ALLIANCE
CONSULTING ENGINEERS

June 29, 2020

Mr. Brandon L. Phillips, Engineering Associate
Solid Waste Permitting and Monitoring Section
Division of Mining and Solid Waste Management
Bureau of Land and Waste Management
SC Department of Health and Environmental Control
2600 Bull Street
Columbia, South Carolina 29201

RE: Permit Application for the Greenpointe Class Two Construction, Demolition, and Land-Clearing Debris (C&D) Landfill Expansion
Permit No.: LF2-00001
Project No.: 16227-0004

Dear Mr. Phillips:

In response to your comments via email on June 8, 2020 for the referenced project, we have the following comment response. The following items were brought to our attention in the aforementioned email and are listed along with our response to each item:

ENGINEERING PLANS

1. *The Construction Plans need to show the distances between the landfill footprint and the following 2 items: minimum 100-foot buffer from all drinking water wells, and a minimum 2,500-foot buffer from any public drinking water supply intake;*
   - **Sheet C-2.0 of the Construction Plans (Drawing No. 01,168-D21 dated June 26, 2020) has been updated to include the minimum 100-foot buffer between the landfill footprint and the on-site drinking water well. The nearest public drinking water supply intake is the Easley Combined Utilities surface water intake at Saluda Lake located approximately 10 miles north of the site, which is outside of the minimum 2,500-foot buffer required from any public drinking water supply intake.**

2. *Update drawing sheets C-6.0, C-6.1 and C-6.2 to show the detailed cross-section of the landfill after maximum settlement;*
   - **Sheets C-6.0, C-6.1, & C-6.2 of the Construction Plans (Drawing No. 01,168-D21 dated June 26, 2020) have been updated to show the maximum settlement on the Cross Sections.**

3. *Provide a location map showing a minimum 10,000-foot buffer from turbojet aircraft runway and a minimum 5,000-foot buffer from piston-type aircraft runway;*
   - **The nearest airport to the facility is the Pickens County Airport, located approximately nine (9) miles north of the site, outside of the minimum 5,000-ft buffer for piston-type aircraft runways and the minimum 10,000-ft buffer for turbojet aircraft runways.**

ENGINEERING REPORT

4. *Please provide a procedure for the cap inspection and maintenance of the Class 2 landfill;*
    - **Section 8.2 of the Engineering Report details the Cap Inspection and Maintenance Procedures to be followed for the Greenpointe Landfill.**

REVIEW COMMENTS BY STORMWATER SECTION

5. *Please clarify what type/manufacturer of EBC and TRM you are requiring to be installed on the slopes and the ditch/swales;*
    - **North American Green SC150 will be installed on the slopes and North American Green SC150 will be installed on the ditches/swales. The Construction Plans (Drawing No. 01,168-D21 dated June 26, 2020) have been updated to state what type of matting is to be used.**

6. *Please clarify will the check dams be rock or sediment tubes;*
    - **The check dams will be rock. The detail for sediment tubes has been removed from Sheet C-7.1 of the Construction Plans (Drawing No. 01,168-D21 dated June 26, 2020).**

7. *Please provide a table with the areas of the ditch/swales which are to get ECB and which are to get TRM as the hydrology report lists some areas as having velocities greater than 30 ft/sec;*
    - **The highest velocity is in Perimeter Ditch 2A.1 of 7.59 feet per second as shown in Appendix E of the C-SWPPP. All ditches will be lined with North American Green SC250 matting, which has a design permissible velocity of 9.59 feet per second (unvegetated) and 15 feet per second (vegetated). Rip rap will be installed at all slope drain outlets to prevent scouring and erosion at all discharge points.**

8. *Please re-calculate the 80% trapping efficiency calculations for the ponds with the smallest D15 value. Madison D15 is 0.0053, Cecil D15 is 0.0043;*
    - **Sediment trapping efficiency calculations have been revised using the Cecil D15 value. The revised Sediment Trapping Efficiency Calculations are included in Appendix F of the C-SWPPP.**

9. *Please clarify in the hydrology report for each of the 3 basins the low flow orifice was not listed in the pond report on pages 559, 563, 567. The ponds will not discharge according to the hydro report until it begins to overtop the riser;*
    - **The low flow orifices have been added to the Post Development Hydraflow Report and revised on Sheet C-8.1 of the Construction Plans (Drawing No. 01,168-D21 dated June 26, 2020).**

10. *Please clarify will the temporary pipe slope drains be converted into permanent pipe slope drains with TRM once the lift is complete and the next lift begins operation;*
    - **Temporary slope drains will be converted to permanent slope drains once the lift has been completed and the next lift begins.**

11. *Please clarify Pond 2 shows an increase of peak discharge for the 2 year event of 0.14CFS, how is this increase being addressed?*
    - **As mentioned in Section 1.1 of the C-SWPPP, the slight increase of 0.14-cfs is compared to the previous design calculations. The post development peak flow rate is still below the pre-development peak flow rates as shown on the revised Table in Section 1.1 of the C-SWPPP.**

12. *Please clarify the SWPPP states the Skimmers are to remain permanently, does this mean they are to stay in operation until the landfill has ceased operations and the ponds will then be converted to water quality ponds?*
    - **Skimmers are to be removed once the landfill has ceased operations (and achieved 70% stabilization). The skimmers will be removed for the outlet structure and the low flow orifice will provide water quality post construction.**

13. *Please clarify will the silt fence remain and be repaired/replaced throughout the life of the landfill;*
    - **The silt fence will need to be maintained as long as areas that are draining towards it have not achieved 70% stabilization. Once these areas have achieved 70% stabilization, the silt fence will no longer need to be maintained and can be removed as stated on Sheet C-7.0 of the Construction Plans (Drawing No. 01,168-D21 dated June 26, 2020).**

14. *Please provide a Maintenance and Responsibility Agreement for the ponds;*
    - **Signed Permanent Pond Maintenance and Responsibility Agreement has been included with this comment response package.**

15. *Please move back the 1st row of Coir Baffles back a little on drawing sheet C5.1 so it is not so close to the rock forebay;*
    - **Silt baffles have been revised accordingly on Sheet C-5.1 of the Construction Plans (Drawing No. 01,168-D21 dated June 26, 2020).**

16. *Please clarify on drawing sheet C8.1 the hydro calcs state the emergency spillway is 25' but the detail sheet list 20' for basin 2, addition the other 2 basins have similar inconsistencies;*
    - **The correct spillway lengths are listed in the spillway notes on Sheet C-8.0 of the Construction Plans (Drawing No. 01,168-D21 dated June 26, 2020). The reference to 20' has been removed from the detail on Sheet C-8.0 and the spillway notes on Sheet C-8.1 have been revised to reference the correct lengths.**

17. *Please clarify on drawing sheet C8.1 the riser crest lengths for each of the 3 basins do not match the construction detail;*
    - **The riser crest lengths have been revised accordingly in the enclosed hydraflow report.**

18. *Please clarify on drawing sheet C5.2 the buffer width is reduced by the access road, a surface water protection plan will need to be developed and Compliance option 2 from the CGP will need to be addressed in the SWPPP;*
    - **The C-SWPPP has been revised to state that Compliance Option B from the Construction General Permit (CGP) will be utilized and the Surface Water Protection Plan Construction Sequence has been added to Section 1.7 of the C-SWPPP.**

We trust that this information is to your satisfaction and look forward to your approval. If you have any questions or comments, please contact us at (803) 779-2078.

Very truly yours,

ALLIANCE CONSULTING ENGINEERS, INC.

Ryan T. Ohmer, P.E.
Project Engineer

Enclosures

cc: Mr. Radford Jenkins, Wasteco, Inc.
Mr. Robert "Ty" Hawkins, Bunnell Lammons Engineering
Mr. Deepal S. Eliatamby, P.E., SCCED, Alliance Consulting Engineers, Inc.
Mr. Kyle M. Clampitt, P.E., Alliance Consulting Engineers, Inc.
Mr. Gregory T. Farrell, P.E., Alliance Consulting Engineers, Inc.

ENGINEERING REPORT

COMPREHENSIVE STORMWATER POLLUTION PREVENTION PLAN (C-SWPPP)

FOR THE

GREENPOINTE CONSTRUCTION & DEMOLITION LANDFILL EXPANSION

LOCATED IN ANDERSON COUNTY, SOUTH CAROLINA

Wasteco, Inc.

Prepared For:
Wasteco, Inc.
500 Hamlin Road
Easley, South Carolina 29642

Prepared By:
Alliance Consulting Engineers, Inc.
124 Verdae Boulevard, Suite 505
Greenville, South Carolina 29607

Project Number 16227-0004
June 2019
Revised June 2020

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1.0 Project Overview

1.1 Narrative

Wasteco, Inc. is proposing the expansion of the Greenpointe Construction and Debris (C&D) Landfill, which consists of construction of a new approximately 8.02 acre (AC) expansion to the existing 21.60 AC Cell 1 C&D Landfill, a new approximately 17.77 AC C&D Cell 2, and a gravel access road located along Hamlin Road in Anderson County, South Carolina. The property (TMS # 164-00-02-036 and 138-00-04-013) is located approximately one (1) mile west of exit 35 on Interstate I-85 in Anderson County, as illustrated in the Site Location Map in **Appendix A**. The proposed development will include approximately 66.8 AC of land disturbance of the approximately 212.5 AC site.

The Anderson County Digital Ortho Quarter Quadrangle (DOQQ) imagery provided by the United States Department of Agriculture Farm Service Agency (USDA-FSA) (See Aerial Map in **Appendix A**) was utilized to provide a general overview of the site and its surroundings. Expansion of Cell 1 and Cell 2 of the site consists of wooded, newly graded, grass, brush, impervious, and gravel areas. The United States Geological Survey's (USGS) 7.5 Minute Anderson County Quad Map (See Topographic Map in **Appendix A**) was utilized to provide a general overview of the site and surrounding area drainage patterns. Utilizing a topographic survey conducted by F&S Surveyors, Engineers, & Planners, Inc. dated February 8, 2017, it appears that a majority of the stormwater runoff is to one (1) discharge point along the southeastern portion of the property line at Pickens Creek. Based on a review of the South Carolina Soil Survey for Anderson County it is apparent that Cartecay (Ca) hydrologic soil group (HSG) B/D, Cecil (CdB, CdC, CdD, CeC2) HSG B, Hiwassee (HaC) HSG B, and Madison (MaC, MaD, MaE) HSG B soil comprises the project site (See Soils Map in **Appendix A**). The Federal Emergency Management Agency (FEMA) Flood Map Panels 45007C0040E, 45007C0110E, 45007C0130E, 45077C295D, 45077C0315D, and 45077C0410D dated 2011 (See FEMA Flood Map in **Appendix A**) identifies that the project site is located within the floodzone, which indicates the site is in an area of flooding and is inside of the 100-year Flood Plain. Based on the provided base flood elevations shown on the FEMA Map, the project site will not disturb this flood zone area. The National Wetlands Inventory (NWI) Map provided by the US Fish and Wildlife Service (See NWI Map in **Appendix A**), indicates there is one (1) creek (Pickens Creek) that borders the site from east to west transversing the property site. This creek has been delineated and is shown on the Construction Plans.

The proposed landfill expansion will include the construction of the approximately 8.02 AC expansion to the existing 21.60 AC Cell 1 C&D Landfill, a new approximately 17.77 AC C&D Cell 2, and a gravel access road. All earth moving activities will tie into existing grade and will

maintain the existing flow patterns of stormwater on-site. The proposed development's stormwater will be routed into three (3) detention basins (See Maps in **Appendix B**). There are currently two (2) detention basins (Detention Basin 1 and 2) on-site. The existing Detention Basin 1 will remain, Detention Basin 2 will be expanded, and a new detention basin (Detention Basin 3) will be constructed. The existing, expanded and new detention basins have approximately 1,306,766 cubic-feet of combined storage and are located along the southeastern portion of the property.

Appendix B, Pre-Development Watershed Map, illustrates the locations of the pre-development watershed areas for the existing Cell 1, expansion of Cell 1, and proposed Cell 2 landfills. The hydraulic calculations for the existing Cell 1 C&D landfill development of the site were performed to compare to the design release rates shown in the previous report (see Appendix C for calculations). The existing Cell 1 C&D Landfill was approved and permitted separately in 2008 under permit LF2-001 (see Appendix C for calculations).

Three (3) existing study points were observed for this site. Drainage Area 1.1 (DA 1.1) is approximately 15.0 AC which contains good-wooded and fair-brush areas. The Discharge Point DA 1.1 is out of the existing Detention Basin 1, which continues in the southerly direction to discharge at Pickens Creek. Drainage Area 1.2 (DA 1.2) is approximately 13.0 acres which contains fair-brush, gravel, and newly graded soil areas. The Discharge Point DA 1.2 Outfall is at the existing Detention Basin 2, which continues in the southerly direction to discharge at Pickens Creek. Drainage Area 2.1 (DA 2.1) is approximately 40.78 AC which contains good-wooded area and fair-brush area. The analysis area DA 2.1 is the area of Cell 2 draining southwest to the wetlands and southeast into Pickens Creek.

Appendix B, Post Development Watershed Map, illustrates the location of the post-development watershed areas and the apparent stormwater drainage patterns. The existing three (3) DAs are subdivided into four (4) Das.

DA 1.1 is approximately 17.34 AC size and is routed to the existing Detention Basin 1, which drains into Outfall 1. DA 1.2 is approximately 27.61 AC in size and is routed to the new expansion of Detention Basin 2, which drains into Outfall 1. This drainage area contains proposed impervious surface, gravel, newly graded soil, fair-grass, and good-woods for the new Cell 1 expansion. The peak flows from Detention Basin 1 and Detention Basin 2 are combined at Outfall 1 for the total post development discharge rates.

DA 2.1 splits into DA 2.1 and DA 2.1 Bypass. DA 2.1 is approximately 23.38 AC in size and is routed to the new Detention Basin 3, which discharges into Outfall 2. DA 2.1 Bypass is approximately 17.41 AC in size and bypasses into the discharge point Outfall 2. This drainage area contains proposed newly graded soils, impervious surfaces, and gravel for the Cell 2 C&D landfill.

The peak flows from the DA 2.1 to the new Detention Basin 3 and DA 2.1 Bypass are combined at Outfall 2 for the total post development discharge rates.

The Stormwater Calculations conducted by Alliance Consulting Engineers, Inc. modeled the overall development utilizing the HydraCAD® Software. This program utilized the SCS method for generating hydrographs, in accordance with South Carolina state regulations. The pre-developed peak flows and post-developed peak flows can be seen in **Table 1A-1C.** DA 1.1 and 1.2 studies the point of discharge from Detention Basins 1 and 2. DA 2.1 studies the discharge into Pickens Creek from the Detention Basin 3 and bypass at Cell 2. The post-developed flows are required to be less than the pre-developed flows up through the 25-yr, 24-hr storm event per Anderson County requirements. As shown in the tables below, even though there is a slight increase from the previously approved post-development peak flow rates, they are still below the pre-development peak flow rates (see Appendix C).

Table 1A – Pre-Developed, Previous Design and Post Developed Peak Flows for Outfall 1

Return Period	Pre-Dev. Peak Flow (CFS)	Previous Design Peak Flow (CFS)	Post-Dev. Peak Flow (CFS)
2 yr, 24-hr	53.52	1.90	2.94
10 yr, 24-hr	108.10	2.21	3.54
25 yr, 24-hr	135.11	6.20	7.17

Table 1B - Pre and Post Developed Peak Flows for Outfall 2

Return Period	Pre-Dev. Peak Flow (CFS)	Post-Dev. Peak Flow (CFS)
2 yr, 24-hr	11.91	10.95
10 yr, 24-hr	53.17	33.61
25 yr, 24-hr	83.76	61.80

Water quality will be provided for this project by the use of skimmers sized for a drawdown of one (1) day for the water quality volume. Sheets C-8.0-8.1 of the Construction Plans includes the details and cross-sections for the detention ponds and skimmers.

Stormwater runoff in DA 2.1 Bypass will have the same good condition of stabilized and wooded areas to flow through in the proposed Post-Development conditions just as it did in the Pre-Development prior to entering the existing creek bed. Therefore, no controls are proposed for the DA 2.1 Bypass area.

All rip-rap berms were designed and located where the stormwater enters the proposed detention basins. The location were selected to provide 20% of the sediment storage in the forebays up to the crests of the berms. The locations and dimensions of the proposed three (3) rip-rap berms are shown on the Storm Drain Details (Sheet C-8.1). In addition, coir baffles and one (1) 6-inch skimmer for Detention Basin 1, one (1) 8-inch skimmer for Detention Basin 2, and two (2) 5-inch skimmers for Detention Basin 3 shall be placed within the detention basins during construction. The skimmer sizes were designed to drain the 10-year storm event volume at a minimum of 24 hours. The skimmer sizing information is shown on Sheet C-8.0 of the Storm Drain Details.

Volume and Drawdown Calculations for Existing Detention Basin #1

D.A. = 17.34 acres

Sediment Storage Required: 3600 cubic feet (CF) x 17.34 acres (AC) = 62,424 CF

Forebay Volume Required: 62,424 CF x 0.2 = 12,485 CF

Forebay Volume Provided: **13,177 CF** as shown on the plans

First Flush Volume = (17.34 AC x 43,560 SF/AC) x (1" / 12" per foot) = 62,944 CF

The actual provided water quality volume is 187,729 CF at elevation 809.92 in Detention Basin 1. Using a Faircloth Skimmer, the skimmer size needed to drawdown this volume in a minimum 24 hours is a 6", which will drawdown 51,840 CF in a 24-hr period. This is a drawdown rate of:

51,840 CF / (24 hr x 3600 sec/hr) = 0.6 cfs

This drawdown rate will be utilized as the pond discharge rate below the top of the first outlet control in the outlet structure in the following design.

First Flush drawdown time:

First Flush Volume = 62,944 CF
Drawdown time = 62,944 CF/ (0.6 cfs x 3600 sec / hr) x (1 day / 24 hr) = **1.21 days**

10-yr drawdown time:

Maximum storage volume in pond = 169,351 CF (see attached Hydraflow Reports, **Appendix D**)
Occurs at hour 19.63 and elevations 809.48 and draws down to elevation 803.00 at hour 69.

Remaining Drawdown time = 187,729 CF / (0.6 cfs x 3600 sec / hr) x (1 day / 24 hr) = **3.62 days**

This results in a total retention time of = 3.62 days + 1.21 days = **4.83 days**

Running Hydraflow for this sediment basin with a contributing area of bare soil (CN = 86) and the average flow rate of the skimmer given for the Faircloth Skimmer, the peak elevation in the basin will be at 809.48 with a peak flow of 1.19 cfs for the 10-yr storm event which is below the crest of the riser (810.50) and crest of the emergency spillway (811.00). From the South Carolina Department of Health and Environmental Control (SCDHEC) Trapping Efficiency Figure this basin will provide 89.69% trapping efficiency (see attached Sediment Basin Trapping Efficiency summary, **Appendix F**).

Volume and Drawdown Calculations for Detention Basin #2

D.A. = 27.61 AC

Sediment Storage Required: 3600 CF x 27.61 AC = 99,396 CF

Forebay Volume Required: 99,396 CF x 0.2 = 19,879 CF

Of the 27.61 acres of run-off being routed to Detention Basin 2 by the perimeter diversions 9.66 acres is routed to Forebay B and 17.95 acres is routed to Forebay A. Therefore, 65% of the forebay volume (12,922 CF) must be contained within Forebay A and 35% (6,958 CF) must be contained within Forebay B.

Forebay A Volume Provided: **17,315 CF** as shown on the plans

Forebay B Volume Provided: **7,986 CF** as shown on the plans

First Flush Volume = (27.61 AC x 43,560 SF/AC) x (1" / 12" per foot) = 100,224 CF

The actual provided water quality volume is 294,075 CF at elevation 804.50 in the detention basin 2. Using a Faircloth Skimmer, the skimmer size needed to drawdown this volume in a minimum 24 hours is an 8", which will drawdown 97,978 CF in a 24 hour period.

This is a drawdown rate of:

97,978 CF / (24 hr x 3600 sec/hr) = 1.13 cfs

This drawdown rate will be utilized as the pond discharge rate below the top of the first outlet control in the outlet structure in the following design.

First Flush drawdown time:

First Flush Volume = 100,224 CF
Drawdown time = 100,224 CF / (1.13 cfs x 3600 sec / hr) x (1 day / 24 hr) = **1.03 days**

10-yr drawdown time:

Maximum storage volume in pond = 263,073 CF (see attached Hydraflow Reports, **Appendix D**)
Occurs at hour 19.17 and elevation 804.13 and draws down to elevation 799.00 at hour 63.2.

Drawdown time = 294,075 CF/ (1.13 cfs x 3600 sec / hr) x (1 day / 24 hr) = **3.01 days**

This results in a total retention time of = 3.01 days + 1.03 days = **4.04 days**

Running Hydraflow for this sediment basin with a contributing area of bare soil (CN = 86) and the average flow rate of the skimmer given for the Faircloth Skimmer, the peak elevation in the basin will be at 804.13 with a peak flow of 2.05 cfs for the 10-yr storm event which is below the crest of the riser (805.00) and crest of the emergency spillway (805.75). From the SCDHEC Trapping Efficiency Figure this basin will provide 90.00% trapping efficiency (see attached Sediment Basin Trapping Efficiency summary, **Appendix F**).

<u>Volume and Drawdown Calculations for proposed Detention Basin #3</u>

D.A. = 23.38 AC

Sediment Storage Required: 3600 CF x 23.38 AC = 84,168 CF

Forebay Volume Required: 84,168 CF x 0.2 = 16,834 CF

Forebay Volume Provided: **18,758 CF** as shown on the plans

First Flush Volume = (23.38 AC x 43,560 SF/AC) x (1" / 12" per foot) = 84,869 CF

The actual provided water quality volume is 91,308 CF at elevation 805.80 in Detention Basin 3. Using a Faircloth Skimmer, the skimmer size needed to drawdown this volume in a minimum 24 hours is a two (2) 5", which will drawdown 65,664 CF in a 24-hr period. This is a drawdown rate of:

65,664 CF / (24 hr x 3600 sec/hr) = 0.76 cfs

This drawdown rate will be utilized as the pond discharge rate below the top of the first outlet control in the outlet structure in the following design.

First Flush drawdown time:

First Flush Volume = 84,869 CF
Drawdown time = 84,869 CF / (0.76 cfs x 3600 sec / hr) x (1 day / 24 hr) = **1.29 days**

10-yr drawdown time:

Maximum storage volume in pond = 104,267 CF (see attached Hydraflow Reports, **Appendix D**)
Occurs at hour 16.03 at elevation 806.09 and draws down to the water quality volume provided at hour 22.87.

Drawdown time = 91,308 CF / (0.76 cfs x 3600 sec / hr) x (1 day / 24 hr) = **1.39 days**
This results in a total retention time of 1.29 days + 1.39 days = **2.68 days**

Running Hydraflow for this sediment basin with a contributing area of bare soil (CN = 86) and the average flow rate of the skimmer given for the Faircloth Skimmer, the peak elevation in the basin will be at 806.09 with a peak flow of 1.58 cfs for the 10-yr storm event which is below the crest of the riser (808.00) and crest of the emergency spillway (808.50). From the SCDHEC Trapping Efficiency Figure this basin will provide 89.14% trapping efficiency (see attached Sediment Basin Trapping Efficiency summary, **Appendix F**) which is above the required 80.0% trapping efficiency.

The proposed storm drainage system was modeled in Autodesk® Storm and Sanitary Analysis Software. This program utilized the Rational Method in order to ensure the proposed pipe networks function properly. The storm drainage systems were sized to handle the 10-year storm event without having any surcharging conditions within the pipes. The 10-year storm event output of this model can be referenced in **Appendix E**, refer to the drainage maps as well.

The proposed slope conveyance systems and perimeter ditches were modeled using in Autodesk® Hydraflow Express Extension. This program utilized the Rational Method in order to ensure the proposed slope conveyance systems and perimeter ditches function properly.

The slope conveyance systems were sized to handle the 25-year storm event without having any surcharging conditions within the system. The largest drainage area was used to design all the slope conveyances and indicate the cross-section parameters. The 25-year storm event output of this model can be referenced in **Appendix E**, refer to the Slope Drainage Maps as well.

The perimeter ditches were sized to handle the 25-year storm event without having any surcharging conditions within the ditches. The perimeter ditches were sized from the analysis point for the entire ditch. The 25-year storm event output of this model can be referenced in **Appendix E**, refer to the Perimeter Ditch Drainage Maps as well.

Excavation and backfilling for site grading of the proposed development will be the primary soil disturbing activities. Excavated soils not immediately utilized in backfilling will be stockpiled and protected on site and then finish graded just before final stabilization. All exposed soils will be reseeded and new vegetation will be planted as soon as practical.

1.2 Stormwater Management and Sediment Control

o Water Quality BMPs

The locations of best management practices (BMPs) are illustrated in **Exhibit A**.

To prevent soil from washing into the undisturbed areas of the site, the following site-wide BMPs will be implemented:

- Single Row and/or Double Row silt fencing will be placed along the perimeter of the areas to be cleared and graded before any clearing or grading takes place.
- Construction Entrance/Exit will be placed at the designated entrance.
- Inlet protections will be used at the proposed inlets where necessary.
- BMPs will be inspected every seven (7) calendar days.
- The detention basins equipped with rip-rap berm, skimmer(s), and baffles will capture runoff from construction areas.

The post construction water quality for the proposed development will be treated within the new detention basins, where runoff is captured into the new storm drainage system. Calculations above should be referenced for the water quality volumes.

o Erosion Prevention BMPs

The locations of best management practices (BMPs) have been illustrated in **Exhibit A**. Several of the BMPs included in this plan have been developed to serve as post-construction stormwater controls.

To prevent soil from washing onto the undisturbed areas of the site or off-site, the following erosion prevention BMPs will be implemented and remain in place until the cells are closed out and meet final stabilization requirements:

- As each phase of the landfill is brought to finished grade, that portion of the cell will be brought to final stabilization.
- After fertilizing these areas will be seeded. The permanent seed mix for March to August planting dates shall consist of Annual Rye Grass, Hulled Bermuda, Pensacola Bahia, Sericea Lespedeza, and Weeping Love Grass. The permanent seed mix for September to February planting dates shall consist of Annual Rye Grass, Hulled Bermuda, Brown Top Millet, and Unhulled Bermuda. Seeding rates shall conform to the grassing specifications approved for the Project and/or to the seeding rates illustrated on the Construction Details for Anderson County.
- Cleared and graded soils and slope drains provided will be sloped as indicated on the Grading Plans (**Sheet C-4.0-4.10**).
- Grassing, erosion control matting, and turf reinforcement matting will be placed at the appropriate locations as indicated on the Erosion and Sediment Control Plan (**Sheets C-5.0 – C-5.4**).
- Outlet protection will be installed at pipe outlets.
- A visual inspection of active landfill sites will occur at least every seven (7) calendar days by landfill personnel for areas of open landfill application;
- A visual inspection will occur every thirty (30) calendar days for stabilized sites to ensure that sediment and erosion control measures are operating properly.

o **Construction Debris Management**

Waste materials will be handled and disposed of per guidelines and requirements of this landfill permit and the following preventative measures:

- Fertilizers will be applied only in the minimum amounts recommended by the manufacturer.
- Fertilizers will be worked into the soil to limit exposure to stormwater.
- Fertilizers will be stored and covered, and partially used bags will be transferred to a sealable bin to avoid spills.
- Vehicles on site will be monitored for leaks and receive regular preventive maintenance to reduce the chance of leakage.
- Petroleum products will be stored in tightly sealed containers which are clearly labeled.
- Spill kits will be included with all fueling sources and maintenance activities.
- Sanitary waste will be collected from portable units as necessary to avoid overfilling.
- A covered receptacle will be used for all waste materials.
- Materials and equipment necessary for spill cleanup will be kept on site. Equipment will include, but not be limited to, brooms, dust pans, mops, rags, gloves, goggles, kitty litter, sand, sawdust, and plastic and metal trash containers.
- Spills will be cleaned up immediately upon discovery. Spills large enough to reach the storm drain collection system will be reported to the National Response Center at (800) 424-8802.

- A stabilized construction entrance with a filter fabric liner will be constructed to reduce vehicle tracking of sediments.
- Dump trucks hauling material from the construction site will be covered with a tarp.

o Construction Entrances and Dust Control

The contractor is to use the designated construction entrance as shown. The contractor will be instructed to protect and maintain entrances at all times and in accordance with the Erosion Control Details. The gravel construction entrance will be maintained and reworked with additional stone as needed. Traffic entering or exiting each parking lot will be directed through the construction entrance. A water truck will be called on site to water soil as necessary to minimize dust.

o Additional Onsite and Offsite Pollution Identification

The following potential source areas of stormwater contamination were identified and evaluated:

- Cleared and graded areas;
- Construction site entrance;
- Undisturbed areas; and
- Construction debris.

Table 2 and Exhibit A presents site specific information regarding stormwater pollution potential from each of these areas.

Table 2 - Locations of Potential Sources of Stormwater Contamination

Sub-Watershed Area(1)	***Potential Stormwater Contamination Point***	***Potential Pollutants***	***Potential Problem***
All Post Watersheds	*Cleared and graded areas; Construction debris*	*Soil erosion, fertilizer, pesticides*	*Erosion of soils from cleared and graded areas have the potential to discharge into the proposed detention basin*
DA 1.1	*Construction site entrance*	*Hydraulic oil, gasoline, antifreeze, soil erosion, fertilizer, pesticides*	*Leaking hydraulic oil and antifreeze from clearing and grading equipment. Gasoline and diesel fuel spills while fueling construction equipment, and erosion of exposed and stockpiled soils. Tracking of soil into the road through the construction site entrance.*
DA 1.1, 1.2, and 2.1	*Proposed inlets*	*Soil erosion, fertilizer, pesticides, hydraulic oil, gasoline, antifreeze*	*Erosion of soils from cleared and graded areas have the potential to discharge into the proposed storm drainage system. Leaking hydraulic oil and antifreeze from vehicles and equipment from the construction site entrance.*
None	*All undisturbed areas*	*None*	*No storm water related issues with this completely vegetated area.*

(1) See Appendix B for drainage areas

1.3 Sequence of Construction

Structural BMPs will be coordinated with construction activities so the BMP is in place before construction begins. A full construction sequence for this project is shown on the Erosion Control Plan (Sheet C-5.0 - C-5.4) within the Construction Plans for this project. The following BMPs will be coordinated with construction activities:

- A Preconstruction Meeting will be held for this project per SCDHEC's review process.
- The limits of disturbance and any portion of the 50' wetland buffer outside the limits of disturbance will need to be flagged.
- The temporary perimeter controls (silt fences) will be installed before any clearing and grading begins.

- The new construction entrance/exit entrances will be installed before any clearing and grading begins.
- The new detention basins will be in place with all during construction measures prior to clearing and grading the remainder of the site.
- Clearing and grading will not occur in an area until it is necessary for construction to proceed.
- Once construction activity ceases permanently in an area, that area will be stabilized with matting and grass seed as indicated in the Construction Documents.
- The temporary perimeter controls (silt fencing) will not be removed until all construction activities at the site are complete and soils have been permanently stabilized.
- Sediment basins will remain in place until the landfill is closed out and authorization from SCDHEC is granted to remove them.

1.4 Non-Numeric Effluent Limits

Stormwater volume and velocity control within the site will be accomplished during construction activities to minimize erosion. This will be accomplished through the use of the following BMPs and techniques:

- Limiting the amount of disturbed area not stabilized at a time;
- Phased construction sequence;
- Diverting off-site flow around the site;
- Controlling drainage patterns within the construction site;
- Surface roughening along any slopes;
- Temporary stabilization of disturbed areas;
- Permanent and temporary seeding, as portions of the landfill cells are completed;
- Riprap outlet protection to be placed at all outfalls, including discharge points;
- Check dams and forebays to minimize velocities; and
- Detention basins.

The contractor shall maintain the riprap outlet protection measures and aprons at all times throughout the construction process.

1.5 Management of Non-Stormwater Discharge

The following are allowable sources of non-stormwater discharges that may be associated with construction activity at the site:

- Waters used to wash vehicles where detergents are not used;
- Water used to control dust in accordance with Section 3.2.2 of the Construction General Permit;
- Uncontaminated ground water or spring water; and
- Uncontaminated excavation dewatering.

1.6 Post-Construction Water Quality Measures

The Post-Construction water quality measures will consist of the following:

1. Permanent grassing; and
2. Dry detention basins.

1.7 Buffer Zone Management

Per Section 3.2.4.C of the CGP, a buffer zone has been proposed along the Jurisdictional Wetlands As shown on the Erosion Control Plans (Sheet C-5.0 - C-5.4 of the Construction Plans), Compliance Option B from the CGP will be utilized and double row silt fence with mulch (a minimum 3 linear feet of spacing between rows) is provided along the areas that cannot maintain a fifty (50)-linear foot (LF) undisturbed buffer. The surface water protection plan detailed below will need to be followed in regards to construction in the buffer zones.

Surface Water Protection Plan – Construction Sequence (Compliance Option B)

1. Receive NPDES coverage from SCDHEC (and approval from MS4, if applicable).
2. Pre-Construction Meeting (On-site if more than 10 disturbed acres and non-linear project).
3. Notify SCDHEC EQC Regional Office (and MS4, when applicable) 48 hours prior to beginning land-disturbing activities.
4. Installation of construction entrance(s).
5. **Flagging of Buffer Zone.**
6. Clearing & grubbing only as necessary for installation of perimeter controls.
7. Installation of perimeter controls (e.g., silt fence).
8. **Begin Weekly Inspections of Buffer Zones and adjacent BMPs. Conduct routine maintenance as necessary (See BMP's construction details).**

9. Clearing and grubbing only in areas of basins/traps/ponds.
10. Installation of basins/traps/ponds and installation of diversions to those structures (outlet structures must be completely installed as shown on the details before proceeding to the next step; areas draining to these structures cannot be disturbed until the structures and diversions to these structures are completely installed).
11. Clearing and grubbing of site or demolition (sediment and erosion control measures for these areas must already be installed).
12. Rough grading.
13. Installation of storm drain system and placement of inlet protection as each inlet is installed.
14. Fine grading, etc.
15. Permanent/final stabilization.
16. Clean-out of detention basins that were used as sediment control structures and re-grading of detention pond bottoms; if necessary, modification of sediment basin riser to convert to detention basin outlet structure.
17. Removal of temporary sediment and erosion control measures after entire area draining to the structure is finally stabilized (The Department recommends that the Project Owner/Operator have the SWPPP Prepared or registration equivalent approve the removal of temporary structures).
18. **End Buffer Zone Inspections and Maintenance.**
19. Perform As-Built Surveys of all detention structures and submit to SCDHEC or MS4 for acceptance.
20. Submit Notice of Termination (NOT) to SCDHEC as appropriate.

BMP Maintenance Notes

- **All BMPs whose discharges reach adjacent surface waters should be maintained until Final Stabilization is reached.**
- **All BMPs discharging to a Surface Water must be maintained to prevent the discharge of sediment-laden stormwater to the best extent possible.**
- **Any accumulated sediment within BMPs adjacent to surface water is to be removed when the sediment depth reaches the cleanout height of each specific BMP.**
- **Records of maintenance of all BMPs discharging to Surface Waters must be kept within the SWPPP's Maintenance Log.**

1.8 Certification Statement

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Name: Ryan T. Ohmer, P.E. Title: Project Engineer

Signature: _____ Date: 6/26/20

Exhibit A Erosion and Sediment Control Plan

GRAPHIC SCALE

80 0 40 80 160 320

(IN FEET)
1 inch = 80 ft.

811
Know what's below.
Call before you dig.

(NORTH AMERICAN GREEN SC 250)
(SEE SHEET C7.1 FOR DETAIL)

50 LF WETLANDS BUFFER

RIPRAP FOREBAY B

COIR BAFFLES
(TYP.)

EMERGENCY
SPILLWAY
ELEV: 805.75

8" SKIMMER WITH
5'X5' STONE PAD

RIPRAP FOREBAY A

BASE GRADING LIMITS OF
DISTURBANCE (TYP.)

CHANNEL MATTING TO BE INSTALLED IN
DRAINAGE SWALE
(NORTH AMERICAN GREEN SC 250)
(SEE SHEET C7.1 FOR DETAIL)

PROPOSED BORROW AREA

CHECK DAMS TO BE INSTALLED
ALONG DITCHES EVERY 100 LF
AS NEEDED (TYP.)

EROSION CONTROL MATTING TO
BE INSTALLED ON ALL SLOPES
3:1 OR STEEPER
(NORTH AMERICAN GREEN SC150)
(SEE SHEET C7.1 FOR DETAIL)

BASE ELEVATION LIMITS
OF DISTURBANCE

100 LF BUILDING SETBACK

DOUBLE ROW SILT
FENCE (TYP.)

45 LF STREAM BUFFER

PICKENS CREEK

RIPRAP FOREBAY C

COIR BAFFLES
(TYP.)

6" SKIMMER WITH
5'X5' STONE PAD

RIPRAP OUTLET PROTECTION
(SEE DETAIL FOR SIZING)

EMERGENCY SPILLWAY
ELEV: 811.00

200 LF WASTE SURFACE WATER BUFFER

REFERENCES:
1. REFERENCE IS MADE TO TOPOGRAPHIC SURVEY PROVIDED BY F&S SURVEYORS, ENGINEERS, & PLANNERS, INC. DATED FEBRUARY 8, 2017.
2. REFERENCE IS MADE TO LIDAR TOPOGRAPHICAL DATA PROVIDED BY ANDERSON COUNTY, SOUTH CAROLINA.
3. REFERENCE IS MADE TO A WETLAND DELINEATION PERFORMED BY F&S SURVEYORS AND ENGINEERS & PLANNERS INC. DATED JANUARY 12, 2017.
4. REFERENCE IS MADE TO A GROUNDWATER MONITORING REPORT PROVIDED BY BUNNELL-LAMMONS ENGINEERING, INC. DATED MAY 16, 2019.

REVISION	DATE
1	6.8.20 SCDHEC REVIEW COMMENTS

APPROVALS	
ENGINEER	RTO
DESIGNER	RTO
TECHNICIAN	PRJ
CHECKED BY	GTF
APPROVED	RTO

SOUTH CAROLINA NOTARIZATION
CERTIFICATE OF AUTHORIZATION
Alliance Consulting Engineers, Inc.
No. C02854
DATE: 6/26/20

SOUTH CAROLINA PROFESSIONAL ENGINEER
No. 35683
HUNTER T. RYAN IV
SIGNATURE:

ALLIANCE CONSULTING ENGINEERS
Alliance Consulting Engineers, Inc.
124 Verdae Blvd - Bonaventure II, Suite 305 - Greenville, SC 29607
Phone (864) 284-1796 ■ Fax (864) 284-1741

SHEET: BASE ELEVATION EROSION AND SEDIMENT CONTROL PLAN - CELL 1
DATE: JUNE 2019
SCALE: AS SHOWN

PROJECT: CIVIL DESIGN PLANS FOR THE CLASS II C&D GREENPOINTE LANDFILL ALONG HAMLIN ROAD LOCATED IN ANDERSON COUNTY, SOUTH CAROLINA
ANDERSON COUNTY
SOUTH CAROLINA

FILE NAME: E16227-PLANS
REFERENCE FILE: E16227-BASE
PROJECT NO. 16227-0004

SHEET C-5.0

DWG NO. 01.1168-D21

GRAPHIC SCALE

60 0 30 60 120 240

(IN FEET)
1 inch = 60 ft.

811 Know what's below. Call before you dig.

100 LF BUILDING SETBACK

BASE ELEVATION LIMITS OF DISTURBANCE

CHECK DAMS TO BE INSTALLED ALONG DITCHES EVERY 100 LF AS NEEDED (TYP.)

SINGLE ROW SILT FENCE (TYP.)

RIPRAP OUTLET PROTECTION (SEE DETAIL FOR SIZING)

EMERGENCY SPILLWAY ELEV. 808.50

TWO (2) 5" SKIMMERS WITH 5'X5' STONE PAD

COIR BAFFLES (TYP.)

RIPRAP FOREBAY D

EROSION CONTROL MATTING TO BE INSTALLED ON ALL SLOPES 3:1 OR STEEPER (NORTH AMERICAN GREEN SC 150) (SEE SHEET C7.1 FOR DETAIL)

50 LF WETLAND BUFFER

JURISDICTIONAL WETLANDS

CHANNEL MATTING TO BE INSTALLED IN DRAINAGE SWALE (NORTH AMERICAN GREEN SC 250) (SEE SHEET C7.1 FOR DETAIL)

DOUBLE ROW SILT FENCE (TYP.)

200 LF WASTE SURFACE WATER BUFFER

PICKENS CREEK

REFERENCES:
1. REFERENCE IS MADE TO TOPOGRAPHIC SURVEY PROVIDED BY F&S SURVEYORS, ENGINEERS, & PLANNERS, INC. DATED FEBRUARY 8, 2017.
2. REFERENCE IS MADE TO LIDAR TOPOGRAPHICAL DATA PROVIDED BY ANDERSON COUNTY, SOUTH CAROLINA.
3. REFERENCE IS MADE TO A WETLAND DELINEATION PERFORMED BY F&S SURVEYORS AND ENGINEERS & PLANNERS INC. DATED JANUARY 12, 2017.
4. REFERENCE IS MADE TO A GROUNDWATER MONITORING REPORT PROVIDED BY BUNNELL-LAMMONS ENGINEERING, INC. DATED MAY 16, 2019.

REVISION	DATE
1	6.8.20 SCDHEC REVIEW COMMENTS

APPROVALS	
ENGINEER	RTO
DESIGNER	RTO
TECHNICIAN	PRJ
CHECKED BY	GTF
APPROVED	RTO

SOUTH CAROLINA NOTARIZATION OF ALL PLANS CERTIFICATE OF AUTHORIZATION
Alliance Consulting Engineers, Inc. No. C02854
DATE: 6/26/20

SOUTH CAROLINA PROFESSIONAL ENGINEER
No. 35683
RYAN T. HALL
SIGNATURE:

ALLIANCE CONSULTING ENGINEERS
Alliance Consulting Engineers, Inc.
124 Verdae Blvd - Bonaventure II, Suite 305 - Greenville, SC 29607
Phone: (864) 284-1796 ■ Fax: (864) 284-1744

SHEET: BASE ELEVATION EROSION AND SEDIMENT CONTROL PLAN - CELL 2
DATE: JUNE 2019
SCALE: AS SHOWN

PROJECT: CIVIL DESIGN PLANS FOR THE CLASS II C&D GREENPOINTE LANDFILL ALONG HAMLIN ROAD LOCATED IN ANDERSON COUNTY, SOUTH CAROLINA
ANDERSON COUNTY SOUTH CAROLINA

FILE NAME: E16227-PLANS
REFERENCE FILE: E16227-BASE
PROJECT NO. 16227-0004

SHEET C-5.1

DWG NO. 01.1168-D21

EXISTING BORROW AREA

100 LF PROPERTY LINE SETBACK

DOUBLE ROW SILT FENCE

LIMITS OF DISTURBANCE

JURISDICTIONAL WETLANDS

50 LF WETLAND BUFFER

INSTALLED ON ALL EROSION CO

(NORT

GRAPHIC SCALE

40 0 20 40 80 160

(IN FEET)
1 inch = 40 ft.

Know what's **below.** **Call** before you dig.

REVISION	DATE
1	6.8.20 SCDHEC REVIEW COMMENTS

APPROVALS	
ENGINEER	RTO
DESIGNER	RTO
TECHNICIAN	PRJ
CHECKED BY	GTF
APPROVED	RTO

NORTH CAROLINA CERTIFICATION NO. C02854 — Alliance Consulting Engineers, Inc. — SOUTH CAROLINA CERTIFICATE OF AUTHORIZATION

DATE: 6/26/20

REGISTERED PROFESSIONAL ENGINEER — No. 35683 — RYAN O. HAMLIN — SOUTH CAROLINA

SIGNATURE:

ALLIANCE CONSULTING ENGINEERS
Alliance Consulting Engineers, Inc.
124 Verdae Blvd - Bonaventure II, Suite 305 - Greenville, SC 29607
Phone (864) 284-1796 ■ Fax (864) 284-1741

SHEET: BASE ELEVATION EROSION AND SEDIMENT CONTROL PLAN - GRAVEL ROAD

DATE: JUNE 2019

SCALE: AS SHOWN

PROJECT: CIVIL DESIGN PLANS FOR THE CLASS II C&D GREENPOINTE LANDFILL ALONG HAMLIN ROAD LOCATED IN ANDERSON COUNTY, SOUTH CAROLINA

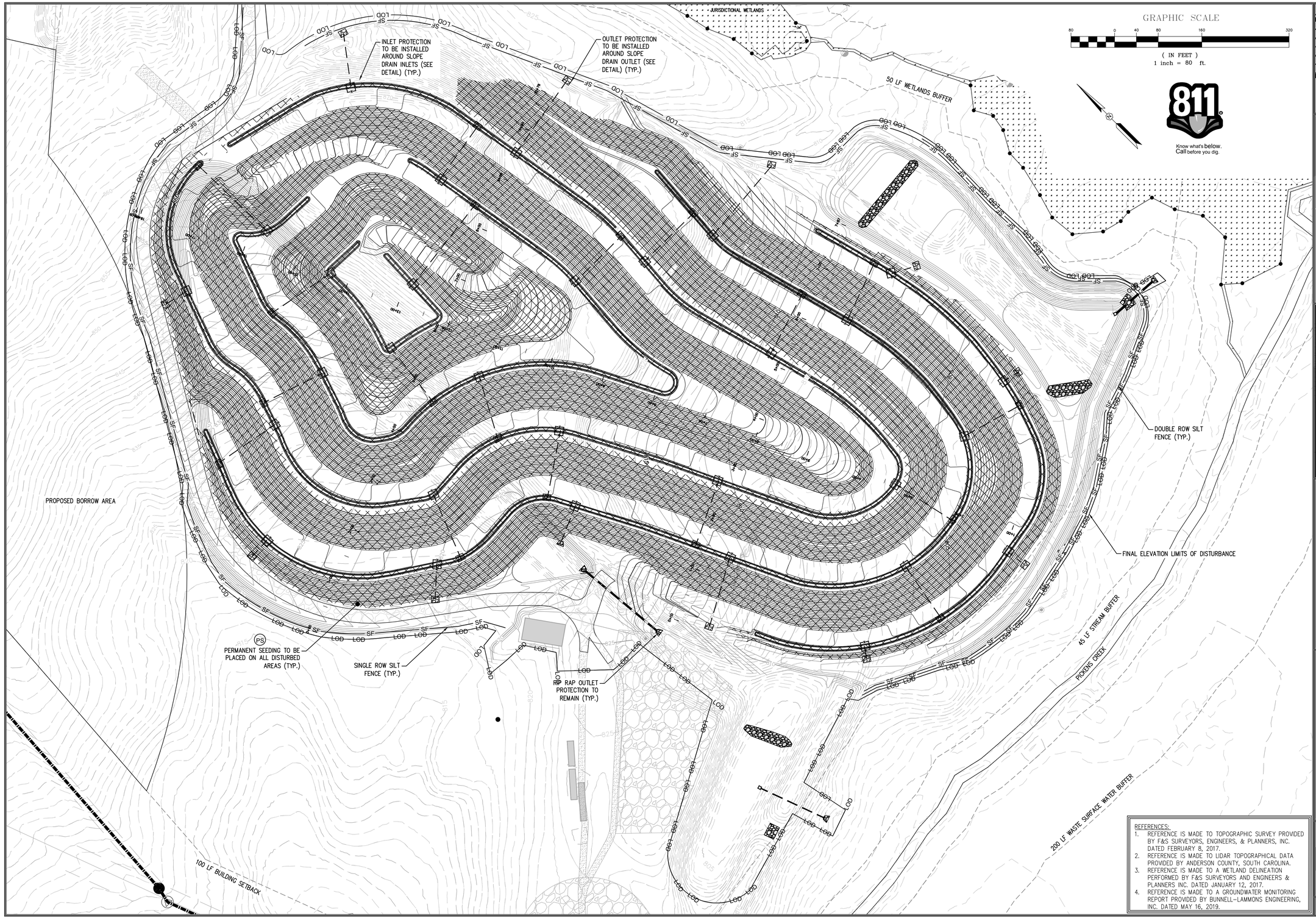
ANDERSON COUNTY — SOUTH CAROLINA

REFERENCES:
1. REFERENCE IS MADE TO TOPOGRAPHIC SURVEY PROVIDED BY F&S SURVEYORS, ENGINEERS, & PLANNERS, INC. DATED FEBRUARY 8, 2017.
2. REFERENCE IS MADE TO LIDAR TOPOGRAPHICAL DATA PROVIDED BY ANDERSON COUNTY, SOUTH CAROLINA.
3. REFERENCE IS MADE TO A WETLAND DELINEATION PERFORMED BY F&S SURVEYORS AND ENGINEERS & PLANNERS INC. DATED JANUARY 12, 2017.
4. REFERENCE IS MADE TO A GROUNDWATER MONITORING REPORT PROVIDED BY BUNNELL-LAMMONS ENGINEERING, INC. DATED MAY 16, 2019.

FILE NAME: E16227-PLANS
REFERENCE FILE: E16227-BASE
PROJECT NO. 16227-0004

SHEET C-5.2

DWG NO. 01.1168-D21



GRAPHIC SCALE

80 0 40 80 160 320

(IN FEET)
1 inch = 80 ft.

811 Know what's below. Call before you dig.

REVISION	DATE
1 6.8.20 SCDHEC REVIEW COMMENTS	

APPROVALS	
ENGINEER	RTO
DESIGNER	RTO
TECHNICIAN	PRJ
CHECKED BY	GTF
APPROVED	RTO

NORTH CAROLINA CERTIFICATION NUMBER — Alliance Consulting Engineers, Inc. No. C02854 — CERTIFICATE OF AUTHORIZATION — DATE: 6/26/20

NORTH CAROLINA REGISTERED PROFESSIONAL ENGINEER — No. 35683 — RYAN T. HAMLIN — SIGNATURE:

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Alliance Consulting Engineers, Inc.
124 Verdae Blvd - Bonaventure II, Suite 305 - Greenville, SC 29607
Phone (864) 284-1784 ■ Fax (864) 284-1474

SHEET: FINAL ELEVATION EROSION AND SEDIMENT CONTROL PLAN - CELL 1 — SCALE: AS SHOWN — DATE: JUNE 2019

PROJECT: CIVIL DESIGN PLANS FOR THE CLASS 11 C&D GREENPOINTE LANDFILL ALONG HAMLIN ROAD LOCATED IN ANDERSON COUNTY. SOUTH CAROLINA — ANDERSON COUNTY — SOUTH CAROLINA

REFERENCES:
1. REFERENCE IS MADE TO TOPOGRAPHIC SURVEY PROVIDED BY F&S SURVEYORS, ENGINEERS, & PLANNERS, INC. DATED FEBRUARY 8, 2017.
2. REFERENCE IS MADE TO LIDAR TOPOGRAPHICAL DATA PROVIDED BY ANDERSON COUNTY, SOUTH CAROLINA.
3. REFERENCE IS MADE TO A WETLAND DELINEATION PERFORMED BY F&S SURVEYORS AND ENGINEERS & PLANNERS INC. DATED JANUARY 12, 2017.
4. REFERENCE IS MADE TO A GROUNDWATER MONITORING REPORT PROVIDED BY BUNNELL-LAMMONS ENGINEERING, INC. DATED MAY 16, 2019.

FILE NAME: E16227-PLANS
REFERENCE FILE: E16227-BASE
PROJECT NO. 16227-0004
SHEET C-5.3
DWG NO. 01.1168-D21

GRAPHIC SCALE

60 0 30 60 120 240

(IN FEET)
1 inch = 60 ft.

811 Know what's below. Call before you dig.

100 LF BUILDING SETBACK

SINGLE ROW SILT FENCE

FINAL ELEVATION LIMITS OF DISTURBANCE

PERMANENT SEEDING TO BE PLACED ON ALL DISTURBED AREAS (TYP.)

INLET PROTECTION TO BE INSTALLED AROUND SLOPE DRAIN INLETS (SEE DETAIL) (TYP.)

DOUBLE ROW SILT FENCE

50 LF WETLAND BUFFER

JURISDICTIONAL WETLANDS

OUTLET PROTECTION TO BE INSTALLED AROUND SLOPE DRAIN OUTLET (SEE DETAIL) (TYP.)

200 LF WASTE SURFACE WATER BUFFER

PICKENS CREEK

RIP RAP OUTLET PROTECTION TO REMAIN (TYP.)

REFERENCES:
1. REFERENCE IS MADE TO TOPOGRAPHIC SURVEY PROVIDED BYF&S SURVEYORS, ENGINEERS, & PLANNERS, INC.DATED FEBRUARY 8, 2017.
2. REFERENCE IS MADE TO LIDAR TOPOGRAPHICAL DATA PROVIDED BY ANDERSON COUNTY, SOUTH CAROLINA.
3. REFERENCE IS MADE TO A WETLAND DELINEATION PERFORMED BY F&S SURVEYORS AND ENGINEERS & PLANNERS INC. DATED JANUARY 12, 2017.
4. REFERENCE IS MADE TO A GROUNDWATER MONITORING REPORT PROVIDED BY BUNNELL-LAMMONS ENGINEERING, INC. DATED MAY 16, 2019.

REVISION	DATE
1	6.8.20 SCDHEC REVIEW COMMENTS
2	
3	
4	
5	

APPROVALS	
ENGINEER	RTO
DESIGNER	RTO
TECHNICIAN	PRJ
CHECKED BY	GTF
APPROVED	RTO

CAROLINA AUTHORIZATION CERTIFICATE OF AUTHORIZATION — Alliance Consulting Engineers, Inc. No. C02854 — DATE: 6/26/20

CAROLINA PROFESSIONAL ENGINEER — No. 35683 — RYAN T. OTTO — SIGNATURE:

ALLIANCE CONSULTING ENGINEERS
Alliance Consulting Engineers, Inc
124 Verdae Blvd - Bonaventure II, Suite 305 - Greenville, SC 29607
Phone (864) 284-1746 ■ Fax (864) 284-1747

SHEET: FINAL ELEVATION EROSION AND SEDIMENT CONTROL PLAN - CELL 2

SCALE: AS SHOWN

DATE: JUNE 2019

PROJECT: CIVIL DESIGN PLANS FOR THE CLASS II C&D GREENPOINTE LANDFILL ALONG HAMLIN ROAD LOCATED IN ANDERSON COUNTY. SOUTH CAROLINA

ANDERSON COUNTY — SOUTH CAROLINA

FILE NAME:	E16227-PLANS
REFERENCE FILE:	E16227-BASE
PROJECT NO.	16227-0004
SHEET	C-5.4
DWG NO.	01.1168-D21

2.0 Site Features and Sensitive Areas

2.1 Sources of Pollution

Pollutants that result from clearing, grading, and excavation have the potential to be present in stormwater runoff are listed in **Table 3** below. This table includes information regarding material type, chemical and physical description, and the specific regulated stormwater pollutants associated with each material.

Table 3 - Potential Construction Site Stormwater Pollutants

Trade Name Material	***Chemical/Physical Description(1)***	***Stormwater Pollutants(1)***
Pesticides (insecticides, fungicides, herbicides, rodenticides)	*Various colored to colorless liquid, powder, pellets, or grains*	*Chlorinated hydrocarbons, organophosphates, carbamates, arsenic*
Fertilizer	*Liquid or solid grains*	*Nitrogen, phosphorous*
Cleaning solvents	*Colorless, blue, or yellow-green liquid*	*Perchloroethylene, methylene chloride, trichloroethylene, petroleum distillates*
Asphalt	*Black solid*	*Oil, petroleum distillates*
Concrete	*White solid*	*Limestone, sand*
Wastewater from construction equipment washing	*Water*	*Soil, oil & grease, solids*
Hydraulic oil/fluids	*Brown oily petroleum hydrocarbon*	*Mineral oil*
Gasoline	*Colorless, pale brown or pink petroleum hydrocarbon*	*Benzene, ethyl benzene, toluene, xylene, MTBE*
Diesel Fuel	*Clear, blue-green to yellow liquid*	*Petroleum distillate, oil & grease, naphthalene, xylenes*

Kerosene	*Pale yellow liquid petroleum hydrocarbon*	*Coal oil, petroleum distillates*
Antifreeze/coolant	*Clear green/yellow liquid*	*Ethylene glycol, propylene glycol, heavy metals (copper, lead, zinc)*
Erosion	*Solid Particles*	*Soil, Sediment*

(1) Data obtained from MSDSs when available

2.2 Surface Waters

A jurisdictional creek (Pickens Creek), is present along the southern portion of the site. This wetland area should not be negatively impacted from construction of this proposed development due to the proposed Best Management Practices (detention basin, rip rap outlet protection at basin outfall within the site, and the double row silt fencing) and ongoing monitoring and measures provided as part of the landfill permit.

The proposed stormwater attenuation by the new detention basins was designed to meet the requirements of SCDHEC. This additional flow should not create additional adverse impacts to the existing downstream conditions.

3.0 Compliance Requirements

3.1 SWPPP Availability

A copy of the On-Site Stormwater Pollution Prevention Plan (OS-SWPPP) will be retained at the construction site or a nearby location easily accessible during normal business hours, from the date of commencement of construction activities to the date the final stabilization is reached. Contractors who have day-to-day operational control over OS-SWPPP implementation will have a copy of this SWPPP available at a central location within the construction site for use by all those identified as having responsibilities under the OS-SWPPP. If it is not practical to have the OS-SWPPP at the site, the permittee and or operator will, upon request make the OS-SWPPP available by the end of normal business hours, or by the following business day under extenuating circumstances. The OS-SWPPP will be made available upon request and at the time of a construction site inspection by SCDHEC, local government officials, and operator of a Municipal Separate Storm Sewer System (MS4) receiving discharges from the construction site to the requestor.

3.2 Pre-Construction Conference

A pre-construction conference will be held at the construction site. Each contractor, subcontractor, blanket utility provider, etc., who will work at the site will attend this conference in person. The primary purpose of this conference is for:

I. The preparer of the SWPPP and someone with a registration equivalent to that of the preparer of the SWPPP; and/or
II. The person with operational control of the plans and specifications or their duly authorized representative

To review and explain the OS-SWPPP so that all are aware of the requirements before they start performing construction-related activities that may affect the implementation of the approved OS-SWPPP.

3.3 Inspection Requirements

Visual inspections of cleared and graded areas of the construction site will be performed once every seven (7) calendar days for active landfills. The inspection will be conducted by the SWPPP coordinator or his designated stormwater team members. The inspection will verify that

the structural BMPs described in Section 1 of this SWPPP are in good condition and are minimizing erosion. The inspection will also verify that the procedures used to prevent stormwater contamination from construction materials and petroleum products are effective. The following inspection and maintenance practices will be used to maintain erosion and sediment controls:

- Built up sediment will be removed from silt fencing when it has reached one-third the height of the fence.
- Silt fences and inlet protections (if applicable) will be inspected for depth of sediment, for tears, to determine if the fabric is securely attached to the fence posts, and to ensure that the fence posts are firmly in the ground.
- Temporary and permanent seeding will be inspected for bare spots, washouts, and healthy growth.
- The stabilized construction entrance will be inspected for sediment tracked on the road, for clean gravel, and to ensure that all traffic use the stabilized entrance when leaving the site.
- Built up sediment will be removed from rip rap outlet protection.
- Sediment forebays will be inspected and cleaned out as needed.
- The detention basin will be inspected for sediment accumulation after each rain event, and skimmer observed to ensure it is functioning properly.

3.4 Maintenance Policies

All maintenance to sediment and erosion control devices shall be in accordance with the Construction Details. The contractor shall maintain the existing BMPs at all times.

Permanent maintenance of the detention basins will include the following:

- Periodic grass cutting,
- Trash and sediment build up within basin,
- Trash and debris removal from Outlet Control Structure,
- Outlet Control Structure orifices and weir cleaning, a
- Outlet pipes to be cleaned, inspected and repaired,
- Rip Rap outlet protection to be maintained,
- Tree growth to not be allowed along the detention basin berms, and
- Erosion on side slopes.

3.5 Record Keeping

The maintenance inspection report will be made after each inspection. A copy of the report form to be completed by the SWPPP coordinator will be provided in the OS-SWPPP. In the event that a spill was to take place on the site, the SWPPP Coordinator will complete a spill report as

outlined in the OS-SWPPP. Completed forms will be maintained on-site during the entire construction project. Following construction, the completed forms will be retained at the General Contractor's office for a minimum of one (1) year.

If construction activities or design modifications are made to the site plan, which could impact stormwater, this SWPPP will be amended appropriately. The amended SWPPP will have a description of the new activities that contribute to the increased pollutant loading and the planned source control activities.

3.6 Final Stabilization

Final stabilization will occur as each stage of the landfill cells are brought to final grade and when all land-disturbing activities at the construction site have been completed and all areas not covered by permanent structures, either (1) have a uniform vegetative cover with a density of 75 percent of the natural background vegetative cover, or (2) equivalent permanent stabilization measures have been implemented to provide effective cover for exposed portions of the construction site not stabilized with vegetation.

