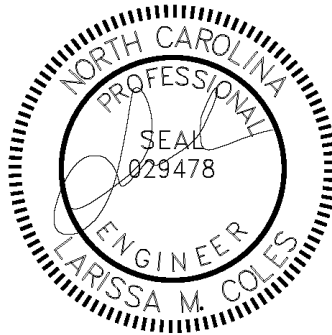


SEDIMENTATION & EROSION CONTROL AND STORM WATER MANAGEMENT CALCULATIONS

New Vedanta Hall
7400 City View Drive
Charlotte, NC

By:

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for:

Hindu Center of Charlotte
7400 City View Drive
Charlotte, N.C. 28212

August 30, 2011

1.0 NARRATIVE:

This Project is located on City View Drive in Charlotte, NC. Refer to vicinity map on the site plan for exact location.

This project consists of the construction of a New Vedanta Hall at the existing Hindu Center property. New parking, sidewalks, and drives will be added as well. The runoff from the disturbed areas will be directed into proposed sediment basins. One of the sediment basins will be converted into a sand filter and detention area when construction is complete. The other sediment basin will be converted into a dry detention pond.

The basin areas will be seeded, mulched, and tacked. Diversion ditches will be used to direct the runoff into the sediment basins. Silt fence will be used for both erosion control and tree protection. Temporary gravel construction entrances will be used at any location used for ingress or egress and will be maintained daily.

If the construction area is not complete and will be left denuded for more than twenty-one days, then temporary seeding, mulching, and tacking should be provided. Seeding should be done in accordance with the specifications for that time of year.

The soil erosion and sedimentation control structures and devices should be done in accordance with the specifications and designs shown on the plans. All devices should be maintained until vegetation has been established and until the stone base has been placed. Stabilization efforts should begin as soon as a specific area is brought to the desired finish grade.

Other erosion control measures or field modifications may be required as site conditions dictate. The Charlotte Erosion Control Inspector and Design Engineer should be notified before any changes are made or any Field Modifications are performed.

2.0 CONSTRUCTION SEQUENCE:

1. Obtain Grading/Erosion Control plan approval from the City of Charlotte Engineering Department.

2. Set up a on-site pre-construction conference with Erosion Control Inspector of the City Engineering Department to discuss erosion control measures. Failure to schedule such conference 48 hours prior to any land disturbing activity is a violation of Chapter 18 of the City Code and is subject to fine.

3. Install gravel construction entrance.

4. Install silt fence below proposed basin area and install tree protection fence in all areas shown on the site plan to ensure all protected trees are protected.

5. Install basin outlet pipe and outlet protection as constructing basin.

6. Install temporary diversion ditches.

7. Call for on-site inspection by Inspector. When approved, Inspector issues the Grading Permit and clearing and grubbing may begin.

8. The contractor shall diligently and continuously maintain all erosion control devices and structures.

9. For phased erosion control plans, contractor shall meet with City Of Charlotte Erosion Control Coordinator prior to commencing with each phase of erosion control measures.

10. Stabilize site as areas are brought to finished grade.

11. Coordinate with City of Charlotte Erosion Control Coordinator prior to removal of erosion control measure. Failure to do so may result in a Notice of Violation.

12. All erosion control measures shall be constructed in accordance with the N. C. Erosion and Sediment Control Planning and Design Manual, U. S. Dept. of Agriculture, City of Charlotte Erosion Control Ordinance, and the Charlotte-Mecklenburg Land Development Standards.

3.0 MAINTENANCE PLAN:

Erosion Control Structures

1. Monitoring of erosion and sedimentation control measures is required at least once per week or after every half inch of rainfall. Sites discharging to 303(d) listed streams are required to monitor measures twice per week. Monitoring is to be conducted by a person that holds either CPESC or the Charlotte-Mecklenburg Certified Site Inspector Certification. Go to: CMCSI.Charmeck.org for more details.

3. Sediment will be removed from behind the sediment fence when it becomes about 0.5 ft. deep at the fence. The sediment fence will be repaired as necessary to maintain a barrier.

4. All seeded areas will be fertilized, reseeded as necessary, and mulched according to the instructions in the seeding specifications to maintain a vigorous, dense vegetative cover.

5. Gravel construction entrance will be installed and maintained at all points used for ingress and egress to the construction area to prevent movement of sediment off site by means of vehicular traffic.

4.0 SEEDING SPECIFICATION:

4.1 SLOPES 3:1 OR FLATTER

1. Apply agricultural lime at the rate of 2 tons/acre.
2. Apply 10-10-10 commercial fertilizers at the rate of 900 lbs/acre.
3. Seed in accordance with the following schedule and application rates:

| DATE | TYPE | PLANTING RATE |
|-----------------|---|---|
| Aug. 15-Nov. 1 | Tall Fescue | 300 lbs/ac. |
| Nov. 1-Mar. 1* | Tall Fescue & Abruzzi Rye | 300 lbs/ac 25 lbs/ac. |
| Mar. 1-Apr. 15 | Tall Fescue | 300 lbs/ac. |
| Apr. 15-Jul. 30 | Hulled common Bermuda grass | 30 lbs/ac. |
| Jul. 15-Aug. 15 | Tall Fescue & Brown top Millet OR Sorghum Sudan Hybrids | 300 lbs/ac. 35 lbs/ac. 30 lbs/ac. |

* Heavily mulched during the January - March period.

- Mulch with straw applied at the rate of 2 tons/acre.

4.2 SLOPES GREATER THAN 3:1 to 2:1

- Apply agricultural lime at the rate of 2 tons/acre.
- Apply 10-10-10 commercial fertilizers at the rate of 900 lbs/ac.
- Seed in accordance with the following schedule and application rates:

| DATE | TYPE | PLANTING RATE |
|----------------|--|---|
| Mar.-June 1 | Sericea Lespedeza | 50 lbs/ac. |
| Mar.-Apr. | ADD Tall Fescue OR | 50 lbs/ac |
| Mar.-June | ADD Weeping Lovegrass | 5 lbs/ac. |
| June-Sept. 1** | Tall Fescue AND Brown top Millet OR Sorghum Sudan Hybrids | 60 lbs/ac. 35 lbs/ac. 30 lbs/ac. |
| Sept.-Mar. 1 | Sericea Lespedeza (unhulled-unscarified) Tall Fescue OR Millet OR Sudan | 70 lbs/ac. 150 lbs/ac. 20 lbs/ac. |

**TEMPORARY - RESEED September 1 at the recommended rates

- Mulch with 3 in. straw applied at the rate of 2 tons/acre and anchor with asphalt emulsion tack coat applied at the rate of 800 gallons/acre.

4.3 SEED BED PREPARATION NOTES

- Surface water control measures to be installed according to plan.
- Areas to be seeded shall be ripped and spread with available topsoil 3 inches deep. Total seedbed prepared depth shall be 4 inches to 6 inches deep.

3. Loose rocks, roots, and other obstructions shall be removed from the surface so that they will not interfere with establishment and maintenance of vegetation.

4. If NO soil test is taken, fertilizer and lime to be provided according to the seeding specifications above. In addition, provide 650 lbs/ac. of super phosphate.

5. If a soil test is taken, provide lime and fertilizer according to the soil test report and submit report to the design engineer.

6. Lime and fertilizer shall be applied uniformly and mixed with the soil during seedbed preparation.

4.4 GROUND COVER FOR SLOPES, FILLS, AND OTHER GRADED AREAS

The angle for graded slopes and fills shall be no greater than the angle that can be retained by vegetative cover or other adequate erosion control devices or structures. Also whenever a land-disturbing activity is undertaken on a tract comprising more than one (1) acre, if more than one acre is uncovered, a ground cover sufficient to restrain erosion must be planted or otherwise provided within fifteen (15) working days on that portion of the tract upon which further active construction is not being undertaken, provided that this section shall not apply to cleared land forming the basin of the reservoir to be inundated.

Seeding should be done in accordance with the specs for that season of the year.

Additional erosion control measures may be required depending on the actual field conditions.

5.0 CALCULATIONS:

Sediment Basin#1 (With Skimmer)

SEDIMENT BASIN VOLUME CALCULATIONS

Denuded Area = 0.97 ac.

Drainage Area = 1.75 ac.

Required Volume of Storage = (0.97 ac)x(1800)= 1746 cuft

Expected $Q_{10} = (0.95)(7.03)(1.75) = 11.69$ cfs

Required Surface Area = (325)x(11.69 cfs) = 3799 sqft

Surface Area provided = 4661 sf

Design Volume of Storage = 9410 cuft

This sediment basin will be converted to Pond #1/ Sand Filter #1 after site is stabilized. Please see attached Hydraflow calculations for stormwater detention.

Sediment Basin#2 (With Skimmer)

SKIMMER SEDIMENT BASIN VOLUME CALCULATIONS

Denuded Area = 2.00 ac.

Drainage Area = 2.15 ac.

Required Volume of Storage = (2.00 ac)x(1800) = 3600 cuft

From Figure 3-1(see attached), $t_c = 15$ min., $I_{10} = 5.03$ in/hr

Expected $Q_{10} = (0.76)(5.03)(2.15) = 8.22$ cfs

Required Surface Area = (325)x(8.22 cfs) = 2671 sqft

Surface Area provided = 4052 sf

Design Volume of Storage = 9597 cuft

HYDRAFLOW DATA OUTPUT
Sand Filter 1 / Pond #1

Sand Filter 1

Drainage Area (A) = 2.2 ac
Impervious Area = 1.96 ac
Percent Impervious (I) = 89.09091 %

Compute WQ_v

$R_v = 0.05 + 0.009(I) = 0.851818182$
 $WQ_v = 1.0R_vA/12 = 0.1562 \text{ ac ft} = 6802.62 \text{ cf}$
 $WQ_v = 1.0R_v = 0.851818182 \text{ inches}$

Compute Modified CN

$CN = 1000/[10+5P + 10WQ_v - 10(WQ_v^2 + 1.25WQ_vP)^{0.5}] = 98.6415$

Compute Channel Protection Volume (CP_v)

$S = 1000/CN-10 = 0.1377 \text{ inches}$
1-year, 24 hour rainfall depth (P) = 2.58 inches
 $Q_d = (P-0.2S)^2/(P+0.8S) = 2.4218 \text{ inches}$
 $CP_v = Q_d * A * 1\text{ft}/12 \text{ in} = 0.4440 \text{ acre-feet}$
Total runoff for 1-year, 24-hour storm event
This volume must be held min. 24 hours

Compute Release Rate for WQ_v

Release this volume over 2 days beyond center of design rainfall (3 hours)

Total control duration = 51 hours
Release Rate = 0.0371 cfs

Compute Release Rate for CP_v

Release this volume over 24 hours beyond the center of the design rainfall (12 hours)

Total control duration = 36 hours
Release Rate = 0.1492 cfs

Sedimentation chamber volume:

$$\text{Vol}_{\text{pre}} = 0.20 * WQ_v = 1360.524 \text{ cf}$$

Size Filtration Basin Chamber

$$A_r = (WQ_v)(d_f) / [(k)(h_r + d_f)(t_f)] = 694.145$$

$d_f =$ 2.5 ft depth of filter bed
 $k =$ 3.5 ft/day coefficient of permeability of filter media
 $h_r =$ 1 ft average height of water above filter bed
 $t_f =$ 2 days design filter bed drain time

Area Provided = 705 sf at Elevation = 659

Storage-Elevation Data

| <u>Elevation</u> | <u>Area (sf)</u> | <u>Avg. Area (</u> <u>Height (ft)</u> | <u>Inc. Vol. (cf)</u> | <u>Acc. Vol. (cf)</u> |
|------------------|------------------|--|-----------------------|-----------------------|
| 659 | 705 | | | |
| 660 | 1791 | 1248 | 1 | 1248 |
| 661 | 2615 | 2203 | 1 | 2203 |
| 662 | 3571 | 3093 | 1 | 3093 |
| 663 | 4661 | 4116 | 1 | 4116 |
| 664 | 5954 | 5307.5 | 1 | 5307.5 |
| | | | | 15967.5 |

Stage Discharge for Filter Media

$$Q_0 = A_f(k)(h_r + d_f) / d_f$$

| <u>Elevation</u> | <u>h_f</u> | <u>Q₀ cf/day</u> | <u>Q₀ cfs</u> |
|------------------|----------------------|-----------------------------|--------------------------|
| 659 | 0 | 0 | 0 |
| 660 | 1 | 3454.5 | 0.039983 |
| 661 | 2 | 4441.5 | 0.051406 |
| 662 | 3 | 5428.5 | 0.062830 |
| 663 | 4 | 6415.5 | 0.074253 |
| 664 | 5 | 7402.5 | 0.085677 |

From Hydraflow Report, Max. Elevation for SCS 1-inch, 6-hour storm = 660.86 using known outflows computed above

Set overflow (weir) elevation at 660.9.

Please see attached Hydraflow Reports for 10-year and 25-year storm routings.

Size Bioretention Underdrain System

Minimum Drawdown Discharge:

$WQ_v = 6802.62 \text{ cf}$

$\text{Drawdown} = WQ_v / (48 \text{ hours} * 3600 \text{ sec/hour}) = 0.039367 \text{ cfs}$

Underdrain spacing at 10' o.c. provides 2 pipes of varying lengths.

Total pipe length = 72 ft
 Length of pipe containing holes = 70 ft (reduced to account for fittings on each end of pipe)
 Hole Diameter = 0.375 in A =
 Number of holes per ft = 2
 Number of holes per row = 4
 Number of holes = 560
 50% of holes = 280

$\text{Capacity of 1 hole} = CA(2gh)^{0.5} = 0.00977 \text{ cfs}$

$\text{Capacity of pipe} = 5.4717 \text{ cfs}$

$\text{Capacity of pipe 50\% clogged} = 2.7358 \text{ cfs}$

h = 3.5 (avg. headwater depth above hole)
 C = 0.60

Underdrain Pipe Capacity:

6-inch PVC underdrain pipe @0.5% slope

$\text{Capacity of pipe} = (1.49/n)(A)(A/P)^{0.67}(S)^{0.5} = 0.4076 \text{ cfs}$

