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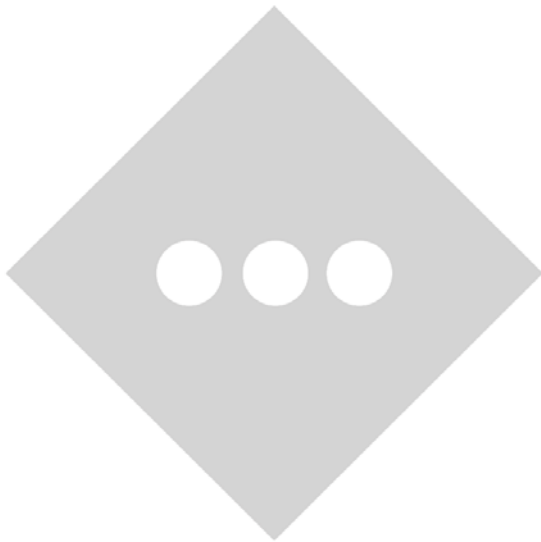
STORMWATER MANAGEMENT REPORT EXECUTIVE DRIVE RESIDENTIAL

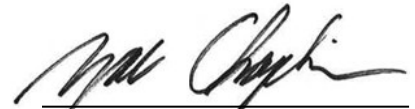
PROPOSED MULTI-FAMILY RESIDENTIAL DEVELOPMENT
BLOCK 155, LOTS 40.02, 42.01, & 42.02
100-300 EXECUTIVE DRIVE
TOWNSHIP OF WEST ORANGE
ESSEX COUNTY, NEW JERSEY

PREPARED FOR:
GREEN ESSEX PARTNERS URBAN RENEWAL ENTITY, LLC

PREPARED BY:
STONEFIELD ENGINEERING & DESIGN, LLC
584 BROADWAY, SUITE 310
NEW YORK, NEW YORK

REPORT DATE:
MAY 7, 2020




ZACHARY E. CHAPLIN, PE
NJ PE LICENSE # 53605

I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED IN THIS DOCUMENT AND ALL ATTACHMENTS AND THAT, BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING AND PREPARING THE INFORMATION, I BELIEVE THAT THE INFORMATION IS TRUE, ACCURATE, AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR KNOWINGLY SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT.

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1.0 PROJECT DESCRIPTION

Green Essex Partners Urban Renewal Entity, LLC is proposing to redevelop Block 155, Lots 40.02, 42.01, & 42.02 (herein referred to as the “project site”) to accommodate three multi-family residential buildings (425 units total), a parking garage (570 spaces), and an amenity area for residents. Additional improvements include off-street parking lots, stormwater management improvements, lighting, and landscaping.

Refer to **APPENDIX A** for project maps of the subject site.

The project site is 18.16 acres, the extent of land disturbance is 16.75 acres, and the project will result in a reduction of 8,909 SF of impervious surfaces.

This Report has been prepared to analyze the potential stormwater runoff impacts of the proposed project site and outline proposed measures to conform to the stormwater management regulations set forth by the Township of West Orange, Hudson-Essex-Passaic Soil Conservation District, and the New Jersey Department of Environmental Protection.

2.0 EXISTING CONDITIONS

EXISTING SITE DEVELOPMENT

The project site is located off Rooney Circle and is serviced by a private road known as Executive Drive. The project site has been historically developed with office buildings since the 1980's. The existing development will be removed entirely as part of the proposed redevelopment, with the exception of the office building located on 300 Executive Drive. An Aerial Map depicting the existing site conditions can be found in **APPENDIX A**.

EXISTING TOPOGRAPHY

The project site generally slopes from east to west with about a 75 FT grade change across the development area. The majority of the area within the northeast portion to the site drains to an existing ditch and retention pond, which is ultimately tributary to the unnamed ditch with straddles the northerly property line. The area south of the central ditch and retention pond, generally drains to on-site conveyance systems, which are tributary to the northerly ditch. Grades on site generally range from 5% to 10% within the previously developed areas / open space and increases in slope as it approaches the ditch or perimeter areas, eventually reaching 1:1 slopes.

PROJECT SITE SOILS

Soil mapping was obtained from the National Resource Conservation Service (NRCS) for the project site and immediate area. Generally, the project site is underlain with two major soil groups: silty loam within the historically

undisturbed open space to the east of Mutton Hollow Road and urban fill / borrow material within the areas of existing development. Overall, the soils drain poorly, and runoff flows overland directly to the unnamed tributary. The table below provide a summary of soils for the project site:

TABLE 1: NRCS SOIL MAPPING RESULTS

Soil Unit Code	Soil Description	Approximate Project Coverage	Drainage Class	Hydrologic Soil Group
YaohEh	Yalesville, Holyoke Complex, 35 to 60 percent slopes	21.7%	Somewhat poorly drained	C
BogBc	Boonton Loam, 0 to 8 percent slopes	5.7%	Somewhat poorly drained	C
URBONB	Urban Land, Boonton Substratum, 0 to 8 percent slopes	50.6%	Somewhat poorly drained	D*

***URBONB** does not have a pre-determined hydraulic soil group due to high variability in the historic fill material utilized. As such, these soils are analyzed as **HSG D** under pre-existing and post-development conditions.

Additional information regarding the NRCS soil mapping can be found in **APPENDIX B**.

EXISTING ENVIRONMENTAL INVENTORY

The project site has two unnamed ditches, one which traversed the center of the project site and the other straddles the northerly property line. Through a Flood Hazard Area Applicability Determination, it has been confirmed that both ditches are regulated and is subject to a 50FT riparian zone. Additionally, two freshwater wetland / State Open Water areas are located immediately adjacent to both ditches per a Letter of Interpretation from NJDEP; the easterly portion of wetlands is subject to a 50FT transition area buffer. The other has been classified as an ordinary resource wetland with no associated transition area. The limits of these areas and associated buffer (where applicable) are shown on the Preliminary and Final Major Site Plans prepared by Stonefield in conjunction with this Report.

3.0 PROPOSED CONDITIONS

PROPOSED SITE DEVELOPMENT

The proposed redevelopment will consist of three multi-family residential buildings (425 units total), a parking garage (570 spaces), and an amenity area for residents. Additional improvements include off-street parking lots, stormwater management upgrades, lighting, and landscaping. Access to the site will be provided via the existing driveway on Rooney Circle. Executive Drive will be re-paved and new internal driveways will connect to Executive Drive. Refer to **APPENDIX A** for a half-size Overall Site Plan depicting the proposed project improvements.

PROPOSED TOPOGRAPHY

Project site topography and drainage patterns will generally remain similar to existing conditions; however, due to the need for more commercially friendly, ADA compliant grades (1.5% to 3%) various retaining walls and split-level building entrances will be implemented through the project to make up for the change in grades.

ANTICIPATED ENVIRONMENTAL INVENTORY IMPACTS

The proposed redevelopment will disturb land within environmentally regulated areas (riparian zone, freshwater wetland ditch, freshwater wetland transition area, state open waters). As such, permits and approvals will be sought from the NJDEP to perform work within these areas. The Township will remain apprised of the NJDEP permitting status as the project moves forward.

4.0 STORMWATER MANAGEMENT METHODOLOGY & PARAMETERS

HYDROLOGIC METHODOLOGY

The analysis program “HydroCAD” Version 10.0 by HydroCAD Software Solutions was utilized to calculate and plot the runoff hydrographs. The program incorporates the time of concentration, C values, rainfall data, and project drainage areas to calculate the runoff characteristics. The existing and proposed drainage areas have been analyzed utilizing Intensity-Duration-Frequency data was obtained from NOAA for the project area; specifics of the rainfall distribution can be found in Appendix C. Additional key variables utilized in the analysis include:

TABLE 2: HYDROCAD DESIGN VARIABLES

Variable	Input	Variable	Input
Runoff Calculation Method	SCS TR-20	NRCS Rainfall Frequency Data Set	Middlesex
Pervious/Impervious CN Calculations	Separate	Storm Intervals (Year Events)	2, 10, 25, 100
Stage-Storage Relationship	Dynamic	Storm Duration	24 Hours
Minimum time of concentration	10 minutes	Storm Curve	NOAA D

Additional information regarding the hydrologic calculations can be found in **APPENDIX C**.

HYDRAULIC METHODOLOGY

The analysis program “HydraFlow Storm Sewers” Version 2018 by Autodesk was utilized to generate hydraulic grade lines through the proposed conveyance system model based on various pipe / junction losses and the runoff tributary to each inlet or discharge structure. Additional key variables utilized in the analysis include:

TABLE 3: HYDRAFLOW DESIGN VARIABLES

Variable	Input	Variable	Input
Runoff Calculation Method	Rational	Pipe Conveyance Method	Std. Step
C-value for impervious surfaces	0.95	Initial Hydraulic Grade Line	Normalized
C-value for pervious surfaces	0.35	Inlet Drainage Area Delineation	Surveyed
Minimum time of concentration	10 minutes	Inlet Geometry & Capacity	NJDOT Std.

Additional information regarding the hydrologic calculations can be found in **APPENDIX C**.

5.0 STORMWATER ANALYSIS

EXISTING DRAINAGE AREAS

Under current conditions, the project site is subdivided into three drainage areas with one ultimate point of interest (POI) which is taken as the downstream point of the unnamed ditch, which straddles northerly property line. This POI was chosen as this is where all three areas’ drainage paths eventually converge. The drainage areas have been split up to delineate which area drains directly to the existing retention basin, the area tributary to the northeast outfall to the northerly ditch, and the area tributary directly to the northerly ditch, via on site conveyance system through 300 Executive Drive. See below for a short summary of each area:

TABLE 4: SUMMARY OF EXISTING DRAINAGE AREAS

Drainage Area	Description	Area Extents	Impervious Area	Time of Concentration
E-1	Existing Area Tributary to POI-1	304,647 SF	182,894 SF	10.0 Minutes*
E-2A	Existing Area Tributary to Aboveground Pond	278,126 SF	171,147 SF	10.0 Minutes*
E-2B	Existing Area Tributary to Culvert Downstream of Pond	41,911 SF	4,929 SF	10.0 Minutes*
E-3	Existing Area Tributary to POI-3	59,770 SF	24,755 SF	10.0 Minutes*
POI	Ultimate Point of Interest: Downstream Point of Unnamed Northerly Ditch	684,454 SF	383,725 SF	N/A

*The minimum time of concentration was utilized due to the high level of impervious coverage and steep slopes.

All existing drainage areas were delineated based on field surveying data and as-built roadway plans obtained from the Township as part of a records request. Hydrologic calculations and parameters for each drainage area can be found in **APPENDIX C**; specific drainage area delineations and land cover can be found in **APPENDIX E**.

PROPOSED DRAINAGE AREAS

Under proposed conditions, the general drainage patterns and ultimate point of interest will be maintained. A new conveyance system is proposed and certain drainage areas are proposed to be sent to various stormwater management features to mitigate flow rates and water quality as outlined in the next Report section. See below for a short summary of each area:

TABLE 5: SUMMARY OF PROPOSED DRAINAGE AREAS

Drainage Area	Description	Area Extents	Impervious Area	Time of Concentration
P-1A	Upper Detained Area Tributary to POI-1	129,383 SF	95,185 SF	10.0 Minutes*
P-1B	Lower Detained Area Tributary to POI-1	100,868 SF	85,579 SF	10.0 Minutes*
P-1C	Undetained Area Tributary to POI-1	113,686 SF	30,004 SF	10.0 Minutes*
P-2A	Proposed Area Tributary to Aboveground Pond	238,270 SF	142,897 SF	10.0 Minutes*
P-2B-1	Proposed Dog Park Area Tributary to Basin	55,047 SF	1,265 SF	10.0 Minutes*
P-2B-2	Proposed Area Tributary to Culvert Downstream of Existing Pond	12,169 SF	0 SF	10.0 Minutes*
P-3	Proposed Area Tributary to POI-3	35,031 SF	23,530 SF	10.0 Minutes*
POI	Ultimate Point of Interest: Downstream Point of Unnamed Northerly Ditch	684,454 SF	378,460	N/A

*The minimum time of concentration was utilized for all drainage areas due to the high level of impervious coverage / land disturbance and proximity to existing and proposed stormwater pipe conveyance system.

All proposed drainage areas were delineated based on the proposed grading design overlain on field survey data. Hydrologic calculations and parameters for each drainage area can be found in **APPENDIX C**; specific drainage area delineations and land cover can be found in **APPENDIX D**.

STORMWATER MANAGEMENT DESIGN PARAMETERS

The extent of redevelopment proposes to disturb more than one acre of land; as such, it is considered a Major Development as defined in the Township Ordinances and NJAC 7:8-1.2. A Major Development is subject to stormwater runoff quantity, quality, and groundwater recharge requirements. See below for a summary of each design parameter and compliance requirements:

TABLE 6: STORMWATER MANAGEMENT DESIGN TARGET SUMMARY

Design Parameter	Design Target for Compliance
Stormwater Runoff Quantity	Demonstrate through hydrologic and hydraulic analysis that for stormwater leaving the site, post-construction runoff hydrographs for the 2, 10, and 100 year storm events do not exceed, at any point in time, the pre-construction runoff hydrographs for the same storm events. Design stormwater management measures so that the post-construction peak runoff rates for the two, 10 and 100-year storm events are 50, 75 and 80 percent, respectively, of the pre-construction peak runoff rates. The percentages apply only to the post-construction stormwater runoff that is attributable to the portion of the site on which the proposed development or project is to be constructed.
Stormwater Runoff Quality	The project is exempt from water quality requirements as the development does not propose at least ¼ acre of new impervious surfaces.
Groundwater Recharge	The project is exempt from groundwater recharge requirements as the project site is located within State Planning Area PA-I (Metropolitan).

STORMWATER RUNOFF QUANTITY

Under proposed conditions, underground detention basins are proposed within the dog park area and by the main parking area in front of Building C. The tables below summarize the various drainage areas in relation to flow rates and runoff volume during regulatory storm events:

TABLE 7: SUMMARY OF EXISTING DRAINAGE AREA FLOW RATES & VOLUMES

Drainage Area	2-Year Flow Rate	10-Year Flow Rate	100-Year Flow Rate
E-1	15.41 CFS	25.73 CFS	46.58 CFS
E-2A	14.51 CFS	24.02 CFS	43.09 CFS
E-2B	1.36 CFS	2.73 CFS	5.64 CFS
E-3	2.50 CFS	4.47 CFS	8.55 CFS
POI	33.78 CFS	56.95 CFS	103.85 CFS

TABLE 8: SUMMARY OF PROPOSED DRAINAGE AREA FLOW RATES & VOLUMES

Drainage Area	2-Year Flow Rate	10-Year Flow Rate	100-Year Flow Rate
P-1A	7.16 CFS	11.57 CFS	20.38 CFS
P-1B	6.10 CFS	9.58 CFS	16.44 CFS
P-1C	4.39 CFS	8.17 CFS	16.04 CFS
P-2A	12.48 CFS	20.66 CFS	37.04 CFS

P-2B-1	1.72 CFS	3.54 CFS	7.40 CFS
P-2B-2	0.39 CFS	0.80 CFS	1.65 CFS
P-3	1.88 CFS	3.08 CFS	5.47 CFS
POI	22.65 CFS	38.82 CFS	82.59 CFS

Under post-development conditions the runoff flow rates and volumes are reduced to the existing retention pond. Post-construction runoff hydrographs for the 2, 10, and 100 year storm events do not exceed, at any point in time, the pre-construction runoff hydrographs for the same storm events for the area tributary to the existing retention pond. Comparison hydrographs can be found in **APPENDIX C**.

Detention Basins are proposed for the other two drainage areas in order to reduce the peak flow rates by the required amounts, as shown in the tables below.

TABLE 9: STORMWATER RUNOFF QUANTITY COMPLIANCE SUMMARY AT POINT OF INTEREST (E-1 / P-1)

Rainfall Event	Existing Flow Rate	Required % Reduction	Required Flow Rate	Proposed Flow Rate	Proposed % Reduction
2-Year Storm	15.41 CFS	50%	7.71 CFS	7.69 CFS	50.10%
10-Year Storm	25.73 CFS	25%	19.30 CFS	16.76 CFS	34.86%
100-Year Storm	46.58 CFS	20%	37.26 CFS	36.81 CFS	20.97%

TABLE 10: STORMWATER RUNOFF QUANTITY COMPLIANCE SUMMARY AT POINT OF INTEREST (E-2B / P-2B)

Rainfall Event	Existing Flow Rate	Required % Reduction	Required Flow Rate	Proposed Flow Rate	Proposed % Reduction
2-Year Storm	1.36 CFS	50%	0.68 CFS	0.65 CFS	52.21%
10-Year Storm	2.73 CFS	25%	2.05 CFS	2.04 CFS	25.27%
100-Year Storm	5.64 CFS	20%	4.51 CFS	4.41 CFS	21.81%

The proposed basin provides sufficient flow rate attenuation so as to ensure that no adverse impacts are anticipated downstream of the project site. Detailed hydrologic calculations for each drainage area can be found in **APPENDIX C**.

STORMWATER RUNOFF QUALITY

As the project results in a net decrease in impervious areas, water quality is naturally enhanced via the addition of lawn and landscaped areas. The project also proposes several bio-swales and rain gardens as a water quality measure to treat runoff from parking areas, which is a significant improvement compared to the existing conditions. Since the project does not result in an increase of ¼ acre of new impervious surfaces, the development is not subject to the rules under NJAC 7:8-5.5.

GROUNDWATER RECHARGE

As indicated in the Township Ordinances and NJAC 7:8-5.4, the project site is exempt from groundwater recharge requirements as the site is located within the Metropolitan Planning Area (PA-I) per the State Plan Policy Map and thus qualifies as an Urban Redevelopment Area (which is exempt from groundwater recharge requirements).

STORMWATER PIPE CONVEYANCE SYSTEM

The on-site stormwater conveyance system has been sized for the 25-year storm event and is able to safely convey runoff to the proposed stormwater management facilities without overflow or bypass. Detailed hydraulic calculations for the conveyance system can be found in **APPENDIX C**.

While the volume of stormwater runoff is increased overall to the ultimate point of interest (due to the increase in impervious coverage on-site) the flow rates are significantly reduced and the proposed stormwater management system and soil erosion features ensure that runoff entering the unnamed tributary is safely conveyed so as to not cause any adverse impacts further downstream.

6.0 STORMWATER FACILITY OPERATIONS & MAINTENANCE

A Stormwater Operations & Maintenance Manual has been submitted for review to the Township and will be forwarded to the relevant jurisdictional agencies prior to obtaining final land use approvals and permits. Any necessary easements or covenants associated with the stormwater improvements will be recorded prior to the start of construction.

7.0 EROSION & SEDIMENT CONTROL

A Soil Erosion & Sediment Control Plan has been prepared in accordance with the latest edition of the Standards for Soil Erosion and Sediment Control in New Jersey. This plan can be found within the Preliminary & Final Major Site Plans prepared by Stonefield in conjunction with this Report. Proposed temporary measures during construction include diversion swales, sediment basin, silt fencing, stabilized construction entrances, inlet filters,

hay bales, street sweeping, and temporary seeding for soil stabilization. No land disturbance will occur until certification and permits have been obtained from the Freehold Soil Conservation District.

8.0 CONCLUSIONS

As demonstrated in this Report, the increase in runoff flow rate and volume generated by the proposed redevelopment will be satisfactorily mitigated by the introduction of underground detention basins and the on-site stormwater conveyance system. Runoff water quality will be naturally enhanced due to the decrease in impervious surfaces.

The proposed project complies with all applicable stormwater management regulations and standards. As such, the project is not anticipated to have any adverse drainage impacts on neighboring properties, downstream watercourses, or adjoining conveyance systems.

9.0 REFERENCES

1. New Jersey Administrative Code Title 7, Chapter 8 Stormwater Management, last amended June 20, 2016
https://www.nj.gov/dep/rules/rules/njac7_8.pdf
2. New Jersey Stormwater Best Management Practices Manual, last revised November 2018
https://www.njstormwater.org/bmp_manual2.htm
3. Township of West Orange Land Use Regulations, last amended July 16, 2012
<https://www.westorange.org/DocumentCenter/View/550/Twp-of-WO-Zoning-Ordinance-Final-Revised--Adopted-6-26-2012?bidId=>

APPENDIX A

PROJECT FIGURES

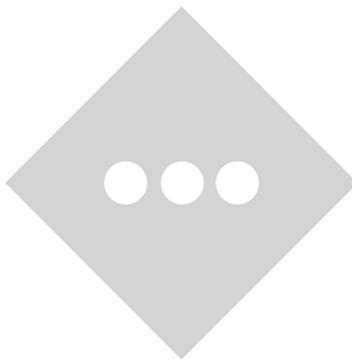
INVENTORY

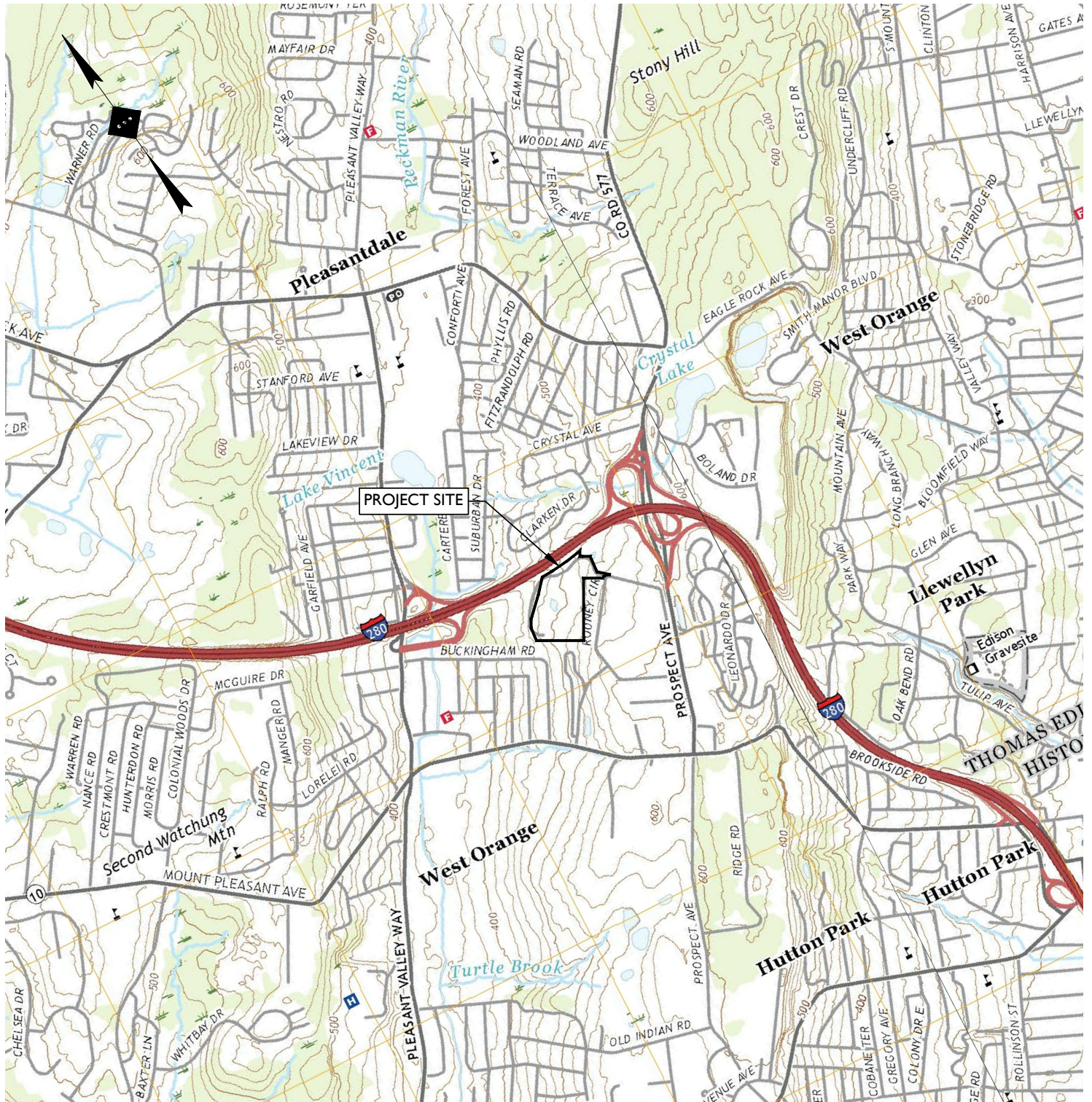
FIGURE 1: USGS LOCATION MAP

FIGURE 2: AERIAL MAP

FIGURE 3: TAX & ZONING MAP

FIGURE 4: OVERALL SITE PLAN (NOT TO SCALE)





USGS MAP

2000' 0' 2000' 4000'



GRAPHIC SCALE IN FEET

1" = 2000'

SOURCE: UNITED STATES GEOLOGICAL SURVEY MAP, CALDWELL & ORANGE QUADRANGLES, DATED 2016

BNE REAL ESTATE GROUP

PROPOSED MULTI-FAMILY RESIDENTIAL DEVELOPMENT

BLOCK 155, LOTS 40.02 & 42.02
100 - 200 EXECUTIVE DRIVE
TOWNSHIP OF WEST ORANGE
ESSEX COUNTY, NEW JERSEY

DRAWN BY:

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CHECKED BY:

ZEC

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SCALE:

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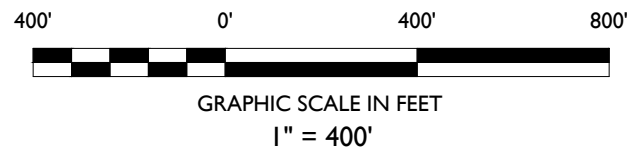
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Phone 201.340.4468 · Fax 201.340.4472



STATE PLANE COORDINATES
OF PROJECT SITE CENTROID:
X: 558,952
Y: 714,885

AERIAL MAP



SOURCE: GOOGLE EARTH PRO

BNE REAL ESTATE GROUP

PROPOSED MULTI-FAMILY RESIDENTIAL DEVELOPMENT

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100 - 200 EXECUTIVE DRIVE
TOWNSHIP OF WEST ORANGE
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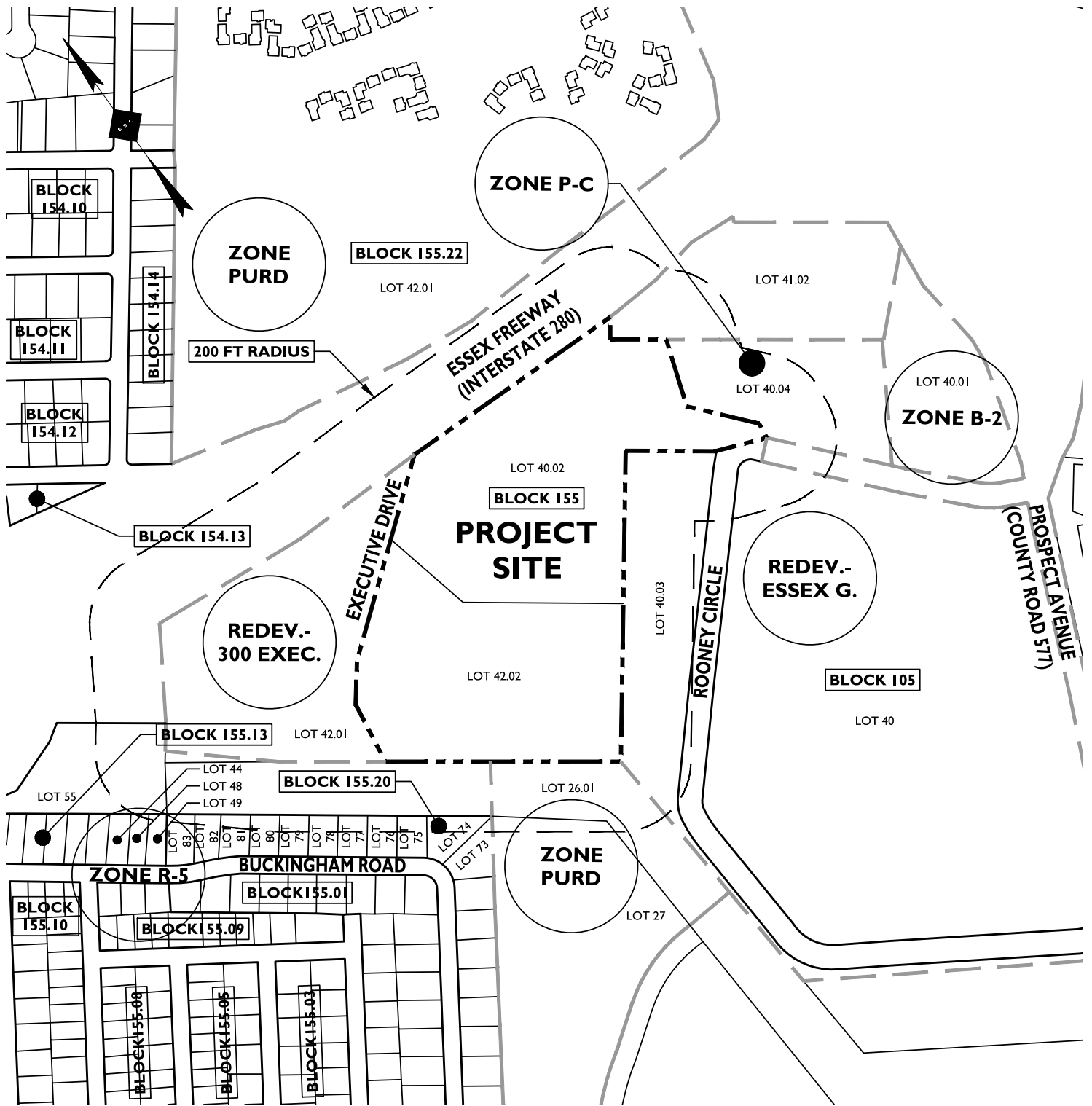
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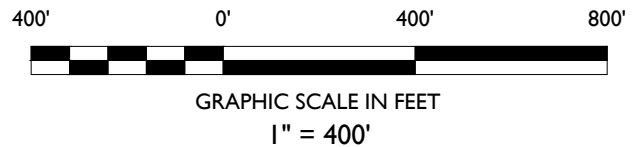
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T:\2017\T-17554 BNE Real Estate Group - 100-200 Executive Drive, West Orange, NJ\CADD\Exhibits\2020-02-12 (LTR) Project Maps.dwg



TAX & ZONING MAP



SOURCE: TOWNSHIP OF WEST ORANGE TAX MAPS SHEETS 34, 85, 86, 86, 88, & 89;
TOWNSHIP OF WEST ORANGE ZONING MAP.

BNE REAL ESTATE GROUP

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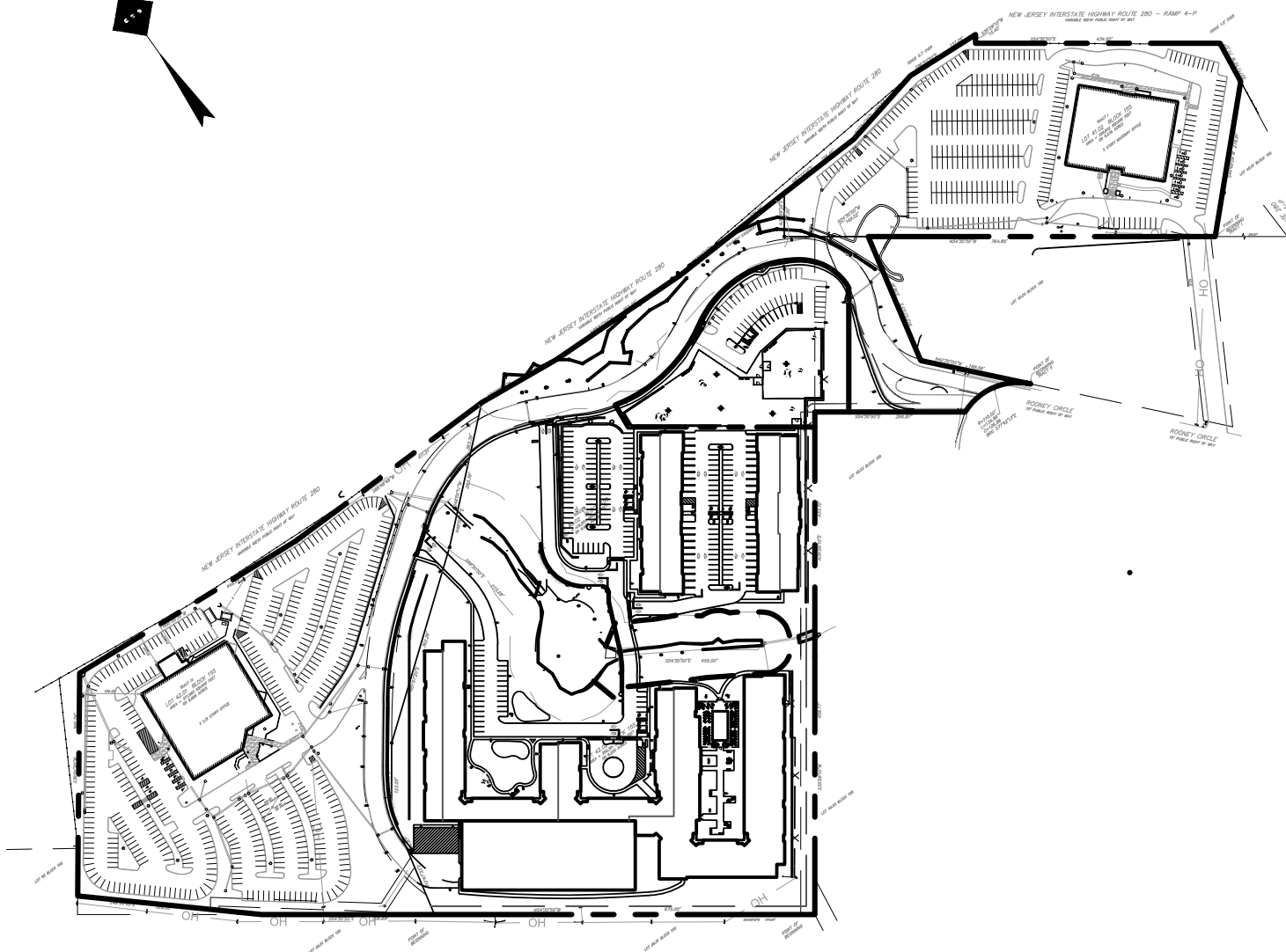
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OVERALL SITE PLAN

SOURCE: TOWNSHIP OF WEST ORANGE TAX MAPS SHEETS 34, 85, 86, 86, 88, & 89;
TOWNSHIP OF WEST ORANGE ZONING MAP.

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DATE:	02/12/2020
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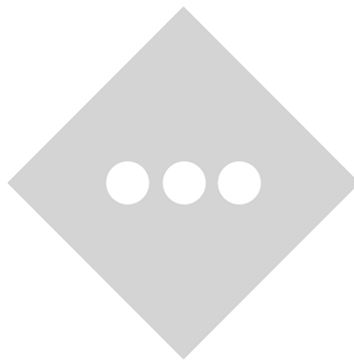
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APPENDIX B

NRCS SOILS REPORT





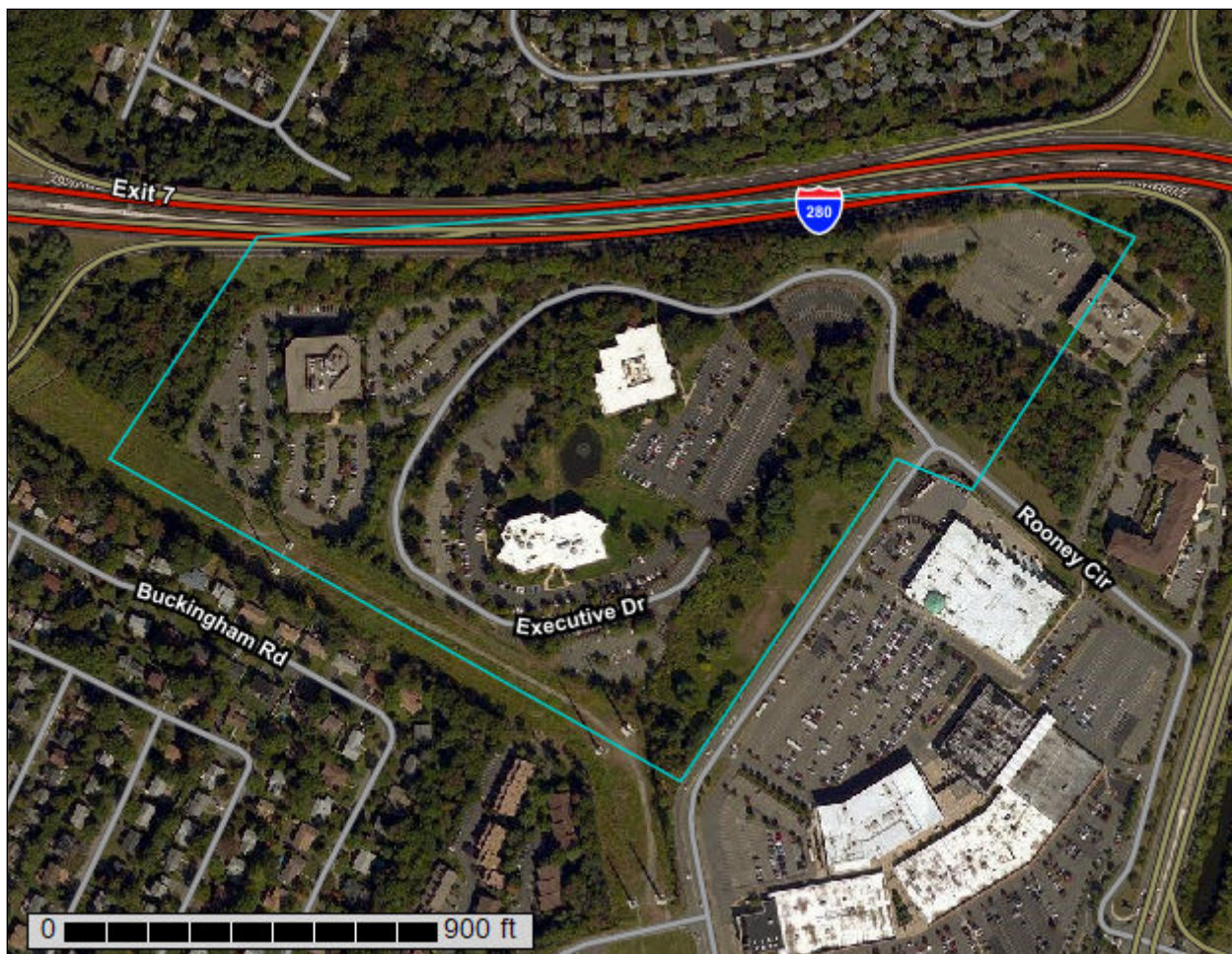
United States
Department of
Agriculture

NRCS

Natural
Resources
Conservation
Service

A product of the National
Cooperative Soil Survey,
a joint effort of the United
States Department of
Agriculture and other
Federal agencies, State
agencies including the
Agricultural Experiment
Stations, and local
participants

Custom Soil Resource Report for **Essex County, New Jersey**



Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report Soil Map



MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

Special Point Features

 Blowout

 Borrow Pit

 Clay Spot

 Closed Depression

 Gravel Pit

 Gravelly Spot

 Landfill

 Lava Flow

 Marsh or swamp

 Mine or Quarry

 Miscellaneous Water

 Perennial Water

 Rock Outcrop

 Saline Spot

 Sandy Spot

 Severely Eroded Spot

 Sinkhole

 Slide or Slip

 Sodic Spot

 Spoil Area

 Stony Spot

 Very Stony Spot

 Wet Spot

 Other

 Special Line Features

Water Features

 Streams and Canals

Transportation

 Rails

 Interstate Highways

 US Routes

 Major Roads

 Local Roads

Background

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

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

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

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

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

Soil Survey Area: Essex County, New Jersey
Survey Area Data: Version 15, Sep 16, 2019

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

Date(s) aerial images were photographed: Aug 25, 2014—Sep 27, 2014

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
BogBc	Boonton loam, 0 to 8 percent slopes, extremely stony	18.4	39.7%
BouB	Boonton - Urban land, Boonton substratum complex, 0 to 8 percent slopes	2.5	5.4%
DunB	Dunellen sandy loam, 3 to 8 percent slopes	0.3	0.6%
URBONB	Urban land, Boonton substratum, 0 to 8 percent slopes	22.1	47.8%
YaohEh	Yalesville - Holyoke complex, 35 to 60 percent slopes, very rocky	3.0	6.5%
Totals for Area of Interest		46.3	100.0%

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not

mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Essex County, New Jersey

BogBc—Boonton loam, 0 to 8 percent slopes, extremely stony

Map Unit Setting

National map unit symbol: b128
Elevation: 50 to 500 feet
Mean annual precipitation: 30 to 64 inches
Mean annual air temperature: 46 to 79 degrees F
Frost-free period: 131 to 178 days
Farmland classification: Not prime farmland

Map Unit Composition

Boonton, extremely stony, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Boonton, Extremely Stony

Setting

Landform: Ground moraines
Landform position (three-dimensional): Upper third of mountainflank, center third of mountainflank
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Coarse-loamy basal till derived from basalt

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material
Oa - 1 to 3 inches: highly decomposed plant material
A - 3 to 5 inches: loam
BA - 5 to 8 inches: silt loam
BE - 8 to 17 inches: silt loam
Bt - 17 to 30 inches: silt loam
Btx1 - 30 to 40 inches: gravelly fine sandy loam
Btx2 - 40 to 47 inches: fine sandy loam
CBt1 - 47 to 58 inches: loamy sand
CBt2 - 58 to 72 inches: loamy sand

Properties and qualities

Slope: 0 to 8 percent
Percent of area covered with surface fragments: 10.0 percent
Depth to restrictive feature: 20 to 36 inches to fragipan
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 5.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s

Custom Soil Resource Report

Hydrologic Soil Group: C

Hydric soil rating: No

Minor Components

Boonton, moderately well drained, extremely stony

Percent of map unit: 10 percent

Landform: Ground moraines

Landform position (two-dimensional): Summit, shoulder

Landform position (three-dimensional): Head slope, side slope

Down-slope shape: Convex

Across-slope shape: Linear

Hydric soil rating: No

Haledon, extremely stony

Percent of map unit: 5 percent

Landform: Ground moraines

Landform position (two-dimensional): Summit, shoulder

Landform position (three-dimensional): Side slope, head slope

Down-slope shape: Convex

Across-slope shape: Linear

Hydric soil rating: No

BouB—Boonton - Urban land, Boonton substratum complex, 0 to 8 percent slopes

Map Unit Setting

National map unit symbol: b12f

Elevation: 50 to 500 feet

Mean annual precipitation: 30 to 64 inches

Mean annual air temperature: 46 to 79 degrees F

Frost-free period: 131 to 178 days

Farmland classification: Not prime farmland

Map Unit Composition

Boonton and similar soils: 50 percent

Urban land, boonton substratum: 40 percent

Minor components: 10 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Boonton

Setting

Landform: Ground moraines

Landform position (three-dimensional): Upper third of mountainflank, center third of mountainflank

Down-slope shape: Convex

Across-slope shape: Linear

Parent material: Coarse-loamy basal till derived from basalt

Custom Soil Resource Report

Typical profile

A - 0 to 5 inches: loam
BA - 5 to 8 inches: silt loam
BE - 8 to 17 inches: silt loam
Bt - 17 to 30 inches: silt loam
Btx1 - 30 to 40 inches: gravelly fine sandy loam
Btx2 - 40 to 47 inches: fine sandy loam
CBt1 - 47 to 58 inches: loamy sand
CBt2 - 58 to 72 inches: loamy sand

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: 20 to 36 inches to fragipan
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 4.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Hydric soil rating: No

Description of Urban Land, Boonton Substratum

Setting

Landform: Ground moraines
Landform position (three-dimensional): Lower third of mountainflank, upper third of mountainflank, center third of mountainflank
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Surface covered by pavement, concrete, buildings, and other structures underlain by disturbed and natural soil material

Typical profile

H1 - 0 to 12 inches: material
H2 - 12 to 47 inches: silt loam
2CBt1 - 47 to 58 inches: loamy sand
2CBt2 - 58 to 72 inches: loamy sand

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s
Hydric soil rating: Unranked

Minor Components

Udorthents, boonton substratum

Percent of map unit: 10 percent
Landform: Ground moraines
Landform position (three-dimensional): Lower third of mountainflank, upper third of mountainflank, center third of mountainflank

Custom Soil Resource Report

Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

DunB—Dunellen sandy loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: njzd
Elevation: 50 to 2,000 feet
Mean annual precipitation: 30 to 64 inches
Mean annual air temperature: 46 to 79 degrees F
Frost-free period: 131 to 178 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Dunellen and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Dunellen

Setting

Landform: Outwash plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Coarse-loamy outwash derived from sandstone

Typical profile

A1 - 0 to 8 inches: sandy loam
A2 - 8 to 14 inches: sandy loam
BA - 14 to 20 inches: sandy loam
Bt - 20 to 31 inches: sandy loam
C - 31 to 42 inches: sandy loam
2C - 42 to 70 inches: loamy sand

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Moderate (about 7.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e

Custom Soil Resource Report

Hydrologic Soil Group: A

Hydric soil rating: No

Minor Components

Tunkhannock

Percent of map unit: 10 percent

Landform: Deltas, kames, outwash terraces

Landform position (three-dimensional): Riser, rise

Down-slope shape: Linear, convex

Across-slope shape: Linear, convex

Hydric soil rating: No

Udorthents, dunellen substratum

Percent of map unit: 5 percent

Landform: Outwash plains

Landform position (three-dimensional): Lower third of mountainflank

Down-slope shape: Linear

Across-slope shape: Linear

Hydric soil rating: No

URBONB—Urban land, Boonton substratum, 0 to 8 percent slopes

Map Unit Setting

National map unit symbol: w9cn

Elevation: 50 to 500 feet

Mean annual precipitation: 30 to 64 inches

Mean annual air temperature: 46 to 79 degrees F

Frost-free period: 131 to 178 days

Farmland classification: Not prime farmland

Map Unit Composition

Urban land, boonton substratum: 90 percent

Minor components: 10 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land, Boonton Substratum

Setting

Landform: Ground moraines

Landform position (three-dimensional): Lower third of mountainflank

Down-slope shape: Linear, convex

Across-slope shape: Linear

Parent material: Surface covered by pavement, concrete, buildings, and other structures underlain by disturbed and natural soil material

Typical profile

H1 - 0 to 12 inches: material

H2 - 12 to 47 inches: silt loam

2CBt1 - 47 to 58 inches: loamy sand

2CBt2 - 58 to 72 inches: loamy sand

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8s

Hydric soil rating: Unranked

Minor Components

Boonton

Percent of map unit: 5 percent

Landform: Ground moraines

Landform position (three-dimensional): Upper third of mountainflank, center third of mountainflank

Down-slope shape: Convex

Across-slope shape: Linear

Hydric soil rating: No

Udorthents, boonton substratum

Percent of map unit: 5 percent

Landform: Ground moraines

Landform position (three-dimensional): Lower third of mountainflank, upper third of mountainflank, center third of mountainflank

Down-slope shape: Convex

Across-slope shape: Linear

Hydric soil rating: No

YaohEh—Yalesville - Holyoke complex, 35 to 60 percent slopes, very rocky

Map Unit Setting

National map unit symbol: w9g0

Elevation: 50 to 500 feet

Mean annual precipitation: 30 to 64 inches

Mean annual air temperature: 46 to 79 degrees F

Frost-free period: 131 to 178 days

Farmland classification: Not prime farmland

Map Unit Composition

Yalesville, very rocky, and similar soils: 50 percent

Holyoke, very rocky, and similar soils: 30 percent

Minor components: 20 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Yalesville, Very Rocky

Setting

Landform: Ground moraines

Landform position (three-dimensional): Mountaintop

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Coarse-loamy till derived from basalt

Typical profile

Oa - 0 to 1 inches: highly decomposed plant material
A - 1 to 5 inches: loam
Bw1 - 5 to 19 inches: fine sandy loam
Bw2 - 19 to 31 inches: fine sandy loam
BC - 31 to 32 inches: fine sandy loam
R - 32 to 80 inches: bedrock

Properties and qualities

Slope: 35 to 60 percent
Percent of area covered with surface fragments: 10.0 percent
Depth to restrictive feature: 20 to 39 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 4.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: C
Hydric soil rating: No

Description of Holyoke, Very Rocky

Setting

Landform: Ground moraines, hills, ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Mountaintop
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Parent material: Loamy till derived from basalt

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material
Oa - 1 to 3 inches: highly decomposed plant material
A - 3 to 5 inches: loam
Bw1 - 5 to 14 inches: loam
Bw2 - 14 to 18 inches: loam
R - 18 to 80 inches: bedrock

Properties and qualities

Slope: 35 to 60 percent
Percent of area covered with surface fragments: 10.0 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None

Custom Soil Resource Report

Available water storage in profile: Low (about 4.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 7s

Hydrologic Soil Group: D

Hydric soil rating: No

Minor Components

Boonton, very rocky

Percent of map unit: 10 percent

Landform: Ground moraines

Landform position (two-dimensional): Summit, shoulder

Landform position (three-dimensional): Upper third of mountainflank, center third of mountainflank

Down-slope shape: Convex

Across-slope shape: Linear

Hydric soil rating: No

Rock outcrop

Percent of map unit: 10 percent

Landform: Ridges

Landform position (two-dimensional): Summit

Landform position (three-dimensional): Interfluve

Down-slope shape: Convex

Across-slope shape: Linear

Hydric soil rating: Unranked

APPENDIX C

HYDROLOGIC & HYDRAULIC CALCULATIONS

INVENTORY

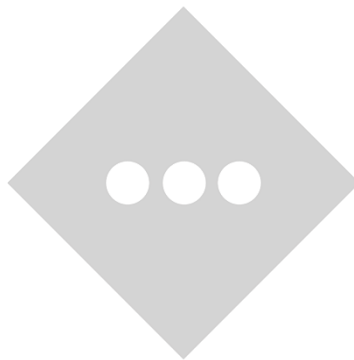
C-1: NOAA 24-HOUR RAINFALL FREQUENCY DATA

C-2: HYDROCAD NODE SCHEMATIC DIAGRAM

C-3: HYDROCAD HYDROLOGIC CALCULATIONS

C-4: HYDRAFLOW PIPE NETWORK SUMMARY CHART

C-5: HYDRAFLOW HYDRAULIC PIPE ANALYSIS





NOAA Atlas 14, Volume 2, Version 3
Location name: West Orange, New Jersey, USA*
Latitude: 40.7954°, Longitude: -74.2593°
Elevation: 503.53 ft**
 * source: ESRI Maps
 ** source: USGS



POINT PRECIPITATION FREQUENCY ESTIMATES

G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M. Yekta, and D. Riley

NOAA, National Weather Service, Silver Spring, Maryland

[PF_tabular](#) | [PF_graphical](#) | [Maps & aerals](#)

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches) ¹										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.336 (0.307-0.369)	0.401 (0.367-0.440)	0.474 (0.433-0.521)	0.527 (0.480-0.578)	0.592 (0.537-0.649)	0.640 (0.578-0.701)	0.685 (0.616-0.750)	0.725 (0.648-0.795)	0.776 (0.687-0.852)	0.812 (0.714-0.894)
10-min	0.534 (0.488-0.587)	0.638 (0.583-0.701)	0.757 (0.691-0.831)	0.840 (0.764-0.921)	0.940 (0.853-1.03)	1.01 (0.913-1.11)	1.08 (0.971-1.18)	1.14 (1.02-1.25)	1.22 (1.08-1.34)	1.27 (1.12-1.40)
15-min	0.667 (0.609-0.732)	0.801 (0.732-0.879)	0.954 (0.870-1.05)	1.06 (0.963-1.16)	1.19 (1.08-1.30)	1.28 (1.15-1.40)	1.36 (1.22-1.49)	1.44 (1.28-1.57)	1.53 (1.36-1.68)	1.59 (1.40-1.75)
30-min	0.910 (0.831-0.999)	1.10 (1.01-1.21)	1.35 (1.23-1.48)	1.53 (1.39-1.67)	1.75 (1.59-1.92)	1.91 (1.72-2.09)	2.07 (1.86-2.27)	2.22 (1.98-2.43)	2.41 (2.14-2.65)	2.55 (2.24-2.81)
60-min	1.13 (1.03-1.24)	1.38 (1.26-1.51)	1.73 (1.57-1.89)	1.98 (1.80-2.17)	2.32 (2.11-2.54)	2.58 (2.33-2.83)	2.84 (2.56-3.11)	3.10 (2.77-3.40)	3.45 (3.05-3.79)	3.71 (3.26-4.08)
2-hr	1.39 (1.26-1.52)	1.69 (1.54-1.86)	2.14 (1.95-2.35)	2.49 (2.27-2.74)	2.98 (2.69-3.27)	3.38 (3.03-3.70)	3.79 (3.38-4.15)	4.22 (3.73-4.62)	4.82 (4.21-5.29)	5.30 (4.58-5.82)
3-hr	1.55 (1.42-1.71)	1.89 (1.73-2.08)	2.40 (2.19-2.63)	2.79 (2.54-3.06)	3.34 (3.02-3.66)	3.79 (3.41-4.14)	4.24 (3.80-4.65)	4.73 (4.19-5.17)	5.40 (4.73-5.91)	5.93 (5.14-6.50)
6-hr	2.00 (1.84-2.20)	2.43 (2.23-2.66)	3.08 (2.81-3.36)	3.60 (3.28-3.93)	4.35 (3.93-4.74)	4.98 (4.47-5.41)	5.64 (5.02-6.13)	6.36 (5.60-6.90)	7.38 (6.41-8.03)	8.24 (7.07-8.97)
12-hr	2.50 (2.28-2.75)	3.03 (2.77-3.34)	3.86 (3.52-4.24)	4.55 (4.14-4.98)	5.57 (5.01-6.07)	6.44 (5.75-7.01)	7.39 (6.52-8.03)	8.44 (7.36-9.17)	9.98 (8.54-10.8)	11.3 (9.52-12.3)
24-hr	2.83 (2.62-3.07)	3.42 (3.17-3.72)	4.39 (4.06-4.77)	5.21 (4.80-5.66)	6.45 (5.90-6.99)	7.53 (6.83-8.15)	8.72 (7.83-9.45)	10.1 (8.93-10.9)	12.1 (10.5-13.1)	13.8 (11.9-15.1)
2-day	3.34 (3.08-3.63)	4.04 (3.74-4.40)	5.16 (4.76-5.62)	6.10 (5.61-6.63)	7.47 (6.83-8.12)	8.64 (7.85-9.39)	9.91 (8.93-10.8)	11.3 (10.1-12.3)	13.4 (11.7-14.7)	15.1 (13.1-16.7)
3-day	3.51 (3.25-3.81)	4.25 (3.94-4.61)	5.40 (5.00-5.86)	6.36 (5.86-6.90)	7.75 (7.10-8.40)	8.92 (8.12-9.67)	10.2 (9.20-11.1)	11.6 (10.3-12.6)	13.6 (12.0-14.8)	15.3 (13.3-16.8)
4-day	3.68 (3.42-3.99)	4.46 (4.14-4.83)	5.65 (5.23-6.11)	6.62 (6.12-7.17)	8.03 (7.37-8.68)	9.20 (8.40-9.95)	10.5 (9.47-11.3)	11.8 (10.6-12.8)	13.8 (12.2-15.0)	15.4 (13.5-16.9)
7-day	4.36 (4.06-4.70)	5.24 (4.87-5.65)	6.51 (6.05-7.01)	7.55 (7.00-8.14)	9.05 (8.34-9.75)	10.3 (9.44-11.1)	11.6 (10.6-12.6)	13.0 (11.8-14.1)	15.1 (13.4-16.4)	16.7 (14.7-18.3)
10-day	5.00 (4.67-5.37)	5.98 (5.59-6.42)	7.32 (6.83-7.85)	8.41 (7.83-9.03)	9.96 (9.23-10.7)	11.2 (10.4-12.1)	12.6 (11.5-13.5)	14.0 (12.7-15.1)	16.0 (14.3-17.3)	17.6 (15.6-19.2)
20-day	6.76 (6.35-7.21)	8.02 (7.54-8.55)	9.58 (8.99-10.2)	10.8 (10.1-11.5)	12.4 (11.6-13.3)	13.7 (12.8-14.7)	15.0 (13.9-16.1)	16.3 (15.0-17.5)	18.1 (16.5-19.5)	19.5 (17.6-21.1)
30-day	8.43 (7.97-8.91)	9.94 (9.40-10.5)	11.6 (11.0-12.3)	12.9 (12.2-13.7)	14.6 (13.7-15.4)	15.8 (14.9-16.8)	17.1 (16.0-18.1)	18.3 (17.0-19.5)	19.8 (18.4-21.2)	21.0 (19.3-22.5)
45-day	10.7 (10.1-11.3)	12.6 (11.9-13.2)	14.5 (13.8-15.3)	16.0 (15.1-16.8)	17.8 (16.9-18.8)	19.2 (18.1-20.3)	20.6 (19.4-21.7)	21.9 (20.5-23.2)	23.5 (21.9-25.0)	24.7 (22.9-26.3)
60-day	12.8 (12.2-13.5)	15.0 (14.3-15.8)	17.2 (16.3-18.1)	18.8 (17.8-19.8)	20.8 (19.7-21.9)	22.2 (21.0-23.4)	23.6 (22.3-24.9)	24.9 (23.4-26.3)	26.4 (24.8-28.0)	27.5 (25.7-29.2)

¹ Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

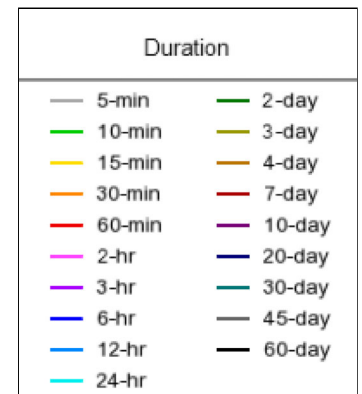
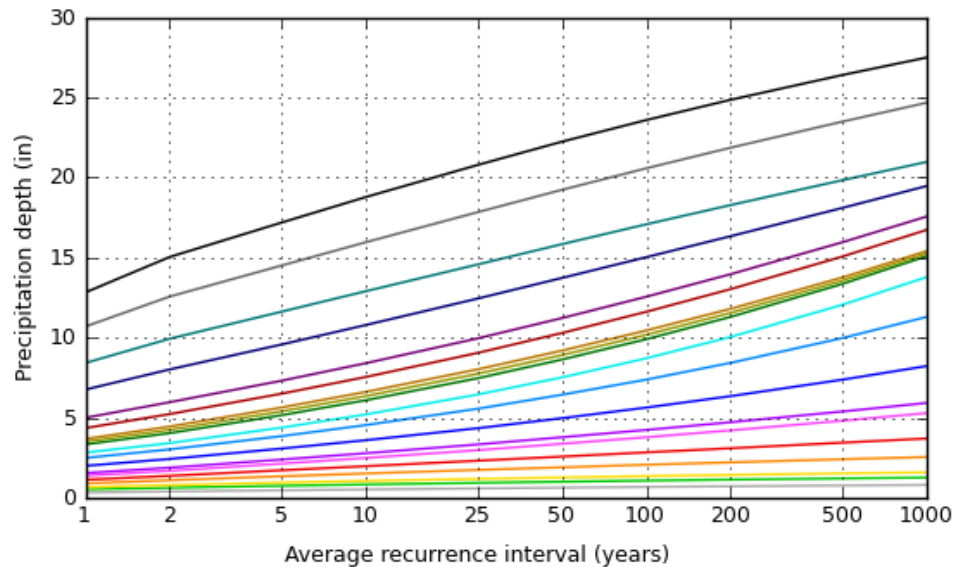
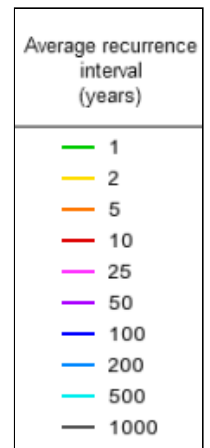
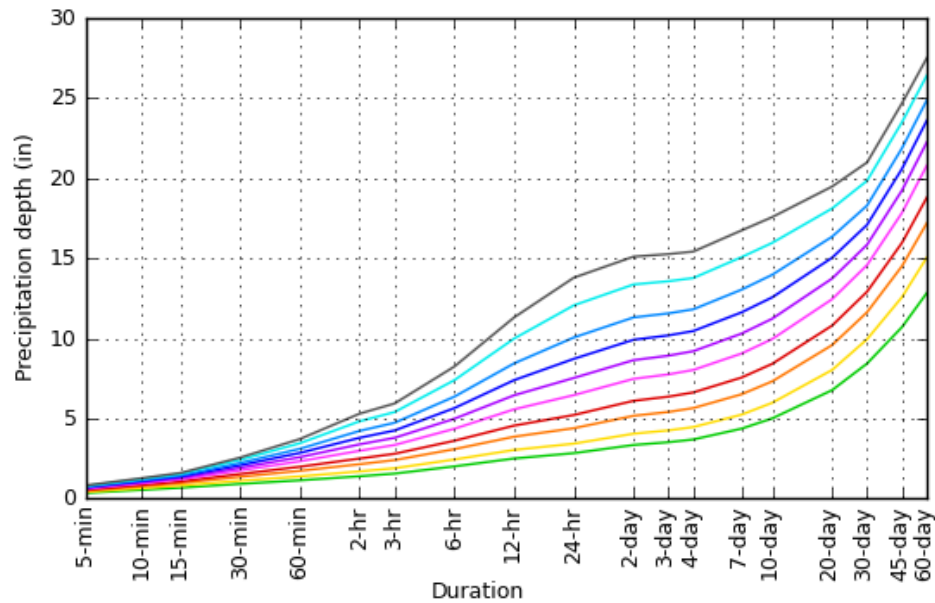
Please refer to NOAA Atlas 14 document for more information.

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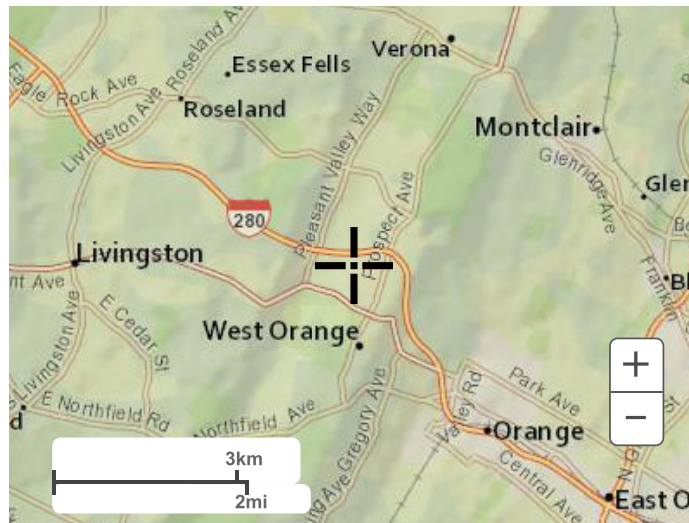
PF graphical

PDS-based depth-duration-frequency (DDF) curves

Latitude: 40.7954°, Longitude: -74.2593°

**Maps & aeriels**

Small scale terrain



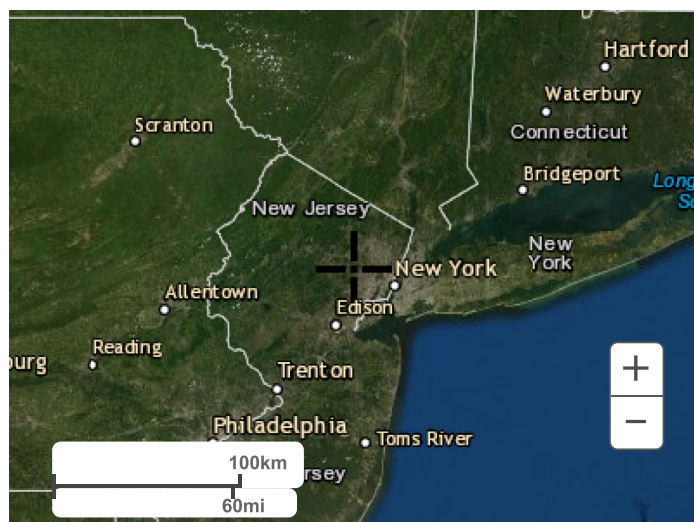
Large scale terrain



Large scale map



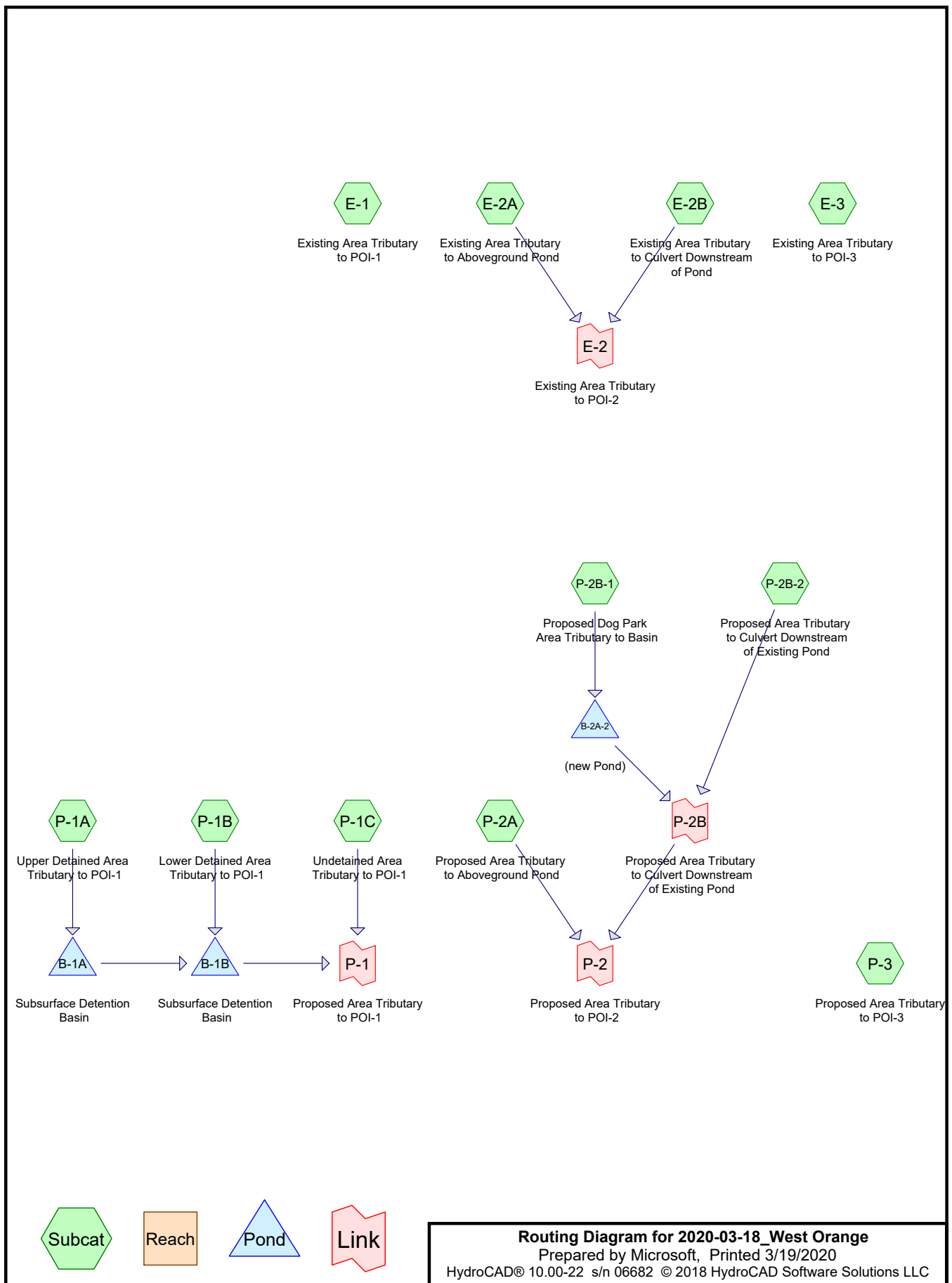
Large scale aerial



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Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv.

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment E-1: Existing Area	Runoff Area=304,647 sf 60.03% Impervious Runoff Depth=2.43" Flow Length=1,157' Tc=10.0 min CN=76/98 Runoff=15.41 cfs 61,643 cf
Subcatchment E-2A: Existing Area	Runoff Area=278,126 sf 61.54% Impervious Runoff Depth=2.50" Tc=10.0 min CN=77/98 Runoff=14.51 cfs 57,887 cf
Subcatchment E-2B: Existing Area	Runoff Area=41,911 sf 11.76% Impervious Runoff Depth=1.47" Tc=10.0 min CN=75/98 Runoff=1.36 cfs 5,134 cf
Subcatchment E-3: Existing Area Tributary	Runoff Area=59,770 sf 41.42% Impervious Runoff Depth=1.99" Tc=10.0 min CN=73/98 Runoff=2.50 cfs 9,927 cf
Subcatchment P-1A: Upper Detained Area	Runoff Area=129,383 sf 73.57% Impervious Runoff Depth=2.68" Flow Length=1,157' Tc=10.0 min CN=76/98 Runoff=7.16 cfs 28,938 cf
Subcatchment P-1B: Lower Detained	Runoff Area=100,868 sf 84.84% Impervious Runoff Depth=2.94" Flow Length=1,157' Tc=10.0 min CN=80/98 Runoff=6.10 cfs 24,731 cf
Subcatchment P-1C: Undetained Area	Runoff Area=113,686 sf 26.39% Impervious Runoff Depth=1.79" Tc=10.0 min CN=76/98 Runoff=4.39 cfs 16,925 cf
Subcatchment P-2A: Proposed Area	Runoff Area=238,270 sf 59.97% Impervious Runoff Depth=2.50" Tc=10.0 min CN=78/98 Runoff=12.48 cfs 49,607 cf
Subcatchment P-2B-1: Proposed Dog Park	Runoff Area=55,047 sf 2.30% Impervious Runoff Depth=1.37" Tc=10.0 min CN=76/98 Runoff=1.72 cfs 6,291 cf
Subcatchment P-2B-2: Proposed Area	Runoff Area=12,169 sf 0.00% Impervious Runoff Depth=1.38" Tc=10.0 min CN=77/0 Runoff=0.39 cfs 1,404 cf
Subcatchment P-3: Proposed Area	Runoff Area=35,031 sf 67.17% Impervious Runoff Depth=2.59" Tc=10.0 min CN=77/98 Runoff=1.88 cfs 7,552 cf
Pond B-1A: Subsurface Detention Basin	Peak Elev=495.36' Storage=3,909 cf Inflow=7.16 cfs 28,938 cf Outflow=3.50 cfs 28,938 cf
Pond B-1B: Subsurface Detention Basin	Peak Elev=481.50' Storage=9,299 cf Inflow=9.13 cfs 53,669 cf Outflow=4.09 cfs 53,669 cf
Pond B-2A-2: (new Pond)	Peak Elev=500.35' Storage=1,868 cf Inflow=1.72 cfs 6,291 cf Outflow=0.33 cfs 6,291 cf
Link E-2: Existing Area Tributary to POI-2	Inflow=15.86 cfs 63,021 cf Primary=15.86 cfs 63,021 cf
Link P-1: Proposed Area Tributary to POI-1	Inflow=7.69 cfs 70,593 cf Primary=7.69 cfs 70,593 cf

2020-03-18_West Orange

NOAA 24-hr D 2-Year Rainfall=3.42"

Prepared by Microsoft

Printed 3/19/2020

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Link P-2: Proposed Area Tributary to POI-2

Inflow=13.12 cfs 57,302 cf

Primary=13.12 cfs 57,302 cf

Link P-2B: Proposed Area Tributary to Culvert Downstream of Existing Pond

Inflow=0.65 cfs 7,695 cf

Primary=0.65 cfs 7,695 cf

Total Runoff Area = 1,368,908 sf Runoff Volume = 270,039 cf Average Runoff Depth = 2.37"
44.32% Pervious = 606,723 sf 55.68% Impervious = 762,185 sf

Summary for Subcatchment E-1: Existing Area Tributary to POI-1

Runoff = 15.41 cfs @ 12.17 hrs, Volume= 61,643 cf, Depth= 2.43"

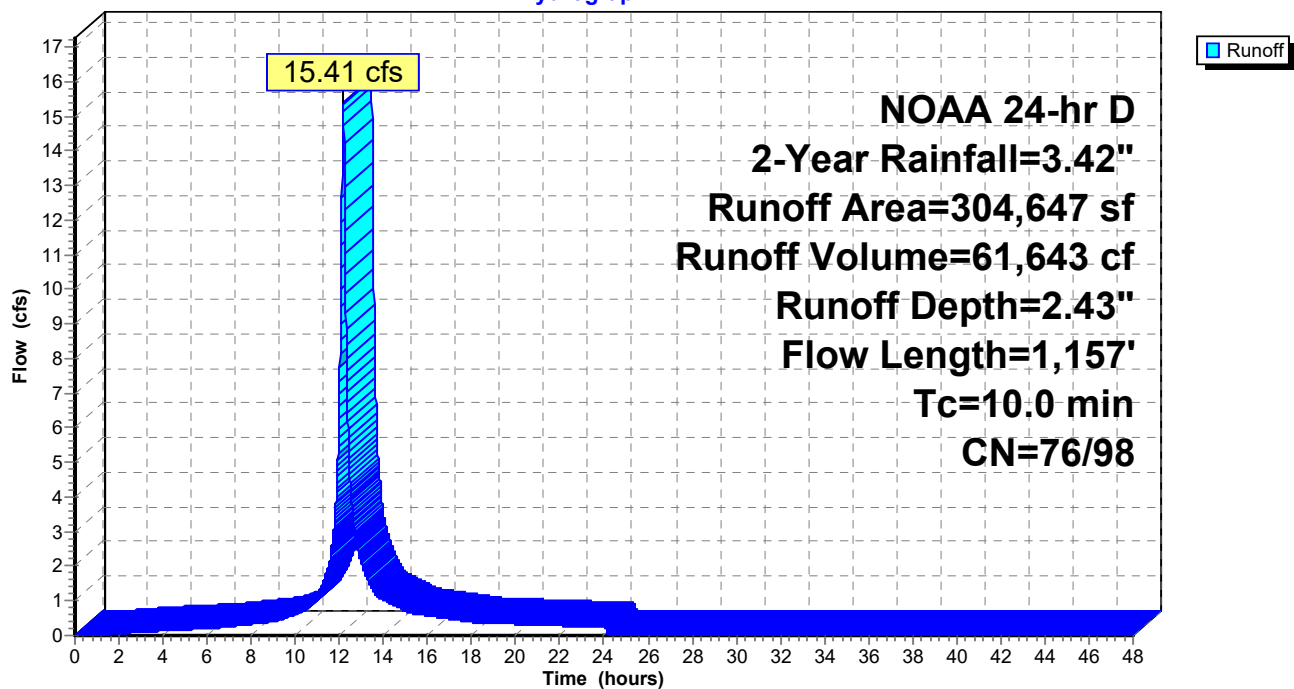
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 2-Year Rainfall=3.42"

	Area (sf)	CN	Description
*	182,894	98	Impervious Surfaces
	34,208	74	>75% Grass cover, Good, HSG C
	47,499	80	>75% Grass cover, Good, HSG D
	28,367	70	Woods, Good, HSG C
	11,679	77	Woods, Good, HSG D
	304,647	89	Weighted Average
	121,753	76	39.97% Pervious Area
	182,894	98	60.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	43	0.3720	0.13		Sheet Flow, A-B Woods: Dense underbrush n= 0.800 P2= 3.42"
0.5	57	0.0614	1.99		Sheet Flow, B-C Smooth surfaces n= 0.011 P2= 3.42"
0.5	155	0.0677	5.28		Shallow Concentrated Flow, C-D Paved Kv= 20.3 fps
0.8	902	0.0860	18.24	22.39	Pipe Channel, D-E 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.011 Concrete pipe, straight & clean
7.5	1,157	Total, Increased to minimum Tc = 10.0 min			

Subcatchment E-1: Existing Area Tributary to POI-1

Hydrograph



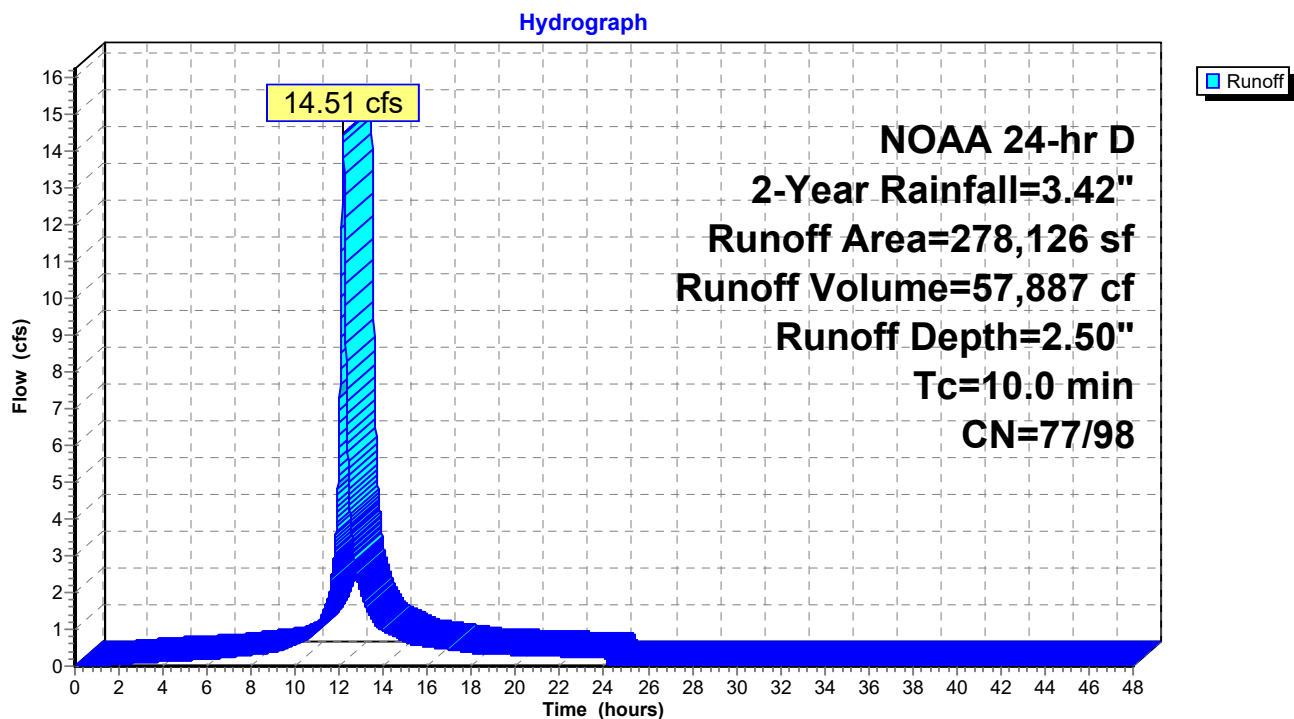
Summary for Subcatchment E-2A: Existing Area Tributary to Aboveground Pond

Runoff = 14.51 cfs @ 12.17 hrs, Volume= 57,887 cf, Depth= 2.50"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 2-Year Rainfall=3.42"

	Area (sf)	CN	Description
*	171,147	98	Impervious Surfaces
	730	74	>75% Grass cover, Good, HSG C
	70,237	80	>75% Grass cover, Good, HSG D
	24,193	70	Woods, Good, HSG C
	11,819	77	Woods, Good, HSG D
	278,126	90	Weighted Average
	106,979	77	38.46% Pervious Area
	171,147	98	61.54% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Subcatchment E-2A: Existing Area Tributary to Aboveground Pond

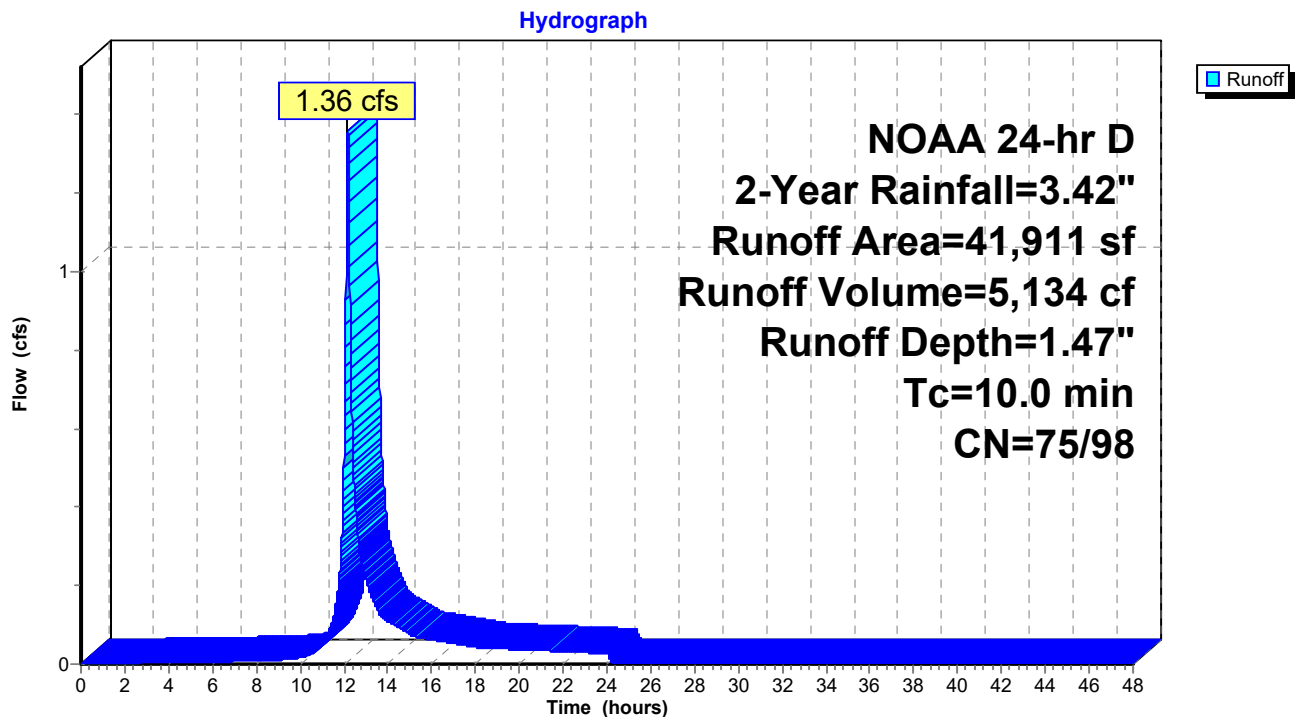
Summary for Subcatchment E-2B: Existing Area Tributary to Culvert Downstream of Pond

Runoff = 1.36 cfs @ 12.18 hrs, Volume= 5,134 cf, Depth= 1.47"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 2-Year Rainfall=3.42"

	Area (sf)	CN	Description
*	4,929	98	Impervious Surfaces
	0	74	>75% Grass cover, Good, HSG C
	6,244	80	>75% Grass cover, Good, HSG D
	13,613	70	Woods, Good, HSG C
	17,125	77	Woods, Good, HSG D
	41,911	78	Weighted Average
	36,982	75	88.24% Pervious Area
	4,929	98	11.76% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Subcatchment E-2B: Existing Area Tributary to Culvert Downstream of Pond

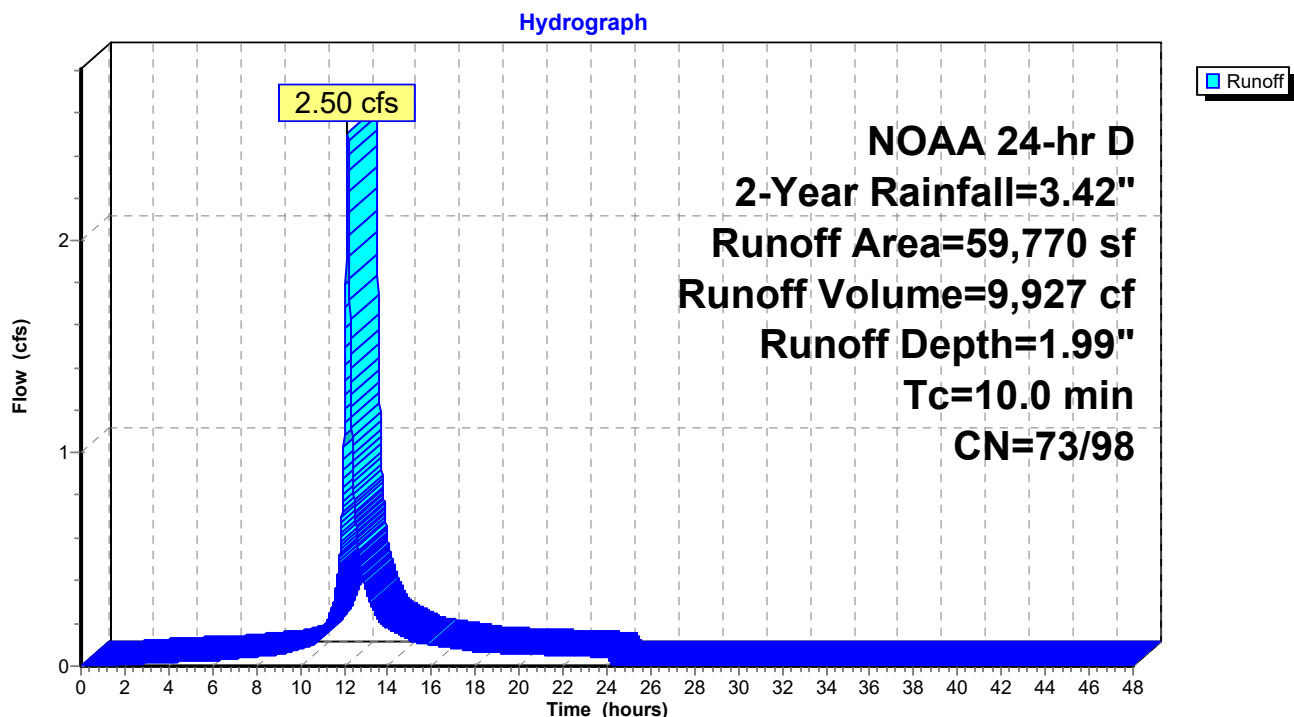
Summary for Subcatchment E-3: Existing Area Tributary to POI-3

Runoff = 2.50 cfs @ 12.17 hrs, Volume= 9,927 cf, Depth= 1.99"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 2-Year Rainfall=3.42"

	Area (sf)	CN	Description
*	24,755	98	Impervious Surfaces
	9,081	74	>75% Grass cover, Good, HSG C
	7,373	80	>75% Grass cover, Good, HSG D
	17,316	70	Woods, Good, HSG C
	1,245	77	Woods, Good, HSG D
	59,770	84	Weighted Average
	35,015	73	58.58% Pervious Area
	24,755	98	41.42% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Subcatchment E-3: Existing Area Tributary to POI-3

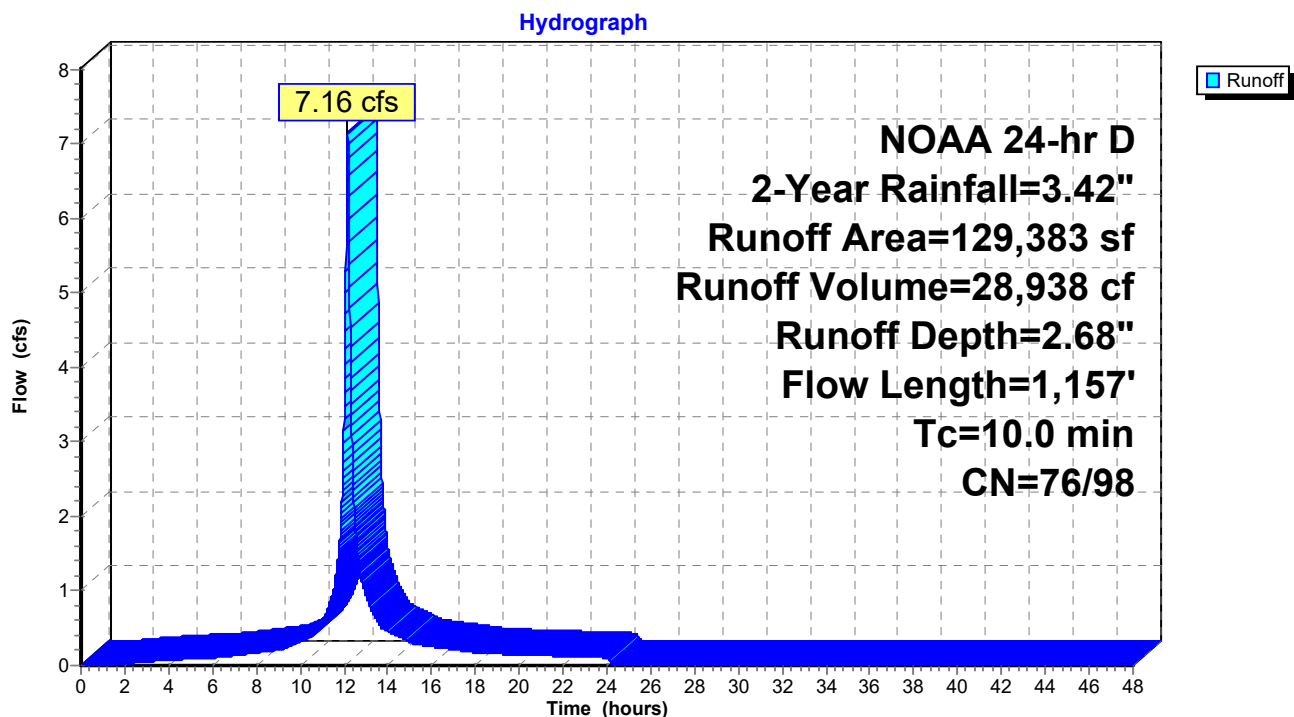
Summary for Subcatchment P-1A: Upper Detained Area Tributary to POI-1

Runoff = 7.16 cfs @ 12.17 hrs, Volume= 28,938 cf, Depth= 2.68"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 2-Year Rainfall=3.42"

	Area (sf)	CN	Description
*	95,185	98	Impervious Surfaces
	6,500	74	>75% Grass cover, Good, HSG C
	16,655	80	>75% Grass cover, Good, HSG D
	11,043	70	Woods, Good, HSG C
	0	77	Woods, Good, HSG D
	129,383	92	Weighted Average
	34,198	76	26.43% Pervious Area
	95,185	98	73.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	43	0.3720	0.13		Sheet Flow, A-B Woods: Dense underbrush n= 0.800 P2= 3.42"
0.5	57	0.0614	1.99		Sheet Flow, B-C Smooth surfaces n= 0.011 P2= 3.42"
0.5	155	0.0677	5.28		Shallow Concentrated Flow, C-D Paved Kv= 20.3 fps
0.8	902	0.0860	18.24	22.39	Pipe Channel, D-E 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.011 Concrete pipe, straight & clean
7.5	1,157	Total, Increased to minimum Tc = 10.0 min			

Subcatchment P-1A: Upper Detained Area Tributary to POI-1

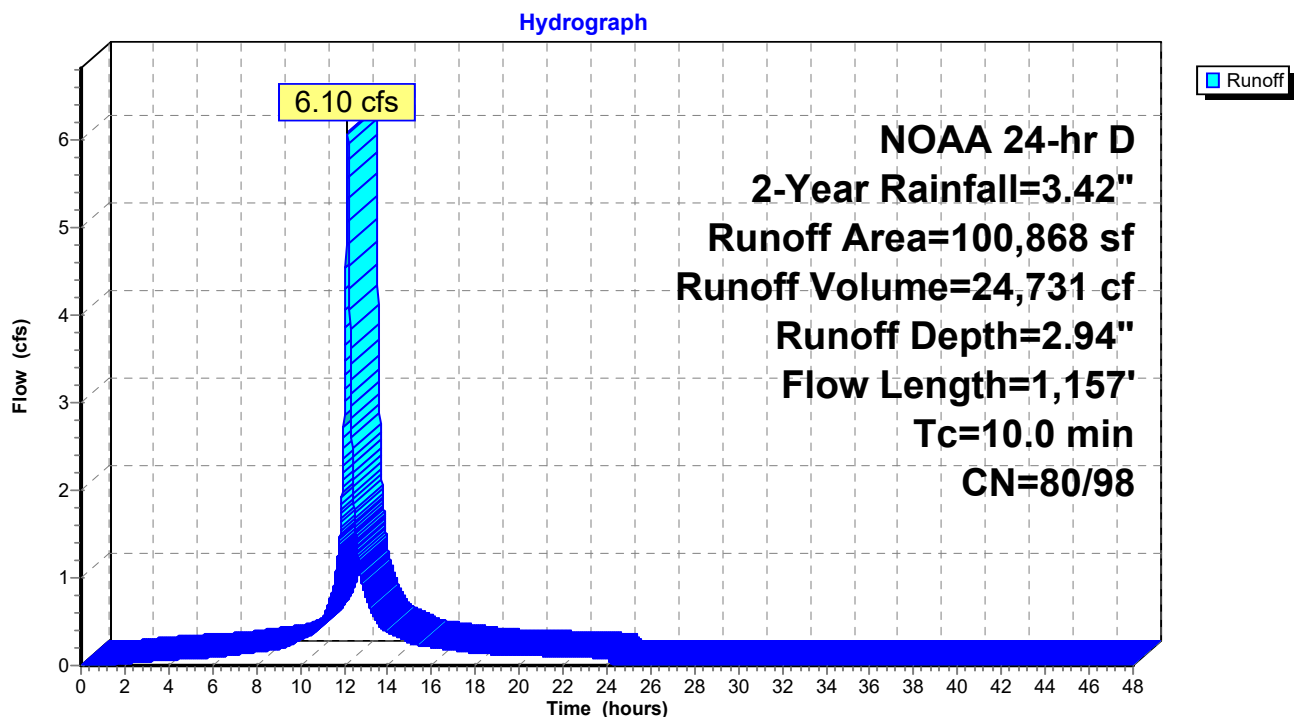
Summary for Subcatchment P-1B: Lower Detained Area Tributary to POI-1

Runoff = 6.10 cfs @ 12.17 hrs, Volume= 24,731 cf, Depth= 2.94"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 2-Year Rainfall=3.42"

	Area (sf)	CN	Description
*	85,579	98	Impervious Surfaces
	0	74	>75% Grass cover, Good, HSG C
	15,289	80	>75% Grass cover, Good, HSG D
	0	70	Woods, Good, HSG C
	0	77	Woods, Good, HSG D
	100,868	95	Weighted Average
	15,289	80	15.16% Pervious Area
	85,579	98	84.84% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	43	0.3720	0.13		Sheet Flow, A-B Woods: Dense underbrush n= 0.800 P2= 3.42"
0.5	57	0.0614	1.99		Sheet Flow, B-C Smooth surfaces n= 0.011 P2= 3.42"
0.5	155	0.0677	5.28		Shallow Concentrated Flow, C-D Paved Kv= 20.3 fps
0.8	902	0.0860	18.24	22.39	Pipe Channel, D-E 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.011 Concrete pipe, straight & clean
7.5	1,157	Total, Increased to minimum Tc = 10.0 min			

Subcatchment P-1B: Lower Detained Area Tributary to POI-1

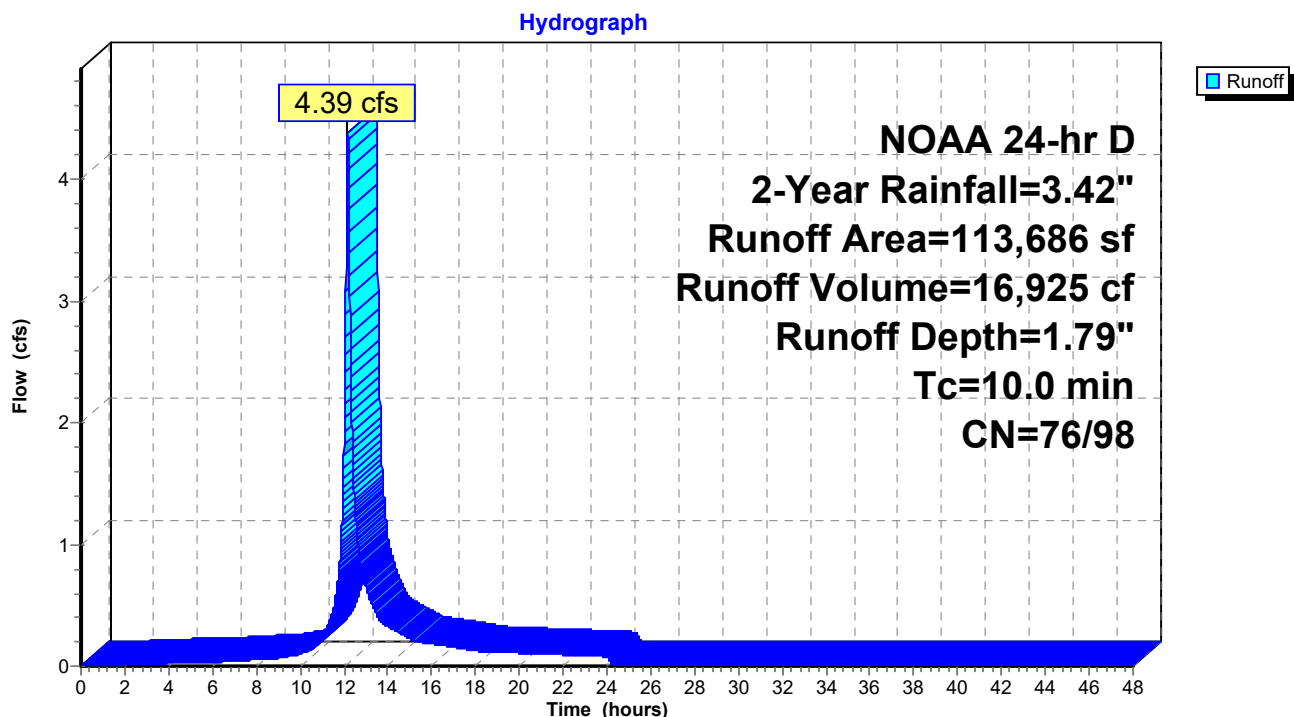
Summary for Subcatchment P-1C: Undetained Area Tributary to POI-1

Runoff = 4.39 cfs @ 12.17 hrs, Volume= 16,925 cf, Depth= 1.79"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 2-Year Rainfall=3.42"

