

SUPPLEMENTAL CULVERT & FLOODPLAIN ANALYSIS
CASTERBRIDGE CROSSING

Re-Subdivision and Inland Wetland Applications

Dorset Crossing PAD
Simsbury, Connecticut

March 24, 2017

Prepared For:

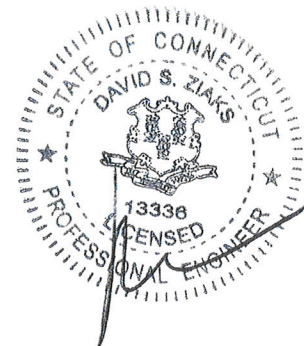
Dorset Crossing, LLC
Applicant

Prepared By:

F. A. Hesketh & Associates, Inc.
6 Creamery Brook
East Granby, CT 06026



F. A. Hesketh
& Associates, Inc.



FAHA Project No.: 04174

SUPPLEMENTAL CULVERT & FLOODPLAIN ANALYSIS CASTERBRIDGE CROSSING

1.0 INTRODUCTION

This report presents a summary of the supplemental hydraulic analysis completed for the proposed concrete box culvert crossing in the vicinity of Station 26+50 associated with the extension of Casterbridge Crossing. Casterbridge Crossing is a town road that currently terminates with a temporary cul-de-sac located approximately 200 feet south of the proposed culvert crossing. Also included in this report is an analysis of the impact of the proposed construction to the FEMA floodplain associated with Saxon Brook.

Casterbridge Crossing was previously constructed by the applicant to meet town standards up to the vicinity of Station 25+00+/- . From this point to the current temporary cul-de-sac, a temporary 24 foot +/- wide paved roadway was constructed with the expectation the road would be upgraded fully to town standards in a future phase of development involving Lots 13 A-D and/or 13 A-G. The crossing of Saxon Brook prior to the development of Dorset Crossing was completed years ago with the installation of temporary pipe culverts and a gravel roadway when the gravel removal operations were still active on the property.

The applicant is proposing to reconstruct the temporary portion of Casterbridge Crossing to current town standards including the installation of a new culvert for Saxon Brook, all underground public utilities and the new cul-de-sac. It is envisioned that this cul-de-sac would be removed in the future should Casterbridge Crossing be extended to the southerly abutting properties.

2.0 HYDROLOGIC ANALYSIS

A Preliminary Culvert Analysis was completed for the proposed crossing (copy attached) back in 2012 as part of the ongoing town approval process associated with the various phases of Dorset Crossing. Based on that analysis, a 5'X4' box culvert was selected for the Saxon Brook crossing.

During review of the current Inland Wetland application submitted, review comments from the Commission and town staff requested that the applicant explore opportunities to add a natural bottom surface to the culvert design and recalculate the hydraulic design analysis using the updated the TR-55 model based on current NOAA intensity data. The results of the new calculations are summarized in Table 1 attached. There is little change in the results for the 100-year design storm as compared to the 2012 analysis.

3.0 FLOODPLAIN ANALYSIS

Based on the current FIRM for Saxton Brook (copy attached), there is a mapped 100-year floodplain associated with the watercourse extending upstream through and past the project limits of Dorset Crossing. Unfortunately, it is a Zone A mapping meaning there are no calculated elevations established for the floodplain limits. The limit of the detailed flood study occurs just east of the Saxton Brook culvert crossing at Route 10 and indicates a flood elevation of 153, which is the floodplain elevation associated with the nearby Farmington River.

The construction drawings prepared by FAHA in 2012 for the widening of Route 10 near the Saxton Brook culvert crossing indicate the inlet elevation for the culvert system carrying the brook under Route 10 is 171.0+/- . This indicates that the effects of backwater from the Farmington River floodplain have little impact on the existing culvert under Route 10. Further upstream at the proposed culvert crossing for Casterbridge Crossing, the outfall elevation of the new box culvert would be 226.40. This means the average slope of Saxton Brook between the two culverts is around 2.6%.

Since there is no defined floodplain elevation along the floodplain limits, the analysis for the new culvert was tested assuming a tail water of between 1 and 3 feet. The results indicate there would be no change to the projected 100-year headwater elevation at the new box culvert based on tail water effects.

With respect to potential loss of floodplain storage capacity as a result of the proposed construction, there will be a negligible change of net flood storage capacity since fill for the current crossing was placed many years ago and will be replaced with new gravel fill to support the improved roadway. It could be argued that there may be a slight increase created as a result of removing the two restrictive 24" diameter culverts which have a total cross sectional area of around 6.3 s.f. with the new box culvert which has a cross sectional area of 20 s.f.

Untitled Map

Write a description for your map.

Legend

 Dorset Crossing Dr

 Proposed Culvert Crossing

Proposed Culvert Crossing

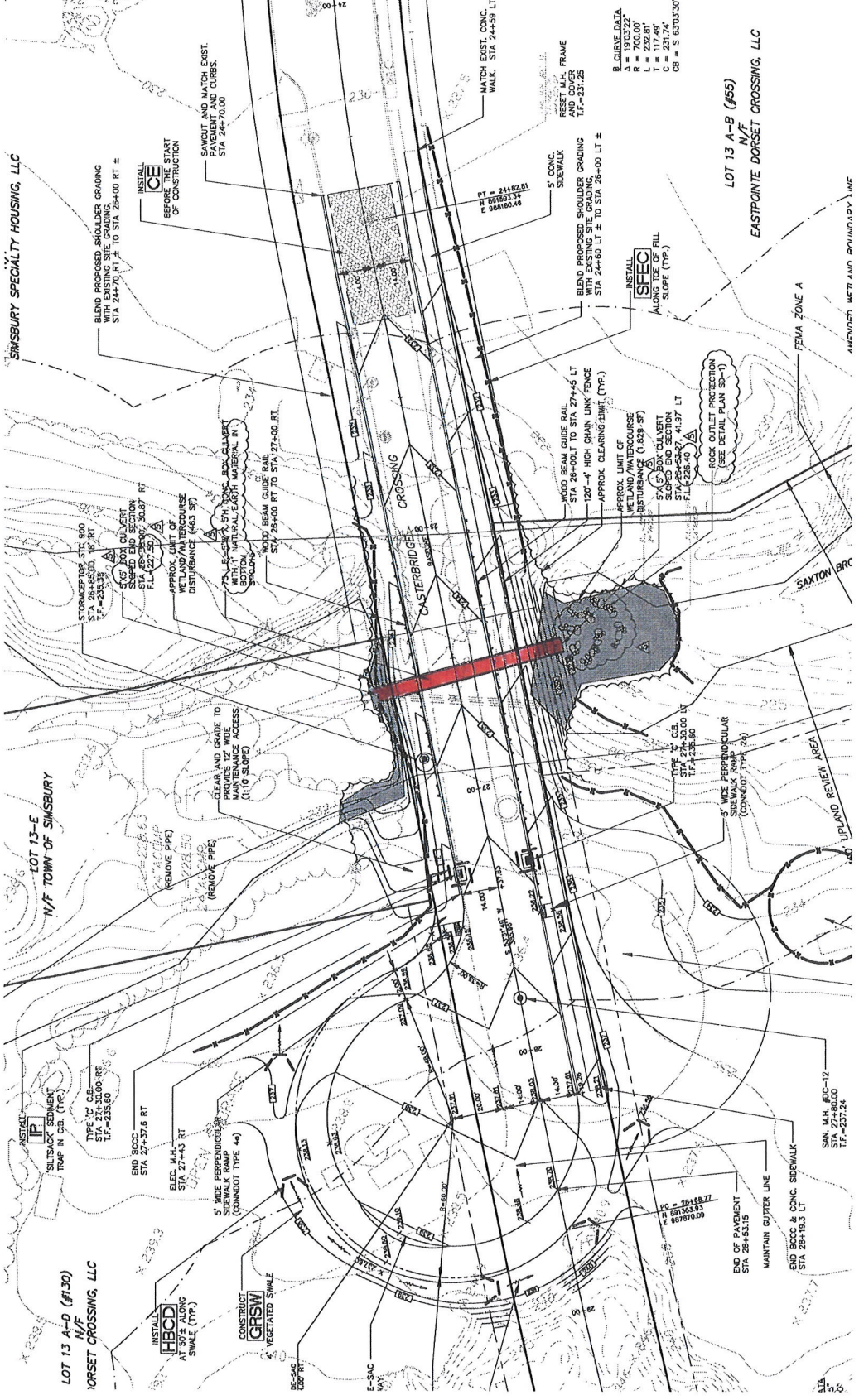
Dorset Crossing Dr



600 ft

| No. | Date | Description | Revisions |
|-----|------------|------------------------|-----------|
| 1 | 08-21-2016 | Issue for Construction | |
| 2 | 08-21-2016 | Issue for Construction | |
| 3 | 08-21-2016 | Issue for Construction | |
| 4 | 08-21-2016 | Issue for Construction | |
| 5 | 08-21-2016 | Issue for Construction | |

DRAINAGE, CROSSING, AND CONDUIT PLAN
CROSSING, LLC
 Job no: 04174
 Date: 08-21-2017
 Scale: 1" = 20'-0"
 Project: East Grubbs, CT 06026
 Client: F.A.H. T.A. Heskel & Associates, Inc.
 Project: East Grubbs, CT 06026
 Project: East Grubbs, CT 06026



LOT 13 A-D (#130) N/F DORSET CROSSING, LLC
LOT 13 A-B (#55) N/F EASTPOINTE DORSET CROSSING, LLC
SMSBURY SPECIALTY HOUSING, LLC
LOT 13-E N/F TOWN OF SMSBURY
SAXTON BRG
UPLAND REVIEW AREA
FEMA ZONE A
AMENDED METRIC DRAWING

SUMMARY TABLE 1

CULVERT ANALYSIS
PROPOSED CONDITIONS-100 YEAR STORM

DORSET CROSSING, SIMSBURY, CT

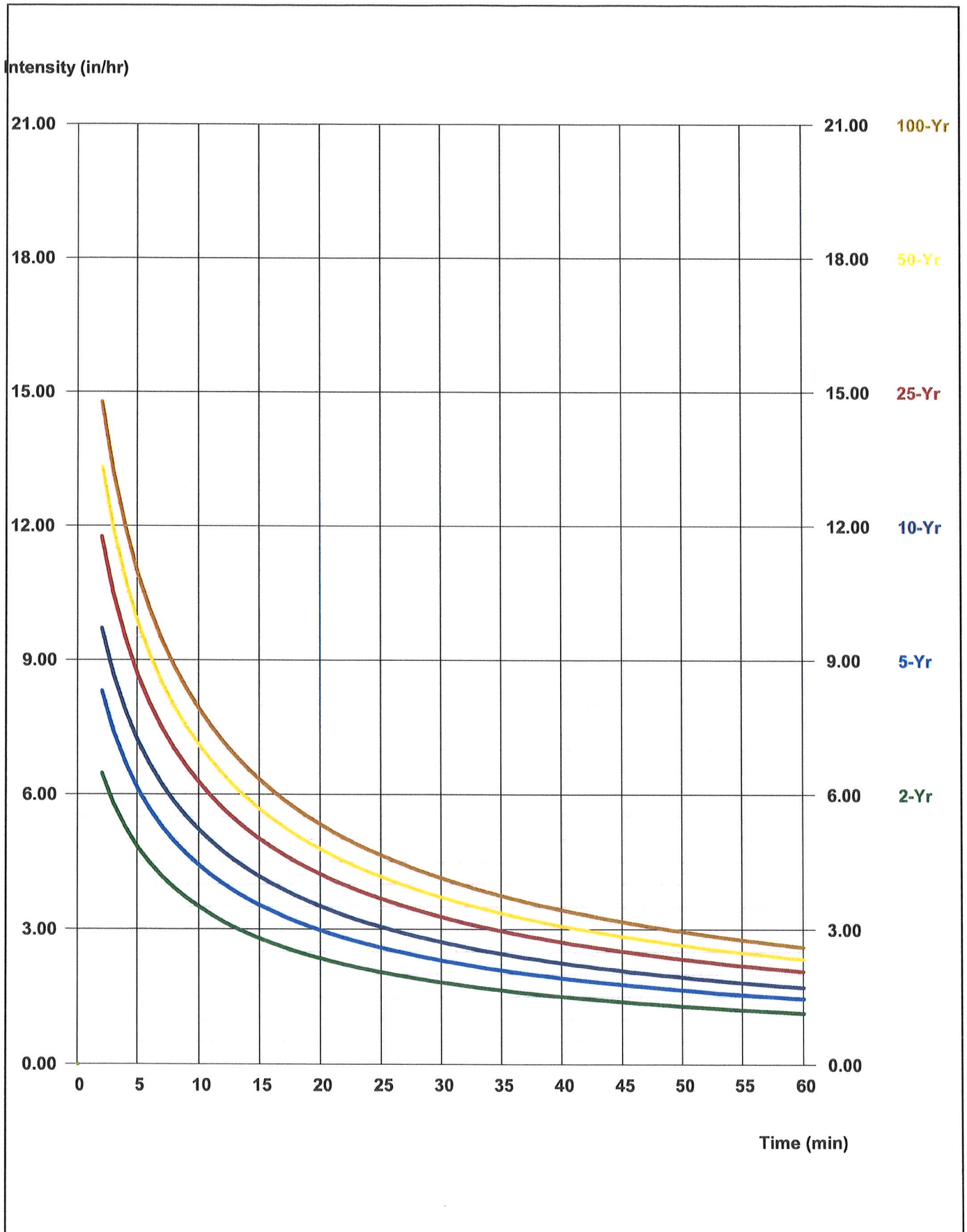
PLANS DATED 02/27/2017

| CULVERT AT | CULVERT CHARACTERISTIC | | DETENTION POND | | CULVERT MANNING COEFFICIENT | CULVERT BOTTOM CONDITIONS |
|----------------|------------------------|----------|----------------|----------------|-----------------------------|---------------------------|
| | SIZE (INCHES) | MATERIAL | FLOW IN (CFS) | FLOW OUT (CFS) | | |
| 1 | 2 | 3 | 4 | 5 | 7 | 8 |
| 1 FT Tailwater | 60"x48" * | CONCRETE | 126.3 | 126.6 | 0.02 | Gravel/Random Stone |
| 2 FT Tailwater | 60"x48" | CONCRETE | 126.3 | 126.6 | 0.02 | Gravel/Random Stone |
| 3 FT Tailwater | 60"x48" | CONCRETE | 126.3 | 126.6 | 0.02 | Gravel/Random Stone |

