Run-on and Run-off Control System Plan

H.W. Pirkey Power Plant Landfill
Hallsville, Harrison County, Texas

October 6, 2021
Akron Project Number: 237P-2109

Prepared for:
American Electric Power
1 Riverside Plaza
Columbus, Ohio 43215

Prepared by:
Akron Consulting, LLC
431 N Center St.
Longview, Texas 75601
TBPE Firm # 14014

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1.0 INTRODUCTION

30 TAC 352.811 (Federal Regulation Title 40, Part 257.81) requires the owner or operator of an existing or new CCR landfill or any lateral expansion of an existing CCR landfill to comply with the following:

1. A run-on control system to prevent flow onto the active portion of the CCR unit during the peak discharge from a 24-hour, 25-year storm.
2. A run-off control system from the active portion of the CCR unit to collect and control at least the water volume resulting from a 24-hour, 25-year storm.
3. Run-off from the active portion of the CCR unit must be handled in accordance with the surface water requirements under §257.3-3.
4. Prepare initial and periodic run-on and run-off control system plans for the CCR unit according to the following timeframes:
    a. For existing CCR landfills, the owner or operator of the CCR unit must prepare the initial run-on and run-off control system plan no later than October 17, 2016.
    b. The owner or operator of the CCR unit must prepare periodic run-on and run-off control system plans every five (5) years.
5. Obtain a certification from a qualified professional engineer stating that the initial and periodic run-on and run-off control system plans meet the requirements of this section.
6. Comply with the recordkeeping requirements specified in §257.105(g), the notification requirements specified in §257.106(g), and the internet requirements specified in §257.107(g).

This Plan represents the 5-year revision of the original Run-on and Run-off Control System Plan, dated October 2016, and presents the regulatory-required materials as noted above. It is prepared for the existing landfill at AEP's H.W. Pirkey Power Plant in Hallsville, Texas. The landfill operation has installed and is maintaining the planned storm water control measures discussed in this plan. Attached Figure 1 – Overall Landfill Exhibit illustrates the landfill complex showing the storm water drainage systems as of October 2021.

2.0 RUN-ON CONTROLS

The purpose of run-on controls is to prevent the flow of water onto the active portion of the landfill during the peak discharge from a 24-hour, 25-year storm. The controls may be permanent or temporary, and their function may also change over time as landfill development proceeds. Controls must consider site conditions outside of the landfill footprint as well as site conditions within the landfill footprint.

2.1 Run-On Controls Outside the Landfill Footprint

2.1.1 Stormwater Perimeter Ditches

Perimeter drainage ditches around the active landfill provide controls to handle run-on from outside the active landfill footprint. The perimeter ditches define the limits of the active landfill ash disposal area/footprint. The perimeter ditches direct stormwater around the landfill pond to the south, and stormwater enters an unnamed tributary that flows 0.8 mile to Hatley Creek.

The perimeter ditches were designed to adequately handle the peak flow from a 24-hour, 25-year storm event. The design calculations are provided in Figure 3. Locations of the perimeter collection and diversion channels are also shown on Figure 1 – Overall Landfill Exhibit.

2.2 Run-On Controls Inside the Landfill Footprint

Run-on controls inside the landfill footprint are in place to ensure that stormwater from closed landfill cells does not enter the active landfill footprint.

2.2.1 Landfill Phasing and Construction Practices

The landfill at H.W. Pirkey Power Plant is broken into multiple cells, which are named based on the year they were constructed. Currently the active landfill cells are the 2012 Cell and 2015 Cell, and all other landfill cells have been capped and covered and are now closed. The closed landfill cells are graded to divert stormwater away from the active landfill cell, and into a storm sewer system with letdowns to capture water from the benches of the cell as well. See the figures in the appendix for the landfill configuration.

2.2.1.1 *Active Filling – 2012 and 2015 Cells*

Active filling currently occurs in the 2012 and 2015 Landfill Cells. Prior to the construction of the 2020 Cap & Cover Project, the access road along the west side of the cell served as a stormwater diversion berm. All capped and covered cells adjacent to the active area to the north and east are graded to divert water away from the active cell and ultimately into stormwater perimeter ditches that bypass the landfill pond. Run-on controls within the landfill footprint consist of underdrain systems. The underdrain system for the 2012 Cell discharges into the landfill pond, and the underdrain system for the 2015 Cell by-passes the pond. Run-off controls consist of a berm on the south and west sides of the active landfill cell. Also, a leachate collection system and a contact stormwater system serve to collect contact water from the cell and carry the water to the landfill pond.

2.2.1.2 *Future Filling – 2018 Cell*

Future filling will occur in Phase I of the 2018 Landfill Cell. The 2018 Cell is already constructed; however, active filling will only commence once the 2015 Cell is at capacity. Once the 2015 Cell is closed, it will slope away from the active landfill to a storm water letdown system that carries water to a perimeter ditch that bypasses the landfill pond. Run-on controls within the landfill footprint consist of an underdrain system that will discharge into a ditch that bypasses the landfill pond. Run-off controls consist of a perimeter HDPE lined ditch on the south and west sides of the landfill cell. Also, a leachate collection system will serve to collect leachate and contact stormwater from the cell and carry the contact water to the landfill pond.

2.2.2 Underdrain System

Underneath the active HDPE lined landfill cells, an underdrain system was installed to convey groundwater to perimeter ditches or the landfill pond. The underdrain systems consist of perforated HDPE pipes that are wrapped in SB57 rock, and then wrapped in filter fabric. The pipe systems are in a drainage layer that directs groundwater to the pipe systems, which are located under low areas or valleys in the liner, generally directly underneath the leachate pipe systems and perimeter stormwater ditches.

3.0 RUN-OFF CONTROLS

The run-off control system prevents flow (contact water) from leaving the active portion of the landfill during the peak discharge from a 24-hour, 25-year storm. Run-off control consists of the following aspects:

- Perimeter ditches
- Leachate collection system
- Landfill Pond
- Ash filling operation

Stormwater from the active landfill travels to the landfill pond via perimeter ditches, a contact stormwater pipeline, or through the leachate collection system via chimney drains. The leachate collection system is similar to the underdrain system, but differs in that it is located in a drainage layer above the HDPE liner of the cell, and conveys leachate from the active landfill cell to the landfill pond. Chimney drains in the 2015 Cell are utilized to capture stormwater from the top of the active landfill cell, and these chimney drains tie directly into the leachate system. Ash filling operation is managed such that contact water is directed to the chimney drains. The run-off control features are presented on the attached figures in the appendix. The following further describes the run-off control components.

3.1 Perimeter Ditches

Perimeter ditches are constructed around the active-phase and future filling areas. These ditches serve to convey stormwater from the active landfill to the landfill pond. All ditches were designed to adequately convey the water volume resulting from a 24-hour, 25-year storm event. The leachate collection system and ash filling operation use the ditches as part of their control systems as described below. The design calculations for the perimeter ditches are provided on Figure 3.

