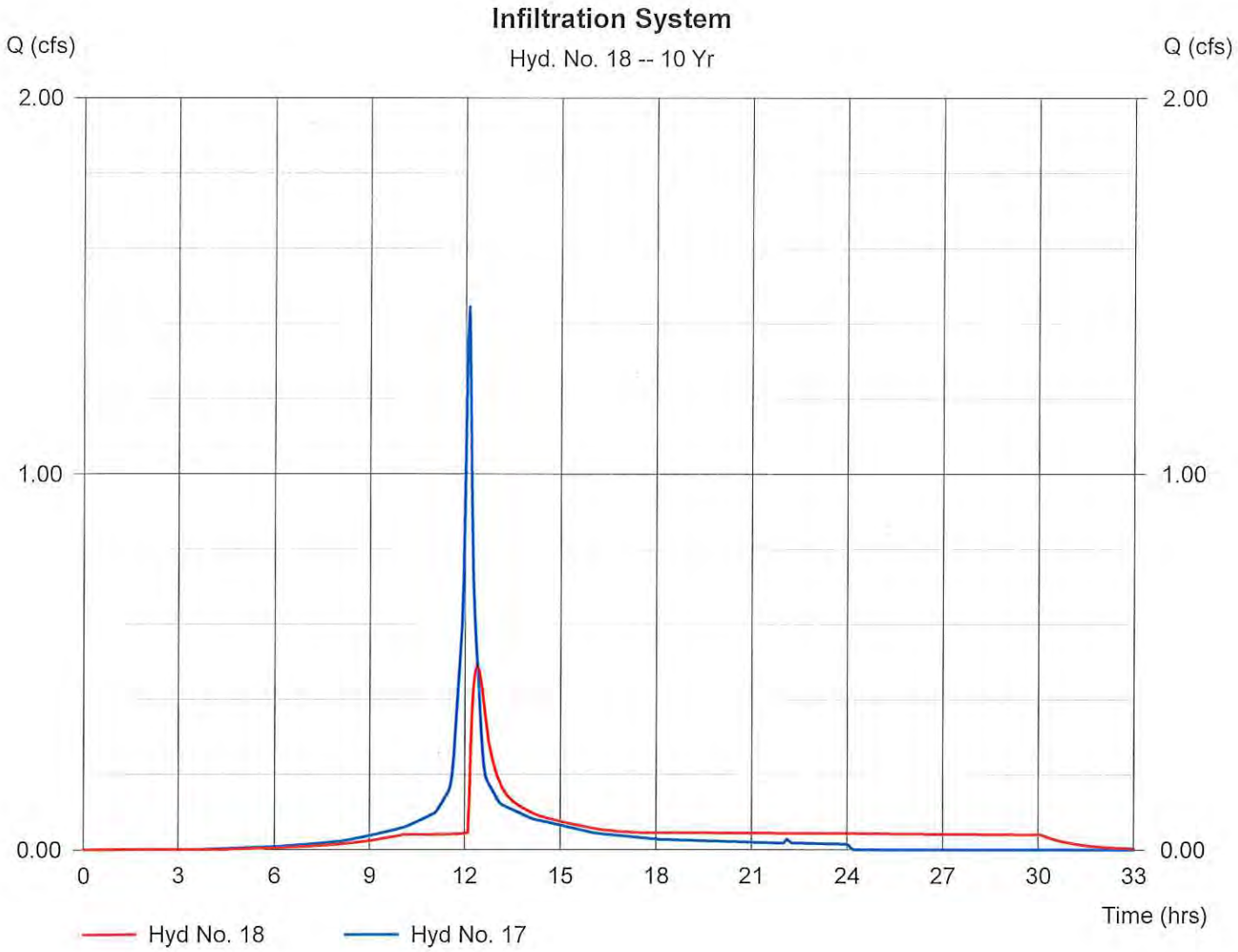
## Hyd. No. 18

Infiltration System

| | | | |
|---|---|---|---|
| Hydrograph type | = Reservoir | Peak discharge | = 0.49 cfs |
| Storm frequency | = 10 yrs | Time interval | = 3 min |
| Inflow hyd. No. | = 17 | Max. Elevation | = 164.21 ft |
| Reservoir name | = Infiltration System | Max. Storage | = 2,089 cuft |

Storage Indication method used.

Hydrograph Volume = 5,057 cuft



# Pond Report



## Pond No. 1 - Infiltration System

### Pond Data

Bottom LxW = 52.0 x 32.0 ft  Side slope = 0.0:1  Bottom elev. = 162.25 ft  Depth = 3.00 ft

### Stage / Storage Table

| Stage (ft) | Elevation (ft) | Contour area (sqft) | Incr. Storage (cuft)* | Total storage (cuft)* (*64.00% voids applied) |
|---|---|---|---|---|
| 0.00 | 162.25 | 1,664 | 0 | 0 |
| 0.15 | 162.40 | 1,664 | 160 | 160 |
| 0.30 | 162.55 | 1,664 | 160 | 319 |
| 0.45 | 162.70 | 1,664 | 160 | 479 |
| 0.60 | 162.85 | 1,664 | 160 | 639 |
| 0.75 | 163.00 | 1,664 | 160 | 799 |
| 0.90 | 163.15 | 1,664 | 160 | 958 |
| 1.05 | 163.30 | 1,664 | 160 | 1,118 |
| 1.20 | 163.45 | 1,664 | 160 | 1,278 |
| 1.35 | 163.60 | 1,664 | 160 | 1,438 |
| 1.50 | 163.75 | 1,664 | 160 | 1,597 |
| 1.65 | 163.90 | 1,664 | 160 | 1,757 |
| 1.80 | 164.05 | 1,664 | 160 | 1,917 |
| 1.95 | 164.20 | 1,664 | 160 | 2,077 |
| 2.10 | 164.35 | 1,664 | 160 | 2,236 |
| 2.25 | 164.50 | 1,664 | 160 | 2,396 |
| 2.40 | 164.65 | 1,664 | 160 | 2,556 |
| 2.55 | 164.80 | 1,664 | 160 | 2,716 |
| 2.70 | 164.95 | 1,664 | 160 | 2,875 |
| 2.85 | 165.10 | 1,664 | 160 | 3,035 |
| 3.00 | 165.25 | 1,664 | 160 | 3,195 |

### Culvert / Orifice Structures

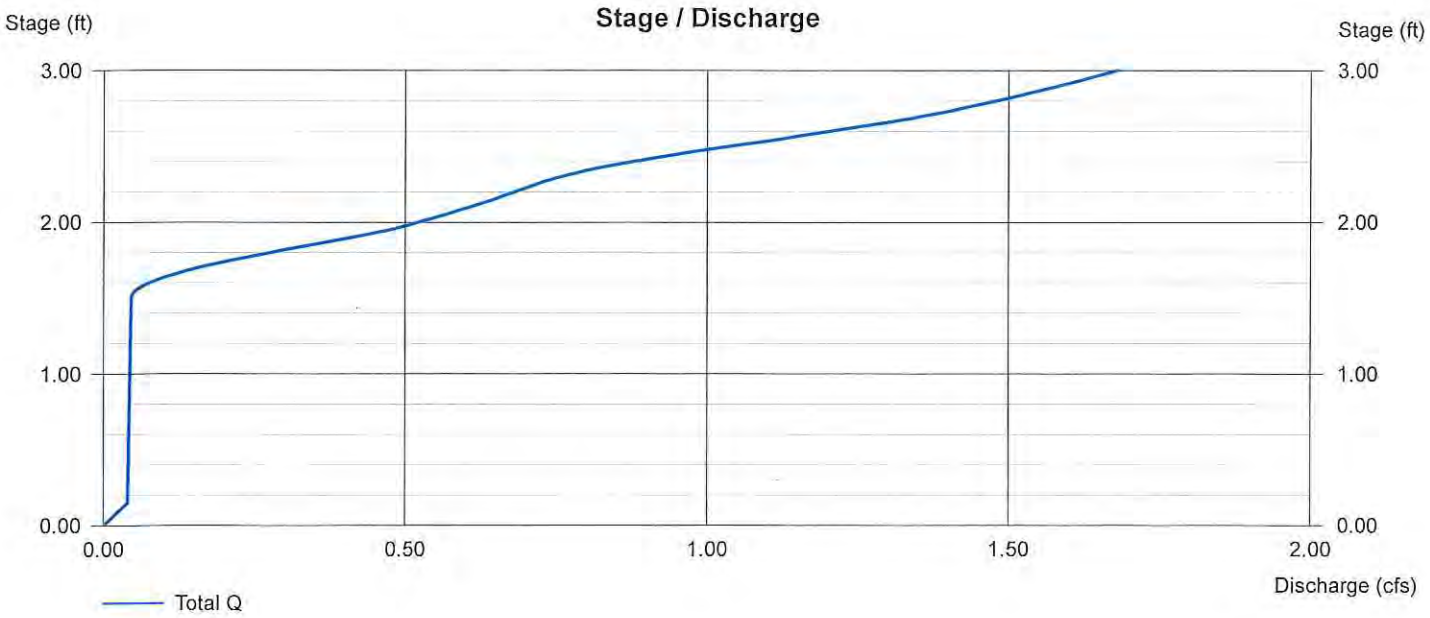
| | [A] | [B] | [C] | [D] |
|---|---|---|---|---|
| Rise (in) | = 6.00 | 6.00 | 0.00 | 0.00 |
| Span (in) | = 6.00 | 6.00 | 0.00 | 0.00 |
| No. Barrels | = 1 | 1 | 0 | 0 |
| Invert El. (ft) | = 163.75 | 164.50 | 0.00 | 0.00 |
| Length (ft) | = 50.00 | 50.00 | 0.00 | 0.00 |
| Slope (%) | = 2.00 | 2.00 | 0.00 | 0.00 |
| N-Value | = .013 | .013 | .000 | .000 |
| Orif. Coeff. | = 0.60 | 0.60 | 0.00 | 0.00 |
| Multi-Stage | = n/a | No | No | No |

### Weir Structures

| | [A] | [B] | [C] | [D] |
|---|---|---|---|---|
| Crest Len (ft) | = 0.00 | 0.00 | 0.00 | 0.00 |
| Crest El. (ft) | = 0.00 | 0.00 | 0.00 | 0.00 |
| Weir Coeff. | = 3.33 | 0.00 | 0.00 | 0.00 |
| Weir Type | = --- | --- | --- | --- |
| Multi-Stage | = No | No | No | No |

Exfiltration = 1.020 in/hr (Wet area)  Tailwater Elev. = 0.00 ft

Note: Culvert/Orifice outflows have been analyzed under inlet and outlet control.



# Hydrograph Plot

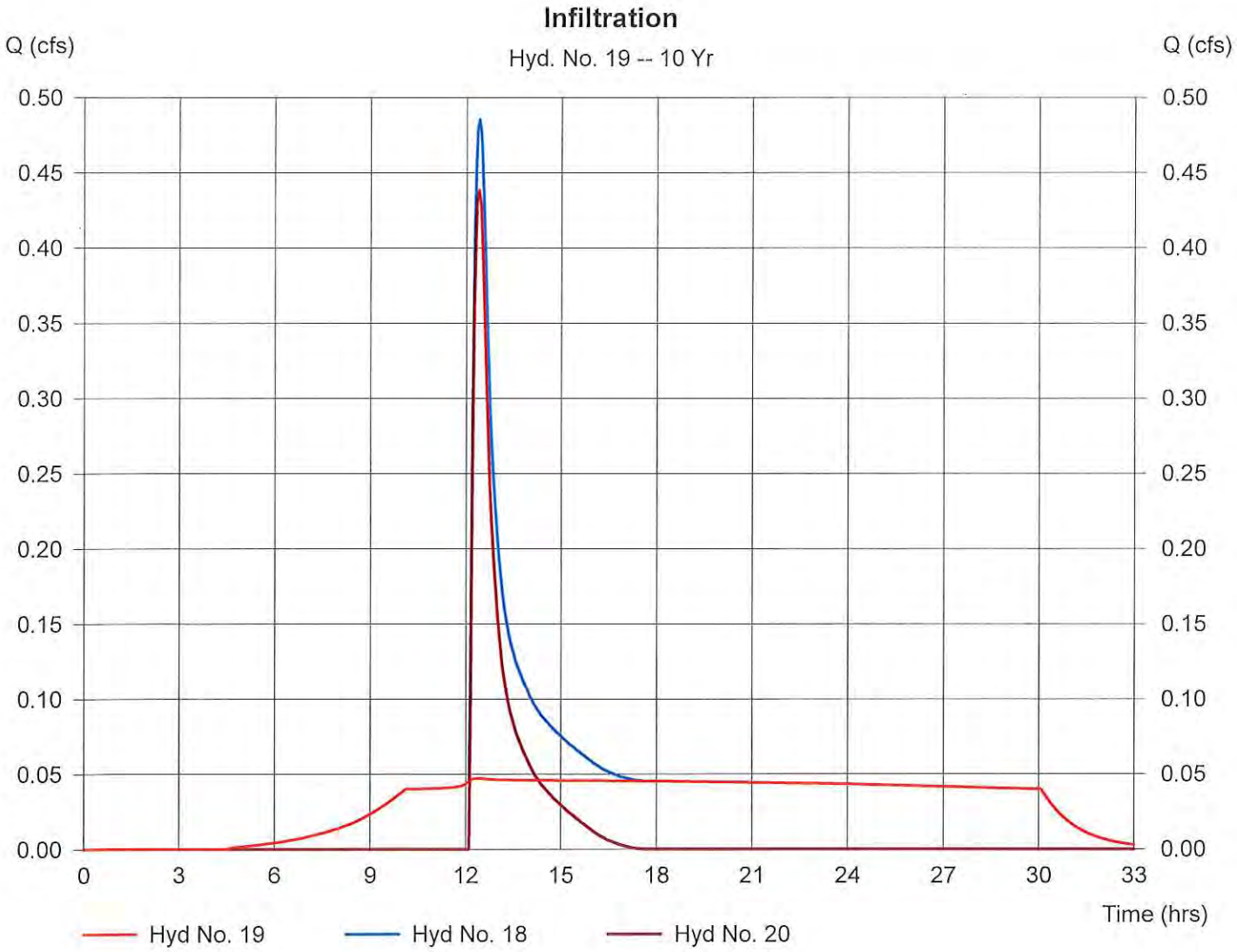


## Hyd. No. 19

Infiltration

| | | | |
|---|---|---|---|
| Hydrograph type | = Diversion1 | Peak discharge | = 0.05 cfs |
| Storm frequency | = 10 yrs | Time interval | = 3 min |
| Inflow hydrograph | = 18 | 2nd diverted hyd. | = 20 |
| Diversion method | = Pond - Infiltration System | Pond structure | = Exfiltration |

Hydrograph Volume = 3,548 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

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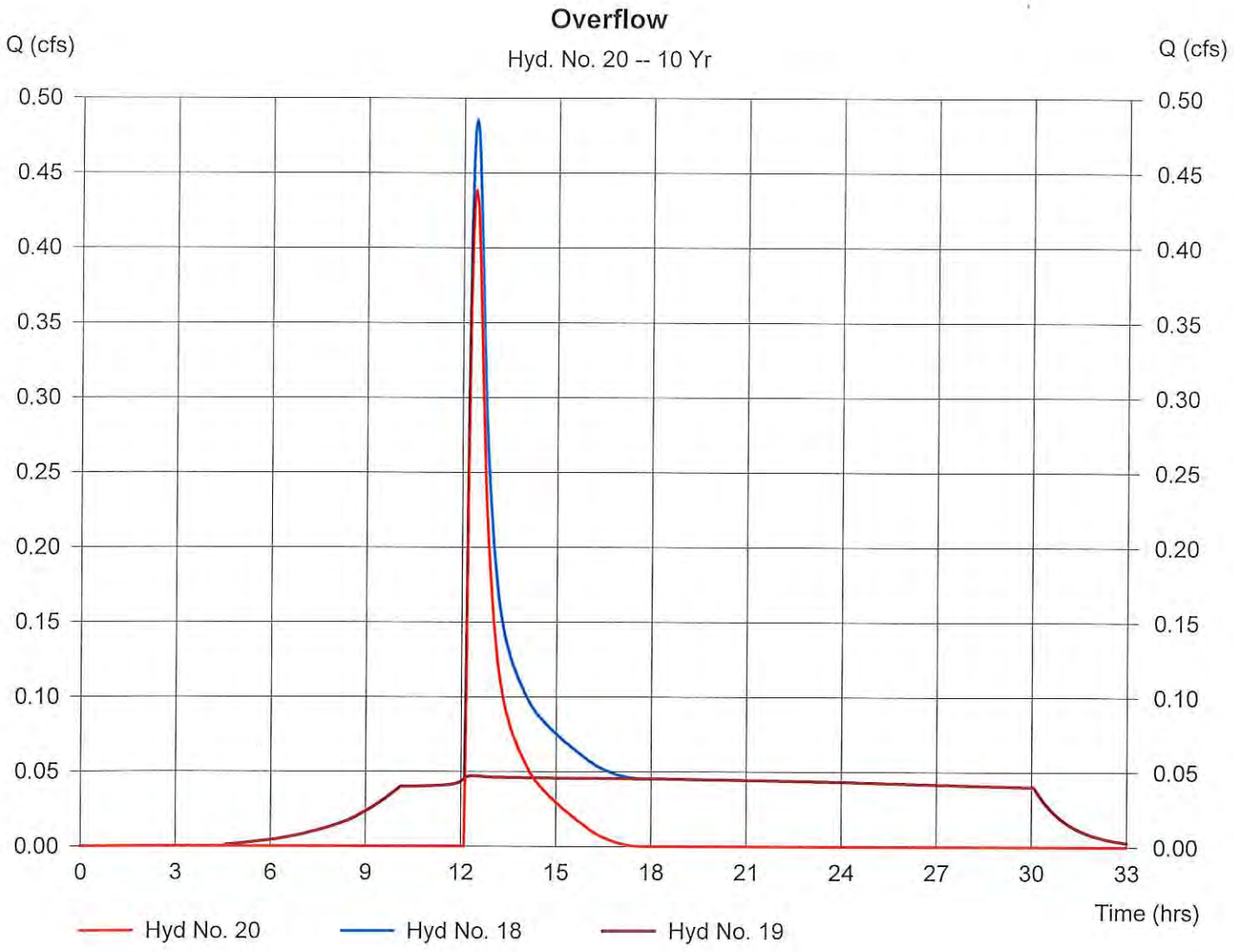
## Hyd. No. 20

Overflow

| | | | |
|---|---|---|---|
| Hydrograph type | = Diversion2 | Peak discharge | = 0.44 cfs |
| Storm frequency | = 10 yrs | Time interval | = 3 min |
| Inflow hydrograph | = 18 | 2nd diverted hyd. | = 19 |
| Diversion method | = Pond - Infiltration System | Pond structure | = Exfiltration |

Hydrograph Volume = 1,510 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

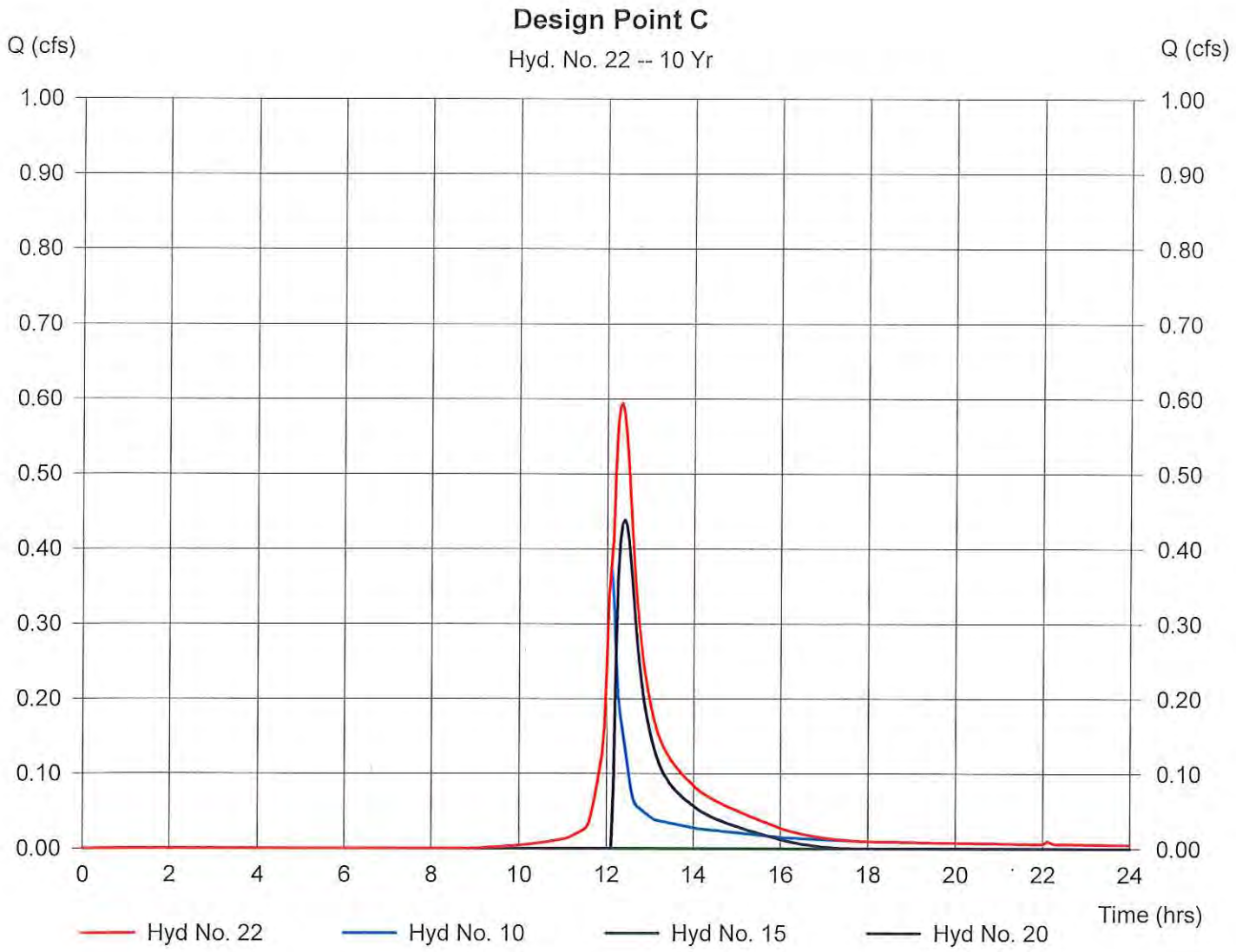
Monday, May 7 2018, 8:27 PM

## Hyd. No. 22

Design Point C

| | | | |
|---|---|---|---|
| Hydrograph type | = Combine | Peak discharge | = 0.59 cfs |
| Storm frequency | = 10 yrs | Time interval | = 3 min |
| Inflow hyds. | = 10, 15, 20 | | |

Hydrograph Volume = 2,761 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

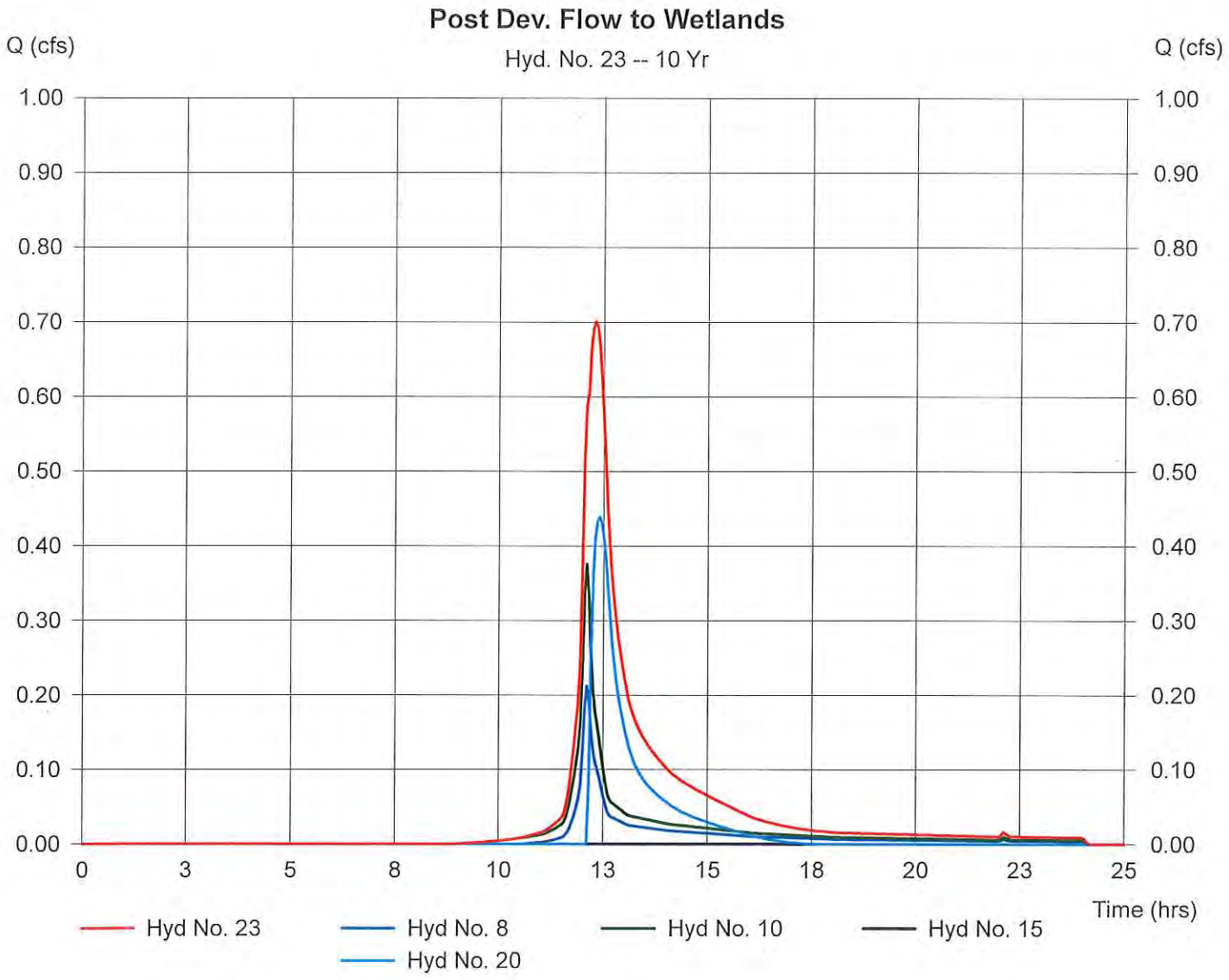
Monday, May 7 2018, 8:27 PM

## Hyd. No. 23

Post Dev. Flow to Wetlands

| | | | |
|---|---|---|---|
| Hydrograph type | = Combine | Peak discharge | = 0.70 cfs |
| Storm frequency | = 10 yrs | Time interval | = 3 min |
| Inflow hyds. | = 8, 10, 15, 20 | | |

Hydrograph Volume = 3,501 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

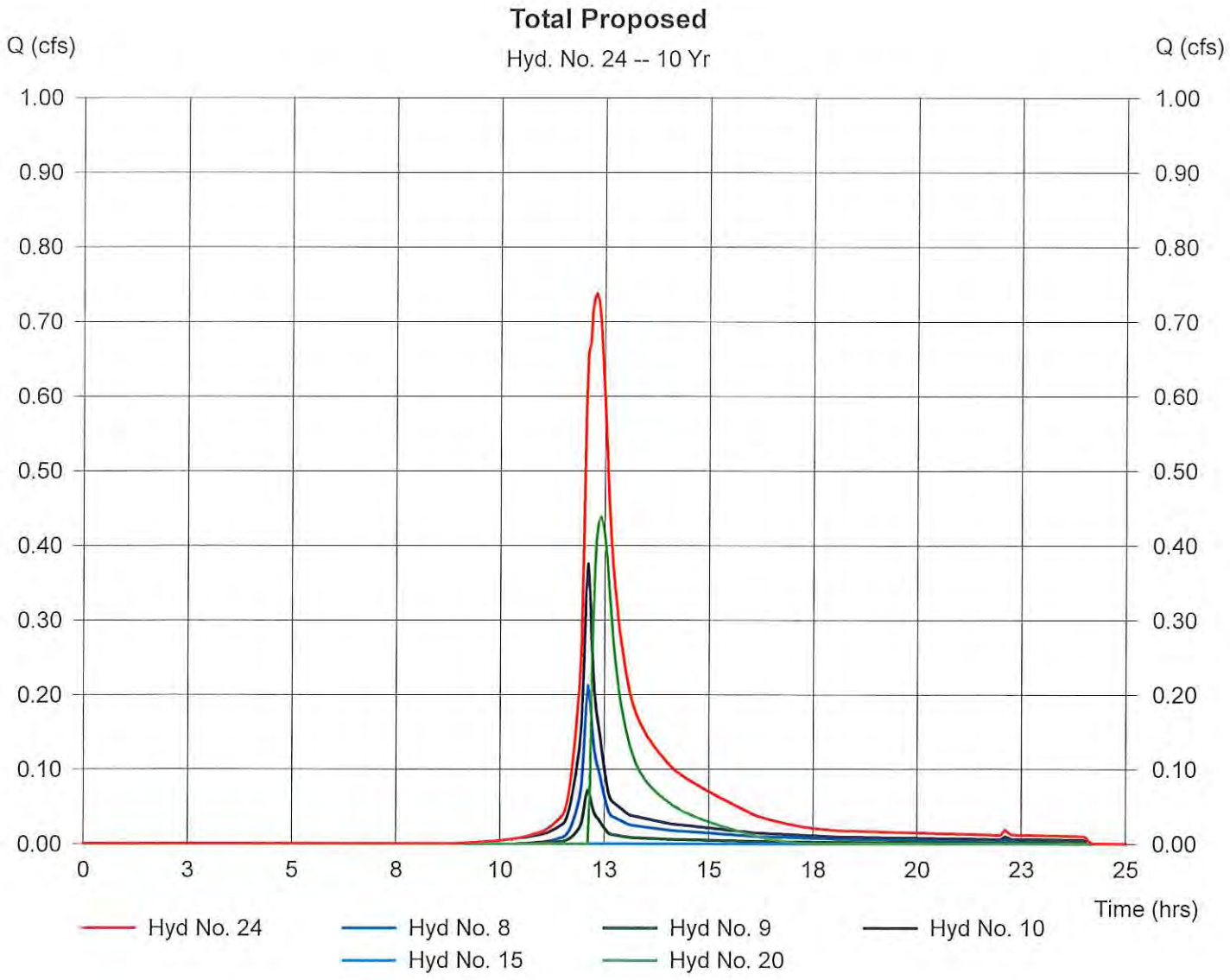
Monday, May 7 2018, 8:27 PM

## Hyd. No. 24

Total Proposed

| | | | |
|---|---|---|---|
| Hydrograph type | = Combine | Peak discharge | = 0.74 cfs |
| Storm frequency | = 10 yrs | Time interval | = 3 min |
| Inflow hyds. | = 8, 9, 10, 15, 20 | | |

Hydrograph Volume = 3,747 cuft



# 25-Year Storm, Pre and Post-Development

# Hydrograph Summary Report

| Hyd. No. | Hydrograph type (origin) | Peak flow (cfs) | Time interval (min) | Time to peak (min) | Volume (cuft) | Inflow hyd(s) | Maximum elevation (ft) | Maximum storage (cuft) | Hydrograph description |
|---|---|---|---|---|---|---|---|---|---|
| 1 | SCS Runoff | 0.86 | 3 | 726 | 2,913 | ---- | ------ | ------ | E.C.B.-1 |
| 2 | SCS Runoff | 0.25 | 3 | 726 | 847 | ---- | ------ | ------ | E.C.B.-2 |
| 3 | SCS Runoff | 1.29 | 3 | 726 | 4,311 | ---- | ------ | ------ | E.C.B.-3 |
| 5 | Combine | 2.16 | 3 | 726 | 7,224 | 1, 3, | ------ | ------ | Flow to Wetlands |
| 6 | Combine | 2.41 | 3 | 726 | 8,071 | 1, 2, 3, | ------ | ------ | Total Existing |
| 8 | SCS Runoff | 0.34 | 3 | 726 | 1,145 | ---- | ------ | ------ | P.D.B.-1 |
| 9 | SCS Runoff | 0.11 | 3 | 726 | 377 | ---- | ------ | ------ | P.D.B.-2 |
| 10 | SCS Runoff | 0.55 | 3 | 726 | 1,813 | ---- | ------ | ------ | P.D.B.-3 |
| 12 | SCS Runoff | 0.42 | 3 | 726 | 1,401 | ---- | ------ | ------ | P.D.B.3A |
| 13 | Reservoir | 0.17 | 3 | 741 | 1,387 | 12 | 164.78 | 591 | Rain Garden |
| 14 | Diversion1 | 0.02 | 3 | 741 | 1,075 | 13 | ------ | ------ | Infiltration |
| 15 | Diversion2 | 0.15 | 3 | 741 | 312 | 13 | ------ | ------ | Overflow |
| 17 | SCS Runoff | 1.87 | 3 | 726 | 6,652 | ---- | ------ | ------ | P.D.B.-4 |
| 18 | Reservoir | 0.81 | 3 | 738 | 6,648 | 17 | 164.60 | 2,505 | Infiltration System |
| 19 | Diversion1 | 0.05 | 3 | 738 | 3,857 | 18 | ------ | ------ | Infiltration |
| 20 | Diversion2 | 0.77 | 3 | 738 | 2,791 | 18 | ------ | ------ | Overflow |
| 22 | Combine | 1.13 | 3 | 741 | 4,916 | 10, 15, 20, | ------ | ------ | Design Point C |
| 23 | Combine | 1.40 | 3 | 729 | 6,061 | 8, 10, 15, 20, | ------ | ------ | Post Dev. Flow to Wetlands |
| 24 | Combine | 1.50 | 3 | 729 | 6,438 | 8, 9, 10, 15, 20, | ------ | ------ | Total Proposed |

# Hydrograph Plot

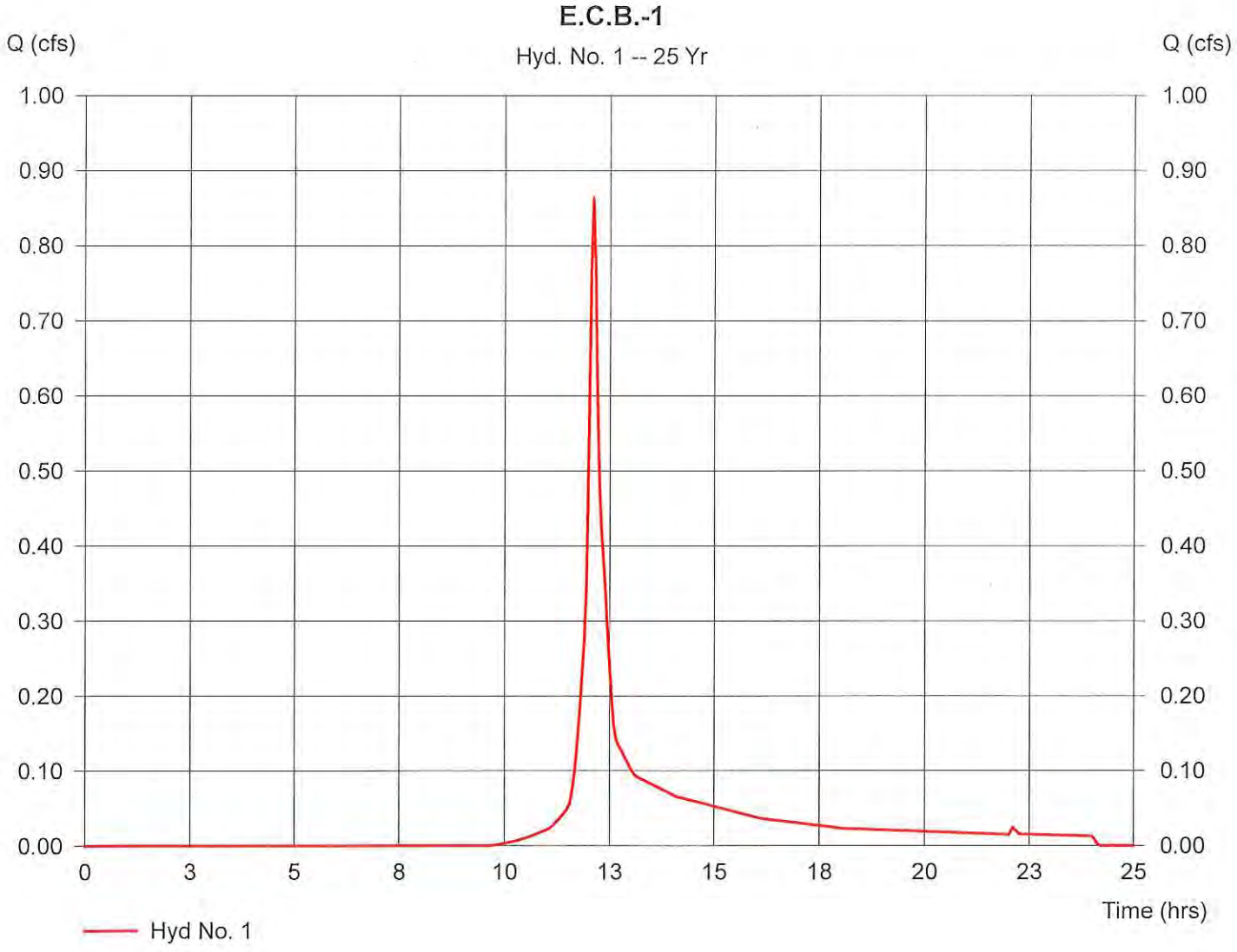


## Hyd. No. 1

E.C.B.-1

| | | | |
|---|---|---|---|
| Hydrograph type | = SCS Runoff | Peak discharge | = 0.86 cfs |
| Storm frequency | = 25 yrs | Time interval | = 3 min |
| Drainage area | = 0.35 ac | Curve number | = 66.4 |
| Basin Slope | = 5.2 % | Hydraulic length | = 189 ft |
| Tc method | = LAG | Time of conc. (Tc) | = 5.407852 min |
| Total precip. | = 5.95 in | Distribution | = Type III |
| Storm duration | = 24 hrs | Shape factor | = 484 |

Hydrograph Volume = 2,913 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

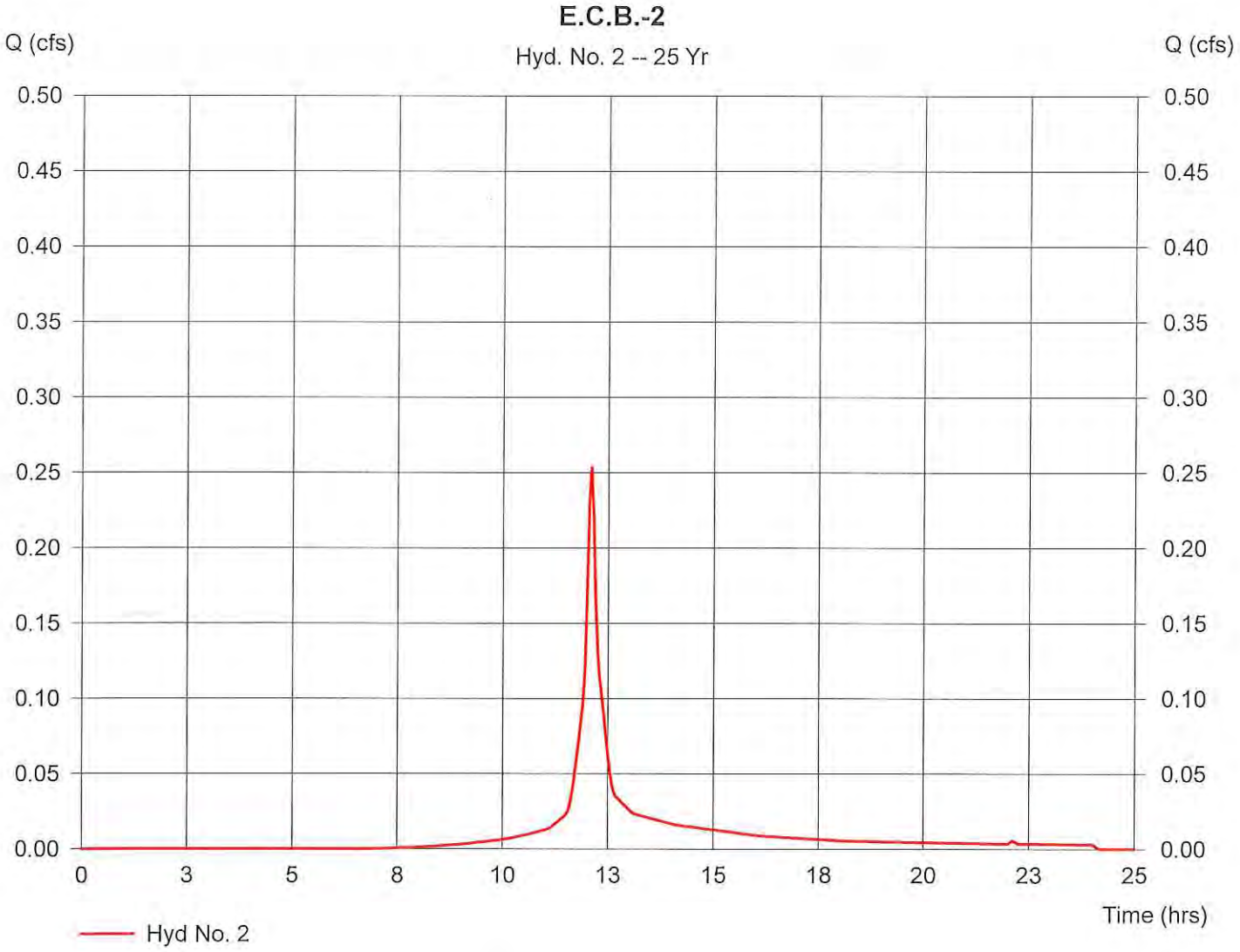
Monday, May 7 2018, 8:27 PM

## Hyd. No. 2

E.C.B.-2

| | | | |
|---|---|---|---|
| Hydrograph type | = SCS Runoff | Peak discharge | = 0.25 cfs |
| Storm frequency | = 25 yrs | Time interval | = 3 min |
| Drainage area | = 0.07 ac | Curve number | = 79.8 |
| Basin Slope | = 1.9 % | Hydraulic length | = 68 ft |
| Tc method | = USER | Time of conc. (Tc) | = 5 min |
| Total precip. | = 5.95 in | Distribution | = Type III |
| Storm duration | = 24 hrs | Shape factor | = 484 |

Hydrograph Volume = 847 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

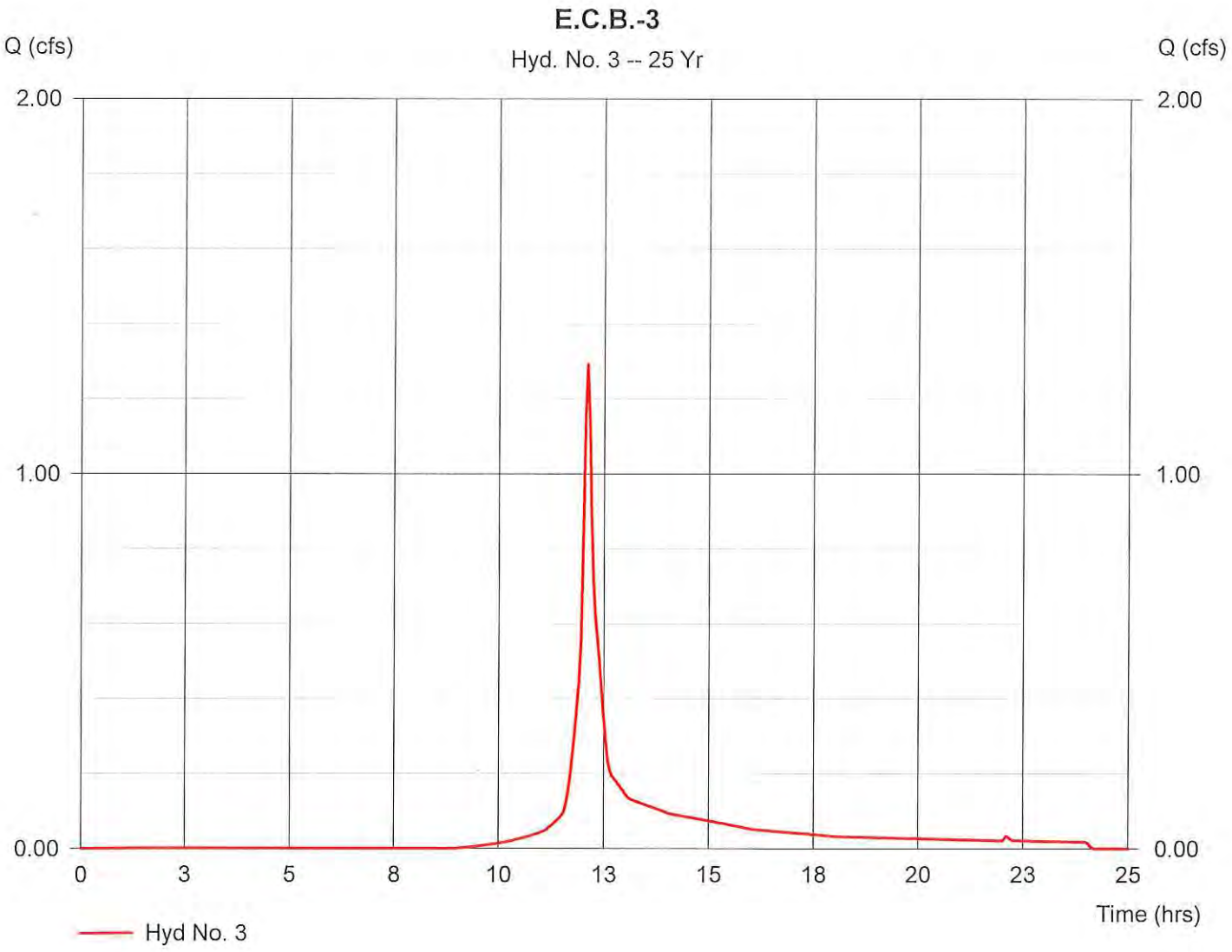
Monday, May 7 2018, 8:27 PM

## Hyd. No. 3

E.C.B.-3

| | | | |
|---|---|---|---|
| Hydrograph type | = SCS Runoff | Peak discharge | = 1.29 cfs |
| Storm frequency | = 25 yrs | Time interval | = 3 min |
| Drainage area | = 0.45 ac | Curve number | = 70.4 |
| Basin Slope | = 4.2 % | Hydraulic length | = 207 ft |
| Tc method | = LAG | Time of conc. (Tc) | = 5.817464 min |
| Total precip. | = 5.95 in | Distribution | = Type III |
| Storm duration | = 24 hrs | Shape factor | = 484 |