APPENDIX A Site Maps

GREENPOINTE CLASS TWO CONSTRUCTION AND DEMOLITION DEBRIS LANDFILL EXPANSION IN ANDERSON COUNTY, SOUTH CAROLINA VICINITY MAP

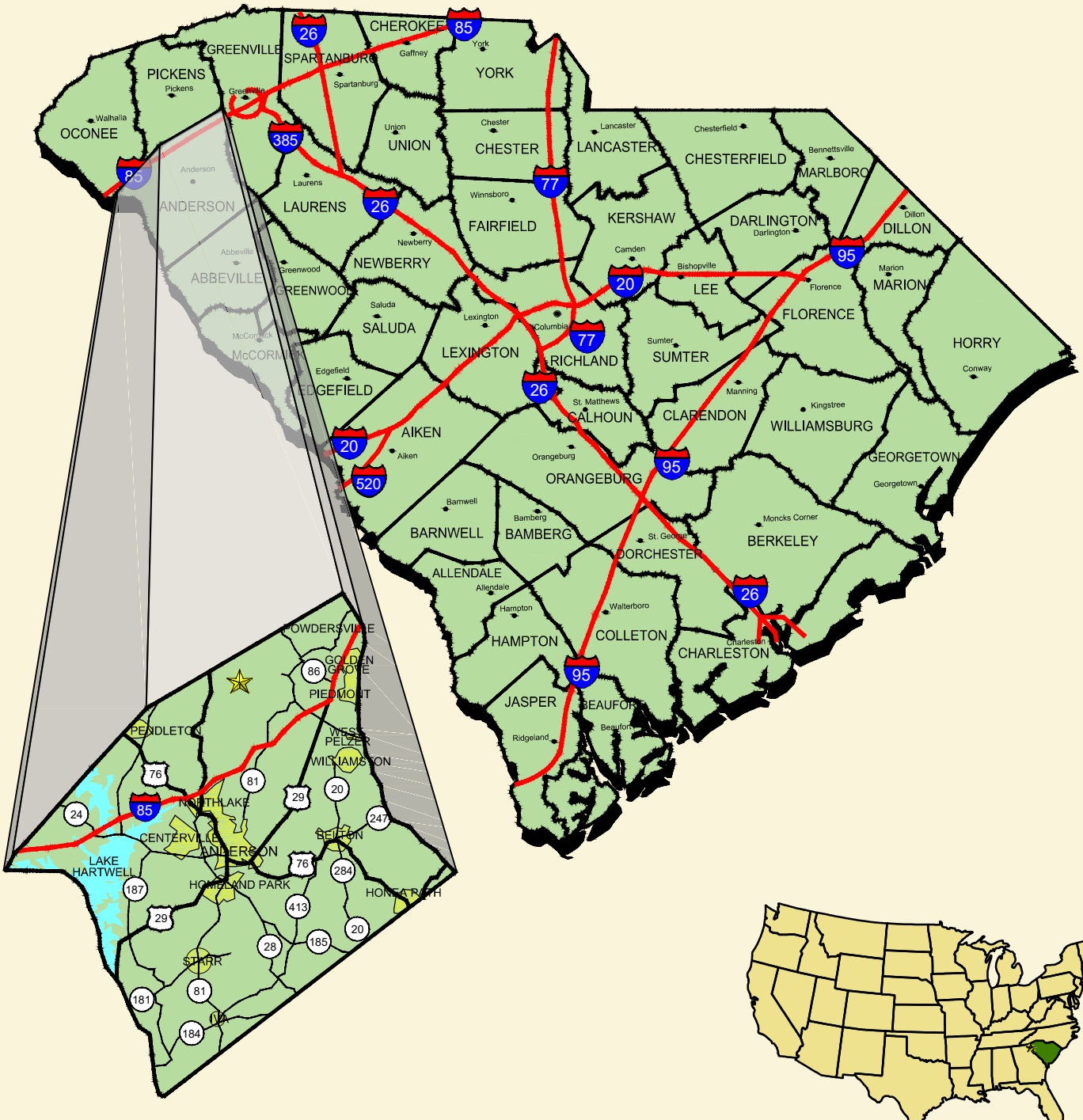
+/- 212 Acres

NORTH

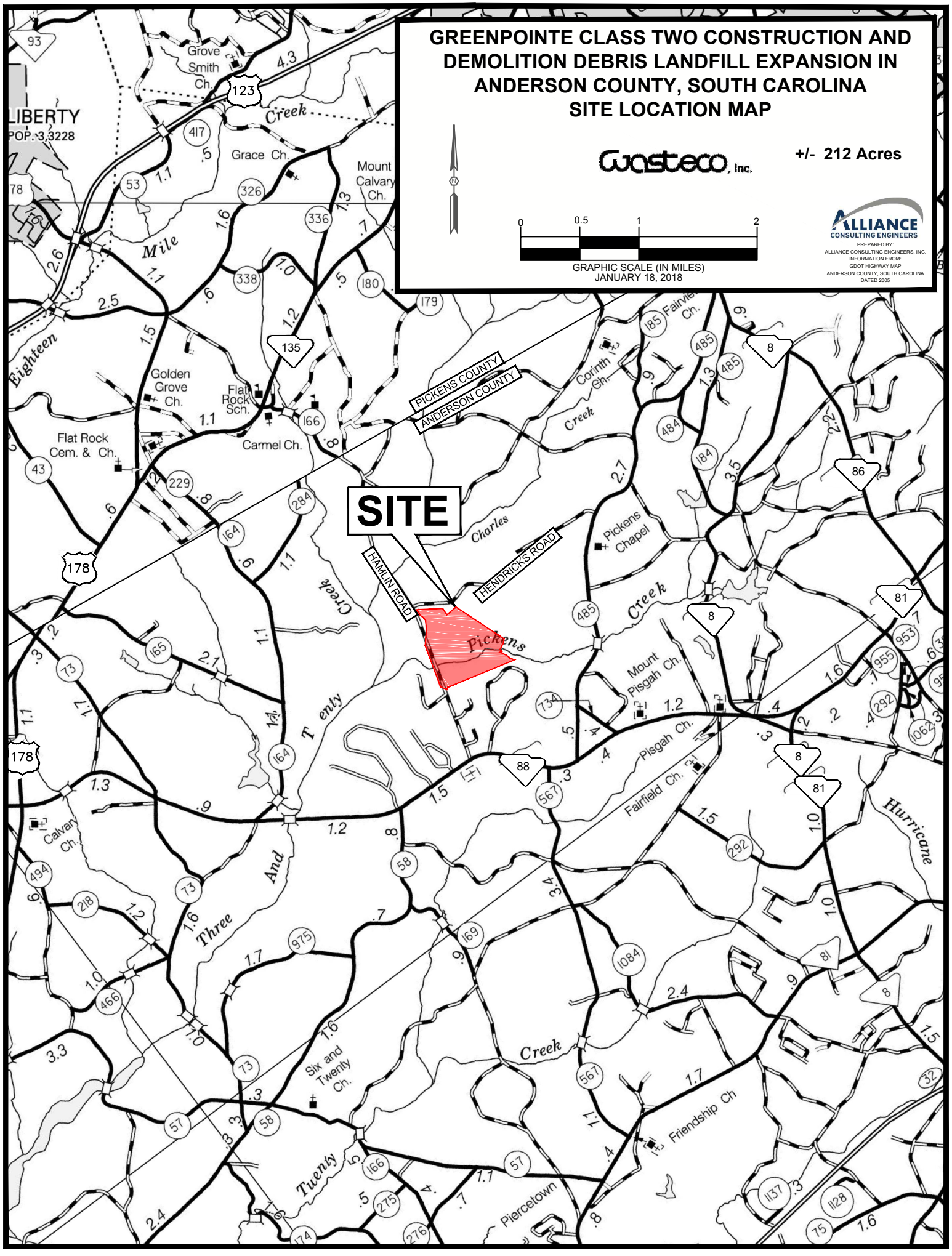
Wasteco, Inc.

ALLIANCE CONSULTING ENGINEERS

PREPARED BY:
ALLIANCE CONSULTING ENGINEERS, INC.
JANUARY 18, 2018



GREENPOINTE CLASS TWO CONSTRUCTION AND DEMOLITION DEBRIS LANDFILL EXPANSION IN ANDERSON COUNTY, SOUTH CAROLINA
SITE LOCATION MAP



+/- 212 Acres

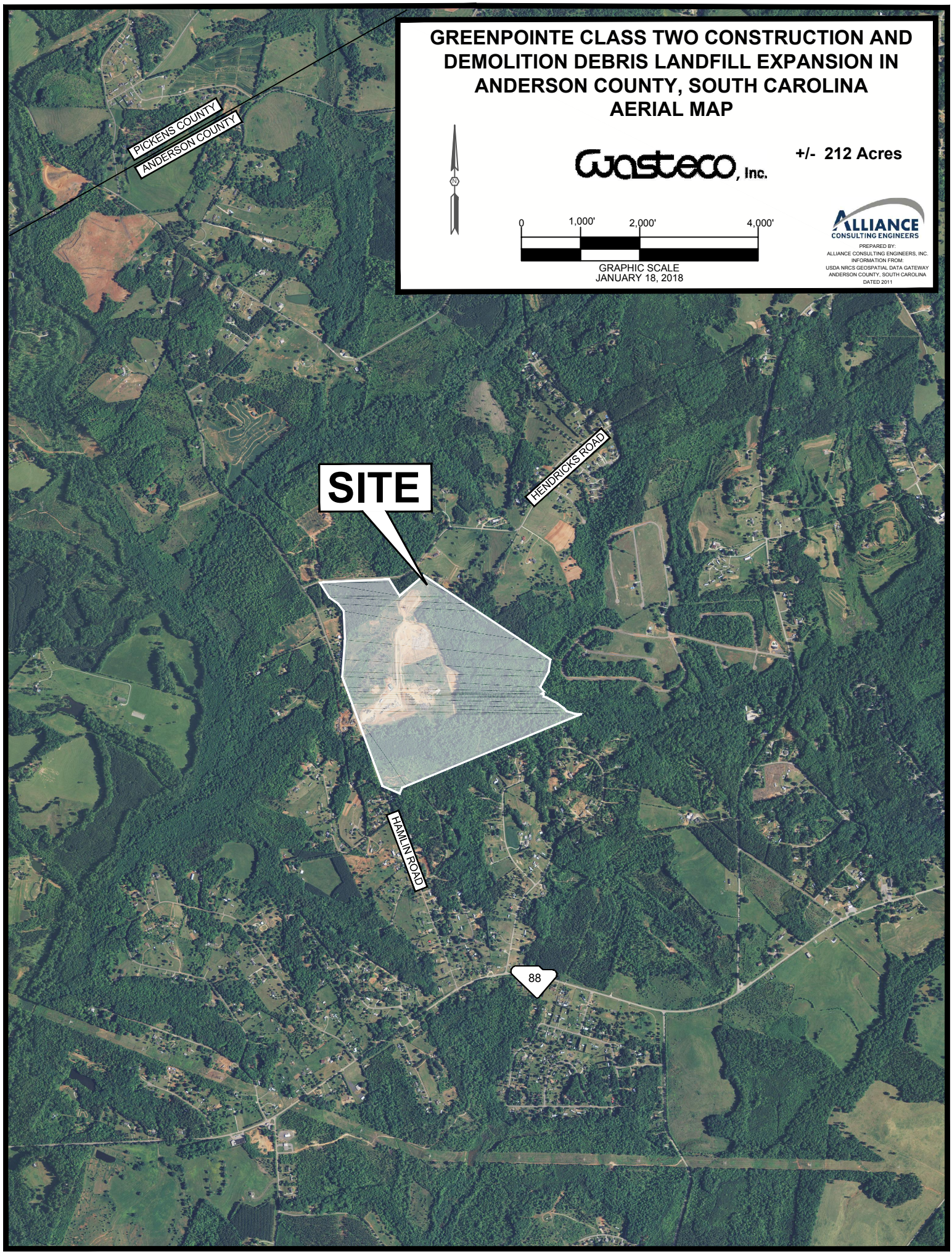
0 0.5 1 2

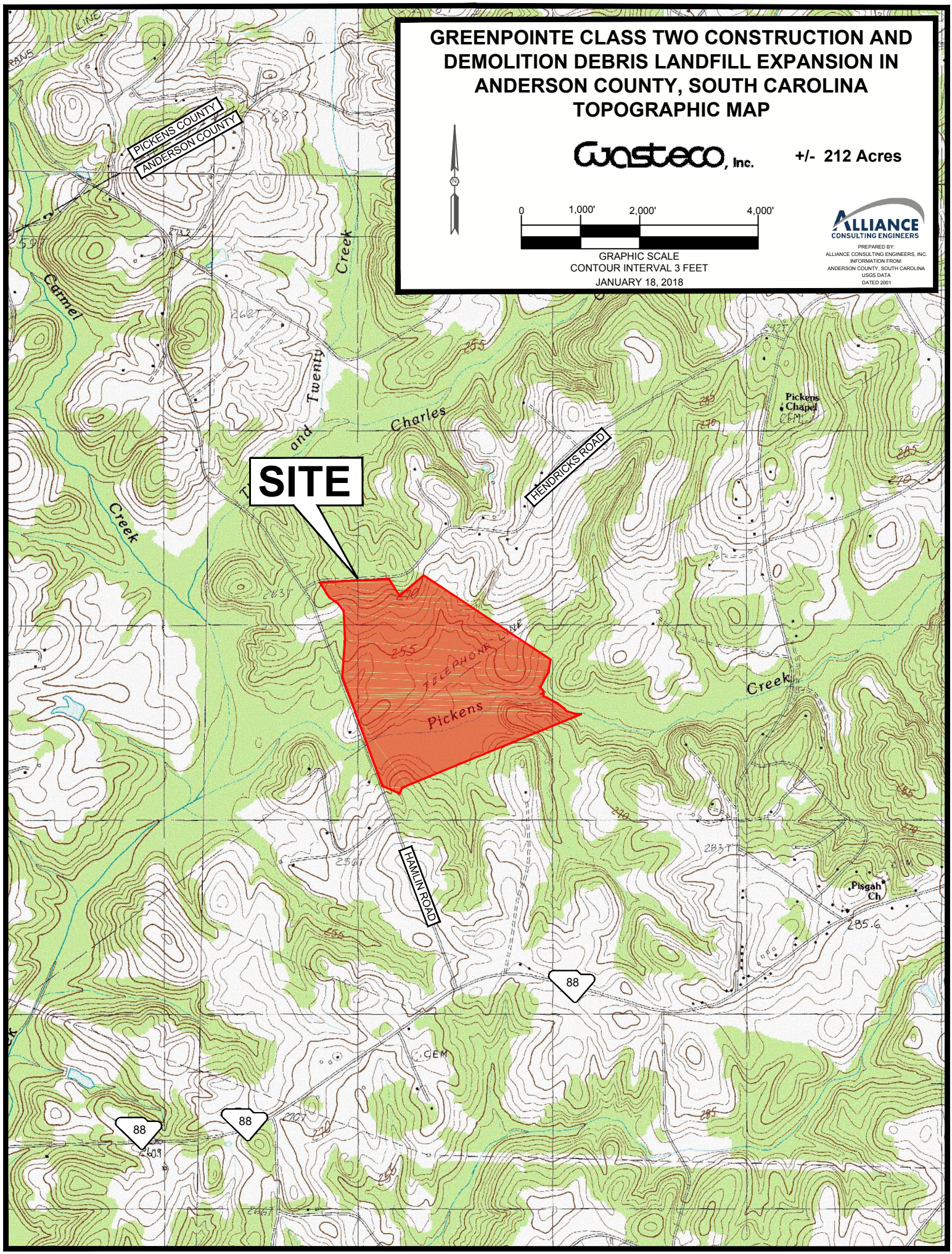
GRAPHIC SCALE (IN MILES)
JANUARY 18, 2018

Gasteco, Inc.

ALLIANCE CONSULTING ENGINEERS

PREPARED BY:
ALLIANCE CONSULTING ENGINEERS, INC.
INFORMATION FROM:
GDOT HIGHWAY MAP
ANDERSON COUNTY, SOUTH CAROLINA
DATED 2005


GREENPOINTE CLASS TWO CONSTRUCTION AND DEMOLITION DEBRIS LANDFILL EXPANSION IN ANDERSON COUNTY, SOUTH CAROLINA
AERIAL MAP
+/- 212 Acres
Wasteco, Inc.
0
1,000'
2,000'
4,000'
GRAPHIC SCALE
JANUARY 18, 2018
ALLIANCE CONSULTING ENGINEERS
PREPARED BY:
ALLIANCE CONSULTING ENGINEERS, INC.
INFORMATION FROM:
USDA NRCS GEOSPATIAL DATA GATEWAY
ANDERSON COUNTY, SOUTH CAROLINA
DATED 2011
PICKENS COUNTY
ANDERSON COUNTY
SITE
HENDRICKS ROAD
HAMLIN ROAD
88


GREENPOINTE CLASS TWO CONSTRUCTION AND DEMOLITION DEBRIS LANDFILL EXPANSION IN ANDERSON COUNTY, SOUTH CAROLINA
TOPOGRAPHIC MAP
Gasteco, Inc.
+/- 212 Acres
0
1,000'
2,000'
4,000'
GRAPHIC SCALE
CONTOUR INTERVAL 3 FEET
JANUARY 18, 2018
ALLIANCE CONSULTING ENGINEERS
PREPARED BY:
ALLIANCE CONSULTING ENGINEERS, INC.
INFORMATION FROM:
ANDERSON COUNTY, SOUTH CAROLINA
USGS DATA
DATED 2001
SITE
PICKENS COUNTY
ANDERSON COUNTY
HENDRICKS ROAD
HAMLIN ROAD
Pickens
Pickens Chapel
Pisgah Ch
Carmel
Creek
Twenty and Charles
TELEPHONE LINE
88
CEM

GREENPOINTE CLASS TWO CONSTRUCTION AND DEMOLITION DEBRIS LANDFILL EXPANSION IN ANDERSON COUNTY, SOUTH CAROLINA
SOILS MAP

Gasteco, Inc.

+/- 212 Acres

0 1,000' 2,000' 4,000'

GRAPHIC SCALE
JANUARY 18, 2018

ALLIANCE CONSULTING ENGINEERS

PREPARED BY:
ALLIANCE CONSULTING ENGINEERS, INC.
INFORMATION FROM:
ANDERSON COUNTY, SOUTH CAROLINA
USDA NRCS SOIL DATAMART
DATED 2009

PICKENS COUNTY

ANDERSON COUNTY

SITE

HENDRICKS ROAD

HAMLIN ROAD

88

CdB
CdC
MaD
MaD
CdC
Ca
MaC
MaE
MaC
Ca
MaD
HaC
CdD
CeC2

LEGEND	HSG	
Cartecay (Ca)	B/D	
Cecil (CdB, CdC, CdD, CeC2)	B	
Hiwassee (HaC)	B	
Madison (MaC, MaD, MaE)	B	

GREENPOINTE CLASS TWO CONSTRUCTION AND DEMOLITION DEBRIS LANDFILL EXPANSION IN ANDERSON COUNTY, SOUTH CAROLINA
FEMA FLOOD MAP

Wasteco, Inc.

+/- 212 Acres

0 1,000' 2,000' 4,000'

GRAPHIC SCALE
JANUARY 18, 2018

ALLIANCE CONSULTING ENGINEERS

PREPARED BY:
ALLIANCE CONSULTING ENGINEERS, INC.
INFORMATION FROM:
FEMA FLOOD MAP CATALOG
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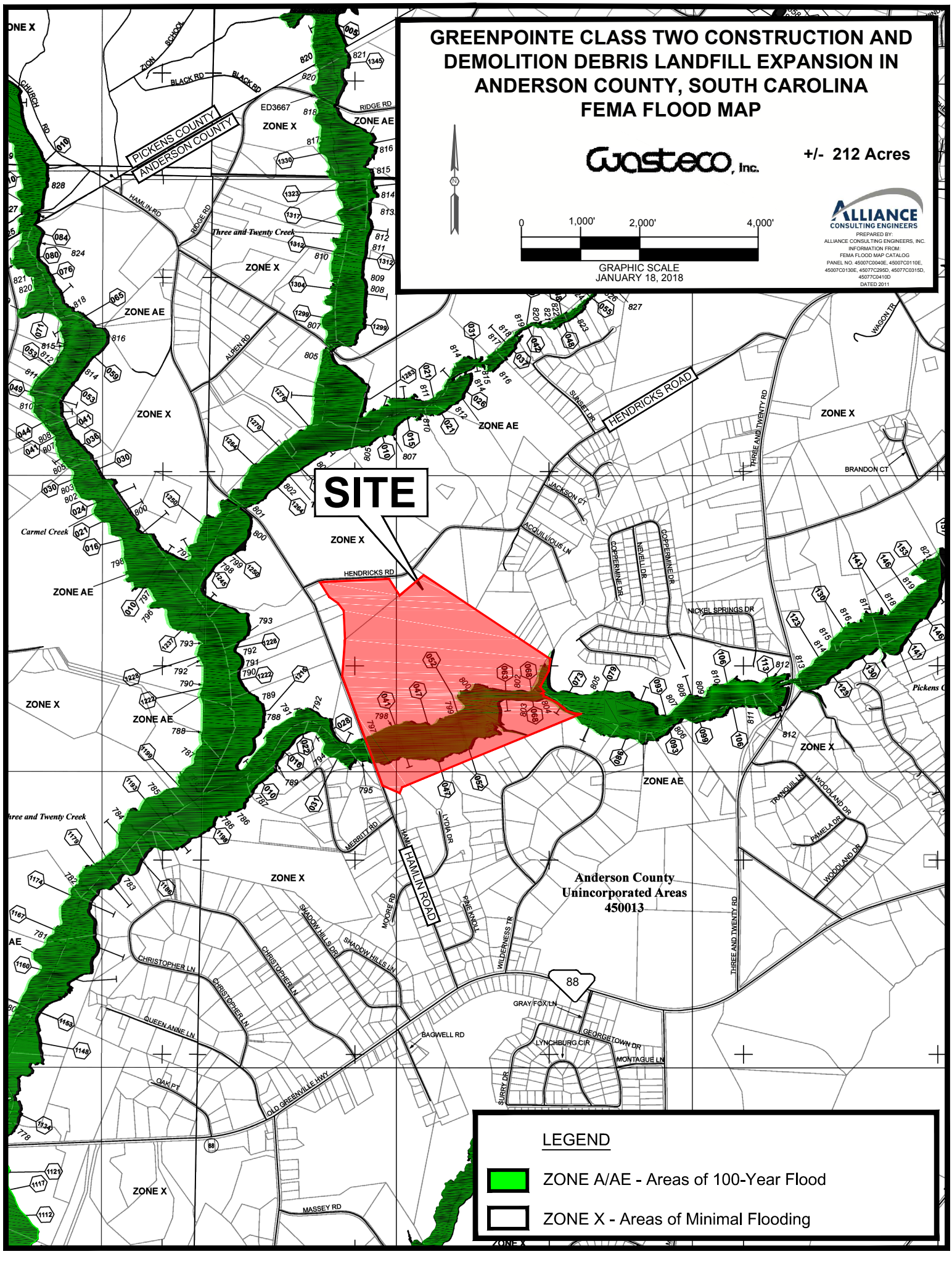
DATED 2011



LEGEND

- ZONE A/AE - Areas of 100-Year Flood
- ZONE X - Areas of Minimal Flooding

GREENPOINTE CLASS TWO CONSTRUCTION AND DEMOLITION DEBRIS LANDFILL EXPANSION IN ANDERSON COUNTY, SOUTH CAROLINA
NATIONAL WETLAND INVENTORY (NWI) MAP

+/- 212 Acres

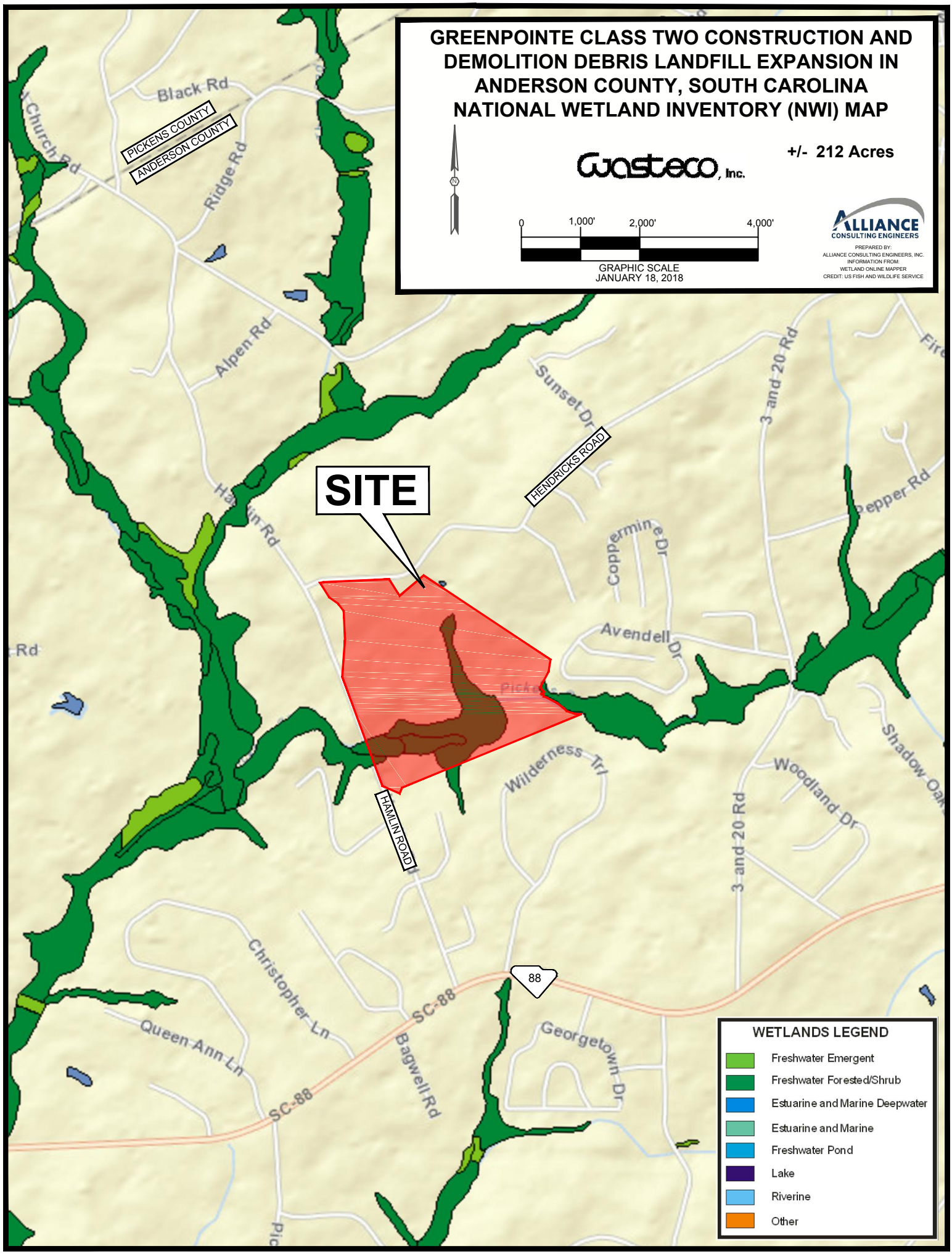
Wasteco, Inc.

0 1,000' 2,000' 4,000'

GRAPHIC SCALE
JANUARY 18, 2018

ALLIANCE CONSULTING ENGINEERS

PREPARED BY:
ALLIANCE CONSULTING ENGINEERS, INC.
INFORMATION FROM:
WETLAND ONLINE MAPPER
CREDIT: US FISH AND WILDLIFE SERVICE



APPENDIX B Pre and Post Development Maps

PRE-DEVELOPMENT WATERSHED DRAINAGE MAP-CELL 1
(PREVIOUSLY PERMITTED LF2-100)

EXISTING DETENTION BASIN 2

EXISTING CELL 1

EXISTING DETENTION BASIN 2 OUTFALL

EXISTING DETENTION BASIN 1

EXISTING DETENTION BASIN 1 OUTFALL

100 YR FLOOD ZONE FROM ANDERSOM COUNTY GIS MAP & FEMA MAPS

Limit of Delineated Wetland

SILT FENCE AROUND COVER SOURCE AREA

COVER MATERIAL SOURCE AREA No. 1

Residence

Property Line

R 1000'

20ft SERVICE ROAD

Isolated Wetland

CL Creek

SHOP

TIPING PAD

RECYCLE AREA

EMPLOYEE AND EQUIPMENT PARKING

GATE

SITE SIGNS

TURNAROUND

R 125'

FENCE

ENTRANCE/EXIT

OUTFALL ACROSS ROAD

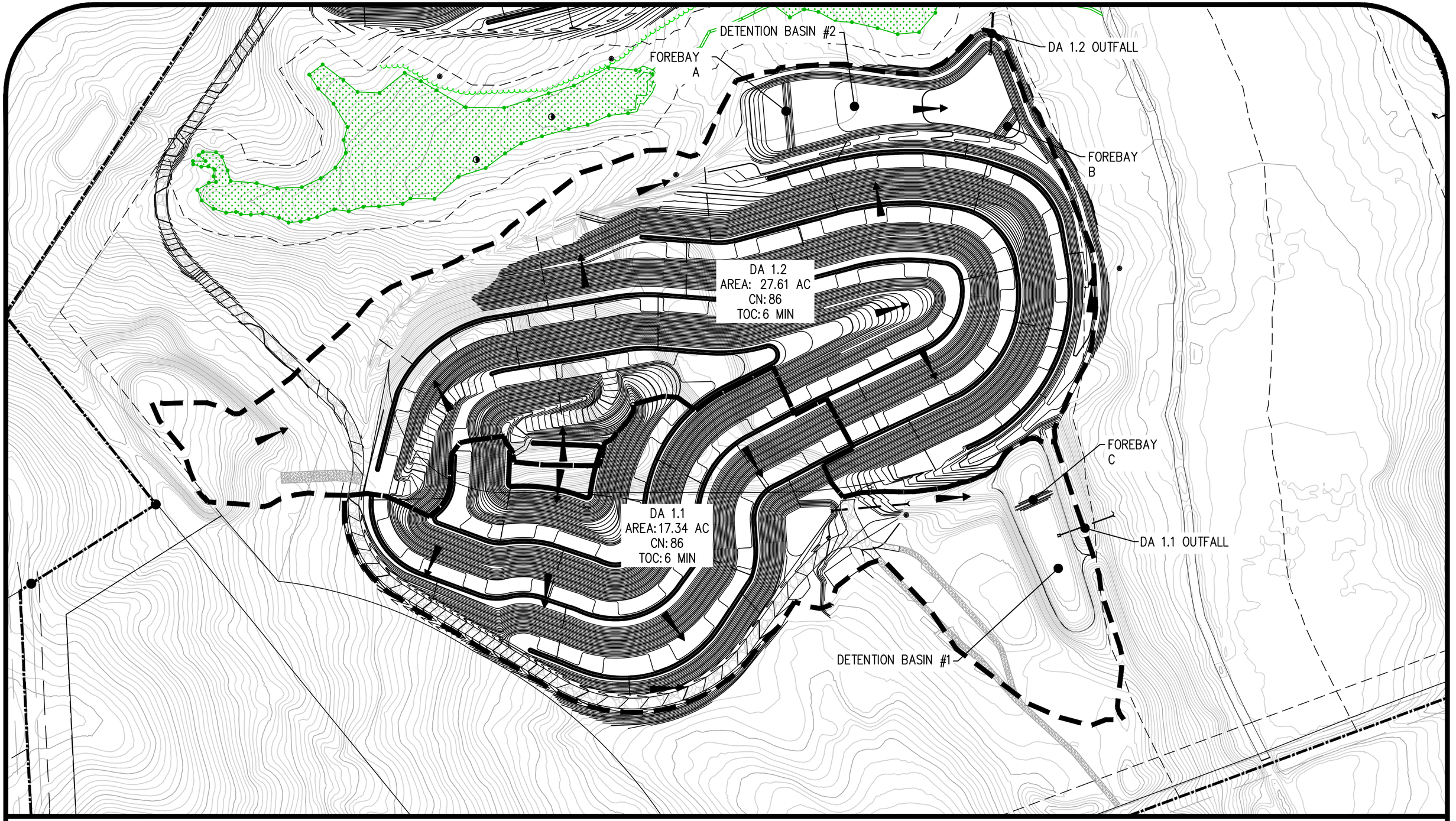
OUTFALL AT CREEK

Road R/W Line

Existing Roadside Ditch

PROPOSED CONDITIONS

SCALE 1" = 200'



200 100 0 200 600

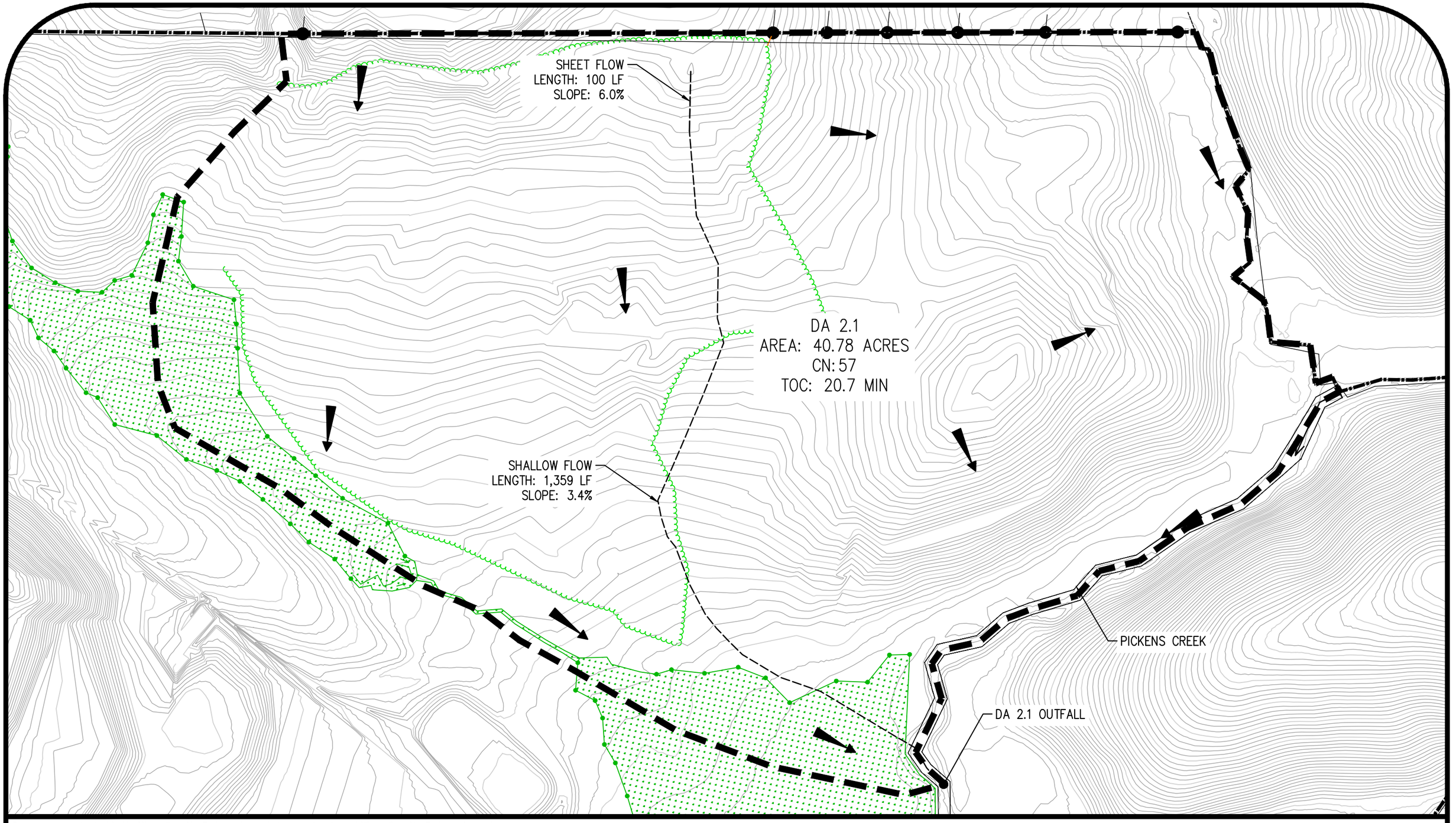
(IN FEET)

Project No.: 16227-0004
March, 2018

Post-Development Watershed Map - Cell 1 for Project Greenpointe Landfill in Anderson County, South Carolina

ALLIANCE CONSULTING ENGINEERS

Prepared by Alliance Consulting Engineers, Inc.
124 Verdae Blvd, Greenville, SC 29607-3843
864-284-1740
www.allianceCE.com



150 75 0 150 450

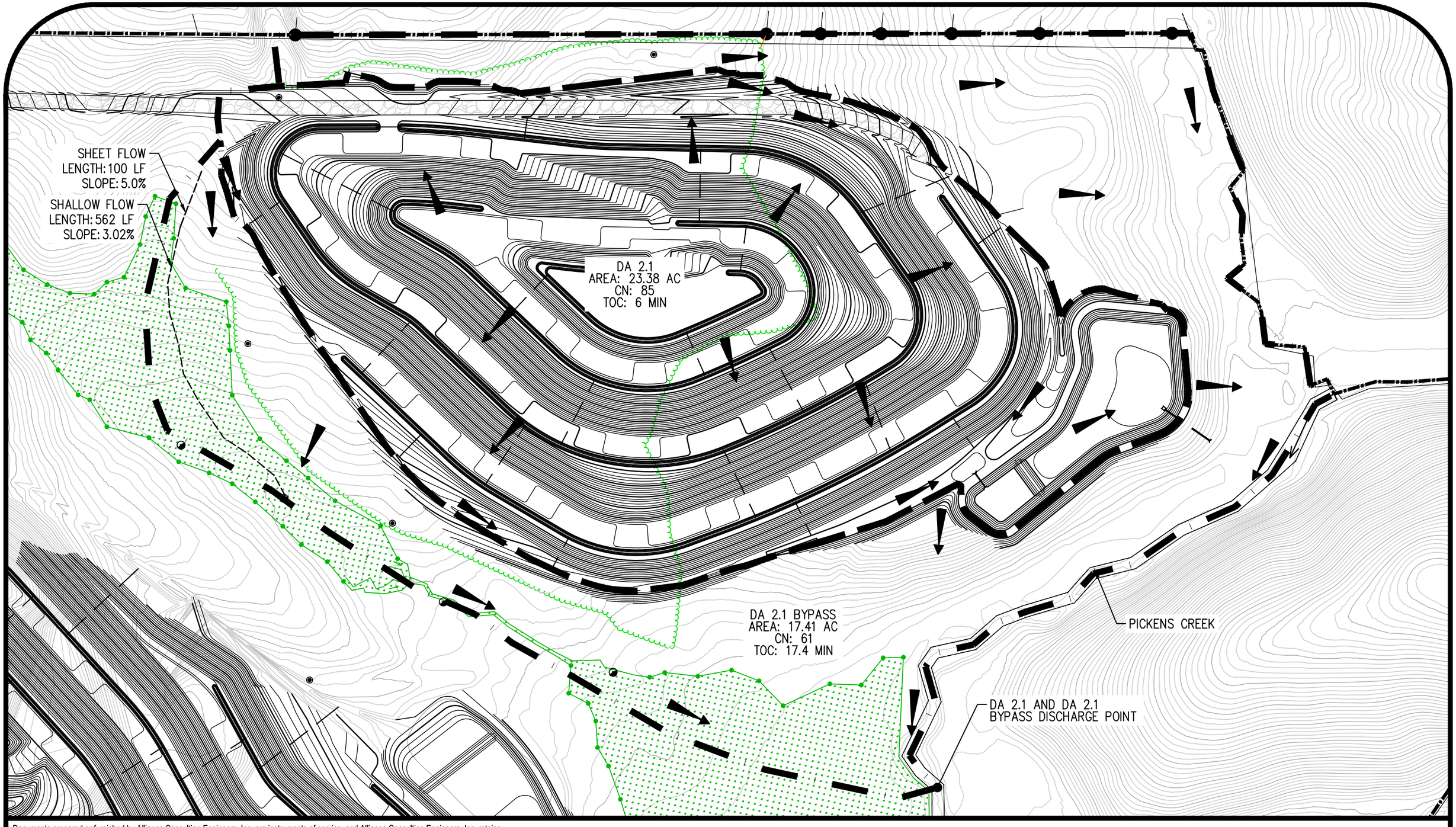
(IN FEET)

Project No.: 16227-0004
March, 2018

Pre-Development Watershep Map - Cell 2 for Project Greenpointe Landfill in Anderson County, South Carolina

ALLIANCE CONSULTING ENGINEERS

Prepared by Alliance Consulting Engineers, Inc.
124 Verdae Blvd. Greenville, SC 29607-3843
864-284-1740
www.allianceCE.com



150 75 0 150 450

(IN FEET)

Project No.: 16227-0004
March, 2018

Post-Development Watershed Map - Cell 2 for Project Greenpointe Landfill in Anderson County, South Carolina

ALLIANCE CONSULTING ENGINEERS

Prepared by Alliance Consulting Engineers, Inc.
124 Verdae Blvd. Greenville, SC 29607-3843
864-284-1740
www.allianceCE.com

APPENDIX C Pre-Development – Previously Permitted Calculations and HydroCAD

Watershed Model Schematic

Legend

Hyd.	Origin	Description
1	SCS Runoff	DA 2.1

Hydraflow Table of Contents

Hydrograph Return Period Recap

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	------	-------	11.91	-------	-------	53.17	83.76	-------	172.88	DA 2.1

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v11

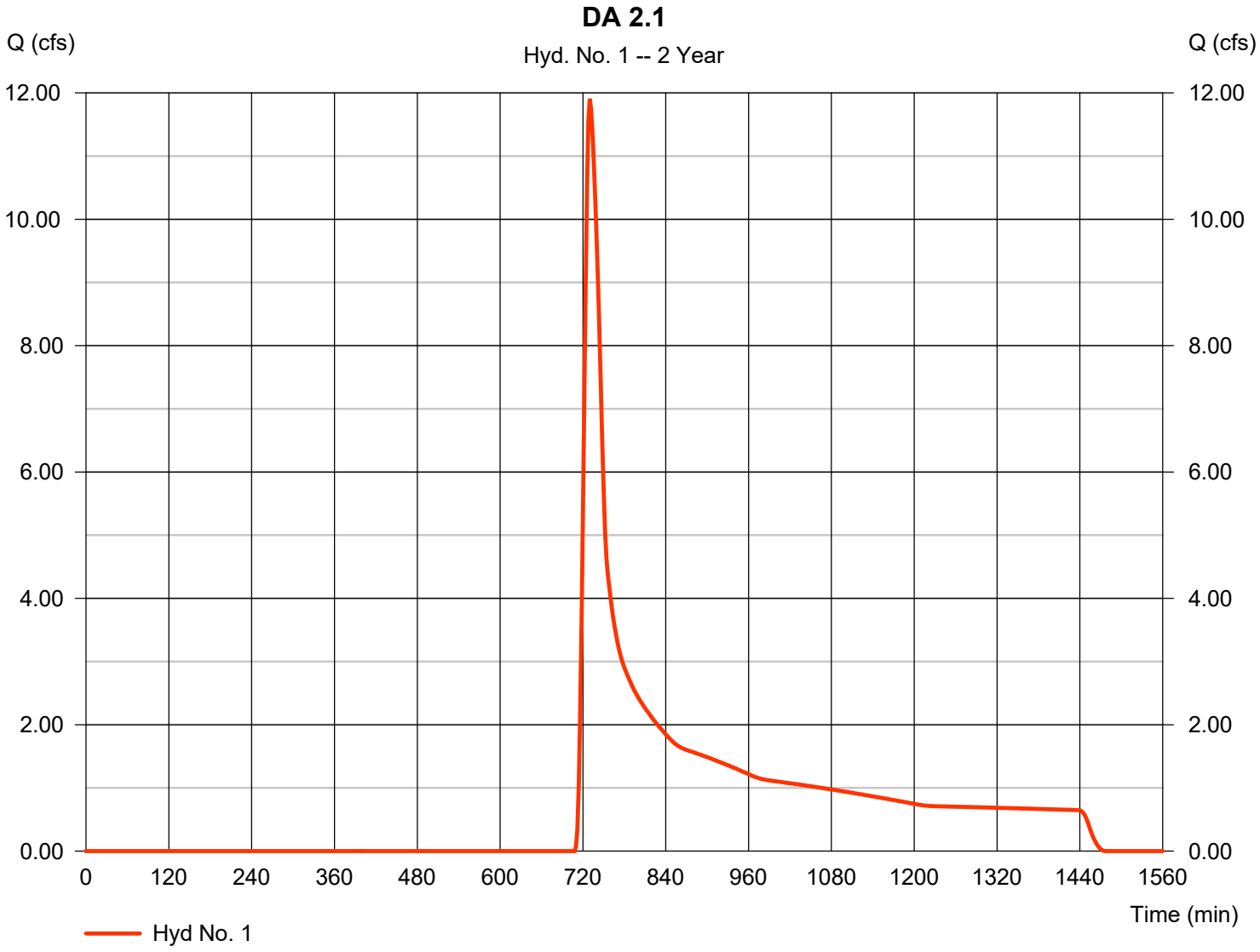
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	11.91	2	730	68,354	------	------	------	DA 2.1

Hydrograph Report

Hyd. No. 1

DA 2.1

Hydrograph type	= SCS Runoff	Peak discharge	= 11.91 cfs
Storm frequency	= 2 yrs	Time to peak	= 730 min
Time interval	= 2 min	Hyd. volume	= 68,354 cuft
Drainage area	= 40.780 ac	Curve number	= 57
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 20.70 min
Total precip.	= 3.60 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



TR55 Tc Worksheet

Hyd. No. 1

DA 2.1

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.400		0.011		0.011		
Flow length (ft)	= 100.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.60		0.00		0.00		
Land slope (%)	= 6.00		0.00		0.00		
Travel Time (min)	**= 13.05**	**+**	**0.00**	**+**	**0.00**	**=**	**13.05**
Shallow Concentrated Flow							
Flow length (ft)	= 1358.68		0.00		0.00		
Watercourse slope (%)	= 3.40		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=2.98		0.00		0.00		
Travel Time (min)	**= 7.61**	**+**	**0.00**	**+**	**0.00**	**=**	**7.61**
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		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 20.70 min

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v11

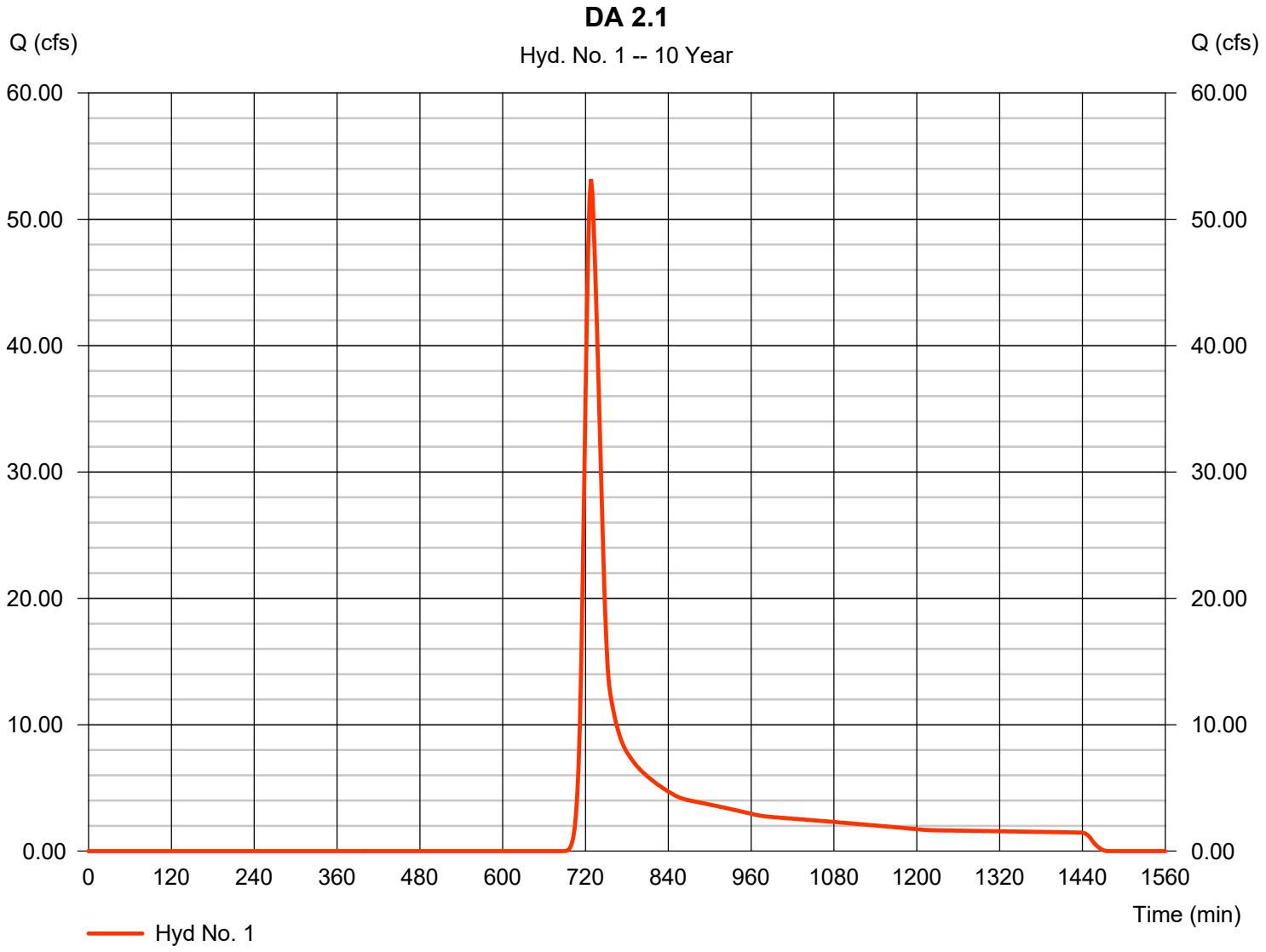
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	53.17	2	728	208,081	------	------	------	DA 2.1

Hydrograph Report

Hyd. No. 1

DA 2.1

Hydrograph type	=	SCS Runoff	Peak discharge	=	53.17 cfs
Storm frequency	=	10 yrs	Time to peak	=	728 min
Time interval	=	2 min	Hyd. volume	=	208,081 cuft
Drainage area	=	40.780 ac	Curve number	=	57
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	20.70 min
Total precip.	=	5.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v11

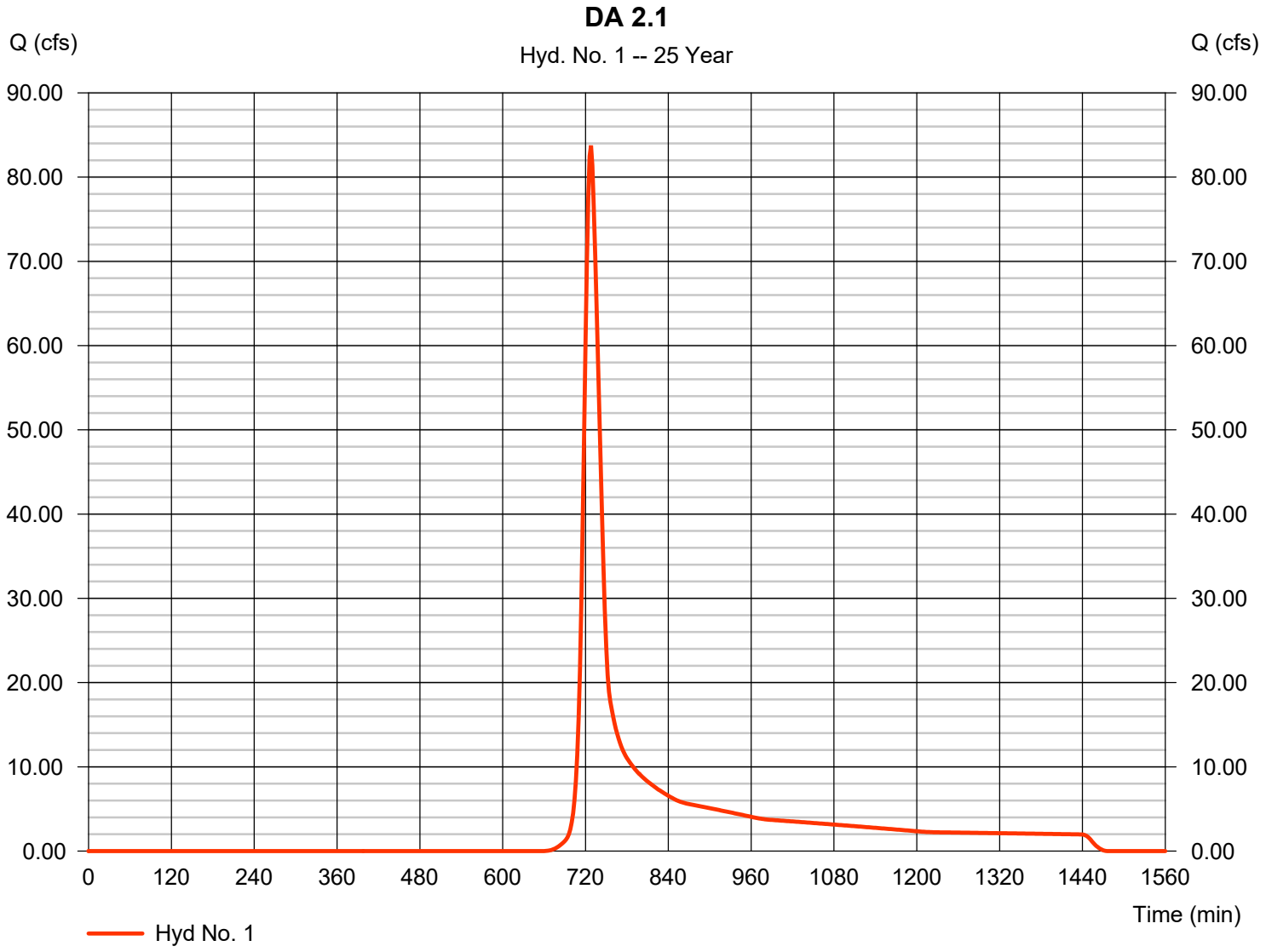
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	83.76	2	728	309,106	------	------	------	DA 2.1

Hydrograph Report

Hyd. No. 1

DA 2.1

Hydrograph type	=	SCS Runoff	Peak discharge	=	83.76 cfs
Storm frequency	=	25 yrs	Time to peak	=	728 min
Time interval	=	2 min	Hyd. volume	=	309,106 cuft
Drainage area	=	40.780 ac	Curve number	=	57
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	20.70 min
Total precip.	=	6.60 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2016 by Autodesk, Inc. v11

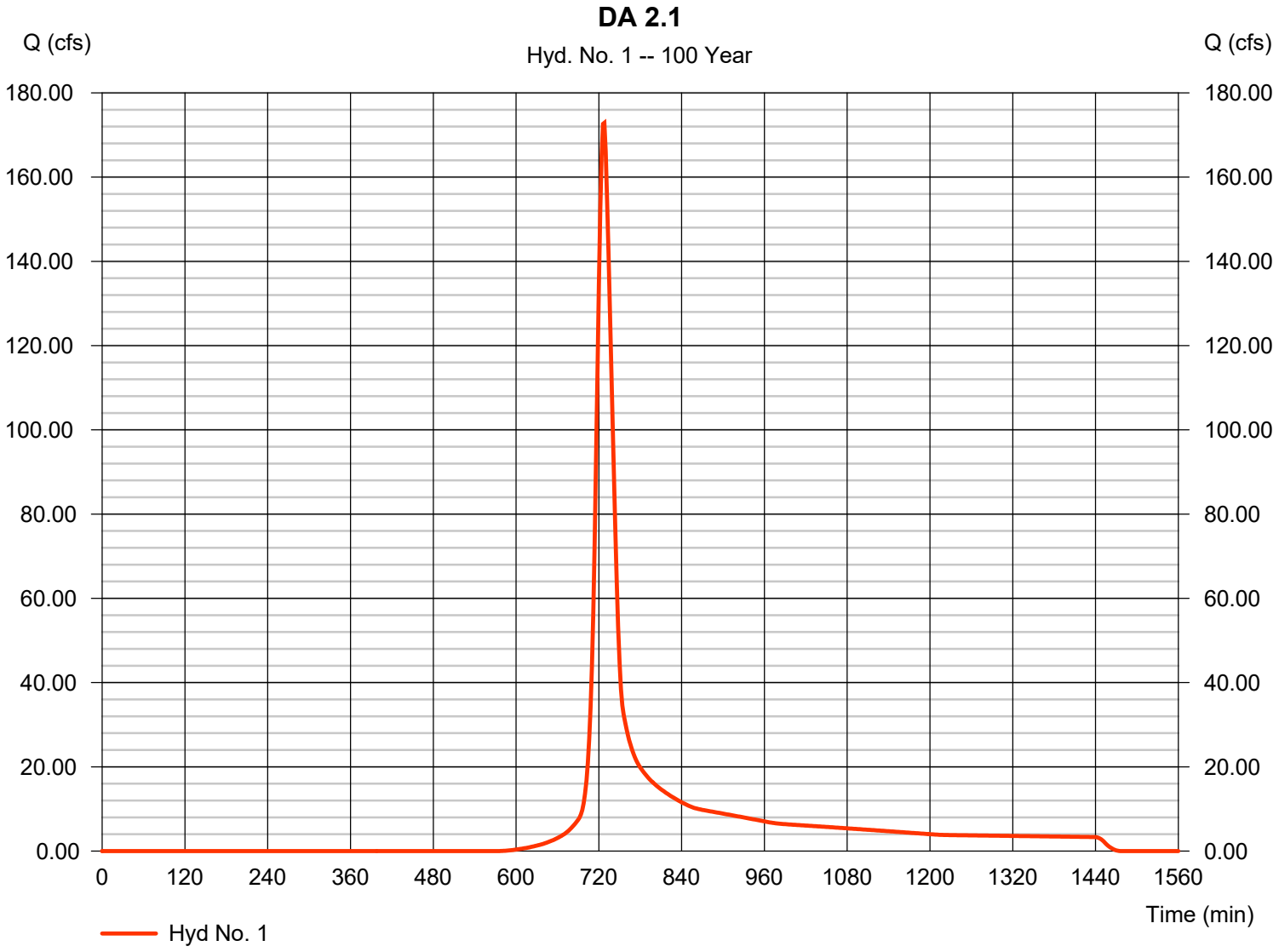
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	172.88	2	728	607,884	------	------	------	DA 2.1

Hydrograph Report

Hyd. No. 1

DA 2.1

Hydrograph type	=	SCS Runoff	Peak discharge	=	172.88 cfs
Storm frequency	=	100 yrs	Time to peak	=	728 min
Time interval	=	2 min	Hyd. volume	=	607,884 cuft
Drainage area	=	40.780 ac	Curve number	=	57
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	20.70 min
Total precip.	=	9.40 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



Hydraflow Rainfall Report

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	0.0000	0.0000	0.0000	--------
2	51.0918	10.3000	0.8101	--------
3	0.0000	0.0000	0.0000	--------
5	50.0837	10.2000	0.7521	--------
10	52.1003	10.3000	0.7297	--------
25	56.3781	10.4000	0.7092	--------
50	60.2406	10.5000	0.6983	--------
100	64.2406	10.6000	0.6897	--------

File name: Greenpointe IDF.IDF

Intensity = B / (Tc + D)^E

Return Period (Yrs)	Intensity Values (in/hr)											
	5 min	10	15	20	25	30	35	40	45	50	55	60
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	5.61	4.46	3.73	3.22	2.85	2.56	2.33	2.14	1.98	1.85	1.73	1.63
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	6.47	5.22	4.42	3.86	3.44	3.11	2.85	2.63	2.45	2.30	2.16	2.05
10	7.12	5.79	4.93	4.32	3.87	3.51	3.22	2.99	2.79	2.62	2.47	2.34
25	8.11	6.64	5.69	5.00	4.49	4.09	3.77	3.50	3.27	3.08	2.91	2.76
50	8.89	7.31	6.28	5.54	4.98	4.54	4.19	3.89	3.65	3.43	3.25	3.09
100	9.66	7.97	6.86	6.07	5.47	4.99	4.61	4.29	4.02	3.79	3.59	3.41

Tc = time in minutes. Values may exceed 60.