* (CULVERT DESIGN DIMENTIONS)

Hydraflow IDF Curves

IDF file: NOAA ATLAS 14, VOL10, V2.IDF



Hydraflow Table of Contents

04174p-culvert-1.gpw

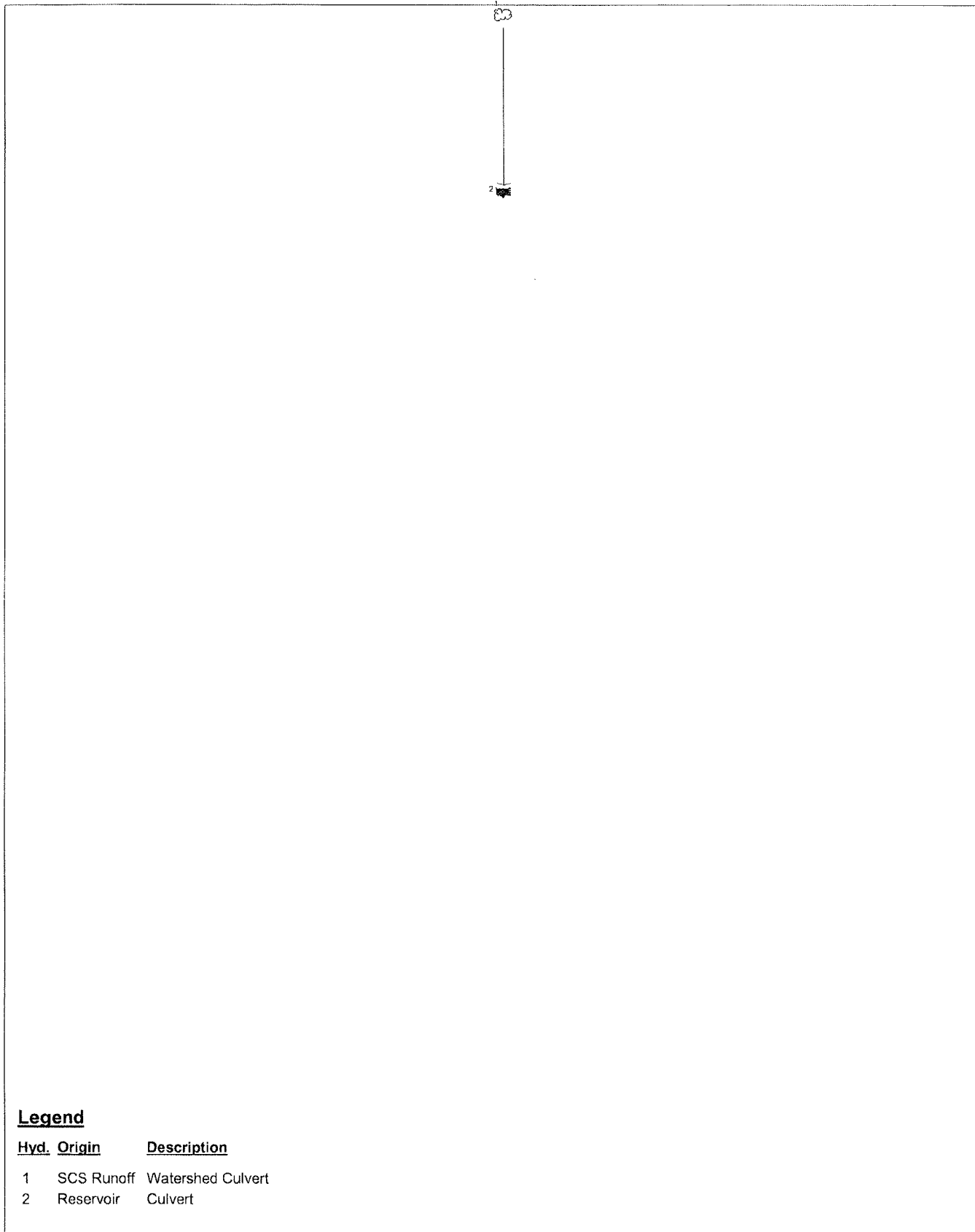
Hydraflow Hydrographs by Intelisolve v9.1

Monday, Feb 27, 2017

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| 100 - Year | |
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Watershed Model Schematic

Hydraflow Hydrographs by Intelisolve v9.1



Legend

| <u>Hyd. Origin</u> | <u>Description</u> |
|--------------------|------------------------------|
| 1 | SCS Runoff Watershed Culvert |
| 2 | Reservoir Culvert |

Hydrograph Return Period Recap

Hydraflow Hydrographs by Intellisolve v9.1

| Hyd. No. | Hydrograph type (origin) | Inflow Hyd(s) | Peak Outflow (cfs) | | | | | | | | Hydrograph description |
|----------|--------------------------|---------------|--------------------|-------|-------|-------|-------|-------|--------|--------|------------------------|
| | | | 1-Yr | 2-Yr | 3-Yr | 5-Yr | 10-Yr | 25-Yr | 50-Yr | 100-Yr | |
| 1 | SCS Runoff | ----- | ----- | 13.88 | ----- | ----- | 50.68 | 76.21 | 100.57 | 126.33 | Watershed Culvert |
| 2 | Reservoir | 1 | ----- | 13.89 | ----- | ----- | 50.77 | 75.97 | 100.20 | 126.62 | Culvert |

Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.1

| Hyd. No. | Hydrograph type (origin) | Peak flow (cfs) | Time interval (min) | Time to peak (min) | Hyd. volume (cuft) | Inflow hyd(s) | Maximum elevation (ft) | Total strge used (cuft) | Hydrograph description |
|----------------------|--------------------------|-----------------|---------------------|--------------------|-------------------------|---------------|------------------------|-------------------------|------------------------|
| 1 | SCS Runoff | 126.33 | 6 | 762 | 993,060 | --- | ----- | ----- | Watershed Culvert |
| 2 | Reservoir | 126.62 | 6 | 762 | 993,060 | 1 | 232.83 | 12,113 | Culvert |
| 04174p-culvert-1.gpw | | | | | Return Period: 100 Year | | Monday, Feb 27, 2017 | | |

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

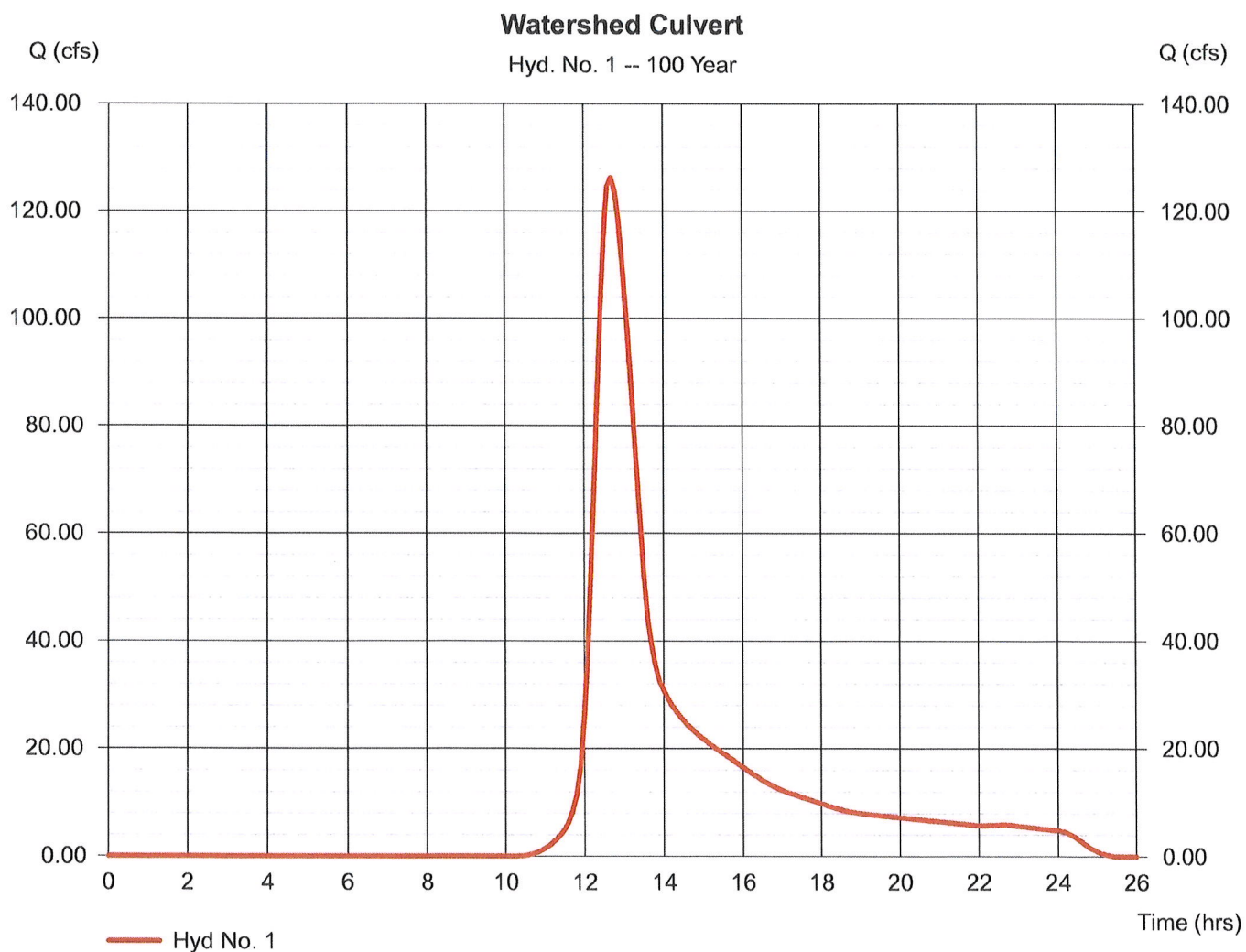
Monday, Feb 27, 2017

Hyd. No. 1

Watershed Culvert

Hydrograph type = SCS Runoff
 Storm frequency = 100 yrs
 Time interval = 6 min
 Drainage area = 108.000 ac
 Basin Slope = 0.0 %
 Tc method = USER
 Total precip. = 6.90 in
 Storm duration = 24 hrs

Peak discharge = 126.33 cfs
 Time to peak = 12.70 hrs
 Hyd. volume = 993,060 cuft
 Curve number = 60
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 53.00 min
 Distribution = Type III
 Shape factor = 484