Hydrograph Volume = 4,311 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

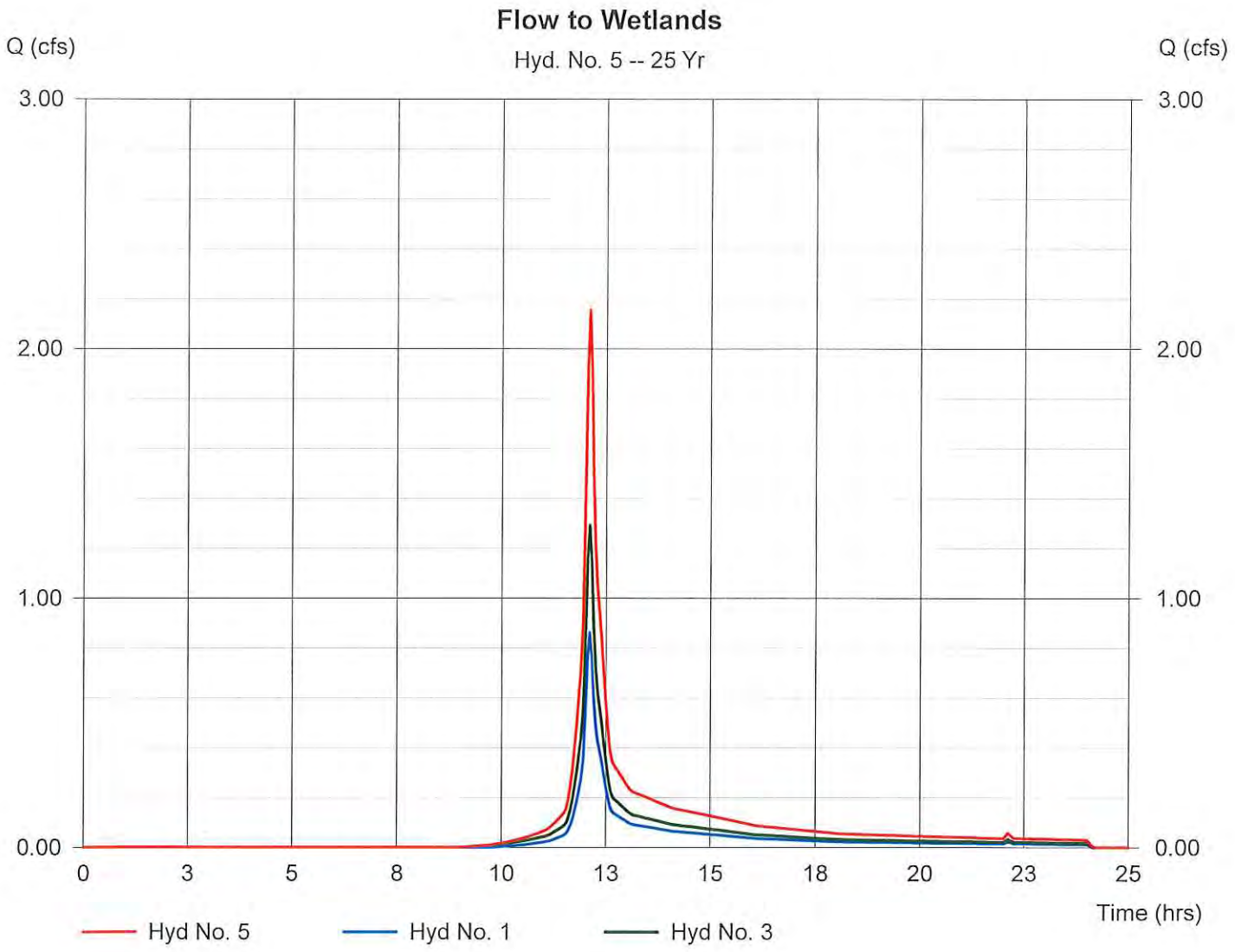
Monday, May 7 2018, 8:27 PM

## Hyd. No. 5

Flow to Wetlands

| | | | |
|---|---|---|---|
| Hydrograph type | = Combine | Peak discharge | = 2.16 cfs |
| Storm frequency | = 25 yrs | Time interval | = 3 min |
| Inflow hyds. | = 1, 3 | | |

Hydrograph Volume = 7,224 cuft



# Hydrograph Plot

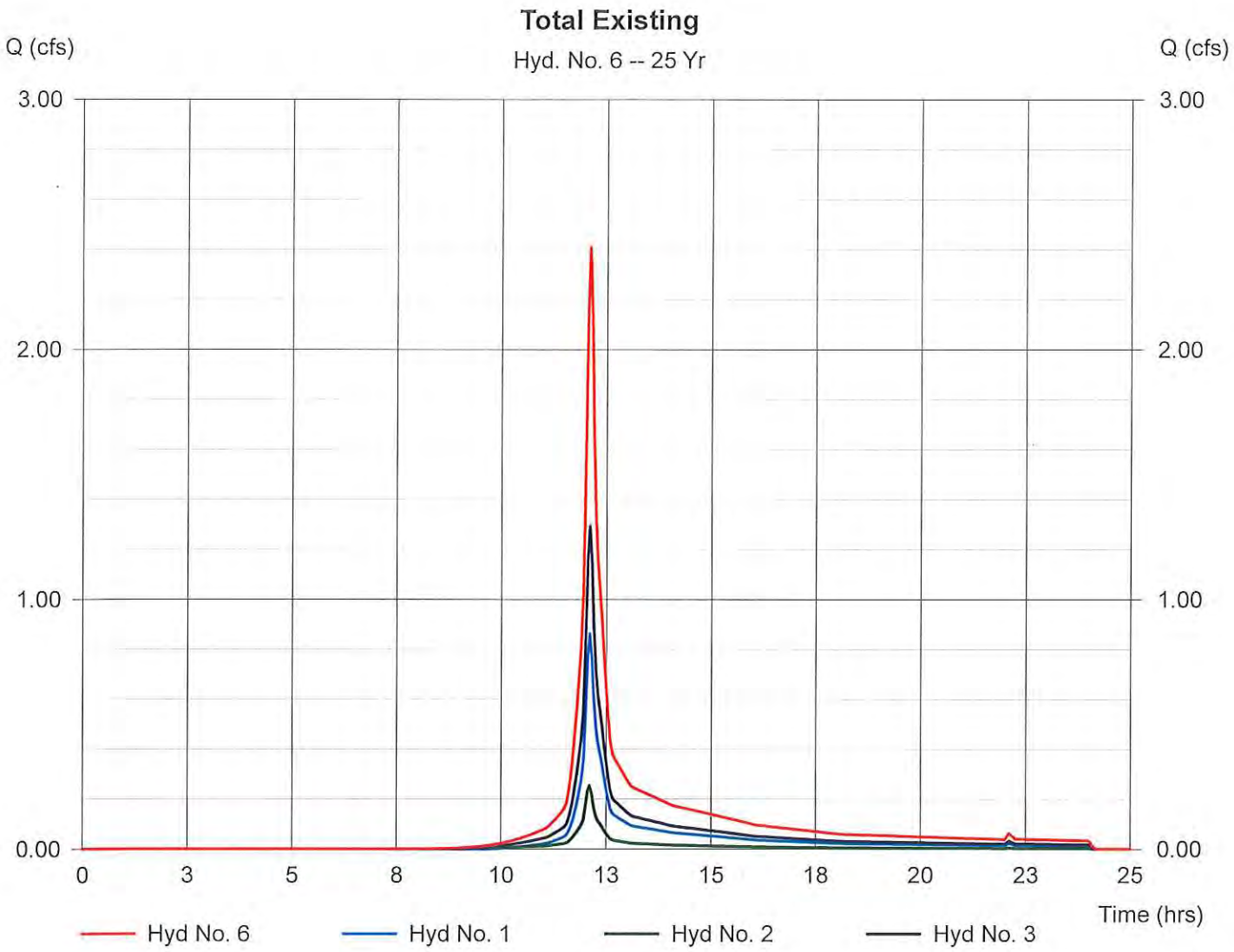


## Hyd. No. 6

Total Existing

| | | | |
|---|---|---|---|
| Hydrograph type | = Combine | Peak discharge | = 2.41 cfs |
| Storm frequency | = 25 yrs | Time interval | = 3 min |
| Inflow hyds. | = 1, 2, 3 | | |

Hydrograph Volume = 8,071 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

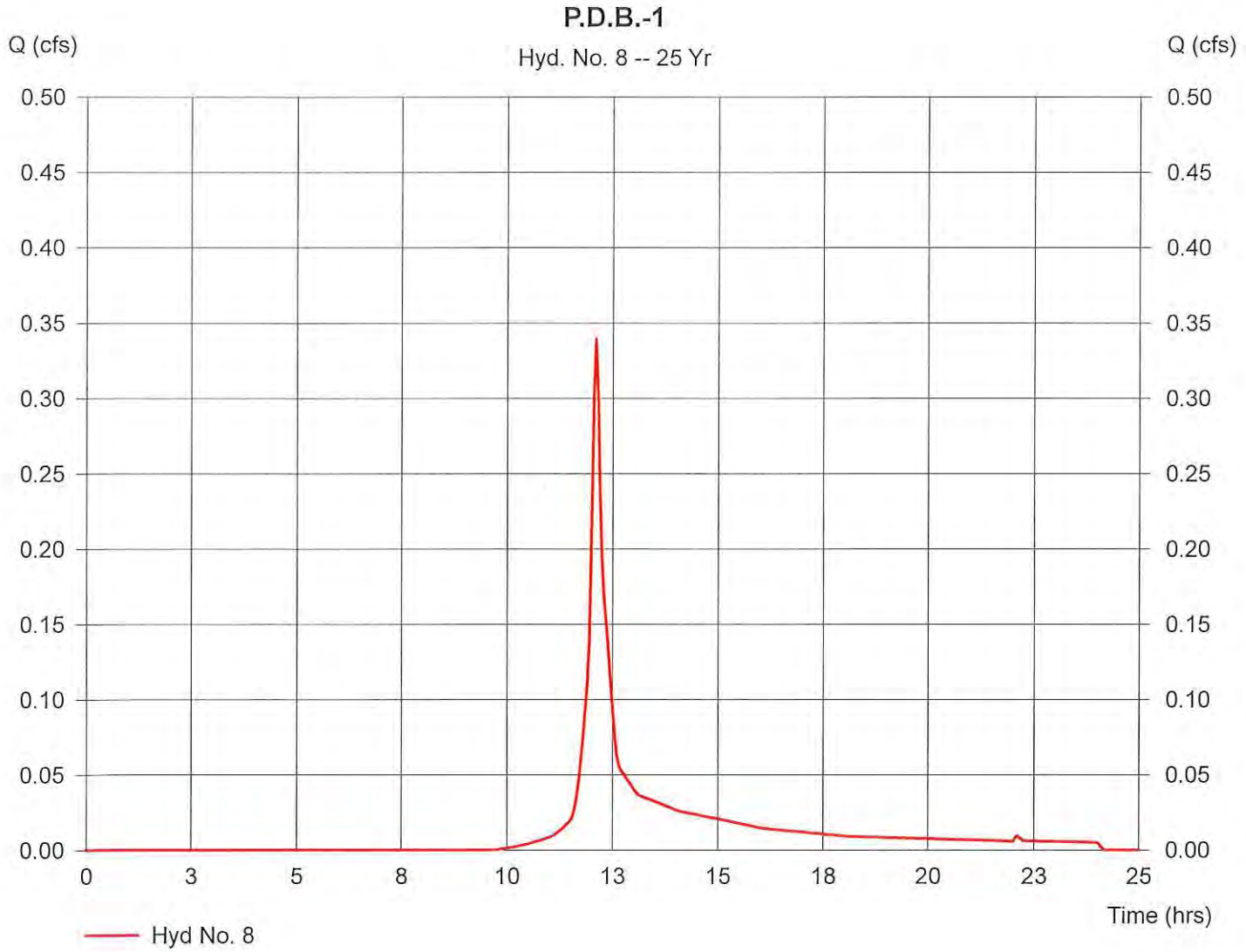
Monday, May 7 2018, 8:27 PM

## Hyd. No. 8

P.D.B.-1

| | | | |
|---|---|---|---|
| Hydrograph type | = SCS Runoff | Peak discharge | = 0.34 cfs |
| Storm frequency | = 25 yrs | Time interval | = 3 min |
| Drainage area | = 0.14 ac | Curve number | = 66.4 |
| Basin Slope | = 4.4 % | Hydraulic length | = 222 ft |
| Tc method | = LAG | Time of conc. (Tc) | = 6.686719 min |
| Total precip. | = 5.95 in | Distribution | = Type III |
| Storm duration | = 24 hrs | Shape factor | = 484 |

Hydrograph Volume = 1,145 cuft



# Hydrograph Plot

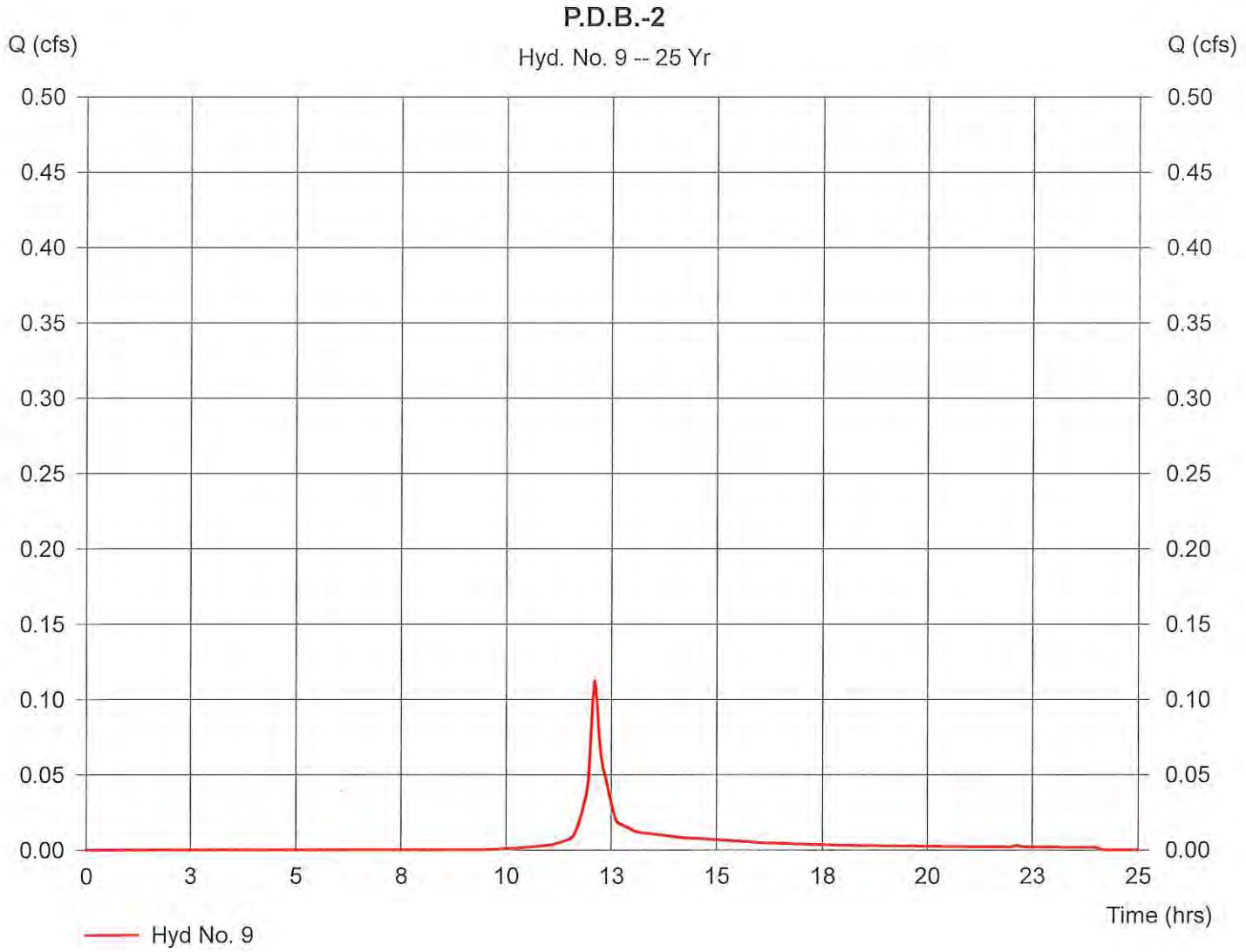


## Hyd. No. 9

P.D.B.-2

| | | | |
|---|---|---|---|
| Hydrograph type | = SCS Runoff | Peak discharge | = 0.11 cfs |
| Storm frequency | = 25 yrs | Time interval | = 3 min |
| Drainage area | = 0.04 ac | Curve number | = 67.9 |
| Basin Slope | = 1.0 % | Hydraulic length | = 49 ft |
| Tc method | = USER | Time of conc. (Tc) | = 5 min |
| Total precip. | = 5.95 in | Distribution | = Type III |
| Storm duration | = 24 hrs | Shape factor | = 484 |

Hydrograph Volume = 377 cuft



# Hydrograph Plot

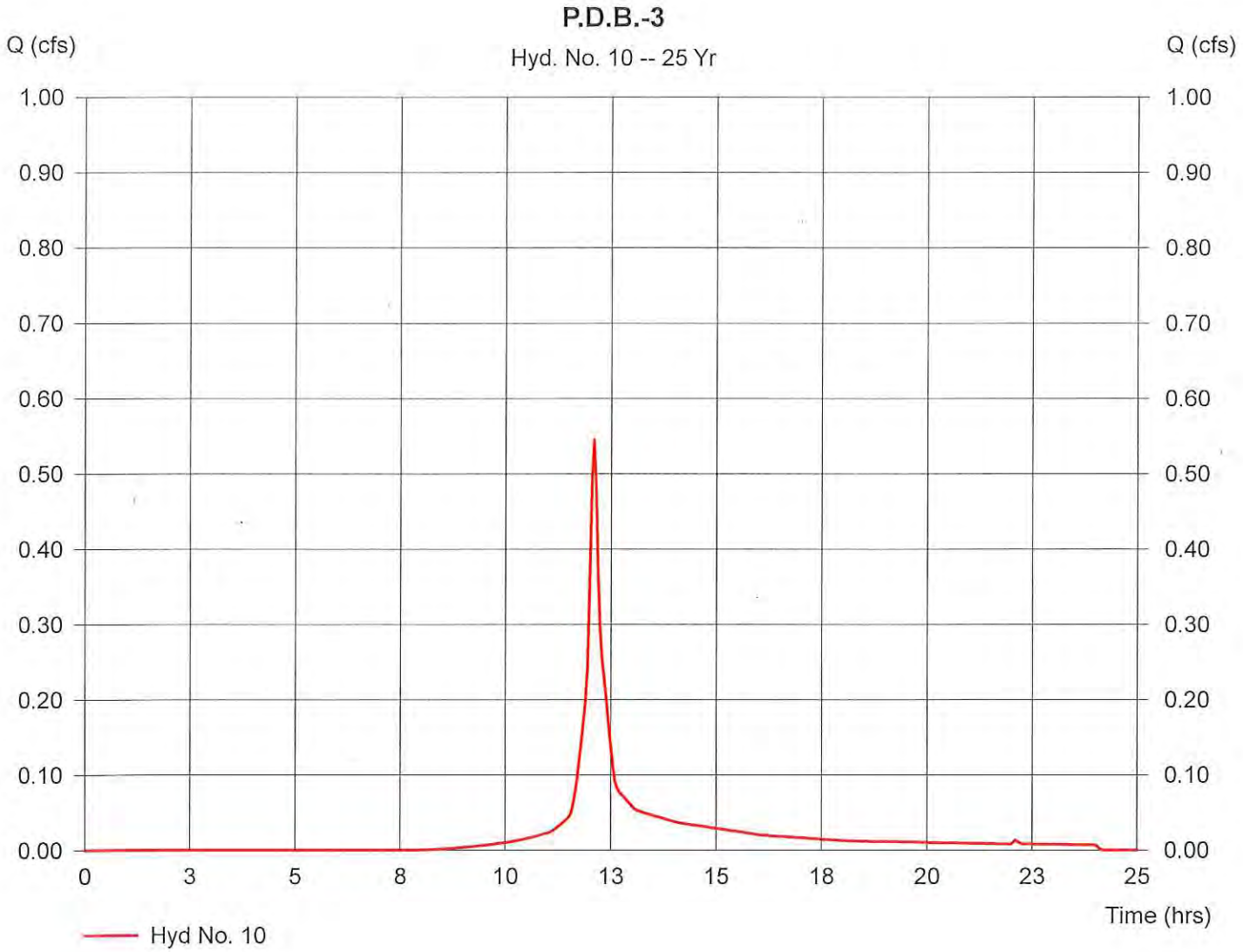


## Hyd. No. 10

P.D.B.-3

| | | | |
|---|---|---|---|
| Hydrograph type | = SCS Runoff | Peak discharge | = 0.55 cfs |
| Storm frequency | = 25 yrs | Time interval | = 3 min |
| Drainage area | = 0.16 ac | Curve number | = 75.3 |
| Basin Slope | = 3.8 % | Hydraulic length | = 196 ft |
| Tc method | = USER | Time of conc. (Tc) | = 5 min |
| Total precip. | = 5.95 in | Distribution | = Type III |
| Storm duration | = 24 hrs | Shape factor | = 484 |

Hydrograph Volume = 1,813 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

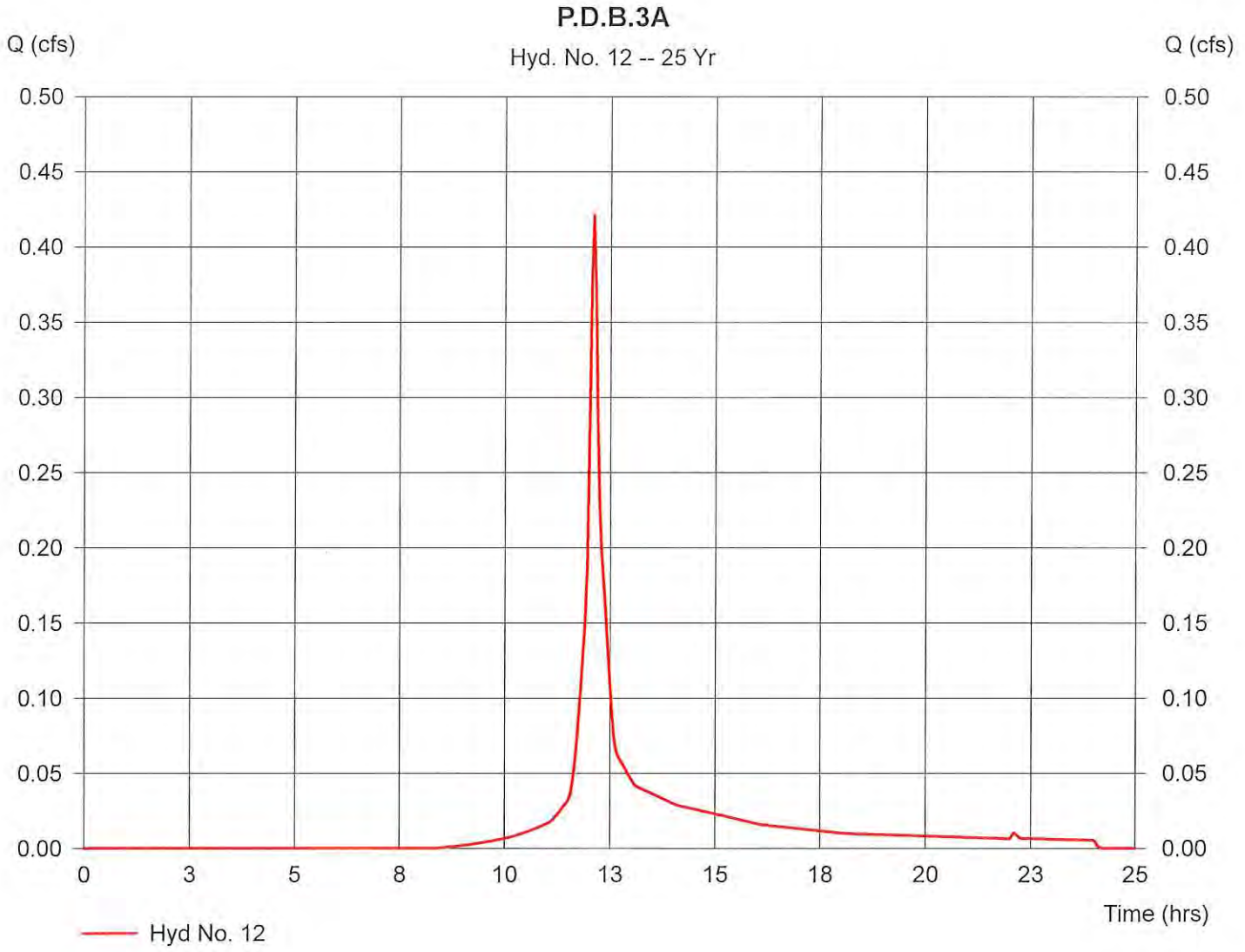
Monday, May 7 2018, 8:27 PM

## Hyd. No. 12

P.D.B.3A

| | | | |
|---|---|---|---|
| Hydrograph type | = SCS Runoff | Peak discharge | = 0.42 cfs |
| Storm frequency | = 25 yrs | Time interval | = 3 min |
| Drainage area | = 0.13 ac | Curve number | = 73.5 |
| Basin Slope | = 2.0 % | Hydraulic length | = 100 ft |
| Tc method | = USER | Time of conc. (Tc) | = 5 min |
| Total precip. | = 5.95 in | Distribution | = Type III |
| Storm duration | = 24 hrs | Shape factor | = 484 |

Hydrograph Volume = 1,401 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, May 7 2018, 8:27 PM

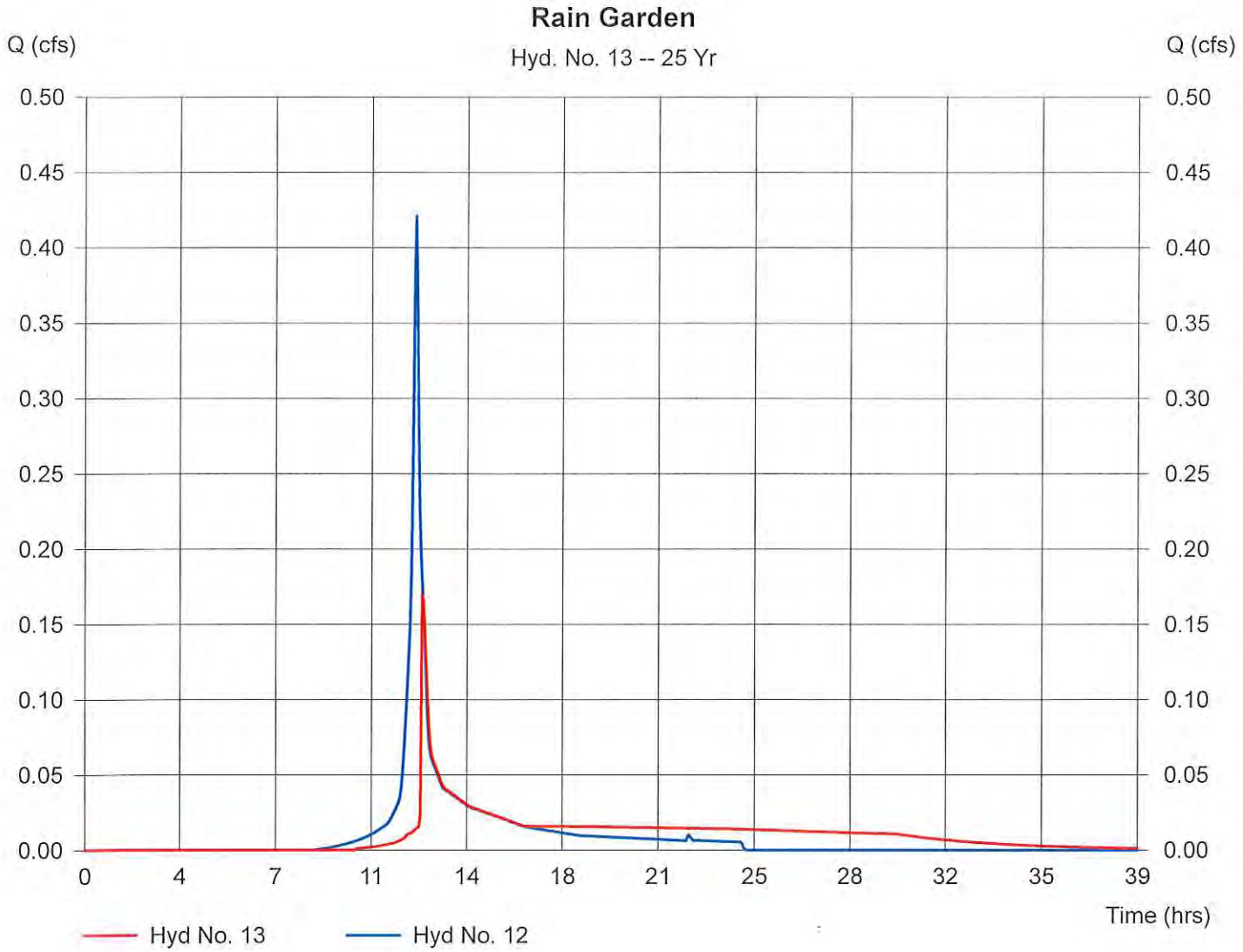
## Hyd. No. 13

Rain Garden

| | | | |
|---|---|---|---|
| Hydrograph type | = Reservoir | Peak discharge | = 0.17 cfs |
| Storm frequency | = 25 yrs | Time interval | = 3 min |
| Inflow hyd. No. | = 12 | Max. Elevation | = 164.78 ft |
| Reservoir name | = Rain Garden | Max. Storage | = 591 cuft |

Storage Indication method used.

Hydrograph Volume = 1,387 cuft



# Pond Report

Hydraflow Hydrographs by Intelisolve

Monday, May 7 2018, 8:27 PM

## Pond No. 5 - Rain Garden

### Pond Data

Pond storage is based on known contour areas. Average end area method used.

### Stage / Storage Table

| Stage (ft) | Elevation (ft) | Contour area (sqft) | Incr. Storage (cuft) | Total storage (cuft) |
|---|---|---|---|---|
| 0.00 | 163.50 | 140 | 0 | 0 |
| 0.50 | 164.00 | 448 | 147 | 147 |
| 1.00 | 164.50 | 591 | 260 | 407 |
| 1.50 | 165.00 | 748 | 335 | 742 |

### Culvert / Orifice Structures

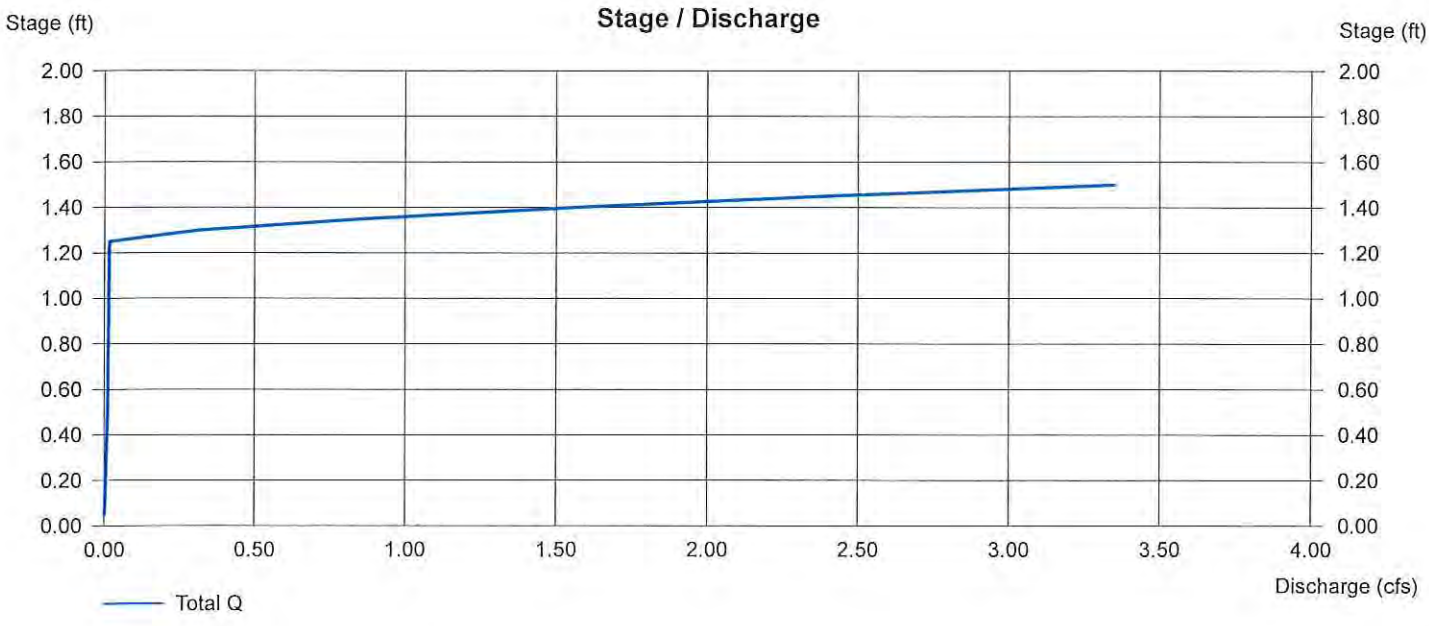
| | [A] | [B] | [C] | [D] |
|---|---|---|---|---|
| Rise (in) | = 0.00 | 0.00 | 0.00 | 0.00 |
| Span (in) | = 0.00 | 0.00 | 0.00 | 0.00 |
| No. Barrels | = 0 | 0 | 0 | 0 |
| Invert El. (ft) | = 0.00 | 0.00 | 0.00 | 0.00 |
| Length (ft) | = 0.00 | 0.00 | 0.00 | 0.00 |
| Slope (%) | = 0.00 | 0.00 | 0.00 | 0.00 |
| N-Value | = .000 | .000 | .000 | .000 |
| Orif. Coeff. | = 0.00 | 0.00 | 0.00 | 0.00 |
| Multi-Stage | = n/a | No | No | No |

### Weir Structures

| | [A] | [B] | [C] | [D] |
|---|---|---|---|---|
| Crest Len (ft) | = 8.00 | 0.00 | 0.00 | 0.00 |
| Crest El. (ft) | = 164.75 | 0.00 | 0.00 | 0.00 |
| Weir Coeff. | = 3.33 | 0.00 | 0.00 | 0.00 |
| Weir Type | = Rect | --- | --- | --- |
| Multi-Stage | = No | No | No | No |

Exfiltration = 1.020 in/hr (Contour) Tailwater Elev. = 0.00 ft

Note: Culvert/Orifice outflows have been analyzed under inlet and outlet control.



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

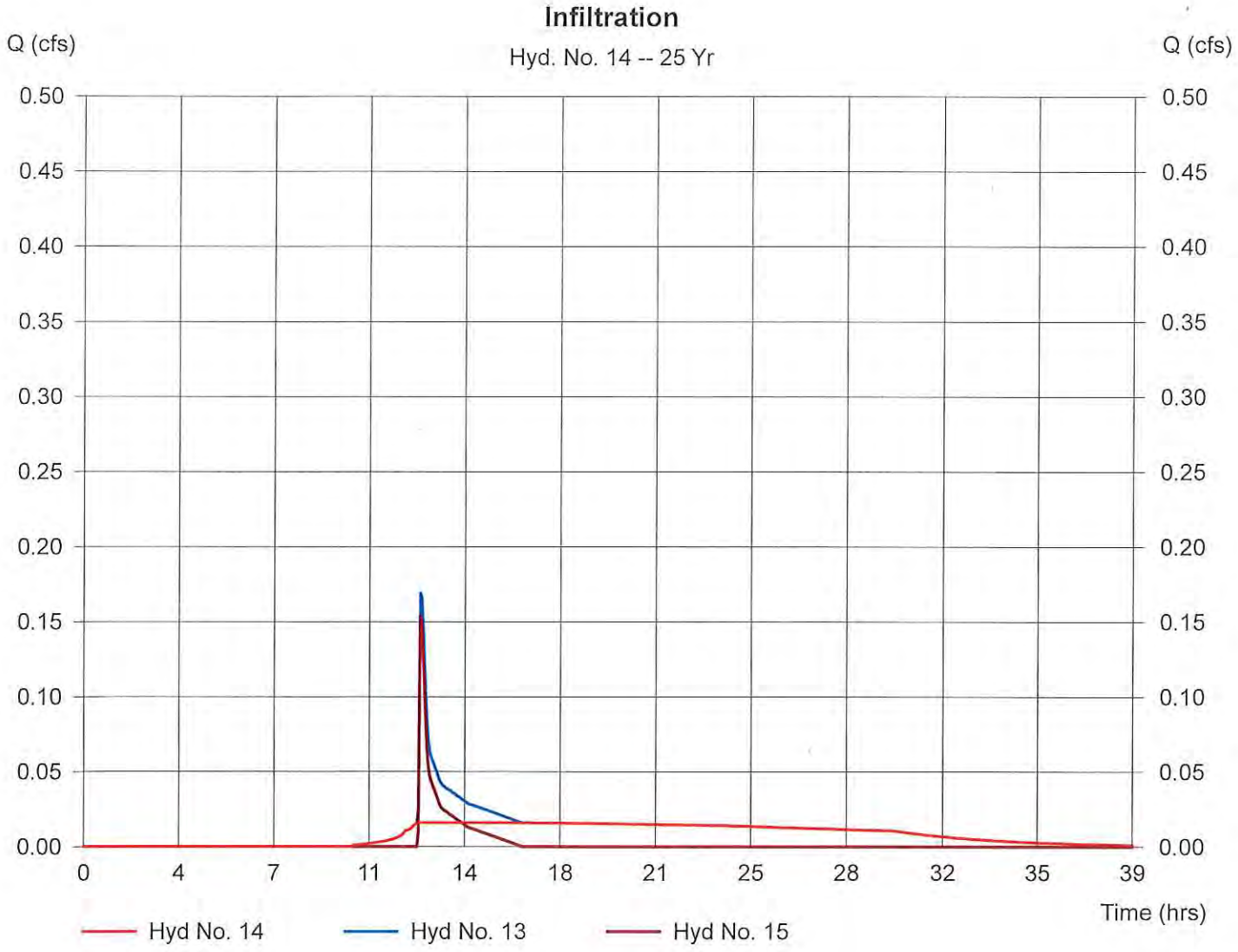
Monday, May 7 2018, 8:27 PM

## Hyd. No. 14

Infiltration

| | | | |
|---|---|---|---|
| Hydrograph type | = Diversion1 | Peak discharge | = 0.02 cfs |
| Storm frequency | = 25 yrs | Time interval | = 3 min |
| Inflow hydrograph | = 13 | 2nd diverted hyd. | = 15 |
| Diversion method | = Pond - Rain Garden | Pond structure | = Exfiltration |

Hydrograph Volume = 1,075 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

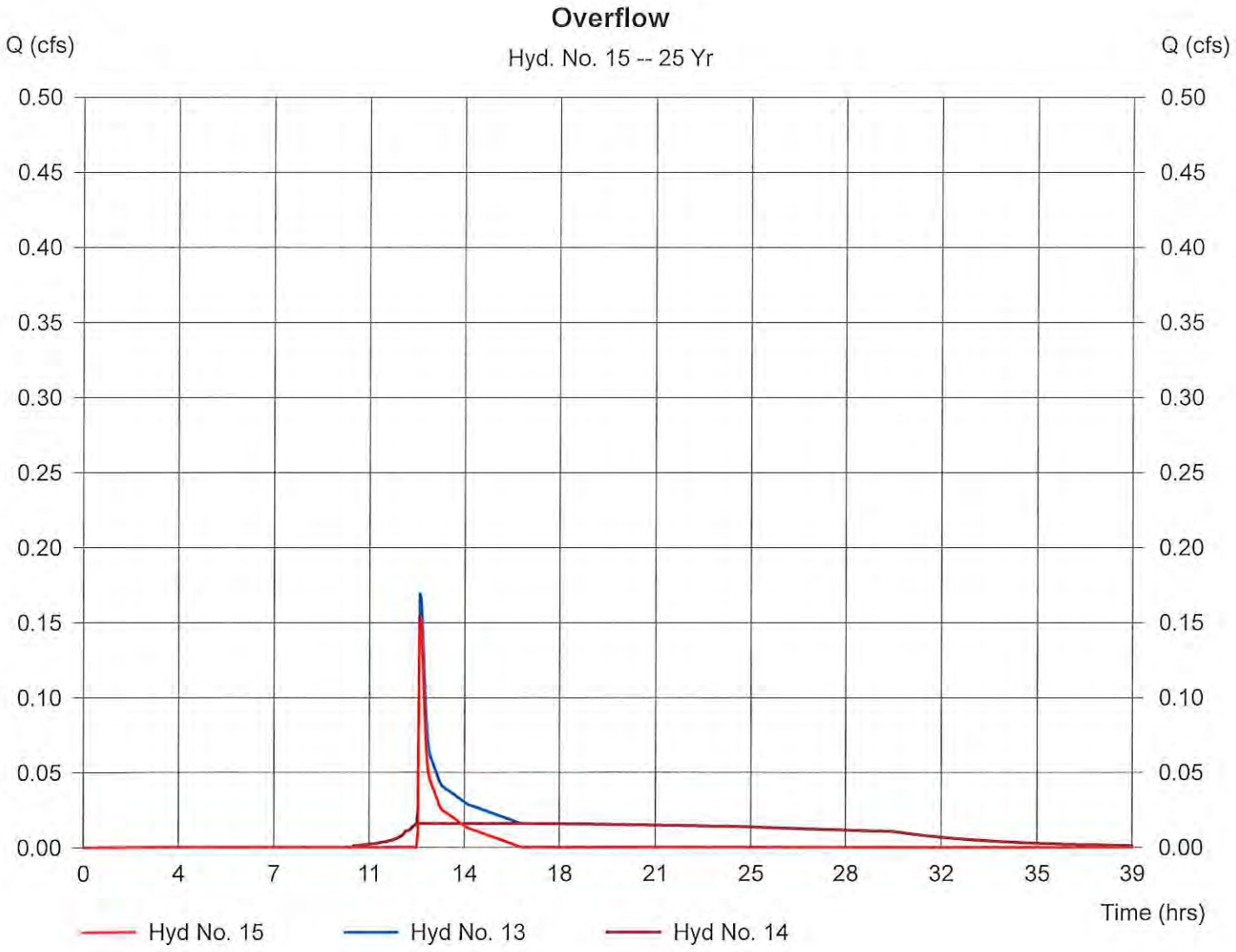
Monday, May 7 2018, 8:27 PM

## Hyd. No. 15

Overflow

| | | | |
|---|---|---|---|
| Hydrograph type | = Diversion2 | Peak discharge | = 0.15 cfs |
| Storm frequency | = 25 yrs | Time interval | = 3 min |
| Inflow hydrograph | = 13 | 2nd diverted hyd. | = 14 |
| Diversion method | = Pond - Rain Garden | Pond structure | = Exfiltration |

Hydrograph Volume = 312 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

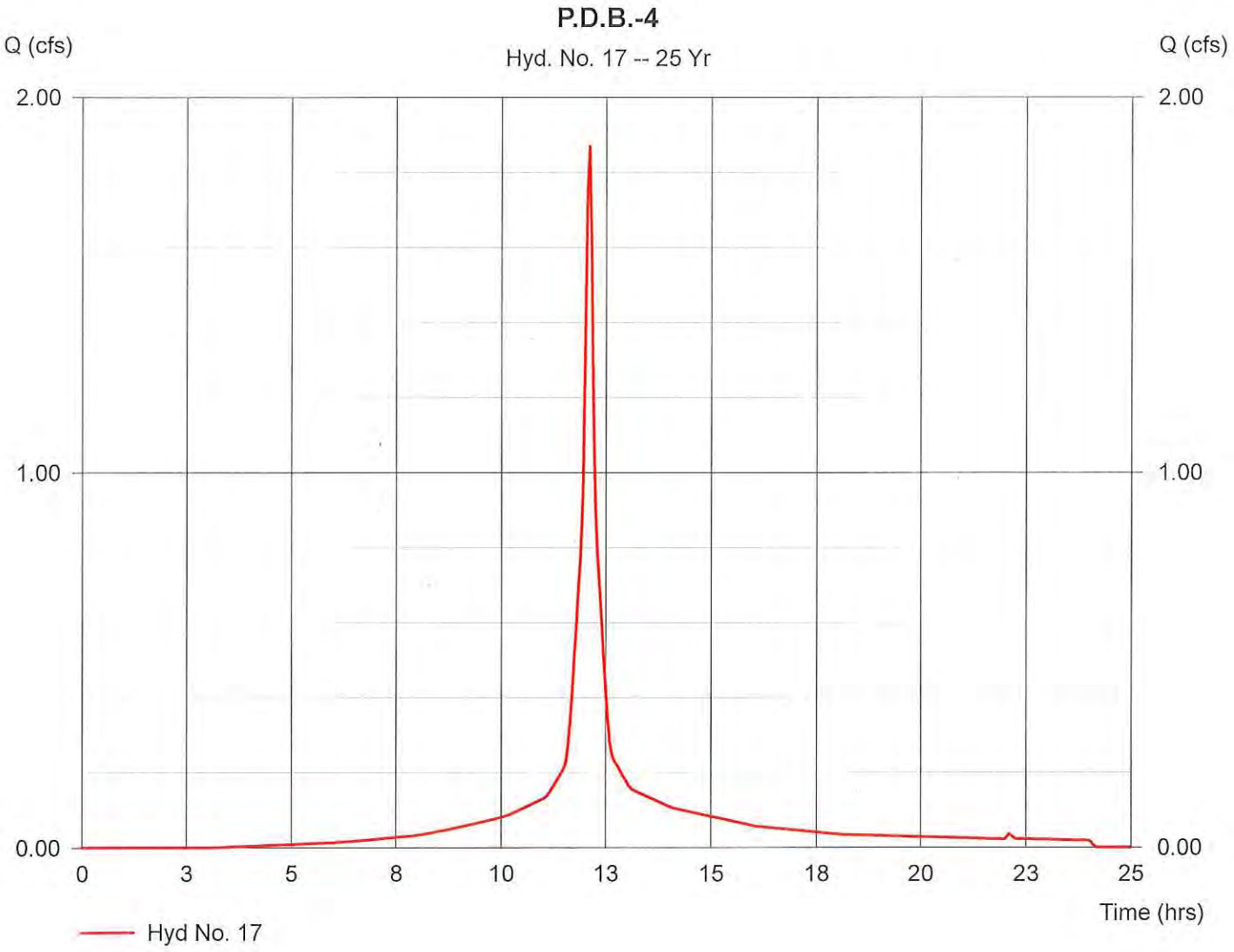
Monday, May 7 2018, 8:27 PM

## Hyd. No. 17

P.D.B.-4

| | | | |
|---|---|---|---|
| Hydrograph type | = SCS Runoff | Peak discharge | = 1.87 cfs |
| Storm frequency | = 25 yrs | Time interval | = 3 min |
| Drainage area | = 0.39 ac | Curve number | = 91.7 |
| Basin Slope | = 2.0 % | Hydraulic length | = 100 ft |
| Tc method | = USER | Time of conc. (Tc) | = 5 min |
| Total precip. | = 5.95 in | Distribution | = Type III |
| Storm duration | = 24 hrs | Shape factor | = 484 |

Hydrograph Volume = 6,652 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, May 7 2018, 8:27 PM

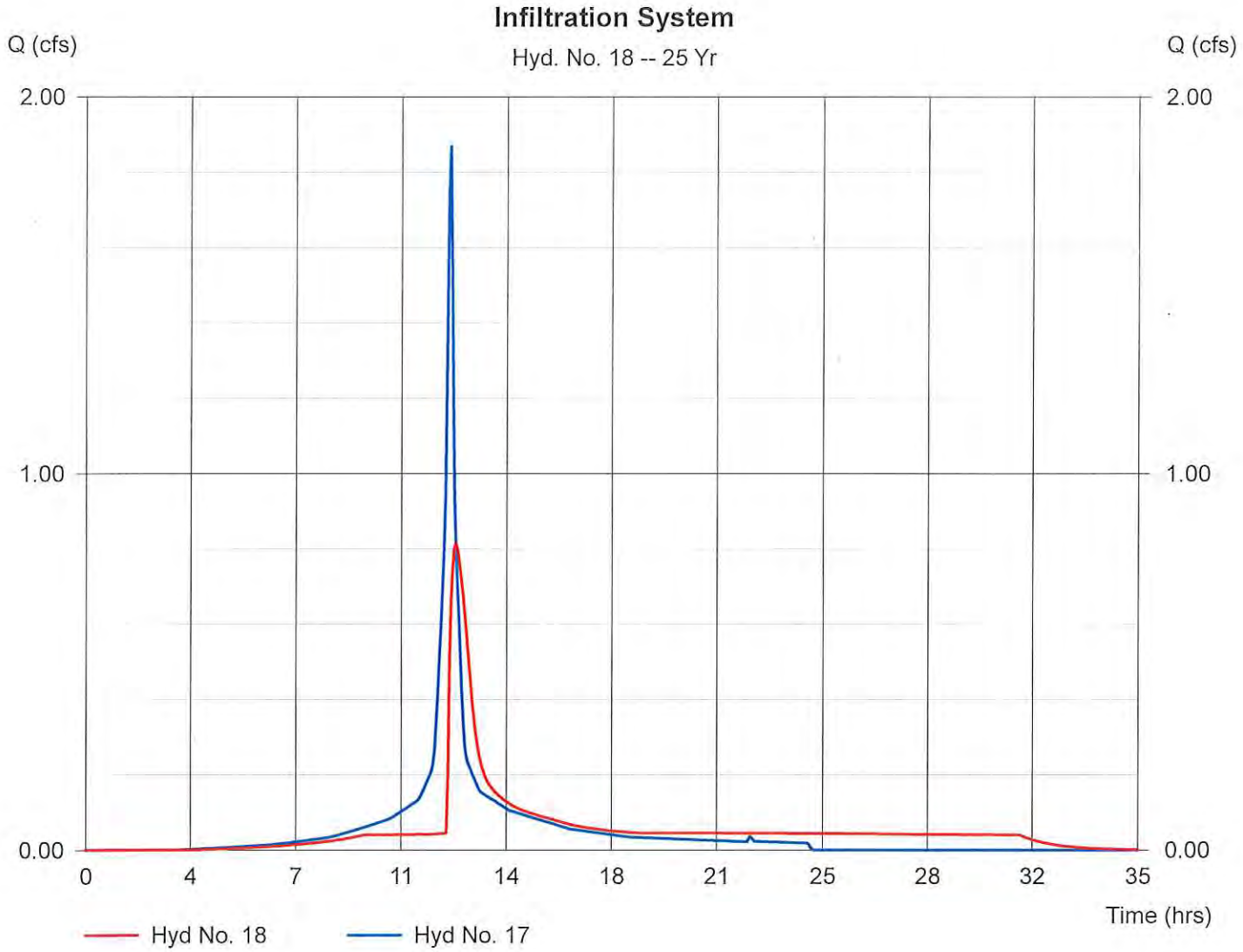
## Hyd. No. 18

Infiltration System

| | | | |
|---|---|---|---|
| Hydrograph type | = Reservoir | Peak discharge | = 0.81 cfs |
| Storm frequency | = 25 yrs | Time interval | = 3 min |
| Inflow hyd. No. | = 17 | Max. Elevation | = 164.60 ft |
| Reservoir name | = Infiltration System | Max. Storage | = 2,505 cuft |

Storage Indication method used.