A = Flow Area = 0.2 sf

P = Wetted Perimeter = 1.57 ft

n = 0.013

S = Slope = 0.005 ft/ft

$\text{Capacity of pipe 50\% clogged} = 0.2038 \text{ cfs}$

Hydrograph Plot

Hyd. No. 1

DA 1 Post-Development to BMP

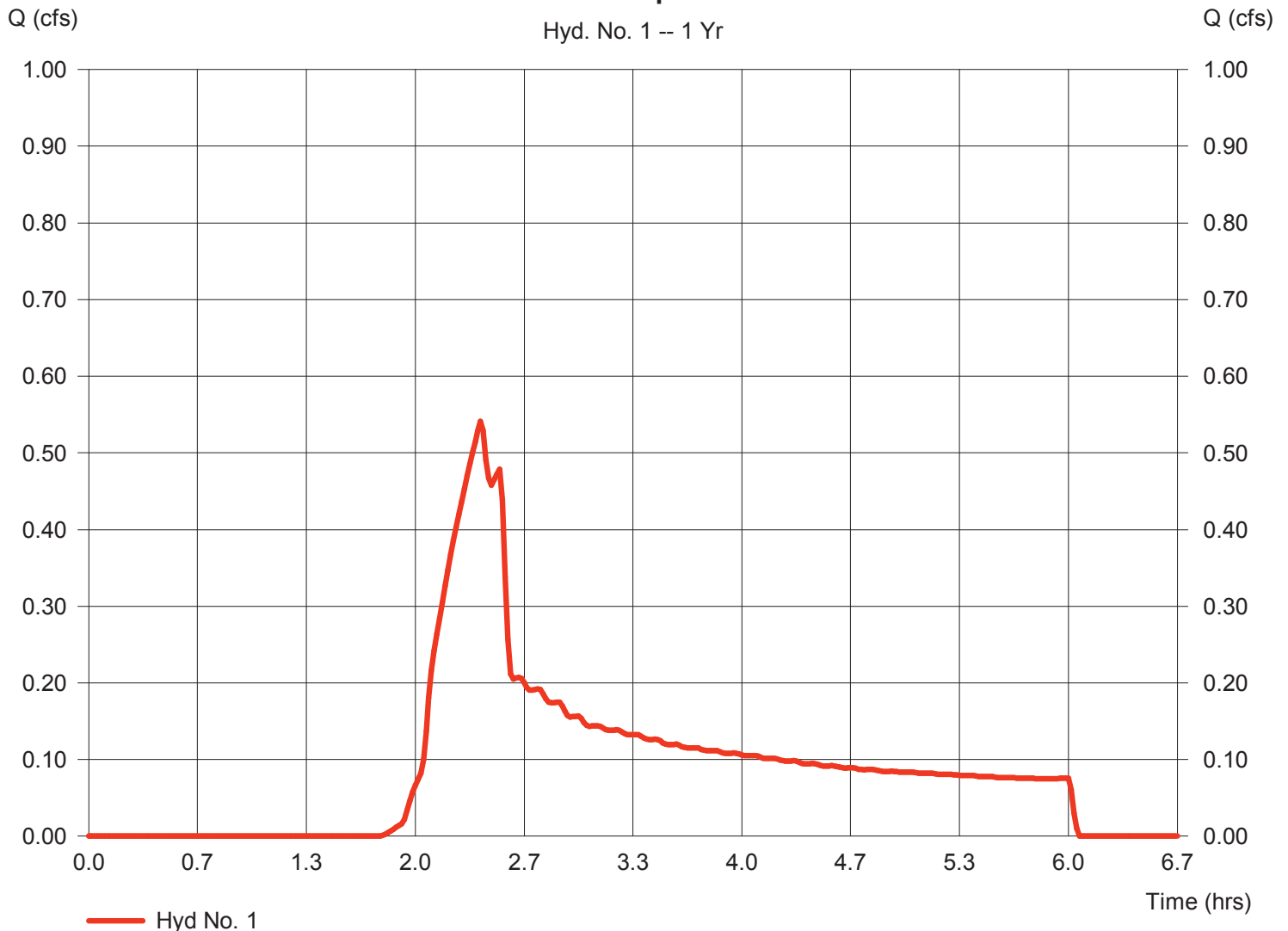
Hydrograph type = SCS Runoff
Storm frequency = 1 yrs
Drainage area = 1.550 ac
Basin Slope = 0.0 %
Tc method = TR55
Total precip. = 1.00 in
Storm duration = 6.00 hrs

Peak discharge = 0.541 cfs
Time interval = 1 min
Curve number = 92
Hydraulic length = 0 ft
Time of conc. (Tc) = 3.00 min
Distribution = SCS 6-Hr
Shape factor = 484

Hydrograph Volume = 2,123 cuft

DA 1 Post-Development to BMP

Hyd. No. 1 -- 1 Yr



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Tuesday, Sep 20 2011, 11:54 AM

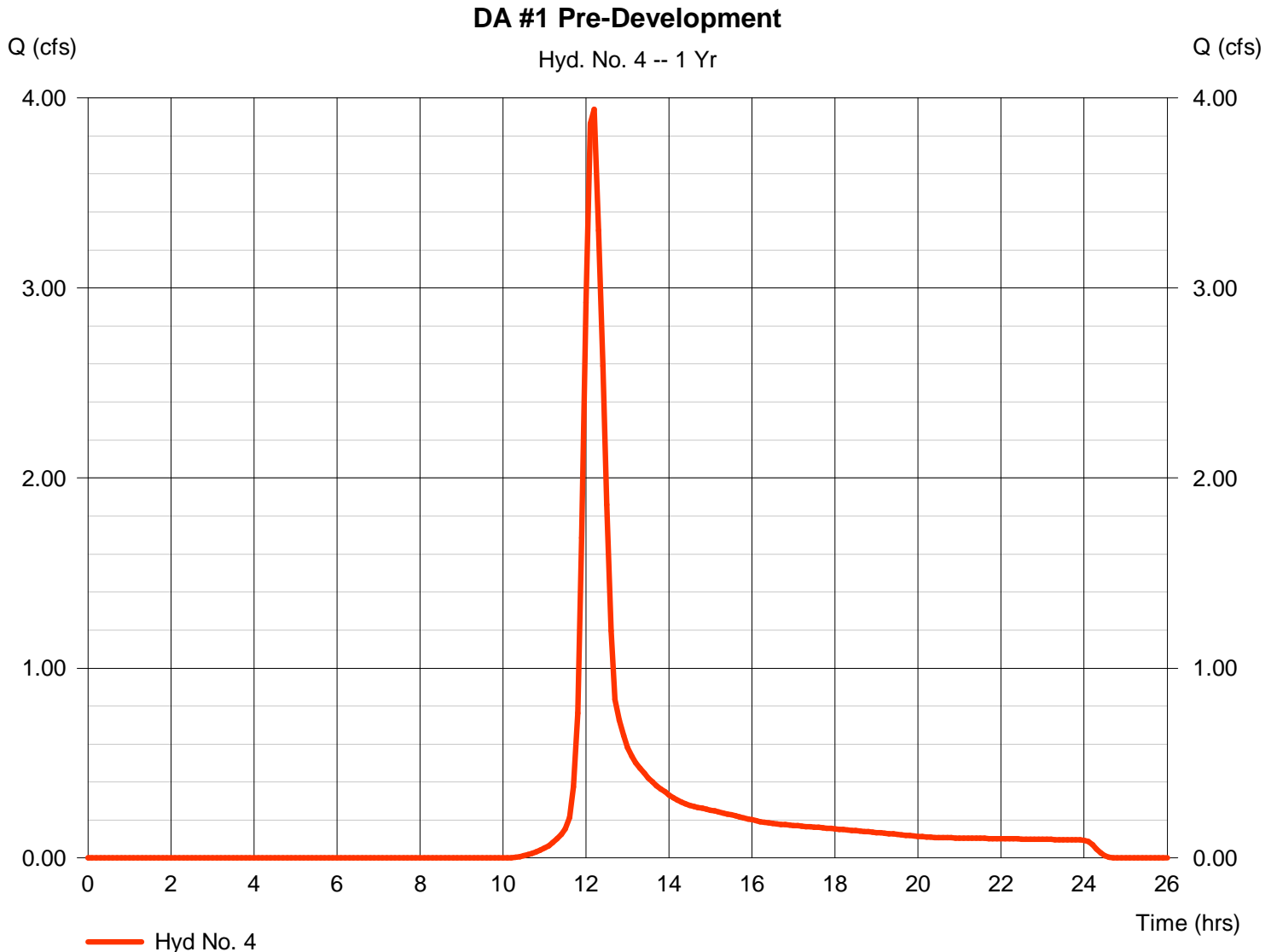
Hyd. No. 4

DA #1 Pre-Development

Hydrograph type = SCS Runoff
Storm frequency = 1 yrs
Drainage area = 4.160 ac
Basin Slope = 0.0 %
Tc method = TR55
Total precip. = 2.79 in
Storm duration = 24 hrs

Peak discharge = 3.941 cfs
Time interval = 6 min
Curve number = 80
Hydraulic length = 0 ft
Time of conc. (Tc) = 24.20 min
Distribution = Type II
Shape factor = 484

Hydrograph Volume = 16,532 cuft



Hydrograph Plot

Hyd. No. 2

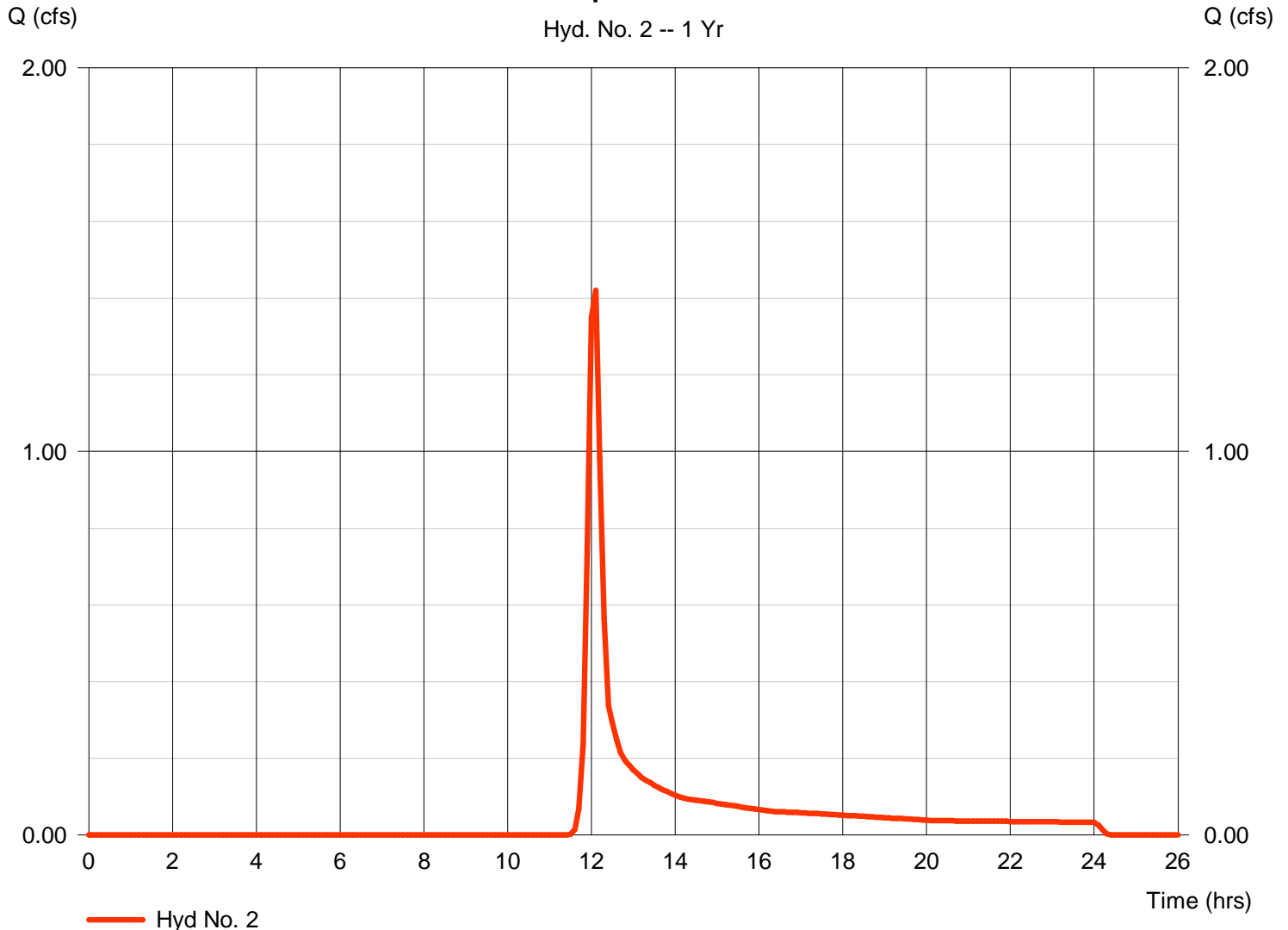
DA #1 Post Development Area not Detained

Hydrograph type = SCS Runoff
Storm frequency = 1 yrs
Drainage area = 1.950 ac
Basin Slope = 0.0 %
Tc method = TR55
Total precip. = 2.79 in
Storm duration = 24 hrs

Peak discharge = 1.419 cfs
Time interval = 6 min
Curve number = 73
Hydraulic length = 0 ft
Time of conc. (Tc) = 10.10 min
Distribution = Type II
Shape factor = 484

Hydrograph Volume = 4,852 cuft

DA #1 Post Development Area not Detained



Hydrograph Plot

Hyd. No. 1

DA 1 Post-Development to BMP

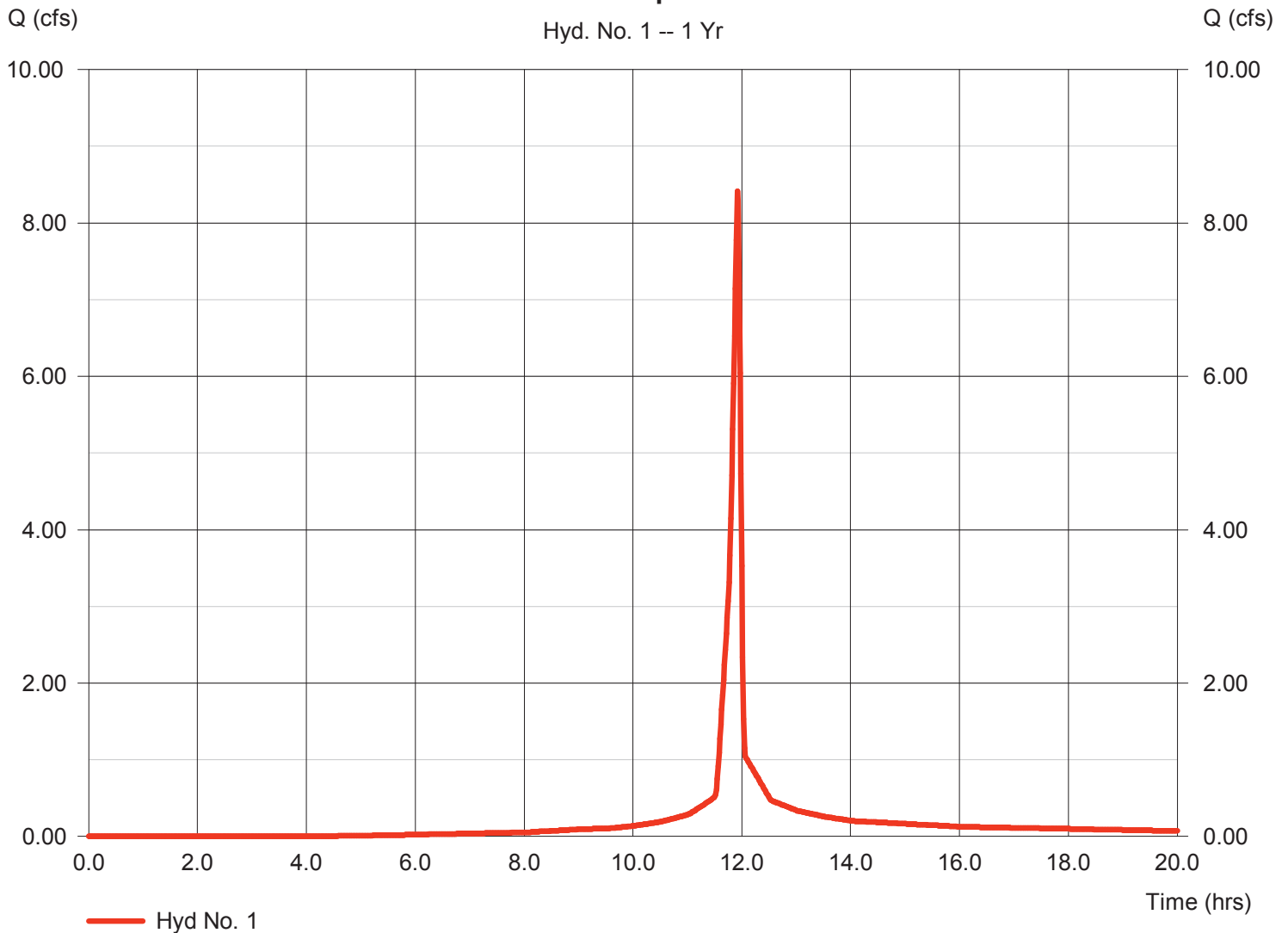
Hydrograph type = SCS Runoff
Storm frequency = 1 yrs
Drainage area = 2.200 ac
Basin Slope = 0.0 %
Tc method = TR55
Total precip. = 2.79 in
Storm duration = 24 hrs