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

Monday, Feb 27, 2017

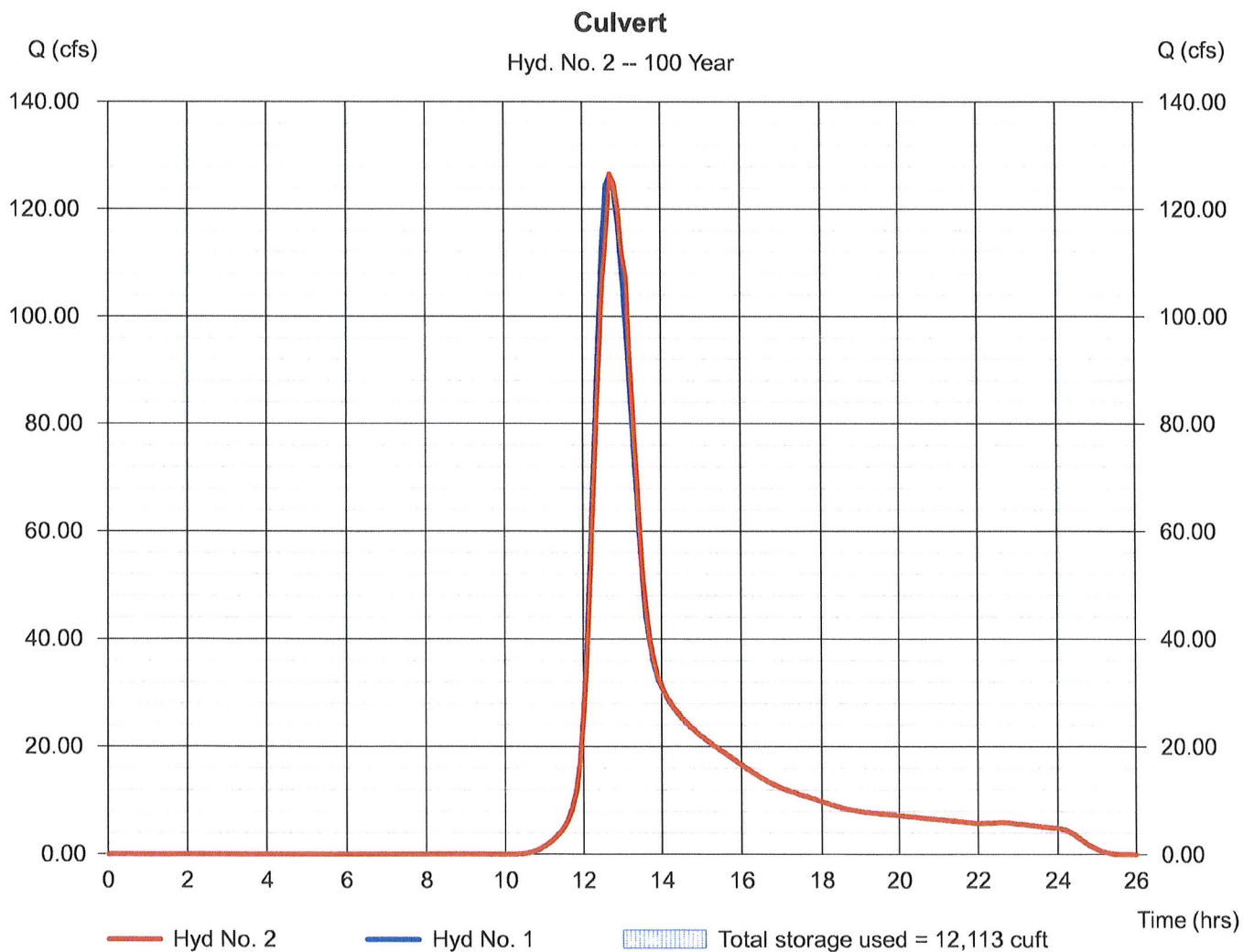
Hyd. No. 2

Culvert

Hydrograph type = Reservoir
 Storm frequency = 100 yrs
 Time interval = 6 min
 Inflow hyd. No. = 1 - Watershed Culvert
 Reservoir name = Culvert

Peak discharge = 126.62 cfs
 Time to peak = 12.70 hrs
 Hyd. volume = 993,060 cuft
 Max. Elevation = 232.83 ft
 Max. Storage = 12,113 cuft

Storage Indication method used.



Pond Report

Hydraflow Hydrographs by Intelisolve v9.1

Monday, Feb 27, 2017

Pond No. 1 - Culvert

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Beginning Elevation = 228.50 ft

Stage / Storage Table

| Stage (ft) | Elevation (ft) | Contour area (sqft) | Incr. Storage (cuft) | Total storage (cuft) |
|------------|----------------|---------------------|----------------------|----------------------|
| 0.00 | 228.50 | 00 | 0 | 0 |
| 1.50 | 230.00 | 828 | 414 | 414 |
| 2.50 | 231.00 | 2,951 | 1,781 | 2,194 |
| 3.50 | 232.00 | 5,572 | 4,192 | 6,387 |
| 4.50 | 233.00 | 8,442 | 6,957 | 13,344 |
| 5.50 | 234.00 | 33,270 | 19,488 | 32,832 |
| 6.50 | 235.00 | 68,366 | 49,771 | 82,603 |

Culvert / Orifice Structures

| | [A] | [B] | [C] | [PrfRsr] |
|-----------------|----------|------|------|----------|
| Rise (in) | = 48.00 | 0.00 | 0.00 | 0.00 |
| Span (in) | = 60.00 | 0.00 | 0.00 | 0.00 |
| No. Barrels | = 1 | 1 | 0 | 0 |
| Invert El. (ft) | = 228.50 | 0.00 | 0.00 | 0.00 |
| Length (ft) | = 70.00 | 0.00 | 0.00 | 0.00 |
| Slope (%) | = 1.50 | 0.00 | 0.00 | n/a |
| N-Value | = .020 | .012 | .013 | n/a |
| Orifice Coeff. | = 0.60 | 0.60 | 0.60 | 0.60 |
| 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. | = 2.60 | 3.33 | 3.33 | 3.33 |
| Weir Type | = Broad | --- | --- | --- |
| Multi-Stage | = No | No | No | No |
| Exfil.(in/hr) | = 0.000 (by Contour) | | | |
| TW Elev. (ft) | = 228.62 | | | |

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

Stage / Storage / Discharge Table

| Stage ft | Storage cuft | Elevation ft | Clv A cfs | Clv B cfs | Clv C cfs | PrfRsr cfs | Wr A cfs | Wr B cfs | Wr C cfs | Wr D cfs | Exfil cfs | User cfs | Total cfs |
|----------|--------------|--------------|-----------|-----------|-----------|------------|----------|----------|----------|----------|-----------|----------|-----------|
| 0.00 | 0 | 228.50 | 0.00 | --- | --- | --- | --- | --- | --- | --- | --- | --- | 0.00 |
| 0.15 | 41 | 228.65 | 0.30 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 0.30 |
| 0.30 | 83 | 228.80 | 2.05 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 2.05 |
| 0.45 | 124 | 228.95 | 4.93 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 4.93 |
| 0.60 | 166 | 229.10 | 7.91 ic | --- | --- | --- | --- | --- | --- | --- | --- | --- | 7.91 |
| 0.75 | 207 | 229.25 | 11.06 ic | --- | --- | --- | --- | --- | --- | --- | --- | --- | 11.06 |
| 0.90 | 248 | 229.40 | 14.53 ic | --- | --- | --- | --- | --- | --- | --- | --- | --- | 14.53 |
| 1.05 | 290 | 229.55 | 18.31 ic | --- | --- | --- | --- | --- | --- | --- | --- | --- | 18.31 |
| 1.20 | 331 | 229.70 | 22.38 ic | --- | --- | --- | --- | --- | --- | --- | --- | --- | 22.38 |
| 1.35 | 373 | 229.85 | 26.70 ic | --- | --- | --- | --- | --- | --- | --- | --- | --- | 26.70 |
| 1.50 | 414 | 230.00 | 31.27 ic | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.27 |
| 1.60 | 592 | 230.10 | 34.45 ic | --- | --- | --- | --- | --- | --- | --- | --- | --- | 34.45 |
| 1.70 | 770 | 230.20 | 37.73 ic | --- | --- | --- | --- | --- | --- | --- | --- | --- | 37.73 |
| 1.80 | 948 | 230.30 | 41.11 ic | --- | --- | --- | --- | --- | --- | --- | --- | --- | 41.11 |
| 1.90 | 1,126 | 230.40 | 44.58 ic | --- | --- | --- | --- | --- | --- | --- | --- | --- | 44.58 |
| 2.00 | 1,304 | 230.50 | 48.15 ic | --- | --- | --- | --- | --- | --- | --- | --- | --- | 48.15 |
| 2.10 | 1,482 | 230.60 | 51.81 ic | --- | --- | --- | --- | --- | --- | --- | --- | --- | 51.81 |
| 2.20 | 1,660 | 230.70 | 55.55 ic | --- | --- | --- | --- | --- | --- | --- | --- | --- | 55.55 |
| 2.30 | 1,838 | 230.80 | 59.38 ic | --- | --- | --- | --- | --- | --- | --- | --- | --- | 59.38 |
| 2.40 | 2,016 | 230.90 | 63.30 ic | --- | --- | --- | --- | --- | --- | --- | --- | --- | 63.30 |
| 2.50 | 2,194 | 231.00 | 67.29 ic | --- | --- | --- | --- | --- | --- | --- | --- | --- | 67.29 |
| 2.60 | 2,614 | 231.10 | 71.37 ic | --- | --- | --- | --- | --- | --- | --- | --- | --- | 71.37 |
| 2.70 | 3,033 | 231.20 | 75.53 ic | --- | --- | --- | --- | --- | --- | --- | --- | --- | 75.53 |
| 2.80 | 3,452 | 231.30 | 79.76 ic | --- | --- | --- | --- | --- | --- | --- | --- | --- | 79.76 |
| 2.90 | 3,871 | 231.40 | 83.30 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 83.30 |
| 3.00 | 4,291 | 231.50 | 86.41 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 86.41 |
| 3.10 | 4,710 | 231.60 | 89.52 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 89.52 |
| 3.20 | 5,129 | 231.70 | 92.64 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 92.64 |
| 3.30 | 5,548 | 231.80 | 95.75 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 95.75 |
| 3.40 | 5,968 | 231.90 | 98.86 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 98.86 |
| 3.50 | 6,387 | 232.00 | 101.97 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 101.97 |
| 3.60 | 7,082 | 232.10 | 105.08 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 105.08 |
| 3.70 | 7,778 | 232.20 | 108.20 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 108.20 |
| 3.80 | 8,474 | 232.30 | 111.31 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 111.31 |
| 3.90 | 9,169 | 232.40 | 114.42 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 114.42 |

Continues on next page...

Culvert

Stage / Storage / Discharge Table

| Stage ft | Storage cuft | Elevation ft | Civ A cfs | Civ B cfs | Civ C cfs | PrfRsr cfs | Wr A cfs | Wr B cfs | Wr C cfs | Wr D cfs | Exfil cfs | User cfs | Total cfs |
|-------------|-----------------|-----------------|--------------|--------------|--------------|---------------|-------------|-------------|-------------|-------------|--------------|-------------|--------------|
| 4.00 | 9,865 | 232.50 | 110.74 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 110.74 |
| 4.10 | 10,561 | 232.60 | 115.89 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 115.89 |
| 4.20 | 11,257 | 232.70 | 120.82 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 120.82 |
| 4.30 | 11,952 | 232.80 | 125.56 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 125.56 |
| 4.40 | 12,648 | 232.90 | 130.13 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 130.13 |
| 4.50 | 13,344 | 233.00 | 134.54 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 134.54 |
| 4.60 | 15,292 | 233.10 | 138.81 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 138.81 |
| 4.70 | 17,241 | 233.20 | 142.96 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 142.96 |
| 4.80 | 19,190 | 233.30 | 146.99 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 146.99 |
| 4.90 | 21,139 | 233.40 | 150.91 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 150.91 |
| 5.00 | 23,088 | 233.50 | 154.73 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 154.73 |
| 5.10 | 25,037 | 233.60 | 158.46 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 158.46 |
| 5.20 | 26,985 | 233.70 | 162.10 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 162.10 |
| 5.30 | 28,934 | 233.80 | 165.66 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 165.66 |
| 5.40 | 30,883 | 233.90 | 169.15 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 169.15 |
| 5.50 | 32,832 | 234.00 | 172.57 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 172.57 |
| 5.60 | 37,809 | 234.10 | 175.92 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 175.92 |
| 5.70 | 42,786 | 234.20 | 179.21 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 179.21 |
| 5.80 | 47,763 | 234.30 | 182.44 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 182.44 |
| 5.90 | 52,740 | 234.40 | 185.61 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 185.61 |
| 6.00 | 57,717 | 234.50 | 188.73 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 188.73 |
| 6.10 | 62,695 | 234.60 | 191.80 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 191.80 |
| 6.20 | 67,672 | 234.70 | 194.82 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 194.82 |
| 6.30 | 72,649 | 234.80 | 197.79 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 197.79 |
| 6.40 | 77,626 | 234.90 | 200.72 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 200.72 |
| 6.50 | 82,603 | 235.00 | 203.61 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 203.61 |