	Area (sf)	CN	Description
*	30,004	98	Impervious Surfaces
	60,942	74	>75% Grass cover, Good, HSG C
	22,740	80	>75% Grass cover, Good, HSG D
	0	70	Woods, Good, HSG C
	0	77	Woods, Good, HSG D
	113,686	82	Weighted Average
	83,682	76	73.61% Pervious Area
	30,004	98	26.39% Impervious Area

Tc	Length	Slope	Velocity	Capacity	Description
(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)	
10.0					Direct Entry,

Subcatchment P-1C: Undetained Area Tributary to POI-1

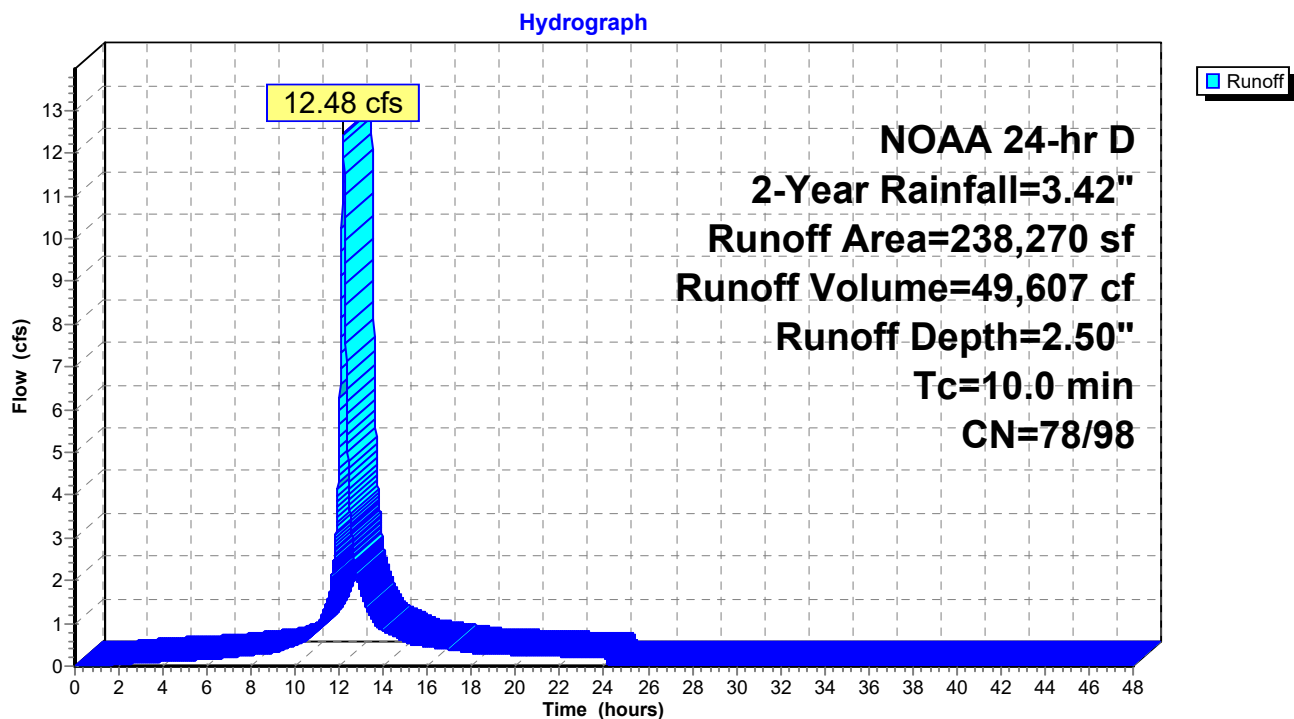
Summary for Subcatchment P-2A: Proposed Area Tributary to Aboveground Pond

Runoff = 12.48 cfs @ 12.17 hrs, Volume= 49,607 cf, Depth= 2.50"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 2-Year Rainfall=3.42"

	Area (sf)	CN	Description
*	142,897	98	Impervious Surfaces
	7,563	74	>75% Grass cover, Good, HSG C
	73,435	80	>75% Grass cover, Good, HSG D
	8,450	70	Woods, Good, HSG C
	5,925	77	Woods, Good, HSG D
	238,270	90	Weighted Average
	95,373	78	40.03% Pervious Area
	142,897	98	59.97% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Subcatchment P-2A: Proposed Area Tributary to Aboveground Pond

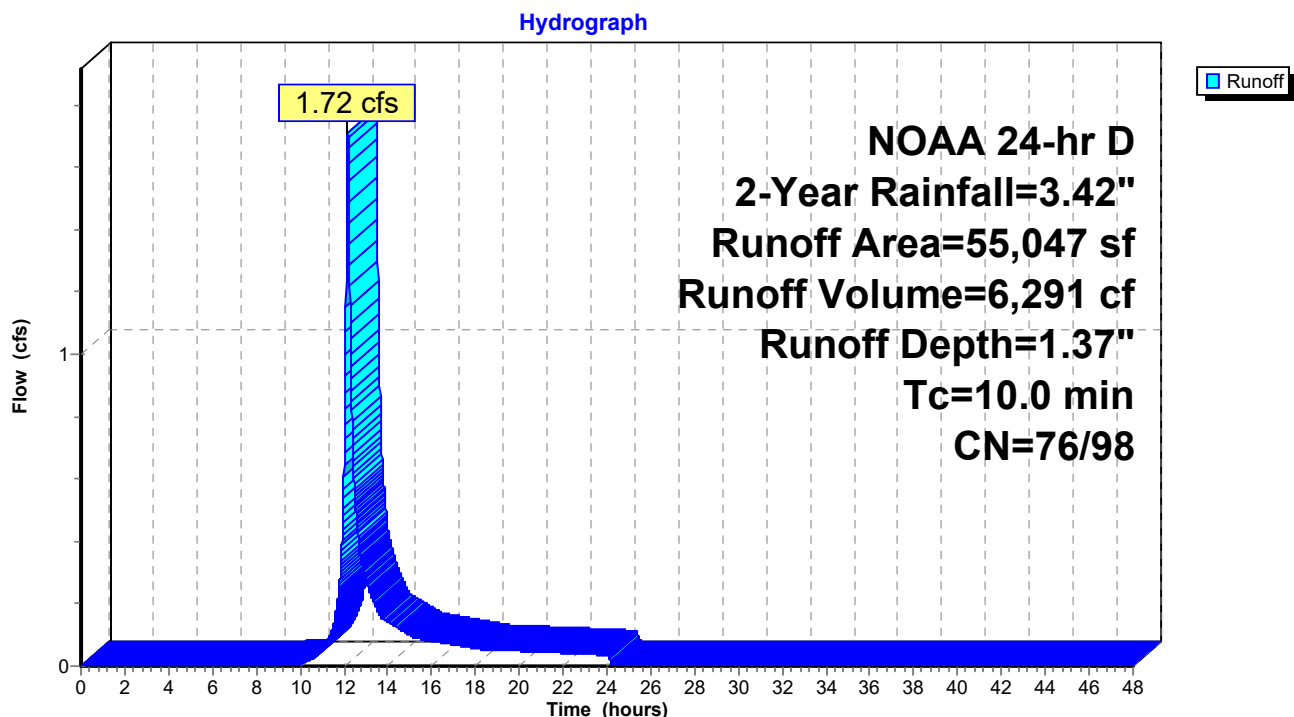
Summary for Subcatchment P-2B-1: Proposed Dog Park Area Tributary to Basin

Runoff = 1.72 cfs @ 12.18 hrs, Volume= 6,291 cf, Depth= 1.37"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 2-Year Rainfall=3.42"

	Area (sf)	CN	Description
*	1,265	98	Impervious Surfaces
	16,597	74	>75% Grass cover, Good, HSG C
	27,424	80	>75% Grass cover, Good, HSG D
	9,761	70	Woods, Good, HSG C
	0	77	Woods, Good, HSG D
	55,047	77	Weighted Average
	53,782	76	97.70% Pervious Area
	1,265	98	2.30% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Subcatchment P-2B-1: Proposed Dog Park Area Tributary to Basin

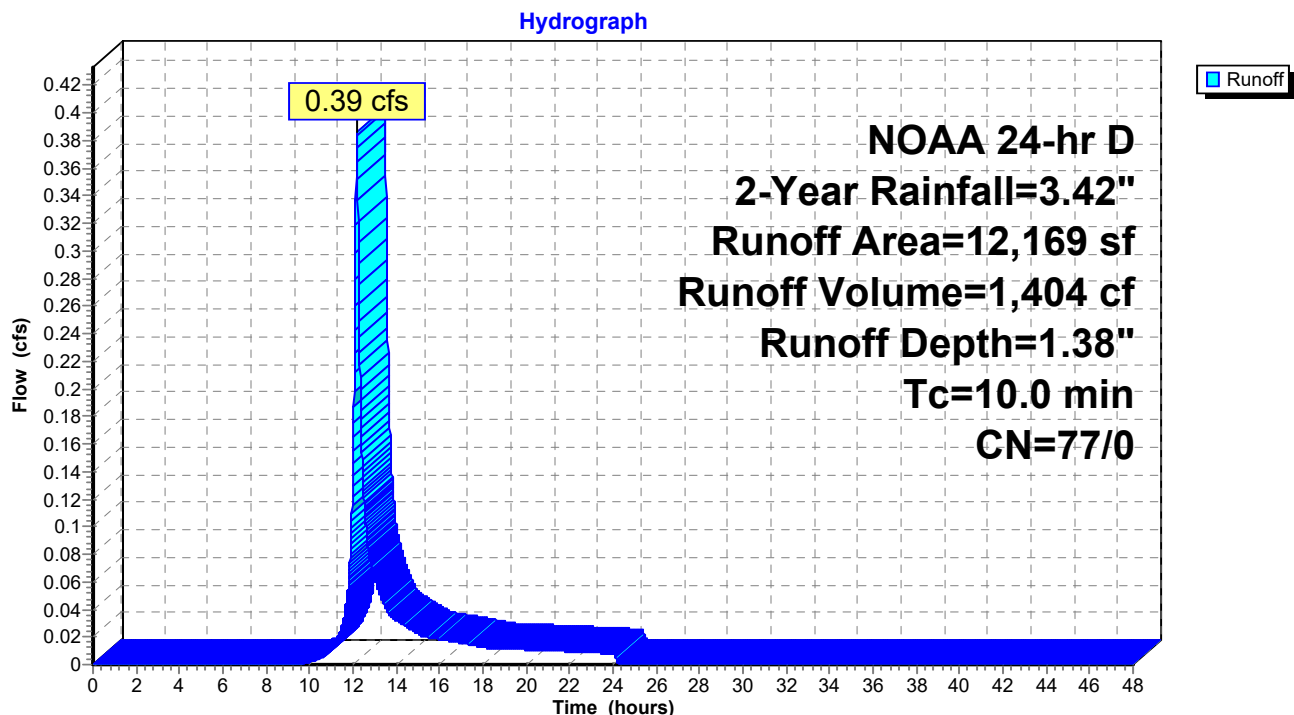
Summary for Subcatchment P-2B-2: Proposed Area Tributary to Culvert Downstream of Existing Pond

Runoff = 0.39 cfs @ 12.18 hrs, Volume= 1,404 cf, Depth= 1.38"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 2-Year Rainfall=3.42"

Area (sf)	CN	Description
*	0	98 Impervious Surfaces
5,664	74	>75% Grass cover, Good, HSG C
6,505	80	>75% Grass cover, Good, HSG D
0	70	Woods, Good, HSG C
0	77	Woods, Good, HSG D
12,169	77	Weighted Average
12,169	77	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Subcatchment P-2B-2: Proposed Area Tributary to Culvert Downstream of Existing Pond

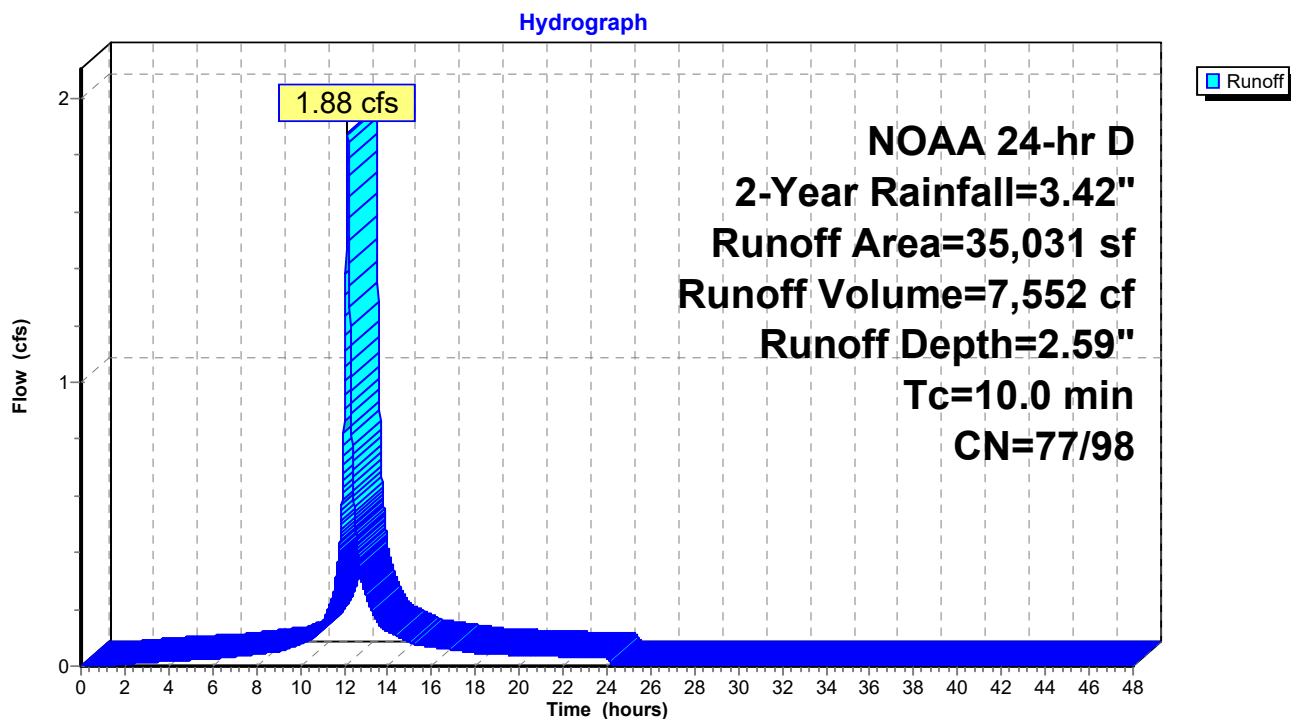
Summary for Subcatchment P-3: Proposed Area Tributary to POI-3

Runoff = 1.88 cfs @ 12.17 hrs, Volume= 7,552 cf, Depth= 2.59"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 2-Year Rainfall=3.42"

	Area (sf)	CN	Description
*	23,530	98	Impervious Surfaces
	3,013	74	>75% Grass cover, Good, HSG C
	6,634	80	>75% Grass cover, Good, HSG D
	1,854	70	Woods, Good, HSG C
	0	77	Woods, Good, HSG D
	35,031	91	Weighted Average
	11,501	77	32.83% Pervious Area
	23,530	98	67.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Subcatchment P-3: Proposed Area Tributary to POI-3

Summary for Pond B-1A: Subsurface Detention Basin

Inflow Area = 129,383 sf, 73.57% Impervious, Inflow Depth = 2.68" for 2-Year event
 Inflow = 7.16 cfs @ 12.17 hrs, Volume= 28,938 cf
 Outflow = 3.50 cfs @ 12.33 hrs, Volume= 28,938 cf, Atten= 51%, Lag= 9.6 min
 Primary = 3.50 cfs @ 12.33 hrs, Volume= 28,938 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 495.36' @ 12.33 hrs Surf.Area= 2,194 sf Storage= 3,909 cf

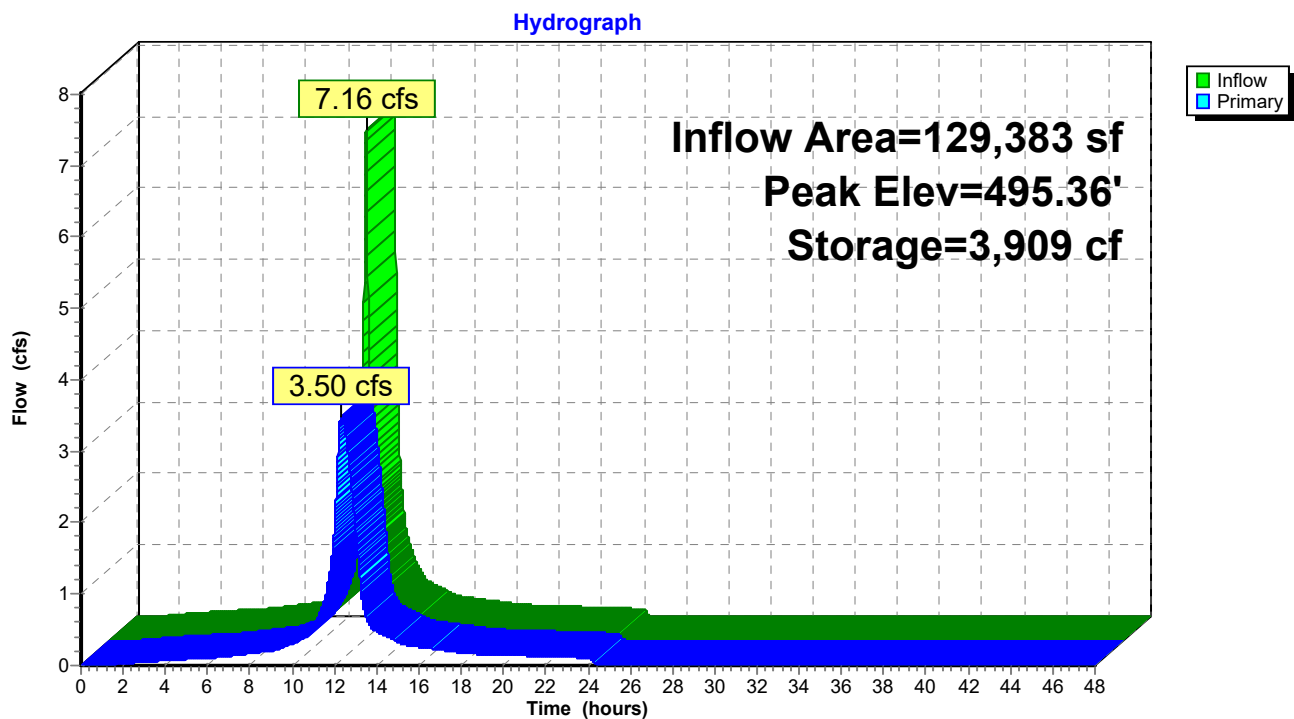
Plug-Flow detention time= 9.3 min calculated for 28,932 cf (100% of inflow)
 Center-of-Mass det. time= 9.3 min (783.5 - 774.3)

Volume	Invert	Avail.Storage	Storage Description
#1	493.00'	8,639 cf	60.0" Round Pipe Storage x 5 L= 88.0' S= 0.0010 '/'

Device	Routing	Invert	Outlet Devices
#1	Primary	493.00'	18.0" Round Culvert L= 90.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 493.00' / 484.00' S= 0.1000 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 1.77 sf
#2	Device 1	493.00'	12.0" W x 6.0" H Vert. Low Flow Orifice C= 0.600
#3	Device 1	495.35'	18.0" W x 14.0" H Vert. Control Slot C= 0.600
#4	Device 1	498.00'	6.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=3.50 cfs @ 12.33 hrs HW=495.36' TW=481.25' (Dynamic Tailwater)

- 1=Culvert (Passes 3.50 cfs of 10.79 cfs potential flow)
- 2=Low Flow Orifice (Orifice Controls 3.49 cfs @ 6.99 fps)
- 3=Control Slot (Orifice Controls 0.00 cfs @ 0.27 fps)
- 4=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond B-1A: Subsurface Detention Basin

Summary for Pond B-1B: Subsurface Detention Basin

Inflow Area = 230,251 sf, 78.51% Impervious, Inflow Depth = 2.80" for 2-Year event
 Inflow = 9.13 cfs @ 12.18 hrs, Volume= 53,669 cf
 Outflow = 4.09 cfs @ 12.66 hrs, Volume= 53,669 cf, Atten= 55%, Lag= 28.7 min
 Primary = 4.09 cfs @ 12.66 hrs, Volume= 53,669 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 481.50' @ 12.66 hrs Surf.Area= 4,994 sf Storage= 9,299 cf

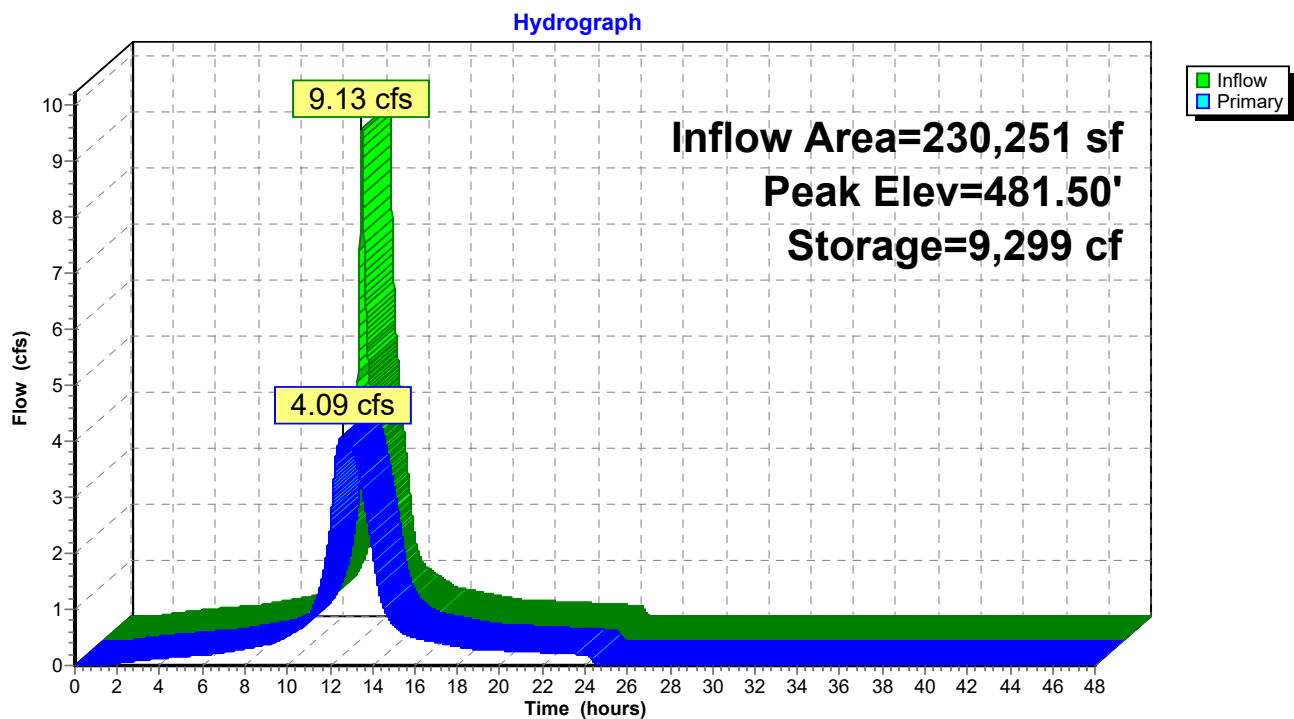
Plug-Flow detention time= 21.8 min calculated for 53,657 cf (100% of inflow)
 Center-of-Mass det. time= 21.8 min (798.3 - 776.4)

Volume	Invert	Avail.Storage	Storage Description
#1	479.00'	19,635 cf	60.0" Round Pipe Storage x 5 L= 200.0' S= 0.0010 '/'

Device	Routing	Invert	Outlet Devices
#1	Primary	479.00'	24.0" Round Culvert L= 50.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 479.00' / 474.00' S= 0.1000 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf
#2	Device 1	479.00'	8.5" W x 10.0" H Vert. Low Flow Orifice C= 0.600
#3	Device 1	481.55'	48.0" W x 8.0" H Vert. Control Slot C= 0.600
#4	Device 1	484.00'	6.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=4.09 cfs @ 12.66 hrs HW=481.50' TW=0.00' (Dynamic Tailwater)

- 1=Culvert (Passes 4.09 cfs of 18.50 cfs potential flow)
- 2=Low Flow Orifice (Orifice Controls 4.09 cfs @ 6.93 fps)
- 3=Control Slot (Controls 0.00 cfs)
- 4=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond B-1B: Subsurface Detention Basin

Summary for Pond B-2A-2: (new Pond)

Inflow Area = 55,047 sf, 2.30% Impervious, Inflow Depth = 1.37" for 2-Year event
 Inflow = 1.72 cfs @ 12.18 hrs, Volume= 6,291 cf
 Outflow = 0.33 cfs @ 12.80 hrs, Volume= 6,291 cf, Atten= 81%, Lag= 37.6 min
 Primary = 0.33 cfs @ 12.80 hrs, Volume= 6,291 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 500.35' @ 12.80 hrs Surf.Area= 2,014 sf Storage= 1,868 cf

Plug-Flow detention time= 53.2 min calculated for 6,289 cf (100% of inflow)
 Center-of-Mass det. time= 53.2 min (914.0 - 860.8)

Volume	Invert	Avail.Storage	Storage Description
#1	499.00'	6,786 cf	48.0" Round Pipe Storage x 4 L= 135.0' S= 0.0010 '/'

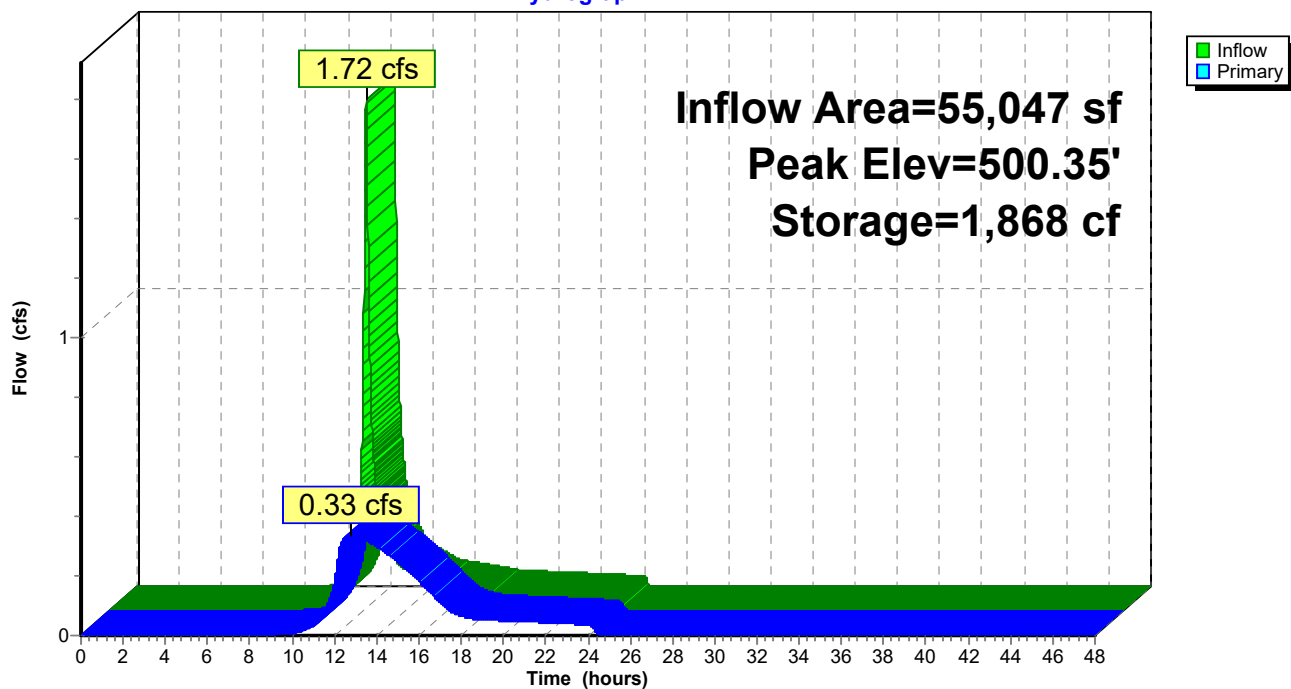
Device	Routing	Invert	Outlet Devices
#1	Primary	499.00'	15.0" Round Culvert L= 44.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 499.00' / 498.78' S= 0.0050 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 1.23 sf
#2	Device 1	499.00'	3.0" W x 3.0" H Vert. Low Flow Orifice C= 0.600
#3	Device 1	500.40'	12.0" W x 4.5" H Vert. Control Slot C= 0.600
#4	Device 1	503.00'	6.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=0.33 cfs @ 12.80 hrs HW=500.35' TW=0.00' (Dynamic Tailwater)

- 1=Culvert (Passes 0.33 cfs of 4.42 cfs potential flow)
- 2=Low Flow Orifice (Orifice Controls 0.33 cfs @ 5.32 fps)
- 3=Control Slot (Controls 0.00 cfs)
- 4=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond B-2A-2: (new Pond)

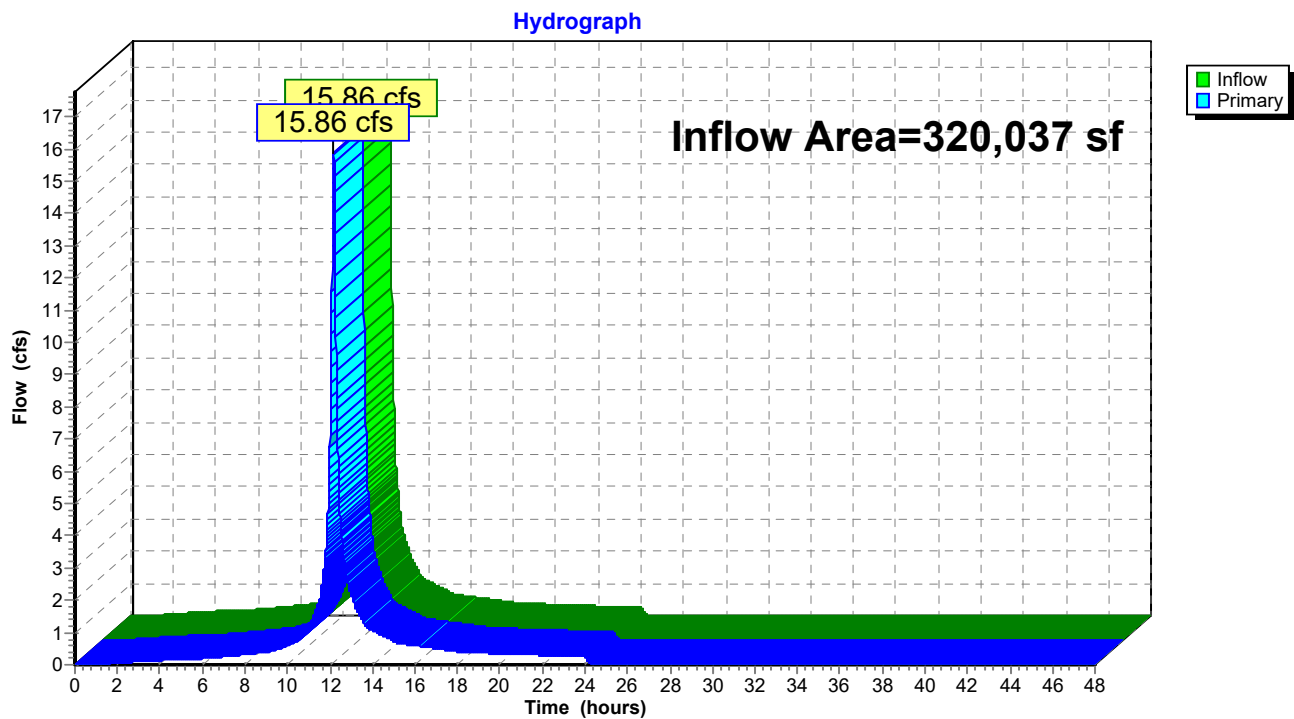
Hydrograph



Summary for Link E-2: Existing Area Tributary to POI-2

Inflow Area = 320,037 sf, 55.02% Impervious, Inflow Depth = 2.36" for 2-Year event
Inflow = 15.86 cfs @ 12.17 hrs, Volume= 63,021 cf
Primary = 15.86 cfs @ 12.17 hrs, Volume= 63,021 cf, Atten= 0%, Lag= 0.0 min

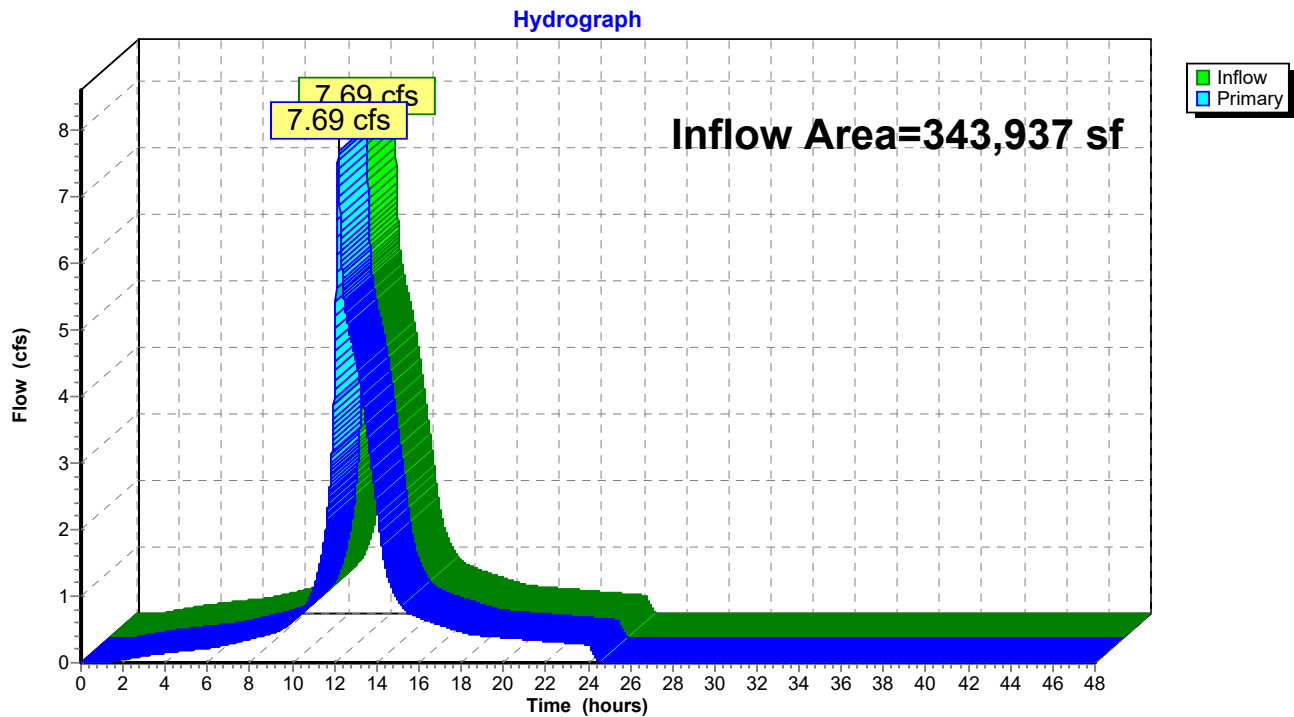
Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Link E-2: Existing Area Tributary to POI-2

Summary for Link P-1: Proposed Area Tributary to POI-1

Inflow Area = 343,937 sf, 61.28% Impervious, Inflow Depth = 2.46" for 2-Year event
Inflow = 7.69 cfs @ 12.19 hrs, Volume= 70,593 cf
Primary = 7.69 cfs @ 12.19 hrs, Volume= 70,593 cf, Atten= 0%, Lag= 0.0 min

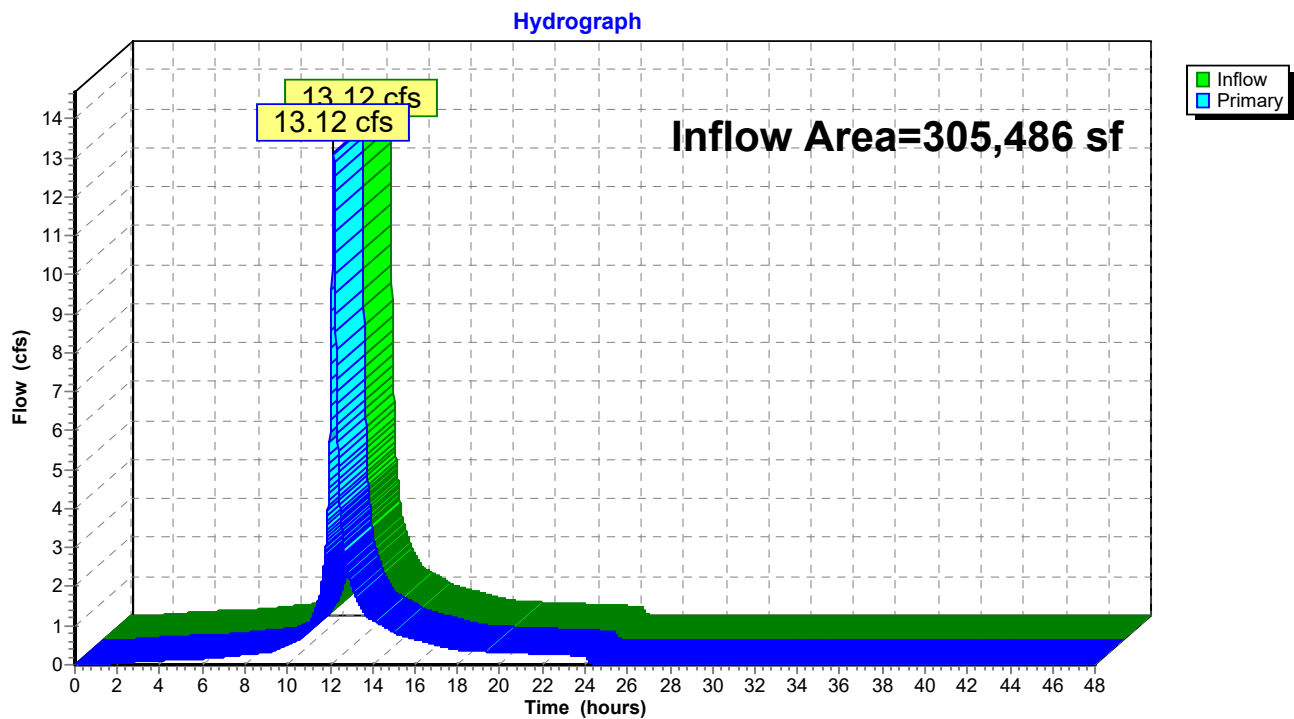
Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Link P-1: Proposed Area Tributary to POI-1

Summary for Link P-2: Proposed Area Tributary to POI-2

Inflow Area = 305,486 sf, 47.19% Impervious, Inflow Depth = 2.25" for 2-Year event
Inflow = 13.12 cfs @ 12.17 hrs, Volume= 57,302 cf
Primary = 13.12 cfs @ 12.17 hrs, Volume= 57,302 cf, Atten= 0%, Lag= 0.0 min

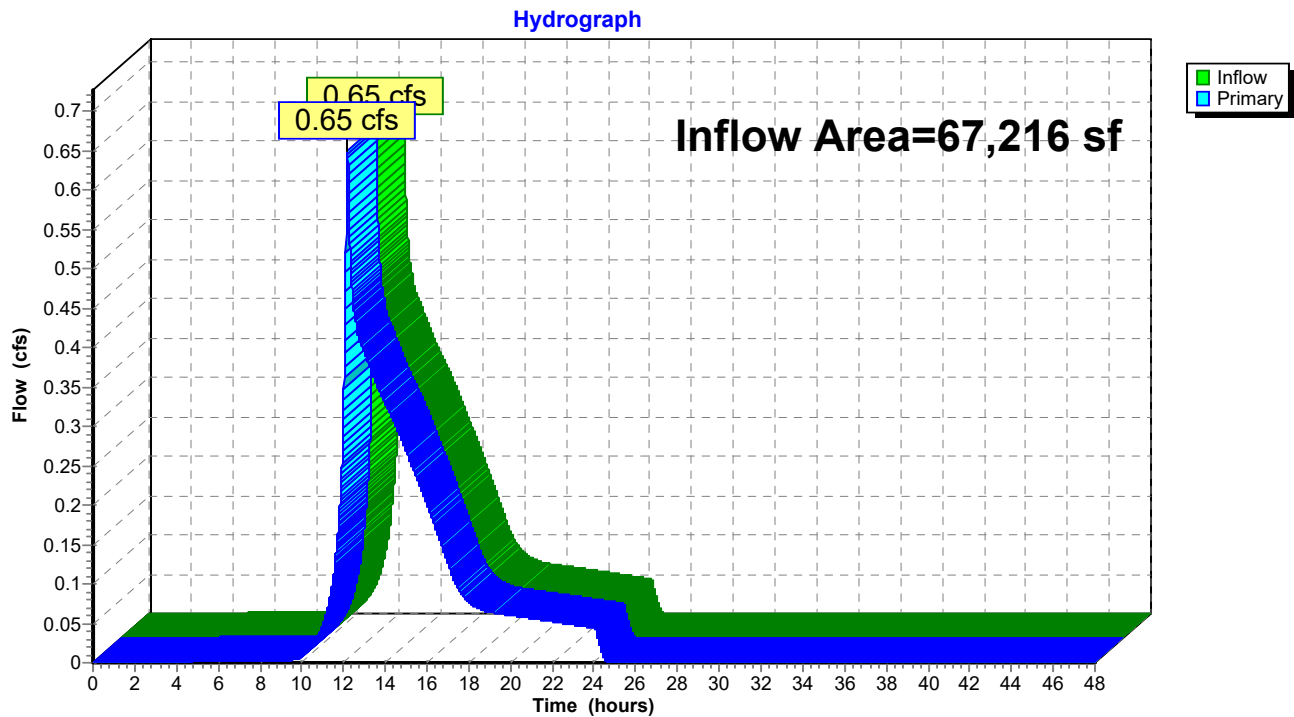
Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Link P-2: Proposed Area Tributary to POI-2

Summary for Link P-2B: Proposed Area Tributary to Culvert Downstream of Existing Pond

Inflow Area = 67,216 sf, 1.88% Impervious, Inflow Depth = 1.37" for 2-Year event
Inflow = 0.65 cfs @ 12.19 hrs, Volume= 7,695 cf
Primary = 0.65 cfs @ 12.19 hrs, Volume= 7,695 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Link P-2B: Proposed Area Tributary to Culvert Downstream of Existing Pond

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv.

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment E-1: Existing Area Runoff Area=304,647 sf 60.03% Impervious Runoff Depth=4.06"
Flow Length=1,157' Tc=10.0 min CN=76/98 Runoff=25.73 cfs 103,008 cf

Subcatchment E-2A: Existing Area Runoff Area=278,126 sf 61.54% Impervious Runoff Depth=4.15"
Tc=10.0 min CN=77/98 Runoff=24.02 cfs 96,179 cf

Subcatchment E-2B: Existing Area Runoff Area=41,911 sf 11.76% Impervious Runoff Depth=2.89"
Tc=10.0 min CN=75/98 Runoff=2.73 cfs 10,100 cf

Subcatchment E-3: Existing Area Tributary Runoff Area=59,770 sf 41.42% Impervious Runoff Depth=3.51"
Tc=10.0 min CN=73/98 Runoff=4.47 cfs 17,495 cf

Subcatchment P-1A: Upper Detained Area Runoff Area=129,383 sf 73.57% Impervious Runoff Depth=4.37"
Flow Length=1,157' Tc=10.0 min CN=76/98 Runoff=11.57 cfs 47,073 cf

Subcatchment P-1B: Lower Detained Runoff Area=100,868 sf 84.84% Impervious Runoff Depth=4.69"
Flow Length=1,157' Tc=10.0 min CN=80/98 Runoff=9.58 cfs 39,384 cf

Subcatchment P-1C: Undetained Area Runoff Area=113,686 sf 26.39% Impervious Runoff Depth=3.28"
Tc=10.0 min CN=76/98 Runoff=8.17 cfs 31,099 cf

Subcatchment P-2A: Proposed Area Runoff Area=238,270 sf 59.97% Impervious Runoff Depth=4.16"
Tc=10.0 min CN=78/98 Runoff=20.66 cfs 82,524 cf

Subcatchment P-2B-1: Proposed Dog Park Runoff Area=55,047 sf 2.30% Impervious Runoff Depth=2.79"
Tc=10.0 min CN=76/98 Runoff=3.54 cfs 12,802 cf

Subcatchment P-2B-2: Proposed Area Runoff Area=12,169 sf 0.00% Impervious Runoff Depth=2.82"
Tc=10.0 min CN=77/0 Runoff=0.80 cfs 2,858 cf

Subcatchment P-3: Proposed Area Runoff Area=35,031 sf 67.17% Impervious Runoff Depth=4.25"
Tc=10.0 min CN=77/98 Runoff=3.08 cfs 12,418 cf

Pond B-1A: Subsurface Detention Basin Peak Elev=496.29' Storage=5,928 cf Inflow=11.57 cfs 47,073 cf
Outflow=8.55 cfs 47,073 cf

Pond B-1B: Subsurface Detention Basin Peak Elev=482.24' Storage=13,005 cf Inflow=16.63 cfs 86,457 cf
Outflow=12.15 cfs 86,457 cf

Pond B-2A-2: (new Pond) Peak Elev=501.02' Storage=3,285 cf Inflow=3.54 cfs 12,802 cf
Outflow=1.59 cfs 12,802 cf

Link E-2: Existing Area Tributary to POI-2 Inflow=26.75 cfs 106,279 cf
Primary=26.75 cfs 106,279 cf

Link P-1: Proposed Area Tributary to POI-1 Inflow=16.76 cfs 117,556 cf
Primary=16.76 cfs 117,556 cf

2020-03-18_West Orange

NOAA 24-hr D 10-Year Rainfall=5.21"

Prepared by Microsoft

Printed 3/19/2020

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Page 2

Link P-2: Proposed Area Tributary to POI-2

Inflow=22.22 cfs 98,184 cf

Primary=22.22 cfs 98,184 cf

Link P-2B: Proposed Area Tributary to Culvert Downstream of Existing Pond

Inflow=2.04 cfs 15,660 cf

Primary=2.04 cfs 15,660 cf

Total Runoff Area = 1,368,908 sf Runoff Volume = 454,941 cf Average Runoff Depth = 3.99"
44.32% Pervious = 606,723 sf 55.68% Impervious = 762,185 sf

Summary for Subcatchment E-1: Existing Area Tributary to POI-1

Runoff = 25.73 cfs @ 12.17 hrs, Volume= 103,008 cf, Depth= 4.06"

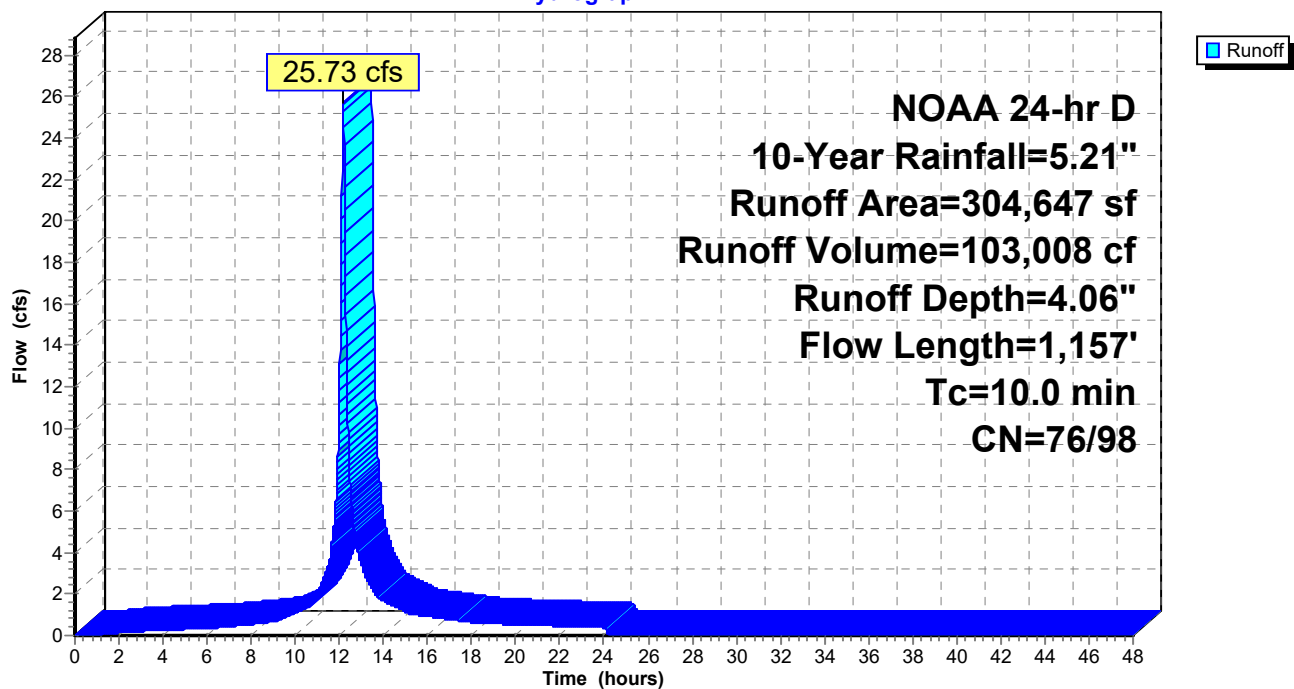
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 10-Year Rainfall=5.21"

	Area (sf)	CN	Description
*	182,894	98	Impervious Surfaces
	34,208	74	>75% Grass cover, Good, HSG C
	47,499	80	>75% Grass cover, Good, HSG D
	28,367	70	Woods, Good, HSG C
	11,679	77	Woods, Good, HSG D
	304,647	89	Weighted Average
	121,753	76	39.97% Pervious Area
	182,894	98	60.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	43	0.3720	0.13		Sheet Flow, A-B Woods: Dense underbrush n= 0.800 P2= 3.42"
0.5	57	0.0614	1.99		Sheet Flow, B-C Smooth surfaces n= 0.011 P2= 3.42"
0.5	155	0.0677	5.28		Shallow Concentrated Flow, C-D Paved Kv= 20.3 fps
0.8	902	0.0860	18.24	22.39	Pipe Channel, D-E 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.011 Concrete pipe, straight & clean
7.5	1,157	Total, Increased to minimum Tc = 10.0 min			

Subcatchment E-1: Existing Area Tributary to POI-1

Hydrograph



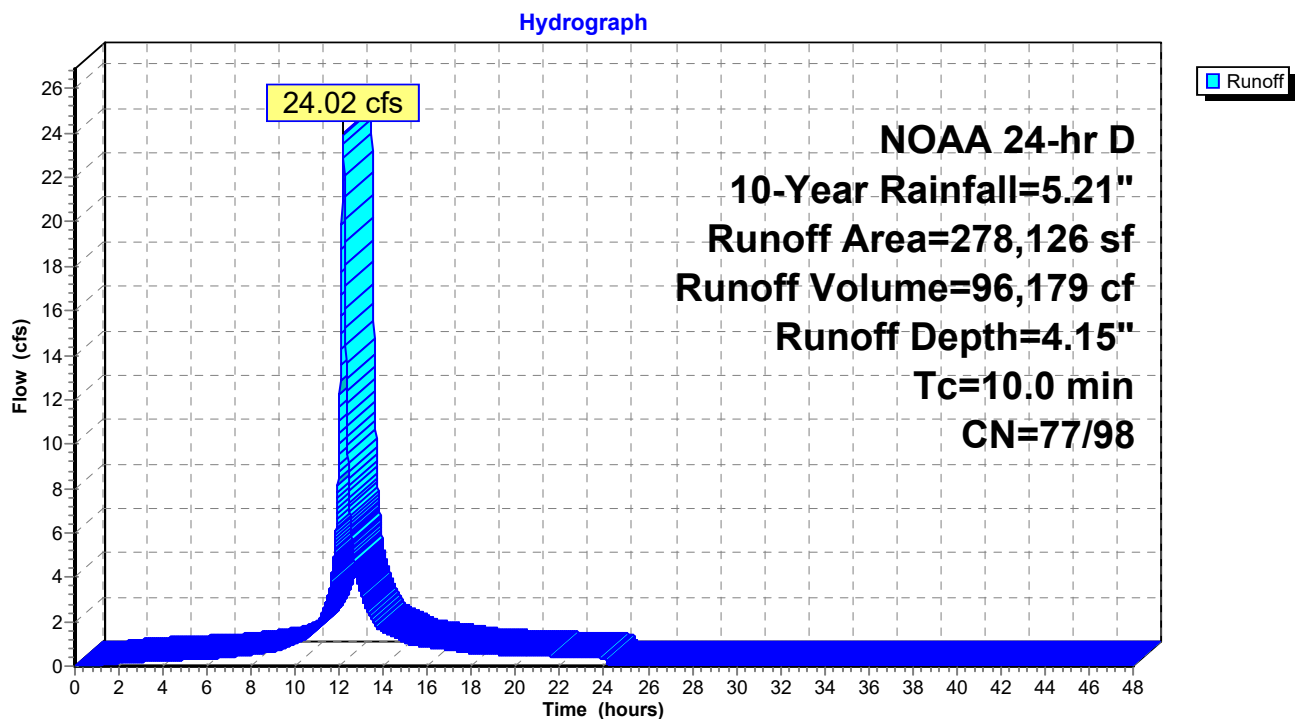
Summary for Subcatchment E-2A: Existing Area Tributary to Aboveground Pond

Runoff = 24.02 cfs @ 12.17 hrs, Volume= 96,179 cf, Depth= 4.15"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 10-Year Rainfall=5.21"

	Area (sf)	CN	Description
*	171,147	98	Impervious Surfaces
	730	74	>75% Grass cover, Good, HSG C
	70,237	80	>75% Grass cover, Good, HSG D
	24,193	70	Woods, Good, HSG C
	11,819	77	Woods, Good, HSG D
	278,126	90	Weighted Average
	106,979	77	38.46% Pervious Area
	171,147	98	61.54% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Subcatchment E-2A: Existing Area Tributary to Aboveground Pond

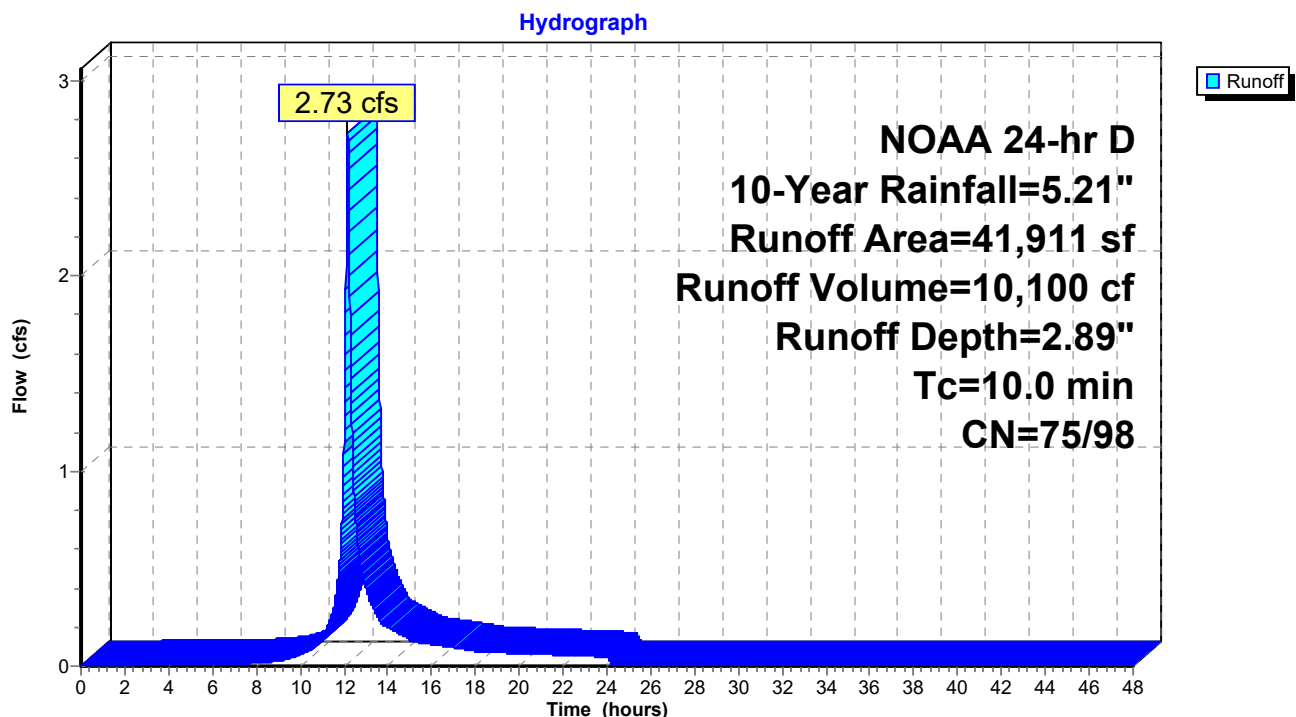
Summary for Subcatchment E-2B: Existing Area Tributary to Culvert Downstream of Pond

Runoff = 2.73 cfs @ 12.17 hrs, Volume= 10,100 cf, Depth= 2.89"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 10-Year Rainfall=5.21"

	Area (sf)	CN	Description
*	4,929	98	Impervious Surfaces
	0	74	>75% Grass cover, Good, HSG C
	6,244	80	>75% Grass cover, Good, HSG D
	13,613	70	Woods, Good, HSG C
	17,125	77	Woods, Good, HSG D
	41,911	78	Weighted Average
	36,982	75	88.24% Pervious Area
	4,929	98	11.76% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Subcatchment E-2B: Existing Area Tributary to Culvert Downstream of Pond

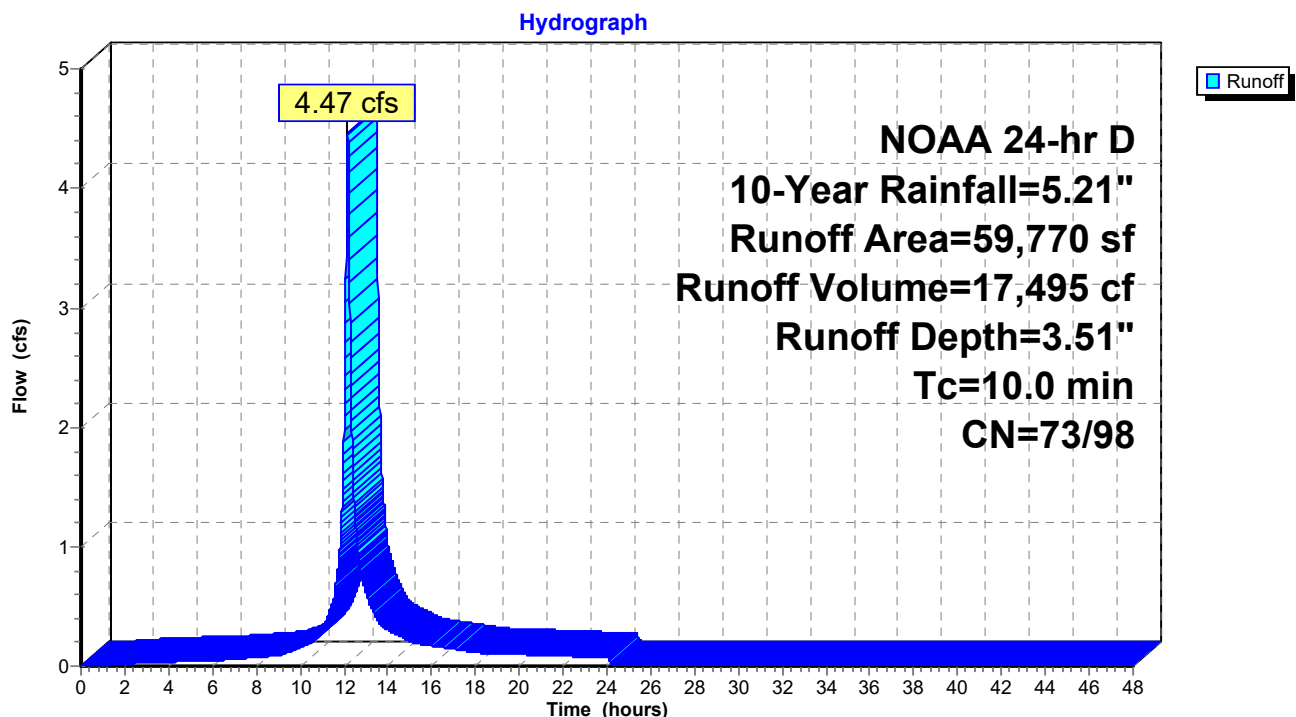
Summary for Subcatchment E-3: Existing Area Tributary to POI-3

Runoff = 4.47 cfs @ 12.17 hrs, Volume= 17,495 cf, Depth= 3.51"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 10-Year Rainfall=5.21"

	Area (sf)	CN	Description
*	24,755	98	Impervious Surfaces
	9,081	74	>75% Grass cover, Good, HSG C
	7,373	80	>75% Grass cover, Good, HSG D
	17,316	70	Woods, Good, HSG C
	1,245	77	Woods, Good, HSG D
	59,770	84	Weighted Average
	35,015	73	58.58% Pervious Area
	24,755	98	41.42% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Subcatchment E-3: Existing Area Tributary to POI-3

Summary for Subcatchment P-1A: Upper Detained Area Tributary to POI-1

Runoff = 11.57 cfs @ 12.17 hrs, Volume= 47,073 cf, Depth= 4.37"

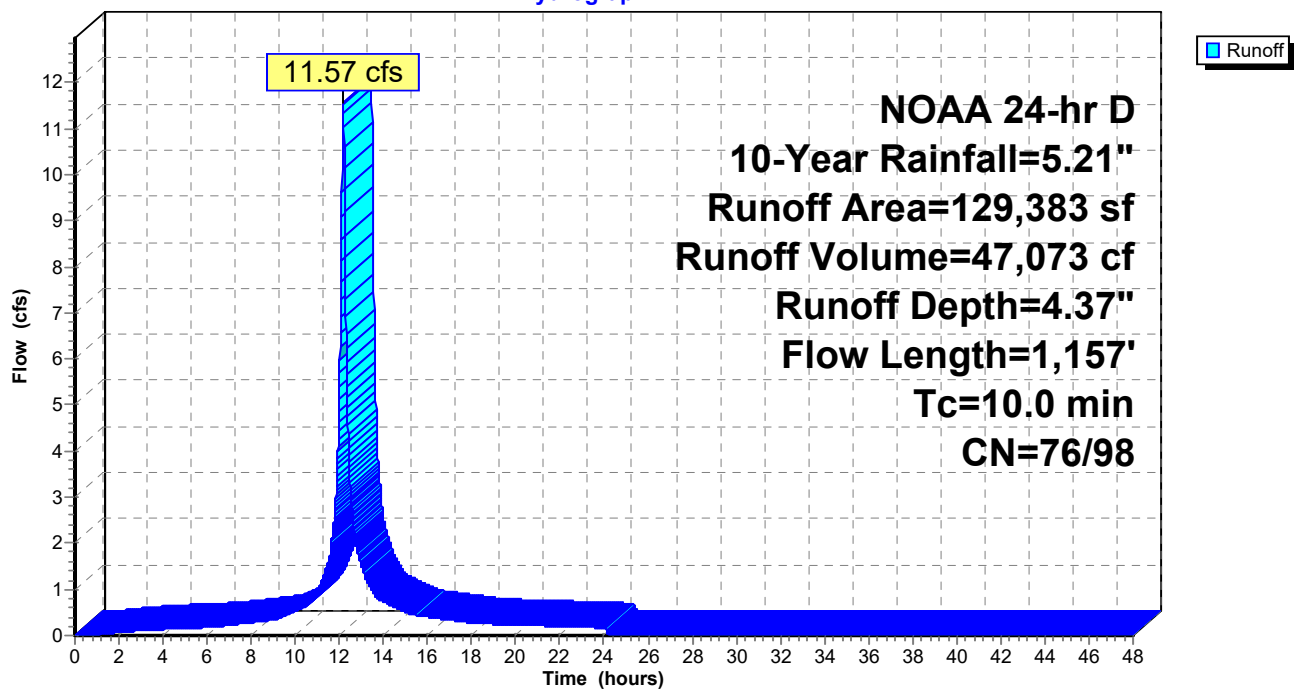
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 10-Year Rainfall=5.21"

	Area (sf)	CN	Description
*	95,185	98	Impervious Surfaces
	6,500	74	>75% Grass cover, Good, HSG C
	16,655	80	>75% Grass cover, Good, HSG D
	11,043	70	Woods, Good, HSG C
	0	77	Woods, Good, HSG D
	129,383	92	Weighted Average
	34,198	76	26.43% Pervious Area
	95,185	98	73.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	43	0.3720	0.13		Sheet Flow, A-B Woods: Dense underbrush n= 0.800 P2= 3.42"
0.5	57	0.0614	1.99		Sheet Flow, B-C Smooth surfaces n= 0.011 P2= 3.42"
0.5	155	0.0677	5.28		Shallow Concentrated Flow, C-D Paved Kv= 20.3 fps
0.8	902	0.0860	18.24	22.39	Pipe Channel, D-E 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.011 Concrete pipe, straight & clean
7.5	1,157	Total, Increased to minimum Tc = 10.0 min			

Subcatchment P-1A: Upper Detained Area Tributary to POI-1

Hydrograph



Summary for Subcatchment P-1B: Lower Detained Area Tributary to POI-1

Runoff = 9.58 cfs @ 12.17 hrs, Volume= 39,384 cf, Depth= 4.69"

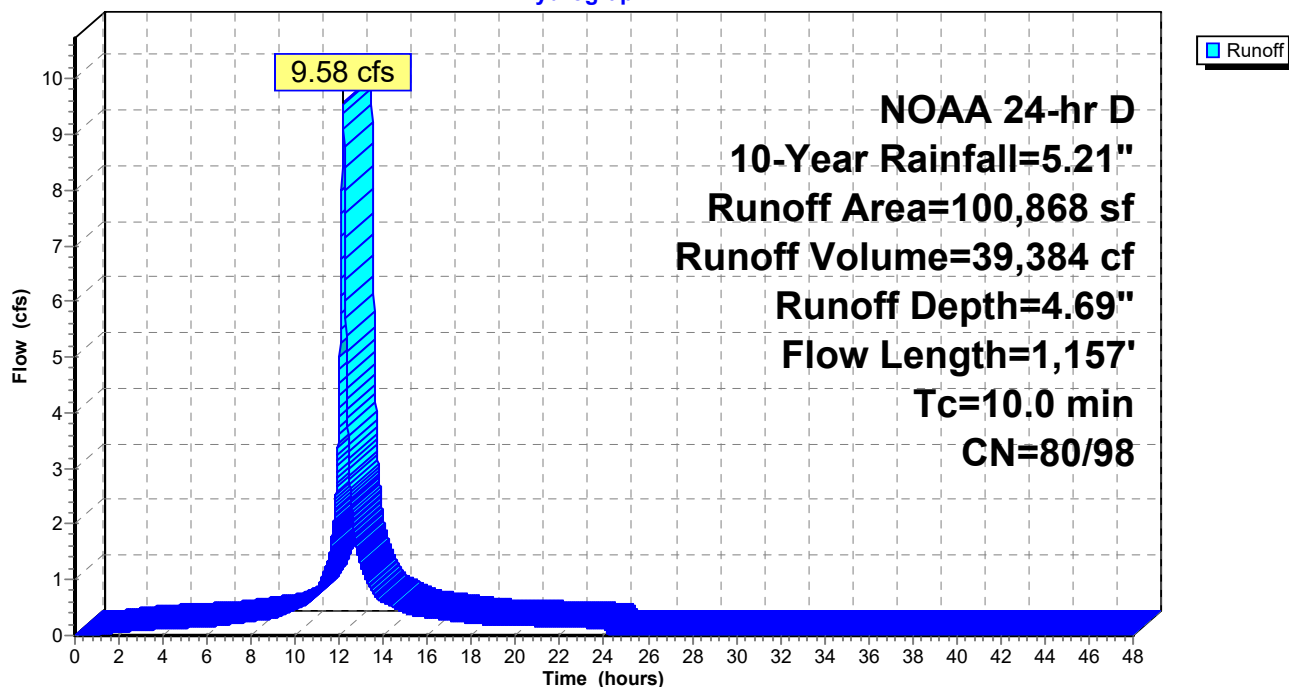
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 10-Year Rainfall=5.21"

	Area (sf)	CN	Description
*	85,579	98	Impervious Surfaces
	0	74	>75% Grass cover, Good, HSG C
	15,289	80	>75% Grass cover, Good, HSG D
	0	70	Woods, Good, HSG C
	0	77	Woods, Good, HSG D
	100,868	95	Weighted Average
	15,289	80	15.16% Pervious Area
	85,579	98	84.84% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	43	0.3720	0.13		Sheet Flow, A-B Woods: Dense underbrush n= 0.800 P2= 3.42"
0.5	57	0.0614	1.99		Sheet Flow, B-C Smooth surfaces n= 0.011 P2= 3.42"
0.5	155	0.0677	5.28		Shallow Concentrated Flow, C-D Paved Kv= 20.3 fps
0.8	902	0.0860	18.24	22.39	Pipe Channel, D-E 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.011 Concrete pipe, straight & clean
7.5	1,157	Total, Increased to minimum Tc = 10.0 min			

Subcatchment P-1B: Lower Detained Area Tributary to POI-1

Hydrograph



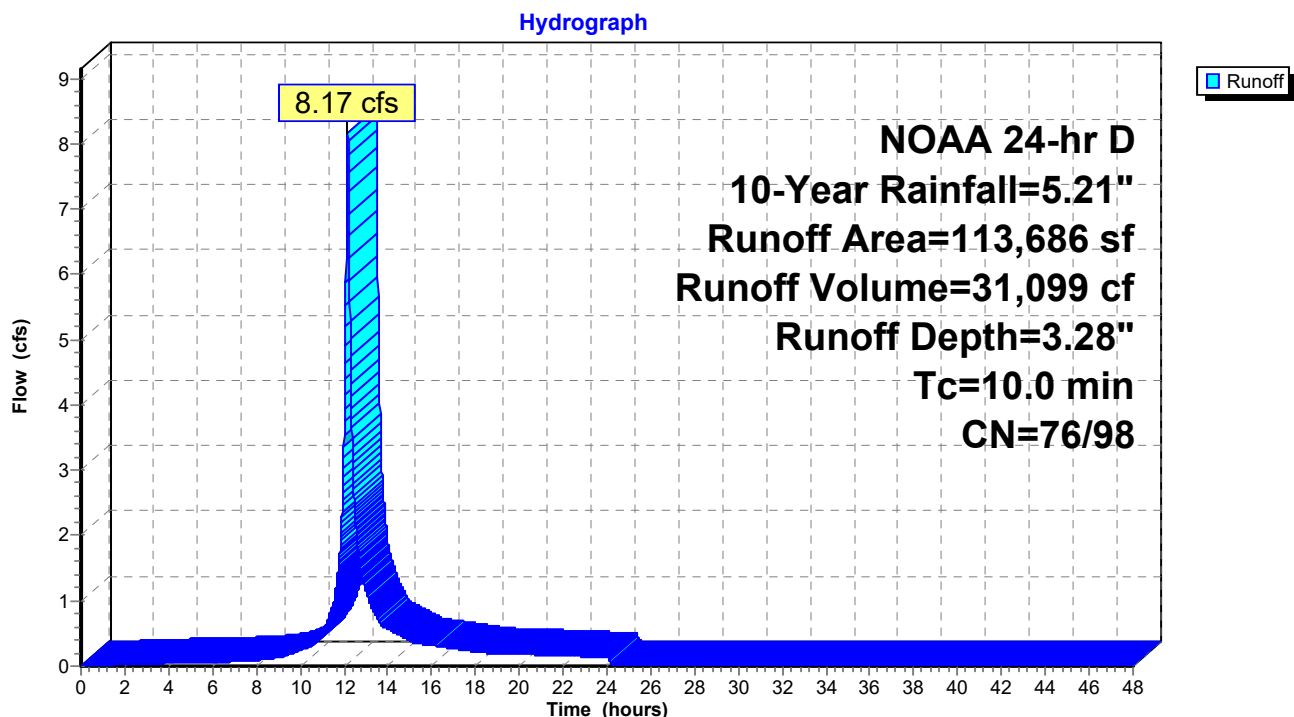
Summary for Subcatchment P-1C: Undetained Area Tributary to POI-1

Runoff = 8.17 cfs @ 12.17 hrs, Volume= 31,099 cf, Depth= 3.28"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 10-Year Rainfall=5.21"

	Area (sf)	CN	Description
*	30,004	98	Impervious Surfaces
	60,942	74	>75% Grass cover, Good, HSG C
	22,740	80	>75% Grass cover, Good, HSG D
	0	70	Woods, Good, HSG C
	0	77	Woods, Good, HSG D
	113,686	82	Weighted Average
	83,682	76	73.61% Pervious Area
	30,004	98	26.39% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Subcatchment P-1C: Undetained Area Tributary to POI-1

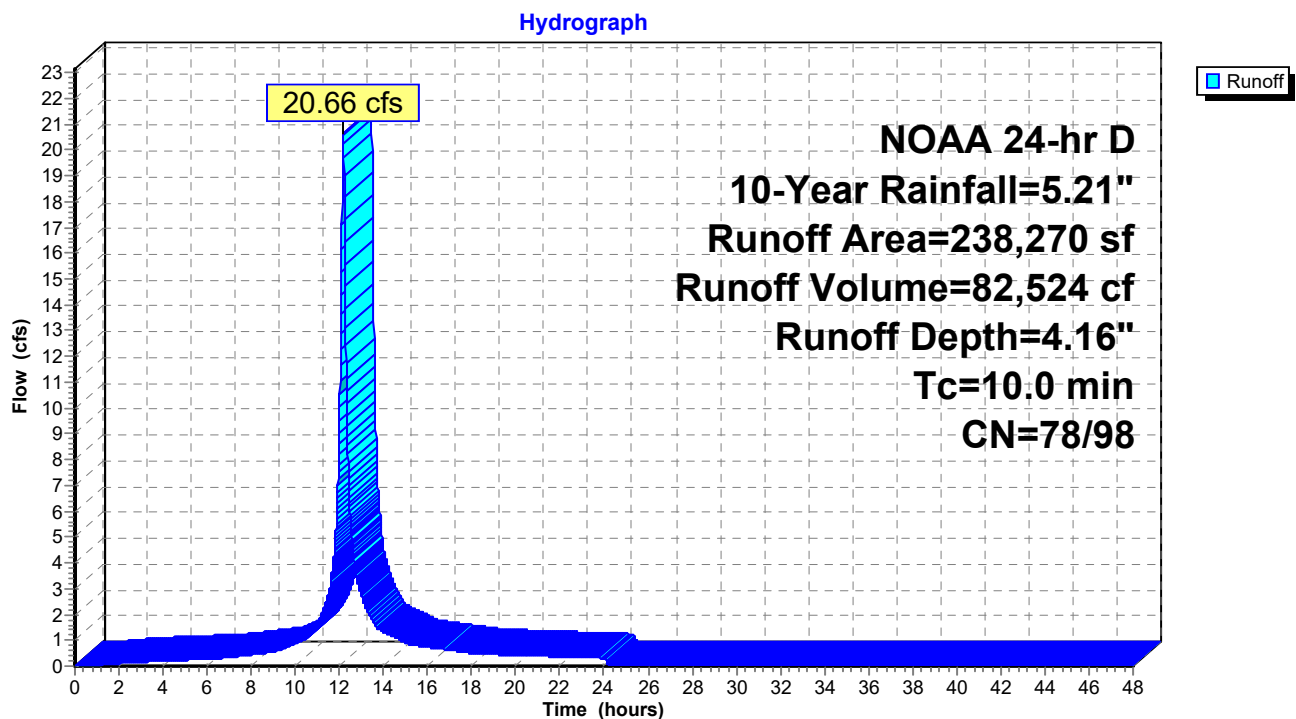
Summary for Subcatchment P-2A: Proposed Area Tributary to Aboveground Pond

Runoff = 20.66 cfs @ 12.17 hrs, Volume= 82,524 cf, Depth= 4.16"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 10-Year Rainfall=5.21"

	Area (sf)	CN	Description
*	142,897	98	Impervious Surfaces
	7,563	74	>75% Grass cover, Good, HSG C
	73,435	80	>75% Grass cover, Good, HSG D
	8,450	70	Woods, Good, HSG C
	5,925	77	Woods, Good, HSG D
	238,270	90	Weighted Average
	95,373	78	40.03% Pervious Area
	142,897	98	59.97% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Subcatchment P-2A: Proposed Area Tributary to Aboveground Pond

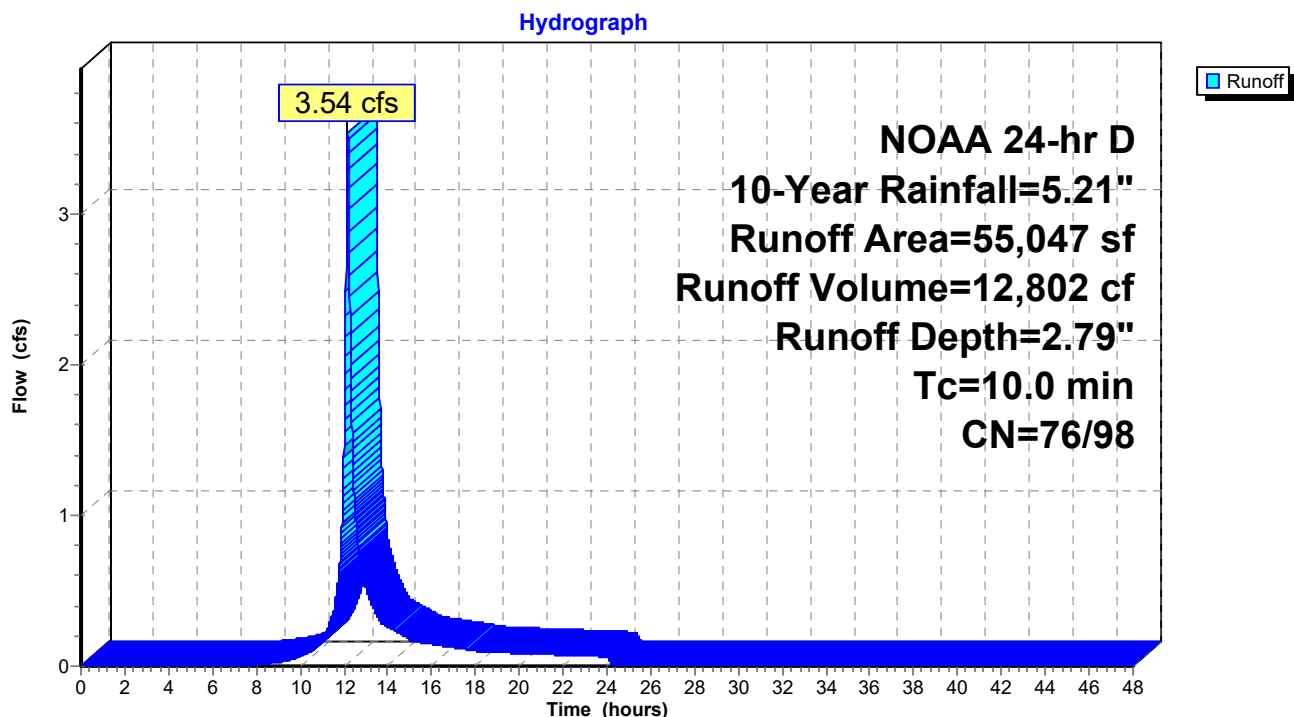
Summary for Subcatchment P-2B-1: Proposed Dog Park Area Tributary to Basin

Runoff = 3.54 cfs @ 12.17 hrs, Volume= 12,802 cf, Depth= 2.79"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 10-Year Rainfall=5.21"

	Area (sf)	CN	Description
*	1,265	98	Impervious Surfaces
	16,597	74	>75% Grass cover, Good, HSG C
	27,424	80	>75% Grass cover, Good, HSG D
	9,761	70	Woods, Good, HSG C
	0	77	Woods, Good, HSG D
	55,047	77	Weighted Average
	53,782	76	97.70% Pervious Area
	1,265	98	2.30% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Subcatchment P-2B-1: Proposed Dog Park Area Tributary to Basin

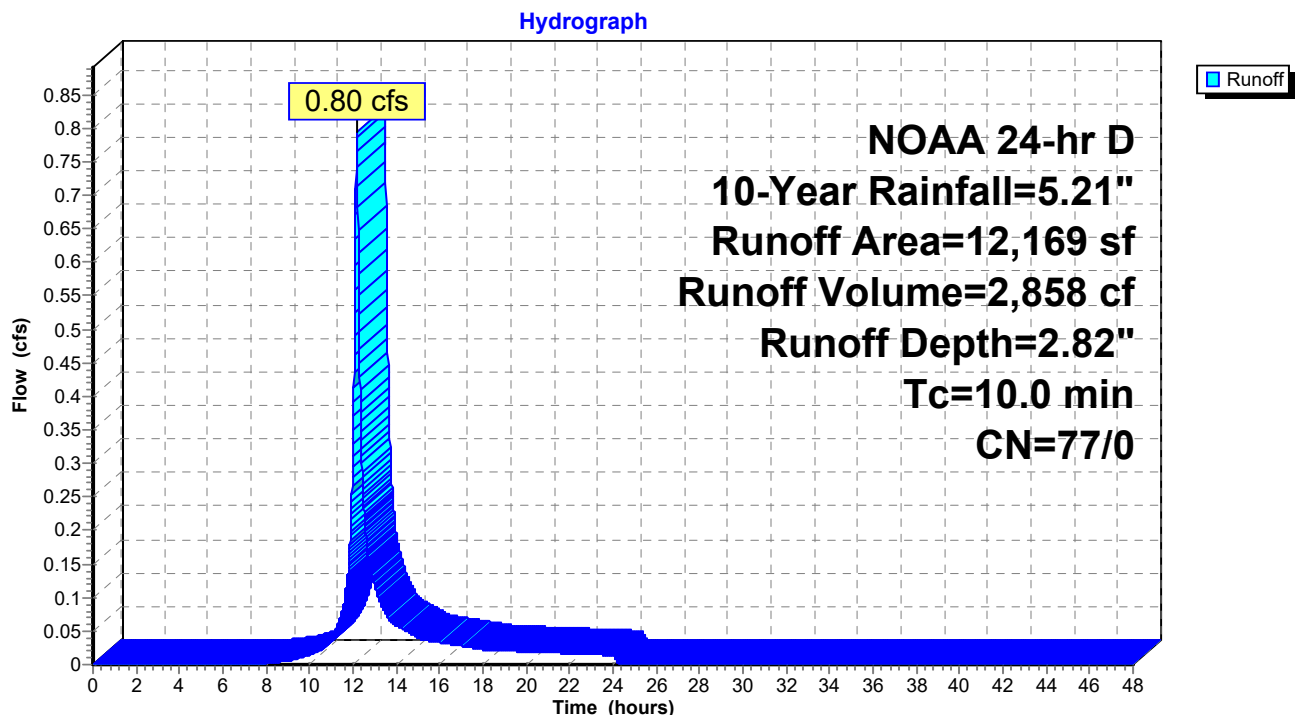
Summary for Subcatchment P-2B-2: Proposed Area Tributary to Culvert Downstream of Existing Pond

Runoff = 0.80 cfs @ 12.17 hrs, Volume= 2,858 cf, Depth= 2.82"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 10-Year Rainfall=5.21"

Area (sf)	CN	Description
*	0	98 Impervious Surfaces
5,664	74	>75% Grass cover, Good, HSG C
6,505	80	>75% Grass cover, Good, HSG D
0	70	Woods, Good, HSG C
0	77	Woods, Good, HSG D
12,169	77	Weighted Average
12,169	77	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Subcatchment P-2B-2: Proposed Area Tributary to Culvert Downstream of Existing Pond

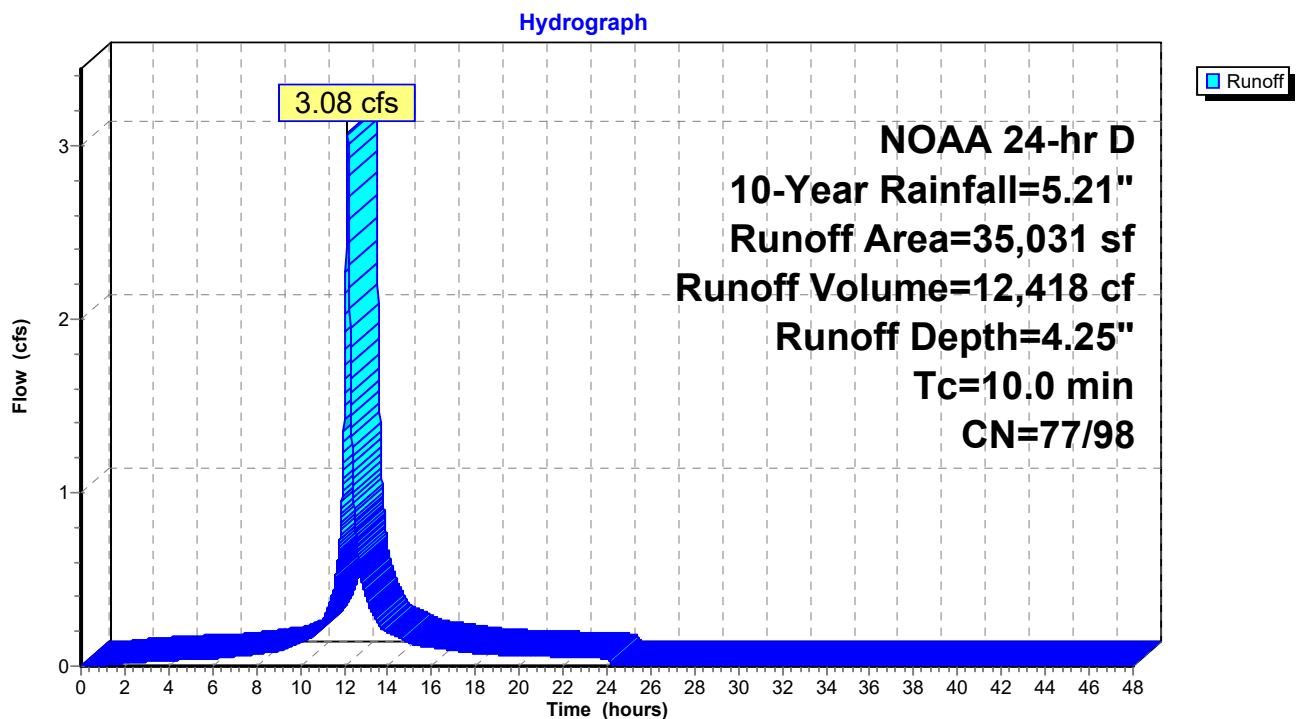
Summary for Subcatchment P-3: Proposed Area Tributary to POI-3

Runoff = 3.08 cfs @ 12.17 hrs, Volume= 12,418 cf, Depth= 4.25"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 10-Year Rainfall=5.21"

	Area (sf)	CN	Description
*	23,530	98	Impervious Surfaces
	3,013	74	>75% Grass cover, Good, HSG C
	6,634	80	>75% Grass cover, Good, HSG D
	1,854	70	Woods, Good, HSG C
	0	77	Woods, Good, HSG D
	35,031	91	Weighted Average
	11,501	77	32.83% Pervious Area
	23,530	98	67.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Subcatchment P-3: Proposed Area Tributary to POI-3

Summary for Pond B-1A: Subsurface Detention Basin

Inflow Area = 129,383 sf, 73.57% Impervious, Inflow Depth = 4.37" for 10-Year event
 Inflow = 11.57 cfs @ 12.17 hrs, Volume= 47,073 cf
 Outflow = 8.55 cfs @ 12.25 hrs, Volume= 47,073 cf, Atten= 26%, Lag= 4.9 min
 Primary = 8.55 cfs @ 12.25 hrs, Volume= 47,073 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 496.29' @ 12.25 hrs Surf.Area= 2,101 sf Storage= 5,928 cf

Plug-Flow detention time= 9.6 min calculated for 47,063 cf (100% of inflow)
 Center-of-Mass det. time= 9.6 min (777.0 - 767.3)

Volume	Invert	Avail.Storage	Storage Description
#1	493.00'	8,639 cf	60.0" Round Pipe Storage x 5 L= 88.0' S= 0.0010 '/'

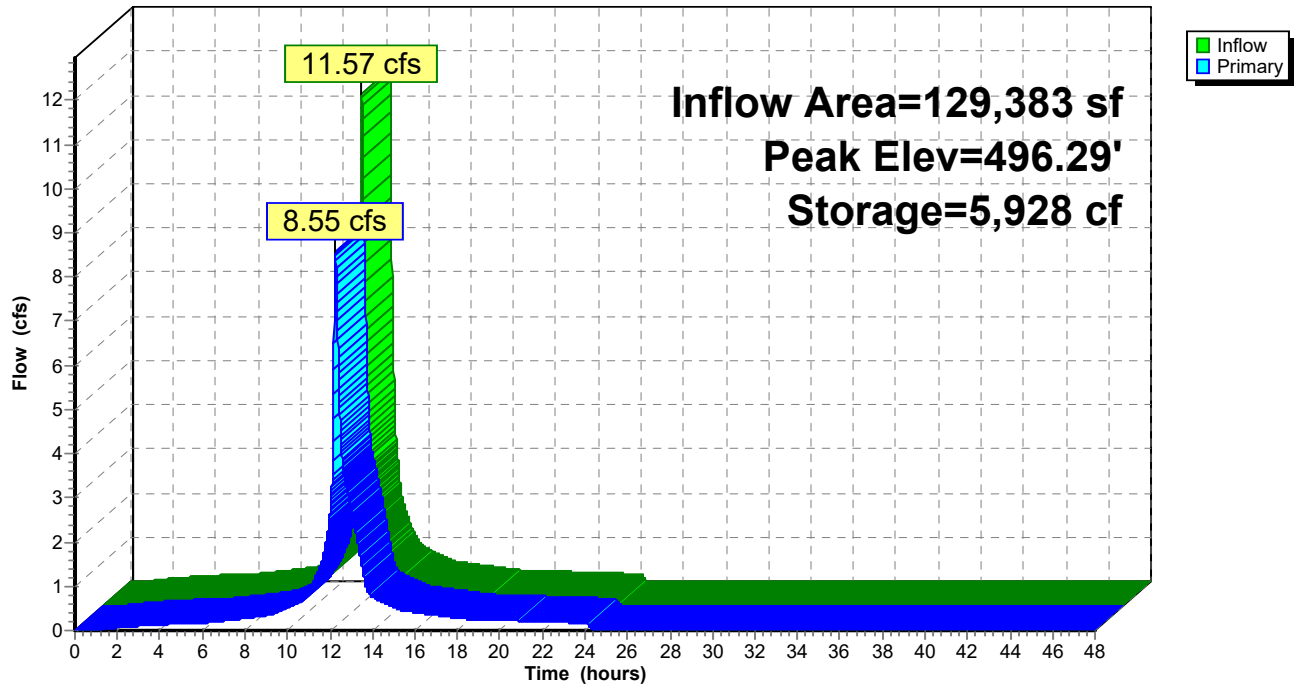
Device	Routing	Invert	Outlet Devices
#1	Primary	493.00'	18.0" Round Culvert L= 90.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 493.00' / 484.00' S= 0.1000 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 1.77 sf
#2	Device 1	493.00'	12.0" W x 6.0" H Vert. Low Flow Orifice C= 0.600
#3	Device 1	495.35'	18.0" W x 14.0" H Vert. Control Slot C= 0.600
#4	Device 1	498.00'	6.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=8.55 cfs @ 12.25 hrs HW=496.29' TW=482.11' (Dynamic Tailwater)

- 1=Culvert (Passes 8.55 cfs of 13.55 cfs potential flow)
- 2=Low Flow Orifice (Orifice Controls 4.19 cfs @ 8.39 fps)
- 3=Control Slot (Orifice Controls 4.35 cfs @ 3.10 fps)
- 4=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond B-1A: Subsurface Detention Basin

Hydrograph



Summary for Pond B-1B: Subsurface Detention Basin

Inflow Area = 230,251 sf, 78.51% Impervious, Inflow Depth = 4.51" for 10-Year event
 Inflow = 16.63 cfs @ 12.21 hrs, Volume= 86,457 cf
 Outflow = 12.15 cfs @ 12.33 hrs, Volume= 86,457 cf, Atten= 27%, Lag= 7.1 min
 Primary = 12.15 cfs @ 12.33 hrs, Volume= 86,457 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 482.24' @ 12.33 hrs Surf.Area= 4,829 sf Storage= 13,005 cf

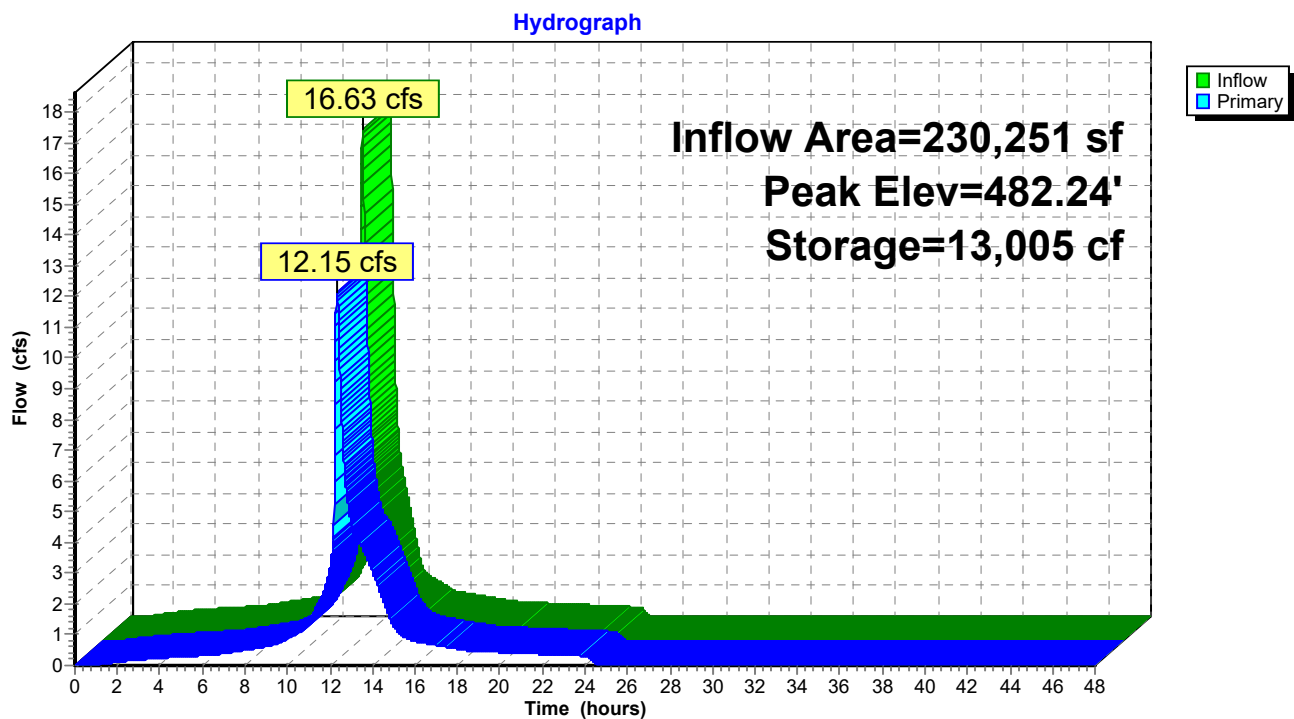
Plug-Flow detention time= 21.6 min calculated for 86,439 cf (100% of inflow)
 Center-of-Mass det. time= 21.6 min (790.9 - 769.4)

Volume	Invert	Avail.Storage	Storage Description
#1	479.00'	19,635 cf	60.0" Round Pipe Storage x 5 L= 200.0' S= 0.0010 '/'

Device	Routing	Invert	Outlet Devices
#1	Primary	479.00'	24.0" Round Culvert L= 50.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 479.00' / 474.00' S= 0.1000 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf
#2	Device 1	479.00'	8.5" W x 10.0" H Vert. Low Flow Orifice C= 0.600
#3	Device 1	481.55'	48.0" W x 8.0" H Vert. Control Slot C= 0.600
#4	Device 1	484.00'	6.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=12.15 cfs @ 12.33 hrs HW=482.24' TW=0.00' (Dynamic Tailwater)

- 1=Culvert (Passes 12.15 cfs of 22.66 cfs potential flow)
- 2=Low Flow Orifice (Orifice Controls 4.78 cfs @ 8.09 fps)
- 3=Control Slot (Orifice Controls 7.38 cfs @ 2.77 fps)
- 4=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond B-1B: Subsurface Detention Basin

Summary for Pond B-2A-2: (new Pond)

Inflow Area = 55,047 sf, 2.30% Impervious, Inflow Depth = 2.79" for 10-Year event
 Inflow = 3.54 cfs @ 12.17 hrs, Volume= 12,802 cf
 Outflow = 1.59 cfs @ 12.36 hrs, Volume= 12,802 cf, Atten= 55%, Lag= 11.4 min
 Primary = 1.59 cfs @ 12.36 hrs, Volume= 12,802 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 501.02' @ 12.36 hrs Surf.Area= 2,159 sf Storage= 3,285 cf