3.2 Leachate Collection System

The leachate collection system consists of 2-ft-thick minimum drainage layer over the landfill composite liner system and a network of perforated collection pipes. The composite liner system is sloped to promote drainage to the leachate collection pipe network, and the leachate collection pipe network discharges into the landfill pond. The leachate collection pipe network spacing is a function of the base grade liner slope, drainage layer permeability, and flow distance to collection pipes. The Hydraulic Evaluation of Landfill Performance (HELP) model was used in evaluating the pipe spacing with respect to contact water percolation to the leachate collection drainage layer, the minimum liner slope, and a selected pipe spacing or flow distance to a collection pipe.

Design of the chimney drains considered a 24-hour, 25-year storm event and a drainage area of approximately 10 acres for the active area. This resulted in a controlled discharge of storm water into the chimney drains and down to the leachate collection pipes.

3.3 Landfill Pond

All stormwater from the active landfill discharges into the landfill pond. The landfill pond was designed for the 24-hour, 25-year storm. However, the current landfill pond is serving as a total containment pond, meaning that stormwater that is collected in the pond is not treated and released downstream. Instead, water from the pond is pumped to the plant for evaporation. Also, an evaporator system is locally utilized in the pond. In case of emergencies, the pond does have an emergency spillway that can be utilized.

3.4 Ash Filling Operation

The ash filling operation must be performed in a manner to provide run-off control within the disposal cell such that the contact surface water reaches the leachate collection system. This involves grading the placed ash in a controlled manner to direct contact surface water flow toward the chimney drain structures in the interior portions of the disposal area. Ash grading must be directed away from the outside slopes, which have been capped.

4.0 PLAN REVIEW AND CHANGES IN FACILITY OPERATION

Landfill Owner and/or Operator will review and evaluate this Plan every five (5) years from initial plan preparation and when there are changes in the facility design, construction, operation, or maintenance that materially affect the facility's potential for run-on and run-off control. Amendments to the Plan made to address changes of this nature are referred to as technical or major amendments, and must be certified by a P.E. Non-technical amendments can be performed by the facility owner and/or operator. This Plan represents the 5-year revision of the original Run-on and Run-off Control System Plan, dated October 2016.

Technical and administrative amendments to the Plan have been and will continue to be documented on the Plan Review Log. Owner/Operator will make the necessary revisions to the Plan as soon as possible, but no later than six months after the change occurs. The Plan must be implemented as soon as possible following a technical amendment, but no later than six months from the date of the amendment. The Designated Person is responsible for initiating and coordinating revisions to the SPCC Plan.

Scheduled reviews and Plan amendments will be recorded in the Plan Review Log provided in Appendix 2. The log will be completed even if no amendment is made to the Plan as a result of the review.

5.0 PROFESSIONAL ENGINEER CERTIFICATION

This revised Plan, and all subsequent reviews and amended plans, must obtain certification from a qualified P.E. stating that the initial and subsequent run-on and run-off control system plans meet the requirements of 40 CFR 257. This certification in no way relieves the owner or operator of the facility of his/her duty to fully implement this Plan. The Professional Engineer Certification page is provided in Appendix C.