...End

Hydraflow Table of Contents

04174p-culvert-1.gpw

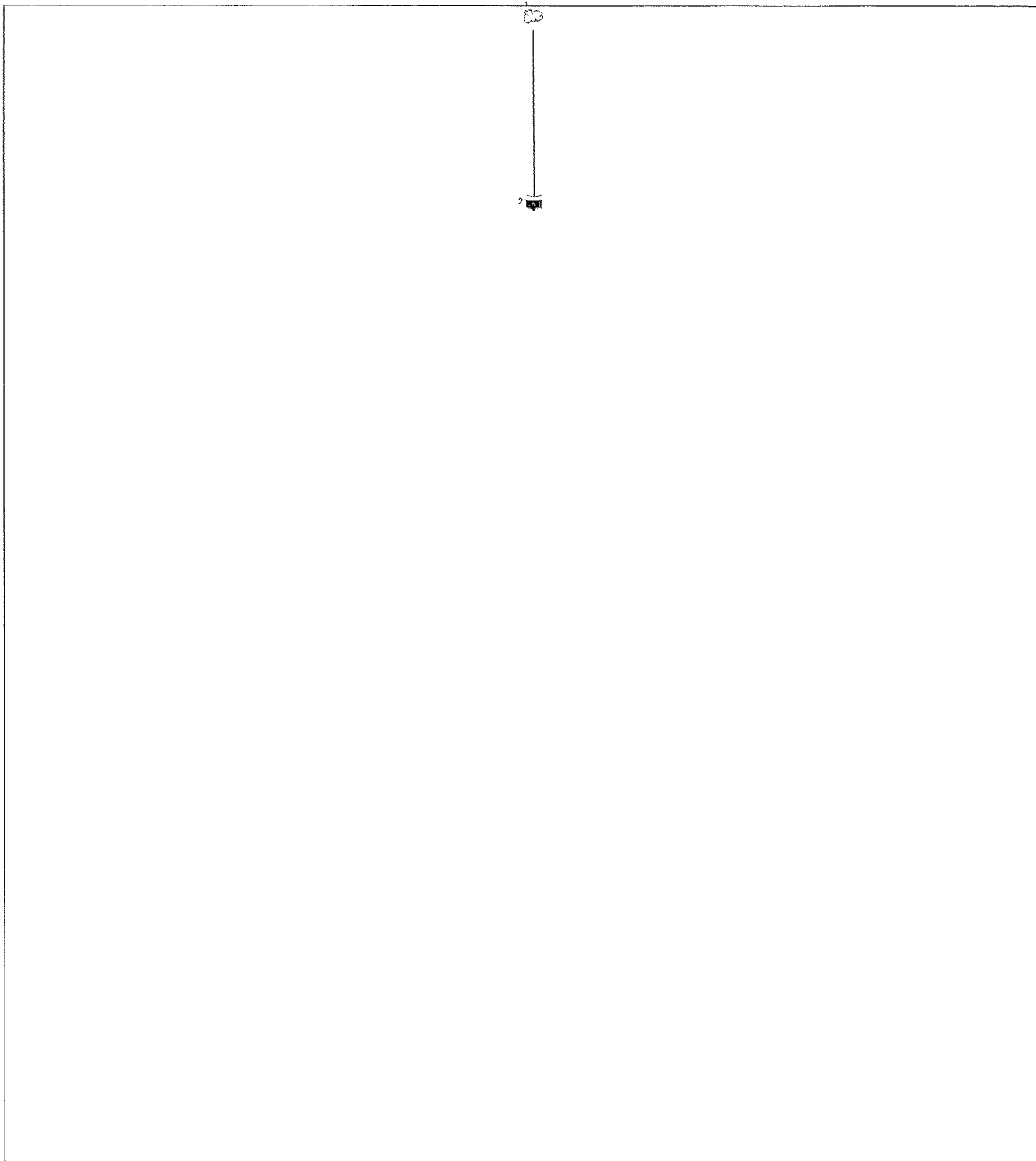
Hydraflow Hydrographs by Intelisolve v9.1

Monday, Feb 27, 2017

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| Pond Report - Culvert | 6 |

Watershed Model Schematic

Hydraflow Hydrographs by Intelisolve v9.1



Legend

| <u>Hyd. Origin</u> | <u>Description</u> |
|--------------------|------------------------------|
| 1 | SCS Runoff Watershed Culvert |
| 2 | Reservoir Culvert |

Hydrograph Return Period Recap

Hydraflow Hydrographs by Intelisolve v9.1

| Hyd. No. | Hydrograph type (origin) | Inflow Hyd(s) | Peak Outflow (cfs) | | | | | | | | Hydrograph description |
|----------|--------------------------|---------------|--------------------|-------|-------|-------|-------|-------|--------|--------|------------------------|
| | | | 1-Yr | 2-Yr | 3-Yr | 5-Yr | 10-Yr | 25-Yr | 50-Yr | 100-Yr | |
| 1 | SCS Runoff | ----- | ----- | 13.88 | ----- | ----- | 50.68 | 76.21 | 100.57 | 126.33 | Watershed Culvert |
| 2 | Reservoir | 1 | ----- | 14.40 | ----- | ----- | 50.60 | 76.01 | 100.20 | 126.62 | Culvert |

Hydrograph Summary Report

Hydraflow Hydrographs by Intellisolve v9.1

| Hyd. No. | Hydrograph type (origin) | Peak flow (cfs) | Time interval (min) | Time to peak (min) | Hyd. volume (cuft) | Inflow hyd(s) | Maximum elevation (ft) | Total strge used (cuft) | Hydrograph description |
|----------------------|--------------------------|-----------------|---------------------|--------------------|-------------------------|---------------|------------------------|-------------------------|------------------------|
| 1 | SCS Runoff | 126.33 | 6 | 762 | 993,060 | --- | ----- | ----- | Watershed Culvert |
| 2 | Reservoir | 126.62 | 6 | 762 | 992,770 | 1 | 232.83 | 12,113 | Culvert |
| 04174p-culvert-1.gpw | | | | | Return Period: 100 Year | | Monday, Feb 27, 2017 | | |

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

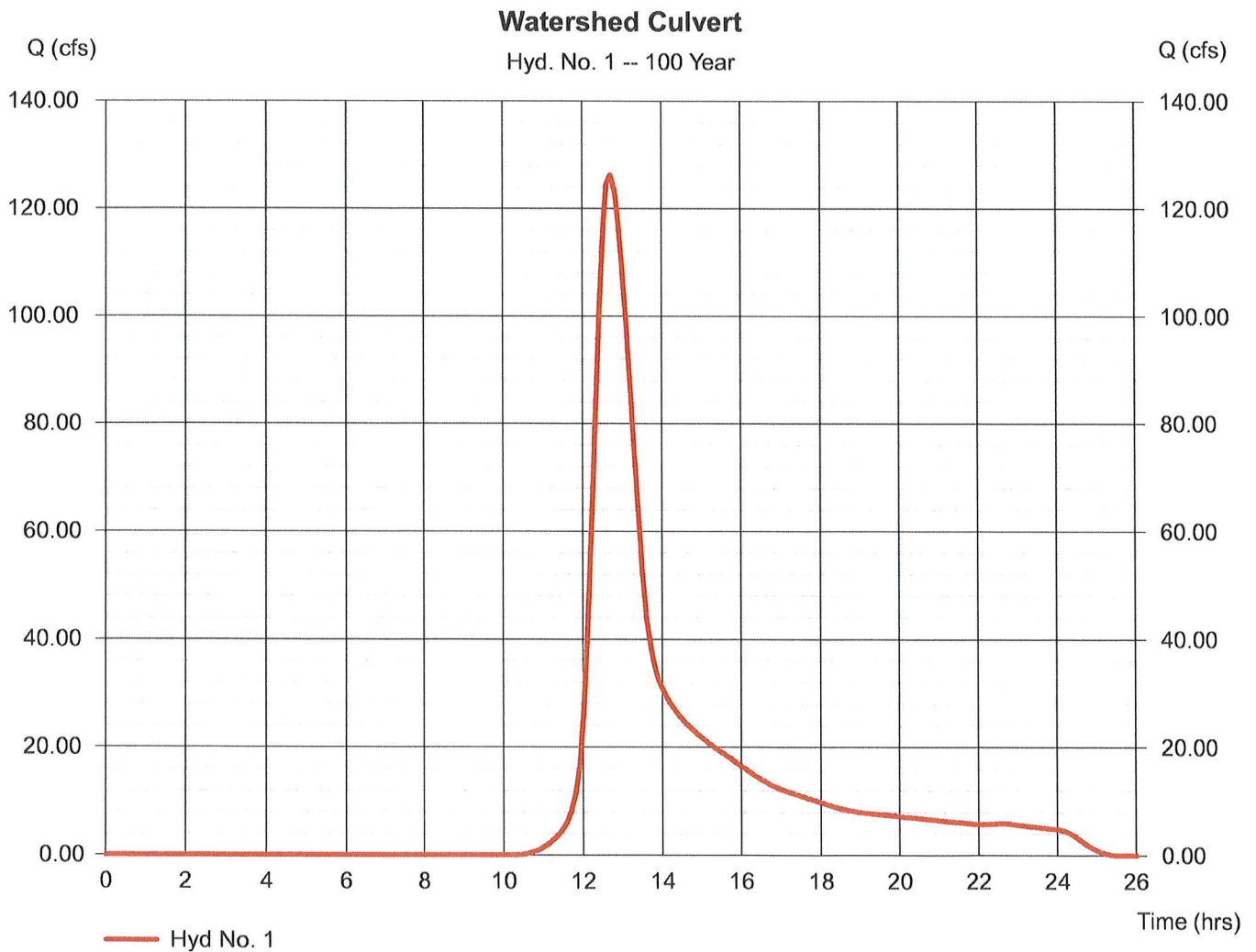
Monday, Feb 27, 2017

Hyd. No. 1

Watershed Culvert

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Time interval = 6 min
Drainage area = 108.000 ac
Basin Slope = 0.0 %
Tc method = USER
Total precip. = 6.90 in
Storm duration = 24 hrs

Peak discharge = 126.33 cfs
Time to peak = 12.70 hrs
Hyd. volume = 993,060 cuft
Curve number = 60
Hydraulic length = 0 ft
Time of conc. (Tc) = 53.00 min
Distribution = Type III
Shape factor = 484



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

Monday, Feb 27, 2017

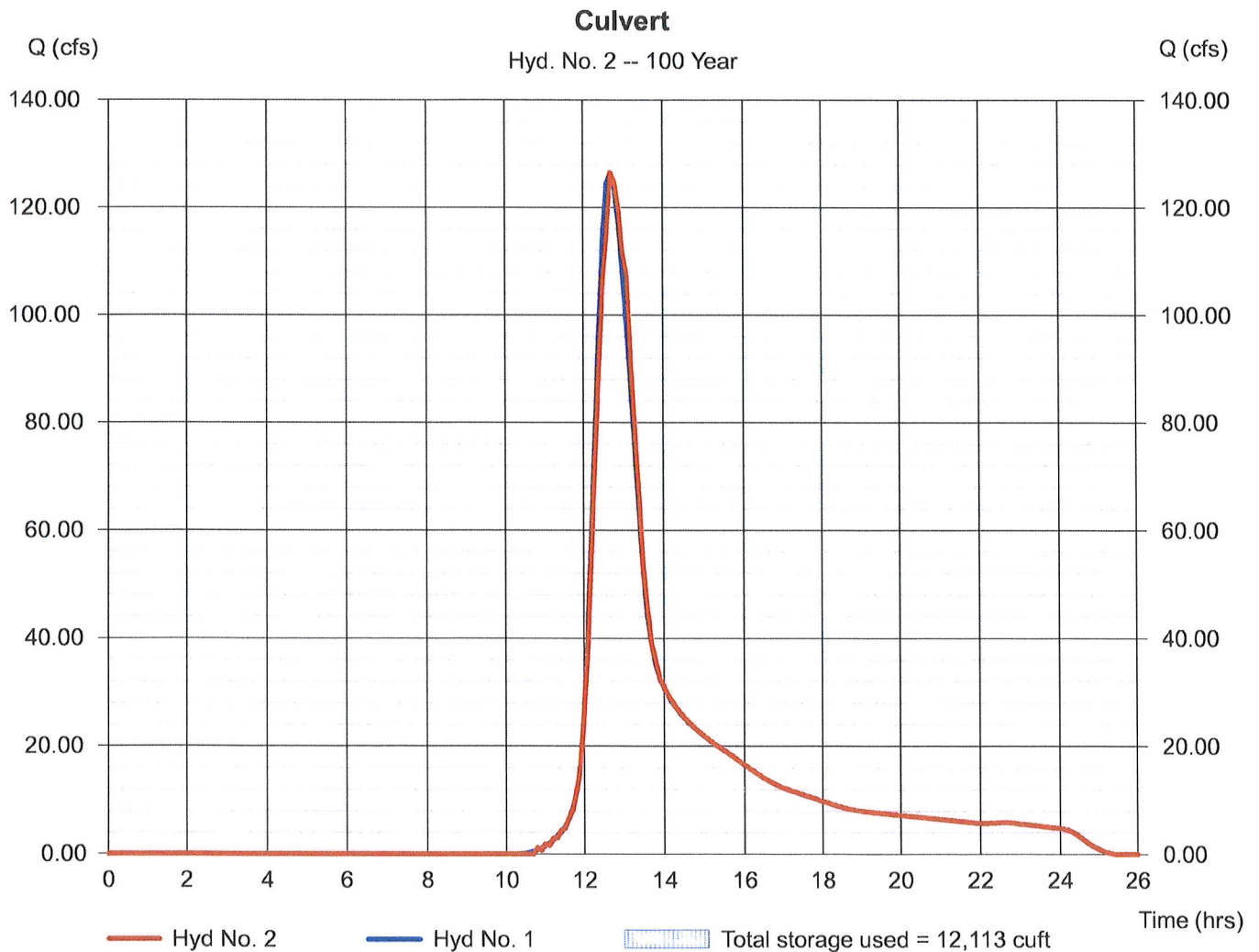
Hyd. No. 2

Culvert

Hydrograph type = Reservoir
Storm frequency = 100 yrs
Time interval = 6 min
Inflow hyd. No. = 1 - Watershed Culvert
Reservoir name = Culvert

Peak discharge = 126.62 cfs
Time to peak = 12.70 hrs
Hyd. volume = 992,770 cuft
Max. Elevation = 232.83 ft
Max. Storage = 12,113 cuft

Storage Indication method used.