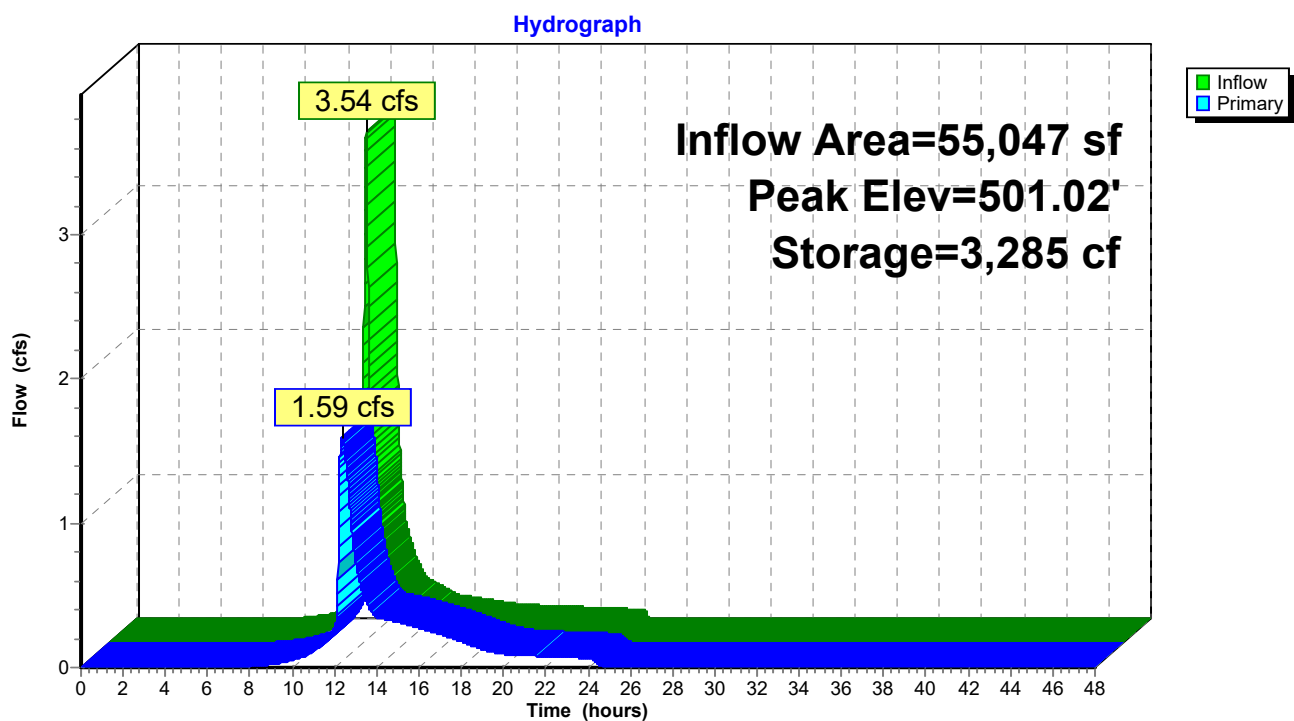
Plug-Flow detention time= 50.5 min calculated for 12,799 cf (100% of inflow)
 Center-of-Mass det. time= 50.5 min (889.9 - 839.4)

Volume	Invert	Avail.Storage	Storage Description
#1	499.00'	6,786 cf	48.0" Round Pipe Storage x 4 L= 135.0' S= 0.0010 '/'

Device	Routing	Invert	Outlet Devices
#1	Primary	499.00'	15.0" Round Culvert L= 44.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 499.00' / 498.78' S= 0.0050 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 1.23 sf
#2	Device 1	499.00'	3.0" W x 3.0" H Vert. Low Flow Orifice C= 0.600
#3	Device 1	500.40'	12.0" W x 4.5" H Vert. Control Slot C= 0.600
#4	Device 1	503.00'	6.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=1.59 cfs @ 12.36 hrs HW=501.02' TW=0.00' (Dynamic Tailwater)

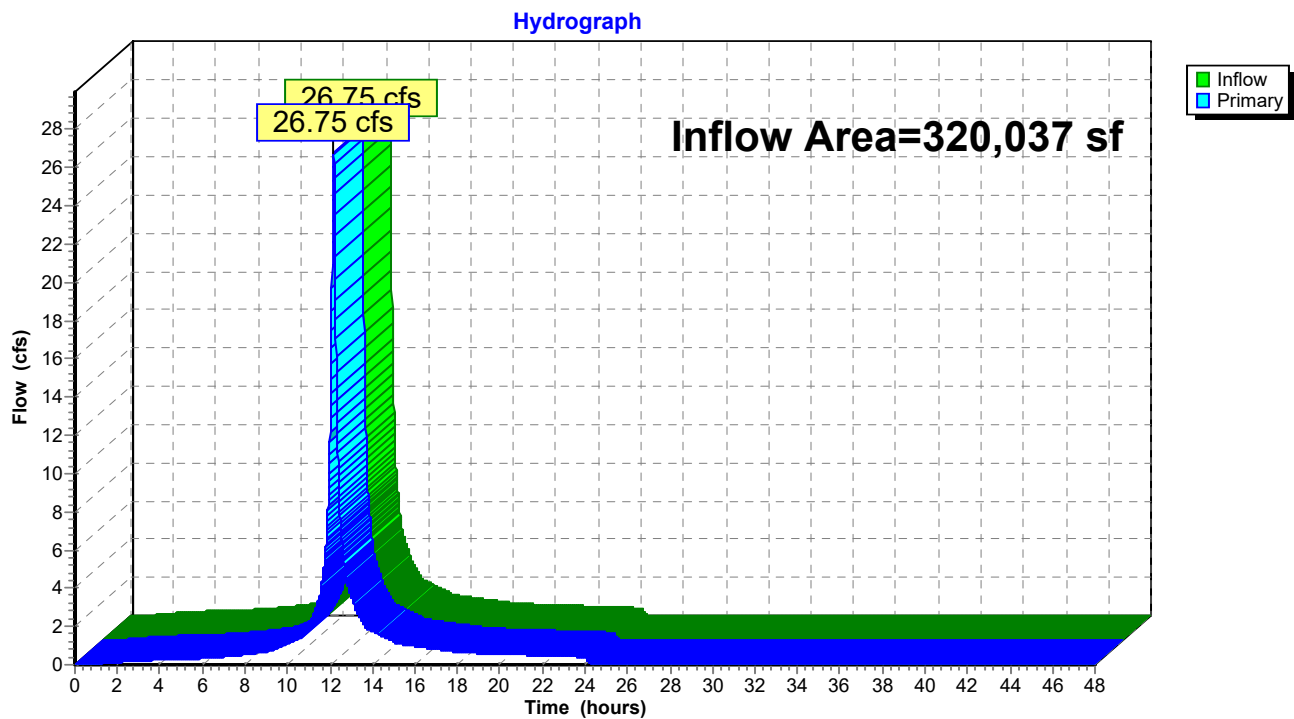
- 1=Culvert (Passes 1.59 cfs of 6.55 cfs potential flow)
- 2=Low Flow Orifice (Orifice Controls 0.41 cfs @ 6.62 fps)
- 3=Control Slot (Orifice Controls 1.17 cfs @ 3.13 fps)
- 4=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond B-2A-2: (new Pond)

Summary for Link E-2: Existing Area Tributary to POI-2

Inflow Area = 320,037 sf, 55.02% Impervious, Inflow Depth = 3.99" for 10-Year event
Inflow = 26.75 cfs @ 12.17 hrs, Volume= 106,279 cf
Primary = 26.75 cfs @ 12.17 hrs, Volume= 106,279 cf, Atten= 0%, Lag= 0.0 min

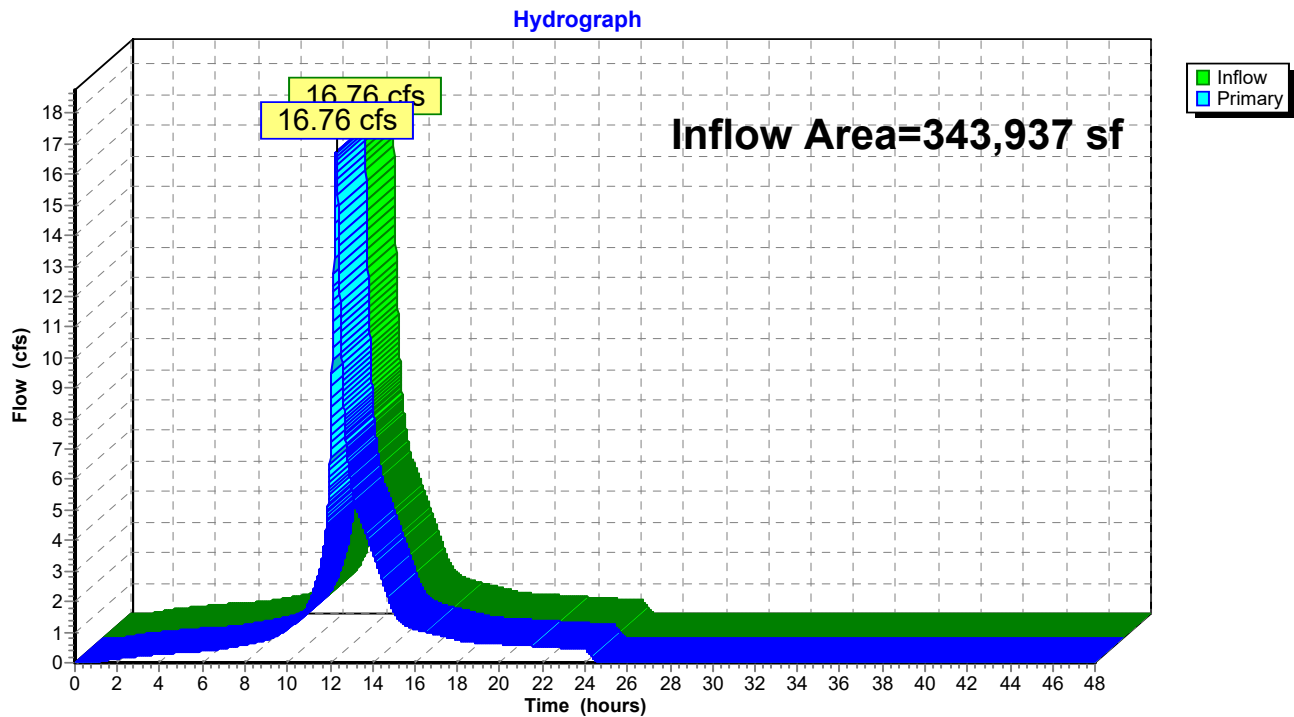
Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Link E-2: Existing Area Tributary to POI-2

Summary for Link P-1: Proposed Area Tributary to POI-1

Inflow Area = 343,937 sf, 61.28% Impervious, Inflow Depth = 4.10" for 10-Year event
Inflow = 16.76 cfs @ 12.29 hrs, Volume= 117,556 cf
Primary = 16.76 cfs @ 12.29 hrs, Volume= 117,556 cf, Atten= 0%, Lag= 0.0 min

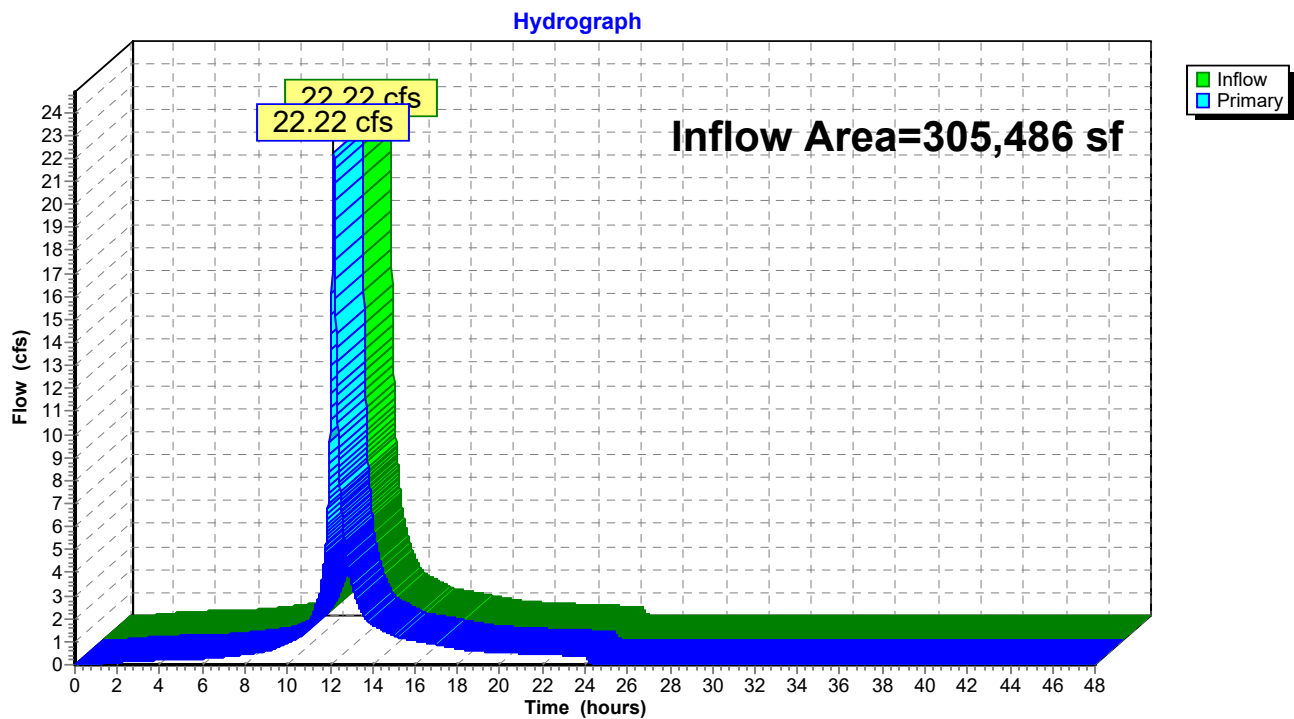
Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Link P-1: Proposed Area Tributary to POI-1

Summary for Link P-2: Proposed Area Tributary to POI-2

Inflow Area = 305,486 sf, 47.19% Impervious, Inflow Depth = 3.86" for 10-Year event
Inflow = 22.22 cfs @ 12.18 hrs, Volume= 98,184 cf
Primary = 22.22 cfs @ 12.18 hrs, Volume= 98,184 cf, Atten= 0%, Lag= 0.0 min

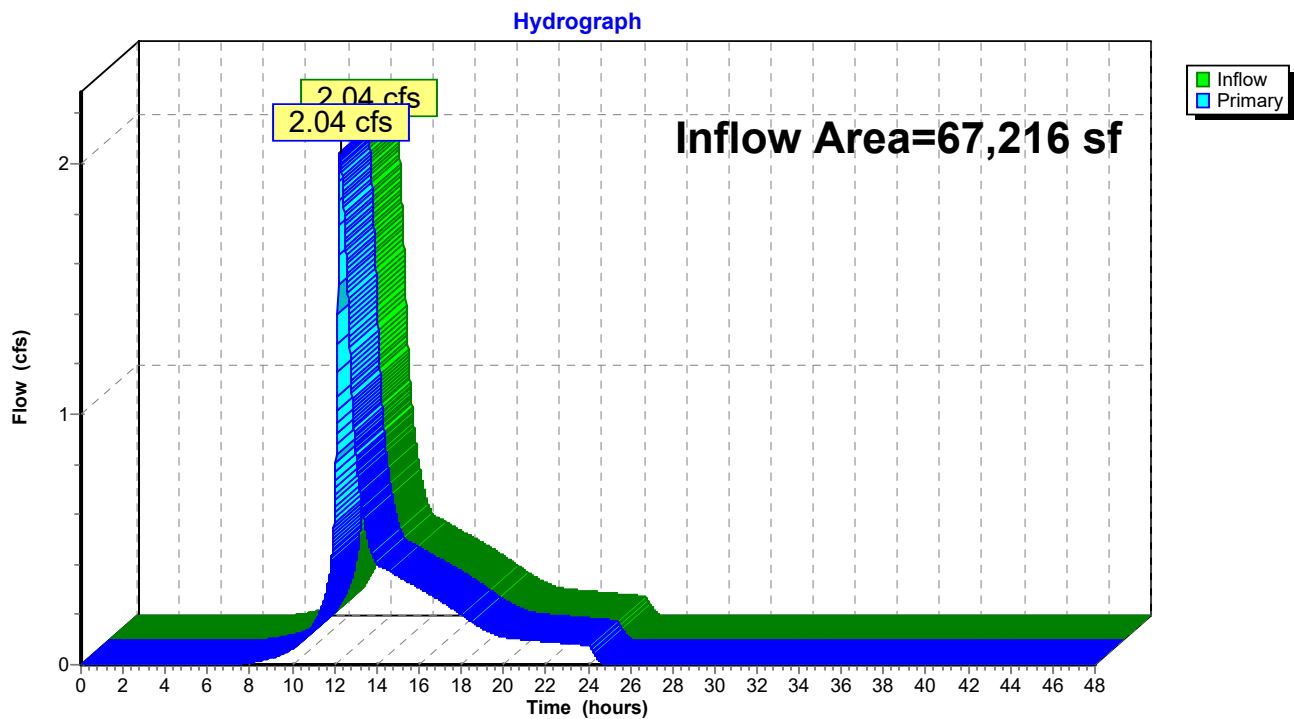
Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Link P-2: Proposed Area Tributary to POI-2

Summary for Link P-2B: Proposed Area Tributary to Culvert Downstream of Existing Pond

Inflow Area = 67,216 sf, 1.88% Impervious, Inflow Depth = 2.80" for 10-Year event
Inflow = 2.04 cfs @ 12.26 hrs, Volume= 15,660 cf
Primary = 2.04 cfs @ 12.26 hrs, Volume= 15,660 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Link P-2B: Proposed Area Tributary to Culvert Downstream of Existing Pond

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv.

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment E-1: Existing Area Runoff Area=304,647 sf 60.03% Impervious Runoff Depth=5.22"
Flow Length=1,157' Tc=10.0 min CN=76/98 Runoff=33.05 cfs 132,618 cf

Subcatchment E-2A: Existing Area Runoff Area=278,126 sf 61.54% Impervious Runoff Depth=5.33"
Tc=10.0 min CN=77/98 Runoff=30.73 cfs 123,473 cf

Subcatchment E-2B: Existing Area Runoff Area=41,911 sf 11.76% Impervious Runoff Depth=3.96"
Tc=10.0 min CN=75/98 Runoff=3.74 cfs 13,836 cf

Subcatchment E-3: Existing Area Tributary Runoff Area=59,770 sf 41.42% Impervious Runoff Depth=4.63"
Tc=10.0 min CN=73/98 Runoff=5.89 cfs 23,041 cf

Subcatchment P-1A: Upper Detained Area Runoff Area=129,383 sf 73.57% Impervious Runoff Depth=5.56"
Flow Length=1,157' Tc=10.0 min CN=76/98 Runoff=14.67 cfs 59,909 cf

Subcatchment P-1B: Lower Detained Runoff Area=100,868 sf 84.84% Impervious Runoff Depth=5.90"
Flow Length=1,157' Tc=10.0 min CN=80/98 Runoff=12.01 cfs 49,635 cf

Subcatchment P-1C: Undetained Area Runoff Area=113,686 sf 26.39% Impervious Runoff Depth=4.39"
Tc=10.0 min CN=76/98 Runoff=10.92 cfs 41,566 cf

Subcatchment P-2A: Proposed Area Runoff Area=238,270 sf 59.97% Impervious Runoff Depth=5.34"
Tc=10.0 min CN=78/98 Runoff=26.43 cfs 105,967 cf

Subcatchment P-2B-1: Proposed Dog Park Runoff Area=55,047 sf 2.30% Impervious Runoff Depth=3.86"
Tc=10.0 min CN=76/98 Runoff=4.89 cfs 17,712 cf

Subcatchment P-2B-2: Proposed Area Runoff Area=12,169 sf 0.00% Impervious Runoff Depth=3.90"
Tc=10.0 min CN=77/0 Runoff=1.09 cfs 3,951 cf

Subcatchment P-3: Proposed Area Runoff Area=35,031 sf 67.17% Impervious Runoff Depth=5.44"
Tc=10.0 min CN=77/98 Runoff=3.92 cfs 15,875 cf

Pond B-1A: Subsurface Detention Basin Peak Elev=496.75' Storage=6,870 cf Inflow=14.67 cfs 59,909 cf
Outflow=11.95 cfs 59,909 cf

Pond B-1B: Subsurface Detention Basin Peak Elev=482.76' Storage=15,392 cf Inflow=22.93 cfs 109,544 cf
Outflow=17.13 cfs 109,544 cf

Pond B-2A-2: (new Pond) Peak Elev=501.56' Storage=4,452 cf Inflow=4.89 cfs 17,712 cf
Outflow=2.25 cfs 17,712 cf

Link E-2: Existing Area Tributary to POI-2 Inflow=34.47 cfs 137,308 cf
Primary=34.47 cfs 137,308 cf

Link P-1: Proposed Area Tributary to POI-1 Inflow=24.86 cfs 151,110 cf
Primary=24.86 cfs 151,110 cf

2020-03-18_West Orange

NOAA 24-hr D 25-Year Rainfall=6.45"

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Link P-2: Proposed Area Tributary to POI-2

Inflow=29.25 cfs 127,630 cf
Primary=29.25 cfs 127,630 cf

Link P-2B: Proposed Area Tributary to Culvert Downstream of Existing Pond Inflow=2.99 cfs 21,664 cf
Primary=2.99 cfs 21,664 cf

Total Runoff Area = 1,368,908 sf Runoff Volume = 587,583 cf Average Runoff Depth = 5.15"
44.32% Pervious = 606,723 sf 55.68% Impervious = 762,185 sf

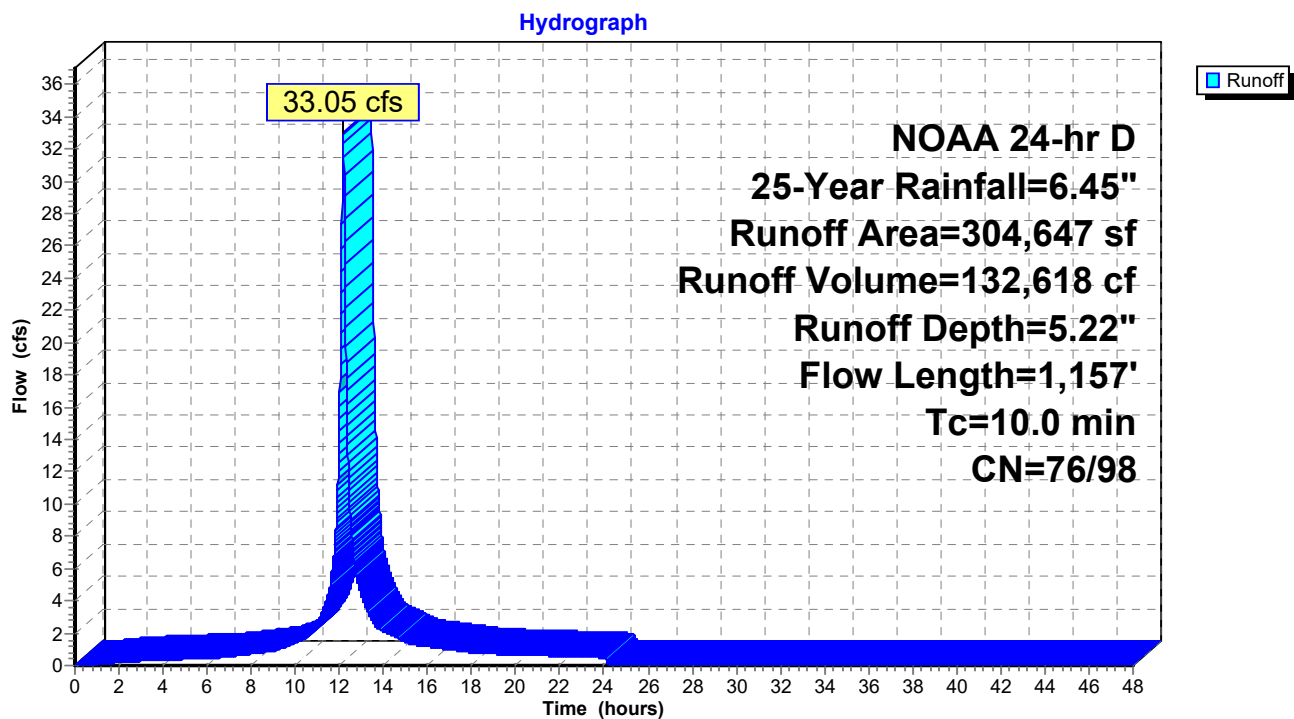
Summary for Subcatchment E-1: Existing Area Tributary to POI-1

Runoff = 33.05 cfs @ 12.17 hrs, Volume= 132,618 cf, Depth= 5.22"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 25-Year Rainfall=6.45"

	Area (sf)	CN	Description
*	182,894	98	Impervious Surfaces
	34,208	74	>75% Grass cover, Good, HSG C
	47,499	80	>75% Grass cover, Good, HSG D
	28,367	70	Woods, Good, HSG C
	11,679	77	Woods, Good, HSG D
	304,647	89	Weighted Average
	121,753	76	39.97% Pervious Area
	182,894	98	60.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	43	0.3720	0.13		Sheet Flow, A-B Woods: Dense underbrush n= 0.800 P2= 3.42"
0.5	57	0.0614	1.99		Sheet Flow, B-C Smooth surfaces n= 0.011 P2= 3.42"
0.5	155	0.0677	5.28		Shallow Concentrated Flow, C-D Paved Kv= 20.3 fps
0.8	902	0.0860	18.24	22.39	Pipe Channel, D-E 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.011 Concrete pipe, straight & clean
7.5	1,157	Total, Increased to minimum Tc = 10.0 min			

Subcatchment E-1: Existing Area Tributary to POI-1

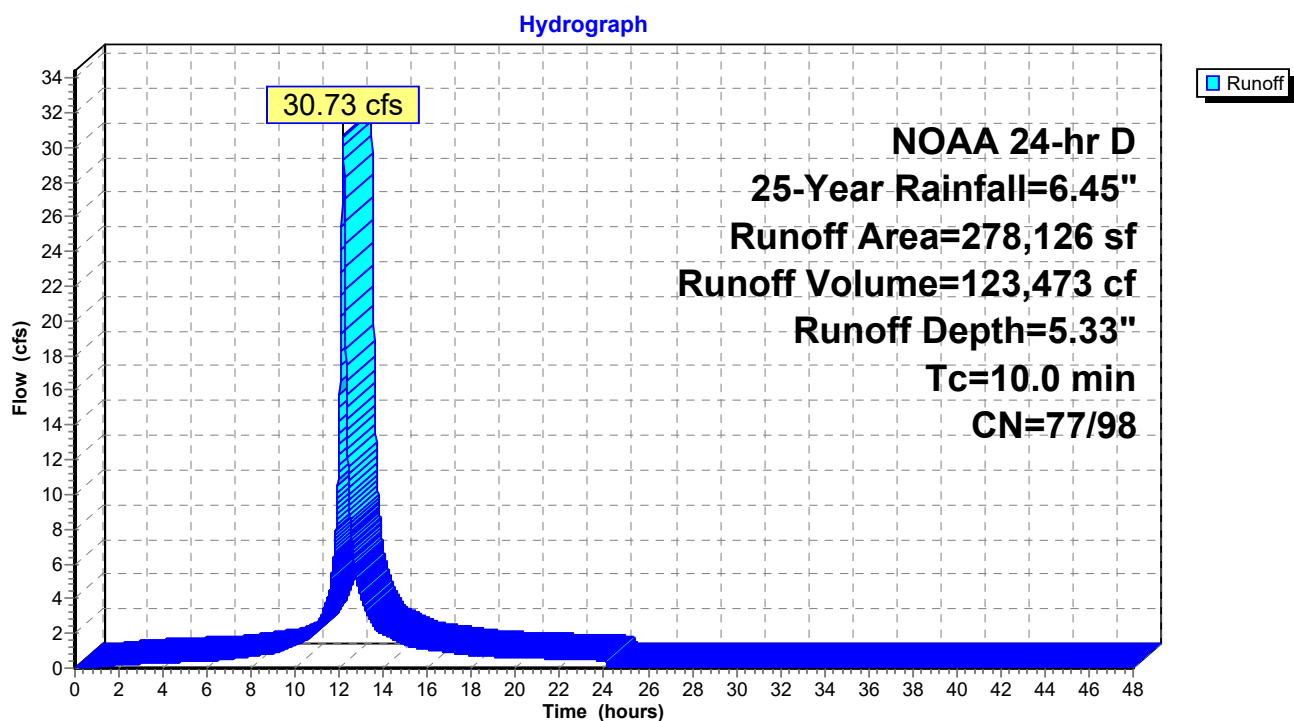
Summary for Subcatchment E-2A: Existing Area Tributary to Aboveground Pond

Runoff = 30.73 cfs @ 12.17 hrs, Volume= 123,473 cf, Depth= 5.33"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 25-Year Rainfall=6.45"

	Area (sf)	CN	Description
*	171,147	98	Impervious Surfaces
	730	74	>75% Grass cover, Good, HSG C
	70,237	80	>75% Grass cover, Good, HSG D
	24,193	70	Woods, Good, HSG C
	11,819	77	Woods, Good, HSG D
	278,126	90	Weighted Average
	106,979	77	38.46% Pervious Area
	171,147	98	61.54% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Subcatchment E-2A: Existing Area Tributary to Aboveground Pond

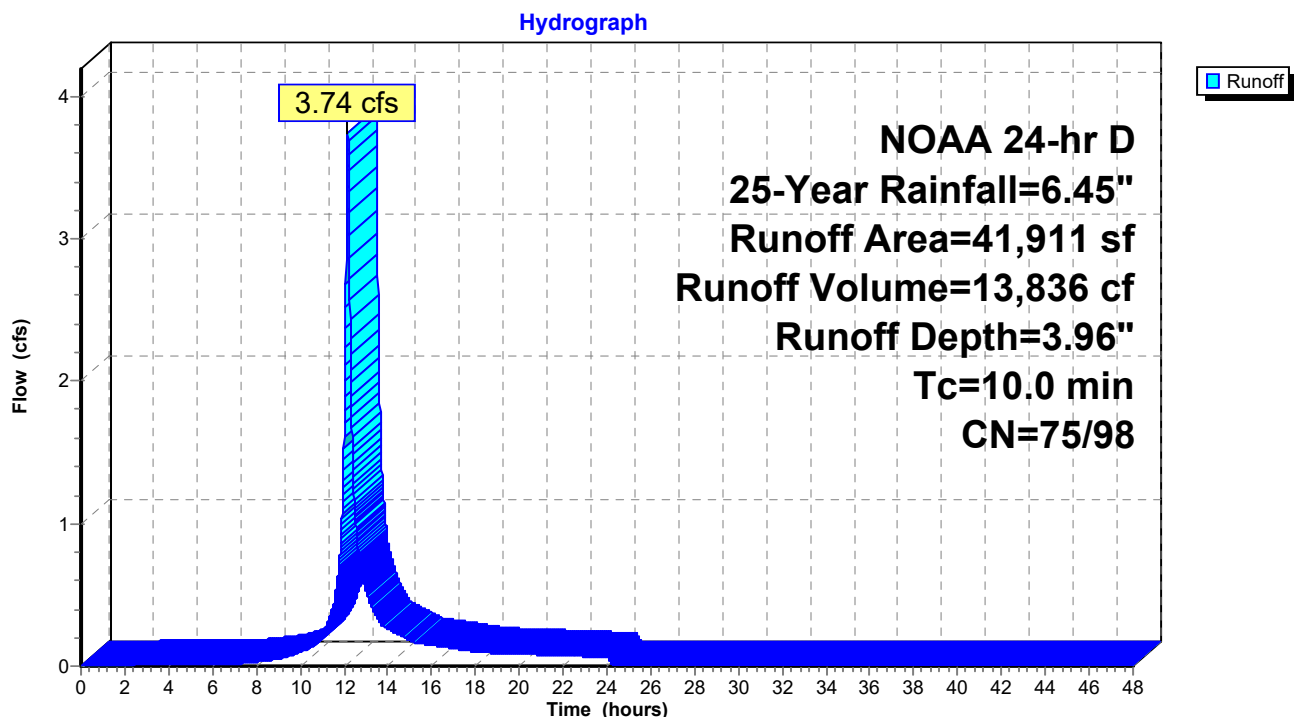
Summary for Subcatchment E-2B: Existing Area Tributary to Culvert Downstream of Pond

Runoff = 3.74 cfs @ 12.17 hrs, Volume= 13,836 cf, Depth= 3.96"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 25-Year Rainfall=6.45"

	Area (sf)	CN	Description
*	4,929	98	Impervious Surfaces
	0	74	>75% Grass cover, Good, HSG C
	6,244	80	>75% Grass cover, Good, HSG D
	13,613	70	Woods, Good, HSG C
	17,125	77	Woods, Good, HSG D
	41,911	78	Weighted Average
	36,982	75	88.24% Pervious Area
	4,929	98	11.76% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Subcatchment E-2B: Existing Area Tributary to Culvert Downstream of Pond

Summary for Subcatchment E-3: Existing Area Tributary to POI-3

Runoff = 5.89 cfs @ 12.17 hrs, Volume= 23,041 cf, Depth= 4.63"

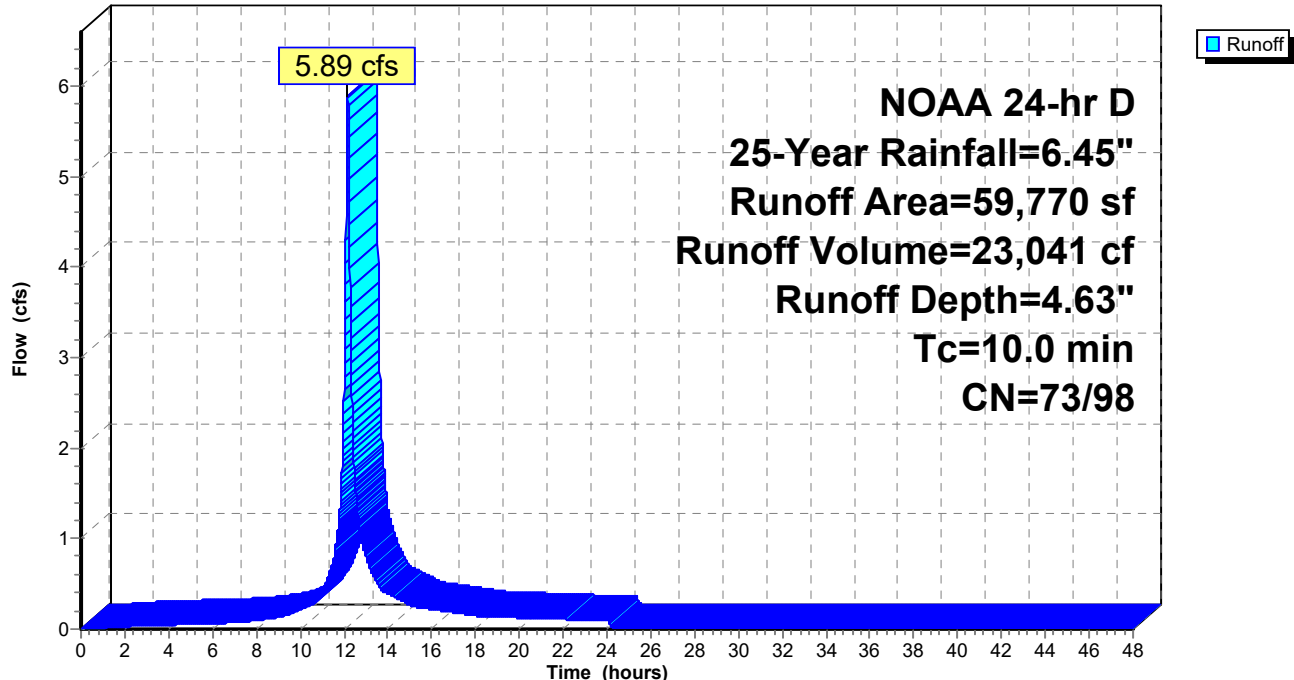
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 25-Year Rainfall=6.45"

	Area (sf)	CN	Description
*	24,755	98	Impervious Surfaces
	9,081	74	>75% Grass cover, Good, HSG C
	7,373	80	>75% Grass cover, Good, HSG D
	17,316	70	Woods, Good, HSG C
	1,245	77	Woods, Good, HSG D
	59,770	84	Weighted Average
	35,015	73	58.58% Pervious Area
	24,755	98	41.42% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Subcatchment E-3: Existing Area Tributary to POI-3

Hydrograph



Summary for Subcatchment P-1A: Upper Detained Area Tributary to POI-1

Runoff = 14.67 cfs @ 12.17 hrs, Volume= 59,909 cf, Depth= 5.56"

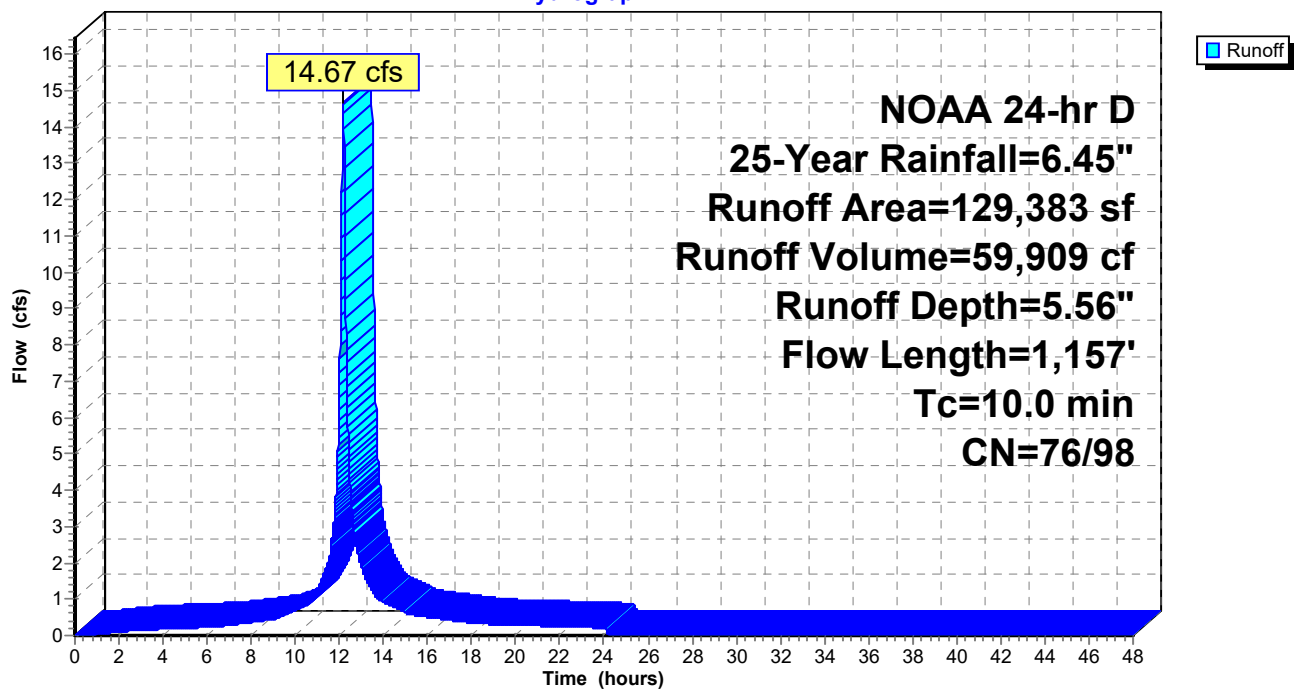
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 25-Year Rainfall=6.45"

	Area (sf)	CN	Description
*	95,185	98	Impervious Surfaces
	6,500	74	>75% Grass cover, Good, HSG C
	16,655	80	>75% Grass cover, Good, HSG D
	11,043	70	Woods, Good, HSG C
	0	77	Woods, Good, HSG D
	129,383	92	Weighted Average
	34,198	76	26.43% Pervious Area
	95,185	98	73.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	43	0.3720	0.13		Sheet Flow, A-B Woods: Dense underbrush n= 0.800 P2= 3.42"
0.5	57	0.0614	1.99		Sheet Flow, B-C Smooth surfaces n= 0.011 P2= 3.42"
0.5	155	0.0677	5.28		Shallow Concentrated Flow, C-D Paved Kv= 20.3 fps
0.8	902	0.0860	18.24	22.39	Pipe Channel, D-E 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.011 Concrete pipe, straight & clean
7.5	1,157	Total, Increased to minimum Tc = 10.0 min			

Subcatchment P-1A: Upper Detained Area Tributary to POI-1

Hydrograph



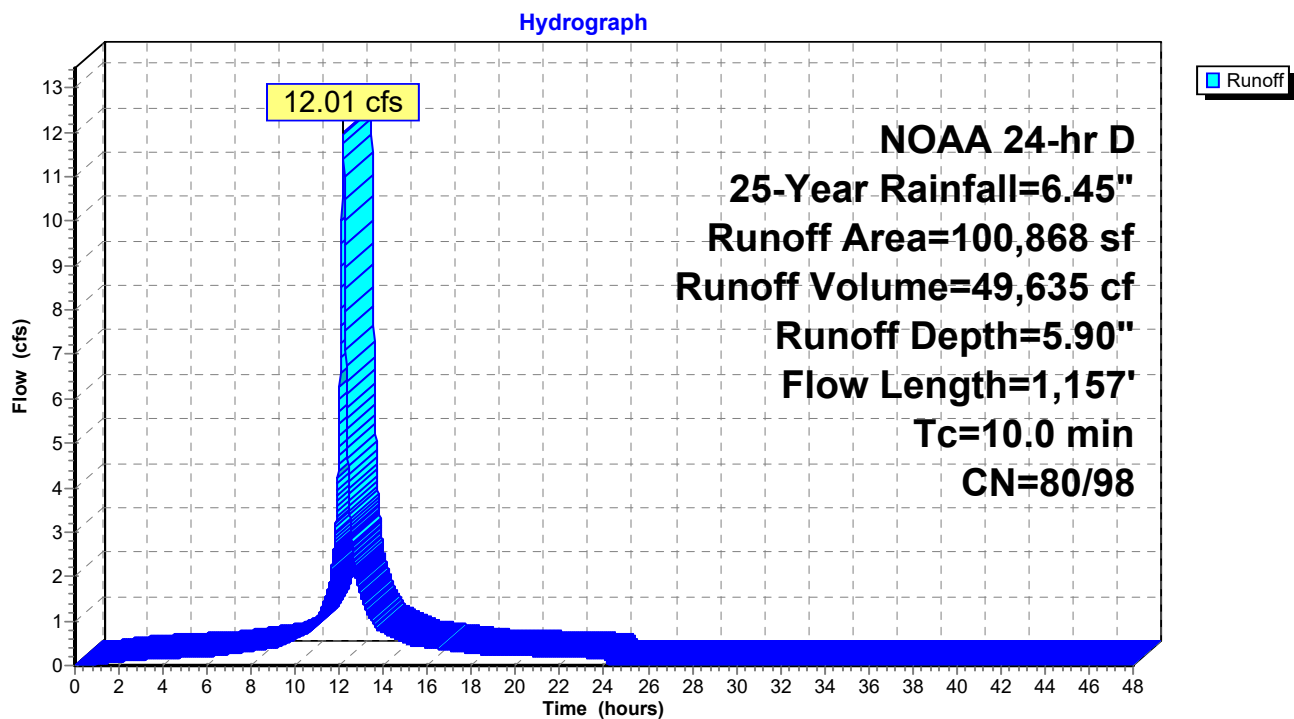
Summary for Subcatchment P-1B: Lower Detained Area Tributary to POI-1

Runoff = 12.01 cfs @ 12.17 hrs, Volume= 49,635 cf, Depth= 5.90"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 25-Year Rainfall=6.45"

	Area (sf)	CN	Description
*	85,579	98	Impervious Surfaces
	0	74	>75% Grass cover, Good, HSG C
	15,289	80	>75% Grass cover, Good, HSG D
	0	70	Woods, Good, HSG C
	0	77	Woods, Good, HSG D
	100,868	95	Weighted Average
	15,289	80	15.16% Pervious Area
	85,579	98	84.84% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	43	0.3720	0.13		Sheet Flow, A-B Woods: Dense underbrush n= 0.800 P2= 3.42"
0.5	57	0.0614	1.99		Sheet Flow, B-C Smooth surfaces n= 0.011 P2= 3.42"
0.5	155	0.0677	5.28		Shallow Concentrated Flow, C-D Paved Kv= 20.3 fps
0.8	902	0.0860	18.24	22.39	Pipe Channel, D-E 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.011 Concrete pipe, straight & clean
7.5	1,157	Total, Increased to minimum Tc = 10.0 min			

Subcatchment P-1B: Lower Detained Area Tributary to POI-1

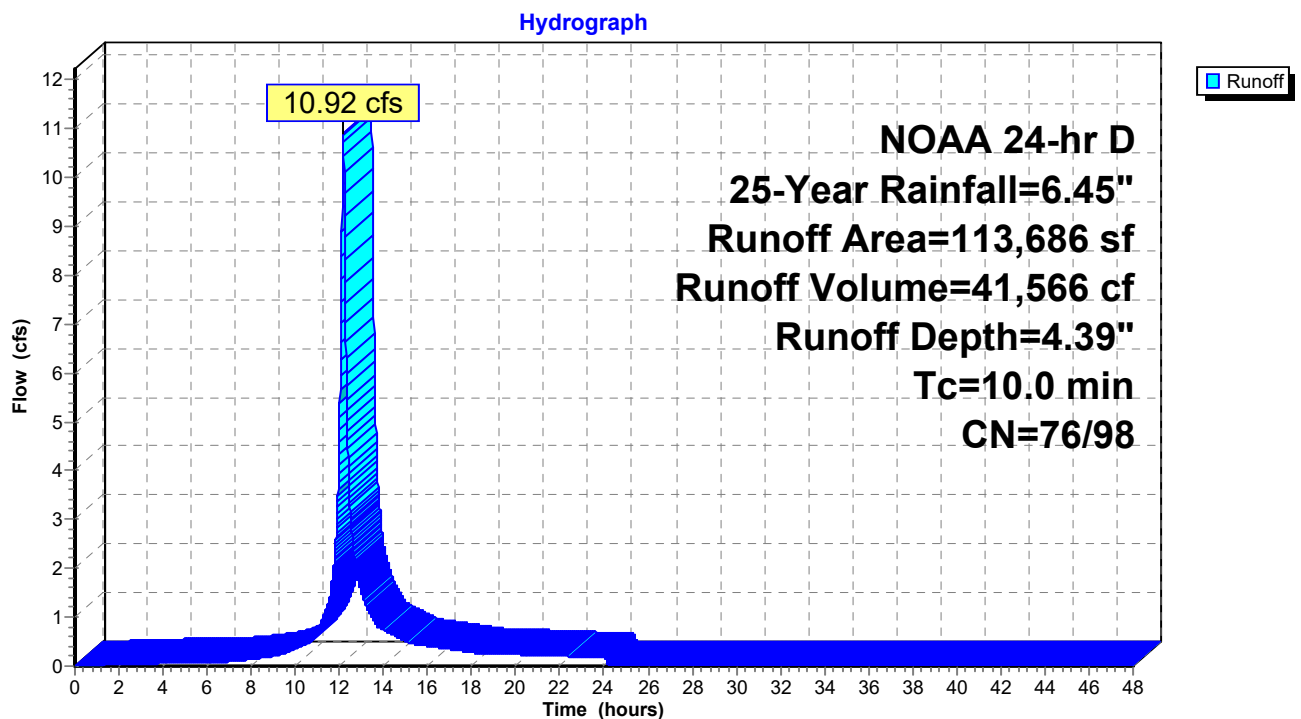
Summary for Subcatchment P-1C: Undetained Area Tributary to POI-1

Runoff = 10.92 cfs @ 12.17 hrs, Volume= 41,566 cf, Depth= 4.39"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 25-Year Rainfall=6.45"

	Area (sf)	CN	Description
*	30,004	98	Impervious Surfaces
	60,942	74	>75% Grass cover, Good, HSG C
	22,740	80	>75% Grass cover, Good, HSG D
	0	70	Woods, Good, HSG C
	0	77	Woods, Good, HSG D
	113,686	82	Weighted Average
	83,682	76	73.61% Pervious Area
	30,004	98	26.39% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Subcatchment P-1C: Undetained Area Tributary to POI-1

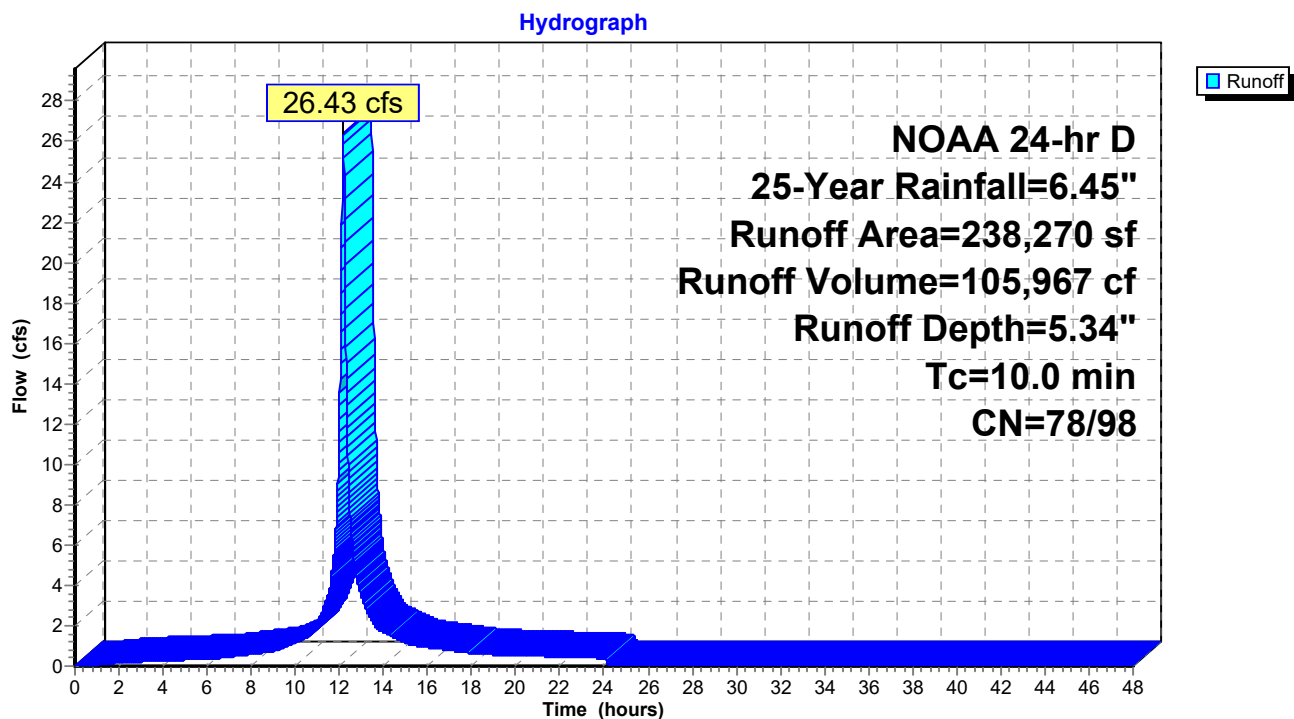
Summary for Subcatchment P-2A: Proposed Area Tributary to Aboveground Pond

Runoff = 26.43 cfs @ 12.17 hrs, Volume= 105,967 cf, Depth= 5.34"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 25-Year Rainfall=6.45"

	Area (sf)	CN	Description
*	142,897	98	Impervious Surfaces
	7,563	74	>75% Grass cover, Good, HSG C
	73,435	80	>75% Grass cover, Good, HSG D
	8,450	70	Woods, Good, HSG C
	5,925	77	Woods, Good, HSG D
	238,270	90	Weighted Average
	95,373	78	40.03% Pervious Area
	142,897	98	59.97% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Subcatchment P-2A: Proposed Area Tributary to Aboveground Pond

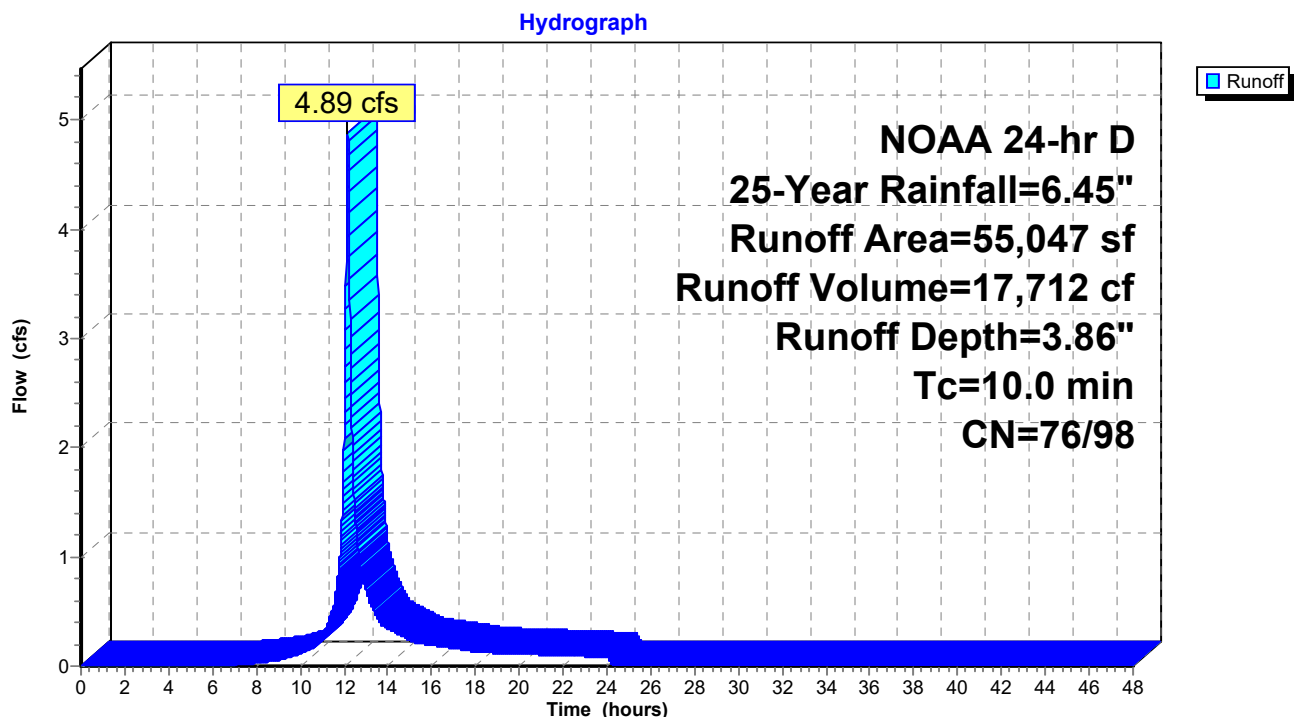
Summary for Subcatchment P-2B-1: Proposed Dog Park Area Tributary to Basin

Runoff = 4.89 cfs @ 12.17 hrs, Volume= 17,712 cf, Depth= 3.86"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 25-Year Rainfall=6.45"

	Area (sf)	CN	Description
*	1,265	98	Impervious Surfaces
	16,597	74	>75% Grass cover, Good, HSG C
	27,424	80	>75% Grass cover, Good, HSG D
	9,761	70	Woods, Good, HSG C
	0	77	Woods, Good, HSG D
	55,047	77	Weighted Average
	53,782	76	97.70% Pervious Area
	1,265	98	2.30% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Subcatchment P-2B-1: Proposed Dog Park Area Tributary to Basin

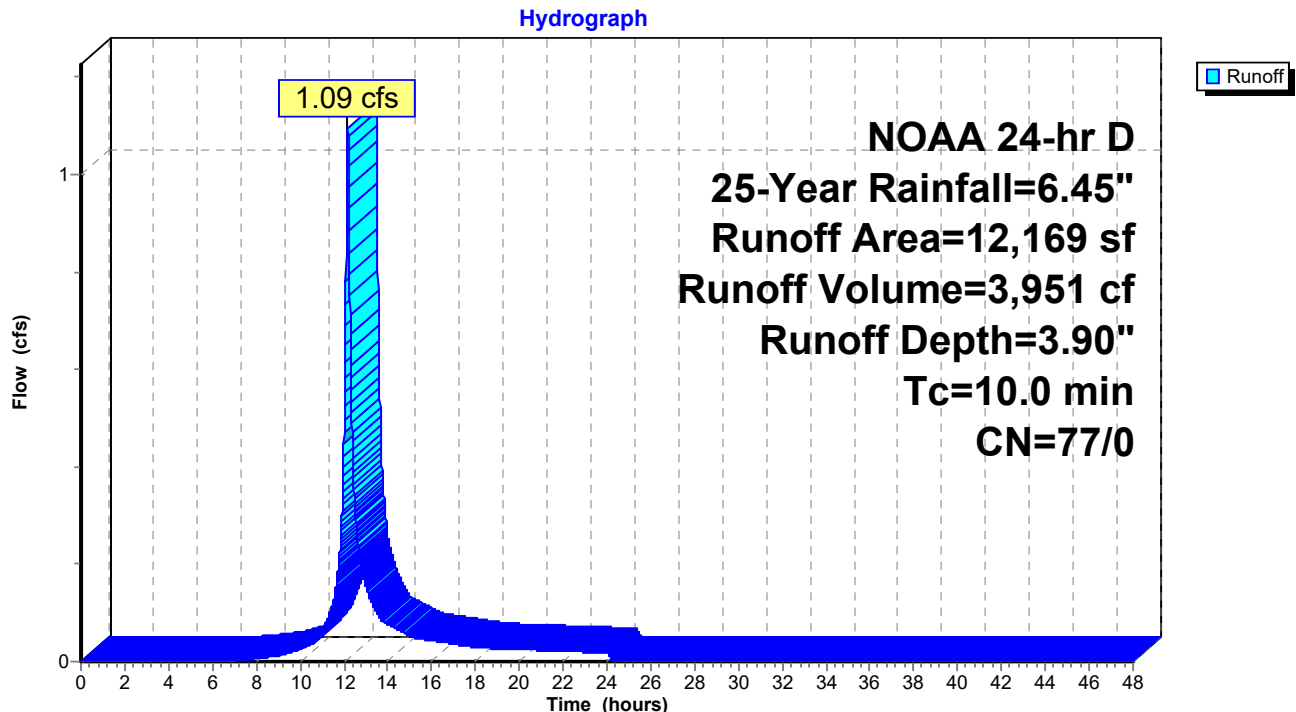
Summary for Subcatchment P-2B-2: Proposed Area Tributary to Culvert Downstream of Existing Pond

Runoff = 1.09 cfs @ 12.17 hrs, Volume= 3,951 cf, Depth= 3.90"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 25-Year Rainfall=6.45"

Area (sf)	CN	Description
*	0	98 Impervious Surfaces
5,664	74	>75% Grass cover, Good, HSG C
6,505	80	>75% Grass cover, Good, HSG D
0	70	Woods, Good, HSG C
0	77	Woods, Good, HSG D
12,169	77	Weighted Average
12,169	77	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Subcatchment P-2B-2: Proposed Area Tributary to Culvert Downstream of Existing Pond

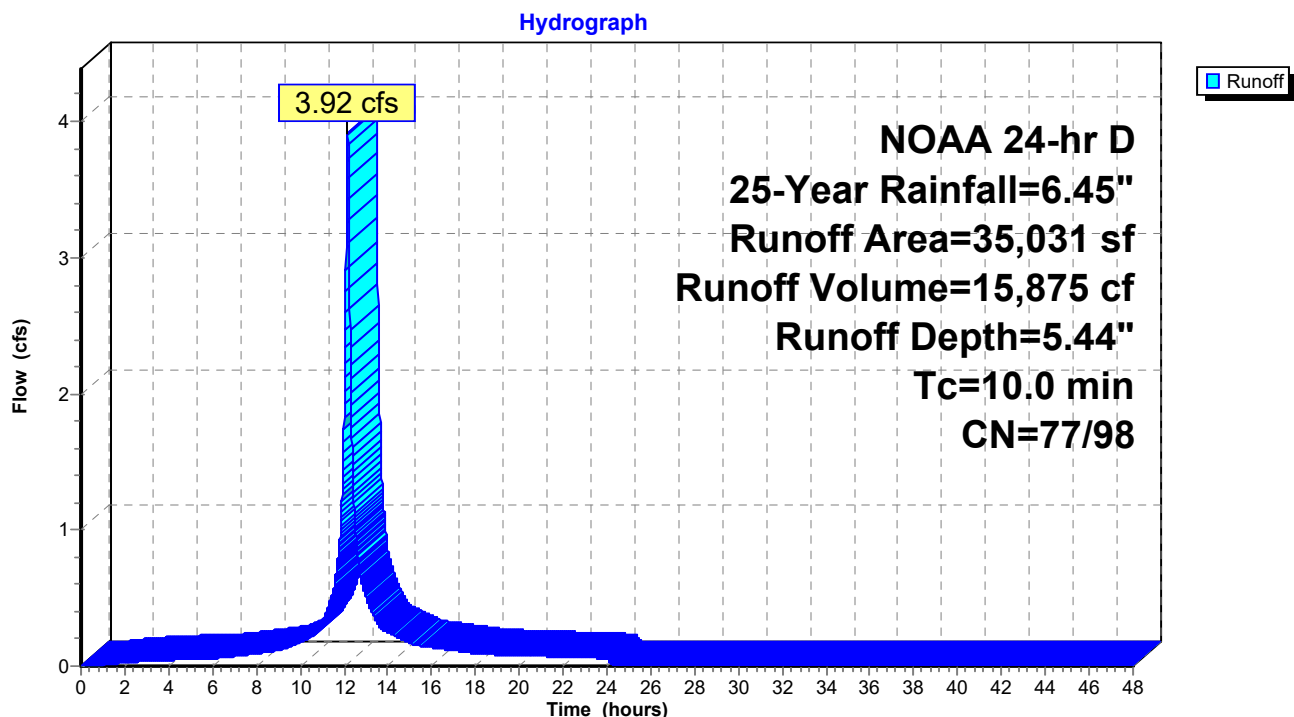
Summary for Subcatchment P-3: Proposed Area Tributary to POI-3

Runoff = 3.92 cfs @ 12.17 hrs, Volume= 15,875 cf, Depth= 5.44"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 25-Year Rainfall=6.45"

	Area (sf)	CN	Description
*	23,530	98	Impervious Surfaces
	3,013	74	>75% Grass cover, Good, HSG C
	6,634	80	>75% Grass cover, Good, HSG D
	1,854	70	Woods, Good, HSG C
	0	77	Woods, Good, HSG D
	35,031	91	Weighted Average
	11,501	77	32.83% Pervious Area
	23,530	98	67.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Subcatchment P-3: Proposed Area Tributary to POI-3

Summary for Pond B-1A: Subsurface Detention Basin

Inflow Area = 129,383 sf, 73.57% Impervious, Inflow Depth = 5.56" for 25-Year event
 Inflow = 14.67 cfs @ 12.17 hrs, Volume= 59,909 cf
 Outflow = 11.95 cfs @ 12.24 hrs, Volume= 59,909 cf, Atten= 19%, Lag= 3.9 min
 Primary = 11.95 cfs @ 12.24 hrs, Volume= 59,909 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 496.75' @ 12.24 hrs Surf.Area= 1,926 sf Storage= 6,870 cf

Plug-Flow detention time= 9.5 min calculated for 59,897 cf (100% of inflow)
 Center-of-Mass det. time= 9.5 min (773.5 - 764.0)

Volume	Invert	Avail.Storage	Storage Description
#1	493.00'	8,639 cf	60.0" Round Pipe Storage x 5 L= 88.0' S= 0.0010 '/'

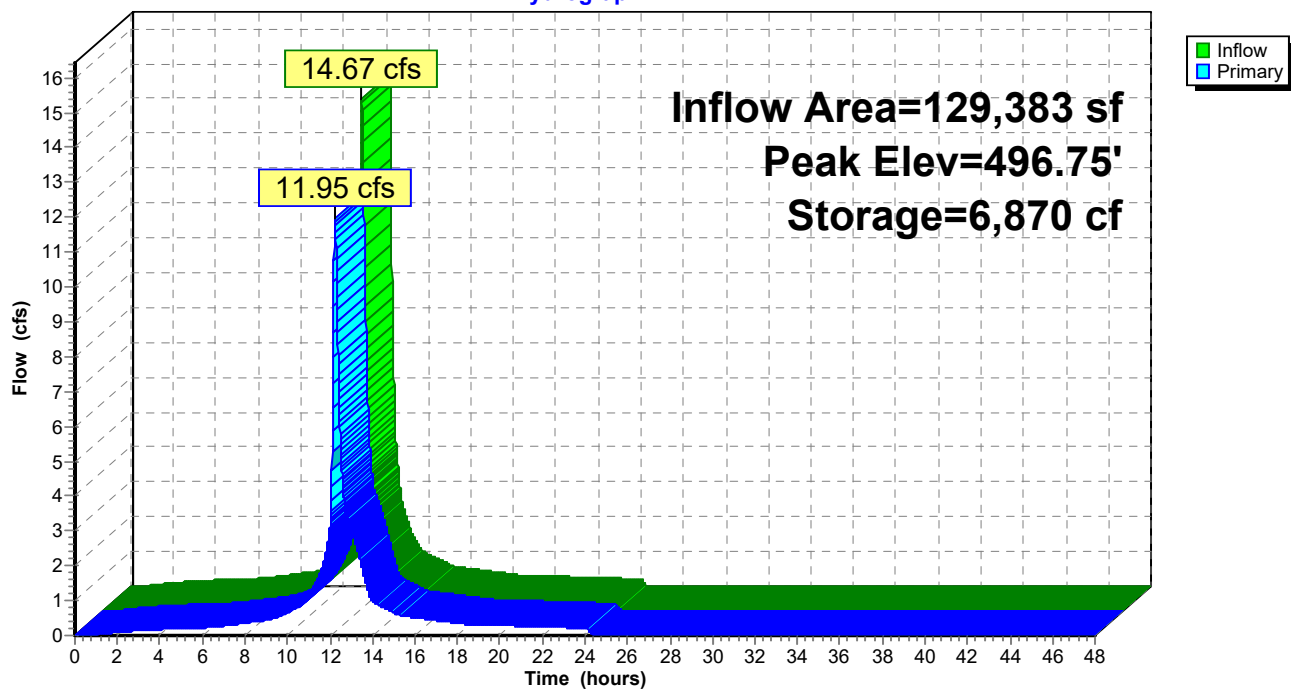
Device	Routing	Invert	Outlet Devices
#1	Primary	493.00'	18.0" Round Culvert L= 90.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 493.00' / 484.00' S= 0.1000 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 1.77 sf
#2	Device 1	493.00'	12.0" W x 6.0" H Vert. Low Flow Orifice C= 0.600
#3	Device 1	495.35'	18.0" W x 14.0" H Vert. Control Slot C= 0.600
#4	Device 1	498.00'	6.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=11.94 cfs @ 12.24 hrs HW=496.75' TW=482.60' (Dynamic Tailwater)

- 1=Culvert (Passes 11.94 cfs of 14.74 cfs potential flow)
- 2=Low Flow Orifice (Orifice Controls 4.50 cfs @ 9.01 fps)
- 3=Control Slot (Orifice Controls 7.44 cfs @ 4.25 fps)
- 4=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond B-1A: Subsurface Detention Basin

Hydrograph



Summary for Pond B-1B: Subsurface Detention Basin

Inflow Area = 230,251 sf, 78.51% Impervious, Inflow Depth = 5.71" for 25-Year event
 Inflow = 22.93 cfs @ 12.19 hrs, Volume= 109,544 cf
 Outflow = 17.13 cfs @ 12.31 hrs, Volume= 109,544 cf, Atten= 25%, Lag= 6.7 min
 Primary = 17.13 cfs @ 12.31 hrs, Volume= 109,544 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 482.76' @ 12.31 hrs Surf.Area= 4,429 sf Storage= 15,392 cf

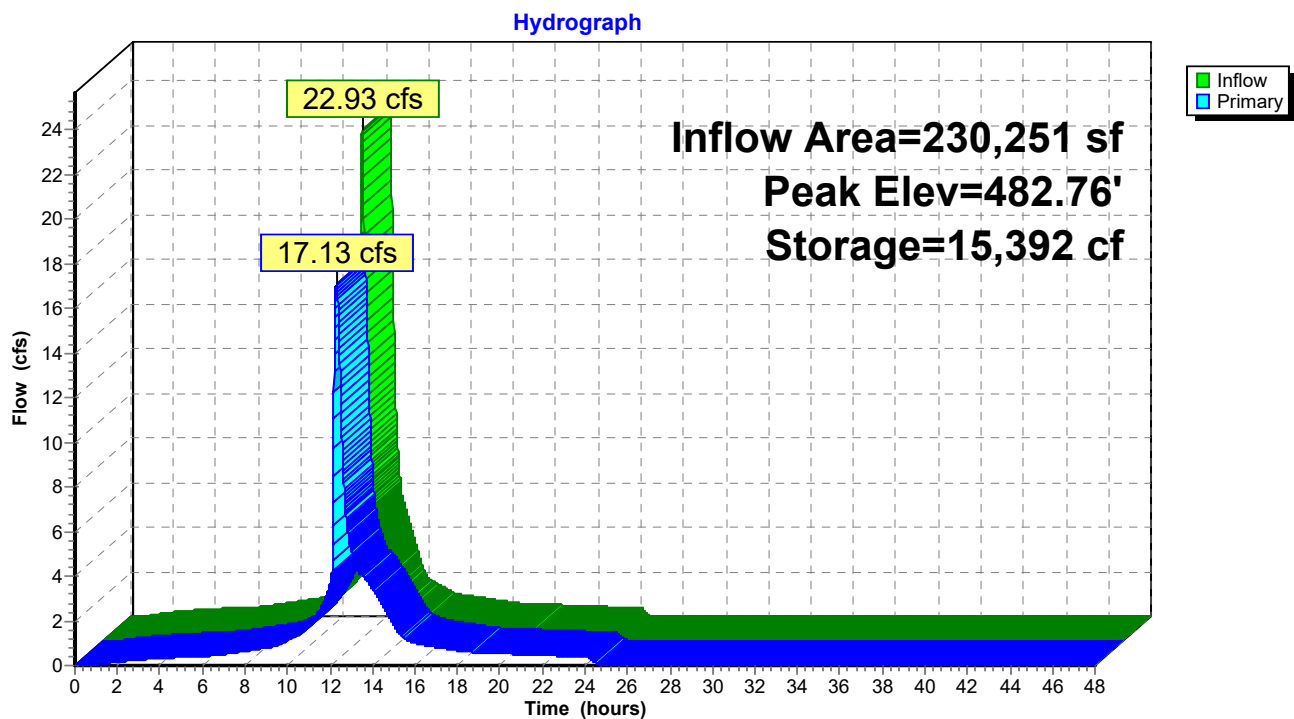
Plug-Flow detention time= 20.9 min calculated for 109,521 cf (100% of inflow)
 Center-of-Mass det. time= 20.9 min (786.8 - 765.9)

Volume	Invert	Avail.Storage	Storage Description
#1	479.00'	19,635 cf	60.0" Round Pipe Storage x 5 L= 200.0' S= 0.0010 '/'

Device	Routing	Invert	Outlet Devices
#1	Primary	479.00'	24.0" Round Culvert L= 50.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 479.00' / 474.00' S= 0.1000 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf
#2	Device 1	479.00'	8.5" W x 10.0" H Vert. Low Flow Orifice C= 0.600
#3	Device 1	481.55'	48.0" W x 8.0" H Vert. Control Slot C= 0.600
#4	Device 1	484.00'	6.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=17.12 cfs @ 12.31 hrs HW=482.76' TW=0.00' (Dynamic Tailwater)

- 1=Culvert (Passes 17.12 cfs of 25.12 cfs potential flow)
- 2=Low Flow Orifice (Orifice Controls 5.19 cfs @ 8.79 fps)
- 3=Control Slot (Orifice Controls 11.93 cfs @ 4.47 fps)
- 4=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond B-1B: Subsurface Detention Basin

Summary for Pond B-2A-2: (new Pond)

Inflow Area = 55,047 sf, 2.30% Impervious, Inflow Depth = 3.86" for 25-Year event
 Inflow = 4.89 cfs @ 12.17 hrs, Volume= 17,712 cf
 Outflow = 2.25 cfs @ 12.35 hrs, Volume= 17,712 cf, Atten= 54%, Lag= 10.8 min
 Primary = 2.25 cfs @ 12.35 hrs, Volume= 17,712 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 501.56' @ 12.35 hrs Surf.Area= 2,092 sf Storage= 4,452 cf

Plug-Flow detention time= 48.5 min calculated for 17,709 cf (100% of inflow)
 Center-of-Mass det. time= 48.5 min (878.0 - 829.6)

Volume	Invert	Avail.Storage	Storage Description
#1	499.00'	6,786 cf	48.0" Round Pipe Storage x 4 L= 135.0' S= 0.0010 '/'

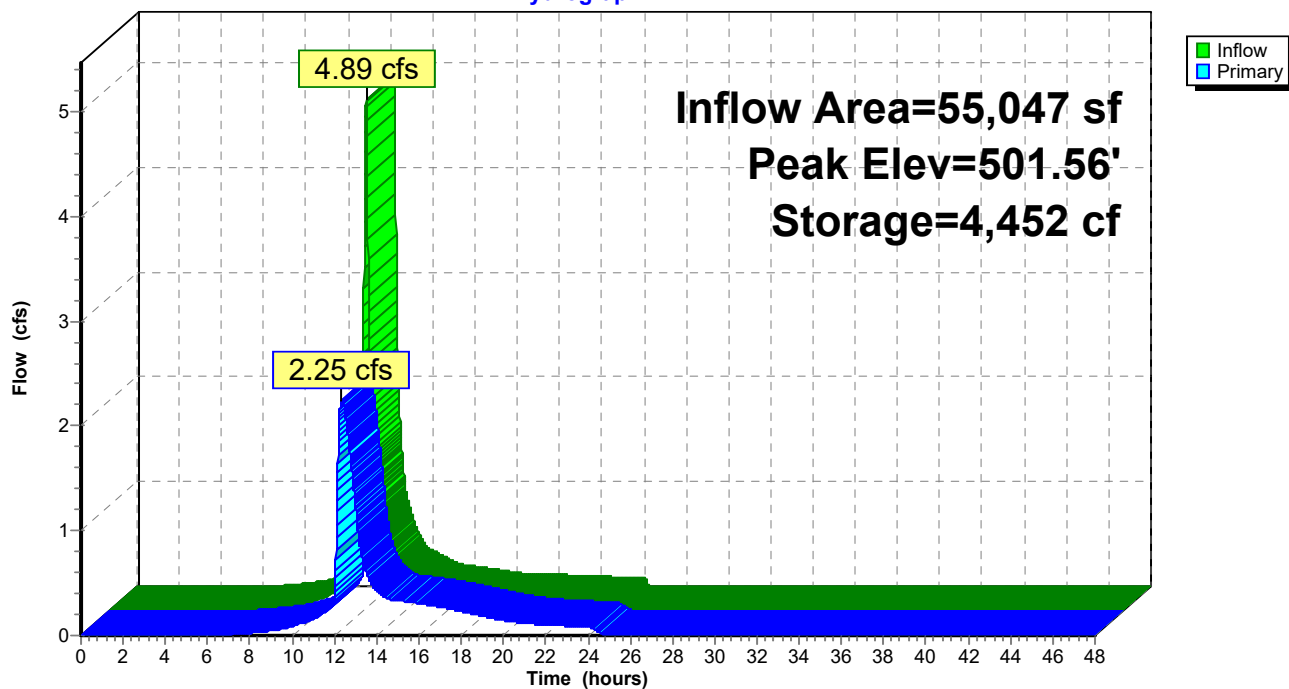
Device	Routing	Invert	Outlet Devices
#1	Primary	499.00'	15.0" Round Culvert L= 44.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 499.00' / 498.78' S= 0.0050 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 1.23 sf
#2	Device 1	499.00'	3.0" W x 3.0" H Vert. Low Flow Orifice C= 0.600
#3	Device 1	500.40'	12.0" W x 4.5" H Vert. Control Slot C= 0.600
#4	Device 1	503.00'	6.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=2.25 cfs @ 12.35 hrs HW=501.56' TW=0.00' (Dynamic Tailwater)

- 1=Culvert (Passes 2.25 cfs of 8.16 cfs potential flow)
- 2=Low Flow Orifice (Orifice Controls 0.47 cfs @ 7.52 fps)
- 3=Control Slot (Orifice Controls 1.78 cfs @ 4.75 fps)
- 4=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond B-2A-2: (new Pond)

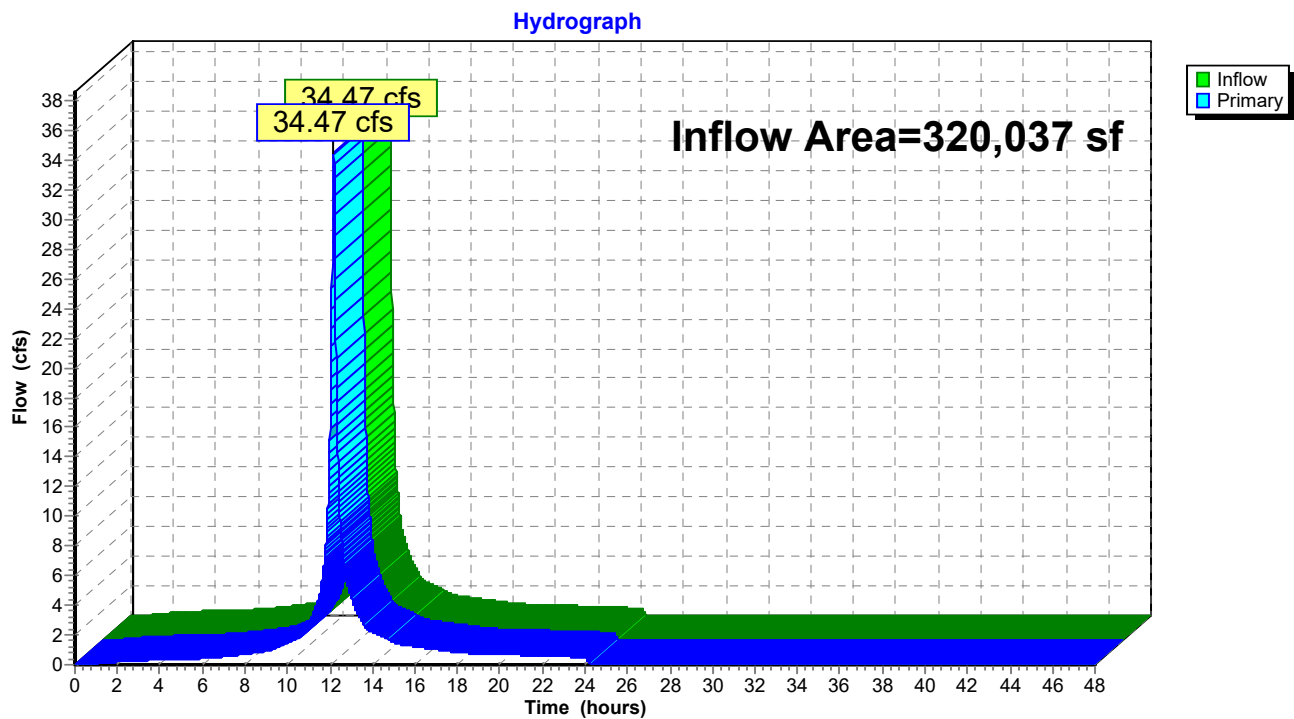
Hydrograph



Summary for Link E-2: Existing Area Tributary to POI-2

Inflow Area = 320,037 sf, 55.02% Impervious, Inflow Depth = 5.15" for 25-Year event
Inflow = 34.47 cfs @ 12.17 hrs, Volume= 137,308 cf
Primary = 34.47 cfs @ 12.17 hrs, Volume= 137,308 cf, Atten= 0%, Lag= 0.0 min

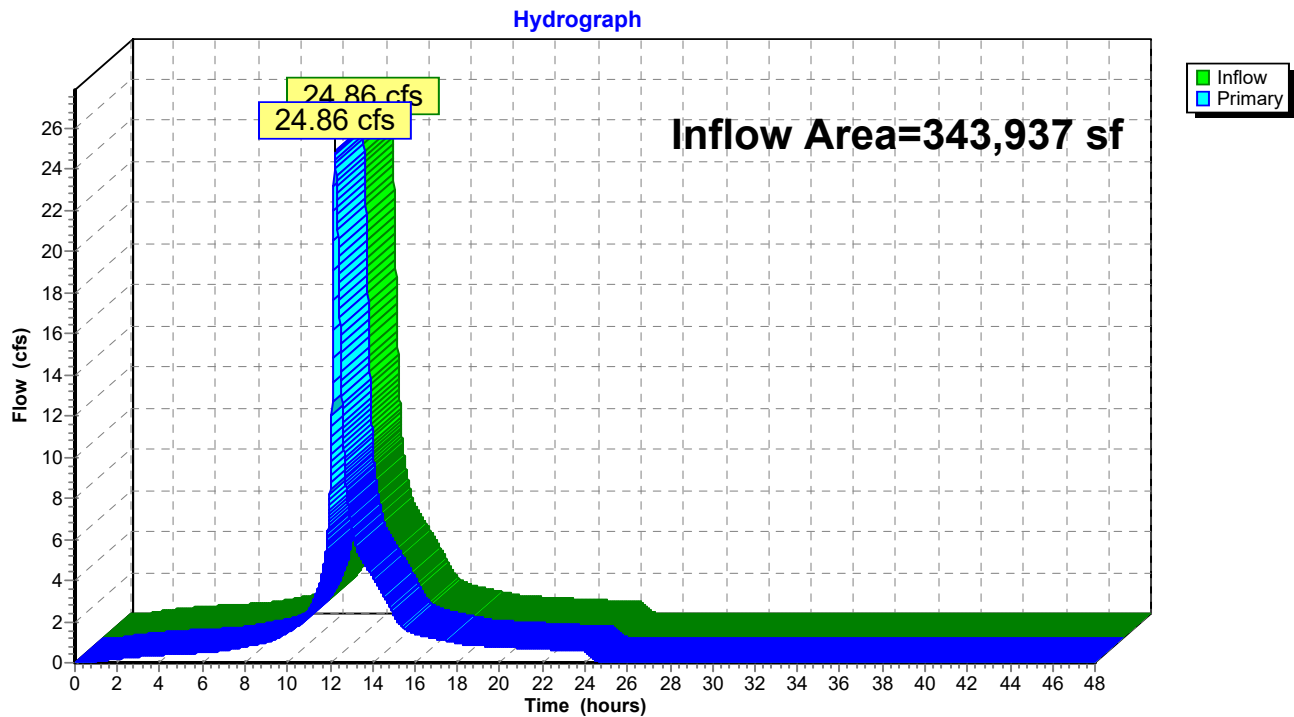
Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Link E-2: Existing Area Tributary to POI-2

Summary for Link P-1: Proposed Area Tributary to POI-1

Inflow Area = 343,937 sf, 61.28% Impervious, Inflow Depth = 5.27" for 25-Year event
Inflow = 24.86 cfs @ 12.23 hrs, Volume= 151,110 cf
Primary = 24.86 cfs @ 12.23 hrs, Volume= 151,110 cf, Atten= 0%, Lag= 0.0 min

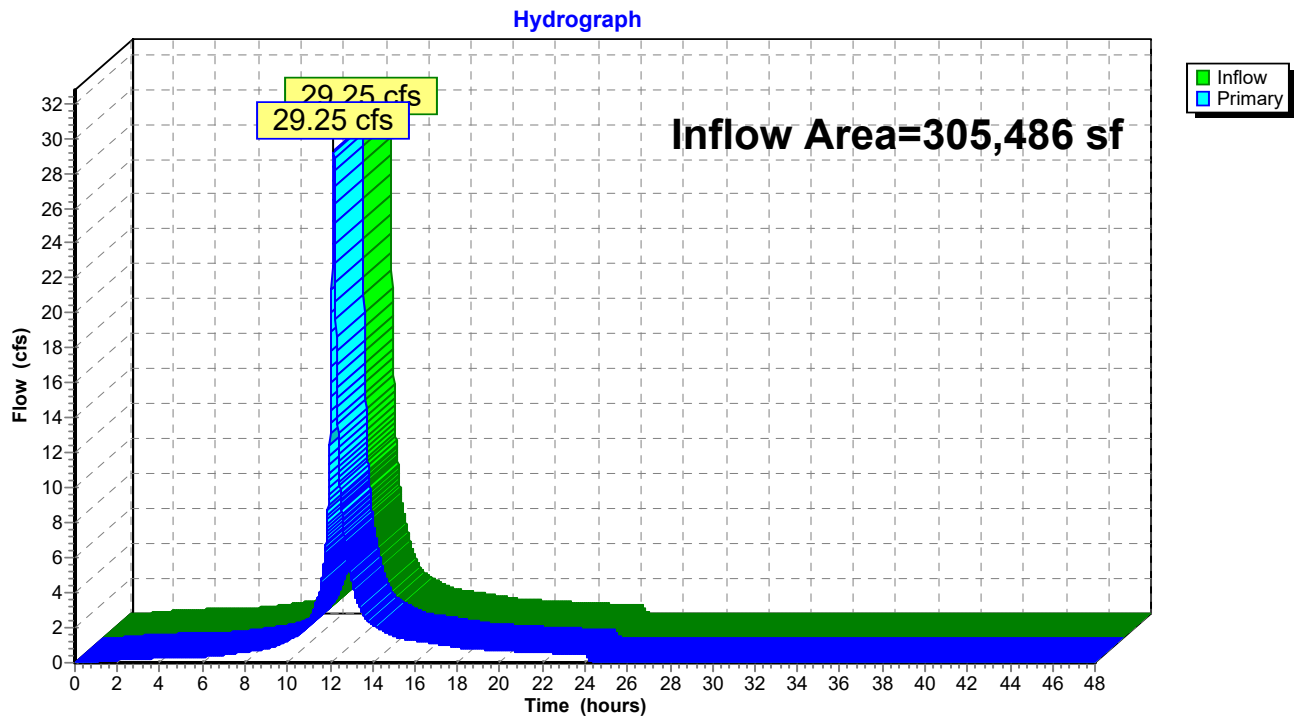
Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Link P-1: Proposed Area Tributary to POI-1

Summary for Link P-2: Proposed Area Tributary to POI-2

Inflow Area = 305,486 sf, 47.19% Impervious, Inflow Depth = 5.01" for 25-Year event
Inflow = 29.25 cfs @ 12.17 hrs, Volume= 127,630 cf
Primary = 29.25 cfs @ 12.17 hrs, Volume= 127,630 cf, Atten= 0%, Lag= 0.0 min

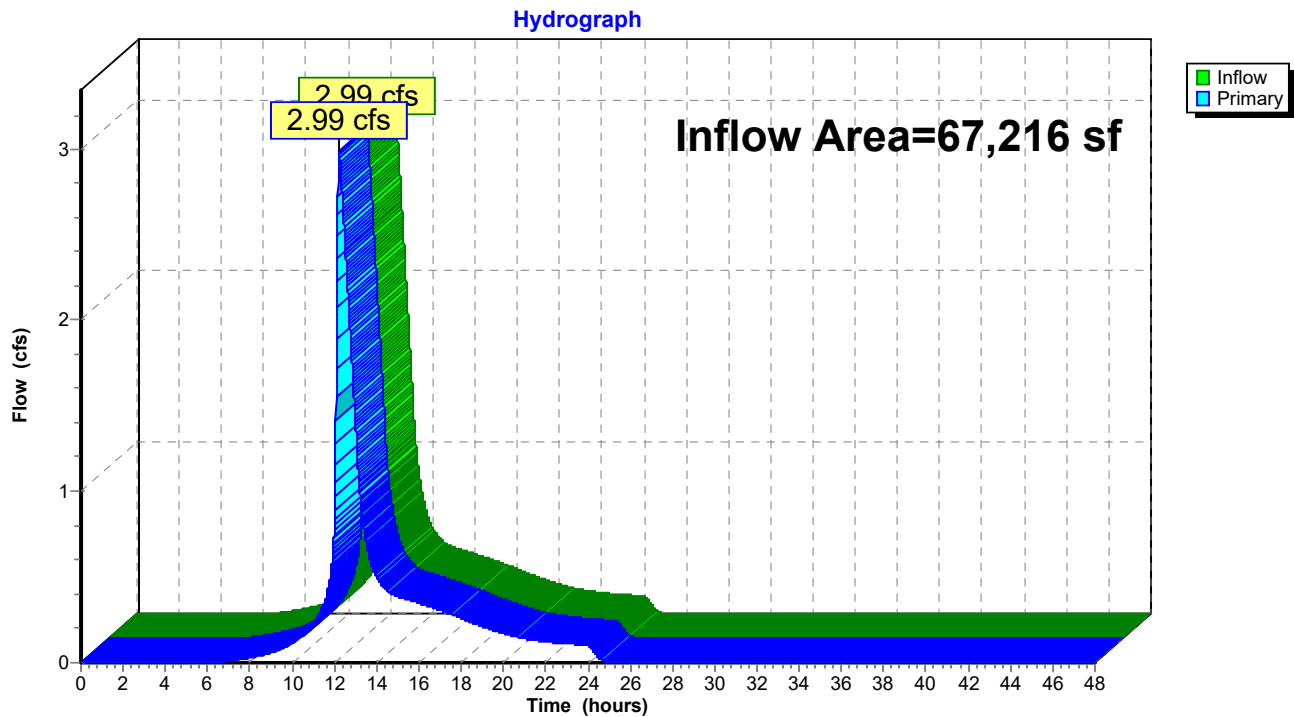
Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Link P-2: Proposed Area Tributary to POI-2

Summary for Link P-2B: Proposed Area Tributary to Culvert Downstream of Existing Pond

Inflow Area = 67,216 sf, 1.88% Impervious, Inflow Depth = 3.87" for 25-Year event
Inflow = 2.99 cfs @ 12.22 hrs, Volume= 21,664 cf
Primary = 2.99 cfs @ 12.22 hrs, Volume= 21,664 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Link P-2B: Proposed Area Tributary to Culvert Downstream of Existing Pond

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv.