Two C&D Landfill Expansion Anderson Cnty\Engineering Calculations\Stormwater\Anderson County 24 hr Rainfall.pcp

Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	3.30	3.60	0.00	0.00	5.50	6.60	0.00	9.40
SCS 6-Hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-1st	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-2nd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-Indy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Custom	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

BLWM # 21126

(164.b)

1 of 2

CONSTRUCTION, DEMOLITION, AND LAND CLEARING DEBRIS LANDFILL PLAN FOR THE GREENPOINTE C & D LANDFILL SITE ANDERSON COUNTY, SOUTH CAROLINA

APPROVED BY
SOUTH CAROLINA DEPARTMENT OF HEALTH
AND ENVIRONMENTAL CONTROL
Bureau of Land & Waste Management
BY Kent M. Cole
TITLE Division Director
DATE ISSUED 7-10-2008
PERMIT NO. LF2-001

RECEIVED
MAY 19 2008
DIVISION OF MINING & SOLID WASTE MANAGEMENT
BLWM

DAVIS & FLOYD

CONSTRUCTION, DEMOLITION, AND LAND CLEARING DEBRIS LANDFILL PLAN FOR THE GREENPOINTE C & D LANDFILL SITE ANDERSON COUNTY, SOUTH CAROLINA

RECEIVED
MAY 19 2008
DIVISION OF MINING & SOLID WASTE MANAGEMENT
BLWM

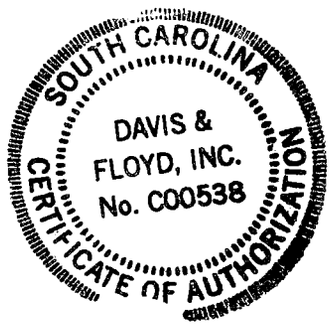
SEPTEMBER, 2005

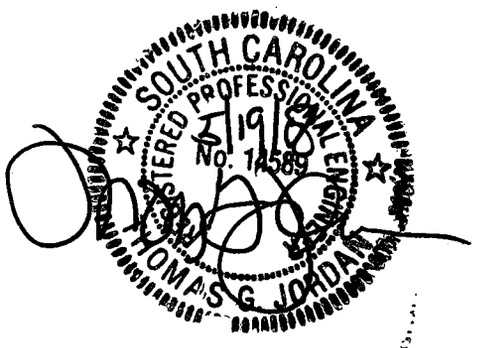
REVISED NOVEMBER, 2005

REVISED OCTOBER 2007

REVISED MAY 2008

DAVIS & FLOYD, INC. JOB NUMBER 11967.00





PREPARED BY

DAVIS & FLOYD, INC.

ENVIRONMENTAL DIVISION

GREENWOOD, SOUTH CAROLINA

TABLE OF CONTENTS

APPENDICES

APPENDIX 3

SEDIMENT CONTROL DESIGN

Area Identification			Predeveloped 10 year Peak Flow (cfs)			Postdeveloped 10 year Peak Flow (cfs)
Total Runoff			190.06			124.31

Area Identification			Predeveloped 10 year Peak Flow (cfs)			Postdeveloped 10 year Peak Flow (cfs)
Across Road			81.53			71.91
At Creek			108.1			52.4

Prop.

Residence

Hendricks Road

Property Line

Delineated Wetland

Delineated Wetland

100 YR FLOOD ZONE
FROM ANDERSON COUNTY
GIS MAP & FEMA MAP

Pickens Creek

Dirt Road

Isolated Wetland

Shop

Residence

Residence

Residence

Property Line

Property Line

Delineated Wetland

Delineated Wetland

OUTFALL ACROSS ROAD

OUTFALL AT CREEK

Road R/W Line

Road R/W Line

Hamlin Road

Hamlin Road

EXISTING CONDITIONS

SCALE 1" = 200'

PROPOSED CONDITIONS

SCALE 1" = 200'

Outfall At Creek

Davis & Floyd, Inc.
1319 Hwy 72 221 E.
Greenwood, SC 29649

Phone: 864-229-5211

General Information

Storm Information:

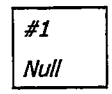
Storm Type:	NRCS Type II
Design Storm:	10 yr - 24 hr
Rainfall Depth:	5.500 inches

Particle Size Distribution:

Size (mm)	Madison
1.4000	100.000%
1.0000	84.600%
0.0630	49.300%
0.0440	42.600%
0.0380	42.600%
0.0040	8.800%
0.0030	5.800%
0.0010	0.000%

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Null	#1	==>	End	0.000	0.000	



Structure Summary:

	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc. (ml/l)	24VW (ml/l)
#1	58.650	58.650	108.10	12.35	88.6	9,574	5.16	2.84

Particle Size Distribution(s) at Each Structure

Structure #1:

Size (mm)	In/Out
1.4000	100.000%
1.0000	100.000%
0.0630	70.972%
0.0440	61.327%
0.0380	61.327%
0.0040	12.668%
0.0030	8.350%
0.0010	0.000%

Structure Detail:

Structure #1 (Null)

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	24.850	0.252	0.252	0.355	77.000	M	49.26	5.064
	2	33.800	0.326	0.326	0.348	79.000	M	66.03	7.287
	Σ	**58.650**						**108.10**	**12.351**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.240	200.00	1.50	0.1700	1.0000	1	23.1	6,171	3.48	1.89
	2	0.240	300.00	5.00	0.0830	1.0000	1	72.9	13,375	7.44	4.08
	Σ							**88.6**	**9,574**	**5.16**	**2.84**

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	8. Large gullies, diversions, and low flowing streams	2.00	38.00	1,900.00	4.240	0.124
		9. Small streams flowing bankfull	0.21	4.00	1,900.23	4.120	0.128
#1	**1**	**Time of Concentration:**					**0.252**
#1	2	3. Short grass pasture	6.55	36.00	550.00	2.040	0.074
		8. Large gullies, diversions, and low flowing streams	2.00	38.00	1,900.00	4.240	0.124
		9. Small streams flowing bankfull	0.21	4.00	1,900.00	4.120	0.128
#1	**2**	**Time of Concentration:**					**0.326**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	8. Large gullies, diversions, and low flowing streams	2.00	38.00	1,900.00	4.240	0.124
		9. Small streams flowing bankfull	0.21	4.00	1,900.00	4.120	0.128
#1	**1**	**Muskingum K:**					**0.252**
#1	2	3. Short grass pasture	6.55	36.00	550.00	2.040	0.074

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
		8. Large gullies, diversions, and low flowing streams	2.00	38.00	1,900.00	4.240	0.124
		9. Small streams flowing bankfull	0.21	4.00	1,900.00	4.120	0.128
#1	**2**	**Muskingum K:**					**0.326**

Outfall Across Road

Davis & Floyd, Inc.
1319 Hwy 72 221 E.
Greenwood, SC 29649

Phone: 864-229-5211

General Information

Storm Information:

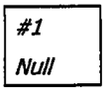
Storm Type:	NRCS Type II
Design Storm:	10 yr - 24 hr
Rainfall Depth:	5.500 inches

Particle Size Distribution:

Size (mm)	Madison
1.4000	100.000%
1.0000	84.600%
0.0630	49.300%
0.0440	42.600%
0.0380	42.600%
0.0040	8.800%
0.0030	5.800%
0.0010	0.000%

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Null	#1	==>	End	0.000	0.000	



Structure Summary:

	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc. (ml/l)	24VW (ml/l)
#1	38.126	38.126	81.53	8.73	77.8	12,714	6.95	3.57

Particle Size Distribution(s) at Each Structure

Structure #1:

Size (mm)	In/Out
1.4000	100.000%
1.0000	99.650%
0.0630	68.654%
0.0440	59.324%
0.0380	59.324%
0.0040	12.255%
0.0030	8.077%
0.0010	0.000%

Structure Detail:

Structure #1 (Null)

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	1.760	0.040	0.040	0.369	98.000	M	7.39	0.771
	2	36.366	0.172	0.172	0.325	79.000	M	83.16	7.957
	Σ	**38.126**						**81.53**	**8.728**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.240	200.00	1.50	0.1700	1.0000	1	2.5	4,358	2.67	1.44
	2	0.240	300.00	5.00	0.0830	1.0000	1	86.5	14,743	8.48	4.58
	Σ							**77.8**	**12,714**	**6.95**	**3.57**

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	8. Large gullies, diversions, and low flowing streams	2.57	18.00	700.00	4.810	0.040
#1	**1**	**Time of Concentration:**					**0.040**
#1	2	3. Short grass pasture	5.56	50.00	900.00	1.880	0.132
		8. Large gullies, diversions, and low flowing streams	2.57	18.00	700.00	4.810	0.040
#1	**2**	**Time of Concentration:**					**0.172**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	8. Large gullies, diversions, and low flowing streams	2.57	18.00	700.00	4.810	0.040
#1	**1**	**Muskingum K:**					**0.040**
#1	2	8. Large gullies, diversions, and low flowing streams	2.57	18.00	700.00	4.810	0.040
		3. Short grass pasture	5.56	50.00	900.00	1.880	0.132
#1	**2**	**Muskingum K:**					**0.172**

Diversion Ditch 25-yr

Davis & Floyd, Inc.
1319 Hwy 72 221 E.
Greenwood, SC 29649

Phone: 864-229-5211

General Information

Storm Information:

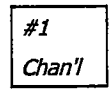
Storm Type:	NRCS Type II
Design Storm:	25 yr - 24 hr
Rainfall Depth:	6.600 inches

Particle Size Distribution:

Size (mm)	Madison
1.4000	100.000%
1.0000	84.600%
0.0630	49.300%
0.0440	42.600%
0.0380	42.600%
0.0040	8.800%
0.0030	5.800%
0.0010	0.000%

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Channel	#1	==>	End	0.000	0.000	



Structure Summary:

	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc. (ml/l)	24VW (ml/l)
#1	1.485	1.485	7.00	0.62	1.5	3,298	2.02	1.08

Particle Size Distribution(s) at Each Structure

Structure #1:

Size (mm)	In/Out
1.4000	100.000%
1.0000	84.620%
0.0630	49.312%
0.0440	42.610%
0.0380	42.610%
0.0040	8.802%
0.0030	5.801%
0.0010	0.000%

Structure Detail:

Structure #1 (Vegetated Channel)

Trapezoidal Vegetated Channel Inputs:

Material: Bermuda grass

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Retardance Classes	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
2.00	3.0:1	3.0:1	2.5	C, B	0.50			8.0

Vegetated Channel Results:

	Stability Class C w/o Freeboard	Stability Class C w/ Freeboard	Capacity Class B w/o Freeboard	Capacity Class B w/ Freeboard
Design Discharge:	7.00 cfs		7.00 cfs	
Depth:	0.84 ft	1.34 ft	1.19 ft	1.69 ft
Top Width:	7.06 ft	10.06 ft	9.17 ft	12.17 ft
Velocity:	1.83 fps		1.05 fps	
X-Section Area:	3.82 sq ft		6.67 sq ft	
Hydraulic Radius:	0.521 ft		0.698 ft	
Froude Number:	0.44		0.22	
Roughness Coefficient:	0.0839		0.1782	

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	1.485	0.091	0.091	0.308	86.000	M	6.86	0.616
	Σ	**1.485**						**7.00**	**0.616**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.240	300.00	3.50	0.0500	1.0000	1	1.5	3,299	2.02	1.08
	Σ							**1.5**	**3,298**	**2.02**	**1.08**

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	8. Large gullies, diversions, and low flowing streams	3.33	3.00	90.00	5.470	0.004
		6. Grassed waterway	2.54	19.04	749.60	2.390	0.087
#1	**1**	**Time of Concentration:**					**0.091**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	8. Large gullies, diversions, and low flowing streams	3.33	3.00	90.00	5.470	0.004
		6. Grassed waterway	2.54	19.04	749.60	2.390	0.087
#1	**1**	**Muskingum K:**					**0.091**

Perimeter Ditch 1 25-yr

Davis & Floyd, Inc.
1319 Hwy 72 221 E.
Greenwood, SC 29649

Phone: 864-229-5211

General Information

Storm Information:

Storm Type:	NRCS Type II
Design Storm:	25 yr - 24 hr
Rainfall Depth:	6.600 inches

Particle Size Distribution:

Size (mm)	Madison
1.4000	100.000%
1.0000	84.600%
0.0630	49.300%
0.0440	42.600%
0.0380	42.600%
0.0040	8.800%
0.0030	5.800%
0.0010	0.000%

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Channel	#1	==>	End	0.000	0.000	

Structure Summary:

	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc. (ml/l)	24VW (ml/l)
#1	15.000	15.000	49.46	5.06	8.2	2,211	1.23	0.66

Particle Size Distribution(s) at Each Structure

Structure #1:

Size (mm)	In/Out
1.4000	100.000%
1.0000	100.000%
0.0630	66.485%
0.0440	57.449%
0.0380	57.449%
0.0040	11.867%
0.0030	7.822%
0.0010	0.000%

Structure Detail:

Structure #1 (Vegetated Channel)

Trapezoidal Vegetated Channel Inputs:

Material: Bermuda grass

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Retardance Classes	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
4.00	3.0:1	3.0:1	3.5	C, B	0.50			8.0

Vegetated Channel Results:

	Stability Class C w/o Freeboard	Stability Class C w/ Freeboard	Capacity Class B w/o Freeboard	Capacity Class B w/ Freeboard
Design Discharge:	49.46 cfs		49.46 cfs	
Depth:	1.26 ft	1.76 ft	1.60 ft	2.10 ft
Top Width:	11.54 ft	14.54 ft	13.57 ft	16.57 ft
Velocity:	5.07 fps		3.53 fps	
X-Section Area:	9.76 sq ft		14.01 sq ft	
Hydraulic Radius:	0.817 ft		0.995 ft	
Froude Number:	0.97		0.61	
Roughness Coefficient:	0.0476		0.0781	

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	15.000	0.138	0.138	0.316	86.000	M	50.93	5.060
	Σ	**15.000**						**49.46**	**5.060**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.240	200.00	2.11	0.0500	1.0000	1	9.2	2,509	1.46	0.78
	Σ							**8.2**	**2,211**	**1.23**	**0.66**

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	3. Short grass pasture	33.00	12.00	36.36	4.590	0.002
		3. Short grass pasture	12.00	2.00	16.66	2.770	0.001
		3. Short grass pasture	33.00	26.00	78.78	4.590	0.004
		6. Grassed waterway	3.45	45.53	1,319.71	2.780	0.131
#1	**1**	**Time of Concentration:**					**0.138**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	3. Short grass pasture	33.00	12.00	36.36	4.590	0.002
		3. Short grass pasture	12.00	2.00	16.66	2.770	0.001
		3. Short grass pasture	33.00	26.00	78.78	4.590	0.004
		6. Grassed waterway	3.45	45.53	1,319.71	2.780	0.131
#1	**1**	**Muskingum K:**					**0.138**

Perimeter Ditch 2 25-yr

Davis & Floyd, Inc.
1319 Hwy 72 221 E.
Greenwood, SC 29649

Phone: 864-229-5211

General Information

Storm Information:

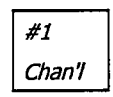
Storm Type:	NRCS Type II
Design Storm:	25 yr - 24 hr
Rainfall Depth:	6.600 inches

Particle Size Distribution:

Size (mm)	Madison
1.4000	100.000%
1.0000	84.600%
0.0630	49.300%
0.0440	42.600%
0.0380	42.600%
0.0040	8.800%
0.0030	5.800%
0.0010	0.000%

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Channel	#1	==>	End	0.000	0.000	



Structure Summary:

	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc. (ml/l)	24VW (ml/l)
#1	13.000	13.000	58.83	5.39	14.2	3,557	2.17	1.18

Particle Size Distribution(s) at Each Structure

Structure #1:

Size (mm)	In/Out
1.4000	100.000%
1.0000	85.853%
0.0630	50.030%
0.0440	43.231%
0.0380	43.231%
0.0040	8.930%
0.0030	5.886%
0.0010	0.000%

Structure Detail:

Structure #1 (Vegetated Channel)

Trapezoidal Vegetated Channel Inputs:

Material: Bermuda grass

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Retardance Classes	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
4.00	3.0:1	3.0:1	4.1	C, B	0.50			8.0

Vegetated Channel Results:

	Stability Class C w/o Freeboard	Stability Class C w/ Freeboard	Capacity Class B w/o Freeboard	Capacity Class B w/ Freeboard
Design Discharge:	58.83 cfs		58.83 cfs	
Depth:	1.27 ft	1.77 ft	1.59 ft	2.09 ft
Top Width:	11.60 ft	14.60 ft	13.52 ft	16.52 ft
Velocity:	5.95 fps		4.23 fps	
X-Section Area:	9.88 sq ft		13.90 sq ft	
Hydraulic Radius:	0.823 ft		0.991 ft	
Froude Number:	1.14		0.74	
Roughness Coefficient:	0.0447		0.0711	

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	13.000	0.114	0.114	0.326	86.000	M	60.07	5.393
	Σ	**13.000**						**58.83**	**5.393**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.240	200.00	3.40	0.0500	1.0000	1	14.4	3,609	2.21	1.21
	Σ							**14.2**	**3,557**	**2.17**	**1.18**

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	3. Short grass pasture	33.00	12.00	36.36	4.590	0.002
		3. Short grass pasture	12.00	2.00	16.66	2.770	0.001
		3. Short grass pasture	33.00	26.00	78.78	4.590	0.004
		6. Grassed waterway	4.14	48.68	1,176.00	3.050	0.107
#1	**1**	**Time of Concentration:**					**0.114**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	3. Short grass pasture	33.00	12.00	36.36	4.590	0.002
		3. Short grass pasture	12.00	2.00	16.66	2.770	0.001
		3. Short grass pasture	33.00	26.00	78.78	4.590	0.004
		6. Grassed waterway	4.14	48.68	1,175.84	3.050	0.107
#1	**1**	**Muskingum K:**					**0.114**

Pond 1 2 yr

Davis & Floyd, Inc.
1319 Hwy 72 221 E.
Greenwood, SC 29649

Phone: 864-229-5211

General Information

Storm Information:

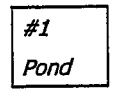
Storm Type:	NRCS Type II
Design Storm:	2 yr - 24 hr
Rainfall Depth:	3.600 inches

Particle Size Distribution:

Size (mm)	Madison
1.4000	100.000%
1.0000	84.600%
0.0630	49.300%
0.0440	42.600%
0.0380	42.600%
0.0040	8.800%
0.0030	5.800%
0.0010	0.000%

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Pond	#1	==>	End	0.000	0.000	



Structure Summary:

		Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc. (ml/l)	24VW (ml/l)
#1	In	15.000	15.000	22.58	2.22	6.5	4,027	2.21	1.19
	Out			0.77	2.07	0.5	1,077	0.00	0.00

Particle Size Distribution(s) at Each Structure

Structure #1:

Size (mm)	In	Out
1.4000	100.000%	100.000%
1.0000	100.000%	100.000%
0.0630	68.069%	100.000%
0.0440	58.818%	100.000%
0.0380	58.818%	100.000%
0.0040	12.150%	100.000%
0.0030	8.008%	100.000%
0.0010	0.000%	0.000%

Structure Detail:

Structure #1 (Pond)

Pond Inputs:

Initial Pool Elev:	807.01 ft
Initial Pool:	0.00 ac-ft
*Sediment Storage:	0.00 ac-ft
Dead Space:	20.00 %

**No sediment capacity defined*

Perforated Riser

Riser Diameter (in)	Riser Height (ft)	Barrel Diameter (in)	Barrel Length (ft)	Barrel Slope (%)	Manning's n	Spillway Elev (ft)	Number of Holes per Elev
48.00	6.00	18.00	50.00	1.00	0.0240	813.00	4

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
813.50	30.00	3.00:1	3.00:1	20.00

Pond Results:

Peak Elevation:	810.34 ft
H'graph Detention Time:	14.61 hrs
Pond Model:	CSTRS
Dewater Time:	1.53 days
Trap Efficiency:	92.37 %

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
807.00	0.000	0.000	0.000		Top of Sed. Storage
807.01	0.000	0.000	0.000		Low hole SPW #1
807.50	0.128	0.022	0.294	0.89*	
808.00	0.503	0.169	0.418	4.27*	
808.50	0.530	0.427	0.513	6.75	
809.00	0.558	0.699	0.593	5.95	
809.50	0.587	0.986	0.663	5.55	

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
810.00	0.618	1.287	0.727	5.25	
810.34	0.639	1.503	0.766	8.10	Peak Stage
810.50	0.649	1.604	0.785		
811.00	0.681	1.936	0.839		
811.50	0.721	2.287	0.890		
812.00	0.763	2.658	0.939		
812.50	0.804	3.049	0.985		
813.00	0.847	3.462	1.028		Spillway #1
813.50	0.901	3.899	13.773		Spillway #2
814.00	0.956	4.364	38.898		
814.50	0.960	4.843	61.932		

**Designates time(s) to dewater have been extrapolated beyond the 50 hour hydrograph limit.*

Detailed Discharge Table

Elevation (ft)	Perf. Riser (cfs)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
807.00	0.000	0.000	0.000
807.01	2.00>0.000	0.000	0.000
807.50	0.294	0.000	0.294
808.00	0.418	0.000	0.418
808.50	0.513	0.000	0.513
809.00	0.593	0.000	0.593
809.50	0.663	0.000	0.663
810.00	0.727	0.000	0.727
810.50	0.785	0.000	0.785
811.00	0.839	0.000	0.839
811.50	0.890	0.000	0.890
812.00	0.939	0.000	0.939
812.50	0.985	0.000	0.985
813.00	1.028	0.000	1.028
813.50	13.773	0.000	13.773
814.00	16.402	22.496	38.898
814.50	16.940	44.992	61.932

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	15.000	0.137	0.138	0.316	86.000	M	23.23	2.222
	Σ	**15.000**						**22.58**	**2.222**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.240	500.00	3.30	0.0500	1.0000	1	7.4	4,566	2.63	1.41
	Σ							**6.5**	**4,027**	**2.21**	**1.19**

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	3. Short grass pasture	33.00	12.00	36.36	4.590	0.002
		3. Short grass pasture	12.00	2.00	16.66	2.770	0.001
		3. Short grass pasture	33.00	26.00	78.78	4.590	0.004
		6. Grassed waterway	3.54	46.72	1,320.00	2.820	0.130
#1	**1**	**Time of Concentration:**					**0.137**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	3. Short grass pasture	33.00	12.00	36.36	4.590	0.002
		3. Short grass pasture	12.00	2.00	16.66	2.770	0.001
		3. Short grass pasture	33.00	26.00	78.78	4.590	0.004
		6. Grassed waterway	3.45	45.53	1,320.00	2.780	0.131
#1	**1**	**Muskingum K:**					**0.138**

Pond 1 10 yr

Davis & Floyd, Inc.
1319 Hwy 72 221 E.
Greenwood, SC 29649

Phone: 864-229-5211

General Information

Storm Information:

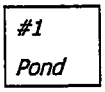
Storm Type:	NRCS Type II
Design Storm:	10 yr - 24 hr
Rainfall Depth:	5.500 inches

Particle Size Distribution:

Size (mm)	Madison
1.4000	100.000%
1.0000	84.600%
0.0630	49.300%
0.0440	42.600%
0.0380	42.600%
0.0040	8.800%
0.0030	5.800%
0.0010	0.000%

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Pond	#1	==>	End	0.000	0.000	



Structure Summary:

		Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc. (ml/l)	24VW (ml/l)
#1	In	15.000	15.000	39.60	4.00	12.4	4,261	2.36	1.26
	Out			0.97	2.88	1.1	1,191	0.00	0.00

Particle Size Distribution(s) at Each Structure

Structure #1:

Size (mm)	In	Out
1.4000	100.000%	100.000%
1.0000	100.000%	100.000%
0.0630	66.863%	100.000%
0.0440	57.776%	100.000%
0.0380	57.776%	100.000%
0.0040	11.935%	100.000%
0.0030	7.866%	92.625%
0.0010	0.000%	0.000%

Structure Detail:

Structure #1 (Pond)

Pond Inputs:

Initial Pool Elev:	807.01 ft
Initial Pool:	0.00 ac-ft
*Sediment Storage:	0.00 ac-ft
Dead Space:	20.00 %

**No sediment capacity defined*

Perforated Riser

Riser Diameter (in)	Riser Height (ft)	Barrel Diameter (in)	Barrel Length (ft)	Barrel Slope (%)	Manning's n	Spillway Elev (ft)	Number of Holes per Elev
48.00	6.00	18.00	50.00	1.00	0.0240	813.00	4

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
813.50	30.00	3.00:1	3.00:1	20.00

Pond Results:

Peak Elevation:	812.37 ft
H'graph Detention Time:	15.39 hrs
Pond Model:	CSTRS
Dewater Time:	2.28 days
Trap Efficiency:	91.51 %

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
807.00	0.000	0.000	0.000		Top of Sed. Storage
807.01	0.000	0.000	0.000		Low hole SPW #1
807.50	0.128	0.022	0.294	0.89*	
808.00	0.503	0.169	0.418	4.27*	
808.50	0.530	0.427	0.513	6.09*	
809.00	0.558	0.699	0.593	5.55*	
809.50	0.587	0.986	0.663	5.22*	

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
810.00	0.618	1.287	0.727	5.02*	
810.50	0.649	1.604	0.785	5.05	
811.00	0.681	1.936	0.839	4.95	
811.50	0.721	2.287	0.890	4.90	
812.00	0.763	2.658	0.939	4.95	
812.37	0.794	2.949	0.973	7.80	Peak Stage
812.50	0.804	3.049	0.985		
813.00	0.847	3.462	1.028		Spillway #1
813.50	0.901	3.899	13.773		Spillway #2
814.00	0.956	4.364	38.898		
814.50	0.960	4.843	61.932		

**Designates time(s) to dewater have been extrapolated beyond the 50 hour hydrograph limit.*

Detailed Discharge Table

Elevation (ft)	Perf. Riser (cfs)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
807.00	0.000	0.000	0.000
807.01	2.00>0.000	0.000	0.000
807.50	0.294	0.000	0.294
808.00	0.418	0.000	0.418
808.50	0.513	0.000	0.513
809.00	0.593	0.000	0.593
809.50	0.663	0.000	0.663
810.00	0.727	0.000	0.727
810.50	0.785	0.000	0.785
811.00	0.839	0.000	0.839
811.50	0.890	0.000	0.890
812.00	0.939	0.000	0.939
812.50	0.985	0.000	0.985
813.00	1.028	0.000	1.028
813.50	13.773	0.000	13.773
814.00	16.402	22.496	38.898
814.50	16.940	44.992	61.932

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	15.000	0.137	0.138	0.316	86.000	M	40.76	3.998
	Σ	**15.000**						**39.60**	**3.998**

Subwatershed Sedimentology Detail:

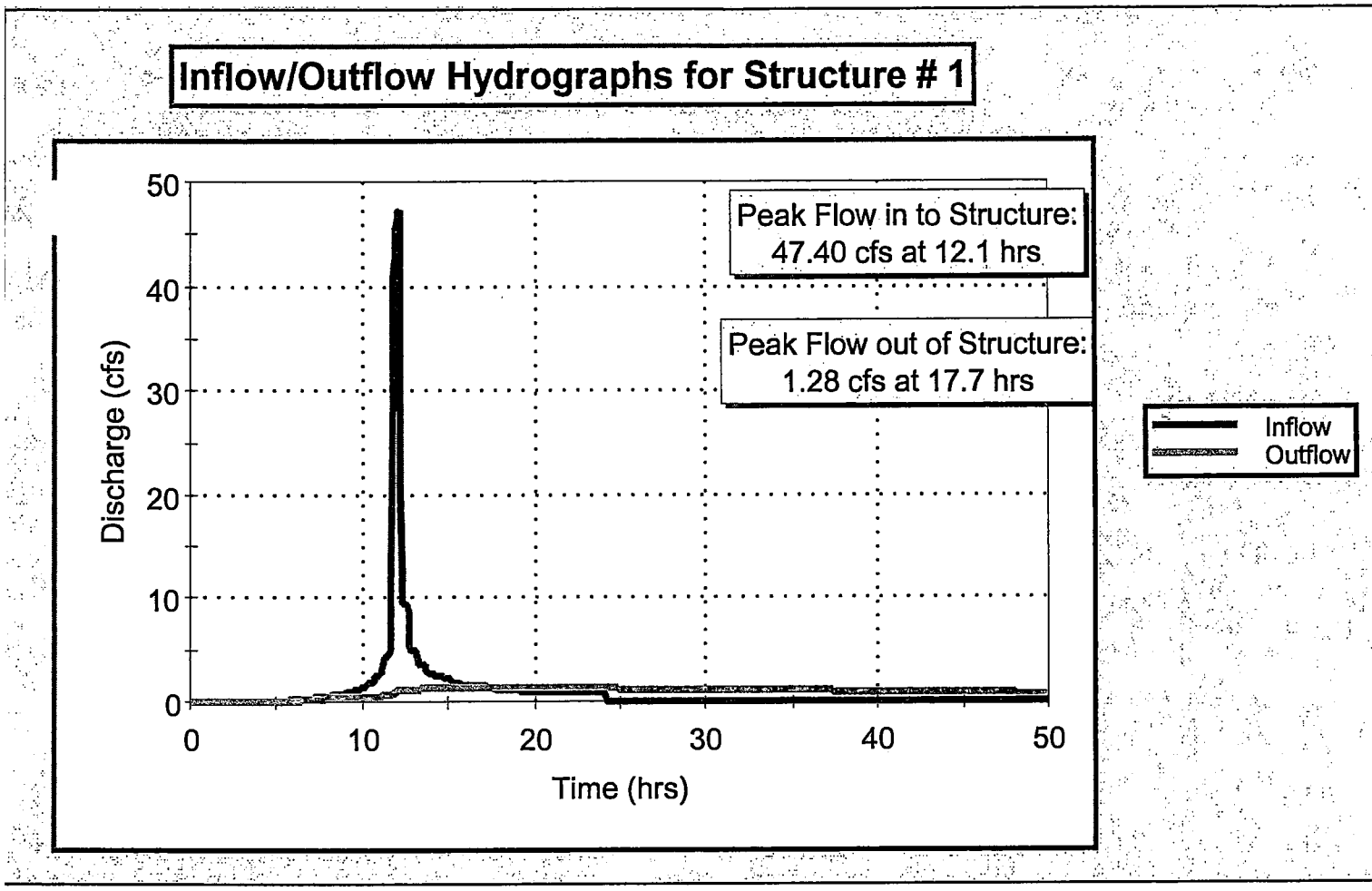
Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.240	500.00	3.30	0.0500	1.0000	1	14.1	4,834	2.80	1.50
	Σ							**12.4**	**4,261**	**2.36**	**1.26**

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	3. Short grass pasture	33.00	12.00	36.36	4.590	0.002
		3. Short grass pasture	12.00	2.00	16.66	2.770	0.001
		3. Short grass pasture	33.00	26.00	78.78	4.590	0.004
		6. Grassed waterway	3.54	46.72	1,320.00	2.820	0.130
#1	**1**	**Time of Concentration:**					**0.137**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	3. Short grass pasture	33.00	12.00	36.36	4.590	0.002
		3. Short grass pasture	12.00	2.00	16.66	2.770	0.001
		3. Short grass pasture	33.00	26.00	78.78	4.590	0.004
		6. Grassed waterway	3.45	45.53	1,320.00	2.780	0.131
#1	**1**	**Muskingum K:**					**0.138**


Inflow/Outflow Hydrographs for Structure # 1
Peak Flow in to Structure:
47.40 cfs at 12.1 hrs
Peak Flow out of Structure:
1.28 cfs at 17.7 hrs
Discharge (cfs)
0
10
20
30
40
50
Time (hrs)
Inflow
Outflow

Pond 1 25 yr

Davis & Floyd, Inc.
1319 Hwy 72 221 E.
Greenwood, SC 29649

Phone: 864-229-5211

General Information

Storm Information:

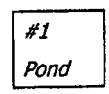
Storm Type:	NRCS Type II
Design Storm:	25 yr - 24 hr
Rainfall Depth:	6.600 inches

Particle Size Distribution:

Size (mm)	Madison
1.4000	100.000%
1.0000	84.600%
0.0630	49.300%
0.0440	42.600%
0.0380	42.600%
0.0040	8.800%
0.0030	5.800%
0.0010	0.000%

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Pond	#1	==>	End	0.000	0.000	



Structure Summary:

		Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc. (ml/l)	24VW (ml/l)
#1	In	15.000	15.000	49.46	5.06	16.1	4,360	2.42	1.29
	Out			2.63	3.54	1.6	1,192	0.00	0.00

Particle Size Distribution(s) at Each Structure

Structure #1:

Size (mm)	In	Out
1.4000	100.000%	100.000%
1.0000	100.000%	100.000%
0.0630	66.485%	100.000%
0.0440	57.449%	100.000%
0.0380	57.449%	100.000%
0.0040	11.867%	100.000%
0.0030	7.822%	79.942%
0.0010	0.000%	0.000%

Structure Detail:

Structure #1 (Pond)

Pond Inputs:

Initial Pool Elev:	807.01 ft
Initial Pool:	0.00 ac-ft
*Sediment Storage:	0.00 ac-ft
Dead Space:	20.00 %

**No sediment capacity defined*

Perforated Riser

Riser Diameter (in)	Riser Height (ft)	Barrel Diameter (in)	Barrel Length (ft)	Barrel Slope (%)	Manning's n	Spillway Elev (ft)	Number of Holes per Elev
48.00	6.00	18.00	50.00	1.00	0.0240	813.00	4

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
813.50	30.00	3.00:1	3.00:1	20.00

Pond Results:

Peak Elevation:	813.06 ft
H'graph Detention Time:	13.99 hrs
Pond Model:	CSTRS
Dewater Time:	2.74 days
Trap Efficiency:	90.22 %

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
807.00	0.000	0.000	0.000		Top of Sed. Storage
807.01	0.000	0.000	0.000		Low hole SPW #1
807.50	0.128	0.022	0.294	0.89*	
808.00	0.503	0.169	0.418	4.27*	
808.50	0.530	0.427	0.513	6.09*	
809.00	0.558	0.699	0.593	5.55*	
809.50	0.587	0.986	0.663	5.22*	

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
810.00	0.618	1.287	0.727	5.02*	
810.50	0.649	1.604	0.785	4.88*	
811.00	0.681	1.936	0.839	5.00	
811.50	0.721	2.287	0.890	4.90	
812.00	0.763	2.658	0.939	4.90	
812.50	0.804	3.049	0.985	4.90	
813.00	0.847	3.462	1.028	8.40	Spillway #1
813.06	0.859	3.517	2.630	5.75	Peak Stage
813.50	0.901	3.899	13.773		Spillway #2
814.00	0.956	4.364	38.898		
814.50	0.960	4.843	61.932		

**Designates time(s) to dewater have been extrapolated beyond the 50 hour hydrograph limit.*

Detailed Discharge Table

Elevation (ft)	Perf. Riser (cfs)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
807.00	0.000	0.000	0.000
807.01	2.00>0.000	0.000	0.000
807.50	0.294	0.000	0.294
808.00	0.418	0.000	0.418
808.50	0.513	0.000	0.513
809.00	0.593	0.000	0.593
809.50	0.663	0.000	0.663
810.00	0.727	0.000	0.727
810.50	0.785	0.000	0.785
811.00	0.839	0.000	0.839
811.50	0.890	0.000	0.890
812.00	0.939	0.000	0.939
812.50	0.985	0.000	0.985
813.00	1.028	0.000	1.028
813.50	13.773	0.000	13.773
814.00	16.402	22.496	38.898
814.50	16.940	44.992	61.932

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	15.000	0.137	0.138	0.316	86.000	M	50.93	5.060
	Σ	**15.000**						**49.46**	**5.060**

Subwatershed Sedimentology Detail:

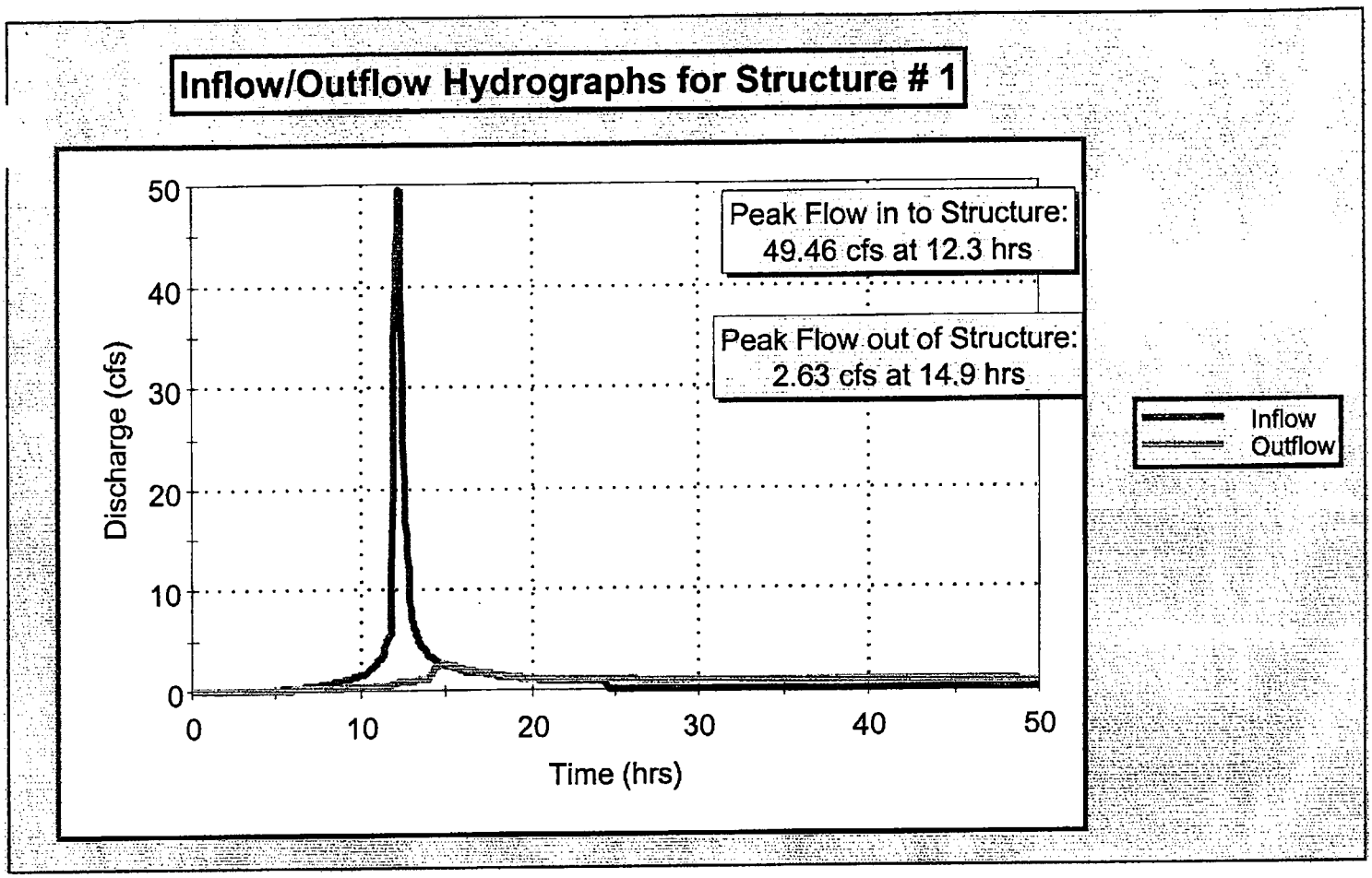
Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.240	500.00	3.30	0.0500	1.0000	1	18.3	4,947	2.88	1.54
	Σ							**16.1**	**4,360**	**2.42**	**1.29**

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	3. Short grass pasture	33.00	12.00	36.36	4.590	0.002
		3. Short grass pasture	12.00	2.00	16.66	2.770	0.001
		3. Short grass pasture	33.00	26.00	78.78	4.590	0.004
		6. Grassed waterway	3.54	46.72	1,320.00	2.820	0.130
#1	**1**	**Time of Concentration:**					**0.137**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	3. Short grass pasture	33.00	12.00	36.36	4.590	0.002
		3. Short grass pasture	12.00	2.00	16.66	2.770	0.001
		3. Short grass pasture	33.00	26.00	78.78	4.590	0.004
		6. Grassed waterway	3.45	45.53	1,320.00	2.780	0.131
#1	**1**	**Muskingum K:**					**0.138**


Inflow/Outflow Hydrographs for Structure # 1
Peak Flow in to Structure:
49.46 cfs at 12.3 hrs
Peak Flow out of Structure:
2.63 cfs at 14.9 hrs
Discharge (cfs)
Time (hrs)
0
10
20
30
40
50
Inflow
Outflow

BMP FIRST FLUSH CALCULATIONS

First Flush Depth = 1.0000 in
Drainage Area = 15.000 acres

Volume = Flush Depth * Drainage Area

First Flush volume = 1.250 ac-ft

TIME vs. VOLUME (ac-ft)

Time hrs	Output Time increment = .5000 hrs Time on left represents time for first value in each row.				
.0000	1.286	1.257	1.229	1.202	1.175
2.5000	1.148	1.122	1.096	1.071	1.046
5.0000	1.021	.997	.972	.948	.924
7.5000	.900	.877	.855	.833	.812
10.0000	.791	.770	.750	.730	.711
12.5000	.692	.672	.653	.633	.614
15.0000	.594	.575	.556	.537	.518
17.5000	.499	.480	.461	.442	.423
20.0000	.404	.385	.367	.349	.331
22.5000	.314	.298	.282	.266	.251
25.0000	.236	.222	.208	.194	.180
27.5000	.167	.146	.128	.112	.098
30.0000	.086	.076	.066	.058	.051
32.5000	.045	.040	.035	.031	.028
35.0000	.025	.022	.013	.006	.003
37.5000	.001	.001	.000	.000	.000
40.0000	.000	.000	.000	.000	.000
42.5000	.000	.000			

Pond 2 2yr

Davis & Floyd, Inc.
1319 Hwy 72 221 E.
Greenwood, SC 29649

Phone: 864-229-5211

General Information

Storm Information:

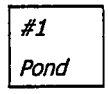
Storm Type:	NRCS Type II
Design Storm:	2 yr - 24 hr
Rainfall Depth:	3.600 inches

Particle Size Distribution:

Size (mm)	Madison
1.4000	100.000%
1.0000	84.600%
0.0630	49.300%
0.0440	42.600%
0.0380	42.600%
0.0040	8.800%
0.0030	5.800%
0.0010	0.000%

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Pond	#1	==>	End	0.000	0.000	



Structure Summary:

		Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc. (ml/l)	24VW (ml/l)
#1	In	13.000	13.000	27.58	2.37	2.0	1,180	0.72	0.39
	Out			0.99	2.37	0.1	245	0.00	0.00

Particle Size Distribution(s) at Each Structure

Structure #1:

Size (mm)	In	Out
1.4000	100.000%	100.000%
1.0000	87.125%	100.000%
0.0630	50.771%	100.000%
0.0440	43.871%	100.000%
0.0380	43.871%	100.000%
0.0040	9.063%	100.000%
0.0030	5.973%	93.703%
0.0010	0.000%	0.000%

Structure Detail:

Structure #1 (Pond)

Pond Inputs:

Initial Pool Elev:	798.01 ft
Initial Pool:	0.00 ac-ft
*Sediment Storage:	0.00 ac-ft
Dead Space:	20.00 %

**No sediment capacity defined*

Perforated Riser

Riser Diameter (in)	Riser Height (ft)	Barrel Diameter (in)	Barrel Length (ft)	Barrel Slope (%)	Manning's n	Spillway Elev (ft)	Number of Holes per Elev
48.00	8.00	18.00	300.00	0.50	0.0240	804.00	5

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
805.00	20.00	3.00:1	3.00:1	40.00

Pond Results:

Peak Elevation:	801.60 ft
H'graph Detention Time:	12.82 hrs
Pond Model:	CSTRS
Dewater Time:	1.41 days
Trap Efficiency:	93.63 %

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
798.00	0.000	0.000	0.000		Top of Sed. Storage
798.01	0.001	0.000	0.000		Low hole SPW #1
798.50	0.126	0.023	0.368	3.15	
799.00	0.464	0.161	0.523	3.80	
799.50	0.486	0.399	0.641	5.00	
800.00	0.508	0.647	0.741	4.35	
800.50	0.531	0.907	0.829	4.00	

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
801.00	0.554	1.178	0.908	3.80	
801.50	0.578	1.461	0.981	6.10	
801.60	0.583	1.519	0.994	3.70	Peak Stage
802.00	0.602	1.756	1.049		
802.50	0.626	2.063	1.113		
803.00	0.651	2.383	1.173		
803.50	0.676	2.714	1.231		
804.00	0.702	3.059	1.285		Spillway #1
804.50	0.728	3.417	9.754		
805.00	0.754	3.787	9.995		Spillway #2
805.50	0.781	4.171	17.462		
806.00	0.809	4.568	105.988		
806.50	0.836	4.979	205.839		

Detailed Discharge Table

Elevation (ft)	Perf. Riser (cfs)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
798.00	0.000	0.000	0.000
798.01	2.00>0.000	0.000	0.000
798.50	0.368	0.000	0.368
799.00	0.523	0.000	0.523
799.50	0.641	0.000	0.641
800.00	0.741	0.000	0.741
800.50	0.829	0.000	0.829
801.00	0.908	0.000	0.908
801.50	0.981	0.000	0.981
802.00	1.049	0.000	1.049
802.50	1.113	0.000	1.113
803.00	1.173	0.000	1.173
803.50	1.231	0.000	1.231
804.00	1.285	0.000	1.285
804.50	9.754	0.000	9.754
805.00	9.995	0.000	9.995
805.50	10.230	7.232	17.462
806.00	10.460	95.528	105.988
806.50	10.685	195.154	205.839

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	13.000	0.114	0.114	0.326	86.000	M	28.60	2.367
	Σ	**13.000**						**27.58**	**2.367**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.240	4.00	3.90	0.0500	1.0000	1	2.1	1,215	0.75	0.40
	Σ							**2.0**	**1,180**	**0.72**	**0.39**

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	3. Short grass pasture	33.00	12.00	36.36	4.590	0.002
		3. Short grass pasture	12.00	2.00	16.66	2.770	0.001
		3. Short grass pasture	33.00	26.00	78.78	4.590	0.004
		6. Grassed waterway	4.14	48.68	1,176.00	3.050	0.107
#1	**1**	**Time of Concentration:**					**0.114**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	3. Short grass pasture	33.00	12.00	36.36	4.590	0.002
		3. Short grass pasture	12.00	2.00	16.66	2.770	0.001
		3. Short grass pasture	33.00	26.00	78.78	4.590	0.004
		6. Grassed waterway	4.14	48.68	1,176.00	3.050	0.107
#1	**1**	**Muskingum K:**					**0.114**

Pond 2 10yr

Davis & Floyd, Inc.
1319 Hwy 72 221 E.
Greenwood, SC 29649

Phone: 864-229-5211

General Information

Storm Information:

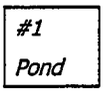
Storm Type:	NRCS Type II
Design Storm:	10 yr - 24 hr
Rainfall Depth:	5.500 inches

Particle Size Distribution:

Size (mm)	Madison
1.4000	100.000%
1.0000	84.600%
0.0630	49.300%
0.0440	42.600%
0.0380	42.600%
0.0040	8.800%
0.0030	5.800%
0.0010	0.000%

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Pond	#1	==>	End	0.000	0.000	



Structure Summary:

		Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc. (ml/l)	24VW (ml/l)
#1	In	13.000	13.000	47.40	4.26	3.9	1,233	0.75	0.41
	Out			1.28	3.60	0.3	280	0.00	0.00

Particle Size Distribution(s) at Each Structure

Structure #1:

Size (mm)	In	Out
1.4000	100.000%	100.000%
1.0000	85.853%	100.000%
0.0630	50.030%	100.000%
0.0440	43.231%	100.000%
0.0380	43.231%	100.000%
0.0040	8.930%	100.000%
0.0030	5.886%	74.800%
0.0010	0.000%	0.000%

Structure Detail:

Structure #1 (Pond)

Pond Inputs:

Initial Pool Elev:	798.01 ft
Initial Pool:	0.00 ac-ft
*Sediment Storage:	0.00 ac-ft
Dead Space:	20.00 %

**No sediment capacity defined*

Perforated Riser

Riser Diameter (in)	Riser Height (ft)	Barrel Diameter (in)	Barrel Length (ft)	Barrel Slope (%)	Manning's n	Spillway Elev (ft)	Number of Holes per Elev
48.00	8.00	18.00	300.00	0.50	0.0240	804.00	5

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
805.00	20.00	3.00:1	3.00:1	40.00

Pond Results:

Peak Elevation:	803.91 ft
H'graph Detention Time:	14.97 hrs
Pond Model:	CSTRS
Dewater Time:	1.86 days
Trap Efficiency:	92.13 %

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
798.00	0.000	0.000	0.000		Top of Sed. Storage
798.01	0.001	0.000	0.000		Low hole SPW #1
798.50	0.126	0.023	0.368	0.74*	
799.00	0.464	0.161	0.523	3.21*	
799.50	0.486	0.399	0.641	4.48*	
800.00	0.508	0.647	0.741	4.06*	
800.50	0.531	0.907	0.829	3.79*	

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
801.00	0.554	1.178	0.908	3.80	
801.50	0.578	1.461	0.981	3.60	
802.00	0.602	1.756	1.049	3.55	
802.50	0.626	2.063	1.113	3.40	
803.00	0.651	2.383	1.173	3.40	
803.50	0.676	2.714	1.231	3.35	
803.91	0.697	2.997	1.276	7.30	Peak Stage
804.00	0.702	3.059	1.285		Spillway #1
804.50	0.728	3.417	9.754		
805.00	0.754	3.787	9.995		Spillway #2
805.50	0.781	4.171	17.462		
806.00	0.809	4.568	105.988		
806.50	0.836	4.979	205.839		

**Designates time(s) to dewater have been extrapolated beyond the 50 hour hydrograph limit.*

Detailed Discharge Table

Elevation (ft)	Perf. Riser (cfs)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
798.00	0.000	0.000	0.000
798.01	2.00>0.000	0.000	0.000
798.50	0.368	0.000	0.368
799.00	0.523	0.000	0.523
799.50	0.641	0.000	0.641
800.00	0.741	0.000	0.741
800.50	0.829	0.000	0.829
801.00	0.908	0.000	0.908
801.50	0.981	0.000	0.981
802.00	1.049	0.000	1.049
802.50	1.113	0.000	1.113
803.00	1.173	0.000	1.173
803.50	1.231	0.000	1.231
804.00	1.285	0.000	1.285
804.50	9.754	0.000	9.754
805.00	9.995	0.000	9.995
805.50	10.230	7.232	17.462
806.00	10.460	95.528	105.988
806.50	10.685	195.154	205.839

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	13.000	0.114	0.114	0.326	86.000	M	48.58	4.261
	Σ	**13.000**						**47.40**	**4.261**

Subwatershed Sedimentology Detail:

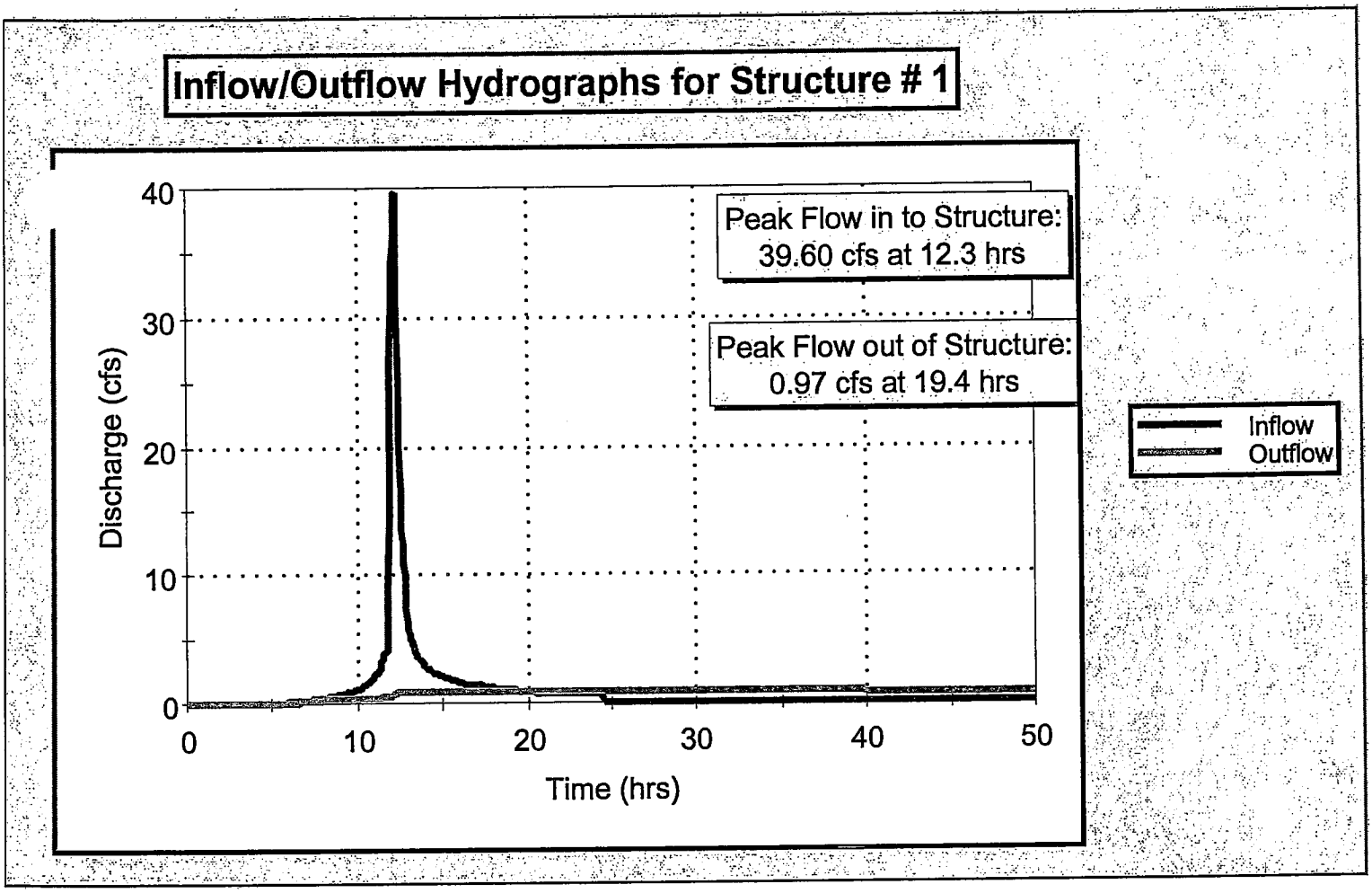
Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.240	4.00	3.90	0.0500	1.0000	1	3.9	1,251	0.77	0.42
	Σ							**3.9**	**1,233**	**0.75**	**0.41**

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	3. Short grass pasture	33.00	12.00	36.36	4.590	0.002
		3. Short grass pasture	12.00	2.00	16.66	2.770	0.001
		3. Short grass pasture	33.00	26.00	78.78	4.590	0.004
		6. Grassed waterway	4.14	48.68	1,176.00	3.050	0.107
#1	**1**	**Time of Concentration:**					**0.114**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	3. Short grass pasture	33.00	12.00	36.36	4.590	0.002
		3. Short grass pasture	12.00	2.00	16.66	2.770	0.001
		3. Short grass pasture	33.00	26.00	78.78	4.590	0.004
		6. Grassed waterway	4.14	48.68	1,176.00	3.050	0.107
#1	**1**	**Muskingum K:**					**0.114**


Inflow/Outflow Hydrographs for Structure # 1
Peak Flow in to Structure:
39.60 cfs at 12.3 hrs
Peak Flow out of Structure:
0.97 cfs at 19.4 hrs
Inflow
Outflow
Discharge (cfs)
Time (hrs)
0
10
20
30
40
50

Pond 2 25yr

Davis & Floyd, Inc.
1319 Hwy 72 221 E.
Greenwood, SC 29649

Phone: 864-229-5211

General Information

Storm Information:

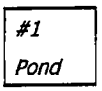
Storm Type:	NRCS Type II
Design Storm:	25 yr - 24 hr
Rainfall Depth:	6.600 inches

Particle Size Distribution:

Size (mm)	Madison
1.4000	100.000%
1.0000	84.600%
0.0630	49.300%
0.0440	42.600%
0.0380	42.600%
0.0040	8.800%
0.0030	5.800%
0.0010	0.000%

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Pond	#1	==>	End	0.000	0.000	



Structure Summary:

		Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc. (ml/l)	24VW (ml/l)
#1	In	13.000	13.000	58.83	5.39	5.0	1,251	0.76	0.42
	Out			5.79	4.65	0.5	275	0.02	0.01

Particle Size Distribution(s) at Each Structure

Structure #1:

Size (mm)	In	Out
1.4000	100.000%	100.000%
1.0000	85.853%	100.000%
0.0630	50.030%	100.000%
0.0440	43.231%	100.000%
0.0380	43.231%	100.000%
0.0040	8.930%	83.377%
0.0030	5.886%	54.953%
0.0010	0.000%	0.000%

Structure Detail:

Structure #1 (Pond)

Pond Inputs:

Initial Pool Elev:	798.01 ft
Initial Pool:	0.00 ac-ft
*Sediment Storage:	0.00 ac-ft
Dead Space:	20.00 %

**No sediment capacity defined*

Perforated Riser

Riser Diameter (in)	Riser Height (ft)	Barrel Diameter (in)	Barrel Length (ft)	Barrel Slope (%)	Manning's n	Spillway Elev (ft)	Number of Holes per Elev
48.00	8.00	18.00	300.00	0.50	0.0240	804.00	5

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
805.00	20.00	3.00:1	3.00:1	40.00

Pond Results:

Peak Elevation:	804.27 ft
H'graph Detention Time:	12.19 hrs
Pond Model:	CSTRS
Dewater Time:	2.11 days
Trap Efficiency:	89.29 %

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
798.00	0.000	0.000	0.000		Top of Sed. Storage
798.01	0.001	0.000	0.000		Low hole SPW #1
798.50	0.126	0.023	0.368	0.74*	
799.00	0.464	0.161	0.523	3.21*	
799.50	0.486	0.399	0.641	4.48*	
800.00	0.508	0.647	0.741	4.06*	
800.50	0.531	0.907	0.829	3.79*	

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
801.00	0.554	1.178	0.908	3.80	
801.50	0.578	1.461	0.981	3.60	
802.00	0.602	1.756	1.049	3.50	
802.50	0.626	2.063	1.113	3.45	
803.00	0.651	2.383	1.173	3.40	
803.50	0.676	2.714	1.231	3.35	
804.00	0.702	3.059	1.285	7.05	Spillway #1
804.27	0.716	3.249	5.793	6.25	Peak Stage
804.50	0.728	3.417	9.754		
805.00	0.754	3.787	9.995		Spillway #2
805.50	0.781	4.171	17.462		
806.00	0.809	4.568	105.988		
806.50	0.836	4.979	205.839		

**Designates time(s) to dewater have been extrapolated beyond the 50 hour hydrograph limit.*

Detailed Discharge Table

Elevation (ft)	Perf. Riser (cfs)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
798.00	0.000	0.000	0.000
798.01	2.00>0.000	0.000	0.000
798.50	0.368	0.000	0.368
799.00	0.523	0.000	0.523
799.50	0.641	0.000	0.641
800.00	0.741	0.000	0.741
800.50	0.829	0.000	0.829
801.00	0.908	0.000	0.908
801.50	0.981	0.000	0.981
802.00	1.049	0.000	1.049
802.50	1.113	0.000	1.113
803.00	1.173	0.000	1.173
803.50	1.231	0.000	1.231
804.00	1.285	0.000	1.285
804.50	9.754	0.000	9.754
805.00	9.995	0.000	9.995
805.50	10.230	7.232	17.462
806.00	10.460	95.528	105.988
806.50	10.685	195.154	205.839

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	13.000	0.114	0.114	0.326	86.000	M	60.07	5.393
	Σ	**13.000**						**58.83**	**5.393**

Subwatershed Sedimentology Detail:

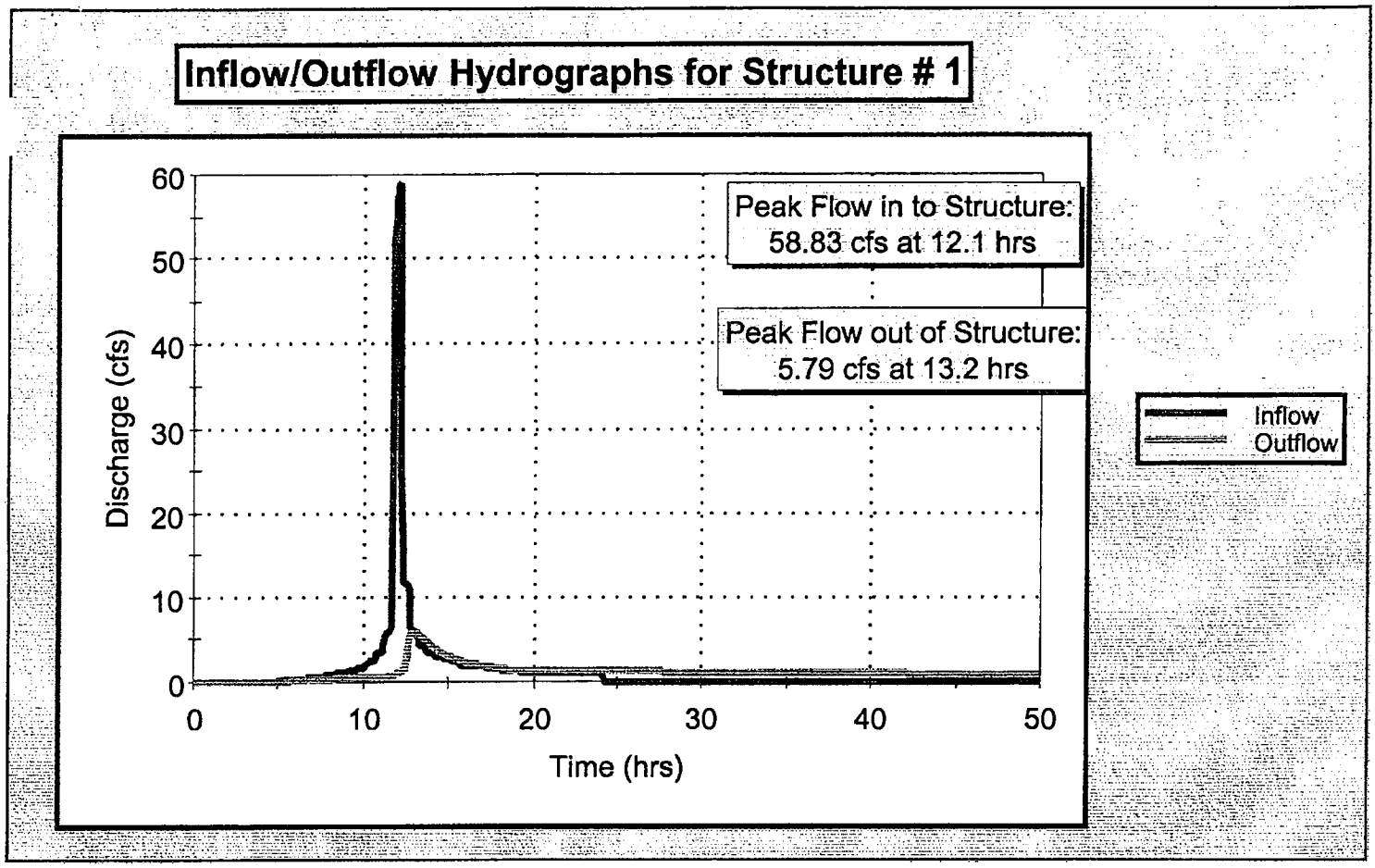
Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.240	4.00	3.90	0.0500	1.0000	1	5.1	1,269	0.78	0.42
	Σ							**5.0**	**1,251**	**0.76**	**0.42**

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	3. Short grass pasture	33.00	12.00	36.36	4.590	0.002
		3. Short grass pasture	12.00	2.00	16.66	2.770	0.001
		3. Short grass pasture	33.00	26.00	78.78	4.590	0.004
		6. Grassed waterway	4.14	48.68	1,176.00	3.050	0.107
#1	**1**	**Time of Concentration:**					**0.114**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	3. Short grass pasture	33.00	12.00	36.36	4.590	0.002
		3. Short grass pasture	12.00	2.00	16.66	2.770	0.001
		3. Short grass pasture	33.00	26.00	78.78	4.590	0.004
		6. Grassed waterway	4.14	48.68	1,176.00	3.050	0.107
#1	**1**	**Muskingum K:**					**0.114**


Inflow/Outflow Hydrographs for Structure # 1
Peak Flow in to Structure:
58.83 cfs at 12.1 hrs
Peak Flow out of Structure:
5.79 cfs at 13.2 hrs
Discharge (cfs)
60
50
40
30
20
10
0
0
10
20
30
40
50
Time (hrs)
Inflow
Outflow

BMP FIRST FLUSH CALCULATIONS

First Flush Depth = 1.0000 in
Drainage Area = 13.000 acres

Volume = Flush Depth * Drainage Area

First Flush volume = 1.083 ac-ft

TIME vs. VOLUME (ac-ft)

Time hrs	Output Time increment = .5000 hrs Time on left represents time for first value in each row.				
.0000	1.089	1.055	1.023	.992	.962
2.5000	.933	.905	.877	.849	.821
5.0000	.793	.765	.737	.710	.682
7.5000	.655	.627	.599	.572	.546
10.0000	.520	.495	.471	.447	.423
12.5000	.400	.378	.355	.332	.310
15.0000	.289	.268	.247	.226	.206
17.5000	.187	.168	.145	.117	.095
20.0000	.078	.064	.052	.043	.036
22.5000	.030	.025	.021	.011	.003
25.0000	.001	.000	.000	.000	.000
27.5000	.000	.000	.000	.000	.000
30.0000	.000				

Greenpointe LF Expansion

Ryan T. Ohmer

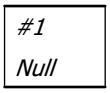
General Information

Storm Information:

Storm Type:	NRCS Type II
Design Storm:	2 yr - 24 hr
Rainfall Depth:	3.600 inches

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Null	#1	==>	End	0.000	0.000	



Structure Summary:

	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#1	58.650	58.650	53.52	6.20

Structure Detail:

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	24.850	0.252	0.252	0.355	77.000	M	24.24	2.502
	2	33.800	0.326	0.326	0.348	79.000	M	33.39	3.702
	Σ	**58.650**						**53.52**	**6.203**

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	8. Large gullies, diversions, and low flowing streams	2.00	38.00	1,900.00	4.240	0.124
		9. Small streams flowing bankfull	0.21	4.00	1,904.76	4.120	0.128
#1	**1**	**Time of Concentration:**					**0.252**
#1	2	3. Short grass pasture	6.55	36.00	549.61	2.040	0.074
		8. Large gullies, diversions, and low flowing streams	2.00	38.00	1,900.00	4.240	0.124
		9. Small streams flowing bankfull	0.21	4.00	1,904.76	4.120	0.128
#1	**2**	**Time of Concentration:**					**0.326**

Greenpointe LF Expansion

Ryan T. Ohmer

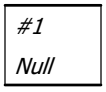
General Information

Storm Information:

Storm Type:	NRCS Type II
Design Storm:	10 yr - 24 hr
Rainfall Depth:	5.500 inches

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Null	#1	==>	End	0.000	0.000	



Structure Summary:

	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#1	58.650	58.650	108.10	12.35

Structure Detail:

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	24.850	0.252	0.252	0.355	77.000	M	49.26	5.064
	2	33.800	0.326	0.326	0.348	79.000	M	66.03	7.287
	Σ	**58.650**						**108.10**	**12.351**

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	8. Large gullies, diversions, and low flowing streams	2.00	38.00	1,900.00	4.240	0.124
		9. Small streams flowing bankfull	0.21	4.00	1,904.76	4.120	0.128
#1	**1**	**Time of Concentration:**					**0.252**
#1	2	3. Short grass pasture	6.55	36.00	549.61	2.040	0.074
		8. Large gullies, diversions, and low flowing streams	2.00	38.00	1,900.00	4.240	0.124
		9. Small streams flowing bankfull	0.21	4.00	1,904.76	4.120	0.128
#1	**2**	**Time of Concentration:**					**0.326**

Greenpointe LF Expansion

Ryan T. Ohmer

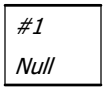
General Information

Storm Information:

Storm Type:	NRCS Type II
Design Storm:	25 yr - 24 hr
Rainfall Depth:	6.400 inches

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Null	#1	==>	End	0.000	0.000	



Structure Summary:

	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#1	58.650	58.650	135.11	15.46

Structure Detail:

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	24.850	0.252	0.252	0.355	77.000	M	61.65	6.367
	2	33.800	0.326	0.326	0.348	79.000	M	82.33	9.093
	Σ	**58.650**						**135.11**	**15.461**

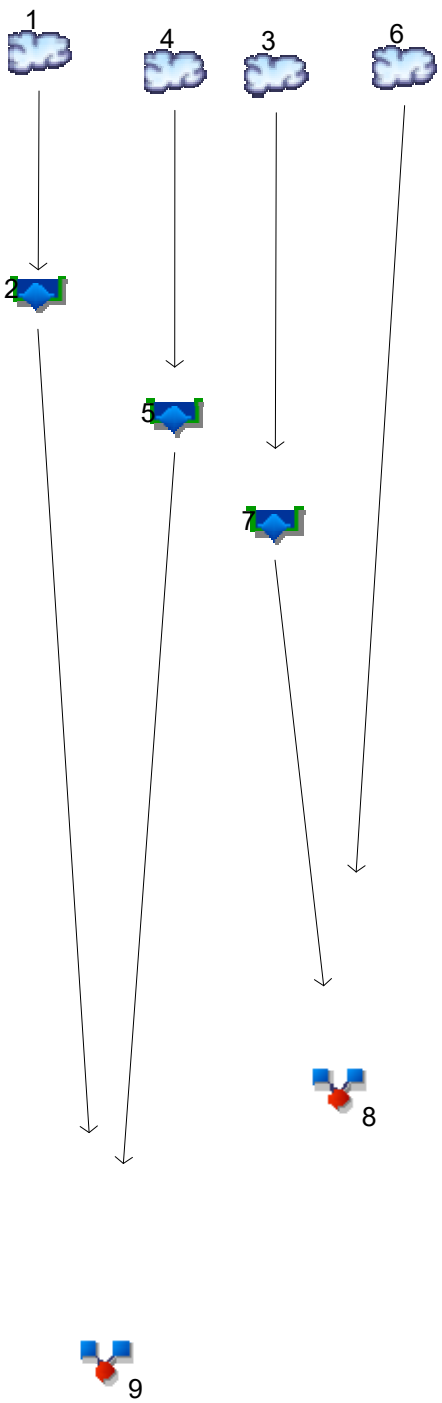
Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	8. Large gullies, diversions, and low flowing streams	2.00	38.00	1,900.00	4.240	0.124
		9. Small streams flowing bankfull	0.21	4.00	1,904.76	4.120	0.128
#1	**1**	**Time of Concentration:**					**0.252**
#1	2	3. Short grass pasture	6.55	36.00	549.61	2.040	0.074
		8. Large gullies, diversions, and low flowing streams	2.00	38.00	1,900.00	4.240	0.124
		9. Small streams flowing bankfull	0.21	4.00	1,904.76	4.120	0.128
#1	**2**	**Time of Concentration:**					**0.326**

APPENDIX D Post-Development – HydroCAD

Watershed Model Schematic

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020



Legend

Hyd.	Origin	Description
1	SCS Runoff	DA 1.1
2	Reservoir	Thru Detention Basin#1
3	SCS Runoff	DA 2.1
4	SCS Runoff	DA 1.2
5	Reservoir	Thru Detention Basin#2
6	SCS Runoff	DA BYPASS 2.1
7	Reservoir	Thru Detention Basin#3
8	Combine	Outfall 2
9	Combine	Outfall 1

Hydrograph Return Period Recap

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	------	-------	63.15	-------	-------	110.65	138.14	-------	207.53	DA 1.1
2	Reservoir	1	-------	1.068	-------	-------	1.188	2.475	-------	37.79	Thru Detention Basin#1
3	SCS Runoff	------	-------	82.22	-------	-------	146.12	183.24	-------	277.06	DA 2.1
4	SCS Runoff	------	-------	100.56	-------	-------	176.19	219.96	-------	330.44	DA 1.2
5	Reservoir	4	-------	1.870	-------	-------	2.051	3.631	-------	36.40	Thru Detention Basin#2
6	SCS Runoff	------	-------	9.445	-------	-------	31.88	47.26	-------	91.39	DA BYPASS 2.1
7	Reservoir	3	-------	1.575	-------	-------	6.338	18.35	-------	159.03	Thru Detention Basin#3
8	Combine	6, 7	-------	10.95	-------	-------	33.61	61.80	-------	246.41	Outfall 2
9	Combine	2, 5,	-------	2.938	-------	-------	3.541	7.168	-------	72.26	Outfall 1

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

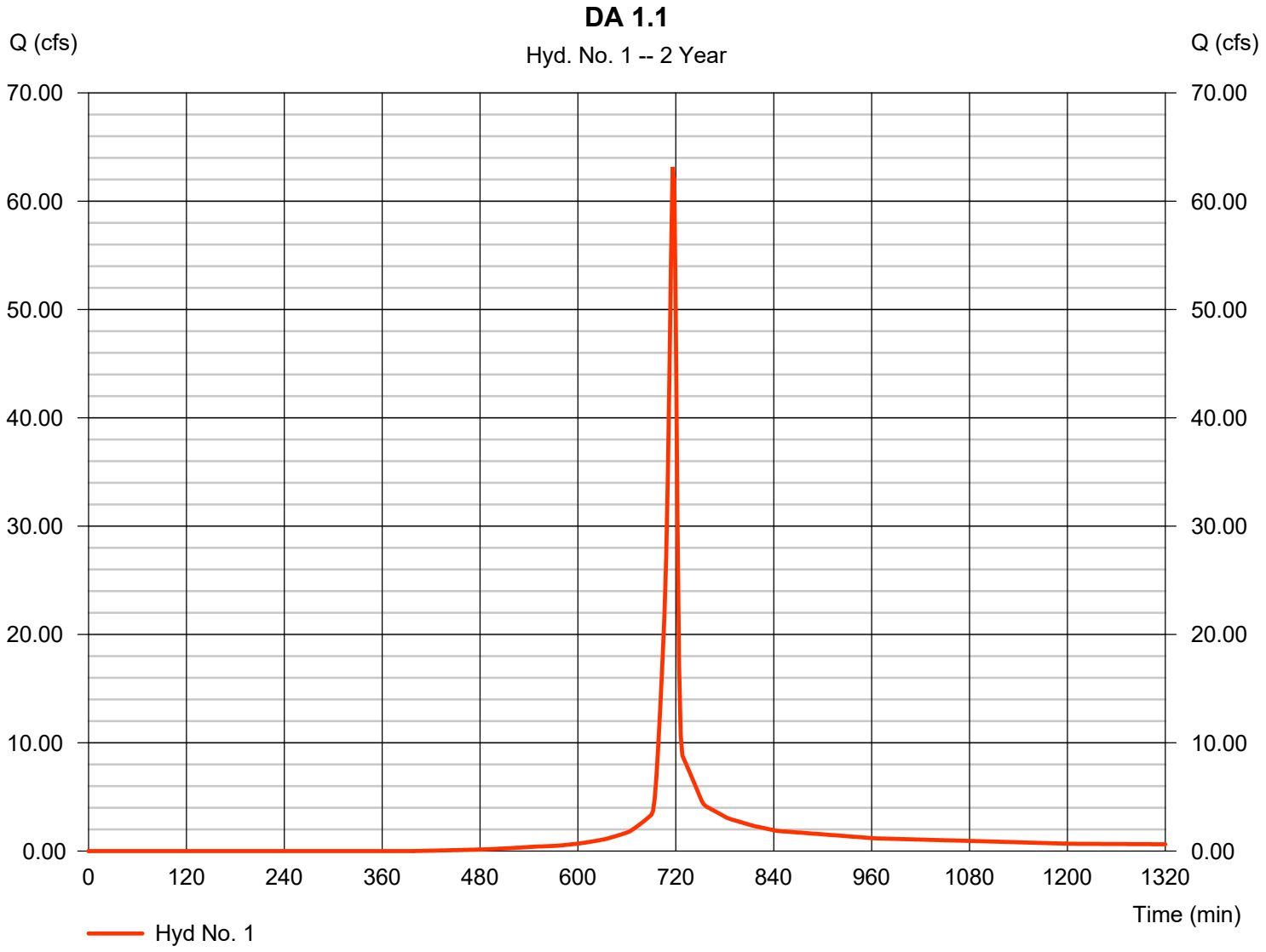
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	63.15	2	716	129,060	------	------	------	DA 1.1
2	Reservoir	1.068	2	1018	129,090	1	807.19	83,113	Thru Detention Basin#1
3	SCS Runoff	82.22	2	716	167,383	------	------	------	DA 2.1
4	SCS Runoff	100.56	2	716	205,499	------	------	------	DA 1.2
5	Reservoir	1.870	2	966	205,540	4	802.40	128,308	Thru Detention Basin#2
6	SCS Runoff	9.445	2	726	39,077	------	------	------	DA BYPASS 2.1
7	Reservoir	1.575	2	962	167,392	3	806.09	104,267	Thru Detention Basin#3
8	Combine	10.95	2	726	206,469	6, 7	------	------	Outfall 2
9	Combine	2.938	2	986	334,630	2, 5,	------	------	Outfall 1

Hydrograph Report

Hyd. No. 1

DA 1.1

Hydrograph type	=	SCS Runoff	Peak discharge	=	63.15 cfs
Storm frequency	=	2 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	129,060 cuft
Drainage area	=	17.340 ac	Curve number	=	86
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	6.00 min
Total precip.	=	3.60 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



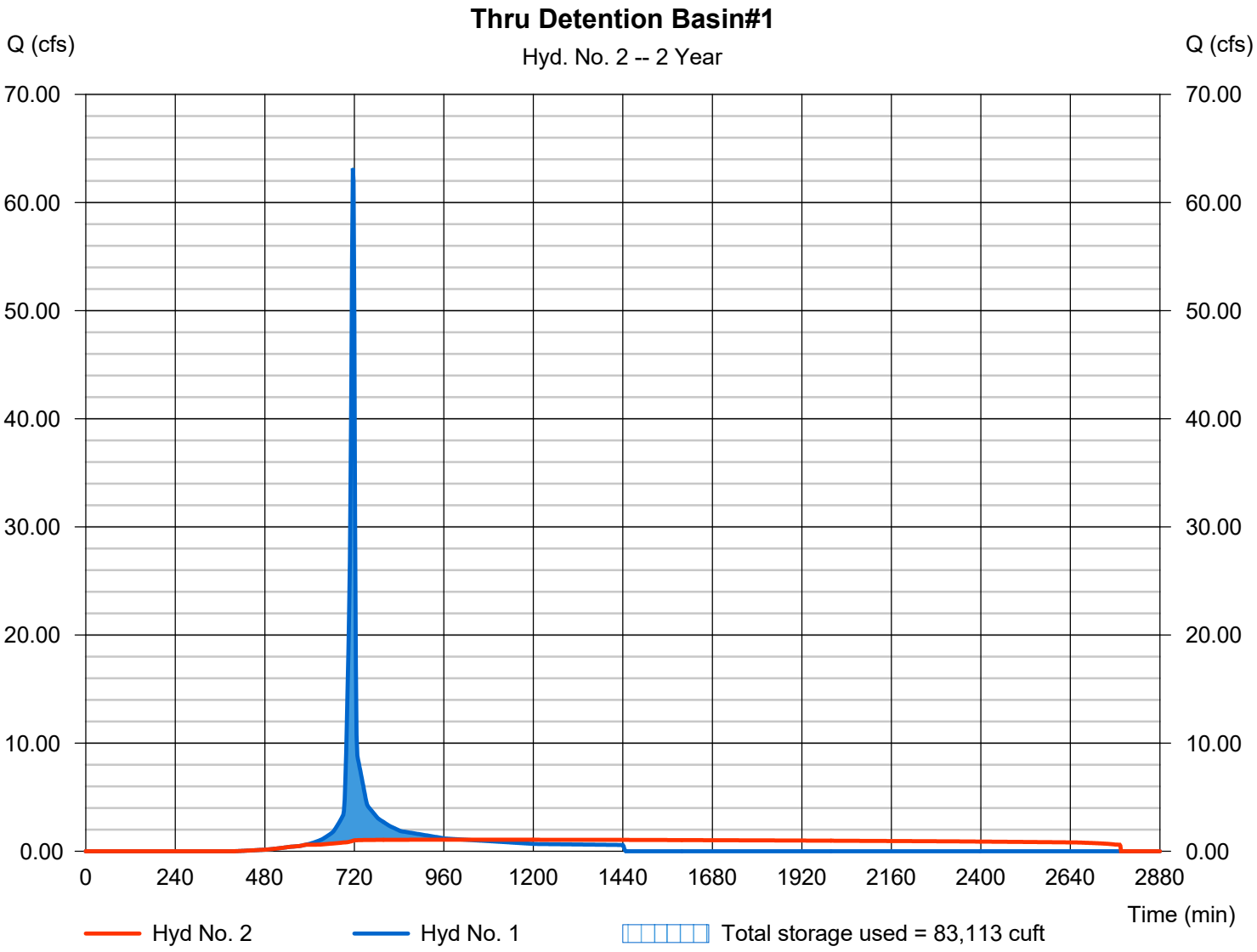
Hydrograph Report

Hyd. No. 2

Thru Detention Basin#1

Hydrograph type	=	Reservoir	Peak discharge	=	1.068 cfs
Storm frequency	=	2 yrs	Time to peak	=	1018 min
Time interval	=	2 min	Hyd. volume	=	129,090 cuft
Inflow hyd. No.	=	1 - DA 1.1	Max. Elevation	=	807.19 ft
Reservoir name	=	Detention Basin #1	Max. Storage	=	83,113 cuft

Storage Indication method used.



Pond Report

Pond No. 1 - Detention Basin #1

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 803.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	803.00	00	0	0
0.01	803.01	100	0	0
1.00	804.00	13,933	5,020	5,020
2.00	805.00	20,159	16,949	21,969
3.00	806.00	28,637	24,272	46,241
4.00	807.00	32,348	30,471	76,712
5.00	808.00	36,240	34,272	110,984
6.00	809.00	39,890	38,047	149,030
7.00	810.00	43,939	41,894	190,924
8.00	811.00	46,647	45,282	236,206
9.00	812.00	50,386	48,500	284,706
10.00	813.00	54,240	52,296	337,002
11.00	814.00	58,612	56,406	393,408
12.00	815.00	61,880	60,233	453,640

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 24.00	3.00	0.00	0.00
Span (in)	= 24.00	3.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 803.00	803.00	0.00	0.00
Length (ft)	= 100.00	0.00	0.00	0.00
Slope (%)	= 1.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

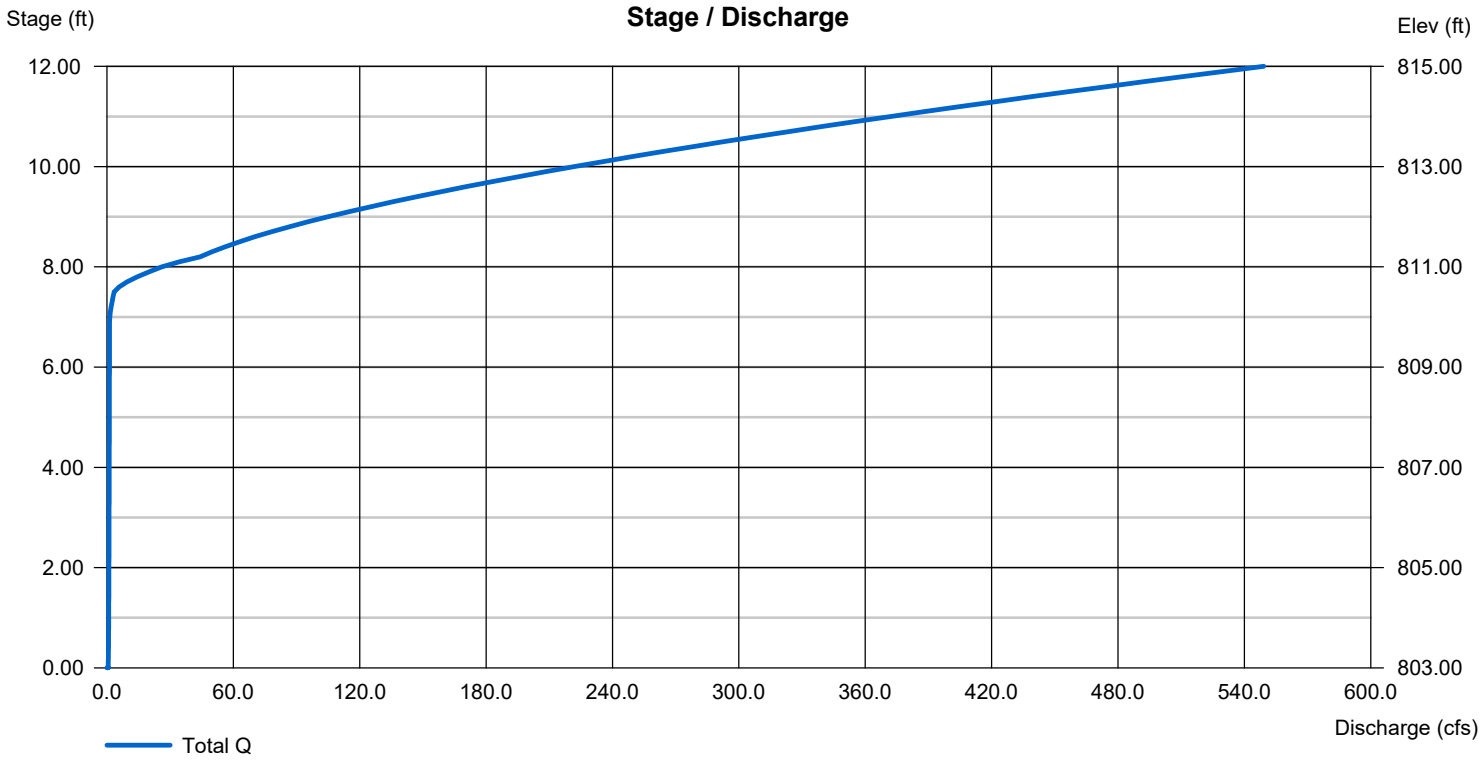
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 16.50	24.00	1.50	0.00
Crest El. (ft)	= 810.50	811.00	809.92	0.00
Weir Coeff.	= 3.33	2.60	3.33	3.33
Weir Type	= 1	Broad	Rect	---
Multi-Stage	= Yes	No	Yes	No

Exfil.(in/hr) = 0.000 (by Contour)

TW Elev. (ft) = 0.00

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

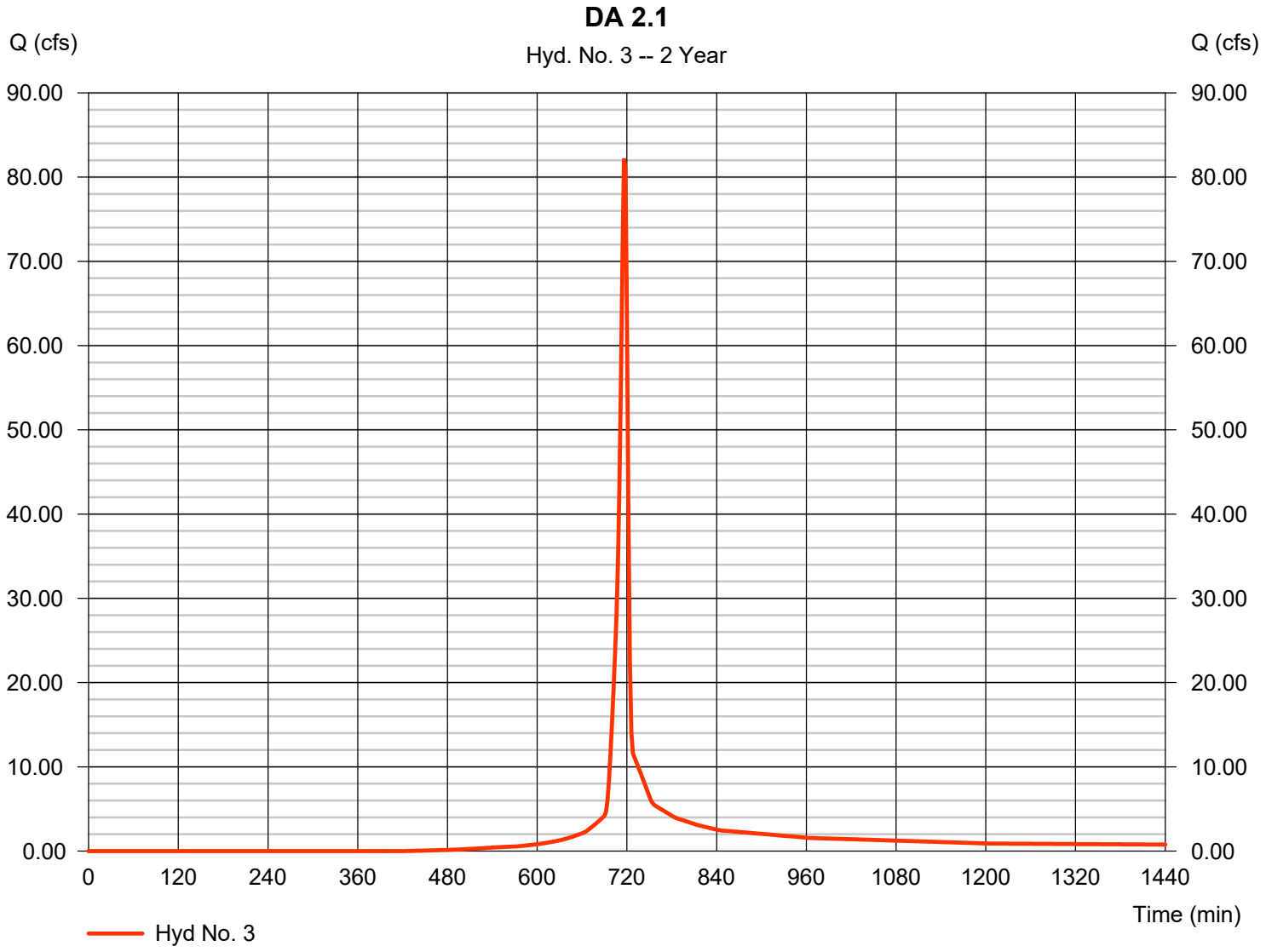


Hydrograph Report

Hyd. No. 3

DA 2.1

Hydrograph type	=	SCS Runoff	Peak discharge	=	82.22 cfs
Storm frequency	=	2 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	167,383 cuft
Drainage area	=	23.380 ac	Curve number	=	85
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	6.00 min
Total precip.	=	3.60 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

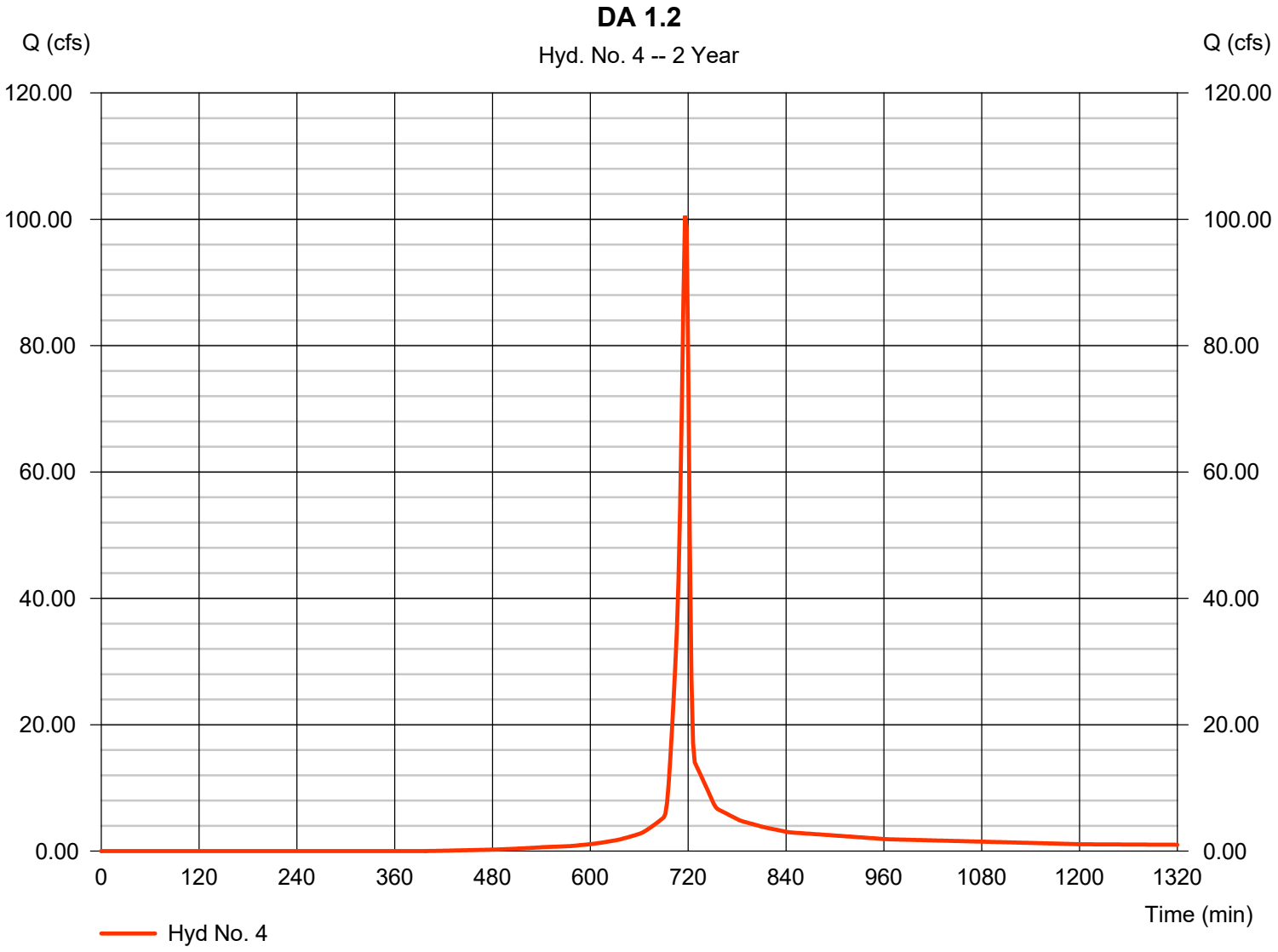


Hydrograph Report

Hyd. No. 4

DA 1.2

Hydrograph type	=	SCS Runoff	Peak discharge	=	100.56 cfs
Storm frequency	=	2 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	205,499 cuft
Drainage area	=	27.610 ac	Curve number	=	86
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	6.00 min
Total precip.	=	3.60 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



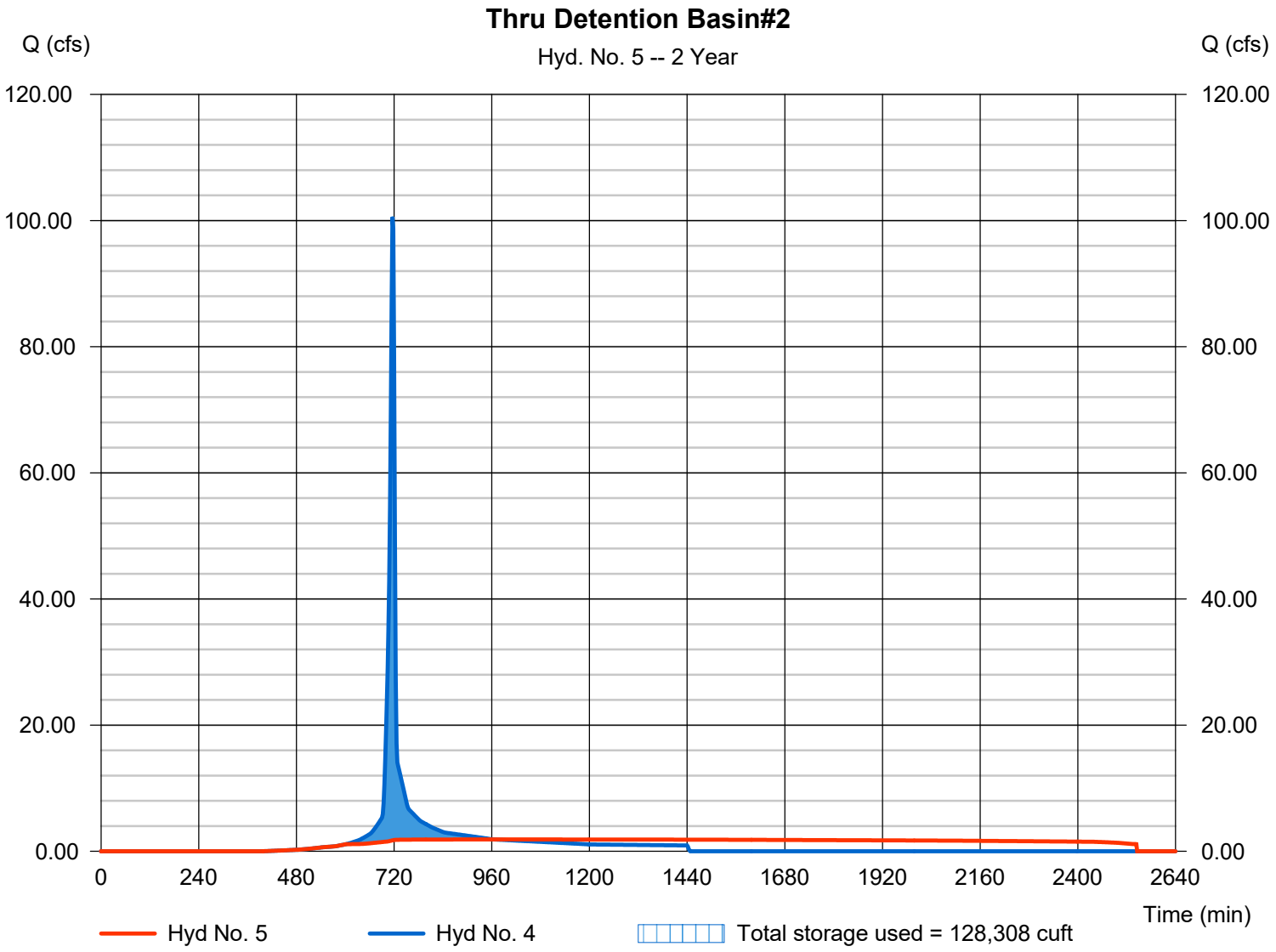
Hydrograph Report

Hyd. No. 5

Thru Detention Basin#2

Hydrograph type	= Reservoir	Peak discharge	= 1.870 cfs
Storm frequency	= 2 yrs	Time to peak	= 966 min
Time interval	= 2 min	Hyd. volume	= 205,540 cuft
Inflow hyd. No.	= 4 - DA 1.2	Max. Elevation	= 802.40 ft
Reservoir name	= Detention Basin #2	Max. Storage	= 128,308 cuft

Storage Indication method used.



Pond Report

Pond No. 3 - Detention Basin #2

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 799.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	799.00	00	0	0
0.01	799.01	100	0	0
1.00	800.00	23,963	8,451	8,451
2.00	801.00	44,503	33,704	42,155
3.00	802.00	70,732	57,108	99,263
4.00	803.00	76,218	73,451	172,713
5.00	804.00	81,851	79,010	251,723
6.00	805.00	87,605	84,703	336,427
7.00	806.00	93,480	90,518	426,944
8.00	807.00	99,469	96,449	523,393

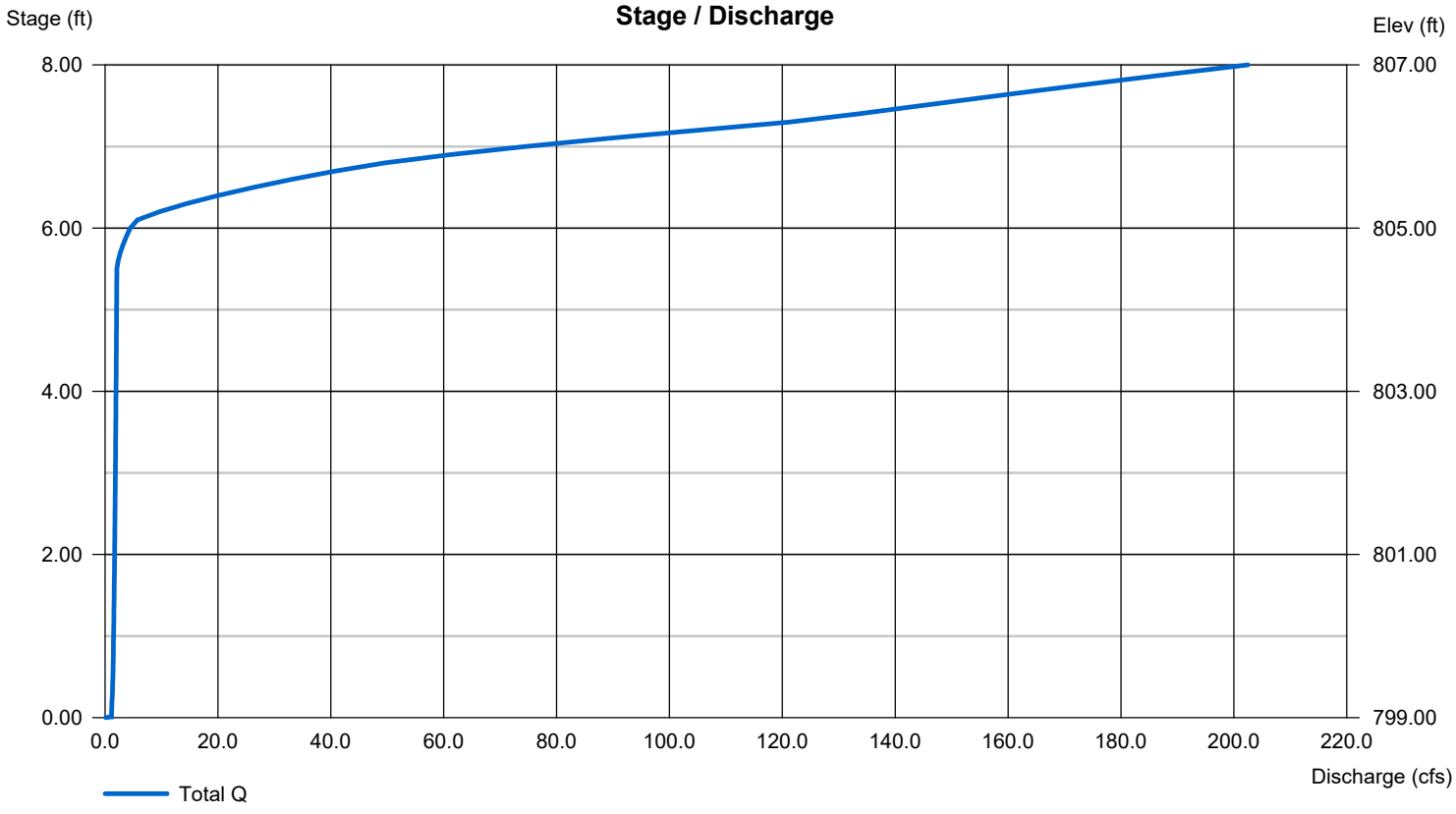
Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 42.00	4.00	0.00	0.00
Span (in)	= 42.00	4.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 799.00	799.00	0.00	0.00
Length (ft)	= 100.00	0.00	0.00	0.00
Slope (%)	= 1.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 16.00	25.00	2.00	0.00
Crest El. (ft)	= 805.00	805.75	804.50	0.00
Weir Coeff.	= 3.33	2.60	3.33	3.33
Weir Type	= 1	Broad	Rect	---
Multi-Stage	= Yes	No	Yes	No
Exfil.(in/hr)	= 0.000 (by Wet area)			
TW Elev. (ft)	= 0.00			

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

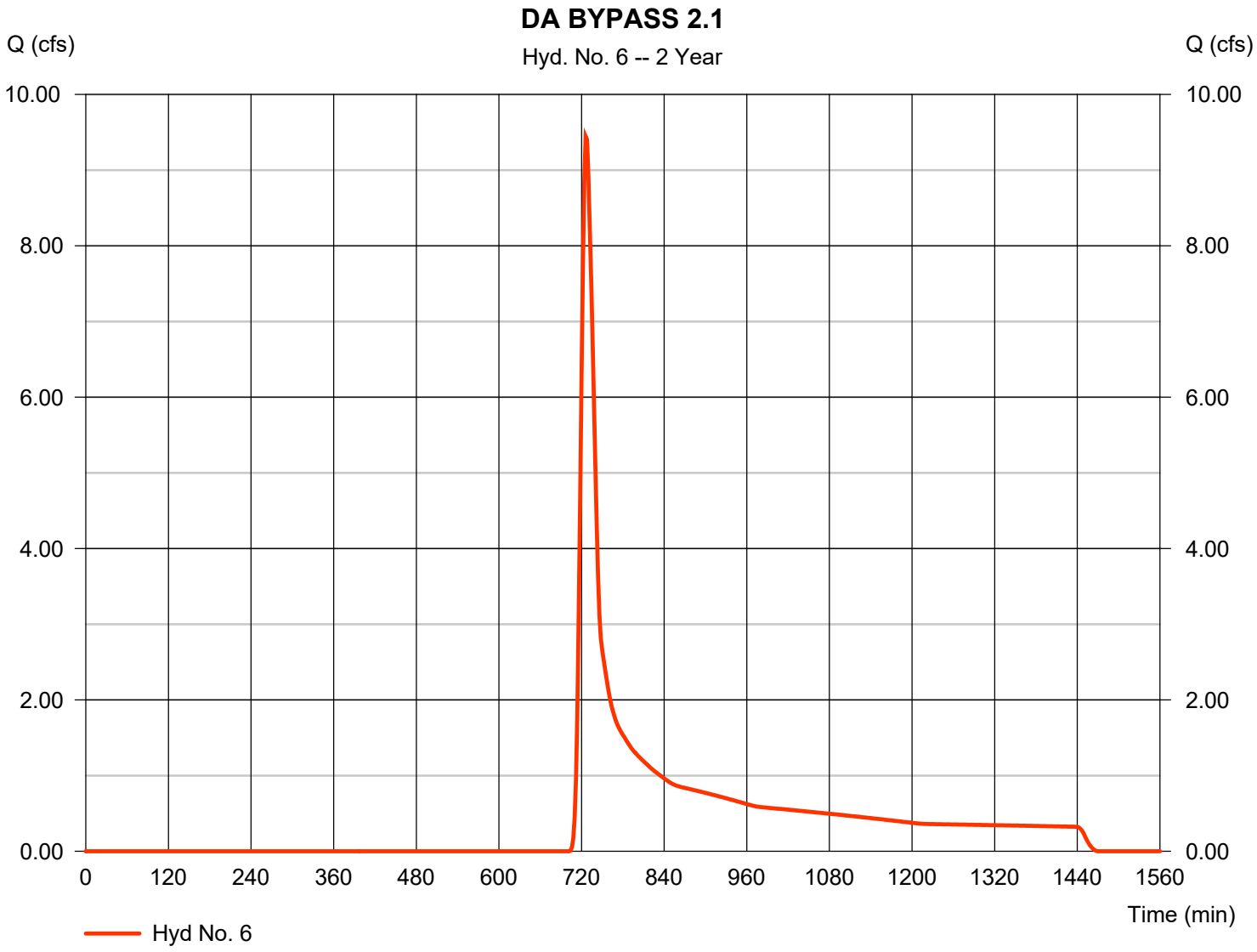


Hydrograph Report

Hyd. No. 6

DA BYPASS 2.1

Hydrograph type	= SCS Runoff	Peak discharge	= 9.445 cfs
Storm frequency	= 2 yrs	Time to peak	= 726 min
Time interval	= 2 min	Hyd. volume	= 39,077 cuft
Drainage area	= 17.410 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 17.40 min
Total precip.	= 3.60 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



TR55 Tc Worksheet

Hyd. No. 6

DA BYPASS 2.1

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.400		0.011		0.011		
Flow length (ft)	= 100.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.60		0.00		0.00		
Land slope (%)	= 5.00		0.00		0.00		
Travel Time (min)	**= 14.03**	**+**	**0.00**	**+**	**0.00**	**=**	**14.03**
Shallow Concentrated Flow							
Flow length (ft)	= 562.00		0.00		0.00		
Watercourse slope (%)	= 3.02		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=2.80		0.00		0.00		
Travel Time (min)	**= 3.34**	**+**	**0.00**	**+**	**0.00**	**=**	**3.34**
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		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 17.40 min

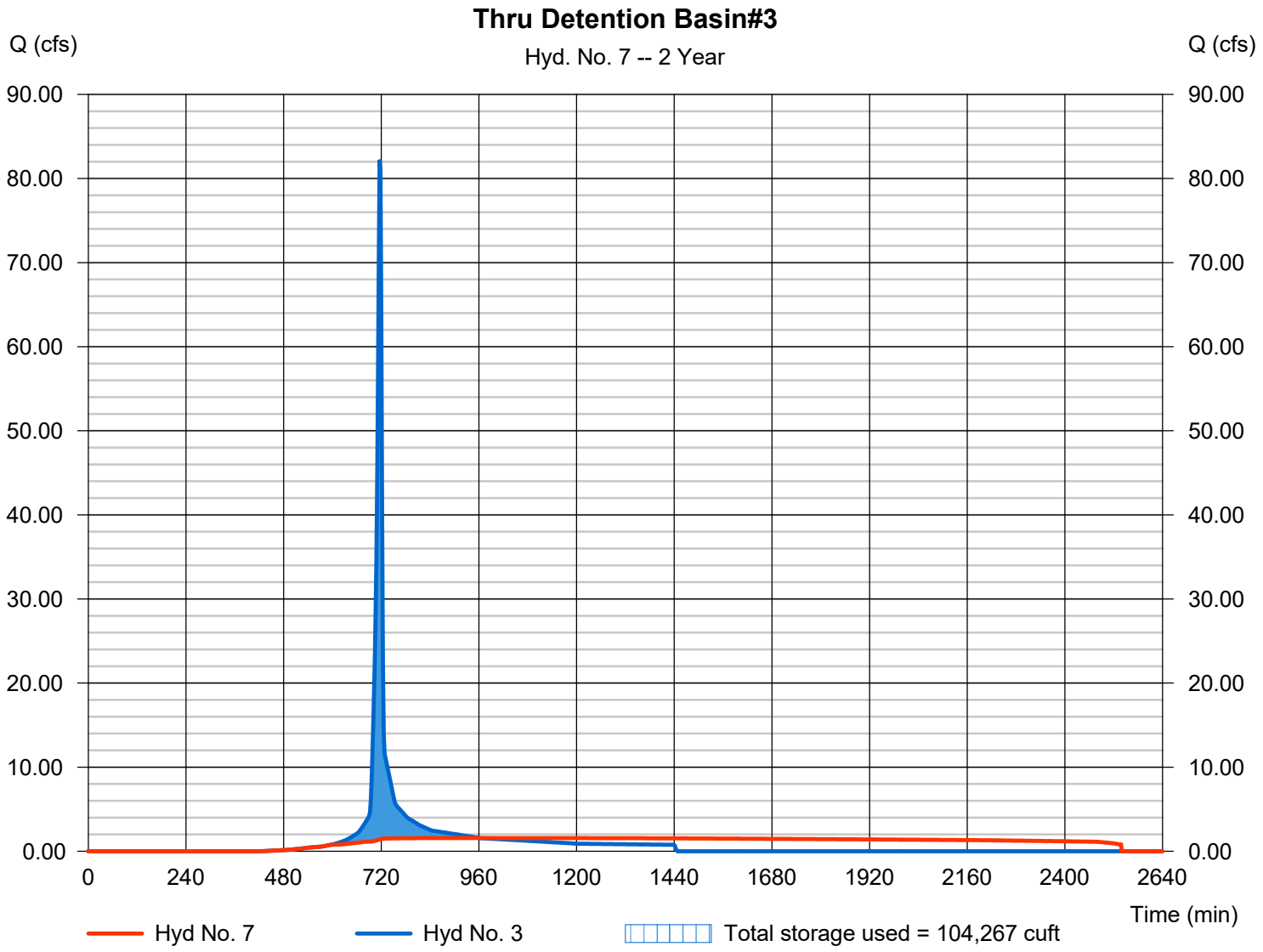
Hydrograph Report

Hyd. No. 7

Thru Detention Basin#3

Hydrograph type	=	Reservoir	Peak discharge	=	1.575 cfs
Storm frequency	=	2 yrs	Time to peak	=	962 min
Time interval	=	2 min	Hyd. volume	=	167,392 cuft
Inflow hyd. No.	=	3 - DA 2.1	Max. Elevation	=	806.09 ft
Reservoir name	=	Detention Basin #3	Max. Storage	=	104,267 cuft

Storage Indication method used.



Pond Report

Pond No. 7 - Detention Basin #3

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 802.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	802.00	00	0	0
0.01	802.10	100	0	0
1.00	803.00	10,959	3,995	3,995
2.00	804.00	30,577	19,945	23,940
3.00	805.00	39,703	35,037	58,978
4.00	806.00	42,916	41,295	100,272
5.00	807.00	46,186	44,537	144,809
6.00	808.00	49,513	47,835	192,644
7.00	809.00	52,896	51,190	243,834
8.00	810.00	56,335	54,601	298,434
8.50	810.50	58,076	28,599	327,033

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 36.00	4.00	0.00	0.00
Span (in)	= 36.00	4.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 802.00	802.00	0.00	0.00
Length (ft)	= 92.00	0.00	0.00	0.00
Slope (%)	= 0.54	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

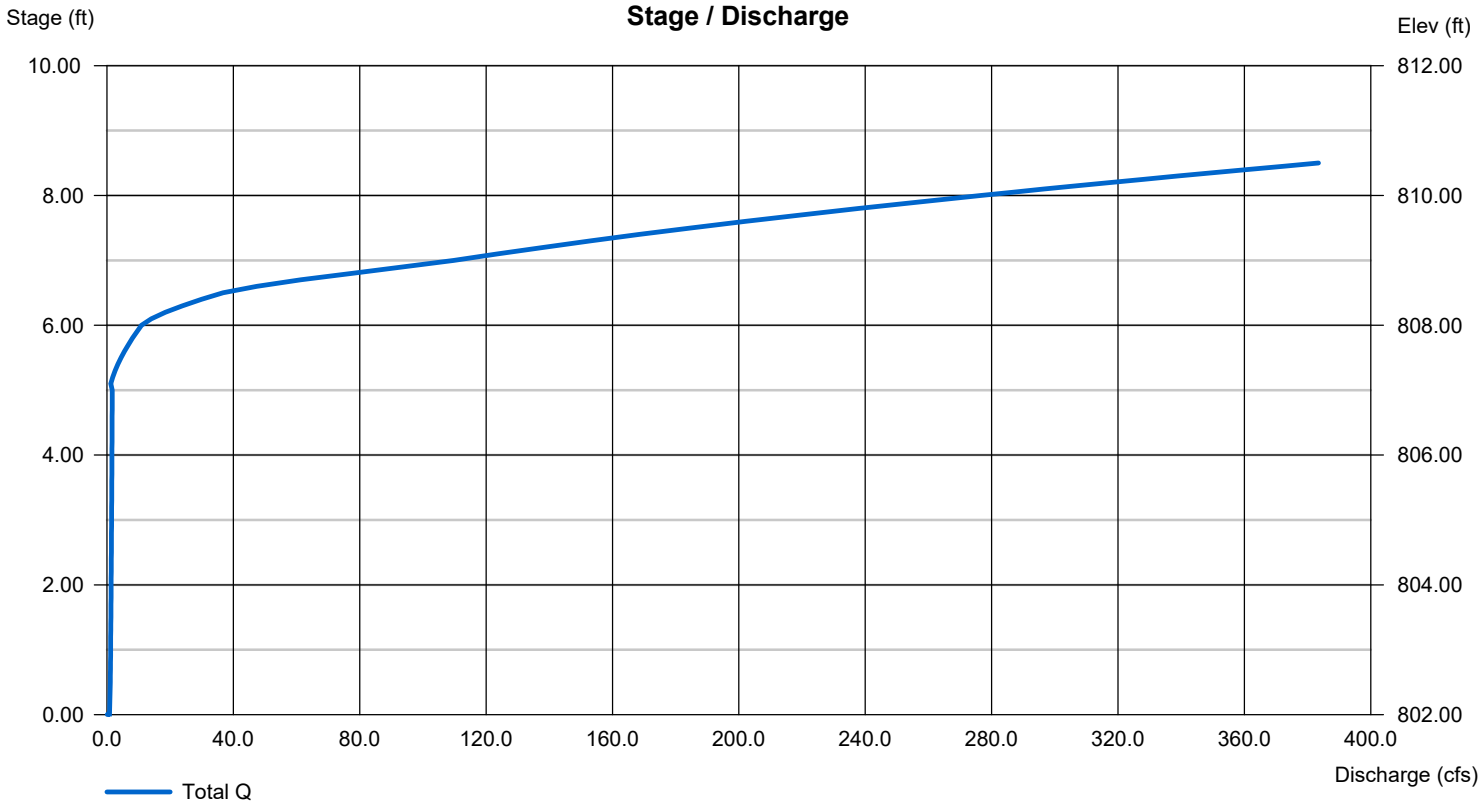
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 15.00	40.00	3.00	0.00
Crest El. (ft)	= 808.00	808.50	807.00	0.00
Weir Coeff.	= 3.33	2.60	3.33	3.33
Weir Type	= 1	Broad	Rect	---
Multi-Stage	= Yes	No	Yes	No

Exfil.(in/hr) = 0.000 (by Wet area)

TW Elev. (ft) = 0.00

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

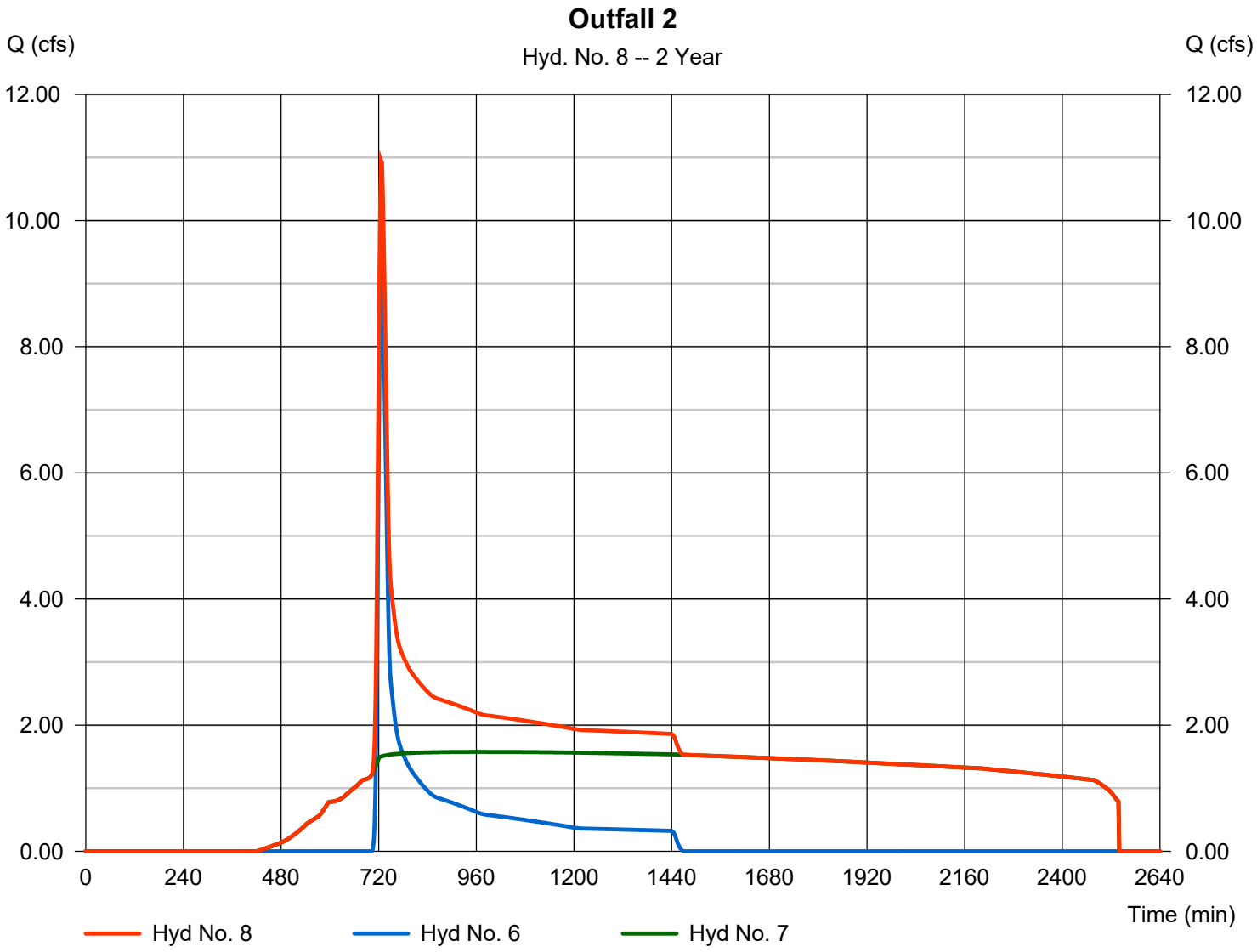


Hydrograph Report

Hyd. No. 8

Outfall 2

Hydrograph type	=	Combine	Peak discharge	=	10.95 cfs
Storm frequency	=	2 yrs	Time to peak	=	726 min
Time interval	=	2 min	Hyd. volume	=	206,469 cuft
Inflow hyds.	=	6, 7	Contrib. drain. area	=	17.410 ac