Pond Report

Hydraflow Hydrographs by Intelisolve v9.1

Monday, Feb 27, 2017

Pond No. 1 - Culvert

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Beginning Elevation = 228.50 ft

Stage / Storage Table

| Stage (ft) | Elevation (ft) | Contour area (sqft) | Incr. Storage (cuft) | Total storage (cuft) |
|------------|----------------|---------------------|----------------------|----------------------|
| 0.00 | 228.50 | 00 | 0 | 0 |
| 1.50 | 230.00 | 828 | 414 | 414 |
| 2.50 | 231.00 | 2,951 | 1,781 | 2,194 |
| 3.50 | 232.00 | 5,572 | 4,192 | 6,387 |
| 4.50 | 233.00 | 8,442 | 6,957 | 13,344 |
| 5.50 | 234.00 | 33,270 | 19,488 | 32,832 |
| 6.50 | 235.00 | 68,366 | 49,771 | 82,603 |

Culvert / Orifice Structures

| | [A] | [B] | [C] | [PrfRsr] |
|-----------------|----------|------|------|----------|
| Rise (in) | = 48.00 | 0.00 | 0.00 | 0.00 |
| Span (in) | = 60.00 | 0.00 | 0.00 | 0.00 |
| No. Barrels | = 1 | 1 | 0 | 0 |
| Invert El. (ft) | = 228.50 | 0.00 | 0.00 | 0.00 |
| Length (ft) | = 70.00 | 0.00 | 0.00 | 0.00 |
| Slope (%) | = 1.50 | 0.00 | 0.00 | n/a |
| N-Value | = .020 | .012 | .013 | n/a |
| Orifice Coeff. | = 0.60 | 0.60 | 0.60 | 0.60 |
| 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. | = 2.60 | 3.33 | 3.33 | 3.33 |
| Weir Type | = Broad | --- | --- | --- |
| Multi-Stage | = No | No | No | No |
| Exfil.(in/hr) | = 0.000 (by Contour) | | | |
| TW Elev. (ft) | = 229.62 | | | |

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

Stage / Storage / Discharge Table

| Stage ft | Storage cuft | Elevation ft | Clv A cfs | Clv B cfs | Clv C cfs | PrfRsr cfs | Wr A cfs | Wr B cfs | Wr C cfs | Wr D cfs | Exfil cfs | User cfs | Total cfs |
|----------|--------------|--------------|-----------|-----------|-----------|------------|----------|----------|----------|----------|-----------|----------|-----------|
| 0.00 | 0 | 228.50 | 0.00 | --- | --- | --- | --- | --- | --- | --- | --- | --- | 0.00 |
| 0.15 | 41 | 228.65 | 0.00 | --- | --- | --- | --- | --- | --- | --- | --- | --- | 0.00 |
| 0.30 | 83 | 228.80 | 0.00 | --- | --- | --- | --- | --- | --- | --- | --- | --- | 0.00 |
| 0.45 | 124 | 228.95 | 0.00 | --- | --- | --- | --- | --- | --- | --- | --- | --- | 0.00 |
| 0.60 | 166 | 229.10 | 0.00 | --- | --- | --- | --- | --- | --- | --- | --- | --- | 0.00 |
| 0.75 | 207 | 229.25 | 0.00 | --- | --- | --- | --- | --- | --- | --- | --- | --- | 0.00 |
| 0.90 | 248 | 229.40 | 0.00 | --- | --- | --- | --- | --- | --- | --- | --- | --- | 0.00 |
| 1.05 | 290 | 229.55 | 0.00 | --- | --- | --- | --- | --- | --- | --- | --- | --- | 0.00 |
| 1.20 | 331 | 229.70 | 8.49 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 8.49 |
| 1.35 | 373 | 229.85 | 16.54 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 16.54 |
| 1.50 | 414 | 230.00 | 24.03 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 24.03 |
| 1.60 | 592 | 230.10 | 29.08 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 29.08 |
| 1.70 | 770 | 230.20 | 34.26 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 34.26 |
| 1.80 | 948 | 230.30 | 39.58 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 39.58 |
| 1.90 | 1,126 | 230.40 | 44.58 ic | --- | --- | --- | --- | --- | --- | --- | --- | --- | 44.58 |
| 2.00 | 1,304 | 230.50 | 48.15 ic | --- | --- | --- | --- | --- | --- | --- | --- | --- | 48.15 |
| 2.10 | 1,482 | 230.60 | 51.81 ic | --- | --- | --- | --- | --- | --- | --- | --- | --- | 51.81 |
| 2.20 | 1,660 | 230.70 | 55.55 ic | --- | --- | --- | --- | --- | --- | --- | --- | --- | 55.55 |
| 2.30 | 1,838 | 230.80 | 59.38 ic | --- | --- | --- | --- | --- | --- | --- | --- | --- | 59.38 |
| 2.40 | 2,016 | 230.90 | 63.30 ic | --- | --- | --- | --- | --- | --- | --- | --- | --- | 63.30 |
| 2.50 | 2,194 | 231.00 | 67.29 ic | --- | --- | --- | --- | --- | --- | --- | --- | --- | 67.29 |
| 2.60 | 2,614 | 231.10 | 71.37 ic | --- | --- | --- | --- | --- | --- | --- | --- | --- | 71.37 |
| 2.70 | 3,033 | 231.20 | 75.53 ic | --- | --- | --- | --- | --- | --- | --- | --- | --- | 75.53 |
| 2.80 | 3,452 | 231.30 | 79.76 ic | --- | --- | --- | --- | --- | --- | --- | --- | --- | 79.76 |
| 2.90 | 3,871 | 231.40 | 83.30 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 83.30 |
| 3.00 | 4,291 | 231.50 | 86.41 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 86.41 |
| 3.10 | 4,710 | 231.60 | 89.52 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 89.52 |
| 3.20 | 5,129 | 231.70 | 92.64 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 92.64 |
| 3.30 | 5,548 | 231.80 | 95.75 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 95.75 |
| 3.40 | 5,968 | 231.90 | 98.86 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 98.86 |
| 3.50 | 6,387 | 232.00 | 101.97 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 101.97 |
| 3.60 | 7,082 | 232.10 | 105.08 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 105.08 |
| 3.70 | 7,778 | 232.20 | 108.20 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 108.20 |
| 3.80 | 8,474 | 232.30 | 111.31 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 111.31 |
| 3.90 | 9,169 | 232.40 | 114.42 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 114.42 |

Continues on next page...

Culvert

Stage / Storage / Discharge Table

| Stage ft | Storage cuft | Elevation ft | Clv A cfs | Clv B cfs | Clv C cfs | PrfRsr cfs | Wr A cfs | Wr B cfs | Wr C cfs | Wr D cfs | Exfil cfs | User cfs | Total cfs |
|-------------|-----------------|-----------------|--------------|--------------|--------------|---------------|-------------|-------------|-------------|-------------|--------------|-------------|--------------|
| 4.00 | 9,865 | 232.50 | 110.74 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 110.74 |
| 4.10 | 10,561 | 232.60 | 115.89 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 115.89 |
| 4.20 | 11,257 | 232.70 | 120.82 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 120.82 |
| 4.30 | 11,952 | 232.80 | 125.56 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 125.56 |
| 4.40 | 12,648 | 232.90 | 130.13 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 130.13 |
| 4.50 | 13,344 | 233.00 | 134.54 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 134.54 |
| 4.60 | 15,292 | 233.10 | 138.81 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 138.81 |
| 4.70 | 17,241 | 233.20 | 142.96 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 142.96 |
| 4.80 | 19,190 | 233.30 | 146.99 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 146.99 |
| 4.90 | 21,139 | 233.40 | 150.91 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 150.91 |
| 5.00 | 23,088 | 233.50 | 154.73 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 154.73 |
| 5.10 | 25,037 | 233.60 | 158.46 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 158.46 |
| 5.20 | 26,985 | 233.70 | 162.10 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 162.10 |
| 5.30 | 28,934 | 233.80 | 165.66 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 165.66 |
| 5.40 | 30,883 | 233.90 | 169.15 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 169.15 |
| 5.50 | 32,832 | 234.00 | 172.57 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 172.57 |
| 5.60 | 37,809 | 234.10 | 175.92 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 175.92 |
| 5.70 | 42,786 | 234.20 | 179.21 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 179.21 |
| 5.80 | 47,763 | 234.30 | 182.44 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 182.44 |
| 5.90 | 52,740 | 234.40 | 185.61 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 185.61 |
| 6.00 | 57,717 | 234.50 | 188.73 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 188.73 |
| 6.10 | 62,695 | 234.60 | 191.80 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 191.80 |
| 6.20 | 67,672 | 234.70 | 194.82 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 194.82 |
| 6.30 | 72,649 | 234.80 | 197.79 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 197.79 |
| 6.40 | 77,626 | 234.90 | 200.72 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 200.72 |
| 6.50 | 82,603 | 235.00 | 203.61 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 203.61 |

...End

Hydraflow Table of Contents

04174p-culvert-1.gpw

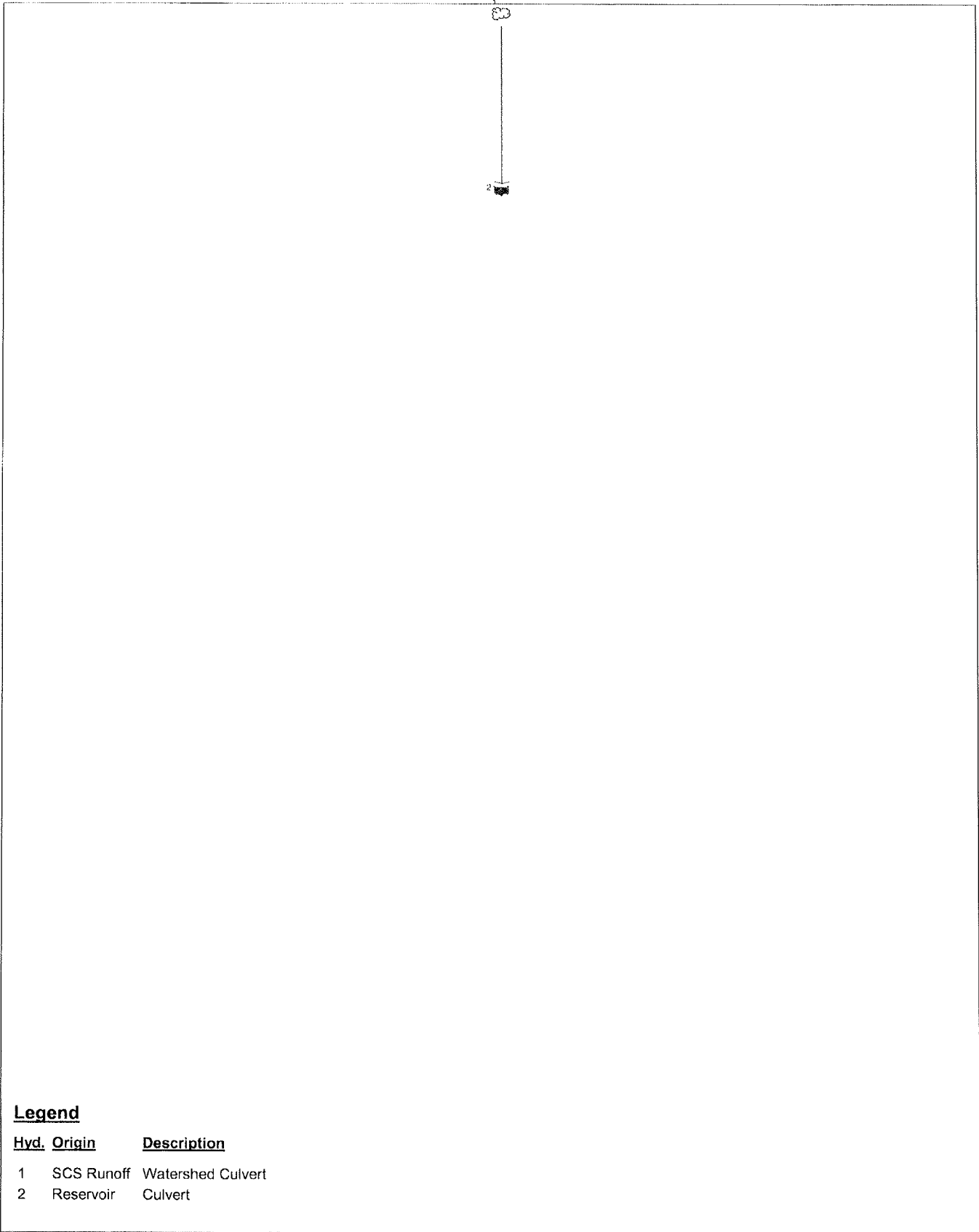
Hydraflow Hydrographs by Intelisolve v9.1