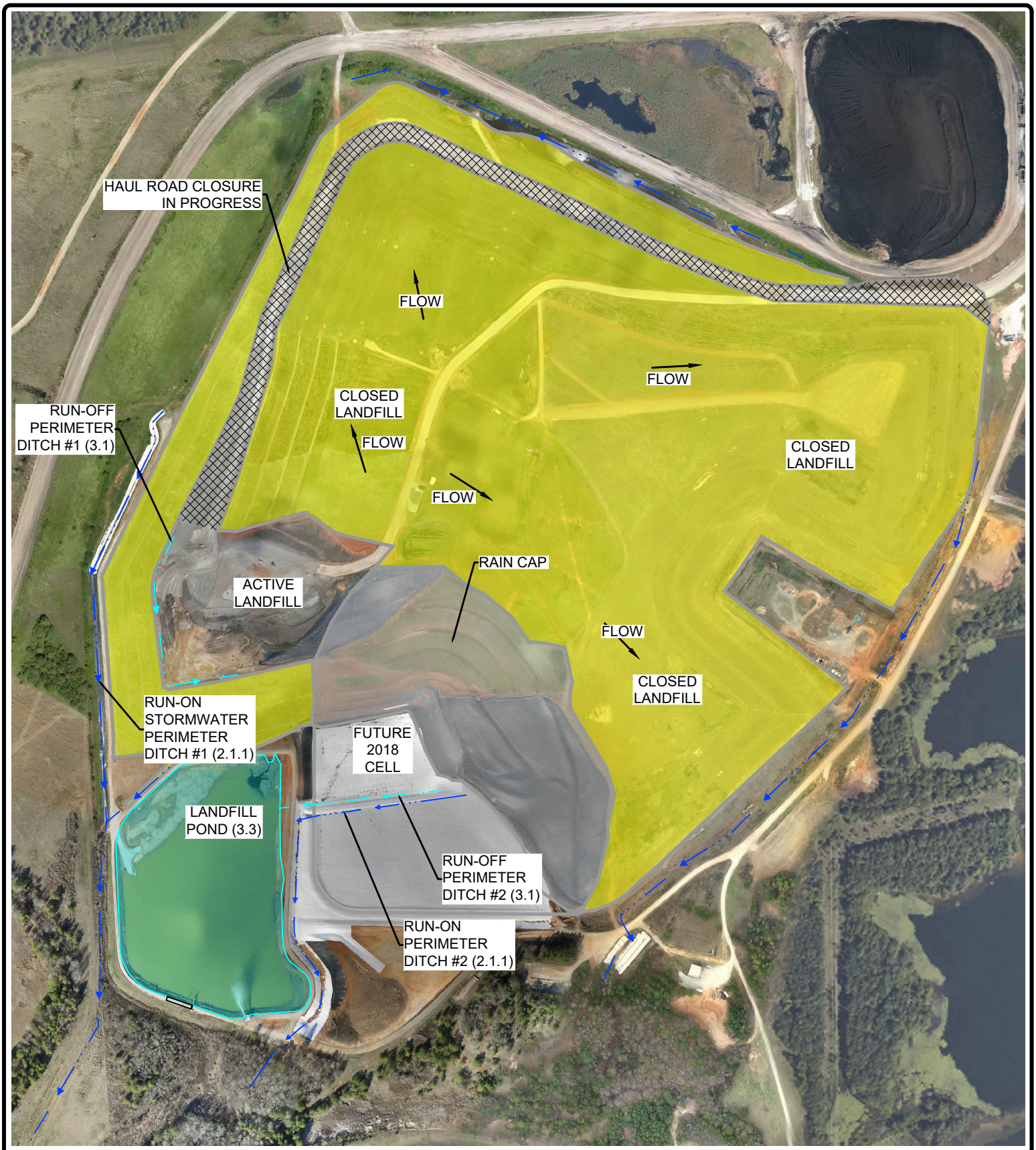
APPENDIX A:
Figures and Calculations

Figure 1: Overall Landfill Exhibit

Figure 2: Active and Future Landfill

Figure 3: Hydrology Exhibit

Associated Calculations



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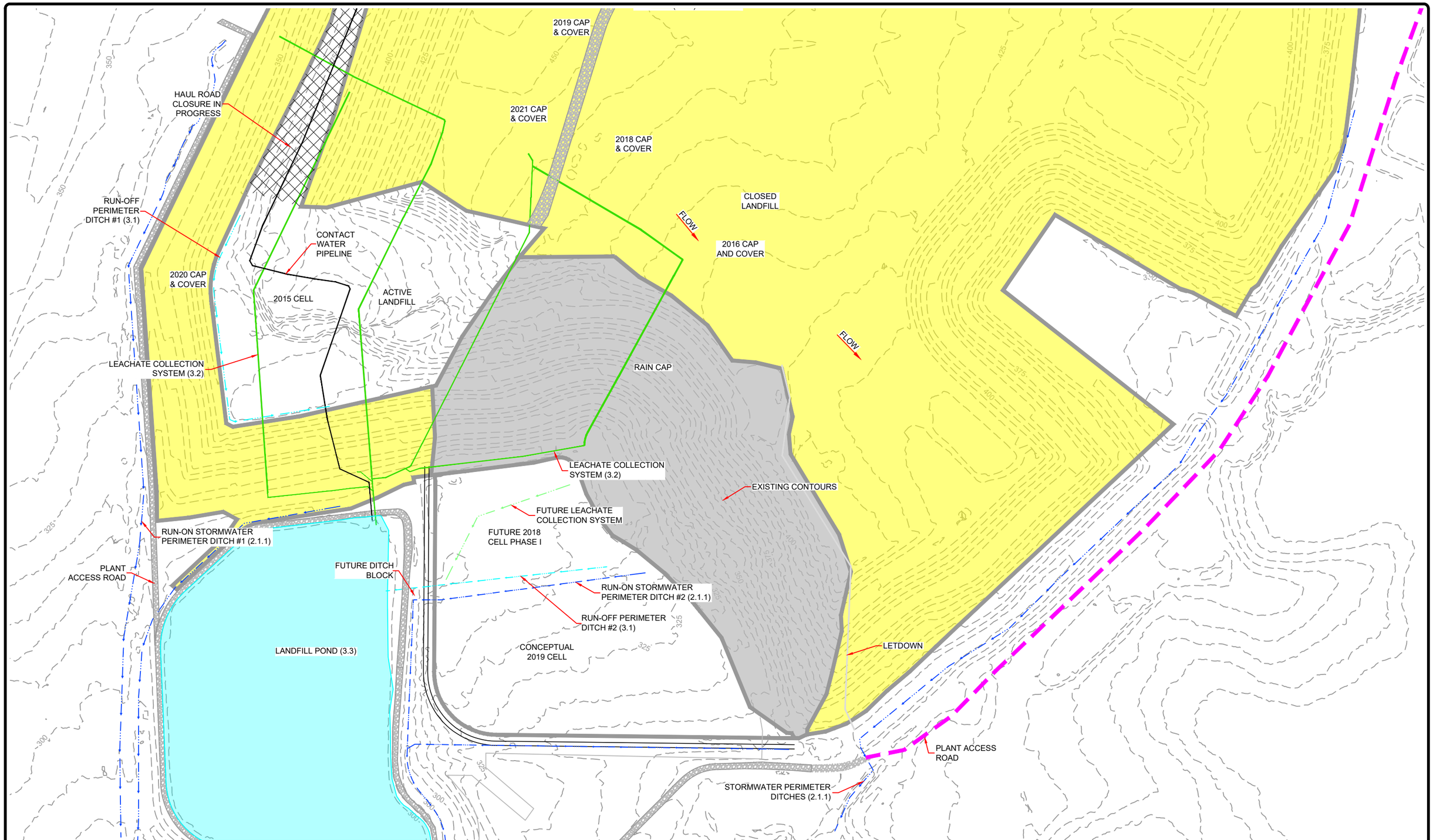
0 500' 1000'

1"=500'

N

FIGURE 1
OVERALL
LANDFILL EXHIBIT



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0 250' 500'

1"=250'

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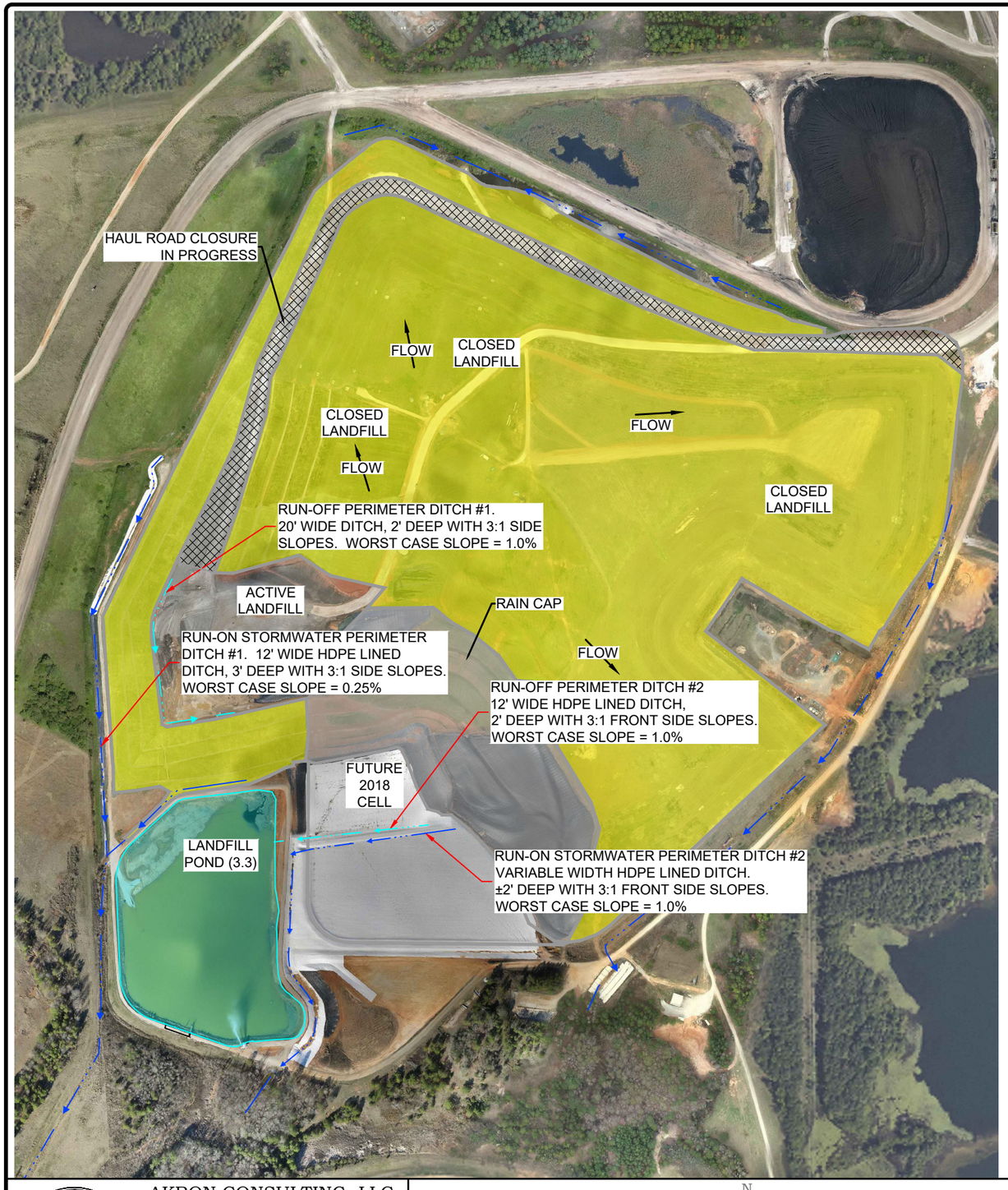
FIGURE 2
ACTIVE & FUTURE LANDFILL



DITCH DESCRIPTION	CAPACITY	25 YR, 24 HR FLOW
RUN-ON STORMWATER PERIMETER DITCH #1	626 CFS	*150 CFS
RUN-OFF PERIMETER DITCH #1	527 CFS	70 CFS
RUN-ON STORMWATER PERIMETER DITCH #2	568 CFS	61 CFS
RUN-OFF PERIMETER DITCH #2	453 CFS	25 CFS

*FLOW WAS ESTIMATED FROM PREVIOUS HYDROLOGIC & HYDRAULIC MODELS FOR UPSTREAM PIPE SYSTEM.

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0 500' 1000'
1"=500'

N

FIGURE 3
HYDROLOGY
EXHIBIT

Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2012 by Autodesk, Inc. Friday, Oct 1 2021

Run-on Stormwater Perimeter Ditch #1

Trapezoidal

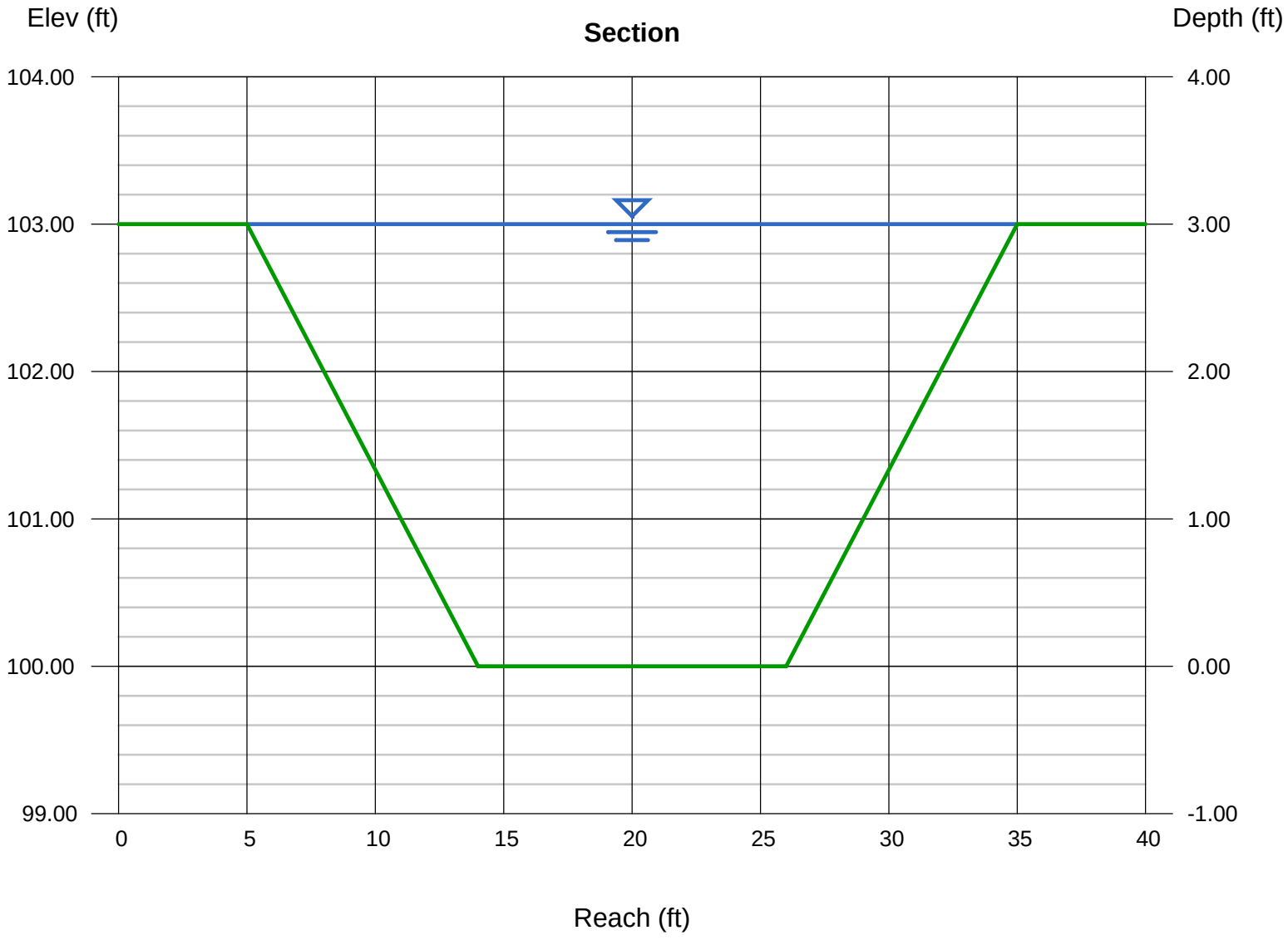
Bottom Width (ft)	= 12.00
Side Slopes (z:1)	= 3.00, 3.00
Total Depth (ft)	= 3.00
Invert Elev (ft)	= 100.00
Slope (%)	= 0.25
N-Value	= 0.012

Calculations

Compute by:	Known Depth
Known Depth (ft)	= 3.00

Highlighted

Depth (ft)	= 3.00
Q (cfs)	= 626.35
Area (sqft)	= 63.00
Velocity (ft/s)	= 9.94
Wetted Perim (ft)	= 30.97
Crit Depth, Yc (ft)	= 3.00
Top Width (ft)	= 30.00
EGL (ft)	= 4.54



Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2012 by Autodesk, Inc. Friday, Oct 1 2021

Run-off Perimeter Ditch #1

Trapezoidal

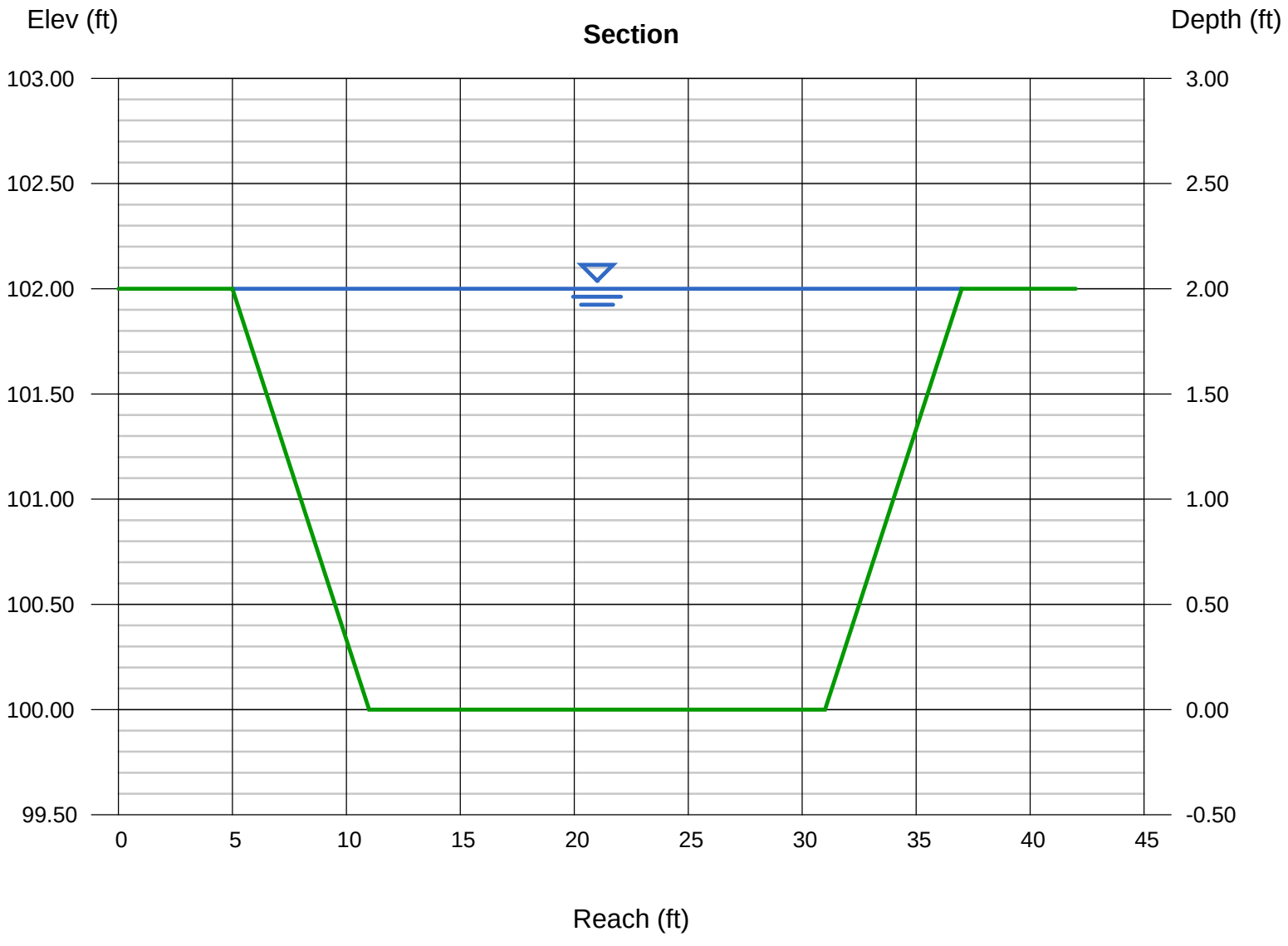
Bottom Width (ft)	= 20.00
Side Slopes (z:1)	= 3.00, 3.00
Total Depth (ft)	= 2.00
Invert Elev (ft)	= 100.00
Slope (%)	= 1.00
N-Value	= 0.020

Calculations

Compute by:	Known Depth
Known Depth (ft)	= 2.00

Highlighted

Depth (ft)	= 2.00
Q (cfs)	= 527.00
Area (sqft)	= 52.00
Velocity (ft/s)	= 10.13
Wetted Perim (ft)	= 32.65
Crit Depth, Yc (ft)	= 2.00
Top Width (ft)	= 32.00
EGL (ft)	= 3.60

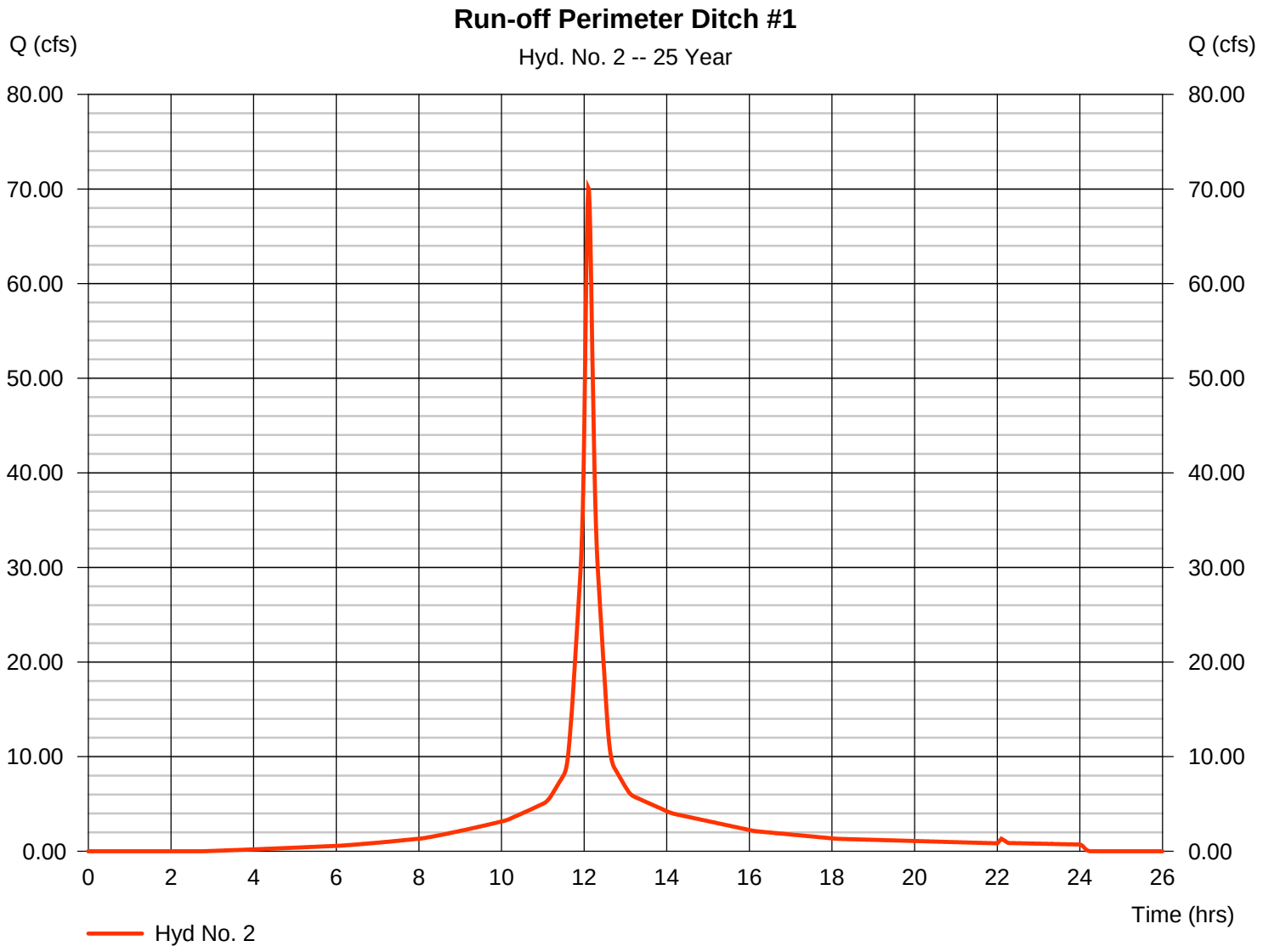


Hydrograph Report

Hyd. No. 2

Run-off Perimeter Ditch #1

Hydrograph type	=	SCS Runoff	Peak discharge	=	70.13 cfs
Storm frequency	=	25 yrs	Time to peak	=	12.10 hrs
Time interval	=	1 min	Hyd. volume	=	5.918 acft
Drainage area	=	10.000 ac	Curve number	=	90
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	10.00 min
Total precip.	=	8.30 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484



Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2012 by Autodesk, Inc. Friday, Oct 1 2021

Run-on Stormwater Perimeter Ditch #2

User-defined

Invert Elev (ft)	= 100.00
Slope (%)	= 1.00
N-Value	= Composite

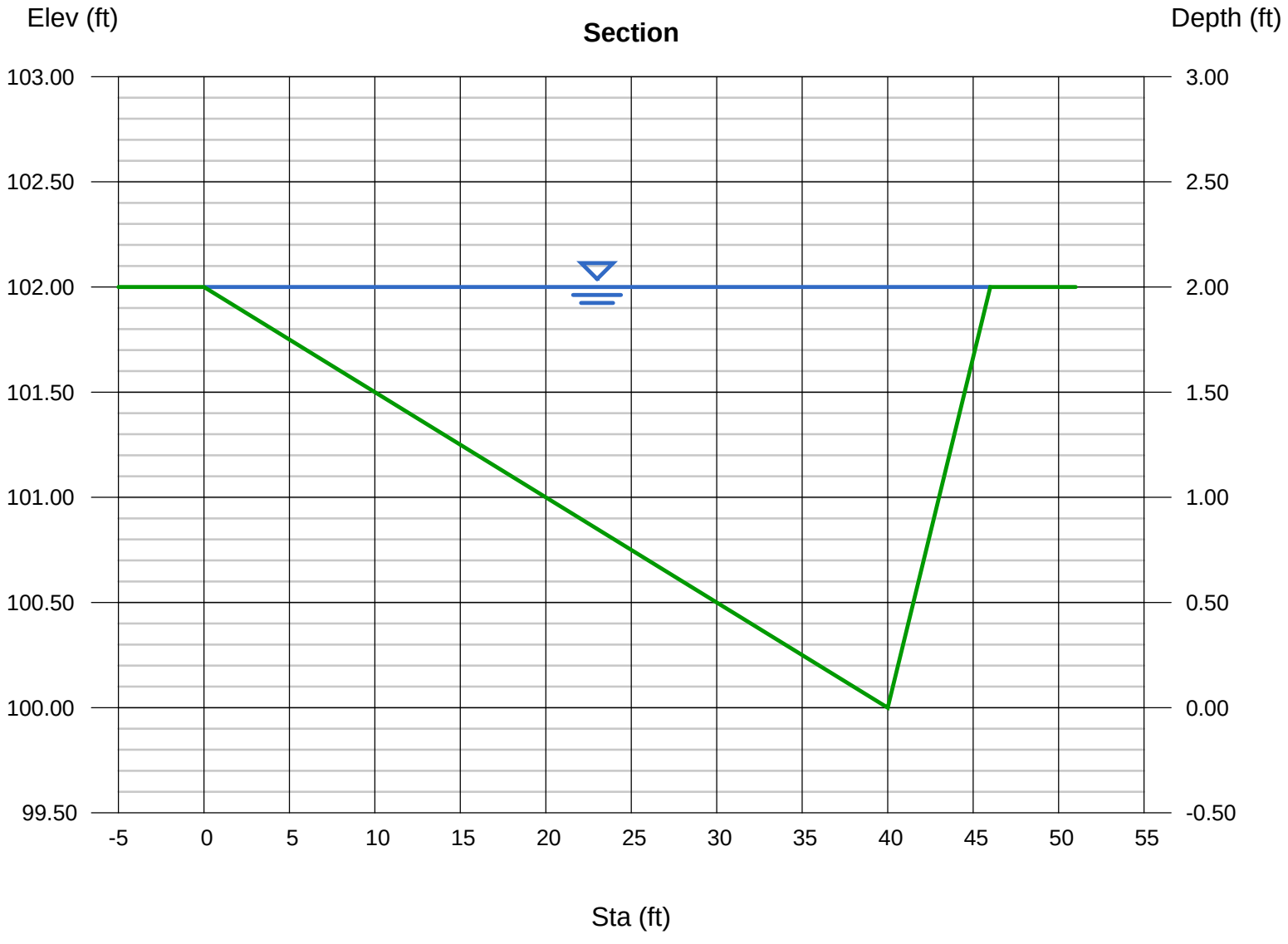
Calculations

Compute by:	Q vs Depth
No. Increments	= 1

(Sta, El, n)-(Sta, El, n)... (0.00, 102.00, 0.013)-(40.00, 100.00, 0.012)-(46.00, 102.00, 0.012)

Highlighted

Depth (ft)	= 2.00
Q (cfs)	= 567.81
Area (sqft)	= 46.00
Velocity (ft/s)	= 12.34
Wetted Perim (ft)	= 46.37
Crit Depth, Yc (ft)	= 0.01
Top Width (ft)	= 46.00
EGL (ft)	= 4.37



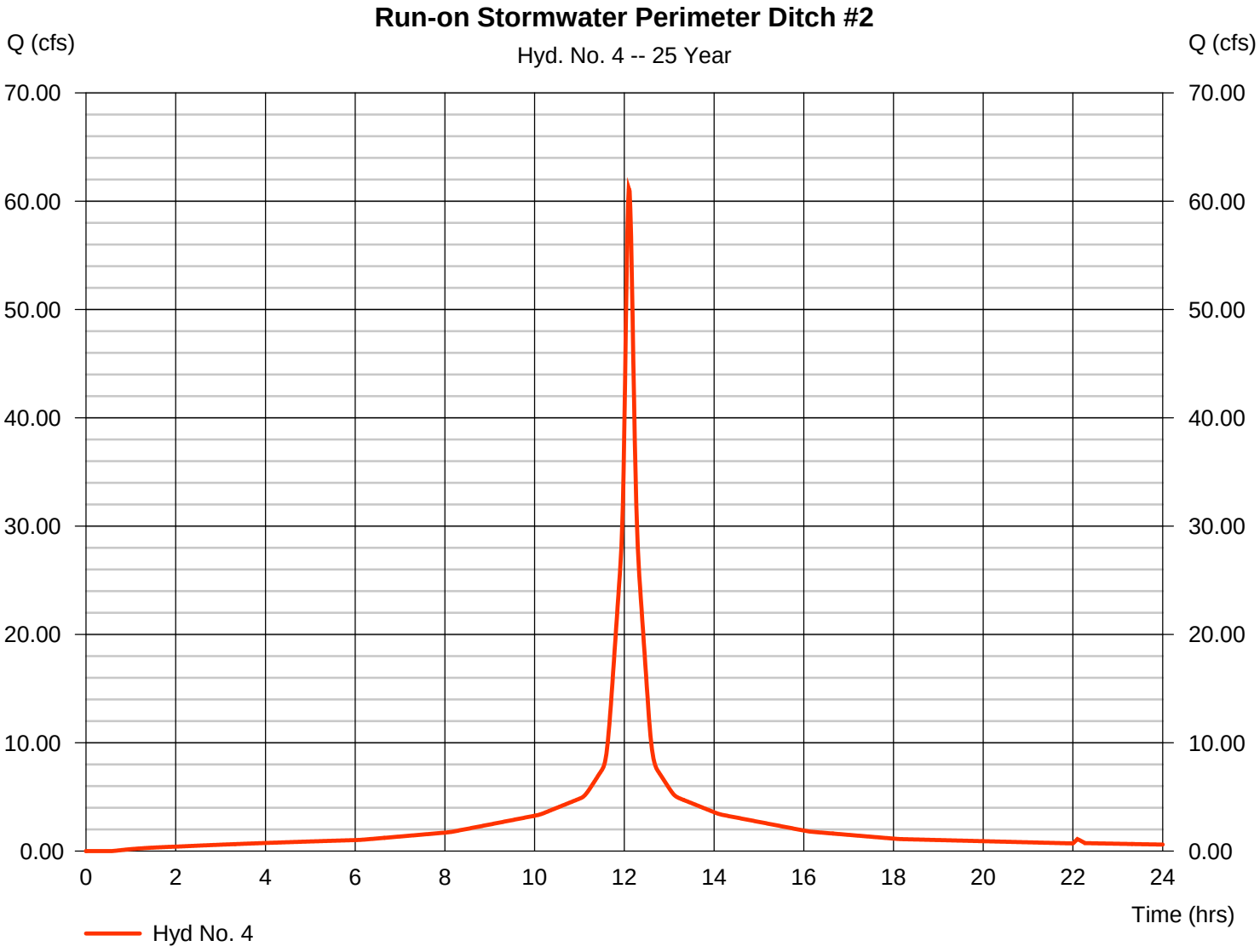
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2012 by Autodesk, Inc. v9 Friday, 00 1, 2021

Hyd. No. 4

Run-on Stormwater Perimeter Ditch #2

Hydrograph type	= SCS Runoff	Peak discharge	= 61.16 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.10 hrs
Time interval	= 1 min	Hyd. volume	= 5.575 acft
Drainage area	= 8.300 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 8.30 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2012 by Autodesk, Inc. Friday, Oct 1 2021

Run-off Perimeter Ditch #2

User-defined

Invert Elev (ft)	= 100.00
Slope (%)	= 1.00
N-Value	= Composite

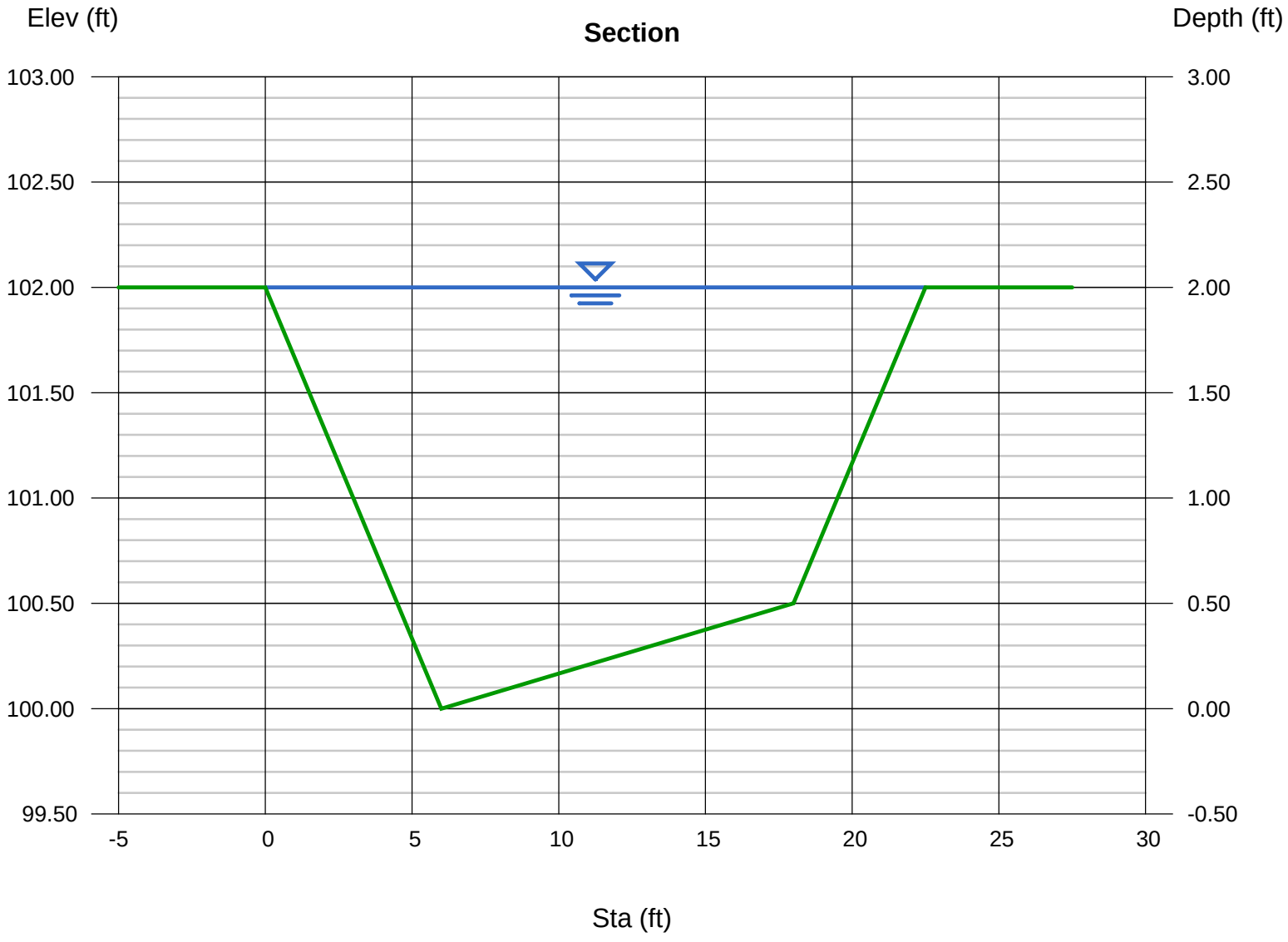
Calculations

Compute by:	Q vs Depth
No. Increments	= 1

(Sta, El, n)-(Sta, El, n)... (0.00, 102.00, 0.012)-(6.00, 100.00, 0.012)-(18.00, 100.50, 0.012)-(22.50, 102.00, 0.012)

Highlighted

Depth (ft)	= 2.00
Q (cfs)	= 452.79
Area (sqft)	= 30.38
Velocity (ft/s)	= 14.91
Wetted Perim (ft)	= 23.08
Crit Depth, Yc (ft)	= 0.01
Top Width (ft)	= 22.50
EGL (ft)	= 5.45



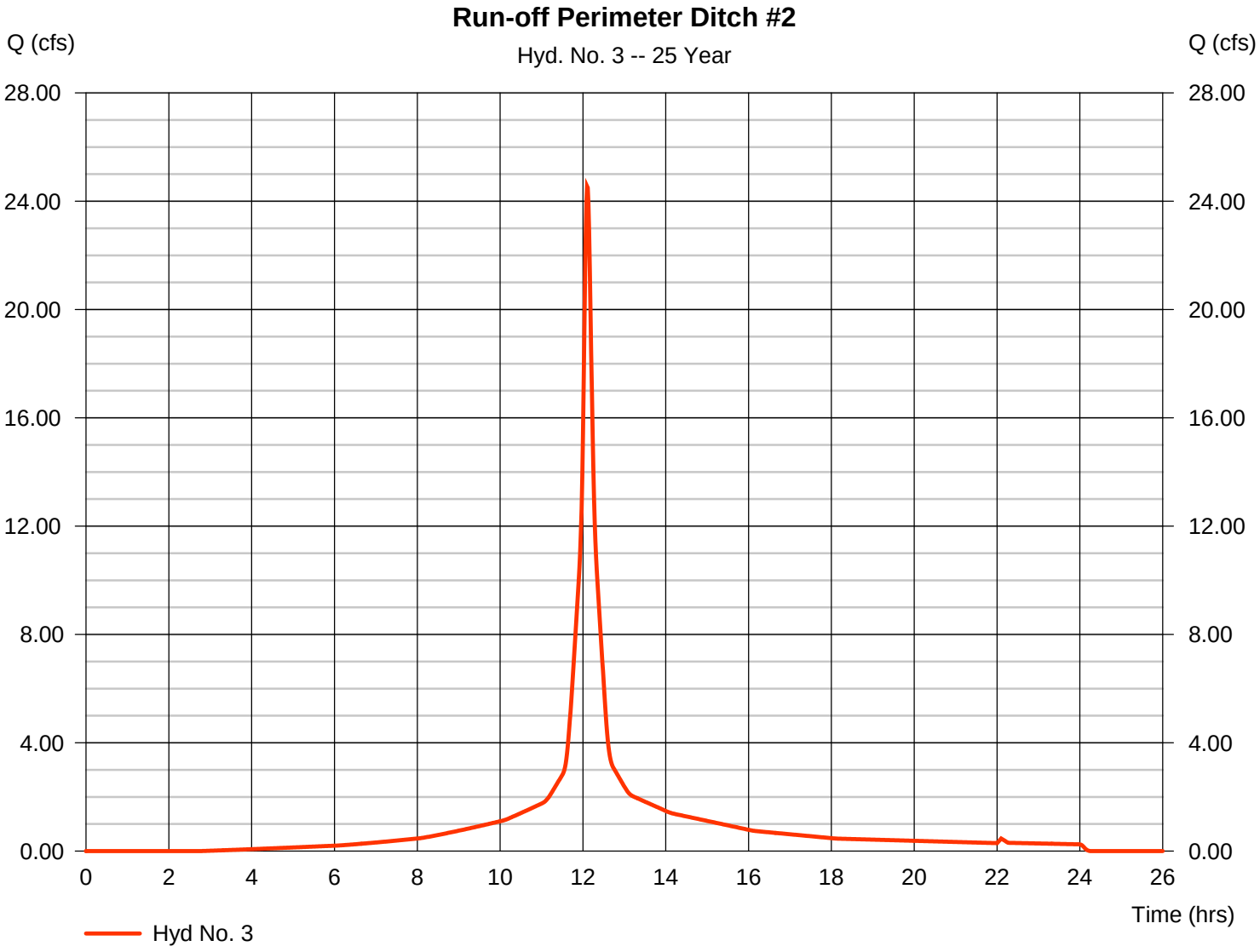
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2012 by Autodesk, Inc. v9 Friday, 00 1, 2021

Hyd. No. 3

Run-off Perimeter Ditch #2

Hydrograph type	= SCS Runoff	Peak discharge	= 24.55 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.10 hrs
Time interval	= 1 min	Hyd. volume	= 2.071 acft
Drainage area	= 3.500 ac	Curve number	= 90
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 8.30 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



APPENDIX B:
Run-On and Run-Off Plan Review Log

Plan Review and Changes in Facility Configuration

Scheduled reviews and Plan amendments shall be recorded in the Plan Review Log below. This log must be completed even if no amendment is made to the Plan as a result of the review.

By	Date	Amendment Description	P.E. Certification Required?	P.E. Name	Licensing State: Registration No.
Akron Consulting, LLC	10/14/2016	Initial Plan	Yes	Landon C. Allen	TX 119170
Akron Consulting, LLC	10/06/2021	5-Year Plan Revision	Yes	Lane D. Roberts	TX 105135

APPENDIX C:
Professional Engineer Certification

Professional Engineer Certification

The Run-on and Run-off System Control Plan for the H.W. Pirkey Power Plant Landfill was prepared by Akron Consulting, LLC (TBPE Firm #14014). This Certification/Statement of Professional Opinion is limited to the information available to Akron at the time the Plan was written. On the basis of and subject to the foregoing, it is my professional opinion as a Professional Engineer licensed in the State of Texas, that the Plan has been prepared in accordance with good and accepted engineering practices as exercised by other engineers practicing in the same discipline(s), under similar circumstances and at the time and in the same locale. It is my professional opinion that the Plan was prepared, reviewed, and revised in accordance with the current requirements of 30 TAC 352.811 (Federal Regulation Title 40, Part 257.81).

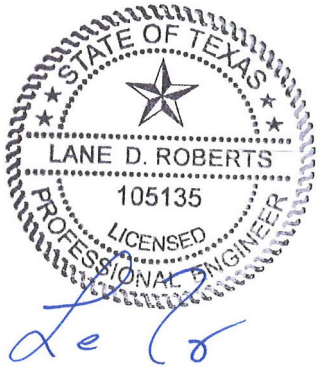
The use of the words "certification" and/or "certify" in this document shall be interpreted and construed as a Statement of Professional Opinion, and is not and shall not be interpreted or construed as a guarantee, warranty or legal opinion. This certification in no way relieves the Owner or Operator of the facility of his/her duty to fully implement this Plan.

Engineer: Lane D. Roberts

Registration Number: 105135

State: Texas

Date: 10/06/2021



P.E. certification is required for the original Plan and Plan reviews and amendments.

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