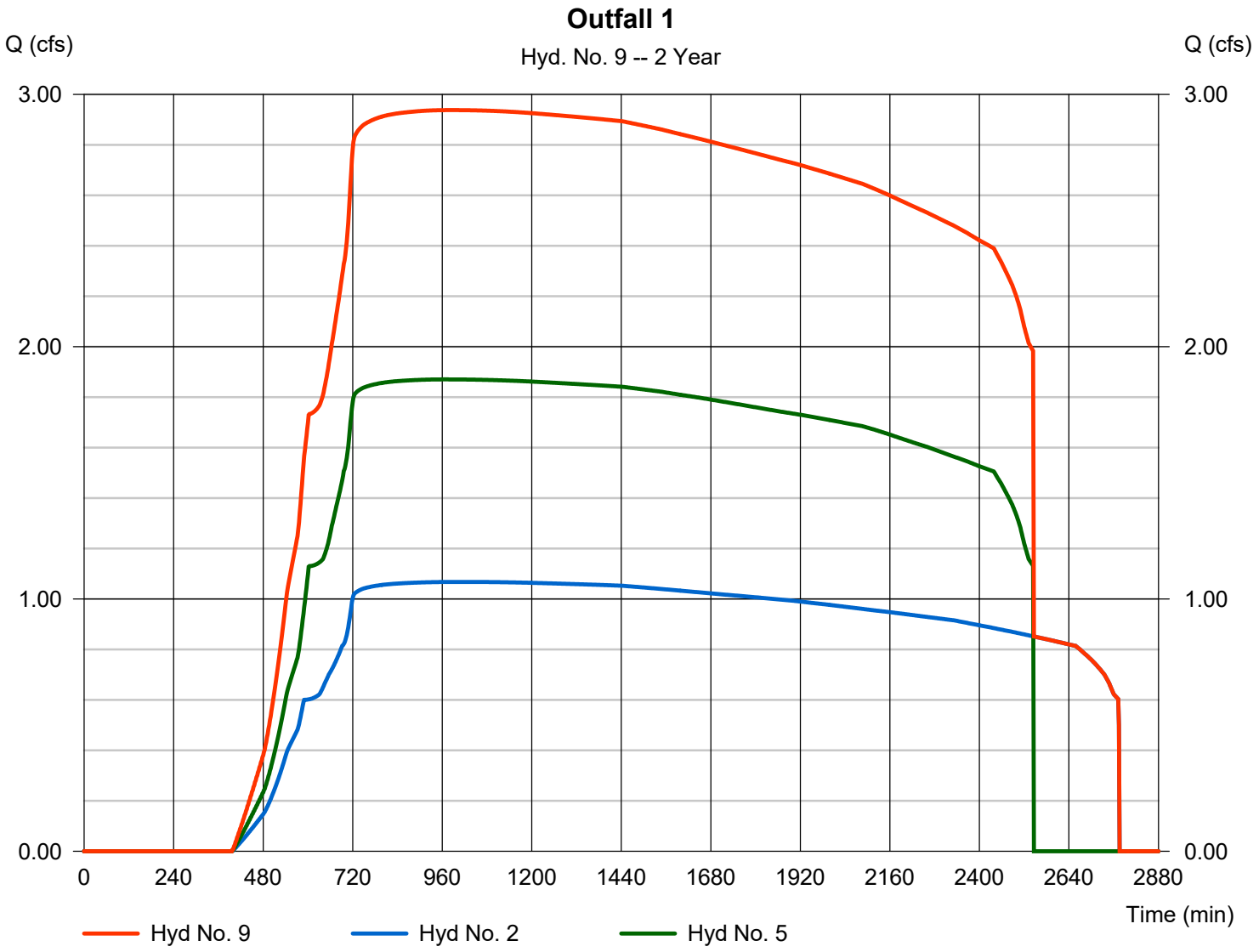


Hydrograph Report

Hyd. No. 9

Outfall 1

Hydrograph type	=	Combine	Peak discharge	=	2.938 cfs
Storm frequency	=	2 yrs	Time to peak	=	986 min
Time interval	=	2 min	Hyd. volume	=	334,630 cuft
Inflow hyds.	=	2, 5	Contrib. drain. area	=	0.000 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

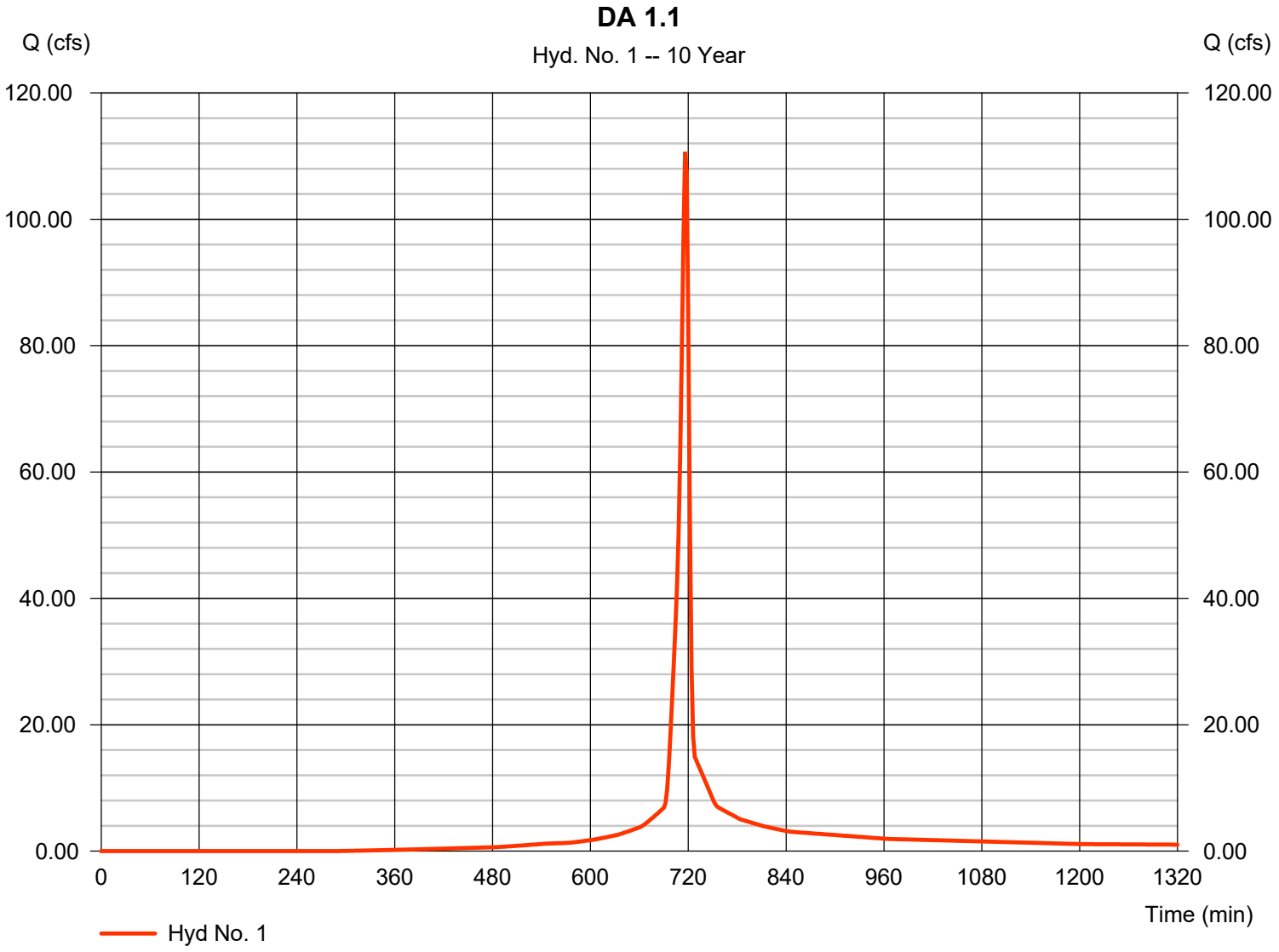
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	110.65	2	716	232,270	------	------	------	DA 1.1
2	Reservoir	1.188	2	1178	232,271	1	809.48	169,351	Thru Detention Basin#1
3	SCS Runoff	146.12	2	716	304,966	------	------	------	DA 2.1
4	SCS Runoff	176.19	2	716	369,837	------	------	------	DA 1.2
5	Reservoir	2.051	2	1150	369,880	4	804.13	263,073	Thru Detention Basin#2
6	SCS Runoff	31.88	2	726	106,094	------	------	------	DA BYPASS 2.1
7	Reservoir	6.338	2	790	305,007	3	807.66	176,611	Thru Detention Basin#3
8	Combine	33.61	2	726	411,102	6, 7	------	------	Outfall 2
9	Combine	3.541	2	1092	602,168	2, 5,	------	------	Outfall 1

Hydrograph Report

Hyd. No. 1

DA 1.1

Hydrograph type	=	SCS Runoff	Peak discharge	=	110.65 cfs
Storm frequency	=	10 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	232,270 cuft
Drainage area	=	17.340 ac	Curve number	=	86
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	6.00 min
Total precip.	=	5.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



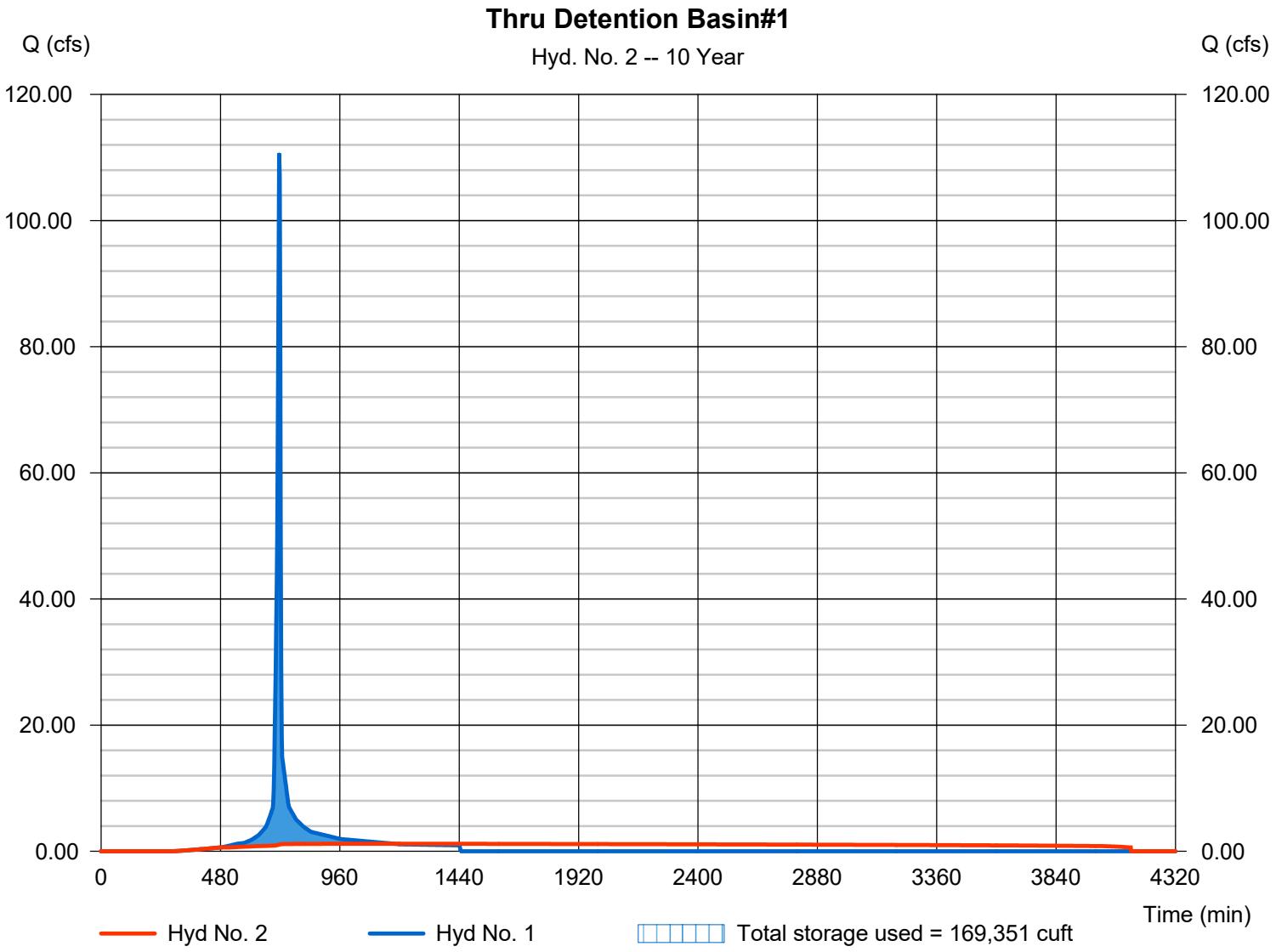
Hydrograph Report

Hyd. No. 2

Thru Detention Basin#1

Hydrograph type	=	Reservoir	Peak discharge	=	1.188 cfs
Storm frequency	=	10 yrs	Time to peak	=	1178 min
Time interval	=	2 min	Hyd. volume	=	232,271 cuft
Inflow hyd. No.	=	1 - DA 1.1	Max. Elevation	=	809.48 ft
Reservoir name	=	Detention Basin #1	Max. Storage	=	169,351 cuft

Storage Indication method used.

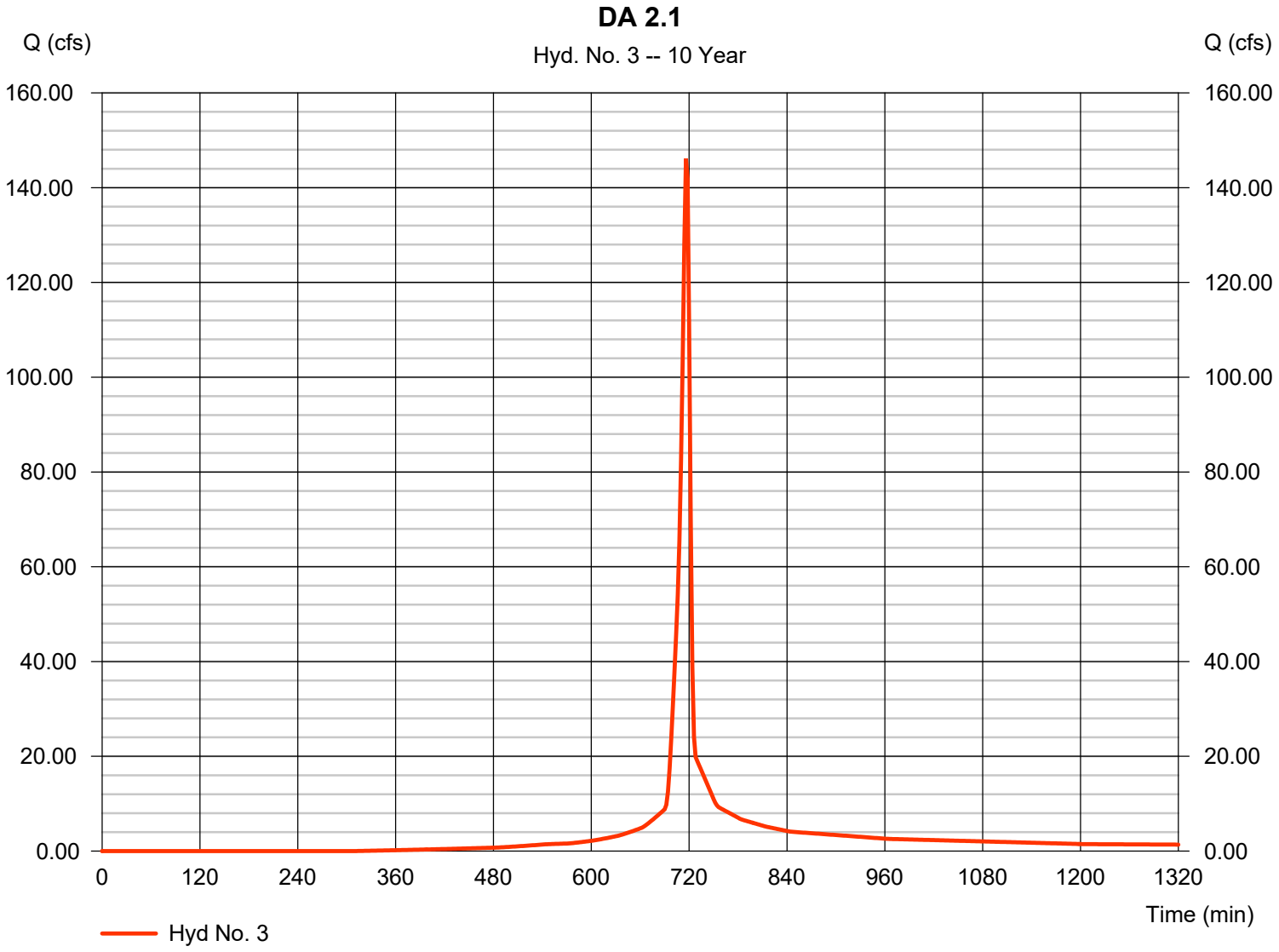


Hydrograph Report

Hyd. No. 3

DA 2.1

Hydrograph type	=	SCS Runoff	Peak discharge	=	146.12 cfs
Storm frequency	=	10 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	304,966 cuft
Drainage area	=	23.380 ac	Curve number	=	85
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	6.00 min
Total precip.	=	5.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

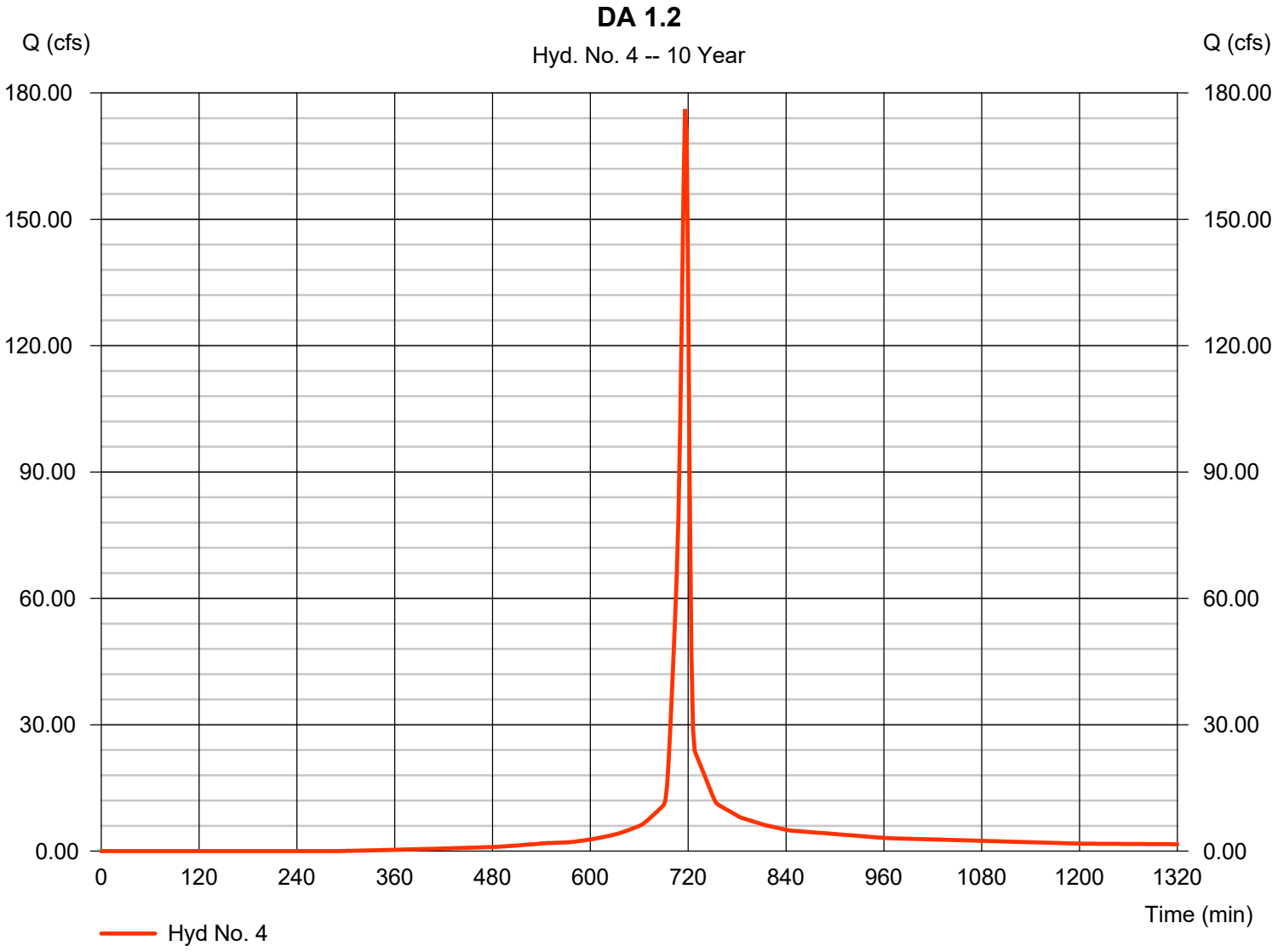


Hydrograph Report

Hyd. No. 4

DA 1.2

Hydrograph type	=	SCS Runoff	Peak discharge	=	176.19 cfs
Storm frequency	=	10 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	369,837 cuft
Drainage area	=	27.610 ac	Curve number	=	86
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	6.00 min
Total precip.	=	5.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



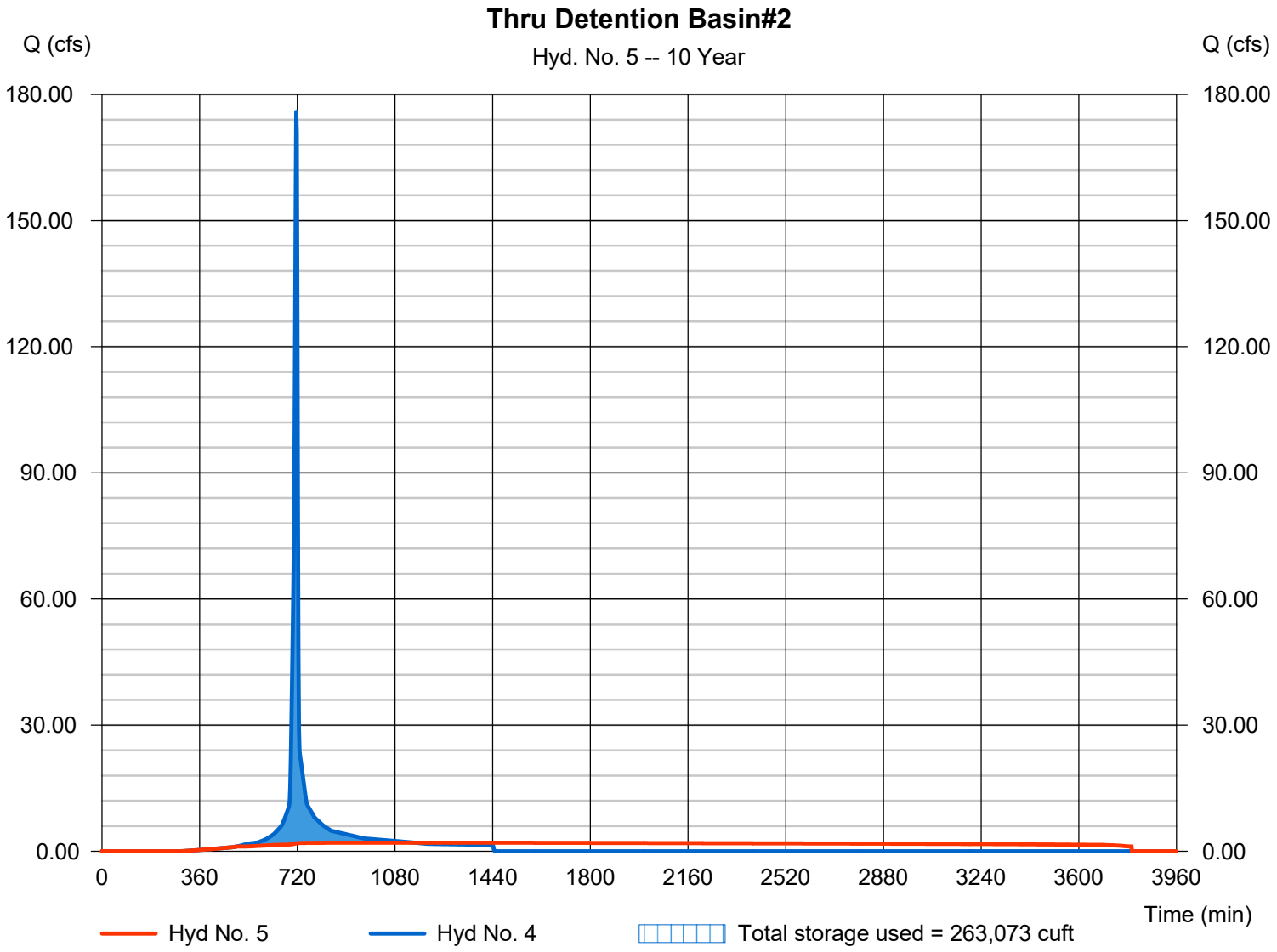
Hydrograph Report

Hyd. No. 5

Thru Detention Basin#2

Hydrograph type	=	Reservoir	Peak discharge	=	2.051 cfs
Storm frequency	=	10 yrs	Time to peak	=	1150 min
Time interval	=	2 min	Hyd. volume	=	369,880 cuft
Inflow hyd. No.	=	4 - DA 1.2	Max. Elevation	=	804.13 ft
Reservoir name	=	Detention Basin #2	Max. Storage	=	263,073 cuft

Storage Indication method used.

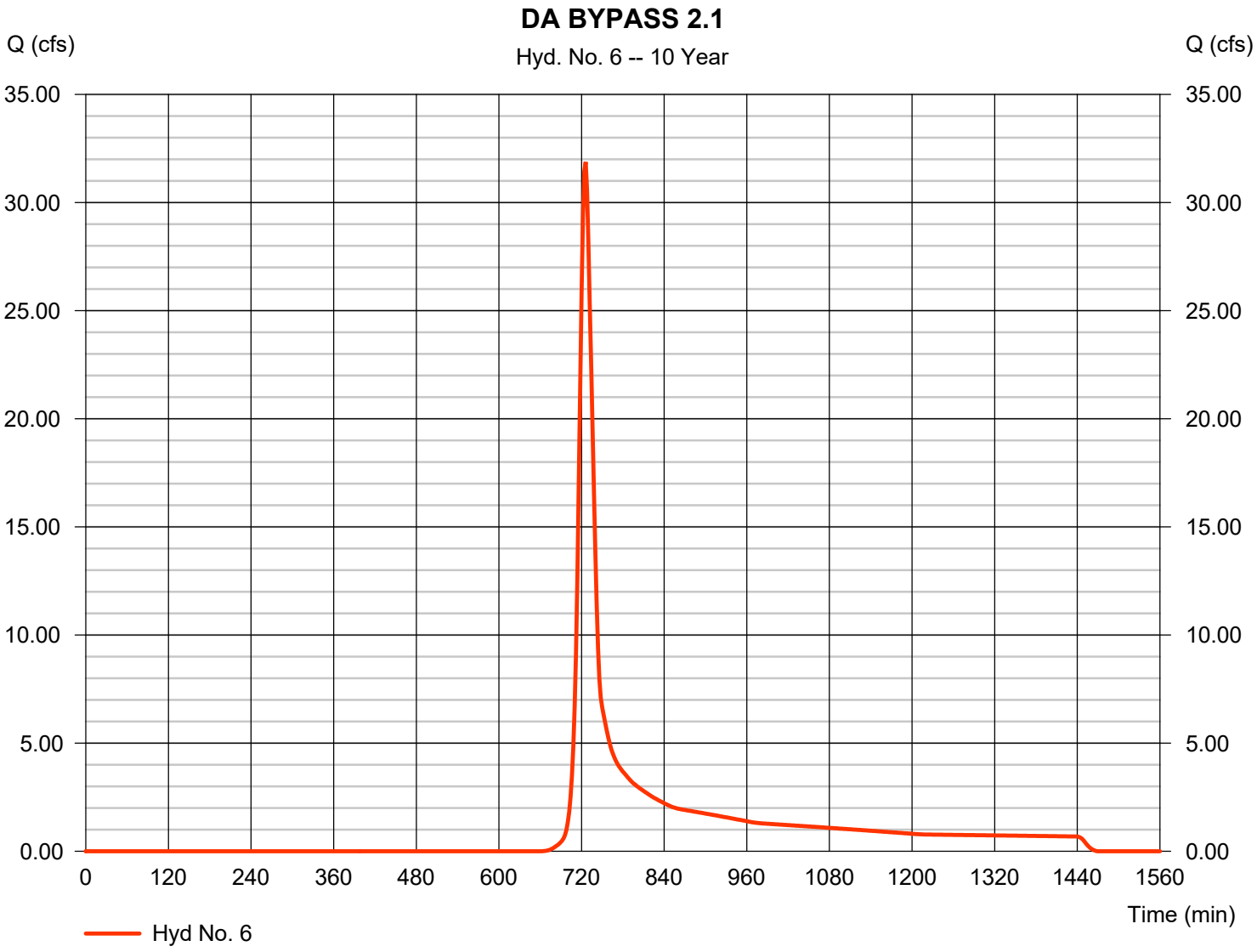


Hydrograph Report

Hyd. No. 6

DA BYPASS 2.1

Hydrograph type	=	SCS Runoff	Peak discharge	=	31.88 cfs
Storm frequency	=	10 yrs	Time to peak	=	726 min
Time interval	=	2 min	Hyd. volume	=	106,094 cuft
Drainage area	=	17.410 ac	Curve number	=	61
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	17.40 min
Total precip.	=	5.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



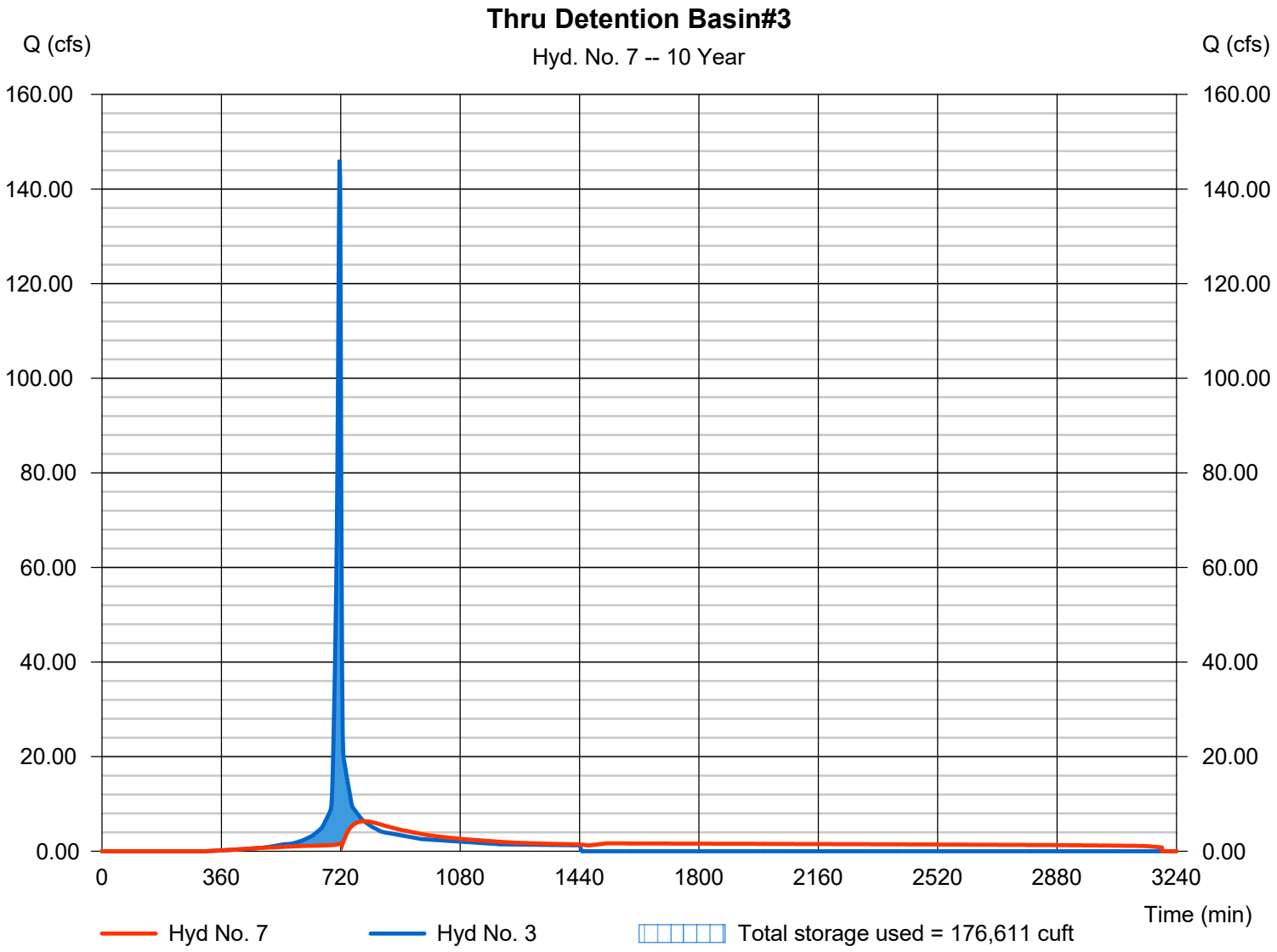
Hydrograph Report

Hyd. No. 7

Thru Detention Basin#3

Hydrograph type	=	Reservoir	Peak discharge	=	6.338 cfs
Storm frequency	=	10 yrs	Time to peak	=	790 min
Time interval	=	2 min	Hyd. volume	=	305,007 cuft
Inflow hyd. No.	=	3 - DA 2.1	Max. Elevation	=	807.66 ft
Reservoir name	=	Detention Basin #3	Max. Storage	=	176,611 cuft

Storage Indication method used.

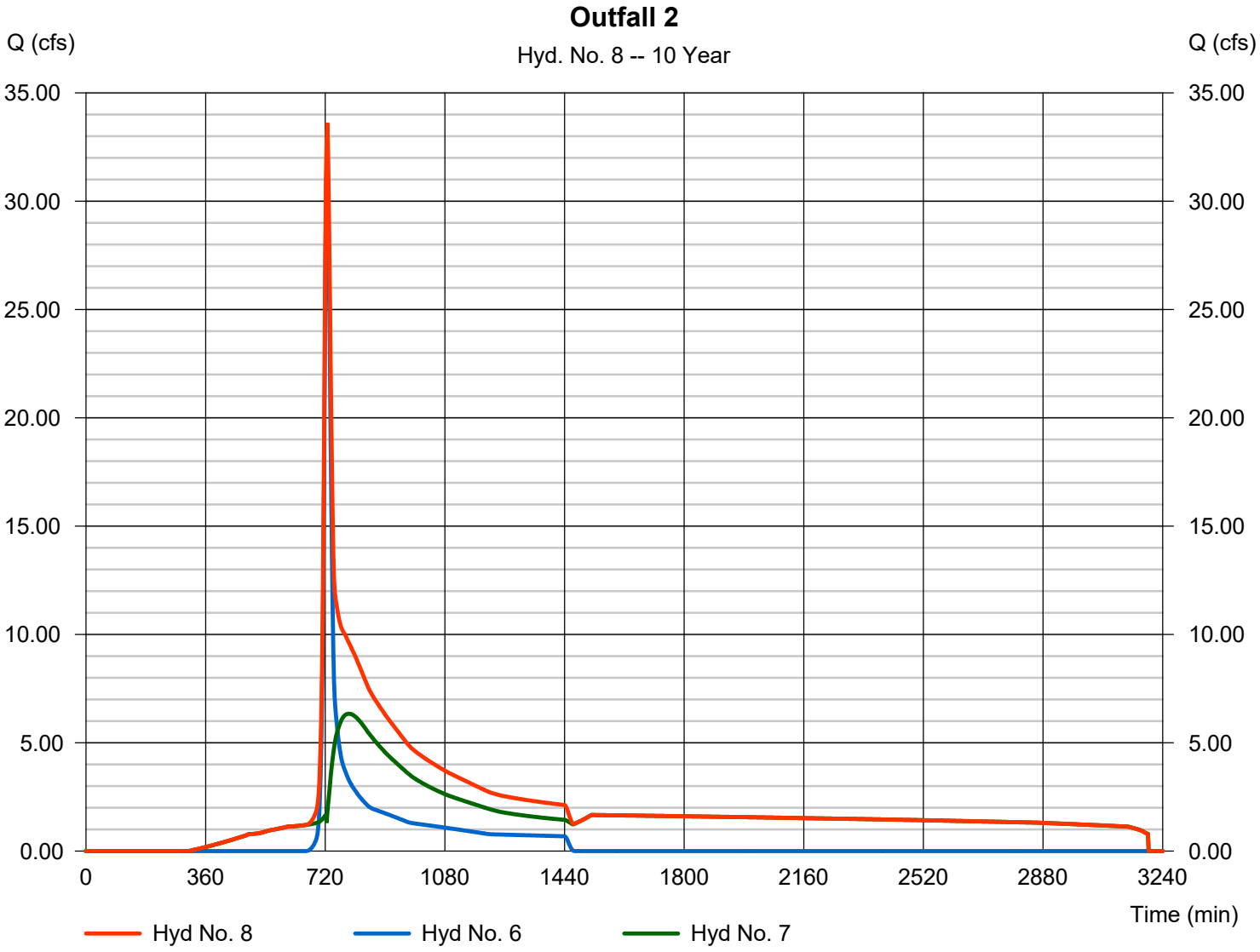


Hydrograph Report

Hyd. No. 8

Outfall 2

Hydrograph type	=	Combine	Peak discharge	=	33.61 cfs
Storm frequency	=	10 yrs	Time to peak	=	726 min
Time interval	=	2 min	Hyd. volume	=	411,102 cuft
Inflow hyds.	=	6, 7	Contrib. drain. area	=	17.410 ac

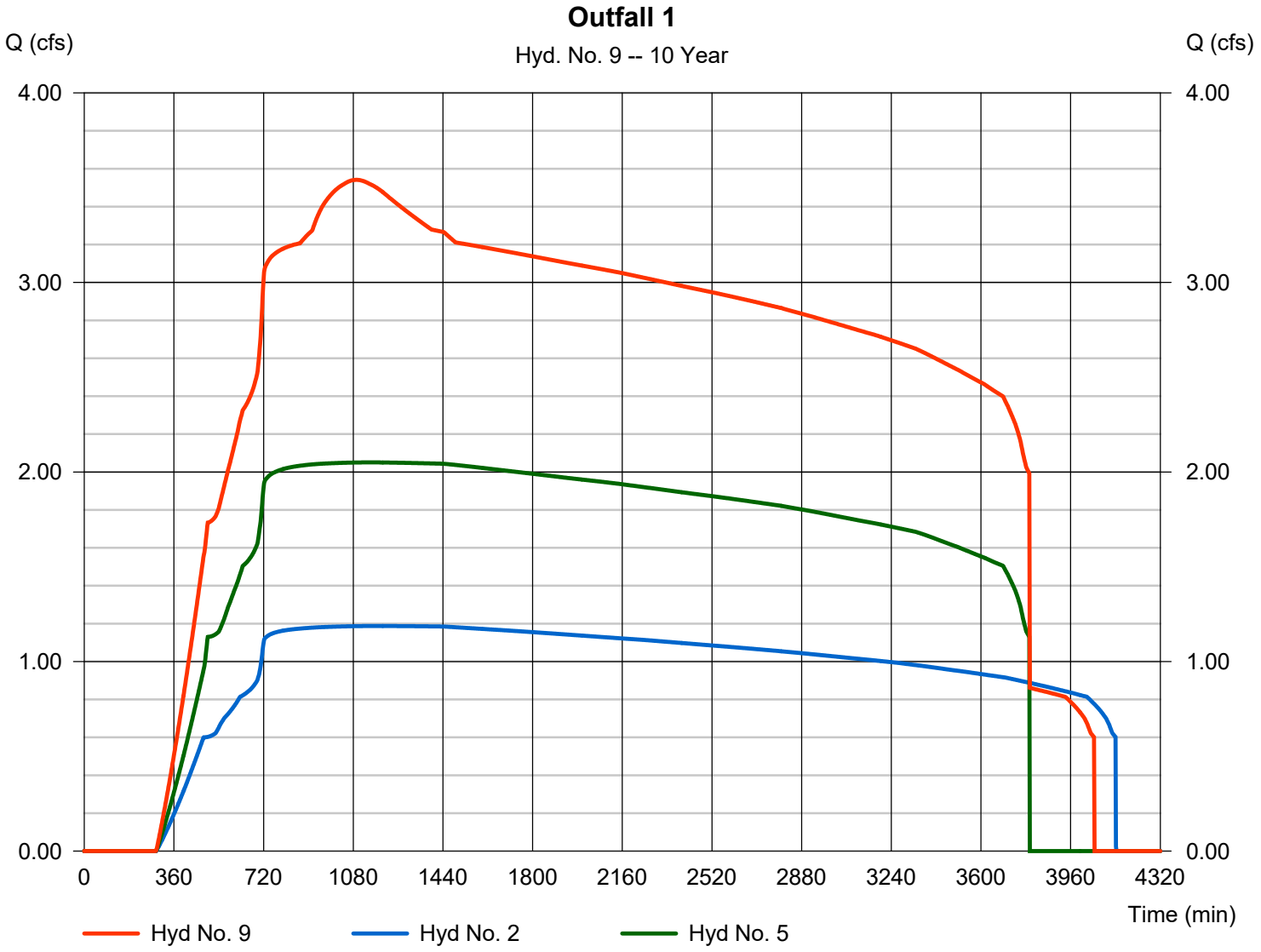


Hydrograph Report

Hyd. No. 9

Outfall 1

Hydrograph type	=	Combine	Peak discharge	=	3.541 cfs
Storm frequency	=	10 yrs	Time to peak	=	1092 min
Time interval	=	2 min	Hyd. volume	=	602,168 cuft
Inflow hyds.	=	2, 5	Contrib. drain. area	=	0.000 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

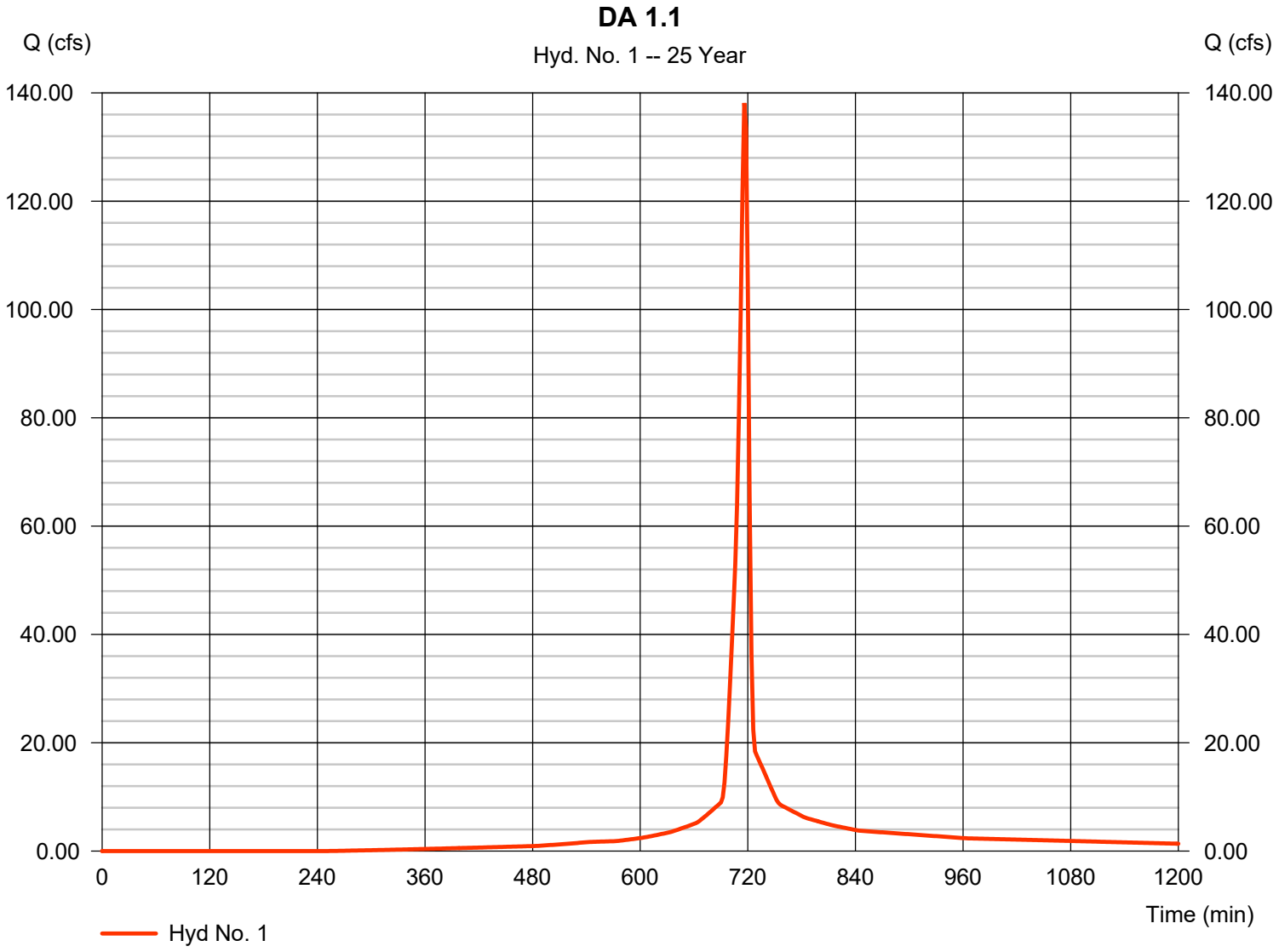
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	138.14	2	716	293,981	------	------	------	DA 1.1
2	Reservoir	2.475	2	954	294,007	1	810.32	205,343	Thru Detention Basin#1
3	SCS Runoff	183.24	2	716	387,566	------	------	------	DA 2.1
4	SCS Runoff	219.96	2	716	468,098	------	------	------	DA 1.2
5	Reservoir	3.631	2	982	468,118	4	804.87	325,781	Thru Detention Basin#2
6	SCS Runoff	47.26	2	726	152,760	------	------	------	DA BYPASS 2.1
7	Reservoir	18.35	2	740	387,585	3	808.20	202,737	Thru Detention Basin#3
8	Combine	61.80	2	726	540,345	6, 7	------	------	Outfall 2
9	Combine	7.168	2	908	762,119	2, 5,	------	------	Outfall 1

Hydrograph Report

Hyd. No. 1

DA 1.1

Hydrograph type	=	SCS Runoff	Peak discharge	=	138.14 cfs
Storm frequency	=	25 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	293,981 cuft
Drainage area	=	17.340 ac	Curve number	=	86
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	6.00 min
Total precip.	=	6.60 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



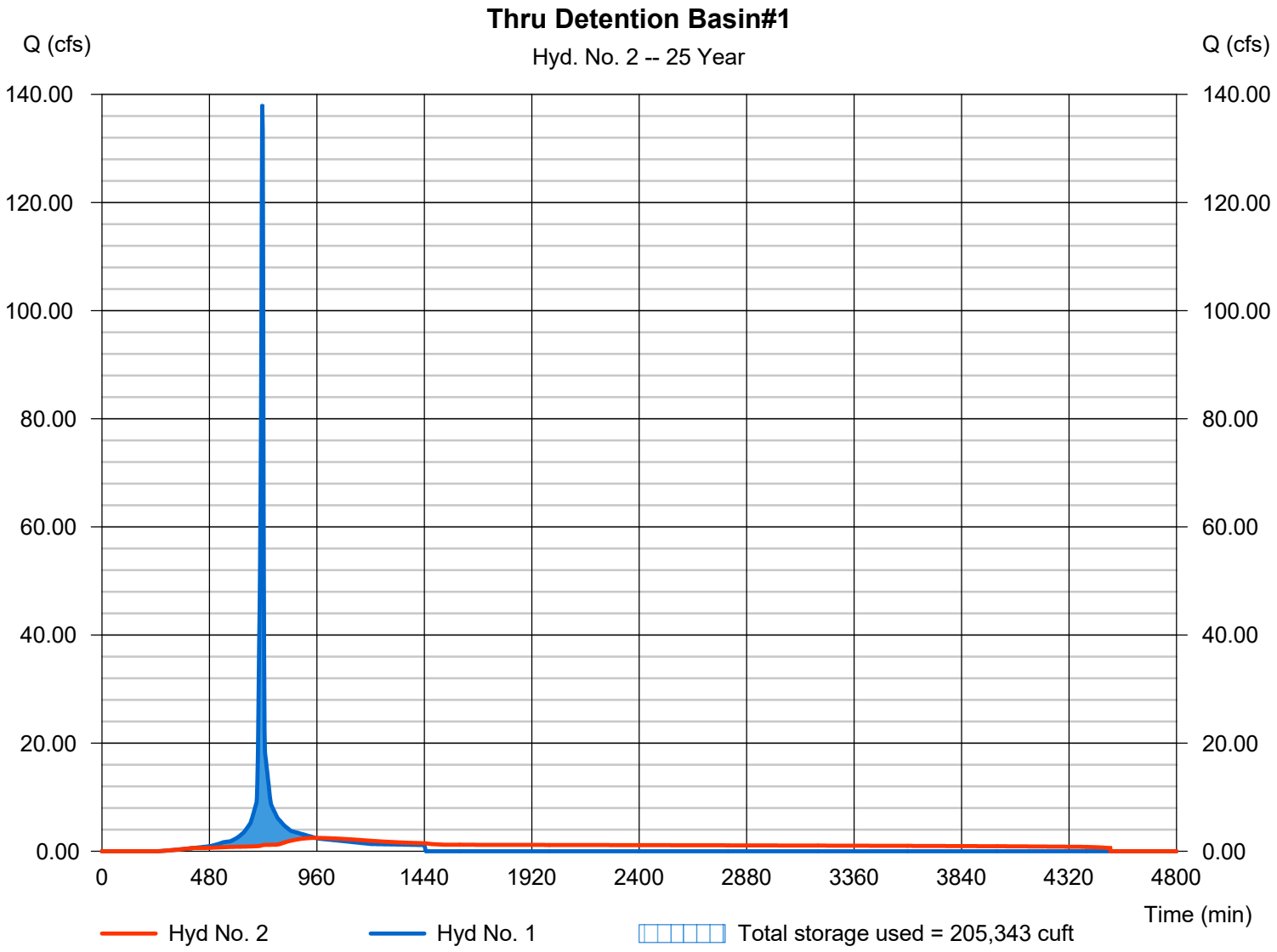
Hydrograph Report

Hyd. No. 2

Thru Detention Basin#1

Hydrograph type	=	Reservoir	Peak discharge	=	2.475 cfs
Storm frequency	=	25 yrs	Time to peak	=	954 min
Time interval	=	2 min	Hyd. volume	=	294,007 cuft
Inflow hyd. No.	=	1 - DA 1.1	Max. Elevation	=	810.32 ft
Reservoir name	=	Detention Basin #1	Max. Storage	=	205,343 cuft

Storage Indication method used.

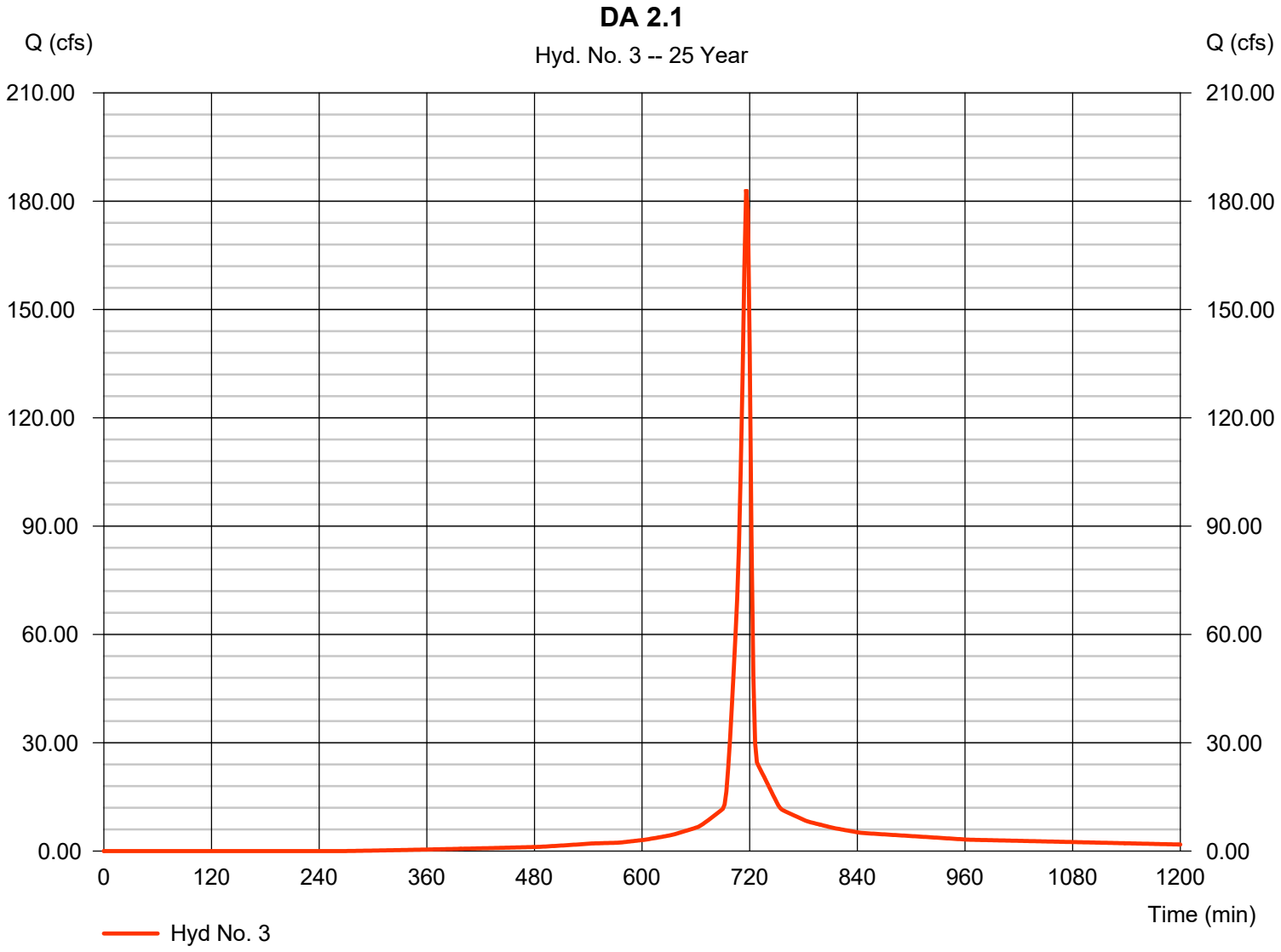


Hydrograph Report

Hyd. No. 3

DA 2.1

Hydrograph type	=	SCS Runoff	Peak discharge	=	183.24 cfs
Storm frequency	=	25 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	387,566 cuft
Drainage area	=	23.380 ac	Curve number	=	85
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	6.00 min
Total precip.	=	6.60 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

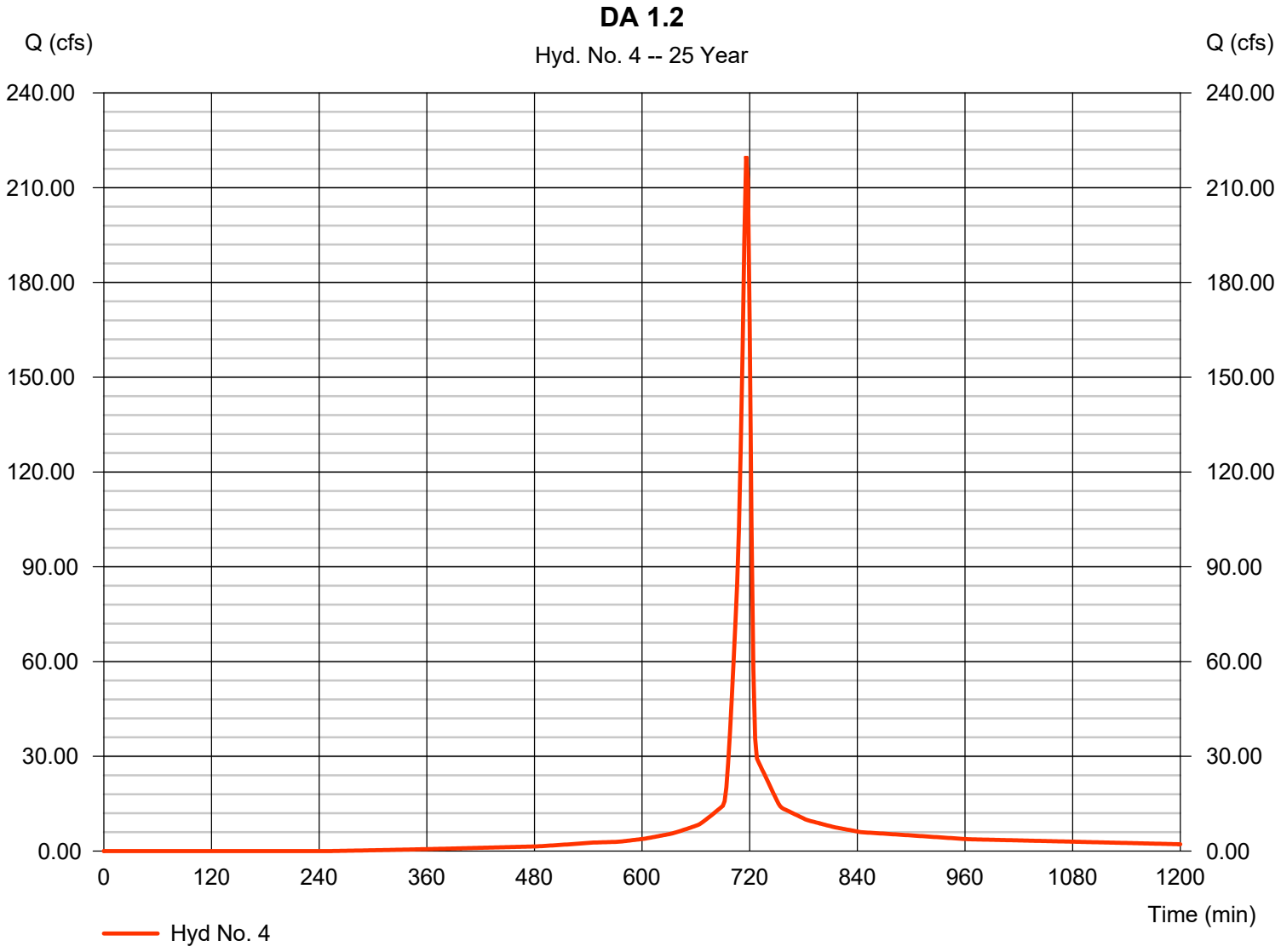


Hydrograph Report

Hyd. No. 4

DA 1.2

Hydrograph type	=	SCS Runoff	Peak discharge	=	219.96 cfs
Storm frequency	=	25 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	468,098 cuft
Drainage area	=	27.610 ac	Curve number	=	86
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	6.00 min
Total precip.	=	6.60 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



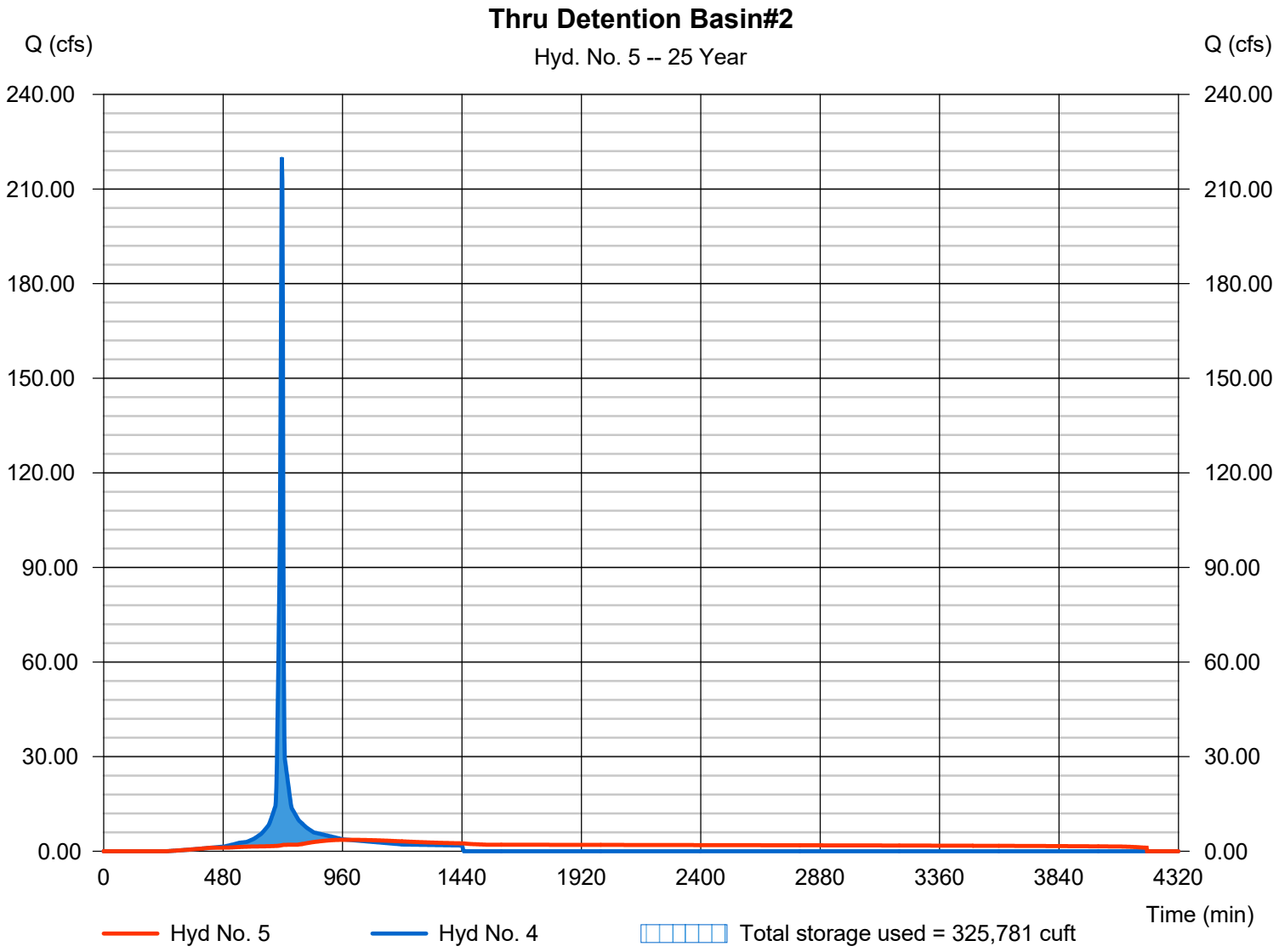
Hydrograph Report

Hyd. No. 5

Thru Detention Basin#2

Hydrograph type	= Reservoir	Peak discharge	= 3.631 cfs
Storm frequency	= 25 yrs	Time to peak	= 982 min
Time interval	= 2 min	Hyd. volume	= 468,118 cuft
Inflow hyd. No.	= 4 - DA 1.2	Max. Elevation	= 804.87 ft
Reservoir name	= Detention Basin #2	Max. Storage	= 325,781 cuft

Storage Indication method used.