Monday, Feb 27, 2017

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Watershed Model Schematic

Hydraflow Hydrographs by Intelisolve v9.1



Legend

| <u>Hyd. Origin</u> | <u>Description</u> |
|--------------------|------------------------------|
| 1 | SCS Runoff Watershed Culvert |
| 2 | Reservoir Culvert |

Hydrograph Return Period Recap

Hydraflow Hydrographs by Intelisolve v9.1

| Hyd. No. | Hydrograph type (origin) | Inflow Hyd(s) | Peak Outflow (cfs) | | | | | | | | Hydrograph description |
|----------|--------------------------|---------------|--------------------|-------|-------|-------|-------|-------|--------|--------|------------------------|
| | | | 1-Yr | 2-Yr | 3-Yr | 5-Yr | 10-Yr | 25-Yr | 50-Yr | 100-Yr | |
| 1 | SCS Runoff | ----- | ----- | 13.88 | ----- | ----- | 50.68 | 76.21 | 100.57 | 126.33 | Watershed Culvert |
| 2 | Reservoir | 1 | ----- | 13.97 | ----- | ----- | 50.74 | 76.20 | 100.09 | 126.63 | Culvert |

Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.1

| Hyd. No. | Hydrograph type (origin) | Peak flow (cfs) | Time interval (min) | Time to peak (min) | Hyd. volume (cuft) | Inflow hyd(s) | Maximum elevation (ft) | Total strge used (cuft) | Hydrograph description |
|----------------------|--------------------------|-----------------|---------------------|--------------------|-------------------------|---------------|------------------------|-------------------------|------------------------|
| 1 | SCS Runoff | 126.33 | 6 | 762 | 993,060 | ---- | ----- | ----- | Watershed Culvert |
| 2 | Reservoir | 126.63 | 6 | 762 | 991,578 | 1 | 232.83 | 12,114 | Culvert |
| 04174p-culvert-1.gpw | | | | | Return Period: 100 Year | | Monday, Feb 27, 2017 | | |

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

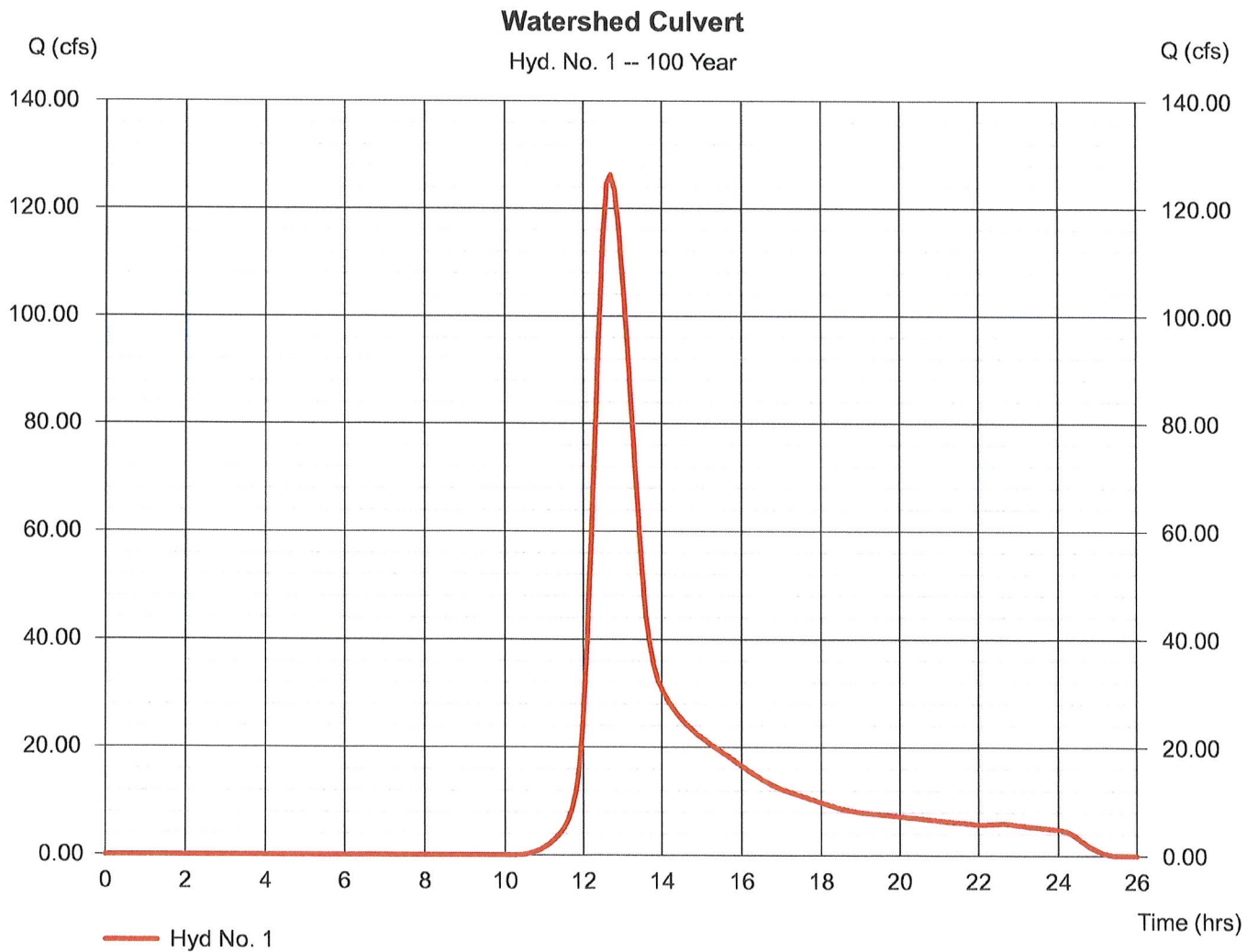
Monday, Feb 27, 2017

Hyd. No. 1

Watershed Culvert

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Time interval = 6 min
Drainage area = 108.000 ac
Basin Slope = 0.0 %
Tc method = USER
Total precip. = 6.90 in
Storm duration = 24 hrs

Peak discharge = 126.33 cfs
Time to peak = 12.70 hrs
Hyd. volume = 993,060 cuft
Curve number = 60
Hydraulic length = 0 ft
Time of conc. (Tc) = 53.00 min
Distribution = Type III
Shape factor = 484



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

Monday, Feb 27, 2017

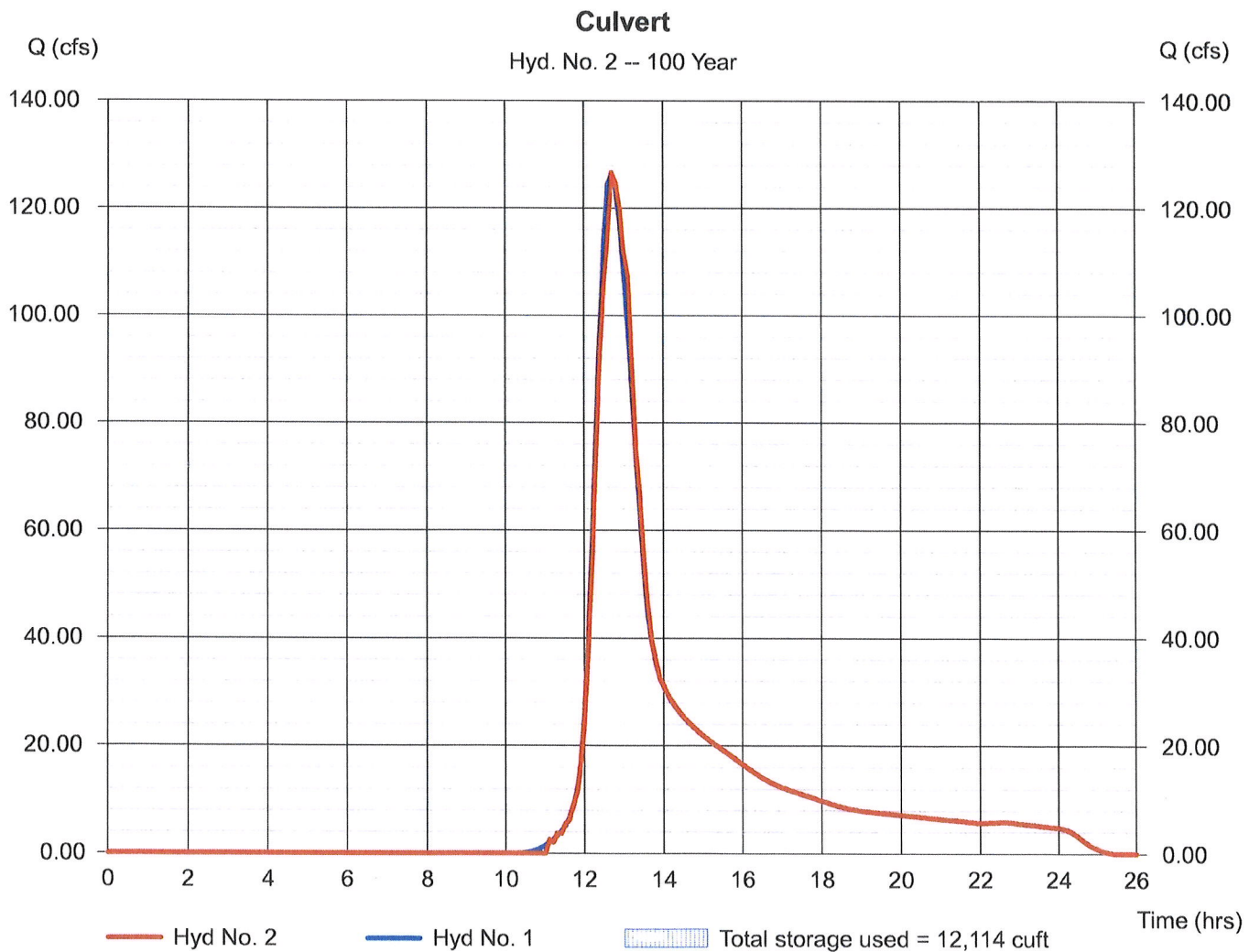
Hyd. No. 2

Culvert

Hydrograph type = Reservoir
Storm frequency = 100 yrs
Time interval = 6 min
Inflow hyd. No. = 1 - Watershed Culvert
Reservoir name = Culvert

Peak discharge = 126.63 cfs
Time to peak = 12.70 hrs
Hyd. volume = 991,578 cuft
Max. Elevation = 232.83 ft
Max. Storage = 12,114 cuft

Storage Indication method used.



Pond Report

Hydraflow Hydrographs by Intelisolve v9.1

Monday, Feb 27, 2017

Pond No. 1 - Culvert

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Beginning Elevation = 228.50 ft

Stage / Storage Table

| Stage (ft) | Elevation (ft) | Contour area (sqft) | Incr. Storage (cuft) | Total storage (cuft) |
|------------|----------------|---------------------|----------------------|----------------------|
| 0.00 | 228.50 | 00 | 0 | 0 |
| 1.50 | 230.00 | 828 | 414 | 414 |
| 2.50 | 231.00 | 2,951 | 1,781 | 2,194 |
| 3.50 | 232.00 | 5,572 | 4,192 | 6,387 |
| 4.50 | 233.00 | 8,442 | 6,957 | 13,344 |
| 5.50 | 234.00 | 33,270 | 19,488 | 32,832 |
| 6.50 | 235.00 | 68,366 | 49,771 | 82,603 |

Culvert / Orifice Structures

| | [A] | [B] | [C] | [PrfRsr] |
|-----------------|----------|------|------|----------|
| Rise (in) | = 48.00 | 0.00 | 0.00 | 0.00 |
| Span (in) | = 60.00 | 0.00 | 0.00 | 0.00 |
| No. Barrels | = 1 | 1 | 0 | 0 |
| Invert El. (ft) | = 228.50 | 0.00 | 0.00 | 0.00 |
| Length (ft) | = 70.00 | 0.00 | 0.00 | 0.00 |
| Slope (%) | = 1.50 | 0.00 | 0.00 | n/a |
| N-Value | = .020 | .012 | .013 | n/a |
| Orifice Coeff. | = 0.60 | 0.60 | 0.60 | 0.60 |
| 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. | = 2.60 | 3.33 | 3.33 | 3.33 |
| Weir Type | = Broad | --- | --- | --- |
| Multi-Stage | = No | No | No | No |
| Exfil.(in/hr) | = 0.000 (by Contour) | | | |
| TW Elev. (ft) | = 230.62 | | | |