Hydrograph Volume = 6,648 cuft



# Pond Report

Hydraflow Hydrographs by Intelisolve

Monday, May 7 2018, 8:27 PM

## Pond No. 1 - Infiltration System

### Pond Data

Bottom LxW = 52.0 x 32.0 ft  Side slope = 0.0:1  Bottom elev. = 162.25 ft  Depth = 3.00 ft

### Stage / Storage Table

| Stage (ft) | Elevation (ft) | Contour area (sqft) | Incr. Storage (cuft)* | Total storage (cuft)* |
|---|---|---|---|---|
| 0.00 | 162.25 | 1,664 | 0 | 0 |
| 0.15 | 162.40 | 1,664 | 160 | 160 |
| 0.30 | 162.55 | 1,664 | 160 | 319 |
| 0.45 | 162.70 | 1,664 | 160 | 479 |
| 0.60 | 162.85 | 1,664 | 160 | 639 |
| 0.75 | 163.00 | 1,664 | 160 | 799 |
| 0.90 | 163.15 | 1,664 | 160 | 958 |
| 1.05 | 163.30 | 1,664 | 160 | 1,118 |
| 1.20 | 163.45 | 1,664 | 160 | 1,278 |
| 1.35 | 163.60 | 1,664 | 160 | 1,438 |
| 1.50 | 163.75 | 1,664 | 160 | 1,597 |
| 1.65 | 163.90 | 1,664 | 160 | 1,757 |
| 1.80 | 164.05 | 1,664 | 160 | 1,917 |
| 1.95 | 164.20 | 1,664 | 160 | 2,077 |
| 2.10 | 164.35 | 1,664 | 160 | 2,236 |
| 2.25 | 164.50 | 1,664 | 160 | 2,396 |
| 2.40 | 164.65 | 1,664 | 160 | 2,556 |
| 2.55 | 164.80 | 1,664 | 160 | 2,716 |
| 2.70 | 164.95 | 1,664 | 160 | 2,875 |
| 2.85 | 165.10 | 1,664 | 160 | 3,035 |
| 3.00 | 165.25 | 1,664 | 160 | 3,195 |

(*64.00% voids applied)

### Culvert / Orifice Structures

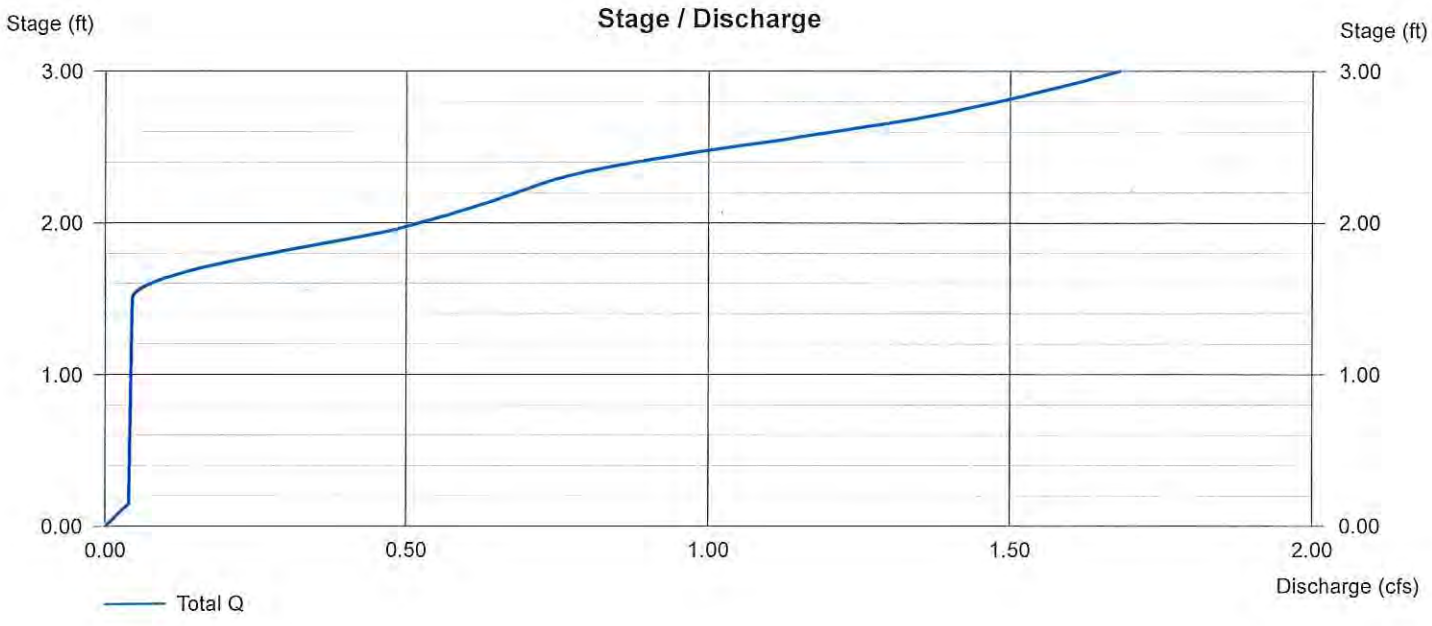
| | [A] | [B] | [C] | [D] |
|---|---|---|---|---|
| Rise (in) | = 6.00 | 6.00 | 0.00 | 0.00 |
| Span (in) | = 6.00 | 6.00 | 0.00 | 0.00 |
| No. Barrels | = 1 | 1 | 0 | 0 |
| Invert El. (ft) | = 163.75 | 164.50 | 0.00 | 0.00 |
| Length (ft) | = 50.00 | 50.00 | 0.00 | 0.00 |
| Slope (%) | = 2.00 | 2.00 | 0.00 | 0.00 |
| N-Value | = .013 | .013 | .000 | .000 |
| Orif. Coeff. | = 0.60 | 0.60 | 0.00 | 0.00 |
| Multi-Stage | = n/a | No | No | No |

### Weir Structures

| | [A] | [B] | [C] | [D] |
|---|---|---|---|---|
| Crest Len (ft) | = 0.00 | 0.00 | 0.00 | 0.00 |
| Crest El. (ft) | = 0.00 | 0.00 | 0.00 | 0.00 |
| Weir Coeff. | = 3.33 | 0.00 | 0.00 | 0.00 |
| Weir Type | = --- | --- | --- | --- |
| Multi-Stage | = No | No | No | No |

Exfiltration = 1.020 in/hr (Wet area)  Tailwater Elev. = 0.00 ft

Note: Culvert/Orifice outflows have been analyzed under inlet and outlet control.



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

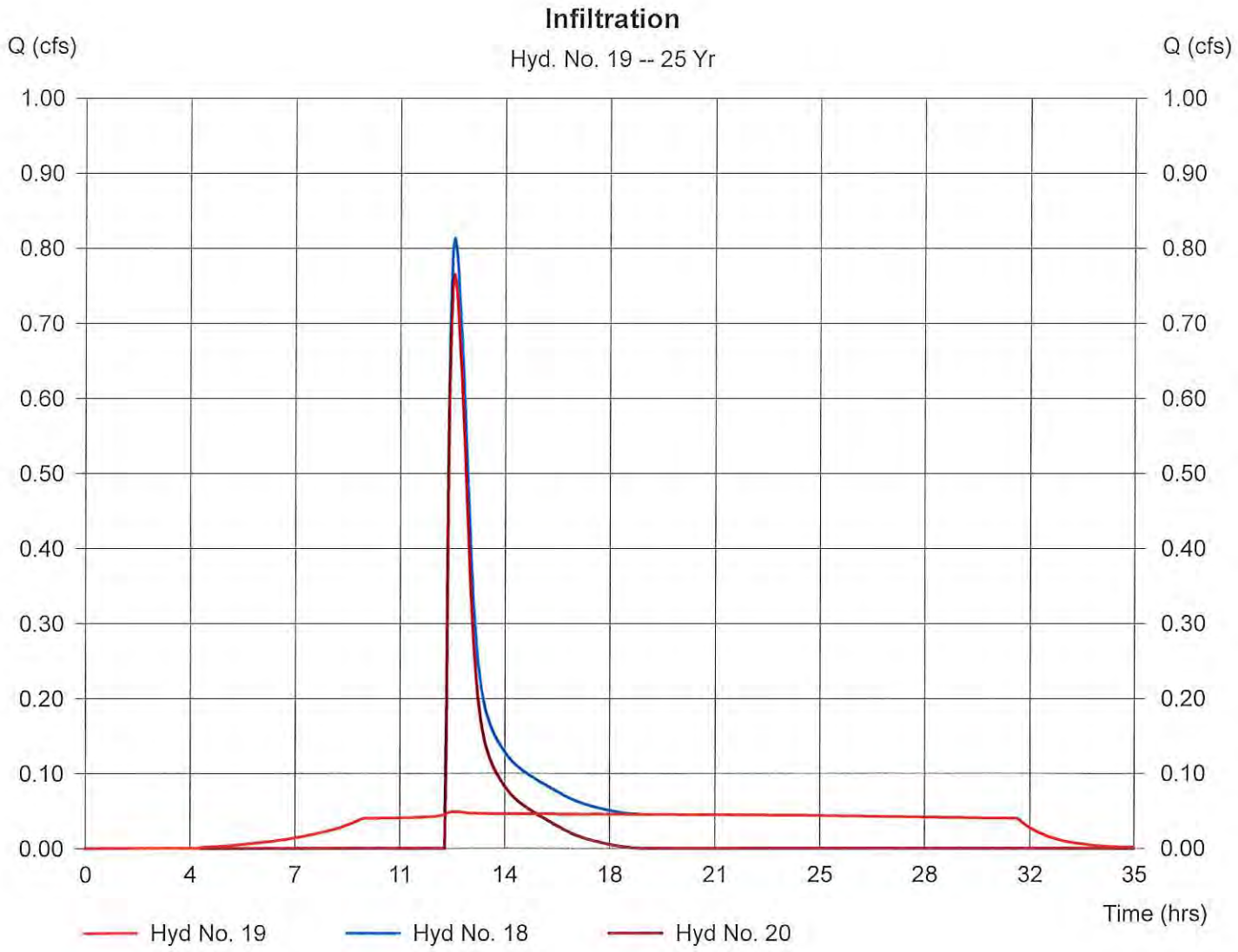
Monday, May 7 2018, 8:27 PM

## Hyd. No. 19

Infiltration

| | | | |
|---|---|---|---|
| Hydrograph type | = Diversion1 | Peak discharge | = 0.05 cfs |
| Storm frequency | = 25 yrs | Time interval | = 3 min |
| Inflow hydrograph | = 18 | 2nd diverted hyd. | = 20 |
| Diversion method | = Pond - Infiltration System | Pond structure | = Exfiltration |

Hydrograph Volume = 3,857 cuft



# Hydrograph Plot

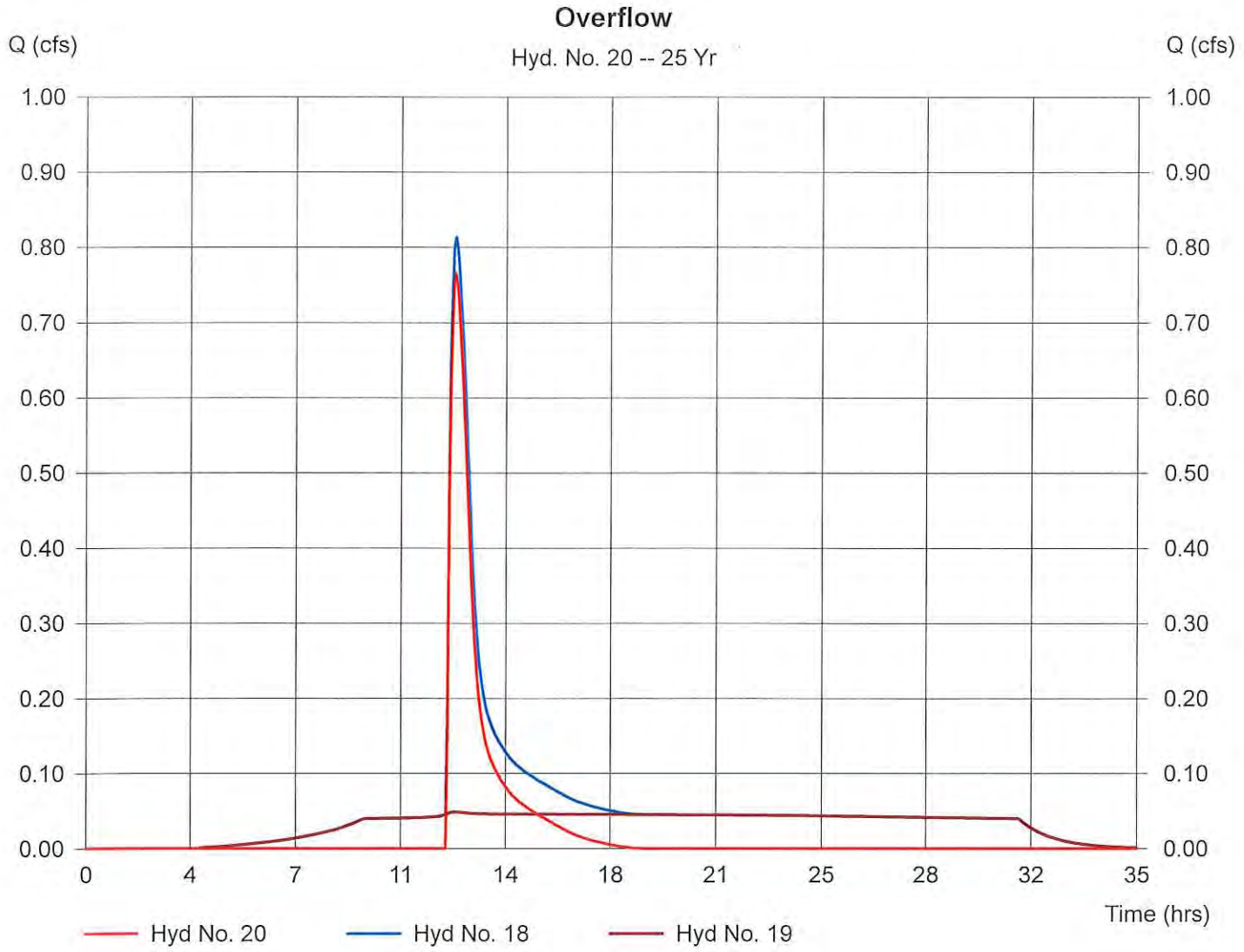


## Hyd. No. 20

Overflow

| | | | |
|---|---|---|---|
| Hydrograph type | = Diversion2 | Peak discharge | = 0.77 cfs |
| Storm frequency | = 25 yrs | Time interval | = 3 min |
| Inflow hydrograph | = 18 | 2nd diverted hyd. | = 19 |
| Diversion method | = Pond - Infiltration System | Pond structure | = Exfiltration |

Hydrograph Volume = 2,791 cuft



# Hydrograph Plot

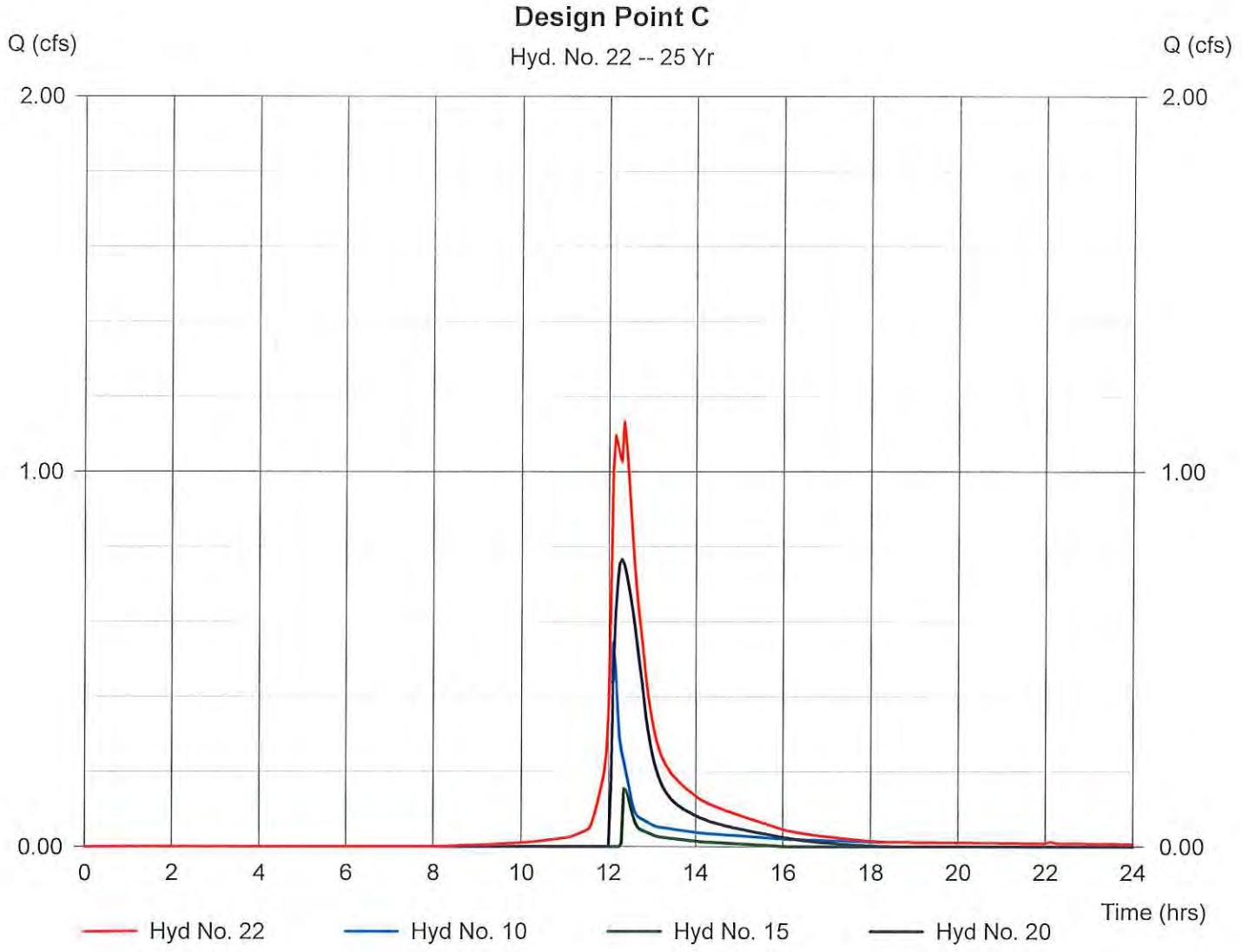


## Hyd. No. 22

Design Point C

| | | | |
|---|---|---|---|
| Hydrograph type | = Combine | Peak discharge | = 1.13 cfs |
| Storm frequency | = 25 yrs | Time interval | = 3 min |
| Inflow hyds. | = 10, 15, 20 | | |

Hydrograph Volume = 4,916 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

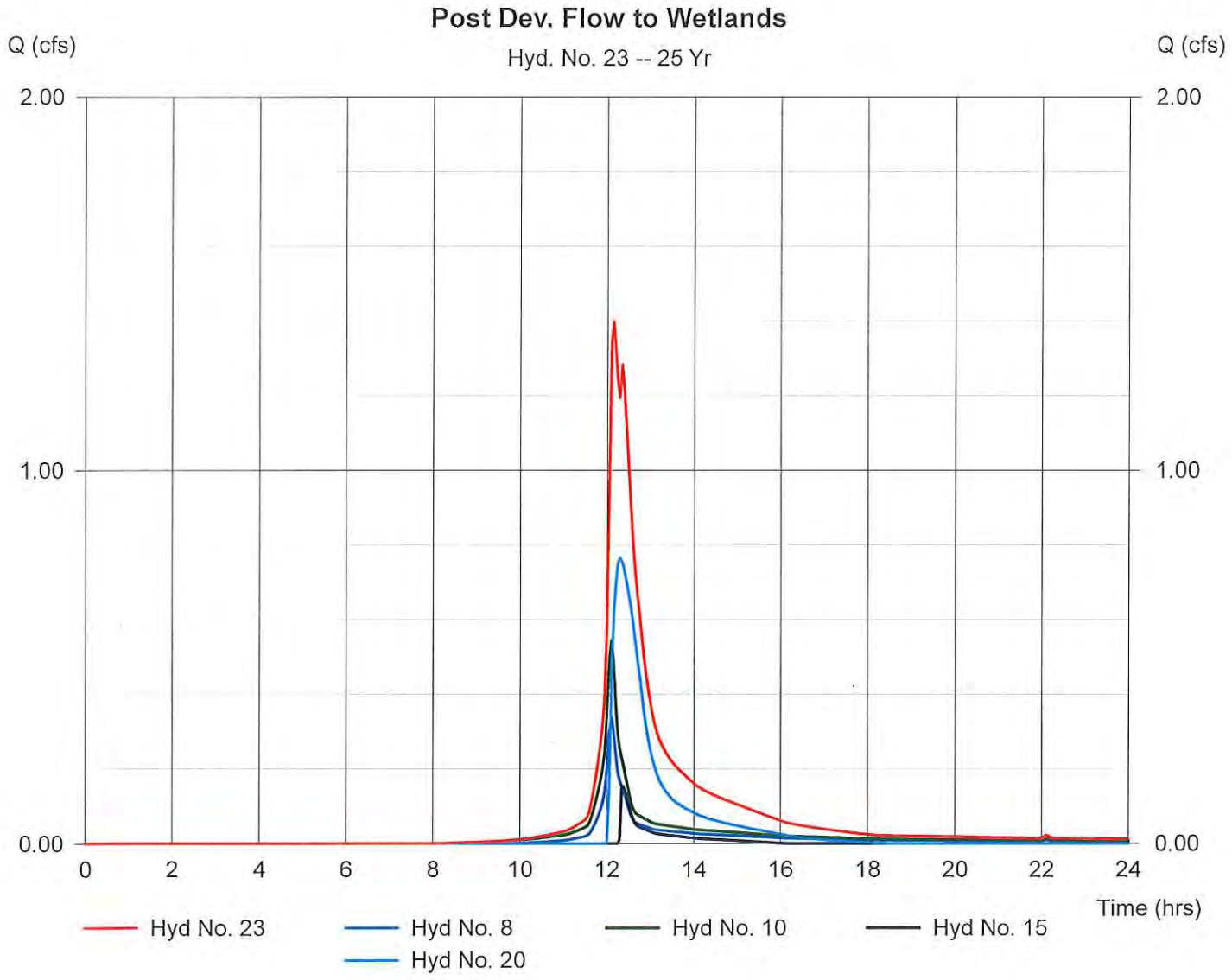
Monday, May 7 2018, 8:27 PM

## Hyd. No. 23

Post Dev. Flow to Wetlands

| | | | |
|---|---|---|---|
| Hydrograph type | = Combine | Peak discharge | = 1.40 cfs |
| Storm frequency | = 25 yrs | Time interval | = 3 min |
| Inflow hyds. | = 8, 10, 15, 20 | | |

Hydrograph Volume = 6,061 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, May 7 2018, 8:27 PM

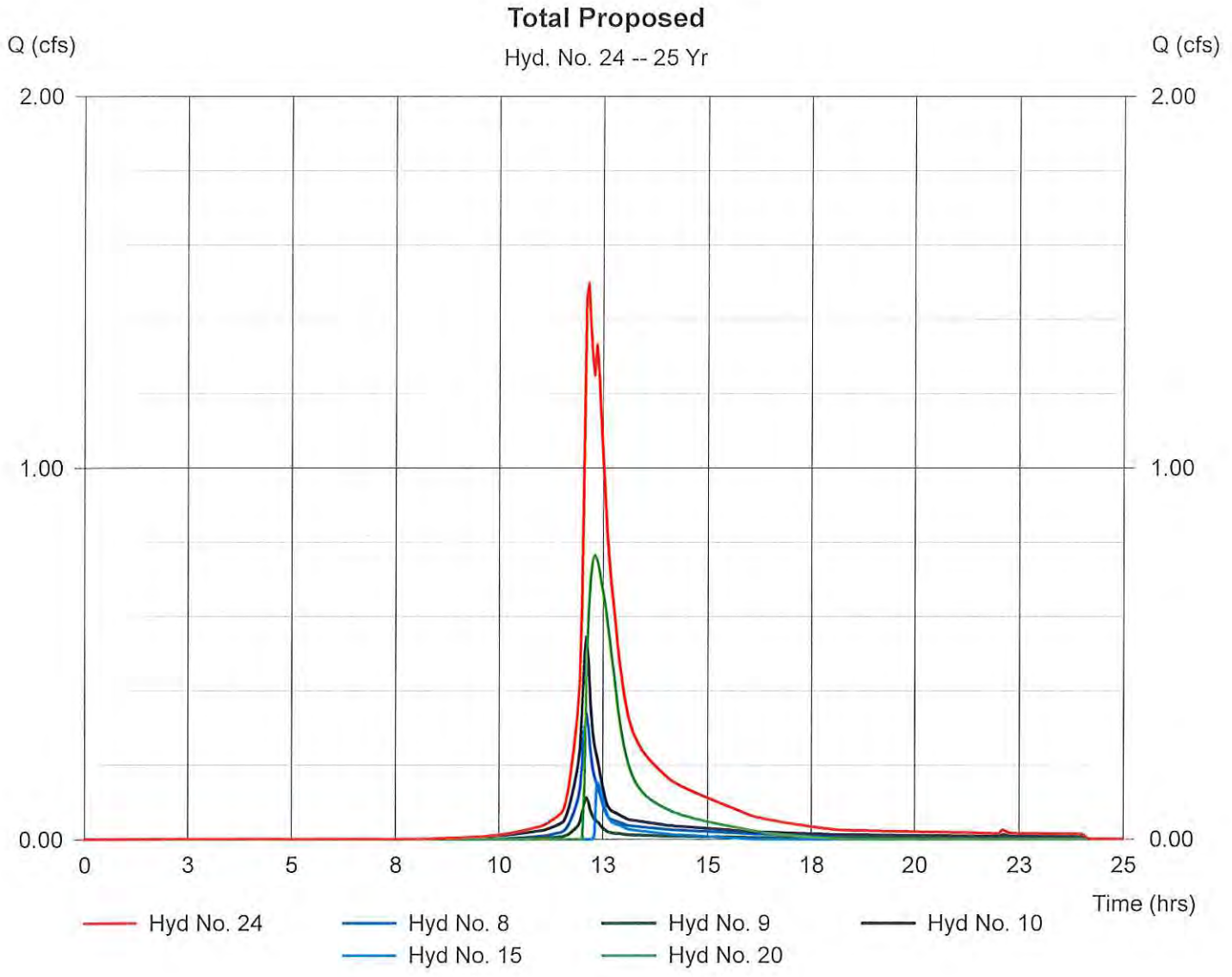
## Hyd. No. 24

Total Proposed

Hydrograph type = Combine
Storm frequency = 25 yrs
Inflow hyds. = 8, 9, 10, 15, 20

Peak discharge = 1.50 cfs
Time interval = 3 min

Hydrograph Volume = 6,438 cuft



# 100-Year Storm, Pre and Post-Development

# Hydrograph Summary Report

| Hyd. No. | Hydrograph type (origin) | Peak flow (cfs) | Time interval (min) | Time to peak (min) | Volume (cuft) | Inflow hyd(s) | Maximum elevation (ft) | Maximum storage (cuft) | Hydrograph description |
|---|---|---|---|---|---|---|---|---|---|
| 1 | SCS Runoff | 1.59 | 3 | 726 | 5,287 | ---- | ------ | ------ | E.C.B.-1 |
| 2 | SCS Runoff | 0.40 | 3 | 726 | 1,374 | ---- | ------ | ------ | E.C.B.-2 |
| 3 | SCS Runoff | 2.26 | 3 | 726 | 7,539 | ---- | ------ | ------ | E.C.B.-3 |
| 5 | Combine | 3.85 | 3 | 726 | 12,826 | 1, 3, | ------ | ------ | Flow to Wetlands |
| 6 | Combine | 4.26 | 3 | 726 | 14,200 | 1, 2, 3, | ------ | ------ | Total Existing |
| 8 | SCS Runoff | 0.63 | 3 | 726 | 2,079 | ---- | ------ | ------ | P.D.B.-1 |
| 9 | SCS Runoff | 0.20 | 3 | 726 | 674 | ---- | ------ | ------ | P.D.B.-2 |
| 10 | SCS Runoff | 0.91 | 3 | 726 | 3,043 | ---- | ------ | ------ | P.D.B.-3 |
| 12 | SCS Runoff | 0.71 | 3 | 726 | 2,385 | ---- | ------ | ------ | P.D.B.3A |
| 13 | Reservoir | 0.73 | 3 | 726 | 2,372 | 12 | 164.84 | 633 | Rain Garden |
| 14 | Diversion1 | 0.02 | 3 | 726 | 1,231 | 13 | ------ | ------ | Infiltration |
| 15 | Diversion2 | 0.71 | 3 | 726 | 1,141 | 13 | ------ | ------ | Overflow |
| 17 | SCS Runoff | 2.73 | 3 | 726 | 9,943 | ---- | ------ | ------ | P.D.B.-4 |
| 18 | Reservoir | 1.65 | 3 | 732 | 9,939 | 17 | 165.22 | 3,163 | Infiltration System |
| 19 | Diversion1 | 0.05 | 3 | 732 | 4,344 | 18 | ------ | ------ | Infiltration |
| 20 | Diversion2 | 1.60 | 3 | 732 | 5,595 | 18 | ------ | ------ | Overflow |
| 22 | Combine | 2.97 | 3 | 726 | 9,778 | 10, 15, 20, | ------ | ------ | Design Point C |
| 23 | Combine | 3.59 | 3 | 726 | 11,857 | 8, 10, 15, 20, | ------ | ------ | Post Dev. Flow to Wetlands |
| 24 | Combine | 3.79 | 3 | 726 | 12,531 | 8, 9, 10, 15, 20, | ------ | ------ | Total Proposed |

# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

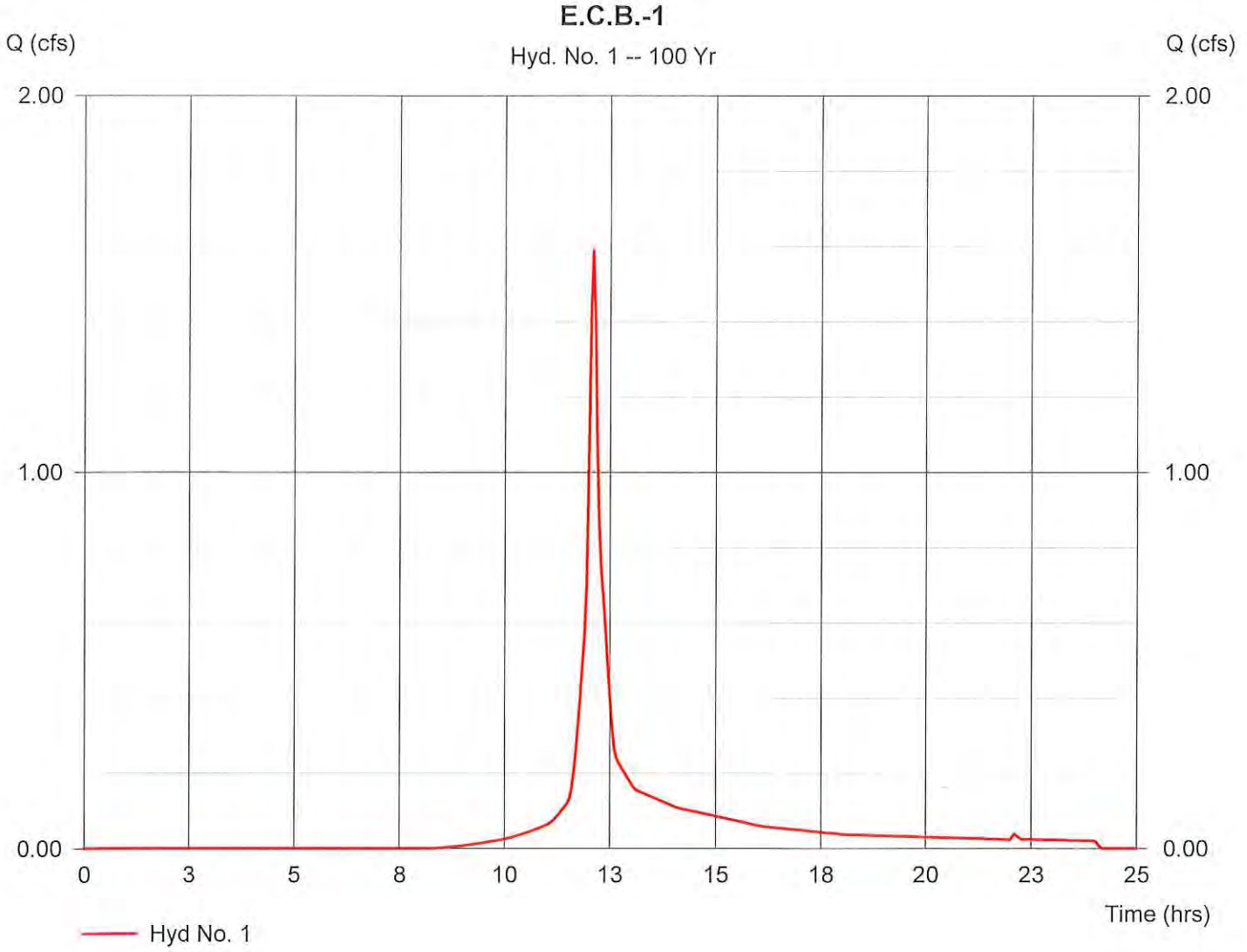
Monday, May 7 2018, 8:27 PM

## Hyd. No. 1

E.C.B.-1

| | | | |
|---|---|---|---|
| Hydrograph type | = SCS Runoff | Peak discharge | = 1.59 cfs |
| Storm frequency | = 100 yrs | Time interval | = 3 min |
| Drainage area | = 0.35 ac | Curve number | = 66.4 |
| Basin Slope | = 5.2 % | Hydraulic length | = 189 ft |
| Tc method | = LAG | Time of conc. (Tc) | = 5.407852 min |
| Total precip. | = 8.45 in | Distribution | = Type III |
| Storm duration | = 24 hrs | Shape factor | = 484 |

Hydrograph Volume = 5,287 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

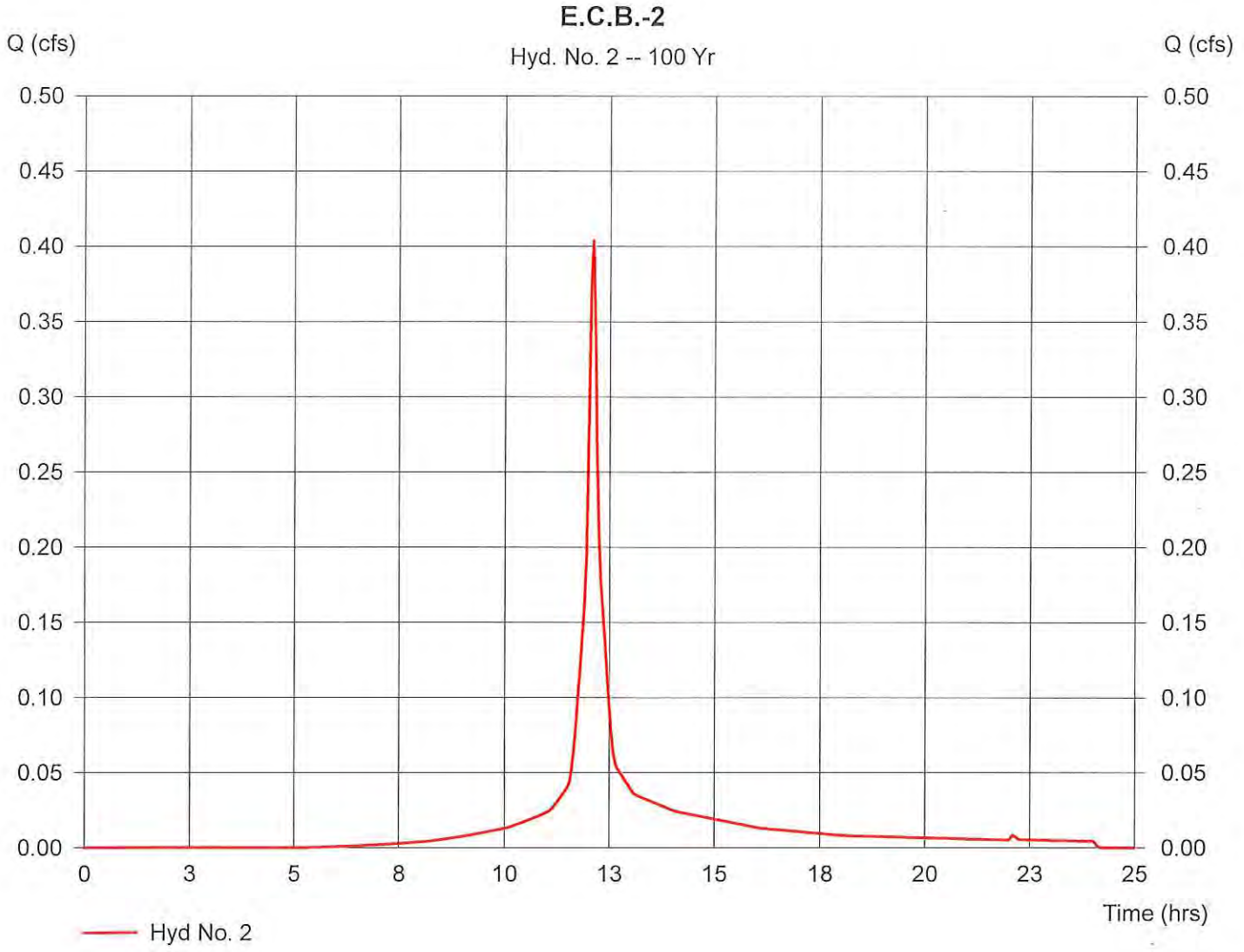
Monday, May 7 2018, 8:27 PM

## Hyd. No. 2

E.C.B.-2

| | | | |
|---|---|---|---|
| Hydrograph type | = SCS Runoff | Peak discharge | = 0.40 cfs |
| Storm frequency | = 100 yrs | Time interval | = 3 min |
| Drainage area | = 0.07 ac | Curve number | = 79.8 |
| Basin Slope | = 1.9 % | Hydraulic length | = 68 ft |
| Tc method | = USER | Time of conc. (Tc) | = 5 min |
| Total precip. | = 8.45 in | Distribution | = Type III |
| Storm duration | = 24 hrs | Shape factor | = 484 |

Hydrograph Volume = 1,374 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

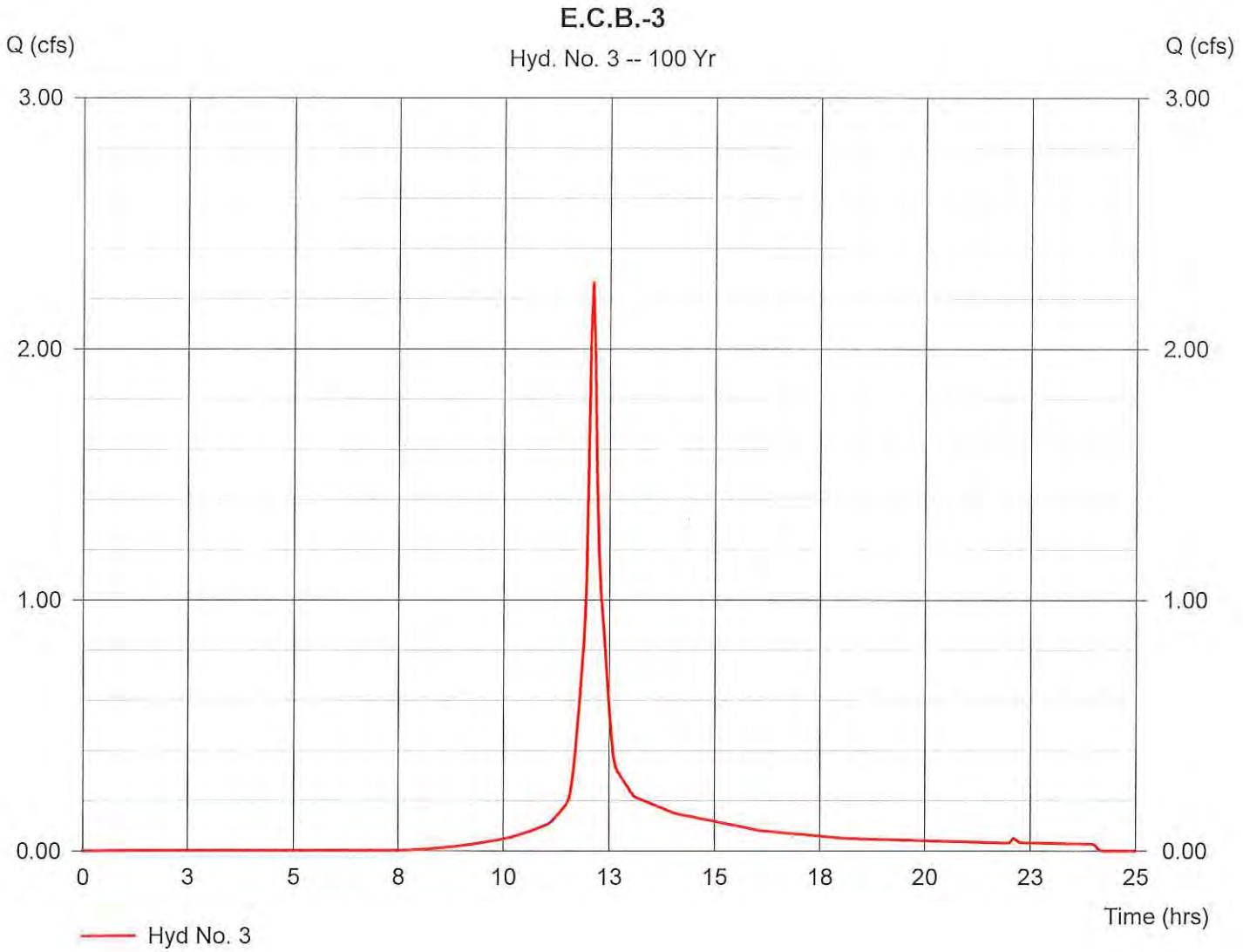
Monday, May 7 2018, 8:27 PM

## Hyd. No. 3

E.C.B.-3

| | | | |
|---|---|---|---|
| Hydrograph type | = SCS Runoff | Peak discharge | = 2.26 cfs |
| Storm frequency | = 100 yrs | Time interval | = 3 min |
| Drainage area | = 0.45 ac | Curve number | = 70.4 |
| Basin Slope | = 4.2 % | Hydraulic length | = 207 ft |
| Tc method | = LAG | Time of conc. (Tc) | = 5.817464 min |
| Total precip. | = 8.45 in | Distribution | = Type III |
| Storm duration | = 24 hrs | Shape factor | = 484 |

Hydrograph Volume = 7,539 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

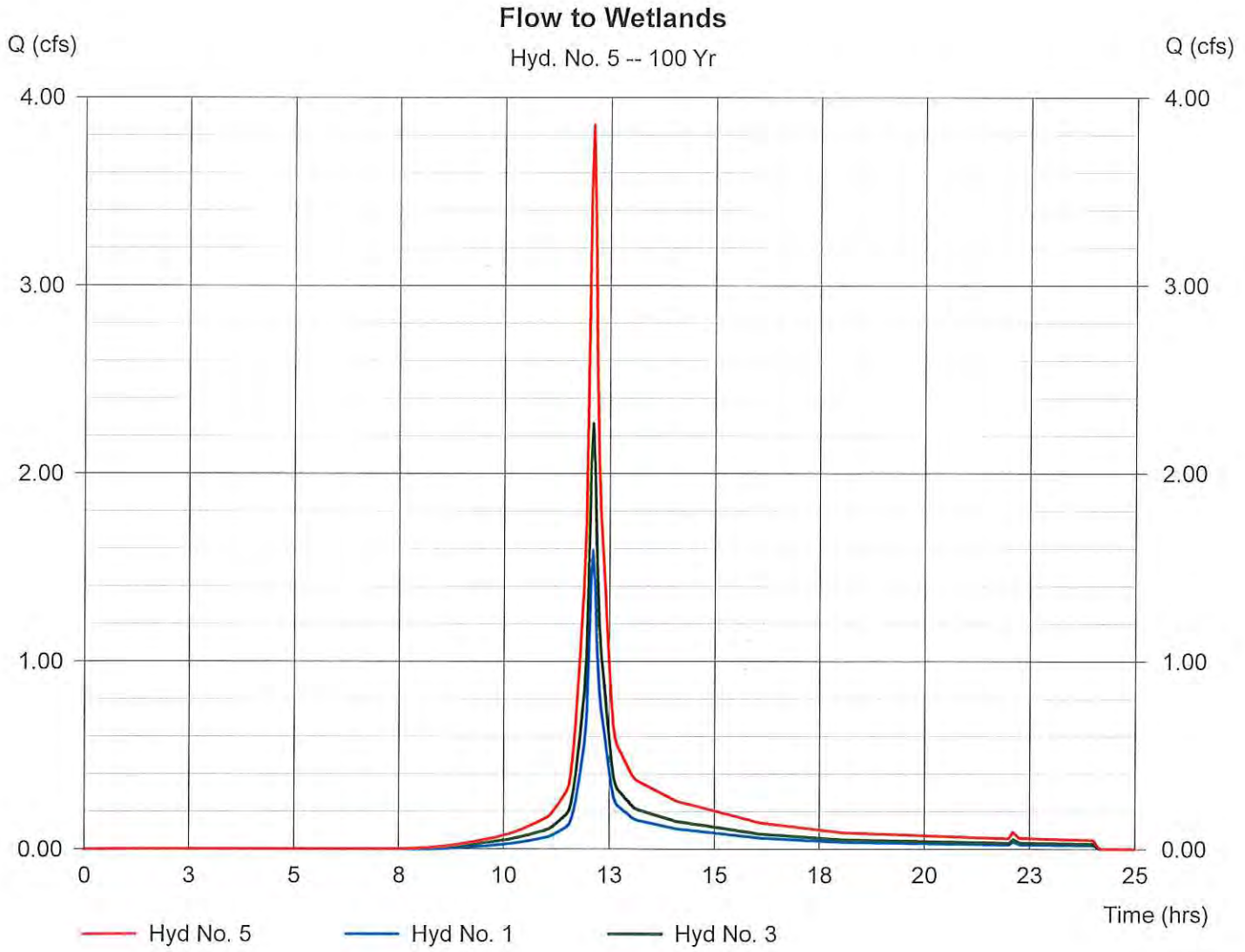
Monday, May 7 2018, 8:27 PM

## Hyd. No. 5

Flow to Wetlands

| | | | |
|---|---|---|---|
| Hydrograph type | = Combine | Peak discharge | = 3.85 cfs |
| Storm frequency | = 100 yrs | Time interval | = 3 min |
| Inflow hyds. | = 1, 3 | | |

Hydrograph Volume = 12,826 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

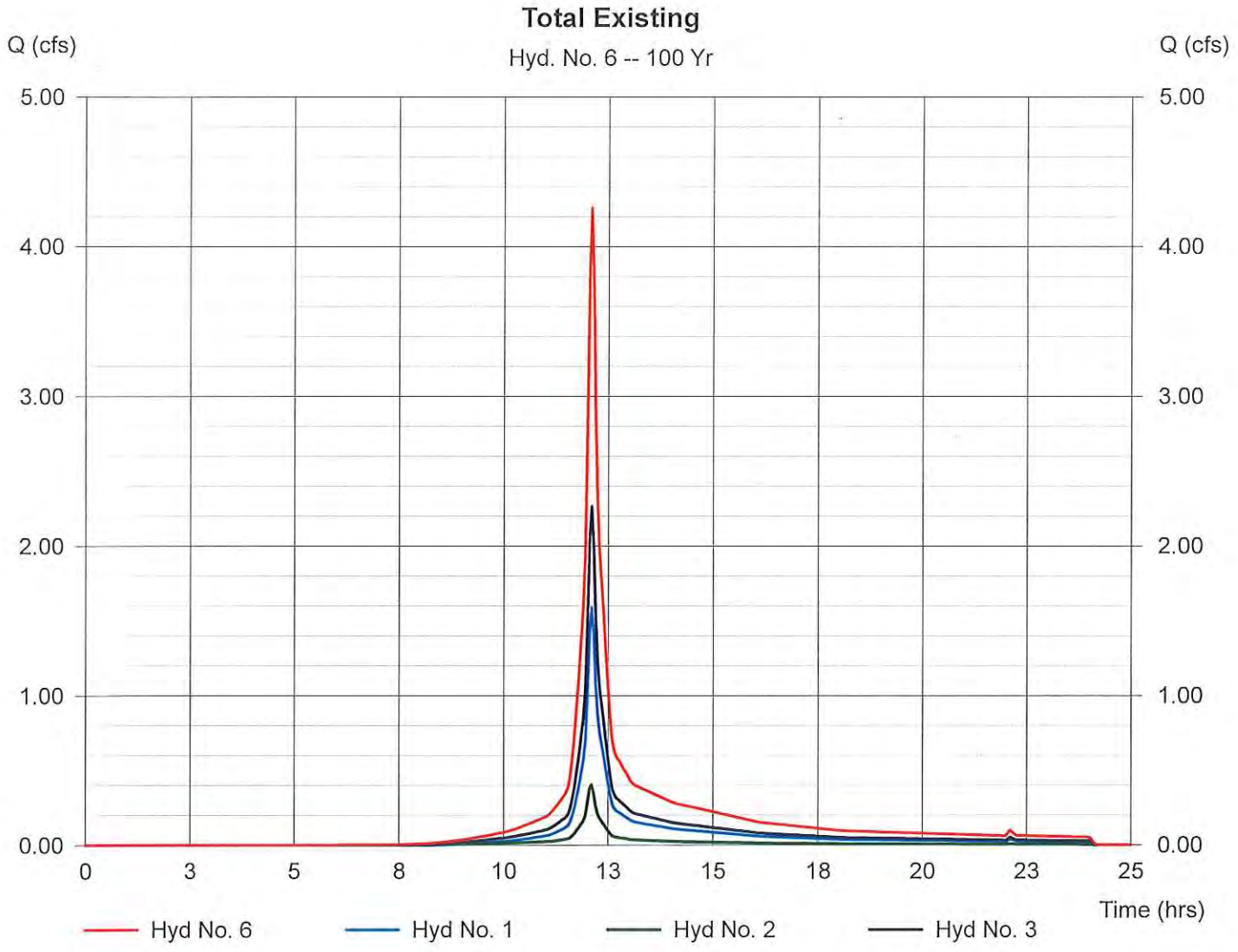
Monday, May 7 2018, 8:27 PM

## Hyd. No. 6

Total Existing

| | | | |
|---|---|---|---|
| Hydrograph type | = Combine | Peak discharge | = 4.26 cfs |
| Storm frequency | = 100 yrs | Time interval | = 3 min |
| Inflow hyds. | = 1, 2, 3 | | |

Hydrograph Volume = 14,200 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

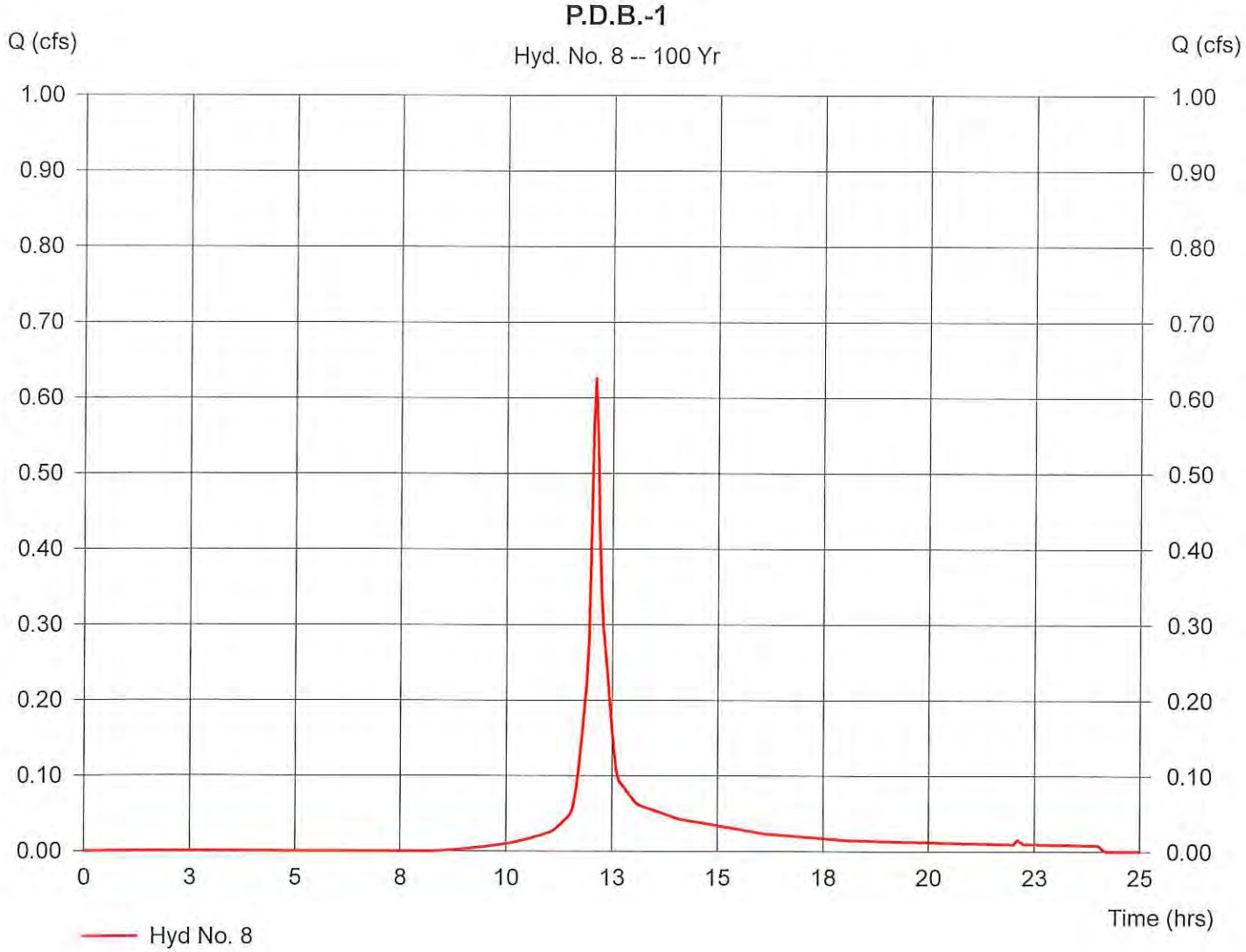
Monday, May 7 2018, 8:27 PM

## Hyd. No. 8

P.D.B.-1

| | | | |
|---|---|---|---|
| Hydrograph type | = SCS Runoff | Peak discharge | = 0.63 cfs |
| Storm frequency | = 100 yrs | Time interval | = 3 min |
| Drainage area | = 0.14 ac | Curve number | = 66.4 |
| Basin Slope | = 4.4 % | Hydraulic length | = 222 ft |
| Tc method | = LAG | Time of conc. (Tc) | = 6.686719 min |
| Total precip. | = 8.45 in | Distribution | = Type III |
| Storm duration | = 24 hrs | Shape factor | = 484 |

Hydrograph Volume = 2,079 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

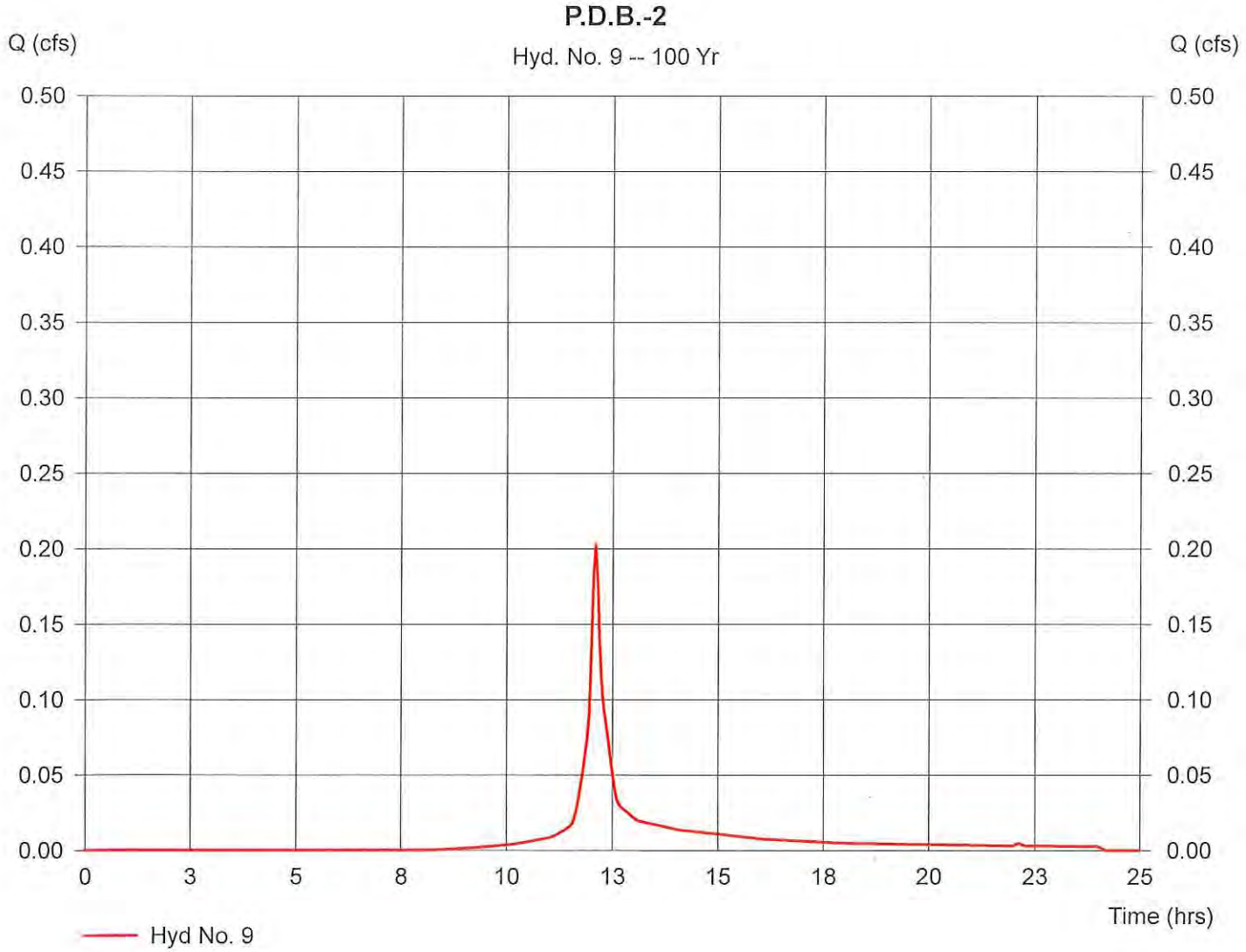
Monday, May 7 2018, 8:27 PM

## Hyd. No. 9

P.D.B.-2

| | | | |
|---|---|---|---|
| Hydrograph type | = SCS Runoff | Peak discharge | = 0.20 cfs |
| Storm frequency | = 100 yrs | Time interval | = 3 min |
| Drainage area | = 0.04 ac | Curve number | = 67.9 |
| Basin Slope | = 1.0 % | Hydraulic length | = 49 ft |
| Tc method | = USER | Time of conc. (Tc) | = 5 min |
| Total precip. | = 8.45 in | Distribution | = Type III |
| Storm duration | = 24 hrs | Shape factor | = 484 |

Hydrograph Volume = 674 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

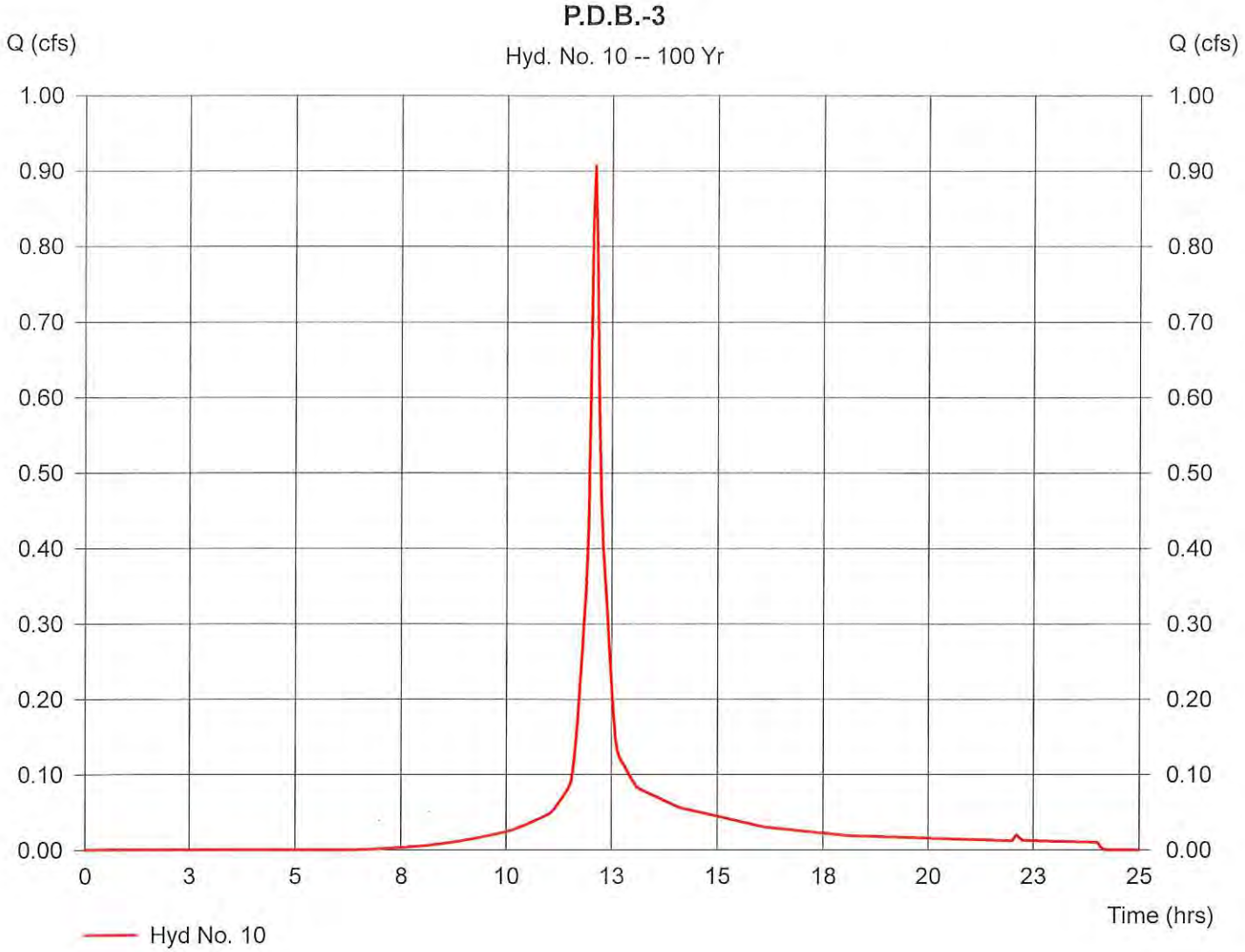
Monday, May 7 2018, 8:27 PM

## Hyd. No. 10

P.D.B.-3

| | | | |
|---|---|---|---|
| Hydrograph type | = SCS Runoff | Peak discharge | = 0.91 cfs |
| Storm frequency | = 100 yrs | Time interval | = 3 min |
| Drainage area | = 0.16 ac | Curve number | = 75.3 |
| Basin Slope | = 3.8 % | Hydraulic length | = 196 ft |
| Tc method | = USER | Time of conc. (Tc) | = 5 min |
| Total precip. | = 8.45 in | Distribution | = Type III |
| Storm duration | = 24 hrs | Shape factor | = 484 |

Hydrograph Volume = 3,043 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

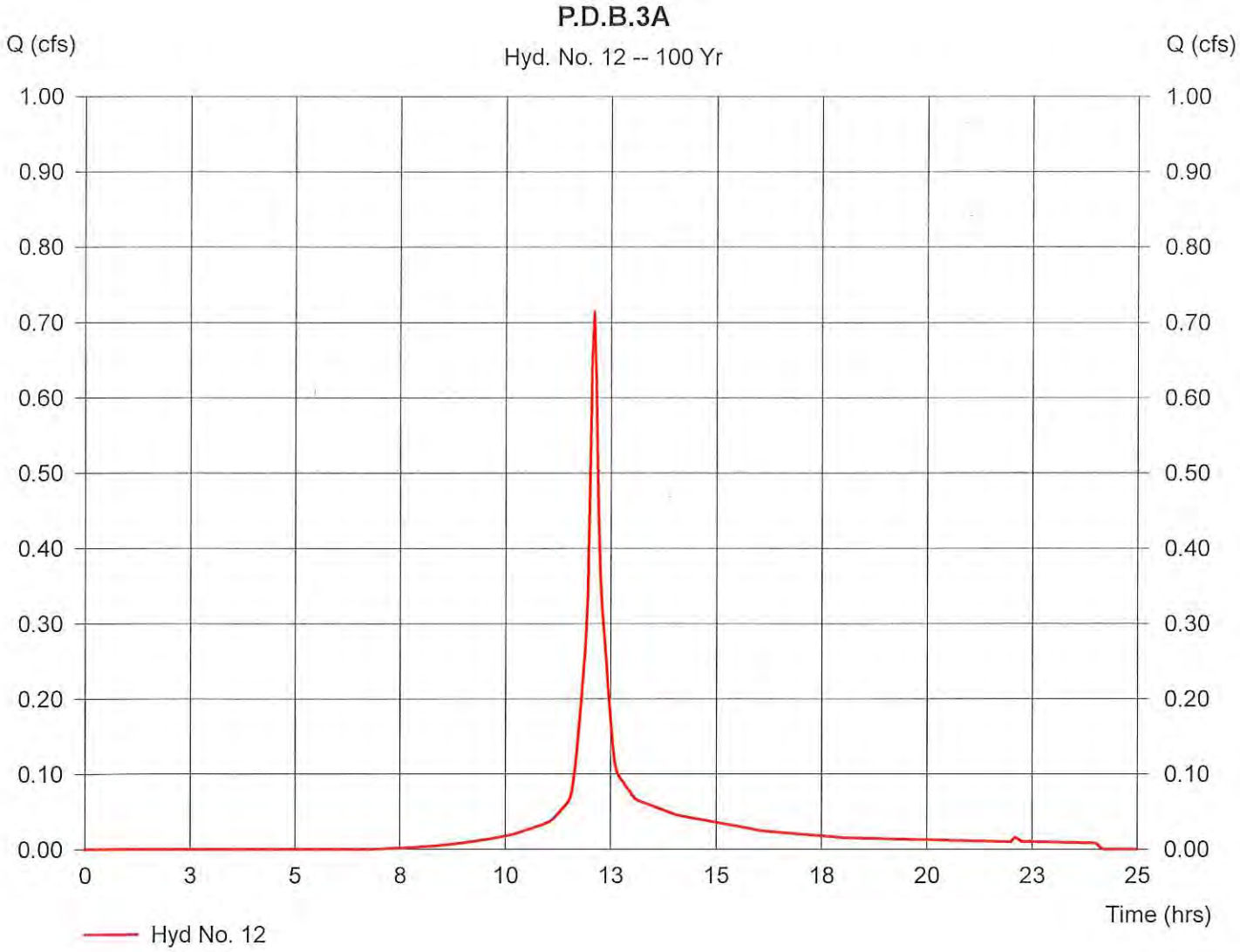
Monday, May 7 2018, 8:27 PM

## Hyd. No. 12

P.D.B.3A

| | | | |
|---|---|---|---|
| Hydrograph type | = SCS Runoff | Peak discharge | = 0.71 cfs |
| Storm frequency | = 100 yrs | Time interval | = 3 min |
| Drainage area | = 0.13 ac | Curve number | = 73.5 |
| Basin Slope | = 2.0 % | Hydraulic length | = 100 ft |
| Tc method | = USER | Time of conc. (Tc) | = 5 min |
| Total precip. | = 8.45 in | Distribution | = Type III |
| Storm duration | = 24 hrs | Shape factor | = 484 |

Hydrograph Volume = 2,385 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, May 7 2018, 8:27 PM

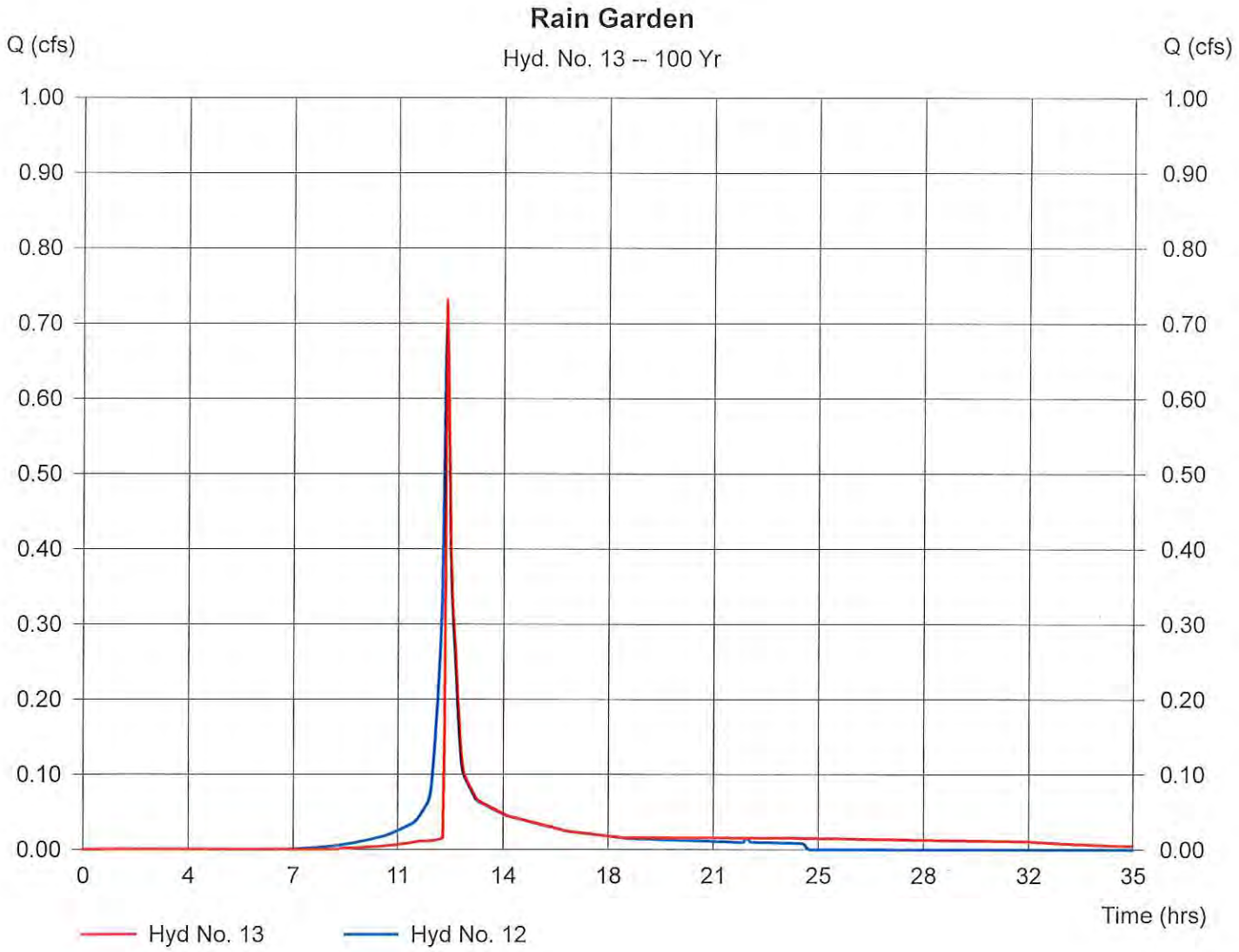
## Hyd. No. 13

Rain Garden

| | | | |
|---|---|---|---|
| Hydrograph type | = Reservoir | Peak discharge | = 0.73 cfs |
| Storm frequency | = 100 yrs | Time interval | = 3 min |
| Inflow hyd. No. | = 12 | Max. Elevation | = 164.84 ft |
| Reservoir name | = Rain Garden | Max. Storage | = 633 cuft |

Storage Indication method used.

Hydrograph Volume = 2,372 cuft



# Pond Report

Hydraflow Hydrographs by Intelisolve

Monday, May 7 2018, 8:27 PM

## Pond No. 5 - Rain Garden

### Pond Data

Pond storage is based on known contour areas. Average end area method used.

### Stage / Storage Table

| Stage (ft) | Elevation (ft) | Contour area (sqft) | Incr. Storage (cuft) | Total storage (cuft) |
|---|---|---|---|---|
| 0.00 | 163.50 | 140 | 0 | 0 |
| 0.50 | 164.00 | 448 | 147 | 147 |
| 1.00 | 164.50 | 591 | 260 | 407 |
| 1.50 | 165.00 | 748 | 335 | 742 |

### Culvert / Orifice Structures

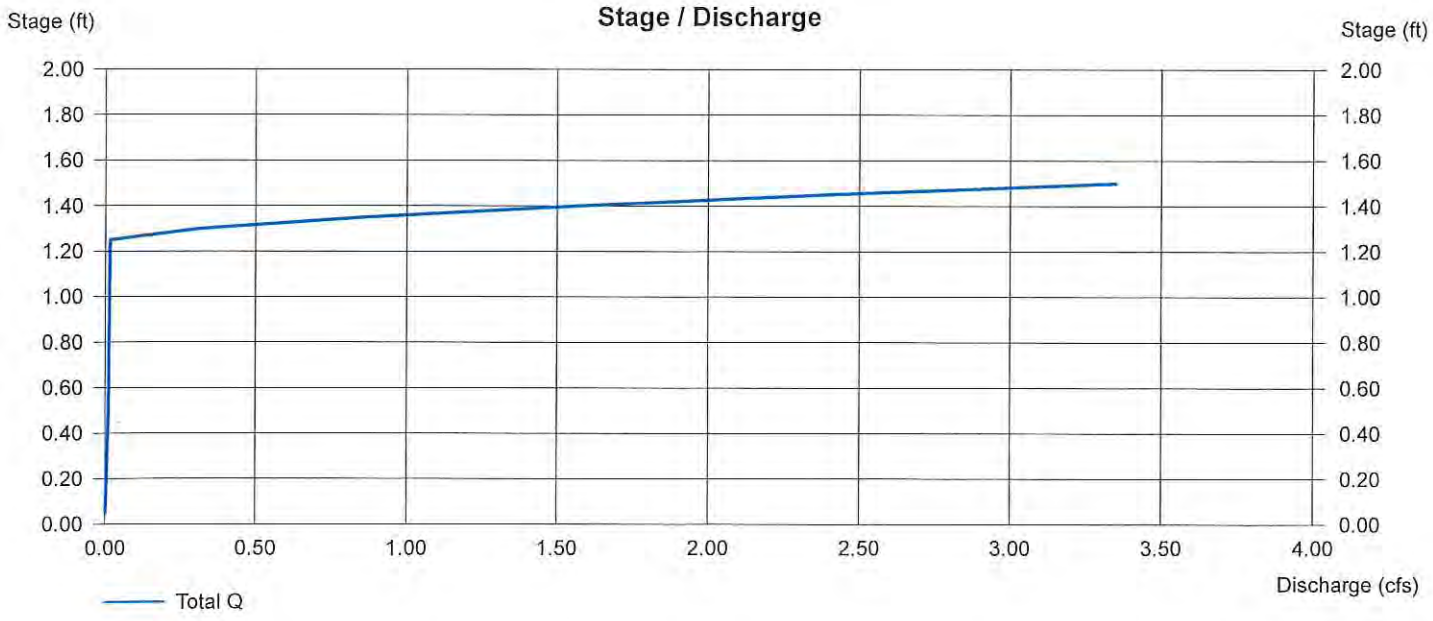
| | [A] | [B] | [C] | [D] |
|---|---|---|---|---|
| Rise (in) | = 0.00 | 0.00 | 0.00 | 0.00 |
| Span (in) | = 0.00 | 0.00 | 0.00 | 0.00 |
| No. Barrels | = 0 | 0 | 0 | 0 |
| Invert El. (ft) | = 0.00 | 0.00 | 0.00 | 0.00 |
| Length (ft) | = 0.00 | 0.00 | 0.00 | 0.00 |
| Slope (%) | = 0.00 | 0.00 | 0.00 | 0.00 |
| N-Value | = .000 | .000 | .000 | .000 |
| Orif. Coeff. | = 0.00 | 0.00 | 0.00 | 0.00 |
| Multi-Stage | = n/a | No | No | No |

### Weir Structures

| | [A] | [B] | [C] | [D] |
|---|---|---|---|---|
| Crest Len (ft) | = 8.00 | 0.00 | 0.00 | 0.00 |
| Crest El. (ft) | = 164.75 | 0.00 | 0.00 | 0.00 |
| Weir Coeff. | = 3.33 | 0.00 | 0.00 | 0.00 |
| Weir Type | = Rect | --- | --- | --- |
| Multi-Stage | = No | No | No | No |

Exfiltration = 1.020 in/hr (Contour) Tailwater Elev. = 0.00 ft

Note: Culvert/Orifice outflows have been analyzed under inlet and outlet control.



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

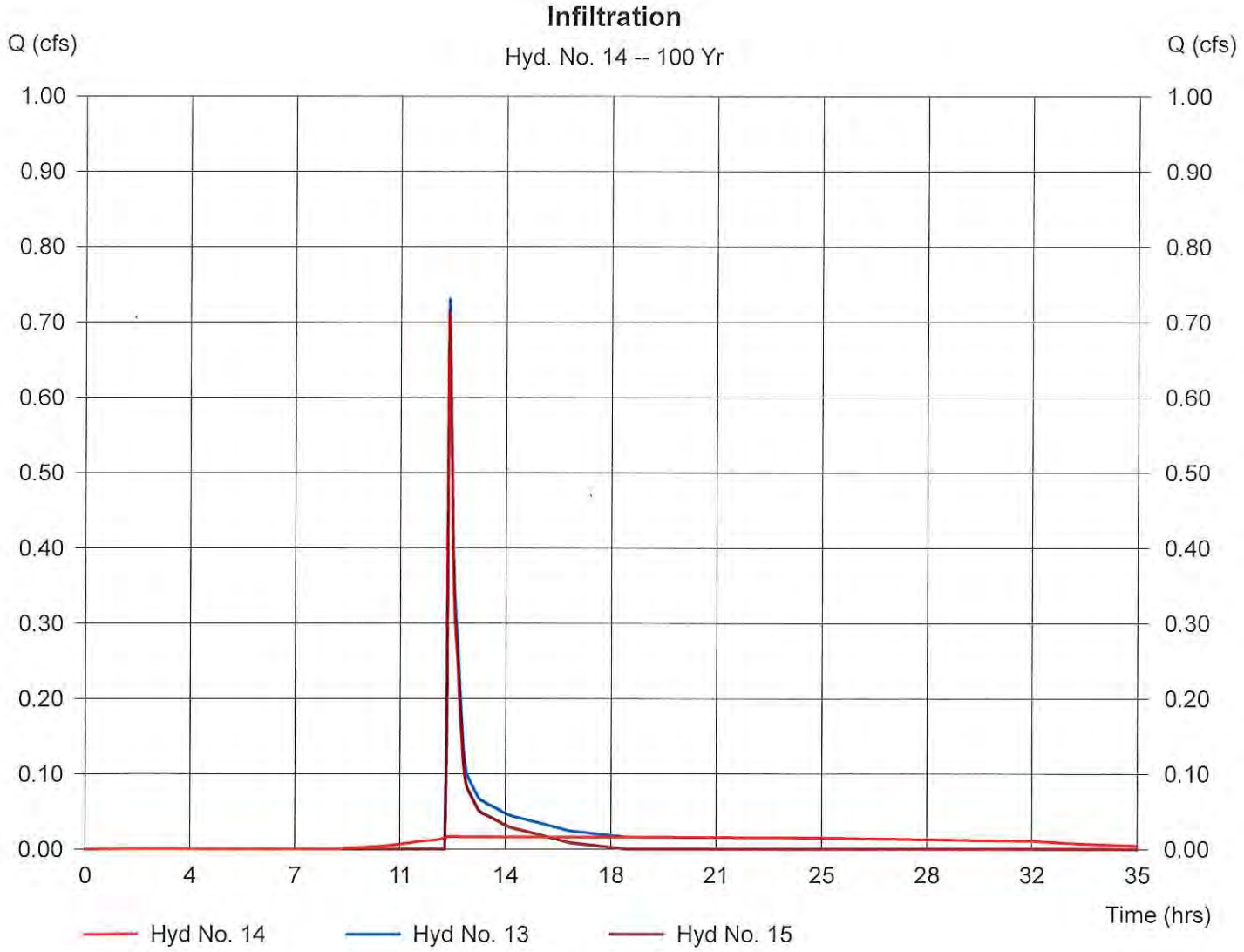
Monday, May 7 2018, 8:27 PM

## Hyd. No. 14

Infiltration

| | | | |
|---|---|---|---|
| Hydrograph type | = Diversion1 | Peak discharge | = 0.02 cfs |
| Storm frequency | = 100 yrs | Time interval | = 3 min |
| Inflow hydrograph | = 13 | 2nd diverted hyd. | = 15 |
| Diversion method | = Pond - Rain Garden | Pond structure | = Exfiltration |

Hydrograph Volume = 1,231 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

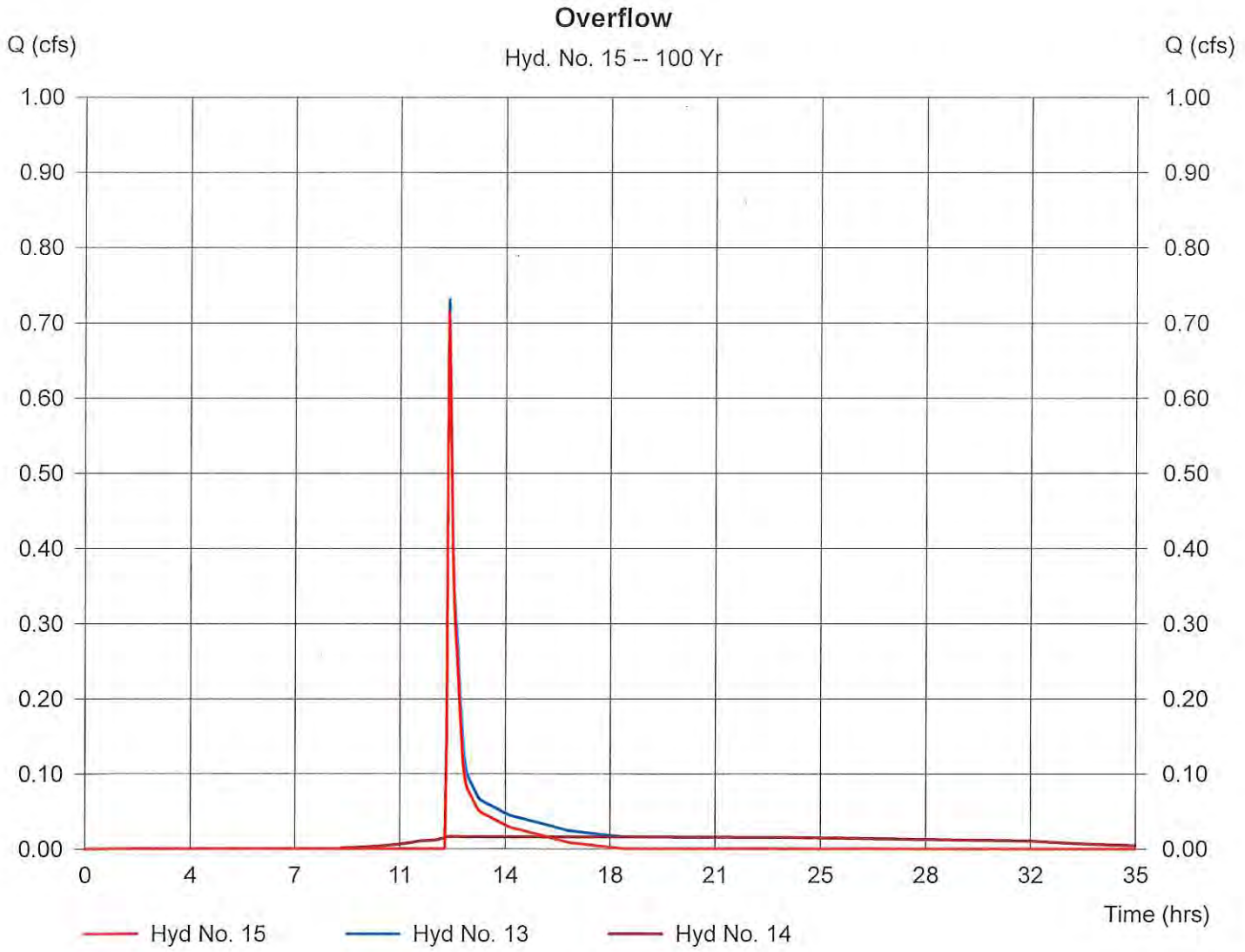
Monday, May 7 2018, 8:27 PM

## Hyd. No. 15

Overflow

| | | | |
|---|---|---|---|
| Hydrograph type | = Diversion2 | Peak discharge | = 0.71 cfs |
| Storm frequency | = 100 yrs | Time interval | = 3 min |
| Inflow hydrograph | = 13 | 2nd diverted hyd. | = 14 |
| Diversion method | = Pond - Rain Garden | Pond structure | = Exfiltration |

Hydrograph Volume = 1,141 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

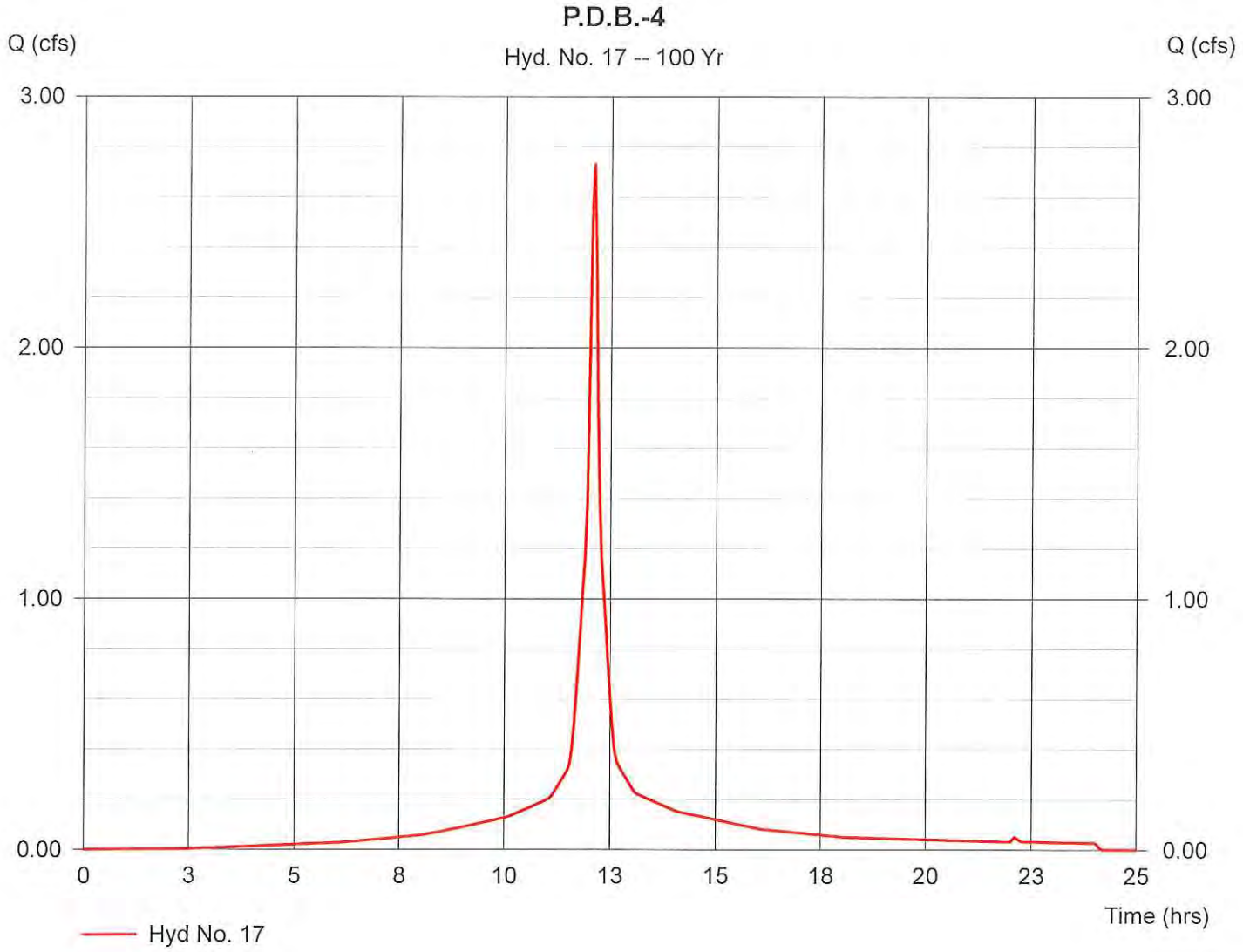
Monday, May 7 2018, 8:27 PM

## Hyd. No. 17

P.D.B.-4

| | | | |
|---|---|---|---|
| Hydrograph type | = SCS Runoff | Peak discharge | = 2.73 cfs |
| Storm frequency | = 100 yrs | Time interval | = 3 min |
| Drainage area | = 0.39 ac | Curve number | = 91.7 |
| Basin Slope | = 2.0 % | Hydraulic length | = 100 ft |
| Tc method | = USER | Time of conc. (Tc) | = 5 min |
| Total precip. | = 8.45 in | Distribution | = Type III |
| Storm duration | = 24 hrs | Shape factor | = 484 |

Hydrograph Volume = 9,943 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, May 7 2018, 8:27 PM

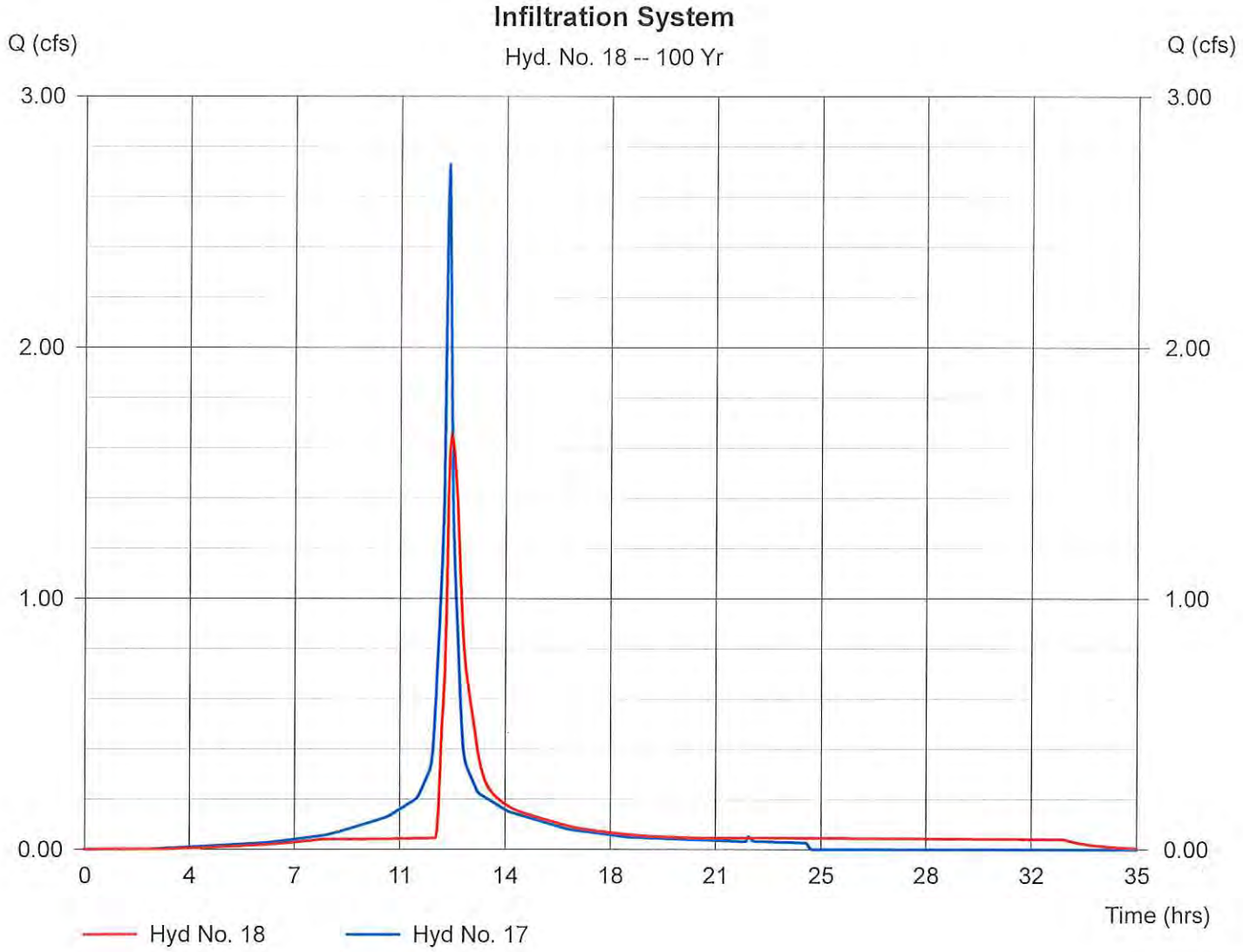
## Hyd. No. 18

Infiltration System

| | | | |
|---|---|---|---|
| Hydrograph type | = Reservoir | Peak discharge | = 1.65 cfs |
| Storm frequency | = 100 yrs | Time interval | = 3 min |
| Inflow hyd. No. | = 17 | Max. Elevation | = 165.22 ft |
| Reservoir name | = Infiltration System | Max. Storage | = 3,163 cuft |

Storage Indication method used.

Hydrograph Volume = 9,939 cuft



# Pond Report

Hydraflow Hydrographs by Intelisolve

Monday, May 7 2018, 8:27 PM

## Pond No. 1 - Infiltration System

### Pond Data

Bottom LxW = 52.0 x 32.0 ft  Side slope = 0.0:1  Bottom elev. = 162.25 ft  Depth = 3.00 ft

### Stage / Storage Table

| Stage (ft) | Elevation (ft) | Contour area (sqft) | Incr. Storage (cuft)* | Total storage (cuft)* |
|---|---|---|---|---|
| 0.00 | 162.25 | 1,664 | 0 | 0 |
| 0.15 | 162.40 | 1,664 | 160 | 160 |
| 0.30 | 162.55 | 1,664 | 160 | 319 |
| 0.45 | 162.70 | 1,664 | 160 | 479 |
| 0.60 | 162.85 | 1,664 | 160 | 639 |
| 0.75 | 163.00 | 1,664 | 160 | 799 |
| 0.90 | 163.15 | 1,664 | 160 | 958 |
| 1.05 | 163.30 | 1,664 | 160 | 1,118 |
| 1.20 | 163.45 | 1,664 | 160 | 1,278 |
| 1.35 | 163.60 | 1,664 | 160 | 1,438 |
| 1.50 | 163.75 | 1,664 | 160 | 1,597 |
| 1.65 | 163.90 | 1,664 | 160 | 1,757 |
| 1.80 | 164.05 | 1,664 | 160 | 1,917 |
| 1.95 | 164.20 | 1,664 | 160 | 2,077 |
| 2.10 | 164.35 | 1,664 | 160 | 2,236 |
| 2.25 | 164.50 | 1,664 | 160 | 2,396 |
| 2.40 | 164.65 | 1,664 | 160 | 2,556 |
| 2.55 | 164.80 | 1,664 | 160 | 2,716 |
| 2.70 | 164.95 | 1,664 | 160 | 2,875 |
| 2.85 | 165.10 | 1,664 | 160 | 3,035 |
| 3.00 | 165.25 | 1,664 | 160 | 3,195 |

(*64.00% voids applied)

### Culvert / Orifice Structures

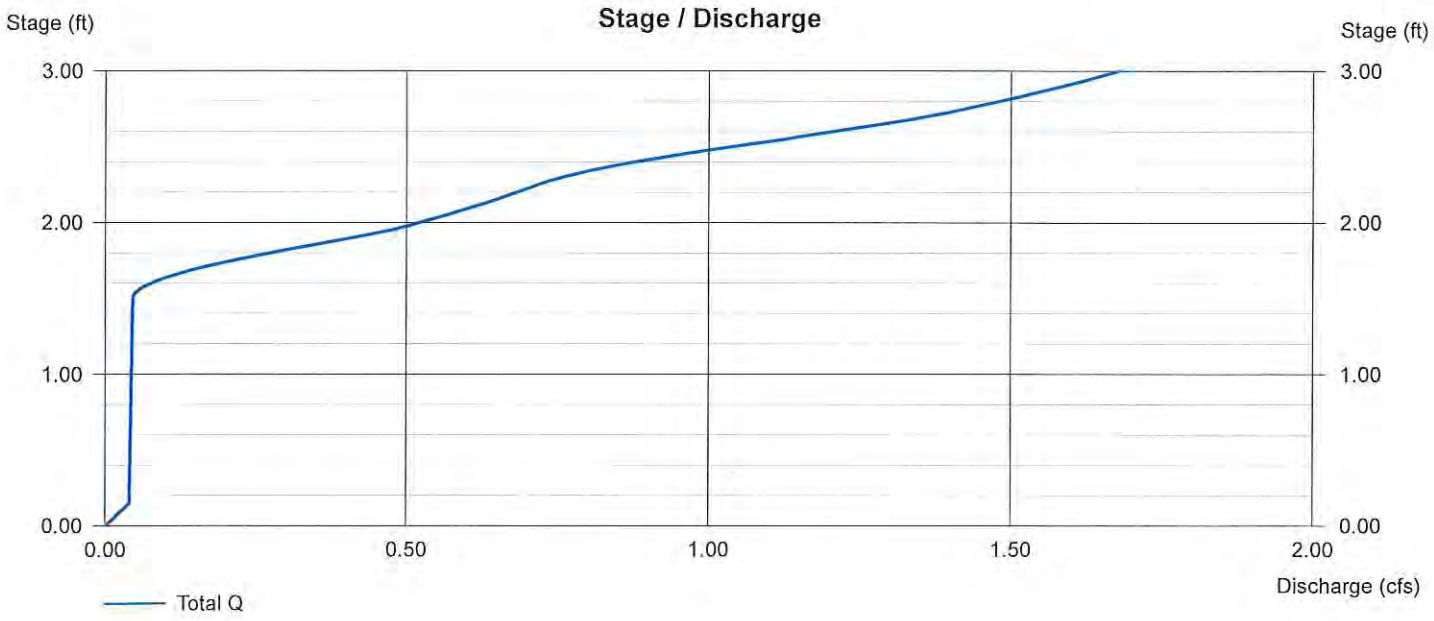
| | [A] | [B] | [C] | [D] |
|---|---|---|---|---|
| Rise (in) | = 6.00 | 6.00 | 0.00 | 0.00 |
| Span (in) | = 6.00 | 6.00 | 0.00 | 0.00 |
| No. Barrels | = 1 | 1 | 0 | 0 |
| Invert El. (ft) | = 163.75 | 164.50 | 0.00 | 0.00 |
| Length (ft) | = 50.00 | 50.00 | 0.00 | 0.00 |
| Slope (%) | = 2.00 | 2.00 | 0.00 | 0.00 |
| N-Value | = .013 | .013 | .000 | .000 |
| Orif. Coeff. | = 0.60 | 0.60 | 0.00 | 0.00 |
| Multi-Stage | = n/a | No | No | No |

### Weir Structures

| | [A] | [B] | [C] | [D] |
|---|---|---|---|---|
| Crest Len (ft) | = 0.00 | 0.00 | 0.00 | 0.00 |
| Crest El. (ft) | = 0.00 | 0.00 | 0.00 | 0.00 |
| Weir Coeff. | = 3.33 | 0.00 | 0.00 | 0.00 |
| Weir Type | = --- | --- | --- | --- |
| Multi-Stage | = No | No | No | No |

Exfiltration = 1.020 in/hr (Wet area)  Tailwater Elev. = 0.00 ft

Note: Culvert/Orifice outflows have been analyzed under inlet and outlet control.



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

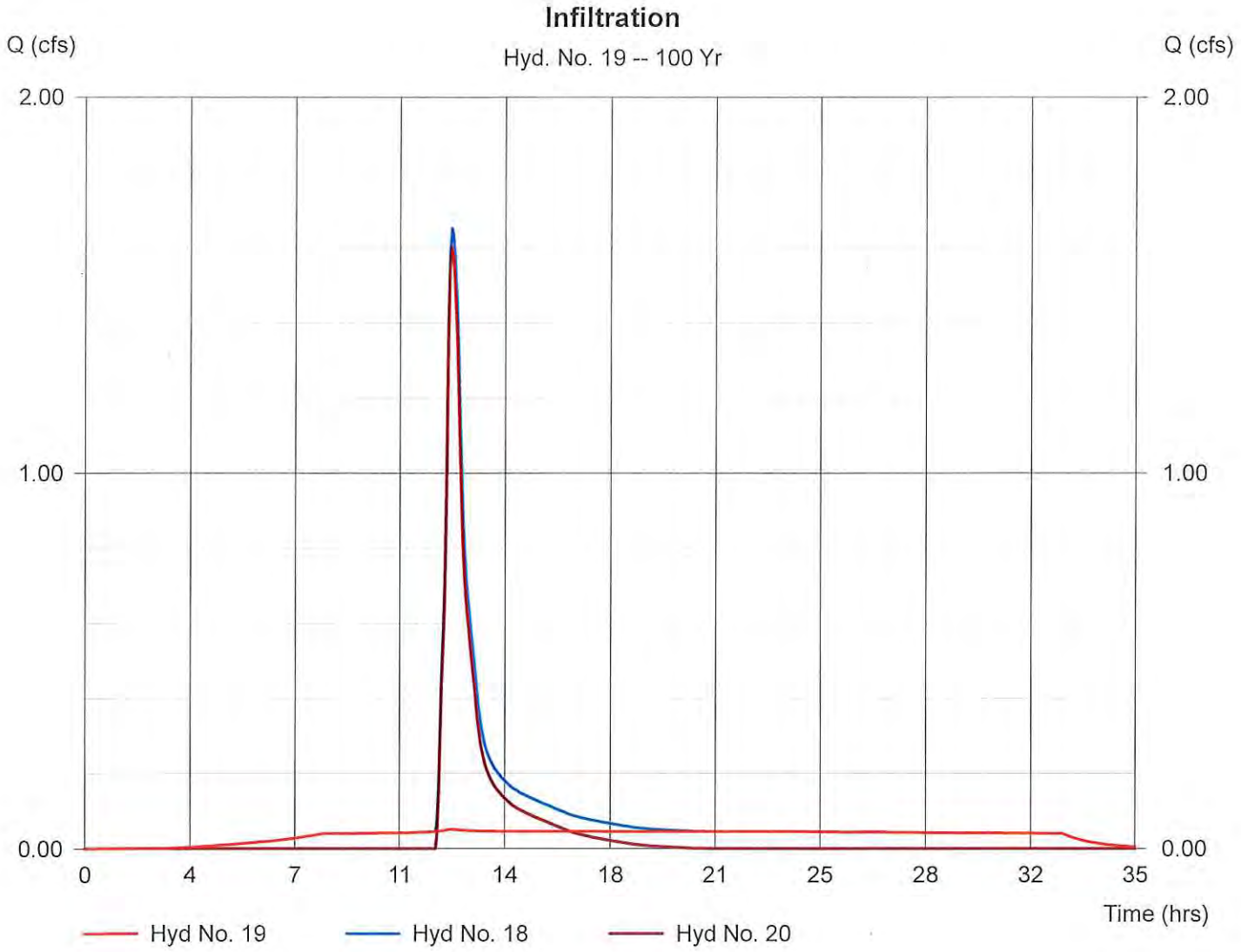
Monday, May 7 2018, 8:27 PM

## Hyd. No. 19

Infiltration

| | | | |
|---|---|---|---|
| Hydrograph type | = Diversion1 | Peak discharge | = 0.05 cfs |
| Storm frequency | = 100 yrs | Time interval | = 3 min |
| Inflow hydrograph | = 18 | 2nd diverted hyd. | = 20 |
| Diversion method | = Pond - Infiltration System | Pond structure | = Exfiltration |

Hydrograph Volume = 4,344 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

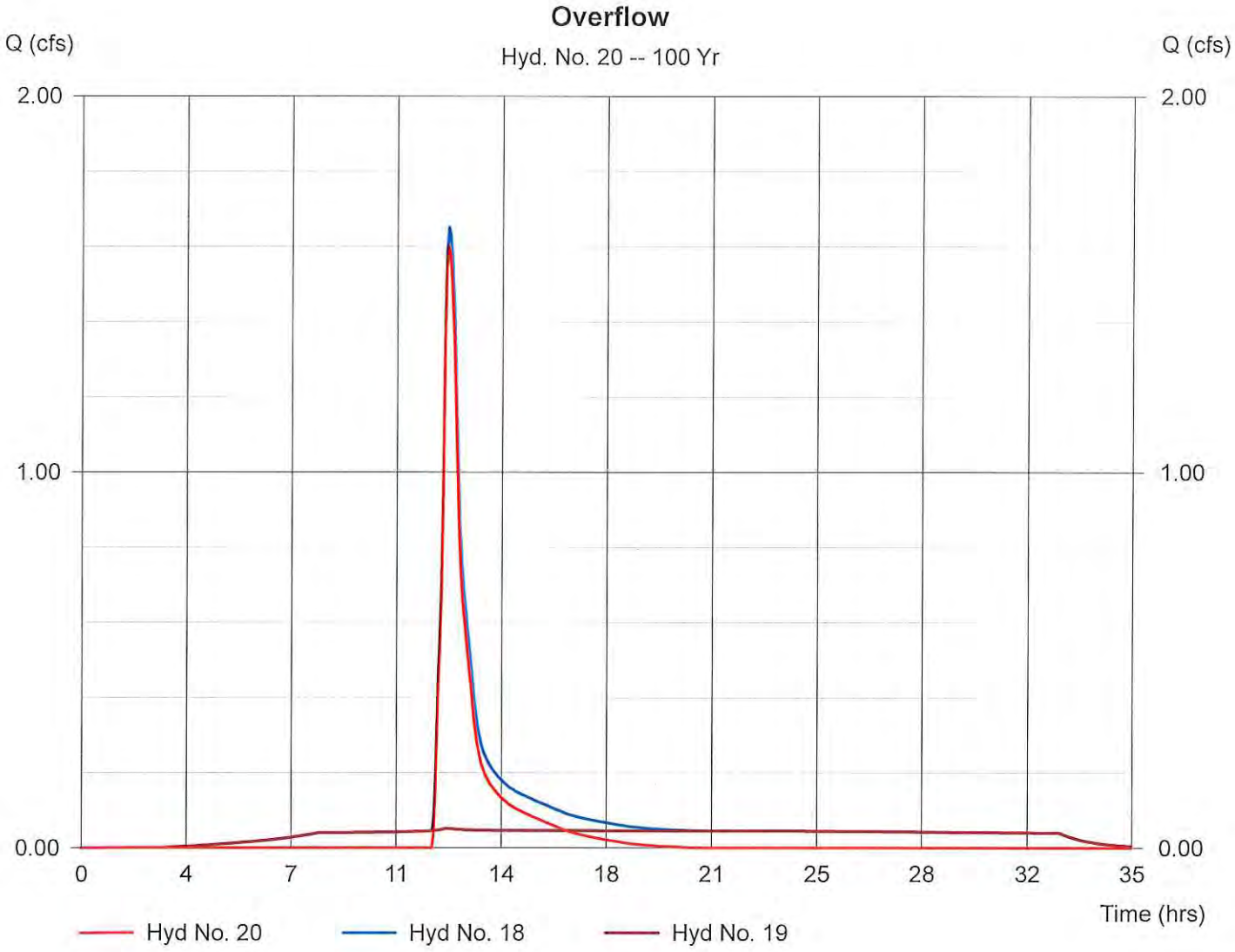
Monday, May 7 2018, 8:27 PM

## Hyd. No. 20

Overflow

| | | | |
|---|---|---|---|
| Hydrograph type | = Diversion2 | Peak discharge | = 1.60 cfs |
| Storm frequency | = 100 yrs | Time interval | = 3 min |
| Inflow hydrograph | = 18 | 2nd diverted hyd. | = 19 |
| Diversion method | = Pond - Infiltration System | Pond structure | = Exfiltration |

Hydrograph Volume = 5,595 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

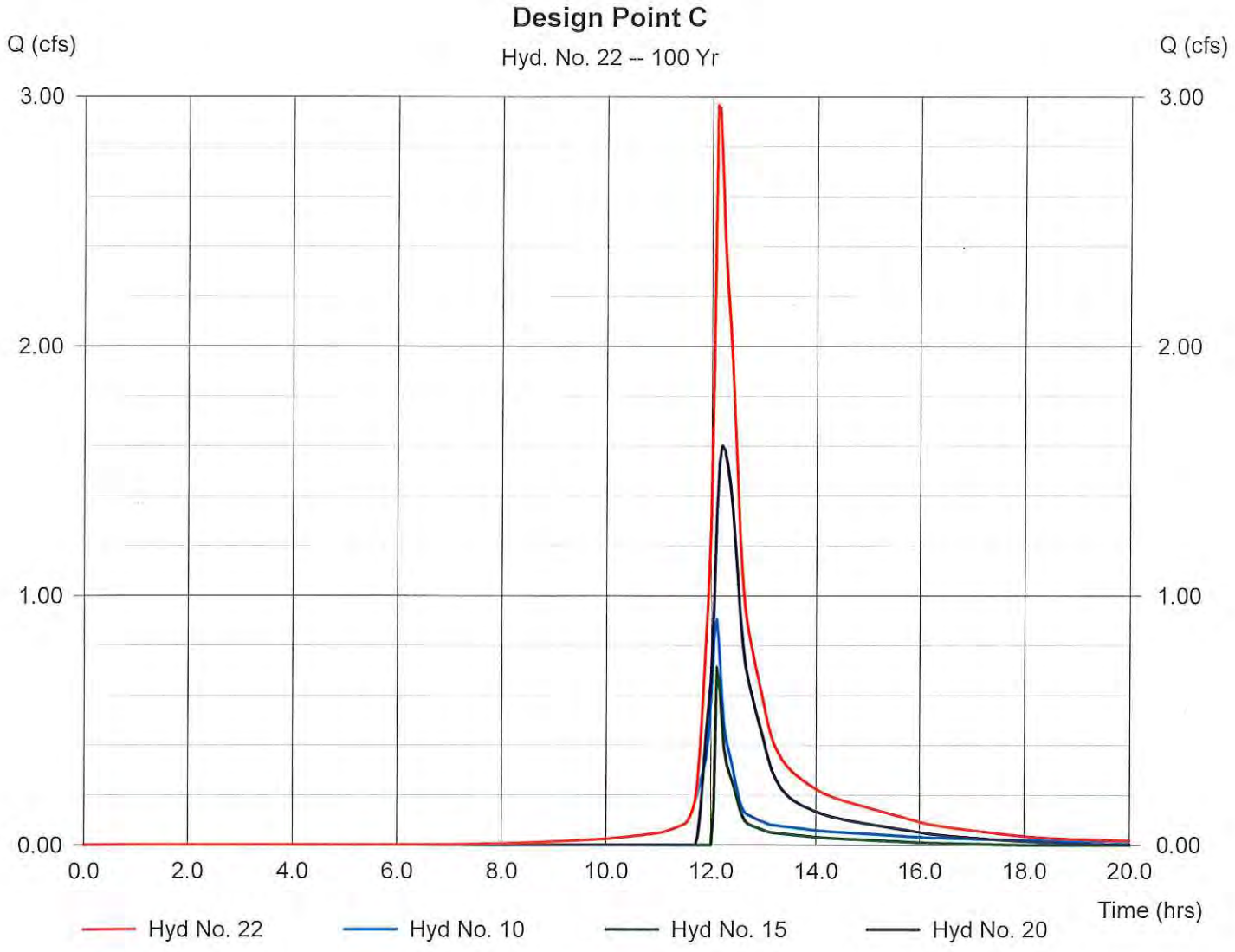
Monday, May 7 2018, 8:27 PM

## Hyd. No. 22

Design Point C

| | | | |
|---|---|---|---|
| Hydrograph type | = Combine | Peak discharge | = 2.97 cfs |
| Storm frequency | = 100 yrs | Time interval | = 3 min |
| Inflow hyds. | = 10, 15, 20 | | |

Hydrograph Volume = 9,778 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

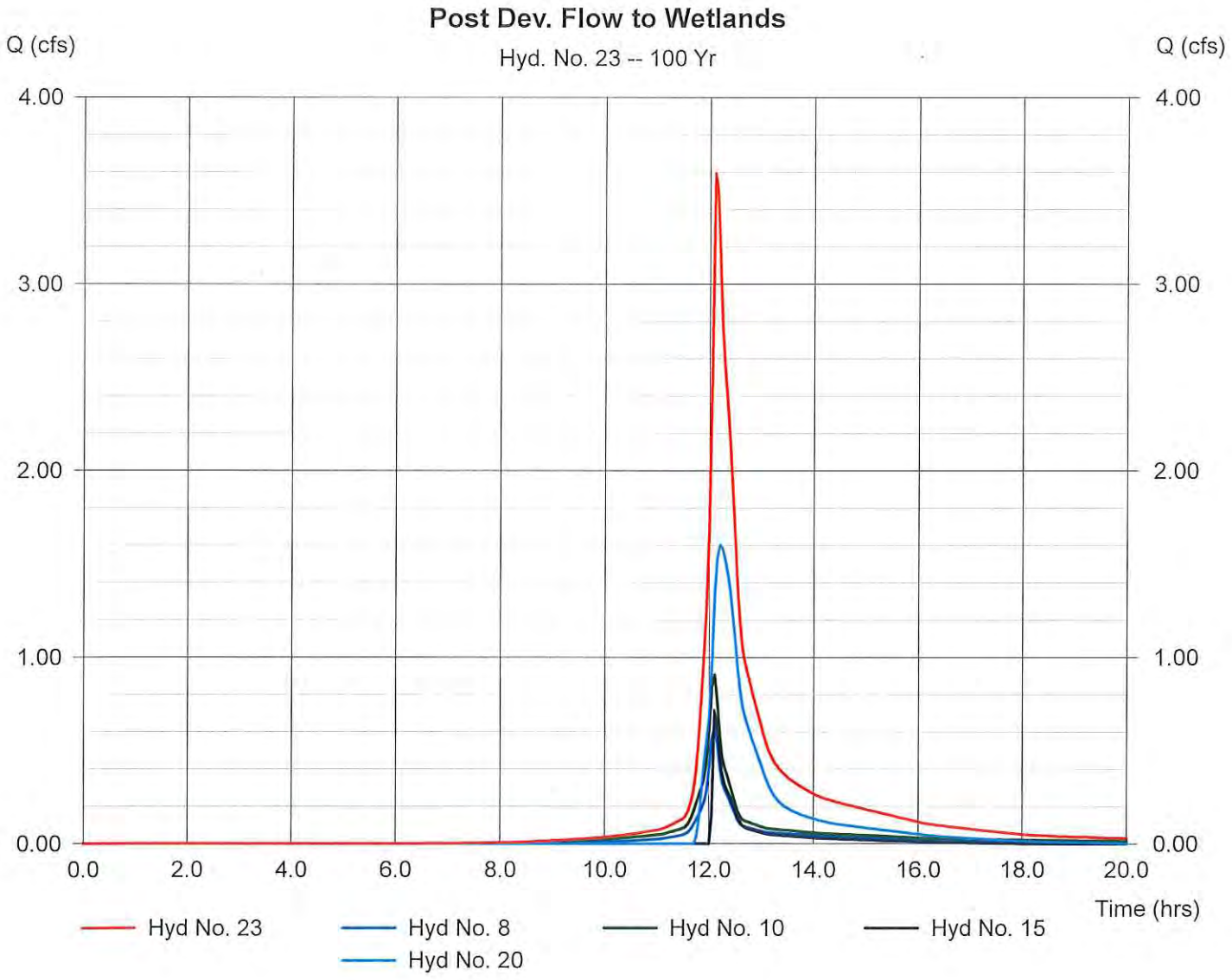
Monday, May 7 2018, 8:27 PM

## Hyd. No. 23

Post Dev. Flow to Wetlands

| | | | |
|---|---|---|---|
| Hydrograph type | = Combine | Peak discharge | = 3.59 cfs |
| Storm frequency | = 100 yrs | Time interval | = 3 min |
| Inflow hyds. | = 8, 10, 15, 20 | | |

Hydrograph Volume = 11,857 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

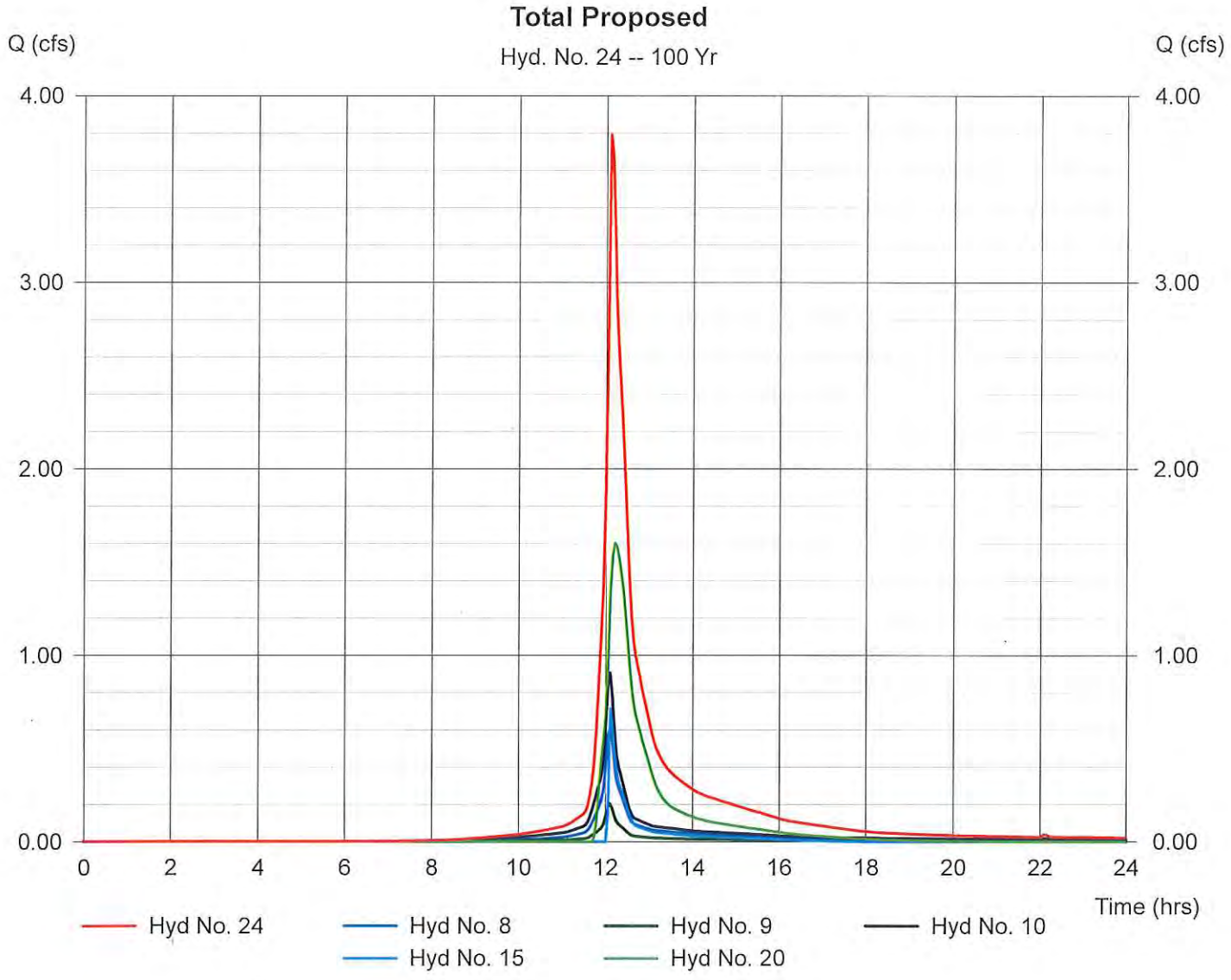
Monday, May 7 2018, 8:27 PM

## Hyd. No. 24

Total Proposed

| | | | |
|---|---|---|---|
| Hydrograph type | = Combine | Peak discharge | = 3.79 cfs |
| Storm frequency | = 100 yrs | Time interval | = 3 min |
| Inflow hyds. | = 8, 9, 10, 15, 20 | | |

Hydrograph Volume = 12,531 cuft



# Appendix B:
# Stormwater Operation and Maintenance Plan

*See Chapter 11 in Stormwater Report*
*For Operation and Maintenace Plan*
*Proposed Site Redevelopment*
*24 School Street*
*Wayland MA 01778*

# Appendix C:
# NRCS Soil Survey

Hydrologic Soil Group—Middlesex County, Massachusetts
(NRCS Soil Survey, 24 School Street, Wayland MA)

## MAP LEGEND

**Area of Interest (AOI)**
- Area of Interest (AOI)

**Soils**

**Soil Rating Polygons**
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

**Soil Rating Lines**
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

**Soil Rating Points**
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

**Water Features**
- Streams and Canals

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

**Background**
- Aerial Photography

## MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:25,000.

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

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

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

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

Soil Survey Area: Middlesex County, Massachusetts
Survey Area Data: Version 17, Oct 6, 2017

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

Date(s) aerial images were photographed: Sep 12, 2014—Sep 28, 2014

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

# Hydrologic Soil Group

| Map unit symbol | Map unit name | Rating | Acres in AOI | Percent of AOI |
|---|---|---|---|---|
| 1 | Water | | 1.8 | 0.1% |
| 30B | Raynham silt loam, 0 to 5 percent slopes | C/D | 8.0 | 0.5% |
| 32B | Wareham loamy fine sand, 0 to 5 percent slopes | A/D | 8.0 | 0.5% |
| 33B | Raypol silt loam, 0 to 5 percent slopes | B/D | 1.6 | 0.1% |
| 44A | Birdsall mucky silt loam, 0 to 1 percent slopes | C/D | 17.0 | 1.1% |
| 51A | Swansea muck, 0 to 1 percent slopes | B/D | 63.9 | 4.3% |
| 52A | Freetown muck, 0 to 1 percent slopes | B/D | 55.0 | 3.7% |
| 53A | Freetown muck, ponded, 0 to 1 percent slopes | B/D | 8.9 | 0.6% |
| 71B | Ridgebury fine sandy loam, 3 to 8 percent slopes, extremely stony | D | 7.8 | 0.5% |
| 104C | Hollis-Rock outcrop-Charlton complex, 0 to 15 percent slopes | D | 16.0 | 1.1% |
| 104D | Hollis-Rock outcrop-Charlton complex, 15 to 25 percent slopes | A | 22.5 | 1.5% |
| 106C | Narragansett-Hollis-Rock outcrop complex, 3 to 15 percent slopes | A | 93.7 | 6.3% |
| 106D | Narragansett-Hollis-Rock outcrop complex, 15 to 25 percent slopes | A | 73.0 | 4.9% |
| 223A | Scio very fine sandy loam, 0 to 3 percent slopes | B/D | 6.1 | 0.4% |
| 251A | Haven silt loam, 0 to 3 percent slopes | A | 6.2 | 0.4% |
| 251B | Haven silt loam, 3 to 8 percent slopes | A | 40.8 | 2.7% |
| 253A | Hinckley loamy sand, 0 to 3 percent slopes | A | 7.2 | 0.5% |

| Map unit symbol | Map unit name | Rating | Acres in AOI | Percent of AOI |
|---|---|---|---|---|
| 253B | Hinckley loamy sand, 3 to 8 percent slopes | A | 43.4 | 2.9% |
| 253C | Hinckley loamy sand, 8 to 15 percent slopes | A | 8.8 | 0.6% |
| 253D | Hinckley loamy sand, 15 to 25 percent slopes | A | 13.5 | 0.9% |
| 254A | Merrimac fine sandy loam, 0 to 3 percent slopes | A | 1.5 | 0.1% |
| 255A | Windsor loamy sand, 0 to 3 percent slopes | A | 4.2 | 0.3% |
| 256A | Deerfield loamy sand, 0 to 3 percent slopes | B | 21.3 | 1.4% |
| 261A | Tisbury silt loam, 0 to 3 percent slopes | C | 5.7 | 0.4% |
| 261B | Tisbury silt loam, 3 to 8 percent slopes | C | 2.7 | 0.2% |
| 311B | Woodbridge fine sandy loam, 0 to 8 percent slopes, very stony | C/D | 1.0 | 0.1% |
| 315B | Scituate fine sandy loam, 3 to 8 percent slopes | D | 37.3 | 2.5% |
| 415B | Narragansett silt loam, 3 to 8 percent slopes | A | 6.7 | 0.5% |
| 416B | Narragansett silt loam, 3 to 8 percent slopes, very stony | A | 116.6 | 7.9% |
| 416C | Narragansett silt loam, 8 to 15 percent slopes, very stony | A | 35.9 | 2.4% |
| 416D | Narragansett silt loam, 15 to 25 percent slopes, very stony | A | 9.0 | 0.6% |
| 602 | Urban land | | 10.5 | 0.7% |
| 624B | Haven-Urban land complex, 0 to 8 percent slopes | A | 257.7 | 17.4% |
| 626B | Merrimac-Urban land complex, 0 to 8 percent slopes | A | 307.8 | 20.7% |
| 629C | Canton-Charlton-Urban land complex, 3 to 15 percent slopes | A | 43.0 | 2.9% |
| 631C | Charlton-Urban land-Hollis complex, 3 to 15 percent slopes, rocky | A | 15.2 | 1.0% |
| 653 | Udorthents, sandy | | 20.5 | 1.4% |
| 654 | Udorthents, loamy | | 32.7 | 2.2% |

| Map unit symbol | Map unit name | Rating | Acres in AOI | Percent of AOI |
|---|---|---|---|---|
| 656 | Udorthents-Urban land complex | | 51.2 | 3.5% |
| Totals for Area of Interest | | | 1,483.5 | 100.0% |

## Description

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

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

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

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

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

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

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

## Rating Options

*Aggregation Method:* Dominant Condition

*Component Percent Cutoff: None Specified*

*Tie-break Rule:* Higher

# Appendix D:
# Time of Concentration Calculations

| | |
|---|---|
| **Time of Concentration Calculations** | |
| **24 School Street, Wayland MA** | |
| ***Prepared For: Windsor Place, LLC*** | |
| | |
| **Existing Conditions Watersheds** | |
| | |
| **E.C.B.-1** | |
| Longest Flow Path (ft.) | 189 |
| L^0.8 (ft.) | 66.25 |
| | |
| Runoff Curve Number | 66.4 |
| Maximum Retention (S) | 5.06 |
| (S+1)^0.7 | 3.53 |
| Basin Slope (%) | 5.2 |
| | |
| Lag Time (Hours) | 0.05 |
| Lag Time (Minutes) | 3.24 |
| **Time of Concentration (Tc) (minutes)** | **5.4** |
| | |
| **E.C.B.-2** | |
| **Time of Concentration (Tc) (minutes)** | **5.0** |
| | **Manually Entered** |
| **E.C.B.-3** | |
| Longest Flow Path (ft.) | 207 |
| L^0.8 (ft.) | 71.25 |
| | |
| Runoff Curve Number | 70.4 |
| Maximum Retention (S) | 4.20 |
| (S+1)^0.7 | 3.17 |
| Basin Slope (%) | 4.2 |
| | |
| Lag Time (Hours) | 0.06 |
| Lag Time (Minutes) | 3.48 |
| **Time of Concentration (Tc) (minutes)** | **5.8** |

| Time of Concentration Calculations | |
|---|---|
| **24 School Street, Wayland MA** | |
| ***Prepared For: Windsor Place, LLC*** | |
| | |
| **Proposed Conditions Watersheds** | |
| | |
| **P.D.B.-1** | |
| Longest Flow Path (ft.) | 222 |
| L^0.8 (ft.) | 75.35 |
| | |
| Runoff Curve Number | 66.4 |
| Maximum Retention (S) | 5.06 |
| (S+1)^0.7 | 3.53 |
| Basin Slope (%) | 4.4 |
| | |
| Lag Time (Hours) | 0.07 |
| Lag Time (Minutes) | 4.00 |
| **Time of Concentration (Tc) (minutes)** | **6.7** |
| | |
| **P.D.B.-2** | |
| **Time of Concentration (Tc) (minutes)** | **5.0** |
| | **Manually Entered** |
| | |
| **P.D.B.-3** | |
| Longest Flow Path (ft.) | 196 |
| L^0.8 (ft.) | 68.20 |
| | |
| Runoff Curve Number | 75.3 |
| Maximum Retention (S) | 3.28 |
| (S+1)^0.7 | 2.77 |
| Basin Slope (%) | 4 |
| | |
| Lag Time (Hours) | 0.05 |
| Lag Time (Minutes) | 2.98 |
| **Time of Concentration (Tc) (minutes)** | **5.0** |
| | **Manually Entered at 5.0 Minutes** |
| | |
| P.D.B.-3A | |
| **Time of Concentration (Tc) (minutes)** | **5.0** |
| | **Manually Entered** |
| | |
| **P.D.B.-4** | |
| **Time of Concentration (Tc) (minutes)** | **5.0** |
| Page 1 of 1 | **Manually Entered** |

## NOTES:

1. SUBJECT PARCEL IS SHOWN AS ASSESSORS MAP 52, LOT 189. RECORD TITLE FROM BOOK 31869, PAGE 55.
2. UTILITY LOCATIONS DEPICTED ON THIS PLAN, BOTH ABOVE– AND BELOW–GROUND, ARE BASED UPON DIRECT FIELD OBSERVATIONS MADE BY METROWEST ENGINEERING, INC. PERSONNEL DURING A FIELD SURVEY, RECORD PLAN LOCATIONS, OR DIGSAFE PAINT–INDICATORS. METROWEST ENGINEERING, INC. DOES NOT WARRANT THAT ALL UTILITIES ARE SHOWN OR THAT UTILITIES THAT ARE DEPICTED ARE SHOWN IN THE CORRECT LOCATION, OR WITH THE PROPER MATERIAL DESIGNATION. METROWEST ENGINEERING, INC. DOES NOT WARRANT OR PROVIDE AN EXPRESS OR IMPLIED WARRANTY THAT ALL SUBSURFACE IMPROVEMENTS ARE SHOWN OR ARE SHOWN CORRECTLY, INCLUDING, BUT NOT LIMITED TO, UTILITIES, UNDERGROUND VAULTS, UNDERGROUND TANKS OR CHAMBERS, BUNKERS, DUCT BANKS, AND/OR OTHER MAN–MADE IMPROVEMENTS THAT LIE BENEATH THE GROUND SURFACE AT THE TIME OF THE SURVEY.
3. CONTRACTOR IS SOLELY RESPONSIBLE FOR ESTABLISHING EXISTING LOCATIONS OF ALL SUB–SURFACE UTILITIES AND MAN–MADE IMPROVEMENTS AND FOR THE REQUIREMENTS TO REPLACE, RELOCATE OR REPAIR EXISTING UTILITIES IN THE EVENT OF DAMAGE OCCURRING DURING CONSTRUCTION. MWE IS NOT RESPONSIBLE OR LIABLE FOR DELAYS OR COSTS ASSOCIATED WITH REMOVING/REPLACING/RELOCATING OF EXISTING UTILITIES REGARDLESS OF WHETHER SAID UTILITIES ARE ACCURATELY DEPICTED ON THIS SURVEY.
4. THE PROPERTY DESCRIBED ON THIS SURVEY DOES NOT LIE WITHIN A SPECIAL FLOOD HAZARD AREA AS DEFINED BY THE FEDERAL EMERGENCY MANAGEMENT AGENCY; THE PROPERTY LIES WITHIN ZONE "X" OF THE FLOOD INSURANCE RATE MAP IDENTIFIED AS MAP NUMBER 25017C0528F, BEARING AN EFFECTIVE DATE OF JULY 7, 2014.

## BENCHMARKS

ELEVATIONS SHOWN ON THIS PLAN REFER TO RM 11 (ELEV.=163.84'), A CHISELED SQUARE IN THE NORTH HEADWALL OF THE CULVERT UNDER COMMONWEALTH ROAD FOR SNAKE BROOK N.G.V.D. 1929.)

| T.B.M. | DESCRIPTION | ELEVATION |
|---|---|---|
| C | DHN SET IN 14" BLACK LOCUST | 161.89' |
| D | DHN SET IN 10" NORWAY MAPLE | 168.74' |

## LEGEND

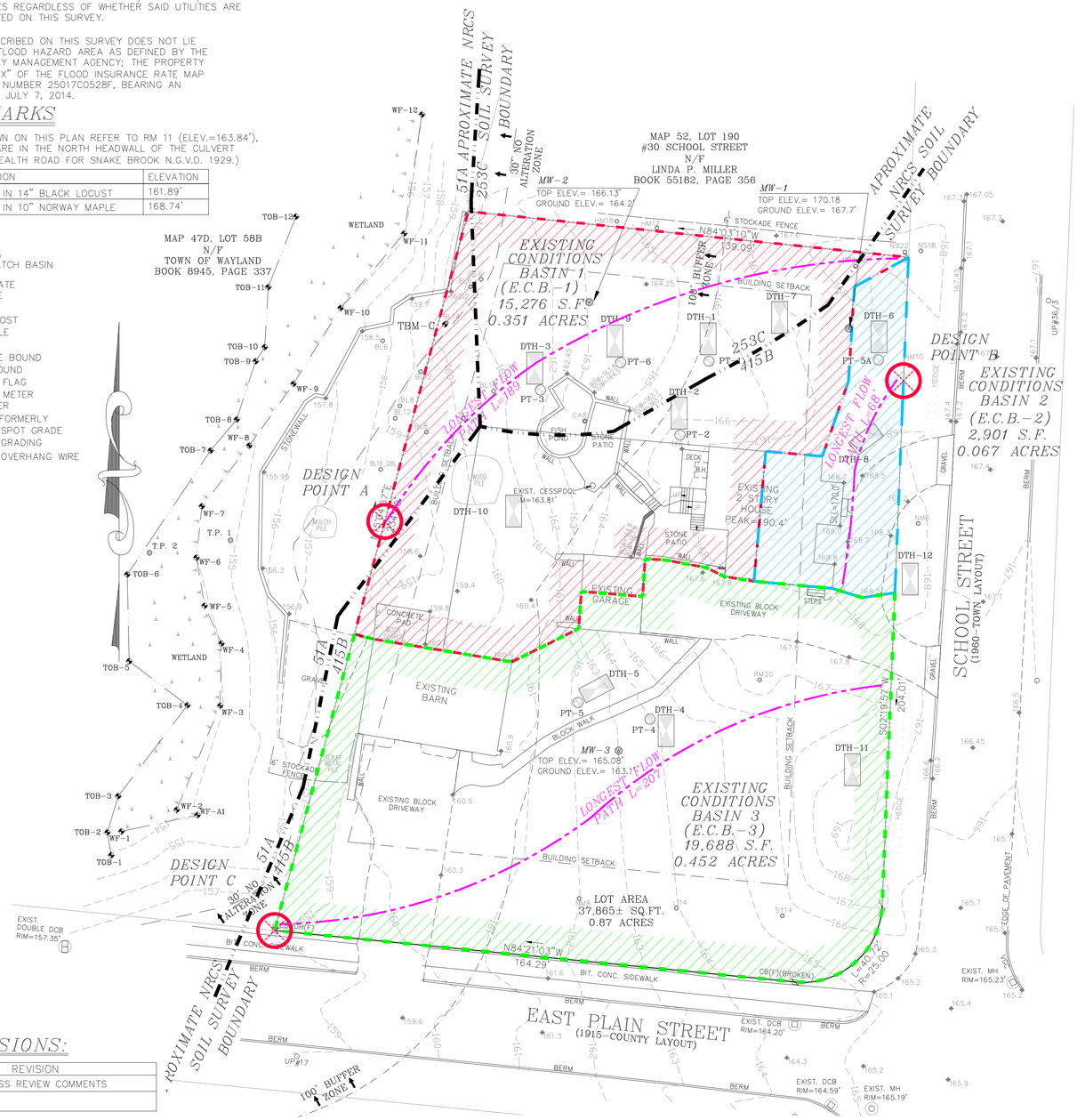
| | |
|---|---|
| DCB | DRAIN CATCH BASIN |
| HM | MANHOLE |
| ⋈WG | WATER GATE |
| ⋈GG | GAS GATE |
| | HYDRANT |
| U.P. | UTILITY POST |
| DH | DRILL HOLE |
| (F) | FOUND |
| CB | CONCRETE BOUND |
| SB | STONE BOUND |
| WF | WETLAND FLAG |
| E.M. | ELECTRIC METER |
| G.M. | GAS METER |
| N/F | NOW OR FORMERLY |
| + 200.0 | EXISTING SPOT GRADE |
| – –200– – – | EXISTING GRADING |
| – – – – – – – | EXISTING OVERHANG WIRE |

## EXISTING TREE DESCRIPTION LEGEND

| CODE | DESCRIPTION |
|---|---|
| BL# | BALCK LOCUST |
| CA# | CRAB APPLE |
| HM# | HEMLOCK |
| LI# | LINDEN |
| NM# | NORWAY MAPLE |
| NS# | NORWAY SPRUCE |
| RM# | RED MAPLE |
| SY# | SYCAMORE |

DETAIL: TREE LOCATION → R014 → TREE CODE / TREE DIAMETER

CONTRACTOR TO VERIFY ACTUAL LOCATION OF EXISTING UTILITY SERVICES IN THE FIELD PRIOR TO CONSTRUCTION (WATER, ELECTRICAL, ETC.) CALL DIG–SAFE BEFORE YOU DIG 811.




## REVISIONS:

| No. | DATE | REVISION |
|---|---|---|
| 1 | 11/04/17 | ADDRESS REVIEW COMMENTS |
| | | |
| | | |

## SOIL LOGS No: SOIL TEST RESULTS

| DTH–1 ELEV=165.7' | DTH–2 ELEV=165.9' | DTH–3 ELEV=161.7' | DTH–4 ELEV=164.1' | DTH–5 ELEV=162.6' |
|---|---|---|---|---|
| 0"–10" Ap FINE SANDY LOAM 10YR3/3<br>10"–24" Bw FINE SANDY LOAM 10YR5/6<br>24"–62" C1 SANDY LOAM 2.5Y5/3<br>62"–126" C2 SANDY LOAM 2.5Y5/4<br>NO STANDING OR WEEPING WATER<br>NO REFUSAL, C2 HORIZON IS TIGHT<br>REDOX @70" 7.5YR5/8 5%<br>ESTIMATED DESIGN GROUNDWATER=159.87' | 0"–22" Ap FINE SANDY LOAM 10YR3/3<br>22"–42" Bw FINE SANDY LOAM 10YR5/6<br>42"–96" C1 SANDY LOAM 2.5Y5/3<br>96"–118" C2 SILT LOAM 2.5Y6/3<br>WATER WEEPING @106"<br>NO STANDING WATER, NO REFUSAL<br>REDOX @80" 7.5YR5/8<br>ESTIMATED DESIGN GROUNDWATER=159.23' | 0"–10" Ap FINE SANDY LOAM 10YR3/3<br>10"–22" Bw FINE SANDY LOAM 10YR5/6<br>22"–84" C1 SANDY LOAM 2.5Y5/3<br>84"–110" C2 SILT LOAM 2.5Y6/3<br>NO STANDING WATER, NO REFUSAL<br>C2 HORIZON IS DAMP<br>REDOX @82" 7.5YR5/8<br>ESTIMATED DESIGN GROUNDWATER=154.87' | 0"–20" FILL<br>20"–28" Ap FINE SANDY LOAM 10YR3/3<br>28"–40" Bw FINE SANDY LOAM 10YR5/6<br>40"–86" C1 SANDY LOAM 2.5Y5/4<br>86"–116" C2 SANDY LOAM 2.5Y4/4<br>NO REFUSAL, NO STANDING OR WEEPING WATER<br>NO REDOX<br>ESTIMATED DESIGN GROUNDWATER=NONE | 0"–16" Ap FINE SANDY LOAM 10YR3/3<br>16"–34" Bw FINE SANDY LOAM 10YR5/6<br>34"–84" C1 SANDY LOAM 2.5Y5/4<br>84"–118" C2 SANDY LOAM 2.5Y4/3<br>WEEPING WATER @112"<br>NO REFUSAL<br>REDOX @72" 7.5YR5/8<br>ESTIMATED DESIGN GROUNDWATER=156.6' |
| DATE: JULY 31, 2014 | | | | |

BY: BRIAN T. NELSON, SOIL EVALUATOR (METROWEST ENGINEERING, INC.)

INSPECTOR: BILL MURPHY, WAYLAND BOARD OF HEALTH

## SOIL LOGS No: SOIL TEST RESULTS

| DTH–6 ELEV=167.7' | DTH–7 ELEV=166.8' | DTH–8 ELEV=168.2' | DTH–9 ELEV=163.0' | DTH–10 ELEV=160.75' |
|---|---|---|---|---|
| 0"–14" Ap FINE SANDY LOAM 10YR3/3<br>14"–26" Bw FINE SANDY LOAM 10YR5/6<br>26"–64" C1 SANDY LOAM 2.5Y5/3<br>64"–122" C2 SANDY LOAM 2.5Y4/4<br>NO STANDING OR WEEPING WATER<br>NO REFUSAL<br>REDOX @70" 7.5YR5/8 5%<br>ESTIMATED DESIGN GROUNDWATER=161.87' | 0"–14" Ap FINE SANDY LOAM 10YR3/3<br>14"–32" Bw FINE SANDY LOAM 10YR5/6<br>32"–58" C1 SANDY LOAM 2.5Y5/3<br>58"–114" C2 SANDY LOAM 2.5Y5/4<br>NO STANDING OR WEEPING WATER<br>LENSES OF SILT LOAM FROM 76" DOWN<br>ESTIMATED DESIGN GROUNDWATER=NONE | 0"–26" FILL<br>26"–40" Bw FINE SANDY LOAM 10YR5/6<br>40"–78" C1 SANDY LOAM 2.5Y5/4<br>78"–108" C2 LOAMY SAND 2.5Y5/3<br>108"–126" C3 SILT LOAM 2.5Y6/3<br>C3 HORIZON IS DAMP<br>NO REFUSAL<br>REDOX @80" 7.5YR5/8 10%<br>ESTIMATED DESIGN GROUNDWATER=161.53' | 0"–16" Ap FINE SANDY LOAM 10YR3/3<br>16"–30" Bw FINE SANDY LOAM 10YR5/6<br>30"–46" Bc SANDY LOAM 2.5Y5/4<br>46"–98" C1 SANDY LOAM 2.5Y5/3<br>98"–118" C2 SANDY LOAM 2.5Y4/4<br>WATER STANDING @108"<br>WATER WEEPING @88"<br>REDOX SEEN @62", NO REFUSAL<br>ESTIMATED DESIGN GROUNDWATER=157.8' | 0"–15" Ap FINE SANDY LOAM 10YR3/3<br>15"–30" Bw FINE SANDY LOAM 10YR5/6<br>30"–66" C1 LOAMY SAND 2.5Y5/3<br>66"–112" C2 SILT LOAM 2.5Y5/4<br>WATER STANDING @100"<br>WATER WEEPING @98"<br>NO REFUSAL<br>REDOX SEEN @68" 7.5YR5/8 10%<br>ESTIMATED DESIGN GROUNDWATER=155.08' |

### PERCOLATION

| NO. | DEPTH | RATE | DATE | BY | INSP. |
|---|---|---|---|---|---|
| PT–1 | 60" | 8 MPI | 07/31/14 | B.N. | B.M. |
| PT–2 | 68" | 13 MPI | 07/31/14 | B.N. | B.M. |
| PT–3 | 50" | 10 MPI | 07/31/14 | B.N. | B.M. |
| PT–4 | 55" | MPI | 07/31/14 | B.N. | B.M. |
| PT–5 | 60" | MPI | 07/31/14 | B.N. | B.M. |

### PERCOLATION

| NO. | DEPTH | RATE | DATE | BY | INSP. |
|---|---|---|---|---|---|
| PT–5A | 54" | 10 MPI | 08/21/14 | B.N. | J.J. |
| PT–6 | 60" | 3 MPI | 08/21/14 | B.N. | J.J. |

| DTH–11 ELEV=166.0' | DTH–12 ELEV=168.2' |
|---|---|
| 0"–18" FILL<br>18"–30" Ap FINE SANDY LOAM 10YR3/3<br>30"–36" Bw FINE SANDY LOAM 10YR5/6<br>36"–58" C1 SANDY LOAM 2.5Y5/3<br>58"–128" C2 SANDY LOAM 2.5Y6/3<br>WATER STANDING @125"<br>NO WEEPING WATER<br>REDOX SEEN @60" 7.5YR5/8 5%<br>ESTIMATED DESIGN GROUNDWATER=161.0' | 0"–54" FILL<br>58"–82" C1 SANDY LOAM 2.5Y4/4<br>82"–114" C2 SANDY LOAM 2.5Y5/4<br>C2 HORIZON HAS LENSES OF SILT LOAM<br>NO STANDING OR WEEPING WATER<br>NO REFUSAL<br>REDOX SEEN @64" 7.5YR5/8<br>ESTIMATED DESIGN GROUNDWATER=161.0' |
| DATE: AUGUST 21, 2014 | |

BY: BRIAN T. NELSON, SOIL EVALUATOR (METROWEST ENGINEERING, INC.)

INSPECTOR: JULIA JUNGHANNS, WAYLAND BOARD OF HEALTH

## USDA SOIL CLASSIFICATION

| SOIL NUMBER | SOIL SERIES | HYDROLOGIC SOIL GROUP |
|---|---|---|
| 51A | SWANSEA MUCK | B/D |
| 253C | HINCKLEY LOAMY SAND | A |
| 415B | NARRAGANSETT SILT LOAM | B |

*HYDROLOGIC SOIL GROUP B USED FOR ANALSYIS*

SOILS ON SITE ARE SANDY LOAM TEXTURES AND CLASSIFIED WITHIN HYDROLOGIC SOIL GROUP B.

## EXISTING CONDITIONS BASIN PROPERTIES:

### EXISTING CONDITIONS BASIN 1 (E.C.B.–1)

TOTAL BASIN AREA = 15,276 S.F. (0.351 ACRES)
HYDRAULIC LENGTH = 189 FEET
CHANGE IN ELEVATION = 9.8 FEET
BASIN SLOPE = 0.052 (5.2%)

| GROUND COVER | Cn | AREA (ACRES) | PRODUCT |
|---|---|---|---|
| IMPERVIOUS AREA = 2,205 S.F. (0.051 ACRES) | 98 | 0.051 | 5.000 |
| LAWN AREA (GOOD COND.) = 13,071 S.F. (0.300 ACRES) | 61 | 0.300 | 18.300 |
| | | SUM 0.351 | SUM 23.300 |

WEIGHTED CURVE NUMBER ($C_N$) = (23.300/0.351) = 66.4

### EXISTING CONDITIONS BASIN 2 (E.C.B.–2)

TOTAL BASIN AREA = 2,901 S.F. (0.067 ACRES)
HYDRAULIC LENGTH = 68 FEET
CHANGE IN ELEVATION = 1.3 FEET
BASIN SLOPE = 0.019 (1.9%)

| GROUND COVER | Cn | AREA (ACRES) | PRODUCT |
|---|---|---|---|
| IMPERVIOUS AREA = 1,460 S.F. (0.034 ACRES) | 98 | 0.034 | 3.332 |
| LAWN AREA (GOOD COND.) = 1,440 S.F. (0.033 ACRES) | 61 | 0.033 | 2.013 |
| | | SUM 0.067 | SUM 5.345 |

WEIGHTED CURVE NUMBER ($C_N$) = (5.345/0.067) = 79.8

### EXISTING CONDITIONS BASIN 3 (E.C.B.–3)

TOTAL BASIN AREA = 19,688 S.F. (0.452 ACRES)
HYDRAULIC LENGTH = 207 FEET
CHANGE IN ELEVATION = 8.8 FEET
BASIN SLOPE = 0.042 (4.2%)

| GROUND COVER | Cn | AREA (ACRES) | PRODUCT |
|---|---|---|---|
| IMPERVIOUS AREA = 5,115 S.F. (0.117 ACRES) | 98 | 0.117 | 11.466 |
| LAWN AREA (GOOD COND.) = 14,573 S.F. (0.334 ACRES) | 61 | 0.334 | 20.374 |
| | | SUM 0.452 | SUM 31.840 |

WEIGHTED CURVE NUMBER ($C_N$) = (31.840/0.452) = 70.4

EXISTING CONDITIONS – TOTAL IMPERVIOUS AREA = 8,780 S.F.
EXISTING CONDITIONS – TOTAL LAWN AREA = 29,085 S.F.

*FOR METROWEST ENGINEERING, INC.* *DATE*
*ROBERT A. GEMMA, P.E.(CIVIL) # 31967*
*P.L.S. # 37046*

GRAPHIC SCALE
1 inch = 20 ft.
20 0 10 20 40 ( FEET ) 80
0 4 10 20 ( METERS ) 30

# FIGURE TWO

# EXISTING CONDITIONS WATERSHED DELINEATION PLAN

#24 SCHOOL STREET
IN
WAYLAND, MASS

PREPARED FOR:
*CHADWICK HOMES*
*73 PELHAM ISLAND ROAD*
*WAYLAND, MA 01778*

PROPERTY OF:
*LINDA C. KNOWLES &*
*CARY W. RIDGE*
*24 SCHOOL STREET*
*WAYLAND, MA 01778*

ENGINEERS & SURVEYORS:
MWE
*METROWEST ENGINEERING, INC.*
*75 FRANKLIN STREET*
*FRAMINGHAM, MA 01702*
*TEL.: (508)626–0063*
*FAX: (508)875–6440*

| SHEET 1 OF 1 | | DATE: DECEMBER 19, 2016 |
|---|---|---|
| CALC'D BY: RAG | FIELD BK: 621 | CAD FILE: EC_HYDRO_R1.dwg |
| DRAFTER: | PROJECT: WY_SCH | DWG FILE: SK121916_R1.dwg |

## NOTES:

1. SUBJECT PARCEL IS SHOWN AS ASSESSORS MAP 52, LOT 189. RECORD TITLE FROM BOOK 31869, PAGE 55.

2. UTILITY LOCATIONS DEPICTED ON THIS PLAN, BOTH ABOVE- AND BELOW-GROUND, ARE BASED UPON DIRECT FIELD OBSERVATIONS MADE BY METROWEST ENGINEERING, INC. PERSONNEL DURING A FIELD SURVEY, RECORD PLAN LOCATIONS, OR DIGSAFE PAINT-INDICATORS. METROWEST ENGINEERING, INC. DOES NOT WARRANT THAT ALL UTILITIES ARE SHOWN OR THAT UTILITIES THAT ARE DEPICTED ARE SHOWN IN THE CORRECT LOCATION, OR WITH THE PROPER MATERIAL DESIGNATION. METROWEST ENGINEERING, INC. DOES NOT WARRANT OR PROVIDE AN EXPRESS OR IMPLIED WARRANTY THAT ALL SUBSURFACE IMPROVEMENTS ARE SHOWN OR ARE SHOWN CORRECTLY, INCLUDING, BUT NOT LIMITED TO, UTILITIES, UNDERGROUND VAULTS, UNDERGROUND TANKS OR CHAMBERS, BUNKERS, DUCT BANKS, AND/OR OTHER MAN-MADE IMPROVEMENTS THAT LIE BENEATH THE GROUND SURFACE AT THE TIME OF THE SURVEY.

3. CONTRACTOR IS SOLELY RESPONSIBLE FOR ESTABLISHING EXISTING LOCATIONS OF ALL SUB-SURFACE UTILITIES AND MAN-MADE IMPROVEMENTS AND FOR THE REQUIREMENTS TO REPLACE, RELOCATE OR REPAIR EXISTING UTILITIES IN THE EVENT OF DAMAGE OCCURRING DURING CONSTRUCTION. MWE IS NOT RESPONSIBLE OR LIABLE FOR DELAYS OR COSTS ASSOCIATED WITH REMOVING/REPLACING/RELOCATING OF EXISTING UTILITIES REGARDLESS OF WHETHER SAID UTILITIES ARE ACCURATELY DEPICTED ON THIS SURVEY.

4. THE PROPERTY DESCRIBED ON THIS SURVEY DOES NOT LIE WITHIN A SPECIAL FLOOD HAZARD AREA AS DEFINED BY THE FEDERAL EMERGENCY MANAGEMENT AGENCY; THE PROPERTY LIES WITHIN ZONE "X" OF THE FLOOD INSURANCE RATE MAP IDENTIFIED AS MAP NUMBER 25017C0528F, BEARING AN EFFECTIVE DATE OF JULY 7, 2014.

## BENCHMARKS

ELEVATIONS SHOWN ON THIS PLAN REFER TO RM 11 (ELEV.=163.84'), A CHISELED SQUARE IN THE NORTH HEADWALL OF THE CULVERT UNDER COMMONWEALTH ROAD FOR SNAKE BROOK N.G.V.D. 1929.

| T.B.M. | DESCRIPTION | ELEVATION |
|---|---|---|
| C | DHN SET IN 14" BLACK LOCUST | 161.89' |
| D | DHN SET IN 10" NORWAY MAPLE | 168.74' |

CONTRACTOR TO VERIFY ACTUAL LOCATION OF EXISTING UTILITY SERVICES IN THE FIELD PRIOR TO CONSTRUCTION (WATER, ELECTRICAL, ETC.) CALL DIG-SAFE BEFORE YOU DIG 811.

## ZONING:

### RESIDENCE ZONE 20,000 – 120' FRONT

MINIMUM LOT AREA= $20,000^{15}$ S.F.
MINIMUM LOT COVERAGE= 20%
MINIMUM FRONTAGE= 200 FT.
SETBACKS:
FRONT LOT LINE= $30^{2}$ FT.
FRONT ROW CENTER LINE= 55 FT.
SIDE YARD= $15^{3}$ FT.
REAR YARD=30 FT.
MAX. HEIGHT = 35 FT./2½ STORIES

2) IF §198-702 SHALL REQUIRE A GREATER SETBACK OR PERMIT A LESSER SETBACK, THE PROVISIONS OF SAID §198-702 SHALL PREVAIL OVER THIS TABLE.

3) SIDE YARDS SHALL MEET THE REQUIREMENTS OF §§198-702.4 AND 703.2, AND THE REQUIRED MINIMUM SIDE YARD MAY BE REDUCED IN ACCORDANCE WITH PROVISIONS OF §198-703.2

15) MINIMUM FRONT YARD WIDTH SHALL BE CALCULATED IN ACCORDANCE WITH THE REQUIREMENTS OF §198-705.1 OF THE ZONING BYLAW.

## EXISTING TREE DESCRIPTION LEGEND

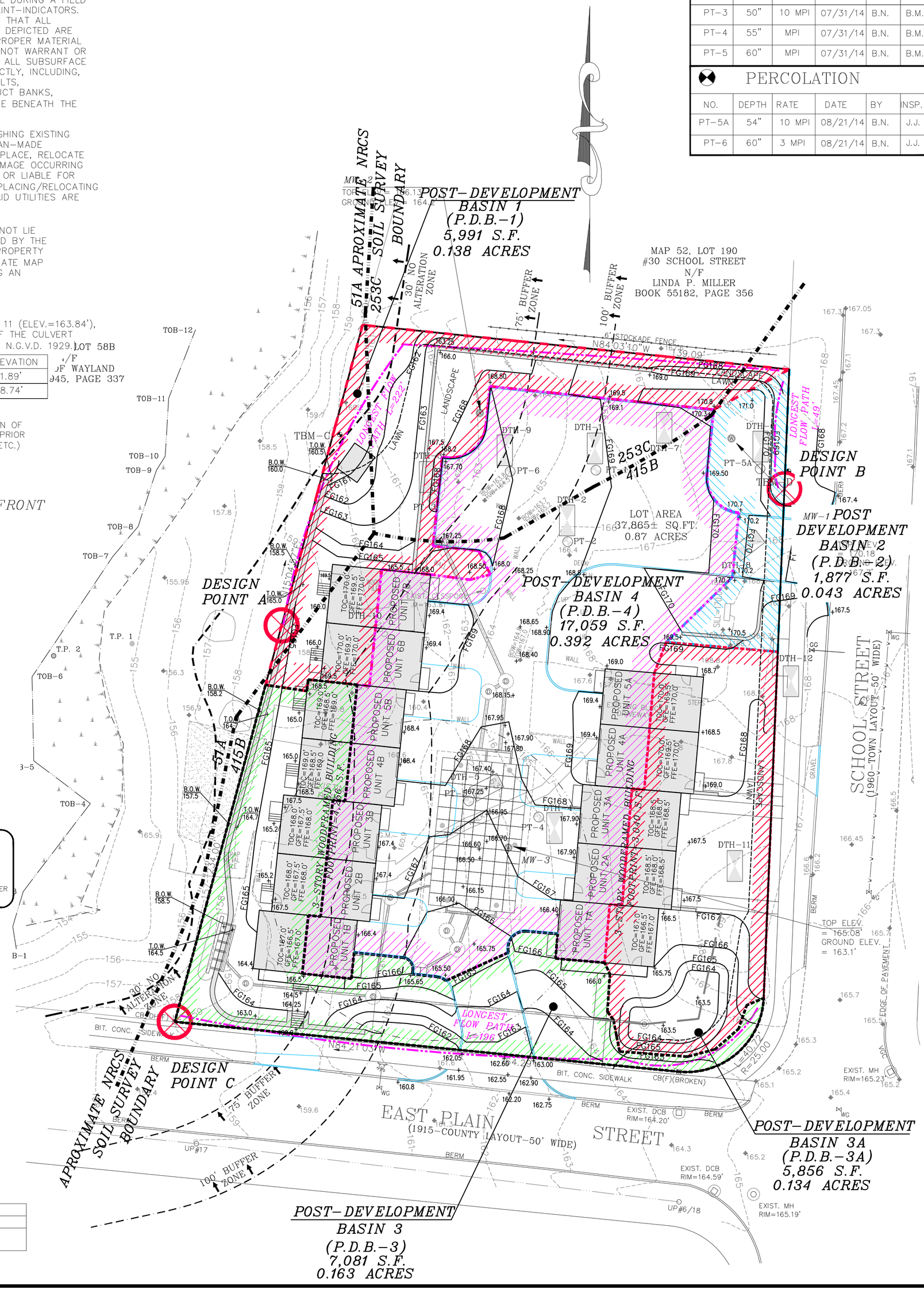
| CODE | DESCRIPTION |
|---|---|
| BL# | BALCK LOCUST |
| CA# | CRAB APPLE |
| HM# | HEMLOCK |
| LI# | LINDEN |
| NM# | NORWAY MAPLE |
| NS# | NORWAY SPRUCE |
| RM# | RED MAPLE |
| SY# | SYCAMORE |

DETAIL
TREE LOCATION
RO14
TREE CODE — TREE DIAMETER

## LEGEND

| | |
|---|---|
| DCB | DRAIN CATCH BASIN |
| HM | MANHOLE |
| WG | WATER GATE |
| GG | GAS GATE |
| | HYDRANT |
| U.P. | UTILITY POST |
| DH | DRILL HOLE |
| (F) | FOUND |
| CB | CONCRETE BOUND |
| SB | STONE BOUND |
| WF | WETLAND FLAG |
| E.M. | ELECTRIC METER |
| G.M. | GAS METER |
| N/F | NOW OR FORMERLY |
| +200.0 | EXISTING SPOT GRADE |
| ----200---- | EXISTING GRADING |
| ---------- | EXISTING OVERHANG WIRE |

| No. | DATE | REVISION |
|---|---|---|
| 2 | 07/29/15 | ADD TOP OF BANK |
| 3 | 11/01/15 | ADD ELEVATION DATUM REFERENCE REVISE WF#11, WF#12 |




## PERCOLATION

| NO. | DEPTH | RATE | DATE | BY | INSP. |
|---|---|---|---|---|---|
| PT-1 | 60" | 8 MPI | 07/31/14 | B.N. | B.M. |
| PT-2 | 68" | 13 MPI | 07/31/14 | B.N. | B.M. |
| PT-3 | 50" | 10 MPI | 07/31/14 | B.N. | B.M. |
| PT-4 | 55" | MPI | 07/31/14 | B.N. | B.M. |
| PT-5 | 60" | MPI | 07/31/14 | B.N. | B.M. |

## PERCOLATION

| NO. | DEPTH | RATE | DATE | BY | INSP. |
|---|---|---|---|---|---|
| PT-5A | 54" | 10 MPI | 08/21/14 | B.N. | J.J. |
| PT-6 | 60" | 3 MPI | 08/21/14 | B.N. | J.J. |

## SOIL LOGS No: SOIL TEST RESULTS

| DTH-1 ELEV=165.7' | DTH-2 ELEV=165.9' | DTH-3 ELEV=161.7' | DTH-4 ELEV=164.1' | DTH-5 ELEV=162.6' |
|---|---|---|---|---|
| 0"-10" Ap FINE SANDY LOAM 10YR3/3<br>10"-24" Bw FINE SANDY LOAM 10YR5/6<br>24"-62" C1 SANDY LOAM 2.5Y5/3<br>62"-126" C2 SANDY LOAM 2.5Y5/4<br>NO STANDING OR WEEPING WATER<br>NO REFUSAL, C2 HORIZON IS TIGHT<br>REDOX @70" 7.5YR5/8 5%<br>ESTIMATED DESIGN GROUNDWATER=159.87' | 0"-22" Ap FINE SANDY LOAM 10YR3/3<br>22"-42" Bw FINE SANDY LOAM 10YR5/6<br>42"-96" C1 SANDY LOAM 2.5Y5/3<br>96"-118" C2 SILT LOAM 2.5Y6/3<br>WATER WEEPING @106"<br>NO STANDING WATER, NO REFUSAL<br>REDOX @80" 7.5YR5/8<br>ESTIMATED DESIGN GROUNDWATER=159.23' | 0"-10" Ap FINE SANDY LOAM 10YR3/3<br>10"-22" Bw FINE SANDY LOAM 10YR5/6<br>22"-84" C1 SANDY LOAM 2.5Y5/3<br>84"-110" C2 SILT LOAM 2.5Y6/3<br>NO STANDING WATER, NO REFUSAL<br>C2 HORIZON IS DAMP<br>REDOX @82" 7.5YR5/8<br>ESTIMATED DESIGN GROUNDWATER=154.87' | 0"-20" FILL<br>20"-28" Ap FINE SANDY LOAM 10YR3/3<br>28"-40" Bw FINE SANDY LOAM 10YR5/6<br>40"-86" C1 SANDY LOAM 2.5Y5/4<br>86"-116" C2 SANDY LOAM 2.5Y4/4<br>NO REFUSAL, NO STANDING OR WEEPING WATER<br>NO REDOX<br>ESTIMATED DESIGN GROUNDWATER=NONE | 0"-16" Ap FINE SANDY LOAM 10YR3/3<br>16"-34" Bw FINE SANDY LOAM 10YR5/6<br>34"-84" C1 SANDY LOAM 2.5Y5/4<br>84"-118" C2 SANDY LOAM 2.5Y4/3<br>WEEPING WATER @112"<br>NO REFUSAL<br>REDOX @72" 7.5YR5/8<br>ESTIMATED DESIGN GROUNDWATER=156.6' |
| DATE: JULY 31, 2014 | | | | |
| BY: BRIAN T. NELSON, SOIL EVALUATOR (METROWEST ENGINEERING, INC.) | | | | |
| INSPECTOR: BILL MURPHY, WAYLAND BOARD OF HEALTH | | | | |

## SOIL LOGS No: SOIL TEST RESULTS

| DTH-6 ELEV=167.7' | DTH-7 ELEV=166.8' | DTH-8 ELEV=168.2' | DTH-9 ELEV=163.0' | DTH-10 ELEV=160.75' |
|---|---|---|---|---|
| 0"-14" Ap FINE SANDY LOAM 10YR3/3<br>14"-26" Bw FINE SANDY LOAM 10YR5/6<br>26"-64" C1 SANDY LOAM 2.5Y5/3<br>64"-122" C2 SANDY LOAM 2.5Y4/4<br>NO STANDING OR WEEPING WATER<br>NO REFUSAL<br>REDOX @70" 7.5YR5/8 5%<br>ESTIMATED DESIGN GROUNDWATER=161.87' | 0"-14" Ap FINE SANDY LOAM 10YR3/3<br>14"-32" Bw FINE SANDY LOAM 10YR5/6<br>32"-58" C1 SANDY LOAM 2.5Y5/3<br>58"-114" C2 SANDY LOAM 2.5Y5/4<br>NO STANDING OR WEEPING WATER<br>LENSES OF SILT LOAM FROM 76" DOWN<br>ESTIMATED DESIGN GROUNDWATER=NONE | 0"-26" FILL<br>26"-40" Bw FINE SANDY LOAM 10YR5/6<br>40"-78" C1 SANDY LOAM 2.5Y5/4<br>78"-108" C2 LOAMY SAND 2.5Y5/3<br>108"-126" C3 SILT LOAM 2.5Y6/3<br>C3 HORIZON IS DAMP<br>NO REFUSAL<br>REDOX @80" 7.5YR5/8 10%<br>ESTIMATED DESIGN GROUNDWATER=161.53' | 0"-16" Ap FINE SANDY LOAM 10YR3/3<br>16"-30" Bw FINE SANDY LOAM 10YR5/6<br>30"-46" Bc SANDY LOAM 2.5Y5/4<br>46"-98" C1 SANDY LOAM 2.5Y5/3<br>98"-118" C2 SANDY LOAM 2.5Y4/4<br>WATER STANDING @108"<br>WATER WEEPING @88"<br>REDOX SEEN @62", NO REFUSAL<br>ESTIMATED DESIGN GROUNDWATER=157.8' | 0"-15" Ap FINE SANDY LOAM 10YR3/3<br>15"-30" Bw FINE SANDY LOAM 10YR5/6<br>30"-66" C1 LOAMY SAND 2.5Y5/3<br>66"-112" C2 SILT LOAM 2.5Y5/4<br>WATER STANDING @100"<br>WATER WEEPING @98"<br>NO REFUSAL<br>REDOX SEEN @68" 7.5YR5/8 10%<br>ESTIMATED DESIGN GROUNDWATER=155.08' |

| DTH-11 ELEV=166.0' | DTH-12 ELEV=168.2' |
|---|---|
| 0"-18" FILL<br>18"-30" Ap FINE SANDY LOAM 10YR3/3<br>30"-36" Bw FINE SANDY LOAM 10YR5/6<br>36"-58" C1 SANDY LOAM 2.5Y5/3<br>58"-128" C2 SANDY LOAM 2.5Y6/3<br>WATER STANDING @125"<br>NO WEEPING WATER<br>REDOX SEEN @60" 7.5YR5/8 5%<br>ESTIMATED DESIGN GROUNDWATER=161.0' | 0"-54" FILL<br>58"-82" C1 SANDY LOAM 2.5Y4/4<br>82"-114" C2 SANDY LOAM 2.5Y5/4<br>C2 HORIZON HAS LENSES OF SILT LOAM<br>NO STANDING OR WEEPING WATER<br>NO REFUSAL<br>REDOX SEEN @64" 7.5YR5/8<br>ESTIMATED DESIGN GROUNDWATER=161.0' |
| DATE: AUGUST 21, 2014 | |
| BY: BRIAN T. NELSON, SOIL EVALUATOR (METROWEST ENGINEERING, INC.) | |
| INSPECTOR: JULIA JUNGHANNS, WAYLAND BOARD OF HEALTH | |

PROPOSED CONDITIONS – TOTAL IMPERVIOUS AREA = 20,063 S.F.
PROPOSED CONDITIONS – TOTAL LAWN AREA = 10,402 S.F.
PROPOSED CONDITIONS – TOTAL LANDSCAPED AREA = 7,403 S.F.

## POST-DEVELOPMENT BASIN PROPERTIES:

### POST-DEVELOPMENT BASIN 1 (P.D.B.-1)

TOTAL BASIN AREA = 5,991 S.F. (0.138 ACRES)
HYDRAULIC LENGTH = 222 FEET
CHANGE IN ELEVATION = 9.7 FEET
BASIN SLOPE = 0.044 (4.4%)

| GROUND COVER | Cn | AREA (ACRES) | PRODUCT |
|---|---|---|---|
| IMPERVIOUS AREA = 857 S.F. (0.020 ACRES) | 98 | 0.020 | 1.960 |
| LAWN AREA (GOOD COND.) = 3,815 S.F. (0.087 ACRES) | 61 | 0.087 | 5.307 |
| LANDSCAPED AREA (GOOD COND.) = 1,323 S.F. (0.031 ACRES) | 61 | 0.031 | 1.891 |
| | | SUM 0.138 | SUM 9.158 |

WEIGHTED CURVE NUMBER ($C_N$) = (9.158/0.138) = 66.4

### POST-DEVELOPMENT BASIN 2 (P.D.B.-2)

TOTAL BASIN AREA = 1,877 S.F. (0.043 ACRES)
HYDRAULIC LENGTH = 49 FEET
CHANGE IN ELEVATION = 0.5 FEET
BASIN SLOPE = 0.010 (1.0%)

| GROUND COVER | Cn | AREA (ACRES) | PRODUCT |
|---|---|---|---|
| IMPERVIOUS AREA = 356 S.F. (0.008 ACRES) | 98 | 0.008 | 0.784 |
| LAWN AREA (GOOD COND.) = 880 S.F. (0.020 ACRES) | 61 | 0.020 | 1.220 |
| LANDSCAPED AREA (GOOD COND.)= 640 S.F. (0.015 ACRES) | 61 | 0.015 | 0.915 |
| | | SUM 0.043 | SUM 2.919 |

WEIGHTED CURVE NUMBER ($C_N$) = (2.919/0.043) = 67.9

### POST-DEVELOPMENT BASIN 3 (P.D.B.-3)

TOTAL BASIN AREA = 7,081 S.F. (0.163 ACRES)
HYDRAULIC LENGTH = 196 FEET
CHANGE IN ELEVATION = 7.5 FEET
BASIN SLOPE = 0.038 (3.8%)

| GROUND COVER | Cn | AREA (ACRES) | PRODUCT |
|---|---|---|---|
| IMPERVIOUS AREA = 2,745 S.F. (0.063 ACRES) | 98 | 0.063 | 6.174 |
| LAWN AREA (GOOD COND.) = 2,391 S.F. (0.055 ACRES) | 61 | 0.055 | 3.355 |
| LANDSCAPED AREA (GOOD COND.)= 1,946 S.F. (0.045 ACRES) | 61 | 0.045 | 2.745 |
| | | SUM 0.163 | SUM 12.274 |

WEIGHTED CURVE NUMBER ($C_N$) = (12.274/0.163) = 75.3

### POST-DEVELOPMENT BASIN 3A (P.D.B.-3A)

TOTAL BASIN AREA = 5,856 S.F. (0.133 ACRES)
HYDRAULIC LENGTH = N.A.
CHANGE IN ELEVATION = N.A.
BASIN SLOPE = N.A.

| GROUND COVER | Cn | AREA (ACRES) | PRODUCT |
|---|---|---|---|
| IMPERVIOUS AREA = 1,960 S.F. (0.045 ACRES) | 98 | 0.045 | 4.410 |
| LAWN AREA (GOOD COND.) = 1,914 S.F. (0.044 ACRES) | 61 | 0.044 | 2.684 |
| LANDSCAPED AREA (GOOD COND.) = 1,983 S.F. (0.045 ACRES) | 61 | 0.045 | 2.684 |
| | | SUM 0.134 | SUM 9.778 |

WEIGHTED CURVE NUMBER ($C_N$) = (9.778/0.133) = 73.5

### POST-DEVELOPMENT BASIN 4 (P.D.B.-4)

TOTAL BASIN AREA = 17,059 S.F. (0.392 ACRES)
HYDRAULIC LENGTH = N.A.
CHANGE IN ELEVATION = N.A.
BASIN SLOPE = N.A.

| GROUND COVER | Cn | AREA (ACRES) | PRODUCT |
|---|---|---|---|
| IMPERVIOUS AREA = 14,145 S.F. (0.325 ACRES) | 98 | 0.325 | 31.850 |
| LAWN AREA (GOOD COND.) = 1,402 S.F. (0.032 ACRES) | 61 | 0.032 | 1.952 |
| LANDSCAPED AREA (GOOD COND.) = 1,511 S.F. (0.035 ACRES) | 61 | 0.035 | 2.135 |
| | | SUM 0.392 | SUM 35.937 |

WEIGHTED CURVE NUMBER ($C_N$) = (35.937/0.392) = 91.7

## USDA SOIL CLASSIFICATION

| SOIL NUMBER | SOIL SERIES | HYDROLOGIC SOIL GROUP |
|---|---|---|
| 51A | SWANSEA MUCK | B/D |
| 253C | HINCKLEY LOAMY SAND | A |
| 415B | NARRAGANSETT SILT LOAM | B |

HYDROLOGIC SOIL GROUP B USED FOR ANALSYIS
SOILS ON SITE ARE SANDY LOAM TEXTURES AND CLASSIFIED WITHIN HYDROLOGIC SOIL GROUP B.

FOR METROWEST ENGINEERING, INC. DATE
ROBERT A. GEMMA, P.E.(CIVIL) # 31967
P.L.S. # 37046

GRAPHIC SCALE
1 inch = 20 ft.
20 0 10 20 40 ( FEET ) 80
0 4 10 20 ( METERS ) 30

# FIGURE THREE

# POST-DEVELOPMENT WATERSHED DELINEATION PLAN

#24 SCHOOL STREET
IN
WAYLAND, MASS

PREPARED FOR:
WINDSOR PLACE LLC
73 PELHAM ISLAND ROAD
WAYLAND, MA 01778

PROPERTY OF:
WINDSOR PLACE LLC
73 PELHAM ISLAND ROAD
WAYLAND, MA 01778


ENGINEERS & SURVEYORS:
MWE
METROWEST ENGINEERING, INC.
75 FRANKLIN STREET
WAYLAND, MA 01702
TEL.: (508)626-0063
FAX: (508)875-6440


| SHEET 1 OF 1 | | DATE: APRIL 23, 2018 |
|---|---|---|
| CALC'D BY: RAG | FIELD BK: 621 | CAD FILE: PD_HYDRO.dwg |
| DRAFTER: | PROJECT: WY_SCH | DWG FILE: SK042318.dwg |

## NOTES:

1. SUBJECT PARCEL IS SHOWN AS ASSESSORS MAP 52, LOT 189. RECORD TITLE FROM BOOK 69050, PAGE 394.

2. UTILITY LOCATIONS DEPICTED ON THIS PLAN, BOTH ABOVE– AND BELOW–GROUND, ARE BASED UPON DIRECT FIELD OBSERVATIONS MADE BY METROWEST ENGINEERING, INC. PERSONNEL DURING A FIELD SURVEY, RECORD PLAN LOCATIONS, OR DIGSAFE PAINT–INDICATORS. METROWEST ENGINEERING, INC. DOES NOT WARRANT THAT ALL UTILITIES ARE SHOWN OR THAT UTILITIES THAT ARE DEPICTED ARE SHOWN IN THE CORRECT LOCATION, OR WITH THE PROPER MATERIAL DESIGNATION. METROWEST ENGINEERING, INC. DOES NOT WARRANT OR PROVIDE AN EXPRESS OR IMPLIED WARRANTY THAT ALL SUBSURFACE IMPROVEMENTS ARE SHOWN OR ARE SHOWN CORRECTLY, INCLUDING, BUT NOT LIMITED TO, UTILITIES, UNDERGROUND VAULTS, UNDERGROUND TANKS OR CHAMBERS, BUNKERS, DUCT BANKS, AND/OR OTHER MAN–MADE IMPROVEMENTS THAT LIE BENEATH THE GROUND SURFACE AT THE TIME OF THE SURVEY.

3. CONTRACTOR IS SOLELY RESPONSIBLE FOR ESTABLISHING EXISTING LOCATIONS OF ALL SUB–SURFACE UTILITIES AND MAN–MADE IMPROVEMENTS AND FOR THE REQUIREMENTS TO REPLACE, RELOCATE OR REPAIR EXISTING UTILITIES IN THE EVENT OF DAMAGE OCCURRING DURING CONSTRUCTION. MWE IS NOT RESPONSIBLE OR LIABLE FOR DELAYS OR COSTS ASSOCIATED WITH REMOVING/REPLACING/RELOCATING OF EXISTING UTILITIES REGARDLESS OF WHETHER SAID UTILITIES ARE ACCURATELY DEPICTED ON THIS SURVEY.

4. THE PROPERTY DESCRIBED ON THIS SURVEY DOES NOT LIE WITHIN A SPECIAL FLOOD HAZARD AREA AS DEFINED BY THE FEDERAL EMERGENCY MANAGEMENT AGENCY; THE PROPERTY LIES WITHIN ZONE "X" OF THE FLOOD INSURANCE RATE MAP IDENTIFIED AS MAP NUMBER 25017C0528F, BEARING AN EFFECTIVE DATE OF JULY 7, 2014.

## BENCHMARKS

ELEVATIONS SHOWN ON THIS PLAN REFER TO RM 11 (ELEV.=163.84'), A CHISELED SQUARE IN THE NORTH HEADWALL OF THE CULVERT UNDER COMMONWEALTH ROAD FOR SNAKE BROOK N.G.V.D. 1929.)

| T.B.M. | DESCRIPTION | ELEVATION |
|---|---|---|
| C | DHN SET IN 14" BLACK LOCUST | 161.89' |
| D | DHN SET IN 10" NORWAY MAPLE | 168.74' |

CONTRACTOR TO VERIFY ACTUAL LOCATION OF EXISTING UTILITY SERVICES IN THE FIELD PRIOR TO CONSTRUCTION (WATER, ELECTRICAL, ETC.) CALL DIG–SAFE BEFORE YOU DIG 811.

## ZONING:

### RESIDENCE ZONE 20,000 – 120' FRONT

MINIMUM LOT AREA= $20{,}000^{15}$ S.F.
MINIMUM LOT COVERAGE= 20%
MINIMUM FRONTAGE= 200 FT.
SETBACKS:
FRONT LOT LINE= $30^{2}$ FT.
FRONT ROW CENTER LINE= 55 FT.
SIDE YARD= $15^{3}$ FT.
REAR YARD=30 FT.
MAX. HEIGHT = 35 FT./2½ STORIES

2) IF §198–702 SHALL REQUIRE A GREATER SETBACK OR PERMIT A LESSER SETBACK, THE PROVISIONS OF SAID §198–702 SHALL PREVAIL OVER THIS TABLE.

3) SIDE YARDS SHALL MEET THE REQUIREMENTS OF §§198–702.4 AND 703.2, AND THE REQUIRED MINIMUM SIDE YARD MAY BE REDUCED IN ACCORDANCE WITH PROVISIONS OF §198–703.2

15) MINIMUM FRONT YARD WIDTH SHALL BE CALCULATED IN ACCORDANCE WITH THE REQUIREMENTS OF §198–705.1 OF THE ZONING BYLAW.

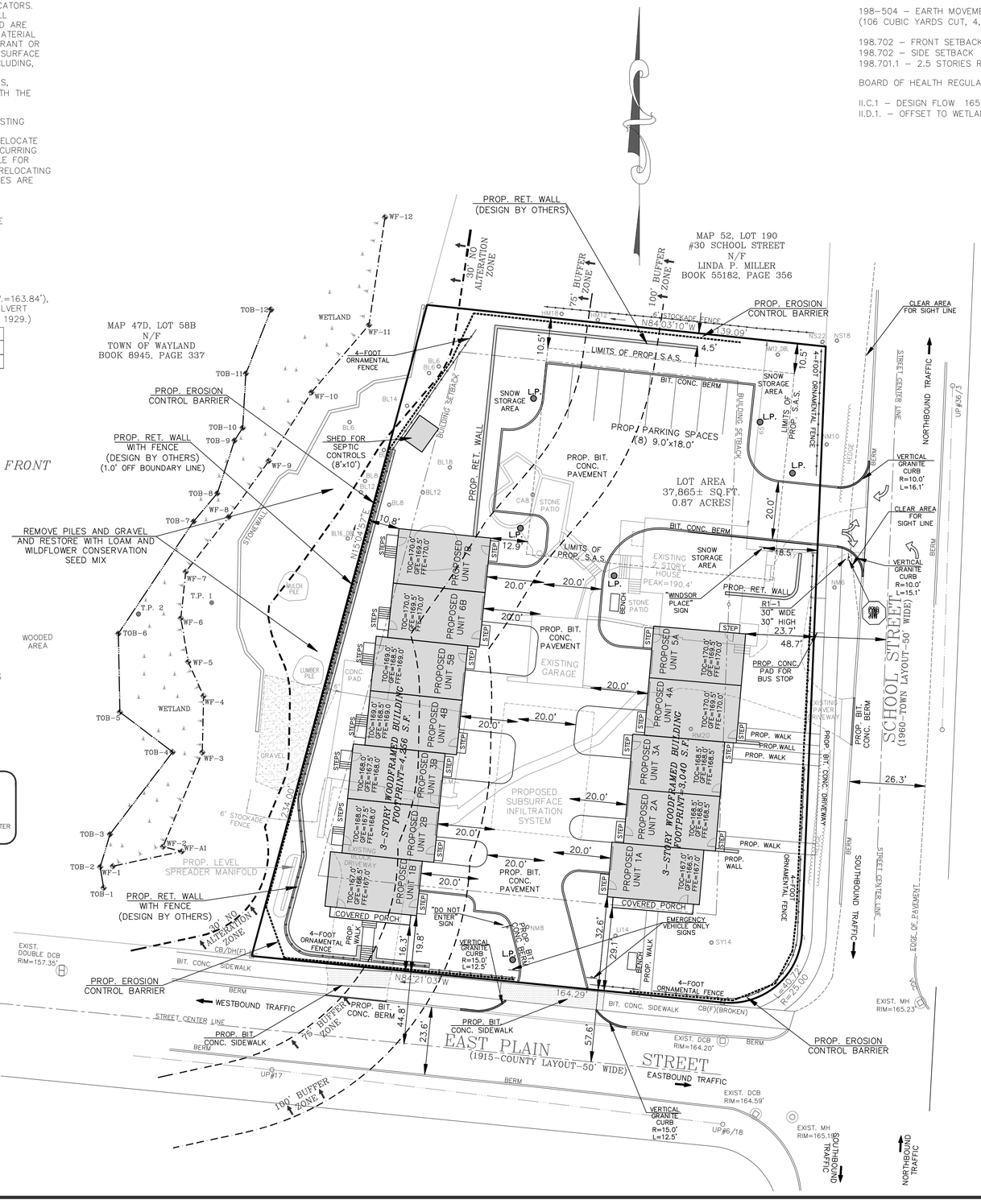
## EXISTING TREE DESCRIPTION LEGEND

| CODE | DESCRIPTION |
|---|---|
| BL# | BALCK LOCUST |
| CA# | CRAB APPLE |
| HM# | HEMLOCK |
| LI# | LINDEN |
| NM# | NORWAY MAPLE |
| NS# | NORWAY SPRUCE |
| RM# | RED MAPLE |
| SY# | SYCAMORE |

DETAIL
TREE LOCATION
RO14
TREE CODE — TREE DIAMETER

## LEGEND

| | |
|---|---|
| DCB | DRAIN CATCH BASIN |
| HM | MANHOLE |
| WG | WATER GATE |
| GG | GAS GATE |
| | HYDRANT |
| U.P. | UTILITY POST |
| DH | DRILL HOLE |
| (F) | FOUND |
| CB | CONCRETE BOUND |
| SB | STONE BOUND |
| WF | WETLAND FLAG |
| E.M. | ELECTRIC METER |
| G.M. | GAS METER |
| N/F | NOW OR FORMERLY |
| 200.0 | EXISTING SPOT GRADE |
| ----200---- | EXISTING GRADING |
| ---------- | EXISTING OVERHEAD WIRE |




## LOCAL WAIVERS REQUESTED:

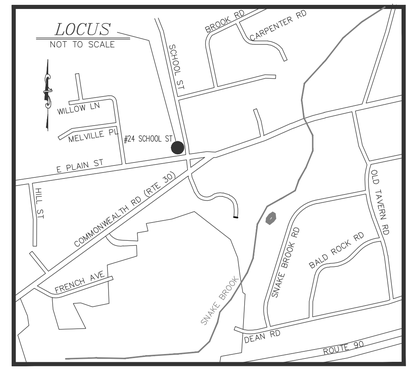
ZONING BYLAWS:

198–504 – EARTH MOVEMENT – 500 CUBIC YARDS MAXIMUM ALLOWED
(106 CUBIC YARDS CUT, 4,571 CUBIC YARDS FILL REQUESTED)

198.702 – FRONT SETBACK 30–FEET REQUIRED (16.3 AND 23.7–FEET REQUESTED)
198.702 – SIDE SETBACK 15.0 FEET REQUIRED (10.8–FEET REQUESTED)
198.701.1 – 2.5 STORIES REQUIRED (3 STORIES REQUESTED)

BOARD OF HEALTH REGULATIONS:

II.C.1 – DESIGN FLOW 165 G.P.D. REQUIRED (110 G.P.D REQUESTED)
II.D.1. – OFFSET TO WETLANDS 100–FEET REQUIRED (54.6–FEET REQUESTED)




## ZONING TABLE

### RESIDENCE ZONE, 20,000 SQUARE FEET

| | REQUIRED | EXISTING | PROPOSED |
|---|---|---|---|
| AREA | 20,000 S.F. | 37,865 S.F. | 37,865 S.F. |
| FRONTAGE | 120 FEET | 204.01 FEET | 204.01 FEET |
| SETBACKS: | | | |
| FRONT YARD | 30 FEET* | 17.5 FEET | 19.8 FEET |
| SIDE YARD | 15 FEET | N.A. | N.A. |
| REAR YARD | 30 FEET | 6.2 FEET | 10.8 FEET |
| BUILDING COVERAGE | 20% MAXIMUM | 0.092 (9.2%) | 0.199 (19.9%) |
| LOT COVERAGE | 20% MAXIMUM | 0.092 (9.2%) | 0.199 (19.9%) |
| IMPERVIOUS AREA | N.A. | 8,908 S.F. (23.5%) | 19,956 S.F. (52.7%) |
| BUILDING COVERAGE | 7,573 S.F. | 3,493 S.F. (9.2%) | 7,572 S.F. (19.9%) |
| OTHER IMPERV. AREA | N.A. | 5,415 S.F. (14.3%) | 12,384 S.F. (32.7%) |
| OPEN SPACE | N.A. | 28,957 S.F. (76.5%) | 17,909 S.F. (47.3%) |
| BUILDING HEIGHT | 35 FEET | 28± FEET | 35.5 FEET |
| NUMBER OF STORIES | 2.5 STORIES | 2 STORIES | 3 STORIES |
| BUILDING TYPE | N.A. | 2–STORY W.F. | 3–STORY W.F. |
| FLOOR AREA RATIO | N.A. | 0.090 (9.0%±) | 0.52 (52.0%±) |
| NUMBER OF BEDROOMS | N.A. | 4 BEDROOMS | 26 BEDROOMS |
| UNITS PER ACRE | N.A. | 0.9 | 13.8 |
| UNITS PER BUILDABLE ACRE | N.A. | 0.9 | 13.9 |
| # PARKING SPACES PER UNIT | N.A. | 4 | 2.5 |
| # PARKING SPACES PER SQUARE FOOT | N.A. | N.A. | 0.002 |
| # PARKING SPACES | N.A. | 4 | 30* |

* – INCLUDES GARAGE PARKING

FOR METROWEST ENGINEERING, INC. DATE
ROBERT A. GEMMA, P.E.(CIVIL) # 31967
P.L.S. # 37046

GRAPHIC SCALE
1 inch = 20 ft.
20 0 10 20 40 ( FEET ) 80
0 4 10 20 ( METERS ) 30

## REVISIONS:

| No. | DATE | REVISION |
|---|---|---|
| 1 | 4/20/18 | REVISIONS TO BUILDING FOOTPRINTS, GRADING, DRAINAGE SYSTEM SND SEPTIC SYSTEM |

# PROPOSED LAYOUT PLAN

#24 SCHOOL STREET
IN
WAYLAND, MASS
(MIDDLESEX COUNTY)

PREPARED FOR:
*WINDSOR PLACE LLC*
*73 PELHAM ISLAND ROAD*
*WAYLAND, MA 01778*

PROPERTY OF:
*WINDSOR PLACE LLC*
*73 PELHAM ISLAND ROAD*
*WAYLAND, MA 01778*

ENGINEERS & SURVEYORS:
MWE
*METROWEST ENGINEERING, INC.*
*75 FRANKLIN STREET*
*WAYLAND, MA 01702*
*TEL.: (508)626–0063*
*FAX: (508)875–6440*

| | | |
|---|---|---|
| SHEET 1 OF 5 | | DATE: SEPTEMBER 6, 2017 |
| CALC'D BY: BTN | FIELD BK: 621 | CAD FILE: PROP_SITE_3_R7.dwg |
| DRAFTER: BTN | PROJECT: WY_SCH | DWG FILE: SP090617_R1.dwg |

## NOTES:

1. SUBJECT PARCEL IS SHOWN AS ASSESSORS MAP 52, LOT 189. RECORD TITLE FROM BOOK 69050, PAGE 394.

2. UTILITY LOCATIONS DEPICTED ON THIS PLAN, BOTH ABOVE- AND BELOW-GROUND, ARE BASED UPON DIRECT FIELD OBSERVATIONS MADE BY METROWEST ENGINEERING, INC. PERSONNEL DURING A FIELD SURVEY, RECORD PLAN LOCATIONS, OR DIGSAFE PAINT-INDICATORS. METROWEST ENGINEERING, INC. DOES NOT WARRANT THAT ALL UTILITIES ARE SHOWN OR THAT UTILITIES THAT ARE DEPICTED ARE SHOWN IN THE CORRECT LOCATION, OR WITH THE PROPER MATERIAL DESIGNATION. METROWEST ENGINEERING, INC. DOES NOT WARRANT OR PROVIDE AN EXPRESS OR IMPLIED WARRANTY THAT ALL SUBSURFACE IMPROVEMENTS ARE SHOWN OR ARE SHOWN CORRECTLY, INCLUDING, BUT NOT LIMITED TO, UTILITIES, UNDERGROUND VAULTS, UNDERGROUND TANKS OR CHAMBERS, BUNKERS, DUCT BANKS, AND/OR OTHER MAN-MADE IMPROVEMENTS THAT LIE BENEATH THE GROUND SURFACE AT THE TIME OF THE SURVEY.

3. CONTRACTOR IS SOLELY RESPONSIBLE FOR ESTABLISHING EXISTING LOCATIONS OF ALL SUB-SURFACE UTILITIES AND MAN-MADE IMPROVEMENTS AND FOR THE REQUIREMENTS TO REPLACE, RELOCATE OR REPAIR EXISTING UTILITIES IN THE EVENT OF DAMAGE OCCURRING DURING CONSTRUCTION. MWE IS NOT RESPONSIBLE OR LIABLE FOR DELAYS OR COSTS ASSOCIATED WITH REMOVING/REPLACING/RELOCATING OF EXISTING UTILITIES REGARDLESS OF WHETHER SAID UTILITIES ARE ACCURATELY DEPICTED ON THIS SURVEY.

4. THE PROPERTY DESCRIBED ON THIS SURVEY DOES NOT LIE WITHIN A SPECIAL FLOOD HAZARD AREA AS DEFINED BY THE FEDERAL EMERGENCY MANAGEMENT AGENCY; THE PROPERTY LIES WITHIN ZONE "X" OF THE FLOOD INSURANCE RATE MAP IDENTIFIED AS MAP NUMBER 25017C0528F, BEARING AN EFFECTIVE DATE OF JULY 7, 2014.

## BENCHMARKS

ELEVATIONS SHOWN ON THIS PLAN REFER TO RM 11 (ELEV.=163.84'), A CHISELED SQUARE IN THE NORTH HEADWALL OF THE CULVERT UNDER COMMONWEALTH ROAD FOR SNAKE BROOK N.G.V.D. 1929.)

| T.B.M. | DESCRIPTION | ELEVATION |
|---|---|---|
| C | DHN SET IN 14" BLACK LOCUST | 161.89' |
| D | DHN SET IN 10" NORWAY MAPLE | 168.74' |

CONTRACTOR TO VERIFY ACTUAL LOCATION OF EXISTING UTILITY SERVICES IN THE FIELD PRIOR TO CONSTRUCTION (WATER, ELECTRICAL, ETC.) CALL DIG-SAFE BEFORE YOU DIG 811.

## ZONING:

### RESIDENCE ZONE 20,000 – 120' FRONT

MINIMUM LOT AREA= 20,000[15] S.F.
MINIMUM LOT COVERAGE= 20%
MINIMUM FRONTAGE= 200 FT.
SETBACKS:
FRONT LOT LINE= 30[2] FT.
FRONT ROW CENTER LINE= 55 FT.
SIDE YARD= 15[3] FT.
REAR YARD=30 FT.
MAX. HEIGHT = 35 FT./2½ STORIES

2) IF §198-702 SHALL REQUIRE A GREATER SETBACK OR PERMIT A LESSER SETBACK, THE PROVISIONS OF SAID §198-702 SHALL PREVAIL OVER THIS TABLE.

3) SIDE YARDS SHALL MEET THE REQUIREMENTS OF §§198-702.4 AND 703.2, AND THE REQUIRED MINIMUM SIDE YARD MAY BE REDUCED IN ACCORDANCE WITH PROVISIONS OF §198-703.2

15) MINIMUM FRONT YARD WIDTH SHALL BE CALCULATED IN ACCORDANCE WITH THE REQUIREMENTS OF §198-705.1 OF THE ZONING BYLAW.

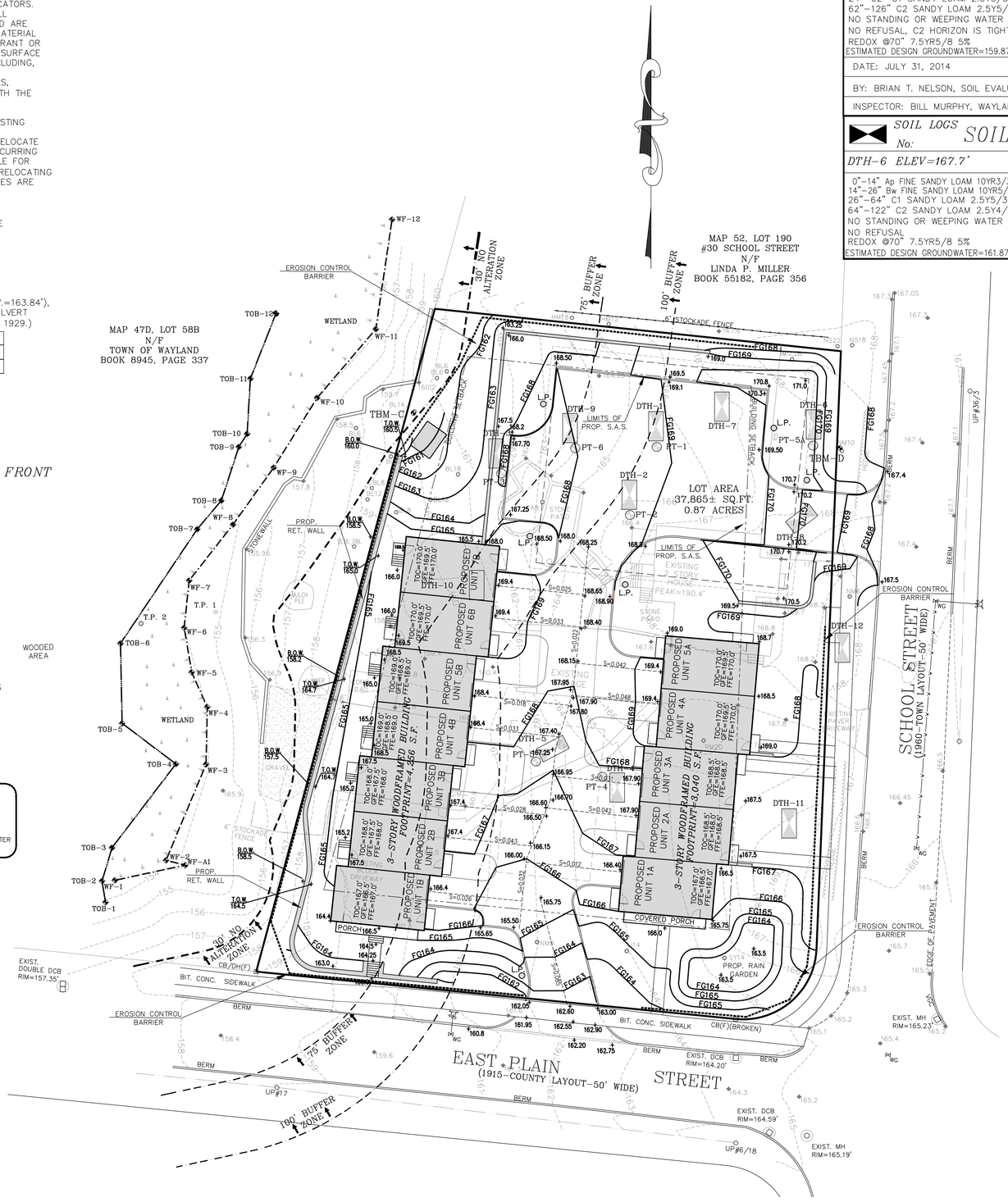
## EXISTING TREE DESCRIPTION LEGEND

| CODE | DESCRIPTION |
|---|---|
| BL# | BALCK LOCUST |
| CA# | CRAB APPLE |
| HM# | HEMLOCK |
| LI# | LINDEN |
| NM# | NORWAY MAPLE |
| NS# | NORWAY SPRUCE |
| RM# | RED MAPLE |
| SY# | SYCAMORE |

DETAIL
TREE LOCATION
RO14
TREE CODE — TREE DIAMETER

## LEGEND

| | |
|---|---|
| DCB | DRAIN CATCH BASIN |
| HM | MANHOLE |
| ⋈WG | WATER GATE |
| ⋈GG | GAS GATE |
| | HYDRANT |
| U.P. | UTILITY POST |
| DH | DRILL HOLE |
| (F) | FOUND |
| CB | CONCRETE BOUND |
| SB | STONE BOUND |
| WF | WETLAND FLAG |
| E.M. | ELECTRIC METER |
| G.M. | GAS METER |
| N/F | NOW OR FORMERLY |
| + 200.0 | EXISTING SPOT GRADE |
| -----200----- | EXISTING GRADING |
| ---------- | EXISTING OVERHEAD WIRE |




## SOIL TEST RESULTS

SOIL LOGS No:

| DTH-1 ELEV=165.7' | DTH-2 ELEV=165.9' | DTH-3 ELEV=161.7' | DTH-4 ELEV=164.1' | DTH-5 ELEV=162.6' |
|---|---|---|---|---|
| 0"-10" Ap FINE SANDY LOAM 10YR3/3<br>10"-24" Bw FINE SANDY LOAM 10YR5/6<br>24"-62" C1 SANDY LOAM 2.5Y5/3<br>62"-126" C2 SANDY LOAM 2.5Y5/4<br>NO STANDING OR WEEPING WATER<br>NO REFUSAL, C2 HORIZON IS TIGHT<br>REDOX @70" 7.5YR5/8 5%<br>ESTIMATED DESIGN GROUNDWATER=159.87' | 0"-22" Ap FINE SANDY LOAM 10YR3/3<br>22"-42" Bw FINE SANDY LOAM 10YR5/6<br>42"-96" C1 SANDY LOAM 2.5Y5/3<br>96"-118" C2 SILT LOAM 2.5Y6/3<br>WATER WEEPING @106"<br>NO STANDING WATER, NO REFUSAL<br>REDOX @80" 7.5YR5/8<br>ESTIMATED DESIGN GROUNDWATER=159.23' | 0"-10" Ap FINE SANDY LOAM 10YR3/3<br>10"-22" Bw FINE SANDY LOAM 10YR5/6<br>22"-84" C1 SANDY LOAM 2.5Y5/3<br>84"-110" C2 SILT LOAM 2.5Y6/3<br>NO STANDING WATER, NO REFUSAL<br>C2 HORIZON IS DAMP<br>REDOX @82" 7.5YR5/8<br>ESTIMATED DESIGN GROUNDWATER=154.87' | 0"-20" FILL<br>20"-28" Ap FINE SANDY LOAM 10YR3/3<br>28"-40" Bw FINE SANDY LOAM 10YR5/6<br>40"-86" C1 SANDY LOAM 2.5Y5/4<br>86"-116" C2 SANDY LOAM 2.5Y4/4<br>NO REFUSAL, NO STANDING OR WEEPING WATER<br>NO REDOX<br>ESTIMATED DESIGN GROUNDWATER=NONE | 0"-16" Ap FINE SANDY LOAM 10YR3/3<br>16"-34" Bw FINE SANDY LOAM 10YR5/6<br>34"-84" C1 SANDY LOAM 2.5Y5/4<br>84"-118" C2 SANDY LOAM 2.5Y4/3<br>WEEPING WATER @112"<br>NO REFUSAL<br>REDOX @72" 7.5YR5/8<br>ESTIMATED DESIGN GROUNDWATER=156.6' |
| DATE: JULY 31, 2014 | | | | |
| BY: BRIAN T. NELSON, SOIL EVALUATOR (METROWEST ENGINEERING, INC.) | | | | |
| INSPECTOR: BILL MURPHY, WAYLAND BOARD OF HEALTH | | | | |

## SOIL TEST RESULTS

SOIL LOGS No:

| DTH-6 ELEV=167.7' | DTH-7 ELEV=166.8' | DTH-8 ELEV=168.2' | DTH-9 ELEV=163.0' | DTH-10 ELEV=160.75' |
|---|---|---|---|---|
| 0"-14" Ap FINE SANDY LOAM 10YR3/3<br>14"-26" Bw FINE SANDY LOAM 10YR5/6<br>26"-64" C1 SANDY LOAM 2.5Y5/3<br>64"-122" C2 SANDY LOAM 2.5Y4/4<br>NO STANDING OR WEEPING WATER<br>NO REFUSAL<br>REDOX @70" 7.5YR5/8 5%<br>ESTIMATED DESIGN GROUNDWATER=161.87' | 0"-14" Ap FINE SANDY LOAM 10YR3/3<br>14"-32" Bw FINE SANDY LOAM 10YR5/6<br>32"-58" C1 SANDY LOAM 2.5Y5/3<br>58"-114" C2 SANDY LOAM 2.5Y5/4<br>NO STANDING OR WEEPING WATER<br>LENSES OF SILT LOAM FROM 76" DOWN<br>ESTIMATED DESIGN GROUNDWATER=NONE | 0"-26" FILL<br>26"-40" Bw FINE SANDY LOAM 10YR5/6<br>40"-78" C1 SANDY LOAM 2.5Y5/4<br>78"-108" C2 LOAMY SAND 2.5Y5/3<br>108"-126" C3 SILT LOAM 2.5Y6/3<br>C3 HORIZON IS DAMP<br>NO REFUSAL<br>REDOX @80" 7.5YR5/8 10%<br>ESTIMATED DESIGN GROUNDWATER=161.53' | 0"-16" Ap FINE SANDY LOAM 10YR3/3<br>16"-30" Bw FINE SANDY LOAM 10YR5/6<br>30"-46" Bc SANDY LOAM 2.5Y5/4<br>46"-98" C1 SANDY LOAM 2.5Y5/3<br>98"-118" C2 SANDY LOAM 2.5Y4/4<br>WATER STANDING @108"<br>WATER WEEPING @98"<br>REDOX SEEN @62", NO REFUSAL<br>ESTIMATED DESIGN GROUNDWATER=157.8' | 0"-15" Ap FINE SANDY LOAM 10YR3/3<br>15"-30" Bw FINE SANDY LOAM 10YR5/6<br>30"-66" C1 LOAMY SAND 2.5Y5/3<br>66"-112" C2 SILT LOAM 2.5Y5/4<br>WATER STANDING @100"<br>WATER WEEPING @98"<br>NO REFUSAL<br>REDOX SEEN @68" 7.5YR5/8 10%<br>ESTIMATED DESIGN GROUNDWATER=155.08' |

## PERCOLATION

| NO. | DEPTH | RATE | DATE | BY | INSP. |
|---|---|---|---|---|---|
| PT-1 | 60" | 8 MPI | 07/31/14 | B.N. | B.M. |
| PT-2 | 68" | 13 MPI | 07/31/14 | B.N. | B.M. |
| PT-3 | 50" | 10 MPI | 07/31/14 | B.N. | B.M. |
| PT-4 | 55" | MPI | 07/31/14 | B.N. | B.M. |
| PT-5 | 60" | MPI | 07/31/14 | B.N. | B.M. |

## PERCOLATION

| NO. | DEPTH | RATE | DATE | BY | INSP. |
|---|---|---|---|---|---|
| PT-5A | 54" | 10 MPI | 08/21/14 | B.N. | J.J. |
| PT-6 | 60" | 3 MPI | 08/21/14 | B.N. | J.J. |

| DTH-11 ELEV=166.0' | DTH-12 ELEV=168.2' |
|---|---|
| 0"-18" FILL<br>18"-30" Ap FINE SANDY LOAM 10YR3/3<br>30"-36" Bw FINE SANDY LOAM 10YR5/6<br>36"-58" C1 SANDY LOAM 2.5Y5/3<br>58"-128" C2 SANDY LOAM 2.5Y6/3<br>WATER STANDING @125"<br>NO WEEPING WATER<br>REDOX SEEN @60" 7.5YR5/8 5%<br>ESTIMATED DESIGN GROUNDWATER=161.0' | 0"-54" FILL<br>58"-82" C1 SANDY LOAM 2.5Y4/4<br>82"-114" C2 SANDY LOAM 2.5Y5/4<br>C2 HORIZON HAS LENSES OF SILT LOAM<br>NO STANDING OR WEEPING WATER<br>NO REFUSAL<br>REDOX SEEN @64" 7.5YR5/8<br>ESTIMATED DESIGN GROUNDWATER=161.0' |
| DATE: AUGUST 21, 2014 | |
| BY: BRIAN T. NELSON, SOIL EVALUATOR (METROWEST ENGINEERING, INC.) | |
| INSPECTOR: JULIA JUNGHANNS, WAYLAND BOARD OF HEALTH | |

## APPROXIMATE EARTHWORK CALCULATIONS:

TOTAL FILL= 4,571 C.Y.
TOTAL CUT= 106 C.Y.

NET EARTHWORK= 4,465 C.Y. (FILL)

EARTHWORK ACTIVITIES EXEMPTED BY BYLAW

INFILTRATION SYSTEM – 38 CUBIC YARDS (CUT)
GENERAL EARTHWORK – 68 CUBIC YARDS (CUT)
FOUNDATION BUILDING A – 286 CUBIC YARDS (FILL)
FOUNDATION BUILDING B – 1,380 CUBIC YARDS (FILL)
EXISTING HOUSE – 274 CUBIC YARDS (FILL)
DRIVEWAY – 740 CUBIC YARDS (FILL)
PROPOSED SEPTIC SYSTEM – 788 CUBIC YARDS (FILL)

EARTHWORK ACTIVITIES SUBJECT TO BYLAW

GENERAL EARTHWORK – 1,103 CUBIC YARDS (FILL)

*FOR METROWEST ENGINEERING, INC.* *DATE*
*ROBERT A. GEMMA, P.E.(CIVIL) # 31967*
*P.L.S. # 37046*

GRAPHIC SCALE
1 inch = 20 ft.
20 0 10 20 40 ( FEET ) 80
0 4 10 20 ( METERS ) 30

## REVISIONS:

| No. | DATE | REVISION |
|---|---|---|
| 1 | 4/20/18 | REVISIONS TO BUILDING FOOTPRINTS, GRADING, DRAINAGE SYSTEM SND SEPTIC SYSTEM |

# PROPOSED GRADING PLAN

#24 SCHOOL STREET
IN
WAYLAND, MASS
(MIDDLESEX COUNTY)

PREPARED FOR:
*WINDSOR PLACE LLC*
*73 PELHAM ISLAND ROAD*
*WAYLAND, MA 01778*

PROPERTY OF:
*WINDSOR PLACE LLC*
*73 PELHAM ISLAND ROAD*
*WAYLAND, MA 01778*

ENGINEERS & SURVEYORS:
MWE
*METROWEST ENGINEERING, INC.*
*75 FRANKLIN STREET*
*WAYLAND, MA 01702*
*TEL.: (508)626-0063*
*FAX: (508)875-6440*

| | | |
|---|---|---|
| SHEET 2 OF 5 | | DATE: SEPTEMBER 6, 2017 |
| CALC'D BY: BTN | FIELD BK: 621 | CAD FILE: PROP_SITE_3_R7.dwg |
| DRAFTER: BTN | PROJECT: WY_SCH | DWG FILE: SP090617_R1.dwg |

## NOTES:

1. SUBJECT PARCEL IS SHOWN AS ASSESSORS MAP 52, LOT 189. RECORD TITLE FROM BOOK 69050, PAGE 394.

2. UTILITY LOCATIONS DEPICTED ON THIS PLAN, BOTH ABOVE- AND BELOW-GROUND, ARE BASED UPON DIRECT FIELD OBSERVATIONS MADE BY METROWEST ENGINEERING, INC. PERSONNEL DURING A FIELD SURVEY, RECORD PLAN LOCATIONS, OR DIGSAFE PAINT-INDICATORS. METROWEST ENGINEERING, INC. DOES NOT WARRANT THAT ALL UTILITIES ARE SHOWN OR THAT UTILITIES THAT ARE DEPICTED ARE SHOWN IN THE CORRECT LOCATION, OR WITH THE PROPER MATERIAL DESIGNATION. METROWEST ENGINEERING, INC. DOES NOT WARRANT OR PROVIDE AN EXPRESS OR IMPLIED WARRANTY THAT ALL SUBSURFACE IMPROVEMENTS ARE SHOWN OR ARE SHOWN CORRECTLY, INCLUDING, BUT NOT LIMITED TO, UTILITIES, UNDERGROUND VAULTS, UNDERGROUND TANKS OR CHAMBERS, BUNKERS, DUCT BANKS, AND/OR OTHER MAN-MADE IMPROVEMENTS THAT LIE BENEATH THE GROUND SURFACE AT THE TIME OF THE SURVEY.

3. CONTRACTOR IS SOLELY RESPONSIBLE FOR ESTABLISHING EXISTING LOCATIONS OF ALL SUB-SURFACE UTILITIES AND MAN-MADE IMPROVEMENTS AND FOR THE REQUIREMENTS TO REPLACE, RELOCATE OR REPAIR EXISTING UTILITIES IN THE EVENT OF DAMAGE OCCURRING DURING CONSTRUCTION. MWE IS NOT RESPONSIBLE OR LIABLE FOR DELAYS OR COSTS ASSOCIATED WITH REMOVING/REPLACING/RELOCATING OF EXISTING UTILITIES REGARDLESS OF WHETHER SAID UTILITIES ARE ACCURATELY DEPICTED ON THIS SURVEY.

4. THE PROPERTY DESCRIBED ON THIS SURVEY DOES NOT LIE WITHIN A SPECIAL FLOOD HAZARD AREA AS DEFINED BY THE FEDERAL EMERGENCY MANAGEMENT AGENCY; THE PROPERTY LIES WITHIN ZONE "X" OF THE FLOOD INSURANCE RATE MAP IDENTIFIED AS MAP NUMBER 25017C0528F, BEARING AN EFFECTIVE DATE OF JULY 7, 2014.

## BENCHMARKS

ELEVATIONS SHOWN ON THIS PLAN REFER TO RM 11 (ELEV.=163.84'), A CHISELED SQUARE IN THE NORTH HEADWALL OF THE CULVERT UNDER COMMONWEALTH ROAD FOR SNAKE BROOK N.G.V.D. 1929.)

| T.B.M. | DESCRIPTION | ELEVATION |
|---|---|---|
| C | DHN SET IN 14" BLACK LOCUST | 161.89' |
| D | DHN SET IN 10" NORWAY MAPLE | 168.74' |

CONTRACTOR TO VERIFY ACTUAL LOCATION OF EXISTING UTILITY SERVICES IN THE FIELD PRIOR TO CONSTRUCTION (WATER, ELECTRICAL, ETC.) CALL DIG-SAFE BEFORE YOU DIG 811.

## ZONING:

### RESIDENCE ZONE 20,000 – 120' FRONT

MINIMUM LOT AREA= 20,000[15] S.F.
MINIMUM LOT COVERAGE= 20%
MINIMUM FRONTAGE= 200 FT.
SETBACKS:
FRONT LOT LINE= 30[2] FT.
FRONT ROW CENTER LINE= 55 FT.
SIDE YARD= 15[3] FT.
REAR YARD=30 FT.
MAX. HEIGHT = 35 FT./2½ STORIES

2) IF §198-702 SHALL REQUIRE A GREATER SETBACK OR PERMIT A LESSER SETBACK, THE PROVISIONS OF SAID §198-702 SHALL PREVAIL OVER THIS TABLE.

3) SIDE YARDS SHALL MEET THE REQUIREMENTS OF §§198-702.4 AND 703.2, AND THE REQUIRED MINIMUM SIDE YARD MAY BE REDUCED IN ACCORDANCE WITH PROVISIONS OF §198-703.2

15) MINIMUM FRONT YARD WIDTH SHALL BE CALCULATED IN ACCORDANCE WITH THE REQUIREMENTS OF §198-705.1 OF THE ZONING BYLAW.

## EXISTING TREE DESCRIPTION LEGEND

| CODE | DESCRIPTION |
|---|---|
| BL# | BALCK LOCUST |
| CA# | CRAB APPLE |
| HM# | HEMLOCK |
| LI# | LINDEN |
| NM# | NORWAY MAPLE |
| NS# | NORWAY SPRUCE |
| RM# | RED MAPLE |
| SY# | SYCAMORE |

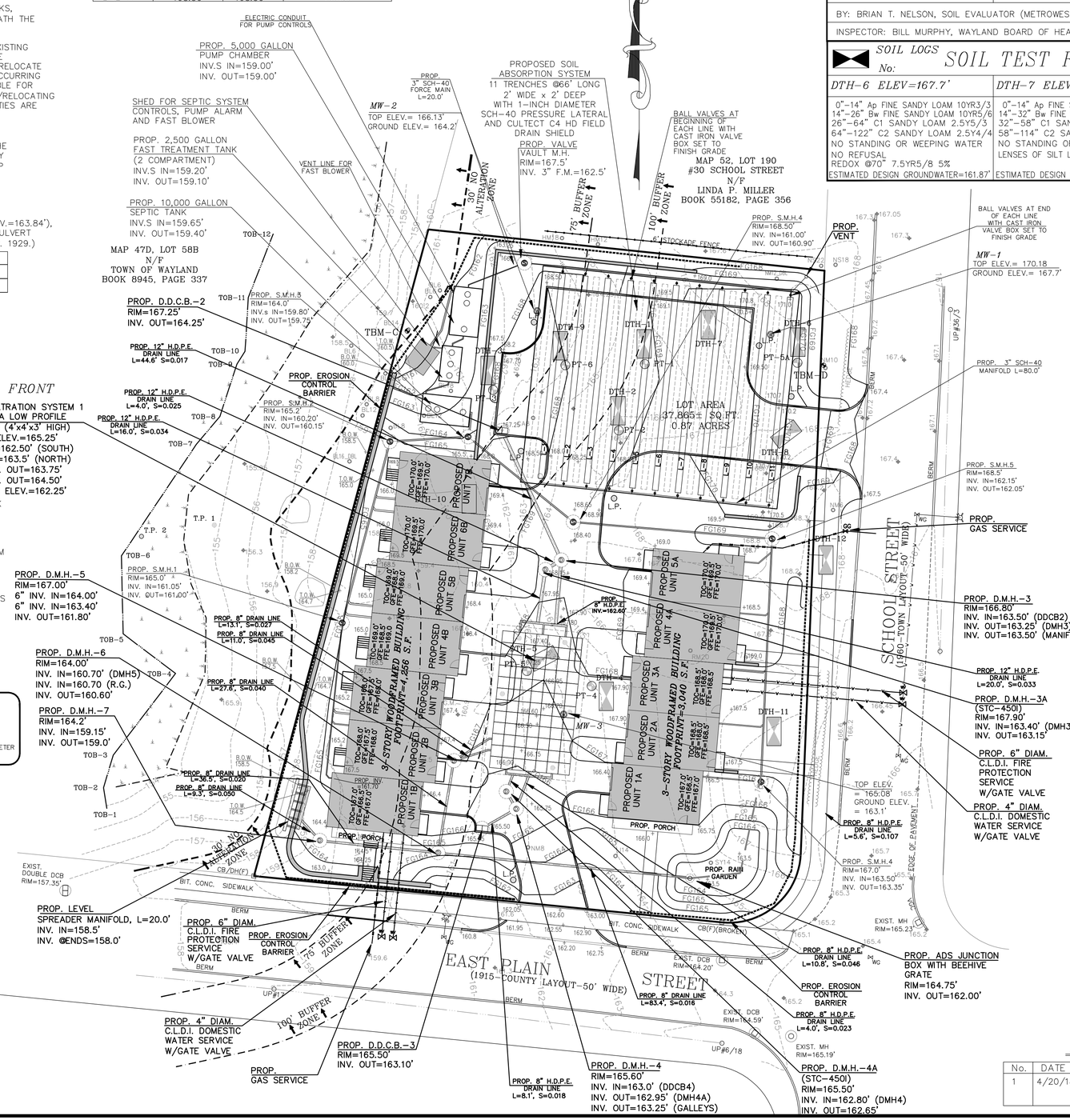
DETAIL
TREE LOCATION
RO14
TREE CODE
TREE DIAMETER

## LEGEND

| | |
|---|---|
| DCB | DRAIN CATCH BASIN |
| HM | MANHOLE |
| ⋈WG | WATER GATE |
| ⋈GG | GAS GATE |
| | HYDRANT |
| U.P. | UTILITY POST |
| DH | DRILL HOLE |
| (F) | FOUND |
| CB | CONCRETE BOUND |
| SB | STONE BOUND |
| WF | WETLAND FLAG |
| E.M. | ELECTRIC METER |
| G.M. | GAS METER |
| N/F | NOW OR FORMERLY |
| +200.0 | EXISTING SPOT GRADE |
| ----200---- | EXISTING GRADING |
| ---------- | EXISTING OVERHEAD WIRE |

## PROPOSED SOIL ABSORPTION SYSTEM ELEVATIONS

| LOCATION | BEG. LINE | END LINE | BOTTOM OF TRENCH |
|---|---|---|---|
| LINE 1 | 164.50' | 164.50' | 162.50' |
| LINE 2 | 164.90' | 164.90' | 162.90' |
| LINE 3 | 165.30' | 165.30' | 163.30' |
| LINE 4 | 165.70' | 165.70' | 163.70' |
| LINE 5 | 166.10' | 166.10' | 164.10' |
| LINE 6 | 166.50' | 166.50' | 164.50' |
| LINE 7 | 166.90' | 166.90' | 164.90' |
| LINE 8 | 167.30' | 167.30' | 165.30' |
| LINE 9 | 167.70' | 167.70' | 165.70' |
| LINE 10 | 168.10' | 168.10' | 166.10' |
| LINE 11 | 168.50' | 168.50' | 166.50' |




| SOIL LOGS No: | SOIL TEST RESULTS | | | | |
|---|---|---|---|---|---|
| DTH-1 ELEV=165.7' | DTH-2 ELEV=165.9' | DTH-3 ELEV=161.7' | DTH-4 ELEV=164.1' | DTH-5 ELEV=162.6' |
| 0"-10" Ap FINE SANDY LOAM 10YR3/3<br>10"-24" Bw FINE SANDY LOAM 10YR5/6<br>24"-62" C1 SANDY LOAM 2.5Y5/3<br>62"-126" C2 SANDY LOAM 2.5Y5/4<br>NO STANDING OR WEEPING WATER<br>NO REFUSAL, C2 HORIZON IS TIGHT<br>REDOX @70" 7.5YR5/8 5%<br>ESTIMATED DESIGN GROUNDWATER=159.87' | 0"-22" Ap FINE SANDY LOAM 10YR3/3<br>22"-42" Bw FINE SANDY LOAM 10YR5/6<br>42"-96" C1 SANDY LOAM 2.5Y5/3<br>96"-118" C2 SILT LOAM 2.5Y6/3<br>WATER WEEPING @106"<br>NO STANDING WATER, NO REFUSAL<br>REDOX @80" 7.5YR5/8<br>ESTIMATED DESIGN GROUNDWATER=159.23' | 0"-10" Ap FINE SANDY LOAM 10YR3/3<br>10"-22" Bw FINE SANDY LOAM 10YR5/6<br>22"-84" C1 SANDY LOAM 2.5Y5/3<br>84"-110" C2 SILT LOAM 2.5Y6/3<br>NO STANDING WATER, NO REFUSAL<br>C2 HORIZON IS DAMP<br>REDOX @82" 7.5YR5/8<br>ESTIMATED DESIGN GROUNDWATER=154.87' | 0"-20" FILL<br>20"-28" Ap FINE SANDY LOAM 10YR3/3<br>28"-40" Bw FINE SANDY LOAM 10YR5/6<br>40"-86" C1 SANDY LOAM 2.5Y5/4<br>86"-116" C2 SANDY LOAM 2.5Y4/4<br>NO REFUSAL, NO STANDING OR WEEPING WATER<br>NO REDOX<br>ESTIMATED DESIGN GROUNDWATER=NONE | 0"-16" Ap FINE SANDY LOAM 10YR3/3<br>16"-34" Bw FINE SANDY LOAM 10YR5/6<br>34"-84" C1 SANDY LOAM 2.5Y5/4<br>84"-118" C2 SANDY LOAM 2.5Y4/3<br>WEEPING WATER @112"<br>NO REFUSAL<br>REDOX @72" 7.5YR5/8<br>ESTIMATED DESIGN GROUNDWATER=156.6' |
| DATE: JULY 31, 2014 | | | | |
| BY: BRIAN T. NELSON, SOIL EVALUATOR (METROWEST ENGINEERING, INC.) | | | | |
| INSPECTOR: BILL MURPHY, WAYLAND BOARD OF HEALTH | | | | |

| SOIL LOGS No: | SOIL TEST RESULTS | | | | |
|---|---|---|---|---|---|
| DTH-6 ELEV=167.7' | DTH-7 ELEV=166.8' | DTH-8 ELEV=168.2' | DTH-9 ELEV=163.0' | DTH-10 ELEV=160.75' |
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| PERCOLATION | | | | | |
|---|---|---|---|---|---|
| NO. | DEPTH | RATE | DATE | BY | INSP. |
| PT-1 | 60" | 8 MPI | 07/31/14 | B.N. | B.M. |
| PT-2 | 68" | 13 MPI | 07/31/14 | B.N. | B.M. |
| PT-3 | 50" | 10 MPI | 07/31/14 | B.N. | B.M. |
| PT-4 | 55" | MPI | 07/31/14 | B.N. | B.M. |
| PT-5 | 60" | MPI | 07/31/14 | B.N. | B.M. |

| PERCOLATION | | | | | |
|---|---|---|---|---|---|
| NO. | DEPTH | RATE | DATE | BY | INSP. |
| PT-5A | 54" | 10 MPI | 08/21/14 | B.N. | J.J. |
| PT-6 | 60" | 3 MPI | 08/21/14 | B.N. | J.J. |

| DTH-11 ELEV=166.0' | DTH-12 ELEV=168.2' |
|---|---|
| 0"-18" FILL<br>18"-30" Ap FINE SANDY LOAM 10YR3/3<br>30"-36" Bw FINE SANDY LOAM 10YR5/6<br>36"-58" C1 SANDY LOAM 2.5Y5/3<br>58"-128" C2 SANDY LOAM 2.5Y6/3<br>WATER STANDING @125"<br>NO WEEPING WATER<br>REDOX SEEN @60" 7.5YR5/8 5%<br>ESTIMATED DESIGN GROUNDWATER=161.0' | 0"-54" FILL<br>58"-82" C1 SANDY LOAM 2.5Y4/4<br>82"-114" C2 SANDY LOAM 2.5Y5/4<br>C2 HORIZON HAS LENSES OF SILT LOAM<br>NO STANDING OR WEEPING WATER<br>NO REFUSAL<br>REDOX SEEN @64" 7.5YR5/8<br>ESTIMATED DESIGN GROUNDWATER=161.0' |
| DATE: AUGUST 21, 2014 | |
| BY: BRIAN T. NELSON, SOIL EVALUATOR (METROWEST ENGINEERING, INC.) | |
| INSPECTOR: JULIA JUNGHANNS, WAYLAND BOARD OF HEALTH | |

## REVISIONS:

| No. | DATE | REVISION |
|---|---|---|
| 1 | 4/20/18 | REVISIONS TO BUILDING FOOTPRINTS, GRADING, DRAINAGE SYSTEM SND SEPTIC SYSTEM |

*FOR METROWEST ENGINEERING, INC.* *DATE*
*ROBERT A. GEMMA, P.E.(CIVIL) # 31967*
*P.L.S. # 37046*

GRAPHIC SCALE
1 inch = 20 ft.
20 0 10 20 40 ( FEET ) 80
0 4 10 20 ( METERS ) 30

# PROPOSED SITE PLAN

#24 SCHOOL STREET
IN
WAYLAND, MASS
(MIDDLESEX COUNTY)

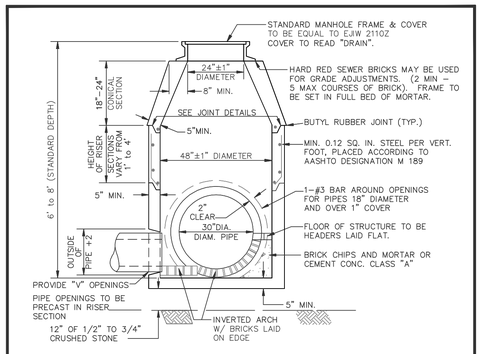
PREPARED FOR:
*WINDSOR PLACE LLC*
*73 PELHAM ISLAND ROAD*
*WAYLAND, MA 01778*

PROPERTY OF:
*WINDSOR PLACE LLC*
*73 PELHAM ISLAND ROAD*
*WAYLAND, MA 01778*

ENGINEERS & SURVEYORS:
MWE
*METROWEST ENGINEERING, INC.*
*75 FRANKLIN STREET*
*WAYLAND, MA 01702*
*TEL.: (508)626-0063*
*FAX: (508)875-6440*

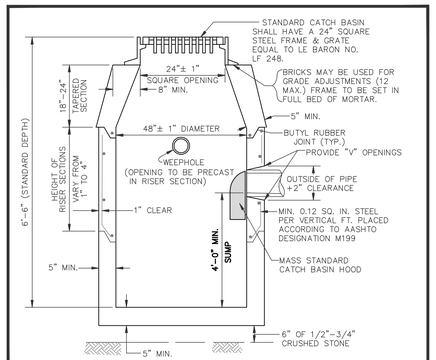
| SHEET 3 OF 5 | | DATE: SEPTEMBER 6, 2017 |
|---|---|---|
| CALC'D BY: BTN | FIELD BK: 621 | CAD FILE: PROP_SITE_3_R4.dwg |
| DRAFTER: BTN | PROJECT: WY_SCH | DWG FILE: SP090617_R1.dwg |

## PRECAST CONCRETE DRAIN MANHOLE
NOT TO SCALE



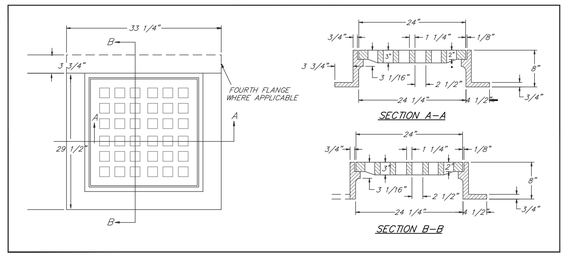

NOTES:
1. ALL DRAINS AND STORM DRAIN MANHOLES SHALL CONFORM TO TOWN OF WAYLAND STANDARDS
2. ALL INLET AND OUTLET PIPES SHALL BE FITTED WITH WATER TIGHT, SYNTHETIC RUBBER BOOTS

## PRECAST CONCRETE CATCH BASIN
NOT TO SCALE

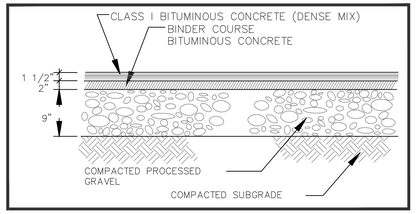



NOTE: NO BELL ENDS IN CATCH BASIN. ALL INLET AND OUTLET PIPES SHALL BE FITTED WITH WATER TIGHT, SYNTHETIC RUBBER BOOTS

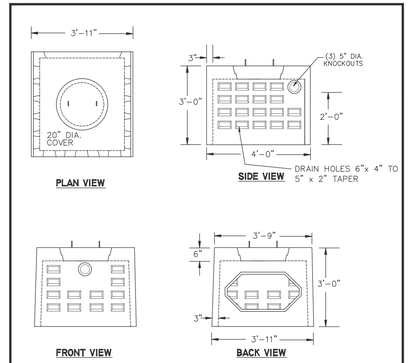
## SQUARE CATCH BASIN FRAME & GRATE
NOT TO SCALE




## BITUMINOUS CONCRETE PAVEMENT
NOT TO SCALE

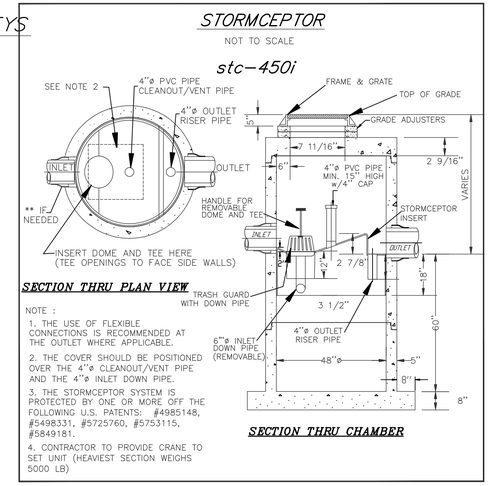



## DRAINAGE INFILTRATION LEACHING GALLEYS
NOT TO SCALE




NOTES
1. CONCRETE: 4,000 PSI MINIMUM AFTER 28 DAYS
2. DESIGNED FOR H–20 LOADING
3. GALLEY AVAILABLE IN BOTH END AND CENTER SECTIONS. CENTER SECTIONS HAVE LARGE OPENING IN BOTH THE BACK AND FRONT SIDES.

## STORMCEPTOR
NOT TO SCALE

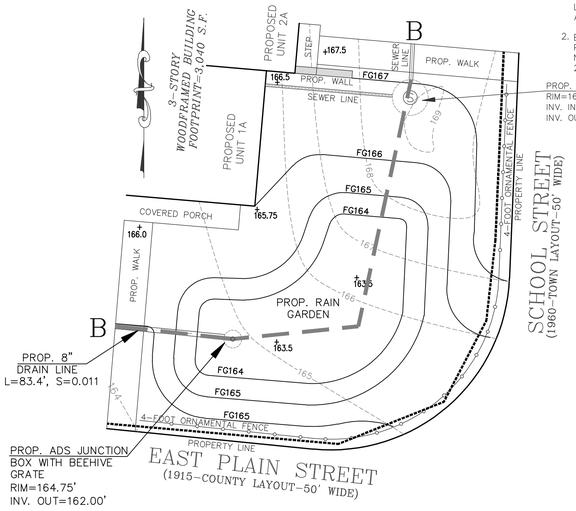



**SECTION THRU PLAN VIEW**

NOTE :
1. THE USE OF FLEXIBLE CONNECTIONS IS RECOMMENDED AT THE OUTLET WHERE APPLICABLE.
2. THE COVER SHOULD BE POSITIONED OVER THE 4"ø CLEANOUT/VENT PIPE AND THE 4"ø INLET DOWN PIPE.
3. THE STORMCEPTOR SYSTEM IS PROTECTED BY ONE OR MORE OFF THE FOLLOWING U.S. PATENTS: #4985148, #5498331, #5725760, #5753115, #5849181.
4. CONTRACTOR TO PROVIDE CRANE TO SET UNIT (HEAVIEST SECTION WEIGHS 5000 LB)

**SECTION THRU CHAMBER**

## PROPOSED RAIN GARDEN
NOT TO SCALE




NOTE:
1. PLANTING MIX FOR RAIN GARDENS SHALL BE TESTED PRIOR TO INSTALLATION OF PLANTS AND/OR SEEDING. A COMPREHENSIVE SOIL TEST WILL BE PERFORMED BY A QUALIFIED LABORATORY FOR pH, ORGANIC MATTER, P, K, Mg, Ca, S, B, Cu, Fe, Mn, Zn, Na, AVAILABLE NITROGEN, SOLUABLE SALT AND LEAD SCAN. LABORATORY REPORT SHALL INCLUDE RECOMMENDATIONS FOR ADDITIVES
2. BASINS SHALL BE HYDRO–SPRAYED WITH A BLEND OF PROFILE PROGANICS, APPLIED AT A RATE OF 5,000 POUNDS PER ACRE, AND NEW ENGLAND CONSERVATION WILDLIFE MIX, APPLIED AT A RATE OF 25 POUNDS PER ACRE.

## PLANTING SCHEDULE

*ZONE 1 – ELEVATION 163.5' TO 164.0'*

*HERBACEOUS*

| SPECIES | QUANTITY | SIZE |
|---|---|---|
| SWITCHGRASS (PANICUM VIRGATUM) | 100 | 1 GALLON |
| LURID SEDGE (CAREX LURIDA) | 100 | 1 GALLON |
| BLUE FLAG IRIS (IRIS VERSICOLOR) | 100 | 1 GALLON |
| CARDINAL FLOWER (LOBELIA CARDINALIS) | 100 | 1 GALLON |
| NEW ENGLAND ASTER (ASTER NOVAE–ANGLIAE) | 100 | 1 GALLON |
| BEARD TONGUE (PENSTEMON) | 100 | 1 GALLON |
| BEE BALM (MONARDA) | 100 | 1 GALLON |
| IRONWEED (VERNONIA NOVEBORACENSIS) | 100 | 1 GALLON |
| BROOM SEDGE (ANDROPOGON VIRGINICUS) | 100 | 1 GALLON |

*ZONE 2 – ELEVATION 164.0' TO 165.0'*

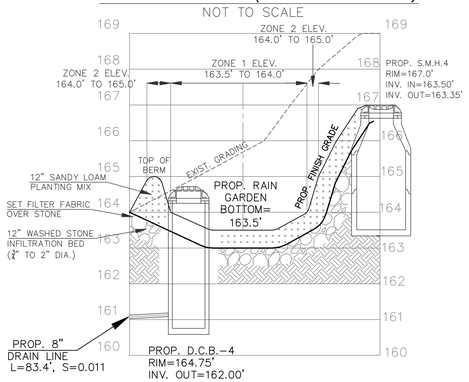
*SHRUBS*

| SYMBOL | SPECIES | QUANTITY | SIZE |
|---|---|---|---|
| SC | ELDERBERRY (SAMBUCUS CANADENSIS) | 2 | 6' HIGH |
| VC | HIGHBUSH BLUEBERRY (VACCINIUM CORYMBOSUM) | 2 | 6' HIGH |
| CS | RED OSIER DOGWOOD (CORNUS SERICEA) | 2 | 6' HIGH |

*HERBACEOUS*

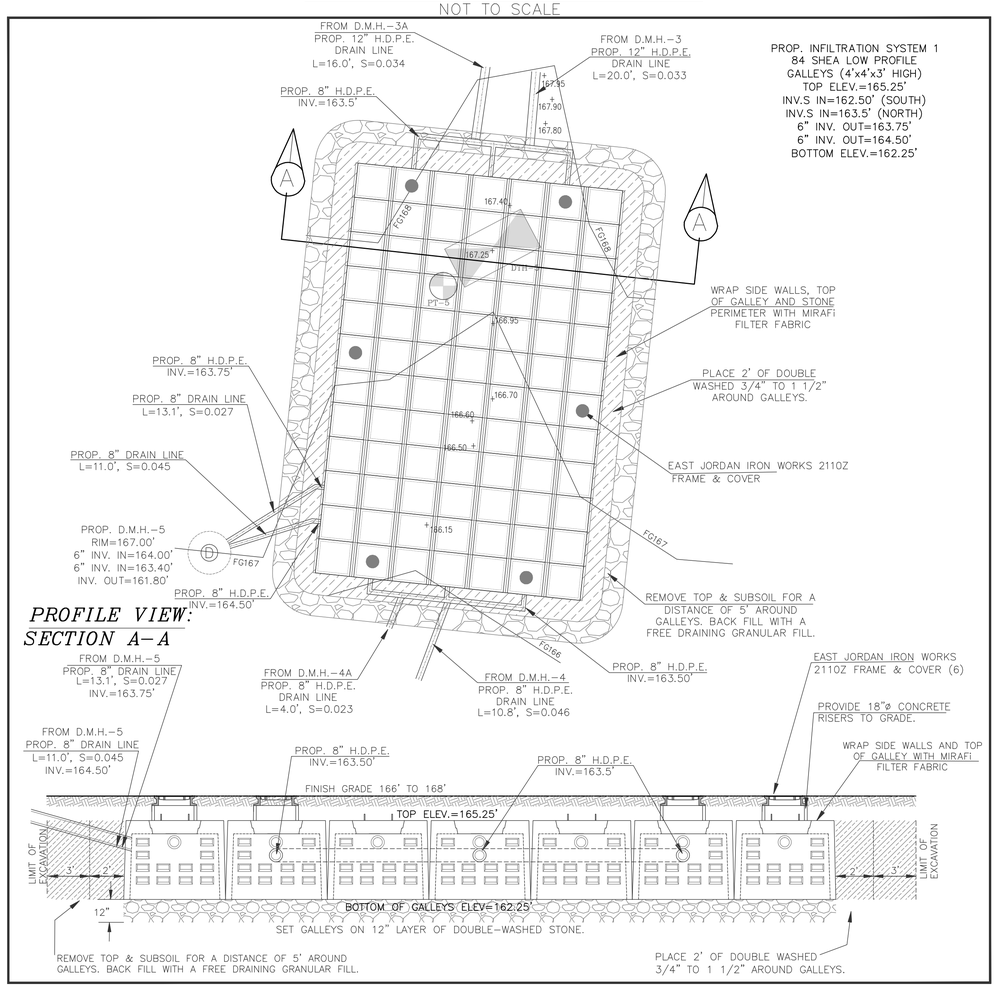
| SPECIES | QUANTITY | SIZE |
|---|---|---|
| NEW ENGLAND ASTER (ASTER NOVAE–ANGLIAE) | 250 | 1 GALLON |
| MARSH BLAZINGSTAR (LIATRIS SPICATA) | 250 | 1 GALLON |
| WILD BERGAMOT (MONARDA FISTULOSA) | 250 | 1 GALLON |
| JOE–PYE WEED (EUPATORIUM MACULATUM) | 250 | 1 GALLON |
| SWITCHGRASS (PANICUM VIRCATUM) | 100 | 1 GALLON |
| BIG BLUESTEM (ANDROPOGON GERARDII) | 100 | 1 GALLON |
| BLACK EYED SUSAN (RUDBECKIA HIRTA) | 100 | 1 GALLON |
| INDIAN GRASS (SORGHASTRUM NUTANS) | 100 | 1 GALLON |

## PROFILE B–B (RAIN GARDEN)
NOT TO SCALE




NOTE: BOTTOM, SIDESLOPES AND BERM OF RAIN GARDEN ARE TO BE HYDROSEEDED WITH A "NEW ENGLAND WET MIX" NATIVE SEED BLEND AND APPLIED AT A RATE OF 1 POUND PER 1,000 SQUARE FEET.

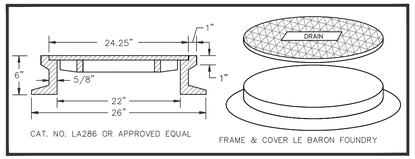
## PROPOSED INFILTRATION SYSTEM 1
NOT TO SCALE




*PROFILE VIEW: SECTION A–A*

PROP. INFILTRATION SYSTEM 1
84 SHEA LOW PROFILE GALLEYS (4'x4'x3' HIGH)
TOP ELEV.=165.25'
INV.S IN=162.50' (SOUTH)
INV.S IN=163.5' (NORTH)
6" INV. OUT=163.75'
6" INV. OUT=164.50'
BOTTOM ELEV.=162.25'

## STANDARD DRAIN MANHOLE FRAME & COVER
NOT TO SCALE




## REVISIONS:

| No. | DATE | REVISION |
|---|---|---|
| 1 | 4/20/18 | REVISIONS TO BUILDING FOOTPRINTS, GRADING, DRAINAGE SYSTEM SND SEPTIC SYSTEM |

*FOR METROWEST ENGINEERING, INC. DATE*
*ROBERT A. GEMMA, P.E.(CIVIL) # 31967*
*P.L.S. # 37046*

# PROPOSED DETAILS PLAN
#24 SCHOOL STREET
IN
WAYLAND, MASS
(MIDDLESEX COUNTY)

PREPARED FOR:
*WINDSOR PLACE LLC*
*73 PELHAM ISLAND ROAD*
*WAYLAND, MA 01778*

PROPERTY OF:
*WINDSOR PLACE LLC*
*73 PELHAM ISLAND ROAD*
*WAYLAND, MA 01778*

ENGINEERS & SURVEYORS:
MWE
*METROWEST ENGINEERING, INC.*
*75 FRANKLIN STREET*
*WAYLAND, MA 01702*
*TEL.: (508)626–0063*
*FAX: (508)875–6440*

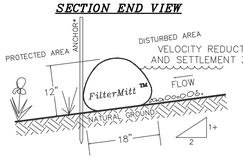
| SHEET 4 OF 5 | | DATE: SEPTEMBER 6, 2017 |
|---|---|---|
| CALC'D BY: BTN | FIELD BK: 621 | CAD FILE: PROP_SITE_3_R4.dwg |
| DRAFTER: BTN | PROJECT: WY_SCH | DWG FILE: SP090617_R1.dwg |

## EROSION CONTROL BARRIER

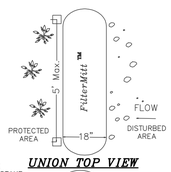
NOT TO SCALE

*FilterMitt*™ **by Groundscapes Express, Inc.**
2:1 SLOPES OR GREATER

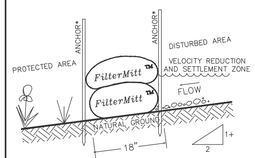
**SECTION END VIEW**




**SECTION TOP VIEW**

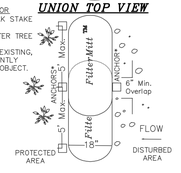



**UNION END VIEW**




**UNION TOP VIEW**

*ANCHOR
1"x1"x36" OAK STAKE
OR
2" OR GREATER TREE
OR
OTHER PRE-EXISTING, EQUIVALENTLY ANCHORED OBJECT.




**USE 18-INCH DIAMETER FILTER MITT.**

***FilterMitt*™ COMPONENTS:**
OUTSIDE CASING: 100% organic hessian.
FILLER INGREDIENT: *FiberRoot Mulch*™
- A blend of coarse and fine compost and shredded wood.
- Particle sizes: 100% passing a 3" screen; 90–100% passing a 1" screen; 70–100% passing a 0.75" screen; 30–75% passing a 0.25" screen.
- Weight: Approx. 850 lbs./cu.yd. (Ave. 30 lbs./l.f.)

For more information visit:
www.groundscapesexpress.com
or contact us at:
**Groundscapes Express, Inc.**
P.O. Box 737
Wrentham, MA 02093
(508) 384–7140

***FilterMitt*™ INSTALLATION:**
With the newest technology and equipment, sections can be constructed on site in lengths from 1' to 100'.

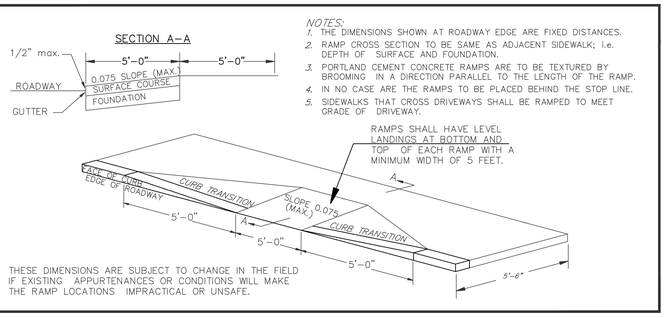
Sections can also be delivered to the site in lengths from 1' to 8'.

The flexibility of *FilterMitt*™ allows it to conform to any contour or terrain while holding a slightly oval shape at 12" high by 18" wide.

Where section ends meet, there shall be an overlap of 6" or greater. Both sides shall be anchored (oak stakes, trees, etc.) to stabilize the union. Additional anchors shall also be placed at 5' intervals (max.) on the downslope or protected side to prevent movement.

## CONCRETE RAMP DETAIL

NOT TO SCALE

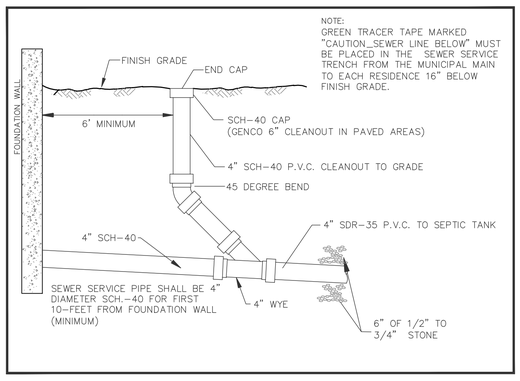



NOTES:
1. THE DIMENSIONS SHOWN AT ROADWAY EDGE ARE FIXED DISTANCES.
2. RAMP CROSS SECTION TO BE SAME AS ADJACENT SIDEWALK; i.e. DEPTH OF SURFACE AND FOUNDATION.
3. PORTLAND CEMENT CONCRETE RAMPS ARE TO BE TEXTURED BY BROOMING IN A DIRECTION PARALLEL TO THE LENGTH OF THE RAMP.
4. IN NO CASE ARE THE RAMPS TO BE PLACED BEHIND THE STOP LINE.
5. SIDEWALKS THAT CROSS DRIVEWAYS SHALL BE RAMPED TO MEET GRADE OF DRIVEWAY.

* THESE DIMENSIONS ARE SUBJECT TO CHANGE IN THE FIELD IF EXISTING APPURTENANCES OR CONDITIONS WILL MAKE THE RAMP LOCATIONS IMPRACTICAL OR UNSAFE.

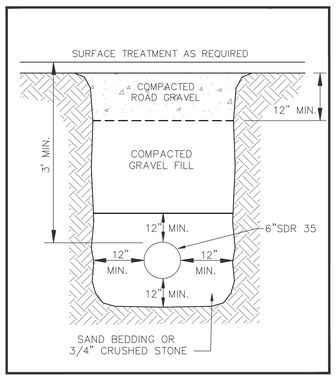
## TYPICAL SEWER SERVICE CONNECTION

NOT TO SCALE



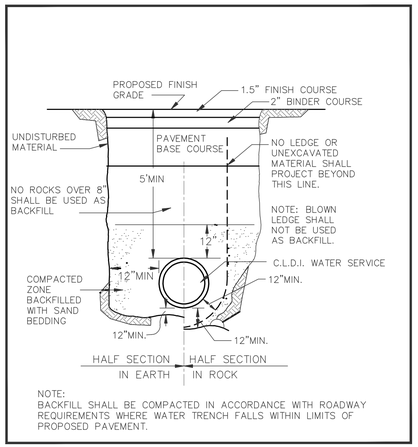

## TYPICAL SEWER TRENCH

NOT TO SCALE




## WATER MAIN TRENCH DETAIL

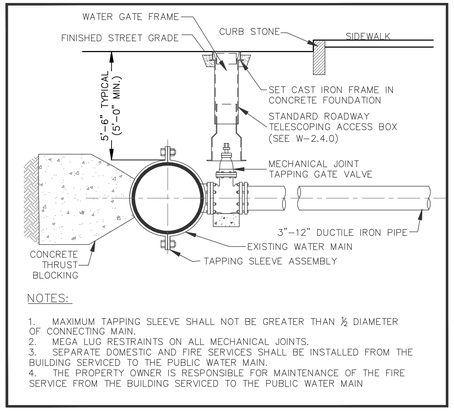
NOT TO SCALE




NOTE:
BACKFILL SHALL BE COMPACTED IN ACCORDANCE WITH ROADWAY REQUIREMENTS WHERE WATER TRENCH FALLS WITHIN LIMITS OF PROPOSED PAVEMENT.

## TYPICAL DOMESTIC AND FIRE SERVICE CONNECTION

NOT TO SCALE

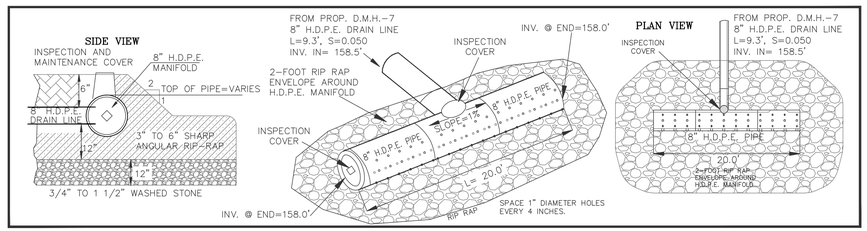



NOTES:

1. MAXIMUM TAPPING SLEEVE SHALL NOT BE GREATER THAN ½ DIAMETER OF CONNECTING MAIN.
2. MEGA LUG RESTRAINTS ON ALL MECHANICAL JOINTS.
3. SEPARATE DOMESTIC AND FIRE SERVICES SHALL BE INSTALLED FROM THE BUILDING SERVICED TO THE PUBLIC WATER MAIN.
4. THE PROPERTY OWNER IS RESPONSIBLE FOR MAINTENANCE OF THE FIRE SERVICE FROM THE BUILDING SERVICED TO THE PUBLIC WATER MAIN

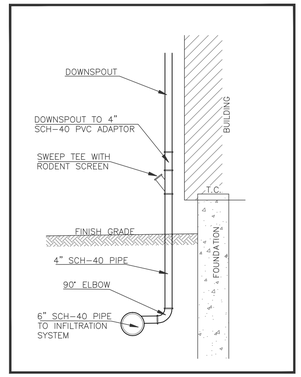
## LEVEL SPREADER FLOW MANIFOLD DETAIL

NOT TO SCALE



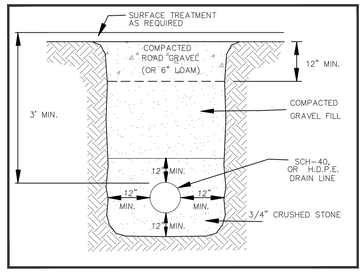

## DOWNSPOUT DETAIL

NOT TO SCALE




## TYPICAL DRAIN LINE TRENCH

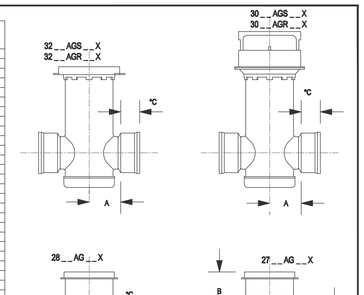
NOT TO SCALE




## P.V.C. JUNCTION BOX

NOT TO SCALE

| BODY SIZE | ADAPTER SIZE | A | B |
|---|---|---|---|
| 8" | 4" | 6.20 | 7.50 |
| 8" | 6" | 6.20 | 8.20 |
| 8" | 8" | 6.70 | 7.25 |
| 10" | 4" | 7.25 | 8.75 |
| 10" | 6" | 7.25 | 8.75 |
| 10" | 8" | 7.75 | 8.50 |
| 10" | 10" | 7.75 | 7.75 |
| 12" | 4" | 8.25 | 10.50 |
| 12" | 6" | 8.25 | 11.00 |
| 12" | 8" | 8.75 | 11.50 |
| 12" | 10" | 8.75 | 11.50 |
| 12" | 12" | 8.25 | 8.00 |
| 15" | 4" | 9.85 | 13.25 |
| 15" | 6" | 9.85 | 12.75 |
| 15" | 8" | 10.15 | 12.25 |
| 15" | 10" | 10.15 | 13.50 |
| 15" | 12" | 10.85 | 12.75 |
| 15" | 15" | 10.85 | 7.00 |
| 18" | 4" | 11.35 | 14.00 |
| 18" | 6" | 11.35 | 14.00 |
| 18" | 8" | 11.85 | 14.00 |
| 18" | 10" | 11.85 | 14.00 |
| 18" | 12" | 12.35 | 14.00 |
| 18" | 15" | 12.35 | 13.50 |
| 18" | 18" | 12.85 | 8.25 |
| 24" | 4" | 14.40 | 15.00 |
| 24" | 6" | 14.40 | 15.00 |
| 24" | 8" | 14.90 | 15.00 |
| 24" | 10" | 14.90 | 15.00 |
| 24" | 12" | 15.40 | 15.00 |
| 24" | 15" | 15.40 | 15.00 |
| 24" | 18" | 15.90 | 15.00 |
| 24" | 24" | 16.80 | 10.25 |
| 30" | 4" | 18.00 | 18.00 |
| 30" | 6" | 18.00 | 18.00 |
| 30" | 8" | 18.50 | 19.75 |
| 30" | 10" | 18.50 | 18.00 |
| 30" | 12" | 19.00 | 18.00 |
| 30" | 15" | 19.00 | 17.00 |
| 30" | 18" | 19.00 | 17.75 |
| 30" | 24" | 20.00 | 14.00 |
| 30" | 30" | 27.00 | 9.50 |




DIMENSIONS ARE FOR REFERENCE ONLY
ACTUAL DIMENSIONS MAY VARY
DIMENSIONS ARE IN INCHES
°C – SEE DRAWING NO. 7005-110-276 FOR ADS N-12 & HANCOR DUAL WALL BELL INFORMATION & DRAWING NO. 7005-110-364 FOR N-12 HP BELL INFORMATION

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TITLE
8 IN - 30 IN BODY TO ADAPTER DIMENSIONS

DWG NO. 7003-110-003 REV E

## H.D.P.E. DRAIN PIPE MATERIALS AND INSTALLATION

1.) ALL PIPE SHALL CONFORM TO MASSDOT SECTION M5.03.10.
2.) PIPE SHALL BE SMOOTH INTERIOR WALL AND CORRUGATED EXTERIOR WALL AND SHALL BE BELL AND SPIGOT CONNECTION.
3.) PIPE SHALL COMPLY WITH REQUIREMENTS AND MARKINGS FOUND IN AASHTO DESIGNATIONS M252 AND M294.
4.) ALL PIPE SHALL SUPPORT AN HS–20 LIVE LOAD WITH A MAXIMUM DEFLECTION OF 5% OF THE PIPE DIAMETER.
5.) ALL PIPE AND FITTINGS SHALL BE MADE FROM VIRGIN POLYETHYLENE COMPOUNDS WHICH CONFORM TO CURRENT AASHTO CLASSIFICATIONS AND ALSO AS DEFINED IN ASTM D3530.
6.) PIPES SHALL BE CAREFULLY LAID TO LINES AND GRADES AS SHOWN ON DESIGN PLANS.
7.) PIPE BEDDING MATERIAL SHALL BE PLACED TO A DEPTH OF NO LESS THAN SIX–INCHES BELOW THE INVERT OF THE PIPE.
8.) TRENCHES FOR DRAIN LINES SHALL PROVIDE MINIMUM OF TWELVE–INCHES (12") OF HORIZONTAL CLEARANCE FROM SIDES OF PIPE TO EDGE OF TRENCH.
9.) INSTALLATION OF H.D.P.E. PIPE SHALL BE IN ACCORDANCE WITH ASTM D2321 AND AS RECOMMENDED BY THE MANUFACTURER.
10.) WATER TIGHT JOINTS SHALL BE USED ON ALL PIPES IN ACCORDANCE WITH ASTM D3212. PIPE JOINTS SHALL BE BELL AND SPIGOT WITH ELASTOMERIC RUBBER GASKETS MEETING OR EXCEEDING ASTM F477.
11.) PIPE BEDDING MATERIAL OR 3/4" CRUSHED STONE SHALL BE CAREFULLY BACKFILLED AND COMPACTED AROUND PIPE TO A DEPTH OF TWELVE–INCHES ABOVE THE TOP OF PIPE.
12.) MATERIAL FOR BACKFILLING THE REMAINDER OF THE TRENCH, PAVEMENT AND PAVEMENT BASE MATERIAL EXCLUDED, SHALL BE BACKFILLED AND COMPACTED IN TWELVE–INCH LIFTS WITH SUITABLE MATERIAL WITH NO STONES GREATER THAN FOUR–INCHES IN DIAMETER. MATERIAL SHOULD BE FREE OF ORGANICS AND DEBRIS.
13.) TRENCH SHALL BE FINISHED WITH SIX–INCHES (6") OF LOAM AND SEED IN NON PAVED AREAS AND PREPARED IN ACCORDANCE WITH PAVEMENT STRUCTURE IN PAVED AREAS.

## SUBSURFACE INFILTRATION SYSTEM MATERIALS AND INSTALLATION

1.) ALL MATERIALS ASSOCIATED SHALL BE IN ACCORDANCE WITH THE DESIGN PLANS AND THE TOWN OF WAYLAND DEPARTMENT OF PUBLIC WORKS CONSTRUCTION STANDARDS.
2.) SUBSURFACE LEACHING CHAMBERS SHALL BE SHEA DW–SDW GALLEYS OR APPROVED EQUAL.
3.) FILTER FABRIC SHALL BE MIRAFI 140N (TENCATE INDUSTRIES) OR APPROVED EQUAL.
4.) ACCESS MANHOLES SHALL BE REQUIRED AT LOCATIONS SPECIFIED ON DESIGN PLANS.
5.) ACCESS MANHOLES SHALL CONSIST OF EAST JORDAN IRON WORKS 2111Z/2111A, HEAVY DUTY FRAME AND COVER AND SHALL MEET OR EXCEED HS–20 LOADING REQUIREMENTS.
6.) ACCESS MANHOLES SHALL BE ADJUSTED TO FINISH GRADE WITH PRECAST CONCRETE RISERS AND/OR LAYERS OF BRICK AND MORTAR.
7.) EXCAVATION FOR PRECAST LEACHING CHAMBERS SHALL BE DONE CAREFULLY TO AVOID SMEARING AND COMPACTION OF BOTTOM AND EXCAVATION SIDEWALLS.
8.) ANY UNSUITABLE MATERIAL SHALL BE REMOVED AND REPLACED WITH FREE DRAINING MATERIAL, INCLUDING BUT NOT LIMITED TO TITLE V SAND.
9.) ALL PRECAST LEACHING CHAMBERS SHALL BE PLACED ON A TWELVE–INCH (12") DEEP LAYER OF COMPACTED 3/4" TO 1 1/2" DOUBLE WASHED CRUSHED STONE.
10.) PRECAST LEACHING CHAMBERS SHALL BE CAREFULLY PLACED AT THE SAME ELEVATION IN ROWS AND BUTTED TOGETHER SO NO VOIDS EXIST BETWEEN UNITS.
11.) AREAS BETWEEN ROWS OF PRECAST LEACHING CHAMBERS SHALL BE FILLED WITH 3/4" TO 1 1/2" DOUBLE WASHED STONE.
12.) ALL PIPES SHALL BE SECURELY MORTARED IN PLACE TO PROVIDE WATER TIGHT CONNECTIONS.
13.) FILTER FABRIC SHALL BE INSTALLED AROUND THE SIDES, AND ON TOPO OF THE PRECAST LEACHING CHAMBERS.
14.) CONTRACTOR SHALL OVERLAP ROWS OF FILTER FABRIC ONE–HALF FOOT (0.5') AND CAREFULLY BACKFILL AROUND AND ON TOP OF THE LEACHING CHAMBERS TO AVOID SHIFTING OR TEARING FILTER FABRIC.
15.) INSTALL AND COMPACT 3/4" TO 1 1/2" DOUBLE WASHED STONE IN TWELVE–INCH (12") LIFTS FOR A DISTANCE OF TWO–FEET (2') AROUND THE PERIMETER OF LEACHING CHAMBERS.

## DRAINAGE MATERIALS NOTES:

## PRECAST CONCRETE DRAIN MANHOLE MATERIALS AND INSTALLATION

1.) ALL MATERIALS ASSOCIATED SHALL BE IN ACCORDANCE WITH THE DESIGN PLANS, THE TOWN OF WAYLAND DEPARTMENT OF PUBLIC WORKS CONSTRUCTION STANDARDS.
2.) STORMCEPTOR UNITS SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURERS SPECIFICATIONS.
3.)FILTER FABRIC SHALL BE MIRAFI 140N (TENCATE INDUSTRIES) OR APPROVED EQUAL.
4.) MANHOLES SHALL BE CONSTRUCTION OF REINFORCED PRECAST CONCRETE BASE SECTION, BARREL SECTION AND DOME SECTION MEETING THE REQUIREMENTS OF ASTM C78 AND AASHTO M199. CONCRETE SHALL HAVE A MINIMUM 28–DAY COMPRESSIVE STRENGTH OF 4,000 P.S.I.
5.) IN CASES WHERE VERTICAL TOLERANCE DOES NOT PERMIT A CONE TOP SECTION, A PRECAST CONCRETE FLAT SECTION MAY BE USED.
6.) MANHOLES SHALL MEET OR EXCEED HS–20 LOADING REQUIREMENTS.
7.) MANHOLES SHALL HAVE A MINIMUM OPENING OF 26–INCHES AND A MINIMUM INSIDE DIAMETER OF FOUR–FEET (4').
7.) MANHOLES SHALL HAVE TONGUE AND GROOVE JOINTS BETWEEN SECTIONS THAT ARE MORTARED OR SEALED WITH BUTYL RUBBER SEALANTS.
8.) PIPE INLETS AND OUTLETS SHALL BE SEALED WITH MORTAR OR RUBBER SEALANTS OR BOOT TYPE CONNECTIONS.
9.) DRAIN MANHOLES SHALL BE PLACED ON A LAYER OF COMPACTED, LEVEL, BEDDING MATERIAL NOT LESS THAN SIX–INCHES IN HEIGHT.
10.) MANHOLE SECTIONS SHALL BE CAREFULLY PLACED SO THAT ALL SECTIONS ARE LEVEL AND PLUMB.
11.) EXCAVATION AROUND THE MANHOLE STRUCTURES SHALL BE BACKFILLED AND COMPACTED IN TWELVE–INCH (12") LIFTS WITH SUITABLE MATERIALS.
12.) ROAD BASE MATERIAL AND PAVEMENT MATERIALS SHALL BE INSTALLED AROUND STRUCTURES IN ACCORDANCE WITH BASE AND PAVEMENT PREPARATION INSTRUCTIONS.
13.) MANHOLE ACCESS FRAME AND COVER SHALL CONSIST OF EAST JORDAN IRONWORKS 2111A/2111Z FRAME AND COVER.
14.) FRAME AND COVER SHALL BE ADJUSTED TO FINISH GRADE USING LAYERS OF MORTAR AND BRICK.
15.) FRAME AND COVERS SHALL MEET ASTM A888 ANDMADE FROM CLASS 20, GREY CAST IRON.

## PRECAST CONCRETE DRAIN CATCH BASIN MATERIALS AND INSTALLATION

1.) ALL MATERIALS ASSOCIATED SHALL BE IN ACCORDANCE WITH THE DESIGN PLANS, THE TOWN OF WAYLAND DEPARTMENT OF PUBLIC WORKS CONSTRUCTION STANDARDS.
2.) ALL CATCH BASINS SHALL HAVE A SUMP OF AT LEAST FOUR–FEET (48–INCHES) BELOW THE INVERT OF THE OUTLET PIPE AND SHALL HAVE A HOOD ON OUTLET PIPES.
3.) CATCH BASIN HOODS SHALL EXTEND AT LEAST ONE–FOOT BELOW THE INVERT OF THE OUTLET PIPE.
4.) CATCH BASINS SHALL BE CONSTRUCTED OF REINFORCED PRECAST CONCRETE BASE SECTION, BARREL SECTION AND DOME SECTION MEETING THE REQUIREMENTS OF ASTM C78 AND AASHTO M199. CONCRETE SHALL HAVE A MINIMUM 28–DAY COMPRESSIVE STRENGTH OF 4,000 P.S.I.
5.) IN CASES WHERE VERTICAL TOLERANCE DOES NOT PERMIT A CONE TOP SECTION, A PRECAST CONCRETE FLAT SECTION MAY BE USED.
6.) CATCH BASINS SHALL MEET OR EXCEED HS–20 LOADING REQUIREMENTS.
7.) CATCH BASINS SHALL HAVE A MINIMUM OPENING OF 26–INCHES AND A MINIMUM INSIDE DIAMETER OF FOUR–FEET (4').
7.) CATCH BASINS SHALL HAVE TONGUE AND GROOVE JOINTS BETWEEN SECTIONS THAT ARE MORTARED OR SEALED WITH BUTYL RUBBER SEALANTS.
8.) PIPE INLETS AND OUTLETS SHALL BE SEALED WITH MORTAR OR RUBBER SEALANTS OR BOOT TYPE CONNECTIONS.
9.) DRAIN MANHOLES SHALL BE PLACED ON A LAYER OF COMPACTED, LEVEL, BEDDING MATERIAL NOT LESS THAN SIX–INCHES IN HEIGHT.
10.) CATCH BASIN SECTIONS SHALL BE CAREFULLY PLACED SO THAT ALL SECTIONS ARE LEVEL AND PLUMB.
11.) EXCAVATION AROUND THE MANHOLE STRUCTURED SHALL BE BACKFILLED AND COMPACTED IN TWELVE–INCH (12") LIFTS WITH SUITABLE MATERIALS.
12.) ROAD BASE MATERIAL AND PAVEMENT MATERIALS SHALL BE INSTALLED AROUND STRUCTURES IN ACCORDANCE WITH BASE AND PAVEMENT PREPARATION INSTRUCTIONS.
13.) MANHOLE ACCESS FRAME AND COVER SHALL CONSIST OF EAST JORDAN IRONWORKS 5523A/5524Z FRAME AND 5520 M5 COVER.
14.) FRAME AND COVER SHALL BE ADJUSTED TO FINISH GRADE USING LAYERS OF MORTAR AND BRICK.

*FOR METROWEST ENGINEERING, INC.* *DATE*
*ROBERT A. GEMMA, P.E.(CIVIL) # 31967*
*P.L.S. # 37046*

## REVISIONS:

| No. | DATE | REVISION |
|---|---|---|
| 1 | 4/20/18 | REVISIONS TO BUILDING FOOTPRINTS, GRADING, DRAINAGE SYSTEM SND SEPTIC SYSTEM |

# PROPOSED DETAILS PLAN

#24 SCHOOL STREET
IN
WAYLAND, MASS
(MIDDLESEX COUNTY)

PREPARED FOR:
*WINDSOR PLACE LLC*
*73 PELHAM ISLAND ROAD*
*WAYLAND, MA 01778*

PROPERTY OF:
*WINDSOR PLACE LLC*
*73 PELHAM ISLAND ROAD*
*WAYLAND, MA 01778*

ENGINEERS & SURVEYORS:
MWE
*METROWEST ENGINEERING, INC.*
*75 FRANKLIN STREET*
*WAYLAND, MA 01702*
*TEL.: (508)626–0063*
*FAX: (508)875–6440*

| | | |
|---|---|---|
| SHEET 5 OF 5 | | DATE: SEPTMEBER 6, 2017 |
| CALC'D BY: BTN | FIELD BK: 621 | CAD FILE: PROP_SITE_3_R4.dwg |
| DRAFTER: BTN | PROJECT: WY_SCH | DWG FILE: SP090617_R1.dwg |