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment E-1: Existing Area Runoff Area=304,647 sf 60.03% Impervious Runoff Depth=7.40"
Flow Length=1,157' Tc=10.0 min CN=76/98 Runoff=46.58 cfs 187,890 cf

Subcatchment E-2A: Existing Area Runoff Area=278,126 sf 61.54% Impervious Runoff Depth=7.52"
Tc=10.0 min CN=77/98 Runoff=43.09 cfs 174,280 cf

Subcatchment E-2B: Existing Area Runoff Area=41,911 sf 11.76% Impervious Runoff Depth=6.02"
Tc=10.0 min CN=75/98 Runoff=5.64 cfs 21,010 cf

Subcatchment E-3: Existing Area Tributary Runoff Area=59,770 sf 41.42% Impervious Runoff Depth=6.73"
Tc=10.0 min CN=73/98 Runoff=8.55 cfs 33,543 cf

Subcatchment P-1A: Upper Detained Area Runoff Area=129,383 sf 73.57% Impervious Runoff Depth=7.76"
Flow Length=1,157' Tc=10.0 min CN=76/98 Runoff=20.38 cfs 83,713 cf

Subcatchment P-1B: Lower Detained Runoff Area=100,868 sf 84.84% Impervious Runoff Depth=8.15"
Flow Length=1,157' Tc=10.0 min CN=80/98 Runoff=16.44 cfs 68,505 cf

Subcatchment P-1C: Undetained Area Runoff Area=113,686 sf 26.39% Impervious Runoff Depth=6.49"
Tc=10.0 min CN=76/98 Runoff=16.04 cfs 61,456 cf

Subcatchment P-2A: Proposed Area Runoff Area=238,270 sf 59.97% Impervious Runoff Depth=7.53"
Tc=10.0 min CN=78/98 Runoff=37.04 cfs 149,579 cf

Subcatchment P-2B-1: Proposed Dog Park Runoff Area=55,047 sf 2.30% Impervious Runoff Depth=5.92"
Tc=10.0 min CN=76/98 Runoff=7.40 cfs 27,147 cf

Subcatchment P-2B-2: Proposed Area Runoff Area=12,169 sf 0.00% Impervious Runoff Depth=5.96"
Tc=10.0 min CN=77/0 Runoff=1.65 cfs 6,048 cf

Subcatchment P-3: Proposed Area Runoff Area=35,031 sf 67.17% Impervious Runoff Depth=7.64"
Tc=10.0 min CN=77/98 Runoff=5.47 cfs 22,298 cf

Pond B-1A: Subsurface Detention Basin Peak Elev=497.94' Storage=8,594 cf Inflow=20.38 cfs 83,713 cf
Outflow=17.10 cfs 83,713 cf

Pond B-1B: Subsurface Detention Basin Peak Elev=484.14' Storage=19,630 cf Inflow=32.12 cfs 152,218 cf
Outflow=26.34 cfs 152,218 cf

Pond B-2A-2: (new Pond) Peak Elev=502.92' Storage=6,704 cf Inflow=7.40 cfs 27,147 cf
Outflow=3.34 cfs 27,147 cf

Link E-2: Existing Area Tributary to POI-2 Inflow=48.72 cfs 195,291 cf
Primary=48.72 cfs 195,291 cf

Link P-1: Proposed Area Tributary to POI-1 Inflow=36.81 cfs 213,673 cf
Primary=36.81 cfs 213,673 cf

2020-03-18_West Orange

NOAA 24-hr D 100-Year Rainfall=8.72"

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Page 2

Link P-2: Proposed Area Tributary to POI-2

Inflow=41.30 cfs 182,774 cf
Primary=41.30 cfs 182,774 cf

Link P-2B: Proposed Area Tributary to Culvert Downstream of Existing Pond Inflow=4.41 cfs 33,195 cf
Primary=4.41 cfs 33,195 cf

Total Runoff Area = 1,368,908 sf Runoff Volume = 835,469 cf Average Runoff Depth = 7.32"
44.32% Pervious = 606,723 sf 55.68% Impervious = 762,185 sf

Summary for Subcatchment E-1: Existing Area Tributary to POI-1

Runoff = 46.58 cfs @ 12.17 hrs, Volume= 187,890 cf, Depth= 7.40"

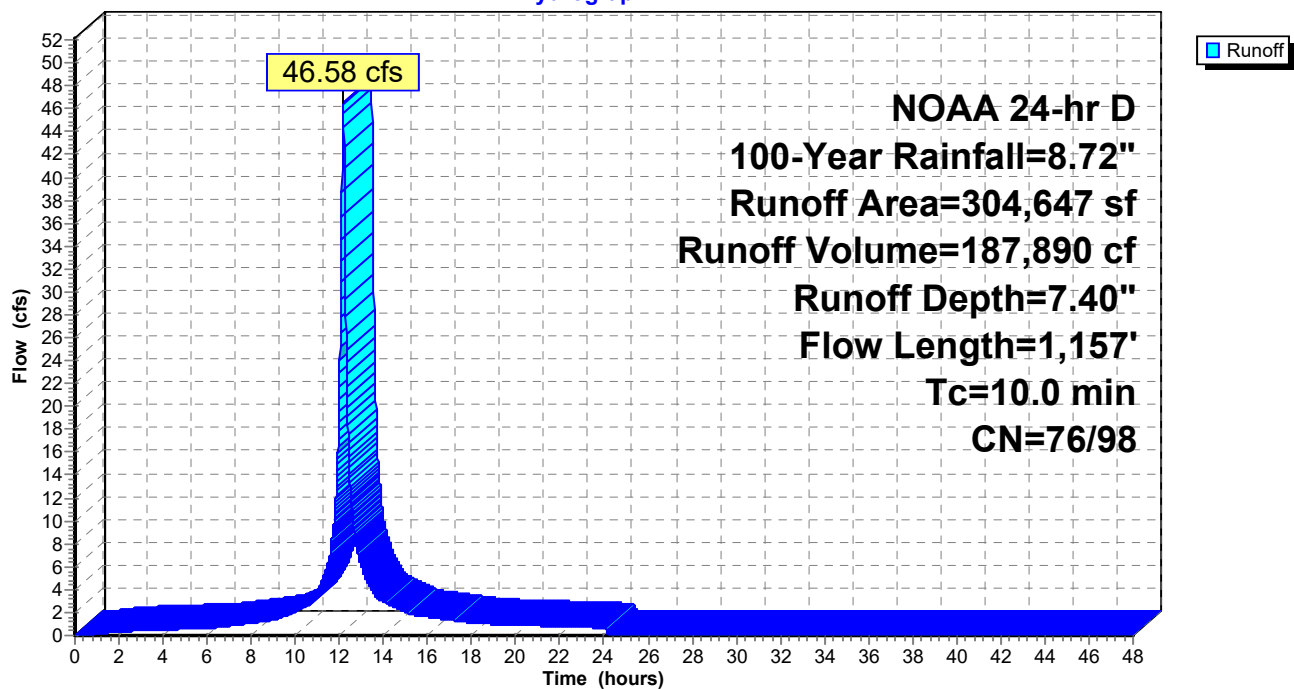
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 100-Year Rainfall=8.72"

	Area (sf)	CN	Description
*	182,894	98	Impervious Surfaces
	34,208	74	>75% Grass cover, Good, HSG C
	47,499	80	>75% Grass cover, Good, HSG D
	28,367	70	Woods, Good, HSG C
	11,679	77	Woods, Good, HSG D
	304,647	89	Weighted Average
	121,753	76	39.97% Pervious Area
	182,894	98	60.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	43	0.3720	0.13		Sheet Flow, A-B Woods: Dense underbrush n= 0.800 P2= 3.42"
0.5	57	0.0614	1.99		Sheet Flow, B-C Smooth surfaces n= 0.011 P2= 3.42"
0.5	155	0.0677	5.28		Shallow Concentrated Flow, C-D Paved Kv= 20.3 fps
0.8	902	0.0860	18.24	22.39	Pipe Channel, D-E 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.011 Concrete pipe, straight & clean
7.5	1,157	Total, Increased to minimum Tc = 10.0 min			

Subcatchment E-1: Existing Area Tributary to POI-1

Hydrograph



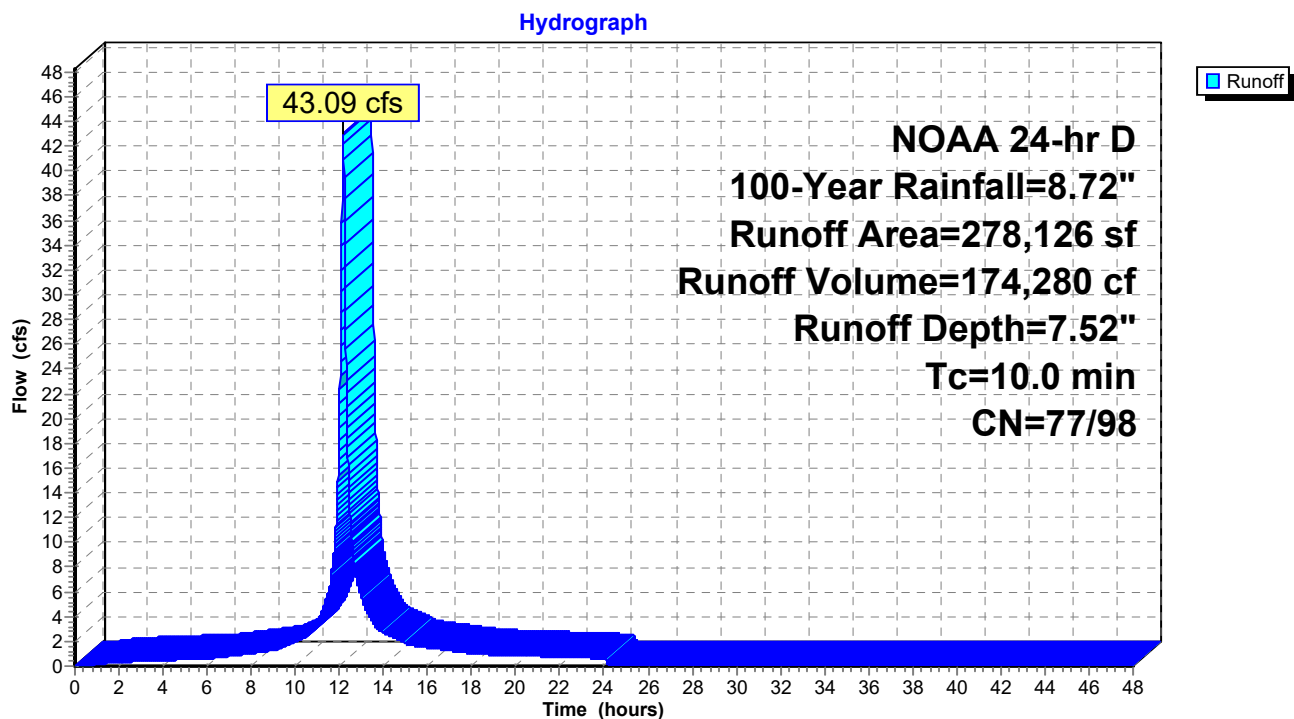
Summary for Subcatchment E-2A: Existing Area Tributary to Aboveground Pond

Runoff = 43.09 cfs @ 12.17 hrs, Volume= 174,280 cf, Depth= 7.52"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 100-Year Rainfall=8.72"

	Area (sf)	CN	Description
*	171,147	98	Impervious Surfaces
	730	74	>75% Grass cover, Good, HSG C
	70,237	80	>75% Grass cover, Good, HSG D
	24,193	70	Woods, Good, HSG C
	11,819	77	Woods, Good, HSG D
	278,126	90	Weighted Average
	106,979	77	38.46% Pervious Area
	171,147	98	61.54% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Subcatchment E-2A: Existing Area Tributary to Aboveground Pond

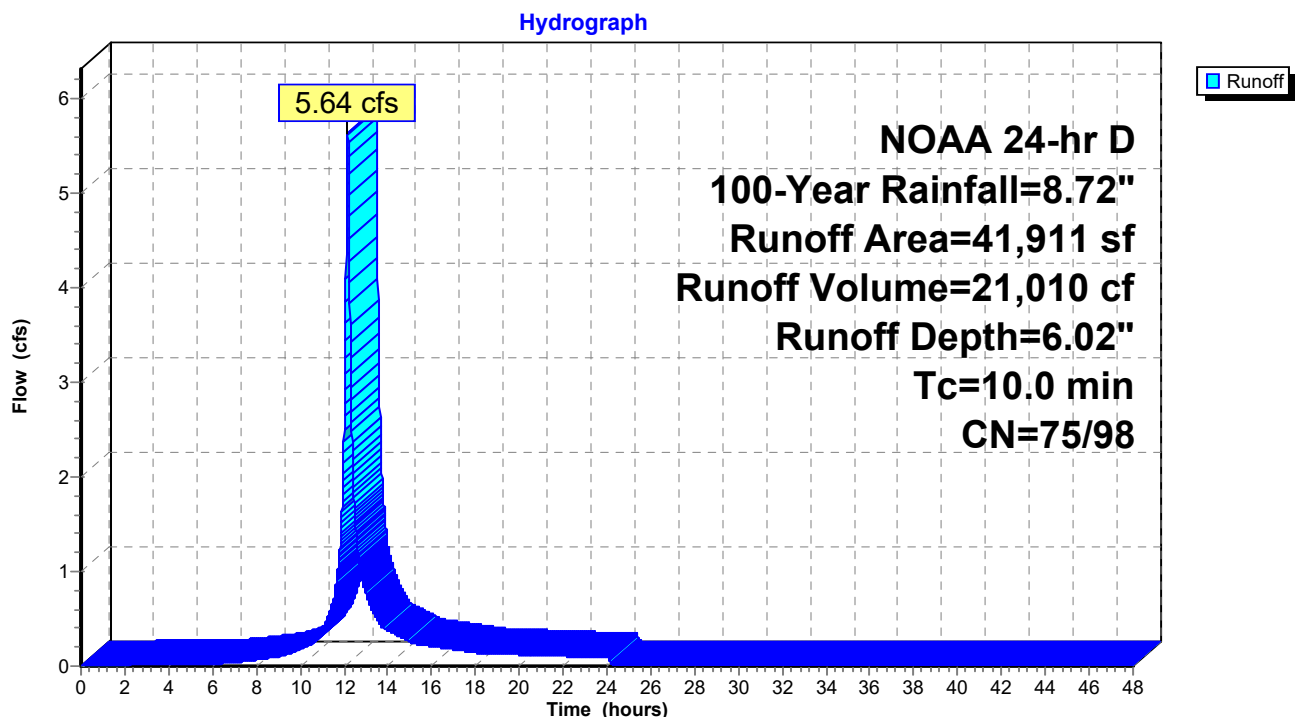
Summary for Subcatchment E-2B: Existing Area Tributary to Culvert Downstream of Pond

Runoff = 5.64 cfs @ 12.17 hrs, Volume= 21,010 cf, Depth= 6.02"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 100-Year Rainfall=8.72"

	Area (sf)	CN	Description
*	4,929	98	Impervious Surfaces
	0	74	>75% Grass cover, Good, HSG C
	6,244	80	>75% Grass cover, Good, HSG D
	13,613	70	Woods, Good, HSG C
	17,125	77	Woods, Good, HSG D
	41,911	78	Weighted Average
	36,982	75	88.24% Pervious Area
	4,929	98	11.76% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Subcatchment E-2B: Existing Area Tributary to Culvert Downstream of Pond

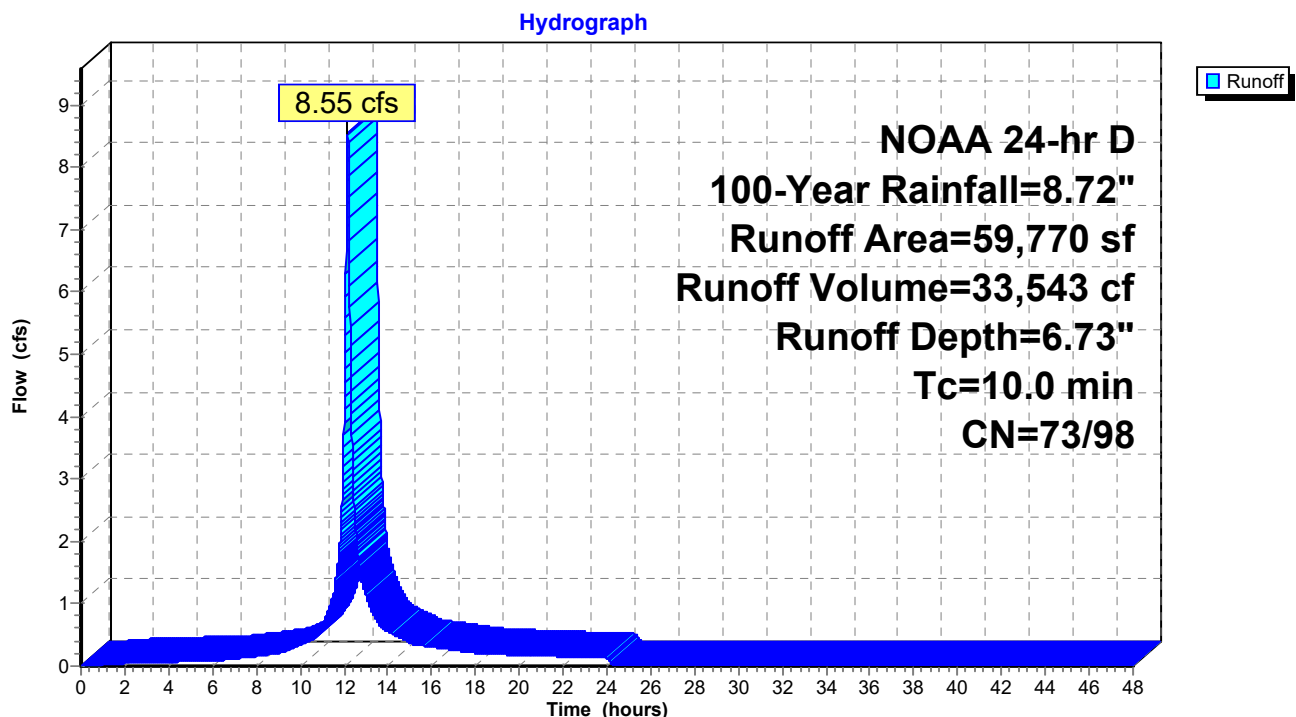
Summary for Subcatchment E-3: Existing Area Tributary to POI-3

Runoff = 8.55 cfs @ 12.17 hrs, Volume= 33,543 cf, Depth= 6.73"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 100-Year Rainfall=8.72"

	Area (sf)	CN	Description
*	24,755	98	Impervious Surfaces
	9,081	74	>75% Grass cover, Good, HSG C
	7,373	80	>75% Grass cover, Good, HSG D
	17,316	70	Woods, Good, HSG C
	1,245	77	Woods, Good, HSG D
	59,770	84	Weighted Average
	35,015	73	58.58% Pervious Area
	24,755	98	41.42% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Subcatchment E-3: Existing Area Tributary to POI-3

Summary for Subcatchment P-1A: Upper Detained Area Tributary to POI-1

Runoff = 20.38 cfs @ 12.17 hrs, Volume= 83,713 cf, Depth= 7.76"

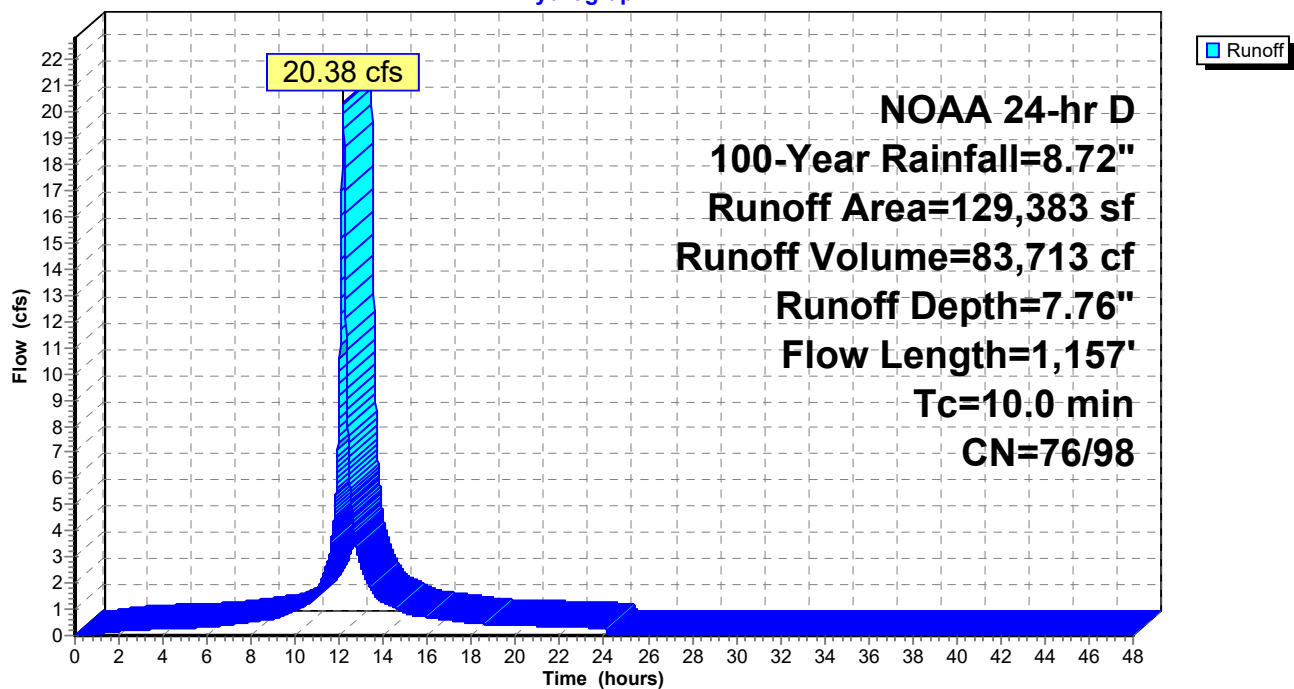
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 100-Year Rainfall=8.72"

	Area (sf)	CN	Description
*	95,185	98	Impervious Surfaces
	6,500	74	>75% Grass cover, Good, HSG C
	16,655	80	>75% Grass cover, Good, HSG D
	11,043	70	Woods, Good, HSG C
	0	77	Woods, Good, HSG D
	129,383	92	Weighted Average
	34,198	76	26.43% Pervious Area
	95,185	98	73.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	43	0.3720	0.13		Sheet Flow, A-B Woods: Dense underbrush n= 0.800 P2= 3.42"
0.5	57	0.0614	1.99		Sheet Flow, B-C Smooth surfaces n= 0.011 P2= 3.42"
0.5	155	0.0677	5.28		Shallow Concentrated Flow, C-D Paved Kv= 20.3 fps
0.8	902	0.0860	18.24	22.39	Pipe Channel, D-E 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.011 Concrete pipe, straight & clean
7.5	1,157	Total, Increased to minimum Tc = 10.0 min			

Subcatchment P-1A: Upper Detained Area Tributary to POI-1

Hydrograph



Summary for Subcatchment P-1B: Lower Detained Area Tributary to POI-1

Runoff = 16.44 cfs @ 12.17 hrs, Volume= 68,505 cf, Depth= 8.15"

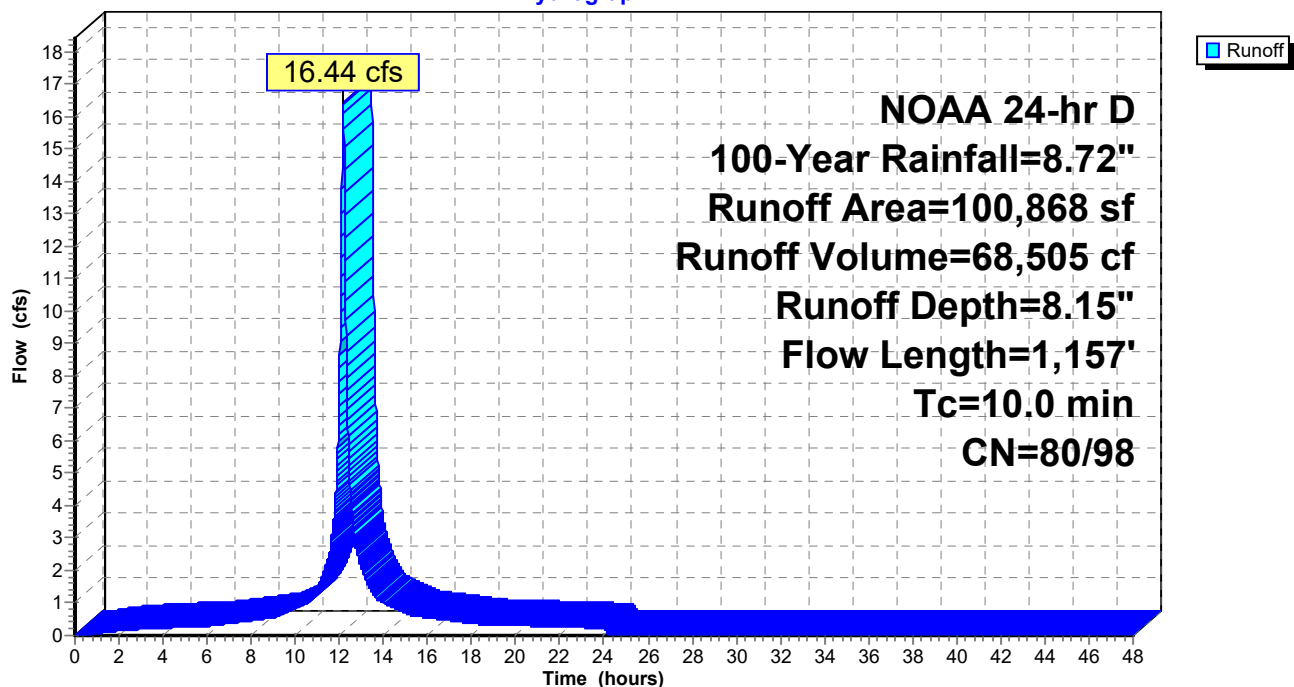
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 100-Year Rainfall=8.72"

	Area (sf)	CN	Description
*	85,579	98	Impervious Surfaces
	0	74	>75% Grass cover, Good, HSG C
	15,289	80	>75% Grass cover, Good, HSG D
	0	70	Woods, Good, HSG C
	0	77	Woods, Good, HSG D
	100,868	95	Weighted Average
	15,289	80	15.16% Pervious Area
	85,579	98	84.84% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	43	0.3720	0.13		Sheet Flow, A-B Woods: Dense underbrush n= 0.800 P2= 3.42"
0.5	57	0.0614	1.99		Sheet Flow, B-C Smooth surfaces n= 0.011 P2= 3.42"
0.5	155	0.0677	5.28		Shallow Concentrated Flow, C-D Paved Kv= 20.3 fps
0.8	902	0.0860	18.24	22.39	Pipe Channel, D-E 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.011 Concrete pipe, straight & clean
7.5	1,157	Total, Increased to minimum Tc = 10.0 min			

Subcatchment P-1B: Lower Detained Area Tributary to POI-1

Hydrograph



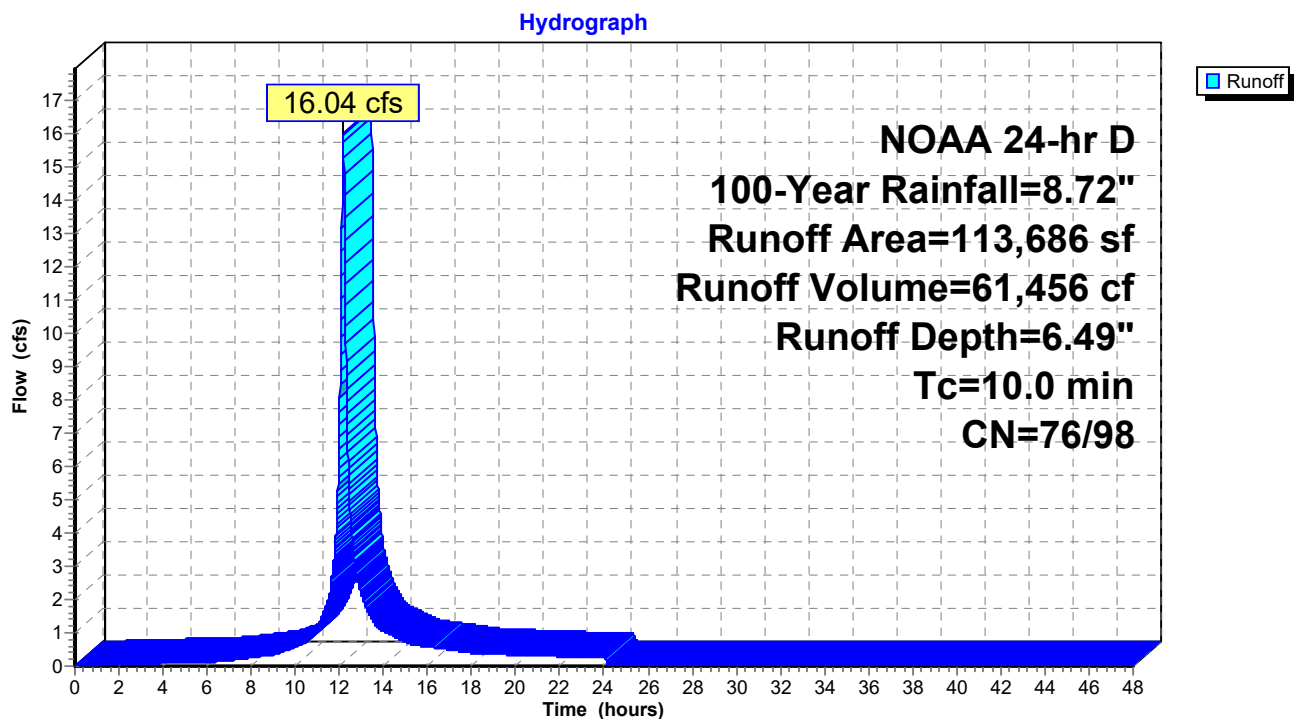
Summary for Subcatchment P-1C: Undetained Area Tributary to POI-1

Runoff = 16.04 cfs @ 12.17 hrs, Volume= 61,456 cf, Depth= 6.49"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 100-Year Rainfall=8.72"

	Area (sf)	CN	Description
*	30,004	98	Impervious Surfaces
	60,942	74	>75% Grass cover, Good, HSG C
	22,740	80	>75% Grass cover, Good, HSG D
	0	70	Woods, Good, HSG C
	0	77	Woods, Good, HSG D
	113,686	82	Weighted Average
	83,682	76	73.61% Pervious Area
	30,004	98	26.39% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Subcatchment P-1C: Undetained Area Tributary to POI-1

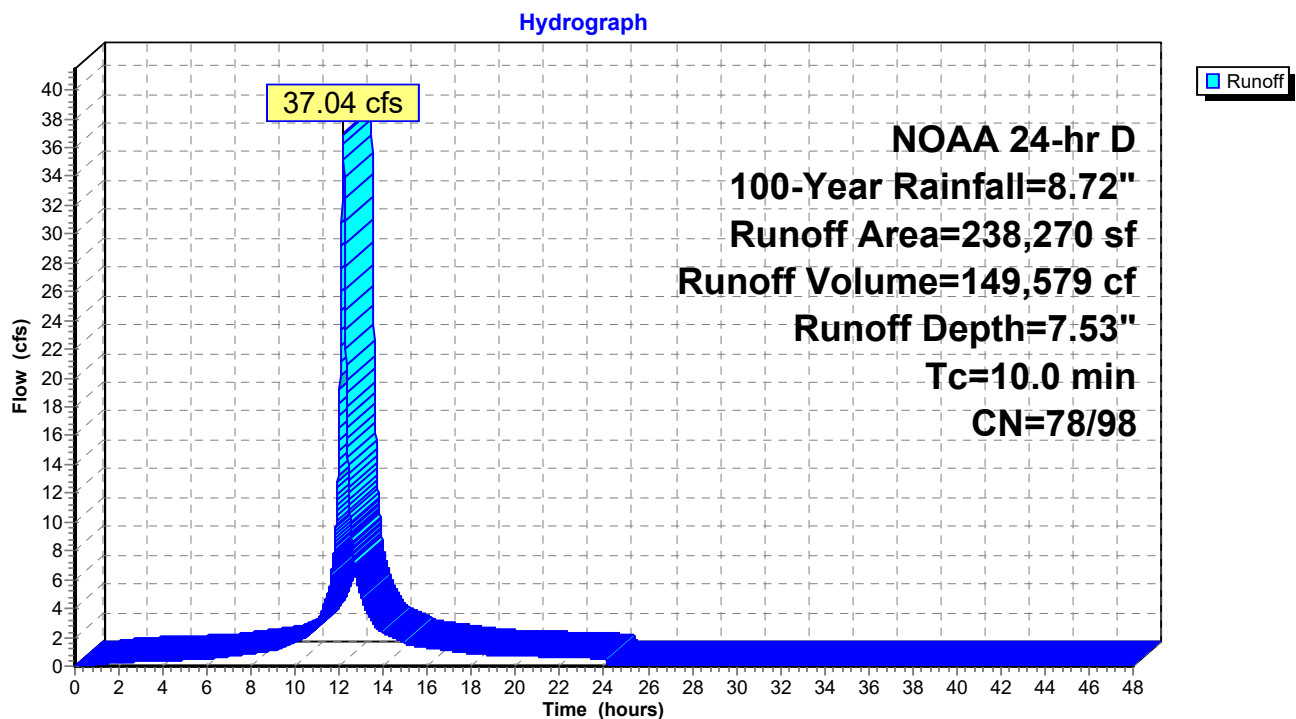
Summary for Subcatchment P-2A: Proposed Area Tributary to Aboveground Pond

Runoff = 37.04 cfs @ 12.17 hrs, Volume= 149,579 cf, Depth= 7.53"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 100-Year Rainfall=8.72"

	Area (sf)	CN	Description
*	142,897	98	Impervious Surfaces
	7,563	74	>75% Grass cover, Good, HSG C
	73,435	80	>75% Grass cover, Good, HSG D
	8,450	70	Woods, Good, HSG C
	5,925	77	Woods, Good, HSG D
	238,270	90	Weighted Average
	95,373	78	40.03% Pervious Area
	142,897	98	59.97% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Subcatchment P-2A: Proposed Area Tributary to Aboveground Pond

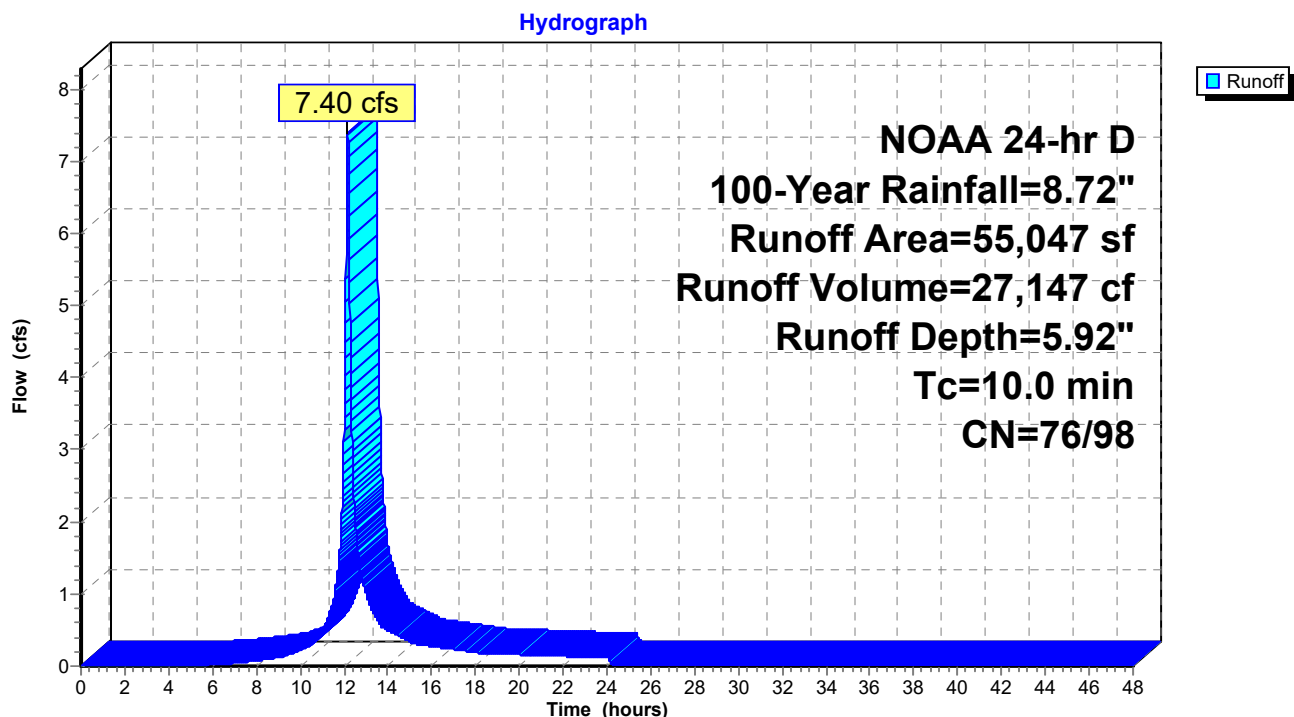
Summary for Subcatchment P-2B-1: Proposed Dog Park Area Tributary to Basin

Runoff = 7.40 cfs @ 12.17 hrs, Volume= 27,147 cf, Depth= 5.92"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 100-Year Rainfall=8.72"

	Area (sf)	CN	Description
*	1,265	98	Impervious Surfaces
	16,597	74	>75% Grass cover, Good, HSG C
	27,424	80	>75% Grass cover, Good, HSG D
	9,761	70	Woods, Good, HSG C
	0	77	Woods, Good, HSG D
	55,047	77	Weighted Average
	53,782	76	97.70% Pervious Area
	1,265	98	2.30% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Subcatchment P-2B-1: Proposed Dog Park Area Tributary to Basin

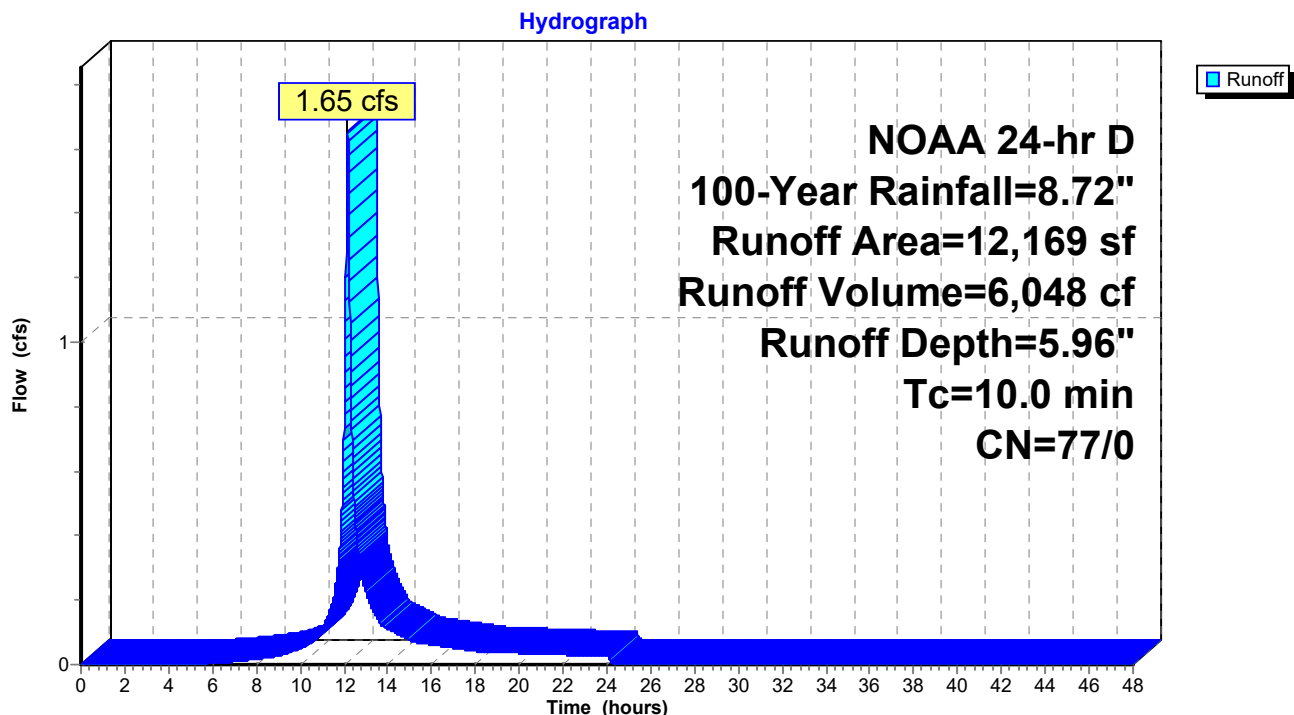
Summary for Subcatchment P-2B-2: Proposed Area Tributary to Culvert Downstream of Existing Pond

Runoff = 1.65 cfs @ 12.17 hrs, Volume= 6,048 cf, Depth= 5.96"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 100-Year Rainfall=8.72"

Area (sf)	CN	Description
*	0	98 Impervious Surfaces
5,664	74	>75% Grass cover, Good, HSG C
6,505	80	>75% Grass cover, Good, HSG D
0	70	Woods, Good, HSG C
0	77	Woods, Good, HSG D
12,169	77	Weighted Average
12,169	77	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Subcatchment P-2B-2: Proposed Area Tributary to Culvert Downstream of Existing Pond

Summary for Subcatchment P-3: Proposed Area Tributary to POI-3

Runoff = 5.47 cfs @ 12.17 hrs, Volume= 22,298 cf, Depth= 7.64"

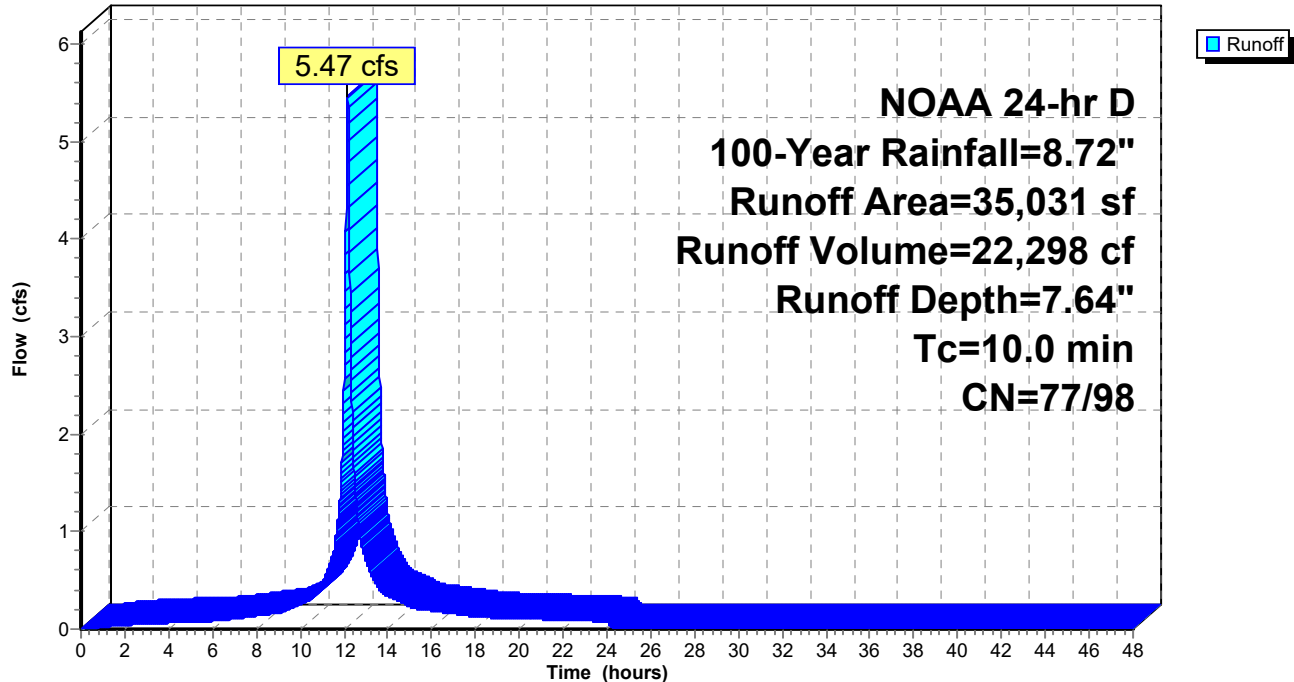
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 100-Year Rainfall=8.72"

	Area (sf)	CN	Description
*	23,530	98	Impervious Surfaces
	3,013	74	>75% Grass cover, Good, HSG C
	6,634	80	>75% Grass cover, Good, HSG D
	1,854	70	Woods, Good, HSG C
	0	77	Woods, Good, HSG D
	35,031	91	Weighted Average
	11,501	77	32.83% Pervious Area
	23,530	98	67.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Subcatchment P-3: Proposed Area Tributary to POI-3

Hydrograph



Summary for Pond B-1A: Subsurface Detention Basin

Inflow Area = 129,383 sf, 73.57% Impervious, Inflow Depth = 7.76" for 100-Year event
 Inflow = 20.38 cfs @ 12.17 hrs, Volume= 83,713 cf
 Outflow = 17.10 cfs @ 12.23 hrs, Volume= 83,713 cf, Atten= 16%, Lag= 3.5 min
 Primary = 17.10 cfs @ 12.23 hrs, Volume= 83,713 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 497.94' @ 12.23 hrs Surf.Area= 628 sf Storage= 8,594 cf

Plug-Flow detention time= 9.4 min calculated for 83,695 cf (100% of inflow)
 Center-of-Mass det. time= 9.4 min (769.0 - 759.6)

Volume	Invert	Avail.Storage	Storage Description
#1	493.00'	8,639 cf	60.0" Round Pipe Storage x 5 L= 88.0' S= 0.0010 '/'

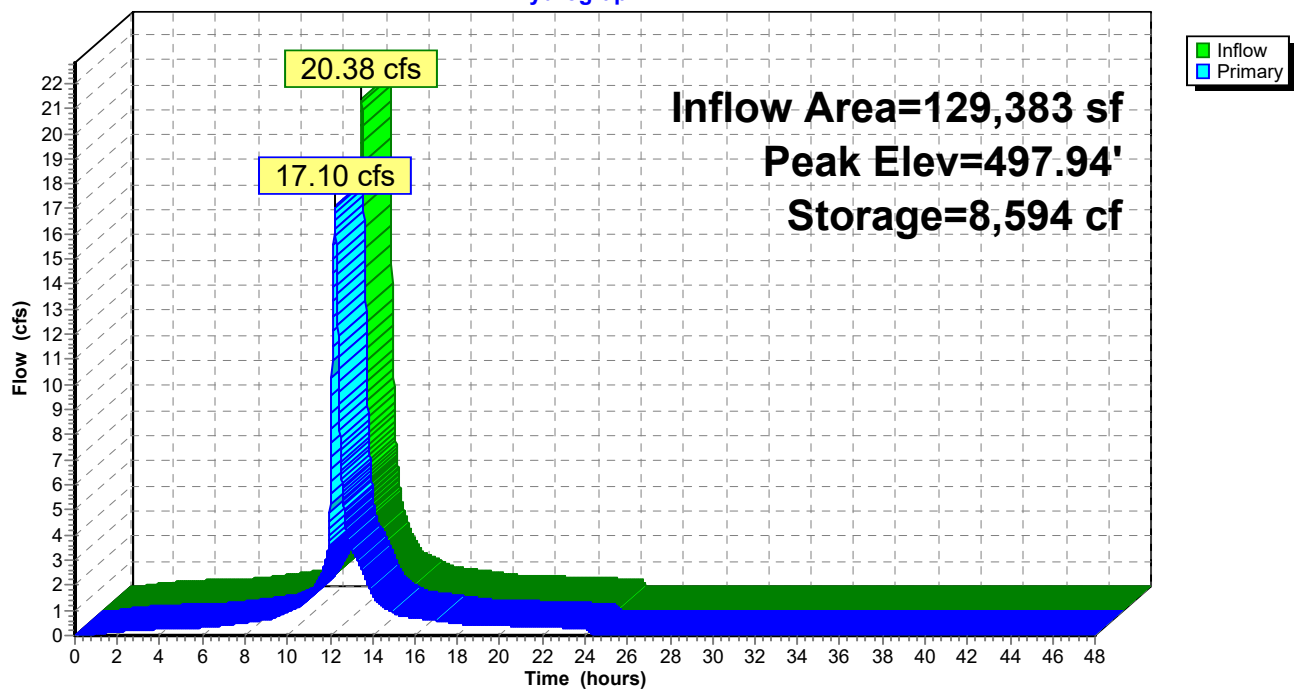
Device	Routing	Invert	Outlet Devices
#1	Primary	493.00'	18.0" Round Culvert L= 90.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 493.00' / 484.00' S= 0.1000 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 1.77 sf
#2	Device 1	493.00'	12.0" W x 6.0" H Vert. Low Flow Orifice C= 0.600
#3	Device 1	495.35'	18.0" W x 14.0" H Vert. Control Slot C= 0.600
#4	Device 1	498.00'	6.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=17.10 cfs @ 12.23 hrs HW=497.94' TW=483.70' (Dynamic Tailwater)

- 1=Culvert (Passes 17.10 cfs of 17.41 cfs potential flow)
- 2=Low Flow Orifice (Orifice Controls 5.21 cfs @ 10.42 fps)
- 3=Control Slot (Orifice Controls 11.88 cfs @ 6.79 fps)
- 4=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond B-1A: Subsurface Detention Basin

Hydrograph



Summary for Pond B-1B: Subsurface Detention Basin

Inflow Area = 230,251 sf, 78.51% Impervious, Inflow Depth = 7.93" for 100-Year event
 Inflow = 32.12 cfs @ 12.19 hrs, Volume= 152,218 cf
 Outflow = 26.34 cfs @ 12.28 hrs, Volume= 152,218 cf, Atten= 18%, Lag= 5.3 min
 Primary = 26.34 cfs @ 12.28 hrs, Volume= 152,218 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 484.14' @ 12.28 hrs Surf.Area= 212 sf Storage= 19,630 cf

Plug-Flow detention time= 20.3 min calculated for 152,186 cf (100% of inflow)
 Center-of-Mass det. time= 20.3 min (781.7 - 761.5)

Volume	Invert	Avail.Storage	Storage Description
#1	479.00'	19,635 cf	60.0" Round Pipe Storage x 5 L= 200.0' S= 0.0010 '/'

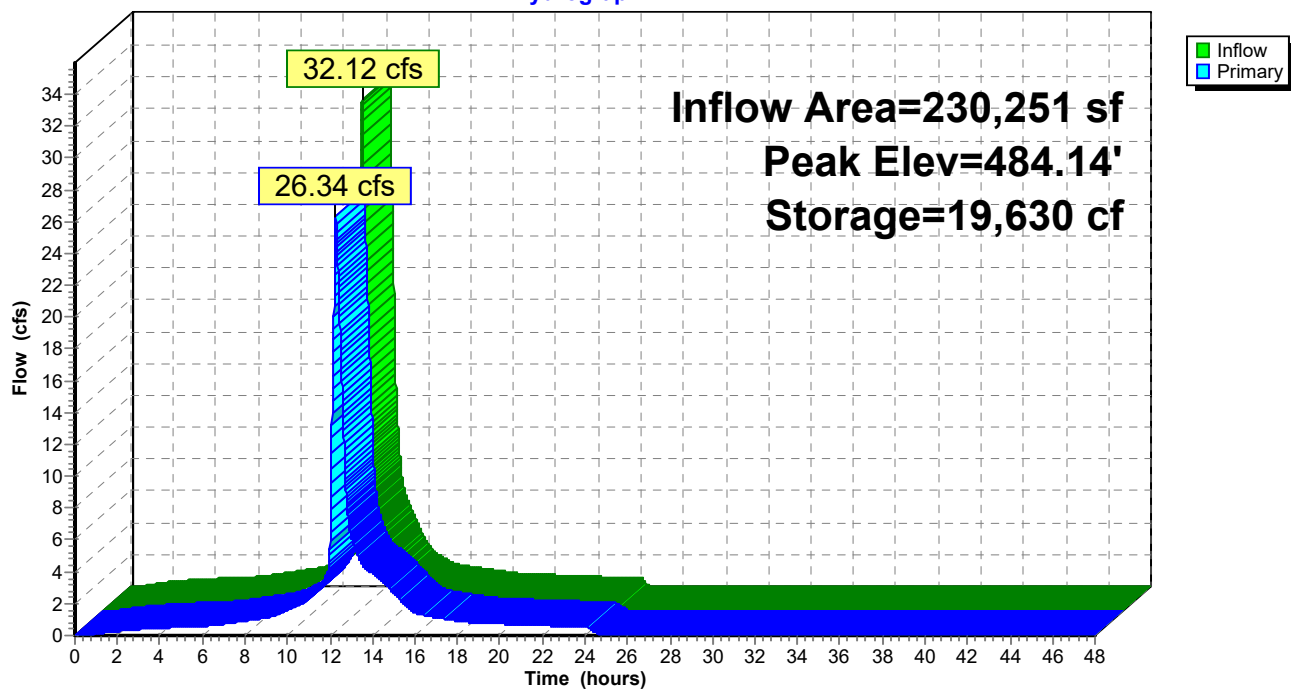
Device	Routing	Invert	Outlet Devices
#1	Primary	479.00'	24.0" Round Culvert L= 50.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 479.00' / 474.00' S= 0.1000 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf
#2	Device 1	479.00'	8.5" W x 10.0" H Vert. Low Flow Orifice C= 0.600
#3	Device 1	481.55'	48.0" W x 8.0" H Vert. Control Slot C= 0.600
#4	Device 1	484.00'	6.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=26.26 cfs @ 12.28 hrs HW=484.14' TW=0.00' (Dynamic Tailwater)

- 1=Culvert (Passes 26.26 cfs of 30.76 cfs potential flow)
- 2=Low Flow Orifice (Orifice Controls 6.17 cfs @ 10.46 fps)
- 3=Control Slot (Orifice Controls 19.25 cfs @ 7.22 fps)
- 4=Broad-Crested Rectangular Weir (Weir Controls 0.84 cfs @ 1.03 fps)

Pond B-1B: Subsurface Detention Basin

Hydrograph



Summary for Pond B-2A-2: (new Pond)

Inflow Area = 55,047 sf, 2.30% Impervious, Inflow Depth = 5.92" for 100-Year event
 Inflow = 7.40 cfs @ 12.17 hrs, Volume= 27,147 cf
 Outflow = 3.34 cfs @ 12.35 hrs, Volume= 27,147 cf, Atten= 55%, Lag= 10.8 min
 Primary = 3.34 cfs @ 12.35 hrs, Volume= 27,147 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 502.92' @ 12.35 hrs Surf.Area= 803 sf Storage= 6,704 cf

Plug-Flow detention time= 47.8 min calculated for 27,142 cf (100% of inflow)
 Center-of-Mass det. time= 47.8 min (864.4 - 816.6)

Volume	Invert	Avail.Storage	Storage Description
#1	499.00'	6,786 cf	48.0" Round Pipe Storage x 4 L= 135.0' S= 0.0010 '/'

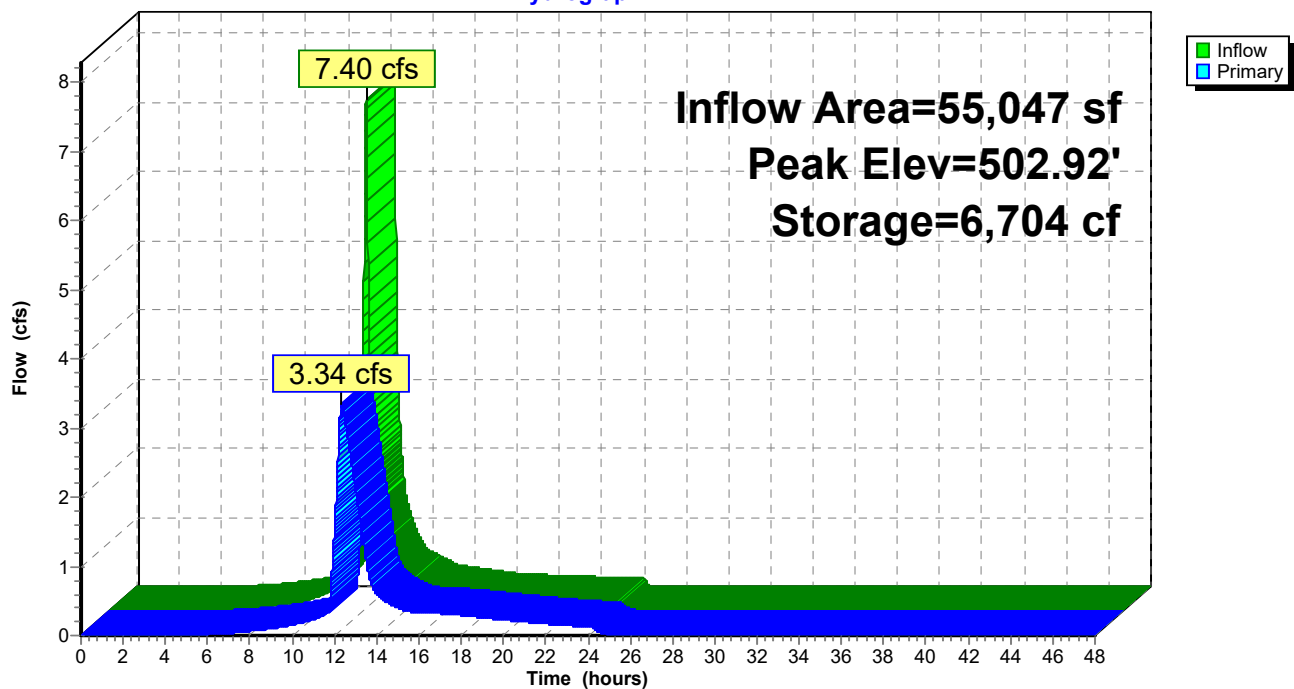
Device	Routing	Invert	Outlet Devices
#1	Primary	499.00'	15.0" Round Culvert L= 44.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 499.00' / 498.78' S= 0.0050 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 1.23 sf
#2	Device 1	499.00'	3.0" W x 3.0" H Vert. Low Flow Orifice C= 0.600
#3	Device 1	500.40'	12.0" W x 4.5" H Vert. Control Slot C= 0.600
#4	Device 1	503.00'	6.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=3.34 cfs @ 12.35 hrs HW=502.92' TW=0.00' (Dynamic Tailwater)

- 1=Culvert (Passes 3.34 cfs of 10.73 cfs potential flow)
- 2=Low Flow Orifice (Orifice Controls 0.59 cfs @ 9.38 fps)
- 3=Control Slot (Orifice Controls 2.76 cfs @ 7.35 fps)
- 4=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond B-2A-2: (new Pond)

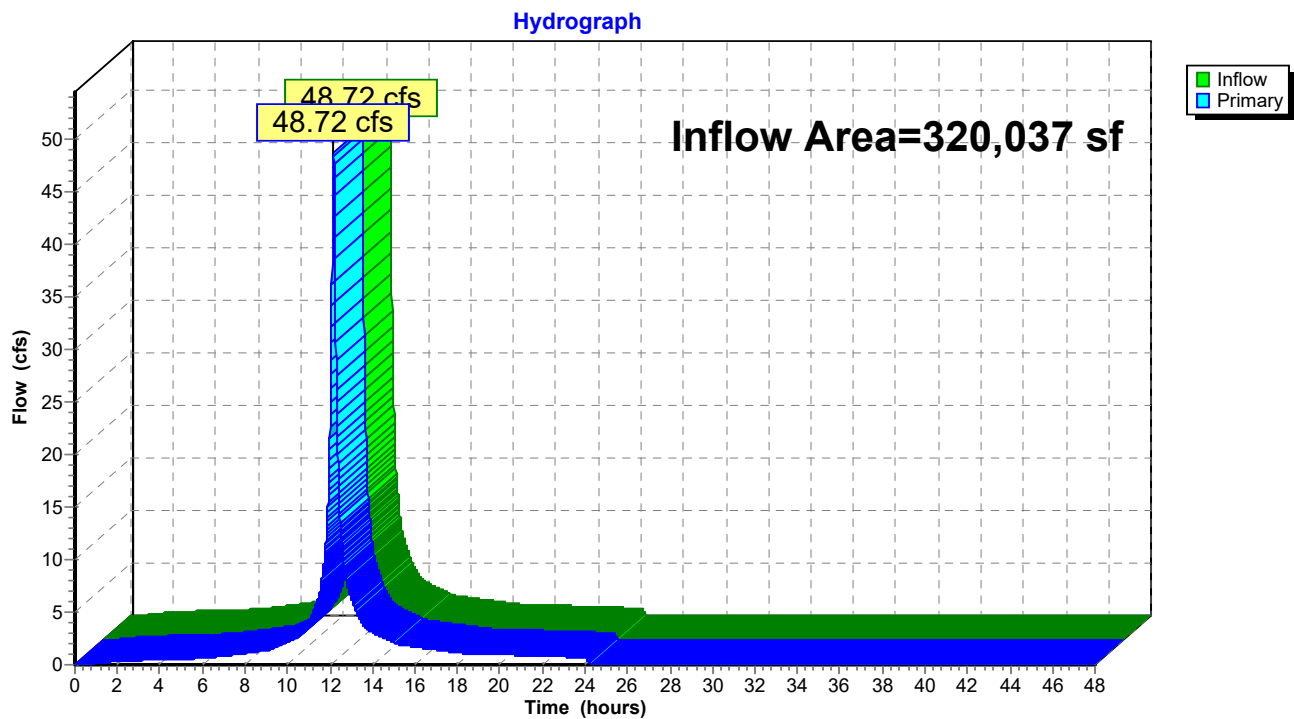
Hydrograph



Summary for Link E-2: Existing Area Tributary to POI-2

Inflow Area = 320,037 sf, 55.02% Impervious, Inflow Depth = 7.32" for 100-Year event
Inflow = 48.72 cfs @ 12.17 hrs, Volume= 195,291 cf
Primary = 48.72 cfs @ 12.17 hrs, Volume= 195,291 cf, Atten= 0%, Lag= 0.0 min

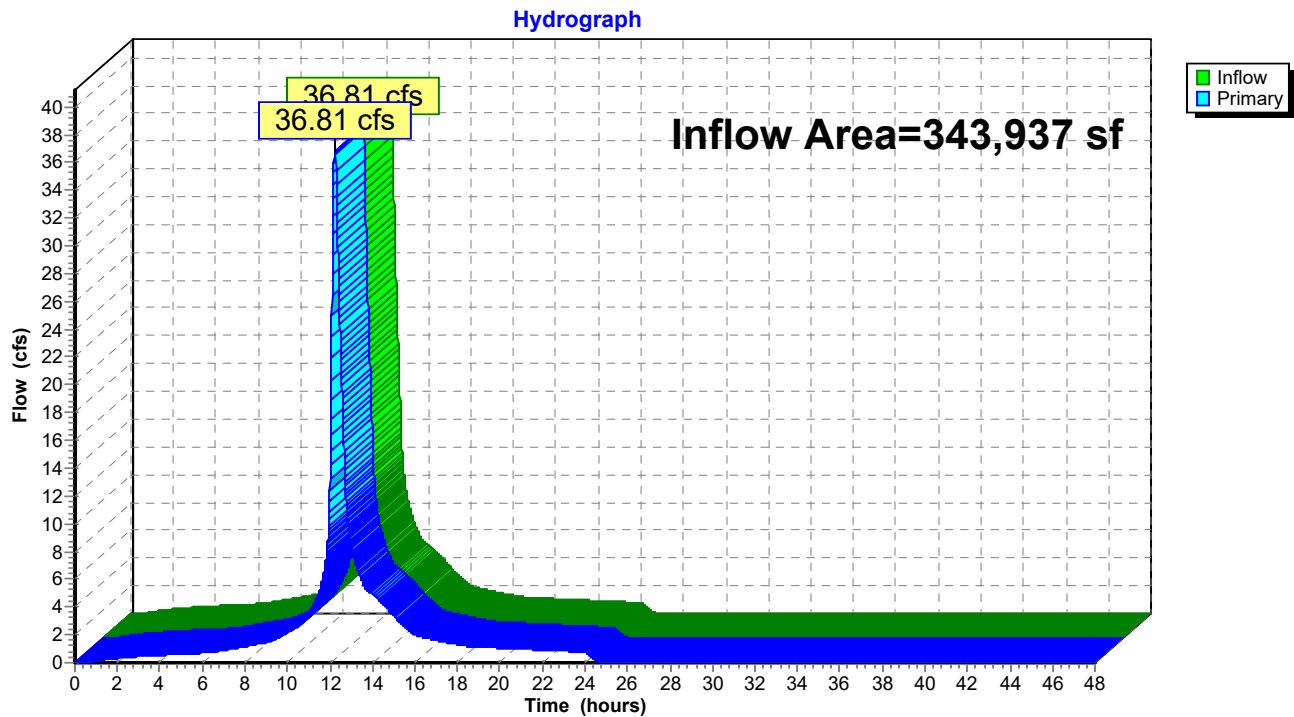
Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Link E-2: Existing Area Tributary to POI-2

Summary for Link P-1: Proposed Area Tributary to POI-1

Inflow Area = 343,937 sf, 61.28% Impervious, Inflow Depth = 7.46" for 100-Year event
Inflow = 36.81 cfs @ 12.21 hrs, Volume= 213,673 cf
Primary = 36.81 cfs @ 12.21 hrs, Volume= 213,673 cf, Atten= 0%, Lag= 0.0 min

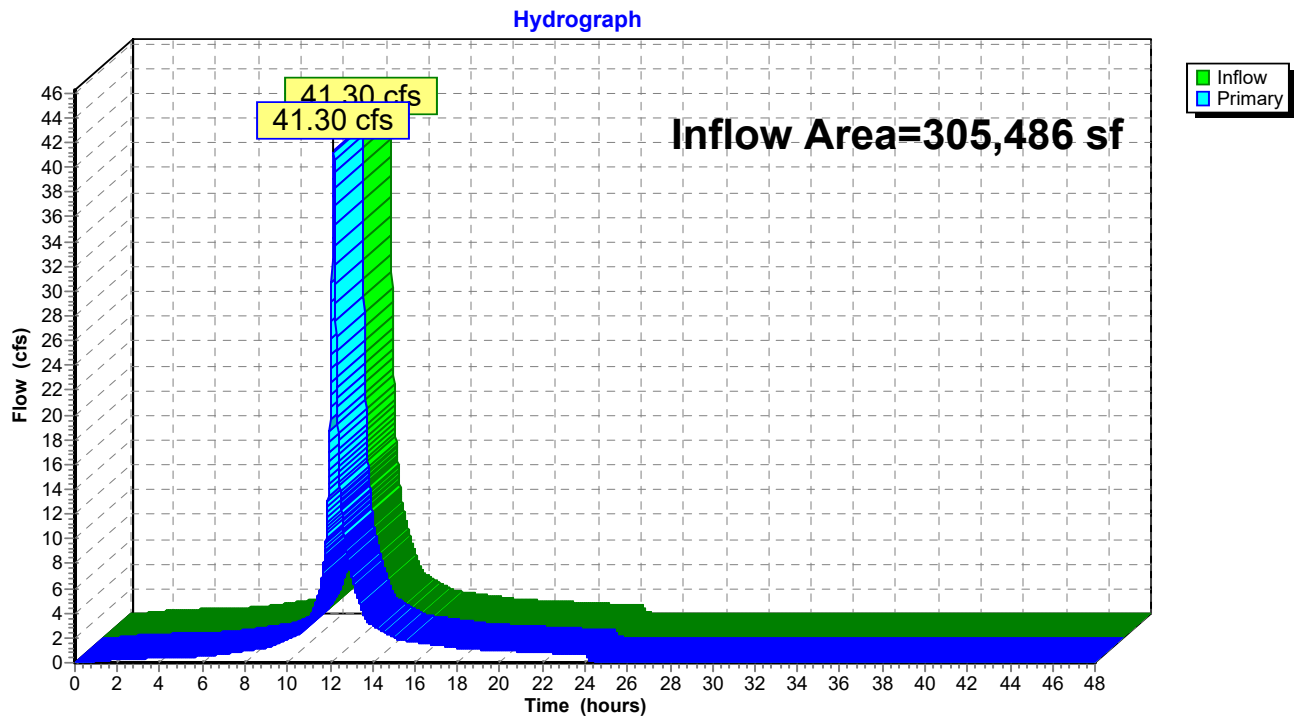
Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Link P-1: Proposed Area Tributary to POI-1

Summary for Link P-2: Proposed Area Tributary to POI-2

Inflow Area = 305,486 sf, 47.19% Impervious, Inflow Depth = 7.18" for 100-Year event
Inflow = 41.30 cfs @ 12.17 hrs, Volume= 182,774 cf
Primary = 41.30 cfs @ 12.17 hrs, Volume= 182,774 cf, Atten= 0%, Lag= 0.0 min

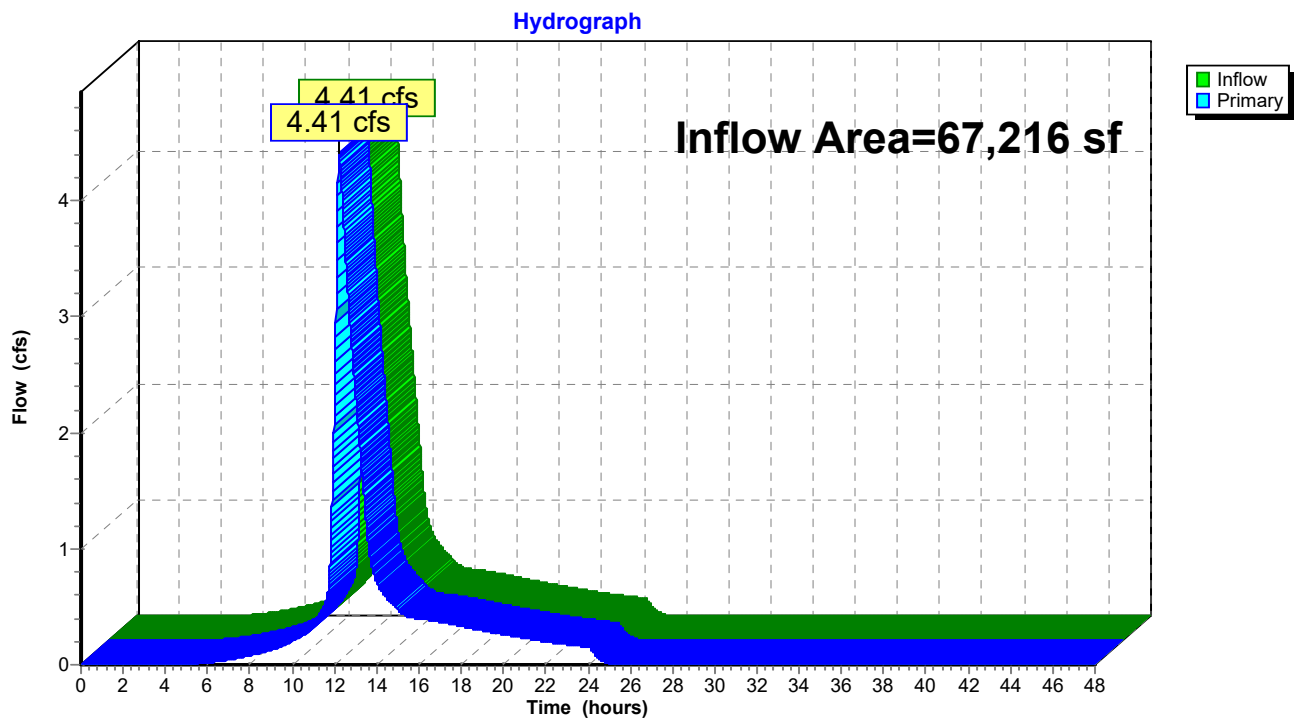
Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Link P-2: Proposed Area Tributary to POI-2

Summary for Link P-2B: Proposed Area Tributary to Culvert Downstream of Existing Pond

Inflow Area = 67,216 sf, 1.88% Impervious, Inflow Depth = 5.93" for 100-Year event
Inflow = 4.41 cfs @ 12.21 hrs, Volume= 33,195 cf
Primary = 4.41 cfs @ 12.21 hrs, Volume= 33,195 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Link P-2B: Proposed Area Tributary to Culvert Downstream of Existing Pond

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv.

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment E-1: Existing Area Runoff Area=304,647 sf 60.03% Impervious Runoff Depth=2.43"
Flow Length=1,157' Tc=10.0 min CN=76/98 Runoff=15.41 cfs 61,643 cf

Subcatchment E-2A: Existing Area Runoff Area=278,126 sf 61.54% Impervious Runoff Depth=2.50"
Tc=10.0 min CN=77/98 Runoff=14.51 cfs 57,887 cf

Subcatchment E-2B: Existing Area Runoff Area=41,911 sf 11.76% Impervious Runoff Depth=1.47"
Tc=10.0 min CN=75/98 Runoff=1.36 cfs 5,134 cf

Subcatchment E-3: Existing Area Tributary Runoff Area=59,770 sf 41.42% Impervious Runoff Depth=1.99"
Tc=10.0 min CN=73/98 Runoff=2.50 cfs 9,927 cf

Subcatchment P-1A: Upper Detained Area Runoff Area=129,383 sf 73.57% Impervious Runoff Depth=2.68"
Flow Length=1,157' Tc=10.0 min CN=76/98 Runoff=7.16 cfs 28,938 cf

Subcatchment P-1B: Lower Detained Runoff Area=100,868 sf 84.84% Impervious Runoff Depth=2.94"
Flow Length=1,157' Tc=10.0 min CN=80/98 Runoff=6.10 cfs 24,731 cf

Subcatchment P-1C: Undetained Area Runoff Area=113,686 sf 26.39% Impervious Runoff Depth=1.79"
Tc=10.0 min CN=76/98 Runoff=4.39 cfs 16,925 cf

Subcatchment P-2A: Proposed Area Runoff Area=238,270 sf 59.97% Impervious Runoff Depth=2.50"
Tc=10.0 min CN=78/98 Runoff=12.48 cfs 49,607 cf

Subcatchment P-2B-1: Proposed Dog Park Runoff Area=55,047 sf 2.30% Impervious Runoff Depth=1.37"
Tc=10.0 min CN=76/98 Runoff=1.72 cfs 6,291 cf

Subcatchment P-2B-2: Proposed Area Runoff Area=12,169 sf 0.00% Impervious Runoff Depth=1.38"
Tc=10.0 min CN=77/0 Runoff=0.39 cfs 1,404 cf

Subcatchment P-3: Proposed Area Runoff Area=35,031 sf 67.17% Impervious Runoff Depth=2.59"
Tc=10.0 min CN=77/98 Runoff=1.88 cfs 7,552 cf

Pond B-1A: Subsurface Detention Basin Peak Elev=495.36' Storage=3,909 cf Inflow=7.16 cfs 28,938 cf
Outflow=3.50 cfs 28,938 cf

Pond B-1B: Subsurface Detention Basin Peak Elev=481.50' Storage=9,299 cf Inflow=9.13 cfs 53,669 cf
Outflow=4.09 cfs 53,669 cf

Pond B-2A-2: (new Pond) Peak Elev=500.35' Storage=1,868 cf Inflow=1.72 cfs 6,291 cf
Outflow=0.33 cfs 6,291 cf

Link E-2: Existing Area Tributary to POI-2 Inflow=15.86 cfs 63,021 cf
Primary=15.86 cfs 63,021 cf

Link P-1: Proposed Area Tributary to POI-1 Inflow=7.69 cfs 70,593 cf
Primary=7.69 cfs 70,593 cf

2020-03-18_West Orange

NOAA 24-hr D 2-Year Rainfall=3.42"

Prepared by Microsoft

Printed 3/19/2020

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Link P-2: Proposed Area Tributary to POI-2

Inflow=13.12 cfs 57,302 cf

Primary=13.12 cfs 57,302 cf

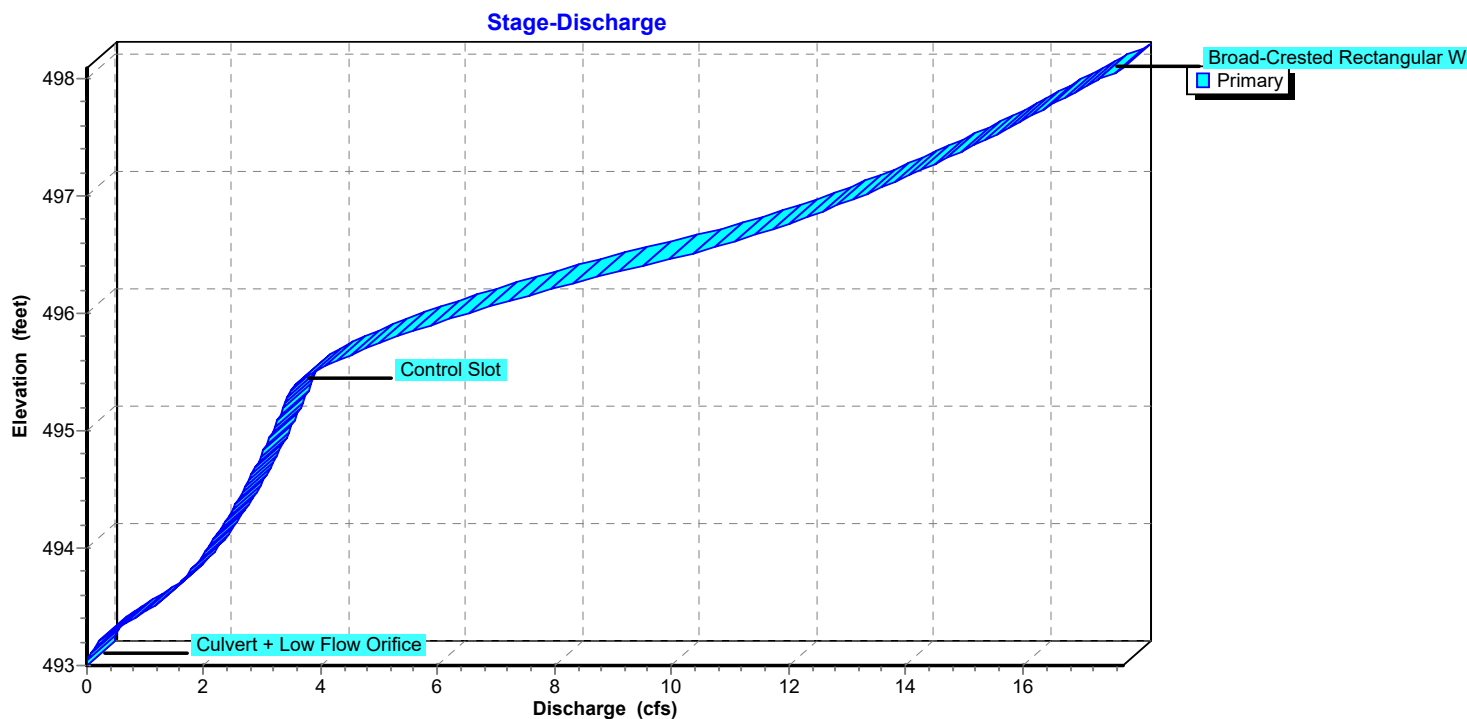
Link P-2B: Proposed Area Tributary to Culvert Downstream of Existing Pond

Inflow=0.65 cfs 7,695 cf

Primary=0.65 cfs 7,695 cf

Total Runoff Area = 1,368,908 sf Runoff Volume = 270,039 cf Average Runoff Depth = 2.37"
44.32% Pervious = 606,723 sf 55.68% Impervious = 762,185 sf

Pond B-1A: Subsurface Detention Basin



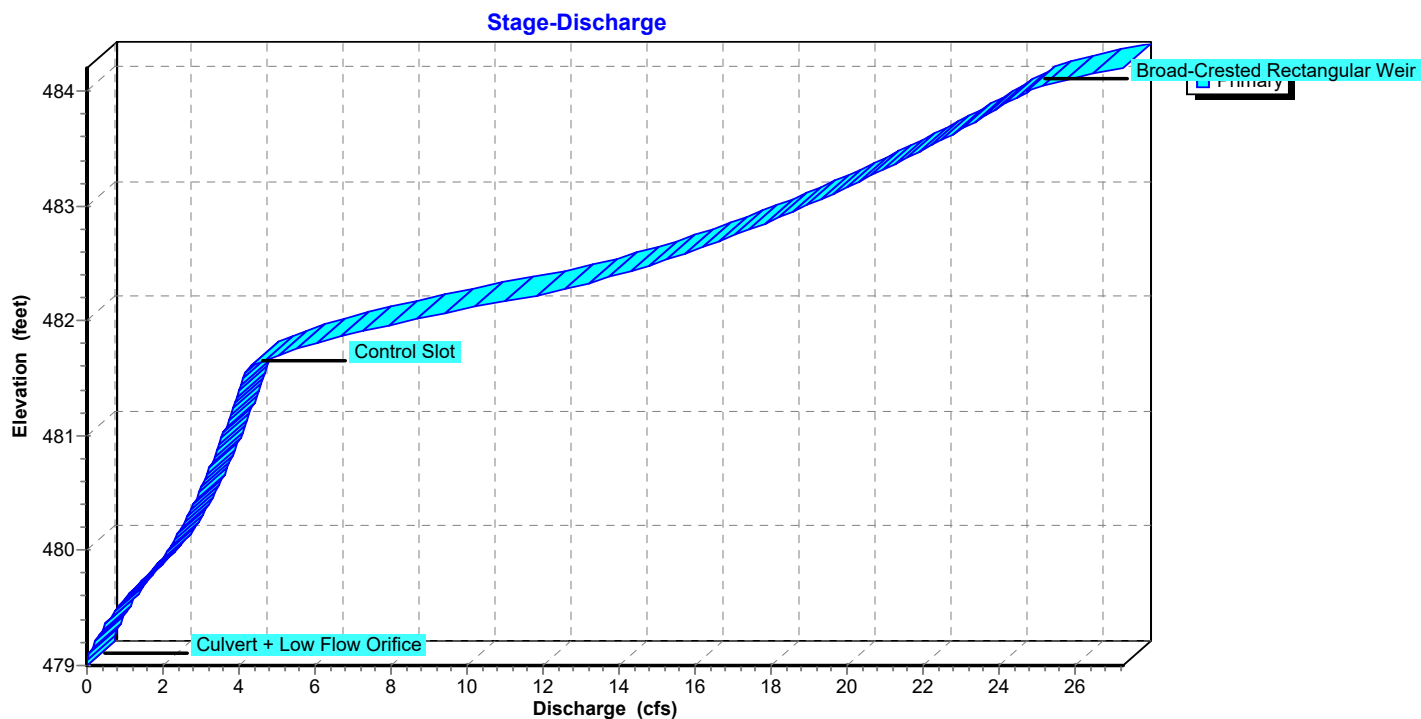
Stage-Discharge for Pond B-1A: Subsurface Detention Basin

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
493.00	0.00	494.06	2.16	495.12	3.29	496.18	7.76
493.02	0.00	494.08	2.18	495.14	3.31	496.20	7.91
493.04	0.01	494.10	2.21	495.16	3.32	496.22	8.06
493.06	0.02	494.12	2.24	495.18	3.34	496.24	8.20
493.08	0.04	494.14	2.26	495.20	3.36	496.26	8.36
493.10	0.05	494.16	2.29	495.22	3.38	496.28	8.51
493.12	0.08	494.18	2.31	495.24	3.39	496.30	8.66
493.14	0.11	494.20	2.34	495.26	3.41	496.32	8.82
493.16	0.14	494.22	2.36	495.28	3.43	496.34	8.97
493.18	0.17	494.24	2.39	495.30	3.44	496.36	9.13
493.20	0.21	494.26	2.41	495.32	3.46	496.38	9.29
493.22	0.26	494.28	2.44	495.34	3.48	496.40	9.45
493.24	0.30	494.30	2.46	495.36	3.50	496.42	9.61
493.26	0.36	494.32	2.48	495.38	3.54	496.44	9.78
493.28	0.41	494.34	2.51	495.40	3.58	496.46	9.94
493.30	0.47	494.36	2.53	495.42	3.63	496.48	10.11
493.32	0.53	494.38	2.55	495.44	3.69	496.50	10.28
493.34	0.60	494.40	2.58	495.46	3.75	496.52	10.45
493.36	0.67	494.42	2.60	495.48	3.82	496.54	10.60
493.38	0.74	494.44	2.62	495.50	3.89	496.56	10.74
493.40	0.81	494.46	2.64	495.52	3.96	496.58	10.88
493.42	0.87	494.48	2.67	495.54	4.04	496.60	11.02
493.44	0.94	494.50	2.69	495.56	4.12	496.62	11.15
493.46	1.00	494.52	2.71	495.58	4.20	496.64	11.28
493.48	1.07	494.54	2.73	495.60	4.29	496.66	11.40
493.50	1.13	494.56	2.75	495.62	4.38	496.68	11.53
493.52	1.19	494.58	2.77	495.64	4.47	496.70	11.65
493.54	1.25	494.60	2.79	495.66	4.57	496.72	11.76
493.56	1.30	494.62	2.81	495.68	4.66	496.74	11.88
493.58	1.35	494.64	2.83	495.70	4.76	496.76	11.99
493.60	1.39	494.66	2.85	495.72	4.87	496.78	12.11
493.62	1.43	494.68	2.88	495.74	4.97	496.80	12.22
493.64	1.48	494.70	2.90	495.76	5.08	496.82	12.33
493.66	1.52	494.72	2.92	495.78	5.19	496.84	12.43
493.68	1.55	494.74	2.94	495.80	5.30	496.86	12.54
493.70	1.59	494.76	2.95	495.82	5.41	496.88	12.64
493.72	1.63	494.78	2.97	495.84	5.52	496.90	12.75
493.74	1.67	494.80	2.99	495.86	5.64	496.92	12.85
493.76	1.70	494.82	3.01	495.88	5.76	496.94	12.95
493.78	1.74	494.84	3.03	495.90	5.88	496.96	13.05
493.80	1.77	494.86	3.05	495.92	6.00	496.98	13.15
493.82	1.80	494.88	3.07	495.94	6.13	497.00	13.25
493.84	1.83	494.90	3.09	495.96	6.26	497.02	13.35
493.86	1.87	494.92	3.11	495.98	6.38	497.04	13.44
493.88	1.90	494.94	3.13	496.00	6.51	497.06	13.54
493.90	1.93	494.96	3.15	496.02	6.65	497.08	13.63
493.92	1.96	494.98	3.16	496.04	6.78	497.10	13.72
493.94	1.99	495.00	3.18	496.06	6.91	497.12	13.82
493.96	2.02	495.02	3.20	496.08	7.05	497.14	13.91
493.98	2.05	495.04	3.22	496.10	7.19	497.16	14.00
494.00	2.08	495.06	3.24	496.12	7.33	497.18	14.09
494.02	2.10	495.08	3.25	496.14	7.47	497.20	14.18
494.04	2.13	495.10	3.27	496.16	7.62	497.22	14.27

Stage-Discharge for Pond B-1A: Subsurface Detention Basin (continued)

Elevation (feet)	Primary (cfs)
497.24	14.36
497.26	14.44
497.28	14.53
497.30	14.62
497.32	14.70
497.34	14.79
497.36	14.87
497.38	14.96
497.40	15.04
497.42	15.12
497.44	15.20
497.46	15.29
497.48	15.37
497.50	15.45
497.52	15.53
497.54	15.61
497.56	15.69
497.58	15.76
497.60	15.84
497.62	15.92
497.64	16.00
497.66	16.07
497.68	16.15
497.70	16.23
497.72	16.30
497.74	16.38
497.76	16.45
497.78	16.53
497.80	16.60
497.82	16.67
497.84	16.75
497.86	16.82
497.88	16.89
497.90	16.96
497.92	17.04
497.94	17.11
497.96	17.18
497.98	17.25
498.00	17.32
498.02	17.44
498.04	17.59
498.06	17.66
498.08	17.71

Pond B-1B: Subsurface Detention Basin



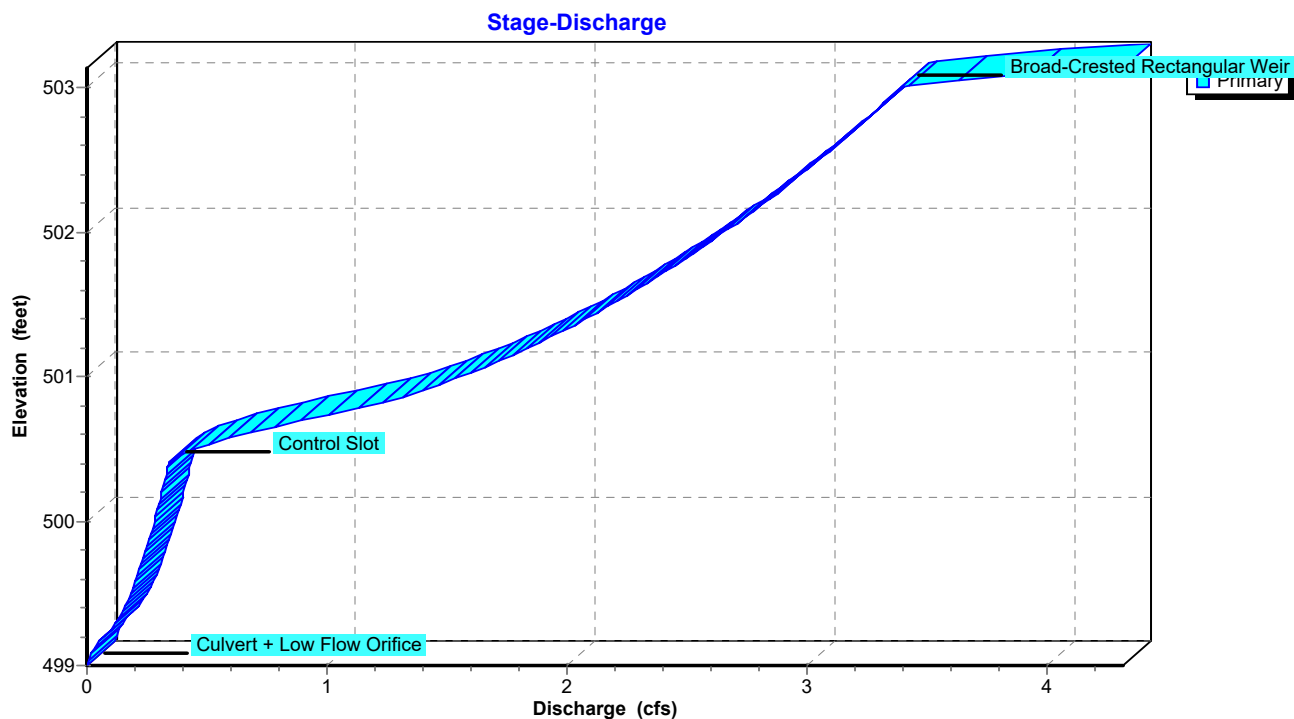
Stage-Discharge for Pond B-1B: Subsurface Detention Basin

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
479.00	0.00	480.06	2.24	481.12	3.70	482.18	11.14
479.02	0.00	480.08	2.27	481.14	3.72	482.20	11.47
479.04	0.01	480.10	2.31	481.16	3.74	482.22	11.79
479.06	0.02	480.12	2.35	481.18	3.77	482.24	12.08
479.08	0.04	480.14	2.38	481.20	3.79	482.26	12.35
479.10	0.06	480.16	2.42	481.22	3.81	482.28	12.61
479.12	0.09	480.18	2.45	481.24	3.83	482.30	12.85
479.14	0.12	480.20	2.48	481.26	3.85	482.32	13.09
479.16	0.15	480.22	2.52	481.28	3.87	482.34	13.31
479.18	0.17	480.24	2.55	481.30	3.89	482.36	13.54
479.20	0.20	480.26	2.58	481.32	3.91	482.38	13.75
479.22	0.23	480.28	2.61	481.34	3.93	482.40	13.96
479.24	0.27	480.30	2.65	481.36	3.95	482.42	14.16
479.26	0.30	480.32	2.68	481.38	3.97	482.44	14.36
479.28	0.34	480.34	2.71	481.40	4.00	482.46	14.56
479.30	0.37	480.36	2.74	481.42	4.02	482.48	14.75
479.32	0.41	480.38	2.77	481.44	4.04	482.50	14.94
479.34	0.45	480.40	2.80	481.46	4.06	482.52	15.12
479.36	0.49	480.42	2.83	481.48	4.08	482.54	15.31
479.38	0.53	480.44	2.85	481.50	4.10	482.56	15.49
479.40	0.58	480.46	2.88	481.52	4.12	482.58	15.66
479.42	0.62	480.48	2.91	481.54	4.13	482.60	15.83
479.44	0.66	480.50	2.94	481.56	4.17	482.62	16.01
479.46	0.71	480.52	2.97	481.58	4.24	482.64	16.17
479.48	0.76	480.54	2.99	481.60	4.34	482.66	16.34
479.50	0.80	480.56	3.02	481.62	4.45	482.68	16.50
479.52	0.85	480.58	3.05	481.64	4.58	482.70	16.67
479.54	0.90	480.60	3.08	481.66	4.72	482.72	16.83
479.56	0.95	480.62	3.10	481.68	4.87	482.74	16.98
479.58	1.00	480.64	3.13	481.70	5.03	482.76	17.14
479.60	1.06	480.66	3.15	481.72	5.21	482.78	17.30
479.62	1.11	480.68	3.18	481.74	5.39	482.80	17.45
479.64	1.16	480.70	3.21	481.76	5.58	482.82	17.60
479.66	1.22	480.72	3.23	481.78	5.78	482.84	17.75
479.68	1.27	480.74	3.26	481.80	5.99	482.86	17.90
479.70	1.33	480.76	3.28	481.82	6.20	482.88	18.04
479.72	1.39	480.78	3.31	481.84	6.42	482.90	18.19
479.74	1.45	480.80	3.33	481.86	6.65	482.92	18.33
479.76	1.51	480.82	3.35	481.88	6.89	482.94	18.47
479.78	1.57	480.84	3.38	481.90	7.13	482.96	18.62
479.80	1.63	480.86	3.40	481.92	7.38	482.98	18.76
479.82	1.69	480.88	3.43	481.94	7.64	483.00	18.89
479.84	1.75	480.90	3.45	481.96	7.90	483.02	19.03
479.86	1.80	480.92	3.47	481.98	8.17	483.04	19.17
479.88	1.85	480.94	3.50	482.00	8.44	483.06	19.30
479.90	1.90	480.96	3.52	482.02	8.72	483.08	19.44
479.92	1.95	480.98	3.54	482.04	9.00	483.10	19.57
479.94	1.99	481.00	3.57	482.06	9.29	483.12	19.70
479.96	2.04	481.02	3.59	482.08	9.59	483.14	19.83
479.98	2.08	481.04	3.61	482.10	9.89	483.16	19.96
480.00	2.12	481.06	3.63	482.12	10.19	483.18	20.09
480.02	2.16	481.08	3.66	482.14	10.50	483.20	20.22
480.04	2.20	481.10	3.68	482.16	10.82	483.22	20.35

Stage-Discharge for Pond B-1B: Subsurface Detention Basin (continued)

Elevation (feet)	Primary (cfs)
483.24	20.47
483.26	20.60
483.28	20.72
483.30	20.85
483.32	20.97
483.34	21.09
483.36	21.21
483.38	21.33
483.40	21.45
483.42	21.57
483.44	21.69
483.46	21.80
483.48	21.92
483.50	22.04
483.52	22.15
483.54	22.27
483.56	22.38
483.58	22.49
483.60	22.61
483.62	22.72
483.64	22.83
483.66	22.94
483.68	23.05
483.70	23.16
483.72	23.27
483.74	23.38
483.76	23.49
483.78	23.59
483.80	23.70
483.82	23.81
483.84	23.91
483.86	24.02
483.88	24.12
483.90	24.23
483.92	24.33
483.94	24.44
483.96	24.54
483.98	24.64
484.00	24.74
484.02	24.89
484.04	25.08
484.06	25.29
484.08	25.53
484.10	25.78
484.12	26.05
484.14	26.33
484.16	26.62
484.18	26.93
484.20	27.24

Pond B-2A-2: (new Pond)



Stage-Discharge for Pond B-2A-2: (new Pond)

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
499.00	0.00	499.53	0.19	500.06	0.29	500.59	0.63
499.01	0.00	499.54	0.19	500.07	0.29	500.60	0.65
499.02	0.00	499.55	0.20	500.08	0.29	500.61	0.68
499.03	0.00	499.56	0.20	500.09	0.30	500.62	0.70
499.04	0.01	499.57	0.20	500.10	0.30	500.63	0.72
499.05	0.01	499.58	0.20	500.11	0.30	500.64	0.75
499.06	0.01	499.59	0.20	500.12	0.30	500.65	0.77
499.07	0.01	499.60	0.21	500.13	0.30	500.66	0.80
499.08	0.02	499.61	0.21	500.14	0.30	500.67	0.82
499.09	0.02	499.62	0.21	500.15	0.30	500.68	0.85
499.10	0.03	499.63	0.21	500.16	0.31	500.69	0.88
499.11	0.03	499.64	0.22	500.17	0.31	500.70	0.91
499.12	0.03	499.65	0.22	500.18	0.31	500.71	0.93
499.13	0.04	499.66	0.22	500.19	0.31	500.72	0.96
499.14	0.04	499.67	0.22	500.20	0.31	500.73	0.99
499.15	0.05	499.68	0.22	500.21	0.31	500.74	1.02
499.16	0.05	499.69	0.23	500.22	0.31	500.75	1.05
499.17	0.06	499.70	0.23	500.23	0.32	500.76	1.08
499.18	0.06	499.71	0.23	500.24	0.32	500.77	1.11
499.19	0.07	499.72	0.23	500.25	0.32	500.78	1.14
499.20	0.07	499.73	0.23	500.26	0.32	500.79	1.16
499.21	0.08	499.74	0.24	500.27	0.32	500.80	1.19
499.22	0.08	499.75	0.24	500.28	0.32	500.81	1.21
499.23	0.09	499.76	0.24	500.29	0.32	500.82	1.23
499.24	0.09	499.77	0.24	500.30	0.33	500.83	1.26
499.25	0.10	499.78	0.24	500.31	0.33	500.84	1.28
499.26	0.11	499.79	0.25	500.32	0.33	500.85	1.30
499.27	0.11	499.80	0.25	500.33	0.33	500.86	1.32
499.28	0.11	499.81	0.25	500.34	0.33	500.87	1.34
499.29	0.12	499.82	0.25	500.35	0.33	500.88	1.36
499.30	0.12	499.83	0.25	500.36	0.33	500.89	1.38
499.31	0.13	499.84	0.25	500.37	0.34	500.90	1.39
499.32	0.13	499.85	0.26	500.38	0.34	500.91	1.41
499.33	0.13	499.86	0.26	500.39	0.34	500.92	1.43
499.34	0.14	499.87	0.26	500.40	0.34	500.93	1.45
499.35	0.14	499.88	0.26	500.41	0.34	500.94	1.46
499.36	0.14	499.89	0.26	500.42	0.35	500.95	1.48
499.37	0.15	499.90	0.26	500.43	0.36	500.96	1.50
499.38	0.15	499.91	0.27	500.44	0.37	500.97	1.51
499.39	0.15	499.92	0.27	500.45	0.38	500.98	1.53
499.40	0.16	499.93	0.27	500.46	0.39	500.99	1.55
499.41	0.16	499.94	0.27	500.47	0.41	501.00	1.56
499.42	0.16	499.95	0.27	500.48	0.42	501.01	1.58
499.43	0.16	499.96	0.27	500.49	0.44	501.02	1.59
499.44	0.17	499.97	0.28	500.50	0.45	501.03	1.61
499.45	0.17	499.98	0.28	500.51	0.47	501.04	1.62
499.46	0.17	499.99	0.28	500.52	0.49	501.05	1.64
499.47	0.18	500.00	0.28	500.53	0.51	501.06	1.65
499.48	0.18	500.01	0.28	500.54	0.53	501.07	1.67
499.49	0.18	500.02	0.28	500.55	0.55	501.08	1.68
499.50	0.18	500.03	0.29	500.56	0.57	501.09	1.69
499.51	0.19	500.04	0.29	500.57	0.59	501.10	1.71
499.52	0.19	500.05	0.29	500.58	0.61	501.11	1.72

Stage-Discharge for Pond B-2A-2: (new Pond) (continued)

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
501.12	1.74	501.65	2.34	502.18	2.80	502.71	3.20
501.13	1.75	501.66	2.35	502.19	2.81	502.72	3.21
501.14	1.76	501.67	2.36	502.20	2.82	502.73	3.21
501.15	1.78	501.68	2.37	502.21	2.83	502.74	3.22
501.16	1.79	501.69	2.38	502.22	2.84	502.75	3.23
501.17	1.80	501.70	2.39	502.23	2.84	502.76	3.23
501.18	1.82	501.71	2.39	502.24	2.85	502.77	3.24
501.19	1.83	501.72	2.40	502.25	2.86	502.78	3.25
501.20	1.84	501.73	2.41	502.26	2.87	502.79	3.25
501.21	1.85	501.74	2.42	502.27	2.87	502.80	3.26
501.22	1.87	501.75	2.43	502.28	2.88	502.81	3.27
501.23	1.88	501.76	2.44	502.29	2.89	502.82	3.28
501.24	1.89	501.77	2.45	502.30	2.90	502.83	3.28
501.25	1.90	501.78	2.46	502.31	2.91	502.84	3.29
501.26	1.92	501.79	2.47	502.32	2.91	502.85	3.30
501.27	1.93	501.80	2.48	502.33	2.92	502.86	3.30
501.28	1.94	501.81	2.49	502.34	2.93	502.87	3.31
501.29	1.95	501.82	2.50	502.35	2.94	502.88	3.32
501.30	1.96	501.83	2.51	502.36	2.94	502.89	3.32
501.31	1.98	501.84	2.51	502.37	2.95	502.90	3.33
501.32	1.99	501.85	2.52	502.38	2.96	502.91	3.34
501.33	2.00	501.86	2.53	502.39	2.97	502.92	3.34
501.34	2.01	501.87	2.54	502.40	2.97	502.93	3.35
501.35	2.02	501.88	2.55	502.41	2.98	502.94	3.36
501.36	2.03	501.89	2.56	502.42	2.99	502.95	3.36
501.37	2.04	501.90	2.57	502.43	3.00	502.96	3.37
501.38	2.06	501.91	2.58	502.44	3.00	502.97	3.38
501.39	2.07	501.92	2.59	502.45	3.01	502.98	3.38
501.40	2.08	501.93	2.59	502.46	3.02	502.99	3.39
501.41	2.09	501.94	2.60	502.47	3.03	503.00	3.40
501.42	2.10	501.95	2.61	502.48	3.03	503.01	3.42
501.43	2.11	501.96	2.62	502.49	3.04	503.02	3.46
501.44	2.12	501.97	2.63	502.50	3.05	503.03	3.50
501.45	2.13	501.98	2.64	502.51	3.06	503.04	3.56
501.46	2.14	501.99	2.65	502.52	3.06	503.05	3.62
501.47	2.15	502.00	2.65	502.53	3.07	503.06	3.68
501.48	2.16	502.01	2.66	502.54	3.08	503.07	3.75
501.49	2.17	502.02	2.67	502.55	3.09	503.08	3.83
501.50	2.19	502.03	2.68	502.56	3.09	503.09	3.91
501.51	2.20	502.04	2.69	502.57	3.10	503.10	3.99
501.52	2.21	502.05	2.70	502.58	3.11	503.11	4.08
501.53	2.22	502.06	2.71	502.59	3.11	503.12	4.17
501.54	2.23	502.07	2.71	502.60	3.12	503.13	4.27
501.55	2.24	502.08	2.72	502.61	3.13		
501.56	2.25	502.09	2.73	502.62	3.14		
501.57	2.26	502.10	2.74	502.63	3.14		
501.58	2.27	502.11	2.75	502.64	3.15		
501.59	2.28	502.12	2.75	502.65	3.16		
501.60	2.29	502.13	2.76	502.66	3.16		
501.61	2.30	502.14	2.77	502.67	3.17		
501.62	2.31	502.15	2.78	502.68	3.18		
501.63	2.32	502.16	2.79	502.69	3.19		
501.64	2.33	502.17	2.80	502.70	3.19		

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv.