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

Stage / Storage / Discharge Table

| Stage ft | Storage cuft | Elevation ft | Clv A cfs | Clv B cfs | Clv C cfs | PrfRsr cfs | Wr A cfs | Wr B cfs | Wr C cfs | Wr D cfs | Exfil cfs | User cfs | Total cfs |
|----------|--------------|--------------|-----------|-----------|-----------|------------|----------|----------|----------|----------|-----------|----------|-----------|
| 0.00 | 0 | 228.50 | 0.00 | --- | --- | --- | --- | --- | --- | --- | --- | --- | 0.00 |
| 0.15 | 41 | 228.65 | 0.00 | --- | --- | --- | --- | --- | --- | --- | --- | --- | 0.00 |
| 0.30 | 83 | 228.80 | 0.00 | --- | --- | --- | --- | --- | --- | --- | --- | --- | 0.00 |
| 0.45 | 124 | 228.95 | 0.00 | --- | --- | --- | --- | --- | --- | --- | --- | --- | 0.00 |
| 0.60 | 166 | 229.10 | 0.00 | --- | --- | --- | --- | --- | --- | --- | --- | --- | 0.00 |
| 0.75 | 207 | 229.25 | 0.00 | --- | --- | --- | --- | --- | --- | --- | --- | --- | 0.00 |
| 0.90 | 248 | 229.40 | 0.00 | --- | --- | --- | --- | --- | --- | --- | --- | --- | 0.00 |
| 1.05 | 290 | 229.55 | 0.00 | --- | --- | --- | --- | --- | --- | --- | --- | --- | 0.00 |
| 1.20 | 331 | 229.70 | 0.00 | --- | --- | --- | --- | --- | --- | --- | --- | --- | 0.00 |
| 1.35 | 373 | 229.85 | 0.00 | --- | --- | --- | --- | --- | --- | --- | --- | --- | 0.00 |
| 1.50 | 414 | 230.00 | 0.00 | --- | --- | --- | --- | --- | --- | --- | --- | --- | 0.00 |
| 1.60 | 592 | 230.10 | 0.00 | --- | --- | --- | --- | --- | --- | --- | --- | --- | 0.00 |
| 1.70 | 770 | 230.20 | 0.00 | --- | --- | --- | --- | --- | --- | --- | --- | --- | 0.00 |
| 1.80 | 948 | 230.30 | 0.00 | --- | --- | --- | --- | --- | --- | --- | --- | --- | 0.00 |
| 1.90 | 1,126 | 230.40 | 0.00 | --- | --- | --- | --- | --- | --- | --- | --- | --- | 0.00 |
| 2.00 | 1,304 | 230.50 | 0.00 | --- | --- | --- | --- | --- | --- | --- | --- | --- | 0.00 |
| 2.10 | 1,482 | 230.60 | 0.00 | --- | --- | --- | --- | --- | --- | --- | --- | --- | 0.00 |
| 2.20 | 1,660 | 230.70 | 16.99 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 16.99 |
| 2.30 | 1,838 | 230.80 | 26.77 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 26.77 |
| 2.40 | 2,016 | 230.90 | 35.00 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 35.00 |
| 2.50 | 2,194 | 231.00 | 42.64 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 42.64 |
| 2.60 | 2,614 | 231.10 | 50.02 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 50.02 |
| 2.70 | 3,033 | 231.20 | 57.29 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 57.29 |
| 2.80 | 3,452 | 231.30 | 64.54 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 64.54 |
| 2.90 | 3,871 | 231.40 | 71.80 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 71.80 |
| 3.00 | 4,291 | 231.50 | 79.11 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 79.11 |
| 3.10 | 4,710 | 231.60 | 86.49 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 86.49 |
| 3.20 | 5,129 | 231.70 | 92.63 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 92.63 |
| 3.30 | 5,548 | 231.80 | 95.75 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 95.75 |
| 3.40 | 5,968 | 231.90 | 98.86 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 98.86 |
| 3.50 | 6,387 | 232.00 | 101.97 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 101.97 |
| 3.60 | 7,082 | 232.10 | 105.08 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 105.08 |
| 3.70 | 7,778 | 232.20 | 108.20 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 108.20 |
| 3.80 | 8,474 | 232.30 | 111.31 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 111.31 |
| 3.90 | 9,169 | 232.40 | 114.42 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 114.42 |

Continues on next page...

Culvert

Stage / Storage / Discharge Table

| Stage ft | Storage cuft | Elevation ft | Civ A cfs | Civ B cfs | Civ C cfs | PrfRsr cfs | Wr A cfs | Wr B cfs | Wr C cfs | Wr D cfs | Exfil cfs | User cfs | Total cfs |
|-------------|-----------------|-----------------|--------------|--------------|--------------|---------------|-------------|-------------|-------------|-------------|--------------|-------------|--------------|
| 4.00 | 9,865 | 232.50 | 110.73 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 110.73 |
| 4.10 | 10,561 | 232.60 | 115.89 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 115.89 |
| 4.20 | 11,257 | 232.70 | 120.82 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 120.82 |
| 4.30 | 11,952 | 232.80 | 125.56 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 125.56 |
| 4.40 | 12,648 | 232.90 | 130.13 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 130.13 |
| 4.50 | 13,344 | 233.00 | 134.54 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 134.54 |
| 4.60 | 15,292 | 233.10 | 138.81 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 138.81 |
| 4.70 | 17,241 | 233.20 | 142.96 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 142.96 |
| 4.80 | 19,190 | 233.30 | 146.99 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 146.99 |
| 4.90 | 21,139 | 233.40 | 150.91 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 150.91 |
| 5.00 | 23,088 | 233.50 | 154.73 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 154.73 |
| 5.10 | 25,037 | 233.60 | 158.46 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 158.46 |
| 5.20 | 26,985 | 233.70 | 162.10 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 162.10 |
| 5.30 | 28,934 | 233.80 | 165.66 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 165.66 |
| 5.40 | 30,883 | 233.90 | 169.15 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 169.15 |
| 5.50 | 32,832 | 234.00 | 172.57 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 172.57 |
| 5.60 | 37,809 | 234.10 | 175.92 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 175.92 |
| 5.70 | 42,786 | 234.20 | 179.21 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 179.21 |
| 5.80 | 47,763 | 234.30 | 182.44 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 182.44 |
| 5.90 | 52,740 | 234.40 | 185.61 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 185.61 |
| 6.00 | 57,717 | 234.50 | 188.73 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 188.73 |
| 6.10 | 62,695 | 234.60 | 191.80 oc | --- | --- | --- | --- | --- | --- | --- | --- | --- | 191.80 |
| 6.20 | 67,672 | 234.70 | 194.52 ic | --- | --- | --- | --- | --- | --- | --- | --- | --- | 194.52 |
| 6.30 | 72,649 | 234.80 | 196.89 ic | --- | --- | --- | --- | --- | --- | --- | --- | --- | 196.89 |
| 6.40 | 77,626 | 234.90 | 199.23 ic | --- | --- | --- | --- | --- | --- | --- | --- | --- | 199.23 |
| 6.50 | 82,603 | 235.00 | 201.54 ic | --- | --- | --- | --- | --- | --- | --- | --- | --- | 201.54 |

...End

**PRELIMINARY CULVERT ANALYSIS
DORSET CROSSING, LLC
NEW TOWN ROAD
SIMSBURY, CT**

FAHA Project No. 04174.00

Prepared for:

**Dorset Crossing, LLC
Applicant**

Prepared by:

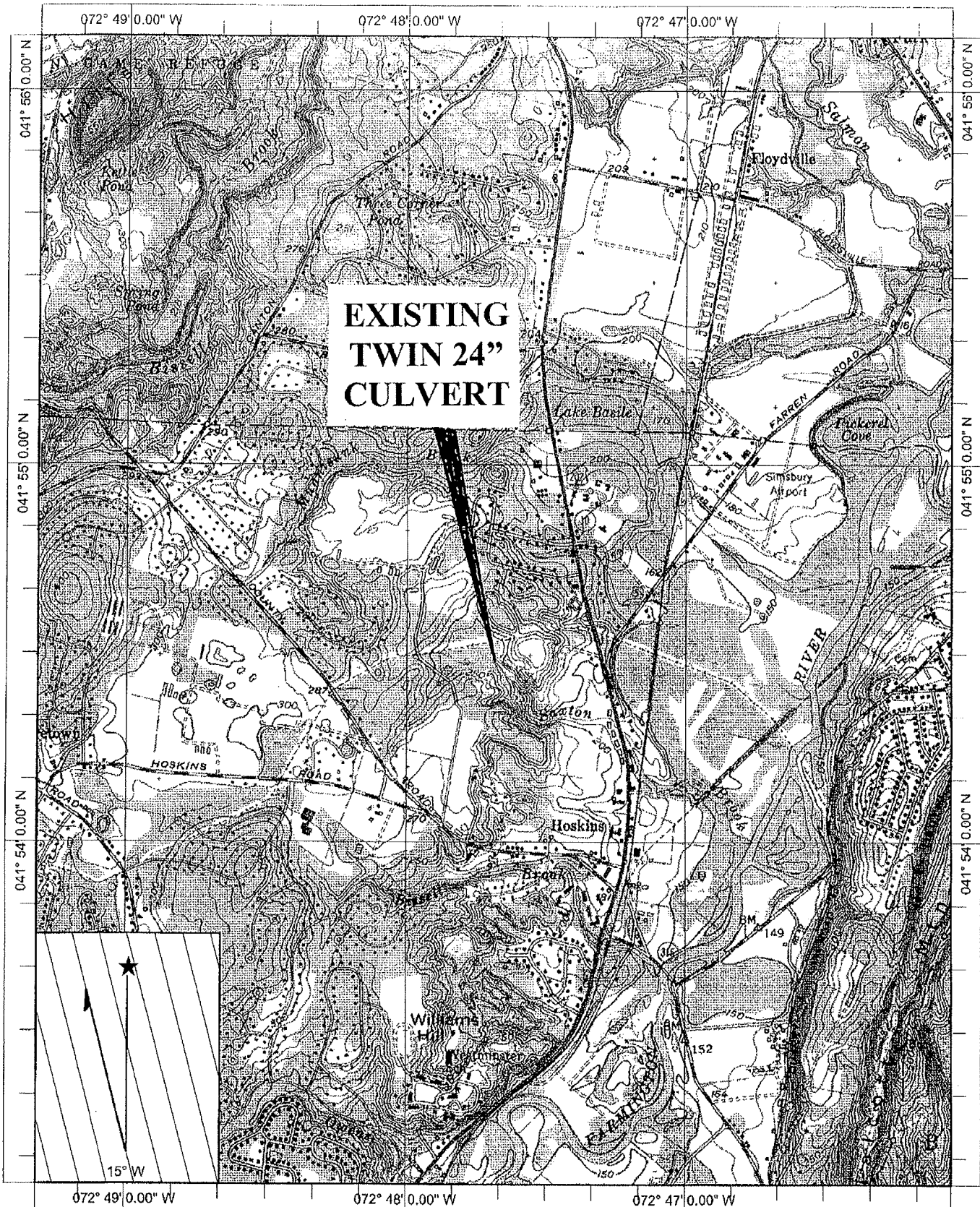


**F. A. Hesketh
& Associates, Inc.**

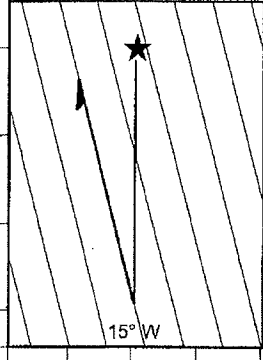
**6 Creamery Brook
East Granby, CT 06026**

860-653-8000

May 18, 2012



**EXISTING
TWIN 24"
CULVERT**



Name: TARIFFVILLE
 Date: 5/15/2012
 Scale: 1 inch equals 2000 feet

Location: 041° 54' 37.2" N 072° 47' 40.9" W
 Caption: LOCATION MAP

SUMMARY TABLE 1

CULVERT ANALYSIS EXISTING AND PROPOSED CONDITIONS

DORSET CROSSING, SIMSBURY, CT

PLANS DATED 5/18/2012

| OPTION NO. | CULVERT CHARACTERISTIC | | DETENTION POND | | | CULVERT MANNING COEFFICIENT | CULVERT BOTTOM CONDITIONS |
|--------------|------------------------|----------|----------------|----------------|------------------|-----------------------------|---------------------------|
| | SIZE (INCHES) | MATERIAL | FLOW IN (CFS) | FLOW OUT (CFS) | ELEVATION (FEET) | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| EXISTING | 2x24" | ADS | 98.6 | 95.7 | 233.98 | 0.01 | N/A |
| PROPOSED (1) | 64"x43" | ACCOMP | 126.3 | 126.4 | 232.24 | 0.012 | PAVED |
| PROPOSED (2) | 64"x43"(64"x37")* | ACCOMP | 126.3 | 121.7 | 233.22 | 0.028 | 6" GRAVEL |
| PROPOSED (3) | 71"x47"(71"x41")* | ACCOMP | 126.3 | 125.4 | 232.64 | 0.028 | 6" GRAVEL |
| PROPOSED (4) | 60"x48" | CONCRETE | 126.3 | 124.2 | 232.5 | 0.012 | PAVED |
| PROPOSED (5) | 72"x48" | CONCRETE | 126.3 | 126.5 | 231.88 | 0.012 | PAVED |

* (CULVERT DESIGN DIMENTIONS)

CULVERT INVENTORY/ANALYSIS

TAKEN FROM
TOWN DRAINAGE
STUDY

INVENTORY

LOCATION: Saxton Brook Crossing West of NO.: I4-104A
Route 10

DESCRIPTION OF EXISTING STRUCTURES 30" RCP; block and mortar headwall and endwall with concrete wingwall -
Poor condition.