Peak discharge = 8.414 cfs
Time interval = 1 min
Curve number = 94
Hydraulic length = 0 ft
Time of conc. (Tc) = 3.00 min
Distribution = Type II
Shape factor = 484

Hydrograph Volume = 16,078 cuft

DA 1 Post-Development to BMP

Hyd. No. 1 -- 1 Yr



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 | 8.414 | 1 | 715 | 16,078 | --- | ----- | ----- | DA 1 Post-Development to BMP | |
| 2 | SCS Runoff | 1.419 | 6 | 726 | 4,852 | --- | ----- | ----- | DA #1 Post Development Area not Detai | |
| 3 | Reservoir | 1.809 | 1 | 722 | 12,841 | 1 | 662.39 | 8,158 | Pond 1 | |
| 4 | SCS Runoff | 3.941 | 6 | 732 | 16,532 | --- | ----- | ----- | DA #1 Pre-Development | |
| 5 | SCS Runoff | 0.154 | 6 | 726 | 1,340 | --- | ----- | ----- | DA#2 Pre-development | |
| 6 | SCS Runoff | 1.938 | 6 | 720 | 6,348 | --- | ----- | ----- | DA#2 Post-development | |
| 7 | Reservoir | 0.251 | 6 | 192 | 3,265 | 6 | 677.36 | 825 | Pond #2 | |
| hindu center stormwater detentiontrial.gp | | | | | | | Return Period: 1 Year | | Tuesday, Sep 20 2011, 11:52 AM | |

Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Tuesday, Sep 20 2011, 11:56 AM

Hyd. No. 3

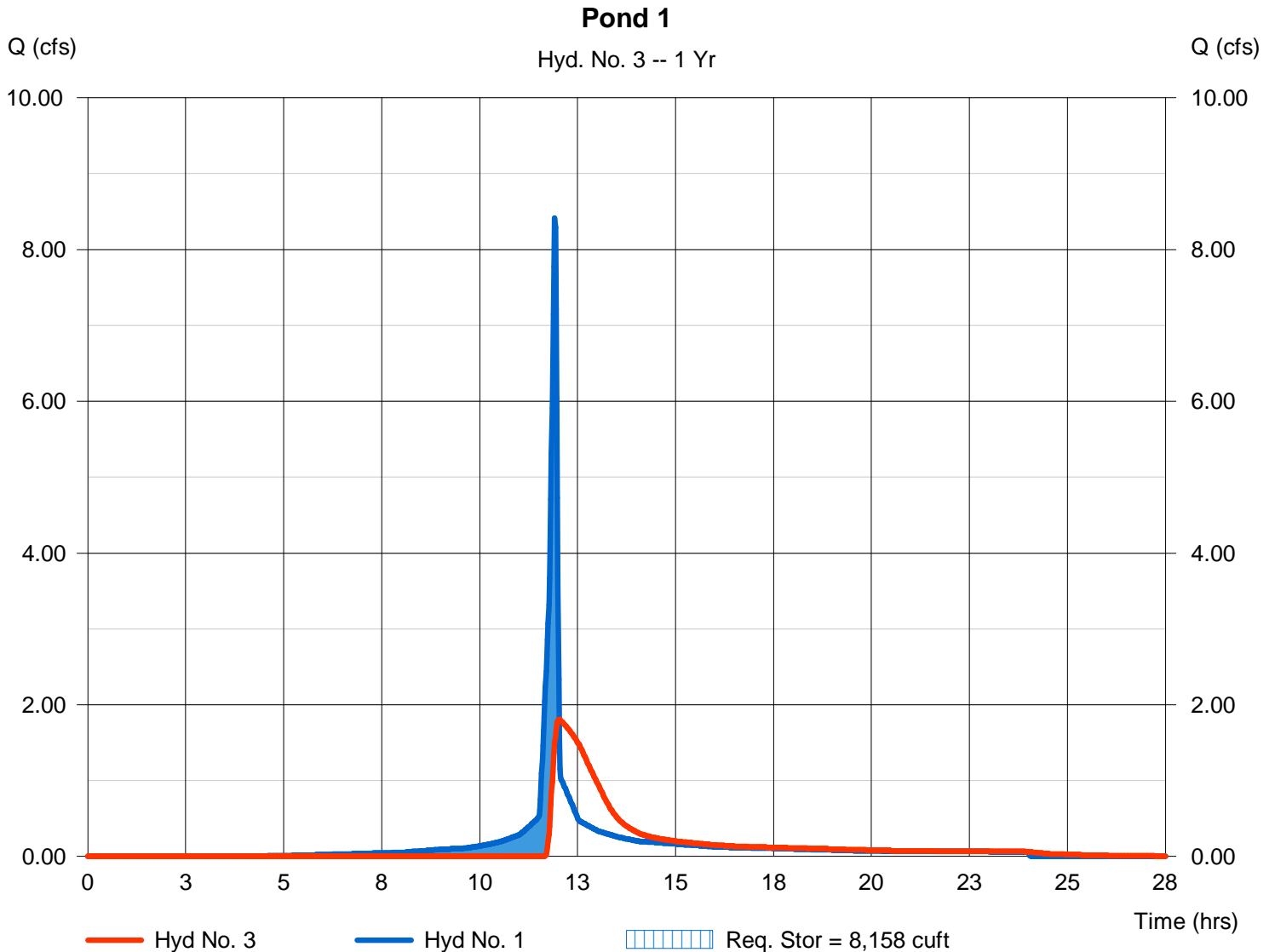
Pond 1

Hydrograph type = Reservoir
Storm frequency = 1 yrs
Inflow hyd. No. = 1
Reservoir name = Sand Filter #1

Peak discharge = 1.809 cfs
Time interval = 1 min
Max. Elevation = 662.39 ft
Max. Storage = 8,158 cuft

Storage Indication method used.

Hydrograph Volume = 12,841 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Tuesday, Sep 20 2011, 11:57 AM

Hyd. No. 3

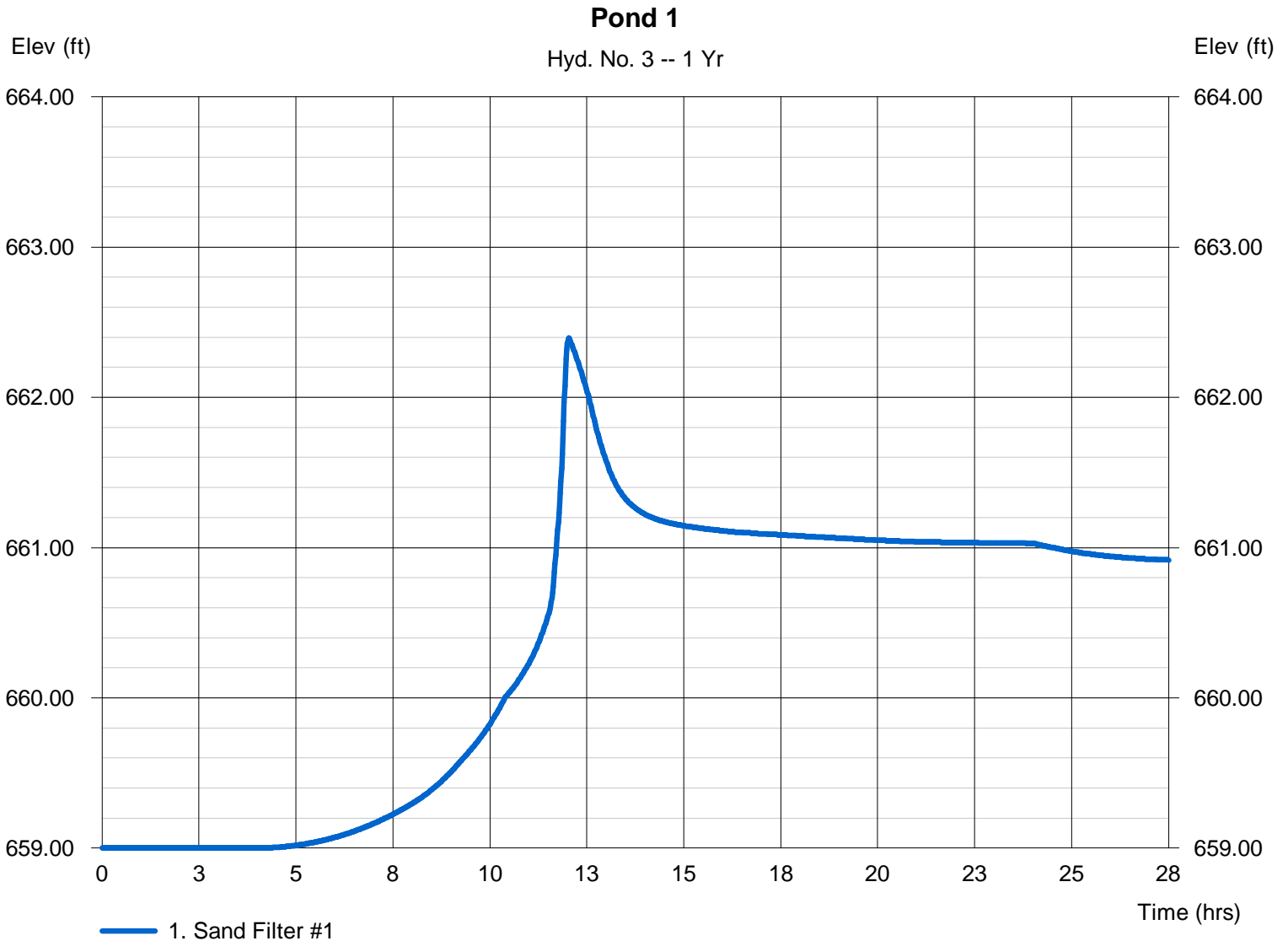
Pond 1

Hydrograph type = Reservoir
Storm frequency = 1 yrs
Inflow hyd. No. = 1
Reservoir name = Sand Filter #1

Peak discharge = 1.809 cfs
Time interval = 1 min
Max. Elevation = 662.39 ft
Max. Storage = 8,158 cuft

Storage Indication method used.

Hydrograph Volume = 12,841 cuft



HYDRAFLOW DATA OUTPUT
Sand Filter 1 / Pond #1

Hydrograph Plot

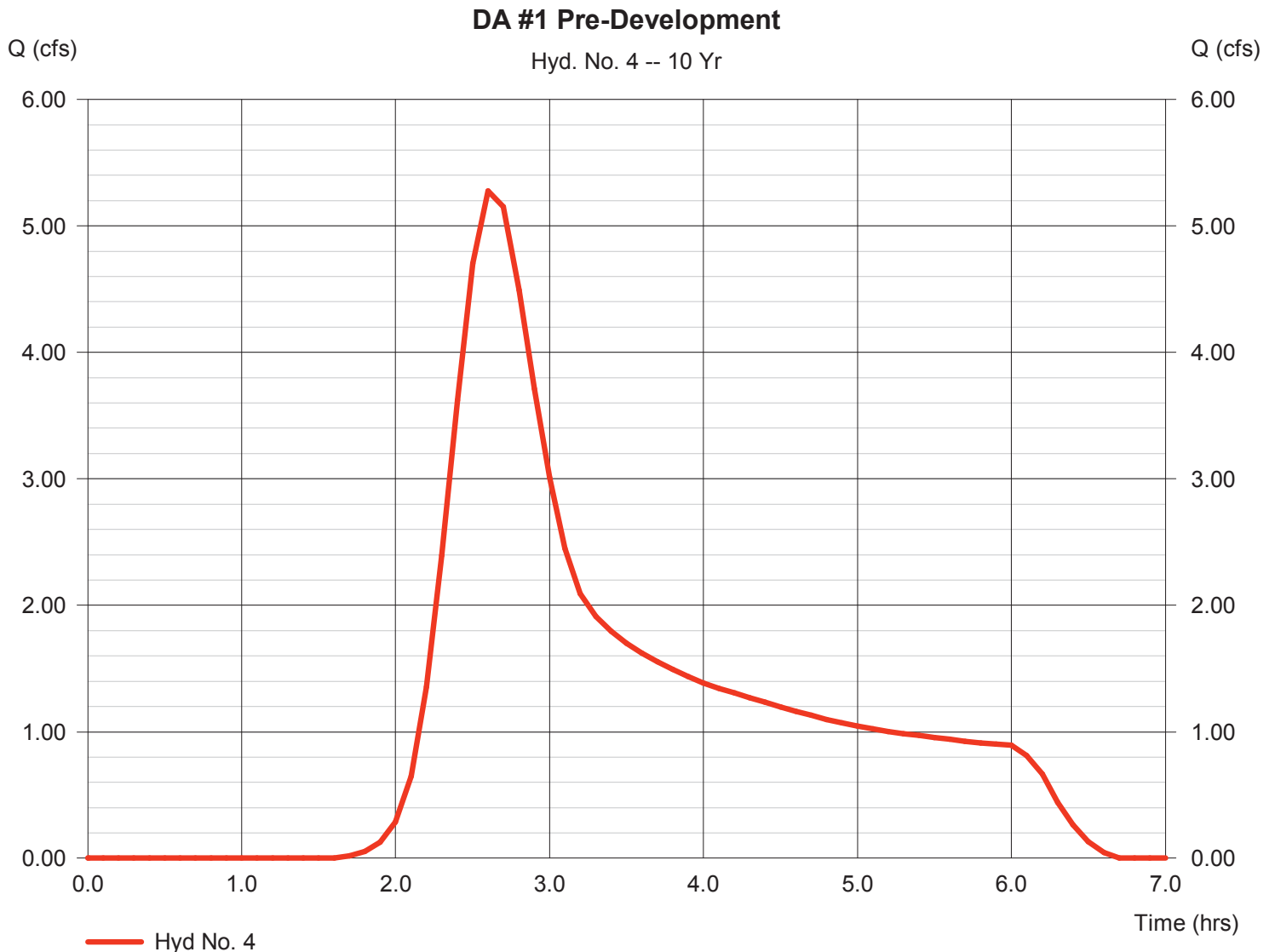
Hyd. No. 4

DA #1 Pre-Development

Hydrograph type = SCS Runoff
Storm frequency = 10 yrs
Drainage area = 4.160 ac
Basin Slope = 0.0 %
Tc method = TR55
Total precip. = 3.72 in
Storm duration = 6.00 hrs

Peak discharge = 5.276 cfs
Time interval = 6 min
Curve number = 80
Hydraulic length = 0 ft
Time of conc. (Tc) = 24.20 min
Distribution = SCS 6-Hr
Shape factor = 484

Hydrograph Volume = 27,373 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Tuesday, Sep 20 2011, 12:4 PM