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment E-1: Existing Area	Runoff Area=304,647 sf 60.03% Impervious Runoff Depth=2.43" Flow Length=1,157' Tc=10.0 min CN=76/98 Runoff=15.41 cfs 61,643 cf
Subcatchment E-2A: Existing Area	Runoff Area=278,126 sf 61.54% Impervious Runoff Depth=2.50" Tc=10.0 min CN=77/98 Runoff=14.51 cfs 57,887 cf
Subcatchment E-2B: Existing Area	Runoff Area=41,911 sf 11.76% Impervious Runoff Depth=1.47" Tc=10.0 min CN=75/98 Runoff=1.36 cfs 5,134 cf
Subcatchment E-3: Existing Area Tributary	Runoff Area=59,770 sf 41.42% Impervious Runoff Depth=1.99" Tc=10.0 min CN=73/98 Runoff=2.50 cfs 9,927 cf
Subcatchment P-1A: Upper Detained Area	Runoff Area=129,383 sf 73.57% Impervious Runoff Depth=2.68" Flow Length=1,157' Tc=10.0 min CN=76/98 Runoff=7.16 cfs 28,938 cf
Subcatchment P-1B: Lower Detained	Runoff Area=100,868 sf 84.84% Impervious Runoff Depth=2.94" Flow Length=1,157' Tc=10.0 min CN=80/98 Runoff=6.10 cfs 24,731 cf
Subcatchment P-1C: Undetained Area	Runoff Area=113,686 sf 26.39% Impervious Runoff Depth=1.79" Tc=10.0 min CN=76/98 Runoff=4.39 cfs 16,925 cf
Subcatchment P-2A: Proposed Area	Runoff Area=238,270 sf 59.97% Impervious Runoff Depth=2.50" Tc=10.0 min CN=78/98 Runoff=12.48 cfs 49,607 cf
Subcatchment P-2B-1: Proposed Dog Park	Runoff Area=55,047 sf 2.30% Impervious Runoff Depth=1.37" Tc=10.0 min CN=76/98 Runoff=1.72 cfs 6,291 cf
Subcatchment P-2B-2: Proposed Area	Runoff Area=12,169 sf 0.00% Impervious Runoff Depth=1.38" Tc=10.0 min CN=77/0 Runoff=0.39 cfs 1,404 cf
Subcatchment P-3: Proposed Area	Runoff Area=35,031 sf 67.17% Impervious Runoff Depth=2.59" Tc=10.0 min CN=77/98 Runoff=1.88 cfs 7,552 cf
Pond B-1A: Subsurface Detention Basin	Peak Elev=495.36' Storage=3,909 cf Inflow=7.16 cfs 28,938 cf Outflow=3.50 cfs 28,938 cf
Pond B-1B: Subsurface Detention Basin	Peak Elev=481.50' Storage=9,299 cf Inflow=9.13 cfs 53,669 cf Outflow=4.09 cfs 53,669 cf
Pond B-2A-2: (new Pond)	Peak Elev=500.35' Storage=1,868 cf Inflow=1.72 cfs 6,291 cf Outflow=0.33 cfs 6,291 cf
Link E-2: Existing Area Tributary to POI-2	Inflow=15.86 cfs 63,021 cf Primary=15.86 cfs 63,021 cf
Link P-1: Proposed Area Tributary to POI-1	Inflow=7.69 cfs 70,593 cf Primary=7.69 cfs 70,593 cf

2020-03-18_West Orange

NOAA 24-hr D 2-Year Rainfall=3.42"

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Link P-2: Proposed Area Tributary to POI-2

Inflow=13.12 cfs 57,302 cf

Primary=13.12 cfs 57,302 cf

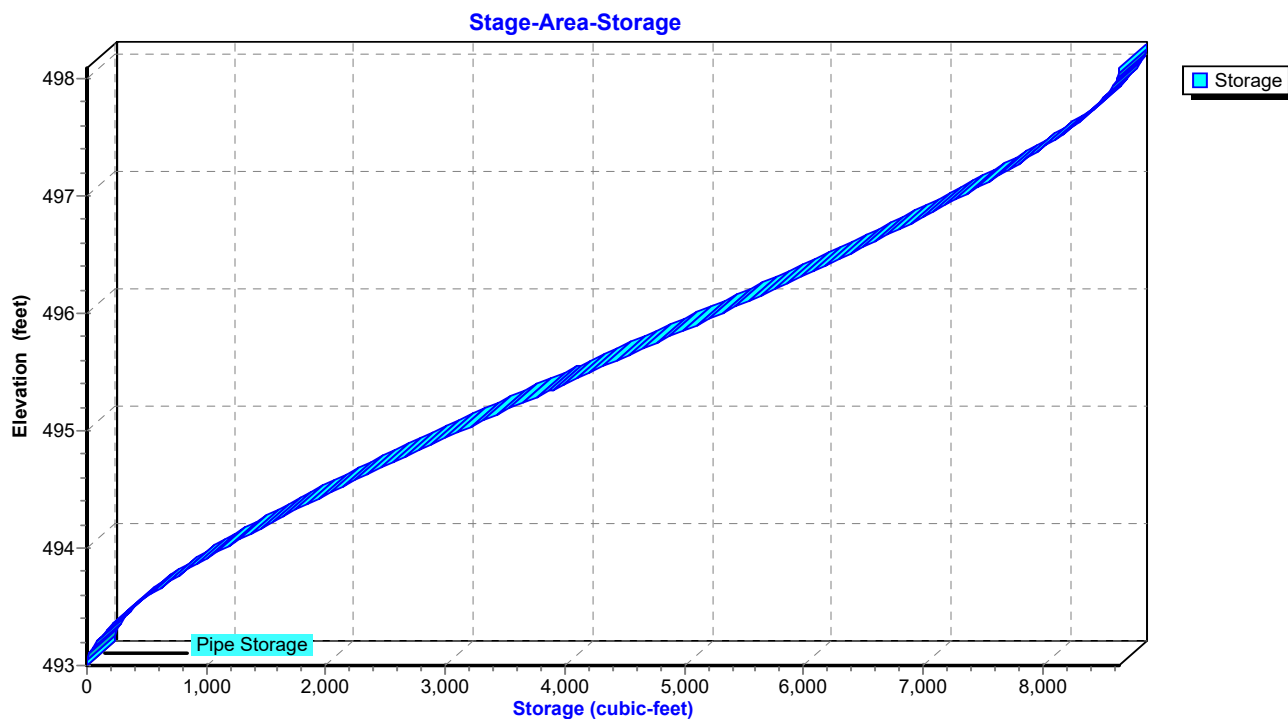
Link P-2B: Proposed Area Tributary to Culvert Downstream of Existing Pond

Inflow=0.65 cfs 7,695 cf

Primary=0.65 cfs 7,695 cf

Total Runoff Area = 1,368,908 sf Runoff Volume = 270,039 cf Average Runoff Depth = 2.37"
44.32% Pervious = 606,723 sf 55.68% Impervious = 762,185 sf

Pond B-1A: Subsurface Detention Basin



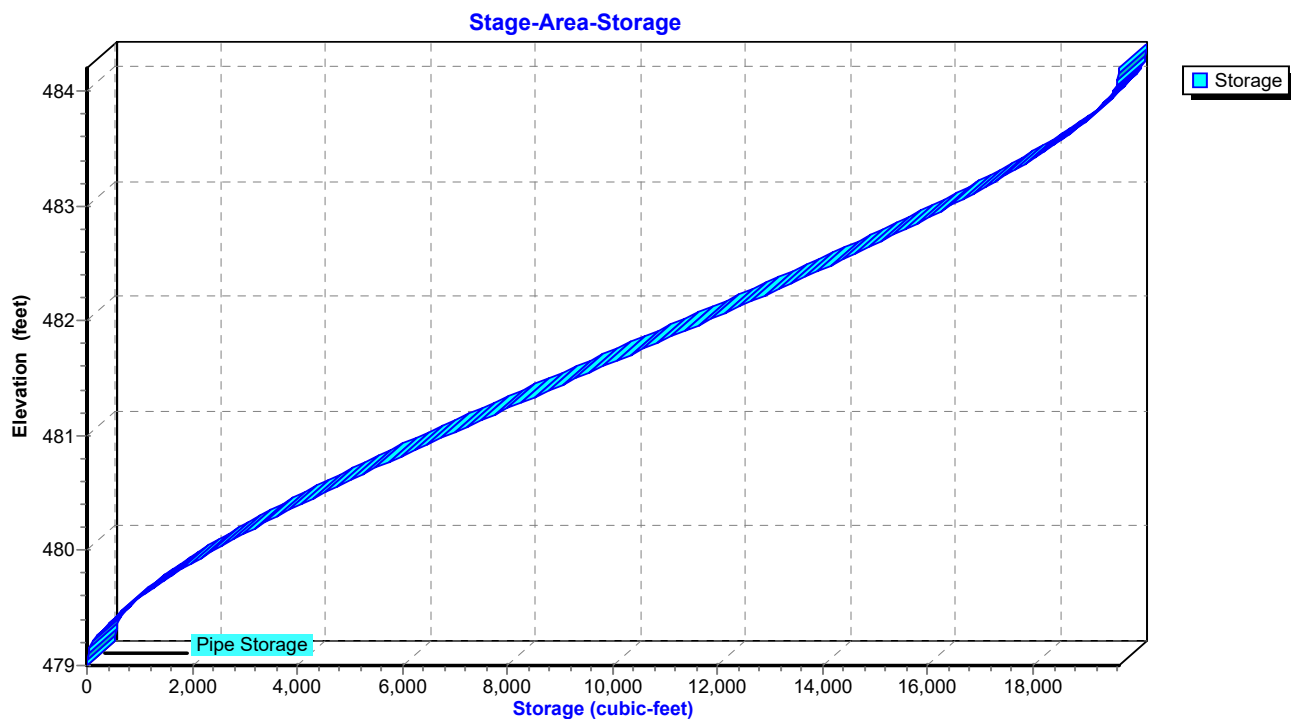
Stage-Area-Storage for Pond B-1A: Subsurface Detention Basin

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
493.00	0	494.06	1,259	495.12	3,391
493.02	0	494.08	1,294	495.14	3,435
493.04	2	494.10	1,330	495.16	3,478
493.06	5	494.12	1,366	495.18	3,522
493.08	11	494.14	1,402	495.20	3,565
493.10	19	494.16	1,439	495.22	3,609
493.12	29	494.18	1,475	495.24	3,653
493.14	40	494.20	1,512	495.26	3,696
493.16	52	494.22	1,550	495.28	3,740
493.18	66	494.24	1,587	495.30	3,784
493.20	81	494.26	1,625	495.32	3,828
493.22	97	494.28	1,663	495.34	3,871
493.24	113	494.30	1,701	495.36	3,915
493.26	131	494.32	1,739	495.38	3,959
493.28	149	494.34	1,777	495.40	4,003
493.30	168	494.36	1,816	495.42	4,047
493.32	188	494.38	1,855	495.44	4,091
493.34	208	494.40	1,894	495.46	4,135
493.36	229	494.42	1,933	495.48	4,179
493.38	251	494.44	1,972	495.50	4,223
493.40	273	494.46	2,012	495.52	4,267
493.42	296	494.48	2,052	495.54	4,311
493.44	319	494.50	2,092	495.56	4,355
493.46	343	494.52	2,132	495.58	4,399
493.48	368	494.54	2,172	495.60	4,443
493.50	393	494.56	2,212	495.62	4,487
493.52	419	494.58	2,253	495.64	4,531
493.54	445	494.60	2,293	495.66	4,575
493.56	471	494.62	2,334	495.68	4,619
493.58	498	494.64	2,375	495.70	4,663
493.60	526	494.66	2,416	495.72	4,707
493.62	554	494.68	2,458	495.74	4,750
493.64	582	494.70	2,499	495.76	4,794
493.66	611	494.72	2,540	495.78	4,838
493.68	640	494.74	2,582	495.80	4,882
493.70	669	494.76	2,624	495.82	4,926
493.72	699	494.78	2,666	495.84	4,969
493.74	729	494.80	2,707	495.86	5,013
493.76	760	494.82	2,750	495.88	5,057
493.78	791	494.84	2,792	495.90	5,100
493.80	822	494.86	2,834	495.92	5,144
493.82	854	494.88	2,876	495.94	5,187
493.84	886	494.90	2,919	495.96	5,231
493.86	918	494.92	2,961	495.98	5,274
493.88	951	494.94	3,004	496.00	5,317
493.90	984	494.96	3,047	496.02	5,360
493.92	1,017	494.98	3,090	496.04	5,404
493.94	1,051	495.00	3,132	496.06	5,447
493.96	1,085	495.02	3,175	496.08	5,490
493.98	1,119	495.04	3,219	496.10	5,533
494.00	1,153	495.06	3,262	496.12	5,576
494.02	1,188	495.08	3,305	496.14	5,618
494.04	1,223	495.10	3,348	496.16	5,661

Stage-Area-Storage for Pond B-1A: Subsurface Detention Basin (continued)

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
496.18	5,704	497.24	7,740
496.20	5,746	497.26	7,773
496.22	5,788	497.28	7,804
496.24	5,831	497.30	7,836
496.26	5,873	497.32	7,867
496.28	5,915	497.34	7,898
496.30	5,957	497.36	7,928
496.32	5,999	497.38	7,958
496.34	6,041	497.40	7,988
496.36	6,082	497.42	8,017
496.38	6,124	497.44	8,046
496.40	6,165	497.46	8,075
496.42	6,207	497.48	8,103
496.44	6,248	497.50	8,130
496.46	6,289	497.52	8,157
496.48	6,330	497.54	8,184
496.50	6,370	497.56	8,210
496.52	6,411	497.58	8,236
496.54	6,451	497.60	8,261
496.56	6,492	497.62	8,286
496.58	6,532	497.64	8,310
496.60	6,572	497.66	8,334
496.62	6,611	497.68	8,357
496.64	6,651	497.70	8,380
496.66	6,691	497.72	8,402
496.68	6,730	497.74	8,423
496.70	6,769	497.76	8,444
496.72	6,808	497.78	8,464
496.74	6,847	497.80	8,483
496.76	6,885	497.82	8,502
496.78	6,923	497.84	8,519
496.80	6,962	497.86	8,536
496.82	7,000	497.88	8,552
496.84	7,037	497.90	8,568
496.86	7,075	497.92	8,582
496.88	7,112	497.94	8,595
496.90	7,149	497.96	8,607
496.92	7,186	497.98	8,617
496.94	7,223	498.00	8,626
496.96	7,259	498.02	8,632
496.98	7,295	498.04	8,636
497.00	7,331	498.06	8,639
497.02	7,367	498.08	8,639
497.04	7,402		
497.06	7,437		
497.08	7,472		
497.10	7,507		
497.12	7,541		
497.14	7,575		
497.16	7,609		
497.18	7,642		
497.20	7,675		
497.22	7,708		

Pond B-1B: Subsurface Detention Basin



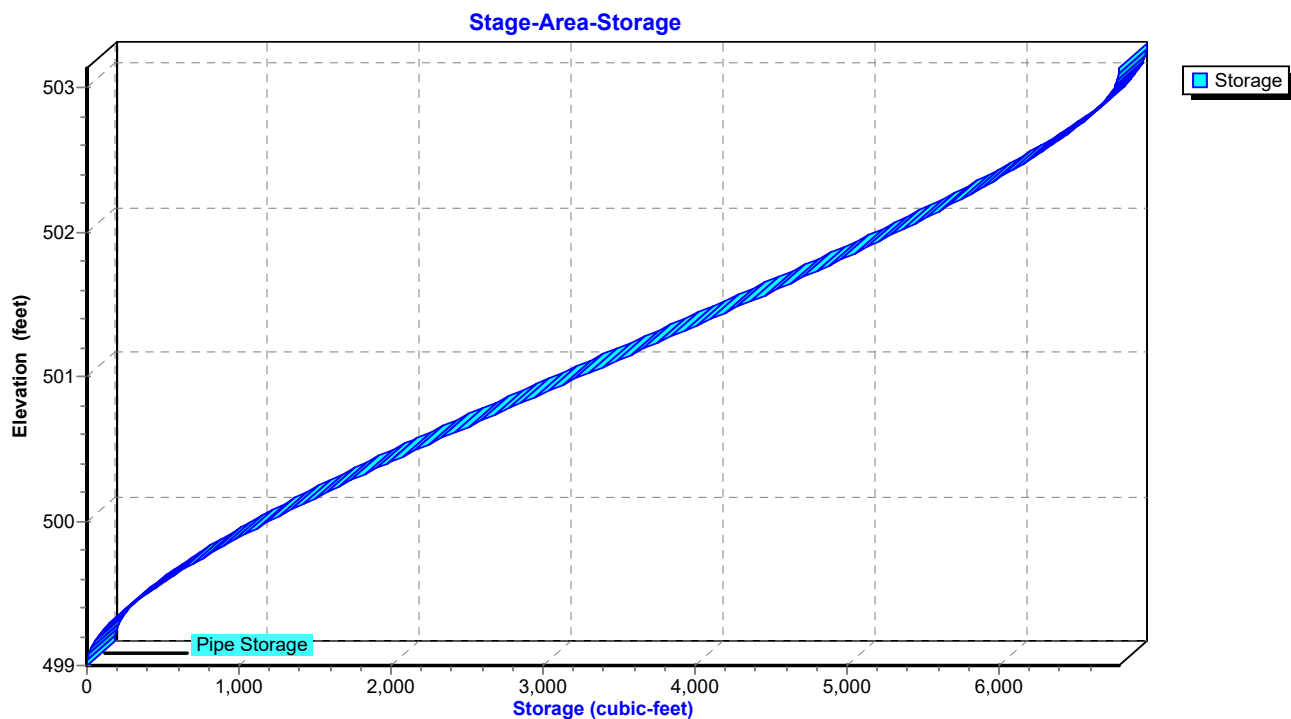
Stage-Area-Storage for Pond B-1B: Subsurface Detention Basin

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
479.00	0	480.06	2,639	481.12	7,433
479.02	0	480.08	2,718	481.14	7,531
479.04	2	480.10	2,798	481.16	7,629
479.06	5	480.12	2,878	481.18	7,728
479.08	11	480.14	2,959	481.20	7,827
479.10	19	480.16	3,041	481.22	7,925
479.12	30	480.18	3,123	481.24	8,024
479.14	43	480.20	3,205	481.26	8,123
479.16	61	480.22	3,288	481.28	8,222
479.18	81	480.24	3,372	481.30	8,321
479.20	106	480.26	3,456	481.32	8,421
479.22	134	480.28	3,541	481.34	8,520
479.24	165	480.30	3,626	481.36	8,620
479.26	198	480.32	3,711	481.38	8,719
479.28	234	480.34	3,797	481.40	8,819
479.30	271	480.36	3,884	481.42	8,918
479.32	311	480.38	3,971	481.44	9,018
479.34	353	480.40	4,058	481.46	9,118
479.36	396	480.42	4,146	481.48	9,218
479.38	441	480.44	4,235	481.50	9,318
479.40	487	480.46	4,323	481.52	9,418
479.42	535	480.48	4,413	481.54	9,518
479.44	585	480.50	4,502	481.56	9,618
479.46	635	480.52	4,592	481.58	9,718
479.48	688	480.54	4,682	481.60	9,817
479.50	741	480.56	4,773	481.62	9,917
479.52	796	480.58	4,864	481.64	10,017
479.54	852	480.60	4,956	481.66	10,117
479.56	909	480.62	5,047	481.68	10,217
479.58	967	480.64	5,140	481.70	10,317
479.60	1,026	480.66	5,232	481.72	10,417
479.62	1,087	480.68	5,325	481.74	10,517
479.64	1,148	480.70	5,418	481.76	10,617
479.66	1,211	480.72	5,511	481.78	10,716
479.68	1,274	480.74	5,605	481.80	10,816
479.70	1,339	480.76	5,699	481.82	10,916
479.72	1,404	480.78	5,793	481.84	11,015
479.74	1,470	480.80	5,888	481.86	11,115
479.76	1,537	480.82	5,983	481.88	11,214
479.78	1,605	480.84	6,078	481.90	11,313
479.80	1,674	480.86	6,173	481.92	11,413
479.82	1,744	480.88	6,269	481.94	11,512
479.84	1,815	480.90	6,365	481.96	11,611
479.86	1,886	480.92	6,461	481.98	11,710
479.88	1,958	480.94	6,557	482.00	11,808
479.90	2,031	480.96	6,654	482.02	11,907
479.92	2,105	480.98	6,750	482.04	12,005
479.94	2,179	481.00	6,847	482.06	12,104
479.96	2,254	481.02	6,945	482.08	12,202
479.98	2,330	481.04	7,042	482.10	12,300
480.00	2,406	481.06	7,139	482.12	12,398
480.02	2,483	481.08	7,237	482.14	12,496
480.04	2,561	481.10	7,335	482.16	12,593

Stage-Area-Storage for Pond B-1B: Subsurface Detention Basin (continued)

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
482.18	12,690	483.24	17,381
482.20	12,788	483.26	17,456
482.22	12,885	483.28	17,530
482.24	12,981	483.30	17,604
482.26	13,078	483.32	17,677
482.28	13,174	483.34	17,749
482.30	13,270	483.36	17,820
482.32	13,366	483.38	17,891
482.34	13,462	483.40	17,961
482.36	13,557	483.42	18,030
482.38	13,652	483.44	18,098
482.40	13,747	483.46	18,165
482.42	13,842	483.48	18,231
482.44	13,936	483.50	18,296
482.46	14,030	483.52	18,361
482.48	14,124	483.54	18,424
482.50	14,217	483.56	18,487
482.52	14,310	483.58	18,548
482.54	14,403	483.60	18,609
482.56	14,495	483.62	18,668
482.58	14,587	483.64	18,726
482.60	14,679	483.66	18,783
482.62	14,771	483.68	18,839
482.64	14,862	483.70	18,894
482.66	14,953	483.72	18,947
482.68	15,043	483.74	19,000
482.70	15,133	483.76	19,050
482.72	15,222	483.78	19,100
482.74	15,312	483.80	19,148
482.76	15,400	483.82	19,194
482.78	15,489	483.84	19,239
482.80	15,577	483.86	19,282
482.82	15,664	483.88	19,324
482.84	15,751	483.90	19,364
482.86	15,838	483.92	19,401
482.88	15,924	483.94	19,437
482.90	16,009	483.96	19,470
482.92	16,094	483.98	19,501
482.94	16,179	484.00	19,529
482.96	16,263	484.02	19,554
482.98	16,347	484.04	19,574
483.00	16,430	484.06	19,591
483.02	16,512	484.08	19,605
483.04	16,594	484.10	19,616
483.06	16,676	484.12	19,624
483.08	16,757	484.14	19,630
483.10	16,837	484.16	19,633
483.12	16,917	484.18	19,635
483.14	16,996	484.20	19,635
483.16	17,074		
483.18	17,152		
483.20	17,229		
483.22	17,305		

Pond B-2A-2: (new Pond)



Stage-Area-Storage for Pond B-2A-2: (new Pond)

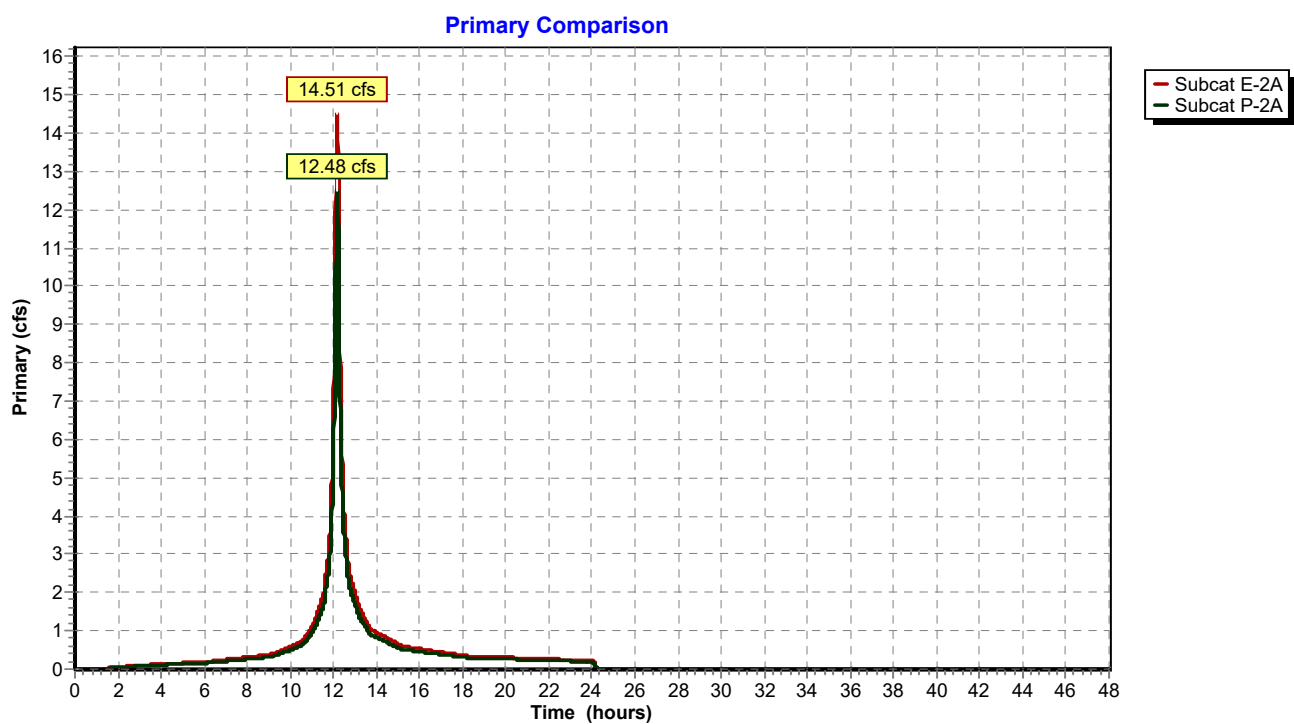
Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
499.00	0	499.53	438	500.06	1,313
499.01	0	499.54	452	500.07	1,332
499.02	0	499.55	466	500.08	1,351
499.03	1	499.56	480	500.09	1,369
499.04	1	499.57	494	500.10	1,388
499.05	2	499.58	508	500.11	1,407
499.06	4	499.59	523	500.12	1,426
499.07	6	499.60	538	500.13	1,445
499.08	8	499.61	552	500.14	1,464
499.09	10	499.62	567	500.15	1,483
499.10	13	499.63	582	500.16	1,503
499.11	17	499.64	597	500.17	1,522
499.12	21	499.65	612	500.18	1,541
499.13	26	499.66	628	500.19	1,561
499.14	31	499.67	643	500.20	1,580
499.15	37	499.68	658	500.21	1,600
499.16	43	499.69	674	500.22	1,619
499.17	49	499.70	690	500.23	1,639
499.18	56	499.71	706	500.24	1,658
499.19	63	499.72	721	500.25	1,678
499.20	71	499.73	737	500.26	1,698
499.21	79	499.74	754	500.27	1,717
499.22	87	499.75	770	500.28	1,737
499.23	95	499.76	786	500.29	1,757
499.24	104	499.77	802	500.30	1,777
499.25	113	499.78	819	500.31	1,797
499.26	122	499.79	835	500.32	1,817
499.27	131	499.80	852	500.33	1,837
499.28	140	499.81	869	500.34	1,857
499.29	150	499.82	886	500.35	1,877
499.30	160	499.83	903	500.36	1,898
499.31	170	499.84	920	500.37	1,918
499.32	181	499.85	937	500.38	1,938
499.33	191	499.86	954	500.39	1,958
499.34	202	499.87	971	500.40	1,979
499.35	213	499.88	988	500.41	1,999
499.36	224	499.89	1,006	500.42	2,019
499.37	235	499.90	1,023	500.43	2,040
499.38	247	499.91	1,041	500.44	2,060
499.39	259	499.92	1,059	500.45	2,081
499.40	270	499.93	1,076	500.46	2,101
499.41	282	499.94	1,094	500.47	2,122
499.42	294	499.95	1,112	500.48	2,143
499.43	307	499.96	1,130	500.49	2,163
499.44	319	499.97	1,148	500.50	2,184
499.45	332	499.98	1,166	500.51	2,205
499.46	345	499.99	1,184	500.52	2,225
499.47	357	500.00	1,202	500.53	2,246
499.48	371	500.01	1,221	500.54	2,267
499.49	384	500.02	1,239	500.55	2,288
499.50	397	500.03	1,257	500.56	2,309
499.51	411	500.04	1,276	500.57	2,330
499.52	424	500.05	1,294	500.58	2,351

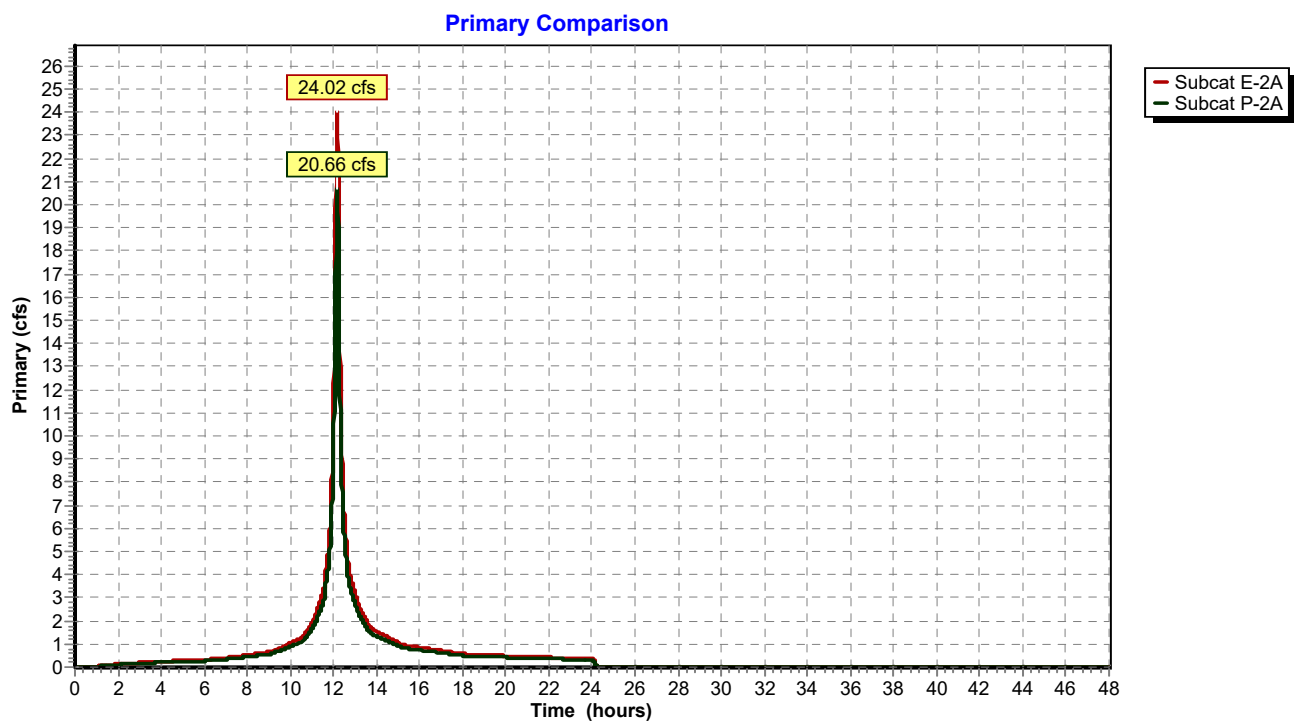
Stage-Area-Storage for Pond B-2A-2: (new Pond) (continued)

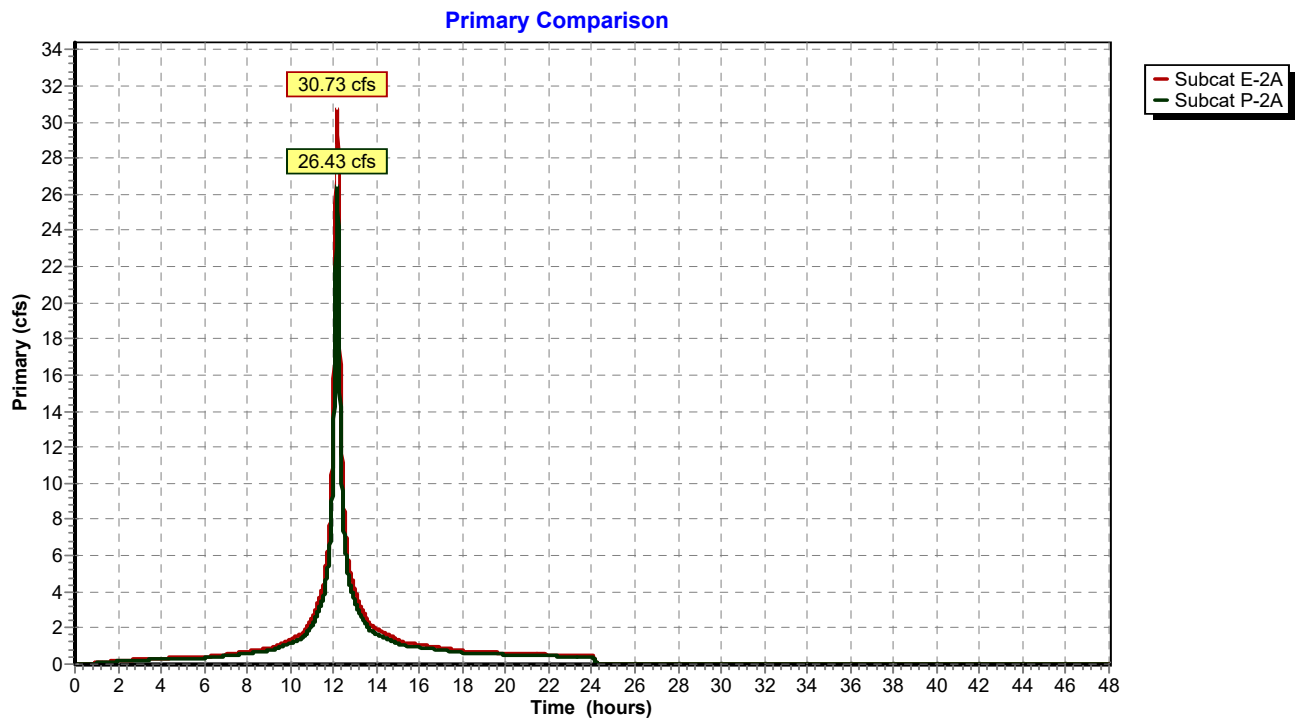
Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
500.59	2,372	501.12	3,506	501.65	4,633
500.60	2,393	501.13	3,528	501.66	4,653
500.61	2,414	501.14	3,549	501.67	4,674
500.62	2,435	501.15	3,571	501.68	4,695
500.63	2,456	501.16	3,593	501.69	4,715
500.64	2,477	501.17	3,614	501.70	4,736
500.65	2,498	501.18	3,636	501.71	4,756
500.66	2,519	501.19	3,657	501.72	4,777
500.67	2,540	501.20	3,679	501.73	4,797
500.68	2,561	501.21	3,700	501.74	4,817
500.69	2,583	501.22	3,722	501.75	4,838
500.70	2,604	501.23	3,743	501.76	4,858
500.71	2,625	501.24	3,765	501.77	4,878
500.72	2,646	501.25	3,786	501.78	4,898
500.73	2,668	501.26	3,808	501.79	4,919
500.74	2,689	501.27	3,829	501.80	4,939
500.75	2,710	501.28	3,851	501.81	4,959
500.76	2,731	501.29	3,872	501.82	4,979
500.77	2,753	501.30	3,894	501.83	4,999
500.78	2,774	501.31	3,915	501.84	5,019
500.79	2,796	501.32	3,937	501.85	5,039
500.80	2,817	501.33	3,958	501.86	5,058
500.81	2,838	501.34	3,980	501.87	5,078
500.82	2,860	501.35	4,001	501.88	5,098
500.83	2,881	501.36	4,022	501.89	5,118
500.84	2,903	501.37	4,044	501.90	5,137
500.85	2,924	501.38	4,065	501.91	5,157
500.86	2,946	501.39	4,086	501.92	5,177
500.87	2,967	501.40	4,108	501.93	5,196
500.88	2,989	501.41	4,129	501.94	5,216
500.89	3,010	501.42	4,150	501.95	5,235
500.90	3,032	501.43	4,171	501.96	5,254
500.91	3,053	501.44	4,193	501.97	5,274
500.92	3,075	501.45	4,214	501.98	5,293
500.93	3,096	501.46	4,235	501.99	5,312
500.94	3,118	501.47	4,256	502.00	5,331
500.95	3,139	501.48	4,277	502.01	5,350
500.96	3,161	501.49	4,299	502.02	5,369
500.97	3,182	501.50	4,320	502.03	5,388
500.98	3,204	501.51	4,341	502.04	5,407
500.99	3,226	501.52	4,362	502.05	5,426
501.00	3,247	501.53	4,383	502.06	5,445
501.01	3,269	501.54	4,404	502.07	5,463
501.02	3,290	501.55	4,425	502.08	5,482
501.03	3,312	501.56	4,446	502.09	5,501
501.04	3,334	501.57	4,467	502.10	5,519
501.05	3,355	501.58	4,487	502.11	5,538
501.06	3,377	501.59	4,508	502.12	5,556
501.07	3,398	501.60	4,529	502.13	5,574
501.08	3,420	501.61	4,550	502.14	5,593
501.09	3,442	501.62	4,571	502.15	5,611
501.10	3,463	501.63	4,591	502.16	5,629
501.11	3,485	501.64	4,612	502.17	5,647

Stage-Area-Storage for Pond B-2A-2: (new Pond) (continued)

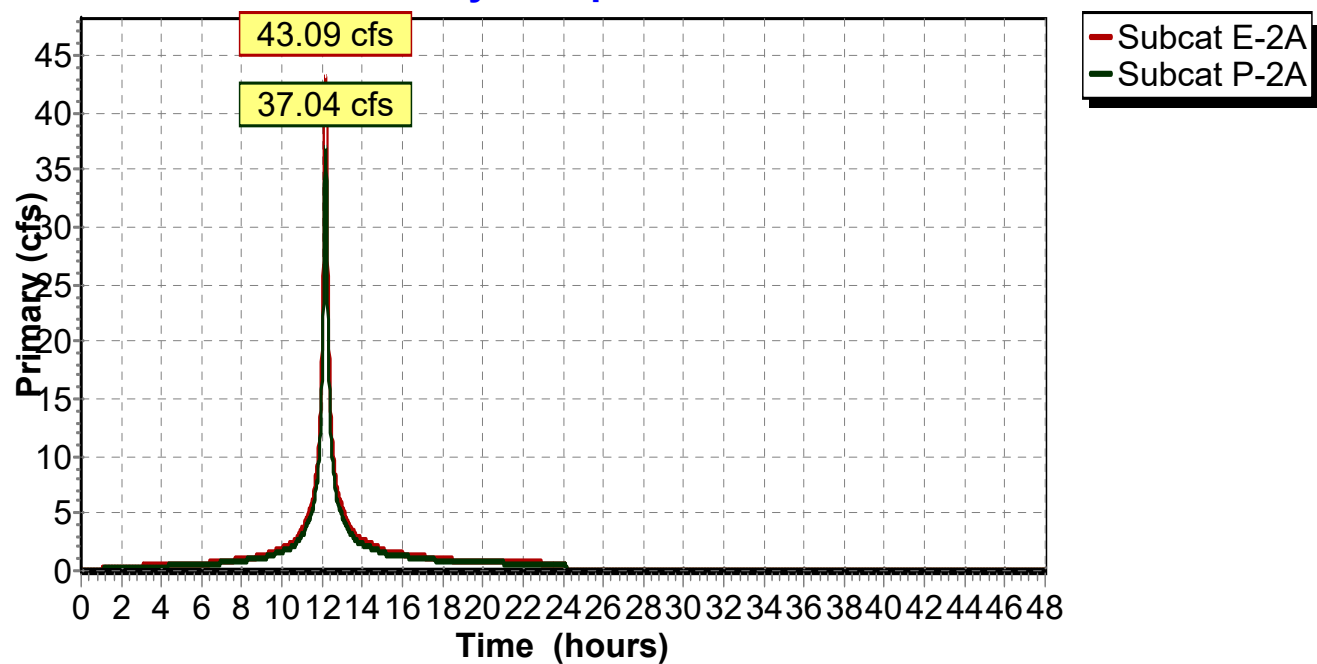
Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
502.18	5,665	502.71	6,485
502.19	5,683	502.72	6,497
502.20	5,701	502.73	6,510
502.21	5,718	502.74	6,521
502.22	5,736	502.75	6,533
502.23	5,754	502.76	6,545
502.24	5,771	502.77	6,556
502.25	5,789	502.78	6,567
502.26	5,806	502.79	6,578
502.27	5,823	502.80	6,589
502.28	5,841	502.81	6,600
502.29	5,858	502.82	6,610
502.30	5,875	502.83	6,621
502.31	5,892	502.84	6,631
502.32	5,909	502.85	6,641
502.33	5,925	502.86	6,650
502.34	5,942	502.87	6,660
502.35	5,959	502.88	6,669
502.36	5,975	502.89	6,678
502.37	5,992	502.90	6,686
502.38	6,008	502.91	6,695
502.39	6,024	502.92	6,703
502.40	6,040	502.93	6,711
502.41	6,056	502.94	6,719
502.42	6,072	502.95	6,726
502.43	6,088	502.96	6,733
502.44	6,104	502.97	6,740
502.45	6,120	502.98	6,746
502.46	6,135	502.99	6,752
502.47	6,151	503.00	6,757
502.48	6,166	503.01	6,762
502.49	6,181	503.02	6,767
502.50	6,196	503.03	6,771
502.51	6,211	503.04	6,774
502.52	6,226	503.05	6,777
502.53	6,241	503.06	6,779
502.54	6,256	503.07	6,781
502.55	6,270	503.08	6,783
502.56	6,285	503.09	6,784
502.57	6,299	503.10	6,785
502.58	6,313	503.11	6,785
502.59	6,327	503.12	6,786
502.60	6,341	503.13	6,786
502.61	6,355		
502.62	6,369		
502.63	6,382		
502.64	6,395		
502.65	6,409		
502.66	6,422		
502.67	6,435		
502.68	6,448		
502.69	6,460		
502.70	6,473		







Primary Comparison



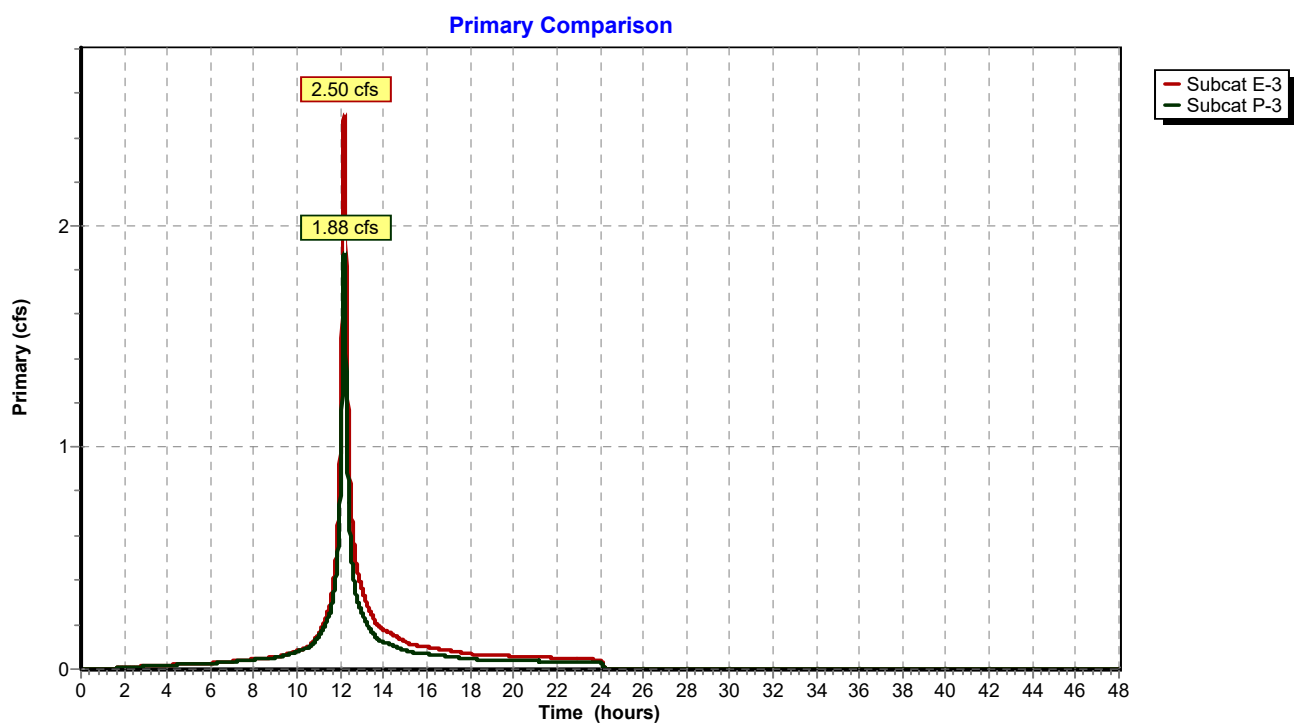
2020-03-18_West Orange

Prepared by Microsoft

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NOAA 24-hr D 2-Year Rainfall=3.42"

Printed 3/19/2020



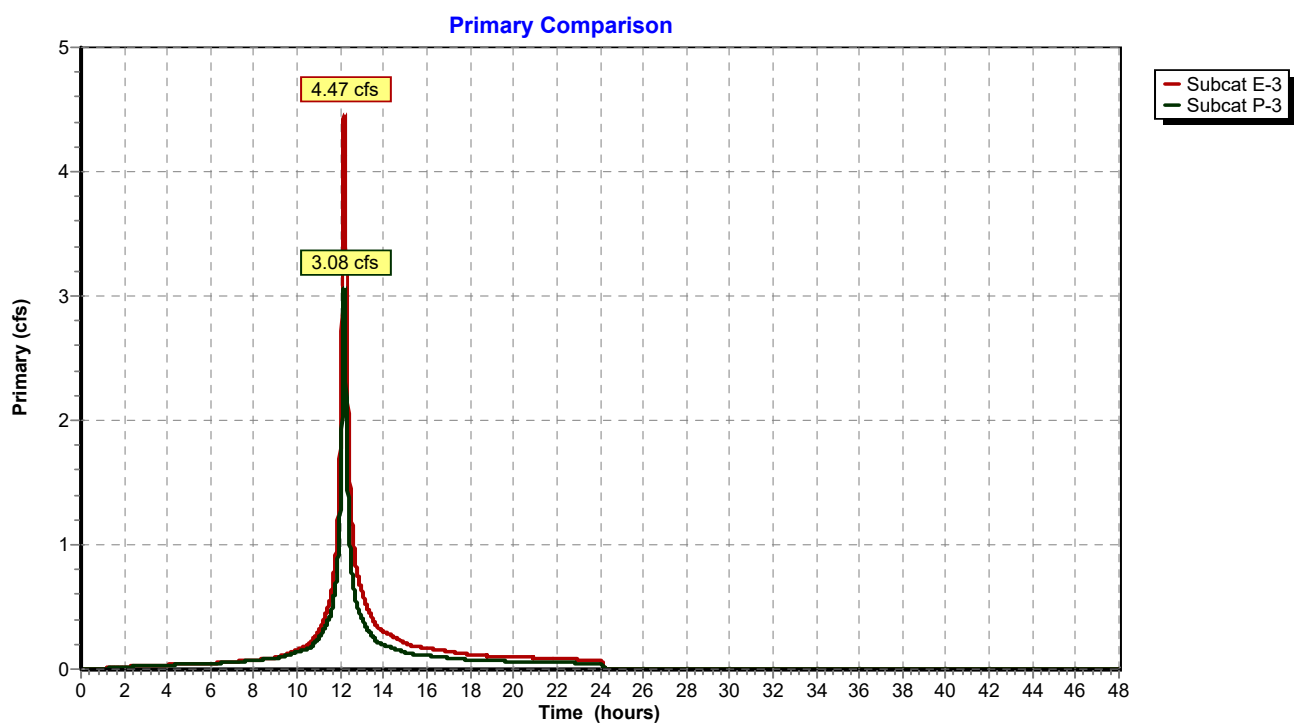
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NOAA 24-hr D 10-Year Rainfall=5.21"

Printed 3/19/2020



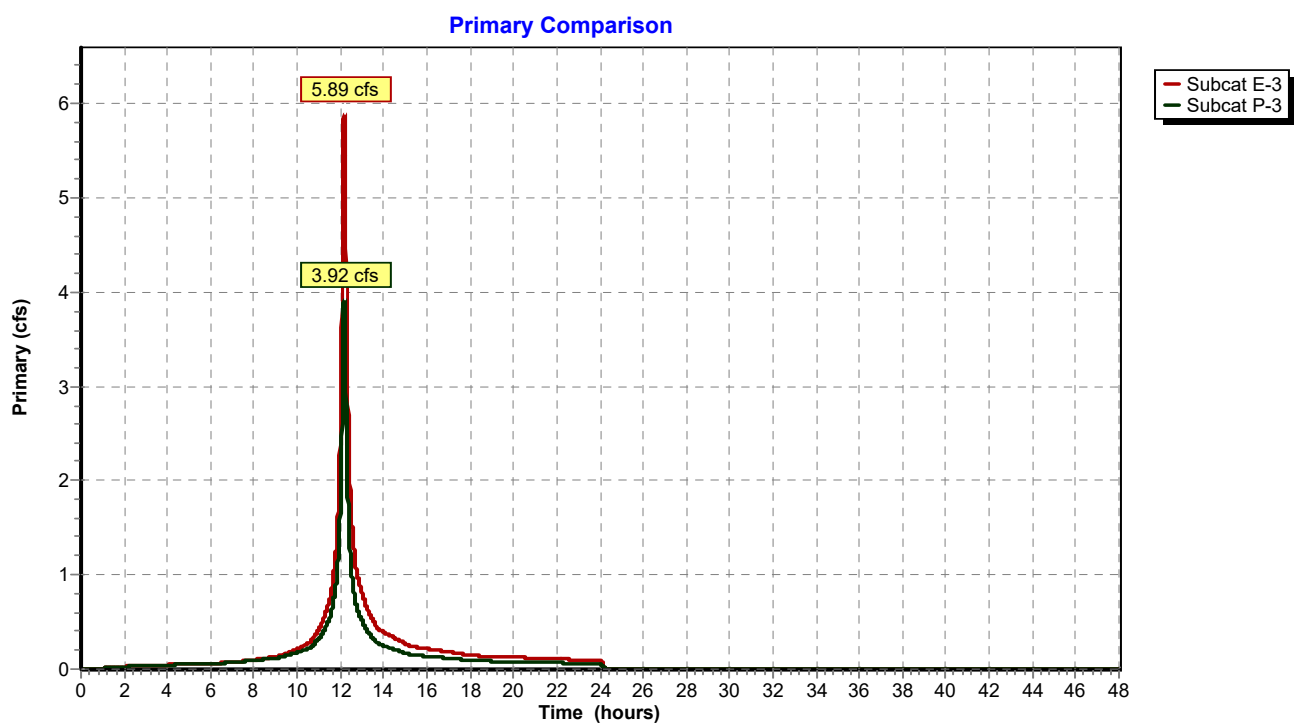
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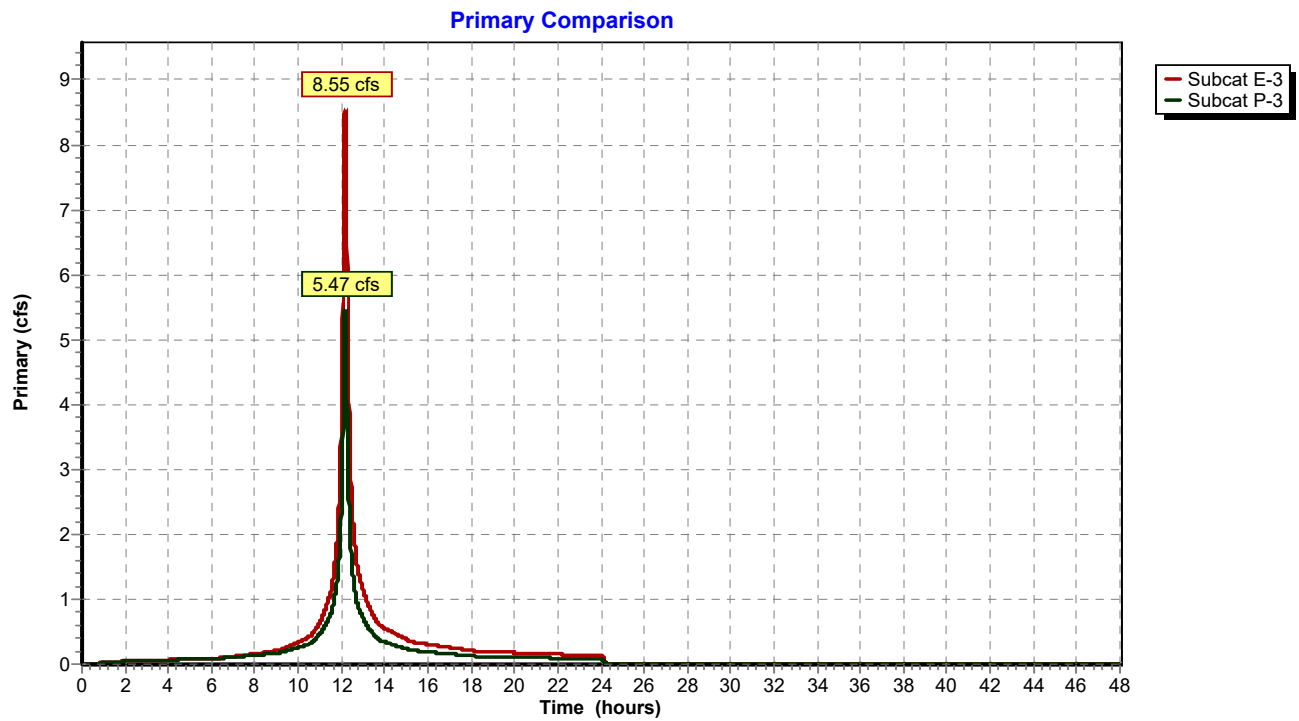
Prepared by Microsoft

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NOAA 24-hr D 25-Year Rainfall=6.45"

Printed 3/19/2020





Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line Size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line Slope (%)	HGL Down (ft)	HGL Up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns Line No.	Junction Type
1	BLDGA-OUTFALL	9.22	15	Cir	17.000	480.92	481.00	0.471	482.17*	482.52*	0.88	483.40	End	Grate
2	D200-OUTFALL	1.69	15	Cir	33.000	481.26	481.42	0.485	481.79	481.95	0.18	482.13	End	Combination
3	D300-OUTFALL	1.43	15	Cir	32.000	487.34	487.50	0.500	487.82	487.98	0.17	488.15	End	Combination
4	OS3-OUTFALL	1.32	15	Cir	9.000	489.95	490.00	0.555	490.40	490.45	0.17	490.45	End	Grate
5	D600-OUTFALL	0.50	15	Cir	5.000	497.25	497.28	0.600	497.52	497.55	0.10	497.55	End	Combination
6	D700-OUTFALL	0.78	15	Cir	23.000	497.25	497.37	0.522	497.60	497.72	0.12	497.84	End	Grate
7	D500-OUTFALL	2.55	15	Cir	25.000	497.25	497.38	0.520	497.91	498.04	0.23	498.27	End	Manhole
8	D501-D500	2.58	15	Cir	77.000	497.61	498.00	0.507	498.28	498.67	0.34	499.01	7	Combination
9	CO1-D501	1.97	12	Cir	75.000	498.00	503.50	7.333	499.01	504.10	n/a	504.10 j	8	None
10	D504-CO1	2.00	12	Cir	95.000	503.50	509.94	6.779	504.10	510.54	0.16	510.54	9	Manhole
11	CO2-D504	0.88	6	Cir	45.000	509.94	513.50	7.911	510.54	513.96	n/a	513.96 j	10	None
12	CO3-CO2	0.88	6	Cir	85.000	513.50	519.02	6.494	513.96	519.48	n/a	519.48	11	None
13	D502-CO3	0.90	6	Cir	98.000	519.02	520.77	1.786	519.52*	522.02*	0.16	522.18	12	Grate
14	D503-D502	0.54	6	Cir	153.000	520.77	522.30	1.000	522.18*	523.62*	0.12	523.74	13	Grate
15	D505-D504	1.15	12	Cir	49.000	509.94	510.43	1.000	510.54	510.88	n/a	510.88 j	10	Grate
16	CO4-D505	1.12	12	Cir	125.000	510.43	511.68	1.000	510.88	512.12	n/a	512.12 j	15	None
17	D506-CO4	1.12	12	Cir	20.000	511.68	511.88	1.000	512.12	512.33	n/a	512.33	16	Grate
18	D507-D506	0.32	6	Cir	37.000	511.88	512.25	1.000	512.33	512.54	n/a	512.54 j	17	Grate
19	D508-D507	0.17	6	Cir	44.000	512.25	512.70	1.023	512.54	512.91	n/a	512.91 j	18	Grate
20	D509-D506	0.52	6	Cir	56.000	511.88	512.44	1.000	512.33	512.81	0.26	513.07	17	Grate
21	D510-D509	0.29	6	Cir	42.000	512.44	512.86	1.000	513.07	513.18	0.04	513.22	20	Grate
22	D511-D510	0.15	6	Cir	35.000	512.86	513.21	1.000	513.22	513.40	n/a	513.40 j	21	Grate
23	OUTFALL-D600	15.84	15	Cir	55.000	485.00	489.27	7.764	485.91	490.51	2.60	490.51	End	Manhole
24	D600-D601	1.60	15	Cir	50.000	489.27	489.52	0.500	490.51	490.53	0.02	490.55	23	Manhole

Project File: 2020-05-01-_Pipe Network.stm

Number of lines: 43

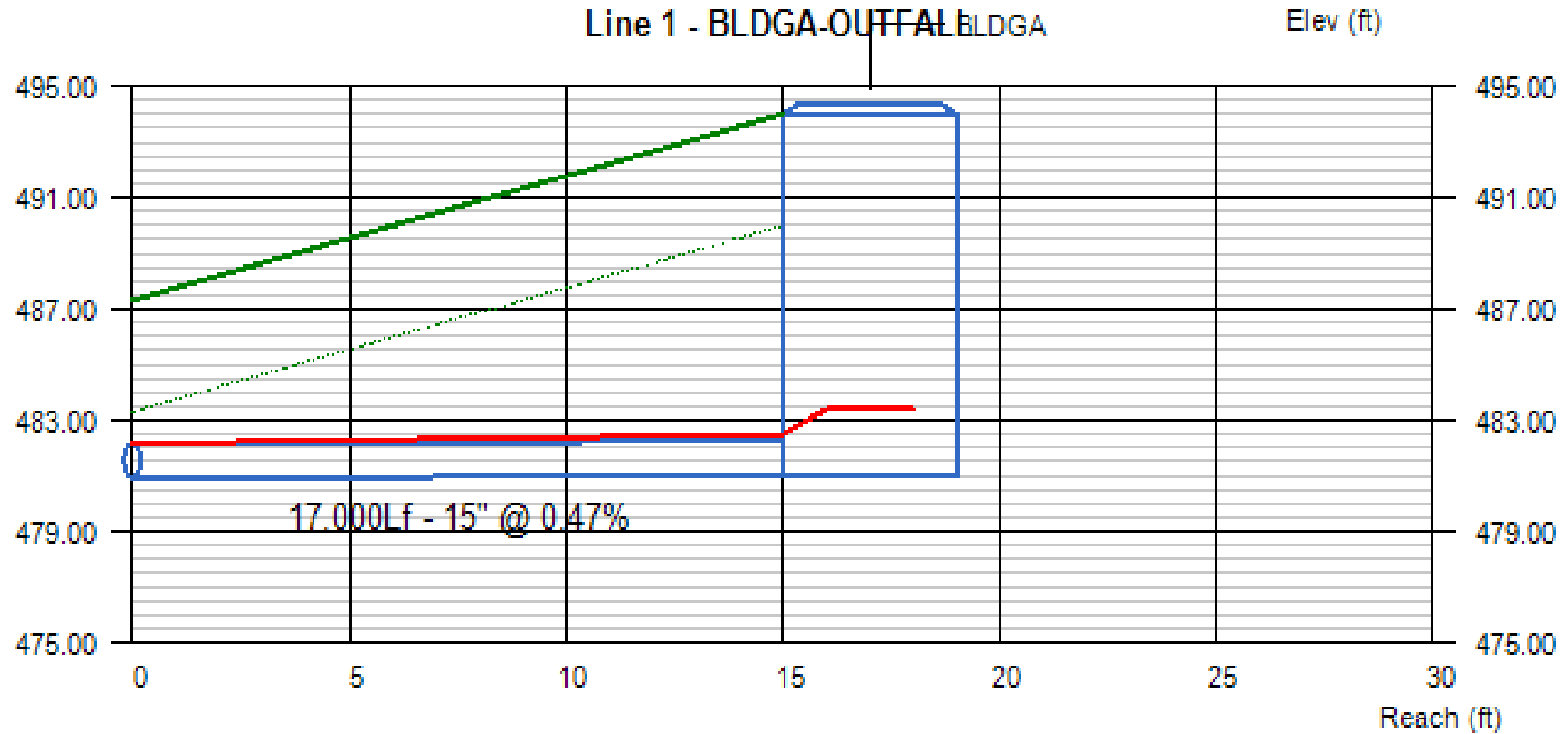
Run Date: 5/5/2020

NOTES: Return period = 25 Yrs. ; *Surcharged (HGL above crown). ; j - Line contains hyd. jump.

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line Size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line Slope (%)	HGL Down (ft)	HGL Up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns Line No.	Junction Type
25	D601-D602	1.63	15	Cir	57.000	489.52	489.81	0.509	490.55	490.58	0.04	490.62	24	Manhole
26	D602-D603	1.64	15	Cir	38.000	489.81	490.00	0.500	490.62	490.64	0.11	490.74	25	Combination
27	D600-D604	3.70	15	Cir	27.000	495.48	495.62	0.518	496.32	496.46	0.04	496.50	23	Manhole
28	D604-D605	3.74	15	Cir	66.000	495.62	495.95	0.500	496.50	496.80	0.27	497.08	27	Combination
29	D600-D606	11.01	15	Cir	21.000	496.50	496.61	0.524	497.75*	498.36*	1.25	499.61	23	Manhole
30	D606-D607	11.05	24	Cir	22.000	496.61	496.72	0.500	499.61*	499.67*	0.29	499.96	29	Combination
31	D607-D608	9.91	15	Cir	41.000	496.72	498.00	3.122	499.96*	500.92*	0.15	501.07	30	Manhole
32	D608-D609	9.96	15	Cir	75.000	498.00	502.96	6.613	501.07	504.14	n/a	504.14 j	31	Manhole
33	D609-D610	7.51	15	Cir	82.000	502.96	510.00	8.585	504.14	511.09	n/a	511.09 j	32	Combination
34	D610-D611	2.96	15	Cir	84.000	511.59	511.87	0.333	512.43	512.71	0.18	512.89	33	Manhole
35	D611-CO5	0.47	6	Cir	62.000	511.87	512.49	1.000	512.89*	513.33*	0.09	513.42	34	None
36	CO5-D612	0.48	6	Cir	78.000	512.49	513.27	1.000	513.42*	513.99*	0.05	514.03	35	Grate
37	D612-D613	0.25	6	Cir	138.000	513.27	514.65	1.000	514.03	514.90	n/a	514.90 j	36	Grate
38	D609-BLDGB	2.75	15	Cir	8.000	507.00	507.04	0.500	507.70	507.74	0.24	507.97	32	Grate
39	D611-BLDGC	2.69	15	Cir	8.000	514.29	514.33	0.500	514.98	515.02	0.23	515.25	34	Grate
40	D800-OUTFALL	1.43	15	Cir	22.000	497.25	497.36	0.500	497.72	497.84	0.17	498.01	End	Combination
41	D1002-OUTFALL	2.25	15	Cir	150.000	475.62	492.90	11.520	475.89	493.50	0.11	493.50	End	Manhole
42	D1001-D1002	2.25	15	Cir	90.000	492.90	498.78	6.533	493.50	499.38	0.23	499.38	41	Manhole
43	D1002-OS5	2.25	15	Cir	44.000	498.78	499.00	0.500	499.40	499.62	0.21	499.83	42	Manhole
Project File: 2020-05-01-_Pipe Network.stm									Number of lines: 43			Run Date: 5/5/2020		
NOTES: Return period = 25 Yrs. ; *Surcharged (HGL above crown). ; j - Line contains hyd. jump.														

Line Profile (Line 1) - BLDGA-OUTFALL



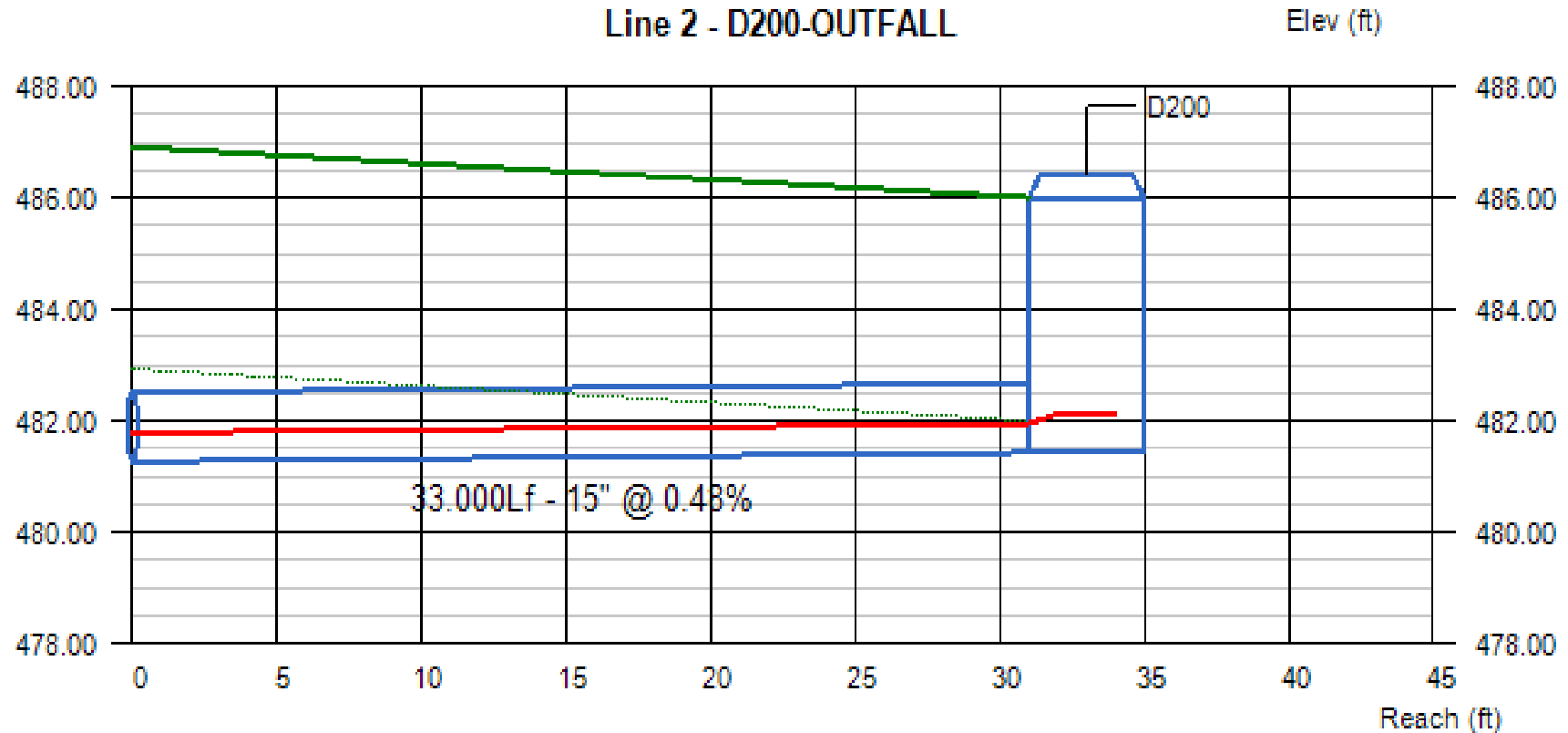
Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
1	9.22	480.92	481.00	1.25	1.25	2.40	482.17	482.52	483.40	7.52	7.51	5.14	11.75

Project File:

No. Lines: 43

Run Date: 5/5/2020

Line Profile (Line 2) - D200-OUTFALL



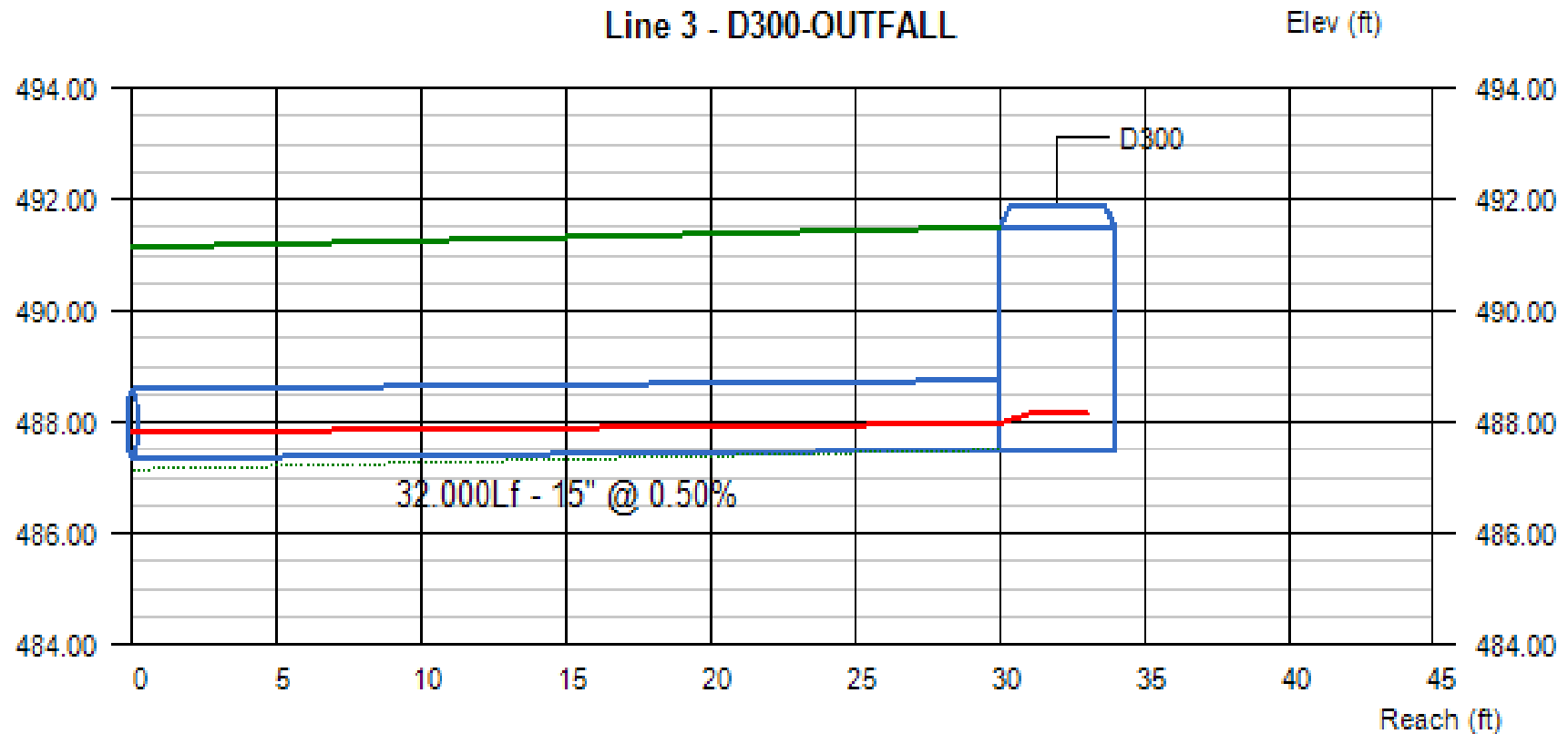
Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
2	1.69	481.26	481.42	0.53	0.53	0.71	481.79	481.95	482.13	3.40	3.40	4.41	3.33

Project File:

No. Lines: 43

Run Date: 5/5/2020

Line Profile (Line 3) - D300-OUTFALL

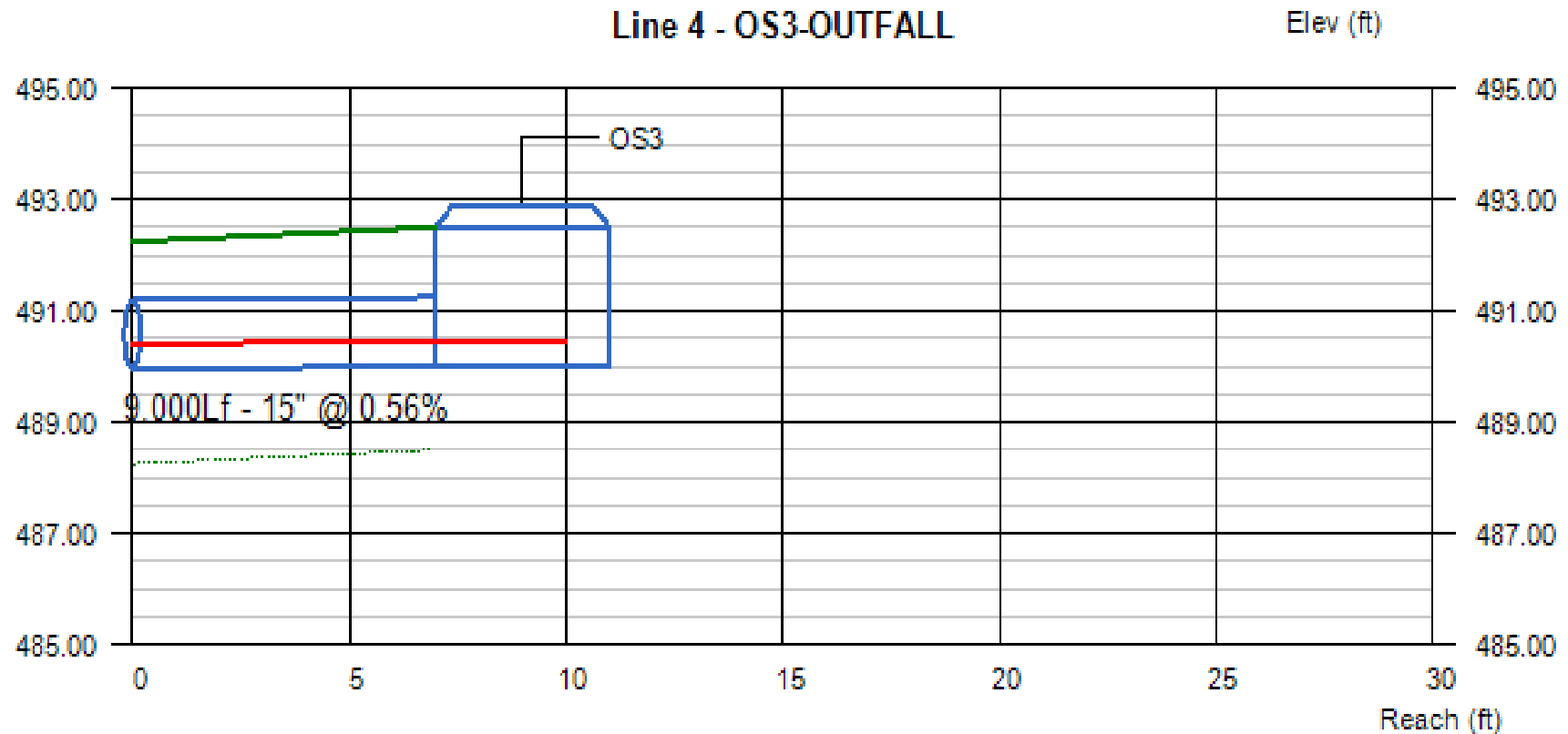


Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
3	1.43	487.34	487.50	0.48	0.48	0.65	487.82	487.98	488.15	3.29	3.30	2.55	2.75

Project File:

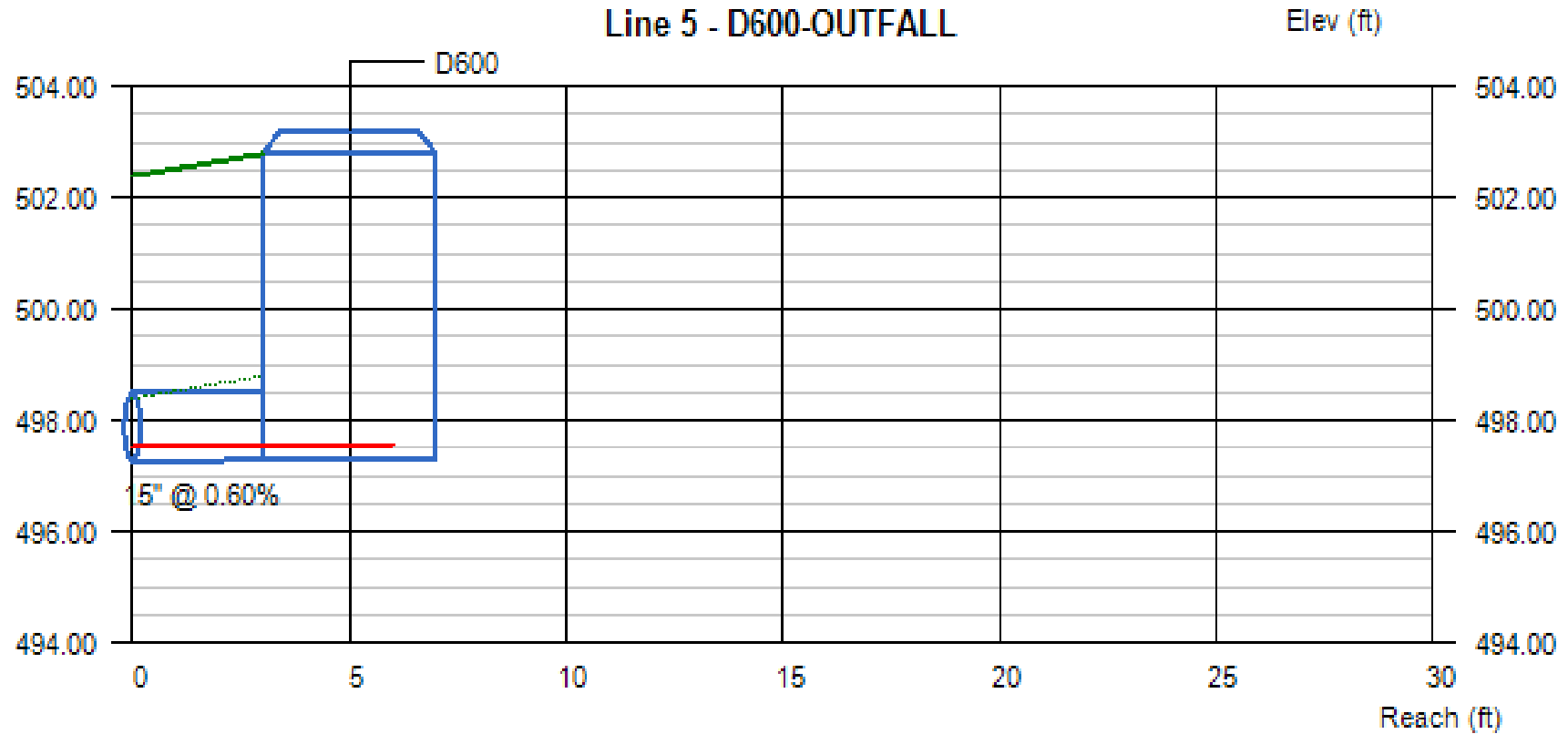
No. Lines: 43

Run Date: 5/5/2020



Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
4	1.32	489.95	490.00	0.45	0.45	0.45	490.40	490.45	490.45	3.34	3.28	1.04	1.25
Project File:								No. Lines: 43			Run Date: 5/5/2020		

Line Profile (Line 5) - D600-OUTFALL



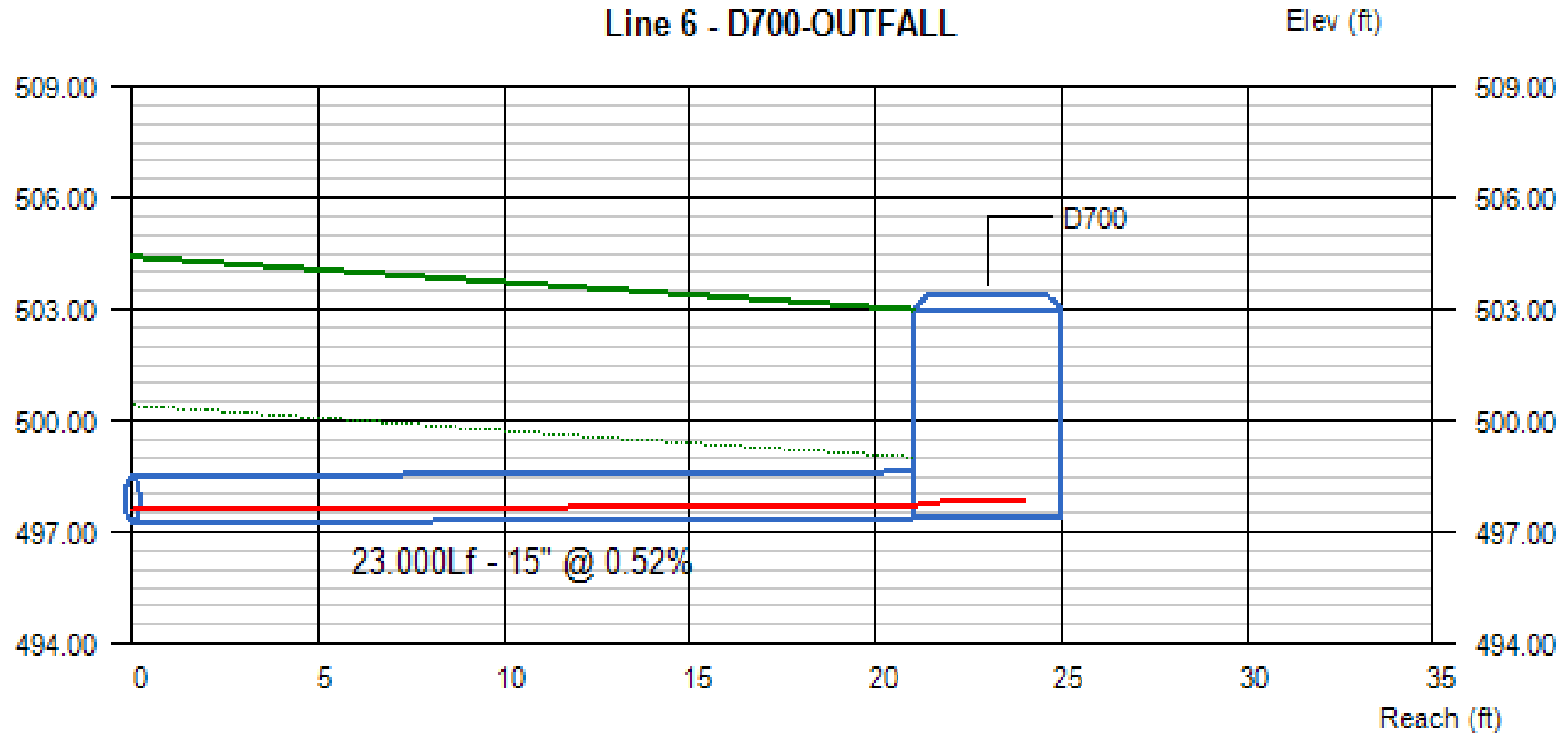
Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
5	0.50	497.25	497.28	0.27	0.27	0.27	497.52	497.55	497.55	2.60	2.49	3.89	4.26

Project File:

No. Lines: 43

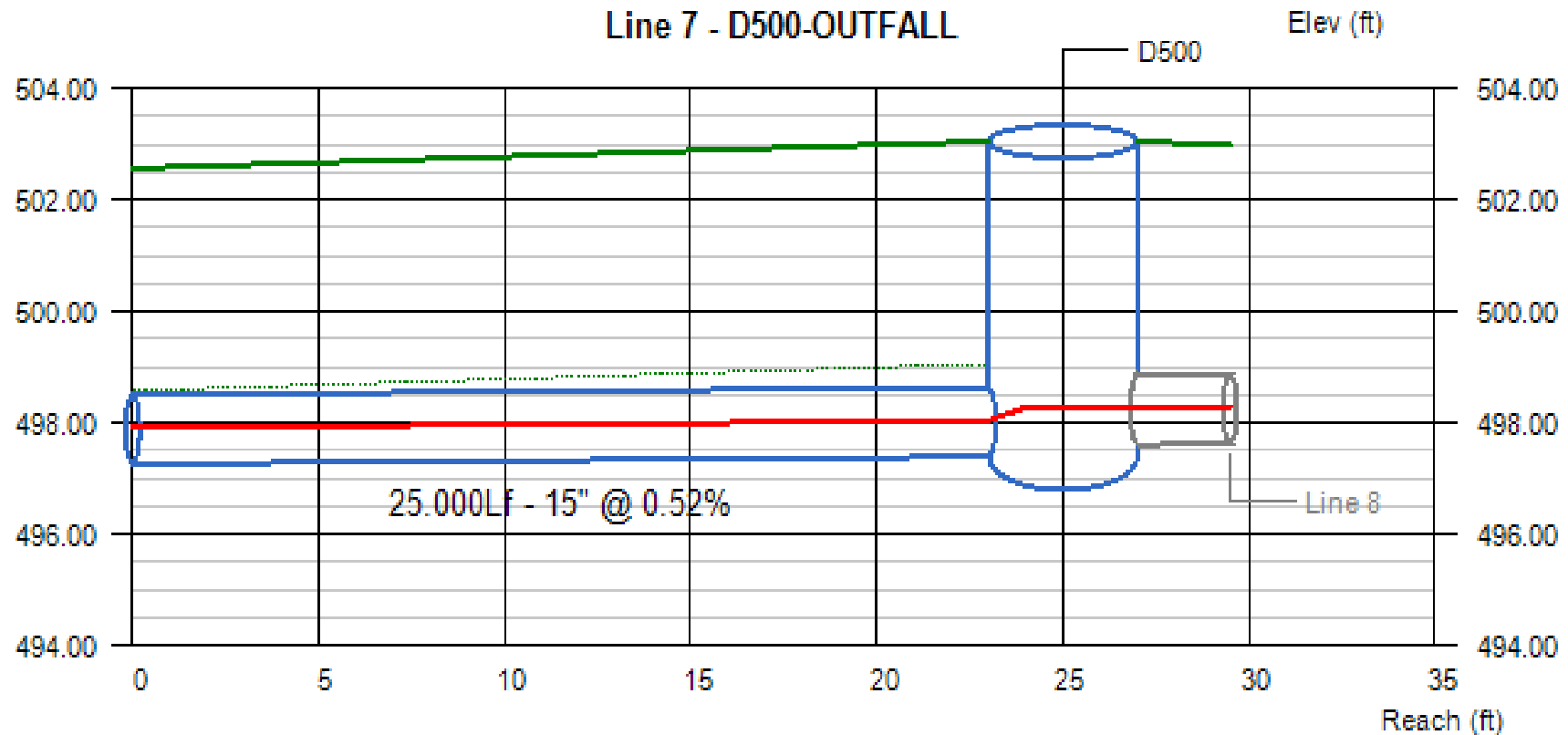
Run Date: 5/5/2020

Line Profile (Line 6) - D700-OUTFALL



Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
6	0.78	497.25	497.37	0.35	0.35	0.47	497.60	497.72	497.84	2.82	2.79	5.91	4.38
Project File:								No. Lines: 43			Run Date: 5/5/2020		

Line Profile (Line 7) - D500-OUTFALL

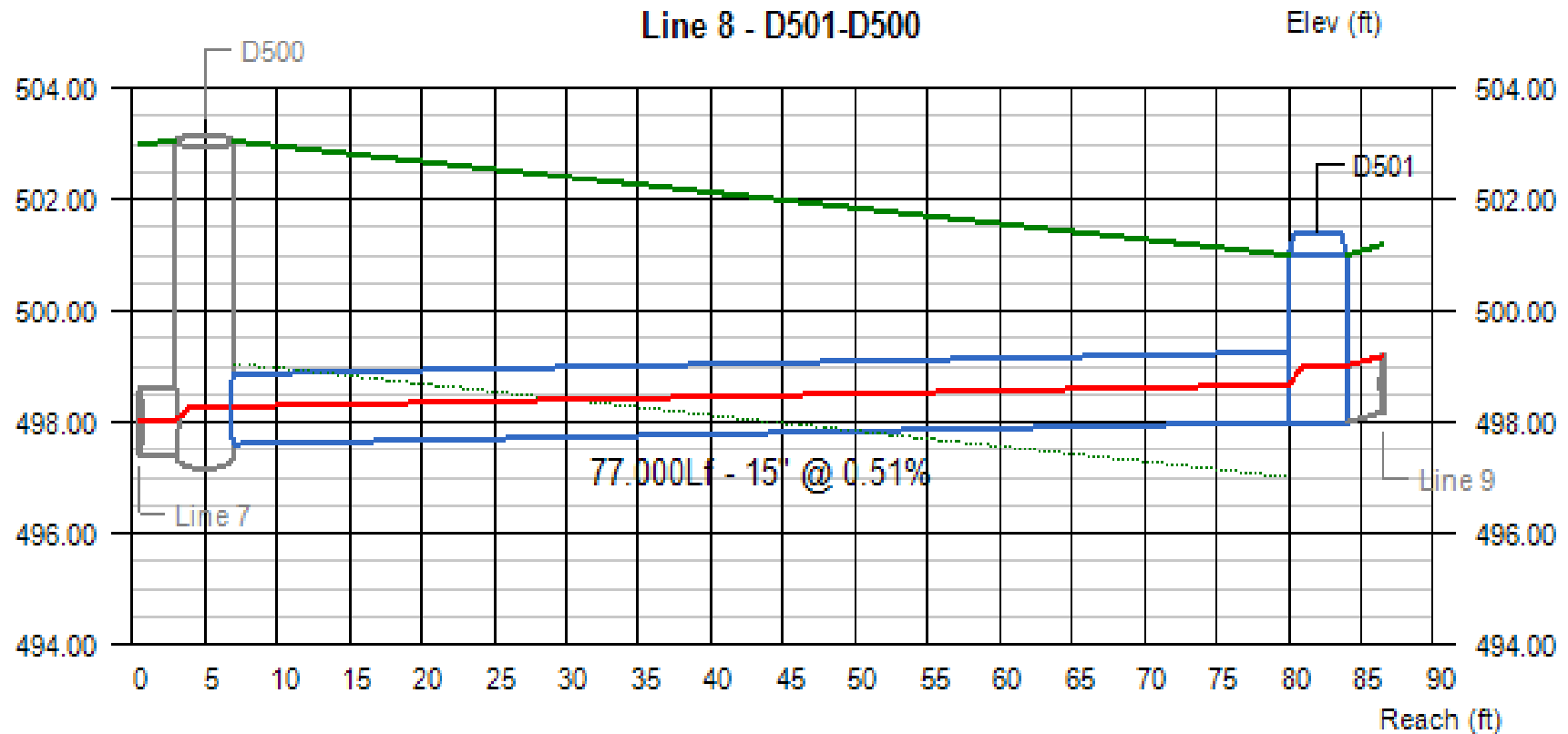


Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
7	2.55	497.25	497.38	0.66	0.66	0.89	497.91	498.04	498.27	3.88	3.87	4.07	4.42

Project File:

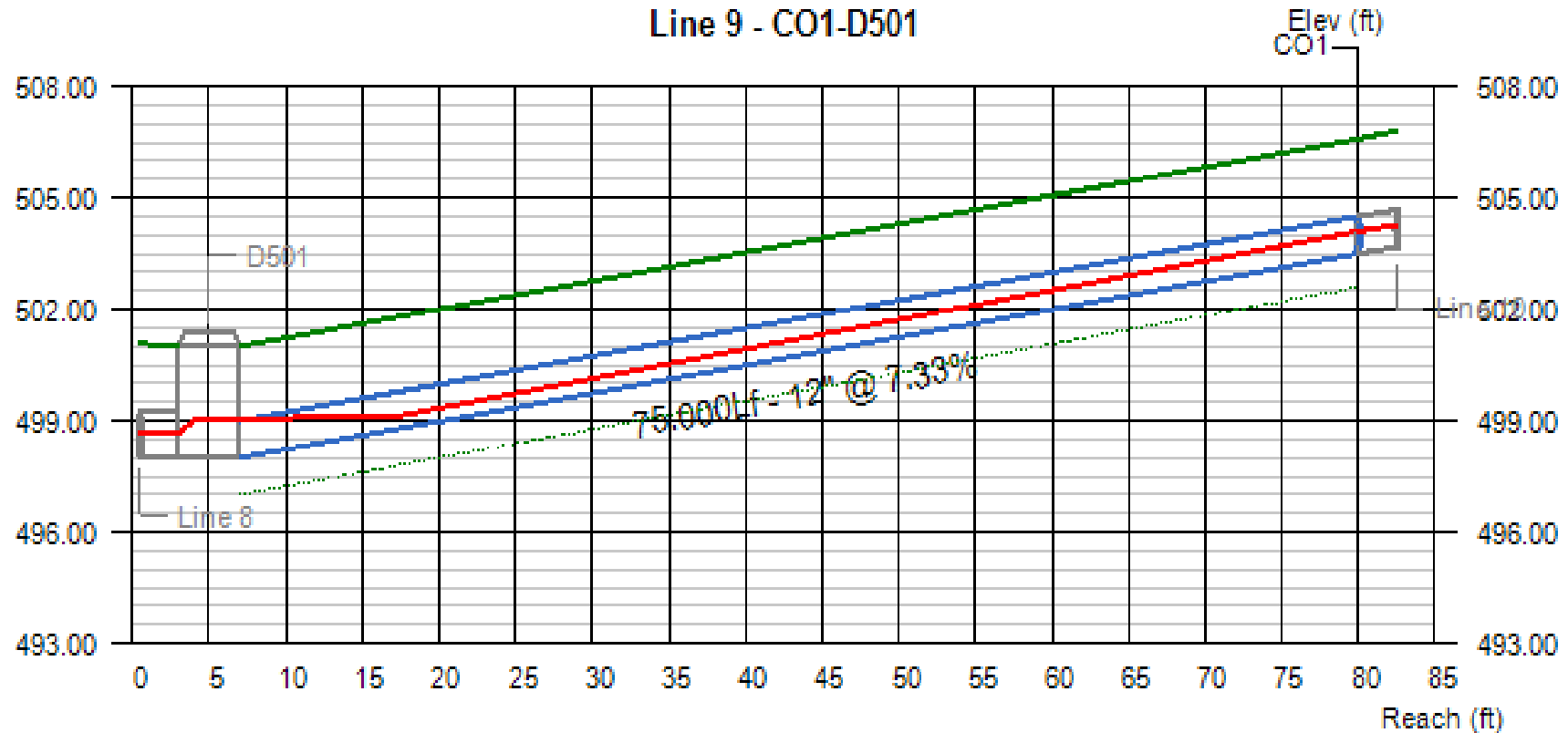
No. Lines: 43

Run Date: 5/5/2020



Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
8	2.58	497.61	498.00	0.67	0.67	1.01	498.28	498.67	499.01	3.85	3.84	4.19	1.75
Project File:								No. Lines: 43			Run Date: 5/5/2020		

Line Profile (Line 9) - CO1-D501



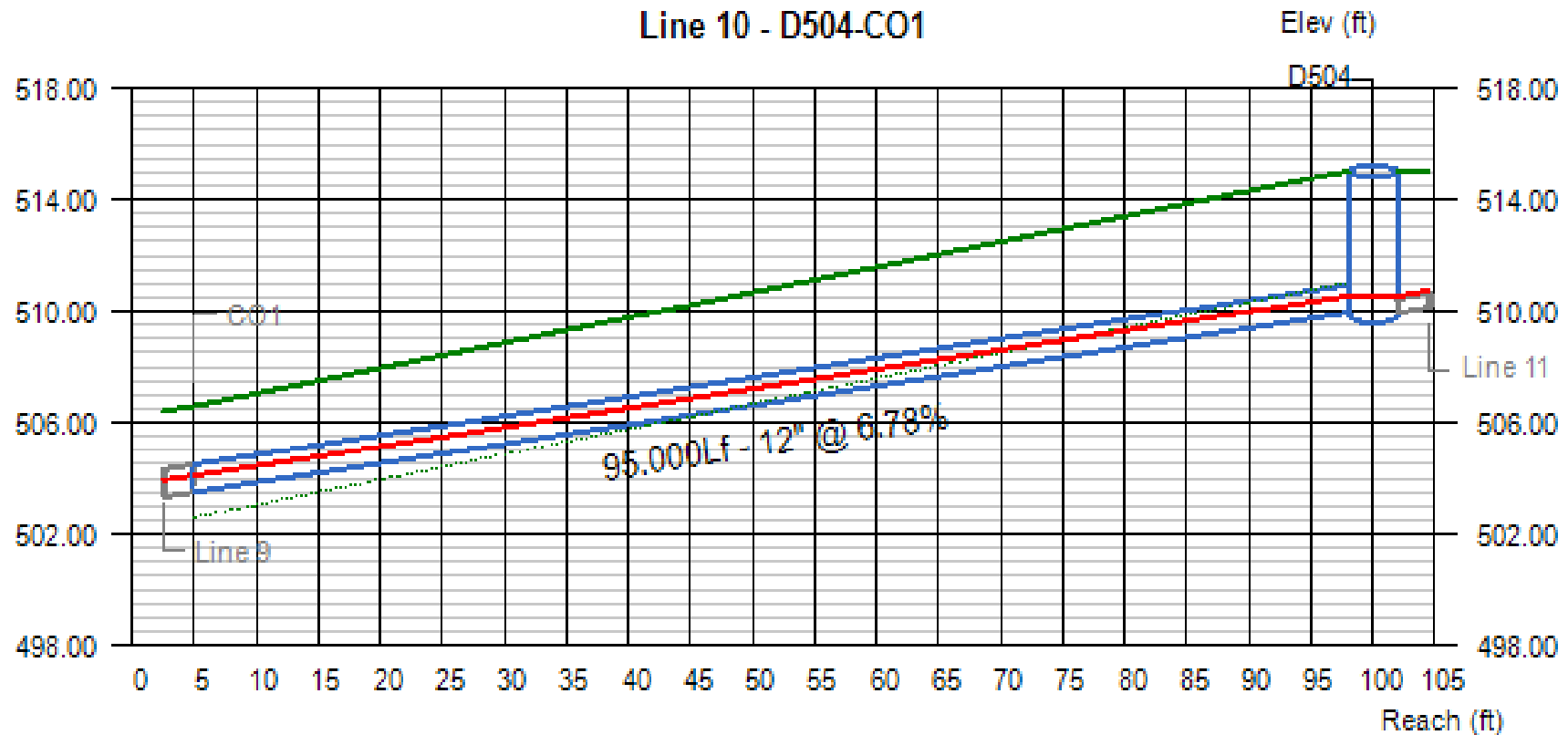
Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
9	1.97	498.00	503.50	1.00	0.60	0.60	499.01	504.10 j	504.10	2.51	4.02	2.00	2.09

Project File:

No. Lines: 43

Run Date: 5/5/2020

Line Profile (Line 10) - D504-CO1



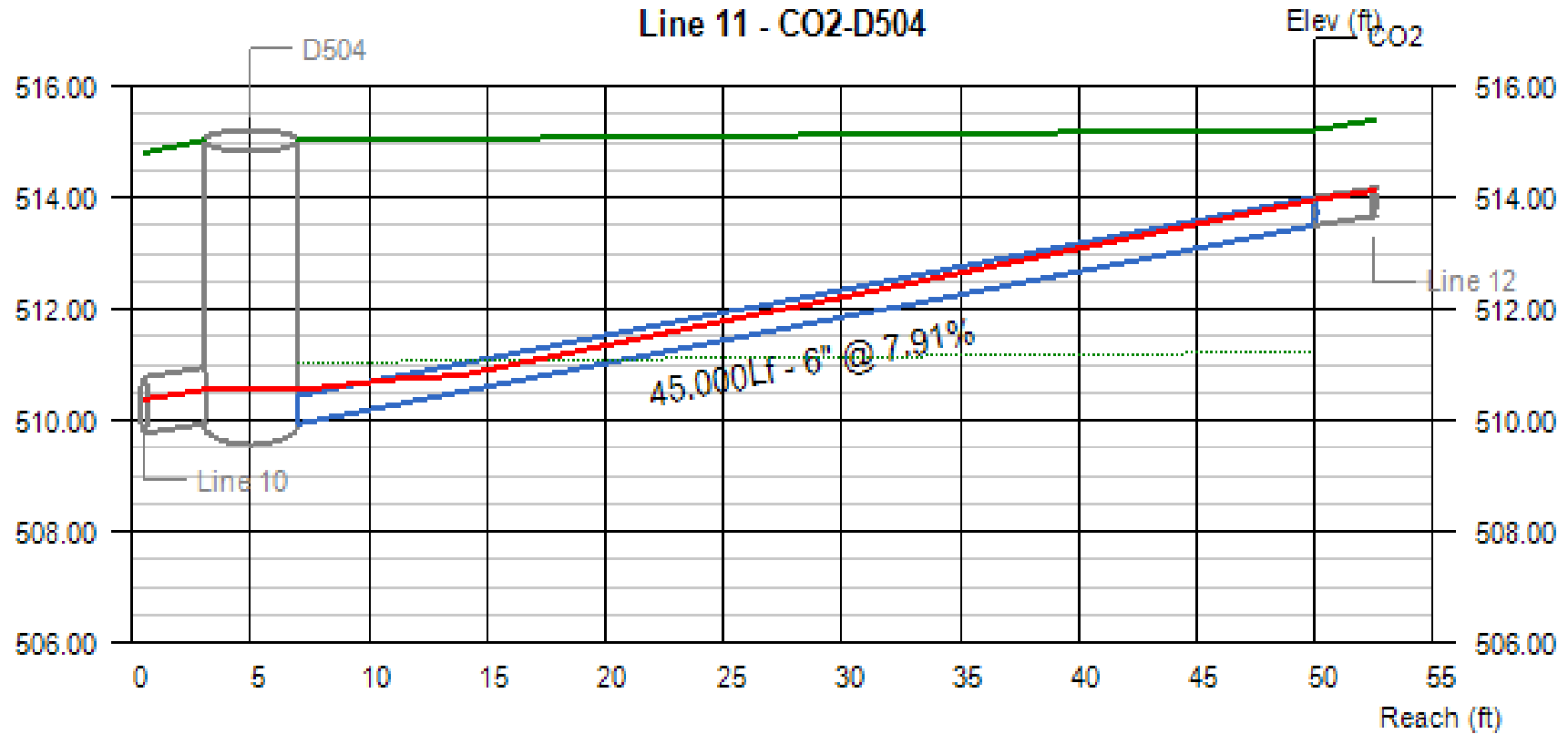
Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
10	2.00	503.50	509.94	0.60	0.60	0.60	504.10	510.54	510.54	4.07	4.04	2.09	4.09