STRUCTURE LENGTH: 90' AVAILABLE HEAD: 12.6

ANALYSIS:

WATERSHED AREA (Acres) 230
DESIGN STORM FREQUENCY (Year) 25

A. PRESENT DEVELOPMENT

Soils Conservation Service (SCS) TR-20 Method

CN - Incremental Curve Number Value 55
T_C - Incremental Time of Concentration, Minutes 53

Peak Rates of Runoff:

25 Year Storm Frequency 54 CFS
50 Year Storm Frequency 79 CFS
100 Year Storm Frequency 108 CFS

Required Size Existing is adequate (see comments)
Cost -

B. ULTIMATE DEVELOPMENT

Soils Conservation Service (SCS) TR-20 Method

CN - Incremental Curve Number Value 69
T_C - Incremental Time of Concentration, Minutes 30

Peak Rates of Runoff:

25 Year Storm Frequency 166 CFS
50 Year Storm Frequency 212 CFS
100 Year Storm Frequency 262 CFS

Required Size Replace w/54" RCP
Cost 9,000

III. COMMENTS

The inlet is 90% blocked and disjointed.

CULVERT INVENTORY/ANALYSIS

INVENTORY

LOCATION: Hopmeadow St @ Saxton Brook NO.: I4-104
(Saxton Brook Watershed)

DESCRIPTION OF EXISTING STRUCTURES 30" RCP; concrete
headwall and endwall - Poor condition.

STRUCTURE LENGTH: 126' AVAILABLE HEAD: 6.2'

ANALYSIS:

| | | |
|------------------------|---------|------------|
| WATERSHED AREA | (Acres) | <u>230</u> |
| DESIGN STORM FREQUENCY | (Year) | <u>100</u> |

A. PRESENT DEVELOPMENT

Soils Conservation Service (SCS) TR-20 Method

| | |
|---|-----------|
| CN - Incremental Curve Number Value | <u>55</u> |
| T _c - Incremental Time of Concentration, Minutes | <u>53</u> |

Peak Rates of Runoff:

| | | |
|--------------------------|------------|-----|
| 25 Year Storm Frequency | <u>54</u> | CFS |
| 50 Year Storm Frequency | <u>79</u> | CFS |
| 100 Year Storm Frequency | <u>108</u> | CFS |

Required Size Replace w/a 54" RCP
Cost \$ 12,500

B. ULTIMATE DEVELOPMENT

Soils Conservation Service (SCS) TR-20 Method

| | |
|---|-----------|
| CN - Incremental Curve Number Value | <u>69</u> |
| T _c - Incremental Time of Concentration, Minutes | <u>30</u> |

Peak Rates of Runoff:

| | | |
|--------------------------|------------|-----|
| 25 Year Storm Frequency | <u>166</u> | CFS |
| 50 Year Storm Frequency | <u>212</u> | CFS |
| 100 Year Storm Frequency | <u>262</u> | CFS |

Required Size Replace w/2 54" RCP
Cost \$25,000

C. COMMENTS

The concrete endwall has deteriorated and the outlet is 1/2 full of sand.

Additional information is available in this community, contact your local Flood Insurance Program at (800) 638-6620.



MAP SCALE 1" = 500'

250 0 500 1000 FEET



TOWN OF SIMSBURY
090035

ZONE X

Saxton Brook

ZONE A

Saxton Brook

ZONE X

SAXTONBROOK DR

JOINS PANEL 0193

683000 M

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0191F

FIRM
FLOOD INSURANCE RATE MAP
HARTFORD COUNTY,
CONNECTICUT
(ALL JURISDICTIONS)

PANEL 191 OF 675

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

| CONTAINS | NUMBER | PANEL | SUFFIX |
|---------------------|--------|-------|--------|
| EAST GRANBY TOWN OF | 090035 | 0191 | F |
| GRANBY TOWN OF | 090126 | 0191 | F |
| SIMSBURY TOWN OF | 090035 | 0191 | F |

Notice to User: The Map Number shown below should be used when ordering a map for a specific community. The community name above should be used on insurance applications for the subject community.



MAP NUMBER
090035C0191F

EFFECTIVE DATE:
SEPTEMBER 26, 2008

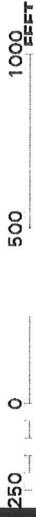
Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

lood insurance is available in this community, contact yo
 nial Flood Insurance Program at (800) 638-6620.



MAP SCALE 1" = 500'



NFIP
 NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0193F

FIRM
FLOOD INSURANCE RATE MAP
 HARTFORD COUNTY,
 CONNECTICUT
 (ALL JURISDICTIONS)

PANEL 193 OF 675

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

| CONTAINS | NUMBER | PANEL | SUFFIX |
|---------------|--------|-------|--------|
| COMMUNITY | | | |
| STATE/TOWN OF | 08555 | 0193 | F |

Notes to User: The Map Number shown below should be used
 for all correspondence regarding this map. The information
 above should be used on insurance applications for the subject
 community.



MAP NUMBER
 09003C0193F

EFFECTIVE DATE:
 SEPTEMBER 26, 2008

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It
 was extracted using F-MIT On-Line. This map does not reflect changes
 or amendments which may have been made subsequent to the date on the
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 Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

990000 FT

ZONE X

ZONE A

LIMIT OF
 STUDY

Saxon Brook



| | | | | | | | | | | | | | |
|---|--|----------|-------|------|-------|-----------|--|--|--|------------------|-------|-------|---|
| <p>OTHER FLOOD AREAS</p> <p>ZONE X Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.</p> <p>OTHER AREAS</p> <p>ZONE X Areas determined to be outside the 0.2% annual chance floodplain.</p> <p>ZONE D Areas in which flood hazards are undetermined, but possible.</p> <p>COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS</p> <p>OTHERWISE PROTECTED AREAS (OPAs)</p> <p>CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.</p> <p>----- 1% annual chance floodplain boundary ----- 0.2% annual chance floodplain boundary ----- Floodway boundary ----- Zone D boundary ***** CBRS and OPA boundary ----- Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or velocities. -----51.3----- Base Flood Elevation line and value; elevation in 0* (EL 087) Base Flood Elevation value where uniform within zone; elevation in 0*</p> <p>*Referenced to the North American Vertical Datum of 1988</p> <p>(A)----- (A) Cross Section Line (23)----- (23) Transect Line</p> <p>97°07'30", 32°22'30" Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)</p> <p>4276003M 1000-meter Universal Transverse Mercator grid values, zone 18 600000 FT 6000-foot grid ticks</p> <p>DX5510 X Bench mark (see explanation in Notes to Users section of this FIRM panel).</p> <p>● M1.5 River Mile</p> <p>MAP REPOSITORY Refer to Repository Listing on Index Map</p> | <p>and insurance is available in this community, contact your local Flood Insurance Program at (800) 938-6620.</p> <p>MAP SCALE 1" = 500'</p> <p>250 0 500 1000 FEET</p> <p>PANEL 0193F</p> <p>FIRM FLOOD INSURANCE RATE MAP HARTFORD COUNTY, CONNECTICUT (ALL JURISDICTIONS)</p> <p>PANEL 193 OF 675</p> <p>SEE MAP INDEX FOR FIRM PANEL LISTINGS</p> <table border="1"> <tr> <td>CONTAINS</td> <td>DATE</td> <td>PAGE</td> <td>SHEET</td> </tr> <tr> <td>COMMUNITY</td> <td></td> <td></td> <td></td> </tr> <tr> <td>DATE: 09/26/2008</td> <td>SCALE</td> <td>1:500</td> <td>1</td> </tr> </table> <p>Notes to Users: This Map Number shows areas which are used when making rate maps. The Floodway Number shows areas which are used for the determination of the water velocity.</p> <p>MAP NUMBER 09003CD193F</p> <p>EFFECTIVE DATE: SEPTEMBER 26, 2008</p> <p>Federal Emergency Management Agency</p> <p><small>This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIF On-line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.nrsa.fema.gov.</small></p> | CONTAINS | DATE | PAGE | SHEET | COMMUNITY | | | | DATE: 09/26/2008 | SCALE | 1:500 | 1 |
| CONTAINS | DATE | PAGE | SHEET | | | | | | | | | | |
| COMMUNITY | | | | | | | | | | | | | |
| DATE: 09/26/2008 | SCALE | 1:500 | 1 | | | | | | | | | | |

PERFORMED SCOUR HOLE, TYPE 1
 MODIFIED RIPRAP
 F=0.63', C=7.5', B=6.25'

FL = 171.0 ±

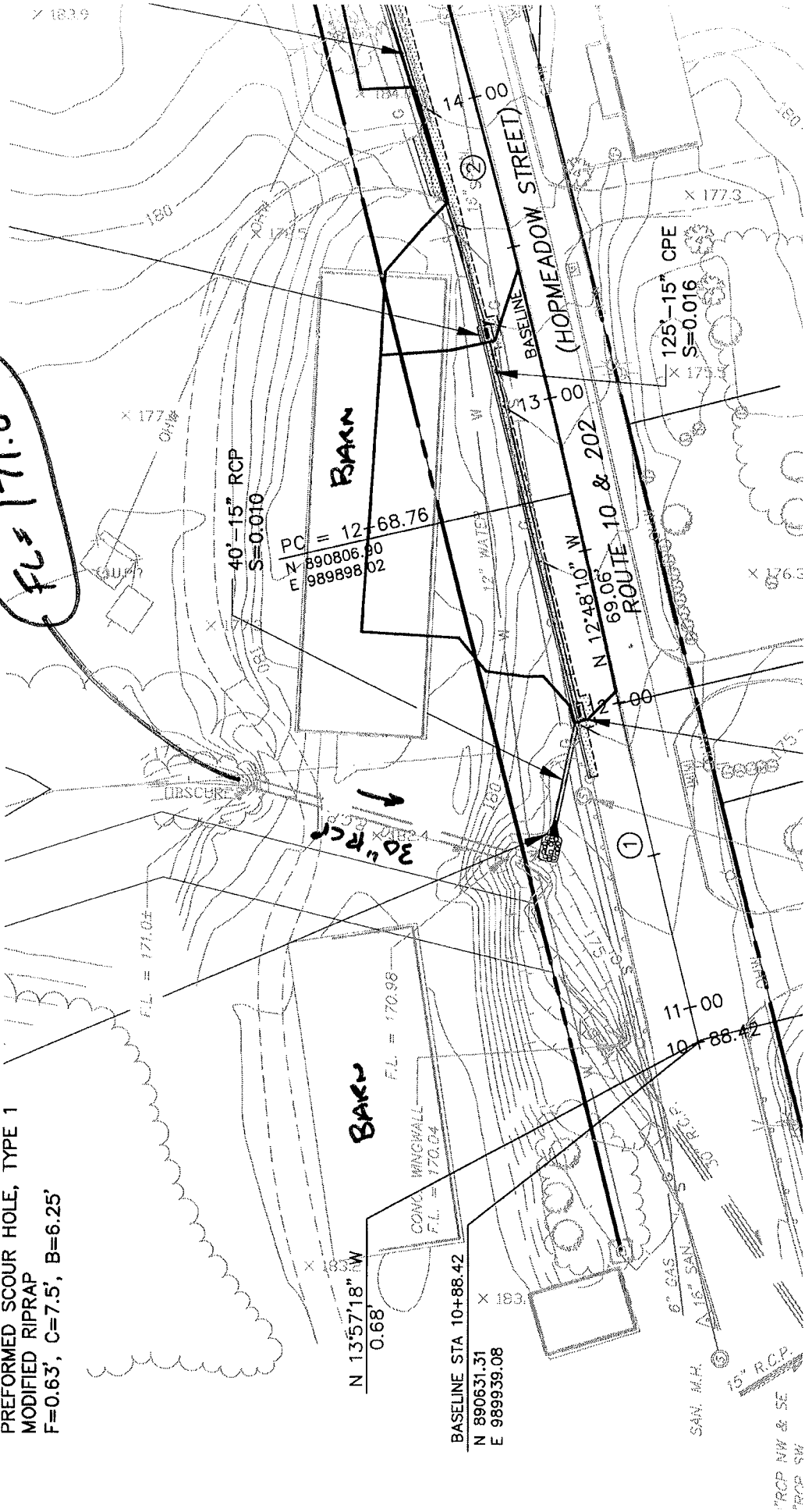


FIGURE NO. 1
FAHA DESIGN
2012 PLAN SET