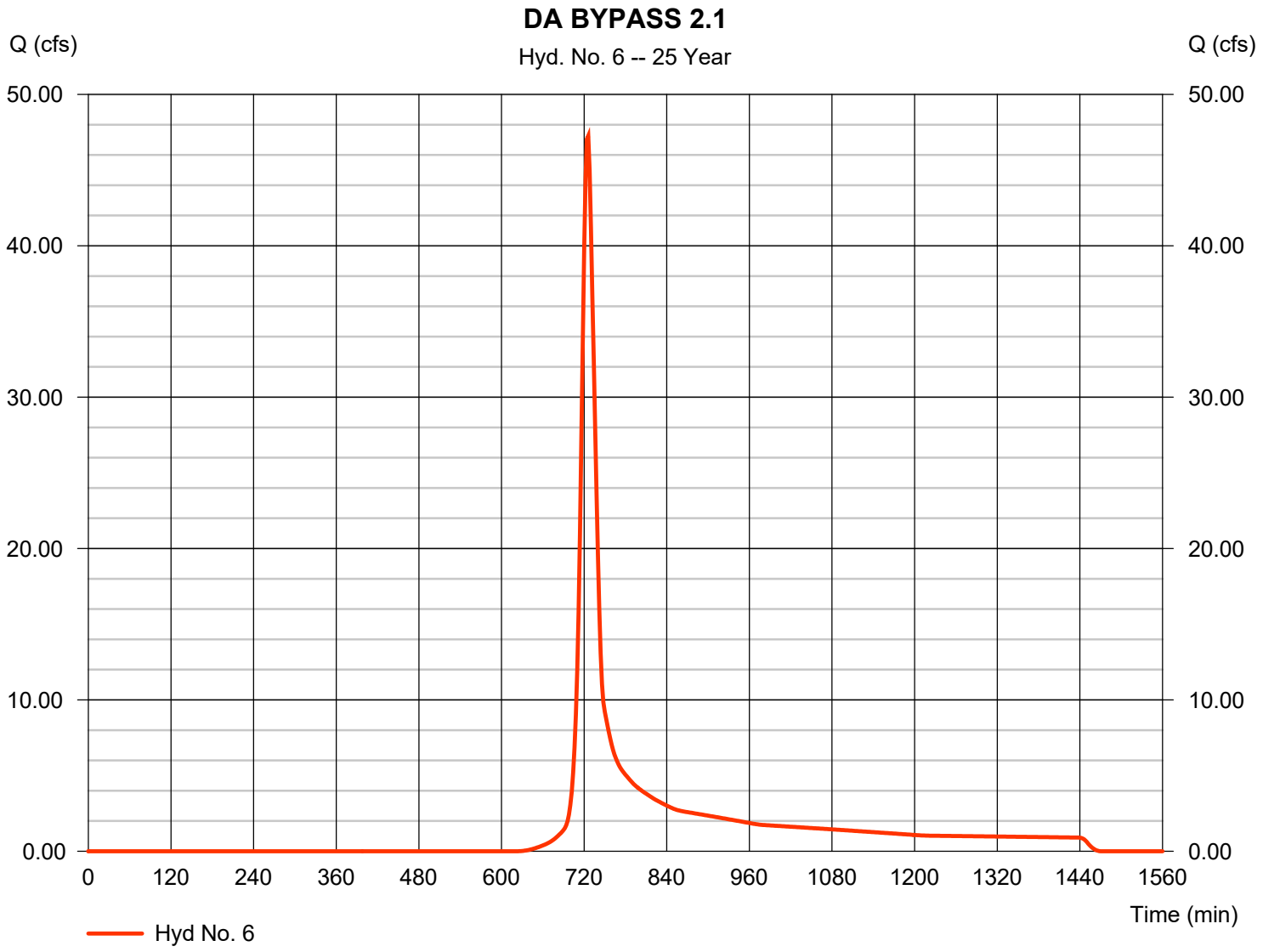


Hydrograph Report

Hyd. No. 6

DA BYPASS 2.1

Hydrograph type	= SCS Runoff	Peak discharge	= 47.26 cfs
Storm frequency	= 25 yrs	Time to peak	= 726 min
Time interval	= 2 min	Hyd. volume	= 152,760 cuft
Drainage area	= 17.410 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 17.40 min
Total precip.	= 6.60 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



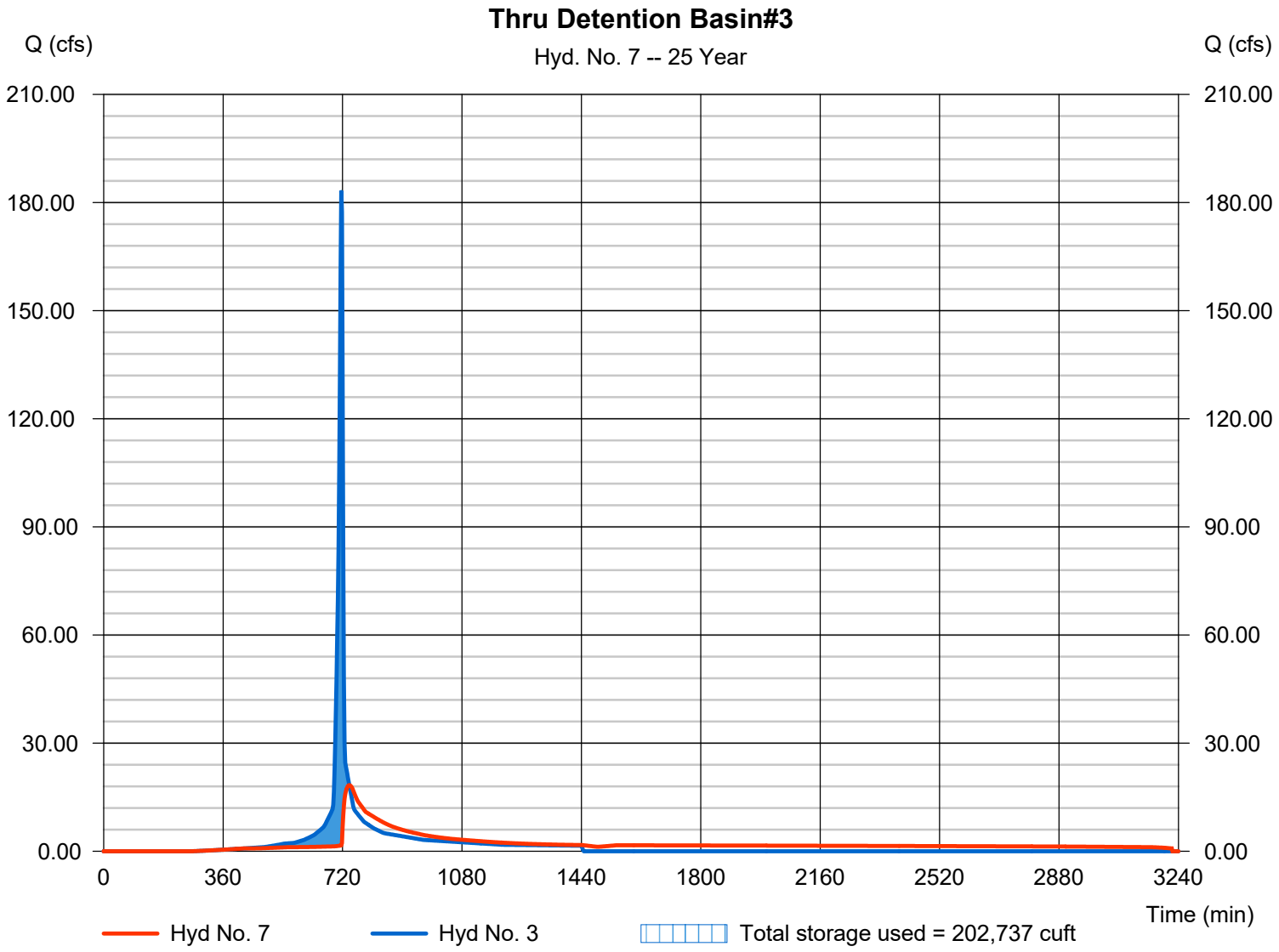
Hydrograph Report

Hyd. No. 7

Thru Detention Basin#3

Hydrograph type	=	Reservoir	Peak discharge	=	18.35 cfs
Storm frequency	=	25 yrs	Time to peak	=	740 min
Time interval	=	2 min	Hyd. volume	=	387,585 cuft
Inflow hyd. No.	=	3 - DA 2.1	Max. Elevation	=	808.20 ft
Reservoir name	=	Detention Basin #3	Max. Storage	=	202,737 cuft

Storage Indication method used.

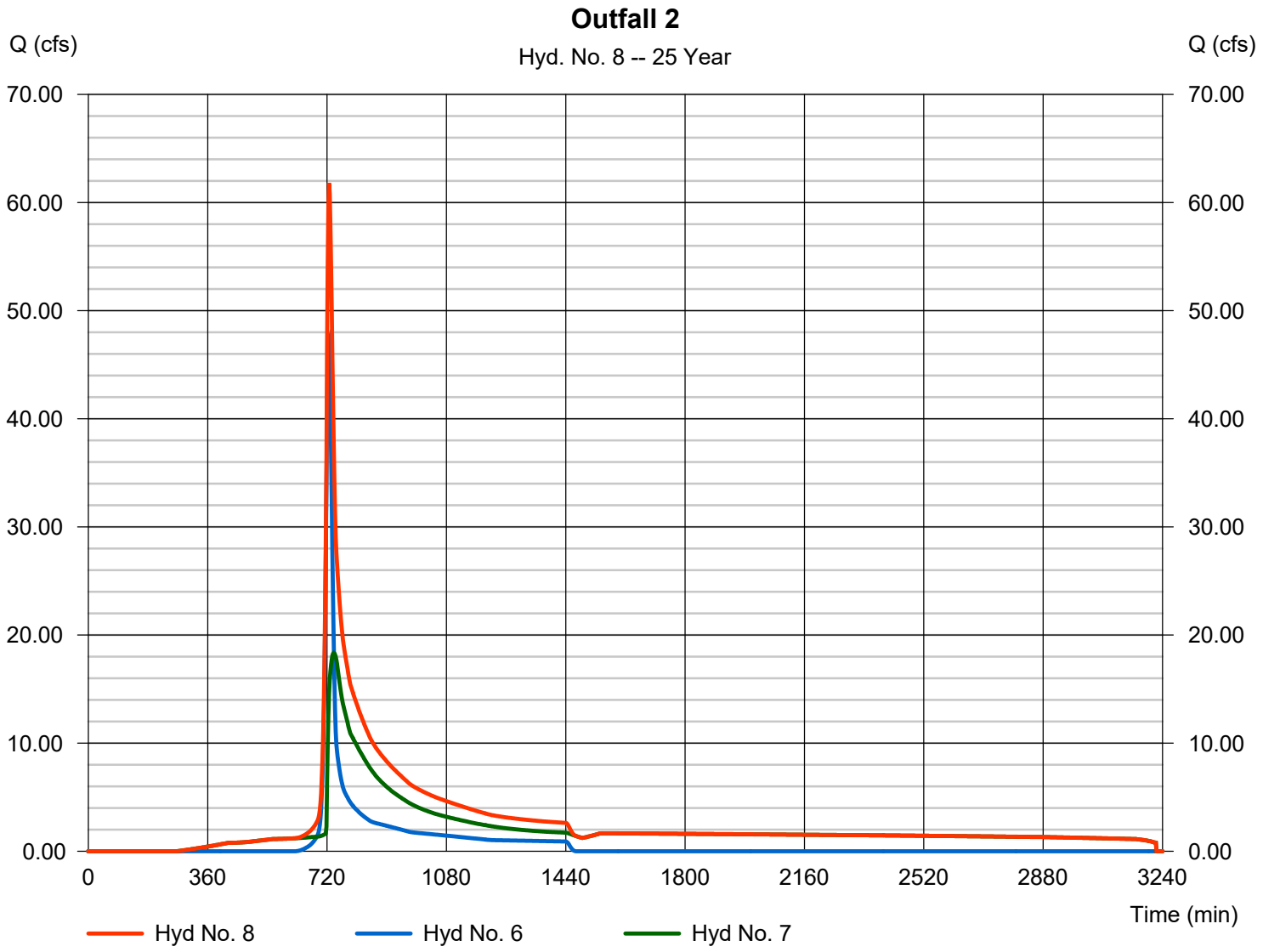


Hydrograph Report

Hyd. No. 8

Outfall 2

Hydrograph type	=	Combine	Peak discharge	=	61.80 cfs
Storm frequency	=	25 yrs	Time to peak	=	726 min
Time interval	=	2 min	Hyd. volume	=	540,345 cuft
Inflow hyds.	=	6, 7	Contrib. drain. area	=	17.410 ac

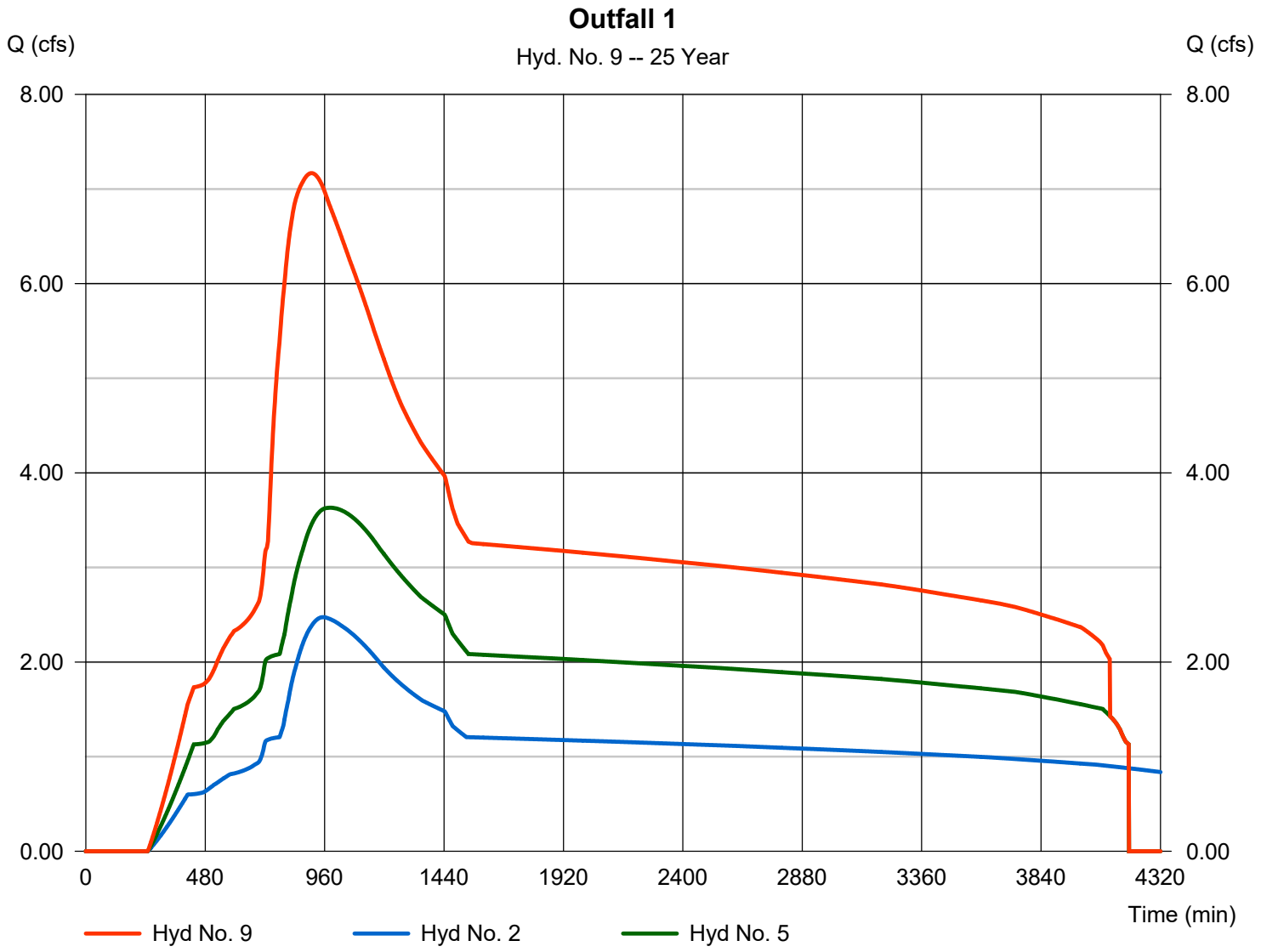


Hydrograph Report

Hyd. No. 9

Outfall 1

Hydrograph type	=	Combine	Peak discharge	=	7.168 cfs
Storm frequency	=	25 yrs	Time to peak	=	908 min
Time interval	=	2 min	Hyd. volume	=	762,119 cuft
Inflow hyds.	=	2, 5	Contrib. drain. area	=	0.000 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

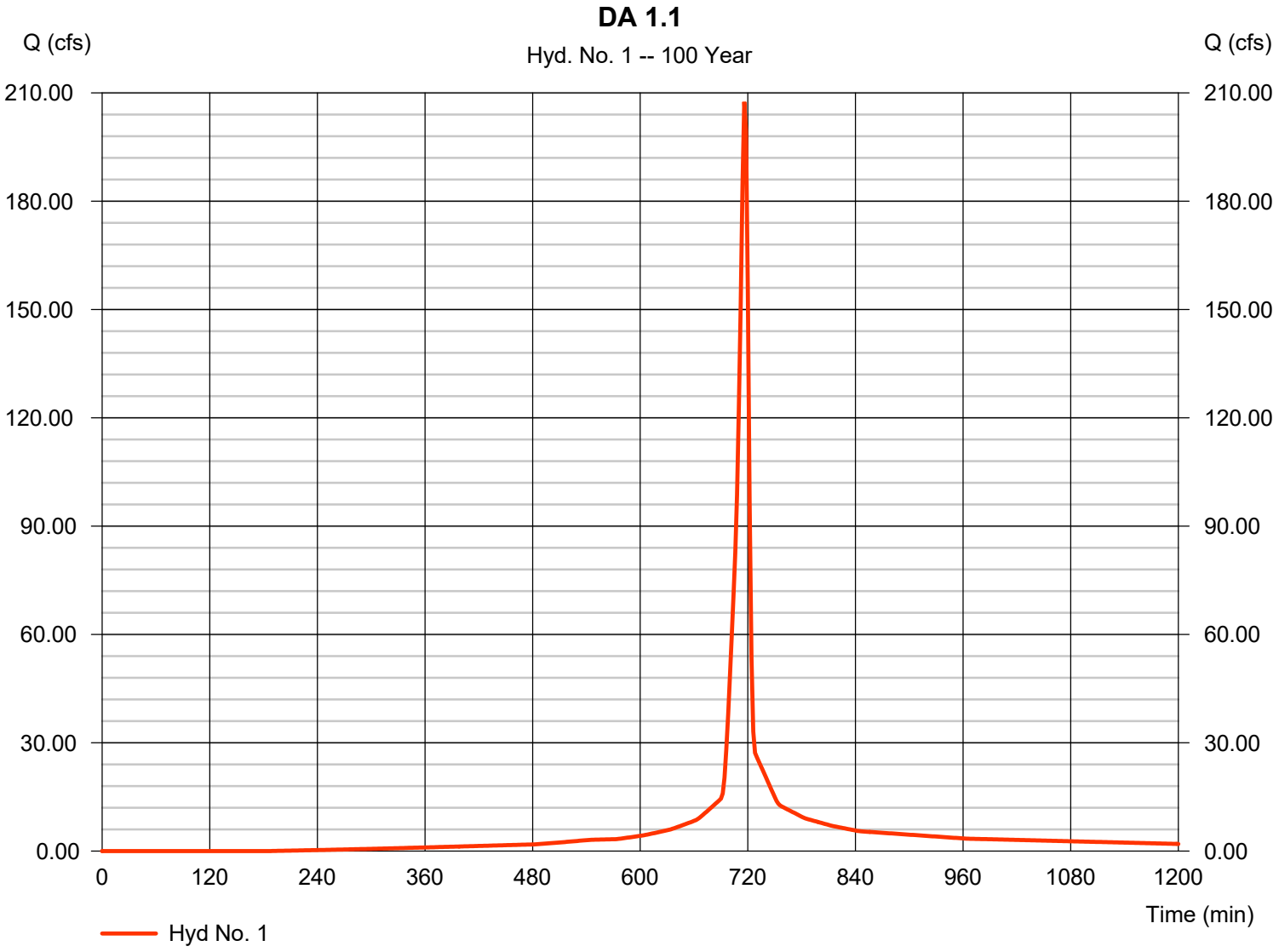
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	207.53	2	716	454,032	------	------	------	DA 1.1
2	Reservoir	37.79	2	726	454,050	1	811.14	242,775	Thru Detention Basin#1
3	SCS Runoff	277.06	2	716	602,339	------	------	------	DA 2.1
4	SCS Runoff	330.44	2	716	722,942	------	------	------	DA 1.2
5	Reservoir	36.40	2	736	722,987	4	805.64	394,471	Thru Detention Basin#2
6	SCS Runoff	91.39	2	724	287,176	------	------	------	DA BYPASS 2.1
7	Reservoir	159.03	2	722	602,348	3	809.37	262,346	Thru Detention Basin#3
8	Combine	246.41	2	722	889,524	6, 7	------	------	Outfall 2
9	Combine	72.26	2	728	1,177,037	2, 5,	------	------	Outfall 1

Hydrograph Report

Hyd. No. 1

DA 1.1

Hydrograph type	=	SCS Runoff	Peak discharge	=	207.53 cfs
Storm frequency	=	100 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	454,032 cuft
Drainage area	=	17.340 ac	Curve number	=	86
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	6.00 min
Total precip.	=	9.40 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



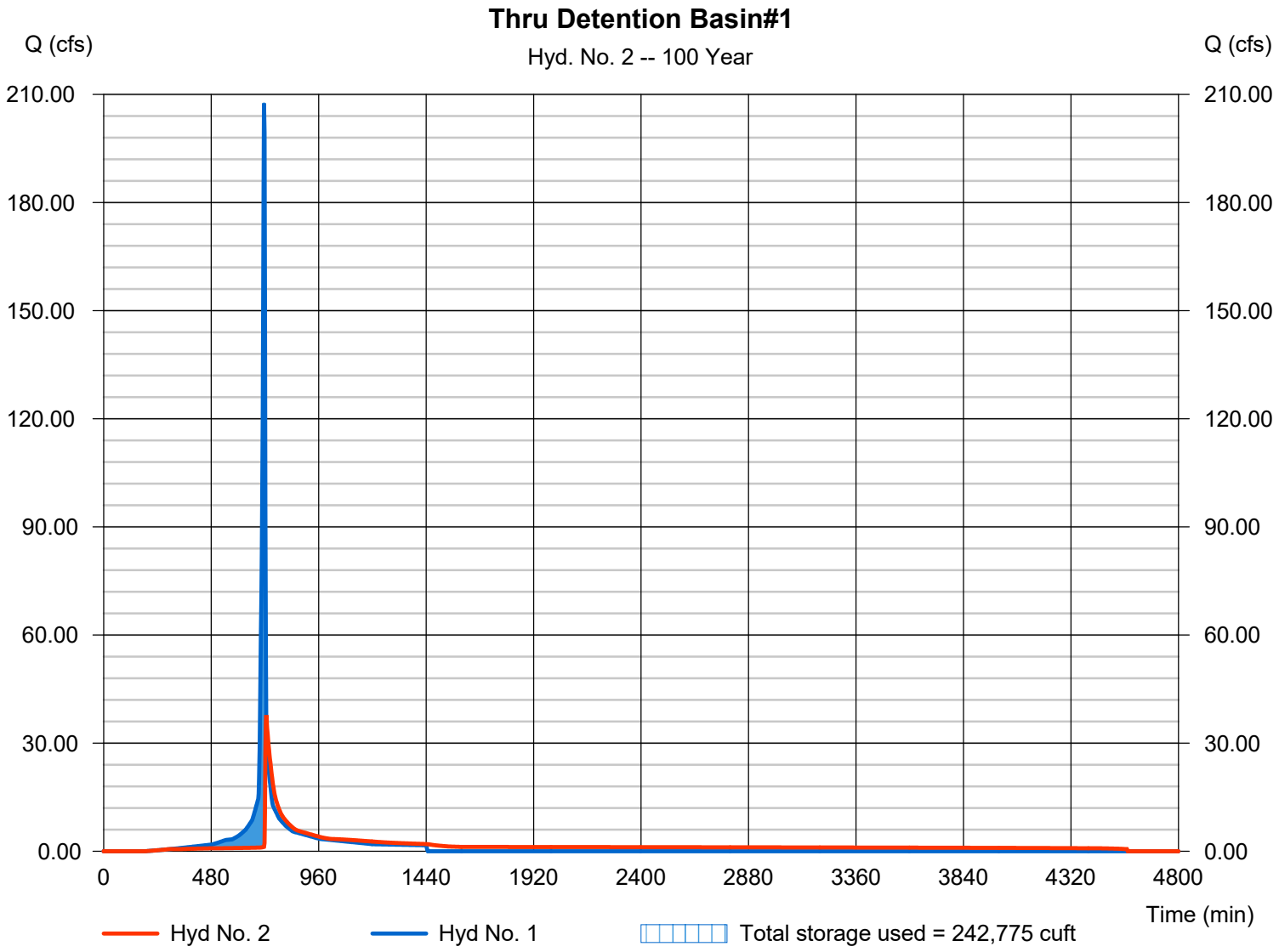
Hydrograph Report

Hyd. No. 2

Thru Detention Basin#1

Hydrograph type	=	Reservoir	Peak discharge	=	37.79 cfs
Storm frequency	=	100 yrs	Time to peak	=	726 min
Time interval	=	2 min	Hyd. volume	=	454,050 cuft
Inflow hyd. No.	=	1 - DA 1.1	Max. Elevation	=	811.14 ft
Reservoir name	=	Detention Basin #1	Max. Storage	=	242,775 cuft

Storage Indication method used.

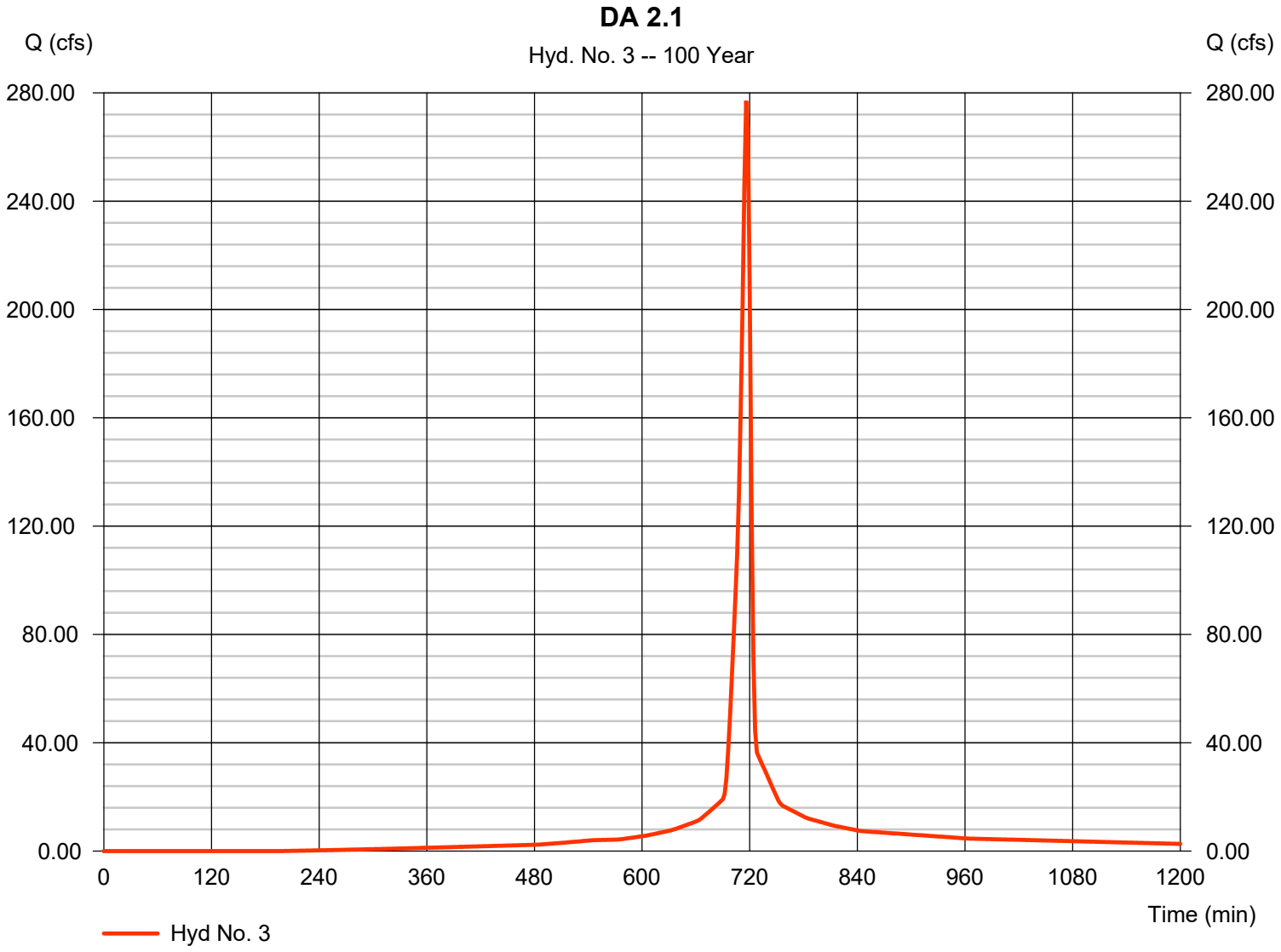


Hydrograph Report

Hyd. No. 3

DA 2.1

Hydrograph type	=	SCS Runoff	Peak discharge	=	277.06 cfs
Storm frequency	=	100 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	602,339 cuft
Drainage area	=	23.380 ac	Curve number	=	85
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	6.00 min
Total precip.	=	9.40 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

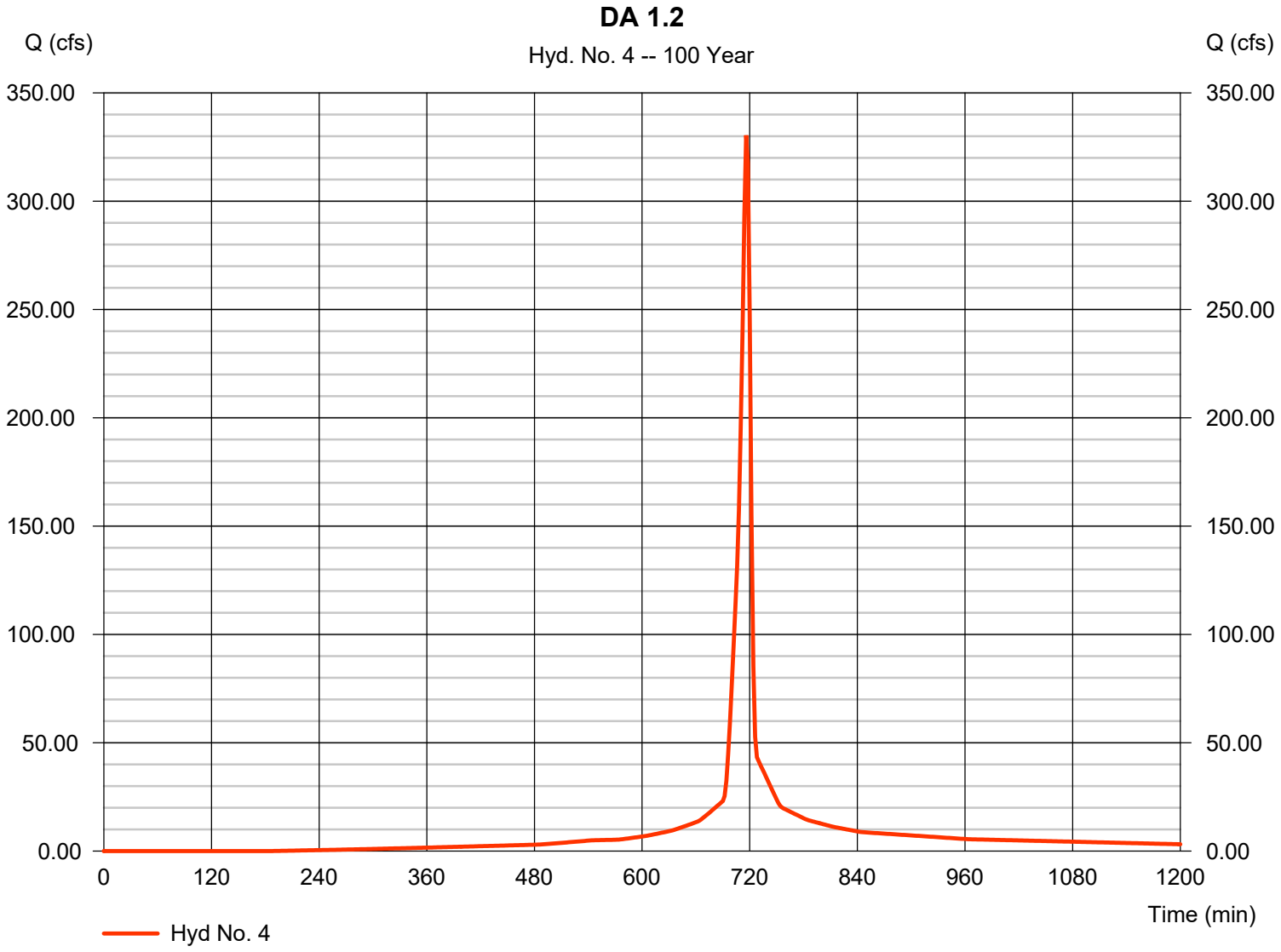


Hydrograph Report

Hyd. No. 4

DA 1.2

Hydrograph type	=	SCS Runoff	Peak discharge	=	330.44 cfs
Storm frequency	=	100 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	722,942 cuft
Drainage area	=	27.610 ac	Curve number	=	86
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	6.00 min
Total precip.	=	9.40 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



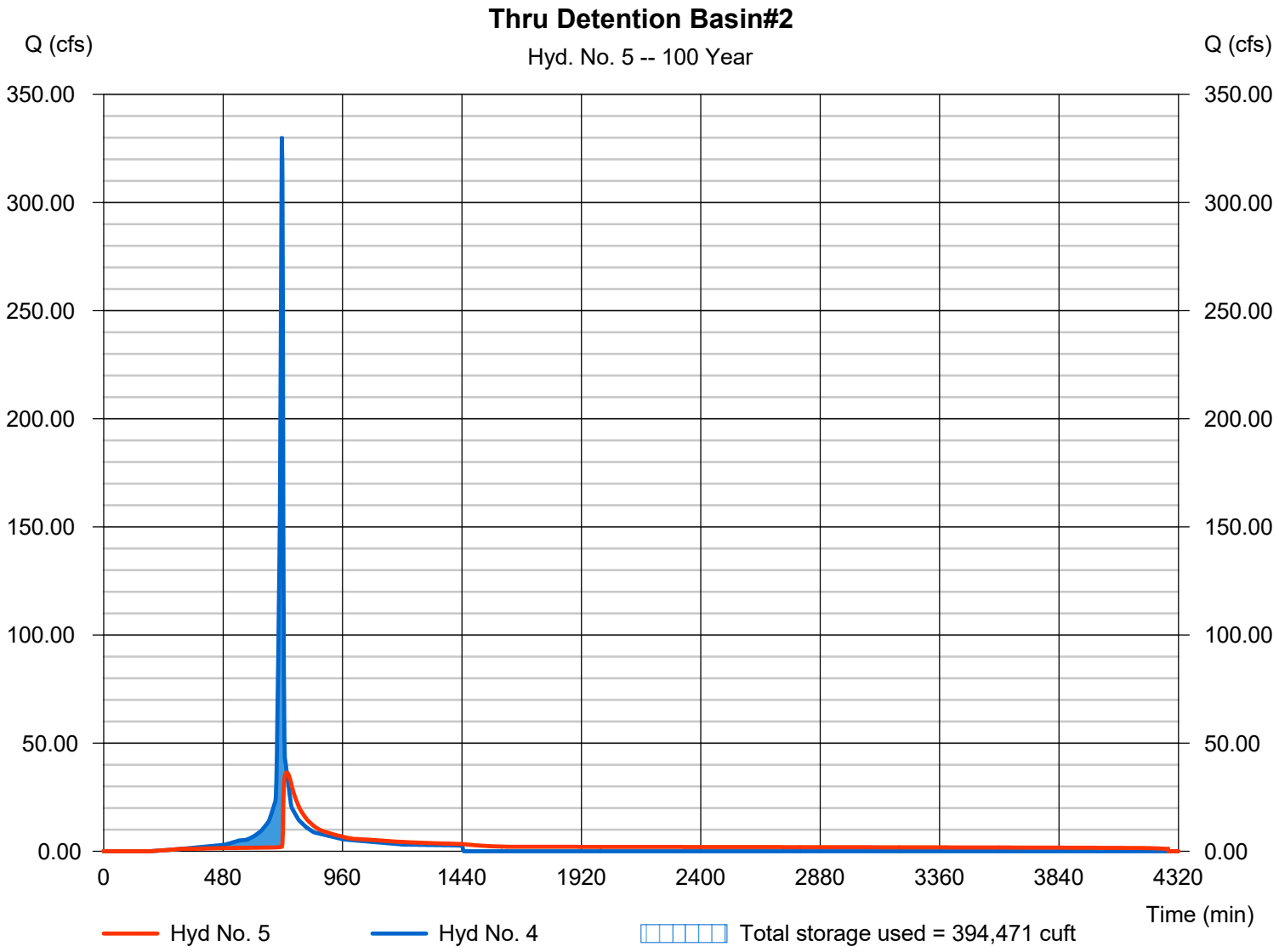
Hydrograph Report

Hyd. No. 5

Thru Detention Basin#2

Hydrograph type	=	Reservoir	Peak discharge	=	36.40 cfs
Storm frequency	=	100 yrs	Time to peak	=	736 min
Time interval	=	2 min	Hyd. volume	=	722,987 cuft
Inflow hyd. No.	=	4 - DA 1.2	Max. Elevation	=	805.64 ft
Reservoir name	=	Detention Basin #2	Max. Storage	=	394,471 cuft

Storage Indication method used.

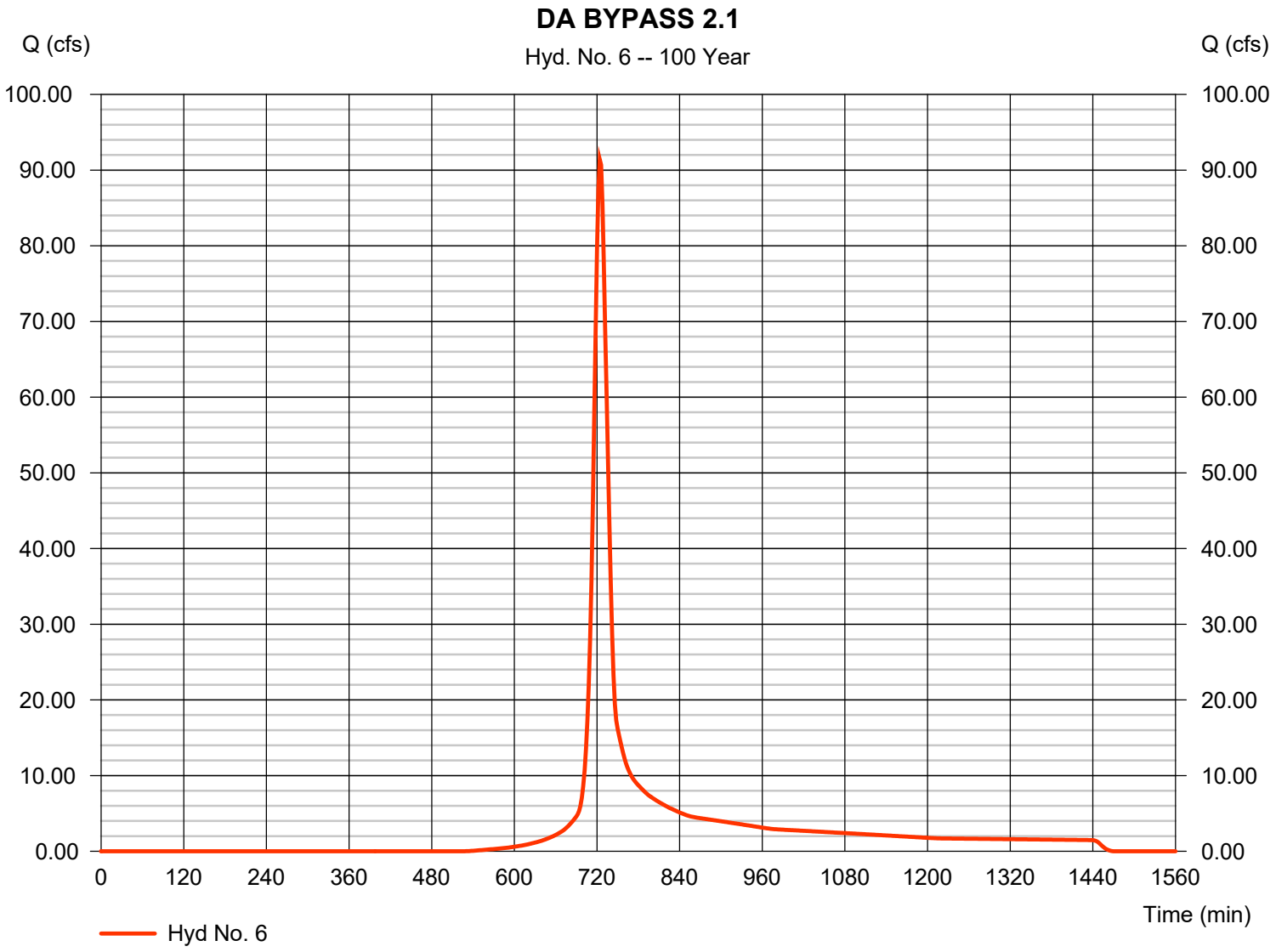


Hydrograph Report

Hyd. No. 6

DA BYPASS 2.1

Hydrograph type	=	SCS Runoff	Peak discharge	=	91.39 cfs
Storm frequency	=	100 yrs	Time to peak	=	724 min
Time interval	=	2 min	Hyd. volume	=	287,176 cuft
Drainage area	=	17.410 ac	Curve number	=	61
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	17.40 min
Total precip.	=	9.40 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



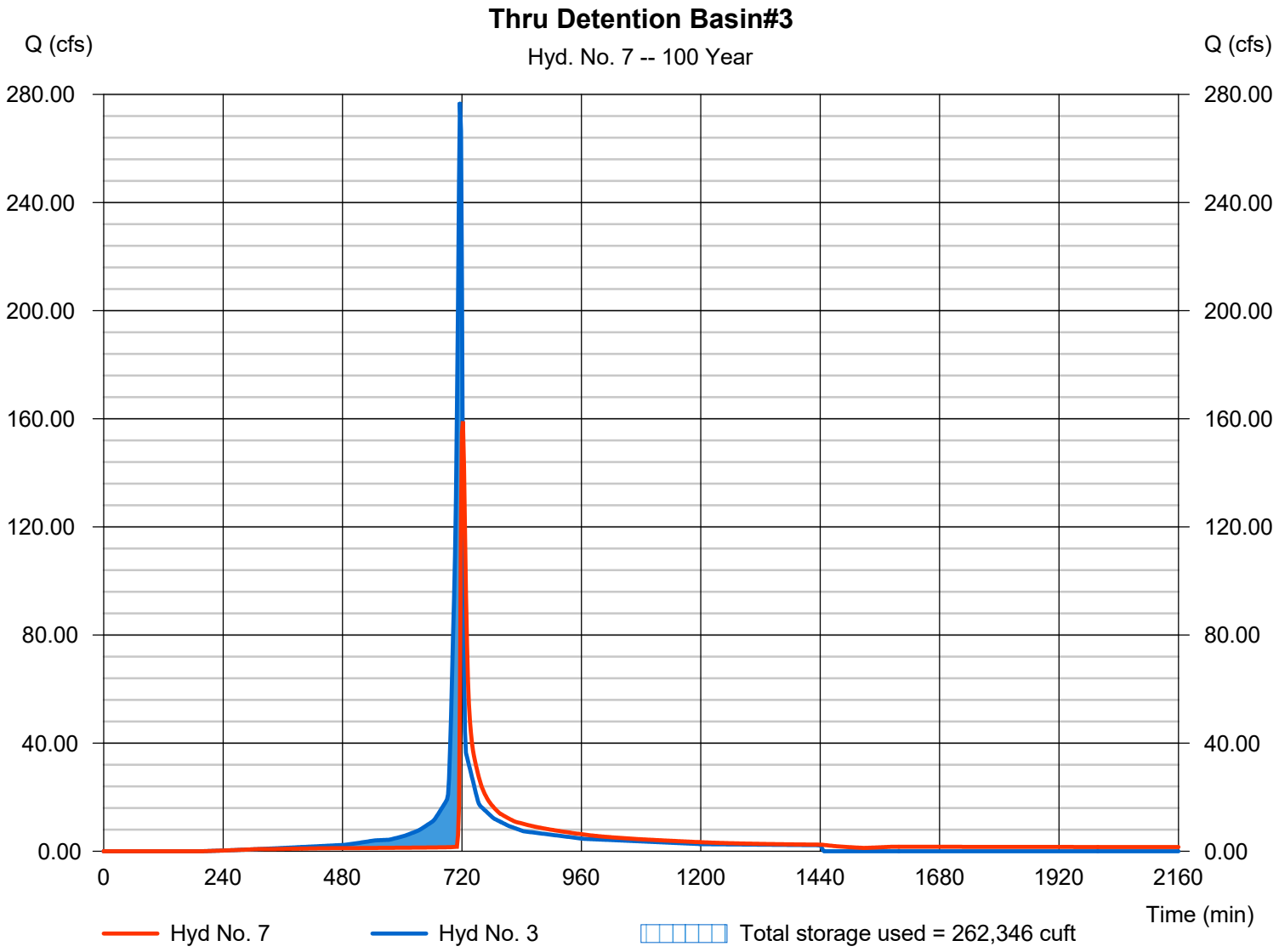
Hydrograph Report

Hyd. No. 7

Thru Detention Basin#3

Hydrograph type	=	Reservoir	Peak discharge	=	159.03 cfs
Storm frequency	=	100 yrs	Time to peak	=	722 min
Time interval	=	2 min	Hyd. volume	=	602,348 cuft
Inflow hyd. No.	=	3 - DA 2.1	Max. Elevation	=	809.37 ft
Reservoir name	=	Detention Basin #3	Max. Storage	=	262,346 cuft

Storage Indication method used.

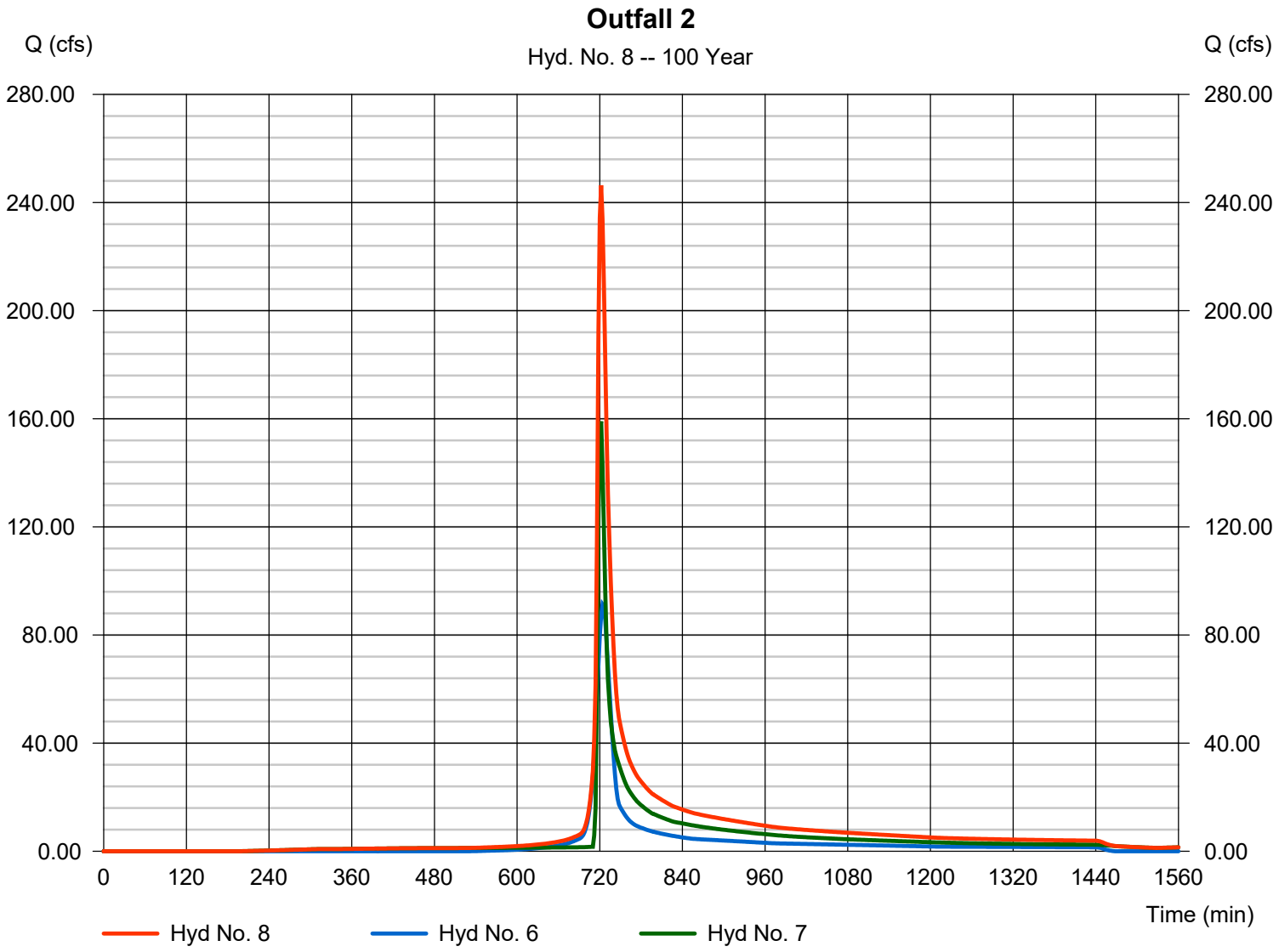


Hydrograph Report

Hyd. No. 8

Outfall 2

Hydrograph type	=	Combine	Peak discharge	=	246.41 cfs
Storm frequency	=	100 yrs	Time to peak	=	722 min
Time interval	=	2 min	Hyd. volume	=	889,524 cuft
Inflow hyds.	=	6, 7	Contrib. drain. area	=	17.410 ac

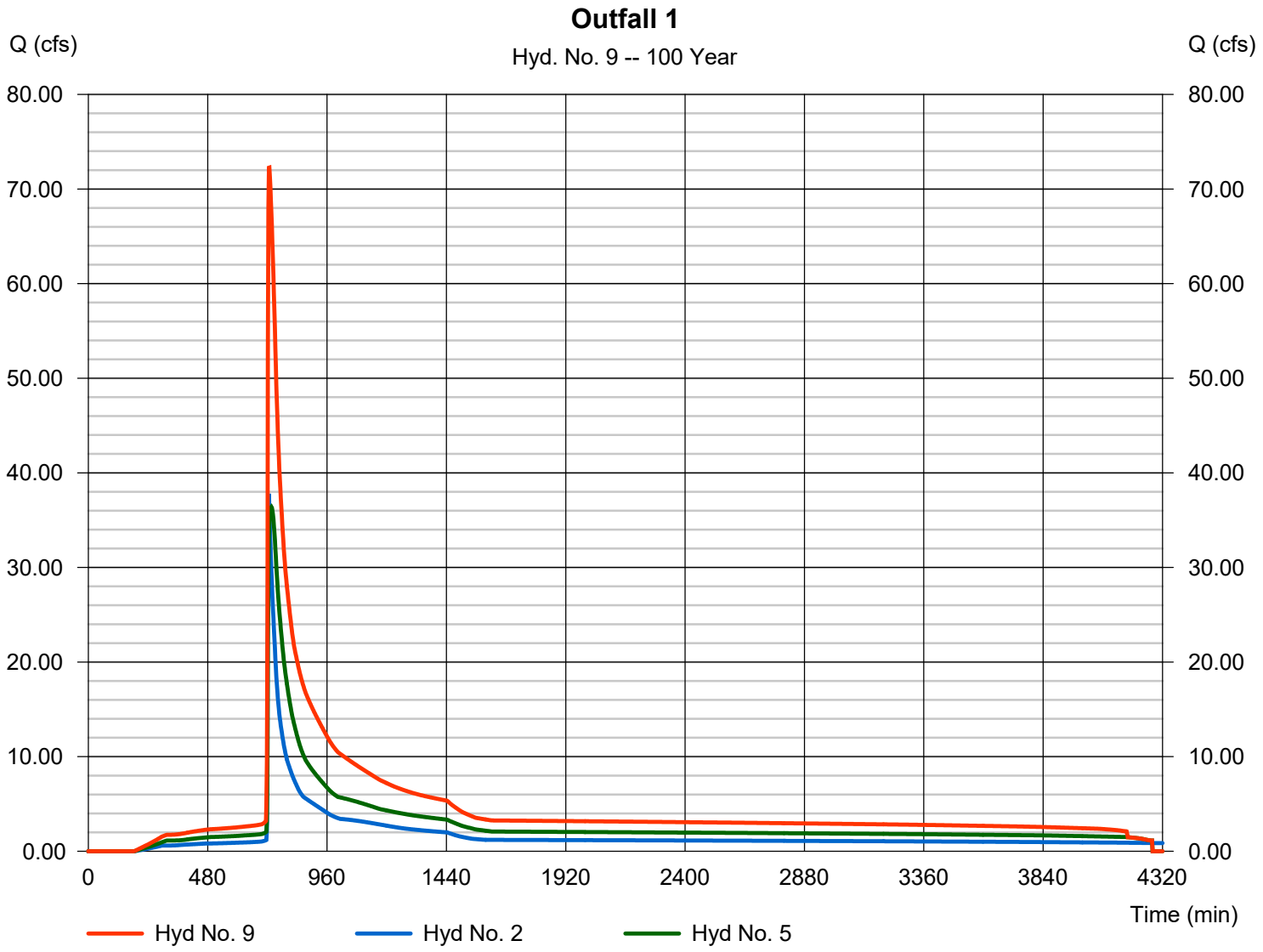


Hydrograph Report

Hyd. No. 9

Outfall 1

Hydrograph type	=	Combine	Peak discharge	=	72.26 cfs
Storm frequency	=	100 yrs	Time to peak	=	728 min
Time interval	=	2 min	Hyd. volume	=	1,177,037 cuft
Inflow hyds.	=	2, 5	Contrib. drain. area	=	0.000 ac



Hydraflow Rainfall Report

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	0.0000	0.0000	0.0000	--------
2	69.8703	13.1000	0.8658	--------
3	0.0000	0.0000	0.0000	--------
5	79.2597	14.6000	0.8369	--------
10	88.2351	15.5000	0.8279	--------
25	102.6072	16.5000	0.8217	--------
50	114.8193	17.2000	0.8199	--------
100	127.1596	17.8000	0.8186	--------

File name: SampleFHA.idf

Intensity = B / (Tc + D)^E

Return Period (Yrs)	Intensity Values (in/hr)											
	5 min	10	15	20	25	30	35	40	45	50	55	60
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	5.69	4.61	3.89	3.38	2.99	2.69	2.44	2.24	2.07	1.93	1.81	1.70
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	6.57	5.43	4.65	4.08	3.65	3.30	3.02	2.79	2.59	2.42	2.27	2.15
10	7.24	6.04	5.21	4.59	4.12	3.74	3.43	3.17	2.95	2.77	2.60	2.46
25	8.25	6.95	6.03	5.34	4.80	4.38	4.02	3.73	3.48	3.26	3.07	2.91
50	9.04	7.65	6.66	5.92	5.34	4.87	4.49	4.16	3.88	3.65	3.44	3.25
100	9.83	8.36	7.30	6.50	5.87	5.36	4.94	4.59	4.29	4.03	3.80	3.60

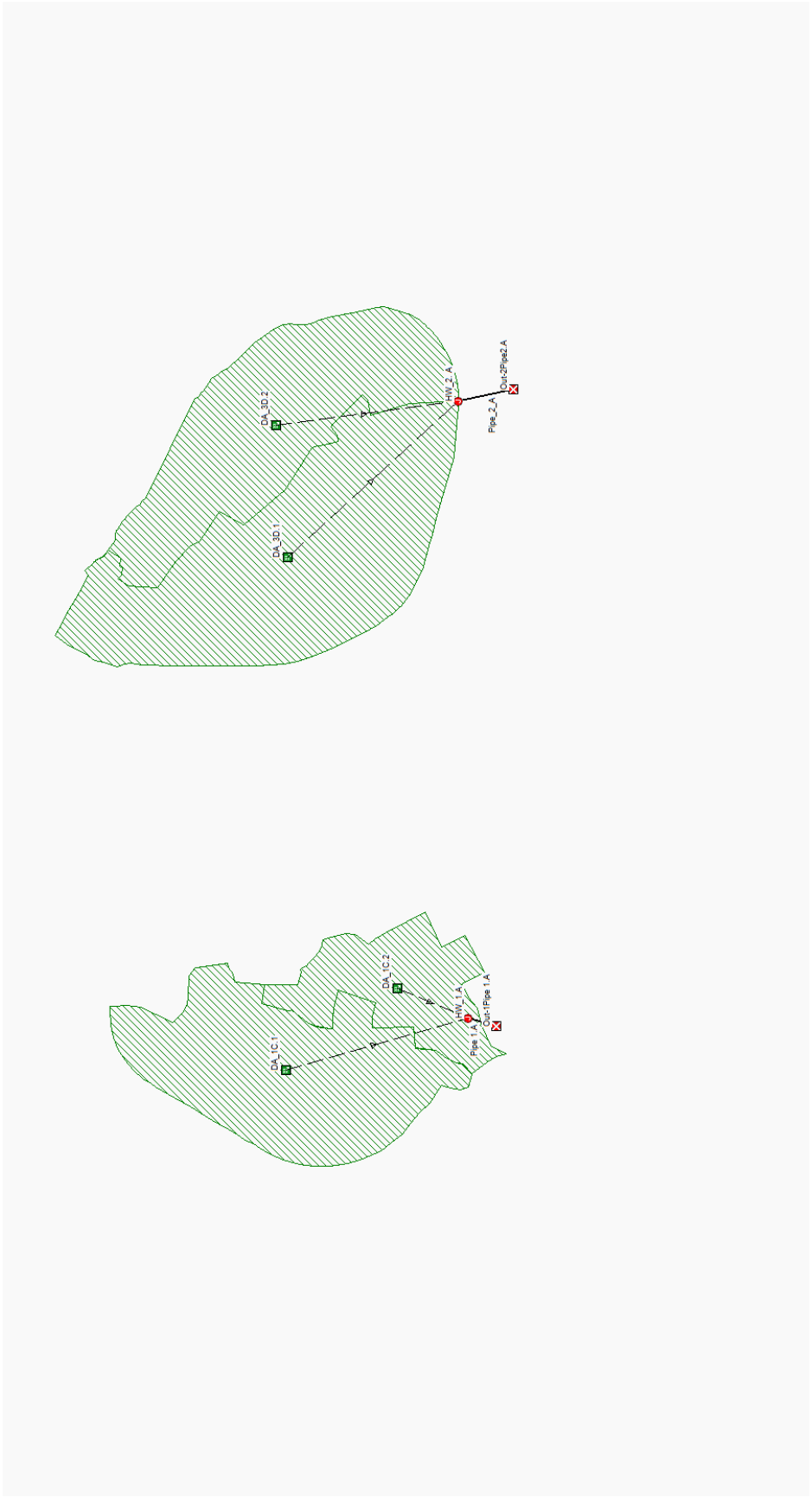
Tc = time in minutes. Values may exceed 60.