Project File:

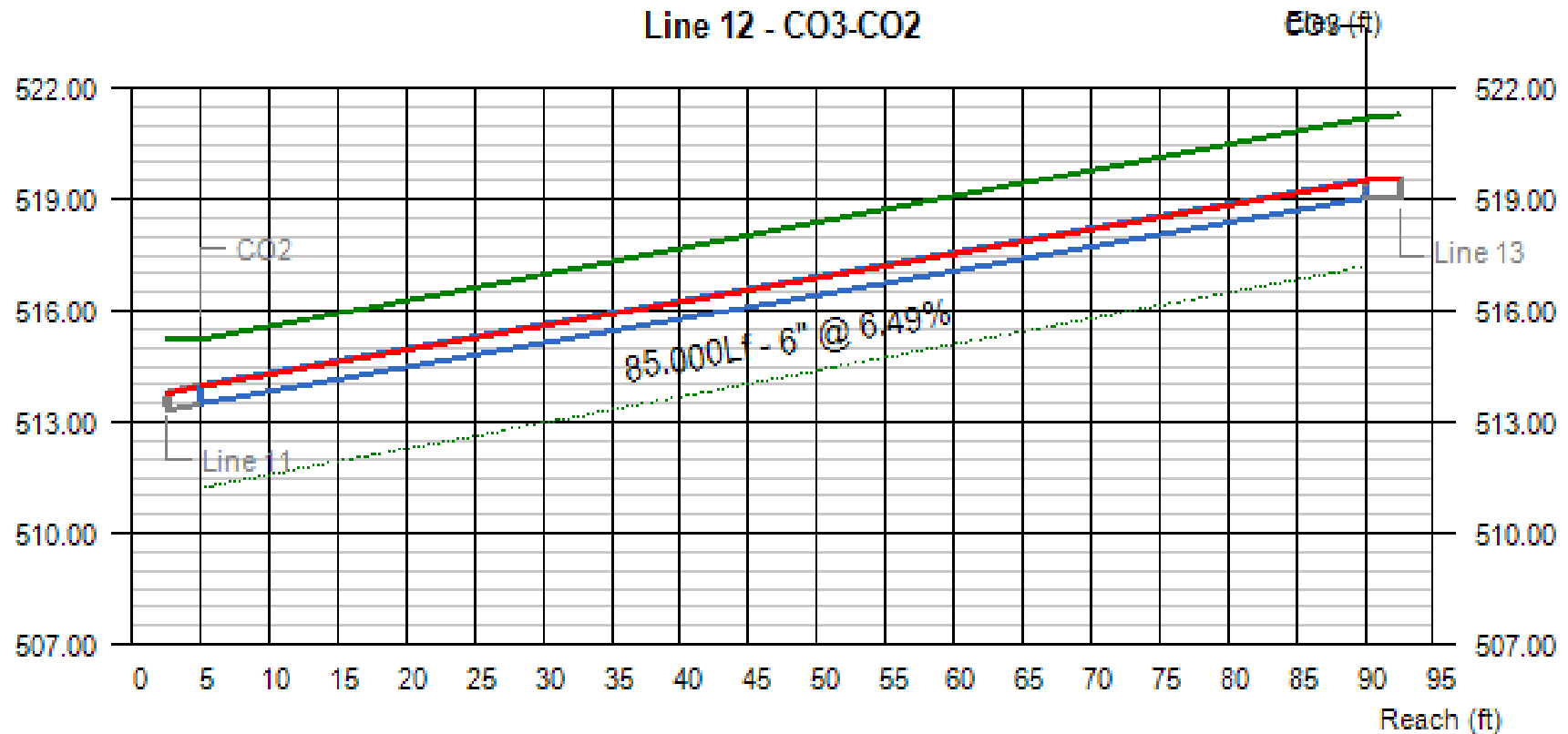
No. Lines: 43

Run Date: 5/5/2020

Line Profile (Line 11) - CO2-D504

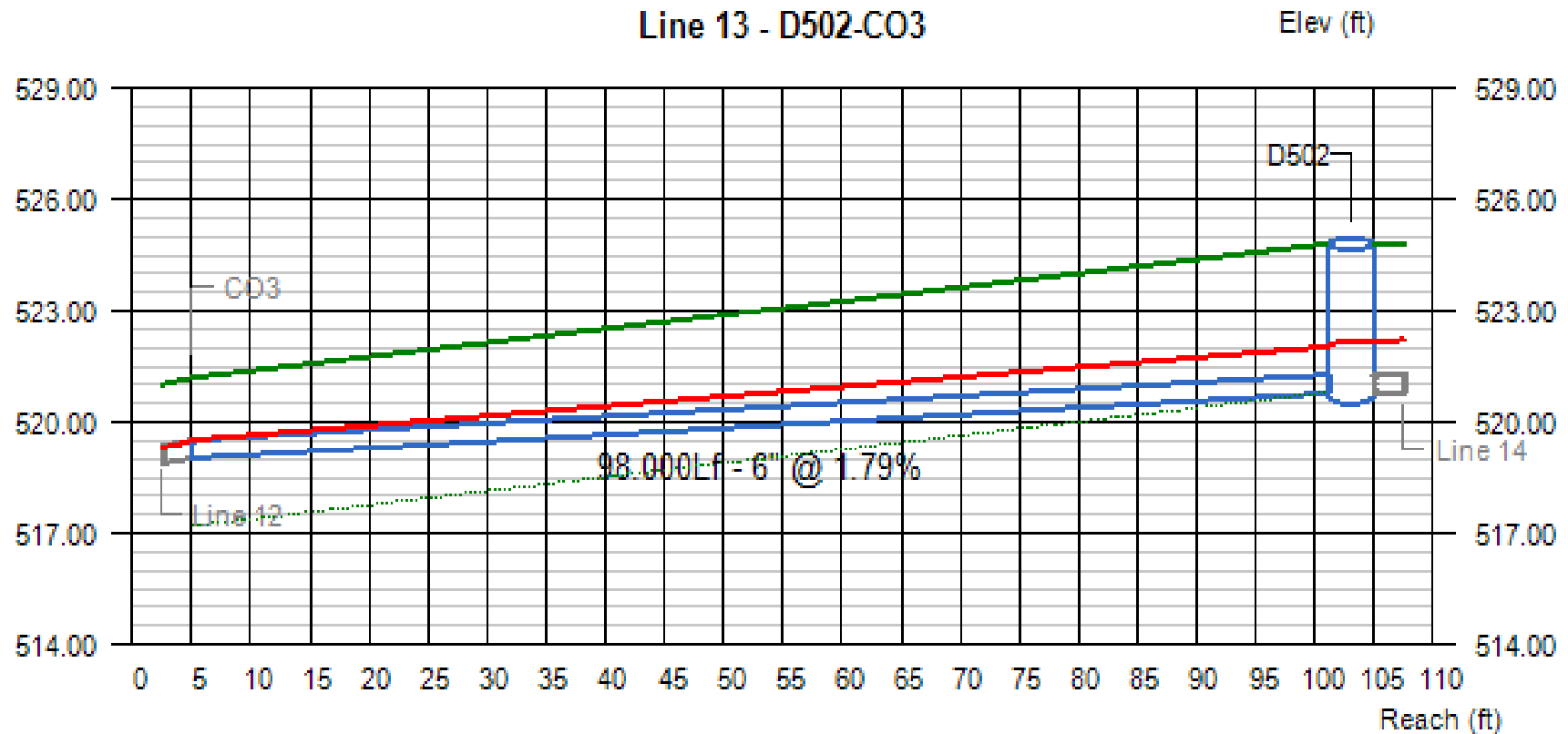


Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
11	0.88	509.94	513.50	0.50	0.46	0.46	510.54	513.96 j	513.96	4.46	4.65	4.59	1.22
Project File:								No. Lines: 43			Run Date: 5/5/2020		



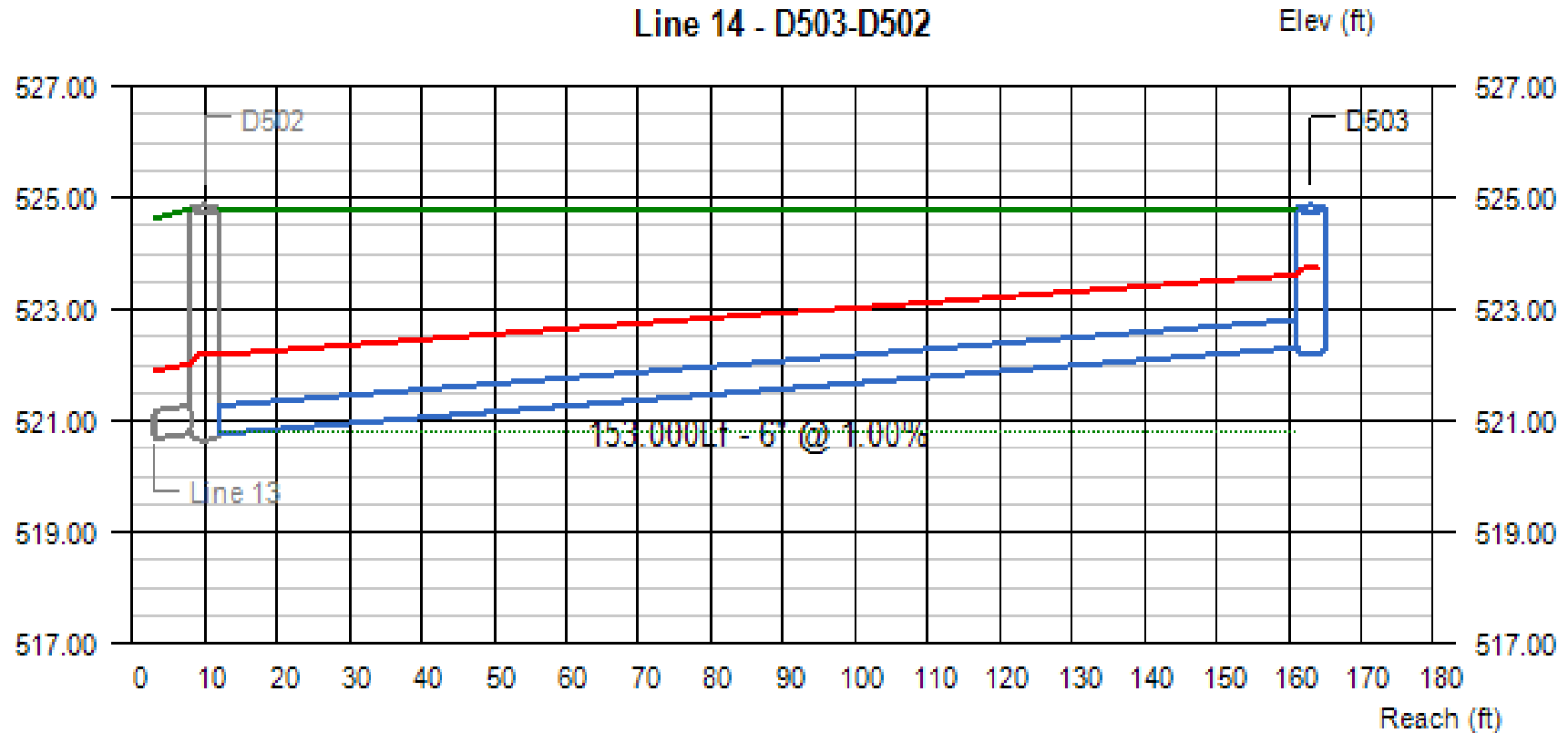
Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
12	0.88	513.50	519.02	0.46	0.46	0.46	513.96	519.48	519.48	4.70	4.69	1.22	1.67
Project File:								No. Lines: 43			Run Date: 5/5/2020		

Line Profile (Line 13) - D502-CO3

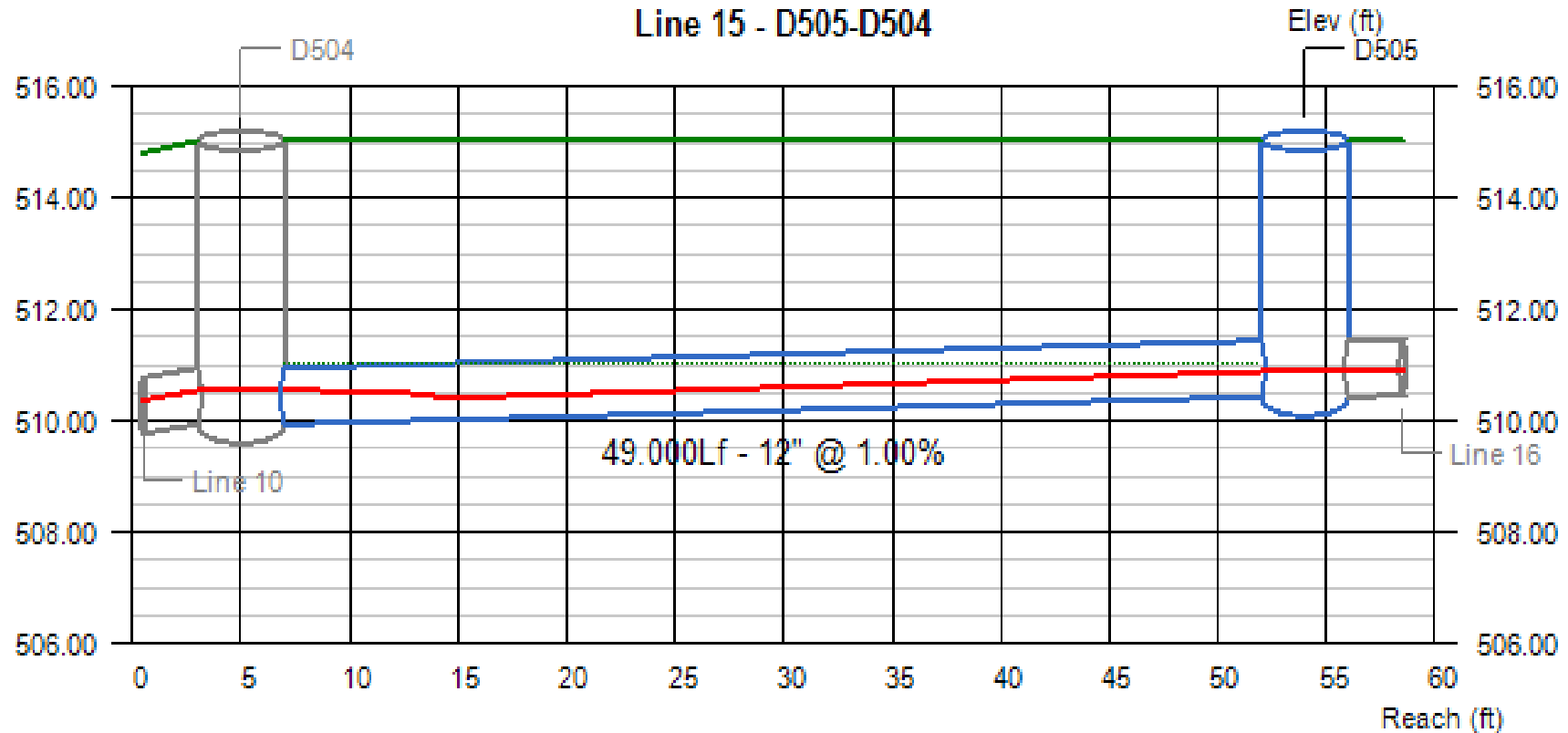


Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
13	0.90	519.02	520.77	0.50	0.50	1.41	519.52	522.02	522.18	4.56	4.56	1.67	3.53
Project File:								No. Lines: 43			Run Date: 5/5/2020		

Line Profile (Line 14) - D503-D502

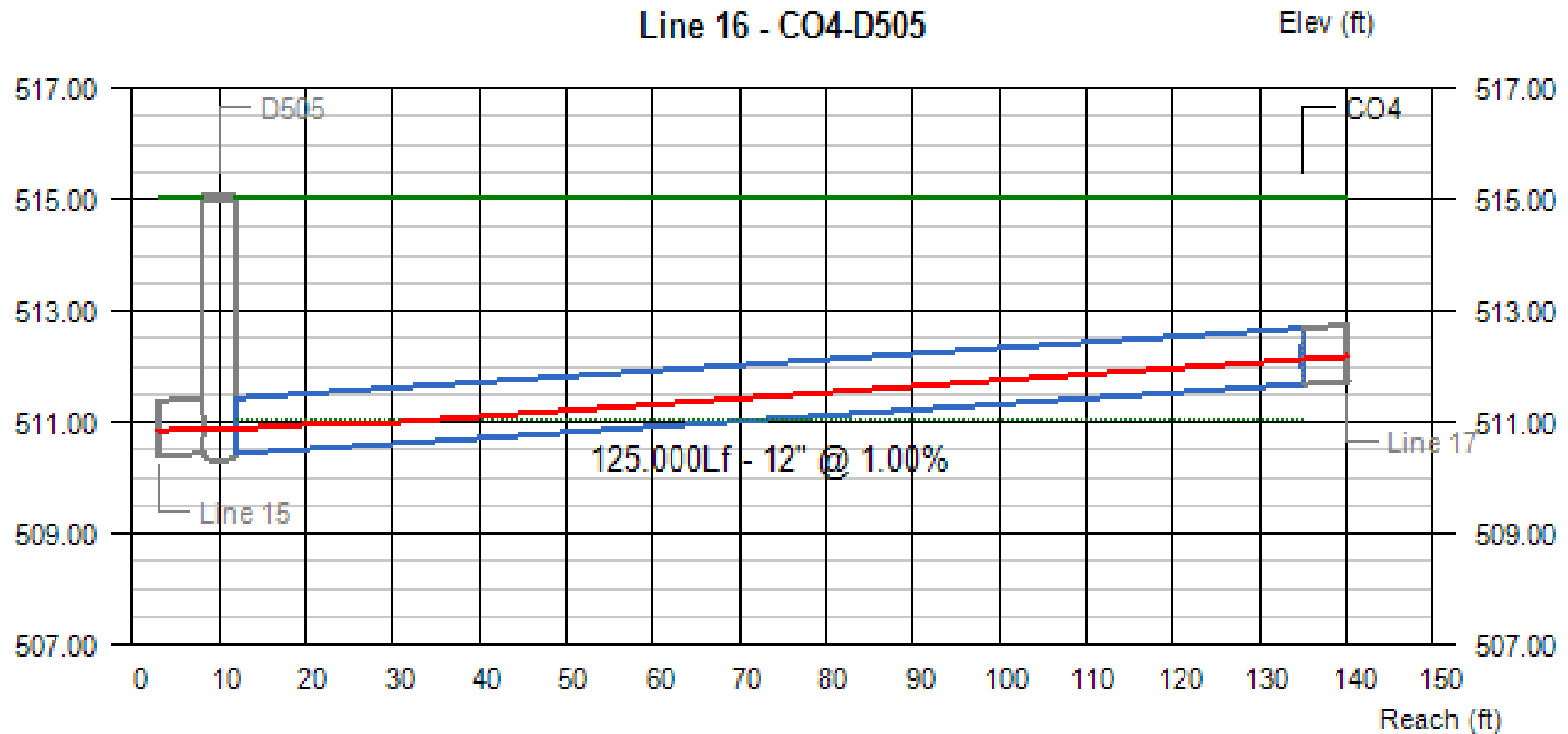


Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
14	0.54	520.77	522.30	0.50	0.50	1.44	522.18	523.62	523.74	2.77	2.77	3.53	2.00
Project File:								No. Lines: 43			Run Date: 5/5/2020		



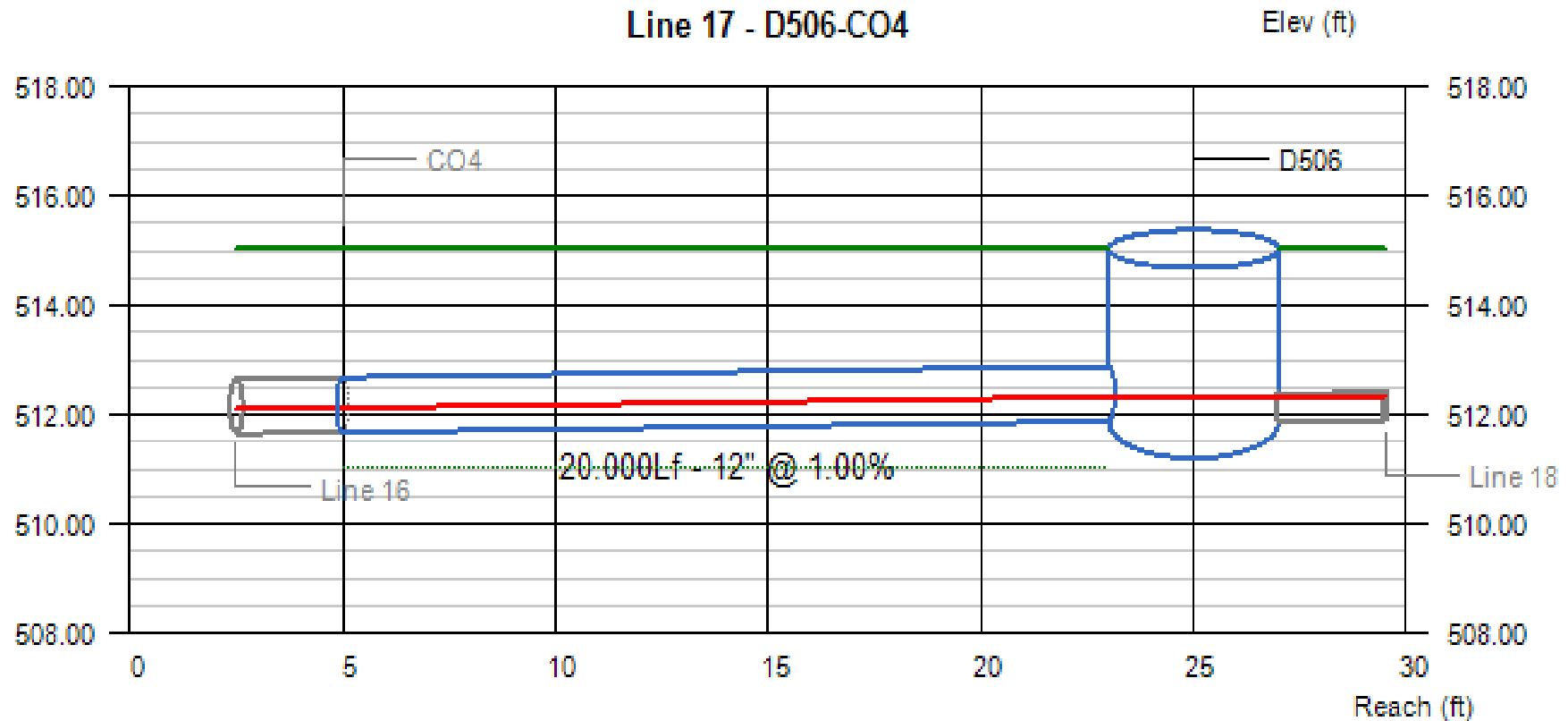
Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
15	1.15	509.94	510.43	0.60	0.45	0.45	510.54	510.88 j	510.88	2.32	3.34	4.09	3.60
Project File:								No. Lines: 43			Run Date: 5/5/2020		

Line Profile (Line 16) - CO4-D505



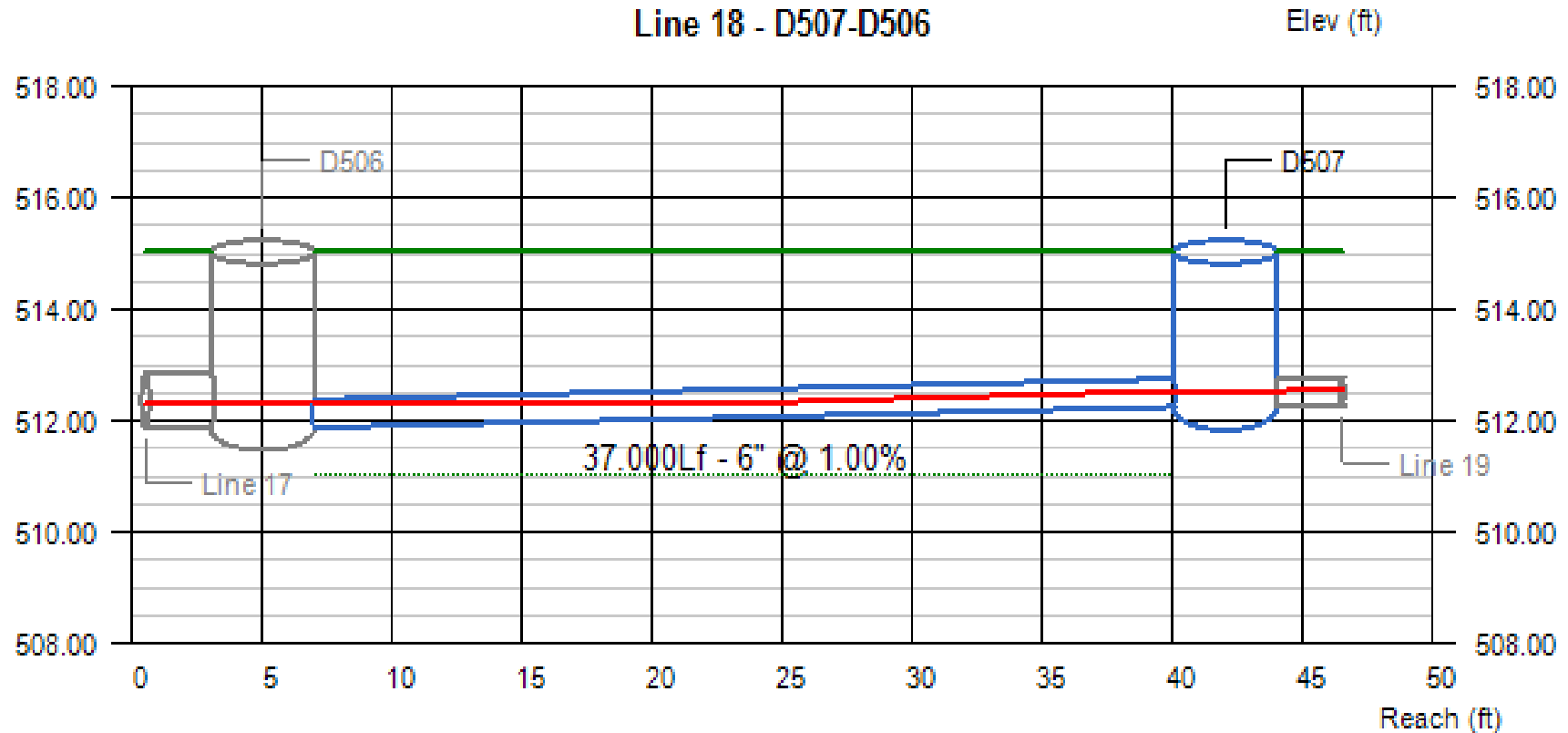
Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
16	1.12	510.43	511.68	0.45	0.44	0.44	510.88	512.12 j	512.12	3.25	3.31	3.60	2.35
Project File:									No. Lines: 43		Run Date: 5/5/2020		

Line Profile (Line 17) - D506-CO4



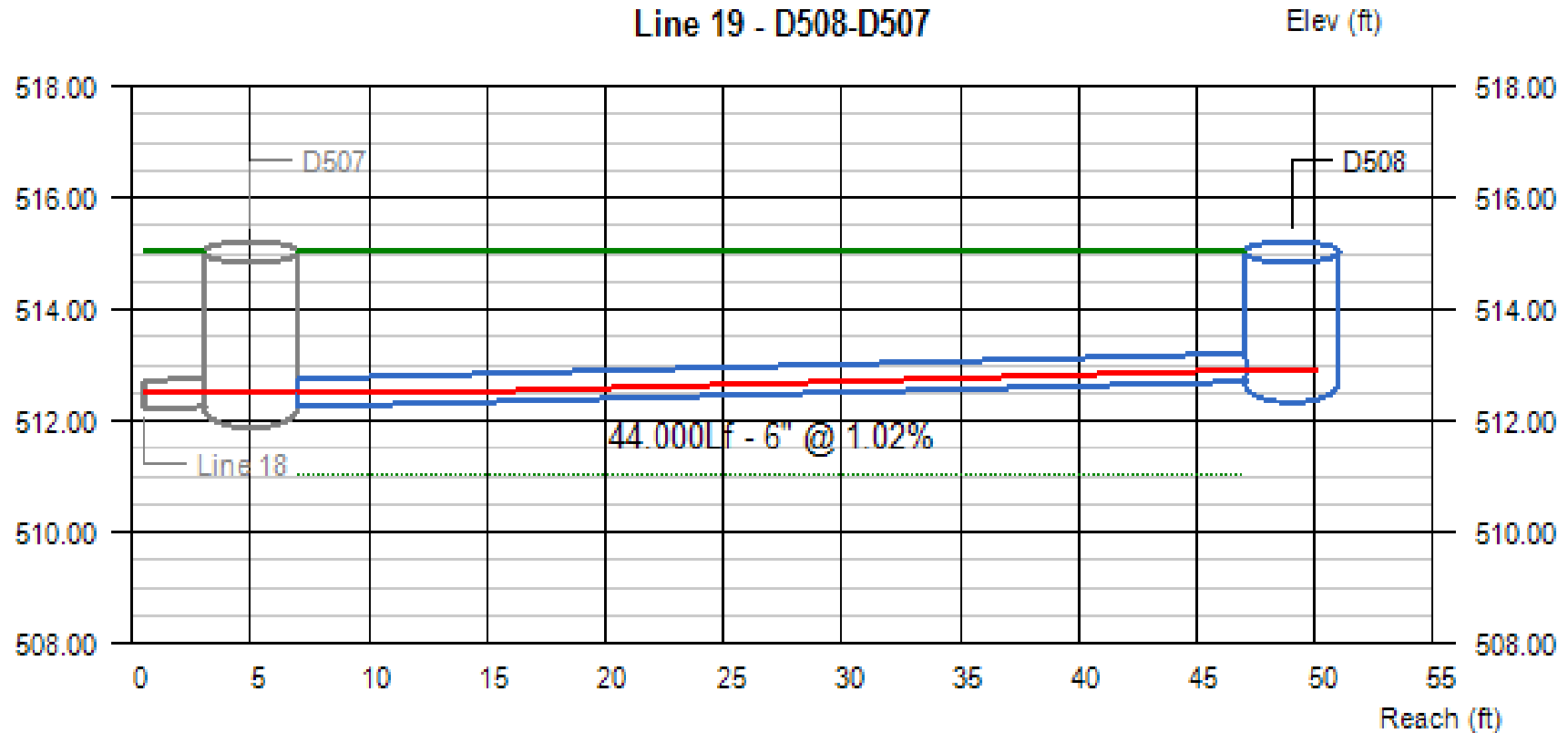
Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
17	1.12	511.68	511.88	0.44	0.45	0.45	512.12	512.33	512.33	3.32	3.31	2.35	2.15
Project File:								No. Lines: 43			Run Date: 5/5/2020		

Line Profile (Line 18) - D507-D506

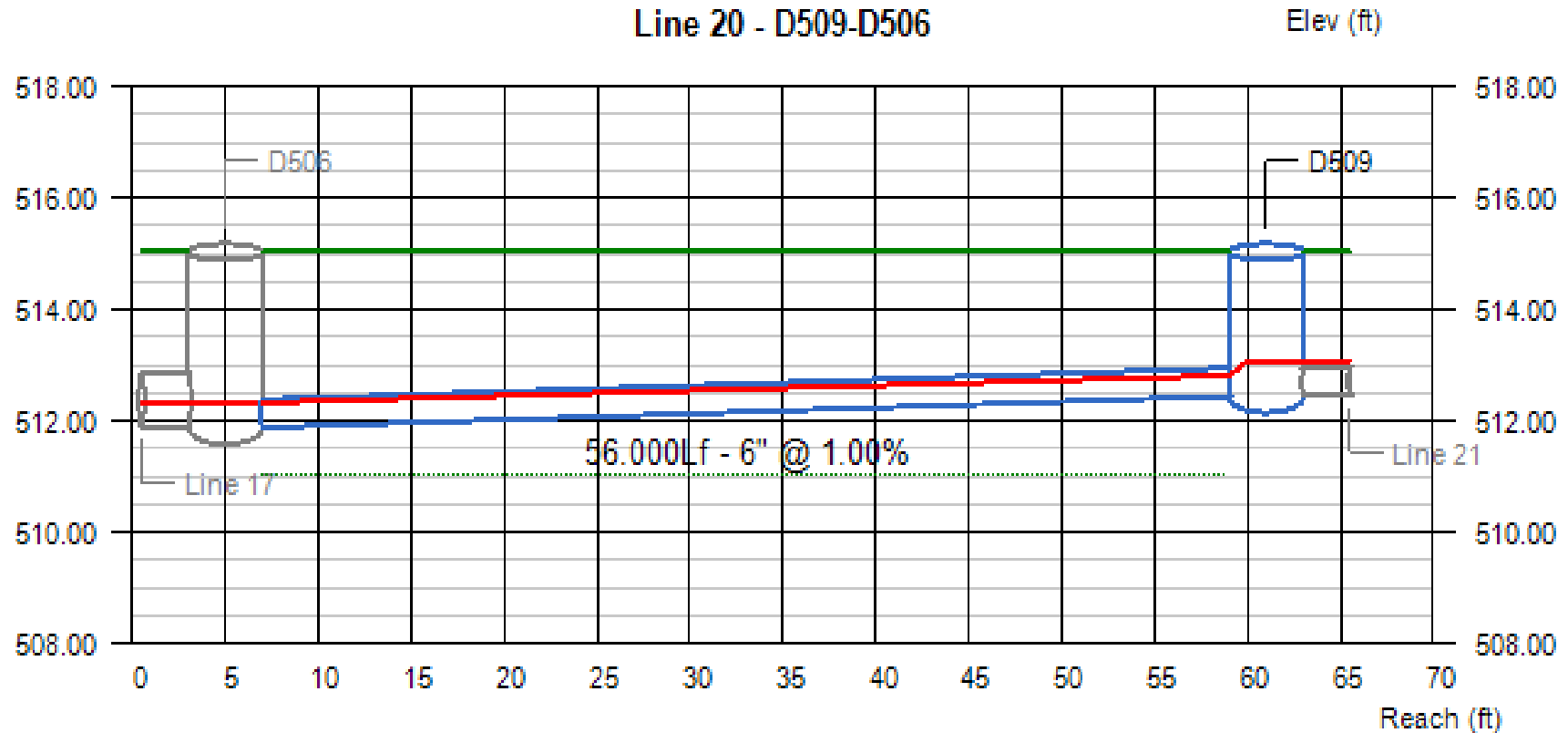


Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
18	0.32	511.88	512.25	0.45	0.29	0.29	512.33	512.54 j	512.54	1.73	2.75	2.65	2.28
Project File:								No. Lines: 43			Run Date: 5/5/2020		

Line Profile (Line 19) - D508-D507



Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
19	0.17	512.25	512.70	0.29	0.21	0.21	512.54	512.91 j	512.91	1.47	2.24	2.28	1.83
Project File:								No. Lines: 43			Run Date: 5/5/2020		



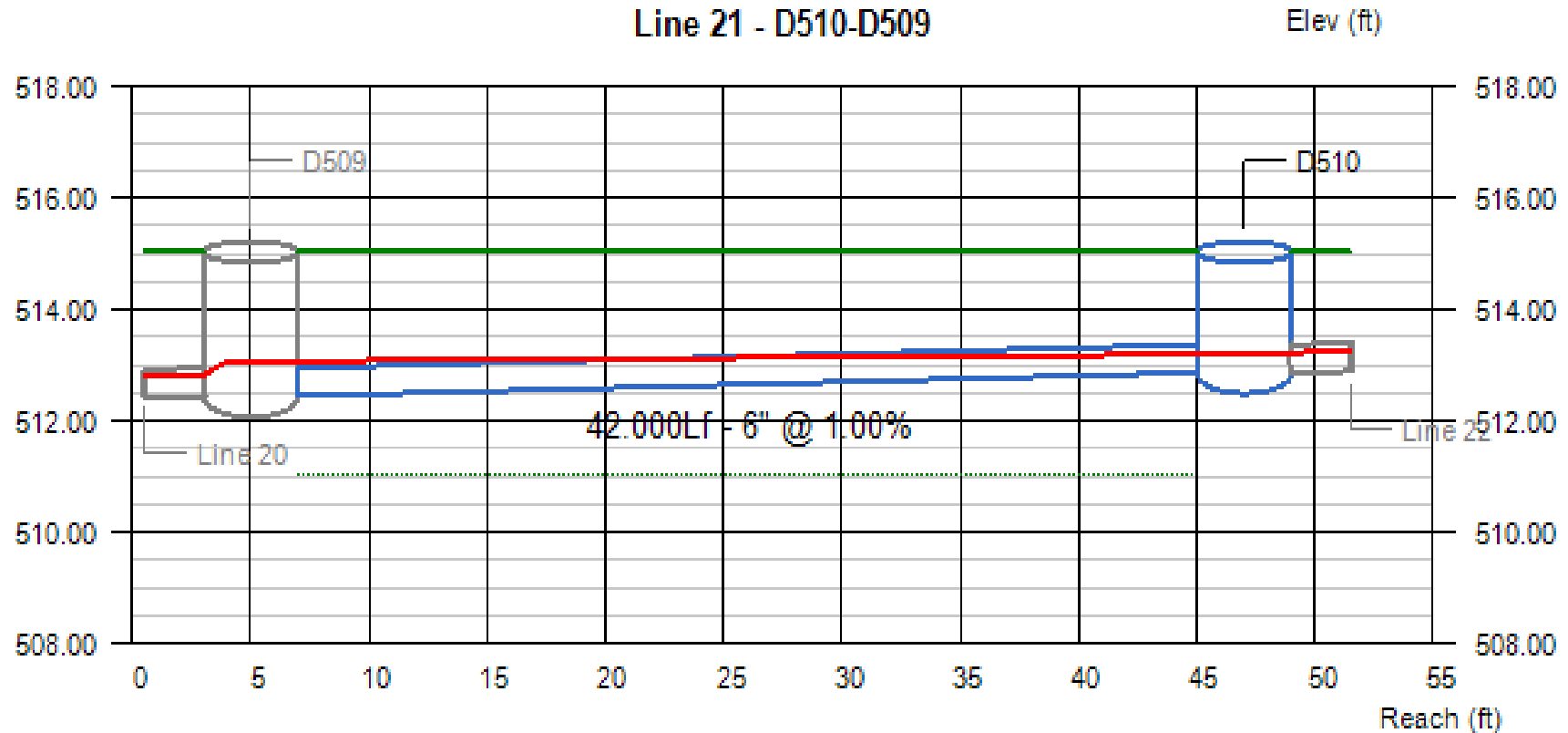
Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
20	0.52	511.88	512.44	0.45	0.37	0.63	512.33	512.81	513.07	2.79	3.34	2.65	2.09

Project File:

No. Lines: 43

Run Date: 5/5/2020

Line Profile (Line 21) - D510-D509



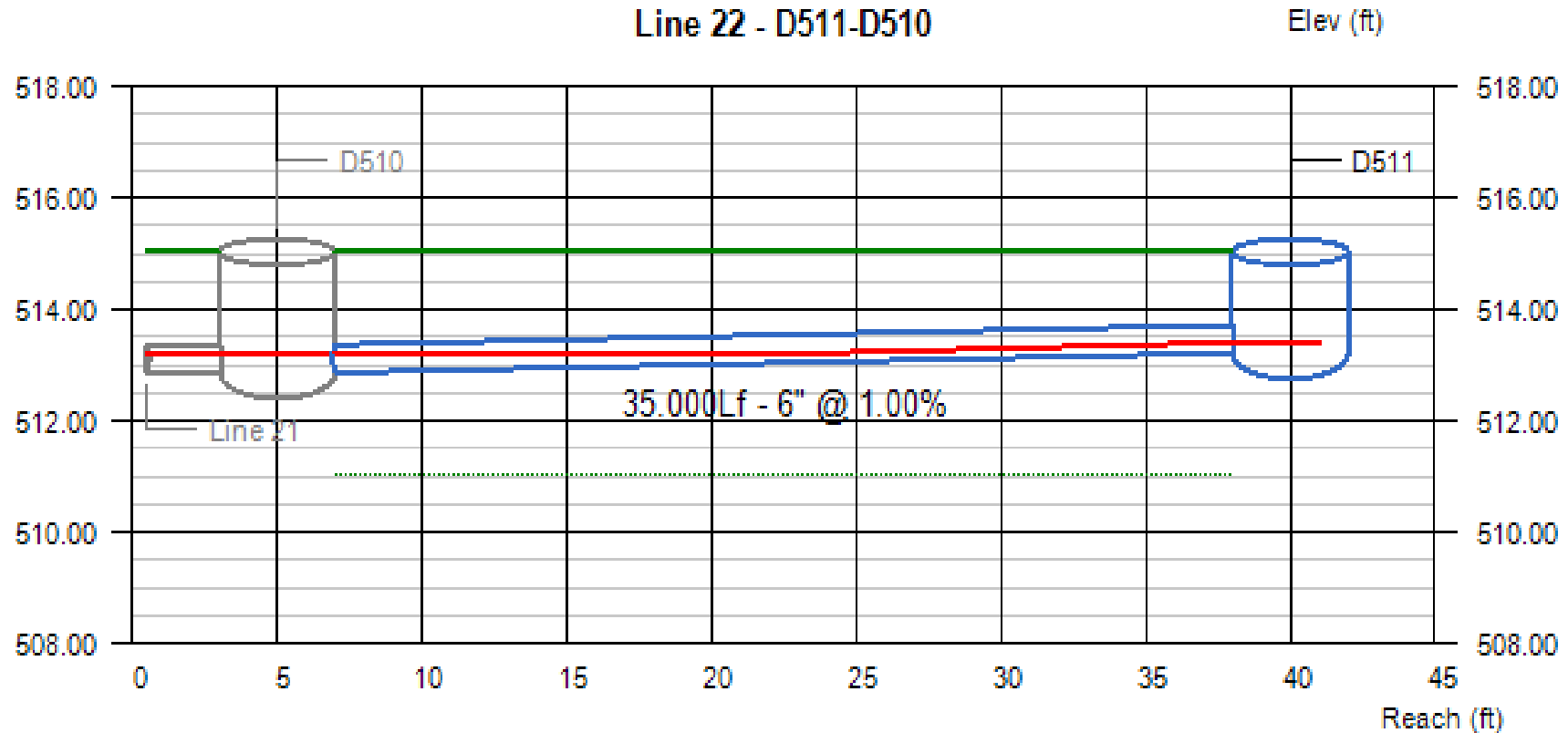
Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
21	0.29	512.44	512.86	0.50	0.32	0.36	513.07	513.18	513.22	1.48	2.15	2.09	1.67

Project File:

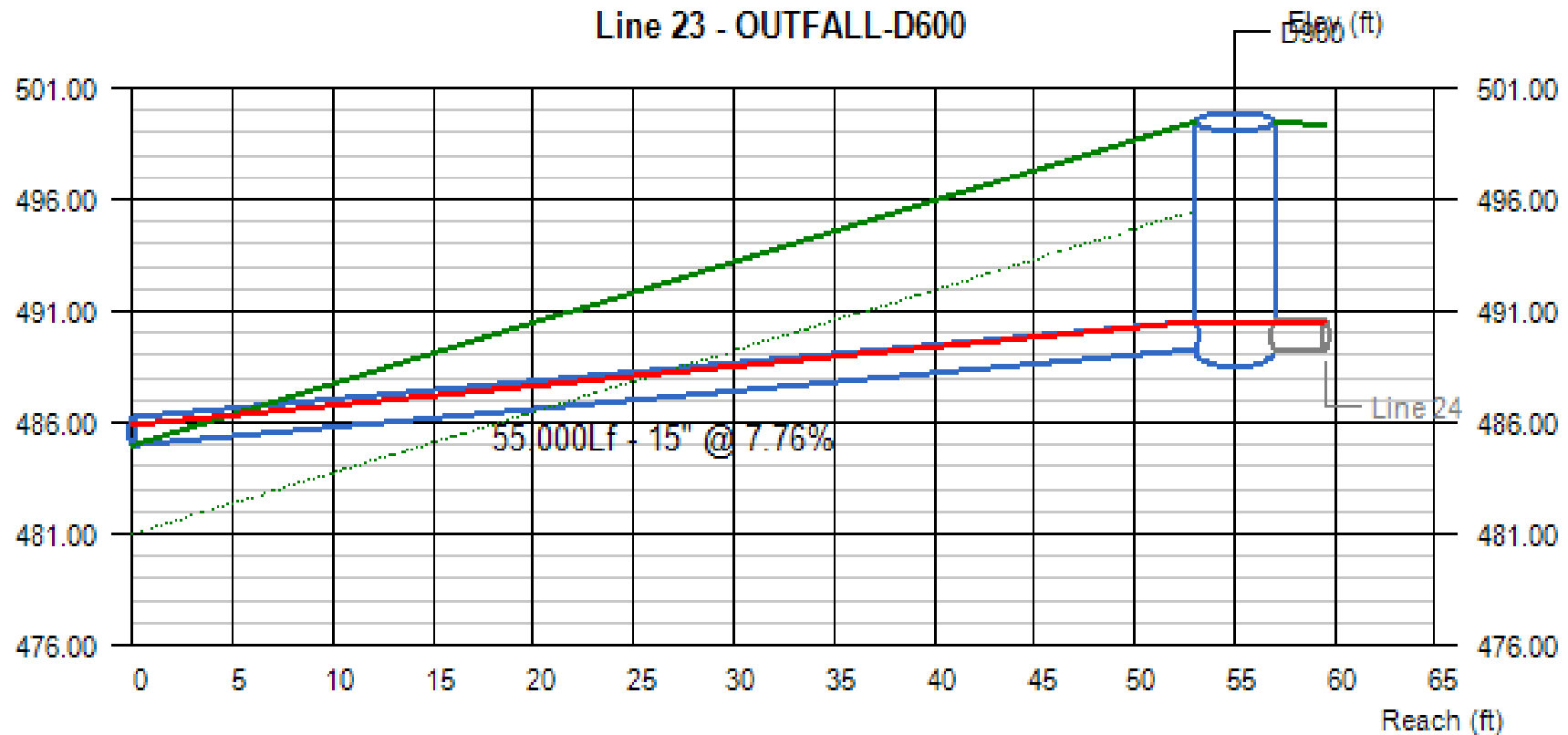
No. Lines: 43

Run Date: 5/5/2020

Line Profile (Line 22) - D511-D510



Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
22	0.15	512.86	513.21	0.36	0.19	0.19	513.22	513.40 j	513.40	0.96	2.13	1.67	1.32
Project File:								No. Lines: 43			Run Date: 5/5/2020		



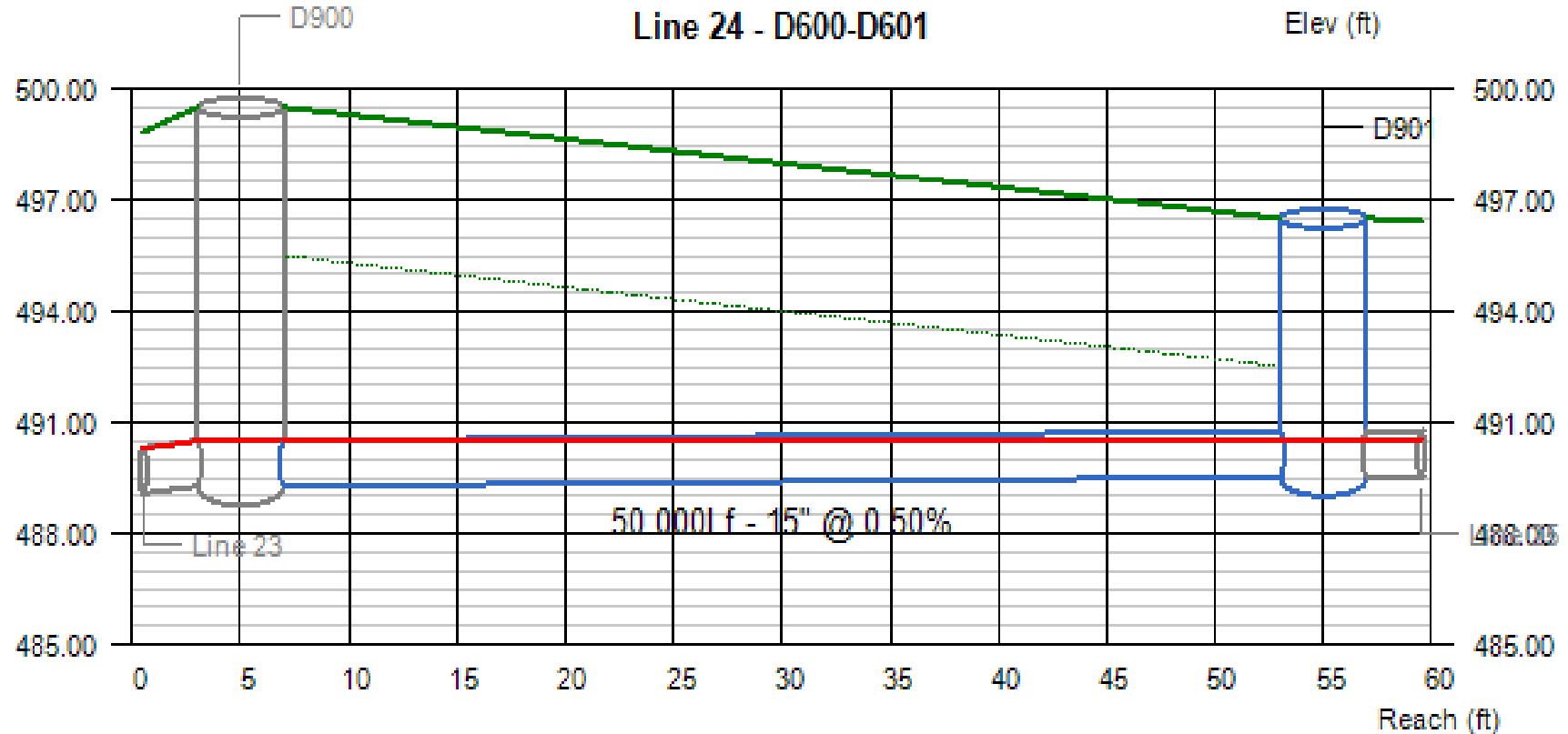
Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
23	15.84	485.00	489.27	0.91	1.24	1.24	485.91	490.51	490.51	16.54	12.93	-1.25	8.98

Project File:

No. Lines: 43

Run Date: 5/5/2020

Line Profile (Line 24) - D600-D601

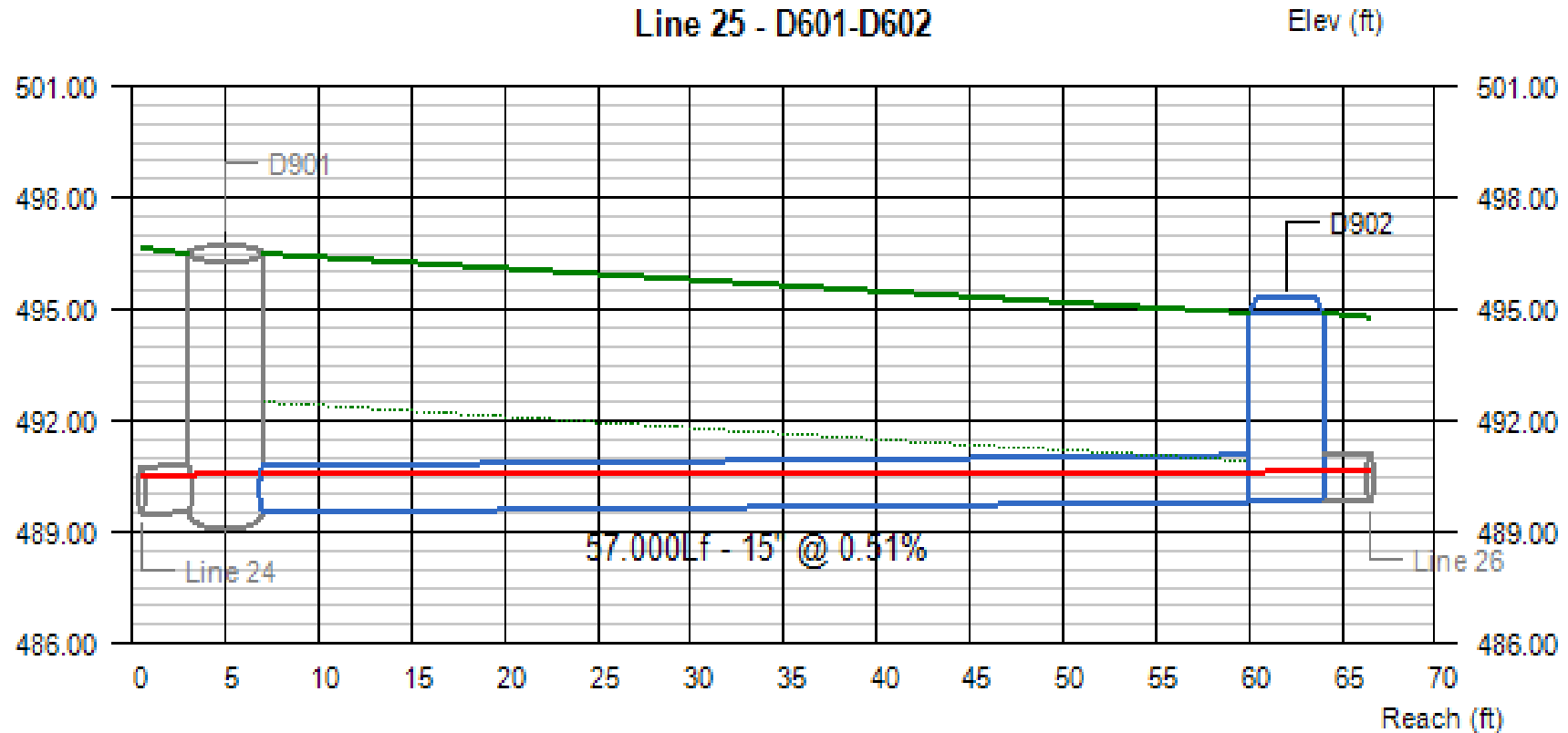


Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
24	1.60	489.27	489.52	1.24	1.01	1.03	490.51	490.53	490.55	1.30	1.50	8.98	5.73

Project File:

No. Lines: 43

Run Date: 5/5/2020



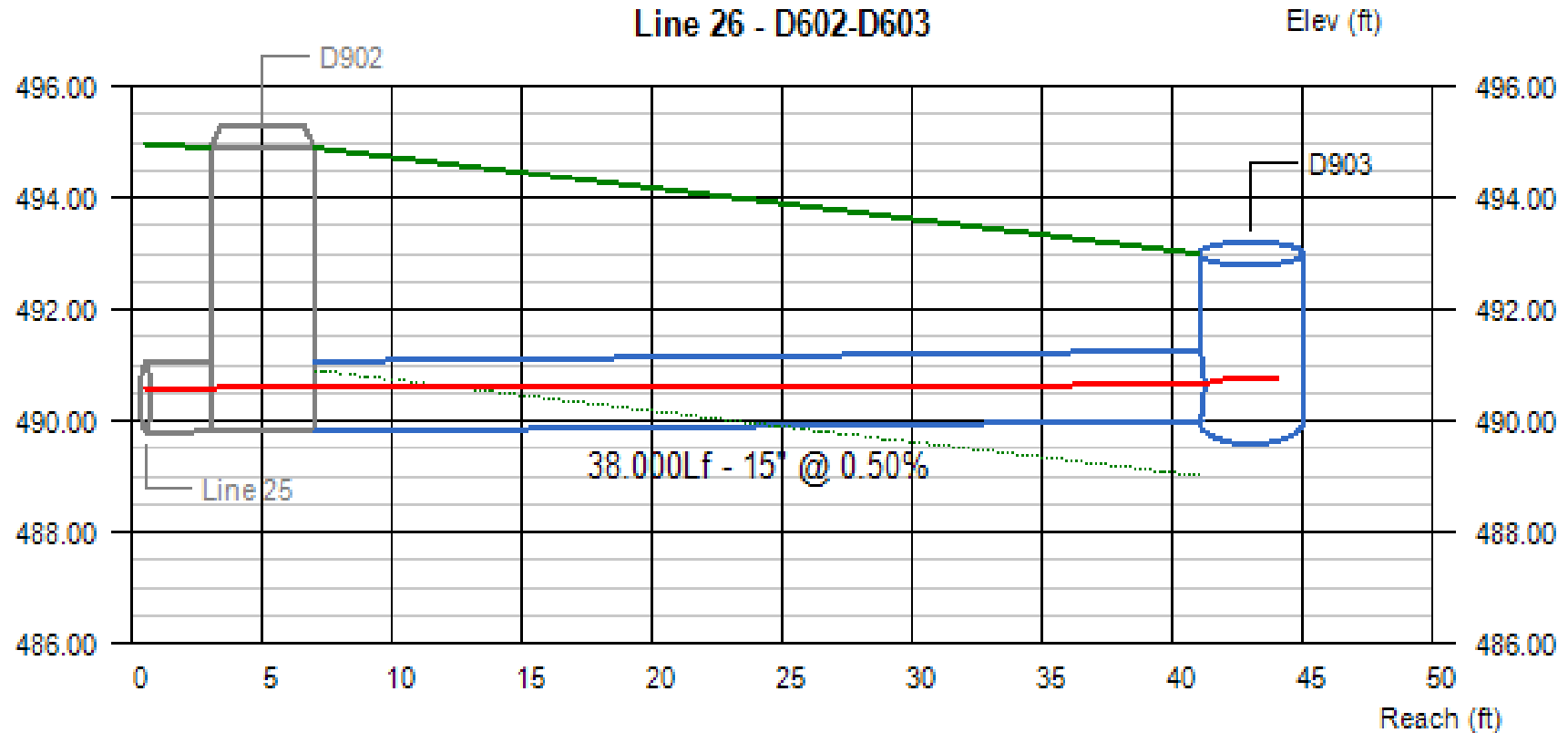
Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
25	1.63	489.52	489.81	1.03	0.77	0.81	490.55	490.58	490.62	1.50	2.05	5.73	3.84

Project File:

No. Lines: 43

Run Date: 5/5/2020

Line Profile (Line 26) - D602-D603

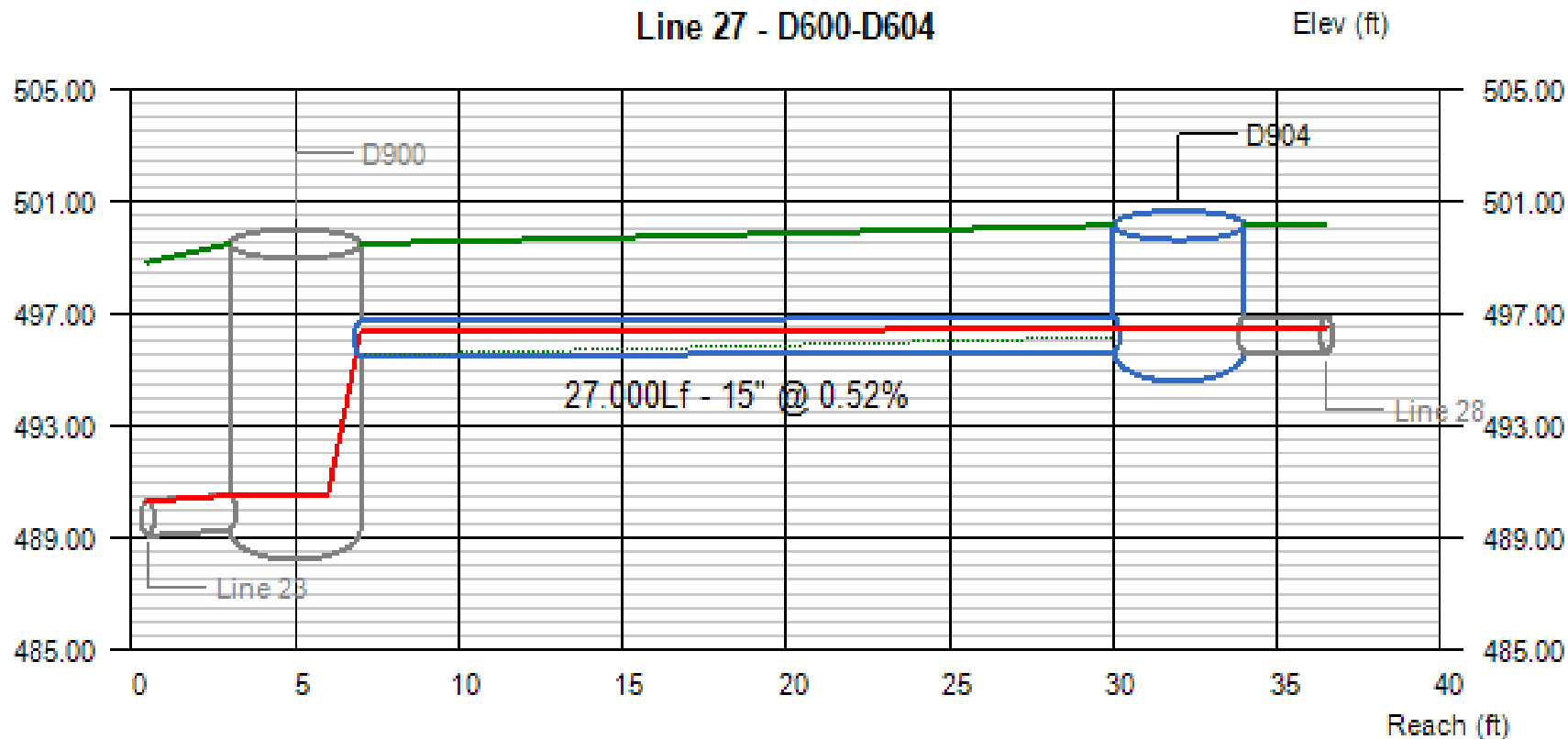


Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
26	1.64	489.81	490.00	0.81	0.64	0.74	490.62	490.64	490.74	1.96	2.60	3.84	1.75

Project File:

No. Lines: 43

Run Date: 5/5/2020

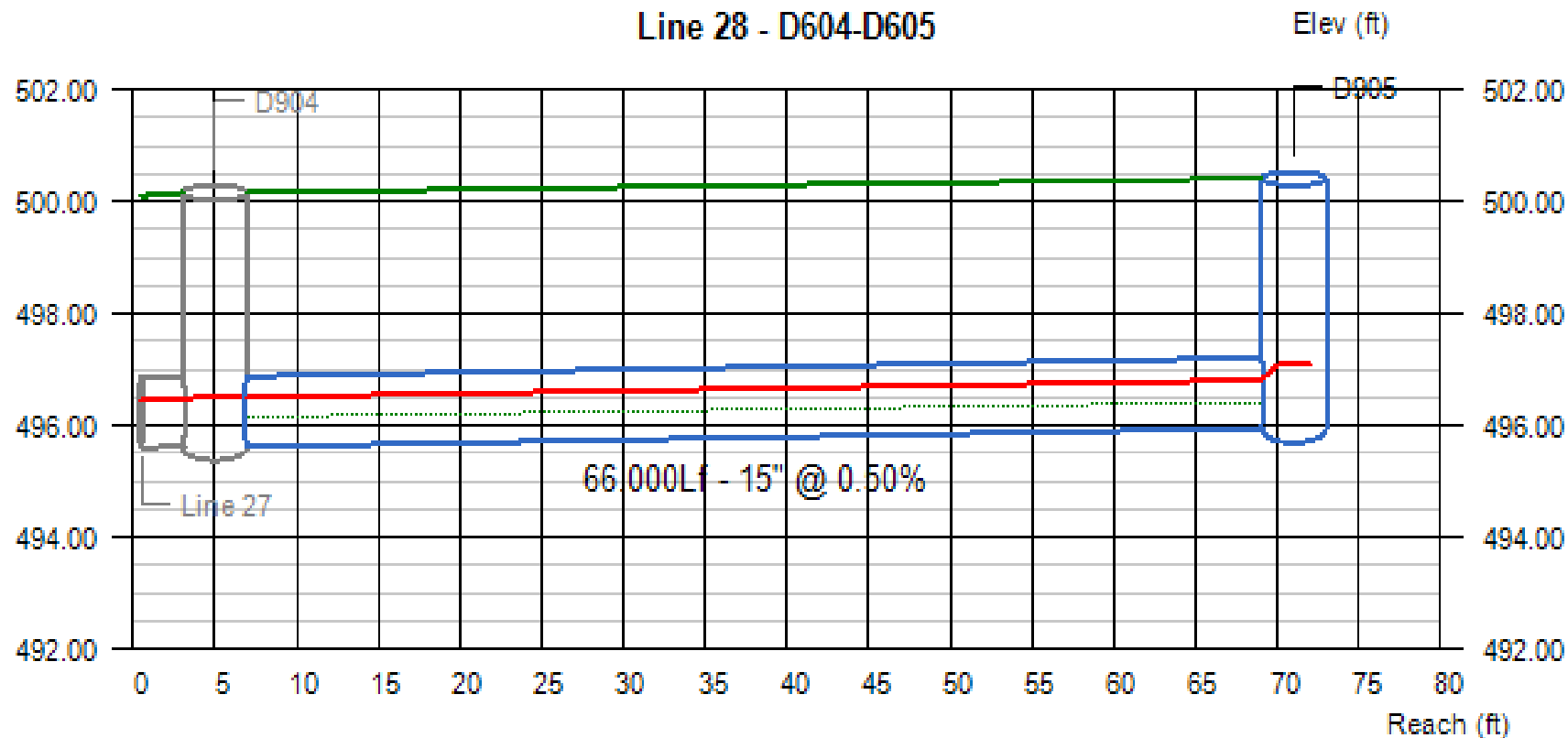


Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
27	3.70	495.48	495.62	0.84	0.84	0.88	496.32	496.46	496.50	4.21	4.21	2.77	3.28

Project File:

No. Lines: 43

Run Date: 5/5/2020

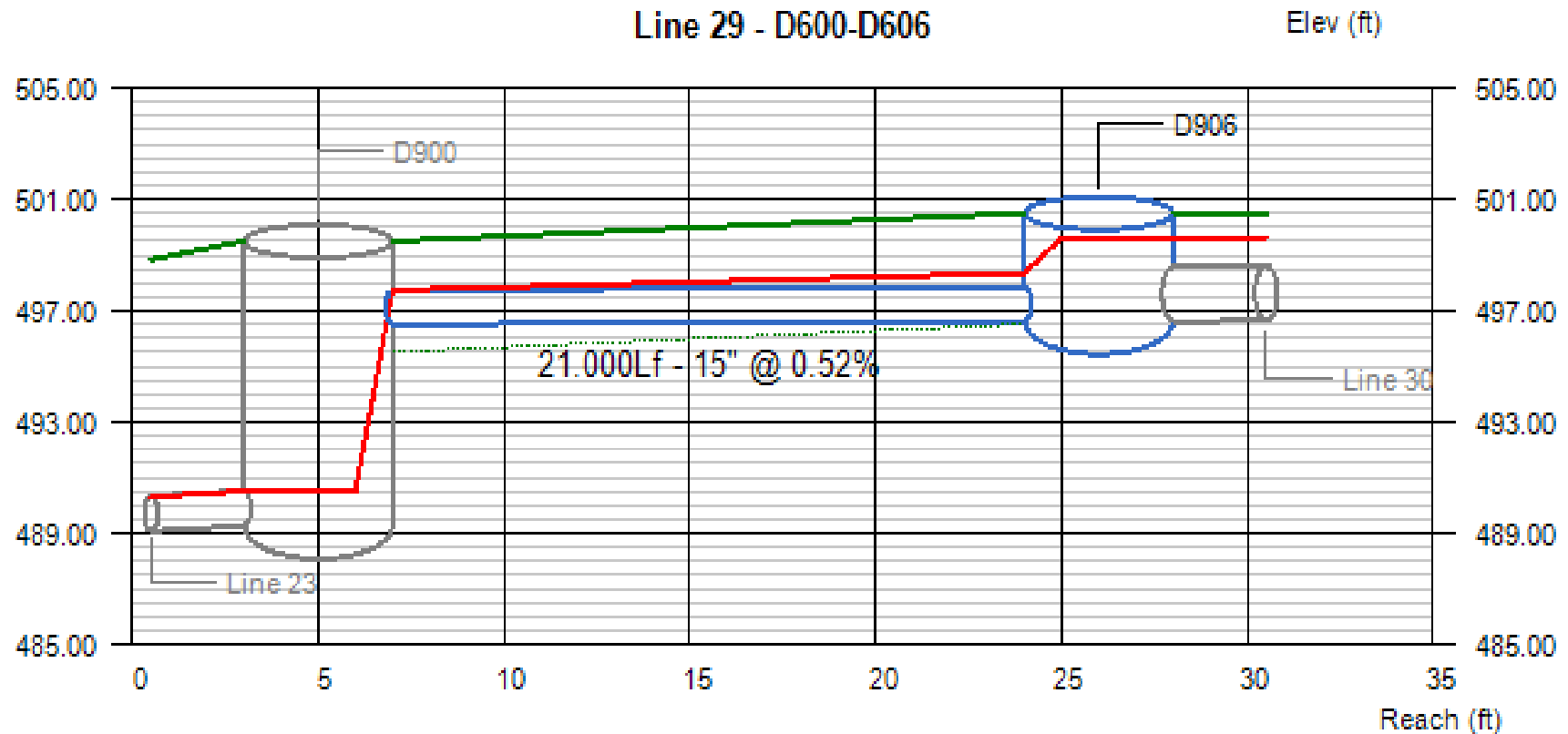


Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
28	3.74	495.62	495.95	0.88	0.85	1.13	496.50	496.80	497.08	4.03	4.18	3.28	3.21

Project File:

No. Lines: 43

Run Date: 5/5/2020

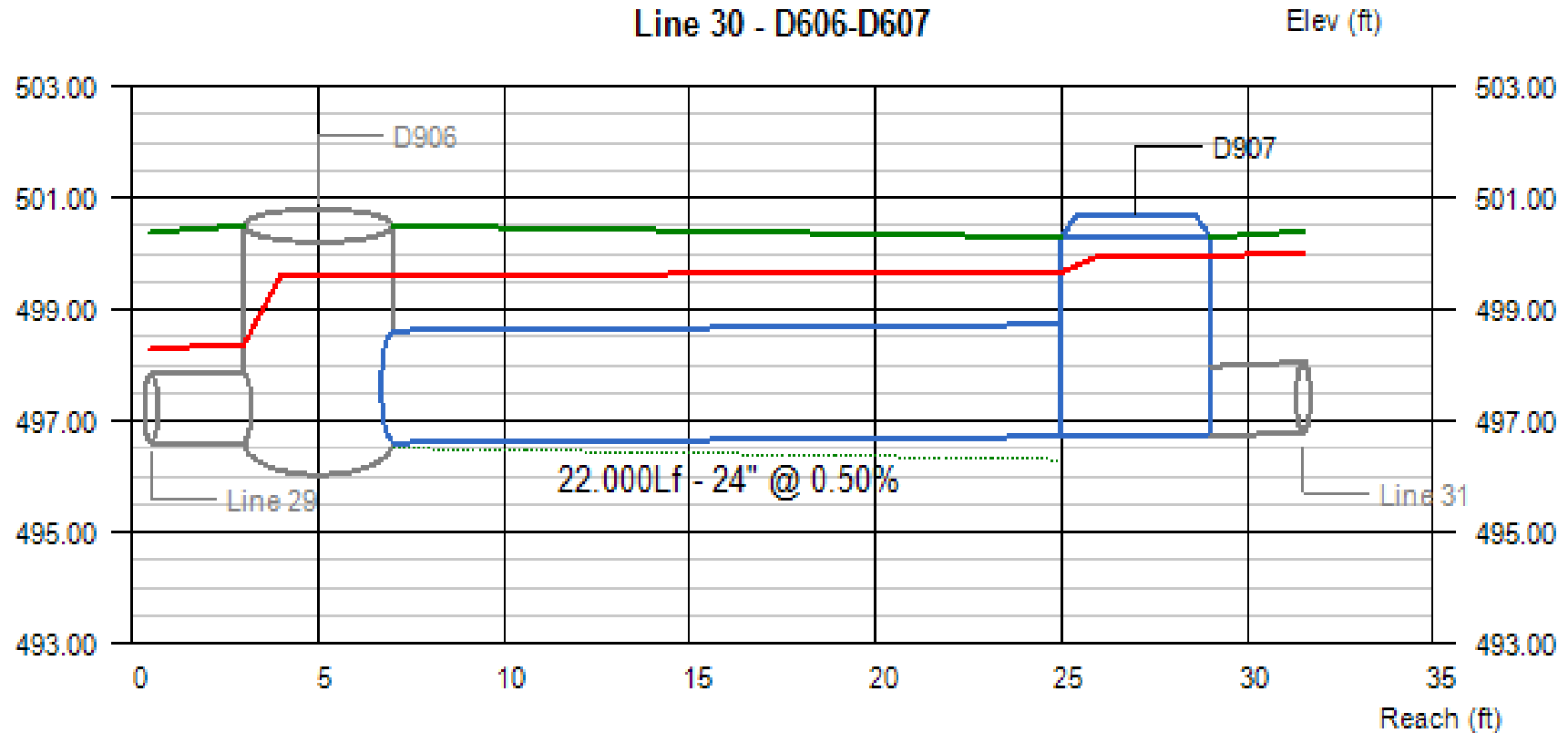


Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
29	11.01	496.50	496.61	1.25	1.25	3.00	497.75	498.36	499.61	8.98	8.98	1.75	2.64

Project File:

No. Lines: 43

Run Date: 5/5/2020



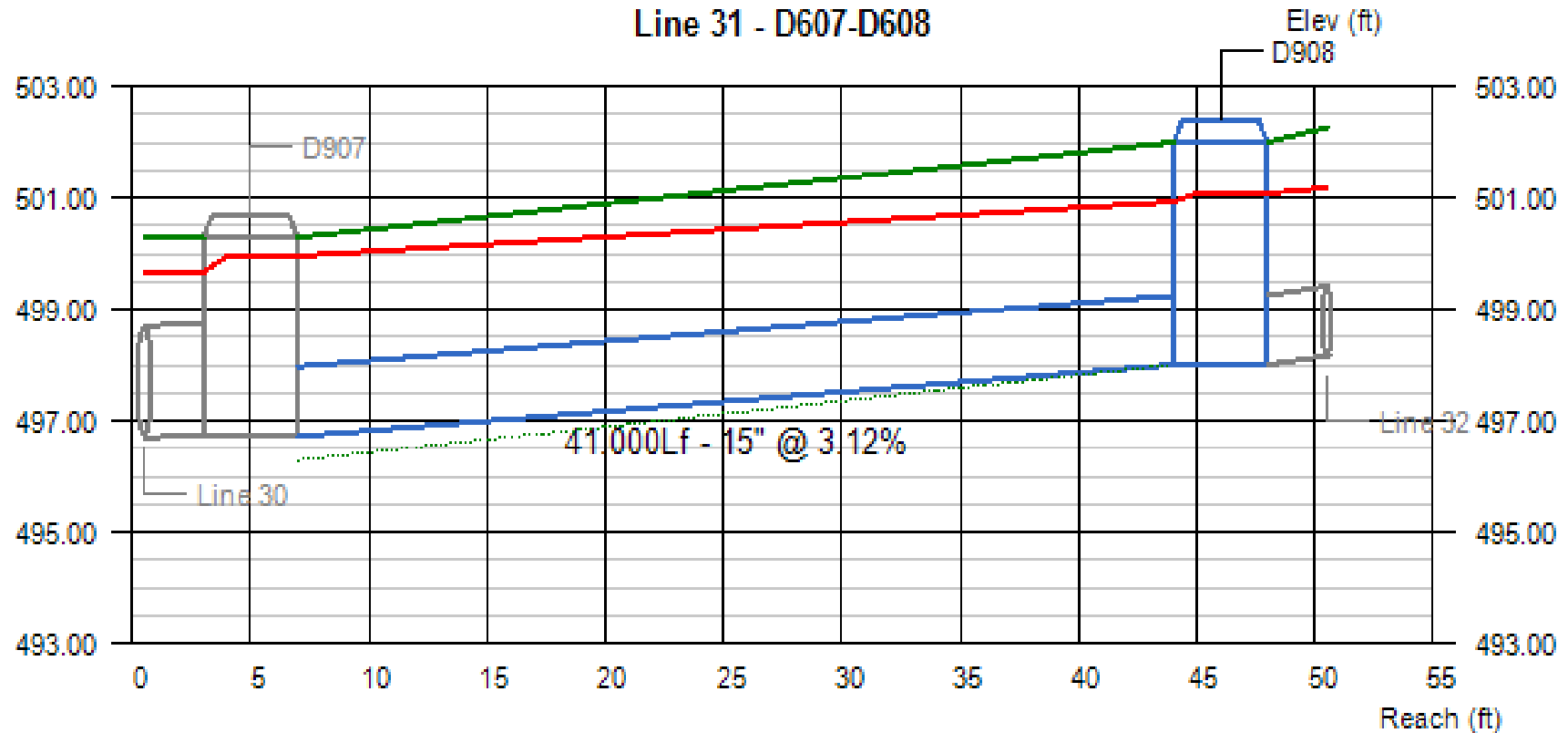
Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
30	11.05	496.61	496.72	2.00	2.00	3.24	499.61	499.67	499.96	3.52	3.52	1.89	1.57

Project File:

No. Lines: 43

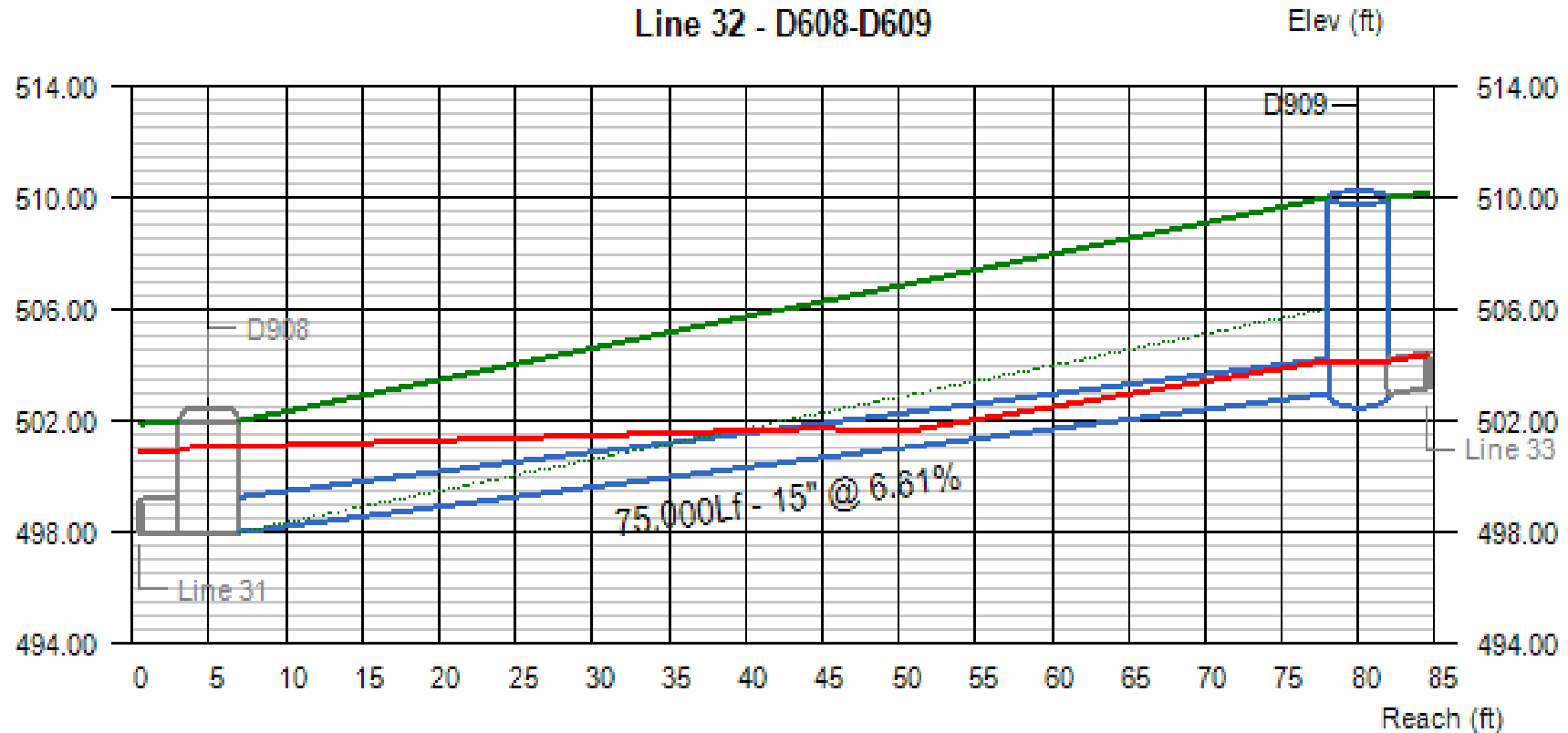
Run Date: 5/5/2020

Line Profile (Line 31) - D607-D608

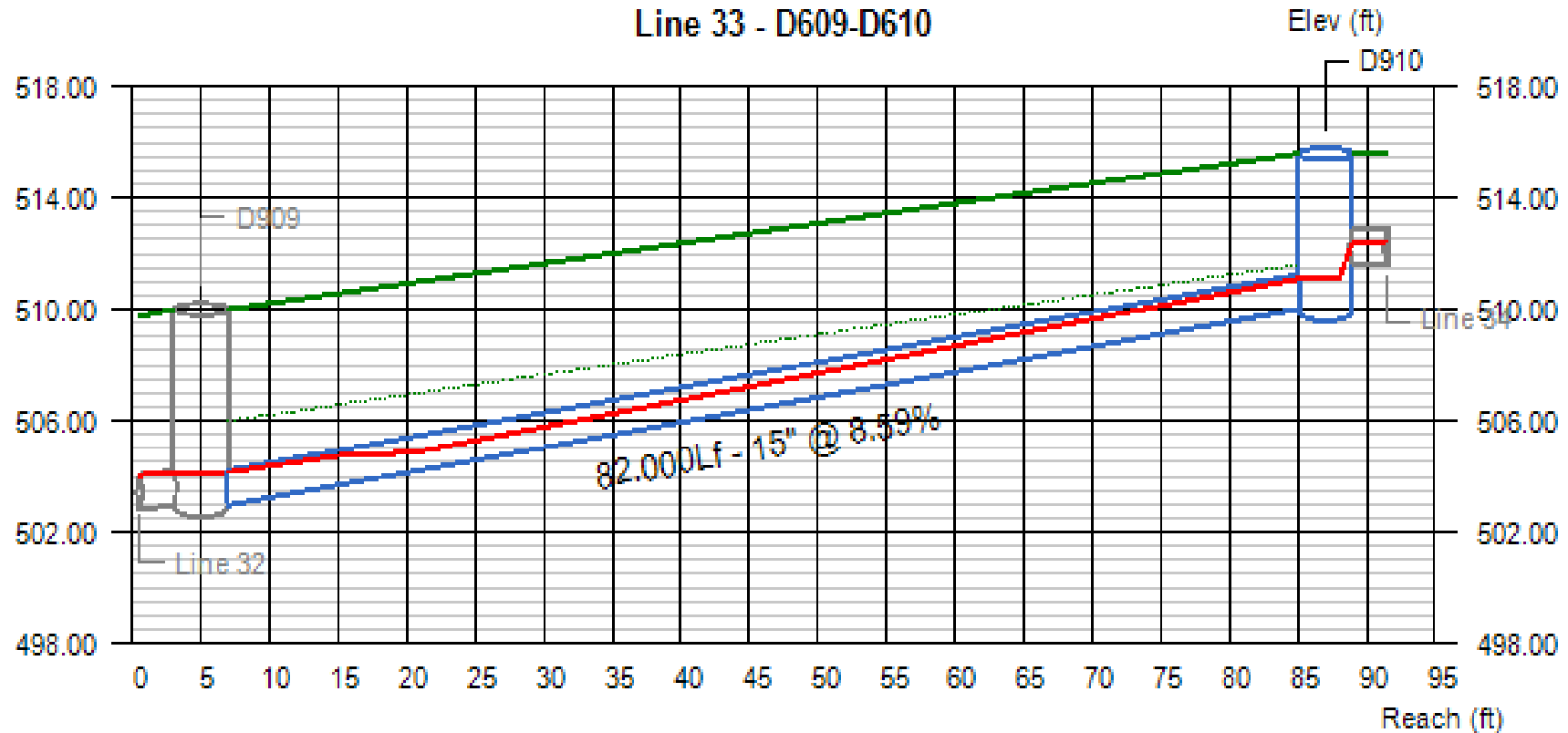


Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
31	9.91	496.72	498.00	1.25	1.25	3.07	499.96	500.92	501.07	8.08	8.08	2.32	2.75
Project File:								No. Lines: 43			Run Date: 5/5/2020		

Line Profile (Line 32) - D608-D609

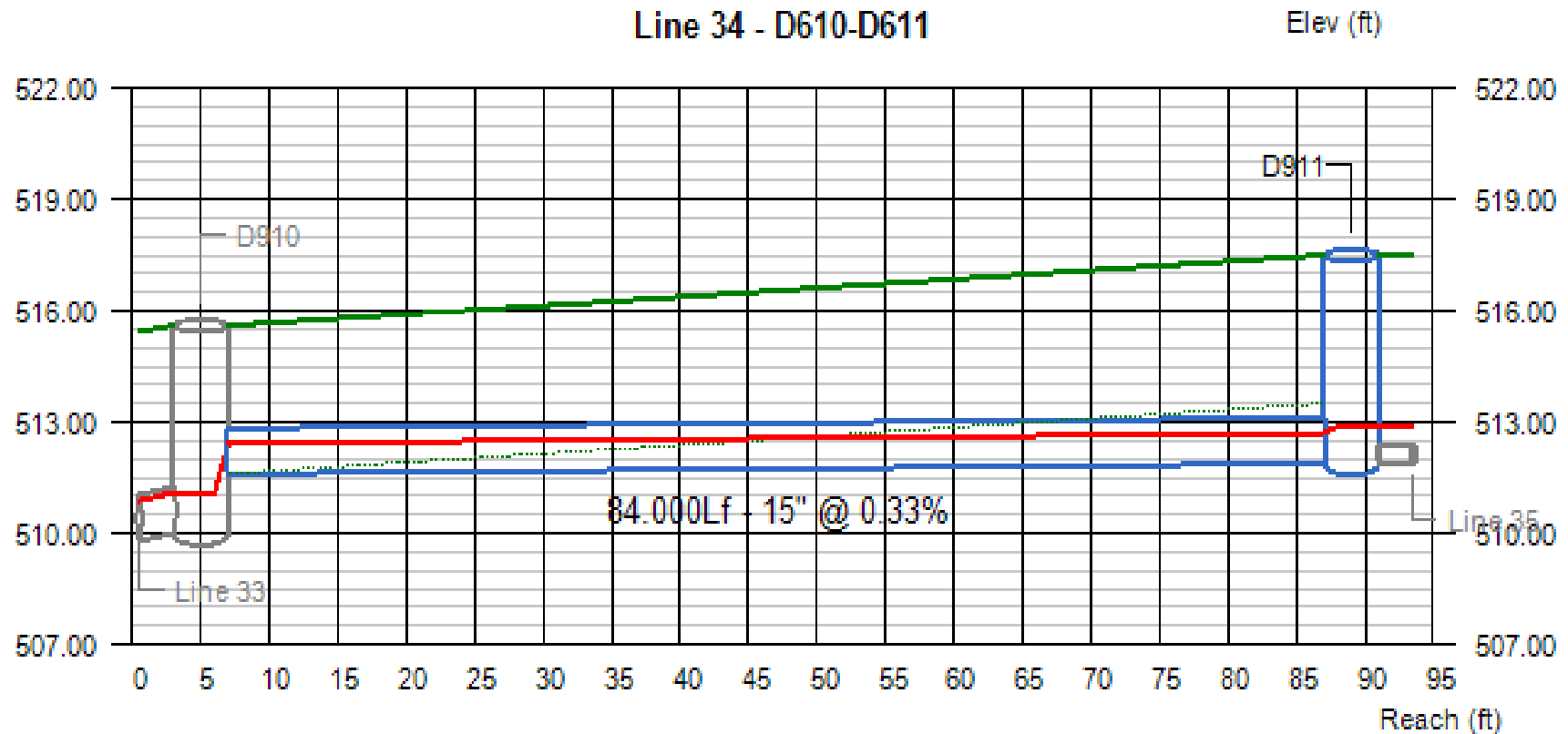


Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
32	9.96	498.00	502.96	1.25	1.18	1.18	501.07	504.14 j	504.14	8.12	8.29	2.75	5.79
Project File:								No. Lines: 43			Run Date: 5/5/2020		



Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
33	7.51	502.96	510.00	1.18	1.09	1.09	504.14	511.09 j	511.09	6.25	6.62	5.79	4.34
Project File:								No. Lines: 43			Run Date: 5/5/2020		

Line Profile (Line 34) - D610-D611



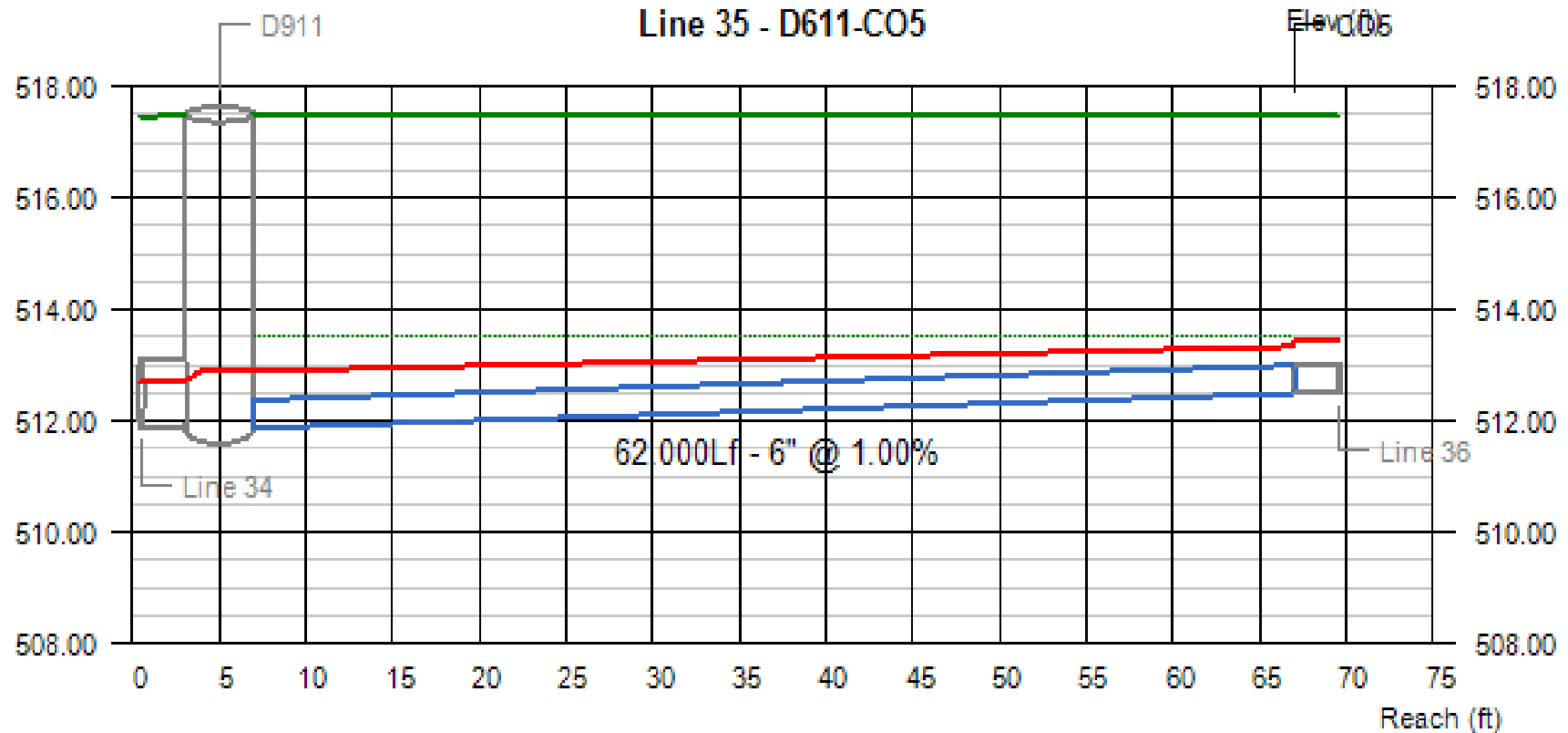
Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
34	2.96	511.59	511.87	0.84	0.84	1.02	512.43	512.71	512.89	3.37	3.37	2.75	4.38

Project File:

No. Lines: 43

Run Date: 5/5/2020

Line Profile (Line 35) - D611-CO5



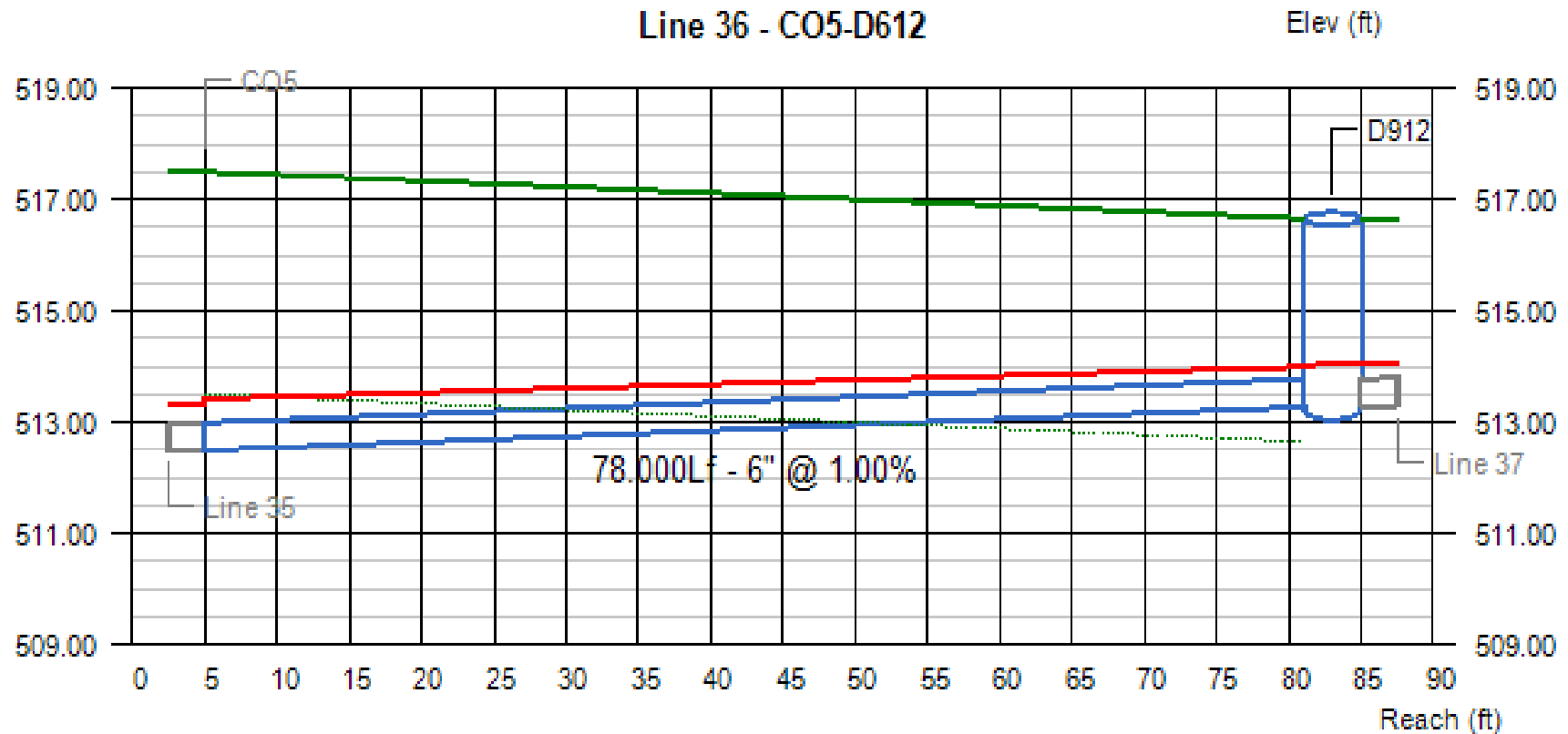
Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
35	0.47	511.87	512.49	0.50	0.50	0.93	512.89	513.33	513.42	2.40	2.40	5.13	4.51

Project File:

No. Lines: 43

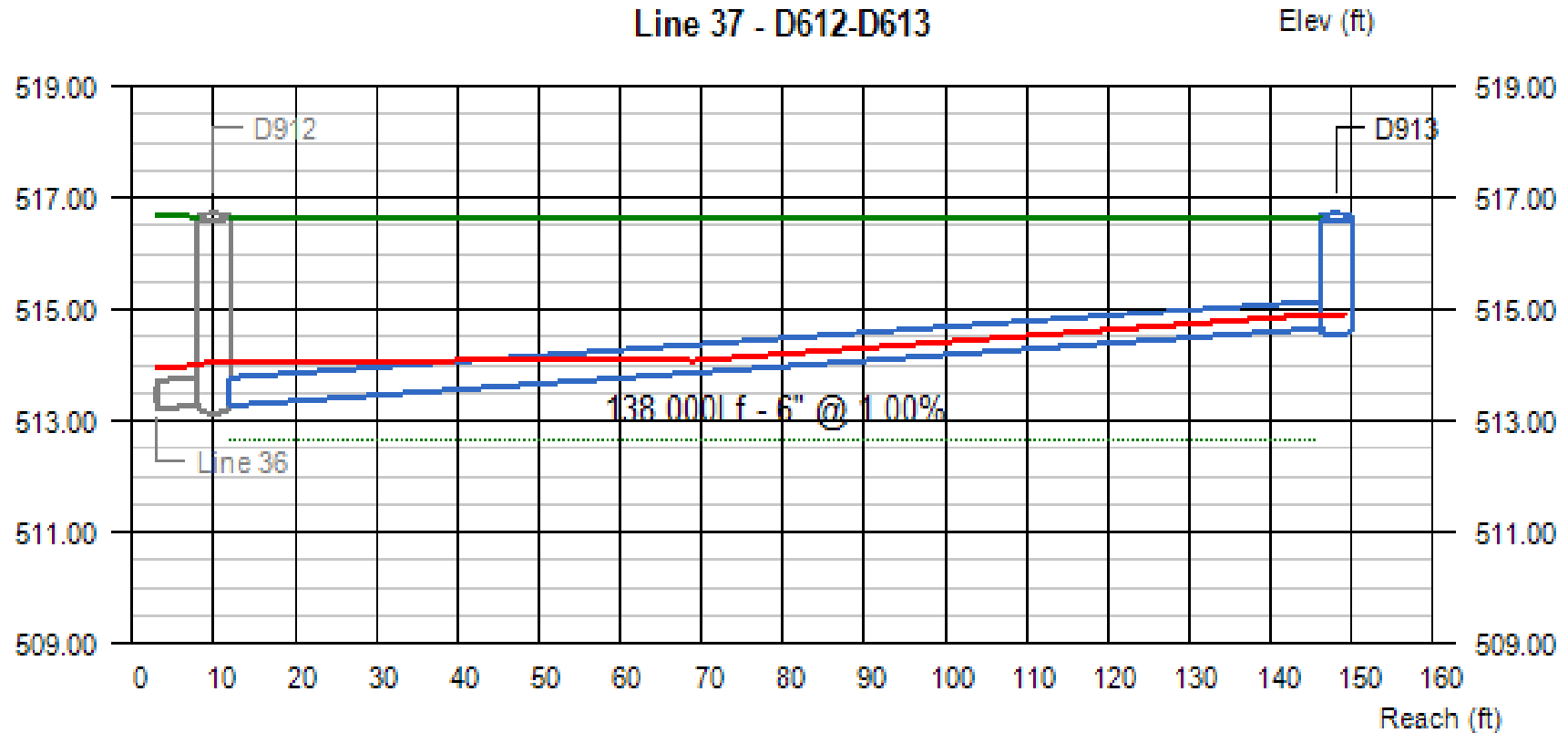
Run Date: 5/5/2020

Line Profile (Line 36) - CO5-D612



Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
36	0.48	512.49	513.27	0.50	0.50	0.76	513.42	513.99	514.03	2.44	2.44	4.51	2.88
Project File:								No. Lines: 43			Run Date: 5/5/2020		

Line Profile (Line 37) - D612-D613



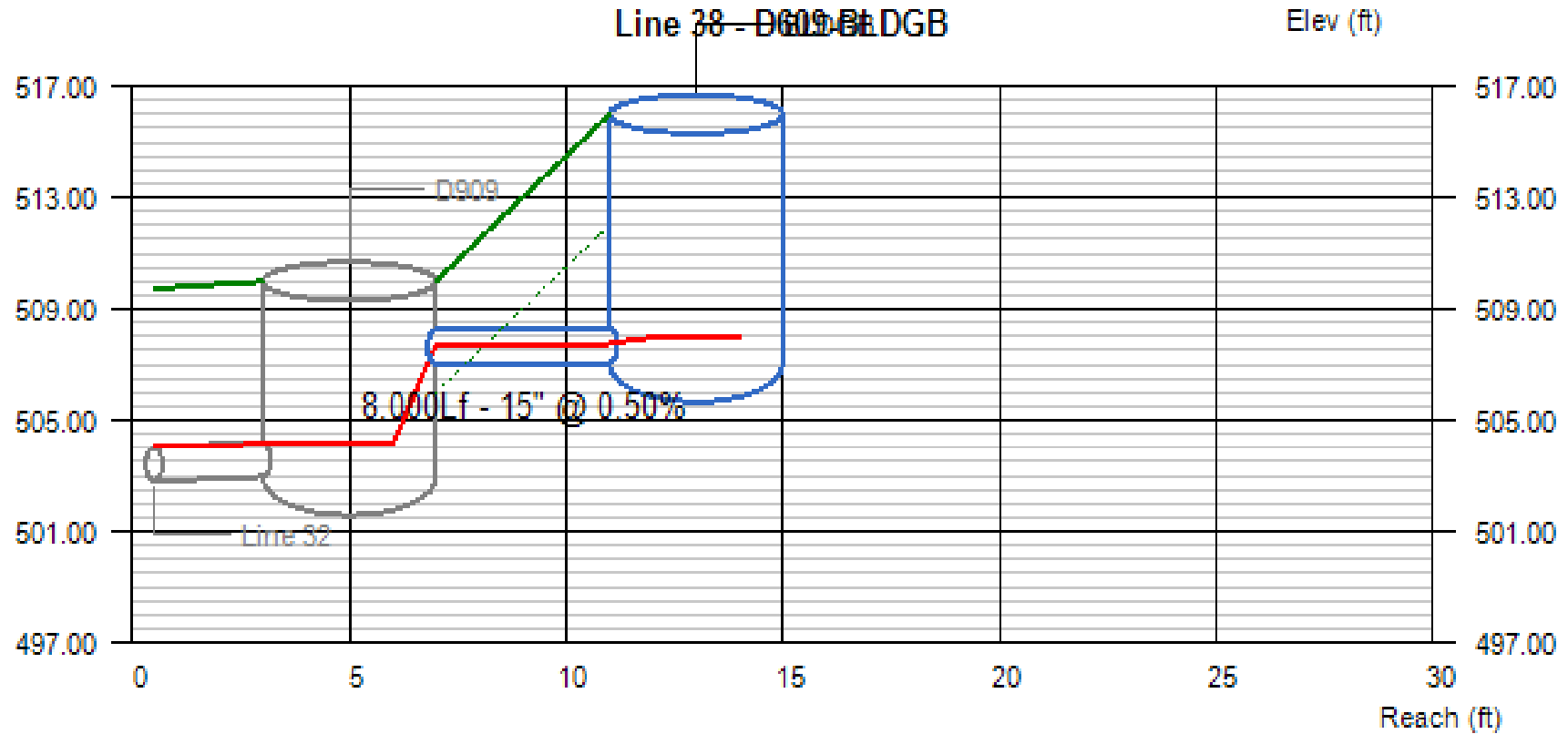
Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
37	0.25	513.27	514.65	0.50	0.25	0.25	514.03	514.90 j	514.90	1.27	2.53	2.88	1.50

Project File:

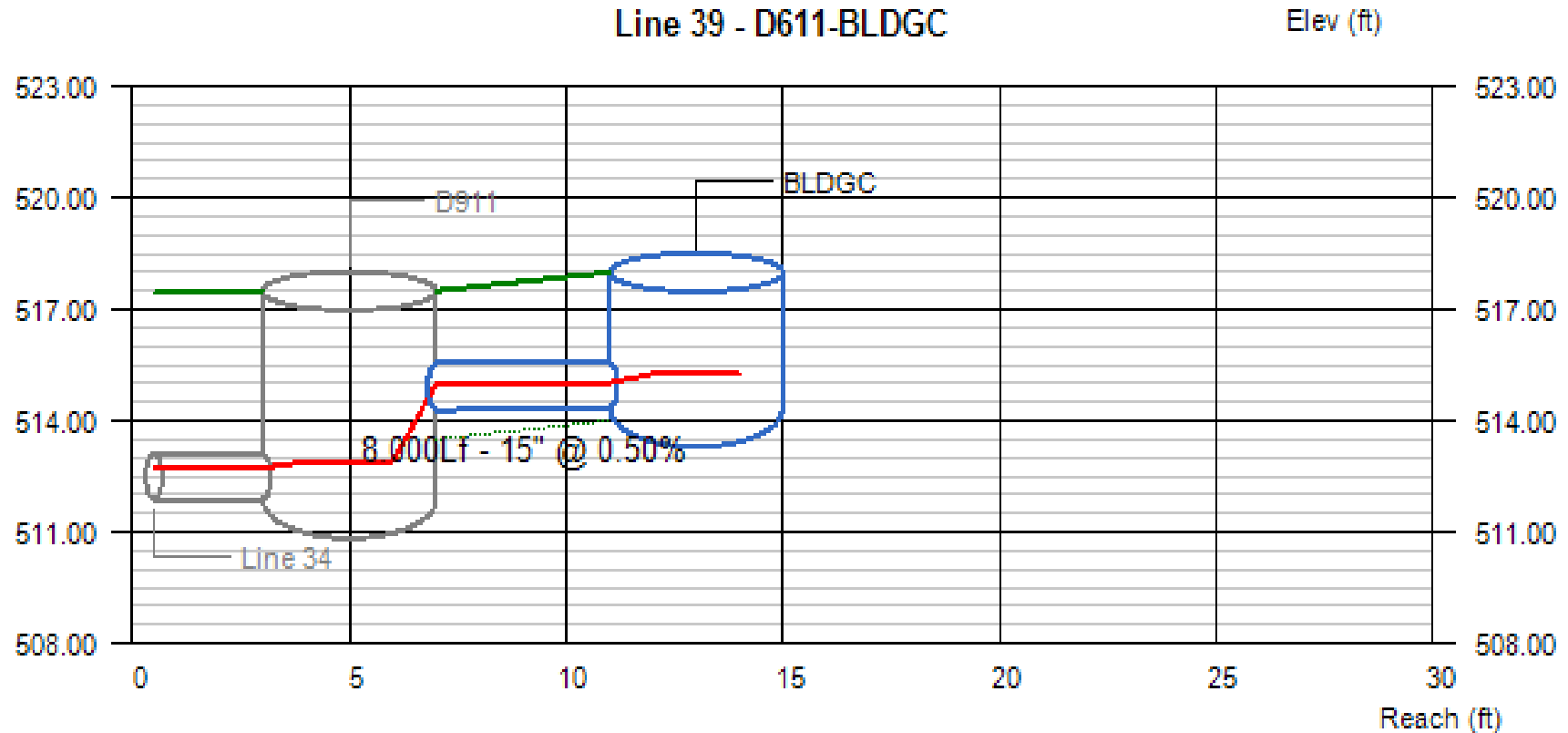
No. Lines: 43

Run Date: 5/5/2020

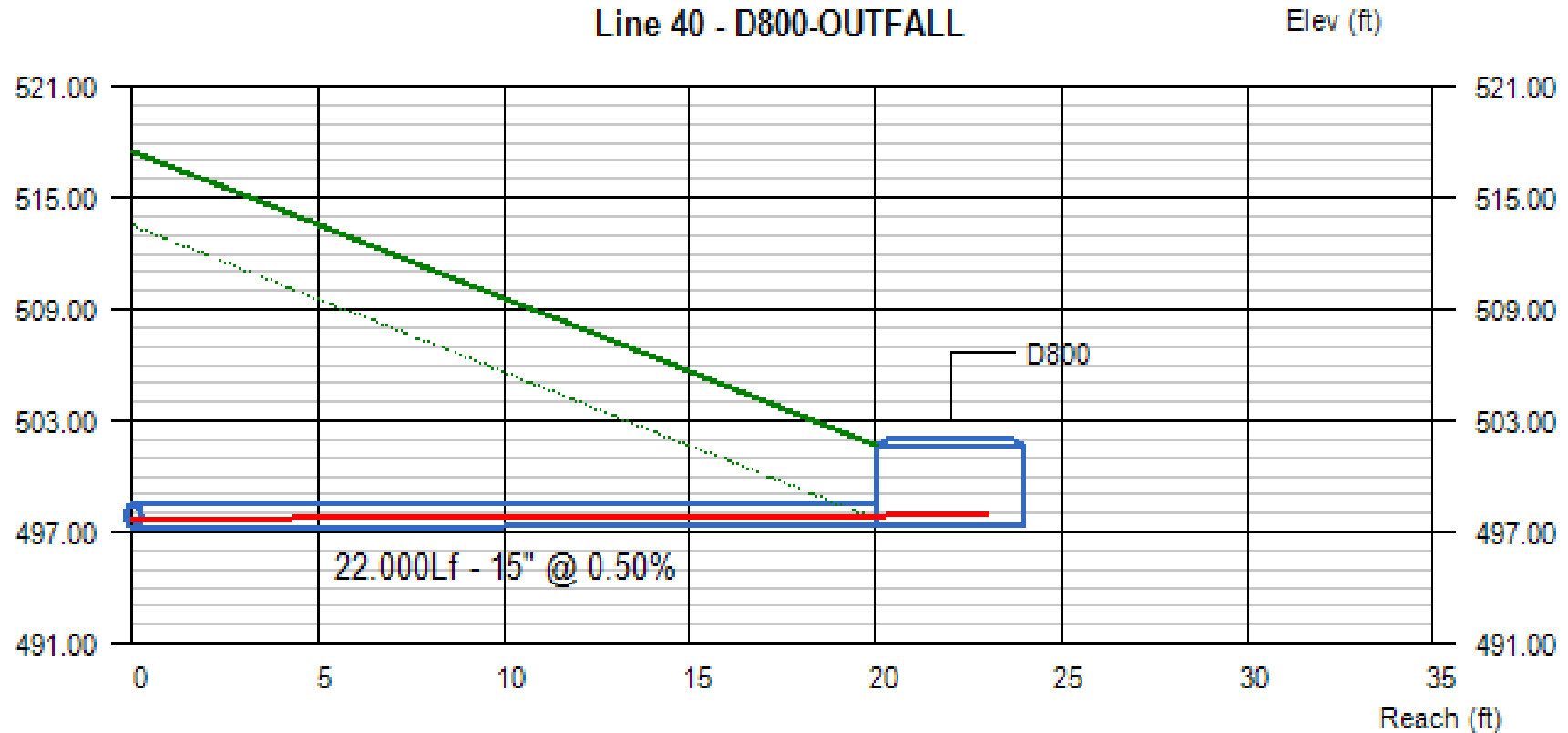
Line Profile (Line 38) - D609-BLDGB



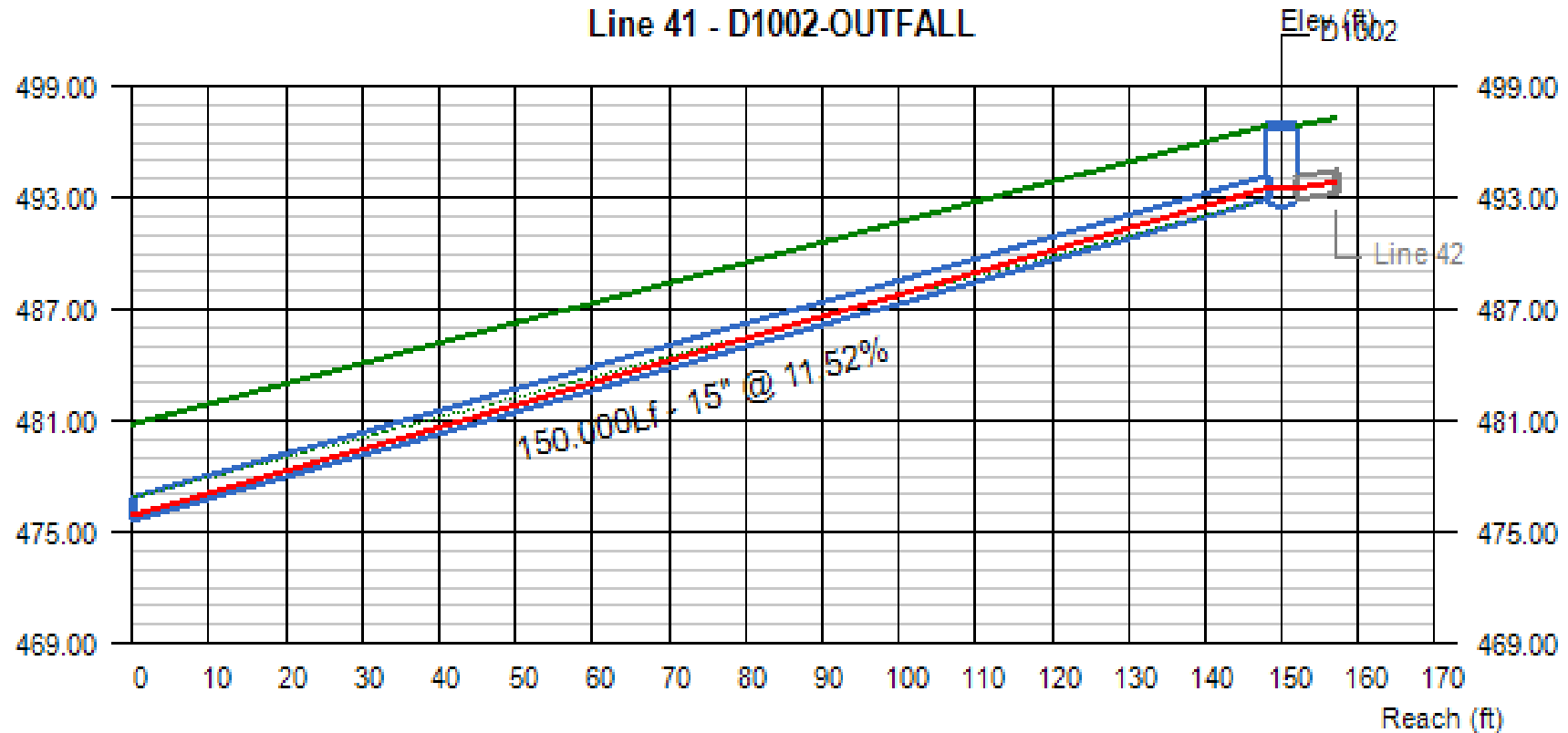
Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
38	2.75	507.00	507.04	0.70	0.70	0.93	507.70	507.74	507.97	3.89	3.89	1.75	7.71
Project File:								No. Lines: 43			Run Date: 5/5/2020		



Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
39	2.69	514.29	514.33	0.69	0.69	0.92	514.98	515.02	515.25	3.87	3.88	1.96	2.42
Project File:								No. Lines: 43			Run Date: 5/5/2020		



Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
40	1.43	497.25	497.36	0.47	0.48	0.65	497.72	497.84	498.01	3.41	3.30	19.00	3.07
Project File:								No. Lines: 43			Run Date: 5/5/2020		



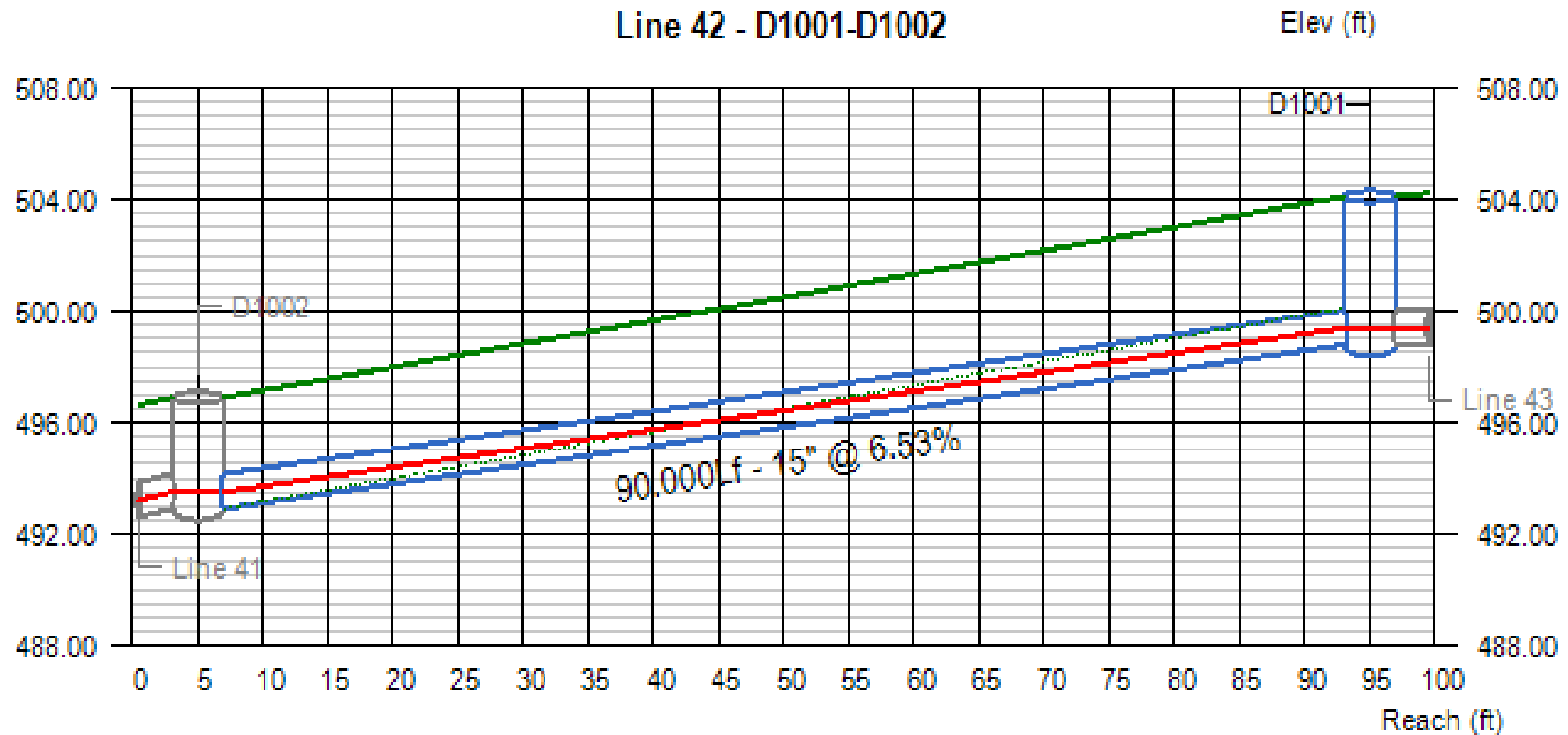
Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
41	2.25	475.62	492.90	0.27	0.60	0.60	475.89	493.50	493.50	11.50	3.88	3.95	2.75

Project File:

No. Lines: 43

Run Date: 5/5/2020

Line Profile (Line 42) - D1001-D1002

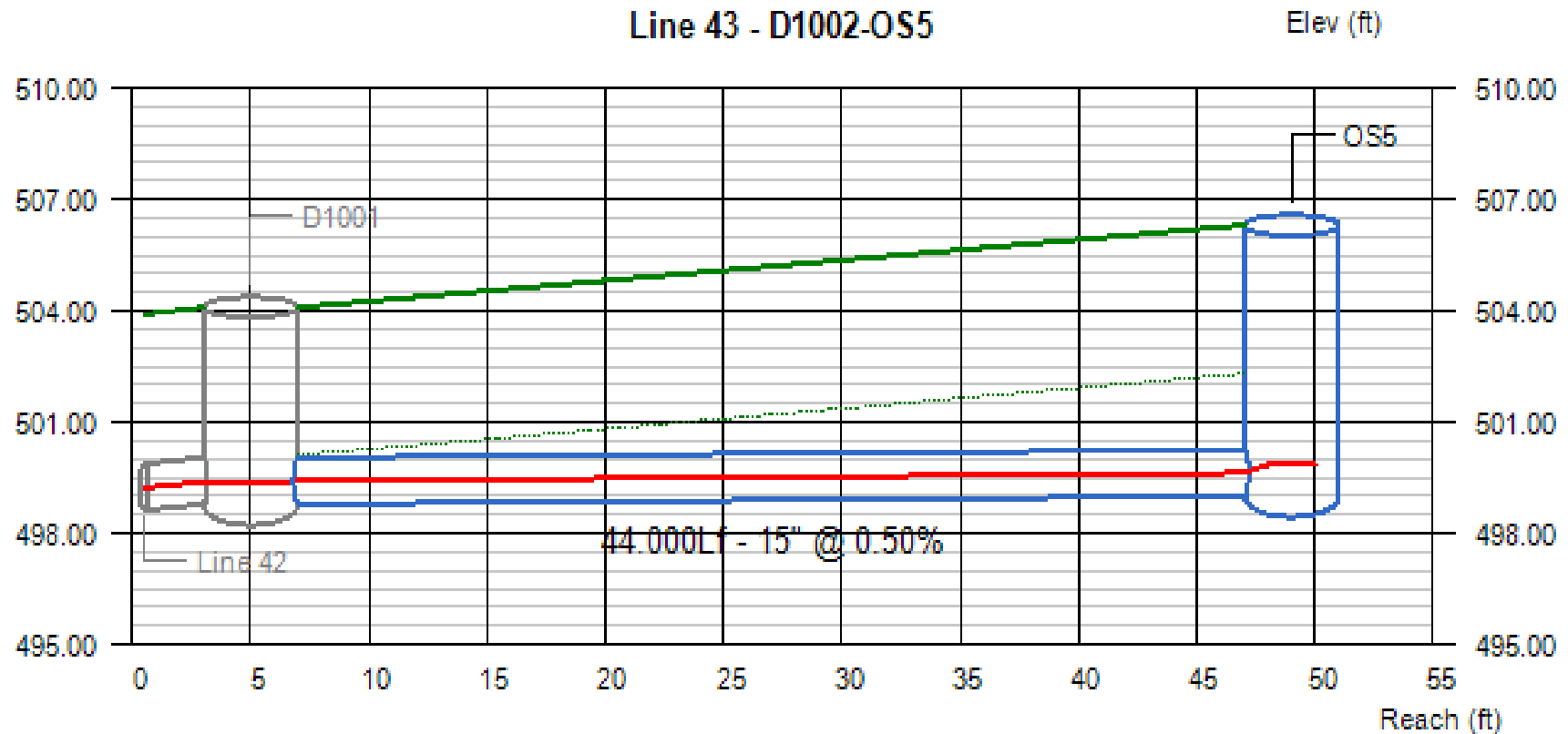


Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
42	2.25	492.90	498.78	0.60	0.60	0.60	493.50	499.38	499.38	3.88	3.88	2.75	4.07

Project File:

No. Lines: 43

Run Date: 5/5/2020



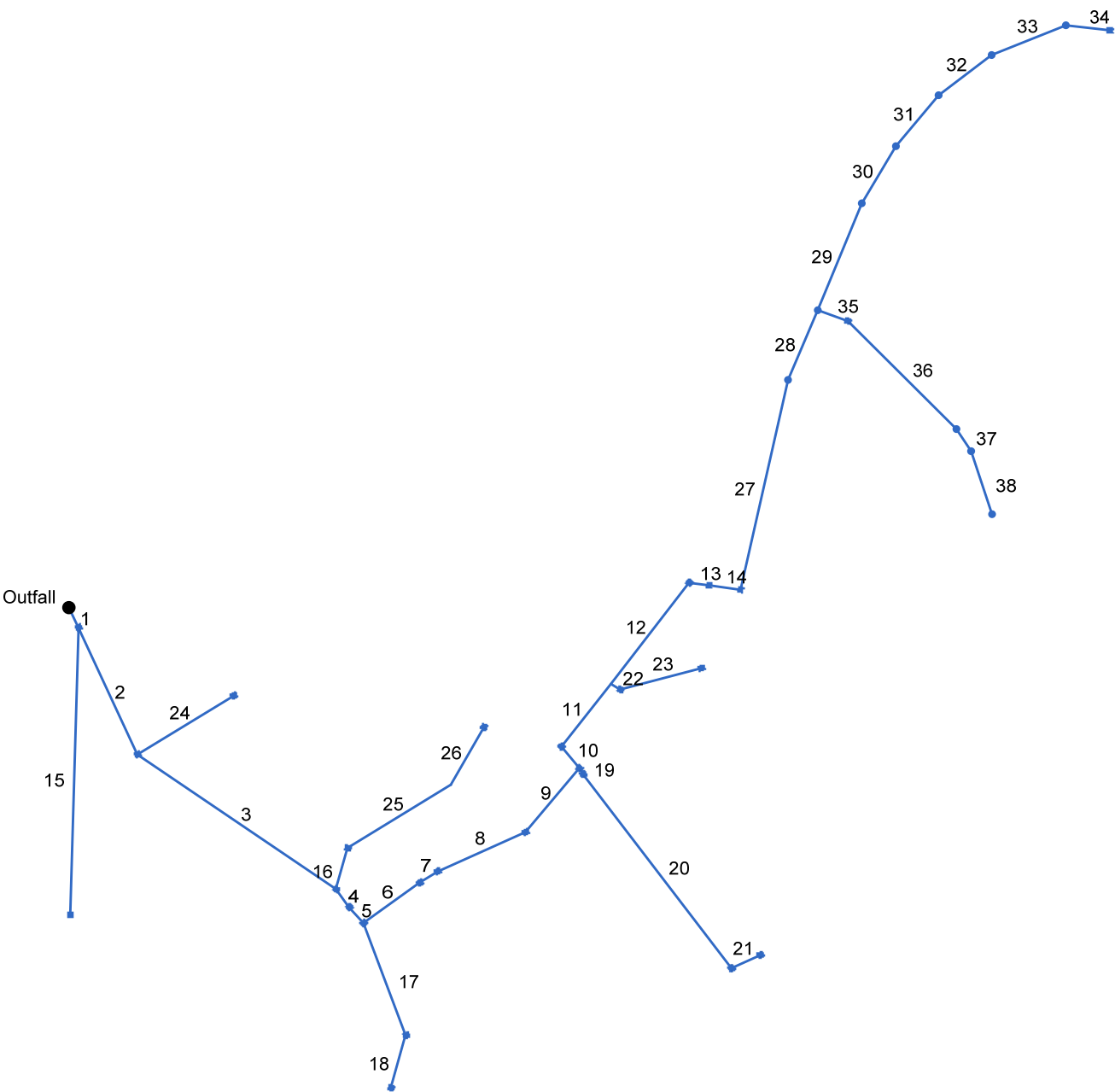
Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
43	2.25	498.78	499.00	0.62	0.62	0.83	499.40	499.62	499.83	3.71	3.70	4.07	6.05

Project File:

No. Lines: 43

Run Date: 5/5/2020

BNE West Orange Pipe Sizing



Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line Size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line Slope (%)	HGL Down (ft)	HGL Up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns Line No.	Junction Type
1	OUTFALL-EX1	49.66	36	Cir	17.000	397.38	397.81	2.529	398.76	400.10	0.87	400.10	End	Combination
2	EX1-EX3	42.26	30	Cir	105.000	399.81	406.04	5.933	400.90	408.21	n/a	408.21	1	Combination
3	EX-3-EX4	36.43	30	Cir	180.000	406.74	412.03	2.939	408.21	414.07	n/a	414.07	2	Combination
4	EX4-EX6	34.49	24	Cir	17.000	416.03	416.82	4.647	417.21	418.74	0.96	418.74	3	Grate
5	EX6-EX7	33.27	24	Cir	16.000	416.82	418.17	8.438	418.74	420.07	n/a	420.07 j	4	Combination
6	EX7-EX10	30.22	24	Cir	52.000	418.82	419.98	2.231	420.21	421.85	0.76	421.85	5	Grate
7	EX10-EX11	30.08	24	Cir	16.000	419.98	420.40	2.625	421.85	422.26	n/a	422.26 j	6	Combination
8	EX11-EX12	29.23	24	Cir	72.000	420.50	423.75	4.514	422.26	425.60	1.05	425.60	7	Combination
9	EX12-EX13	28.30	24	Cir	63.000	428.80	431.74	4.667	429.84	433.57	2.05	433.57	8	Combination
10	EX13-EX15	26.29	24	Cir	21.000	432.74	432.89	0.714	434.74*	434.98*	1.60	436.58	9	Combination
11	EX13-JOINT	26.15	18	Cir	60.000	433.05	438.54	9.150	436.58	440.03	n/a	440.03	10	None
12	JOINT-EX23	24.33	18	Cir	96.000	438.54	447.33	9.156	440.03	448.81	n/a	448.81 j	11	Combination
13	EX23-EX21	23.55	18	Cir	15.000	447.33	447.38	0.333	448.83*	449.47*	1.38	450.85	12	Grate
14	EX21-EX22	22.77	30	Cir	24.000	447.38	447.58	0.833	450.85*	450.92*	0.50	451.42	13	Combination
15	EX1-EX2	5.05	18	Cir	216.000	399.51	401.22	0.792	400.26	402.08	n/a	402.08	1	Combination
16	EX4-EX5	0.90	12	Cir	32.000	416.63	417.44	2.531	416.89	417.84	0.16	417.84	3	Grate
17	EX7-EX8	0.38	24	Cir	90.000	420.92	426.44	6.133	421.03	426.65	0.07	426.65	5	Combination
18	EX8-EX9	0.03	12	Cir	41.000	426.44	427.54	2.683	426.65	427.61	n/a	427.61 j	17	Grate
19	EX13-EX14	1.70	18	Cir	5.000	432.29	432.63	6.800	433.57	433.12	n/a	433.12	9	Grate
20	EX14-EX18	1.57	18	Cir	184.000	432.68	457.82	13.663	433.12	458.29	0.25	458.29	19	Combination
21	EX18-EX19	1.06	18	Cir	24.000	458.02	461.93	16.292	458.29	462.32	n/a	462.32	20	Combination
22	JOINT-EX16	2.01	18	Cir	8.000	438.54	440.06	19.000	440.03	440.59	0.23	440.59	11	Combination
23	EX16-EX20	1.81	18	Cir	63.000	440.06	449.08	14.317	440.59	449.59	n/a	449.59 j	22	Combination
24	EX3-ROOF	4.18	18	Cir	85.000	406.74	414.80	9.482	408.21	415.58	n/a	415.58 j	2	Grate

BNE West Orange Pipe Sizing

Number of lines: 38

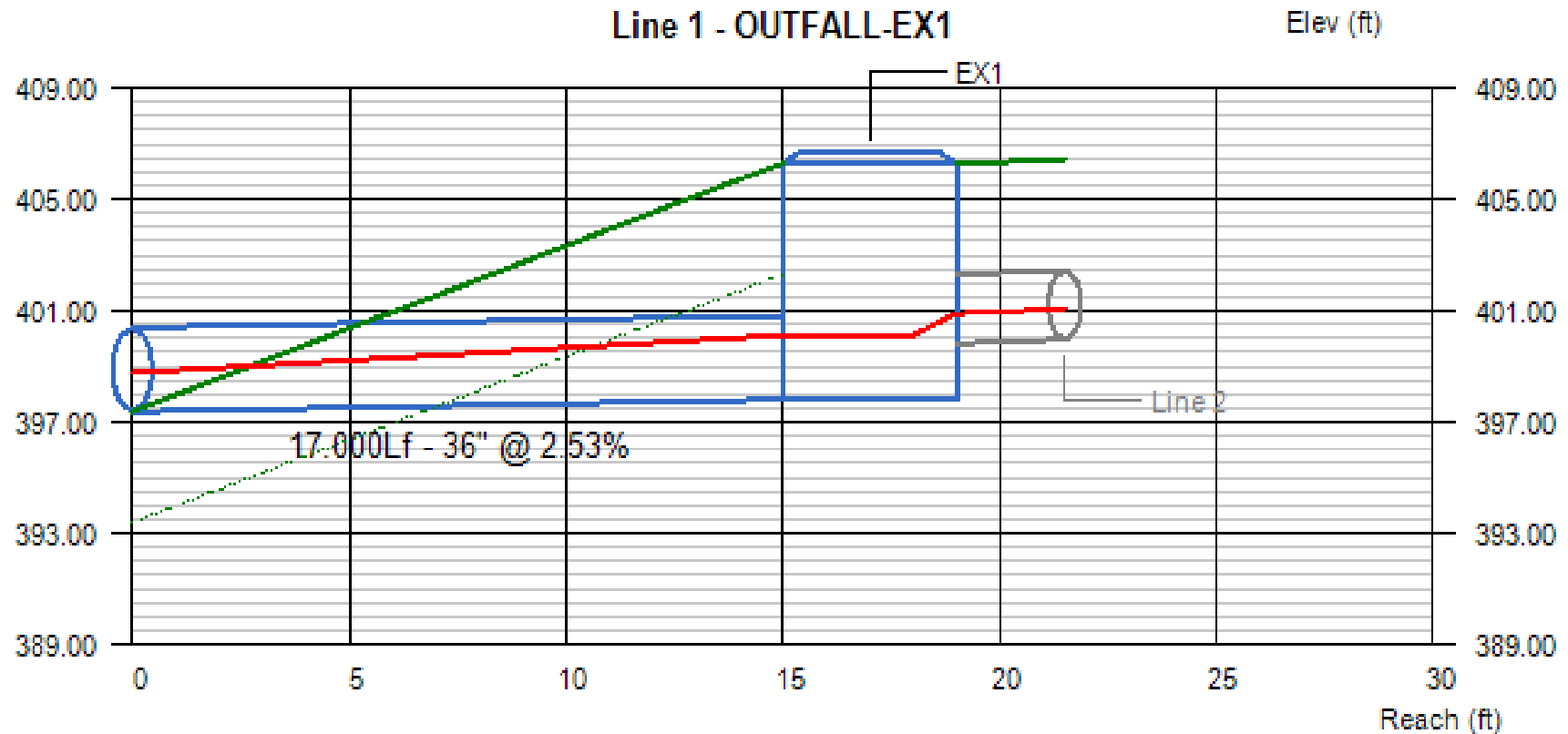
Run Date: 5/5/2020

NOTES: Return period = 25 Yrs. ; *Surcharged (HGL above crown). ; j - Line contains hyd. jump.

Storm Sewer Summary Report

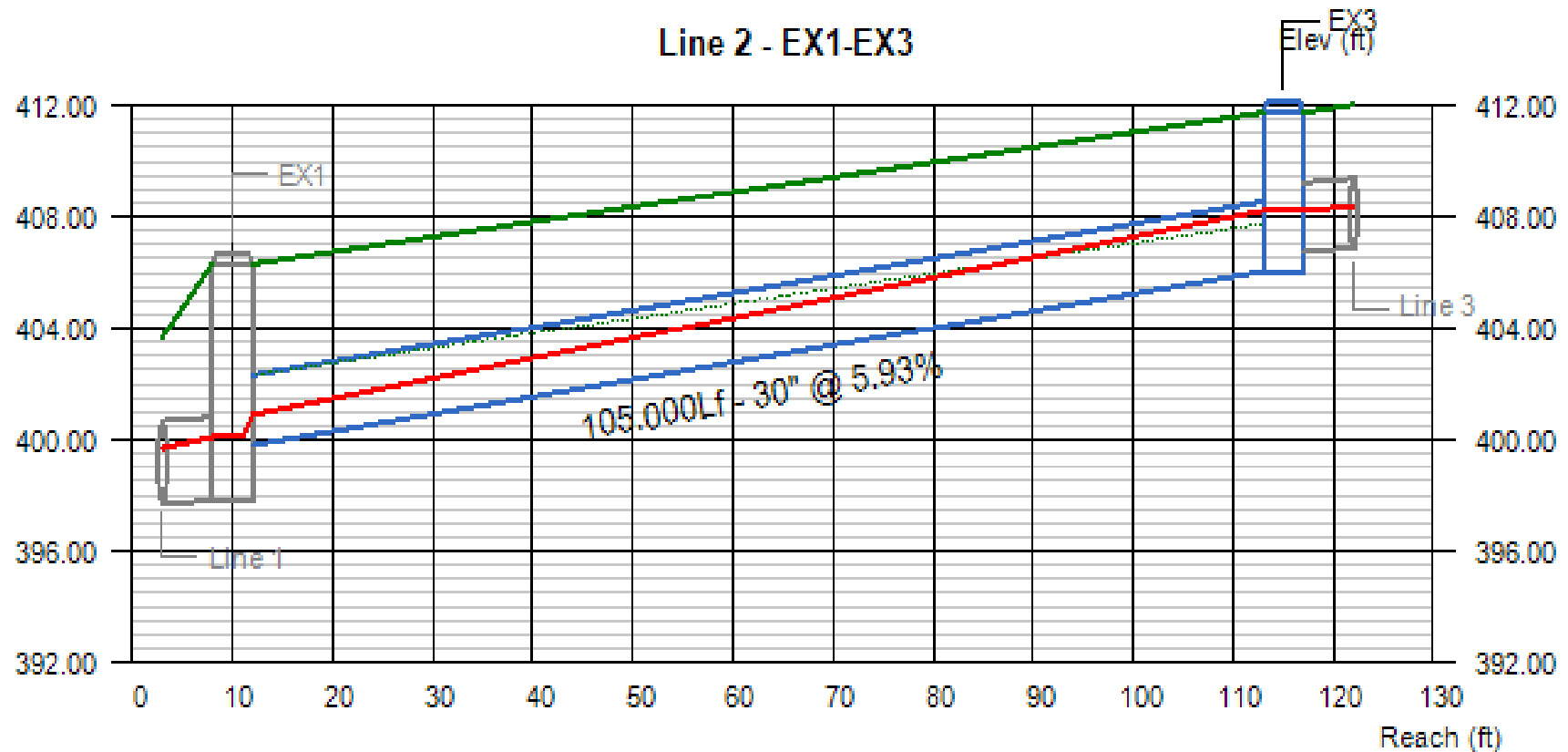
Line No.	Line ID	Flow rate (cfs)	Line Size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line Slope (%)	HGL Down (ft)	HGL Up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns Line No.	Junction Type
25	EX5-JOINT2	0.33	12	Cir	91.000	417.44	420.20	3.033	417.84	420.44	n/a	420.44 j	16	None
26	JOINT2-EX17	0.34	12	Cir	50.000	420.20	421.71	3.020	420.44	421.95	n/a	421.95	25	Grate
27	EX22-D100	21.09	24	Cir	162.000	447.88	453.40	3.407	451.42	455.04	n/a	455.04 j	14	Manhole
28	D100-D101	19.35	24	Cir	57.000	453.40	455.60	3.860	455.04	457.18	n/a	457.18 j	27	Manhole
29	D101-D105	0.94	15	Cir	87.000	455.60	460.60	5.747	457.18	460.98	n/a	460.98 j	28	Manhole
30	D105-D106	0.95	15	Cir	50.000	460.60	463.90	6.600	460.98	464.28	0.03	464.28	29	Manhole
31	D106-D107	0.96	15	Cir	50.000	463.90	467.30	6.800	464.28	467.68	0.04	467.68	30	Manhole
32	D107-D108	0.97	15	Cir	50.000	467.30	471.80	9.000	467.68	472.19	0.04	472.19	31	Manhole
33	D108-D109	0.98	15	Cir	60.000	471.80	477.30	9.167	472.19	477.69	0.07	477.69	32	Manhole
34	D109-D110	0.99	15	Cir	33.000	477.30	480.50	9.697	477.69	480.89	n/a	480.89	33	Combination
35	D101-D102	18.51	24	Cir	24.000	455.60	458.00	10.000	457.18	459.55	n/a	459.55 j	28	Combination
36	D102-D103	17.13	24	Cir	115.000	458.00	473.70	13.652	459.55	475.19	n/a	475.19 j	35	Manhole
37	D103-D104	17.13	24	Cir	20.000	473.70	474.00	1.500	475.19	475.49	n/a	475.49	36	Manhole
38	D104-OS1	17.13	24	Cir	50.000	474.00	479.00	10.000	475.49	480.49	n/a	480.49	37	Manhole
BNE West Orange Pipe Sizing									Number of lines: 38				Run Date: 5/5/2020	
NOTES: Return period = 25 Yrs. ; *Surcharged (HGL above crown). ; j - Line contains hyd. jump.														

Line Profile (Line 1) - OUTFALL-EX1



Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
1	49.66	397.38	397.81	1.38	2.29	2.29	398.76	400.10	400.10	15.66	8.57	-3.00	5.50
BNE West Orange Pipe Sizing									No. Lines: 38		Run Date: 5/5/2020		

Line Profile (Line 2) - EX1-EX3

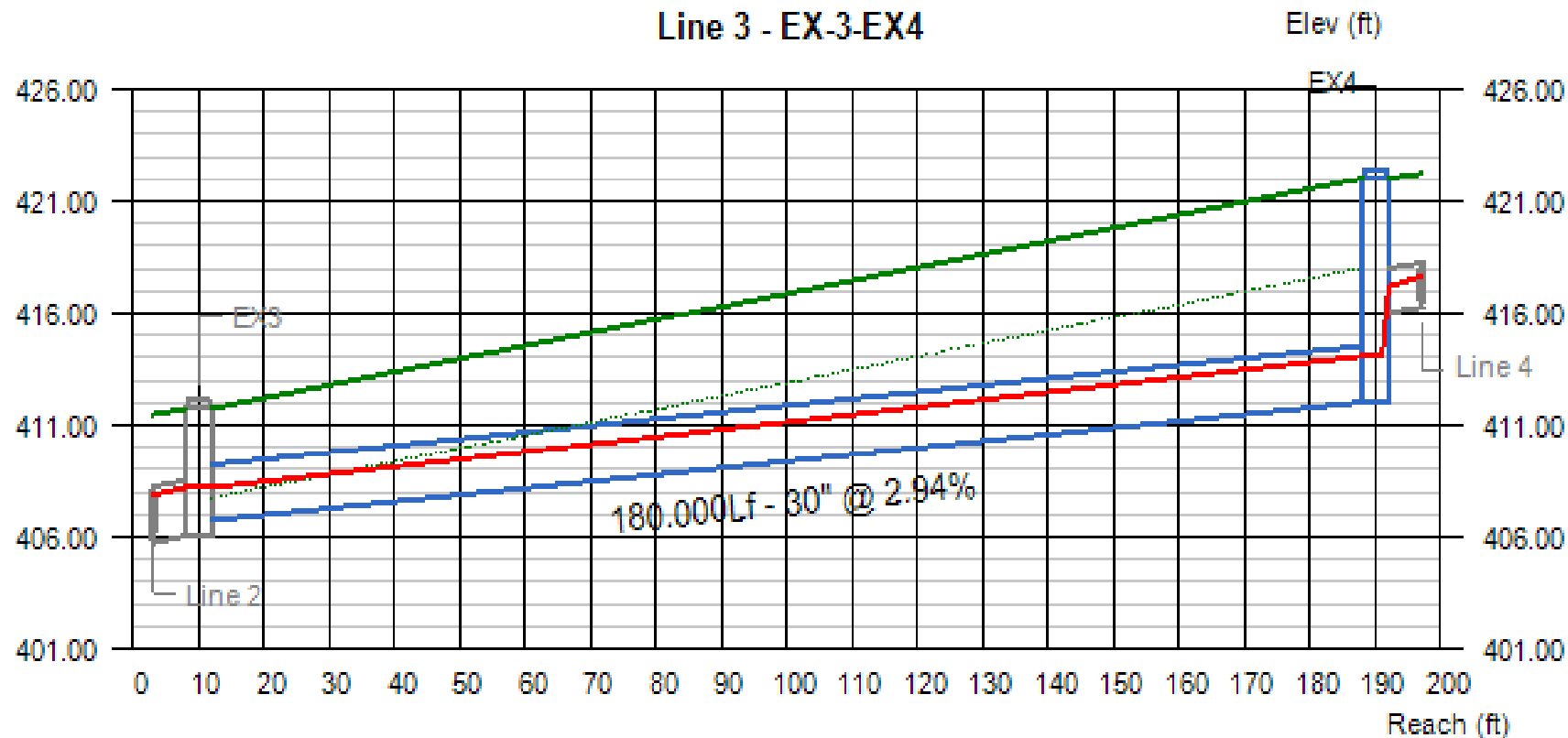


Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
2	42.26	399.81	406.04	1.09	2.17	2.17	400.90	408.21	408.21	20.68	9.33	4.00	3.20

BNE West Orange Pipe Sizing

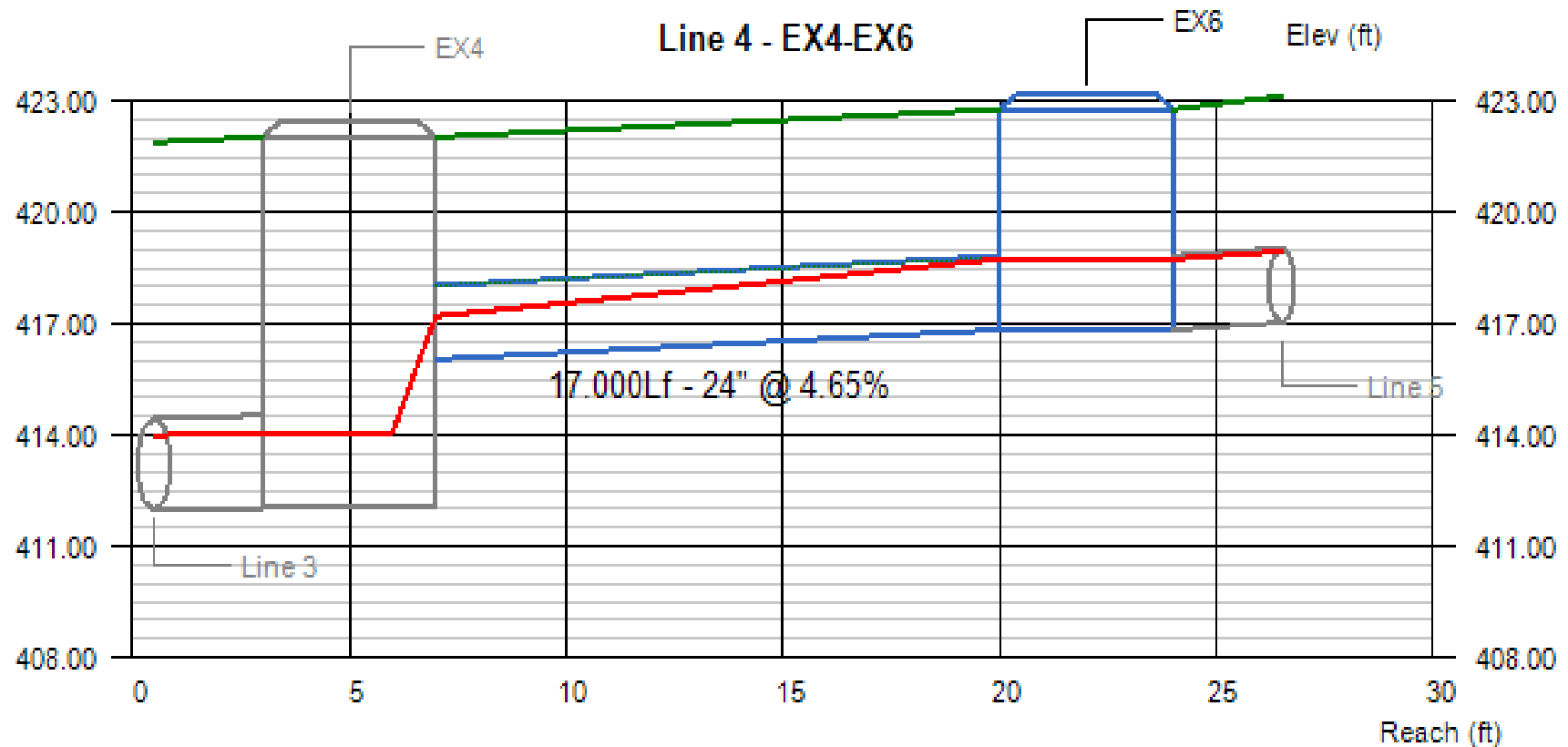
No. Lines: 38

Run Date: 5/5/2020



Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
3	36.43	406.74	412.03	1.47	2.04	2.04	408.21	414.07	414.07	12.10	8.48	2.50	7.50
BNE West Orange Pipe Sizing								No. Lines: 38			Run Date: 5/5/2020		

Line Profile (Line 4) - EX4-EX6



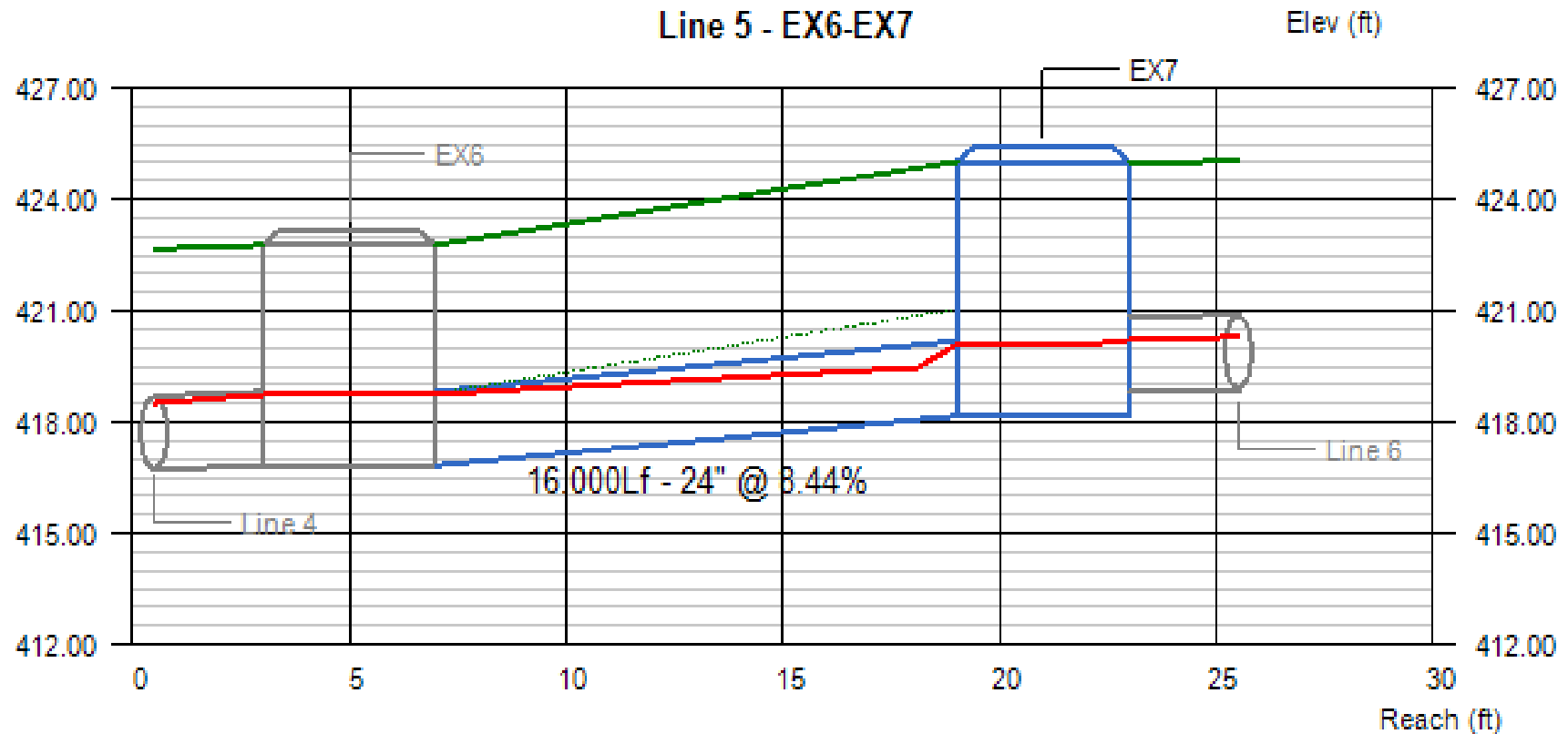
Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
4	34.49	416.03	416.82	1.18	1.92	1.92	417.21	418.74	418.74	17.91	11.14	4.00	3.95

BNE West Orange Pipe Sizing

No. Lines: 38

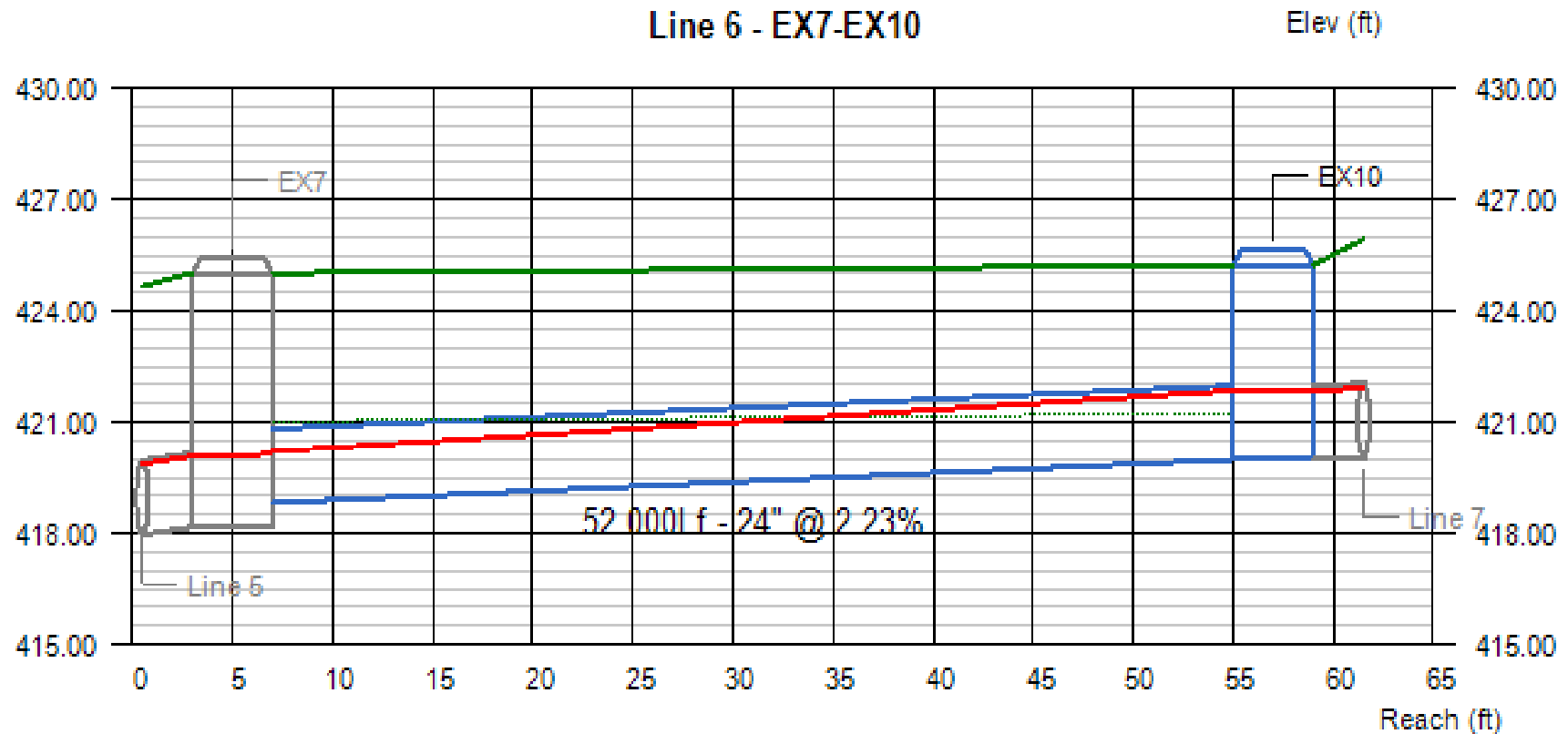
Run Date: 5/5/2020

Line Profile (Line 5) - EX6-EX7



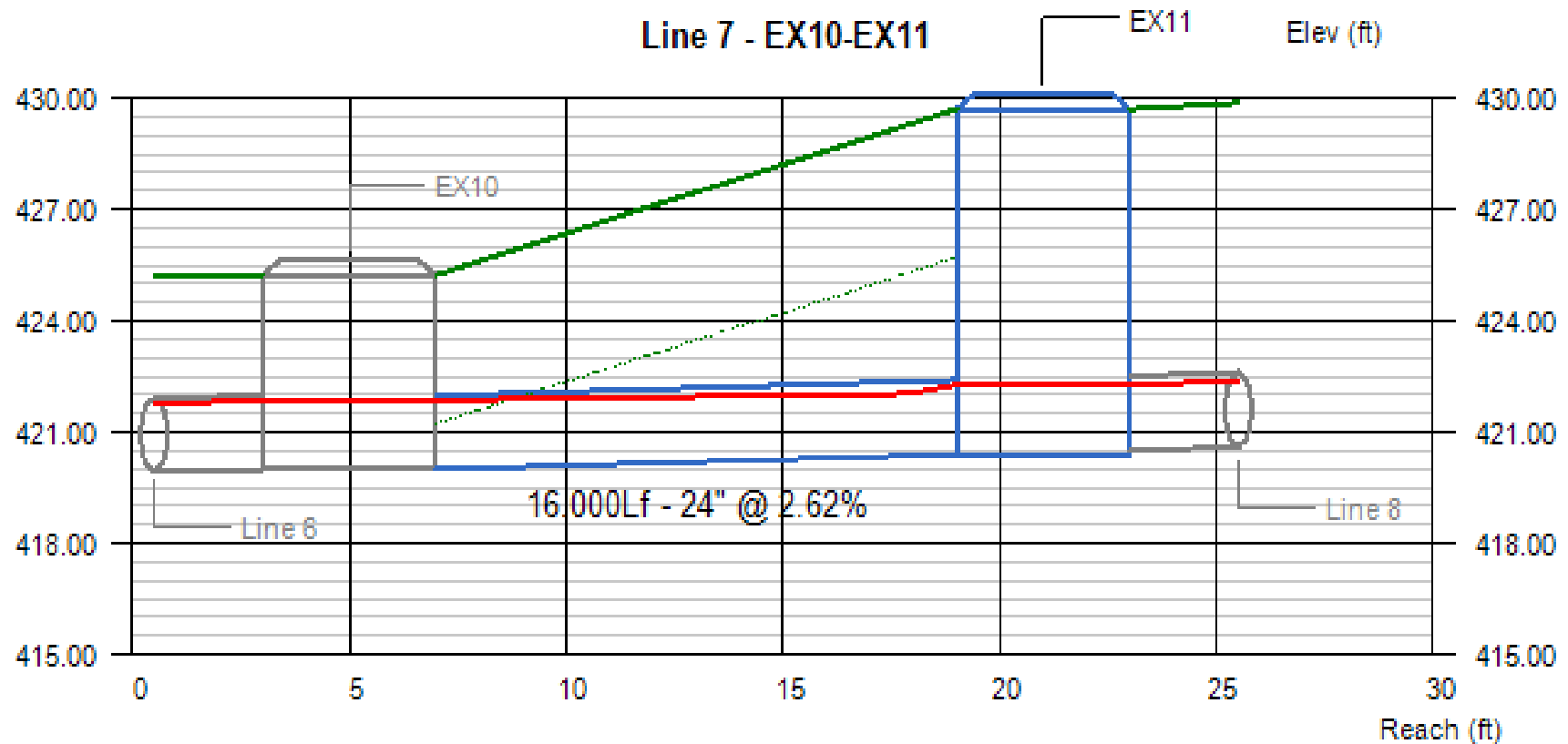
Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
5	33.27	416.82	418.17	1.92	1.90	1.90	418.74	420.07 j	420.07	10.75	10.78	3.95	4.85
BNE West Orange Pipe Sizing								No. Lines: 38			Run Date: 5/5/2020		

Line Profile (Line 6) - EX7-EX10



Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
6	30.22	418.82	419.98	1.39	1.86	1.86	420.21	421.85	421.85	13.01	9.91	4.20	3.25
BNE West Orange Pipe Sizing									No. Lines: 38		Run Date: 5/5/2020		

Line Profile (Line 7) - EX10-EX11



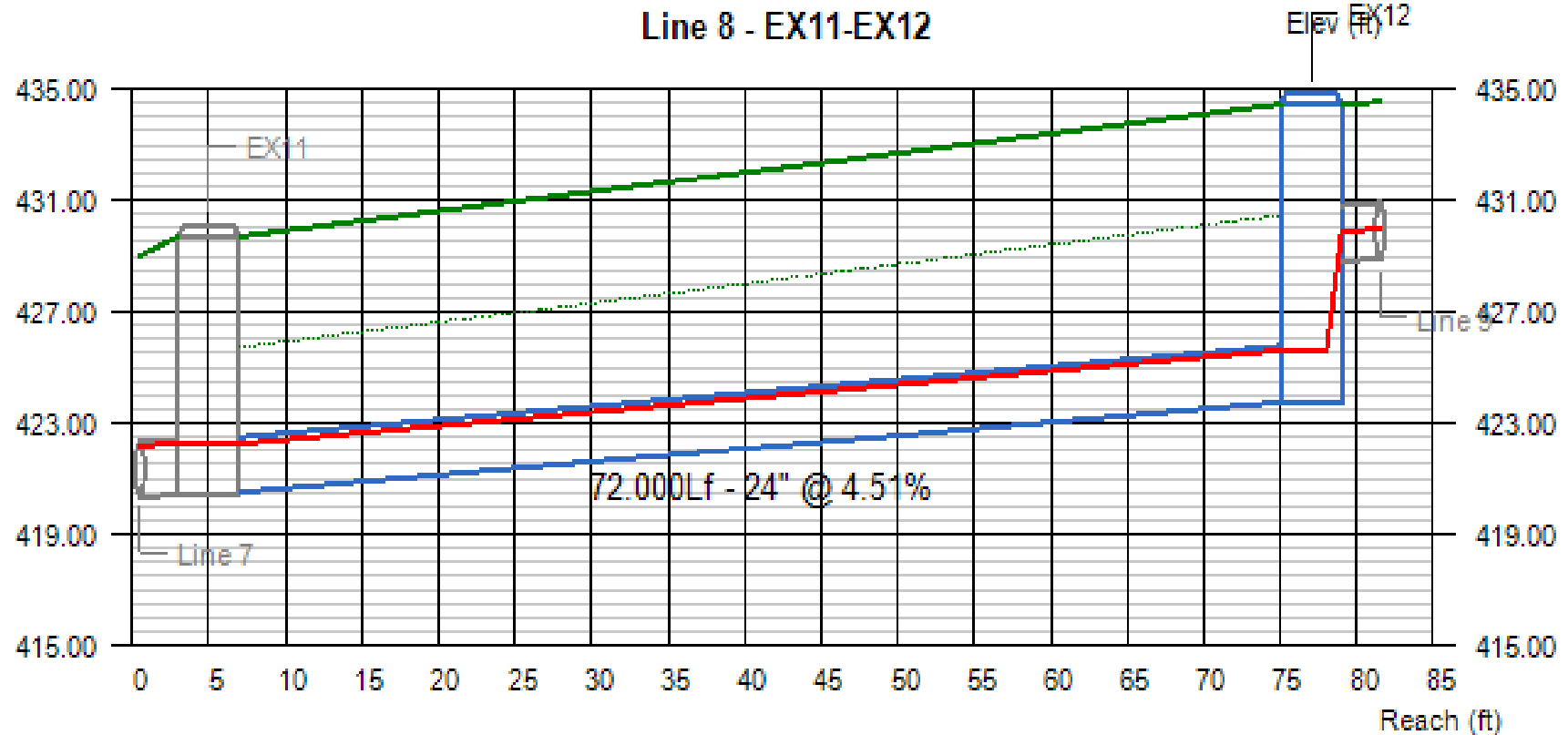
Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
7	30.08	419.98	420.40	1.86	1.86	1.86	421.85	422.26 j	422.26	9.86	9.87	3.25	7.30

BNE West Orange Pipe Sizing

No. Lines: 38

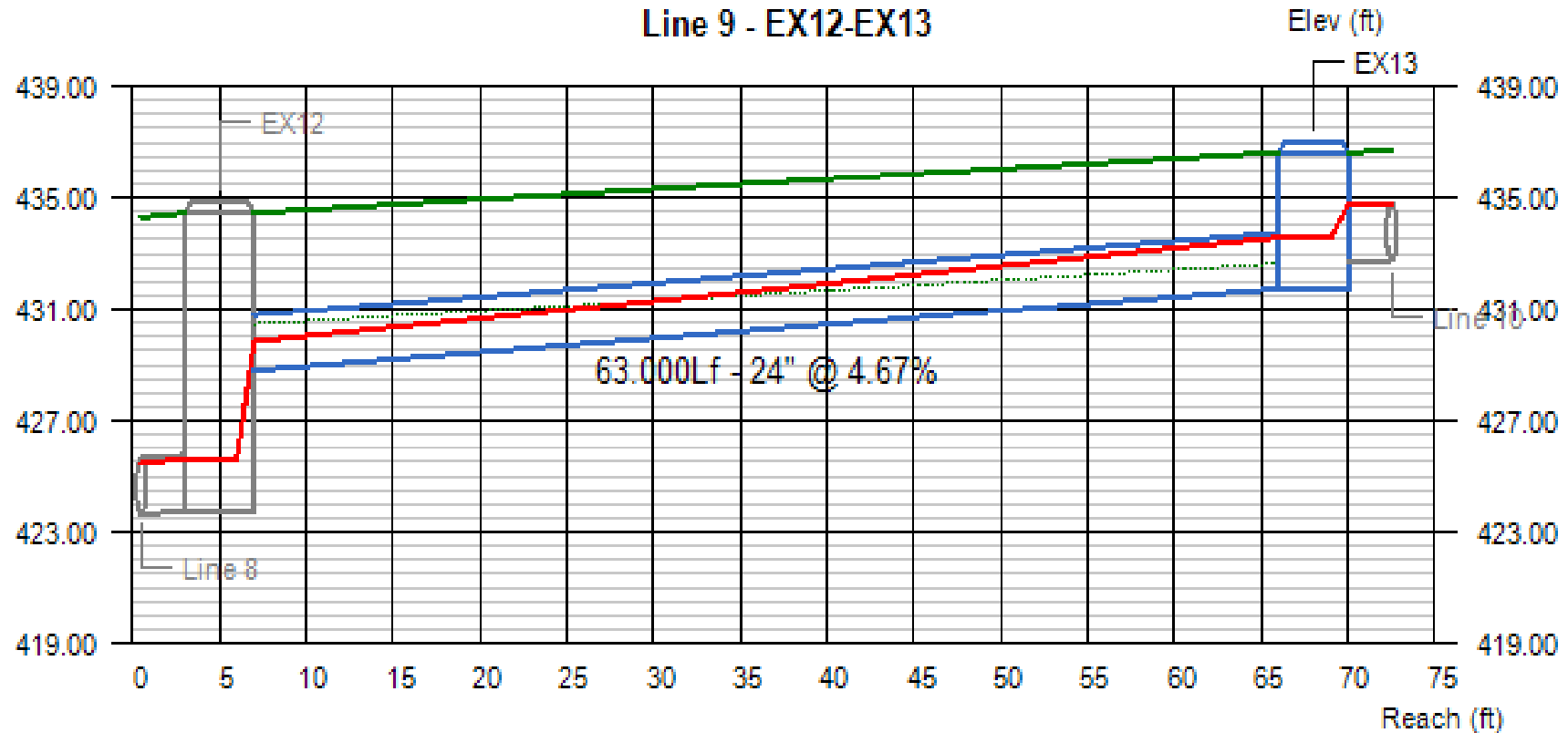
Run Date: 5/5/2020

Line Profile (Line 8) - EX11-EX12



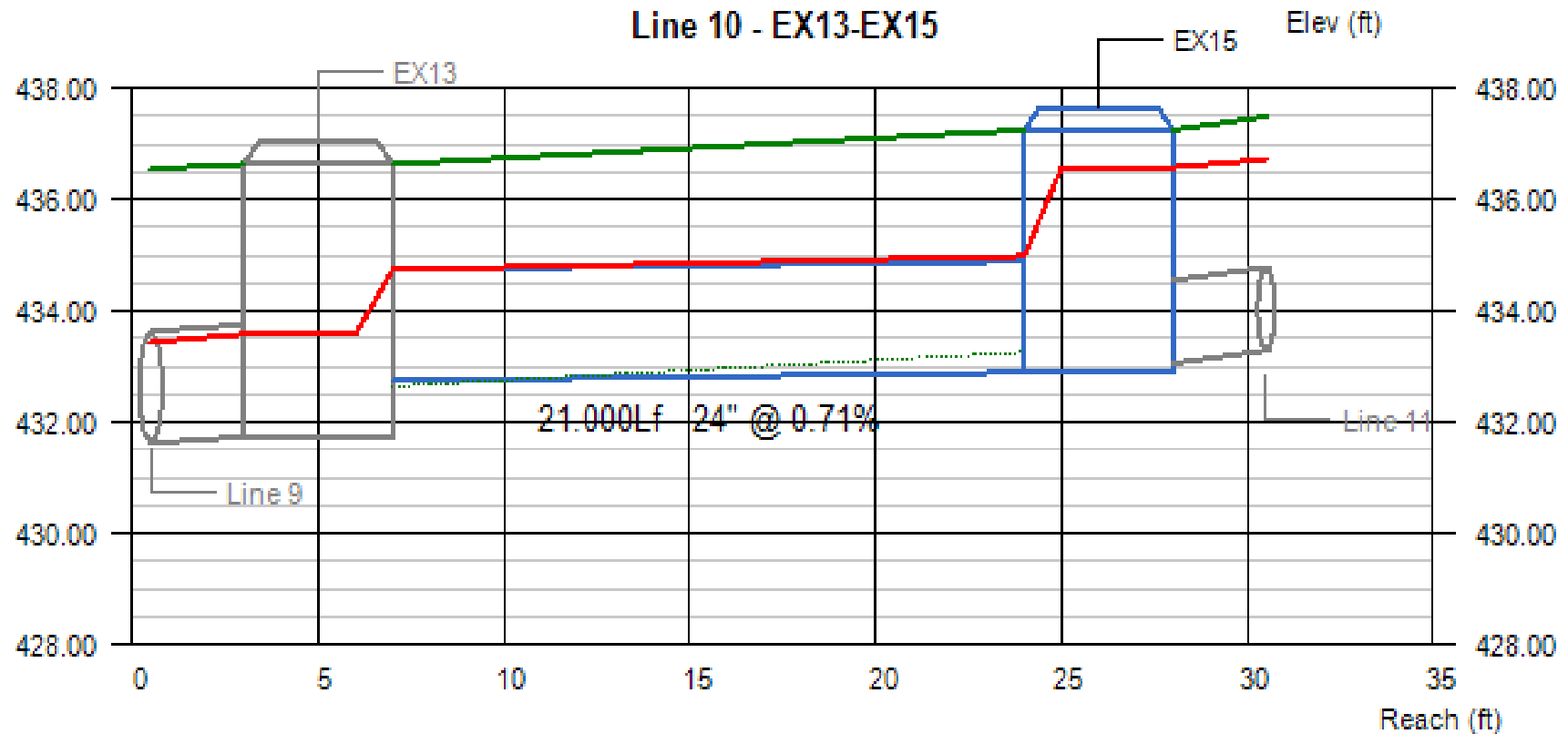
Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
8	29.23	420.50	423.75	1.76	1.85	1.85	422.26	425.60	425.60	9.97	9.64	7.20	8.70
BNE West Orange Pipe Sizing									No. Lines: 38		Run Date: 5/5/2020		

Line Profile (Line 9) - EX12-EX13



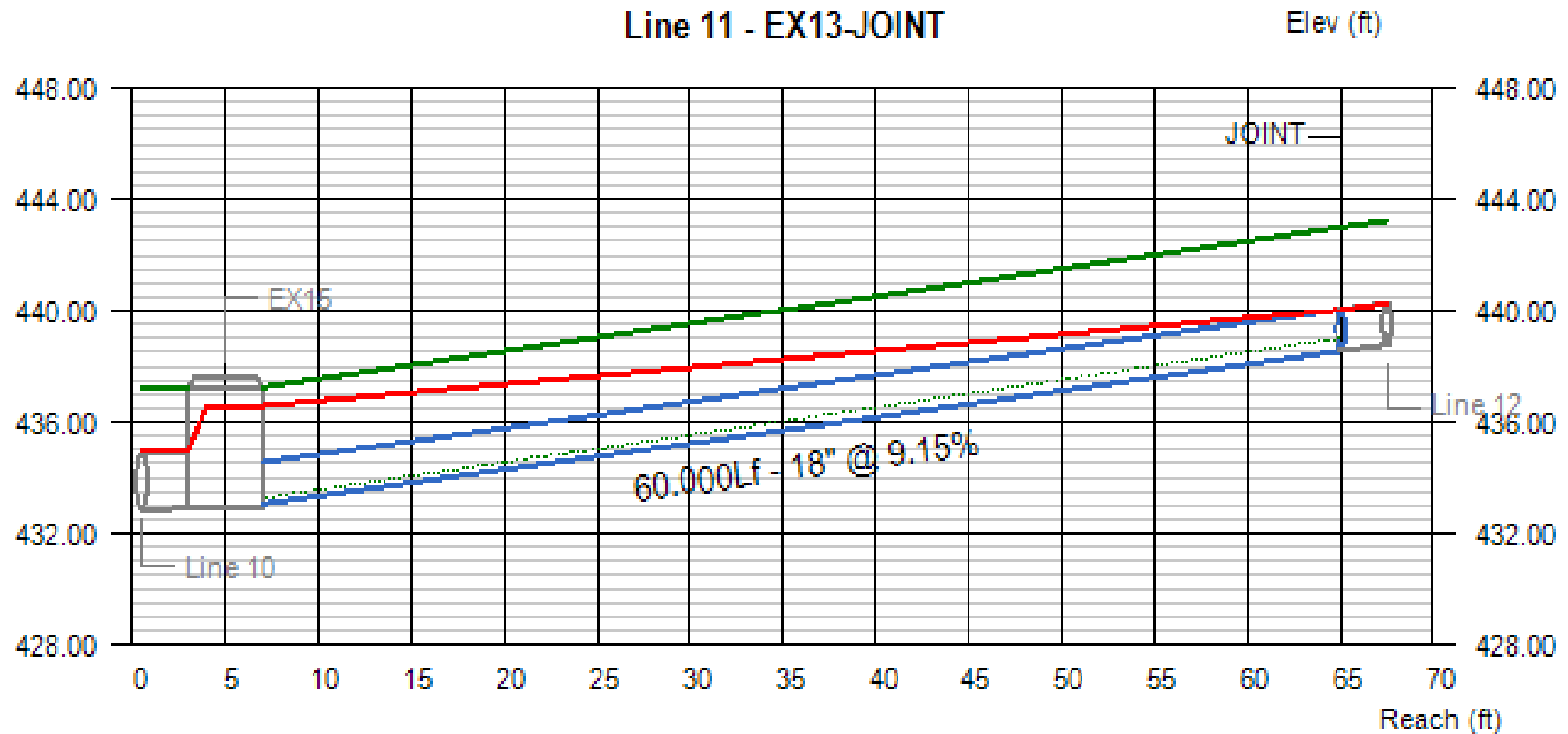
Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
9	28.30	428.80	431.74	1.04	1.83	1.83	429.84	433.57	433.57	17.13	9.38	3.65	2.90
BNE West Orange Pipe Sizing									No. Lines: 38		Run Date: 5/5/2020		

Line Profile (Line 10) - EX13-EX15



Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
10	26.29	432.74	432.89	2.00	2.00	3.69	434.74	434.98	436.58	8.37	8.37	1.90	2.36
BNE West Orange Pipe Sizing								No. Lines: 38			Run Date: 5/5/2020		

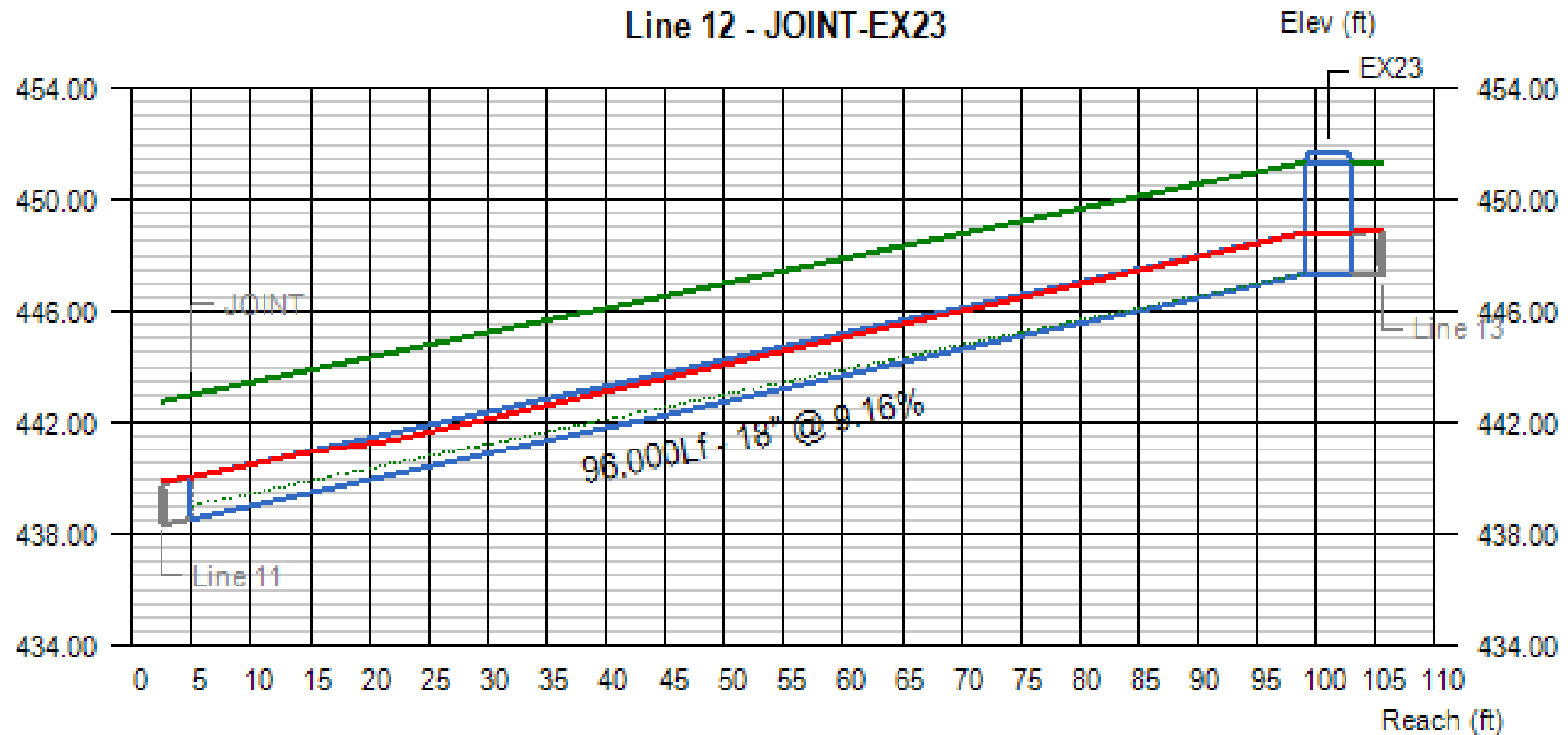
Line Profile (Line 11) - EX13-JOINT



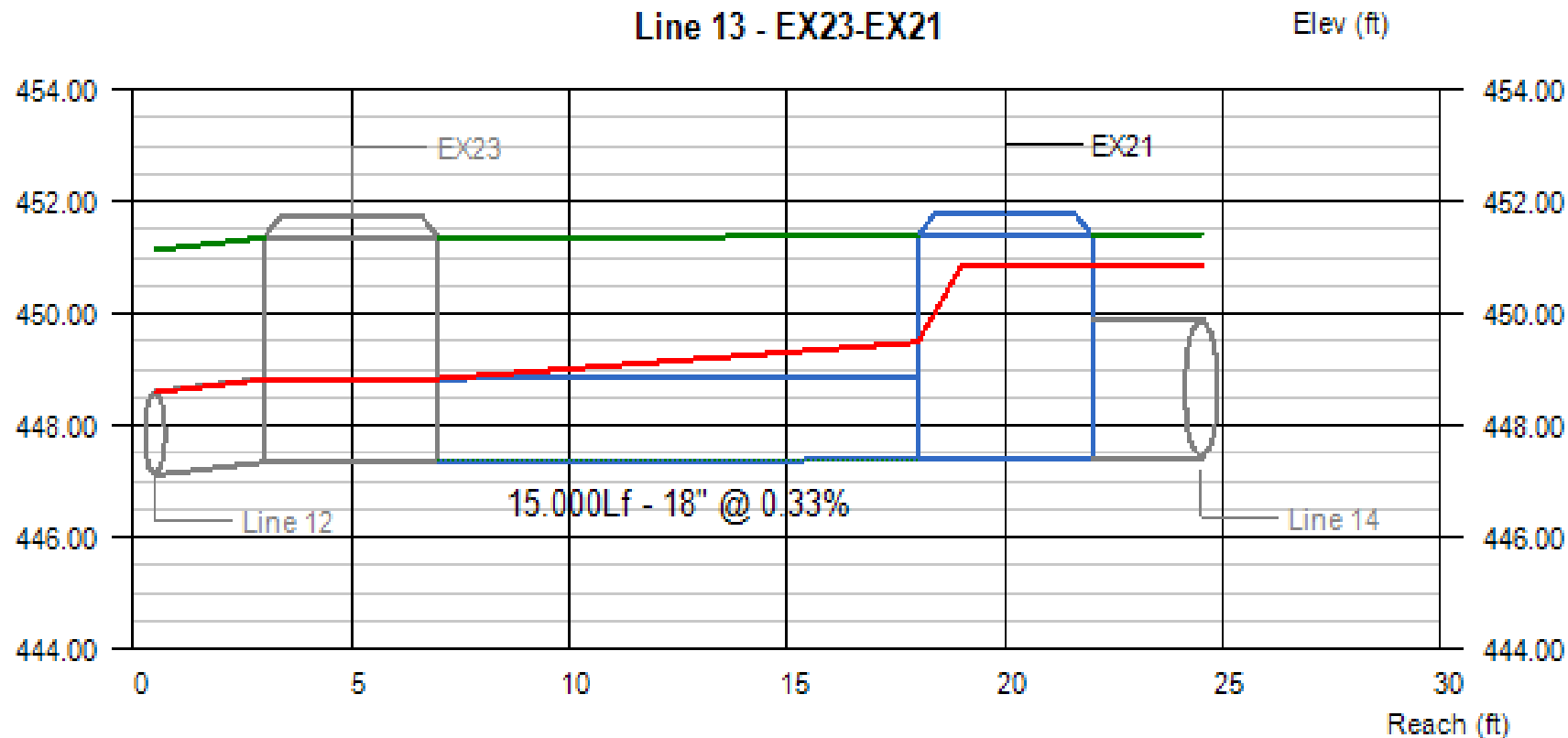
Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
11	26.15	433.05	438.54	1.50	1.49	1.49	436.58	440.03	440.03	14.80	14.82	2.70	2.96

BNE West Orange Pipe Sizing
No. Lines: 38
Run Date: 5/5/2020

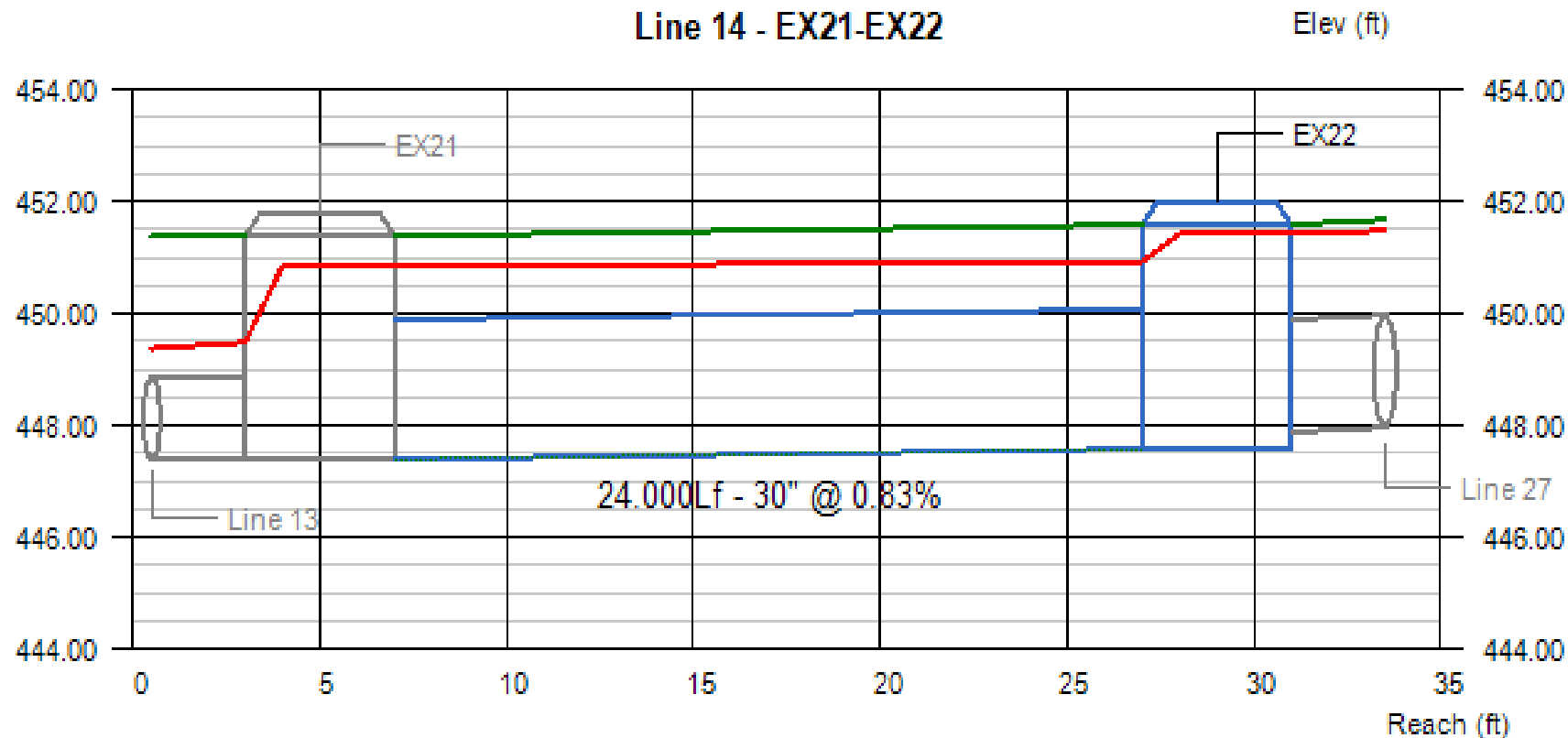
Line Profile (Line 12) - JOINT-EX23



Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
12	24.33	438.54	447.33	1.49	1.48	1.48	440.03	448.81 j	448.81	13.78	13.79	2.96	2.52
BNE West Orange Pipe Sizing								No. Lines: 38			Run Date: 5/5/2020		



Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
13	23.55	447.33	447.38	1.50	1.50	3.47	448.83	449.47	450.85	13.33	13.33	2.52	2.50
BNE West Orange Pipe Sizing								No. Lines: 38			Run Date: 5/5/2020		



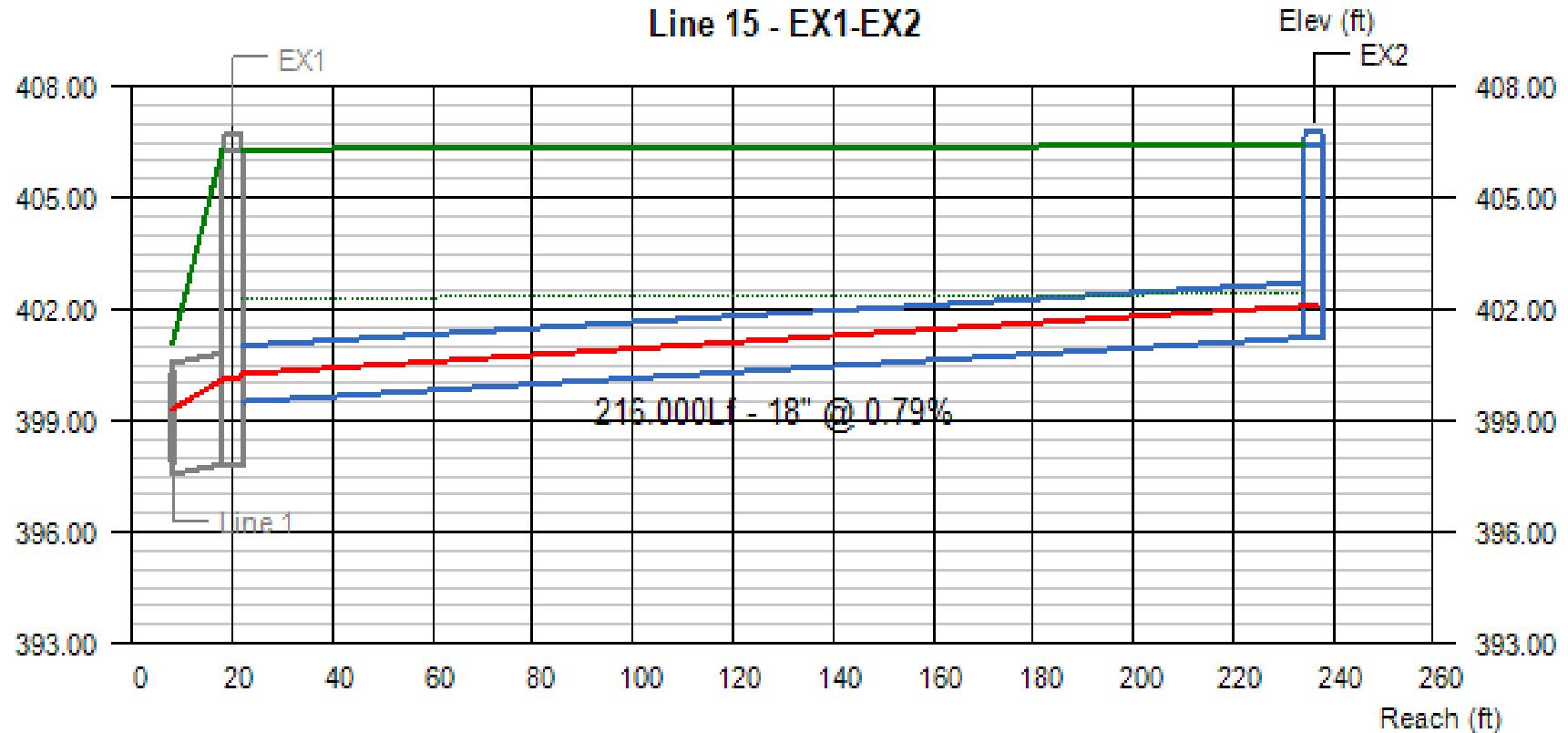
Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
14	22.77	447.38	447.58	2.50	2.50	3.84	450.85	450.92	451.42	4.64	4.64	1.50	1.50

BNE West Orange Pipe Sizing

No. Lines: 38

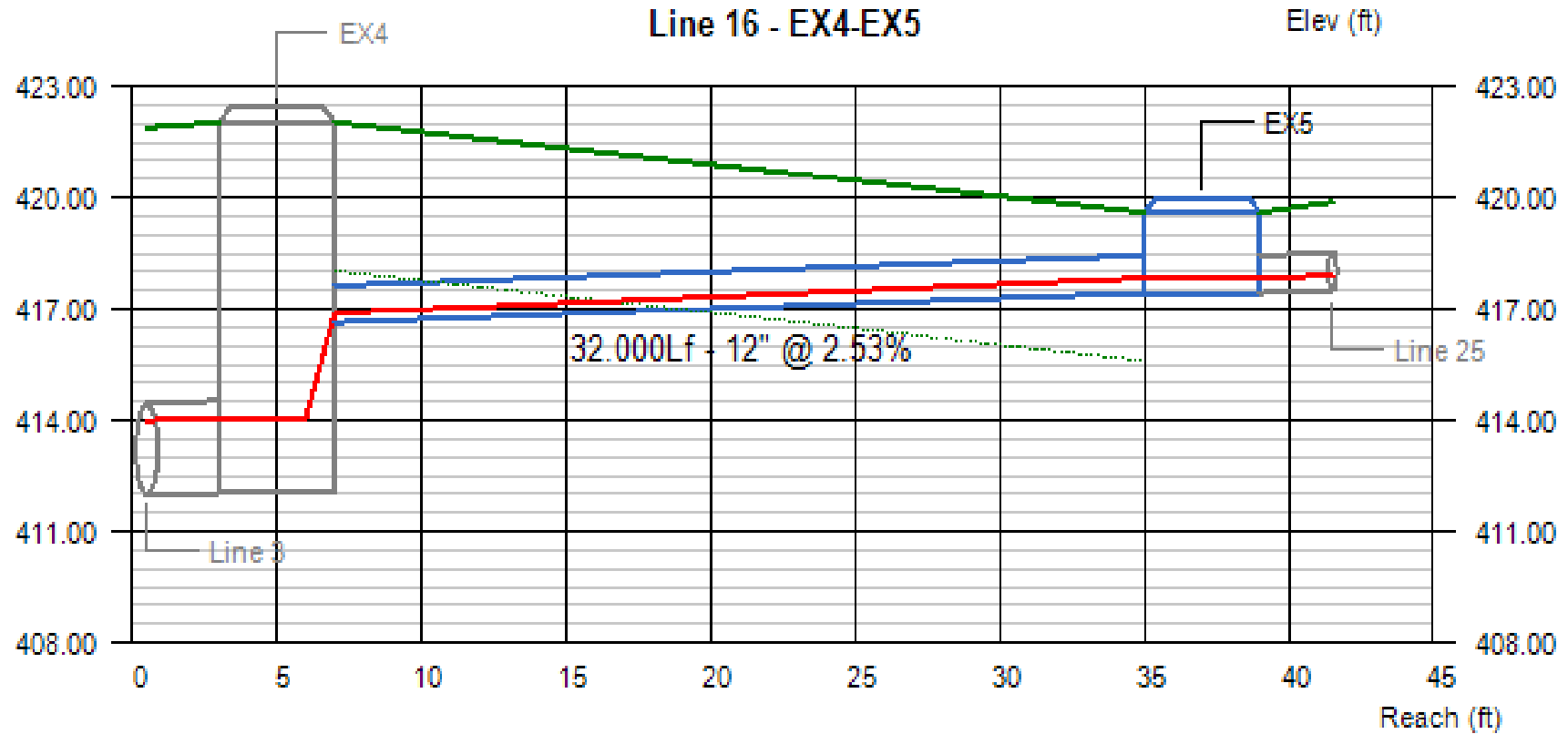
Run Date: 5/5/2020

Line Profile (Line 15) - EX1-EX2



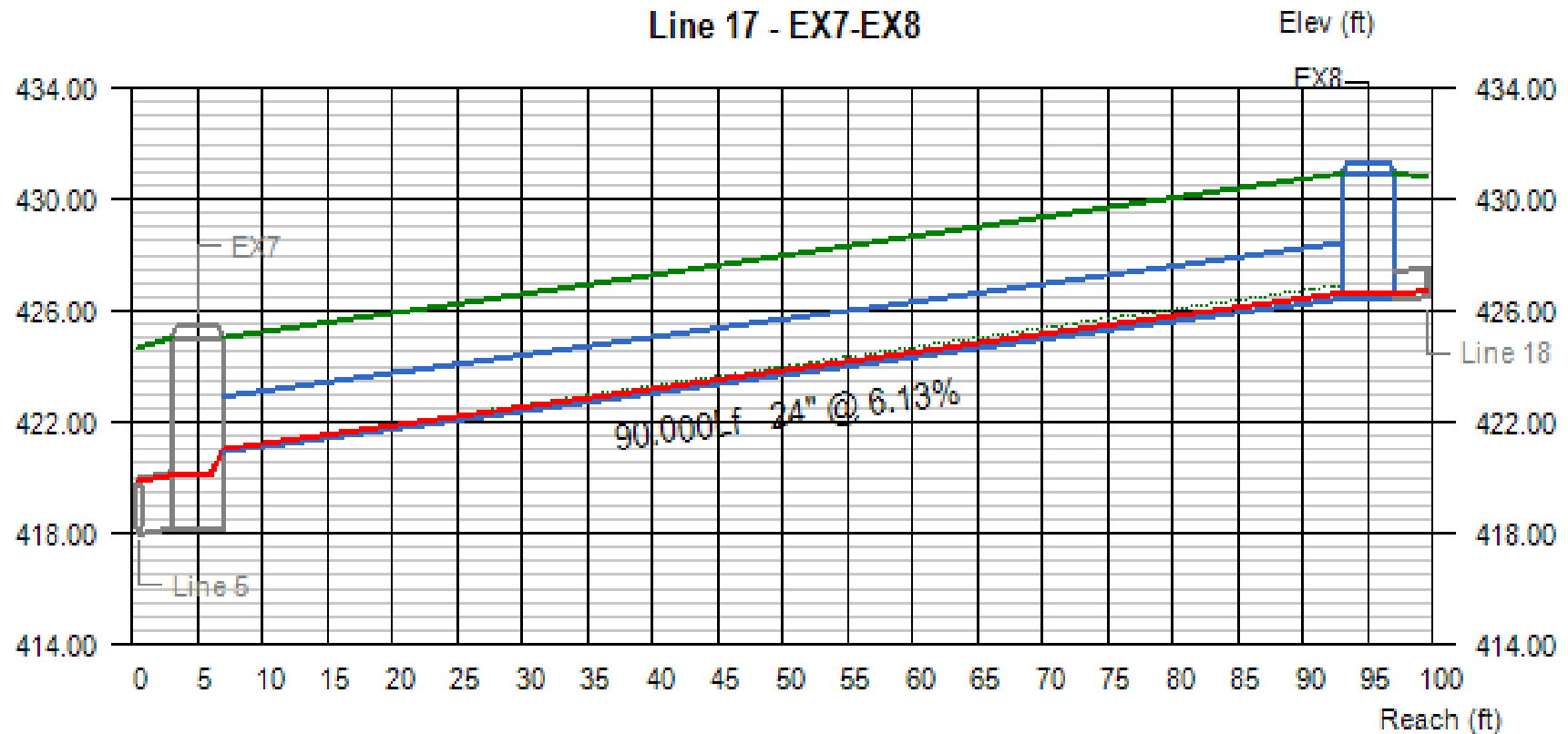
Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
15	5.05	399.51	401.22	0.75	0.86	0.86	400.26	402.08	402.08	5.72	4.79	5.30	3.70
BNE West Orange Pipe Sizing									No. Lines: 38		Run Date: 5/5/2020		