Hyd. No. 2

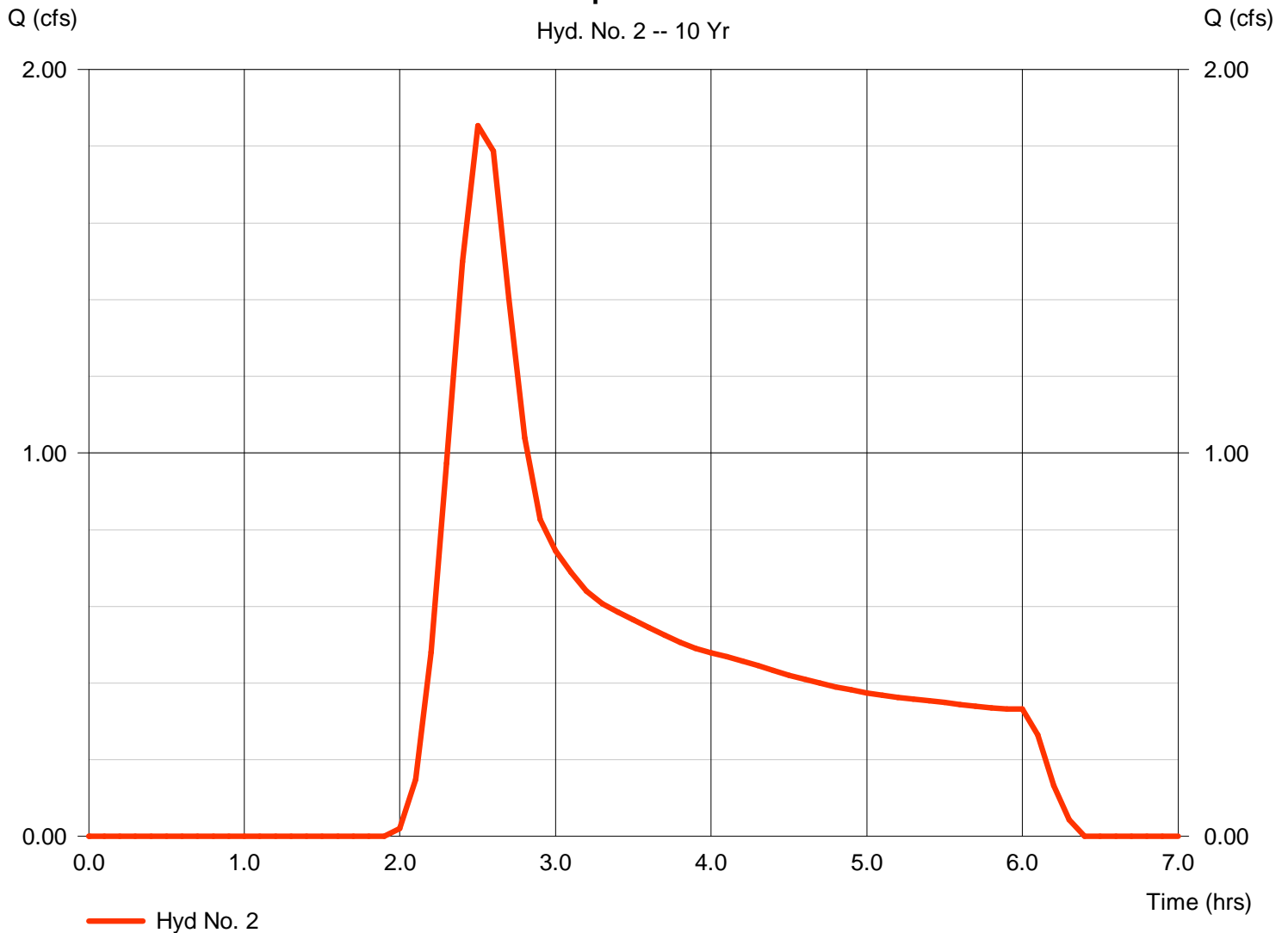
DA #1 Post Development Area not Detained

Hydrograph type = SCS Runoff
Storm frequency = 10 yrs
Drainage area = 1.950 ac
Basin Slope = 0.0 %
Tc method = TR55
Total precip. = 3.72 in
Storm duration = 6.00 hrs

Peak discharge = 1.854 cfs
Time interval = 6 min
Curve number = 73
Hydraulic length = 0 ft
Time of conc. (Tc) = 10.10 min
Distribution = SCS 6-Hr
Shape factor = 484

Hydrograph Volume = 8,825 cuft

DA #1 Post Development Area not Detained



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Tuesday, Sep 20 2011, 12:6 PM

Hyd. No. 3

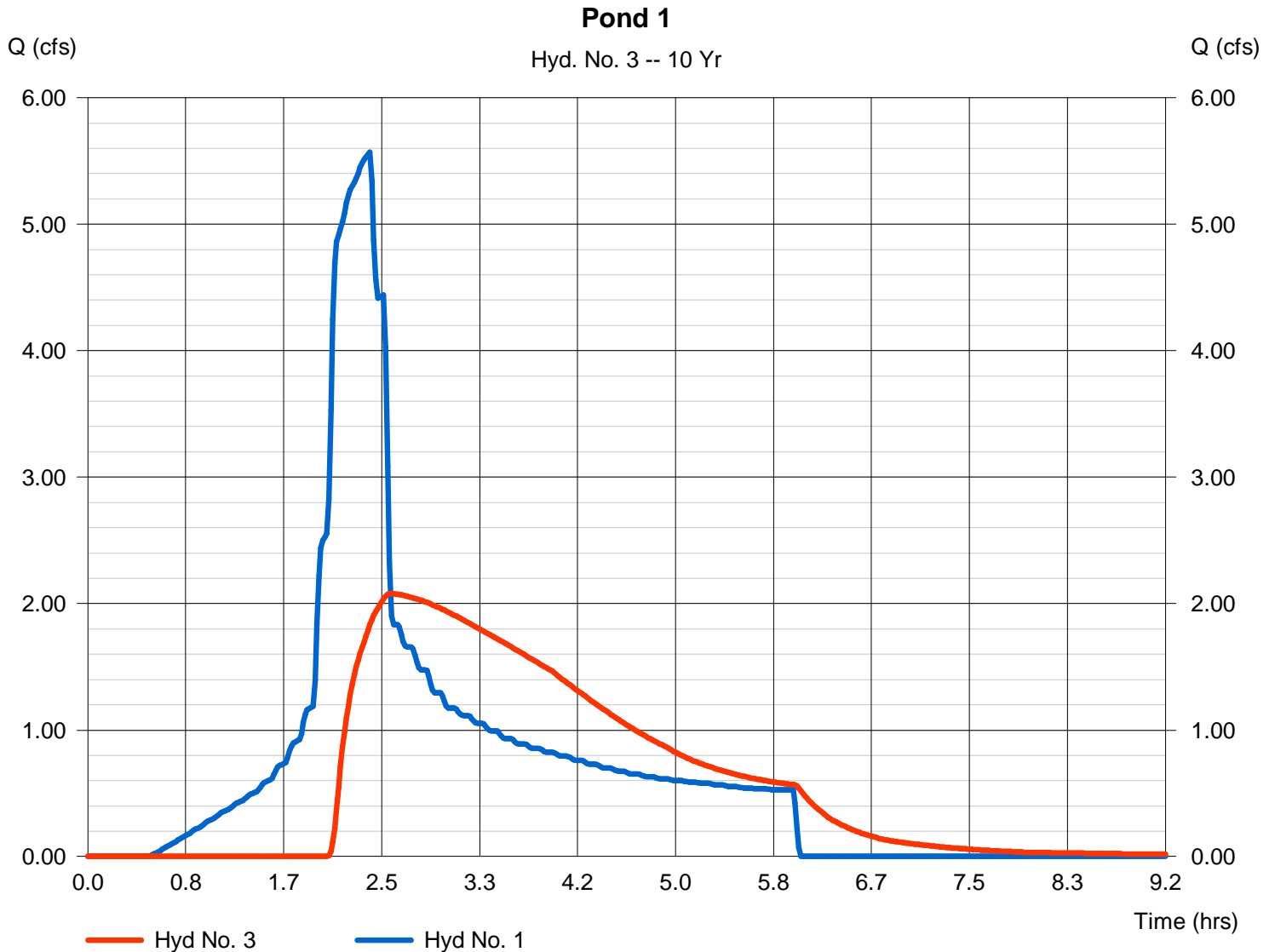
Pond 1

Hydrograph type = Reservoir
Storm frequency = 10 yrs
Inflow hyd. No. = 1
Reservoir name = Sand Filter #1

Peak discharge = 2.081 cfs
Time interval = 1 min
Max. Elevation = 662.77 ft
Max. Storage = 9,705 cuft

Storage Indication method used.

Hydrograph Volume = 19,601 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Tuesday, Sep 20 2011, 12:7 PM

Hyd. No. 3

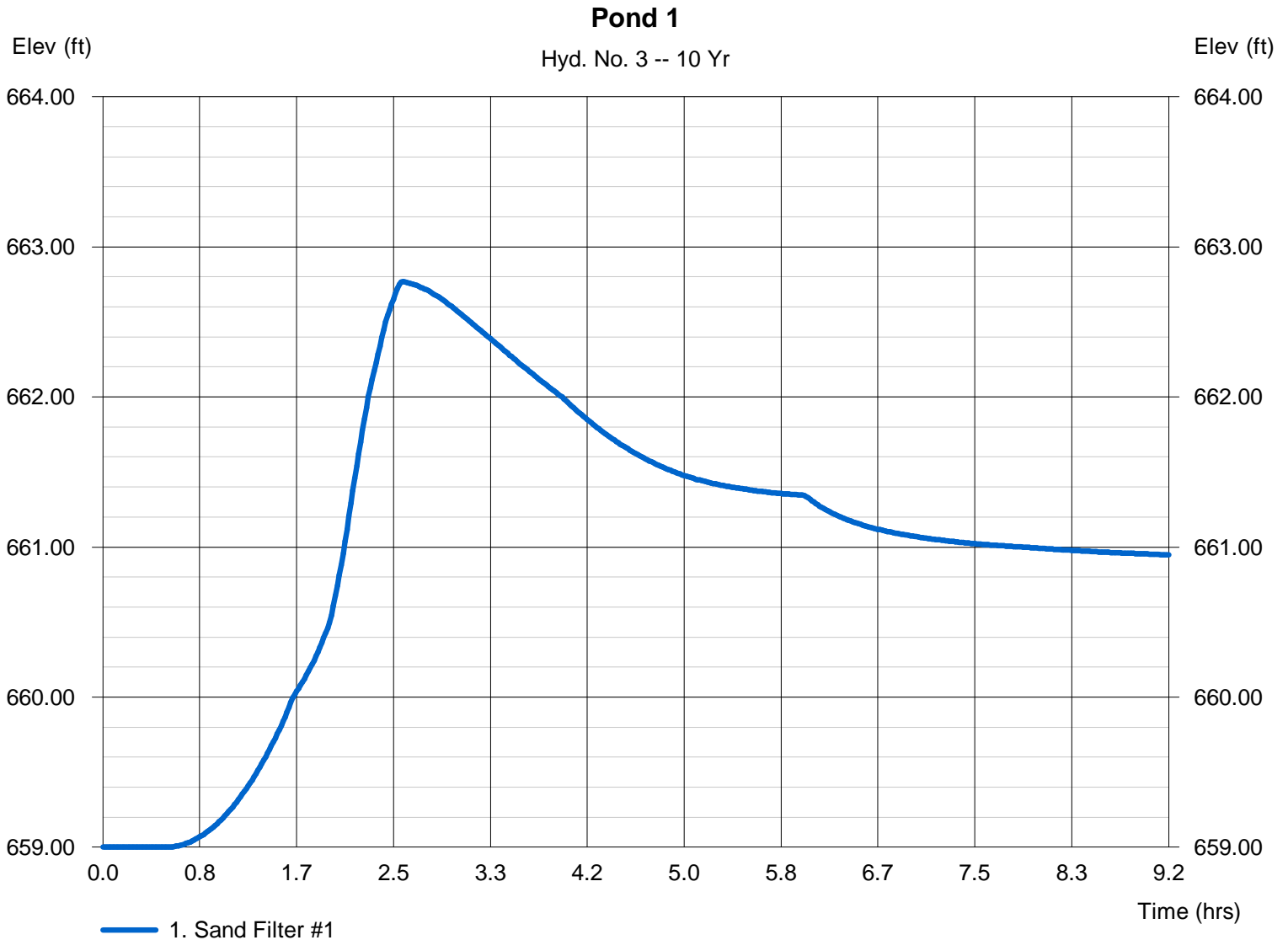
Pond 1

Hydrograph type = Reservoir
Storm frequency = 10 yrs
Inflow hyd. No. = 1
Reservoir name = Sand Filter #1

Peak discharge = 2.081 cfs
Time interval = 1 min
Max. Elevation = 662.77 ft
Max. Storage = 9,705 cuft

Storage Indication method used.

Hydrograph Volume = 19,601 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Tuesday, Sep 20 2011, 12:0 PM

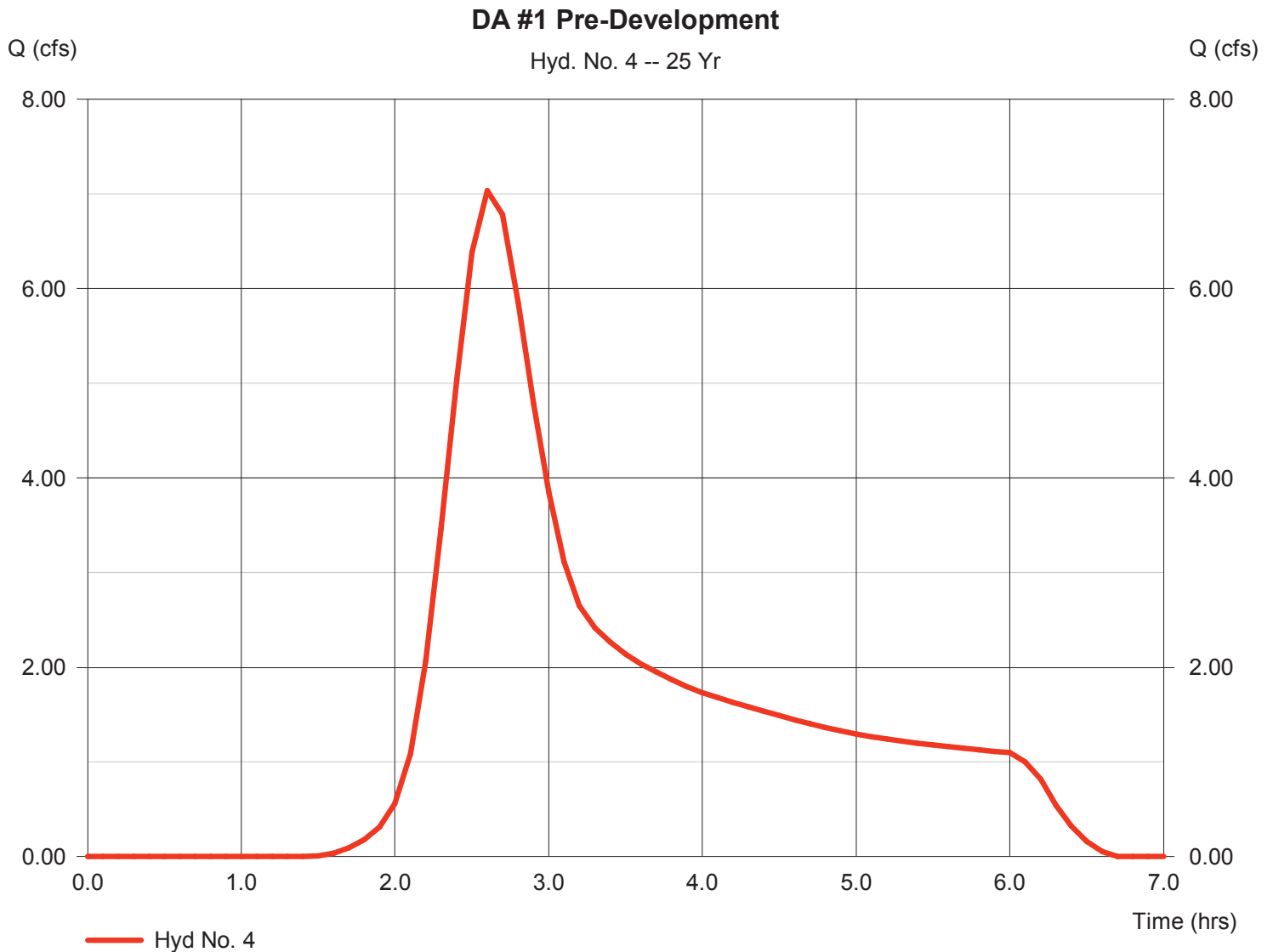
Hyd. No. 4

DA #1 Pre-Development

Hydrograph type = SCS Runoff
Storm frequency = 25 yrs
Drainage area = 4.160 ac
Basin Slope = 0.0 %
Tc method = TR55
Total precip. = 4.38 in
Storm duration = 6.00 hrs

Peak discharge = 7.037 cfs
Time interval = 6 min
Curve number = 80
Hydraulic length = 0 ft
Time of conc. (Tc) = 24.20 min
Distribution = SCS 6-Hr
Shape factor = 484

Hydrograph Volume = 35,630 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Tuesday, Sep 20 2011, 12:8 PM

Hyd. No. 2

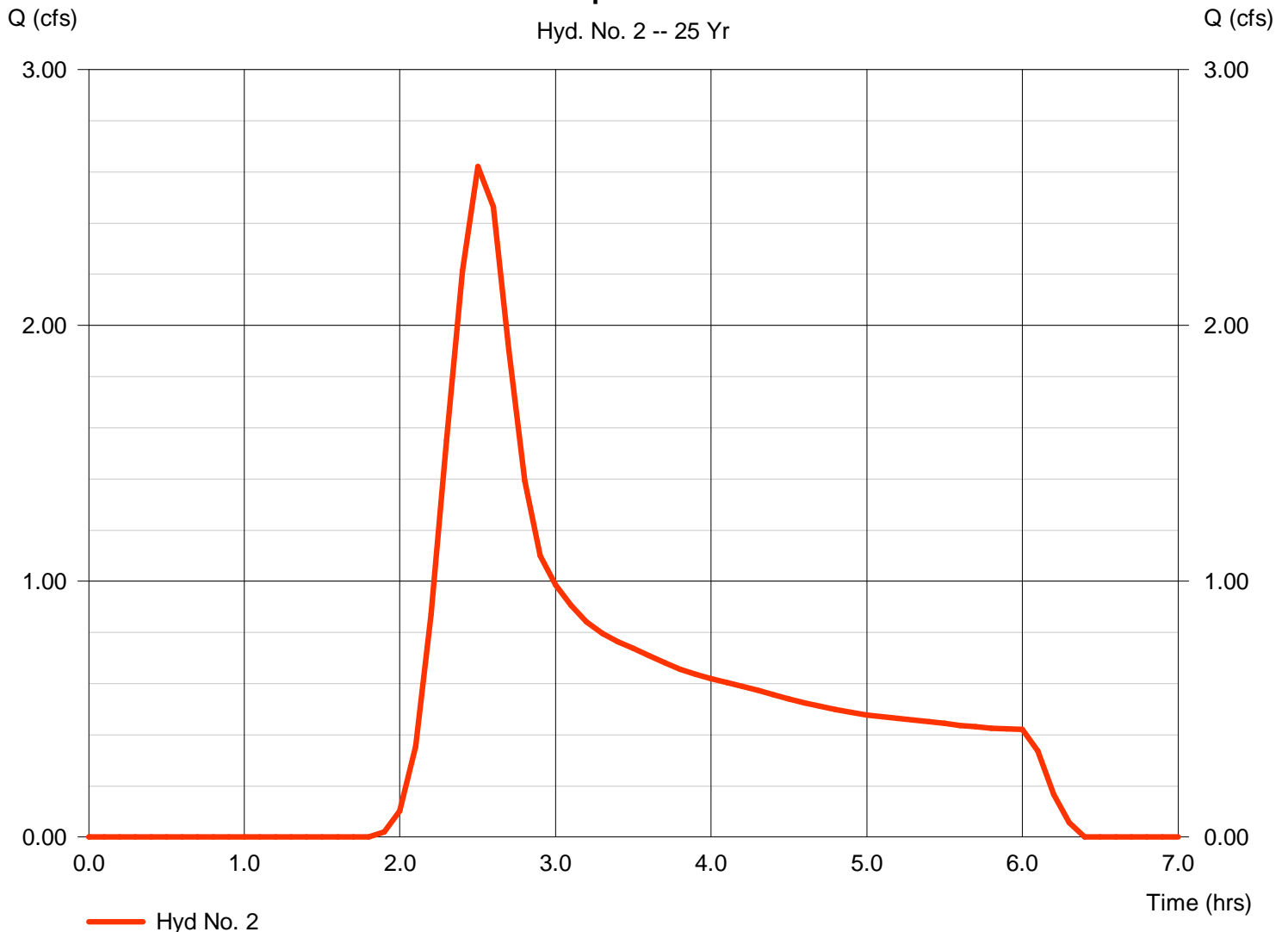
DA #1 Post Development Area not Detained

Hydrograph type = SCS Runoff
Storm frequency = 25 yrs
Drainage area = 1.950 ac
Basin Slope = 0.0 %
Tc method = TR55
Total precip. = 4.38 in
Storm duration = 6.00 hrs

Peak discharge = 2.622 cfs
Time interval = 6 min
Curve number = 73
Hydraulic length = 0 ft
Time of conc. (Tc) = 10.10 min
Distribution = SCS 6-Hr
Shape factor = 484

Hydrograph Volume = 11,981 cuft

DA #1 Post Development Area not Detained



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Tuesday, Sep 20 2011, 12:9 PM

Hyd. No. 3

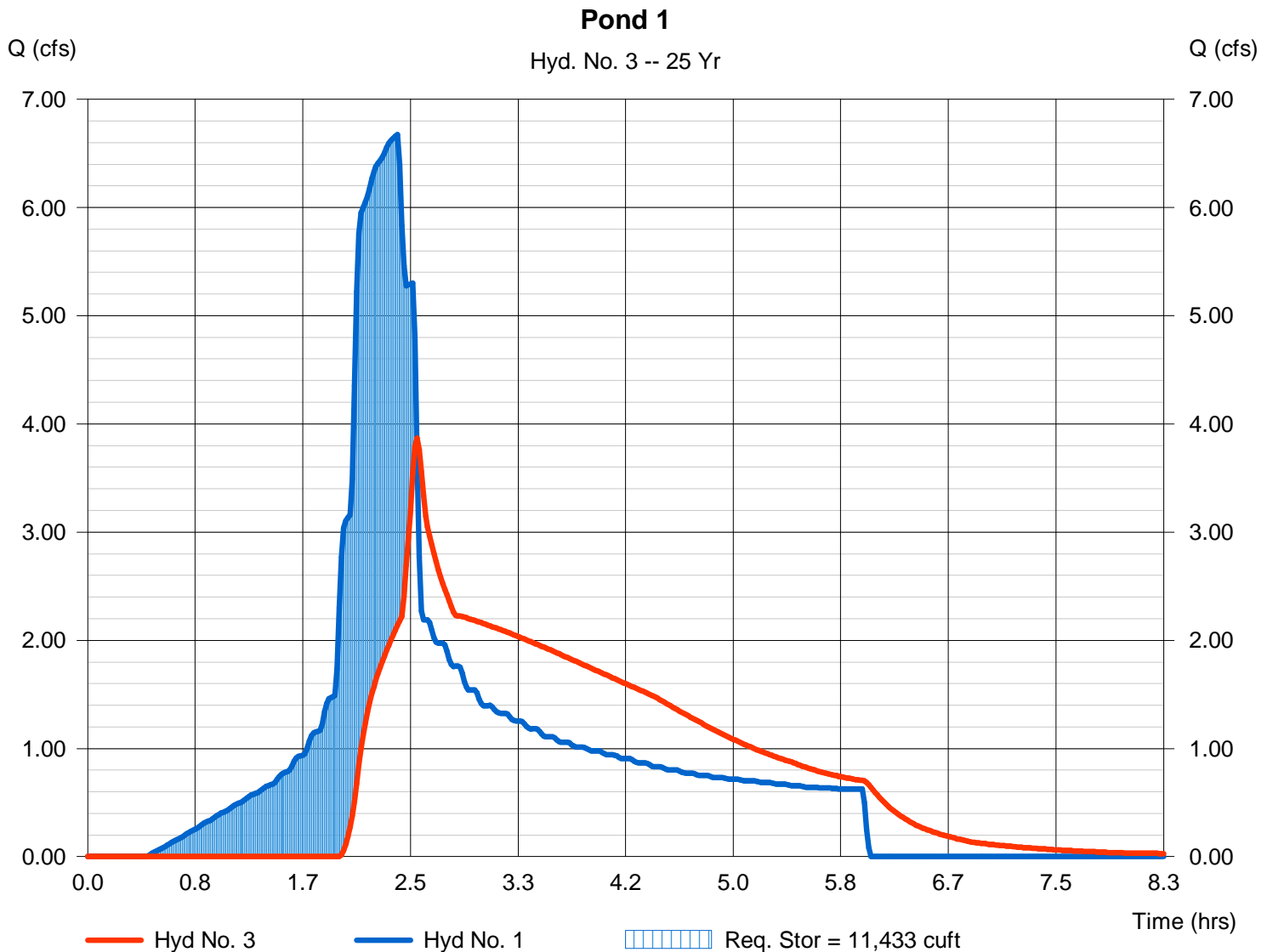
Pond 1

Hydrograph type = Reservoir
Storm frequency = 25 yrs
Inflow hyd. No. = 1
Reservoir name = Sand Filter #1

Peak discharge = 3.870 cfs
Time interval = 1 min
Max. Elevation = 663.15 ft
Max. Storage = 11,433 cuft

Storage Indication method used.

Hydrograph Volume = 24,445 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Tuesday, Sep 20 2011, 12:9 PM

Hyd. No. 3

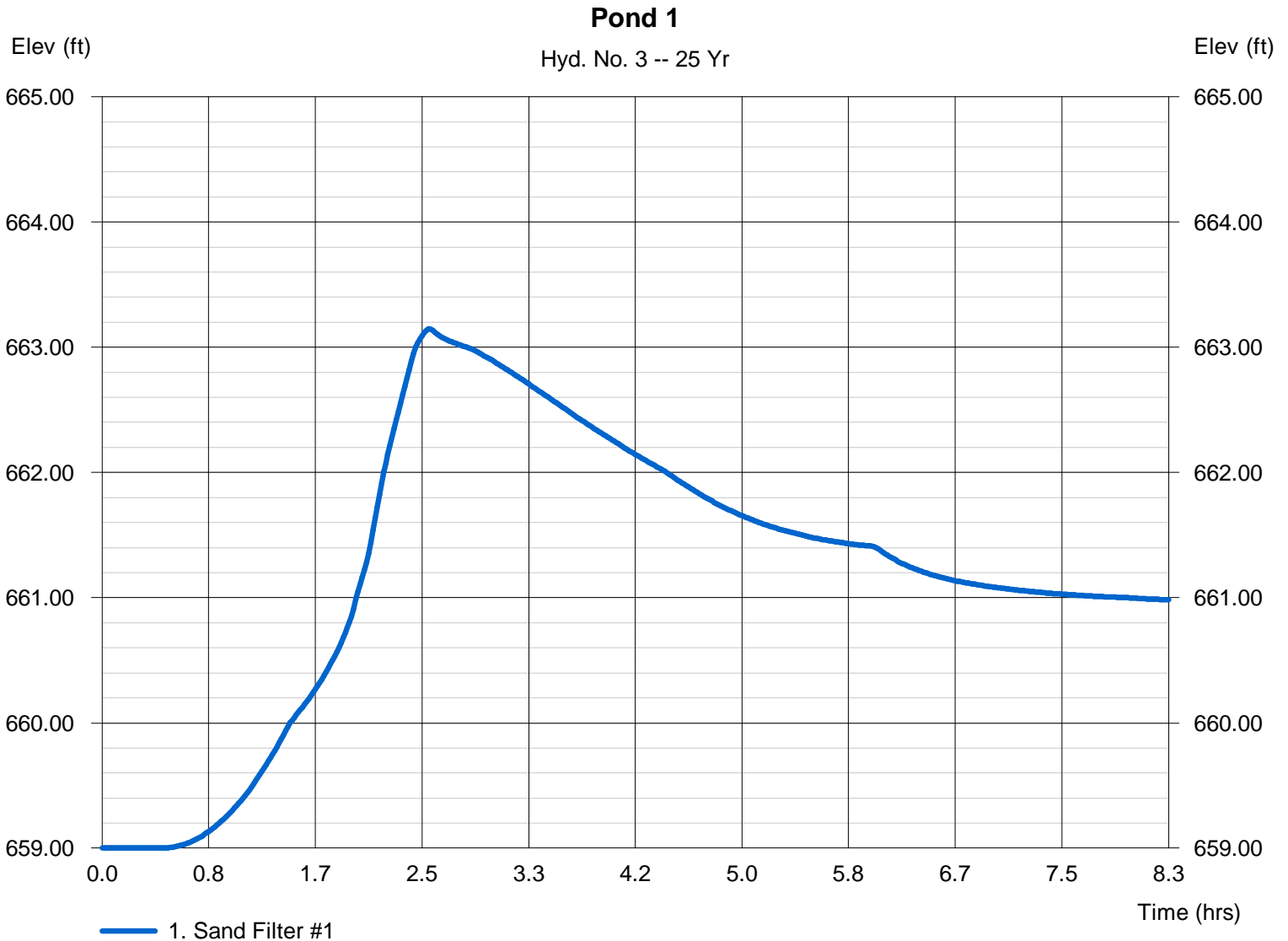
Pond 1

Hydrograph type = Reservoir
Storm frequency = 25 yrs
Inflow hyd. No. = 1
Reservoir name = Sand Filter #1

Peak discharge = 3.870 cfs
Time interval = 1 min
Max. Elevation = 663.15 ft
Max. Storage = 11,433 cuft

Storage Indication method used.

Hydrograph Volume = 24,445 cuft



HYDRAFLOW DATA OUTPUT
Pond #2

Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Tuesday, Sep 20 2011, 12:13 PM

Hyd. No. 5

DA#2 Pre-development

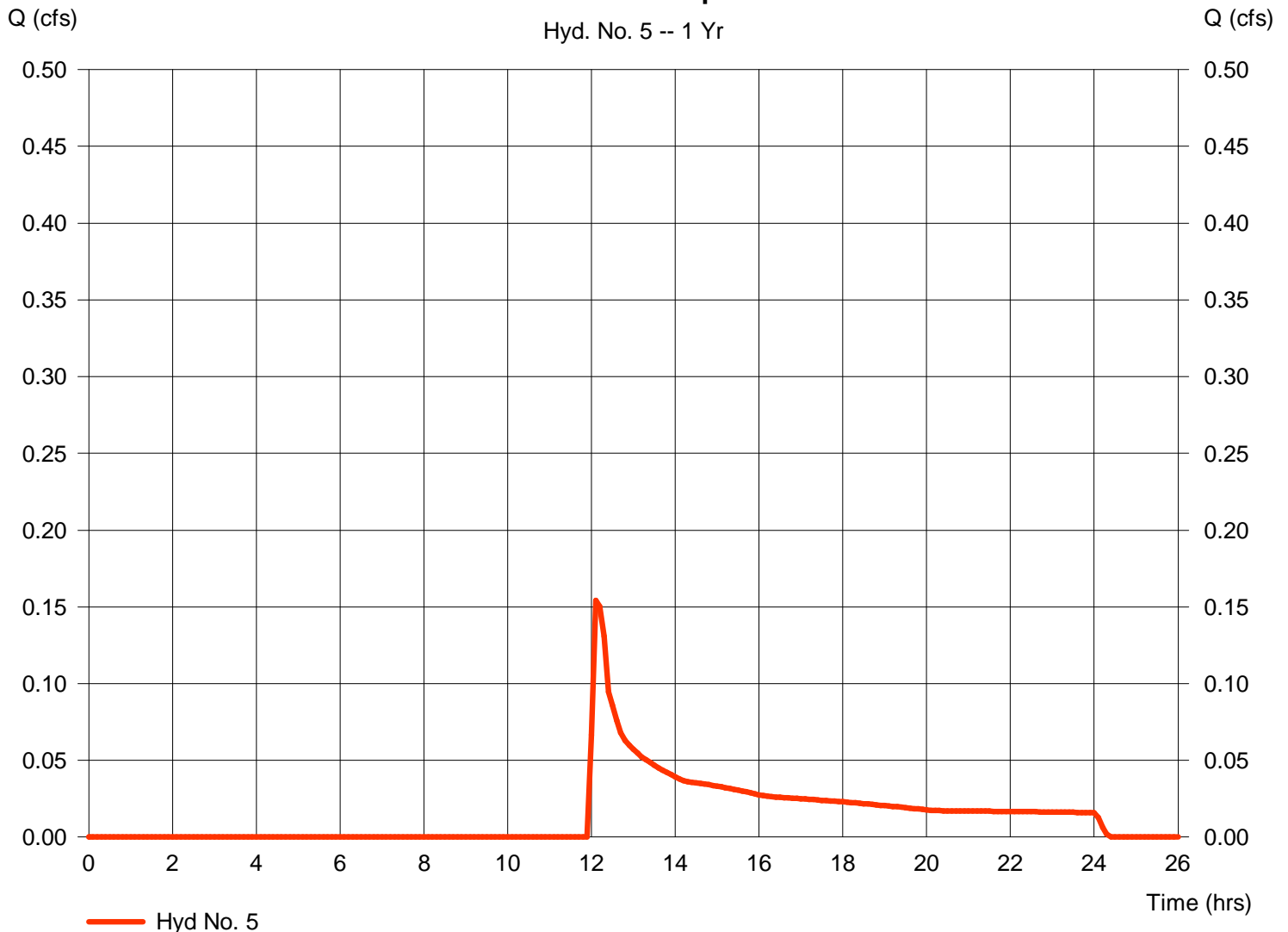
Hydrograph type = SCS Runoff
Storm frequency = 1 yrs
Drainage area = 1.900 ac
Basin Slope = 0.0 %
Tc method = TR55
Total precip. = 2.79 in
Storm duration = 24 hrs

Peak discharge = 0.154 cfs
Time interval = 6 min
Curve number = 58
Hydraulic length = 0 ft
Time of conc. (Tc) = 16.90 min
Distribution = Type II
Shape factor = 484

Hydrograph Volume = 1,340 cuft

DA#2 Pre-development

Hyd. No. 5 -- 1 Yr



TR55 Tc Worksheet

Hyd. No. 5

DA#2 Pre-development

| <u>Description</u> | <u>A</u> | <u>B</u> | <u>C</u> | <u>Totals</u> |
|------------------------------------|----------------|----------------------|----------------------|------------------|
| Sheet Flow | | | | |
| Manning's n-value | = 0.240 | 0.011 | 0.011 | |
| Flow length (ft) | = 230.0 | 0.0 | 0.0 | |
| Two-year 24-hr precip. (in) | = 3.36 | 0.00 | 0.00 | |
| Land slope (%) | = 6.50 | 0.00 | 0.00 | |
| Travel Time (min) | = 16.92 | + 0.00 | + 0.00 | = 16.92 |
| Shallow Concentrated Flow | | | | |
| Flow length (ft) | = 0.00 | 0.00 | 0.00 | |
| Watercourse slope (%) | = 0.00 | 0.00 | 0.00 | |
| Surface description | = Paved | Paved | Paved | |
| Average velocity (ft/s) | = 0.00 | 0.00 | 0.00 | |
| Travel Time (min) | = 0.00 | + 0.00 | + 0.00 | = 0.00 |
| Channel Flow | | | | |
| X sectional flow area (sqft) | = 0.00 | 0.00 | 0.00 | |
| Wetted perimeter (ft) | = 0.00 | 0.00 | 0.00 | |
| Channel slope (%) | = 0.00 | 0.00 | 0.00 | |
| Manning's n-value | = 0.015 | 0.015 | 0.015 | |
| Velocity (ft/s) | = 0.00 | 0.00 | 0.00 | |
| Flow length (ft) | = 0.0 | 0.0 | 0.0 | |
| Travel Time (min) | = 0.00 | + 0.00 | + 0.00 | = 0.00 |
| Total Travel Time, Tc | | | | 16.90 min |

Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Tuesday, Sep 20 2011, 12:14 PM

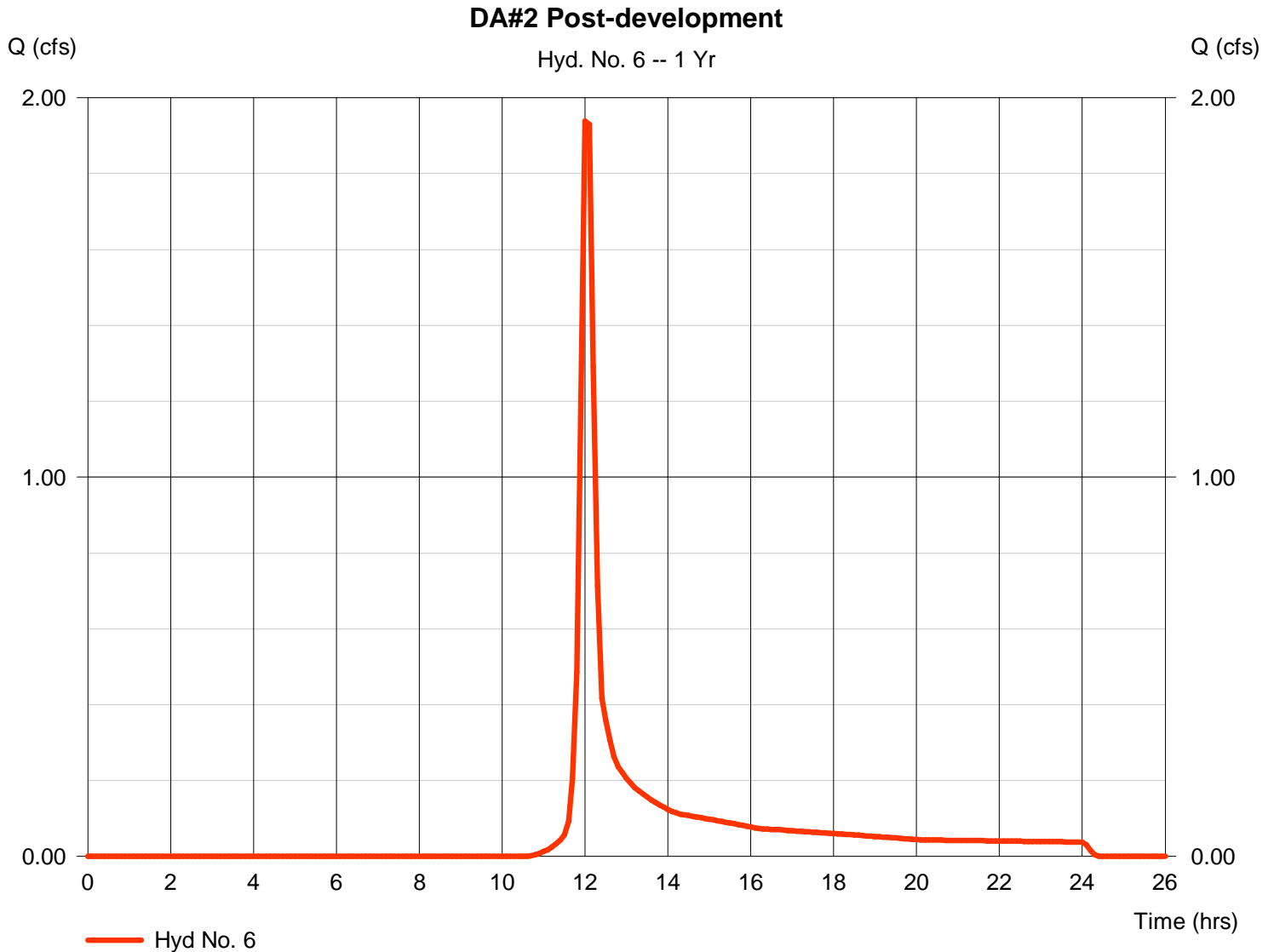
Hyd. No. 6

DA#2 Post-development

Hydrograph type = SCS Runoff
Storm frequency = 1 yrs
Drainage area = 1.900 ac
Basin Slope = 0.0 %
Tc method = TR55
Total precip. = 2.79 in
Storm duration = 24 hrs

Peak discharge = 1.938 cfs
Time interval = 6 min
Curve number = 78
Hydraulic length = 0 ft
Time of conc. (Tc) = 11.80 min
Distribution = Type II
Shape factor = 484

Hydrograph Volume = 6,348 cuft



TR55 Tc Worksheet

Hyd. No. 6

DA#2 Post-development

| <u>Description</u> | <u>A</u> | <u>B</u> | <u>C</u> | <u>Totals</u> |
|------------------------------------|----------------|----------------------|----------------------|------------------|
| Sheet Flow | | | | |
| Manning's n-value | = 0.150 | 0.011 | 0.011 | |
| Flow length (ft) | = 150.0 | 0.0 | 0.0 | |
| Two-year 24-hr precip. (in) | = 3.12 | 0.00 | 0.00 | |
| Land slope (%) | = 3.00 | 0.00 | 0.00 | |
| Travel Time (min) | = 11.67 | + 0.00 | + 0.00 | = 11.67 |
| Shallow Concentrated Flow | | | | |
| Flow length (ft) | = 50.00 | 0.00 | 0.00 | |
| Watercourse slope (%) | = 6.40 | 0.00 | 0.00 | |
| Surface description | = Paved | Paved | Paved | |
| Average velocity (ft/s) | = 5.14 | 0.00 | 0.00 | |
| Travel Time (min) | = 0.16 | + 0.00 | + 0.00 | = 0.16 |
| Channel Flow | | | | |
| X sectional flow area (sqft) | = 0.00 | 0.00 | 0.00 | |
| Wetted perimeter (ft) | = 0.00 | 0.00 | 0.00 | |
| Channel slope (%) | = 0.00 | 0.00 | 0.00 | |
| Manning's n-value | = 0.015 | 0.015 | 0.015 | |
| Velocity (ft/s) | = 0.00 | 0.00 | 0.00 | |
| Flow length (ft) | = 0.0 | 0.0 | 0.0 | |
| Travel Time (min) | = 0.00 | + 0.00 | + 0.00 | = 0.00 |
| Total Travel Time, Tc | | | | 11.80 min |

Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Tuesday, Sep 20 2011, 12:16 PM

Hyd. No. 7

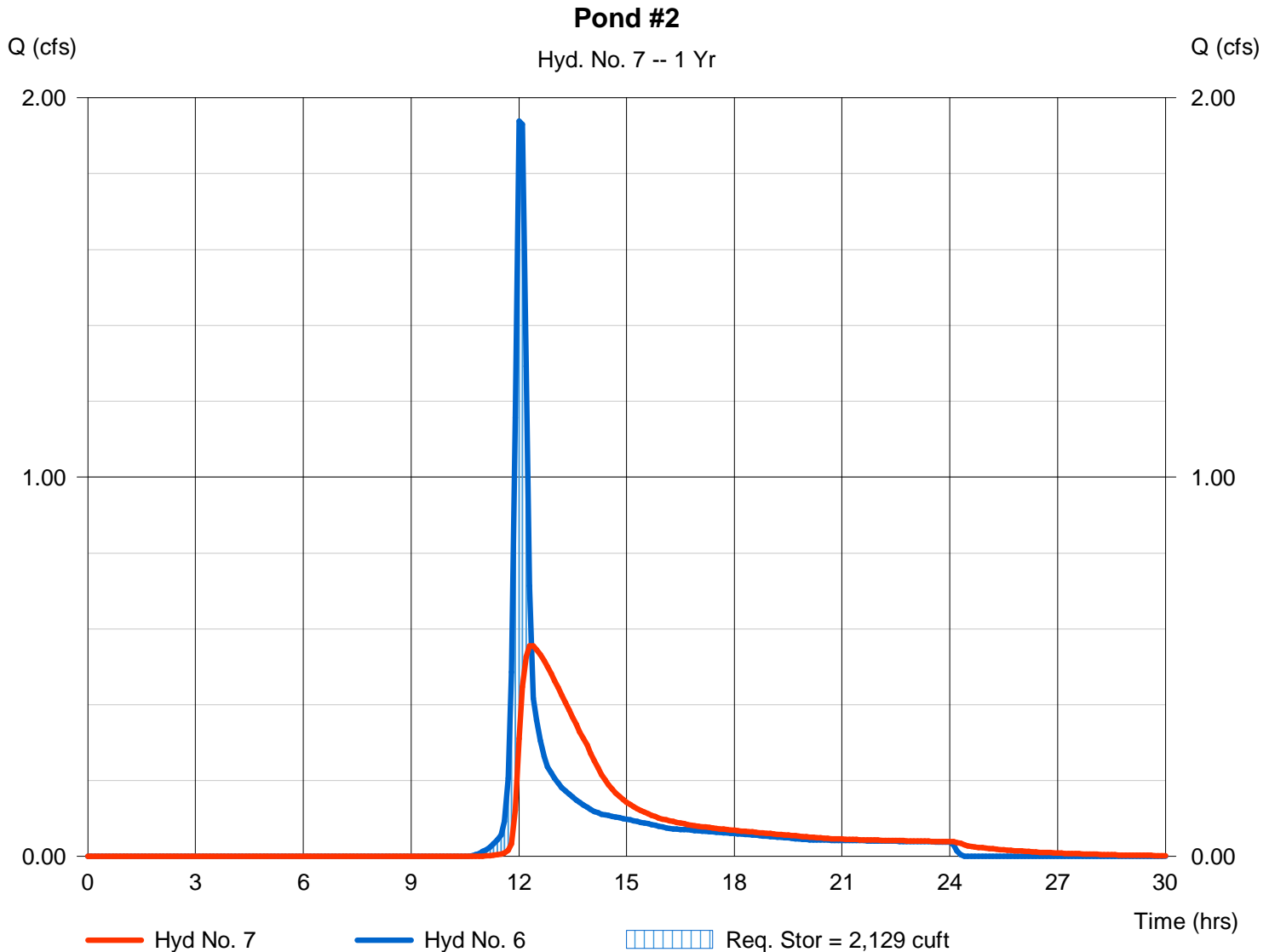
Pond #2

Hydrograph type = Reservoir
Storm frequency = 1 yrs
Inflow hyd. No. = 6
Reservoir name = Pond #2

Peak discharge = 0.555 cfs
Time interval = 6 min
Max. Elevation = 677.92 ft
Max. Storage = 2,129 cuft

Storage Indication method used.

Hydrograph Volume = 6,340 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Tuesday, Sep 20 2011, 12:16 PM

Hyd. No. 7

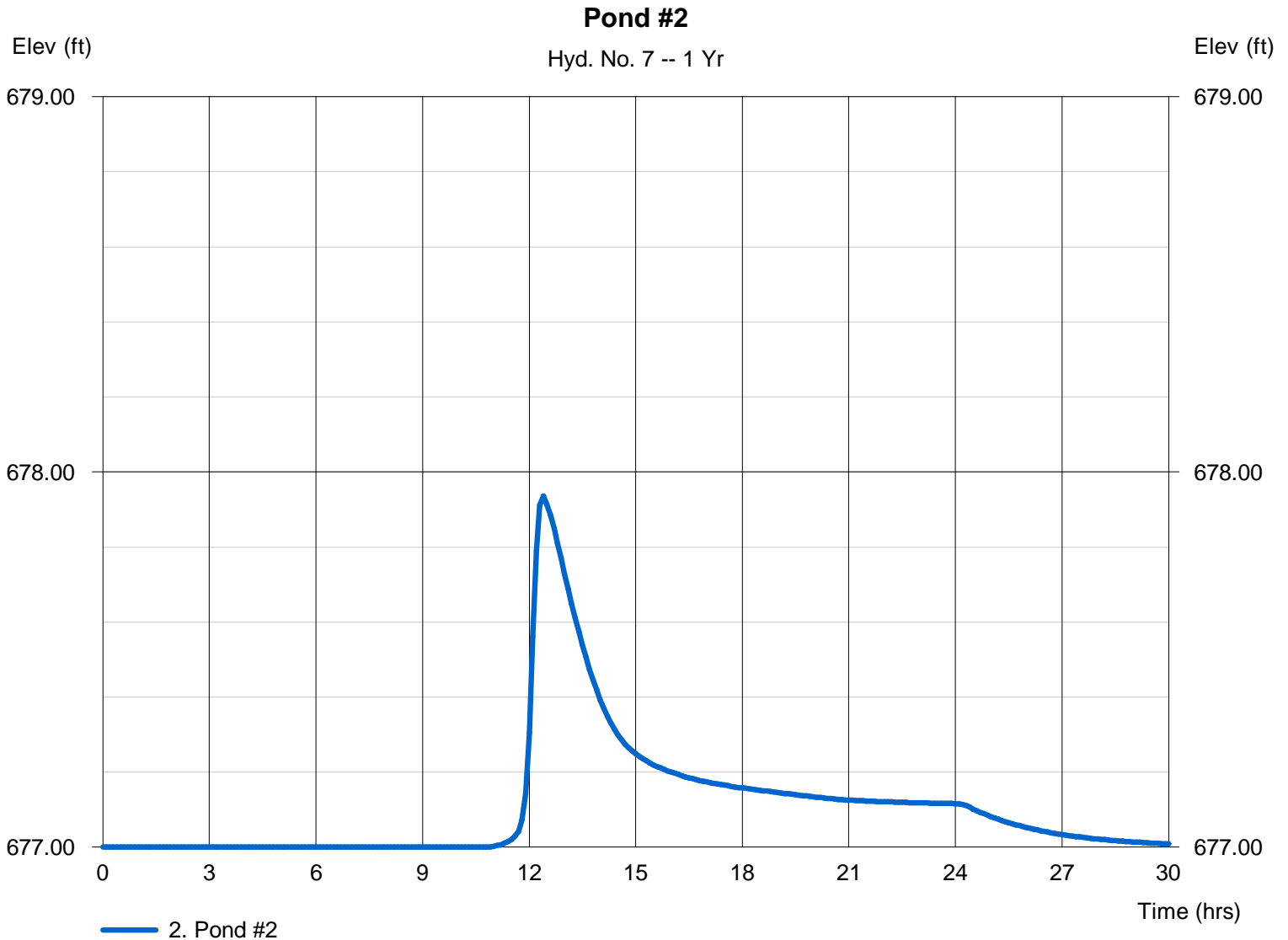
Pond #2

Hydrograph type = Reservoir
Storm frequency = 1 yrs
Inflow hyd. No. = 6
Reservoir name = Pond #2

Peak discharge = 0.555 cfs
Time interval = 6 min
Max. Elevation = 677.92 ft
Max. Storage = 2,129 cuft

Storage Indication method used.

Hydrograph Volume = 6,340 cuft



Hydrograph Plot

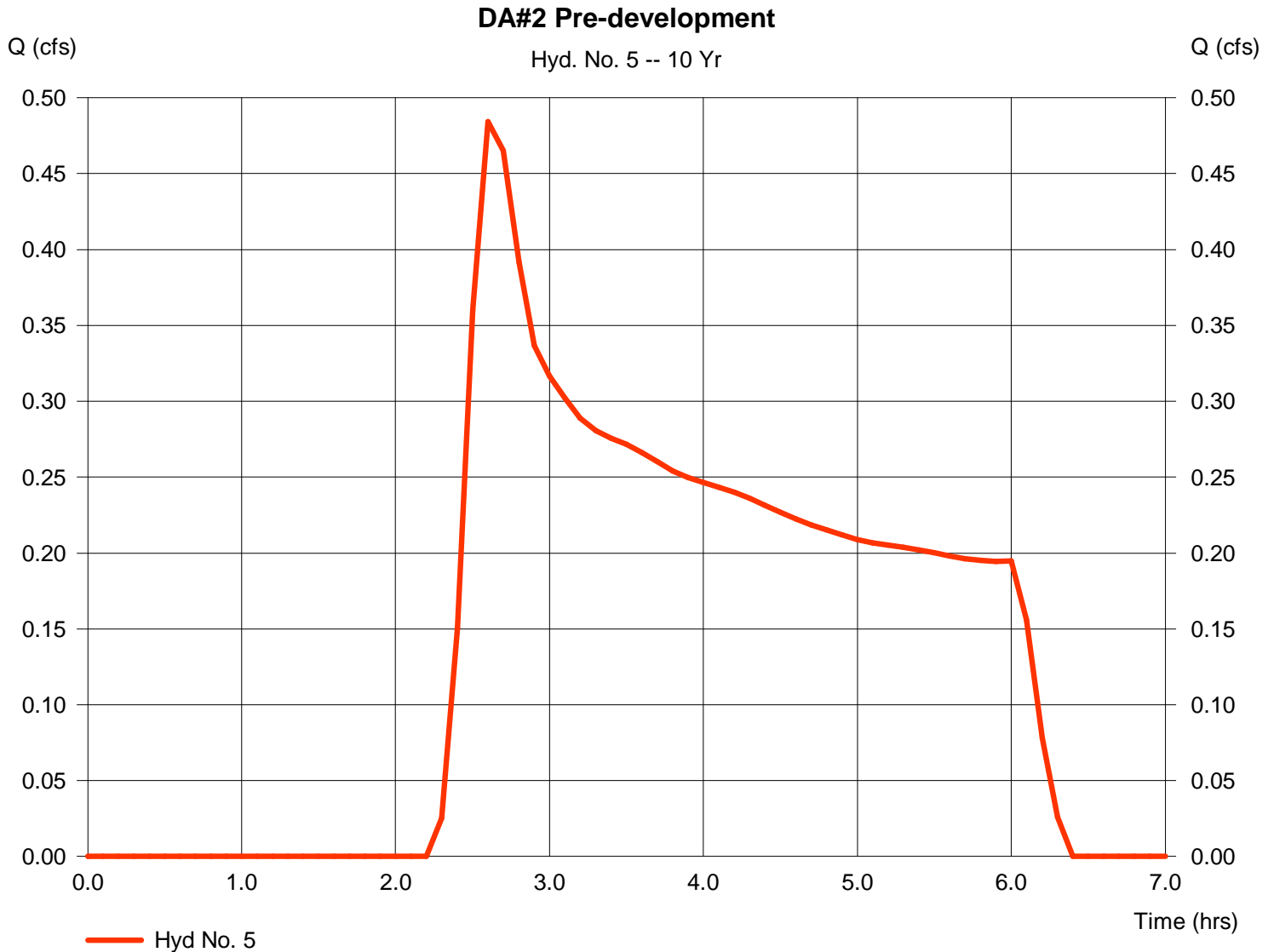
Hyd. No. 5

DA#2 Pre-development

Hydrograph type = SCS Runoff
Storm frequency = 10 yrs
Drainage area = 1.900 ac
Basin Slope = 0.0 %
Tc method = TR55
Total precip. = 3.72 in
Storm duration = 6.00 hrs

Peak discharge = 0.484 cfs
Time interval = 6 min
Curve number = 58
Hydraulic length = 0 ft
Time of conc. (Tc) = 16.90 min
Distribution = SCS 6-Hr
Shape factor = 484

Hydrograph Volume = 3,505 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Tuesday, Sep 20 2011, 12:18 PM

Hyd. No. 7

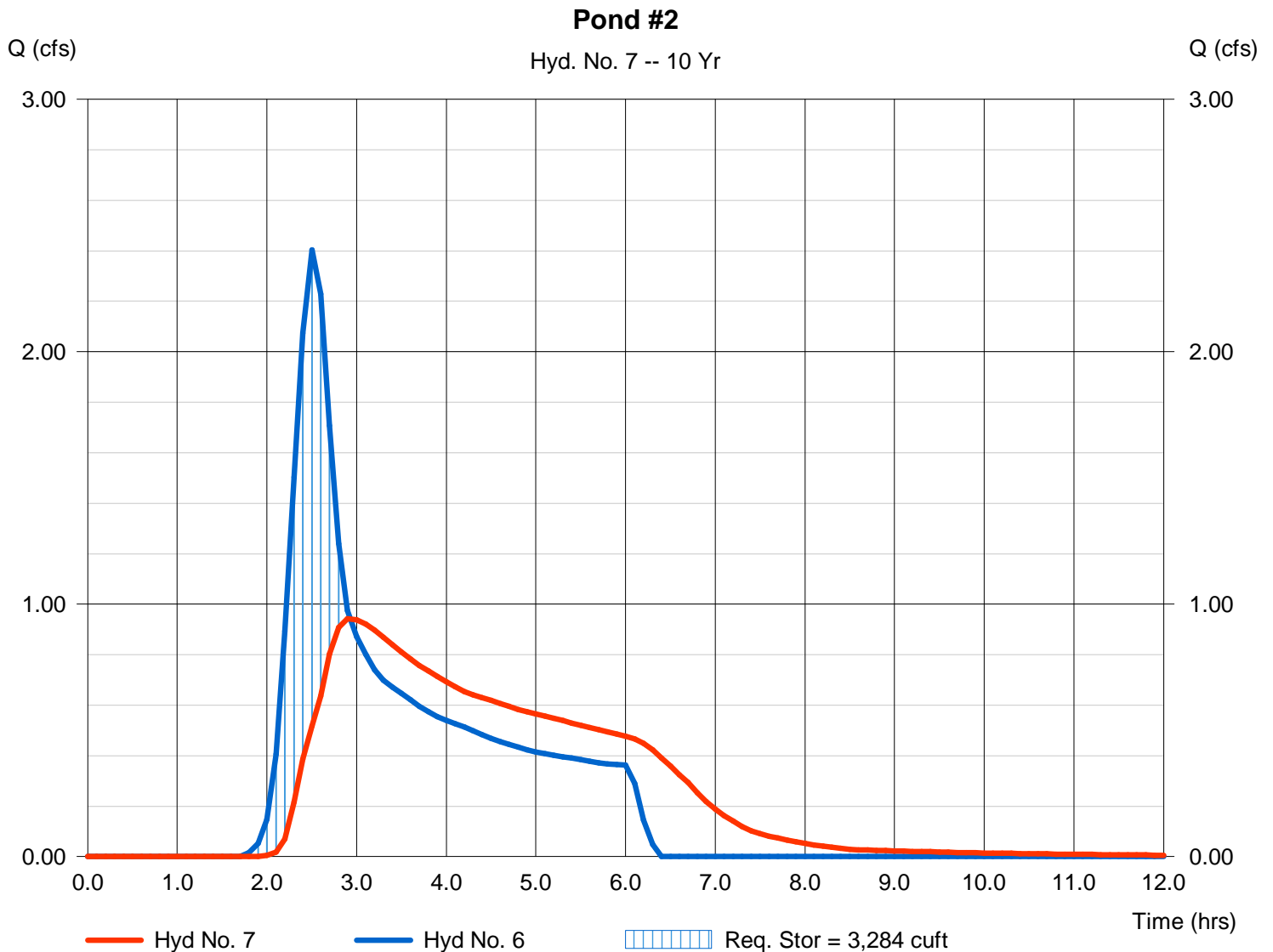
Pond #2

Hydrograph type = Reservoir
Storm frequency = 10 yrs
Inflow hyd. No. = 6
Reservoir name = Pond #2

Peak discharge = 0.943 cfs
Time interval = 6 min
Max. Elevation = 678.32 ft
Max. Storage = 3,284 cuft

Storage Indication method used.

Hydrograph Volume = 10,767 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Tuesday, Sep 20 2011, 12:18 PM

Hyd. No. 7

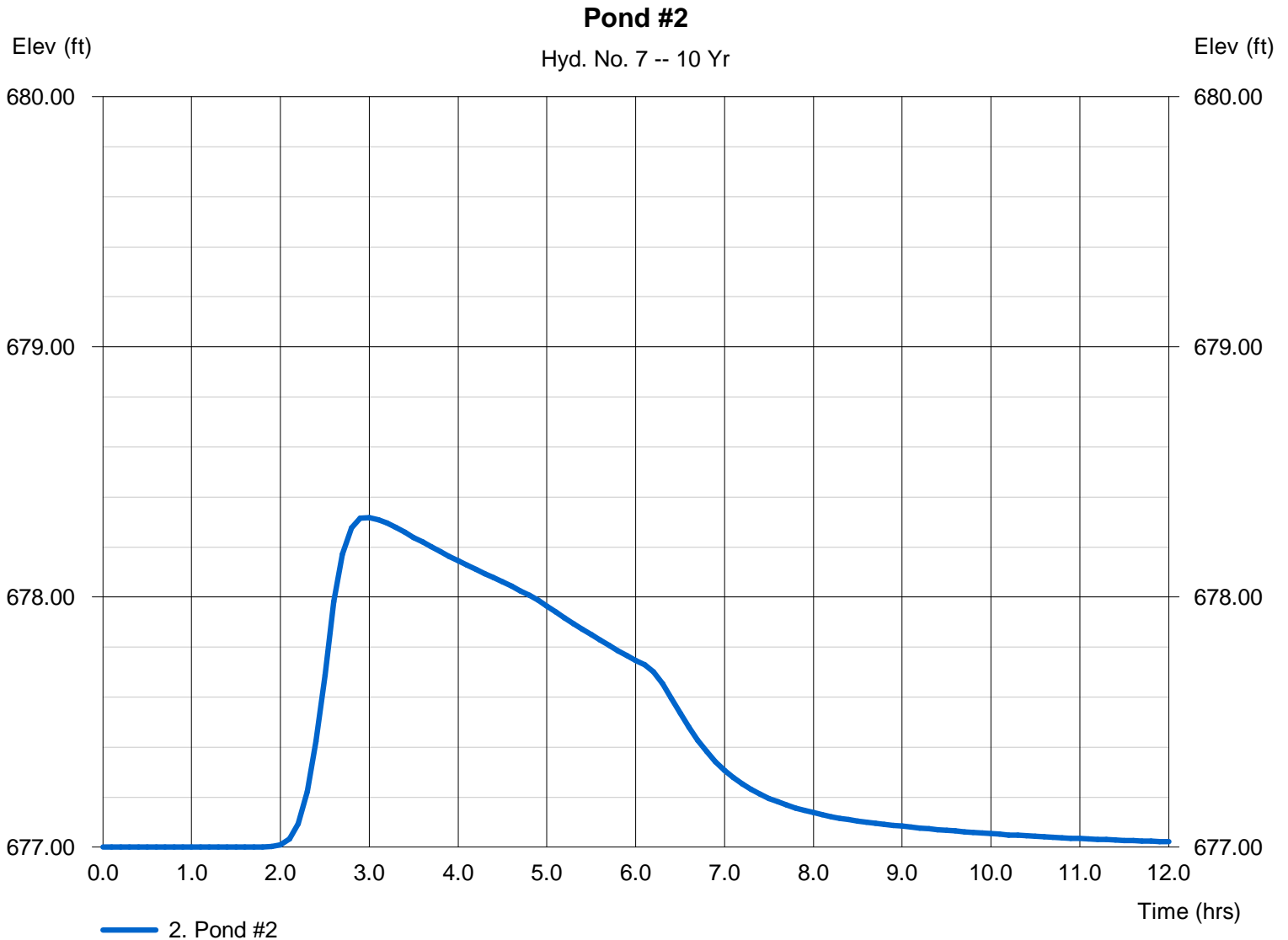
Pond #2

Hydrograph type = Reservoir
Storm frequency = 10 yrs
Inflow hyd. No. = 6
Reservoir name = Pond #2

Peak discharge = 0.943 cfs
Time interval = 6 min
Max. Elevation = 678.32 ft
Max. Storage = 3,284 cuft

Storage Indication method used.

Hydrograph Volume = 10,767 cuft



Hydrograph Plot

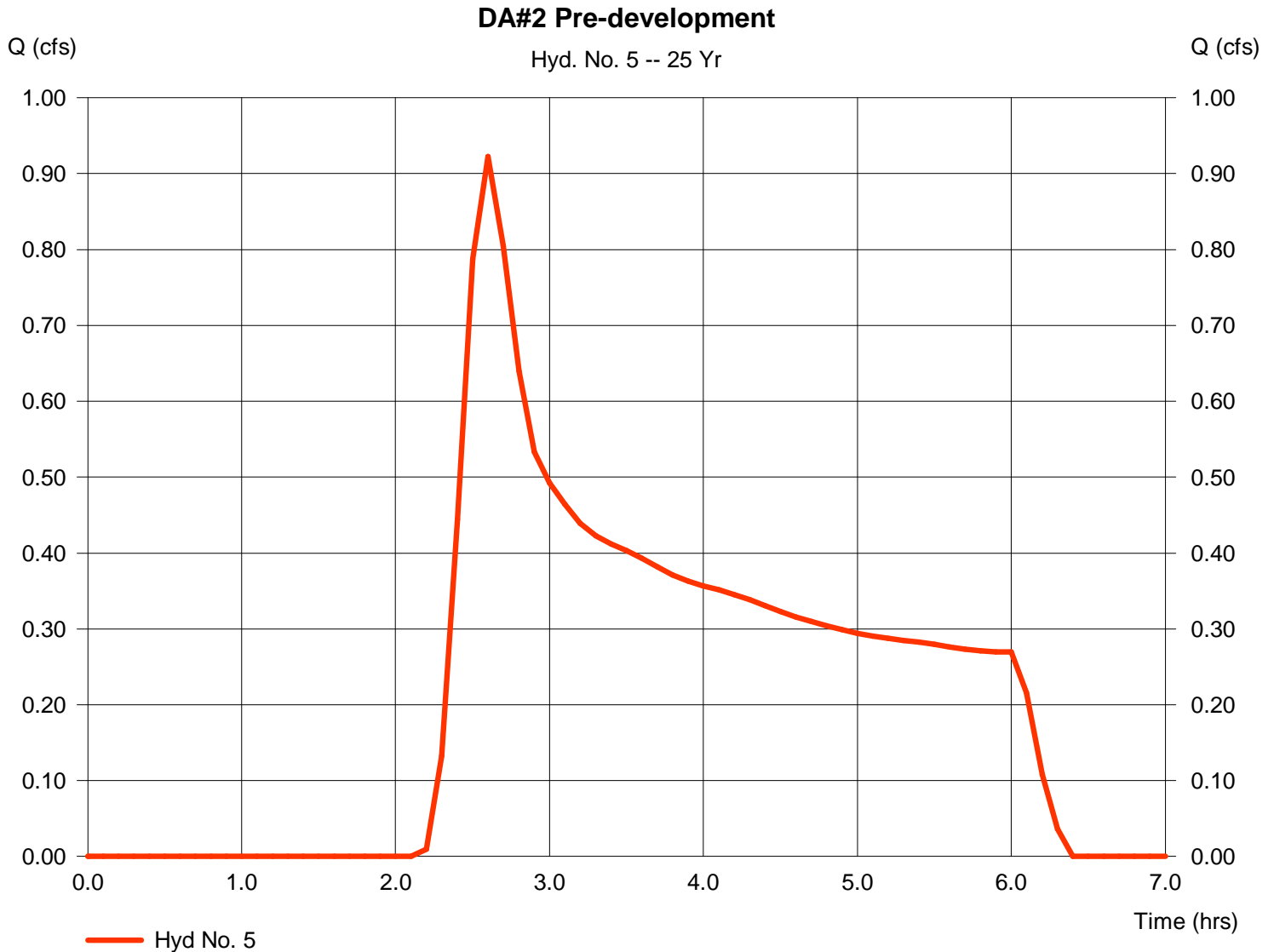
Hyd. No. 5

DA#2 Pre-development

Hydrograph type = SCS Runoff
Storm frequency = 25 yrs
Drainage area = 1.900 ac
Basin Slope = 0.0 %
Tc method = TR55
Total precip. = 4.38 in
Storm duration = 6.00 hrs

Peak discharge = 0.923 cfs
Time interval = 6 min
Curve number = 58
Hydraulic length = 0 ft
Time of conc. (Tc) = 16.90 min
Distribution = SCS 6-Hr
Shape factor = 484

Hydrograph Volume = 5,447 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Tuesday, Sep 20 2011, 12:19 PM

Hyd. No. 7

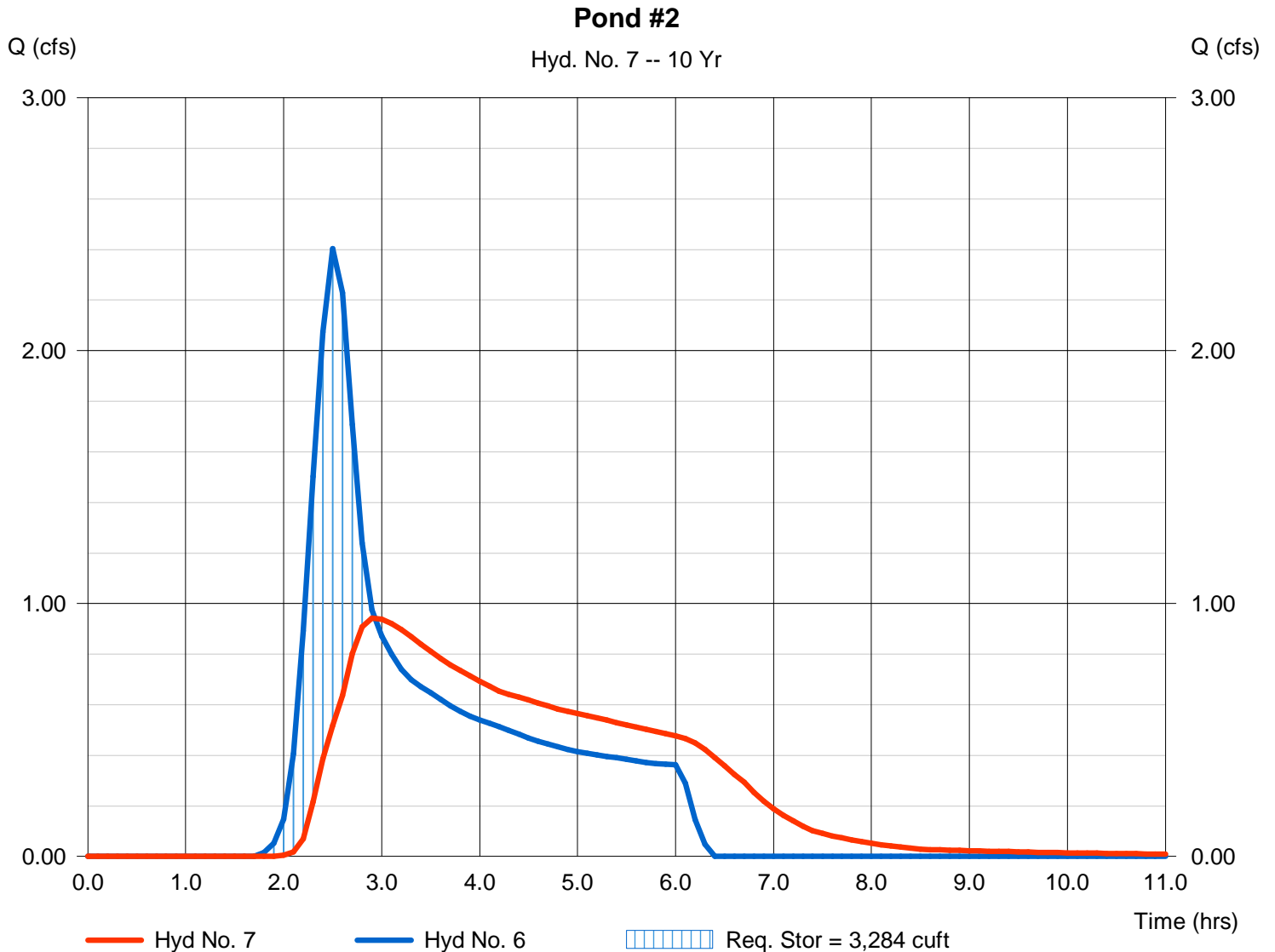
Pond #2

Hydrograph type = Reservoir
Storm frequency = 10 yrs
Inflow hyd. No. = 6
Reservoir name = Pond #2

Peak discharge = 0.943 cfs
Time interval = 6 min
Max. Elevation = 678.32 ft
Max. Storage = 3,284 cuft

Storage Indication method used.

Hydrograph Volume = 10,767 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Tuesday, Sep 20 2011, 12:20 PM

Hyd. No. 7

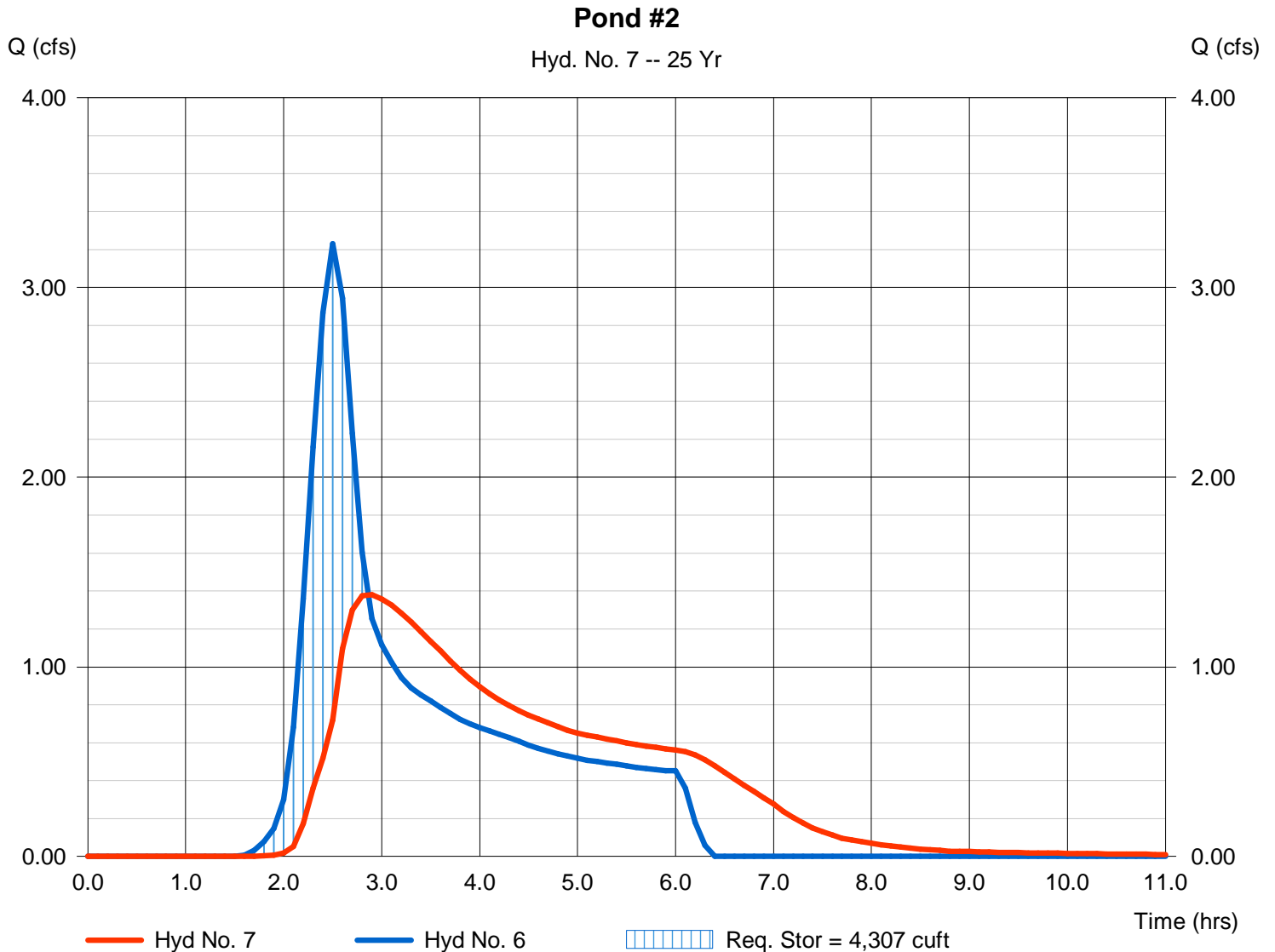
Pond #2

Hydrograph type = Reservoir
Storm frequency = 25 yrs
Inflow hyd. No. = 6
Reservoir name = Pond #2

Peak discharge = 1.380 cfs
Time interval = 6 min
Max. Elevation = 678.65 ft
Max. Storage = 4,307 cuft

Storage Indication method used.

Hydrograph Volume = 14,178 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Tuesday, Sep 20 2011, 12:21 PM

Hyd. No. 7

Pond #2

Hydrograph type = Reservoir
Storm frequency = 25 yrs
Inflow hyd. No. = 6
Reservoir name = Pond #2

Peak discharge = 1.380 cfs
Time interval = 6 min
Max. Elevation = 678.65 ft
Max. Storage = 4,307 cuft

Storage Indication method used.

Hydrograph Volume = 14,178 cuft