Two C&D Landfill Expansion Anderson Cnty\Engineering Calculations\Stormwater\Anderson County 24 hr Rainfall.pcp

Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	3.30	3.60	0.00	0.00	5.50	6.60	0.00	9.40
SCS 6-Hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-1st	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-2nd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-Indy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Custom	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

APPENDIX E Perimeter Drainage, Slope Conveyance, and Storm Drainage Pipes

STORM DRAINAGE PIPE REPORT



Autodesk® Storm and Sanitary Analysis 2016 - Version 11.1.55 (Build 1)

****
Project Description
****
File Name ..... GP Landfill Pipes.SPF

****
Analysis Options
****
Flow Units ..... cfs
Subbasin Hydrograph Method. EPA SWMM
Infiltration Method ..... SCS Curve Number
Link Routing Method ..... Kinematic Wave
Storage Node Exfiltration.. None
Starting Date APR-13-2018 00:00:00
Ending Date APR-14-2018 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:05:00
Wet Time Step 00:05:00
Dry Time Step 01:00:00
Routing Time Step ..... 30.00 sec

****
Element Count
****
Number of rain gages 1
Number of subbasins 4
Number of nodes 4
Number of links 2
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Gage ID	Data Source	Data Type	Recording Interval min
Rain Gage-01	10-Yr	CUMULATIVE	6.00

****
Subbasin Summary
****

Subbasin ID	Total Area acres	Equiv. Width ft	Imperv. Area %	Average Slope %	Raingage
DA_1C.1	8.53	500.00	25.00	0.5000	Rain Gage-01
DA_1C.2	3.78	500.00	25.00	0.5000	Rain Gage-01
DA_3D.1	12.07	500.00	25.00	0.5000	Rain Gage-01
DA_3D.2	8.34	500.00	25.00	0.5000	Rain Gage-01

****
Node Summary
****

Node ID	Element Type	Invert Elevation ft	Maximum Elev. ft	Ponded Area ft²	External Inflow

HW_1.A	JUNCTION	816.90	819.90	0.00	
HW_2. A	JUNCTION	808.95	811.70	0.00	
Out-1Pipe 1.A	OUTFALL	816.00	819.00	0.00	
Out-2Pipe2.A	OUTFALL	805.00	807.00	0.00	

****
Link Summary
****

Link ID	From Node	To Node	Element Type	Length ft	Slope %	Manning's Roughness
Pipe 1.A	HW_1.A	Out-1Pipe 1.A	CONDUIT	170.9	0.5267	0.0130
Pipe_2_A	HW_2. A	Out-2Pipe2.A	CONDUIT	29.1	13.5512	0.0130

****
Cross Section Summary
****

Link ID	Shape	Depth/ Diameter ft	Width ft	No. of Barrels	Cross Sectional Area ft²	Full Flow Hydraulic Radius ft	Design Flow Capacity cfs
Pipe 1.A	CIRCULAR	3.00	3.00	1	7.07	0.75	48.41
Pipe_2_A	CIRCULAR	2.00	2.00	1	3.14	0.50	83.28

Runoff Quantity Continuity	Volume acre-ft	Depth inches
Total Precipitation	14.993	5.499
Evaporation Loss	0.000	0.000
Infiltration Loss	2.569	0.942
Surface Runoff	11.632	4.266
Final Surface Storage	0.813	0.298
Continuity Error (%)	-0.138	

Flow Routing Continuity	Volume acre-ft	Volume Mgallons
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	11.618	3.786
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	11.614	3.785
Surface Flooding	0.000	0.000
Evaporation Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.001	0.000
Continuity Error (%)	0.023	

****
Composite Curve Number Computations Report
****

Subbasin DA_1C.1

Soil/Surface Description	Area (acres)	Soil Group	CN
Newly Graded, Fair Condition (HSG B)	8.53	B	86.00
Composite Area & Weighted CN	8.53		86.00

Subbasin DA_1C.2

Soil/Surface Description	Area (acres)	Soil Group	CN
Newly Graded, Fair Condition (HSG B)	3.78	B	86.00
Composite Area & Weighted CN	3.78		86.00

Subbasin DA_3D.1

Soil/Surface Description	Area (acres)	Soil Group	CN
Newly Graded, Fair Condition (HSG B)	12.07	B	86.00
Composite Area & Weighted CN	12.07		86.00

Subbasin DA_3D.2

Soil/Surface Description	Area (acres)	Soil Group	CN
Newly Graded, Fair Condition (HSG B)	8.34	B	86.00
Composite Area & Weighted CN	8.34		86.00

****
EPA SWMM Time of Concentration Computations Report
****

Tc = (0.94 * (L^0.6) * (n^0.6)) / ((i^0.4) * (S^0.3))

Where:

Tc = Time of Concentration (min)
L = Flow Length (ft)
n = Manning's Roughness
i = Rainfall Intensity (in/hr)
S = Slope (ft/ft)

Subbasin DA_1C.1

Flow length (ft):	743.44
Pervious Manning's Roughness:	0.10000
Impervious Manning's Roughness:	0.01500
Pervious Rainfall Intensity (in/hr):	0.22912
Impervious Rainfall Intensity (in/hr):	0.22912
Slope (%):	0.50000
Computed TOC (minutes):	92.75

Subbasin DA_1C.2

Flow length (ft): 329.12
Pervious Manning's Roughness: 0.10000
Impervious Manning's Roughness: 0.01500
Pervious Rainfall Intensity (in/hr): 0.22912
Impervious Rainfall Intensity (in/hr): 0.22912
Slope (%): 0.50000
Computed TOC (minutes): 56.88

Subbasin DA_3D.1

Flow length (ft): 1051.65
Pervious Manning's Roughness: 0.10000
Impervious Manning's Roughness: 0.01500
Pervious Rainfall Intensity (in/hr): 0.22912
Impervious Rainfall Intensity (in/hr): 0.22912
Slope (%): 0.50000
Computed TOC (minutes): 114.21

Subbasin DA_3D.2

Flow length (ft): 726.30
Pervious Manning's Roughness: 0.10000
Impervious Manning's Roughness: 0.01500
Pervious Rainfall Intensity (in/hr): 0.22912
Impervious Rainfall Intensity (in/hr): 0.22912
Slope (%): 0.50000
Computed TOC (minutes): 91.46

****

Subbasin Runoff Summary

****

Subbasin ID	Total Rainfall in	Total Runon in	Total Evap. in	Total Infil. in	Total Runoff in	Peak Runoff cfs	Runoff Coefficient	Time of Concentration days hh:mm:ss
DA_1C.1	5.50	0.00	0.00	0.94	4.27	29.39	0.777	0 01:32:45
DA_1C.2	5.50	0.00	0.00	0.94	4.32	16.72	0.786	0 00:56:53
DA_3D.1	5.50	0.00	0.00	0.94	4.24	37.25	0.771	0 01:54:12
DA_3D.2	5.50	0.00	0.00	0.94	4.27	28.92	0.777	0 01:31:27

****

Node Depth Summary

****

Node ID	Average Depth Attained ft	Maximum Depth Attained ft	Maximum HGL Attained ft	Time of Max Occurrence days	Time of Max Occurrence hh:mm	Total Flooded Volume acre-in	Total Time Flooded minutes	Retention Time hh:mm:ss
HW_1.A	0.34	2.34	819.24	0	12:00	0	0	0:00:00
HW_2. A	0.22	1.35	810.30	0	12:06	0	0	0:00:00
Out-1Pipe 1.A	0.34	2.33	818.33	0	12:00	0	0	0:00:00
Out-2Pipe2.A	0.22	1.35	806.35	0	12:06	0	0	0:00:00

****
Node Flow Summary
****

Node ID	Element Type	Maximum Lateral Inflow cfs	Peak Inflow cfs	Time of Peak Inflow Occurrence days	Time of Peak Inflow Occurrence hh:mm	Maximum Flooding Overflow cfs	Time of Peak Flooding Occurrence days	Time of Peak Flooding Occurrence hh:mm
HW_1.A	JUNCTION	45.99	45.99	0	12:00	0.00		
HW_2. A	JUNCTION	66.17	66.17	0	12:06	0.00		
Out-1Pipe 1.A	OUTFALL	0.00	45.95	0	12:00	0.00		
Out-2Pipe2.A	OUTFALL	0.00	66.16	0	12:06	0.00		

****
Outfall Loading Summary
****

Outfall Node ID	Flow Frequency (%)	Average Flow cfs	Peak Inflow cfs
Out-1Pipe 1.A	99.17	2.23	45.95
Out-2Pipe2.A	99.48	3.66	66.16
System	99.32	5.89	111.52

****
Link Flow Summary
****

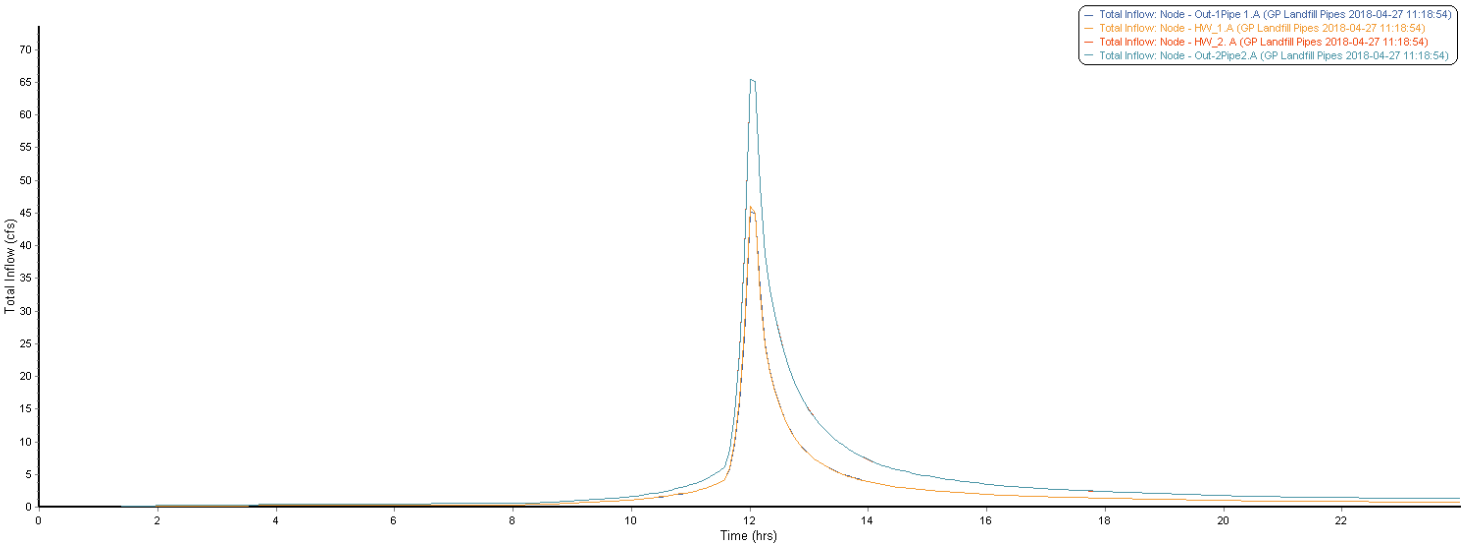
Link ID	Element Type	Time of Peak Flow Occurrence days	Time of Peak Flow Occurrence hh:mm	Maximum Velocity Attained ft/sec	Length Factor	Peak Flow during Analysis cfs	Design Flow Capacity cfs	Ratio of Maximum Flow /Design Flow	Ratio of Maximum Depth	Total Time Surcharged minutes	Reported Condition
Pipe 1.A	CONDUIT	0	12:00	7.86	1.00	45.95	48.41	0.95	0.78	0	Calculated
Pipe_2_A	CONDUIT	0	12:06	29.41	1.00	66.16	83.28	0.79	0.67	0	Calculated

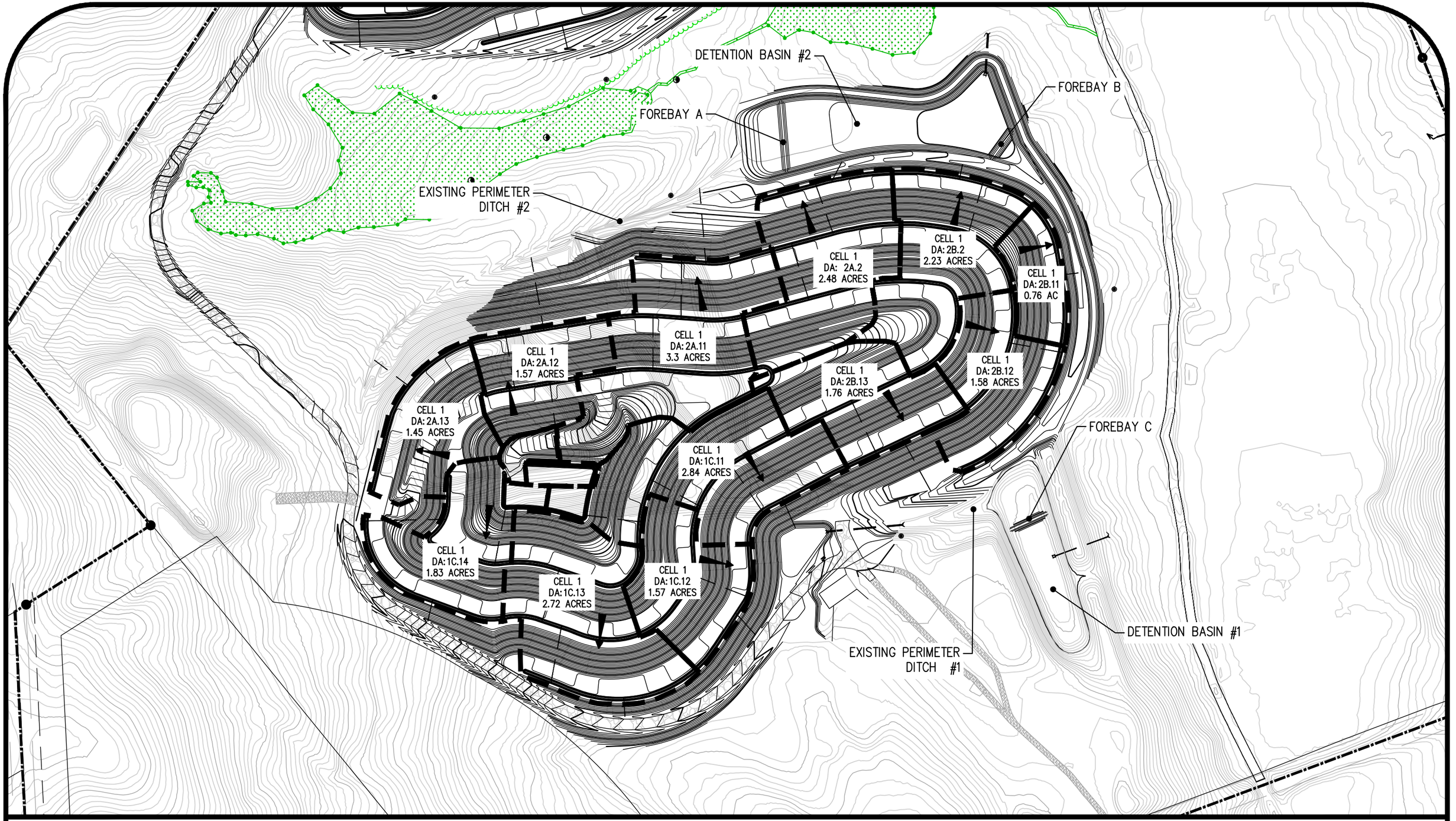
```
  ********************************
  Highest Flow Instability Indexes
  ********************************
  Link Pipe_2_A (1)


  ************************
  Routing Time Step Summary
  ************************
  Minimum Time Step           :    30.00 sec
  Average Time Step           :    30.00 sec
  Maximum Time Step           :    30.00 sec
  Percent in Steady State     :     0.00
  Average Iterations per Step :     1.25

  WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height
dimensions for Node HW_1.A.

  Analysis began on:  Fri Apr 27 11:18:52 2018
  Analysis ended on:  Fri Apr 27 11:18:53 2018
  Total elapsed time: 00:00:01
```


Total Inflow: Node - Out-1Pipe 1.A (GP Landfill Pipes 2018-04-27 11:18:54)
Total Inflow: Node - HW_1.A (GP Landfill Pipes 2018-04-27 11:18:54)
Total Inflow: Node - HW_2. A (GP Landfill Pipes 2018-04-27 11:18:54)
Total Inflow: Node - Out-2Pipe2.A (GP Landfill Pipes 2018-04-27 11:18:54)
Total Inflow (cfs)
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
Time (hrs)
0
2
4
6
8
10
12
14
16
18
20
22



200 100 0 200 600

(IN FEET)

Project No.: 16227-0004
March, 2018

Slope Conveyance Drainage Map - Cell 1 for Project Greenpointe Landfill in Anderson County, South Carolina

ALLIANCE CONSULTING ENGINEERS

Prepared by Alliance Consulting Engineers, Inc.
124 Verdae Blvd. Greenville, SC 29607-3843
864-284-1740
www.allianceCE.com

Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Monday, Apr 16 2018

SLOPE CONVEYANCE DRAINAGE - CELL 1

Trapezoidal

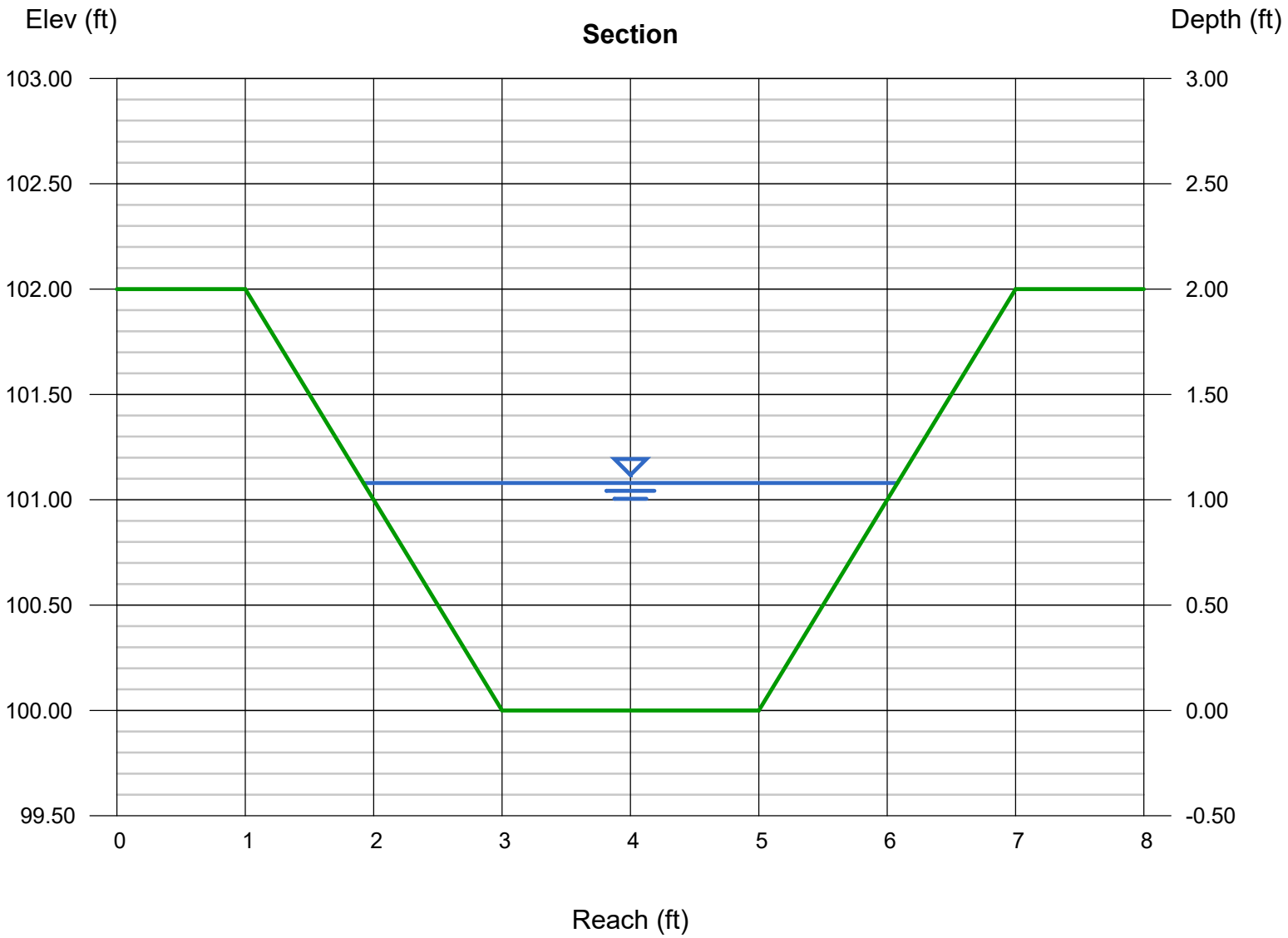
Bottom Width (ft)	= 2.00
Side Slopes (z:1)	= 1.00, 1.00
Total Depth (ft)	= 2.00
Invert Elev (ft)	= 100.00
Slope (%)	= 1.00
N-Value	= 0.030

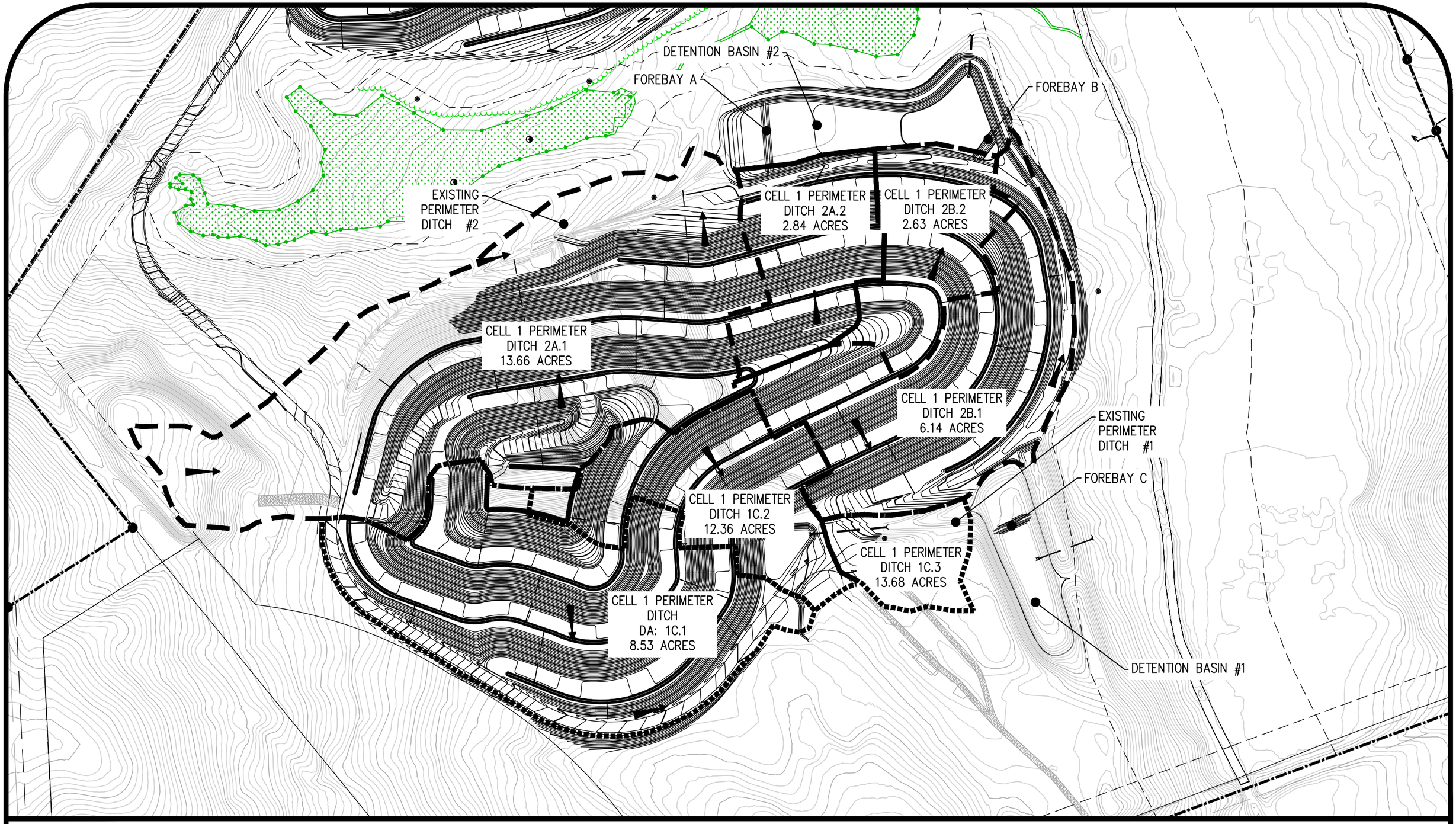
Calculations

Compute by:	Known Q
Known Q (cfs)	= 12.28

Highlighted

Depth (ft)	= 1.08
Q (cfs)	= 12.28
Area (sqft)	= 3.33
Velocity (ft/s)	= 3.69
Wetted Perim (ft)	= 5.05
Crit Depth, Yc (ft)	= 0.91
Top Width (ft)	= 4.16
EGL (ft)	= 1.29





200 100 0 200 600

(IN FEET)

Perimeter Drainage Ditch Map - Cell 1 for Project Greenpointe Landfill in Anderson County, South Carolina

Project No.: 16227-0004
March, 2018

ALLIANCE CONSULTING ENGINEERS

Prepared by Alliance Consulting Engineers, Inc.
124 Verdae Blvd. Greenville, SC 29607-3843
864-284-1740
www.allianceCE.com

Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Wednesday, Mar 7 2018

PERIMETER DRAINAGE DITCH - CELL 1 - PERIMETER DITCH 2A.1 (EXISTING DITCH 2)

Trapezoidal

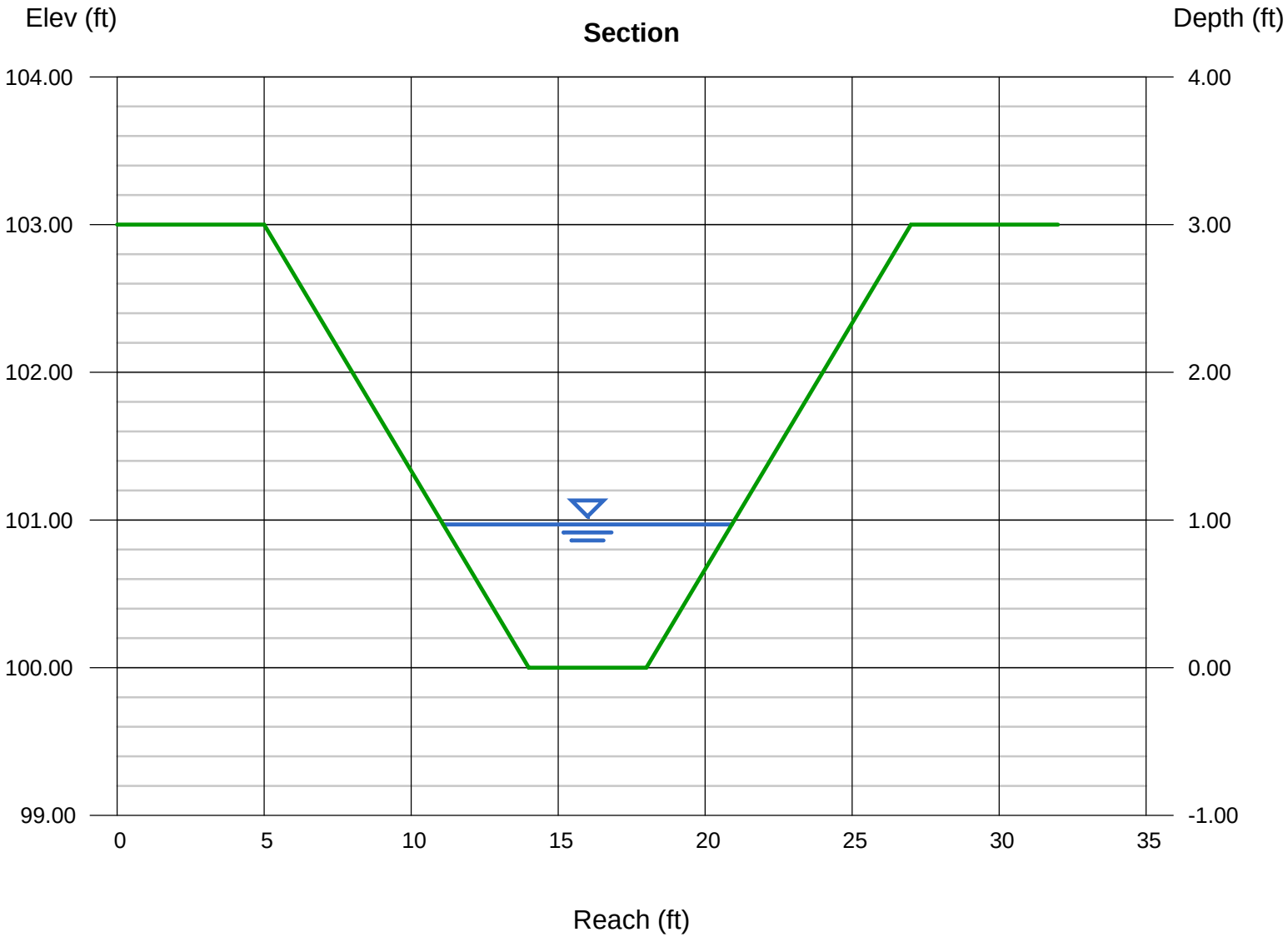
Bottom Width (ft)	= 4.00
Side Slopes (z:1)	= 3.00, 3.00
Total Depth (ft)	= 3.00
Invert Elev (ft)	= 100.00
Slope (%)	= 4.10
N-Value	= 0.030

Calculations

Compute by:	Known Q
Known Q (cfs)	= 50.84

Highlighted

Depth (ft)	= 0.97
Q (cfs)	= 50.84
Area (sqft)	= 6.70
Velocity (ft/s)	= 7.59
Wetted Perim (ft)	= 10.13
Crit Depth, Yc (ft)	= 1.26
Top Width (ft)	= 9.82
EGL (ft)	= 1.86



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Wednesday, Mar 7 2018

PERIMETER DRAINAGE DITCH - CELL 1 - PERIMETER DITCH 2A.2

Trapezoidal

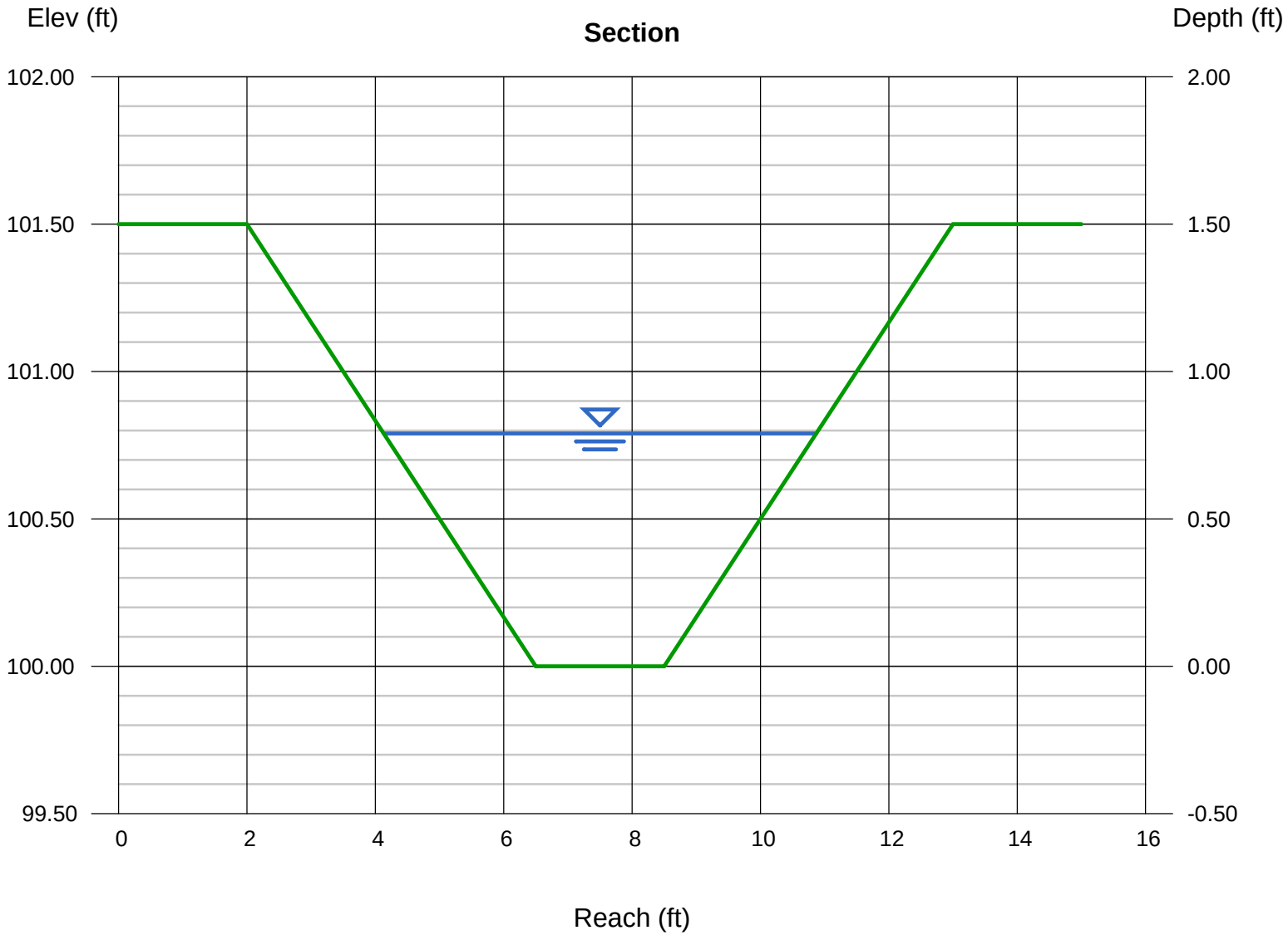
Bottom Width (ft)	= 2.00
Side Slopes (z:1)	= 3.00, 3.00
Total Depth (ft)	= 1.50
Invert Elev (ft)	= 100.00
Slope (%)	= 1.00
N-Value	= 0.030

Calculations

Compute by:	Known Q
Known Q (cfs)	= 10.57

Highlighted

Depth (ft)	= 0.79
Q (cfs)	= 10.57
Area (sqft)	= 3.45
Velocity (ft/s)	= 3.06
Wetted Perim (ft)	= 7.00
Crit Depth, Yc (ft)	= 0.69
Top Width (ft)	= 6.74
EGL (ft)	= 0.94



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Wednesday, Mar 7 2018

PERIMETER DRAINAGE DITCH - CELL 1 - PERIMETER DITCH 2B.1

Trapezoidal

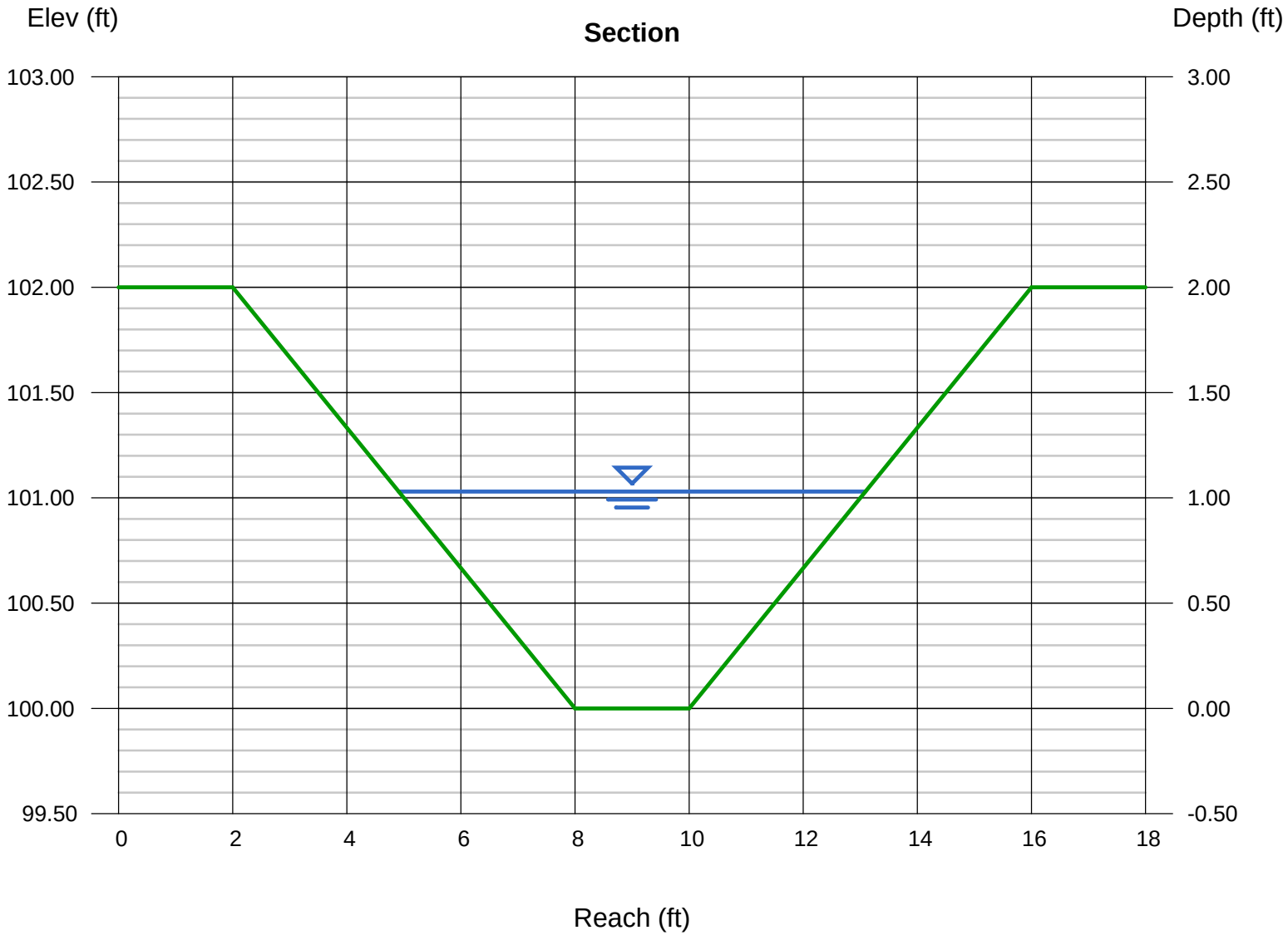
Bottom Width (ft)	= 2.00
Side Slopes (z:1)	= 3.00, 3.00
Total Depth (ft)	= 2.00
Invert Elev (ft)	= 100.00
Slope (%)	= 1.50
N-Value	= 0.030

Calculations

Compute by:	Known Q
Known Q (cfs)	= 22.85

Highlighted

Depth (ft)	= 1.03
Q (cfs)	= 22.85
Area (sqft)	= 5.24
Velocity (ft/s)	= 4.36
Wetted Perim (ft)	= 8.51
Crit Depth, Yc (ft)	= 1.01
Top Width (ft)	= 8.18
EGL (ft)	= 1.33



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Wednesday, Mar 7 2018

PERIMETER DRAINAGE DITCH - CELL 1 - PERIMETER DITCH 2B.2

Trapezoidal

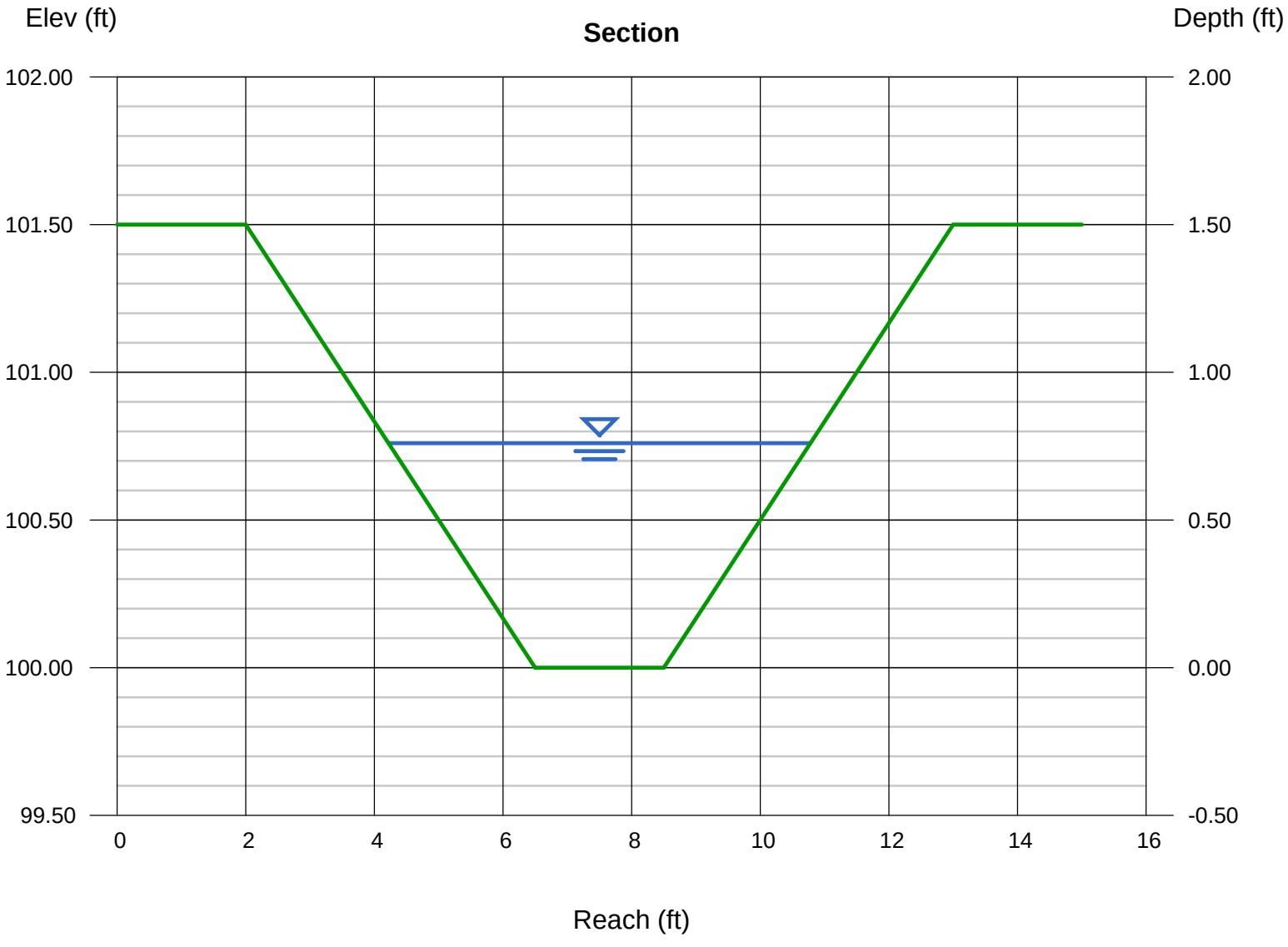
Bottom Width (ft)	= 2.00
Side Slopes (z:1)	= 3.00, 3.00
Total Depth (ft)	= 1.50
Invert Elev (ft)	= 100.00
Slope (%)	= 1.00
N-Value	= 0.030

Calculations

Compute by:	Known Q
Known Q (cfs)	= 9.79

Highlighted

Depth (ft)	= 0.76
Q (cfs)	= 9.790
Area (sqft)	= 3.25
Velocity (ft/s)	= 3.01
Wetted Perim (ft)	= 6.81
Crit Depth, Yc (ft)	= 0.66
Top Width (ft)	= 6.56
EGL (ft)	= 0.90



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Wednesday, Mar 7 2018

PERIMETER DRAINAGE DITCH - CELL 1 - PERIMETER DITCH 1C.1

Trapezoidal

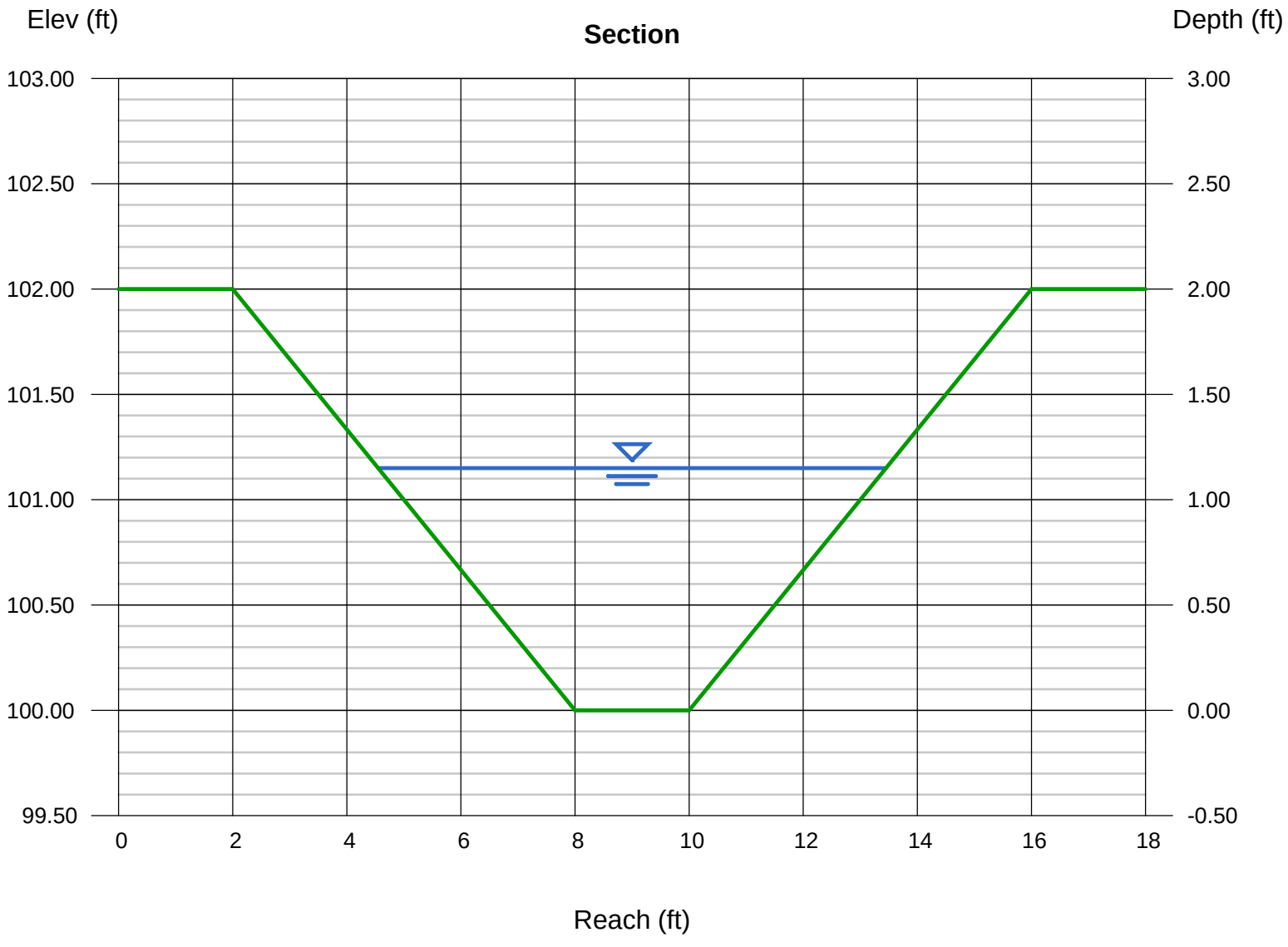
Bottom Width (ft)	= 2.00
Side Slopes (z:1)	= 3.00, 3.00
Total Depth (ft)	= 2.00
Invert Elev (ft)	= 100.00
Slope (%)	= 1.80
N-Value	= 0.030

Calculations

Compute by:	Known Q
Known Q (cfs)	= 31.74

Highlighted

Depth (ft)	= 1.15
Q (cfs)	= 31.74
Area (sqft)	= 6.27
Velocity (ft/s)	= 5.06
Wetted Perim (ft)	= 9.27
Crit Depth, Yc (ft)	= 1.19
Top Width (ft)	= 8.90
EGL (ft)	= 1.55



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Wednesday, Mar 7 2018

PERIMETER DRAINAGE DITCH - CELL 1 - PERIMETER DITCH 1C.2

Trapezoidal

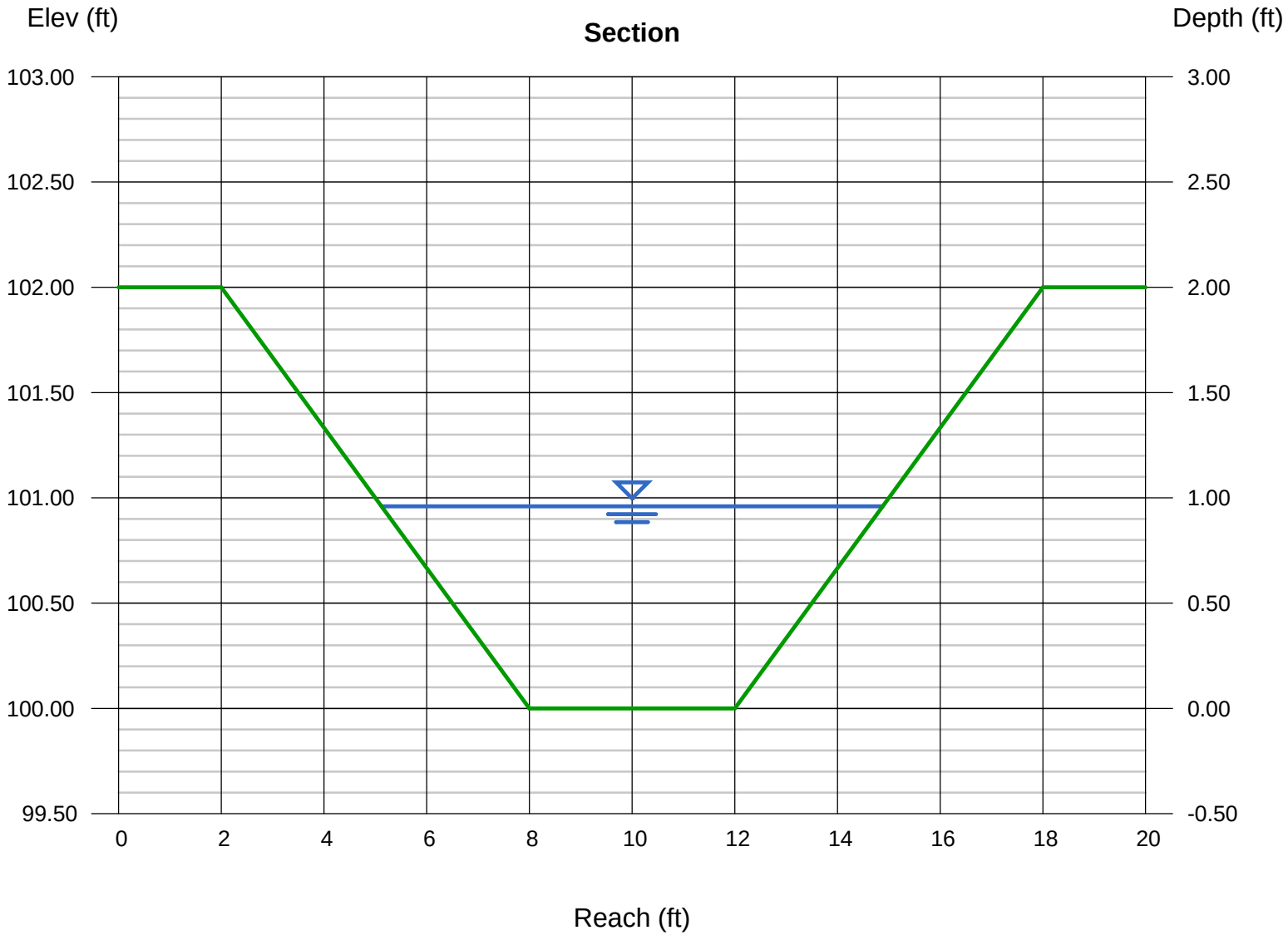
Bottom Width (ft)	= 4.00
Side Slopes (z:1)	= 3.00, 3.00
Total Depth (ft)	= 2.00
Invert Elev (ft)	= 100.00
Slope (%)	= 3.50
N-Value	= 0.030

Calculations

Compute by:	Known Q
Known Q (cfs)	= 46.00

Highlighted

Depth (ft)	= 0.96
Q (cfs)	= 46.00
Area (sqft)	= 6.60
Velocity (ft/s)	= 6.96
Wetted Perim (ft)	= 10.07
Crit Depth, Yc (ft)	= 1.20
Top Width (ft)	= 9.76
EGL (ft)	= 1.71



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Wednesday, Mar 7 2018

PERIMETER DRAINAGE DITCH - CELL 1 - PERIMETER DITCH 1C.3

Trapezoidal

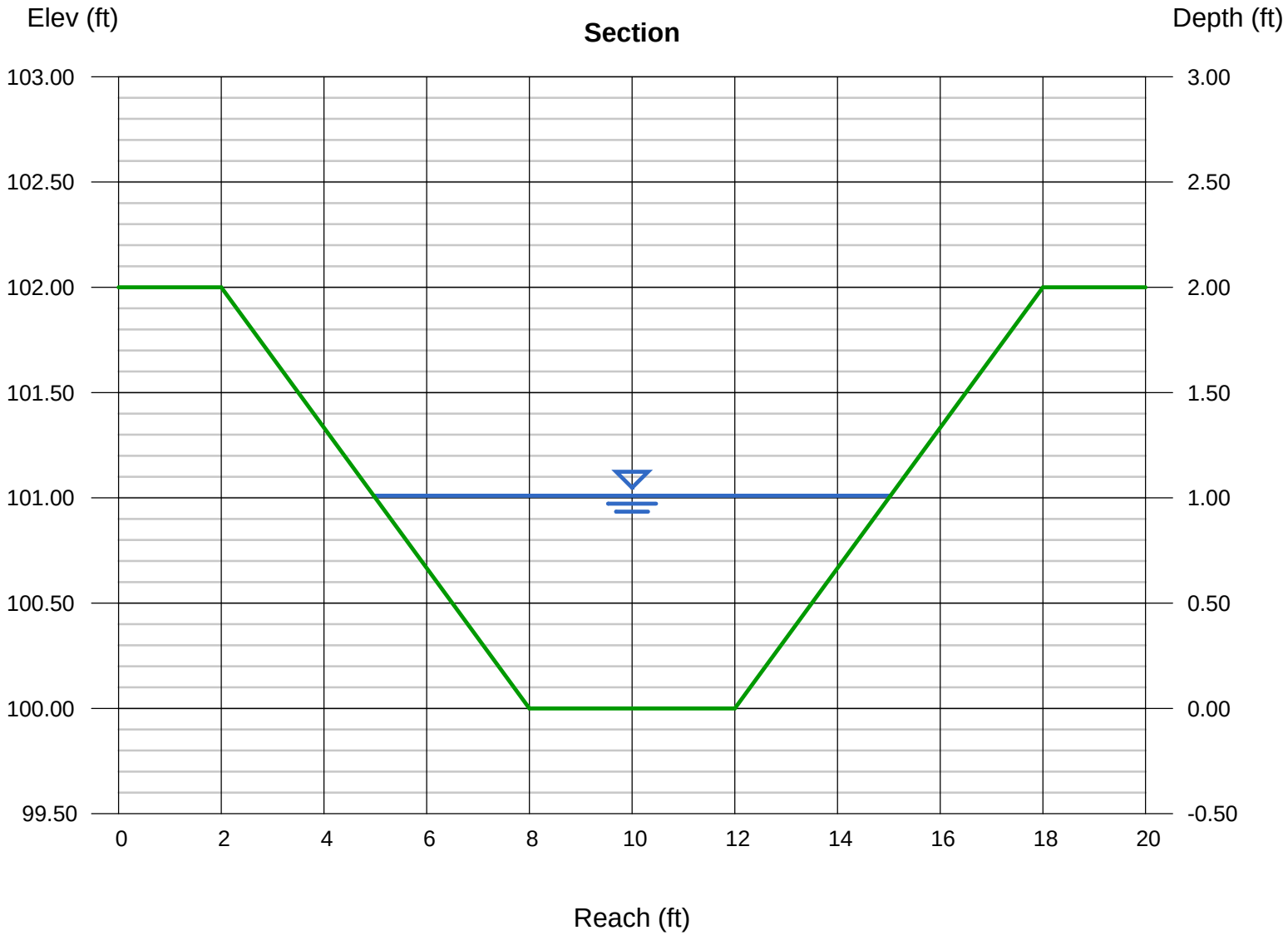
Bottom Width (ft)	= 4.00
Side Slopes (z:1)	= 3.00, 3.00
Total Depth (ft)	= 2.00
Invert Elev (ft)	= 100.00
Slope (%)	= 3.50
N-Value	= 0.030

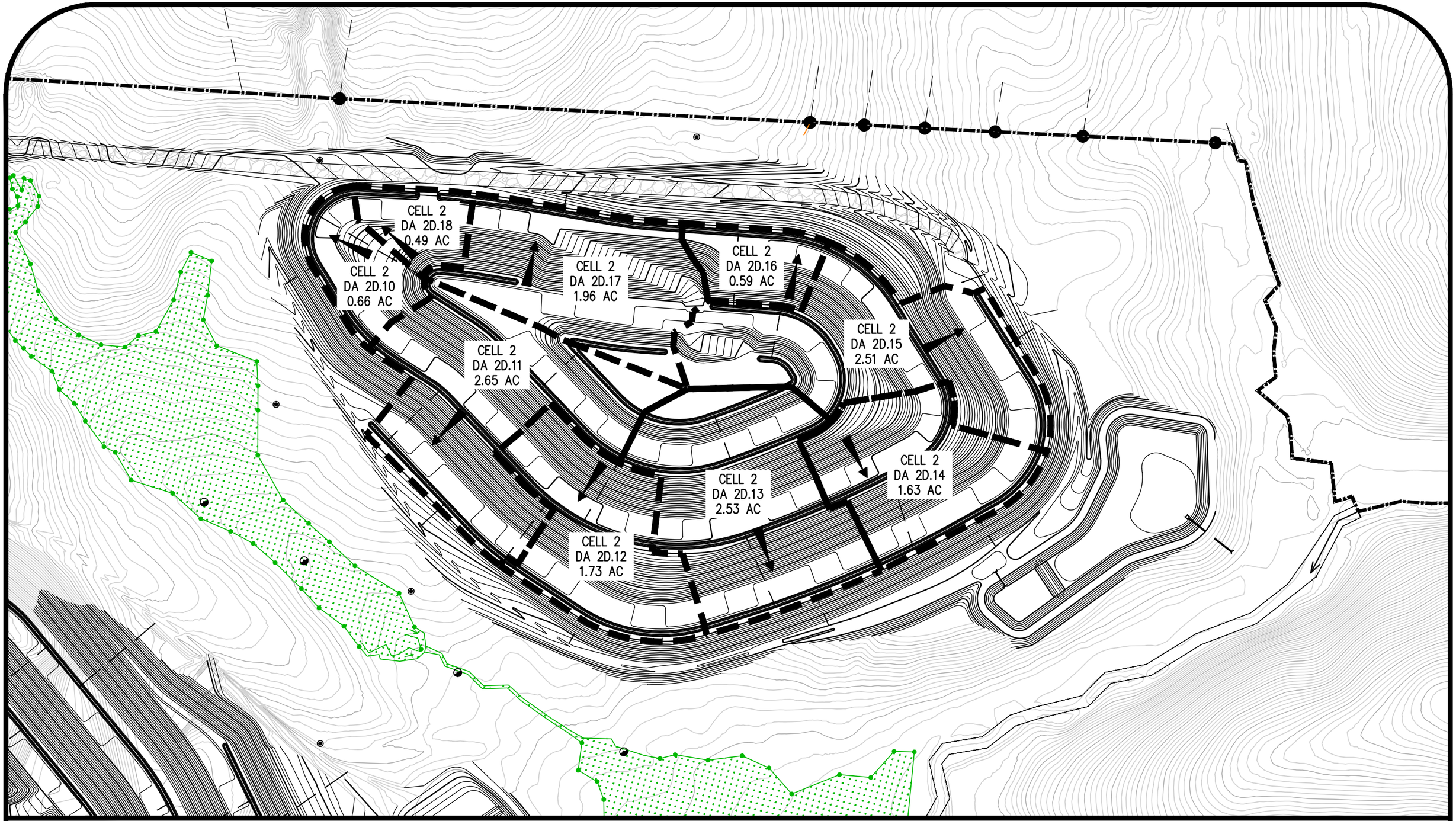
Calculations

Compute by:	Known Q
Known Q (cfs)	= 50.92

Highlighted

Depth (ft)	= 1.01
Q (cfs)	= 50.92
Area (sqft)	= 7.10
Velocity (ft/s)	= 7.17
Wetted Perim (ft)	= 10.39
Crit Depth, Yc (ft)	= 1.26
Top Width (ft)	= 10.06
EGL (ft)	= 1.81





150 75 0 150 450

(IN FEET)

Project No.: 16227-0004
March, 2018

Slope Conveyance Drainage Map - Cell 2 for Project Greenpointe Landfill in Anderson County, South Carolina

ALLIANCE CONSULTING ENGINEERS

Prepared by Alliance Consulting Engineers, Inc.
124 Verdae Blvd, Greenville, SC 29607-3843
864-284-1740
www.allianceCE.com

Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Wednesday, Apr 18 2018

SLOPE CONVEYANCE DRAINAGE - CELL 2

Trapezoidal

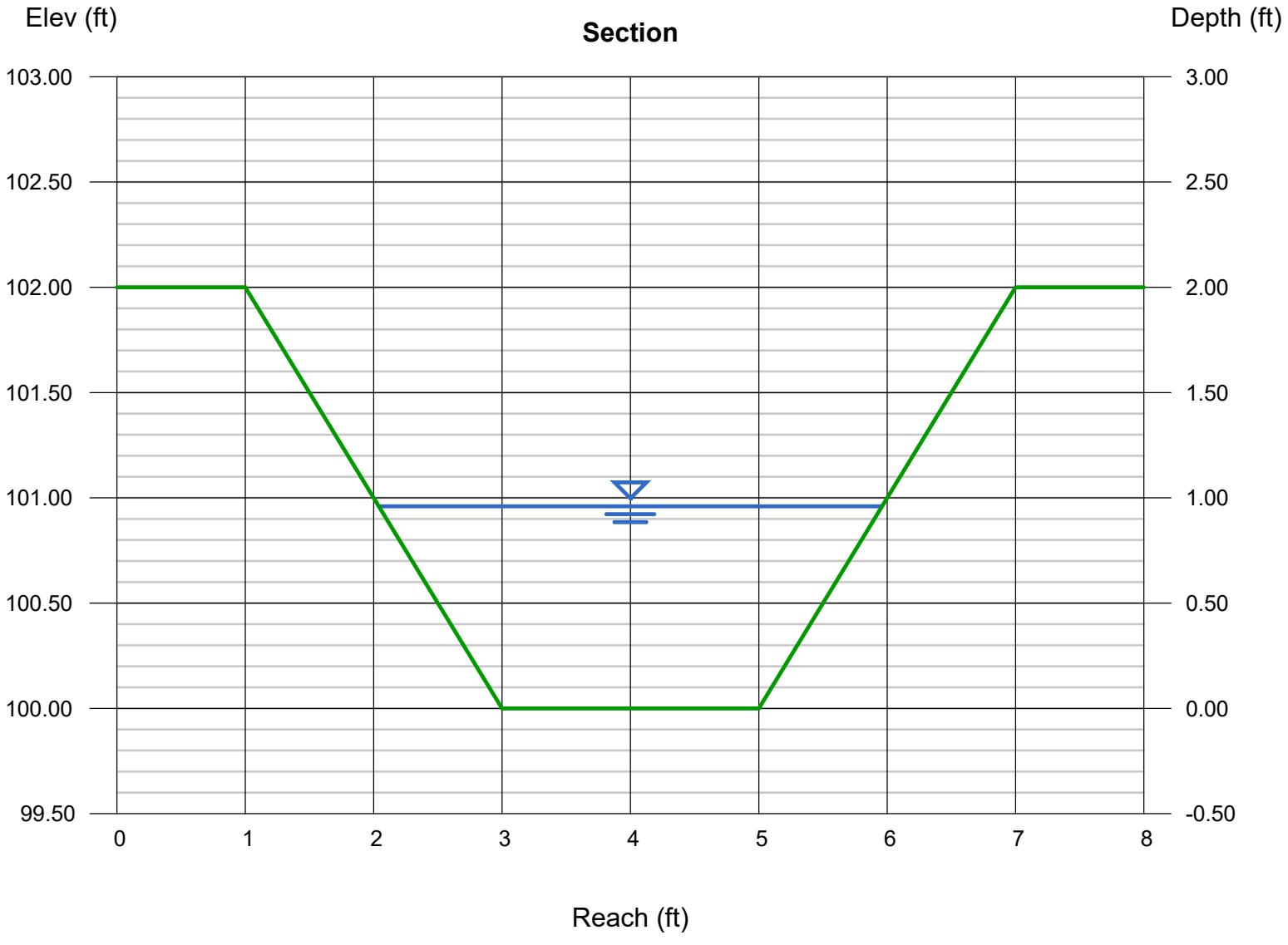
Bottom Width (ft)	= 2.00
Side Slopes (z:1)	= 1.00, 1.00
Total Depth (ft)	= 2.00
Invert Elev (ft)	= 100.00
Slope (%)	= 1.00
N-Value	= 0.030

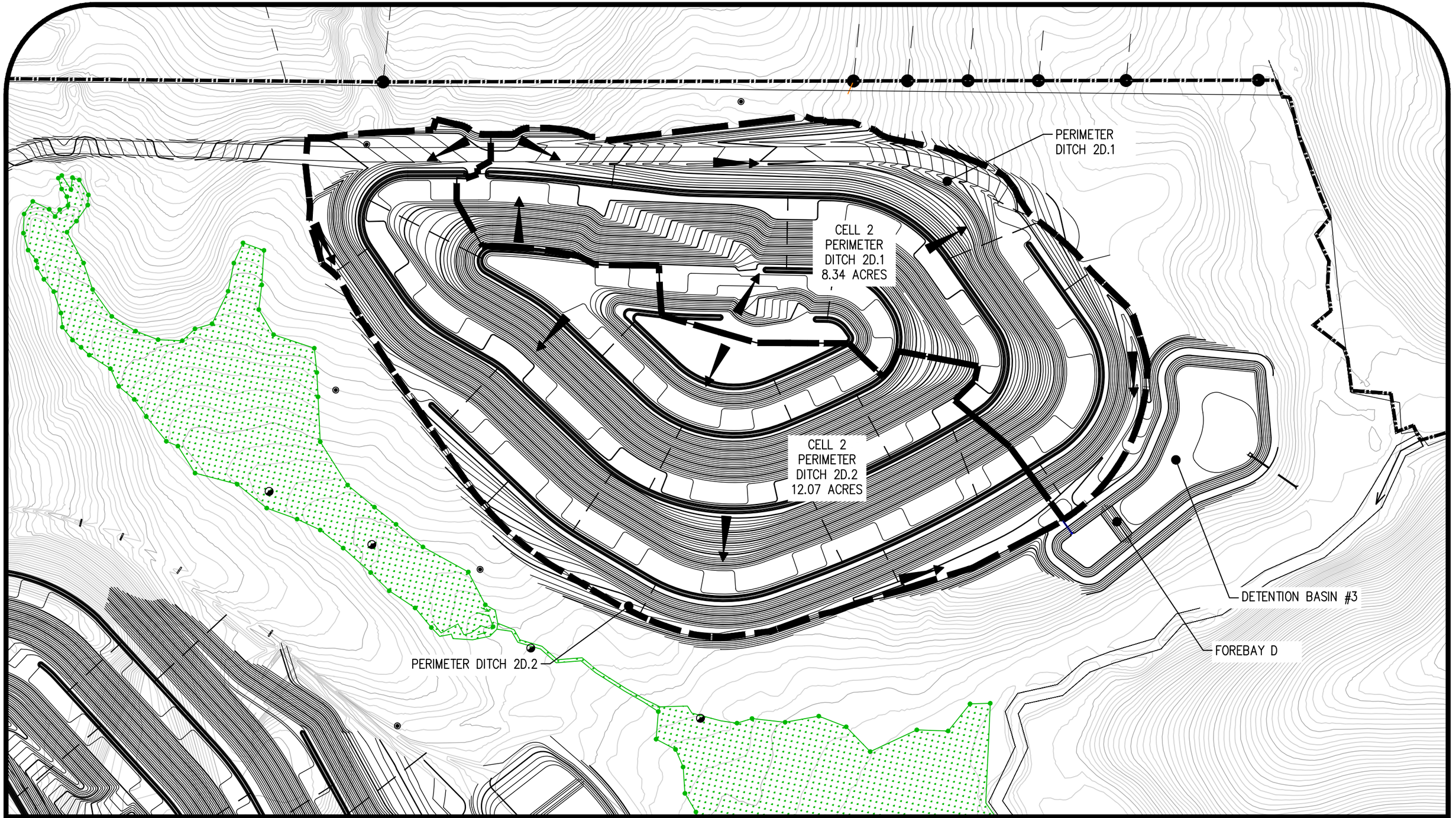
Calculations

Compute by:	Known Q
Known Q (cfs)	= 9.86

Highlighted

Depth (ft)	= 0.96
Q (cfs)	= 9.860
Area (sqft)	= 2.84
Velocity (ft/s)	= 3.47
Wetted Perim (ft)	= 4.72
Crit Depth, Yc (ft)	= 0.80
Top Width (ft)	= 3.92
EGL (ft)	= 1.15





150 75 0 150 450

(IN FEET)

Project No.: 16227-0004
March, 2018

Perimeter Ditch Drainage Map - Cell 2 for Project Greenpointe Landfill in Anderson County, South Carolina

ALLIANCE CONSULTING ENGINEERS

Prepared by Alliance Consulting Engineers, Inc.
124 Verdae Blvd. Greenville, SC 29607-3843
864-284-1740
www.allianceCE.com

Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Tuesday, Apr 17 2018

PERIMETER DRAINAGE DITCH - CELL 2 - PERIMETER DITCH 2D.1

Trapezoidal

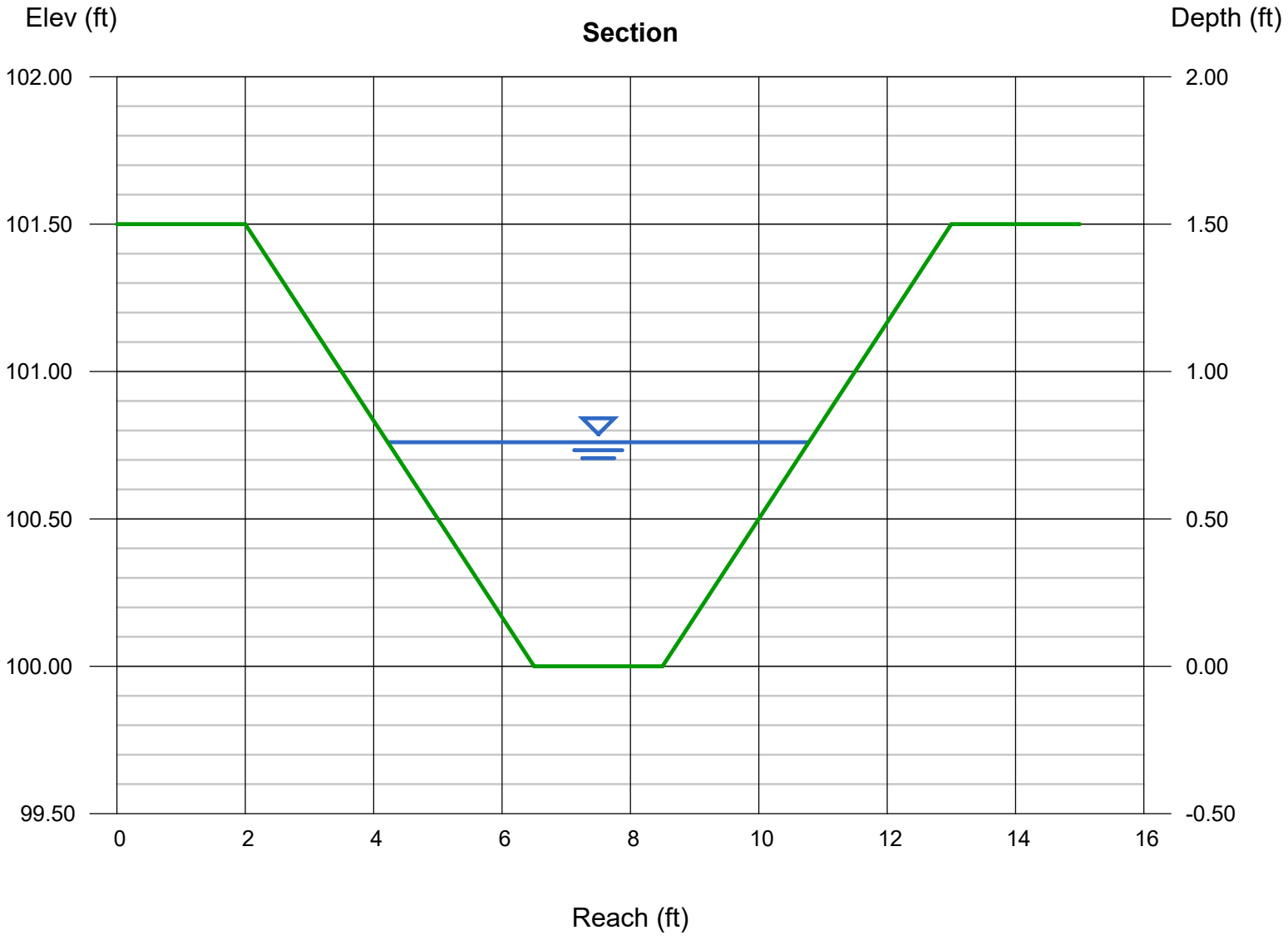
Bottom Width (ft)	= 2.00
Side Slopes (z:1)	= 3.00, 3.00
Total Depth (ft)	= 1.50
Invert Elev (ft)	= 100.00
Slope (%)	= 1.00
N-Value	= 0.030

Calculations

Compute by:	Known Q
Known Q (cfs)	= 9.79

Highlighted

Depth (ft)	= 0.76
Q (cfs)	= 9.790
Area (sqft)	= 3.25
Velocity (ft/s)	= 3.01
Wetted Perim (ft)	= 6.81
Crit Depth, Yc (ft)	= 0.66
Top Width (ft)	= 6.56
EGL (ft)	= 0.90



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Tuesday, Apr 17 2018

PERIMETER DRAINAGE DITCH - CELL 2 - PERIMETER DITCH 2D.2

Trapezoidal

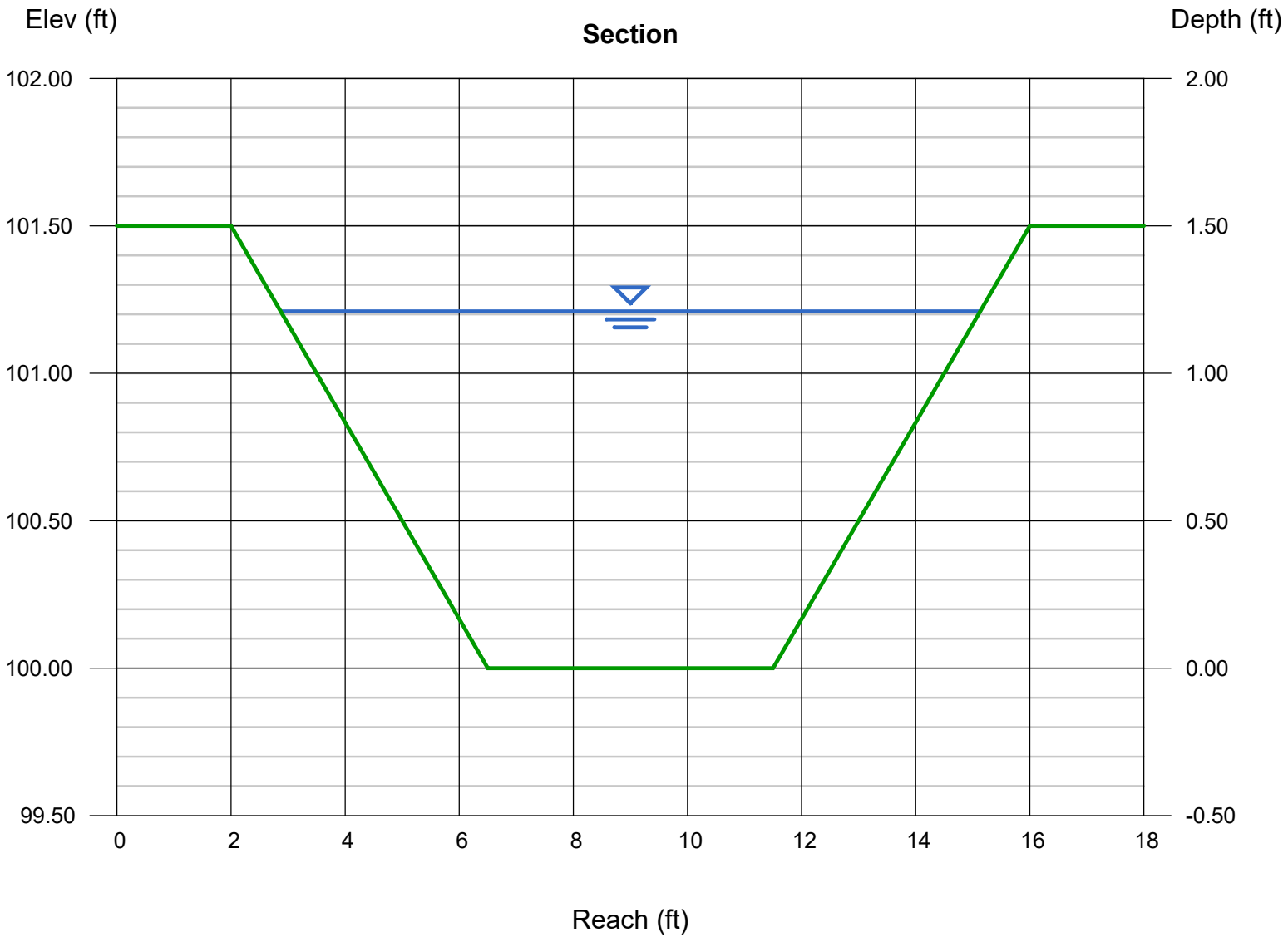
Bottom Width (ft)	= 5.00
Side Slopes (z:1)	= 3.00, 3.00
Total Depth (ft)	= 1.50
Invert Elev (ft)	= 100.00
Slope (%)	= 1.00
N-Value	= 0.030

Calculations

Compute by:	Known Q
Known Q (cfs)	= 44.91

Highlighted

Depth (ft)	= 1.21
Q (cfs)	= 44.91
Area (sqft)	= 10.44
Velocity (ft/s)	= 4.30
Wetted Perim (ft)	= 12.65
Crit Depth, Yc (ft)	= 1.09
Top Width (ft)	= 12.26
EGL (ft)	= 1.50



APPENDIX F Additional Calculations

Sediment Basin Trapping Efficiency

SCDHEC method (basin is NOT in low lying area & no high water table)

Basin ID=	**Detention Basin #1**	**Efficiency =**	**90.08 %**	(80% req'd)
		Okay?	**Yes, OK**	

Soil Type=	CECIL (B)	name of soil
Soil Strata=	11 - 50 0.0043	range in inches - D_{15}

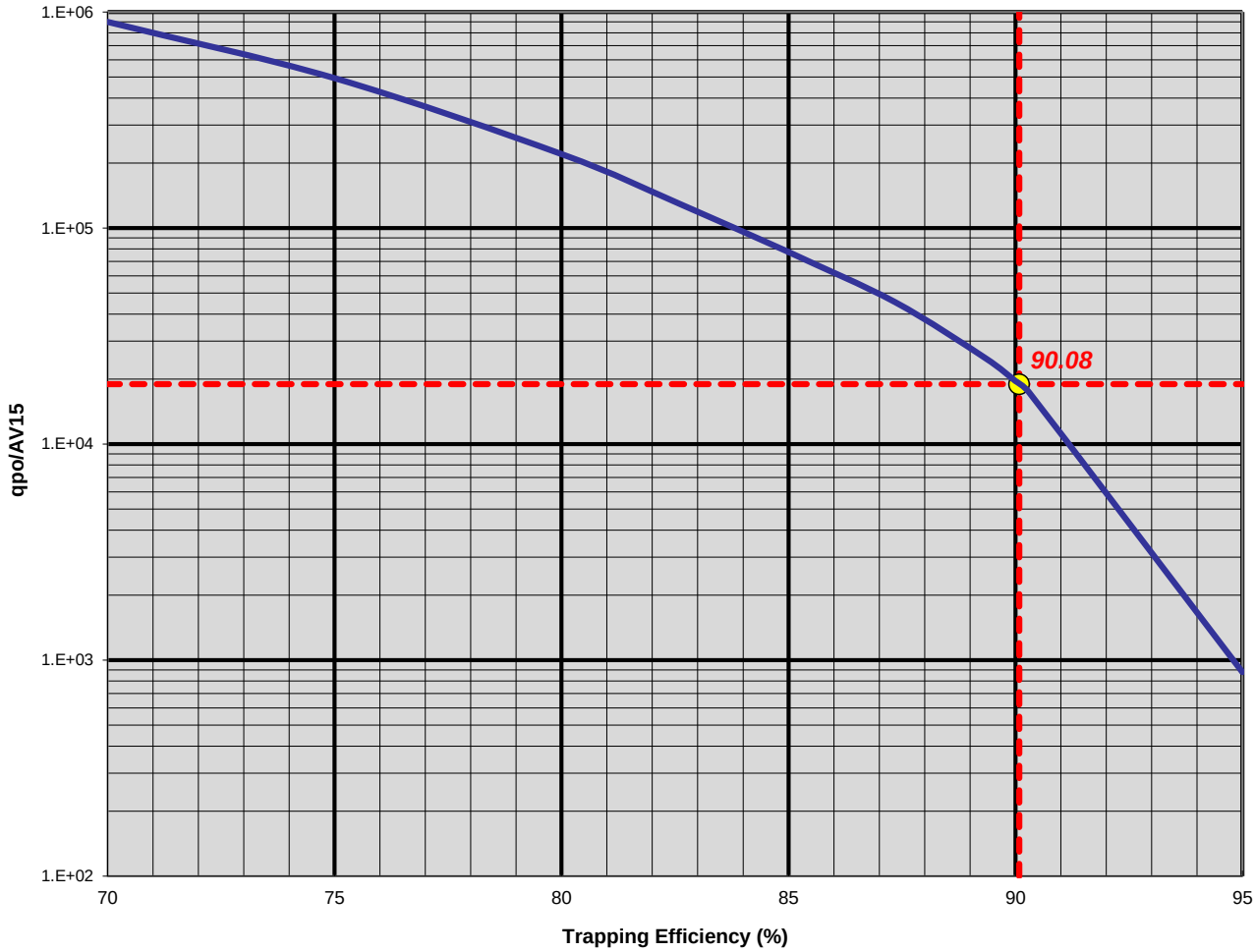
Basin Ratio=q_{po}/AV_{15}

q_{po}=	1.0	cfs	Peak outflow rate from basin - 10 yr 24 hr event
A=	42926.0	ft^2	Surface area of pond at riser crest
D_{15}=	0.0043	mm	(from soil tables)
V_{15}=	5.20E-05	ft/sec	(from eqns) (if D_{15}< 0.01 mm then $V_{15}=2.81D_{15}^2$)
Ratio=	1.89E+04		(if D_{15}>= 0.01 mm then $\log V_{15}=-0.34246(\log D_{15})^2+0.98912(\log D_{15})-0.33801$)

Constraints:			**Meets Constraints?**	
Watershed Area=	17.3	acres	Yes, OK	<= 30 acre watershed
Overland Slope=	6.0	%	Yes, OK	slope <= 20 percent
Outlet Diameter=	24	inches	Yes, OK	outlet diameter <=6 feet

basin NOT in low lying area and not having a high water table has a ratio=2.20e5 at 80%

basin IN low lying are and not having a high water table has a ratio=4.70e3 at 80%



Sediment Basin Trapping Efficiency

SCDHEC method (basin is NOT in low lying area & no high water table)

Basin ID= Detention Basin #2 | **Efficiency =** 90.00 % (80% req'd)

Okay? Yes, OK

Soil Type= CECIL (B) name of soil

Soil Strata= 11 - 50 0.0043 range in inches - D_{15}

Basin Ratio=q_{po}/AV_{15}

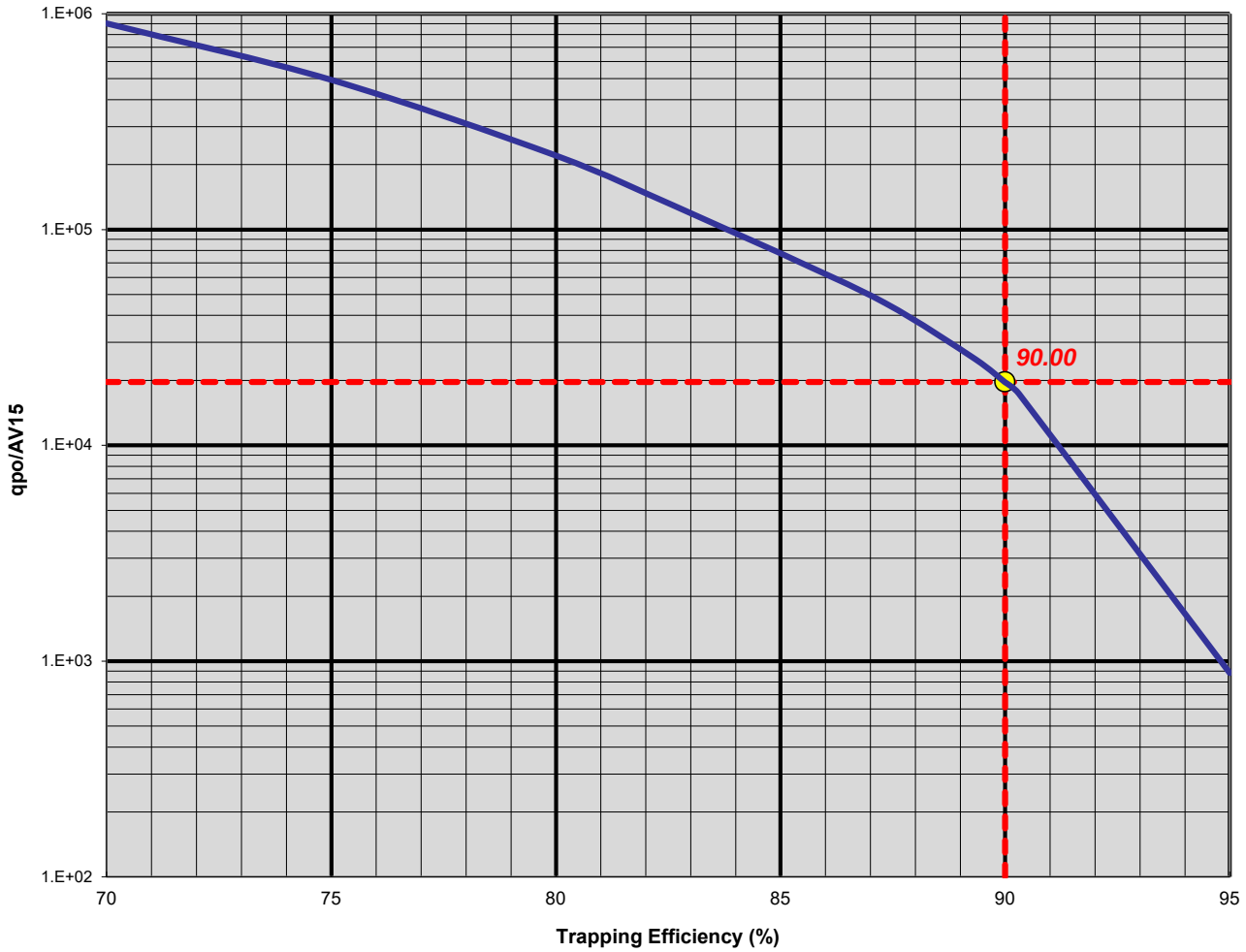
q_{po}=	2.1	cfs	Peak outflow rate from basin - 10 yr 24 hr event
A=	87605.0	ft^2	Surface area of pond at riser crest
D_{15}=	0.0043	mm	(from soil tables)
V_{15}=	5.20E-05	ft/sec	(from eqns) (if D_{15}< 0.01 mm then $V_{15}=2.81D_{15}^2$)
Ratio=	1.96E+04		(if D_{15}>= 0.01 mm then $\log V_{15}=-0.34246(\log D_{15})^2+0.98912(\log D_{15})-0.33801$)

Constraints:

			Meets Constraints?	
Watershed Area=	27.6	acres	Yes, OK	<= 30 acre watershed
Overland Slope=	6.0	%	Yes, OK	slope <= 20 percent
Outlet Diameter=	42	inches	Yes, OK	outlet diameter <=6 feet

basin NOT in low lying area and not having a high water table has a ratio=2.20e5 at 80%

basin IN low lying are and not having a high water table has a ratio=4.70e3 at 80%



Sediment Basin Trapping Efficiency

SCDHEC method (basin is NOT in low lying area & no high water table)

Basin ID=	**Detention Basin #3**	**Efficiency =**	**89.14 %**	(80% req'd)
		Okay?	**Yes, OK**	

Soil Type=	CECIL (B)	name of soil
Soil Strata=	11 - 50 0.0043	range in inches - D_{15}

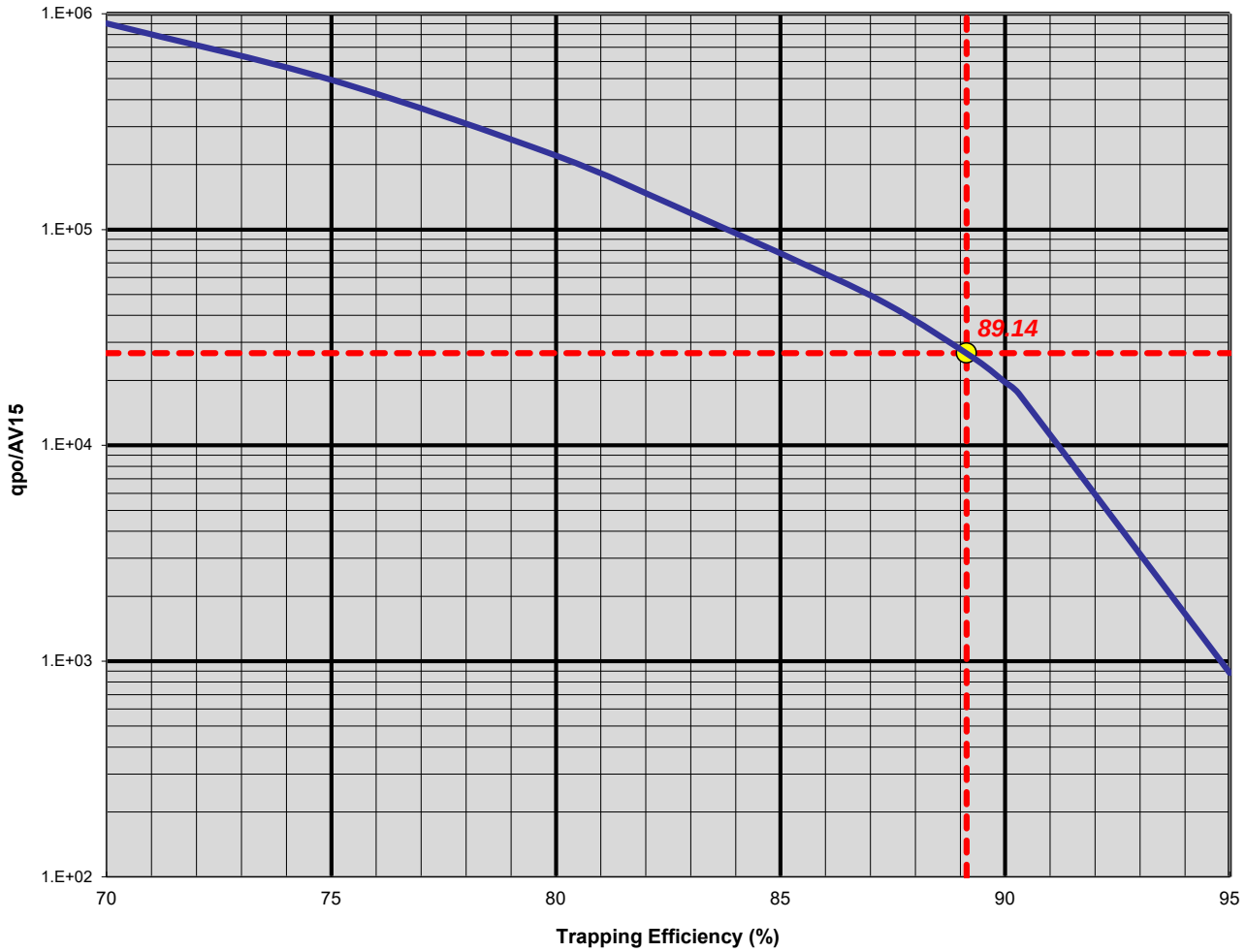
Basin Ratio=q_{po}/AV_{15}

q_{po}=	1.58	cfs	Peak outflow rate from basin - 10 yr 24 hr event
A=	49513.0	ft^2	Surface area of pond at riser crest
D_{15}=	0.0043	mm	(from soil tables)
V_{15}=	5.20E-05	ft/sec	(from eqns) (if D_{15}< 0.01 mm then $V_{15}=2.81D_{15}^2$)
Ratio=	2.68E+04		(if D_{15}>= 0.01 mm then $\log V_{15}=-0.34246(\log D_{15})^2+0.98912(\log D_{15})-0.33801$)

Constraints:			**Meets Constraints?**	
Watershed Area=	23.4	acres	Yes, OK	<= 30 acre watershed
Overland Slope=	6.0	%	Yes, OK	slope <= 20 percent
Outlet Diameter=	36	inches	Yes, OK	outlet diameter <=6 feet

basin NOT in low lying area and not having a high water table has a ratio=2.20e5 at 80%

basin IN low lying are and not having a high water table has a ratio=4.70e3 at 80%



Basin 1 Water Quality Calculations

Drainage Area to Basin =

DA 1.1 = 17.34 AC

17.34 Total Acres

Type of Detention Basin (Dry or Wet) = Dry

Water Quality Volume = 17.34 Acres * 43,560 ft^2/Ac * 0.0833 ft = 62,919.0 ft^3

Average Discharge Rate for 24-hour Dewatering = $\frac{62{,}919.0\ ft^3}{24\ hours} * \frac{1\ hr}{3600\ sec} = 0.728$ cfs

Size Orifice for Dewatering

$$Q = 0.6A\sqrt{2gh}$$

Interpolate Pond Storage to Find h (Pond Report Attached)

@ h_1 = 1.00 v_1 = 5,020 ft^3

@ h_2 = 2.00 v_2 = 21,969 ft^3

$$h = (V - v_1)\frac{(h_2 - h_1)}{(v_2 - v_1)}$$ h = 4.42 ft

$$A = \frac{Q}{0.6\sqrt{2gh}}$$ A = 0.072 ft^2

$$d = \sqrt{\frac{4A}{\pi}}$$ d = 0.3027 ft

d = 3.63 inches

Pond Storage

Stage	Volume
0.0	0
1.0	5,020
1.7	21,969
2.7	46,241
3.7	76,712
4.7	110,984
6.0	149,030
7.0	190,924
8.0	236,206
9.0	284,706
10.0	337,002
11.0	393,408
12.0	453,640

***Use a 3 inch orifice or smaller to guarantee more than 24-hour dewatering time**

Dewatering Calculations

A = 0.049 ft^2

Q = 0.497 cfs

t = 35.2 hours

A volume of	**62,919.0**	**ft^3 will be discharged from a**	**3.00**	**inch orifice over**	**35.2**	**hours**

Basin 2 Water Quality Calculations

Drainage Area to Basin =

DA 1.2 = 27.61 AC

27.61 Total Acres

Type of Detention Basin (Dry or Wet) = Dry

Water Quality Volume = 27.61 Acres * 43,560 ft^2/Ac * 0.0833 ft = 100,184.2 ft^3

Average Discharge Rate for 24-hour Dewatering = $\frac{100{,}184.2\ ft^3}{24\ hours} * \frac{1\ hr}{3600\ sec} = 1.160$ cfs

Pond Storage

Stage	Volume
0.0	0
1.0	8,451
2.0	42,155
3.0	99,263
4.0	172,713
5.0	251,723
6.0	336,427
7.0	426,994
8.0	523,393

Size Orifice for Dewatering

$$Q = 0.6A\sqrt{2gh}$$

Interpolate Pond Storage to Find h (Pond Report Attached)

@ h_1 = 1.00 v_1 = 8,451 ft^3

@ h_2 = 2.00 v_2 = 42,155 ft^3

$$h = (V - v_1)\frac{(h_2 - h_1)}{(v_2 - v_1)}$$ h = 3.72 ft

$$A = \frac{Q}{0.6\sqrt{2gh}}$$ A = 0.125 ft^2

$$d = \sqrt{\frac{4A}{\pi}}$$ d = 0.3987 ft

d = 4.78 inches

***Use a 4 inch orifice or smaller to guarantee more than 24-hour dewatering time**

Dewatering Calculations

A = 0.087 ft^2

Q = 0.811 cfs

t = 34.3 hours

A volume of	**100,184.2**	**ft^3 will be discharged from a**	**4.00**	**inch orifice over**	**34.3**	**hours**

Basin 3 Water Quality Calculations

Drainage Area to Basin =

DA 2.1 = 23.38 AC / 23.38 Total Acres

Type of Detention Basin (Dry or Wet) = Dry

Water Quality Volume = 23.38 Acres * 43,560 ft^2/Ac * 0.0833 ft = 84,835.5 ft^3

Average Discharge Rate for 24-hour Dewatering = 84,835.5 ft^3 / 24 hours * 1 hr / 3600 sec = 0.982 cfs

Pond Storage

Stage	Volume
0.0	0
1.0	3,995
2.0	23,940
3.0	58,978
4.0	100,272
5.0	144,809
6.0	192,644
7.0	243,834
8.0	298,434

Size Orifice for Dewatering

$$Q = 0.6A\sqrt{2gh}$$

Interpolate Pond Storage to Find h (Pond Report Attached)

@ h_1 = 3.00 v_1 = 58,978 ft^3

@ h_2 = 4.00 v_2 = 100,272 ft^3

$$h = (V - v_1)\frac{(h_2 - h_1)}{(v_2 - v_1)}$$ h = 3.63 ft

$$A = \frac{Q}{0.6\sqrt{2gh}}$$ A = 0.107 ft^2

$$d = \sqrt{\frac{4A}{\pi}}$$ d = 0.3693 ft

d = 4.43 inches

***Use a 4 inch orifice or smaller to guarantee more than 24-hour dewatering time**

Dewatering Calculations

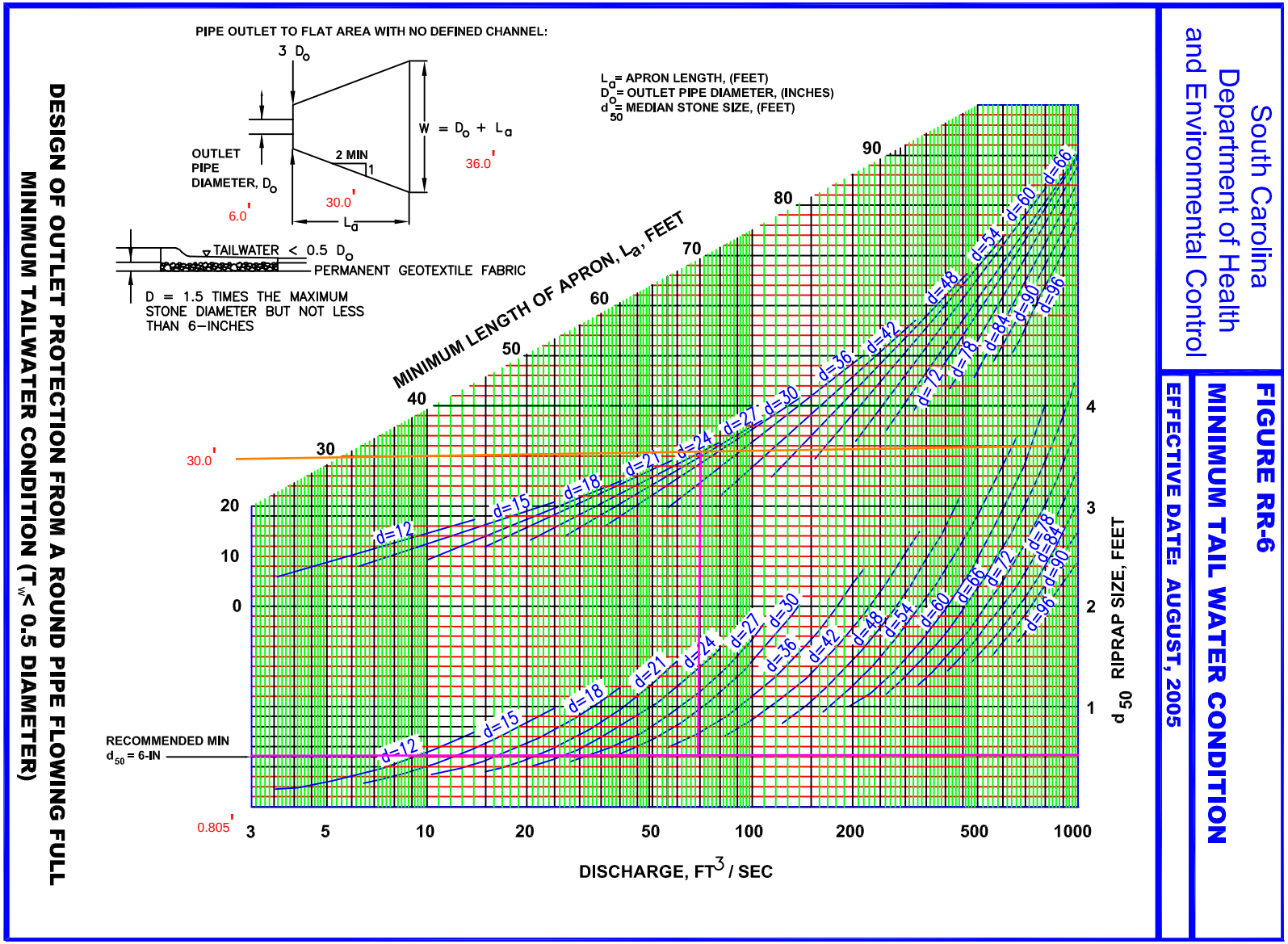
A = 0.087 ft^2

Q = 0.800 cfs

t = 29.5 hours

A volume of	**84,835.5**	**ft^3 will be discharged from a**	**4.00**	**inch orifice over**	**29.5**	**hours**

RIP-RAP FOR OUTFALL PIPE OF DETENTION BASIN 1



DESIGN OF OUTLET PROTECTION FROM A ROUND PIPE FLOWING FULL

MINIMUM TAILWATER CONDITION (T_w< 0.5 DIAMETER)

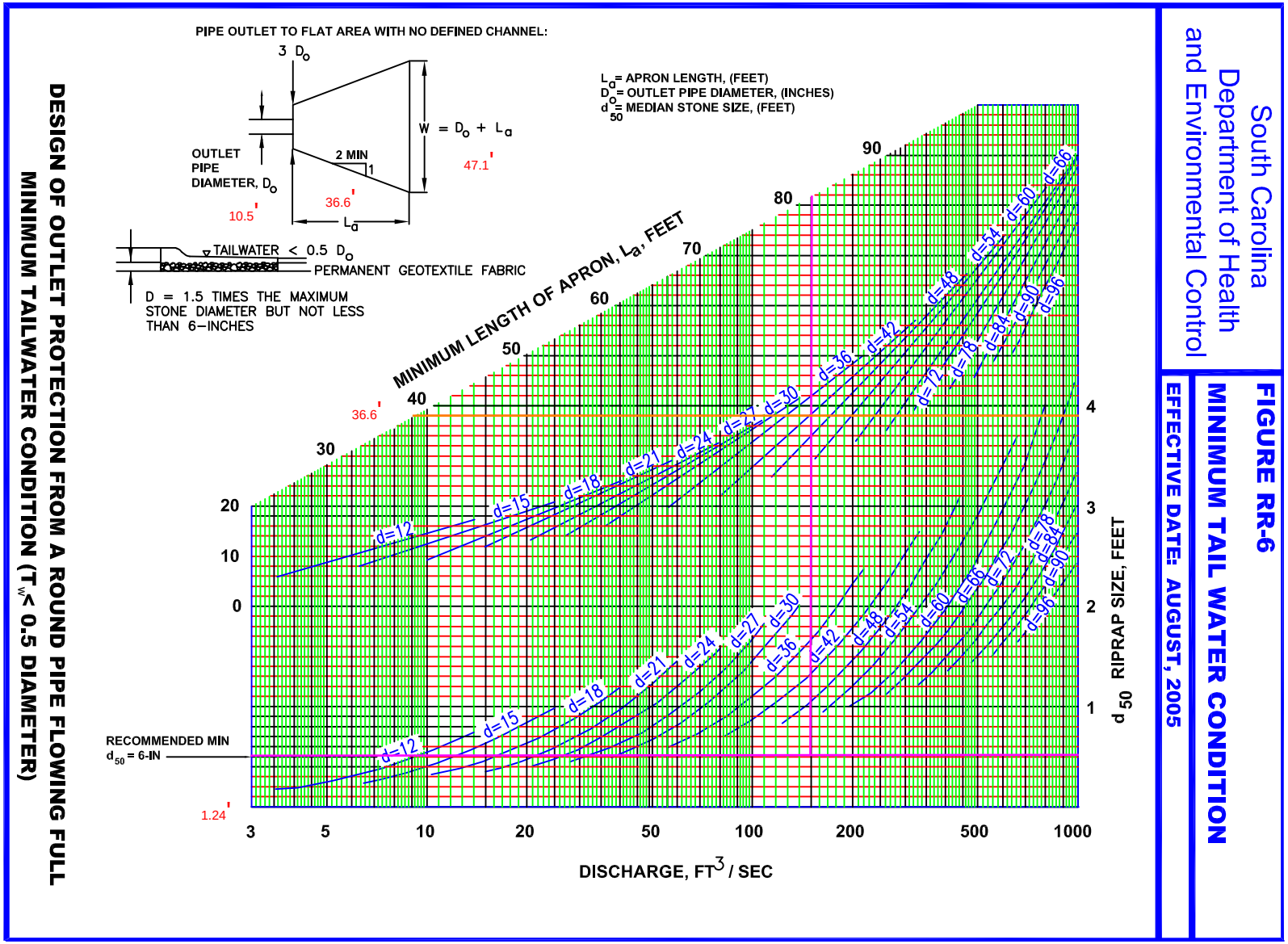
South Carolina
Department of Health
and Environmental Control

FIGURE RR-6

MINIMUM TAIL WATER CONDITION

EFFECTIVE DATE: AUGUST, 2005

RIP-RAP FOR OUTFALL PIPE OF DETENTION BASIN 2



DESIGN OF OUTLET PROTECTION FROM A ROUND PIPE FLOWING FULL

MINIMUM TAILWATER CONDITION (T_w< 0.5 DIAMETER)

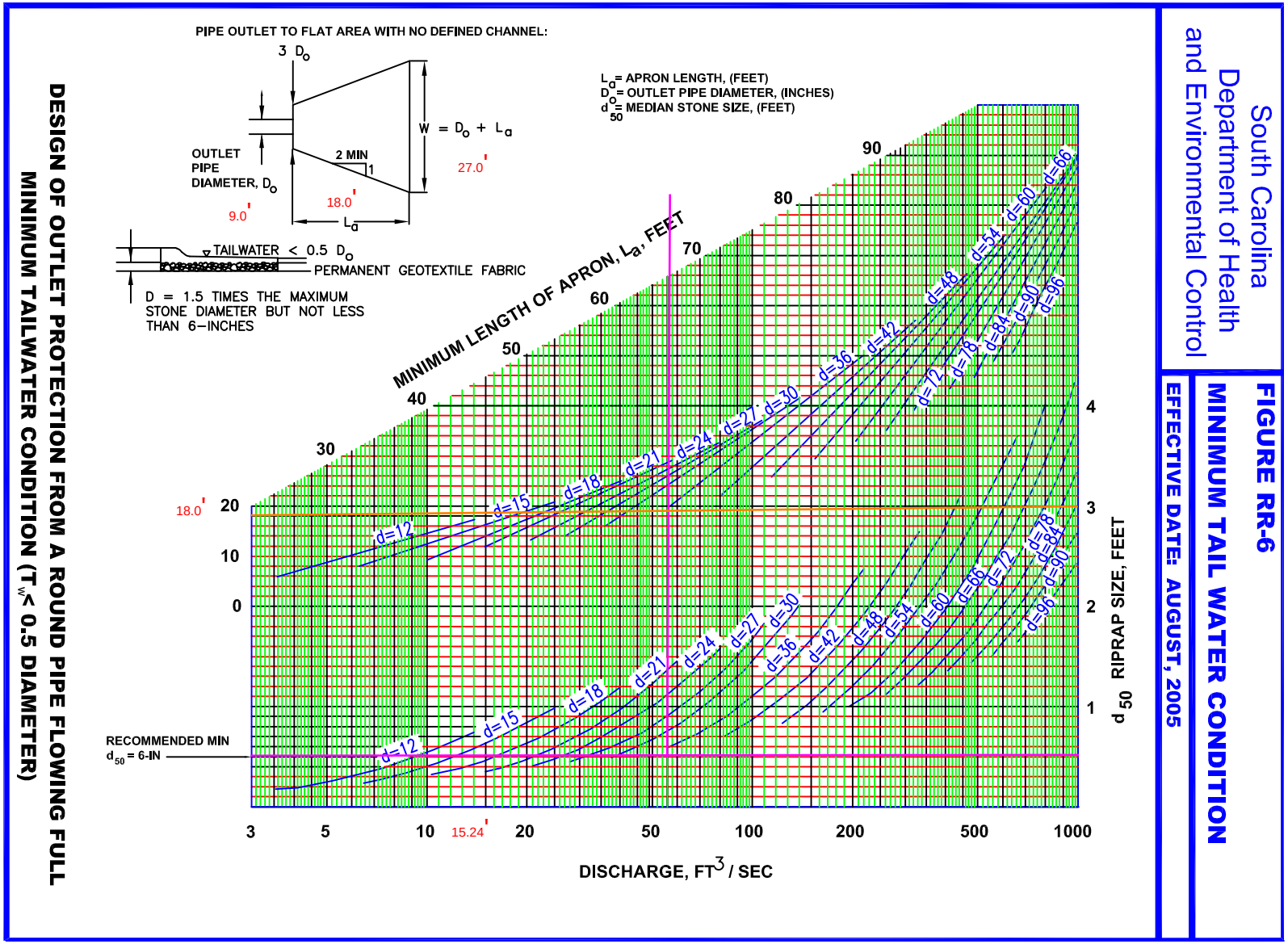
South Carolina
Department of Health
and Environmental Control

FIGURE RR-6

MINIMUM TAIL WATER CONDITION

EFFECTIVE DATE: AUGUST, 2005

RIP-RAP FOR OUTFALL PIPE OF DETENTION BASIN 3



DESIGN OF OUTLET PROTECTION FROM A ROUND PIPE FLOWING FULL

MINIMUM TAILWATER CONDITION (T_w< 0.5 DIAMETER)

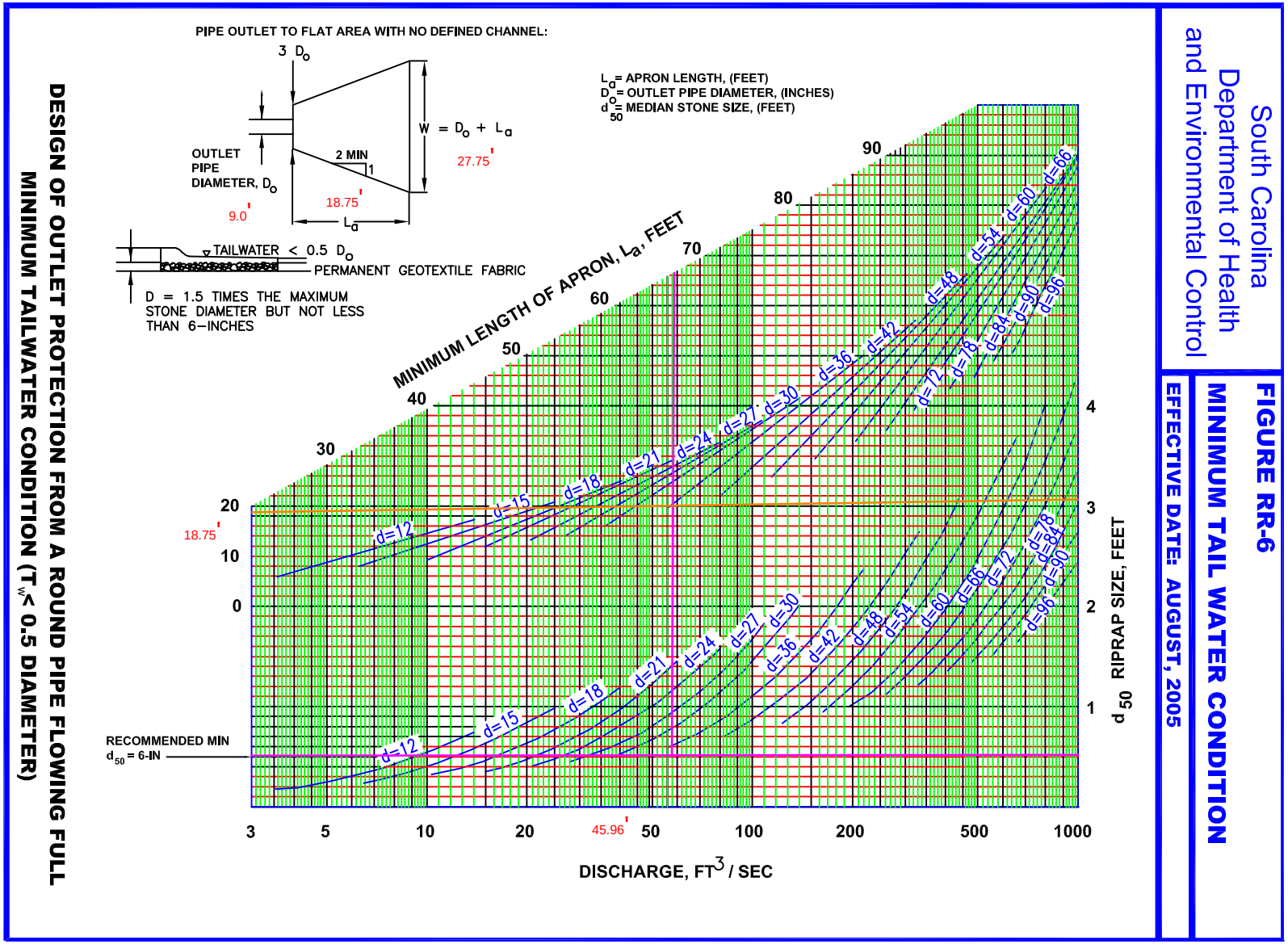
South Carolina
Department of Health
and Environmental Control

FIGURE RR-6

MINIMUM TAIL WATER CONDITION

EFFECTIVE DATE: AUGUST, 2005

RIP-RAP FOR OUTFALL PIPE OF 36" RCP PIPE IN CELL 1



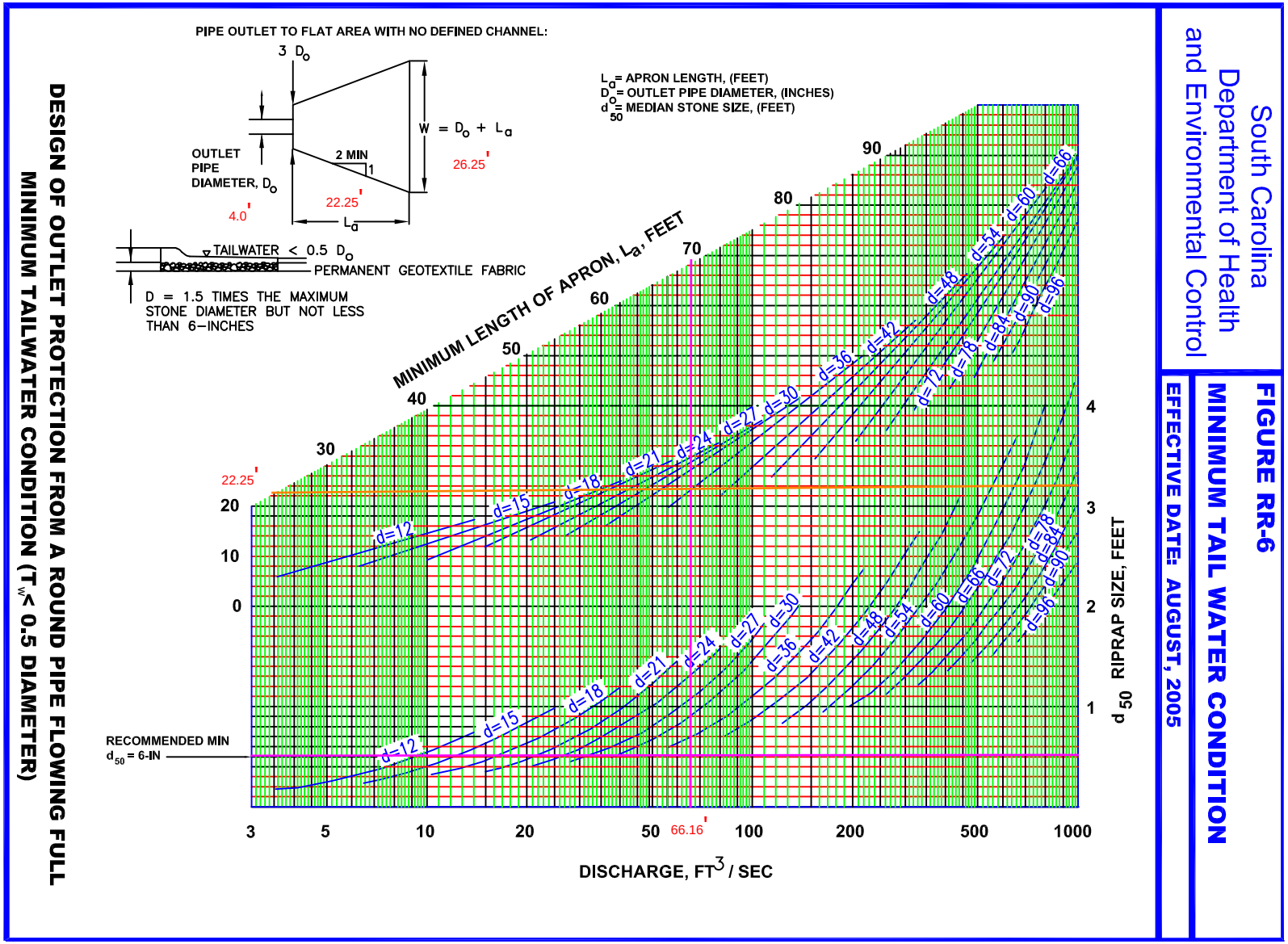
South Carolina Department of Health and Environmental Control

FIGURE RR-6

MINIMUM TAIL WATER CONDITION

EFFECTIVE DATE: AUGUST, 2005

RIP-RAP FOR OUTFALL 24" PIPE IN CELL 2



DESIGN OF OUTLET PROTECTION FROM A ROUND PIPE FLOWING FULL

MINIMUM TAILWATER CONDITION (T_w< 0.5 DIAMETER)

South Carolina
Department of Health
and Environmental Control

FIGURE RR-6

MINIMUM TAIL WATER CONDITION

EFFECTIVE DATE: AUGUST, 2005