Line Profile (Line 16) - EX4-EX5



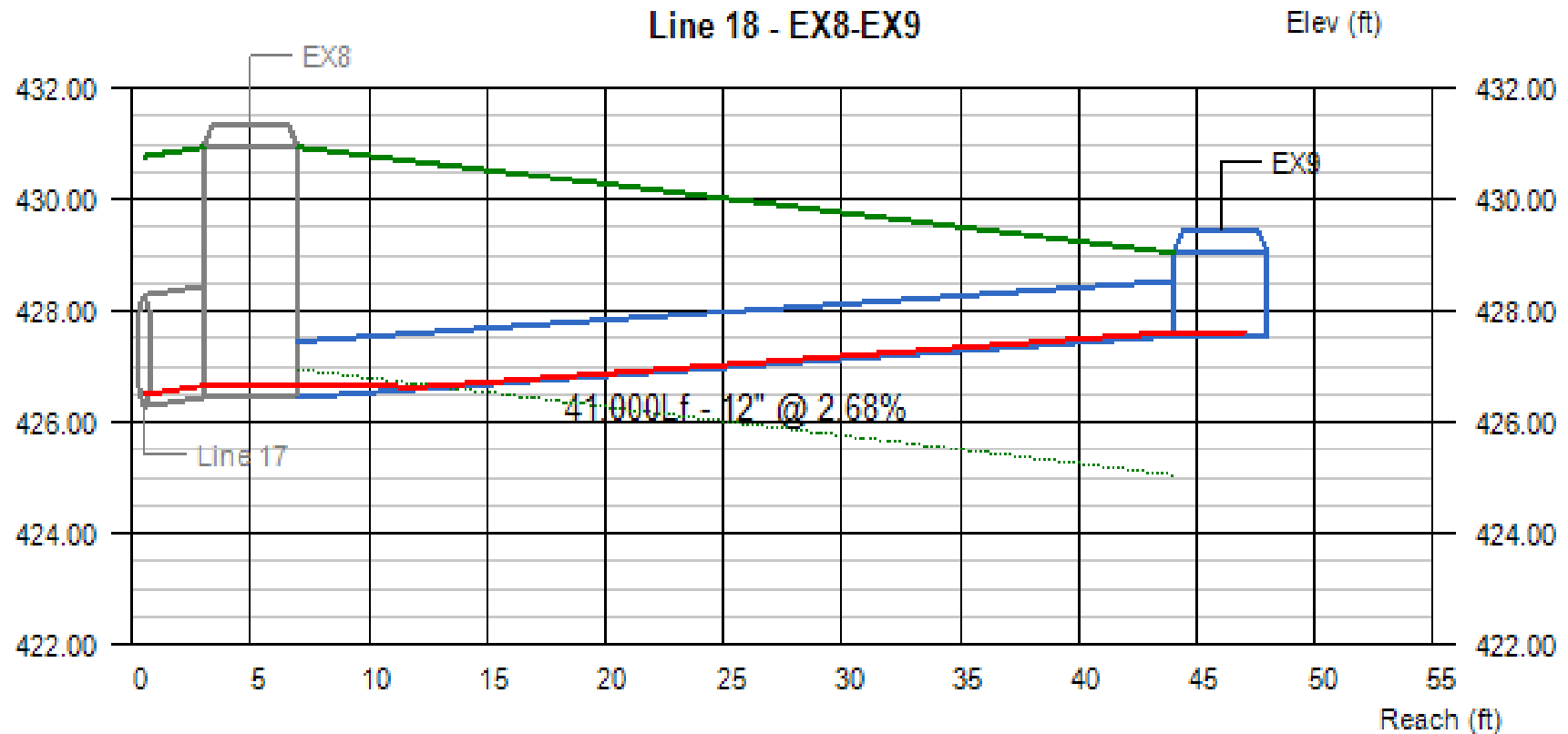
Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
16	0.90	416.63	417.44	0.26	0.40	0.40	416.89	417.84	417.84	5.58	3.10	4.40	1.15
BNE West Orange Pipe Sizing									No. Lines: 38		Run Date: 5/5/2020		

Line Profile (Line 17) - EX7-EX8



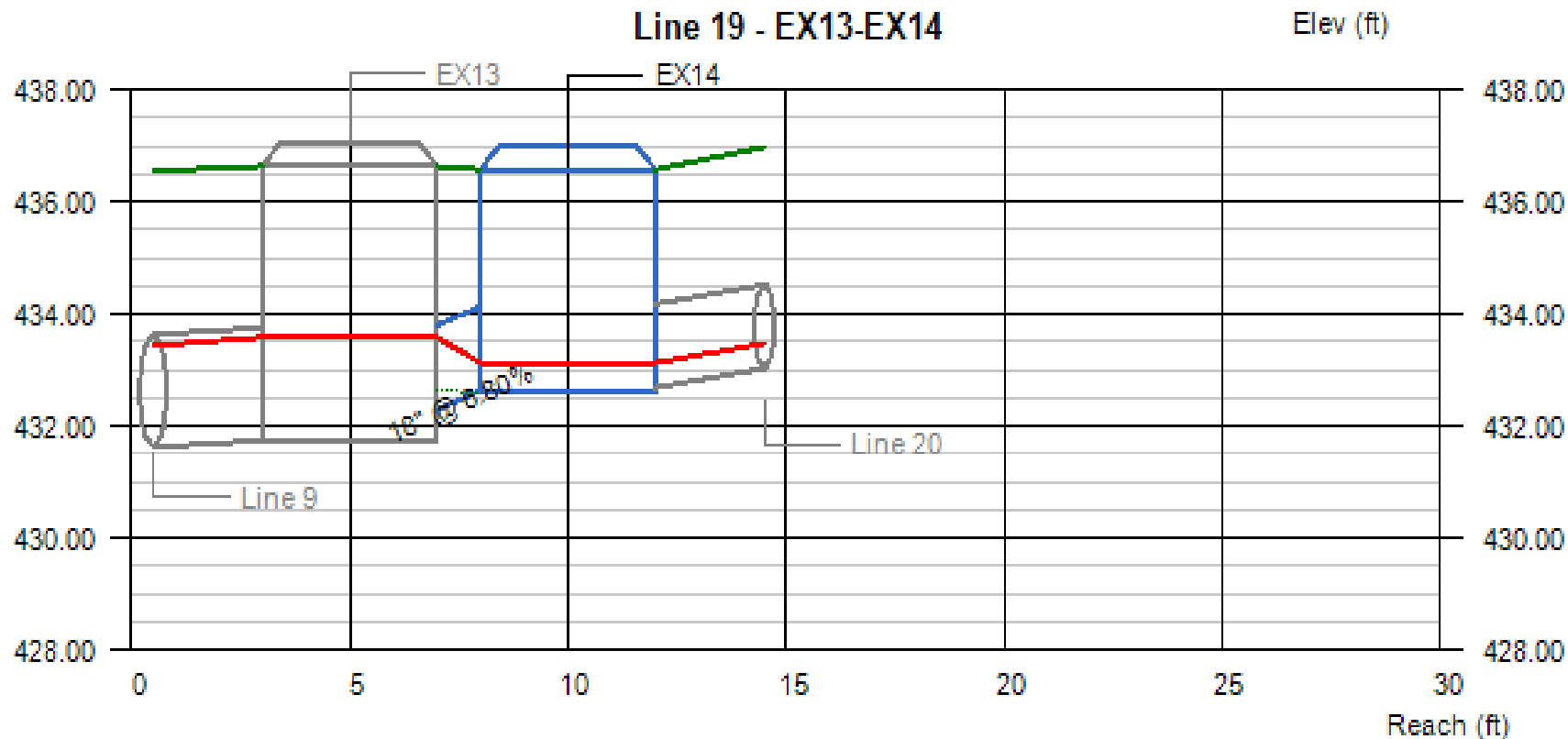
Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
17	0.38	420.92	426.44	0.11	0.21	0.21	421.03	426.65	426.65	5.36	2.15	2.10	2.50
BNE West Orange Pipe Sizing								No. Lines: 38			Run Date: 5/5/2020		

Line Profile (Line 18) - EX8-EX9



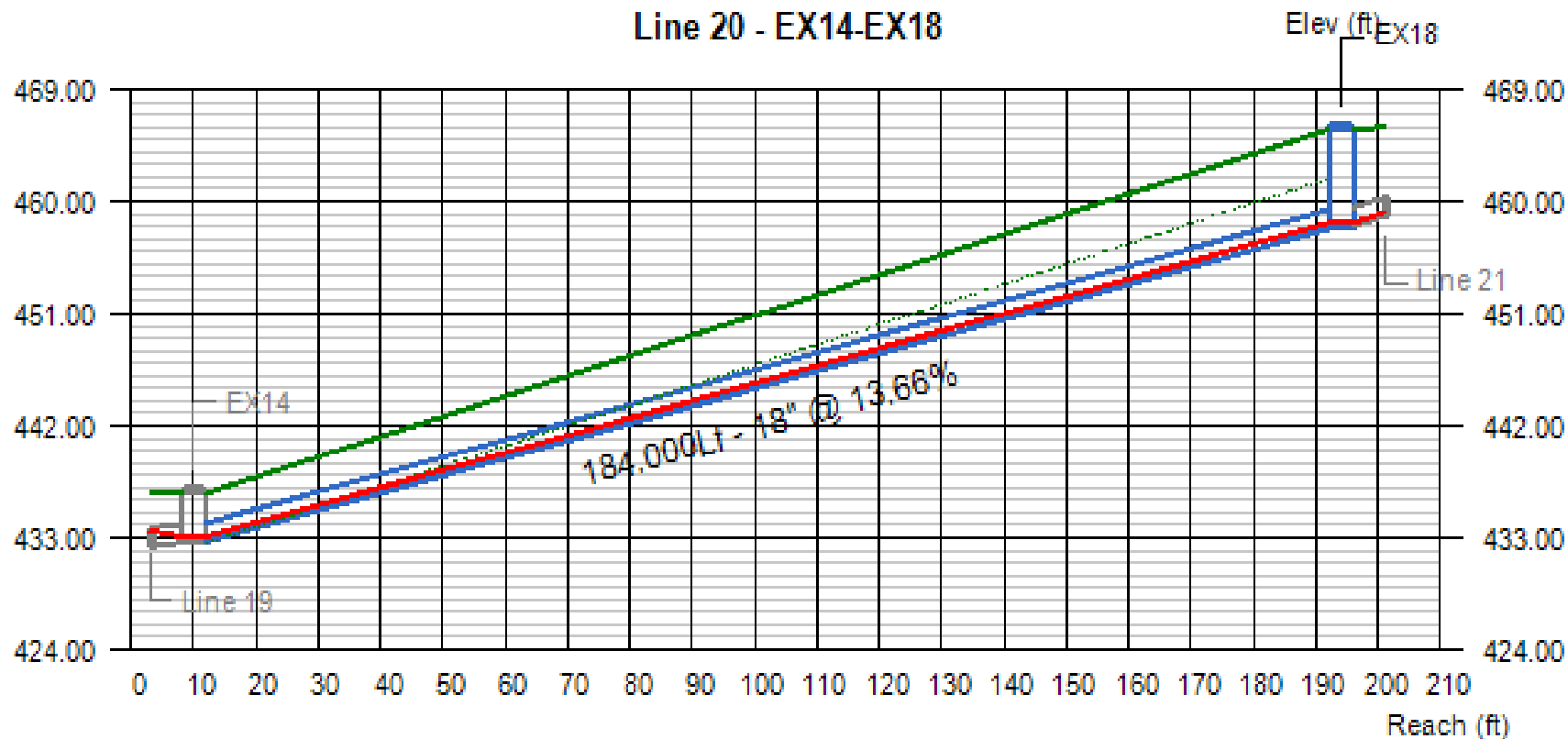
Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
18	0.03	426.44	427.54	0.21	0.07	0.07	426.65	427.61 j	427.61	0.22	1.19	3.50	0.50
BNE West Orange Pipe Sizing									No. Lines: 38		Run Date: 5/5/2020		

Line Profile (Line 19) - EX13-EX14



Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
19	1.70	432.29	432.63	1.28	0.49	0.49	433.57	433.12	433.12	1.05	3.39	2.85	2.45
BNE West Orange Pipe Sizing								No. Lines: 38			Run Date: 5/5/2020		

Line Profile (Line 20) - EX14-EX18



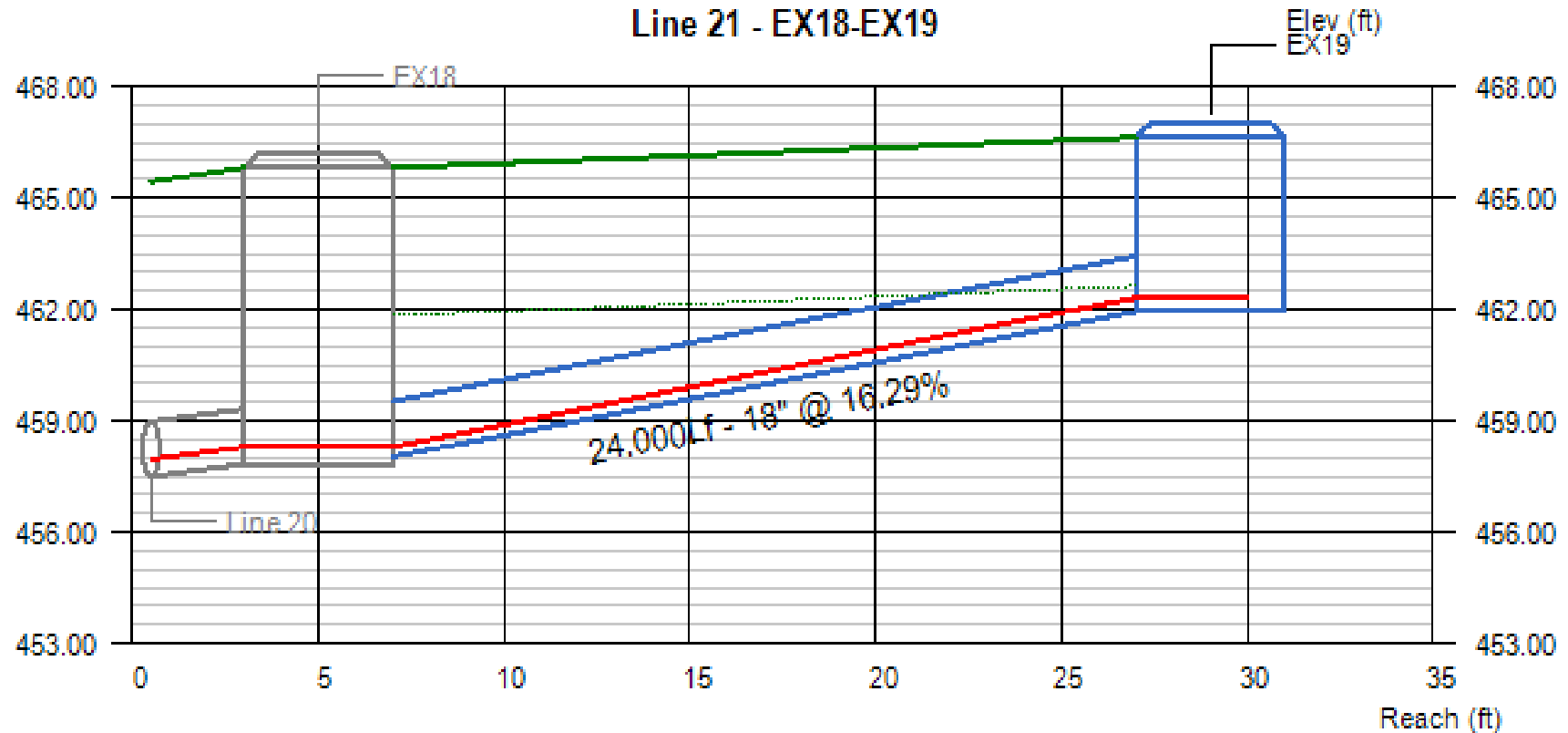
Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
20	1.57	432.68	457.82	0.44	0.47	0.47	433.12	458.29	458.29	3.65	3.32	2.40	6.50

BNE West Orange Pipe Sizing

No. Lines: 38

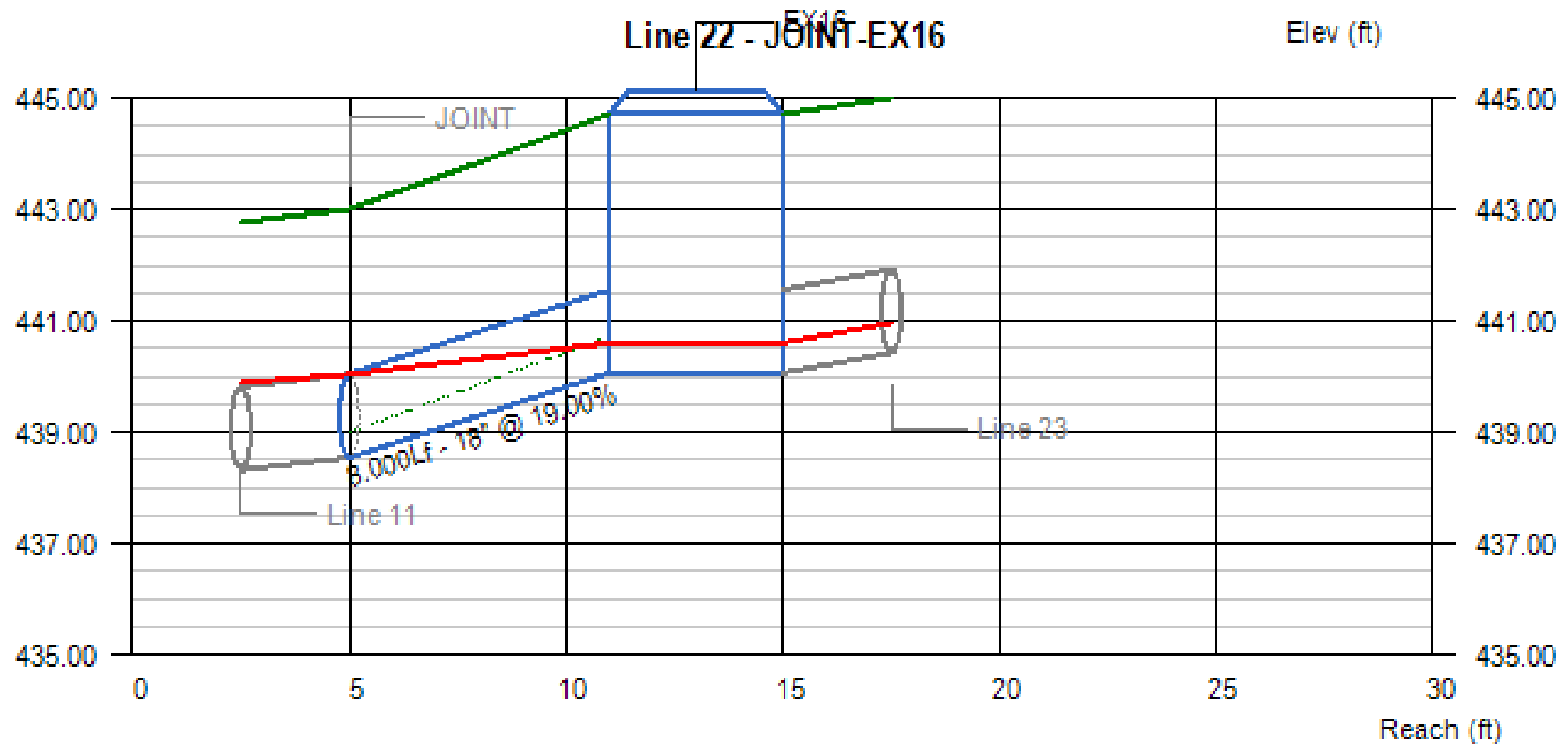
Run Date: 5/5/2020

Line Profile (Line 21) - EX18-EX19



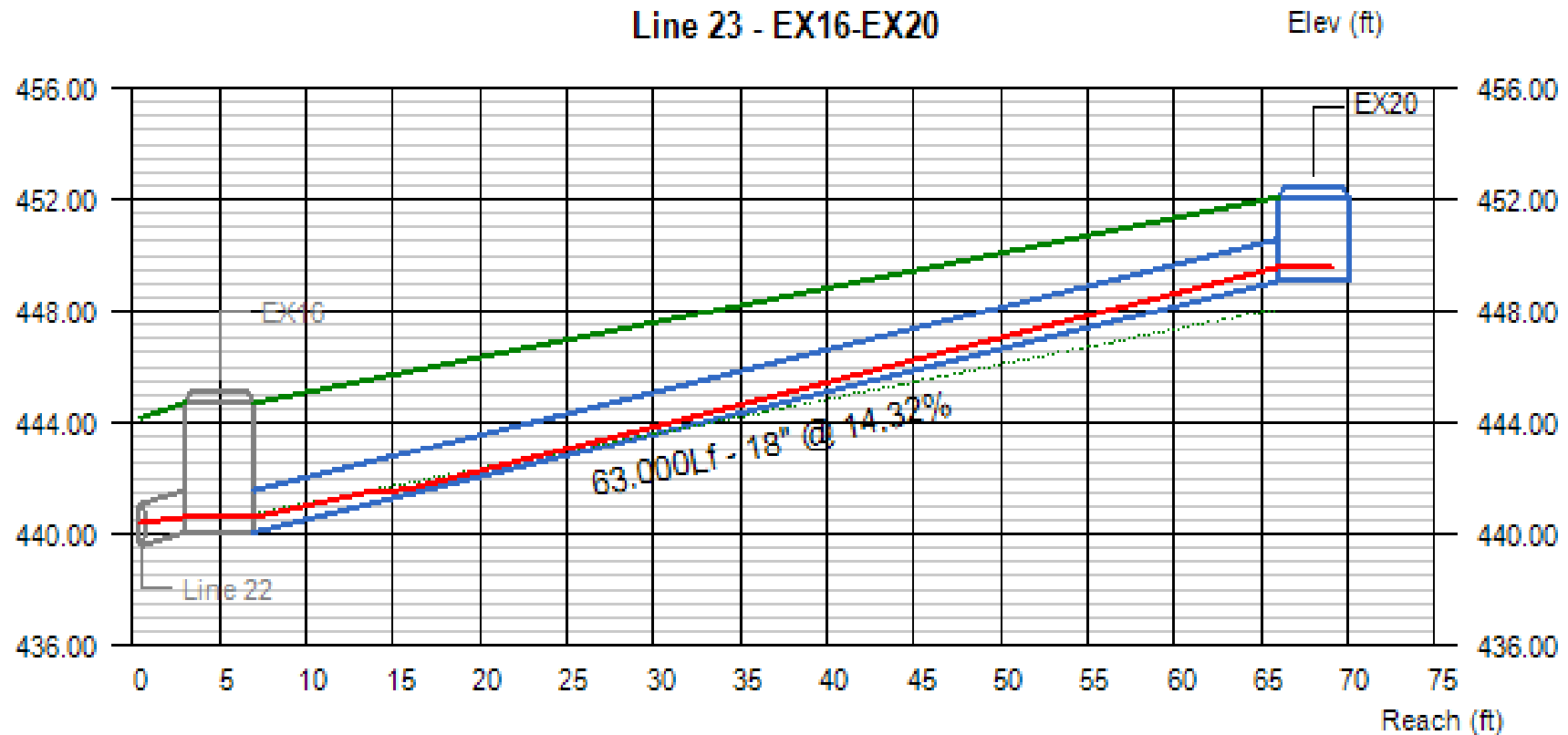
Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
21	1.06	458.02	461.93	0.27	0.38	0.38	458.29	462.32	462.32	4.90	2.97	6.30	3.20
BNE West Orange Pipe Sizing								No. Lines: 38			Run Date: 5/5/2020		

Line Profile (Line 22) - JOINT-EX16



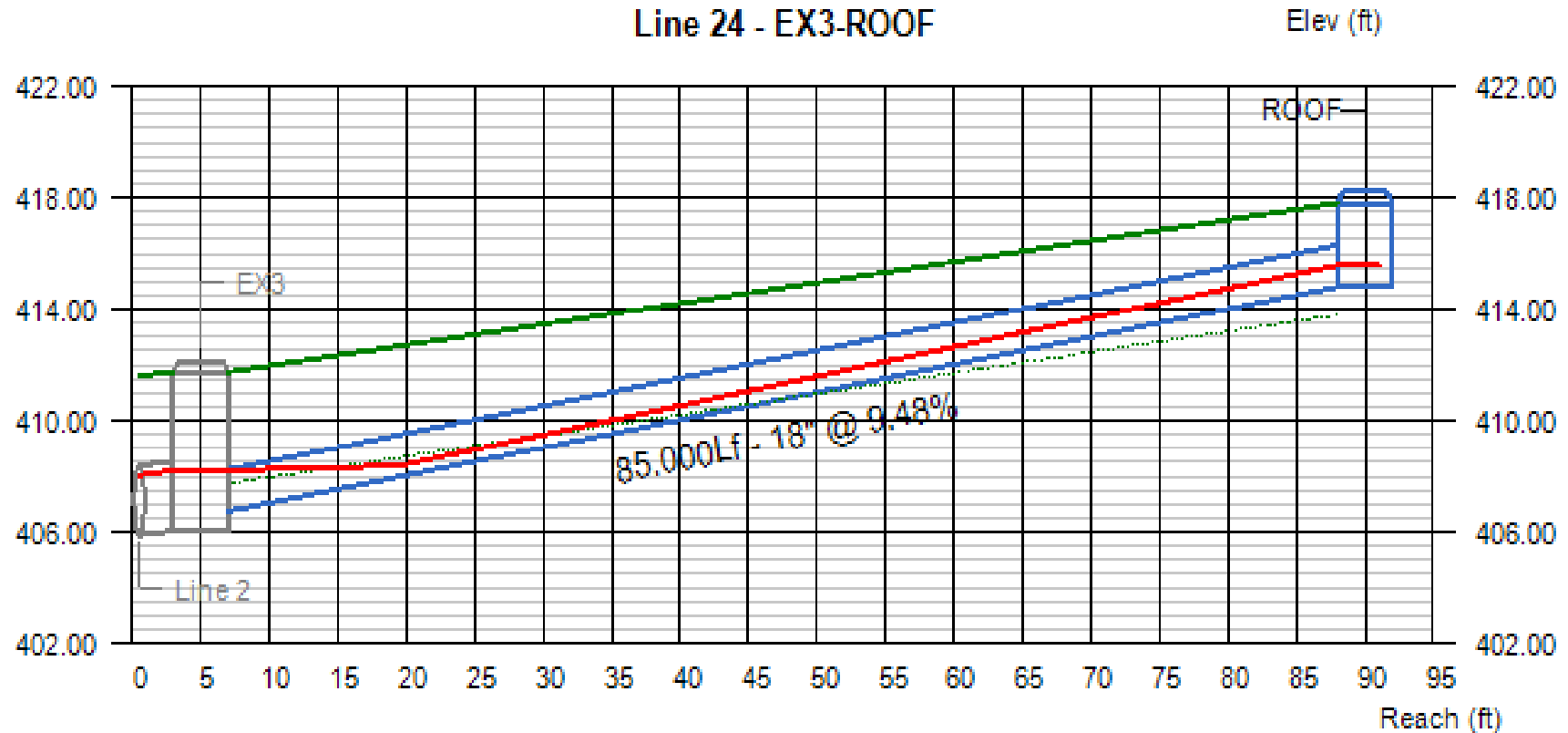
Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
22	2.01	438.54	440.06	1.49	0.53	0.53	440.03	440.59	440.59	1.14	3.56	2.96	3.15
BNE West Orange Pipe Sizing								No. Lines: 38			Run Date: 5/5/2020		

Line Profile (Line 23) - EX16-EX20



Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
23	1.81	440.06	449.08	0.53	0.51	0.51	440.59	449.59 j	449.59	3.20	3.45	3.15	1.50
BNE West Orange Pipe Sizing								No. Lines: 38			Run Date: 5/5/2020		

Line Profile (Line 24) - EX3-ROOF



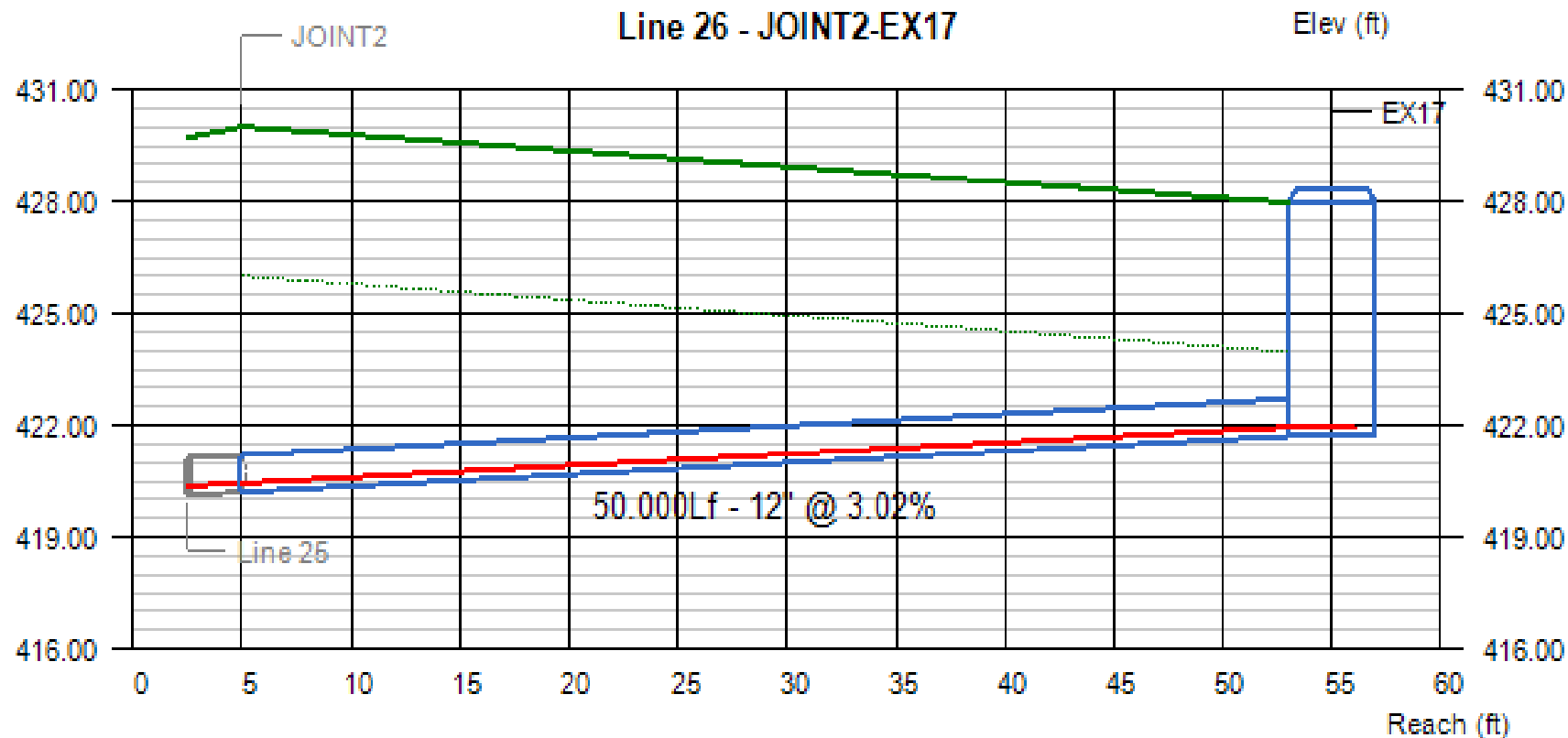
Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
24	4.18	406.74	414.80	1.47	0.78	0.78	408.21	415.58 j	415.58	2.38	4.48	3.50	1.50
BNE West Orange Pipe Sizing								No. Lines: 38			Run Date: 5/5/2020		

Line Profile (Line 25) - EX5-JOINT2



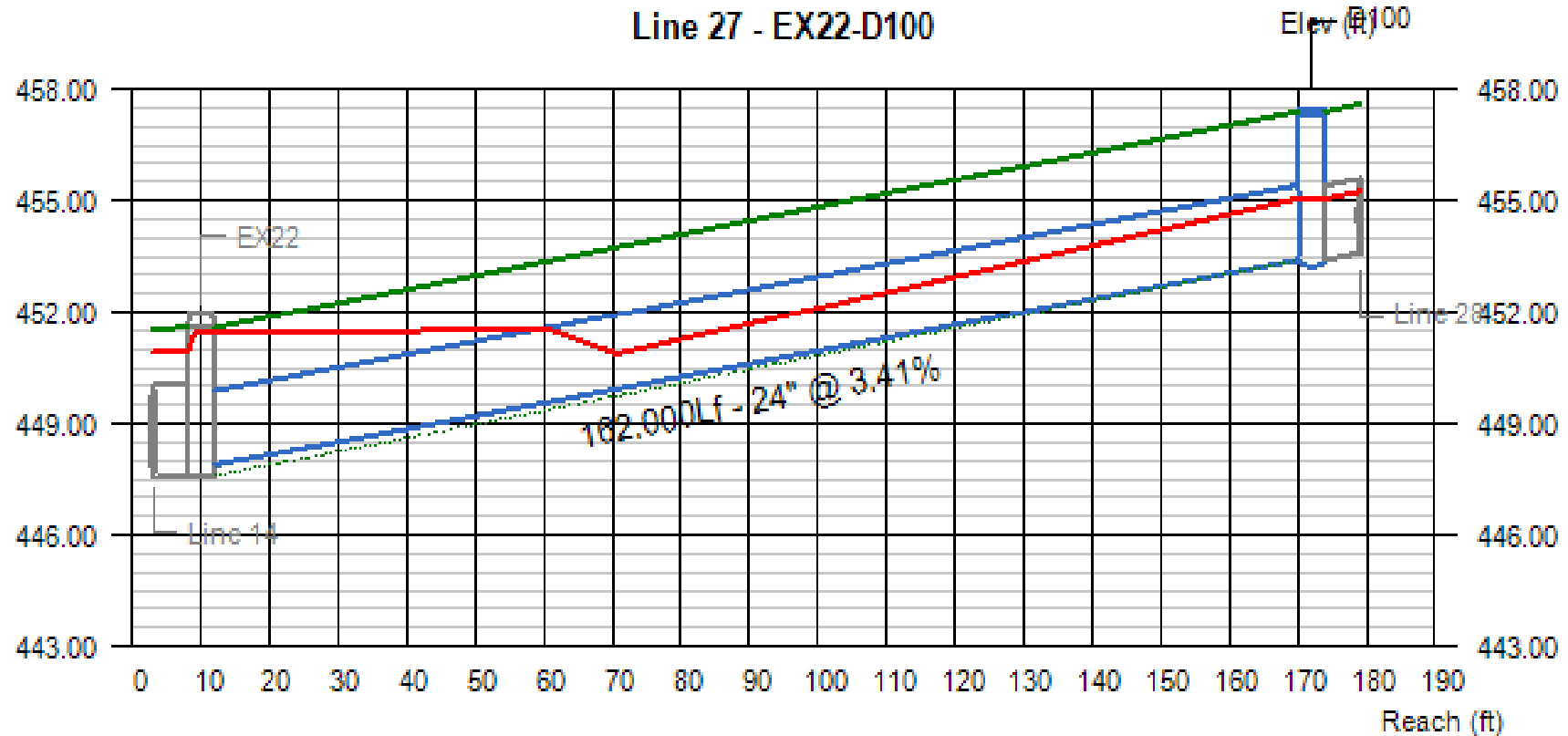
Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
25	0.33	417.44	420.20	0.40	0.24	0.24	417.84	420.44 j	420.44	1.15	2.33	1.15	8.80
BNE West Orange Pipe Sizing									No. Lines: 38		Run Date: 5/5/2020		

Line Profile (Line 26) - JOINT2-EX17



Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
26	0.34	420.20	421.71	0.24	0.24	0.24	420.44	421.95	421.95	2.36	2.34	8.80	5.25
BNE West Orange Pipe Sizing								No. Lines: 38			Run Date: 5/5/2020		

Line Profile (Line 27) - EX22-D100



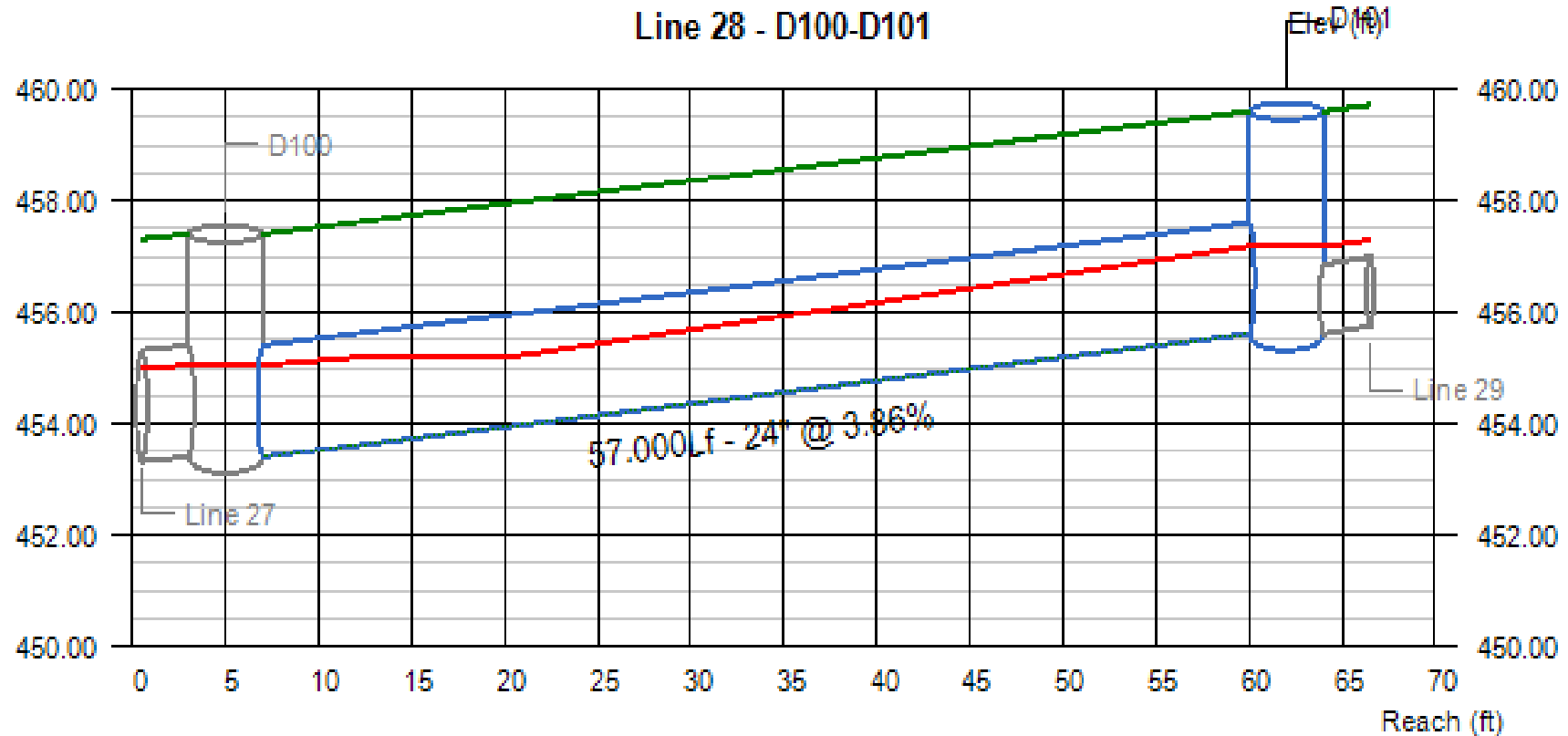
Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
27	21.09	447.88	453.40	2.00	1.64	1.64	451.42	455.04 j	455.04	6.72	7.64	1.70	2.00

BNE West Orange Pipe Sizing

No. Lines: 38

Run Date: 5/5/2020

Line Profile (Line 28) - D100-D101



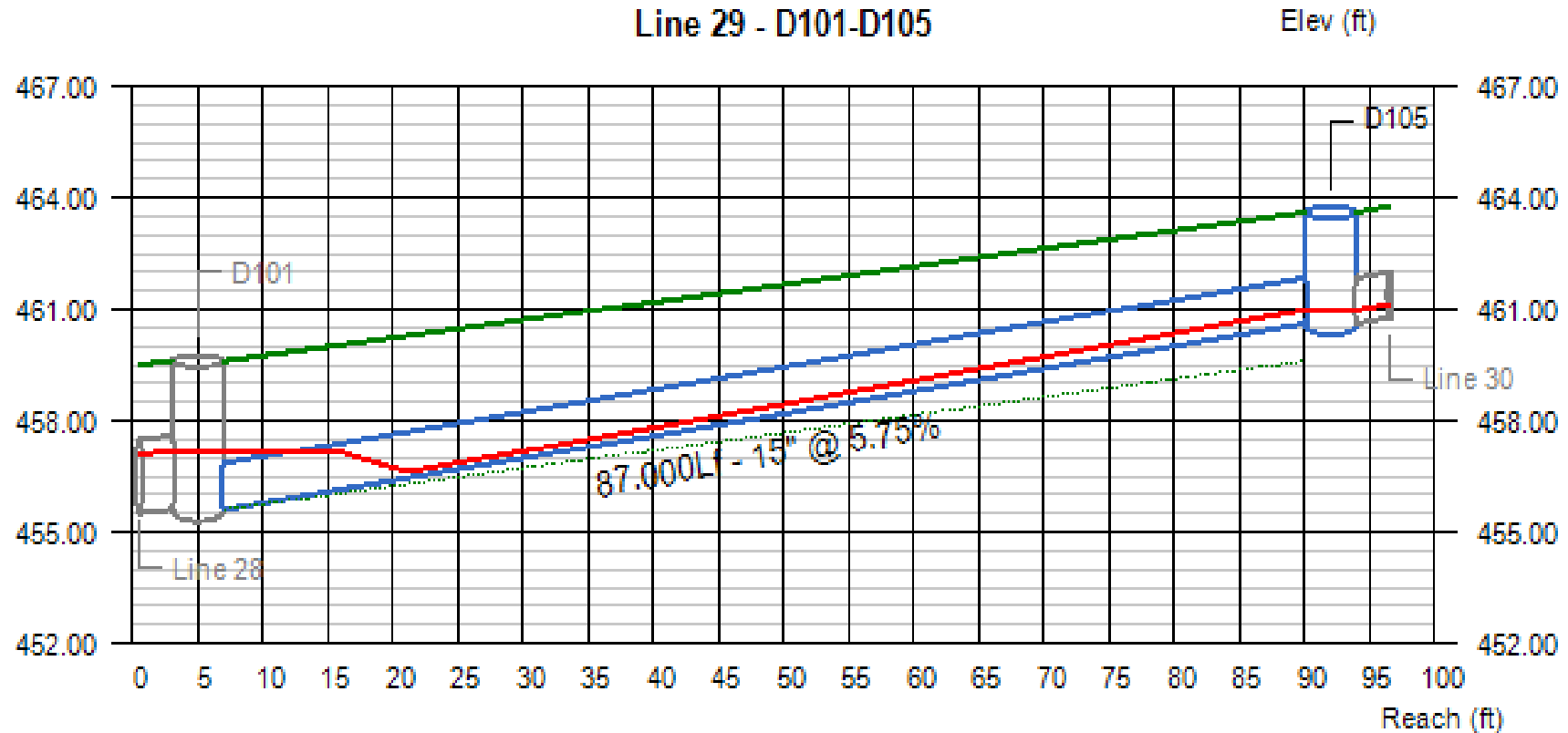
Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
28	19.35	453.40	455.60	1.64	1.58	1.58	455.04	457.18 j	457.18	7.01	7.27	2.00	2.00

BNE West Orange Pipe Sizing

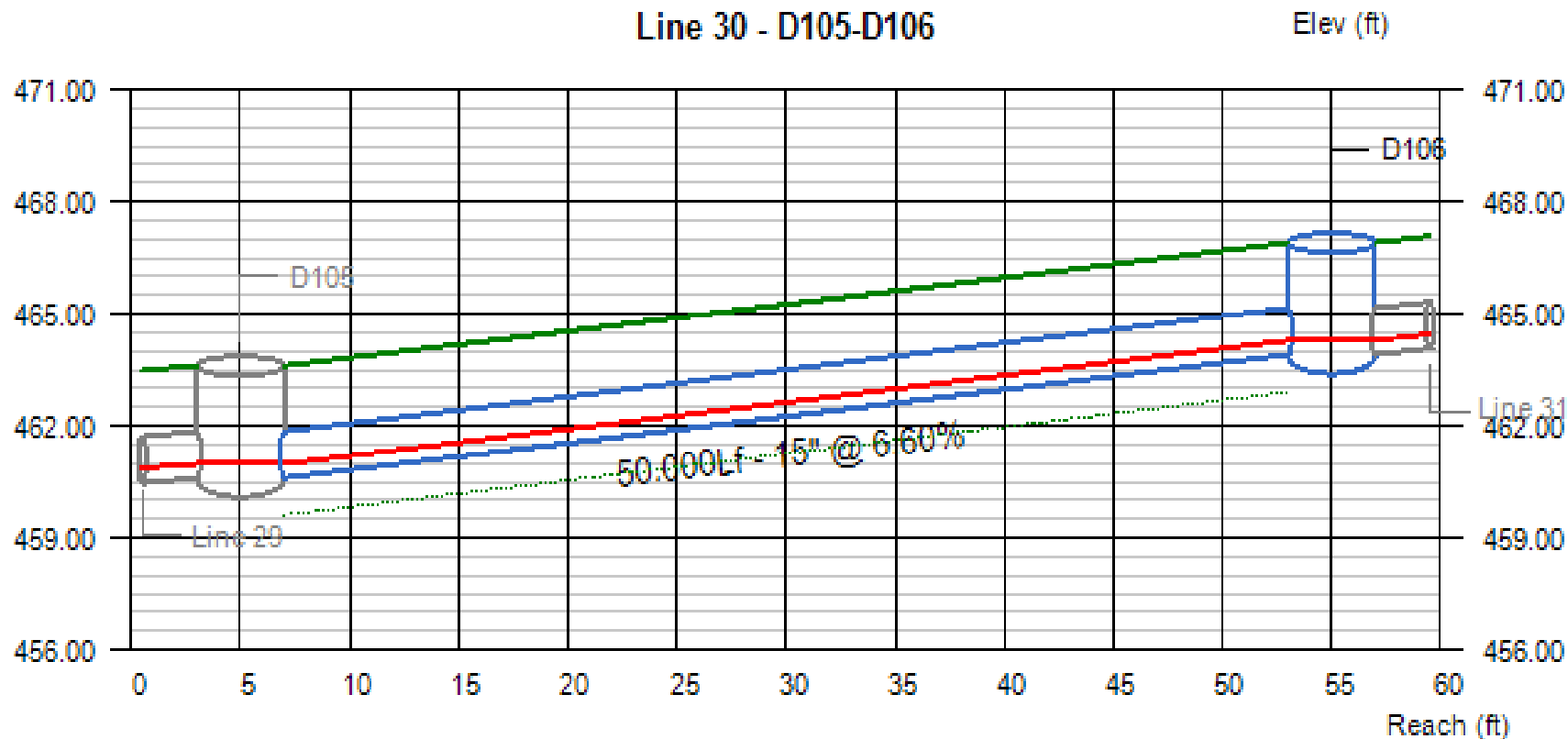
No. Lines: 38

Run Date: 5/5/2020

Line Profile (Line 29) - D101-D105



Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
29	0.94	455.60	460.60	1.25	0.38	0.38	457.18	460.98 j	460.98	0.77	2.98	2.75	1.75
BNE West Orange Pipe Sizing									No. Lines: 38		Run Date: 5/5/2020		



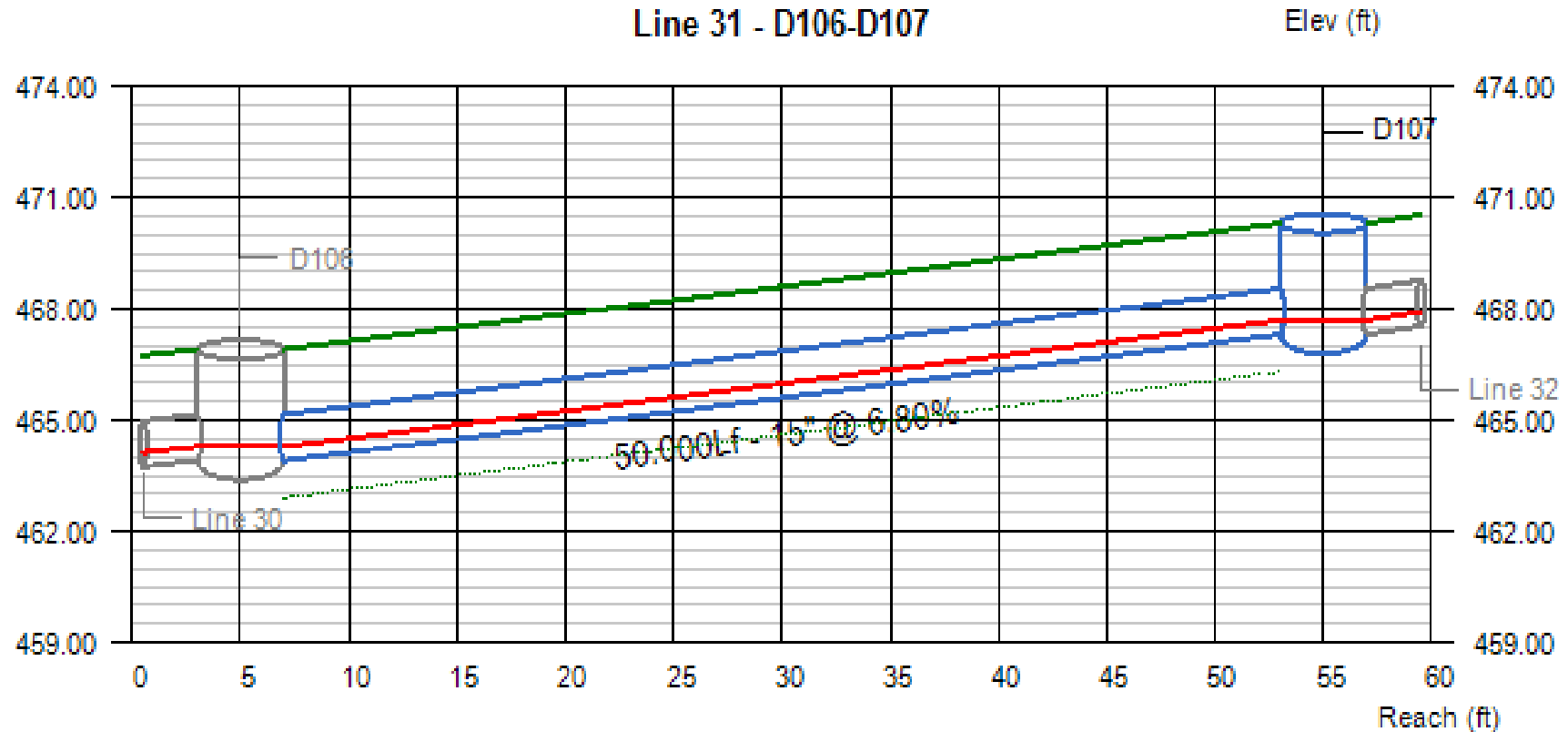
Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
30	0.95	460.60	463.90	0.38	0.38	0.38	460.98	464.28	464.28	3.01	2.99	1.75	1.75

BNE West Orange Pipe Sizing

No. Lines: 38

Run Date: 5/5/2020

Line Profile (Line 31) - D106-D107



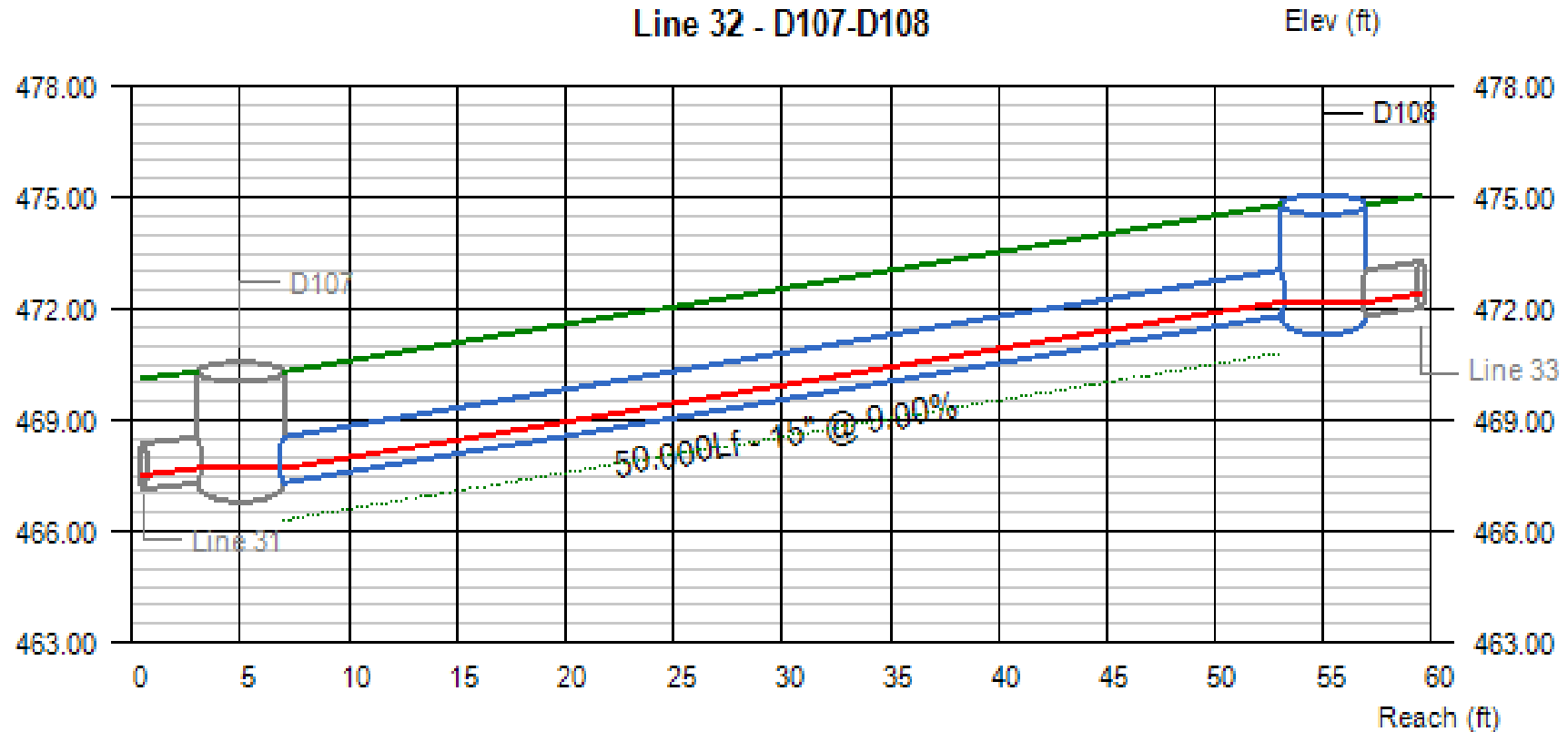
Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
31	0.96	463.90	467.30	0.38	0.38	0.38	464.28	467.68	467.68	3.02	3.00	1.75	1.75

BNE West Orange Pipe Sizing

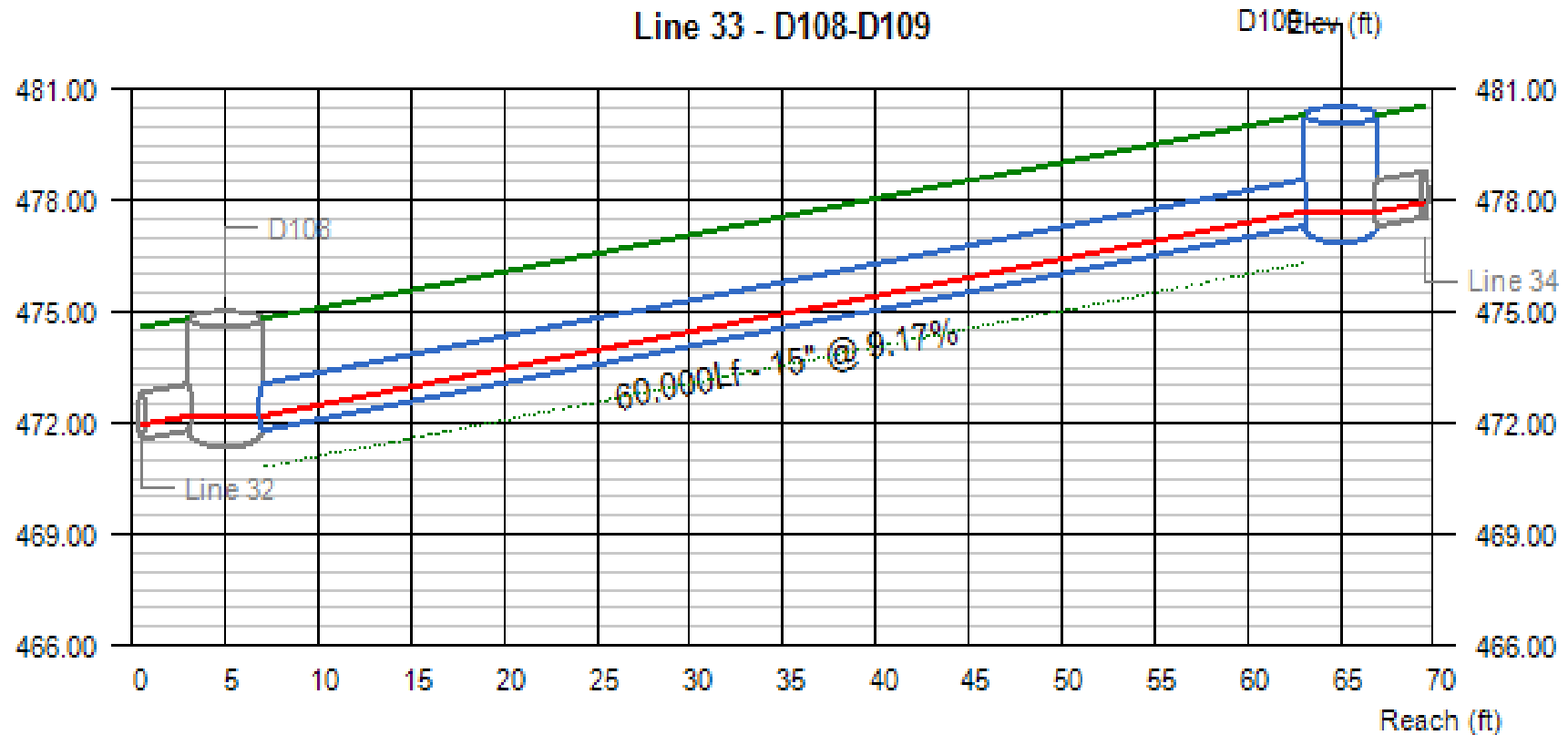
No. Lines: 38

Run Date: 5/5/2020

Line Profile (Line 32) - D107-D108



Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
32	0.97	467.30	471.80	0.38	0.39	0.39	467.68	472.19	472.19	3.03	3.00	1.75	1.75
BNE West Orange Pipe Sizing								No. Lines: 38			Run Date: 5/5/2020		



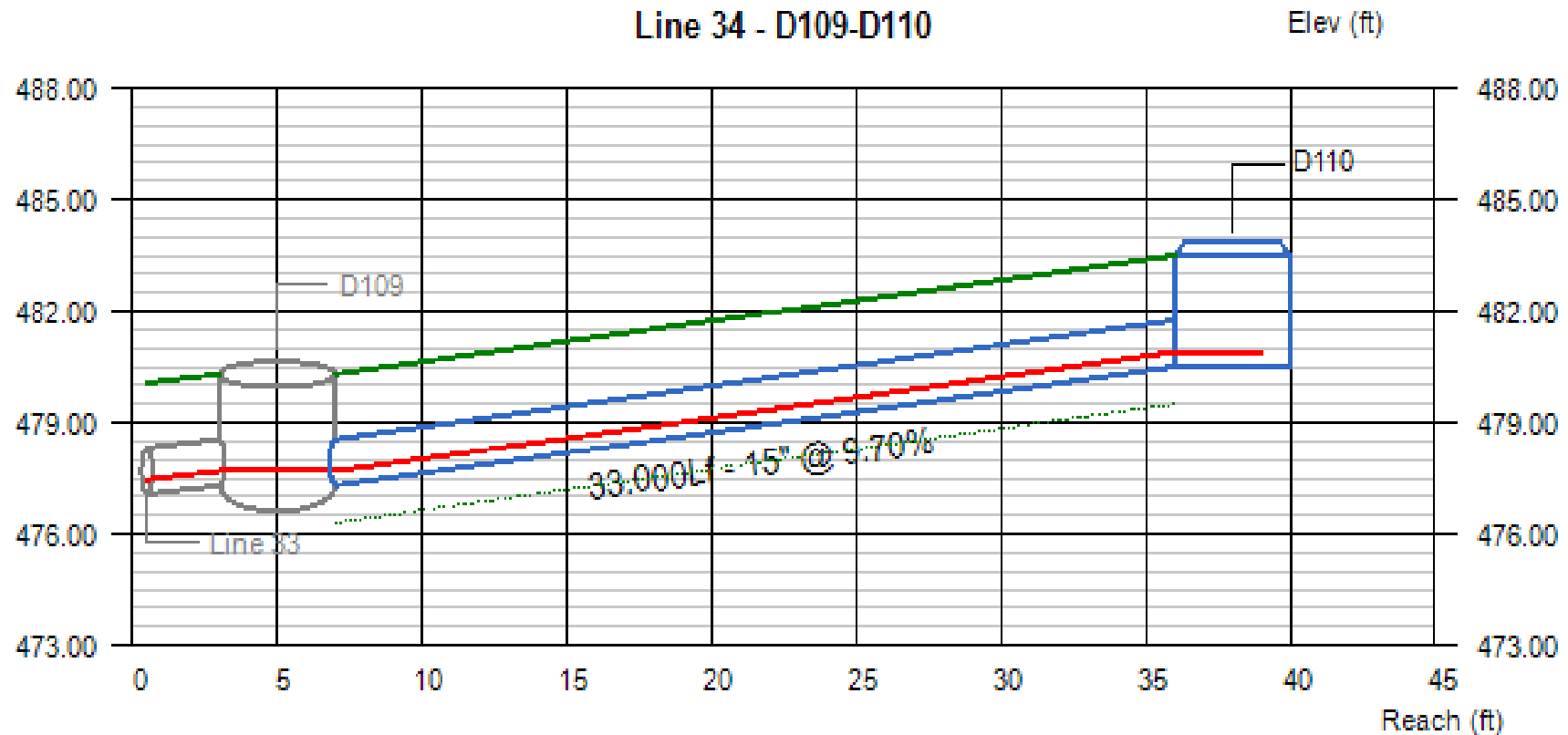
Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
33	0.98	471.80	477.30	0.39	0.39	0.39	472.19	477.69	477.69	3.04	3.01	1.75	1.75

BNE West Orange Pipe Sizing

No. Lines: 38

Run Date: 5/5/2020

Line Profile (Line 34) - D109-D110

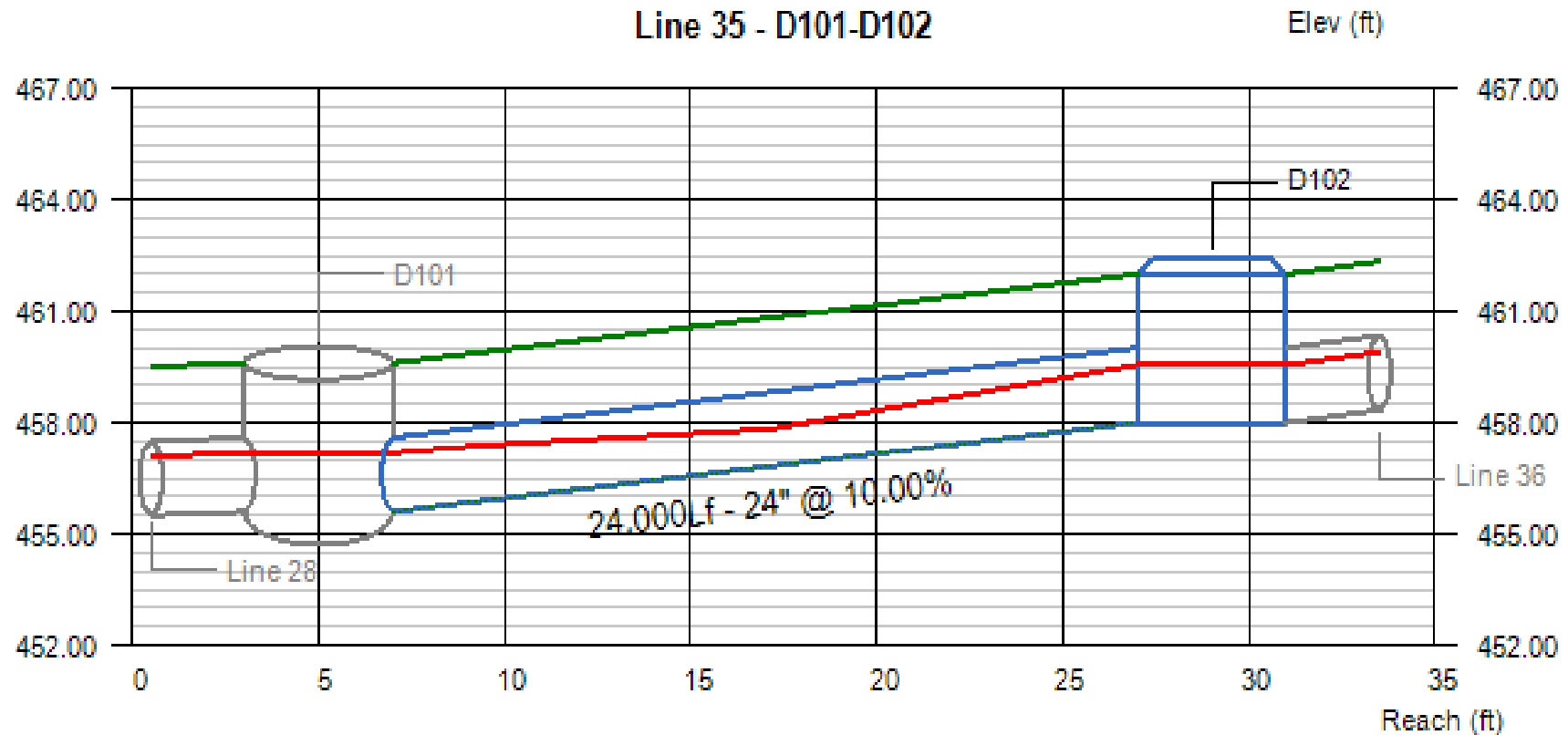


Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
34	0.99	477.30	480.50	0.39	0.39	0.39	477.69	480.89	480.89	3.03	3.02	1.75	1.75

BNE West Orange Pipe Sizing

No. Lines: 38

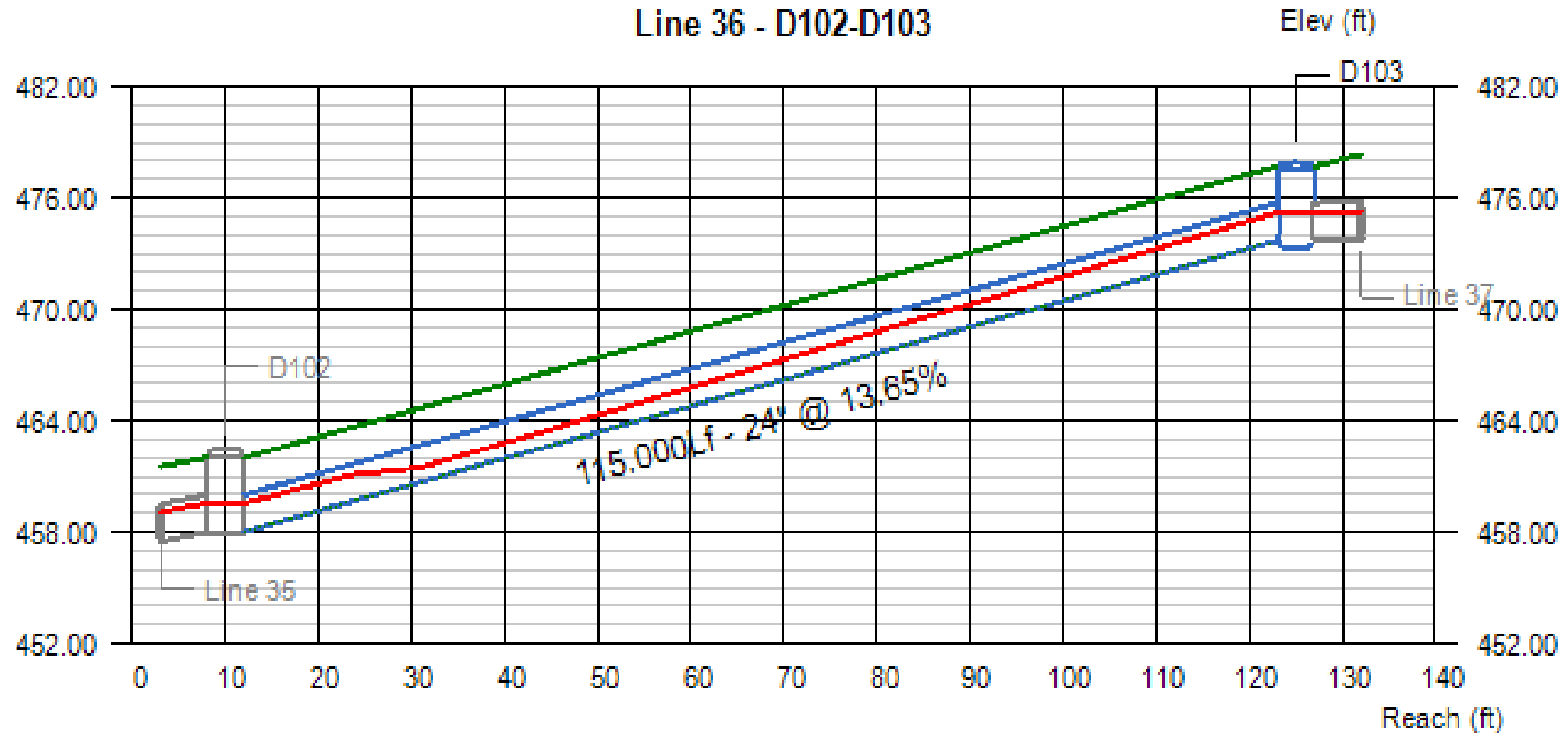
Run Date: 5/5/2020



Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
35	18.51	455.60	458.00	1.58	1.55	1.55	457.18	459.55 j	459.55	6.95	7.10	2.00	2.00

BNE West Orange Pipe Sizing
No. Lines: 38
Run Date: 5/5/2020

Line Profile (Line 36) - D102-D103



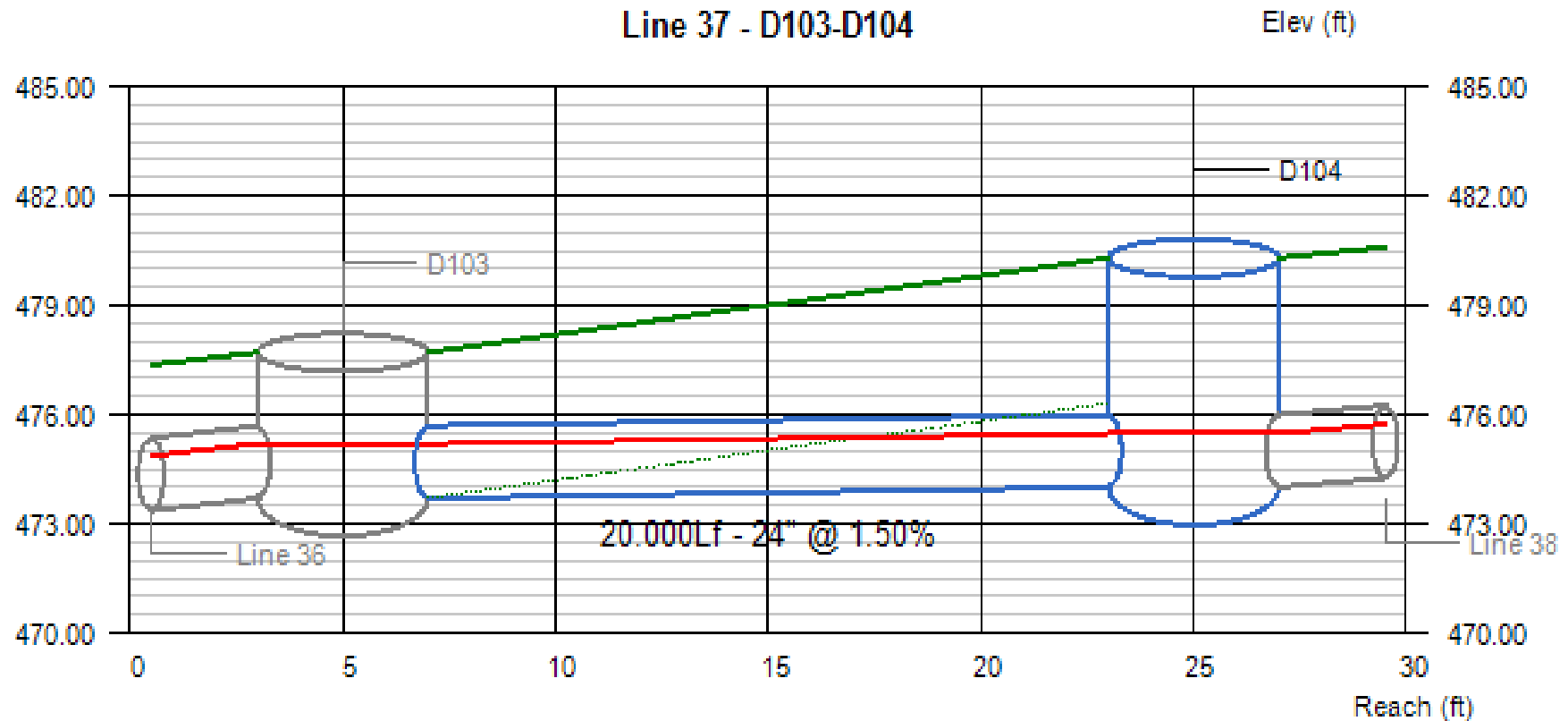
Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
36	17.13	458.00	473.70	1.55	1.49	1.49	459.55	475.19 j	475.19	6.57	6.82	2.00	2.00

BNE West Orange Pipe Sizing

No. Lines: 38

Run Date: 5/5/2020

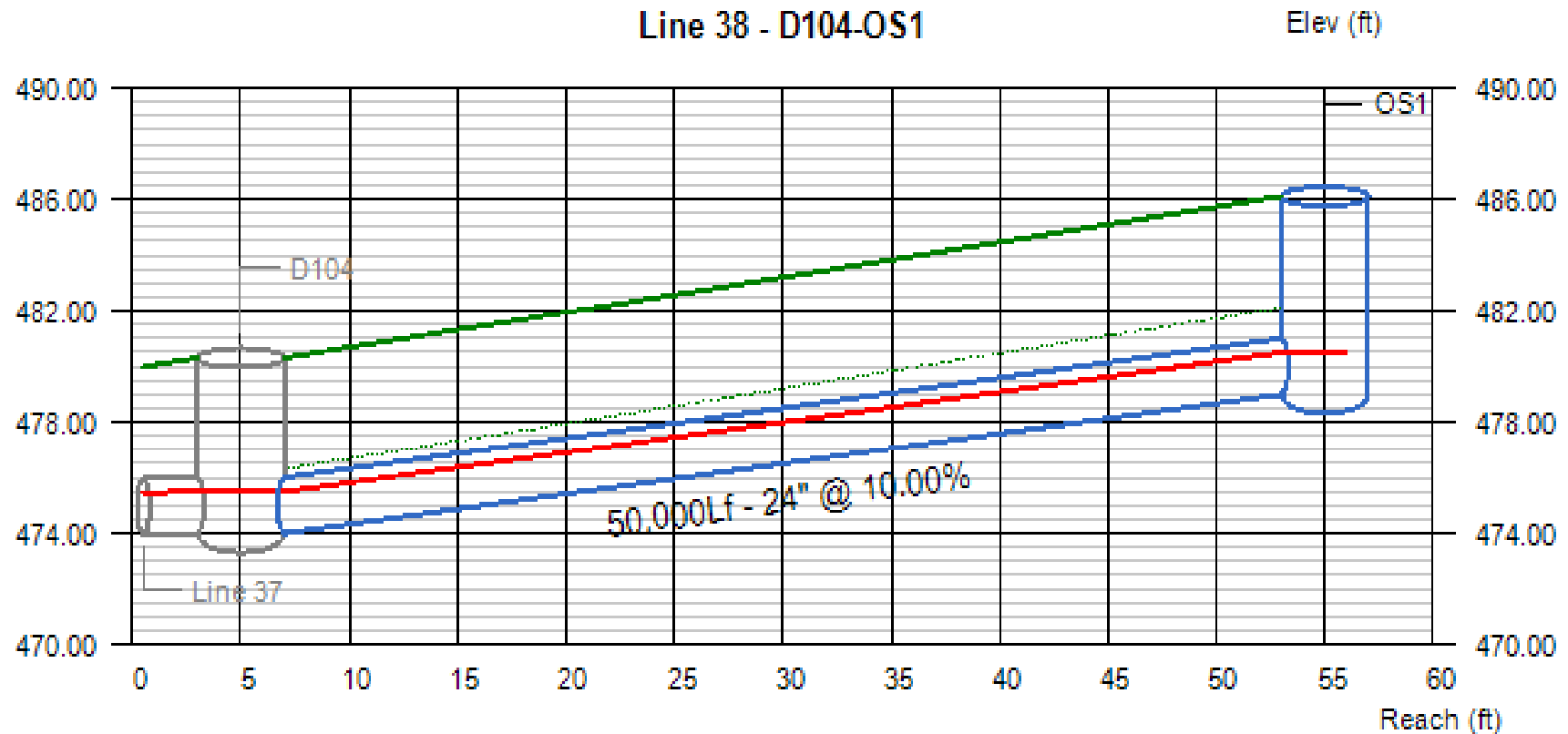
Line Profile (Line 37) - D103-D104



Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
37	17.13	473.70	474.00	1.49	1.49	1.49	475.19	475.49	475.49	6.82	6.82	2.00	4.30

BNE West Orange Pipe Sizing
No. Lines: 38
Run Date: 5/5/2020

Line Profile (Line 38) - D104-OS1



Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
38	17.13	474.00	479.00	1.49	1.49	1.49	475.49	480.49	480.49	6.82	6.82	4.30	5.10
BNE West Orange Pipe Sizing								No. Lines: 38			Run Date: 5/5/2020		

APPENDIX D

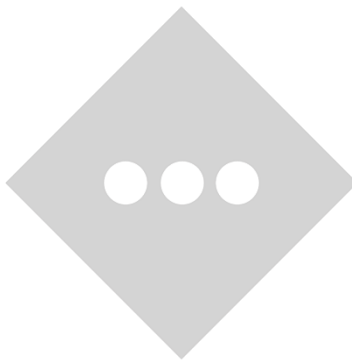
DRAINAGE AREA MAPS

INVENTORY

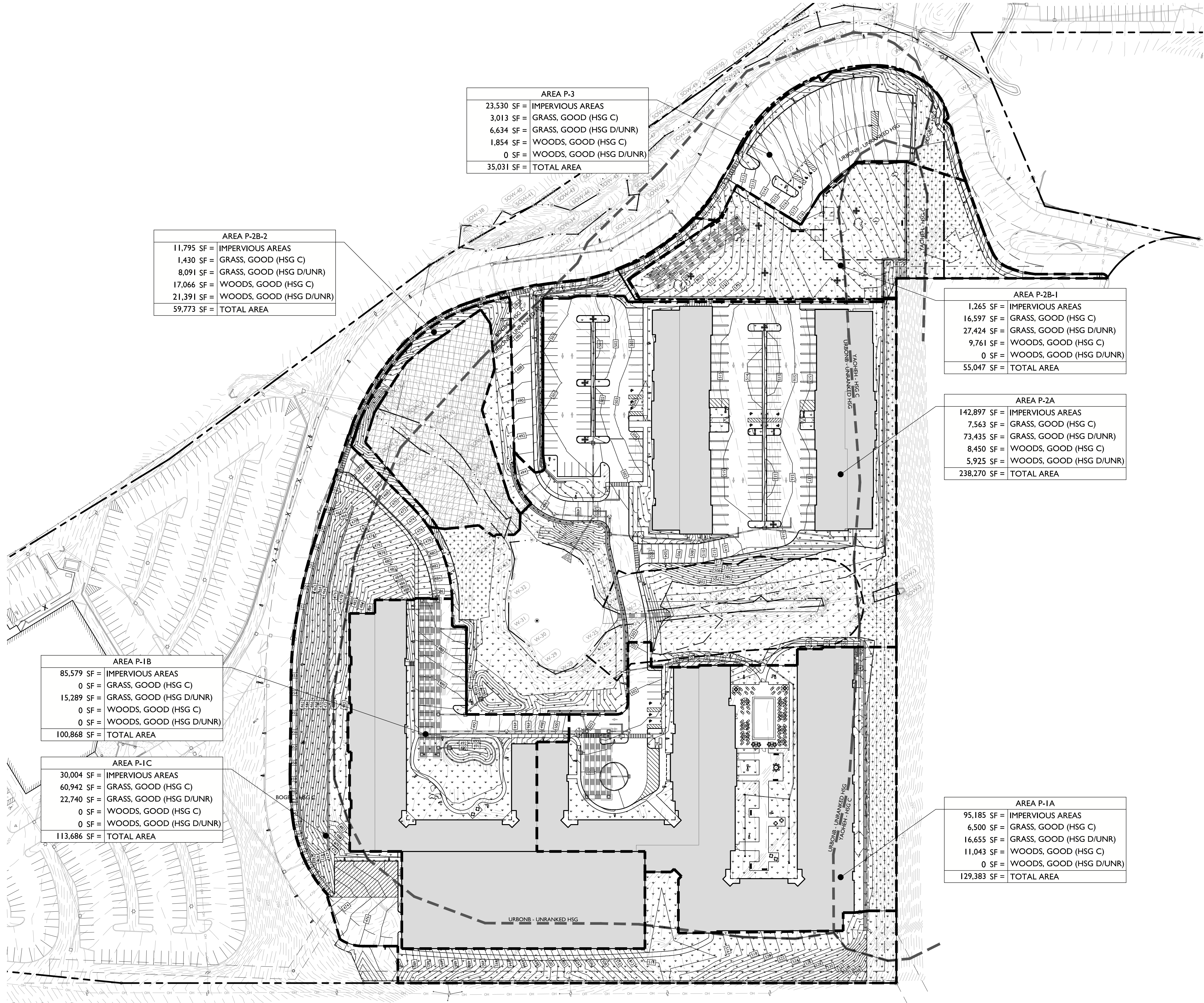
SHEET 1 OF 3: EXISTING DRAINAGE AREA MAP

SHEET 2 OF 3: PROPOSED DRAINAGE AREA MAP

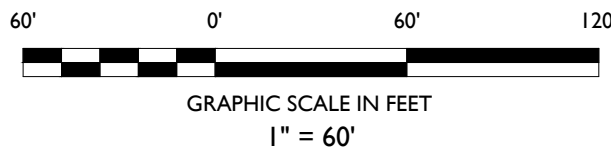
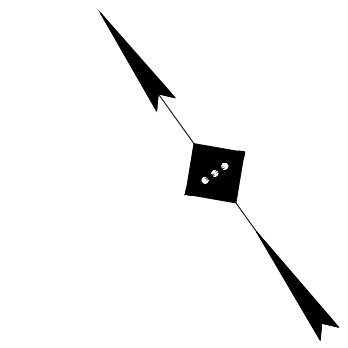
SHEET 3 OF 3: INLET DRAINAGE AREA MAP



T:\2017\1754 BINE REAL ESTATE GROUP - 100-200 EXECUTIVE DRIVE, WEST ORANGE, NJ\040618\BMT\2016\03_11_19\03 DRAINAGE AREA MAP.DWG



SYMBOL	DESCRIPTION
	PROPOSED DRAINAGE AREA
	SOIL TYPE BOUNDARY
	PROPOSED GRASSED AREA
	PROPOSED WOODED AREA
	AREA EXCLUDED FROM STUDY



ISSUED FOR REVIEW		DD	BY
		DATE	ISSUE
		03/19/2020	I

NOT APPROVED FOR CONSTRUCTION

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DRAINAGE AREA MAPS

GREEN ESSEX PARTNERS URBAN
RENEWAL ENTITY, LLC

PROPOSED MULTI-FAMILY
RESIDENTIAL DEVELOPMENT

BLOCK 155, LOTS 40.02, 42.01, & 42.02
100 - 200 EXECUTIVE DRIVE
TOWNSHIP OF WEST ORANGE
ESSEX COUNTY, NEW JERSEY

ZACHARY E. CHAPLIN, P.E.
NEW JERSEY LICENSE No. 53605
LICENSED PROFESSIONAL ENGINEER

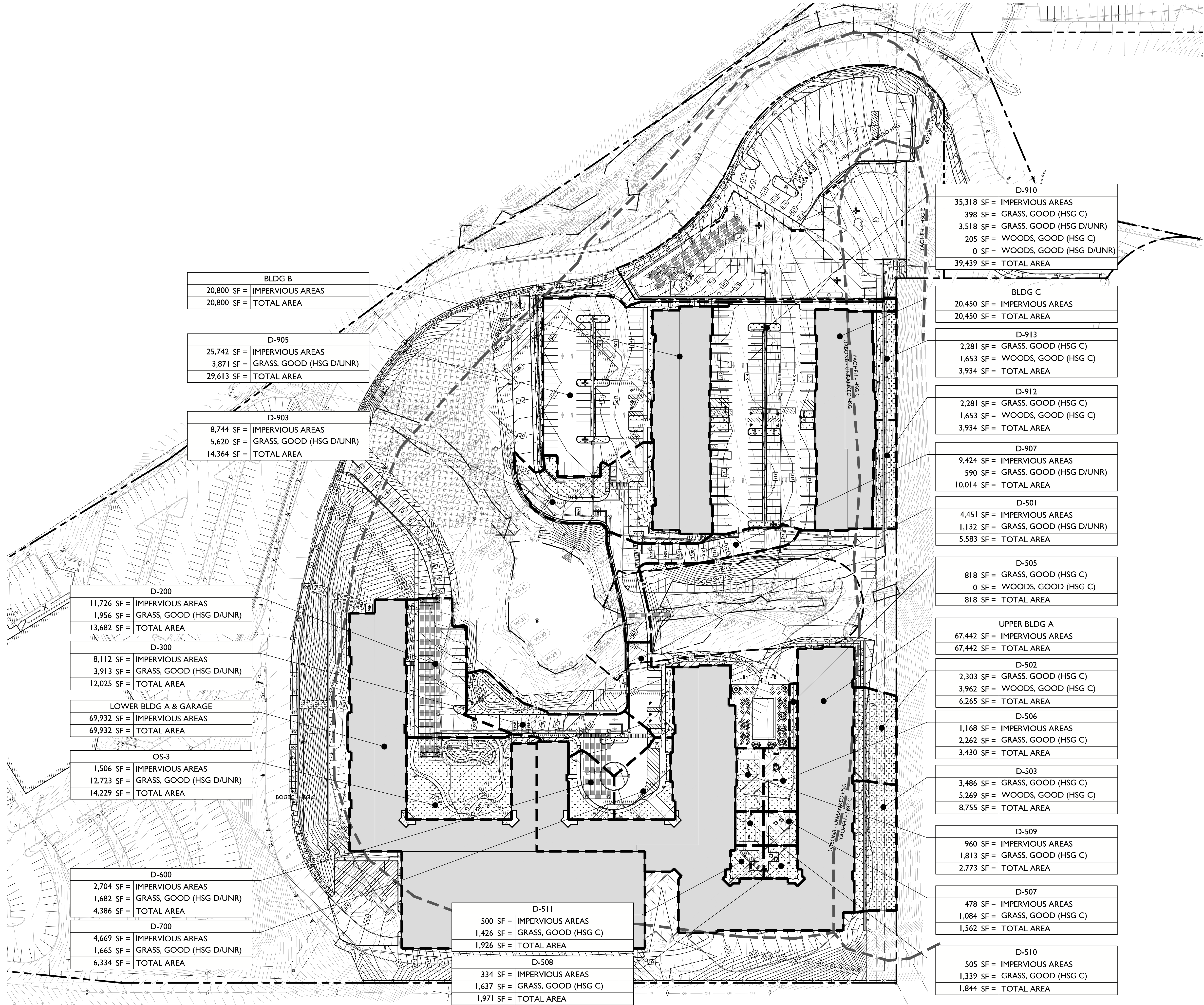
STONEFIELD
engineering & design

SCALE: 1" = 60' PROJECT ID: T-17354

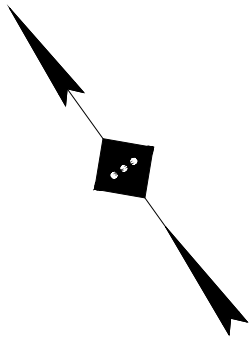
TITLE:
**PROPOSED DRAINAGE
AREA MAP**

DRAWING:

T:\2017\T-1754 BIRN REAL ESTATE GROUP - 100-200 EXECUTIVE DRIVE, WEST ORANGE, NJ\040826\BIRN\T-1754.DWG 11/15/2016 10:00 AM



SYMBOL	DESCRIPTION
---	PROPOSED INLET AREA
---	SOIL TYPE BOUNDARY
+	PROPOSED GRASSED AREA
+	PROPOSED WOODED AREA



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DRAINAGE AREA MAPS

GREEN ESSEX PARTNERS URBAN
RENEWAL ENTITY, LLC

PROPOSED MULTI-FAMILY
RESIDENTIAL DEVELOPMENT

BLOCK 155, LOTS 40.02, 42.01, & 42.02
100 - 200 EXECUTIVE DRIVE
TOWNSHIP OF WEST ORANGE
ESSEX COUNTY, NEW JERSEY

ZACHARY E. CHAPLIN, P.E.
NEW JERSEY LICENSE No. 53605
LICENSED PROFESSIONAL ENGINEER

STONEFIELD

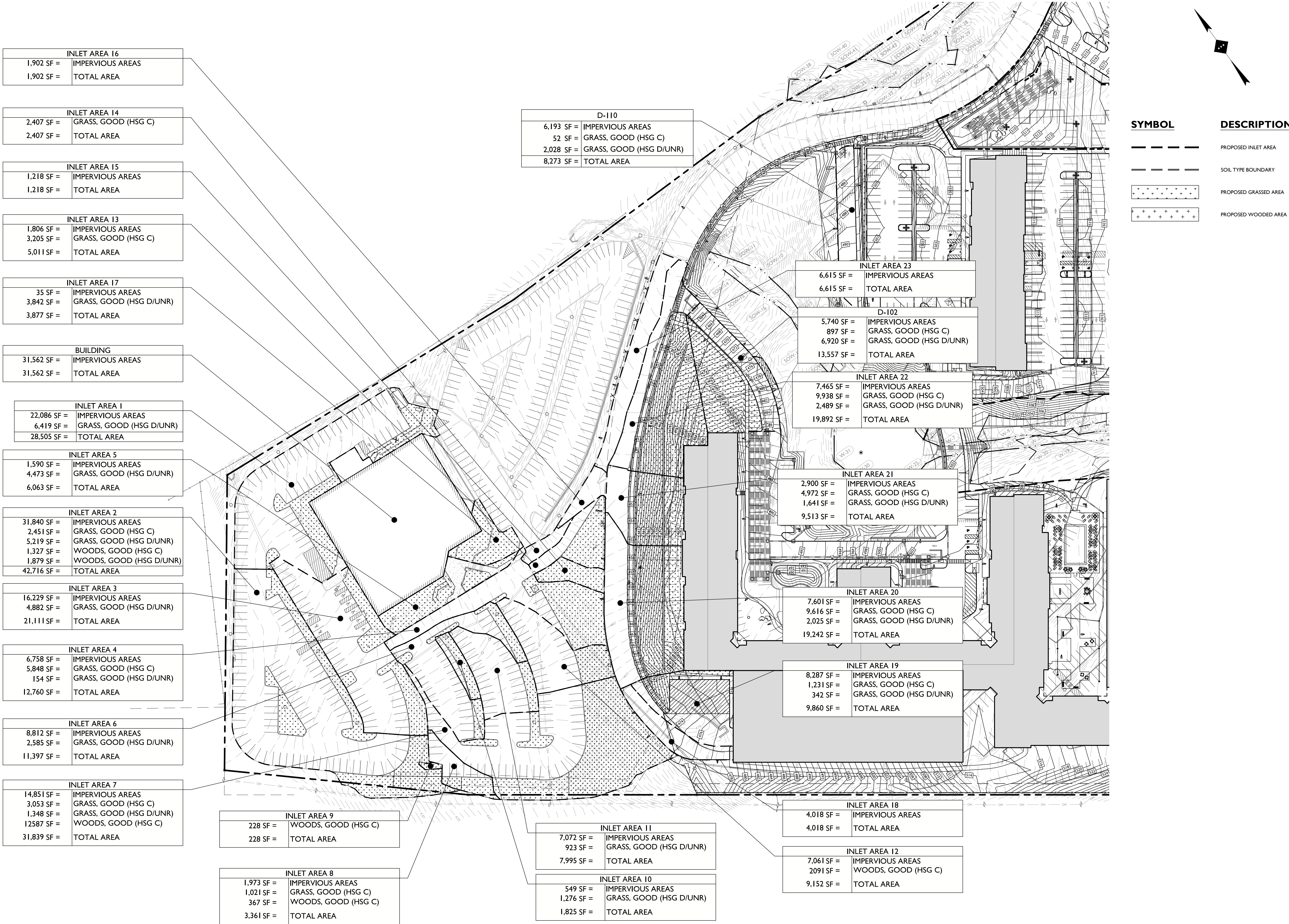
engineering & design

SCALE: 1" = 60' PROJECT ID: T-1754

TITLE:
PROPOSED INLET
AREA MAP

DRAWING:

T:\2017\1754 BIR REAL ESTATE GROUP - 100-380 EXECUTIVE DRIVE, WEST ORANGE, NJ\CDR\DWG\1754030.DWG 1754 DRAINAGE AREA MAP.DWG



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DRAINAGE AREA MAPS

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RENEWAL ENTITY, LLC**

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NEW JERSEY LICENSE No. 53605
LICENSED PROFESSIONAL ENGINEER

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SCALE: 1" = 60' PROJECT ID: T-17554

TITLE:
**DOWNSTREAM INLET
AREA MAP**

DRAWING: