EPC STORMWATER REVIEW COMMENTS
IN ORANGE BOXES WITH BLACK TEXT

FINAL DRAINAGE REPORT

FOR

MAYBERRY, COLORADO SPRINGS – FILING NO. 3

PREPARED FOR:

COLORADO SPRINGS MAYBERRY, LLC
3296 DEVINE HEIGHTS #208
COLORADO SPRINGS, CO 80922

PREPARED BY:

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R&R JOB #MC22110
EPC PROJECT NO. SF2219

ORIGINAL SUBMITTAL: MAY 2022
2ND SUBMITTAL: SEPTEMBER 2022
3RD SUBMITTAL: JANUARY 2023

ENGINEER'S STATEMENT:

The attached drainage plan and report were prepared under my direction and supervision and are correct to the best of my knowledge and belief. Said drainage report has been prepared according to the criteria established by the County for drainage reports and said report is in conformity with the master plan of the drainage basin. I accept responsibility for liability caused by negligent acts, errors or omissions on my part in preparing this report.

SIGNATURE: ______________________________
Clif Dayton, P.E.
Registered Professional Engineer
State of Colorado No. 51674

DEVELOPER'S STATEMENT:

I, the developer, have read and will comply with all of the requirements specified in this drainage report and plan.

SIGNATURE: ______________________________
John Mick
Colorado Springs Mayberry, LLC
3296 Devine Heights #208
Colorado Springs, CO 80922

EL PASO COUNTY'S STATEMENT:

Filed in accordance with the requirements of the El Paso County Land Development Code, Drainage Criteria Manual, Volumes 1 and 2, and Engineering Criteria Manual as amended.

SIGNATURE: ______________________________
Joshua Palmer, P.E.
County Engineer/ECM Administrator

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I. GENERAL LOCATION AND DESCRIPTION

A. Background

Mayberry, Colorado Springs (formerly known as “Ellicott Town Center”) is a proposed subdivision located west of Ellicott, Colorado in El Paso County. The development is located on the south side of State Highway 94, approximately 1-1/2 miles west of Ellicott Highway, as shown in Appendix C. The approved Ellicott Town Center Sketch Plan and Overall PUD includes a total of 1,048 single-family dwelling units and 32 acres of commercial space. The Amended Mayberry, Colorado Springs Phase 1 PUD was approved by BOCC in April 2022, which maintained the originally approved 240 Phase 1 lots, but revised various street and lot configurations based on current market conditions. Filing No. 3 comprises the easterly 142 residential lots within the Amended Phase 1 PUD.

B. Scope

This report has been prepared in support of the Final Plat application for Mayberry, Colorado Springs Filing No. 3. The report is intended to fulfill the El Paso County requirements for a Final Drainage Report (FDR).

The report will provide a summary of site drainage issues impacting the proposed development, including analysis of impacts from upstream drainage patterns, site-specific developed drainage patterns, and impacts on downstream facilities. This drainage report was prepared based on the guidelines and criteria presented in the El Paso County Drainage Criteria Manual, providing preliminary design of required drainage facilities for this phase of the project.

C. Site Location and Description

The Mayberry, Colorado Springs (Ellicott Town Center) parcel comprises the west half of Section 14 along with the contiguous east quarter of Section 15, as well the west half of the northeast quarter of Section 14, Township 14 South, Range 63 West of the 6th Principal Meridian. The site is located at an elevation of approximately 6,060 feet above mean sea level. Filing No. 3 comprises 105.8-acres in the northeast area of the Mayberry development.

State Highway 94 borders Filing 3 to the north along with Filing 2, and unplatted agricultural properties (zoned A35) border Filing 3 on the east and south sides. Unplatted property zoned PUD and Filing 1 border Filing 3 to the west.

The primary access to Filing 3 will be provided by construction of Springs Road, which will run through the site from north to south as a minor collector roadway (65’ right-of-way). Additionally, Filing 3 will be accessed by New Log Road via Village Main Street (60’ right-of-way). Both roads intersect SH94 to the north.

The intermittent streams throughout this area drain into the Black Squirrel Creek Basin which ultimately outfalls into the Arkansas River. Filing 3 is located within the Ellicott Consolidated Drainage Basin (CHBS1200). This basin conveys surface drainage to the West Fork of Black Squirrel Creek, which is located east of this parcel between the site and Ellicott Highway.

The terrain is generally flat with gentle northwest to southeast slopes ranging from one to two percent. Historic drainage patterns from the site are conveyed overland to the south and east boundaries of the site. The entire site is covered with native grasses.

D. General Soil Conditions

According to the Soil Survey of El Paso County prepared by the Soil Conservation Service, on-site soils are comprised primarily of “Blakeland series (type 8)” soils (see Appendix C). The Blakeland soils are characterized as well-drained loamy sand with rapid permeability, slow surface runoff rates, and moderate hazard of erosion. These soils are classified as hydrologic soils group “A” for drainage analysis purposes.

E. References

City of Colorado Springs “Drainage Criteria Manual, Vol 1 & 2”, May 2014.

CDOT, “CDOT Drainage Design Manual,” 2004.

David R. Sellon & Associates Inc., “Antelope Park Ranchettes Interior Drainage Plan,” March, 1972.

El Paso County “Drainage Criteria Manual County of El Paso, Colorado – Volumes 1 and 2” dated October 31, 2018. (Referred to throughout as EPC DCM)

El Paso County Planning Department, “Ellicott Valley Comprehensive Plan,” March, 1989.

El Paso County “Engineering Criteria Manual,” January 9, 2006.

El Paso County Resolution No. 15-042 (El Paso County adoption of “Chapter 6: Hydrology” and “Chapter 13, Section 3.2.1: Full Spectrum Detention” of the City of Colorado Springs Drainage Criteria Manual dated May 2014).

JPS Engineering, “Master Development Drainage Plan for Ellicott Town Center,” November 22, 2005 (approved by El Paso County 12/02/05).

JPS Engineering, "Master Development Drainage Plan and Preliminary Drainage Report for Springs East Village," March 21, 2002 (approved by El Paso County 10/23/02).

JPS Engineering, "Master Development Drainage Plan and Preliminary Drainage Report for Viewpoint Village," January 28, 2002 (approved by El Paso County 9/11/02).

JPS Engineering, "Preliminary Drainage Report for Ellicott Town Center - Phase 1," January 15, 2007.

JPS Engineering, "Preliminary & Final Drainage Report for Mayberry, Colorado Springs - Filing No. 1," revised October 27, 2020 (approved by El Paso County November 5, 2020).

JPS Engineering, "Preliminary Drainage Report Amendment for Mayberry, Colorado Springs – Phase 1 PUD," revised February 2022

Leigh Whitehead & Associates, Inc., "Master Development Drainage Plan for Sunset Village," May, 2000 (approved by El Paso County 8/31/00).

Pacific Summits Engineering, "Final Drainage Report for Viewpoint Estates," January 6, 1998 (approved by El Paso County 10/6/99).

United Planning and Engineering, "Preliminary Drainage Plan & Report for Springs East," November 19, 1999.

United Planning and Engineering, "Drainage Plan & Report for Viewpoint Subdivision," May, 2000.

USDA/NRCS, "Soil Survey of El Paso County Area, Colorado," June, 1981.

II. DRAINAGE BASINS AND SUB-BASINS

A. Major Drainage Basins

The proposed development lies primarily within the Ellicott Consolidated Drainage Basin (CHBS1200) as classified by El Paso County. This basin is comprised of the area tributary to the West Fork of Black Squirrel Creek, with the majority of the basin bounded by SH94 to the north and Ellicott Highway to the east. No drainage planning study has been completed for the Ellicott Consolidated Drainage Basin or any adjacent drainage basins.

The major drainage basins lying in and around the proposed development are depicted in Figure EX1 and is sourced from the Phase 1 PUD Amended Drainage Report. Mayberry, Colorado Springs is located primarily within the Ellicott Consolidated Drainage Basin, which comprises a tributary area of about 13 square miles, or 8,320 acres. The proposed subdivision represents a total of 551 acres of development, or 7 percent of the total basin area. An “on-site” drainage planning approach has been proposed based on the relatively small developed area in comparison to the remaining undeveloped basin area, which is primarily agricultural land.

The existing site topography has one off-site drainage basin (EC-10) that enters the northeast corner of Filing 3. Triple 30-inch CMP culverts cross SH94 at this location combining with on-site flows, following existing grass-lined swales southeasterly through the site. Filing 3 historically consists of one major basin conveying flows towards the south and eastern boundaries of the site, as shown in Figure EX2. Flows from Filing 3 combine with the tributary areas from Filing 1 and surrounding offsite areas downstream of the site, flowing southeasterly to an existing natural channel towards Black Squirrel Creek.

B. Floodplain Impacts

Mayberry – Filing 3, Colorado Springs is located approximately one mile southwest of the 100-year floodplain limits for the West Fork of Black Squirrel Creek, as delineated by the Federal Emergency Management Agency (FEMA). The floodplain limits in the vicinity of the site are shown in Flood Insurance Rate Map (FIRM) Number 08041C0810G, dated December 7, 2018 (see Appendix C).

C. Sub-Basin Description

The developed drainage basins lying within Filing 3 are depicted in Figure D1. The interior site layout has been delineated into several major drainage basins (C-E) based on the proposed interior road layout and grading scheme. The natural drainage patterns will be impacted through development by site grading and concentration of runoff in subdivision street gutters, storm drains, and channels. Most sub-basins drain to the southeast, collecting in the interior roads and drainage channels. On-site flows will be diverted to a proposed extended detention basin (EDB) located at the southeast boundary of the site, and detained flows will discharge to the east, following historic drainage paths.

III. DRAINAGE DESIGN CRITERIA

A. Development Criteria Reference

The Ellicott Consolidated Drainage Basin has not had a Drainage Basin Planning Study performed for the basin. Most areas within the basin are comprised of agricultural lands and rural residential uses.

A "Master Development Drainage Plan (MDDP) for Ellicott Town Center" was approved concurrent with the original Overall PUD, and a Preliminary Drainage Report for Ellicott Town Center Phase One was approved with the original Phase One PUD and Preliminary Plan.

JPS Engineering prepared the "Preliminary & Final Drainage Report for Mayberry, Colorado Springs - Filing No. 1," revised October 27, 2020 (approved by El Paso County November 5, 2020) in support of the final approval and recording of Filing No. 1.

This "Final Drainage Report for Mayberry, Colorado Springs – Filing No. 3" fully conforms to the previously approved MDDP and Preliminary/Final Drainage Reports, along with the "Preliminary Drainage Report Amendment for Mayberry, Colorado Springs Phase 1 PUD" dated February, 2022 prepared in support of the Phase 1 PUD Amendment.

B. Hydrologic Criteria

SCS procedures were utilized for analysis of major basin flows impacting the site. In accordance with El Paso County drainage criteria, SCS hydrologic calculations were based on the following assumptions:

• Design storm (minor)	5-year
• Design storm (major)	100-year
• Storm distribution	SCS Type IIA (eastern Colorado)
• 100-year, 24-hour rainfall	4.4 inches per hour (NOAA isopluvial map)
• 5-year, 24-hour rainfall	2.6 inches per hour (NOAA isopluvial map)
• Hydrologic soil type	A

- SCS curve number - undeveloped conditions 61 (pasture / range)
- SCS curve number - developed conditions 80 (1/8-1/4 acre lots)
- SCS curve number - developed conditions 92 (commercial areas)

Hydraflow Hydrographs was utilized for the modeling of these storms.

Rational method procedures were utilized for calculation of peak flows within the on-site drainage basins. Rational method hydrologic calculations were based on the following assumptions:

• Design storm (minor)	5-year	
• Design storm (major)	100-year	
• Rainfall Intensities	El Paso County I-D-F Curve	
• Hydrologic soil type	A	
	C5	C100
• Runoff Coefficients - undeveloped:		
Existing pasture/range areas	0.25	0.35
• Runoff Coefficients - developed:		
Proposed Residential (1/8-1/4 acre lots)	0.375	0.545
Proposed Neighborhood Commercial	0.49	0.62

Composite runoff coefficients for the developed residential areas have been calculated based on average lot sizes between 1/8-acre and 1/4-acre. A rational method spreadsheet was utilized for modeling these flows.

C. Hydraulic Criteria

Streets and Inlets

Street and inlet capacities were calculated using the UD_Inlet utilizing the street geometries at each inlet. The criteria used for design was that of Local/Residential/Collector roads from Table 6-1 of the EPC DCM. The criteria states that for the 5 year storm, flow depths would not exceed 6 inches or overtop the street crown while for the 100 year storm, the depth of water at the flow line would not exceed 12 inches.

Underground Storm Sewer Pipe Systems

Three pipe systems are proposed as part of the Filing 3 development. Pipes are sized so that the 100 year HGLs are a minimum of 1 foot below finished grades. HGLs are derived using Bentley StormCAD software. Velocities in pipes do not exceed 18 fps as stated in the EPC DCM. All peak flows for pipes were derived via the Rational Method.

Channels

Four grass lined channels are proposed as part of the Filing 3 development: C2, D, E, and F. Channels are sized so that there is a minimum of 1 foot of freeboard between the 100 year water surface elevation and the top of channels. Where channels make defined bends, additional freeboard is provided per Equation 10-4 of the EPC DCM. Channels are designed to not exceed velocities of 5 fps and will be lined with native grasses.

Because the EPC DCM does not give specific guidance on the use of native grasses for channel lining, Table 12-6 of the Colorado Springs DCM Vol. 1 was utilized to establish maximum velocities and roughness coefficients. Peak flows for Channels C2 and D were derived via the Rational Method while peak flows for Channels E and F were obtained using the SCS method due to the size of the offsite basins being routed through these channels.

Additional criteria has been referenced for the analysis of an existing roadside ditch along Log Road. Table 6-1 of the EPC DCM states that during the 100 Year storm, the flow shall not exceed 6 inches at the shoulder.

Rip-Rap and Plunge Pools

Rip-Rap and plunge pools were sized for the 100 year storm per UDFCD Chapter 9 Section 3.2.1 and 3.2.2. Rip-rap is placed where all pipes discharge into channels across the site and is sized to reduce velocities to 5 fps. A plunge pool is proposed where flows from the site enter the Log Road ROW. The plunge pool is sized to reduce velocities to 1.3 fps to ensure flows entering the ROW are as non erosive as possible.

Culverts

Two temporary culverts are proposed beneath temporary cul-de-sacs east of the proposed development. The culverts are designed so that during the 100 year storm event, water levels do not exceed 12 inches above finished grade when overtopping the roadway above per Table 6-4 of EPC DCM.

D. Detention and Water Quality Criteria

Detention volumes and required release rates will be calculated using the UD_Detention Spreadsheet from UDFCD. An extended detention basin will be utilized to provide water quality and detention for Filing 3. The facility is designed to pass and release the water quality captured volume (WQCV), excess urban runoff volume (EURV), and 100 year storm to meet all local and state regulations by means of a multi-stage outlet structure.

The WQCV will be routed through an orifice plate installed within the outlet structure and sized to have a 40 hour draw down time. The orifice plate will also drain 97% the EURV within 72 hours. Finally, a restrictor plate and weir combination will pass the 100 year flow at 90% of the pre-developed rate.

Per El Paso County Engineering Criteria Manual Section 1.7.1.C.1, up to one acre of development may be exempt from stormwater treatment. Due to the requirement that temporary cul-de-sacs be provided for fire department access to Union Pacific and El Reno Way, these developed areas are unable to drain to the proposed detention pond. These areas will drain to Channel E and flow offsite undetained.

These cul-de-sac areas total to 0.3 acres, so well below the 1 acre requirement.

IV. DRAINAGE PLANNING FOUR STEP PROCESS

El Paso County Drainage Criteria require drainage planning to include a Four Step Process for receiving water protection that focuses on reducing runoff volumes, treating the water quality capture volume (WQCV), stabilizing drainageways, and implementing long-term source controls.

As stated in DCM Volume 2, the Four Step Process is applicable to all new and re-development projects with construction activities that disturb 1 acre or greater or that disturb less than 1 acre but are part of a larger common plan of development. The Four Step Process has been implemented as follows in the planning of this project:

Step 1: Employ Runoff Reduction Practices

- Minimize Impacts: The approved Planned Unit Development includes significant open space, play areas, and parks, resulting in a moderate level of impervious site development.
- Minimize Directly Connected Impervious Areas (MDCIA): The proposed development will include landscaped areas adjoining the proposed building and parking lots, providing for impervious areas to drain across pervious areas where feasible.
- Grass Swales: The proposed drainage plan incorporates grass-lined swales in selected locations to encourage stormwater infiltration while providing positive drainage through the site.

Step 2: Stabilize Drainageways

- Proper erosion control measures will be implemented along the grass-lined drainage channels to provide stabilized drainageways within the site.

Step 3: Provide Water Quality Capture Volume (WQCV)

- EDB: The developed areas of the site will drain through proposed Full-Spectrum Extended Detention Basins (EDB) southeast of the developed areas. Site drainage will be routed through the extended detention basins, which will capture and slowly release the WQCV over an extended release period.
- Stormwater detention and WQCV for Filing as well as future Filings 2 and 4 will be provided by EDB-D.

Step 4: Consider Need for Industrial and Commercial BMPs

- No industrial or commercial land uses are proposed as part of the Filing No. 3 residential development.

V. GENERAL DRAINAGE RECOMMENDATIONS

The developed drainage plan for the site is to provide and maintain positive drainage away from structures and conform to the established drainage patterns for the overall site. Positive drainage shall be established and maintained away from all structures within the site in conformance with applicable building codes and geotechnical engineering recommendations.

Site grading and drainage improvements performed as a part of subdivision infrastructure development includes overlot grading and subdivision drainage improvements depicted on the subdivision construction drawings. Individual lot grading is the sole responsibility of the individual builders and property owners. Final grading of each home site should establish proper protective slopes and positive drainage in accordance with HUD guidelines and building codes. In general, main floor elevations for each home should be established approximately 2 feet above the top of curb of the adjoining street.

In general, we recommend a minimum of 6 inches clearance from the top of concrete foundation walls to adjacent finished site grades. Positive drainage slopes should be maintained away from all structures, with a minimum recommended slope of 5 percent for the first 10 feet away from buildings in landscaped areas, a minimum recommended slope of 2 percent for the first 10 feet away from buildings in paved areas, and a minimum slope of 1 percent for paved areas beyond buildings.

VI. DRAINAGE FACILITY DESIGN

A. General Concept

Consistent with generally accepted practices in eastern El Paso County, the general concept for management of stormwater from development of Mayberry – Filing 3 will be to construct an extended detention basin along the southeast boundary of the site to mitigate the impacts of developed runoff flows from the site.

Development of the Mayberry – Filing 3 project will require site grading and paving, resulting in additional impervious areas across the site. The general drainage pattern will consist of grading away from home sites to drainage swales and gutters along the internal roads within the subdivision, conveying runoff flows through the site. The Amended PUD includes 4-foot minimum side-lot drainage easements, and the proposed easements are adequate for the required side-lot drainage swales to accommodate proper grading of the individual home sites.

Runoff from the site will flow by street gutters to curb inlets at low points and road intersections, thence by storm drains and drainage channels to the proposed detention ponds. The storm inlets and storm sewer system within the development will be designed as the "minor" drainage system, sized for 5-year developed peak flows. The internal road system, drainage channels, and detention pond will be designed as the "major" drainage system, sized for 100-year peak flows. Street flows within subdivision streets will be maintained below allowable levels in accordance with El Paso County drainage criteria.

Due to an offsite basin north of SH94 flowing onto the subject property, the site has been designed to convey this flow through the site via a series of temporary swales and culverts. The offsite flow will be routed around the proposed development and will combine with the pond discharge via a swale that conveys flow east of the site.

B. Specific Details

Existing Basins

Historic drainage conditions for Filing 3 are depicted in Figure EX2. The site has been divided into two major basins (EX-D1 and EX-D2). The undeveloped site currently has no drainage facilities within the area. The existing off-site drainage basins north of Filing 3 generally combine with on-site basins as shown on Sheet EX2, flowing southeasterly through the site within existing grass-lined drainage swales and channels.

Basin EX-D2 flows offsite to the south towards Design Point 4-A while Basin EX-D1 flows southeasterly towards Design Point EX-5. Off-site flows from Basin EC10 north of this property cross State Highway 94 in a triple 30-inch CMP culvert crossing near the northeast corner of this site. Additionally, basin OS-1 which consists of water from the CDOT ROW flows south onto the site. Flows from EX-D1 combined with offsite flows from Basin EC10 and OS-1 at Design Point EX-5 with 5 year and 100 year peak flows of 23.7 and 183.9 cfs respectively.

From here flows are stopped by an existing berm along the southern property line and are forced eastward, combining with offsite basins EX-E and LOG. Basin EX-E is east of the subject property and generally flows southeast towards Log Road. Basin LOG consists of the Lot Road ROW. Flows from design point EX-5 combine with basins EX-E and LOG at design point EX-6 with 5 year and 100 year peak flows of 30.5 cfs and 231.4 cfs respectively.

An existing roadside swale along Log Road conveys flows to the south and combines with an offsite Basin EX-Z at design point EX-7 with 5 year and 100 year peak flows of 36.9 cfs and 285.4 cfs respectively.

From here flows turn east and follow the southerly ditch of Handle Road to its confluence with the main channel of the Middle Fork of Black Squirrel Creek.

An analysis of the major downstream drainage patterns comparing the historic and developed flows in more detail is discussed later in this report.

Developed Drainage Basins

The developed drainage basins and projected flows are shown in Sheets D1.1-D1.5. The developed Filing 3 site has been divided into three major basins (C2, D and E) and one major design point (EX-5), as shown on the enclosed Drainage Plans. Hydrologic flow schematics and calculations are enclosed in Appendix B.

Major Basin C2 (Sub-basins C2.1-C2.4, C3.0) will be routed to the extended detention basin via Channel C2 where it will combine with major basin D (Sub-basins D1.1-D1.11, C2.0-D2.1). Channels C2 and D are also sized to convey future flows from the area south of Filing 3 which is currently undeveloped. Offsite basin EC-10 will combine with onsite major Basin E (Sub-basin E1) revised develop at Channel E. Basin EC-10 will be routed around Filing 3 and will combine with Pond D's discharge downstream of the pond at Channel F.

All onsite basin peak flows were derived via the Rational Method while the offsite basins EC-10 and OS-1 were analyzed by the SCS Method due to the tributary area. Detailed breakdowns of each sub-basin are listed below:

Sub-basin C2.1 is a 0.77 acre onsite area that is collected by a curb inlet. This basin consists of single family lots and a portion of Solaire Loop. Runoff from this basin drains to the street curb and gutter and enters the public storm sewer system. The 5 year and 100 year developed peak flows are 1.1 and 2.7 cfs respectively

Sub-basin C2.2 is a 0.33 acre onsite area that is collected by a curb inlet. This basin consists of single family lots and a portion of Solaire Loop. Runoff from this basin drains to the street curb and gutter and enters the public storm sewer system. The 5 year and 100 year developed peak flows are 0.6 and 1.4 cfs respectively

Sub-basin C2.3 is a 1.81 acre onsite area that is collected by a curb inlet in Mayberry Drive. This basin consists of single family lots and a portion of Mayberry Drive. Runoff from this basin is routed via curb/gutter, enters a Type R curb inlet, and is discharged into the piped storm sewer system. The 5 year and 100 year developed peak flows are 2.1 and 5.2 cfs respectively.

Sub-basin C2.4 is a 1.16 acre onsite area that will not be fully developed until future phases. In the future the basin will be collected by a curb inlet on the south side of Mayberry Drive. This basin consists of south section of the Mayberry Drive ROW. Runoff from this basin will be routed via curb/gutter, enter a Type R curb inlet, and will be discharged into the piped storm sewer system. A stub will be installed during Filing 3 and the future Type R inlet will discharge to the main storm sewer system via this stub. The 5 year and 100 year developed peak flows are 4.1 and 7.8 cfs respectively.

Sub-basin C2.5 is a 9.61 acre onsite area that is collected by a curb inlet in Mayberry Drive. This basin consists of single family lots and a portion of Solaire Loop, Galveston Terrace, Cattlemen Run, Achison Way, and Village Main Street. Runoff from this basin is routed via curb/gutter and crosspans, enters a Type R curb inlet, and is discharged into the piped storm sewer system. The 5 year and 100 year developed peak flows are 14.2 and 34.6 cfs respectively.

Sub-basin C3.0* is a 35.40 acre basin south of the Filing 3 development. The basin was analyzed for future development and assumed to comprise both single family lots and park area. During the interim condition the basin will be undeveloped with part of the basin bypassing Pond D following existing drainage patterns. Once fully developed, the entire basin will ultimately drain to Pond D via future storm sewer improvements. The 5 year and 100 year developed peak flows are 22 and 72.7 cfs respectively.

***C3.0** was also analyzed using an interim condition that represents the runoff patterns prior to development. Under this condition the basin would flow southeast and southwest into Channel C2, ultimately discharging into Pond D. The 5 year and 100 year undeveloped peak flows are 7.4 and 54.4 cfs respectively.

Sub-basin D1.1 is a 1.73 acre basin comprising commercial lots of Filing 2. The basin was analyzed for future development of Filing 2. The developed basin will drain via a swale along the southern Filing 2 boundary and enter the Springs Road storm system via a flared end section. The 5 year and 100 year developed peak flows are 6.7 and 12.2 cfs respectively.

Sub-basin D1.2 is a 2.56 acre basin comprising single family lots and portions of Solaire Loop and Besseyi Way. Runoff from this basin is routed via curb/gutter and crosspans, enters a Type R curb inlet on the south side of Besseyi Way, and is discharged into the piped storm sewer system. The 5 year and 100 year developed peak flows are 3.4 and 8.3 cfs respectively.

Sub-basin D1.3 is a 2.02 acre basin comprising single family lots and portions of Union Pacific Way and El Reno Way. Runoff from this basin is routed via curb/gutter and crosspans, enters a Type R curb inlet on the north side of El Reno Way, and is discharged into the piped storm sewer system. The 5 year and 100 year developed peak flows are 3.1 and 7.5 cfs respectively.

Sub-basin D1.4 is a 3.75 acre basin comprising single family lots and portions of Besseyi Way, Union Pacific Way, Springs Road and El Reno Way. Runoff from this basin is routed via curb/gutter and crosspans, enters a Type R curb inlet on the south side of El Reno Way, and is discharged into the piped storm sewer system. The 5 year and 100 year developed peak flows are 5.4 and 12.7 cfs respectively.

Sub-basin D1.5* is a 9.88 acre basin comprising the future Filing 4 area and is assumed to be Commercial/Industrial in nature. Developed runoff from this basin will be routed via curb/gutter and crosspans and enter inlets within the future development. The inlets will be piped to the proposed piping to the south of the basin that will be stubbed as part of Filing 3. The 5 year and 100 year developed peak flows are 31.6 and 57.6 cfs respectively.

***D1.5** was also analyzed using an interim condition that represents the runoff patterns prior to development. Under this condition the basin would flow east into Channel E, combining with offsite basins EC-10 and OS-1 along with onsite basin E1. The flows would ultimately be routed to the Log Road ROW. The basin was analyzed using the SCS method due to the combining with the large offsite basins. The 5 year and 100 year undeveloped peak flows are 1.4 and 12.2 cfs respectively.

Sub-basin D1.6 is a 1.96 acre basin comprising single family lots and portions of Union Pacific Way. Runoff from this basin is routed via curb/gutter and crosspans, enters a Type R curb inlet on the north side of Union Pacific Way, and is discharged into the piped storm sewer system to the east. The 5 year and 100 year developed peak flows are 2.6 and 6.3 cfs respectively.

Sub-basin D1.7 is a 1.56 acre basin comprising single family lots and portions of Union Pacific Way. Runoff from this basin is routed via curb/gutter, enters a Type R curb inlet on the south side of Union Pacific Way, and is discharged into the piped storm sewer system to the east. The 5 year and 100 year developed peak flows are 2.1 and 5.0 cfs respectively.

Sub-basin D1.8 is a 1.27 acre basin comprising single family lots and portions of El Reno Way. Runoff from this basin is routed via curb/gutter, enters a Type R curb inlet on the north side of El Reno Way, and is discharged into the piped storm sewer system to the east. The 5 year and 100 year developed peak flows are 1.8 and 4.3 cfs respectively.

Sub-basin D1.9 is a 0.54 acre basin comprising single family lots and portions of El Reno Way. Runoff from this basin is routed via curb/gutter, enters a Type R curb inlet on the south side of El Reno Way, and is discharged into the piped storm sewer system to the east. The 5 year and 100 year developed peak flows are 0.9 and 2.1 cfs respectively.

Sub-basin D1.10 is a 2.13 acre onsite area that will not be fully developed until future phases. In the future the basin will be collected by a curb inlet on the south side of Mayberry Drive. This basin consists of the north section of the Mayberry Drive ROW. Runoff from this basin will be routed via curb/gutter, enter a Type R curb inlet, and will be discharged into the piped storm sewer system. A stub will be installed during

the 5' inlet (DP17) in this basin is on the north side. revise accordingly.

Filing 3 and the future Type R inlet will discharge to the main storm sewer system via this stub. The 5 year and 100 year developed peak flows are 3.3 and 8.0 cfs respectively.

Sub-basin D1.11 is a 1.23 acre onsite area that will not be fully developed until future phases. In the future the basin will be collected by a curb inlet on the south side of Mayberry Drive. This basin consists of the south section of the Mayberry Drive ROW. Runoff from this basin will be routed via curb/gutter, enter a Type R curb inlet, and will be discharged into the piped storm sewer system. A stub will be installed during Filing 3 and the future Type R inlet will discharge to the main storm sewer system via this stub. The 5 year and 100 year developed peak flows are 4 and 7.7 cfs respectively.

Sub-basin D1.12 is a 3.42 acre basin comprising single family lots and portions of Cattlemen Run, Solaire Loop, and Besseyi Way. The basin drains via curb and gutter to a Type R inlet on the north side of Besseyi Way. The 5 year and 100 year developed peak flows are 3.8 and 9.3 cfs respectively.

Sub-basin D1.13 is a 3.07 acre basin comprising commercial lots of Filing 2. The basin was analyzed for future development of Filing 2. The developed basin will drain into a future road's curb and gutter system and enter the Springs Road storm system via a Type R inlet within Springs Road. The 5 year and 100 year developed peak flows are 10.9 and 19.9 cfs respectively.

Sub-basin D1.14 is a 0.91 acre basin comprising both single family lots and the southeast commercial lots of Filing 2. The basin was analyzed for future development of Filing 2. The basin drains via curb and gutter to a Type R inlet on the north side of Besseyi Way. The 5 year and 100 year developed peak flows are 1.8 and 3.9 cfs respectively.

Sub-basin D2.0* is a 11.90 acre basin south of the Filing 3 development. The basin was analyzed for future development and assumed to comprise both single family lots and park area. The basin will ultimately drain to Pond D via future storm sewer improvements. The 5 year and 100 year developed peak flows are 10.3 and 27.7 cfs respectively.

***D3.0** was also analyzed using an interim condition that represents the runoff patterns prior to development. Under this condition the basin would flow southeast into Channel D, ultimately discharging into Pond D. The 5 year and 100 year undeveloped peak flows are 2.4 and 17.9 cfs respectively.

Sub-basin D2.1 is a 3.15 acre basin south of the Filing 3 development. The basin comprises the area around Detention Pond D. The basin will ultimately surface flow. The 5 year and 100 year developed peak flows are 0.9 and 6.6 cfs respectively.

Sub-basin E1 is a 3.92 acre basin east/northeast of the Filing 3 development. The basin comprises Channel E south of SH94 and bypasses the site to the east, ultimately discharging into Channel F to the east of Pond D. The basin also comprises the temporary cul-de-sacs required at the ends of El Reno Way and Union Pacific Drive. The basin was analyzed using the SCS method due to it combining with the large upstream offsite basin EC10. The 5 year and 100 year developed peak flows are 0.3 and 2.8 cfs respectively.

Sub-basin OS-1 is a 2.65 acre offsite basin North of the Filing 3 development. The basin comprises of CDOT ROW which drains into a roadside ditch that flows east into Channel E south of SH94 and bypasses the site to the east, ultimately discharging into Channel F to the east of Pond D. The basin was analyzed using the SCS method due to it combining with the large upstream offsite basin EC10. The 5 year and 100 year developed peak flows are 1.4 and 4.3 cfs respectively.

Sub-basin EC-10 is a 320 acre agricultural basin north of SH94 and drains into Channel E via culverts beneath SH94. The basin combines with flows generated by Basin E1 and OS-1 and bypasses the site to the east, ultimately discharging into Channel F to the east of Pond D. Due to the size of the basin, the generated peak flows were derived via the SCS Method. The 5 year and 100 year peak flows are 18.4 and 144.7 cfs respectively.

C. Emergency Conditions Analysis

In the event of clogging, the storm inlets within the Filing 3 development area will overflow to the adjoining public streets, which all generally flow southeasterly. Emergency overflows would sheet flow southeasterly along the public streets, flowing into Channels C2, D, and Detention Pond D.

Pond D also has measures in place to mitigate an emergency condition. A buried riprap emergency spillway will route emergency flows over the embankment and into a swale that will carry flows east of the site.

D. Comparison of Developed to Historic Discharges

Based on the hydrologic calculations in the Appendix, the total developed flows from the site will exceed historic flows from the parcel. Due to the increased impervious areas in the developed site, the total undetained flow from the site would be significantly higher than the historic flow. The increase in developed flows will be mitigated by an on-site extended detention basin.

Historic to Post Developed Comparison		
	5 Year Flow (cfs)	100 Year Flow (cfs)
Historic Site (Basin EX-D1 and EX-D2)	9.6	86.2
Post Developed Site Undetained (DP22)	98.5	237.8
Post Developed Site Detained (Pond D Discharge – DP23)	1.2	39.5

E. Detention Design

The total developed storm runoff downstream of the Filing No. 3 development along with the future developments of Filings 2, 2A, 4, and the area south of Filing 3 area will be maintained at historic levels by routing flows through the proposed Detention Pond D located at the southeast corner of the subdivision. The proposed detention facility has been sized to attenuate onsite peak flows through the pond, mitigating developed drainage impacts.

The total volume requiring storage is equivalent to the 100 Year + ½ WQCV produced by the onsite developed area. The required pond volume was determined using the ultimate buildout conditions for all areas tributary to the pond. The calculated volume to be stored is 9.1 ac-ft and was calculated by means of the UD_Detention spreadsheet. The detention volume will be routed through the extended detention basin by means of a modified CDOT Type C structure. The WQCV and EURV will be controlled by a multi-stage orifice plate within the Type C structure while the 100-year volume will be routed through a 36” pipe with restrictor plate within the Type C structure.

Two scenarios for Pond D have been examined for design purposes within and downstream of the pond: Interim Condition and Ultimate Development. The interim condition assumes all tributary basins except Basins D1.5, D2.0, and C3.0 are fully developed while ultimate development assumes all tributary basins are fully developed. The proposed Type C outlet structure and multi-stage orifice plate proposed with Filing 3 will meet the required release rates during the interim condition with the intention that with the development of future filings the orifice plate and restrictor plate will be replaced as needed to ensure release rates remain in compliance.

Release rates for ultimate development were utilized for sizing riprap and channels downstream of the pond to ensure these facilities will not need to be replaced as the tributary area upstream is developed.

The proposed detention pond will be privately owned and maintained by the Metropolitan District, under the terms of a “Private Detention Basin Maintenance

Agreement" recorded during final platting. Gravel maintenance access roads will be provided around the perimeter of the detention ponds to facilitate maintenance access.

The pond outlet structures have been designed to release historic flows southeast of the site towards the existing natural swales downstream. Based on the proposed approach of reducing developed flows to historic levels at the site boundaries, no significant downstream drainage impacts are anticipated, and no downstream drainage improvements are proposed.

F. Onsite Drainage Facility Design

Storm Sewer System Layout

Generally, streets are designed with cross slopes of 2%, pushing water from the centerlines to curb and gutter systems. The streets convey flows to low points at various points around the site where Type R curb inlets are proposed to convey street flows to an underground storm sewer system. The storm sewer system contains reinforced concrete pipes (RCP) with minimum sizes of 18 inches and minimum slopes of 0.5%.

Basins C2.1-C2.5 drain to a dedicated storm sewer system that discharged to channel C2. Basins D1.1-D1.4 and D1.10-D1.14 drain to another dedicated storm sewer system that discharges into Channel D at DP19. Basins D1.5-D1.9 drain into a third dedicated storm sewer system on the eastern edge of the Filing 3 boundary. This system also discharges into Channel D at DP19. Both channels ultimately drain to Detention Pond D.

Open Channel System Layout

Four open channels are proposed as part of this development: C2, D, E, and F. These channels will generally be designed as stable native grass-lined channels with subcritical flow regimes. Drainage channels will be designed to convey 100-year flows, with trapezoidal cross-sections, side slopes of 4:1, and minimum freeboard of 1-foot.

Channel C2 conveys flows from DP4 along with flows from future basin C3.0. The channel is trapezoidal with a bottom width of 8 feet and a depth of 3 feet. The channel will be lined with a native grass mixture.

Channel D conveys flows from DP19 along with flows from future basin D2.0. The channel is trapezoidal with a bottom width of 8 feet and a depth of 4 feet. The channel will be lined with a native grass mixture.

Channel E conveys flows from offsite basins EC-10 and OS-1 along with flows from onsite basins E1 and undeveloped basin D1.5. The channel is trapezoidal with a bottom width of 8 feet and a depth of 3.25 feet. Where channel E discharges into Channel F, riprap protection has been provided to lower velocities at this bend. By lowering the velocity to

3 fps, adequate freeboard is provided as the channel bends into Channel F. The channel will be lined with a native grass mixture.

Channel F conveys flows from the outfalls of Detention Pond D and combines with Channel E downstream of the pond. Where channel E discharges into Channel F, riprap protection has been provided to lower velocities at this bend. Additionally, a riprap plunge pool has been placed upstream of the Log Road ROW to ensure velocities are non erosive. The plunge pool also acts as a level spreader, forcing water to sheet flow into the roadside ditch as opposed to entering the as erosive concentrated flow. The channel will convey flows to the eastern ditch adjacent to Log Road. The channel is trapezoidal with a bottom width of 8 feet and a depth of 4 feet. The channel will be lined with a native grass mixture.

G. Analysis of Existing and Proposed Downstream Facilities

The general concept of the proposed drainage plan is to attenuate peak flows from the developed site by routing flows through the proposed on-site detention pond D. An analysis of drainage patterns downstream of the site was performed as part of this report to ensure historic drainage patterns are maintained. Historic and developed flows were compared at key design points downstream of the site. The design points are EX-5, EX-6, and EX-7. This is illustrated as Filing 3 – Log Road Drainage Plan on Sheet D1.7 in the Appendix. In addition to this sheet, a Sheet D1.8 shows cross sections at Design Points EX-5, EX-6, and EX-7 illustrating what the 100 year flow looks like in the developed condition at each of these design points. In general, developed flows are lower than historic rates at each design point.

Design Point EX-5 is located at the eastern property line where flows from the subject property combine with offsite flows from Basins EC10 and OS-1. In the existing condition flows are conveyed east by means of an existing berm to the south. In the proposed condition, these flows will be conveyed by Channel F in the same easterly direction. The historic and developed 100 year flows are 183.9 and 177.6 cfs respectively.

Design Point EX-6 is located where flows from EX-5 enter the Log Road ROW. This is the case for both the historic and developed condition. At this design point, flows from EX-5 combine with Basins EX-E (offsite eastern basin) and LOG (offsite basin comprising the Log Road ROW) and enter an existing roadside ditch along Log Road. The historic and developed 100 year flows are 231.4 and 203.5 cfs respectively with the developed 100 year flow depth less than 6 inches deep at the Log Road Shoulder.

Design Point EX-7 is located near the intersection of Log Road and Handle Road. In both the historic and developed conditions, flows from EX-6 are diverted to the east along Handle Road. At this design point, flows from EX-6 combine with Basins EX-Z (offsite basin south of the Site) and enters an existing roadside ditch along Handle Road. The historic and developed 100 year flows are 285.4 and 240.4 cfs respectively with the developed 100 year flow depth less than 6 inches deep at the Log Road Shoulder.

Combined flows from the Mayberry site flow southeasterly towards the existing Middle Fork of Black Squirrel Creek. The existing channels downstream of the site consist of broad grass-lined swales with no signs of active erosion. As previously discussed, there is an existing drainage crossing of Ellicott Highway approximately 2-1/2 miles downstream of this site where a future culvert should be installed. Recognizing that this historically deficient crossing is miles downstream of the site, no cost contribution to this off-site drainage improvement was requested during previous approval of the Ellicott Town Center MDDP, and no contribution is proposed at this time.

H. Anticipated Drainage Problems and Solutions

The proposed stormwater detention pond is designed to mitigate the impacts of developed drainage from this project. The overall drainage plan for the subdivision includes a system of improved public streets with curb and gutter, storm inlets, and storm sewers conveying developed flows to improved drainage channels running through the site. The primary drainage problems anticipated within this development will consist of maintenance of these storm sewer systems, culverts, drainage channels, and detention pond facilities. Care will need to be taken to implement proper erosion control measures in the proposed channels and swales, which will be designed to meet allowable velocity criteria.

A trail system will be constructed along the major drainage channels to provide maintenance access to the drainage facilities throughout the development. Proper construction and maintenance of the proposed detention facilities will minimize downstream drainage impacts. The proposed public streets will be owned and maintained by El Paso County. The proposed detention ponds and channels running through open space tracts and storm drains through private alleys will be privately owned and maintained by the homeowners association or metropolitan district.

VII. EROSION CONTROL

The Contractor will be required to implement best management practices (BMP’s) for erosion control during construction. The proposed erosion control plan is included in the Grading & Erosion Control (GEC) Plans submitted with the subdivision construction drawings. Erosion control measures will include installation of silt fence at the toe of disturbed slopes and hay bales protecting drainage ditches. Cut and fill slopes will be stabilized during excavation if necessary and vegetation will be established for stabilization of the disturbed areas. All ditches have been designed to meet El Paso County criteria for slope and velocity. Additionally, gravel vehicle tracking pads will be installed at construction access points and inlet protection will be provided to minimize conveyance of sediment into storm inlets.

VIII. COST ESTIMATE AND DRAINAGE FEES

The developer will pay all capital costs for roadway and drainage improvements. As detailed in Appendix C, the engineer's estimate for Filing 3 drainage improvements is approximately $1,088,557.80. Filing 3 is located entirely within the Ellicott Consolidated Drainage Basin, which currently does not have a drainage or bridge fee requirement. As such, no drainage basin fees are applicable.

IX. MAINTENANCE

All proposed road and drainage construction within the Mayberry – Filing 3, Colorado Springs project will be performed to El Paso County Standards. Interior roads will be dedicated as public right-of-way. Roads and drainage facilities within the public right-of-way will be maintained by El Paso County upon final acceptance of these facilities after the warranty period. The Metropolitan District will maintain drainage channels and stormwater detention pond within the proposed open space areas.

X. SUMMARY

The Mayberry – Filing 3, Colorado Springs consists of 142 residential lots in the northeast part of the master development, with access connections to State Highway 94 at Springs Road. The residential lots are platted within Filing 3. The development will generate an increase in developed runoff from the site, which will be mitigated through on-site stormwater detention and water quality facility.

The proposed drainage patterns will remain consistent with historic conditions, and new drainage facilities constructed to El Paso County standards will safely convey runoff to adequate outfalls. Construction of the proposed Detention Pond D southeast of the development areas will ensure that developed flows remain below historic levels. Construction and proper maintenance of the proposed drainage and erosion control facilities will ensure that this subdivision has no significant adverse drainage impacts on downstream or surrounding areas.

XI. APPENDICES

Appendix A - Hydrologic Computations

1. Hydrologic References
2. Pre Developed Flow Rates
3. Post Developed Flow Rates

Appendix B – Hydraulic Computations

1. Detention and Water Quality Facility Design
2. Storm Sewer Capacity
3. Inlet and Street Capacity
4. Rip Rap Calculations
5. Channel Design

Appendix C – Reference Information

1. Cost Estimate
2. NRCS Soils Report
3. FEMA Flood Insurance Maps
4. Drainage Maps

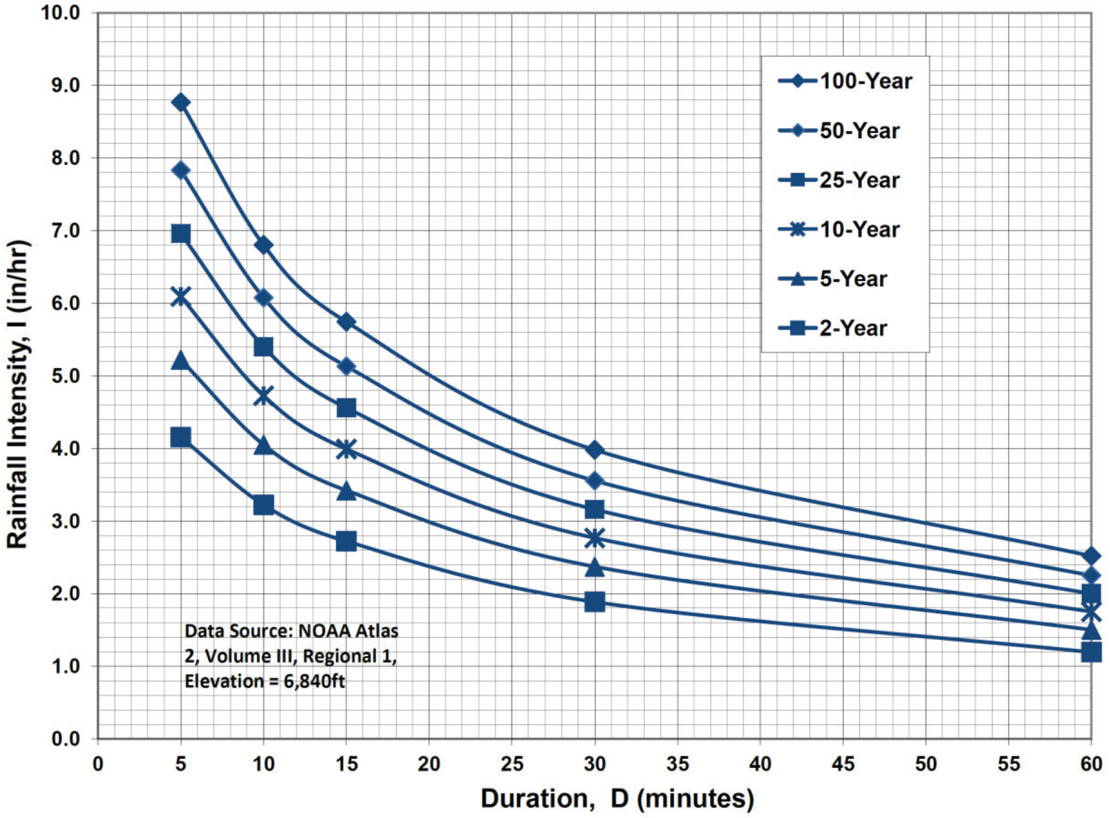
APPENDIX A - HYDROLOGIC COMPUTATIONS

Land Use or Surface Characteristics	Percent Impervious	Runoff Coefficients											
		2-year		5-year		10-year		25-year		50-year		100-year	
		HSG A&B	HSG C&D	HSG A&B	HSG C&D	HSG A&B	HSG C&D	HSG A&B	HSG C&D	HSG A&B	HSG C&D	HSG A&B	HSG C&D
Business													
Commercial Areas	95	0.79	0.80	0.81	0.82	0.83	0.84	0.85	0.87	0.87	0.88	0.88	0.89
Neighborhood Areas	70	0.45	0.49	0.49	0.53	0.53	0.57	0.58	0.62	0.60	0.65	0.62	0.68
Residential	Lots are 1/6 acre, used 0.375							Lots are 1/6 acre, used 0.545					
⅛ Acre or less	65	0.41	0.45	0.45	0.49	0.49	0.54	0.54	0.59	0.57	0.62	0.59	0.65
¼ Acre	40	0.23	0.28	0.30	0.35	0.36	0.42	0.42	0.50	0.46	0.54	0.50	0.58
⅓ Acre	30	0.18	0.22	0.25	0.30	0.32	0.38	0.39	0.47	0.43	0.52	0.47	0.57
½ Acre	25	0.15	0.20	0.22	0.28	0.30	0.36	0.37	0.46	0.41	0.51	0.46	0.56
1 Acre	20	0.12	0.17	0.20	0.26	0.27	0.34	0.35	0.44	0.40	0.50	0.44	0.55

Industrial													
Light Areas	80	0.57	0.60	0.59	0.63	0.63	0.66	0.66	0.70	0.68	0.72	0.70	0.74
Heavy Areas	90	0.71	0.73	0.73	0.75	0.75	0.77	0.78	0.80	0.80	0.82	0.81	0.83
Parks and Cemeteries	7	0.05	0.09	0.12	0.19	0.20	0.29	0.30	0.40	0.34	0.46	0.39	0.52
Playgrounds	13	0.07	0.13	0.16	0.23	0.24	0.31	0.32	0.42	0.37	0.48	0.41	0.54
Railroad Yard Areas	40	0.23	0.28	0.30	0.35	0.36	0.42	0.42	0.50	0.46	0.54	0.50	0.58
Undeveloped Areas													
Historic Flow Analysis—Greenbelts, Agriculture	2	0.03	0.05	0.09	0.16	0.17	0.26	0.26	0.38	0.31	0.45	0.36	0.51
Pasture/Meadow	0	0.02	0.04	0.08	0.15	0.15	0.25	0.25	0.37	0.30	0.44	0.35	0.50
Forest	0	0.02	0.04	0.08	0.15	0.15	0.25	0.25	0.37	0.30	0.44	0.35	0.50

Exposed Rock	100	0.89	0.89	0.90	0.90	0.92	0.92	0.94	0.94	0.95	0.95	0.96	0.96
Offsite Flow Analysis (when landuse is undefined)	45	0.26	0.31	0.32	0.37	0.38	0.44	0.44	0.51	0.48	0.55	0.51	0.59
Streets													
Paved	100	0.89	0.89	0.90	0.90	0.92	0.92	0.94	0.94	0.95	0.95	0.96	0.96
Gravel	80	0.57	0.60	0.59	0.63	0.63	0.66	0.66	0.70	0.68	0.72	0.70	0.74
Drive and Walks	100	0.89	0.89	0.90	0.90	0.92	0.92	0.94	0.94	0.95	0.95	0.96	0.96
Roofs	90	0.71	0.73	0.73	0.75	0.75	0.77	0.78	0.80	0.80	0.82	0.81	0.83
Lawns	0	0.02	0.04	0.08	0.15	0.15	0.25	0.25	0.37	0.30	0.44	0.35	0.50

Figure 6-5. Colorado Springs Rainfall Intensity Duration Frequency



IDF Equations

$I_{100} = -2.52 \ln(D) + 12.735$

$I_{50} = -2.25 \ln(D) + 11.375$

$I_{25} = -2.00 \ln(D) + 10.111$

$I_{10} = -1.75 \ln(D) + 8.847$

$I_{5} = -1.50 \ln(D) + 7.583$

$I_{2} = -1.19 \ln(D) + 6.035$

Note: Values calculated by equations may not precisely duplicate values read from figure.

TABLE 6-10. NRCS CURVE NUMBERS FOR FRONTAL STORMS & THUNDERSTORMS FOR DEVELOPED CONDITIONS (ARCII)

EXPAND

Fully Developed Urban Areas (vegetation established)[1]	Treatment	Hydrologic Condition	% I	Pre-Development CN			
				HSG A	HSG B	HSG C	HSG D
Open space (lawns, parks, golf courses, cemeteries, etc.):							
Poor condition (grass cover < 50%)	——-	——-	—-	68	79	86	89
Fair condition (grass cover 50% to 75%)	——-	——-	—-	49	69	79	84
Good condition (grass cover > 75%)	——-	——-	—-	39	61	74	80
Impervious areas:							
Paved parking lots, roofs, driveways, etc. (excluding right-of-way	——-	——-	—-	98	98	98	98
Streets and roads:							
Paved; curbs and storm sewers (excluding right-of-way)	——-	——-	—-	98	98	98	98
Paved; open ditches (including right-of-way)	——-	——-	—-	83	89	92	93
Gravel (including right-of-way)	——-	——-	—-	76	85	89	91
Dirt (including right-of-way)	——-	——-	—-	72	82	87	89
Western desert urban areas:							
Natural desert landscaping (pervious areas only)	——-	——-	—-	63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders)	——-	——-	—-	96	96	96	96
Urban districts:							
Commercial and business	——-	——-	85	89	92	94	95
Industrial	——-	——-	72	81	88	91	93
Residential districts by average lot size:							
⅛ acre or less (town houses)	——-	——-	65	77	85	90	92
¼ acre	——-	——-	38	61	75	83	87
⅓ acre	——-	——-	30	57	72	81	86
½ acre	——-	——-	25	54	70	80	85
1 acre	——-	——-	20	51	68	79	84
2 acres	——-	——-	12	46	65	77	82
Developing Urban Areas[1]	**Treatment[2]**	**Hydrologic Condition[3]**	**% I**	**HSG A**	**HSG B**	**HSG C**	**HSG D**
Newly graded areas (pervious areas only, no vegetation)	——-	——-	—-	77	86	91	94
Cultivated Agricultural Lands[1]	**Treatment**	**Hydrologic Condition**	**% I**	**HSG A**	**HSG B**	**HSG C**	**HSG D**
Fallow	Bare soil	——-	—-	77	86	91	94
	Crop residue cover (CR)	Poor	—-	76	85	90	93
		Good	—-	74	83	88	90
Row crops	Straight row (SR)	Poor	—-	72	81	88	91
		Good	—-	67	78	85	89
	SR + CR	Poor	—-	71	80	87	90
		Good	—-	64	75	82	85
	Contoured (C)	Poor	—-	70	79	84	88
		Good	—-	65	75	82	86
	C + CR	Poor	—-	69	78	83	87
		Good	—-	64	74	81	85
	Contoured & terraced (C&T)	Poor	—-	66	74	80	82
		Good	—-	62	71	78	81
	C&T+ CR	Poor	—-	65	73	79	81
		Good	—-	61	70	77	80
Small grain	SR	Poor	—-	65	76	84	88
		Good	—-	63	75	83	87
	SR + CR	Poor	—-	64	75	83	86
		Good	—-	60	72	80	84
	C	Poor	—-	63	74	82	85
		Good	—-	61	73	81	84
	C + CR Poor	Poor	—-	62	73	81	84
		Good	—-	60	72	80	83
	C&T	Poor	—-	61	72	79	82
		Good	—-	59	70	78	81
	C&T+ CR	Poor	—-	60	71	78	81
		Good	—-	58	69	77	80
Pasture, grassland, or range—continuous forage for grazing [4]	——-	Poor	—-	68	79	86	89
	—	Fair	—-	49	69	79	84
	—	Good	—-	39	61	74	80
Meadow-continuous grass, protected from grazing and generally mowed for hay	——-	——-	—-	30	58	71	78
Brush-brush-weed-grass mixture with brush the major element [5]	——-	Poor	—-	48	67	77	83
	—	Fair	—-	35	56	70	77
	—	Good	—-	30	48	65	73
Woods-grass combination (orchard or tree farm) [6]	——-	Poor	—-	57	73	82	86
	—	Fair	—-	43	65	76	82
	—	Good	—-	32	58	72	79
Woods [7]	——-	Poor	—-	45	66	77	83
	—	Fair	—-	36	60	73	79
	—	Good	—-	30	55	70	77
Farmsteads-buildings, lanes, driveways, and surrounding lots	——-	——-	—-	59	74	82	86
Arid and Semi-arid Rangelands[1]	**Treatment**	**Hydrologic Condition[8]**	**% I**	**HSG A**	**HSG B**	**HSG C**	**HSG D**
Herbaceous-mixture of grass, weeds, and low-growing brush, with brush the minor element	——-	Poor	—-	——-	80	87	93
	—	Fair	—-	——-	71	81	89
	—	Good	—-	——-	62	74	85
Oak-aspen-mountain brush mixture of oak brush, aspen, mountain mahogany, bitter brush, maple, and other brush	——-	Poor	—-	——-	66	74	79
	—	Fair	—-	——-	48	57	63
	—	Good	—-	——-	30	41	48
Pinyon-juniper-pinyon, juniper, or both; grass understory	——-	Poor	—-	——-	75	85	89
	—	Fair	—-	——-	58	73	80
	—	Good	—-	——-	41	61	71
Sagebrush with grass understory	——-	Poor	—-	——-	67	80	85
	—	Fair	—-	——-	51	63	70
	—	Good	—-	——-	35	47	55
Desert shrub—major plants include saltbush, greasewood, creosotebush, blackbrush, bursage, palo verde, mesquite, and cactus	——-	Poor	—-	63	77	85	88
	—	Fair	—-	55	72	81	86
	—	Good	—-	49	68	79	84

1/6 AC -
USE 80

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[1] Ia = 0.1 S

[2] Crop residue cover applies only if residue is on at least 5% of the surface throughout the year.

[3] Hydraulic condition is based on combination factors that affect infiltration and runoff, including (a) density and canopy of vegetative areas, (b) amount of year-round cover, (c) amount of grass or close-seeded legumes, (d) percent of residue cover on the land surface (good ≥ 20%), and (e) degree of surface roughness. Poor: Factors impair infiltration and tend to increase runoff. Good: Factors encourage average and better than average infiltration and tend to decrease runoff.

[4] Poor: <50%) ground cover or heavily grazed with no mulch. Fair: 50 to 75% ground cover and not heavily grazed. Good: > 75% ground cover and lightly or only occasional

[5] Poor: <50% ground cover. Fair: 50 to 75% ground cover. Good: >75% ground cover.

[6] CN's shown were computed for areas with 50% woods and 50% grass (pasture) cover. Other combinations of conditions may be computed from the CN's for woods

[7] Poor: Forest litter, small trees, and brush are destroyed by heavy grazing or regular burning. Fair: Woods are grazed but not burned, and some forest litter covers the soil. Good: Woods are protected from grazing, and litter and brush adequately cover the soil.

[8] Poor: <30% ground cover (litter, grass, and brush overstory). Fair: 30 to 70% ground cover. Good: > 70% ground cover.

Table 6-9. NRCS Curve Numbers for Pre-Development Thunderstorms Conditions (ARC I)

EXPAND

Fully Developed Urban Areas (vegetation established)[1]	**Treatment**	**Hydrologic Condition**	**% I**	**Pre-Development CN**			
				HSG A	**HSG B**	**HSG C**	**HSG D**
Open space (lawns, parks, golf courses, cemeteries, etc.):							
Poor condition (grass cover < 50%)	—	—	—	47	61	72	77
Fair condition (grass cover 50% to 75%)	—	—	—	29	48	61	69
Good condition (grass cover > 75%)	—	—	—	21	40	54	63
Impervious areas:							
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)	—	—	—	95	95	95	95
Streets and roads:							
Paved; curbs and storm sewers (excluding right-of-way)	—	—	—	95	95	95	95
Paved; open ditches (including right-of-way)	—	—	—	67	77	83	85
Gravel (including right-of-way)	—	—	—	57	70	77	81
Dirt (including right-of-way)	—	—	—	52	66	74	77
Western desert urban areas:							
Natural desert landscaping (pervious areas only)	—	—	—	42	58	70	75
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders)	—	—	—	91	91	91	91
Developing Urban Areas[1]	**Treatment[2]**	**Hydrologic Condition[3]**	**% I**	**HSG A**	**HSG B**	**HSG C**	**HSG D**
Newly graded areas (pervious areas only, no vegetation)	—	—	—	58	72	81	87
Cultivated Agricultural Lands[1]	**Treatment**	**Hydrologic Condition**	**% I**	**HSG A**	**HSG B**	**HSG C**	**HSG D**
Fallow	Bare soil	—	—	58	72	81	87
	Crop residue cover (CR)	Poor	—	57	70	79	85
		Good	—	54	67	75	79
Row crops	Straight row (SR)	Poor	—	52	64	75	81
		Good	—	46	60	70	77
	SR + CR	Poor	—	51	63	74	79
		Good	—	43	56	66	70
	Contoured (C)	Poor	—	49	61	69	75
		Good	—	44	56	66	72
	C + CR	Poor	—	48	60	67	74
		Good	—	43	54	64	70
	Contoured & terraced (C&T)	Poor	—	45	54	63	66
		Good	—	41	51	60	64
	C&T+ CR	Poor	—	44	53	61	64
		Good	—	40	49	58	63
Small grain	SR	Poor	—	44	57	69	75
		Good	—	42	56	67	74
	SR + CR	Poor	—	43	56	67	72
		Good	—	39	52	63	69
	C	Poor	—	42	54	66	70
		Good	—	40	53	64	69
	C + CR Poor	Poor	—	41	53	64	69
		Good	—	39	52	63	67
	C&T	Poor	—	40	52	61	66
		Good	—	38	49	60	64
	C&T+ CR	Poor	—	39	51	60	64
		Good	—	37	48	58	63
Close-seeded or broadcast legumes or rotation meadow	SR	Poor	—	45	58	70	77
		Good	—	37	52	64	70
	C	Poor	—	43	56	67	70
		Good	—	34	48	60	67
	C&T	Poor	—	42	53	63	67
		Good	—	30	46	57	63
Pasture, grassland, or range-continuous forage for grazing [4]	—	Poor	—	47	61	72	77
	—	Fair	—	29	48	61	69
	—	Good	—	21	40	54	63
Meadow-continuous grass, protected from grazing and generally mowed for hay	—	—	—	15	37	51	60
Brush-brush-weed-grass mixture with brush the major element [5]	—	Poor	—	28	46	58	67
	—	Fair	—	18	35	49	58
	—	Good	—	15	28	44	53
Woods-grass combination (orchard or tree farm) [6]	—	Poor	—	36	53	66	72
	—	Fair	—	24	44	57	66
	—	Good	—	17	37	52	61
Woods [7]	—	Poor	—	26	45	58	67
	—	Fair	—	19	39	53	61
	—	Good	—	15	34	49	58
Farmsteads-buildings, lanes, driveways, and surrounding lots	—	—	—	38	54	66	72
Arid and Semi-arid Rangelands[1]	**Treatment**	**Hydrologic Condition[8]**	**% I**	**HSG A**	**HSG B**	**HSG C**	**HSG D**
Herbaceous-mixture of grass, weeds, and low-growing brush, with brush the minor element	—	Poor	—	—	63	74	85
	—	Fair	—	—	51	64	77
	—	Good	—	—	41	54	70
Oak-aspen-mountain brush mixture of oak brush, aspen, mountain mahogany, bitter brush, maple, and other brush	—	Poor	—	—	45	54	61
	—	Fair	—	—	28	36	42
	—	Good	—	—	15	23	28
Pinyon-juniper-pinyon, juniper, or both; grass understory	—	Poor	—	—	56	70	77
	—	Fair	—	—	37	53	63
	—	Good	—	—	23	40	51
Sagebrush with grass understory	—	Poor	—	—	46	63	70
	—	Fair	—	—	30	42	49
	—	Good	—	—	18	27	34
Desert shrub—major plants include saltbush, greasewood, creosotebush, blackbrush, bursage, palo verde, mesquite, and cactus	—	Poor	—	42	58	70	75
	—	Fair	—	34	52	64	72
	—	Good	—	29	47	61	69

[1] Average runoff condition, and Ia = 0.1S.

[2] Crop residue cover applies only if residue is on at least 5% of the surface throughout the year.

[3] Hydraulic condition is based on combination factors that affect infiltration and runoff, including (a) density and canopy of vegetative areas, (b) amount of year-round cover, (c) amount of grass or close-seeded legumes, (d) percent of residue cover on the land surface (good ≥ 20%), and (e) degree of surface roughness. Poor: Factors impair infiltration and tend to increase runoff. Good: Factors encourage average and better than average infiltration and tend to decrease runoff.

[4] Poor: <50%) ground cover or heavily grazed with no mulch. Fair: 50 to 75% ground cover and not heavily grazed. Good: > 75% ground cover and lightly or only occasionally grazed.

[5] Poor: <50% ground cover. Fair: 50 to 75% ground cover. Good: >75% ground cover.

[6] CN's shown were computed for areas with 50% woods and 50% grass (pasture) cover. Other combinations of conditions may be computed from the CN's for woods and pasture.

[7] Poor: Forest litter, small trees, and brush are destroyed by heavy grazing or regular burning. Fair: Woods are grazed but not burned, and some forest litter covers the soil. Good: Woods are protected from grazing, and litter and brush adequately cover the soil.

[8] Poor: <30% ground cover (litter, grass, and brush overstory). Fair: 30 to 70% ground cover. Good: > 70% ground cover.

Figure 6-12. 2-Year, 24-Hour Precipitation Tenths of an Inch (NOAA Atlas 2)

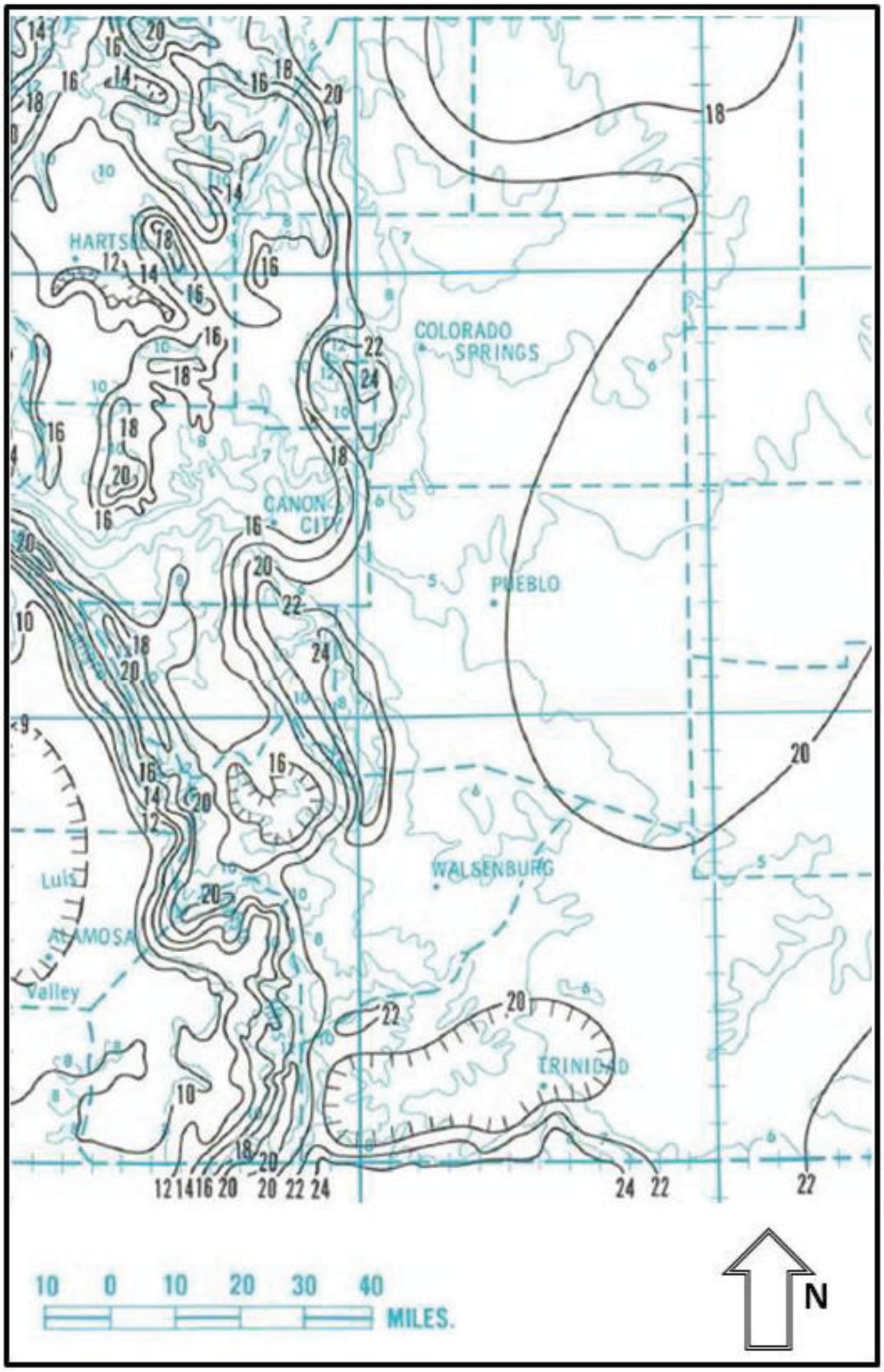


Figure 6-13. 5-Year, 24-Hour Precipitation Tenths of an Inch (NOAA Atlas 2)

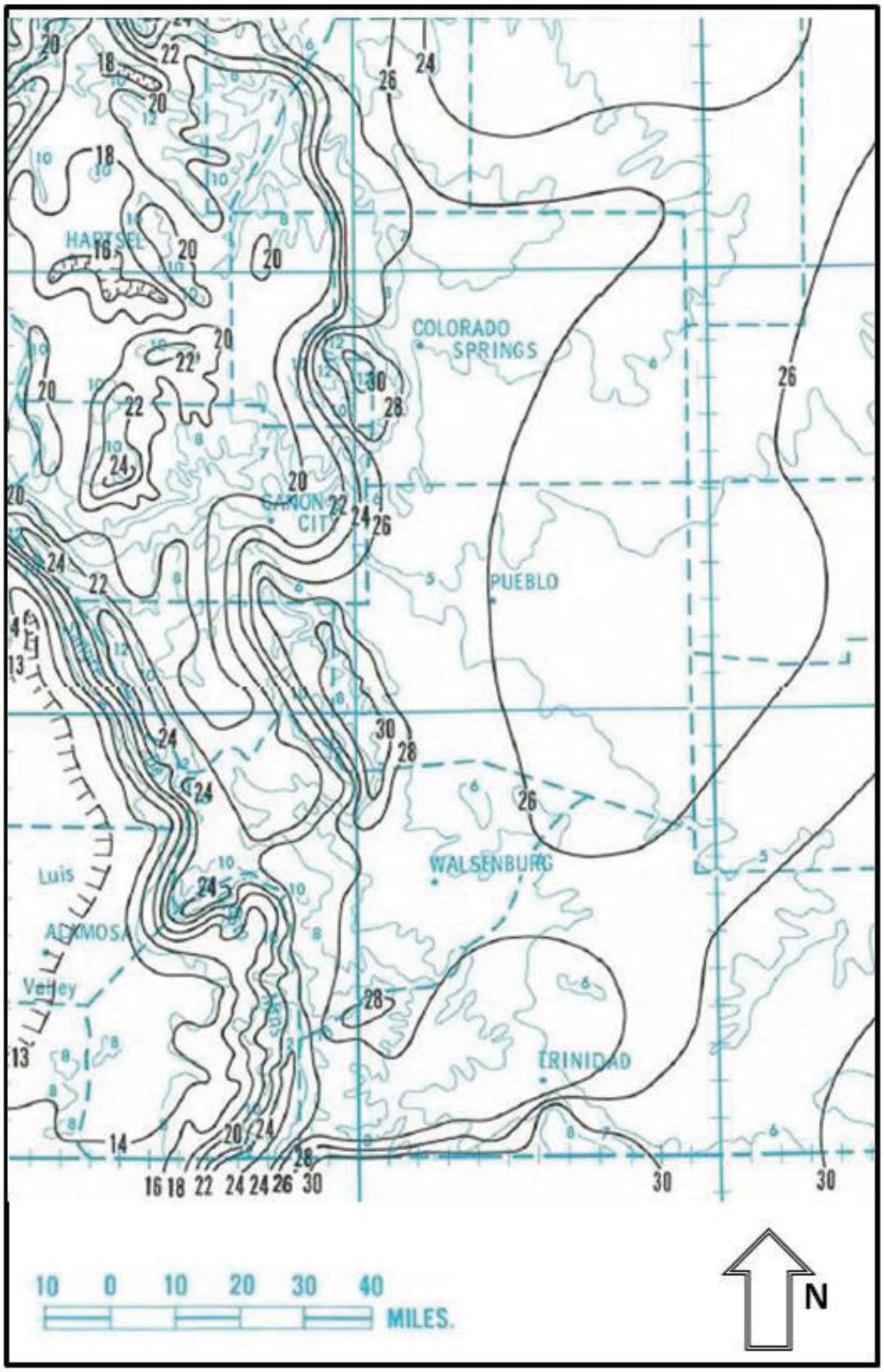
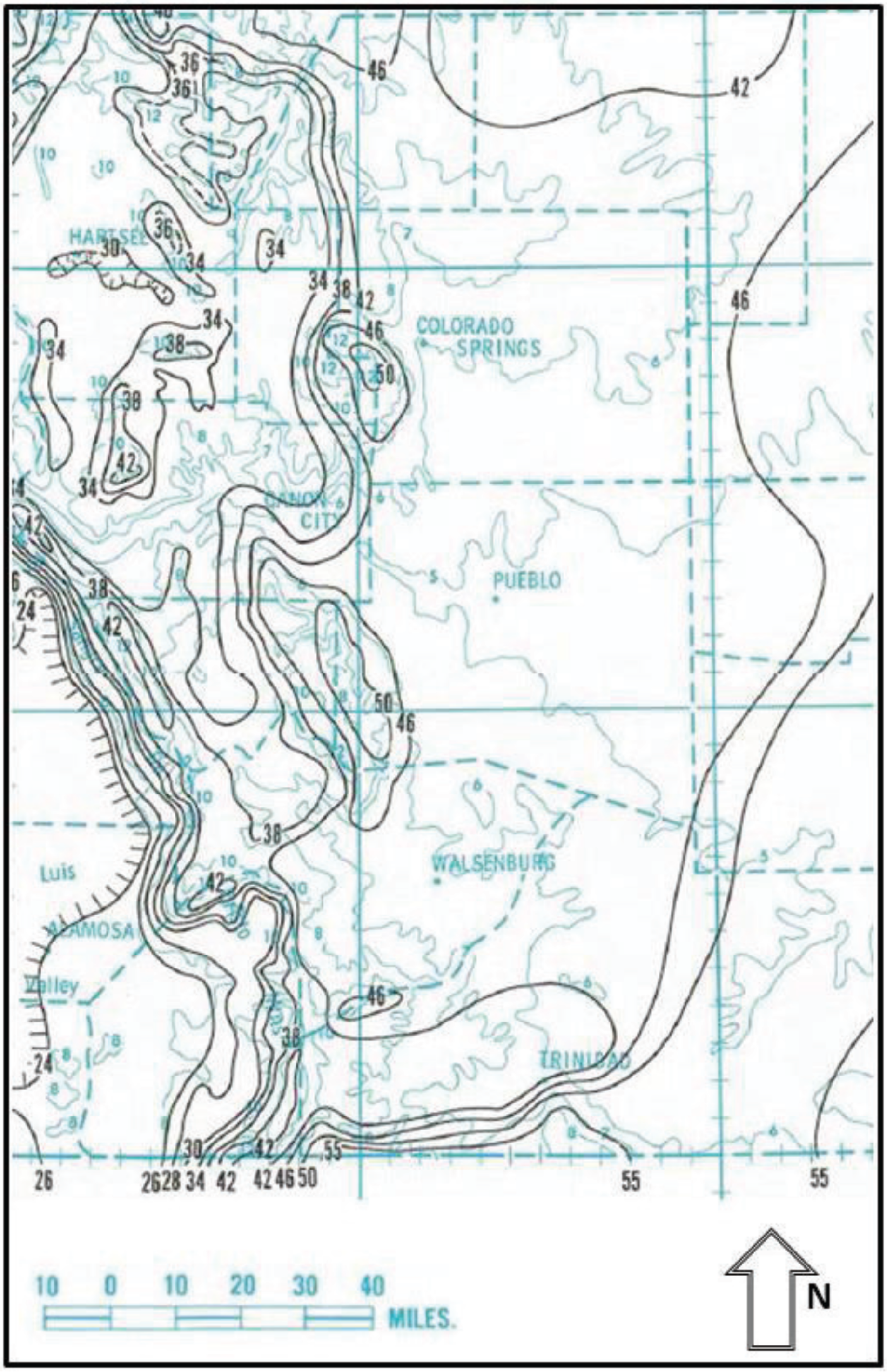


Figure 6-17. 100-Year, 24-Hour Precipitation Tenths of an Inch (NOAA Atlas 2)



EX DEVELOPMENT CN VALUES

Designer: ESJ
Company: R&R Engineers-Surveyors
Date: 1/5/2023
Project: Mayberry Filing 3
Location: El Paso County

Global Parameters[1]	
Land Use	CN
PASTURE/GRASS - GOOD	61
ROAD	98

Basin Name	Area (ac)	NRCS Hydrologic Soil Group	PASTURE/GRASS - GOOD		ROAD		% Check	SCS CN
			Area (ac)	%	Area (ac)	%		CN
EC10	320.00	A	320.00	100.0%	0.00	0.0%		61
EX-D1	93.50	A	93.50	100.0%	0.00	0.0%		61
EX-D2	11.50	A	11.50	100.0%	0.00	0.0%		61
EX-E	76.00	A	76.00	100.0%	0.00	0.0%		61
EX-LOG	1.80	A	0.00	0.0%	1.80	100.0%		98
EX-Z	83.50	A	81.94	98.1%	1.56	1.9%		62
OS-1	2.65	A	1.74	65.7%	0.91	34.3%		74

Hydraflow Table of Contents

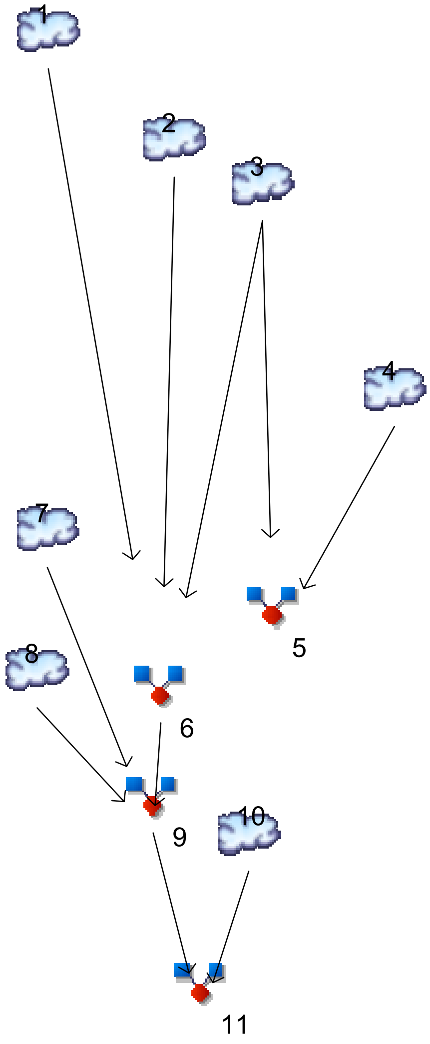
SCS ROUTING - Existing Downstream Analysis.gpw

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

Thursday, 01 / 5 / 2023

Watershed Model Schematic

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023



Legend

Hyd.	Origin	Description
1	SCS Runoff	EC10
2	SCS Runoff	OS-1
3	SCS Runoff	EX-D1
4	SCS Runoff	EX-D2
5	Combine	TOTAL ONSITE FLOW
6	Combine	DP EX-5
7	SCS Runoff	EX-E
8	SCS Runoff	EX-LOG
9	Combine	DP EX-6
10	SCS Runoff	EX-Z
11	Combine	DP EX-7

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

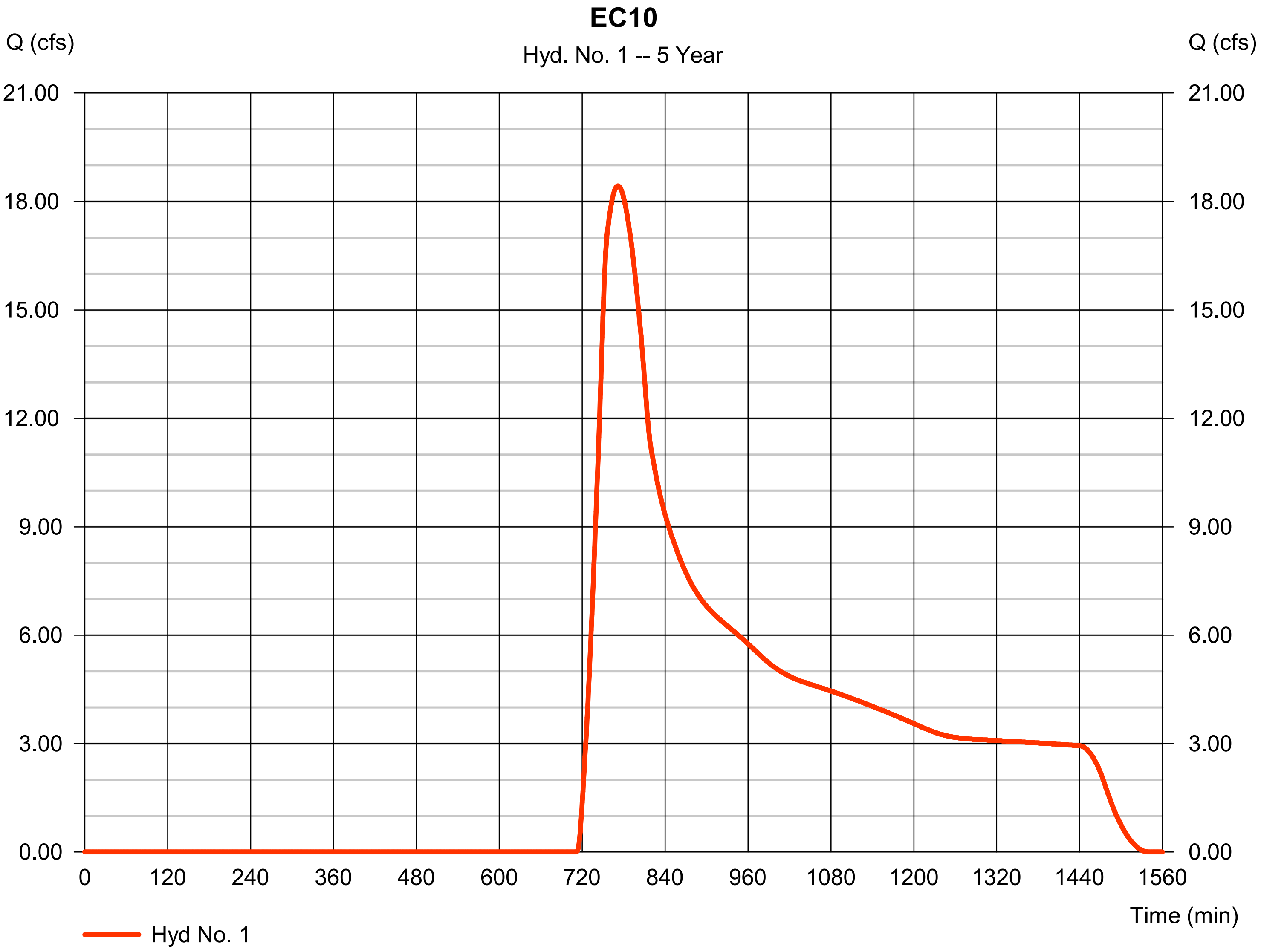
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	18.43	1	772	262,007	------	------	------	EC10
2	SCS Runoff	1.349	1	734	6,442	------	------	------	OS-1
3	SCS Runoff	8.399	1	737	76,243	------	------	------	EX-D1
4	SCS Runoff	1.367	1	728	9,340	------	------	------	EX-D2
5	Combine	9.557	1	735	85,583	3, 4	------	------	TOTAL ONSITE FLOW
6	Combine	23.73	1	755	344,692	1, 2, 3,	------	------	DP EX-5
7	SCS Runoff	6.054	1	745	62,432	------	------	------	EX-E
8	SCS Runoff	3.682	1	729	15,373	------	------	------	EX-LOG
9	Combine	30.51	1	752	422,497	6, 7, 8	------	------	DP EX-6
10	SCS Runoff	8.146	1	742	76,284	------	------	------	EX-Z
11	Combine	38.16	1	751	498,780	9, 10	------	------	DP EX-7

Hydrograph Report

Hyd. No. 1

EC10

Hydrograph type	= SCS Runoff	Peak discharge	= 18.43 cfs
Storm frequency	= 5 yrs	Time to peak	= 772 min
Time interval	= 1 min	Hyd. volume	= 262,007 cuft
Drainage area	= 320.000 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 63.00 min
Total precip.	= 2.60 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



TR55 Tc Worksheet

Hyd. No. 1

EC10

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.030		0.011		0.011		
Flow length (ft)	=	300.0		0.0		0.0		
Two-year 24-hr precip. (in)	=	2.20		0.00		0.00		
Land slope (%)	=	2.00		0.00		0.00		
Travel Time (min)	**=**	**7.85**	**+**	**0.00**	**+**	**0.00**	**=**	**7.85**
Shallow Concentrated Flow								
Flow length (ft)	=	6086.00		0.00		0.00		
Watercourse slope (%)	=	1.30		0.00		0.00		
Surface description	=	Unpaved		Paved		Paved		
Average velocity (ft/s)	=1.84			0.00		0.00		
Travel Time (min)	**=**	**55.14**	**+**	**0.00**	**+**	**0.00**	**=**	**55.14**
Channel Flow								
X sectional flow area (sqft)	=	0.00		0.00		0.00		
Wetted perimeter (ft)	=	0.00		0.00		0.00		
Channel slope (%)	=	0.00		0.00		0.00		
Manning's n-value	=	0.015		0.015		0.015		
Velocity (ft/s)	=0.00							
				0.00				
						0.00		
Flow length (ft)	({0})0.0			0.0		0.0		
Travel Time (min)	**=**	**0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc .... 63.00 min

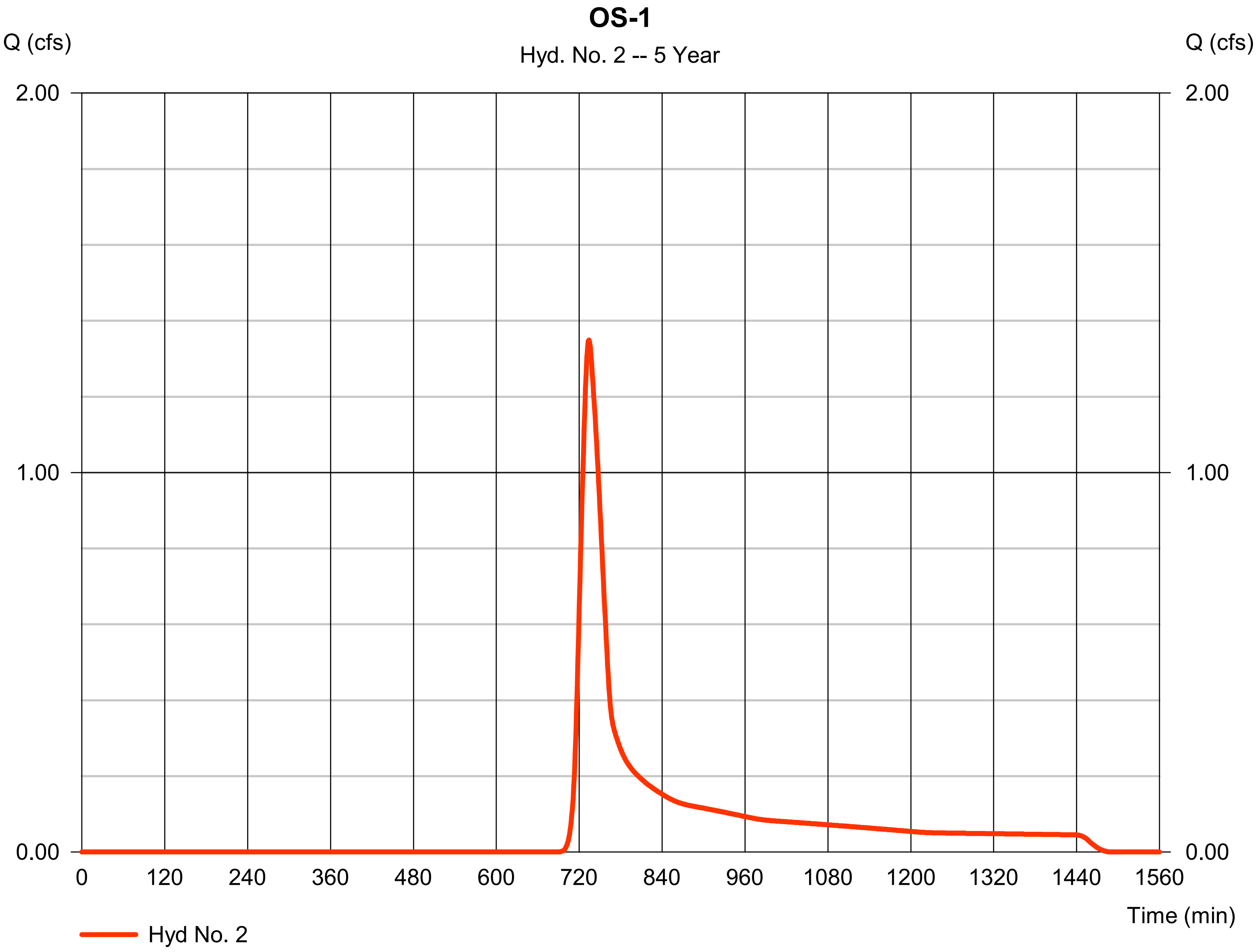
Hydrograph Report

Hyd. No. 2

OS-1

Hydrograph type = SCS Runoff
Storm frequency = 5 yrs
Time interval = 1 min
Drainage area = 2.650 ac
Basin Slope = 0.0 %
Tc method = TR55
Total precip. = 2.60 in
Storm duration = 24 hrs

Peak discharge = 1.349 cfs
Time to peak = 734 min
Hyd. volume = 6,442 cuft
Curve number = 74
Hydraulic length = 0 ft
Time of conc. (Tc) = 32.10 min
Distribution = Type II
Shape factor = 484



TR55 Tc Worksheet

Hyd. No. 2

OS-1

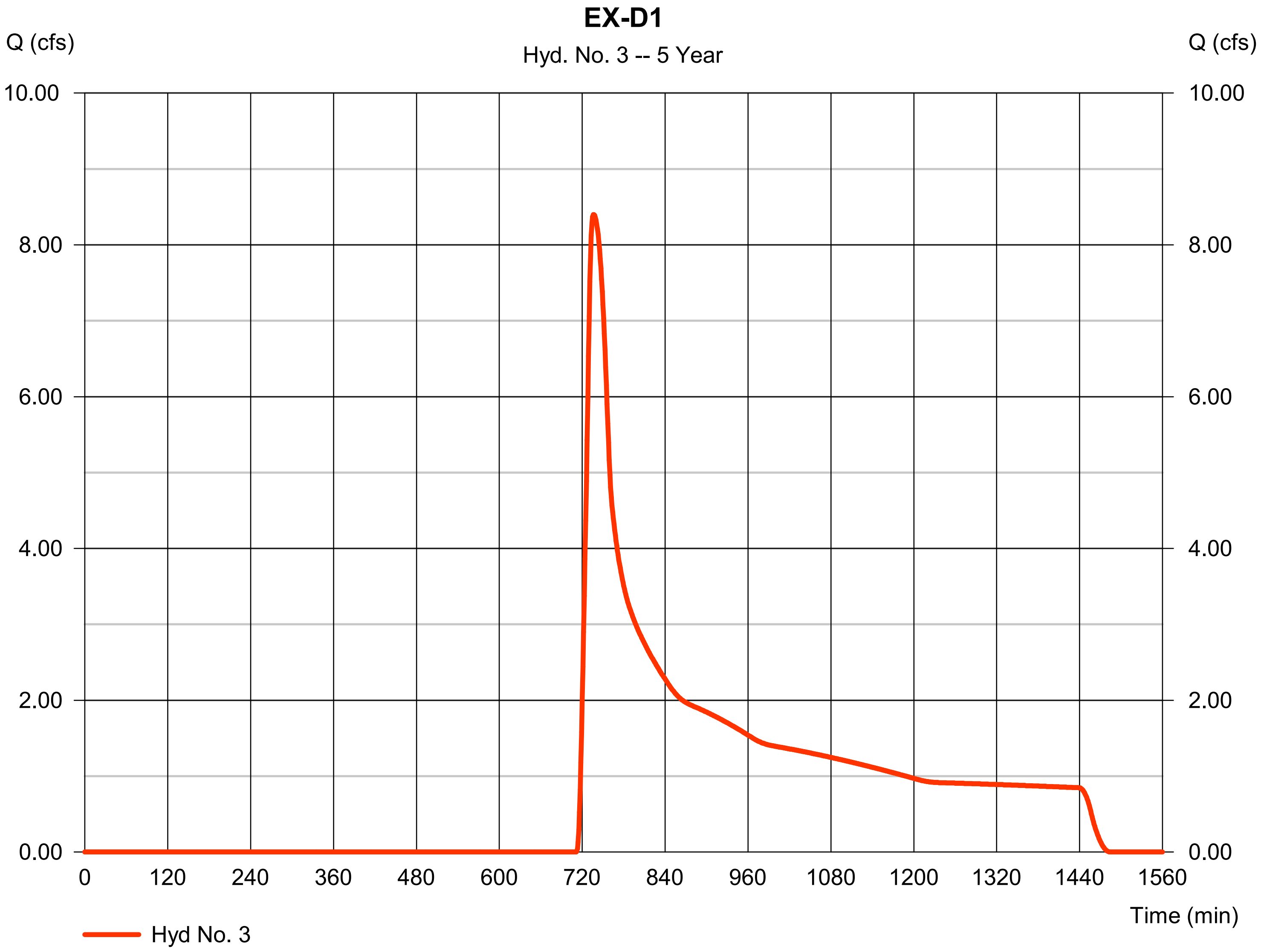
Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.013		0.011		0.011		
Flow length (ft)	=	50.0		0.0		0.0		
Two-year 24-hr precip. (in)	=	2.20		0.00		0.00		
Land slope (%)	=	2.00		0.00		0.00		
Travel Time (min)	**=**	**0.96**	**+**	**0.00**	**+**	**0.00**	**=**	**0.96**
Shallow Concentrated Flow								
Flow length (ft)	=	2525.00		0.00		0.00		
Watercourse slope (%)	=	0.70		0.00		0.00		
Surface description	=	Unpaved		Paved		Paved		
Average velocity (ft/s)	=1.35			0.00		0.00		
Travel Time (min)	**=**	**31.17**	**+**	**0.00**	**+**	**0.00**	**=**	**31.17**
Channel Flow								
X sectional flow area (sqft)	=	0.00		0.00		0.00		
Wetted perimeter (ft)	=	0.00		0.00		0.00		
Channel slope (%)	=	0.00		0.00		0.00		
Manning's n-value	=	0.015		0.015		0.015		
Velocity (ft/s)	=0.00							
				0.00				
						0.00		
Flow length (ft)	({0})0.0			0.0		0.0		
Travel Time (min)	**=**	**0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Total Travel Time, Tc								**32.10 min**

Hydrograph Report

Hyd. No. 3

EX-D1

Hydrograph type	= SCS Runoff	Peak discharge	= 8.399 cfs
Storm frequency	= 5 yrs	Time to peak	= 737 min
Time interval	= 1 min	Hyd. volume	= 76,243 cuft
Drainage area	= 93.500 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 28.60 min
Total precip.	= 2.60 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



TR55 Tc Worksheet

Hyd. No. 3

EX-D1

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.030		0.011		0.011		
Flow length (ft)	= 300.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 2.20		0.00		0.00		
Land slope (%)	= 2.00		0.00		0.00		
Travel Time (min)	**= 7.85**	**+**	**0.00**	**+**	**0.00**	**=**	**7.85**
Shallow Concentrated Flow							
Flow length (ft)	= 2845.00		0.00		0.00		
Watercourse slope (%)	= 2.00		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=2.28		0.00		0.00		
Travel Time (min)	**= 20.78**	**+**	**0.00**	**+**	**0.00**	**=**	**20.78**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

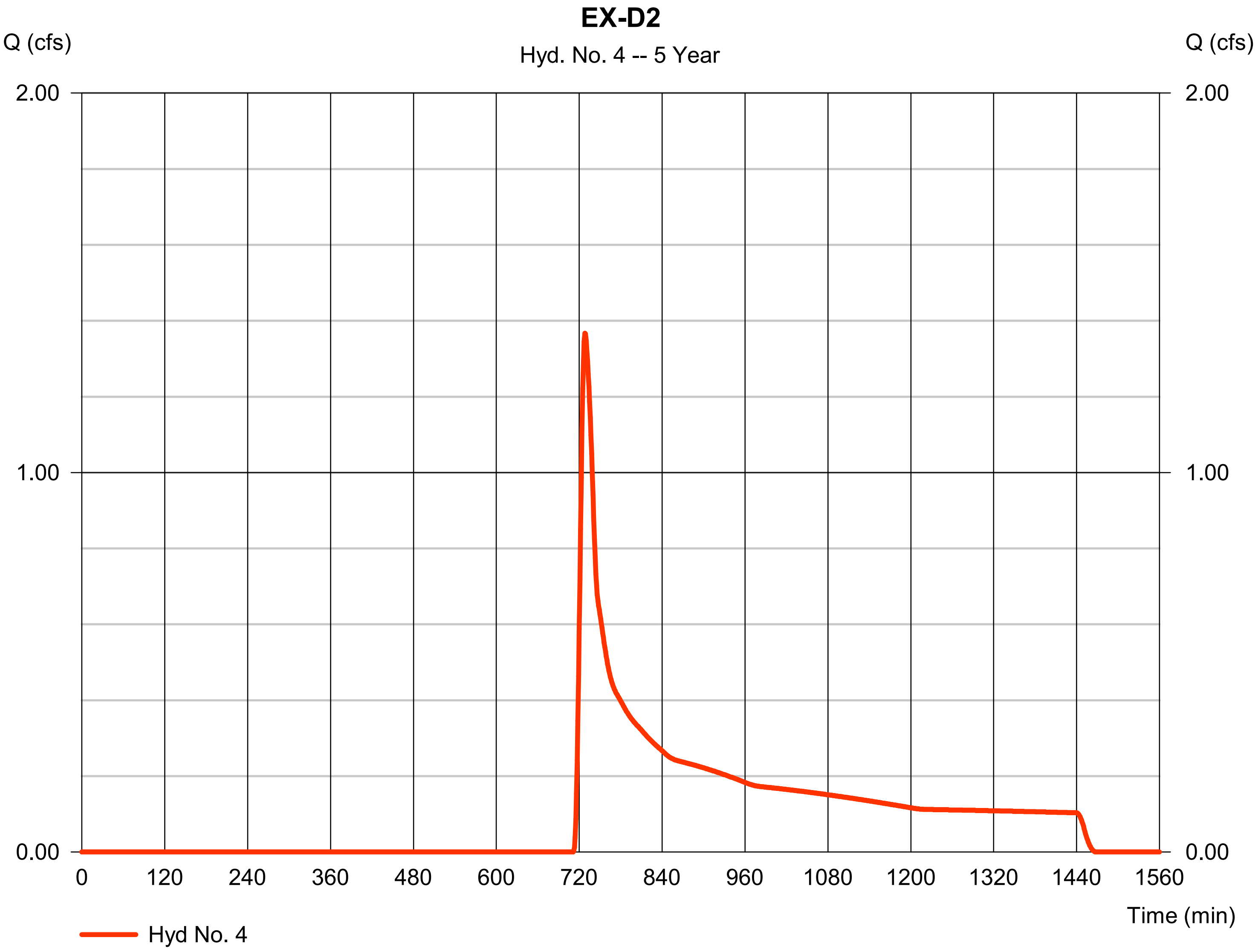
Total Travel Time, Tc .... 28.60 min

Hydrograph Report

Hyd. No. 4

EX-D2

Hydrograph type	= SCS Runoff	Peak discharge	= 1.367 cfs
Storm frequency	= 5 yrs	Time to peak	= 728 min
Time interval	= 1 min	Hyd. volume	= 9,340 cuft
Drainage area	= 11.500 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 18.00 min
Total precip.	= 2.60 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



TR55 Tc Worksheet

Hyd. No. 4

EX-D2

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.030		0.011		0.011		
Flow length (ft)	=	300.0		0.0		0.0		
Two-year 24-hr precip. (in)	=	2.20		0.00		0.00		
Land slope (%)	=	2.00		0.00		0.00		
Travel Time (min)	**=**	**7.85**	**+**	**0.00**	**+**	**0.00**	**=**	**7.85**
Shallow Concentrated Flow								
Flow length (ft)	=	1395.00		0.00		0.00		
Watercourse slope (%)	=	2.00		0.00		0.00		
Surface description	=	Unpaved		Paved		Paved		
Average velocity (ft/s)		=2.28		0.00		0.00		
Travel Time (min)	**=**	**10.19**	**+**	**0.00**	**+**	**0.00**	**=**	**10.19**
Channel Flow								
X sectional flow area (sqft)	=	0.00		0.00		0.00		
Wetted perimeter (ft)	=	0.00		0.00		0.00		
Channel slope (%)	=	0.00		0.00		0.00		
Manning's n-value	=	0.015		0.015		0.015		
Velocity (ft/s)		=0.00						
				0.00				
						0.00		
Flow length (ft)		({0})0.0		0.0		0.0		
Travel Time (min)	**=**	**0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc .... 18.00 min

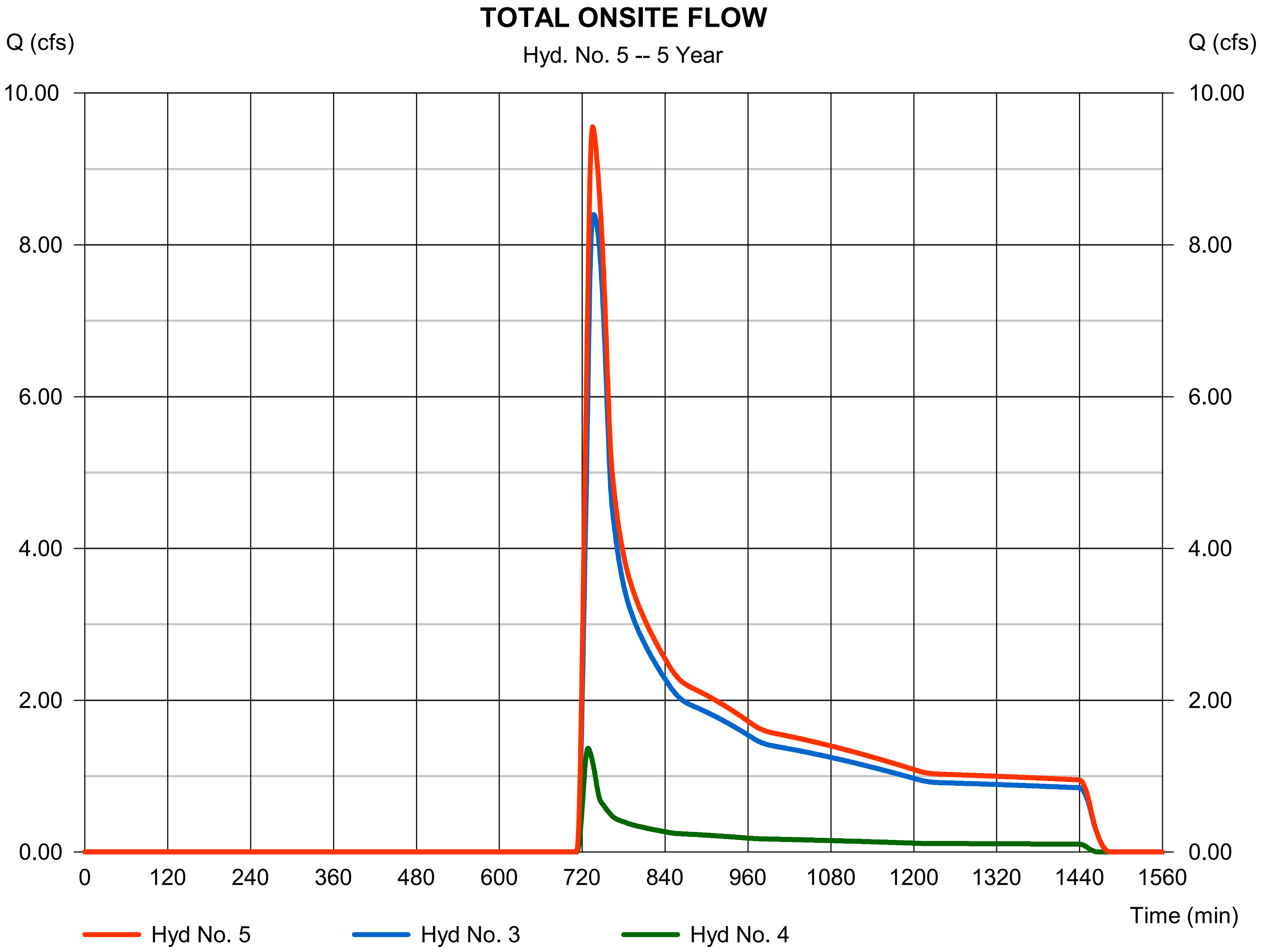
Hydrograph Report

Hyd. No. 5

TOTAL ONSITE FLOW

Hydrograph type = Combine
Storm frequency = 5 yrs
Time interval = 1 min
Inflow hyds. = 3, 4

Peak discharge = 9.557 cfs
Time to peak = 735 min
Hyd. volume = 85,583 cuft
Contrib. drain. area = 105.000 ac

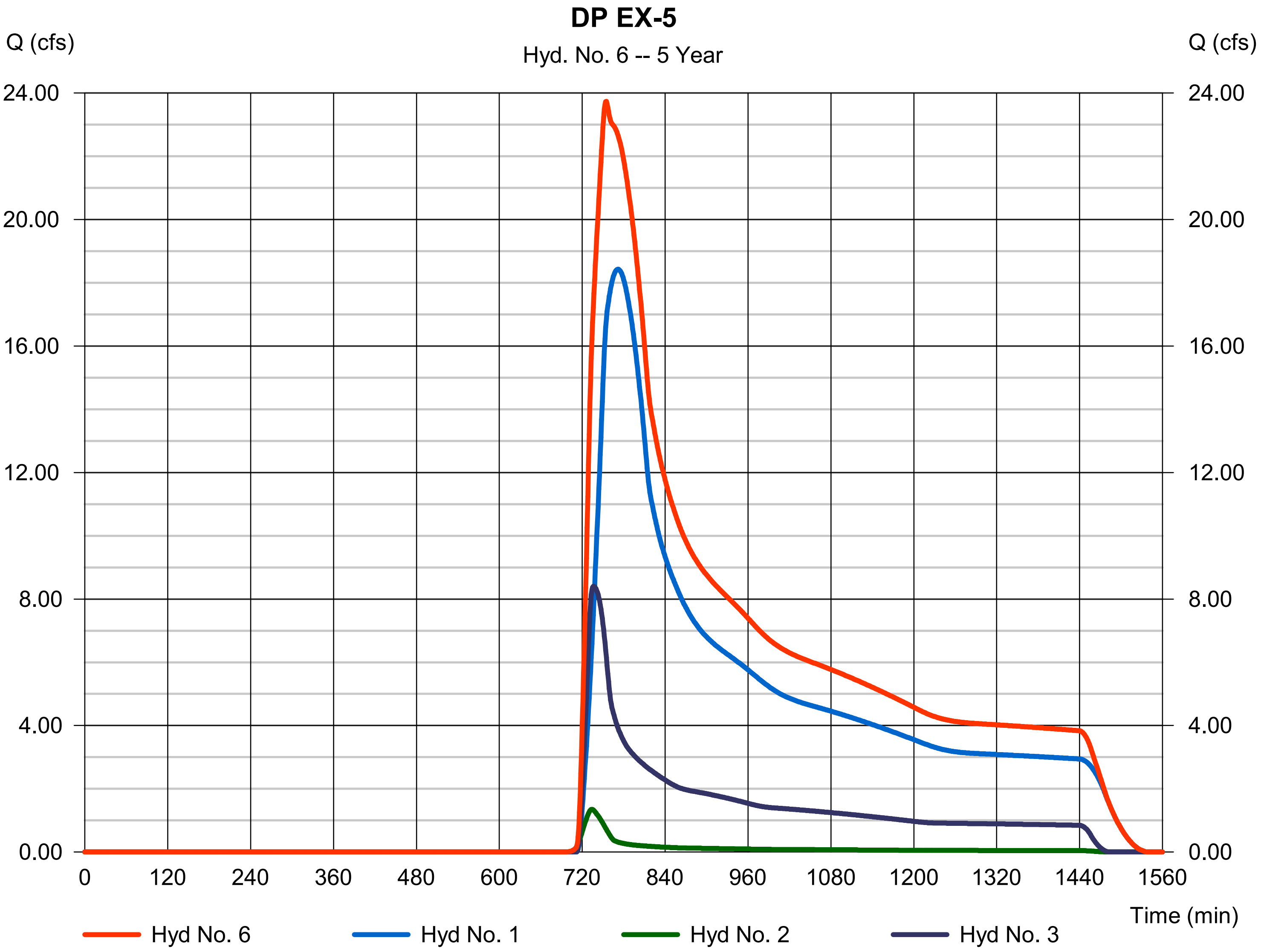


Hydrograph Report

Hyd. No. 6

DP EX-5

Hydrograph type	= Combine	Peak discharge	= 23.73 cfs
Storm frequency	= 5 yrs	Time to peak	= 755 min
Time interval	= 1 min	Hyd. volume	= 344,692 cuft
Inflow hyds.	= 1, 2, 3	Contrib. drain. area	= 416.150 ac



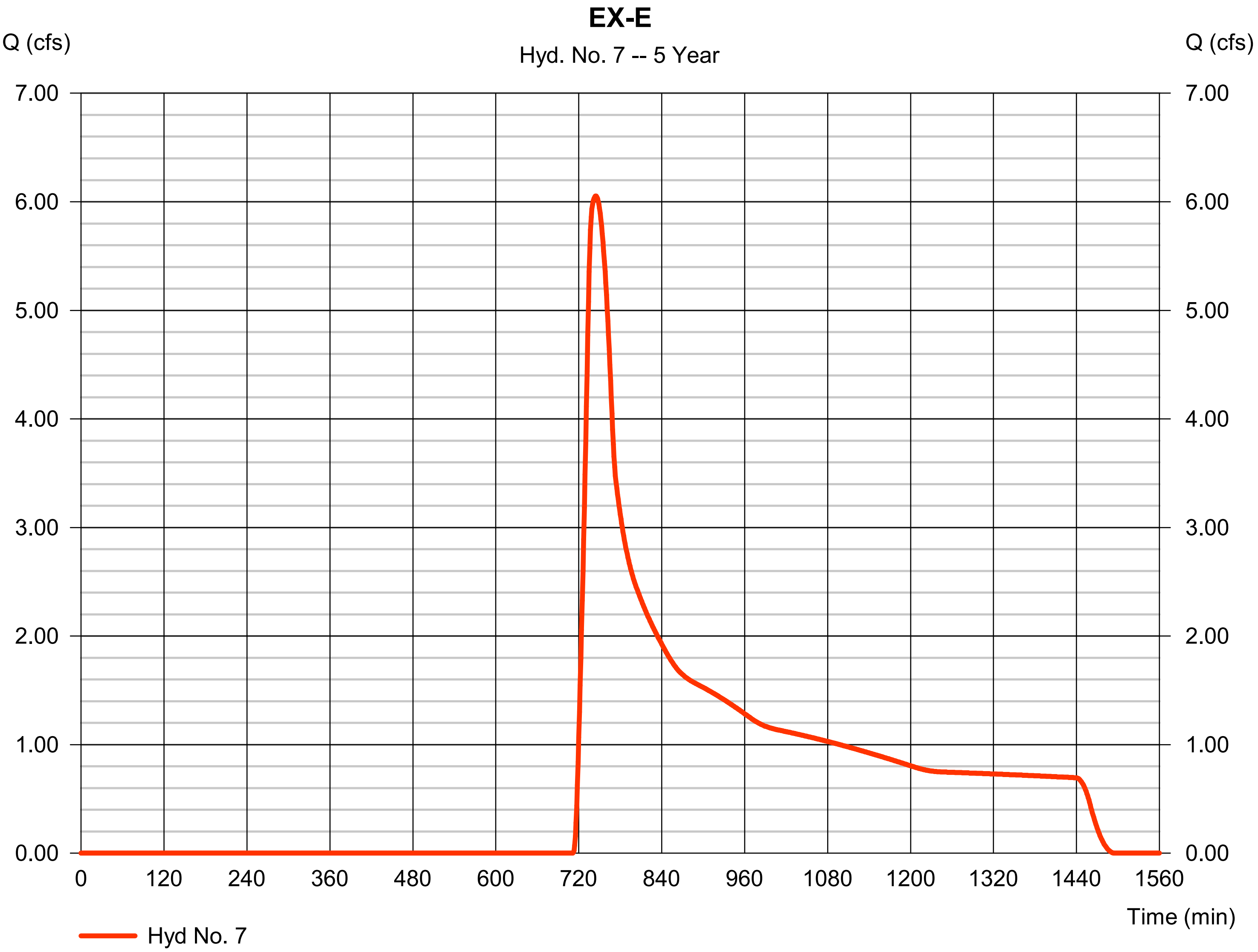
Hydrograph Report

Hyd. No. 7

EX-E

Hydrograph type = SCS Runoff
Storm frequency = 5 yrs
Time interval = 1 min
Drainage area = 76.000 ac
Basin Slope = 0.0 %
Tc method = TR55
Total precip. = 2.60 in
Storm duration = 24 hrs

Peak discharge = 6.054 cfs
Time to peak = 745 min
Hyd. volume = 62,432 cuft
Curve number = 61
Hydraulic length = 0 ft
Time of conc. (Tc) = 34.20 min
Distribution = Type II
Shape factor = 484



TR55 Tc Worksheet

Hyd. No. 7

EX-E

Description	A	B	C	Totals
Sheet Flow				
Manning's n-value	= 0.030	0.011	0.011	
Flow length (ft)	= 300.0	0.0	0.0	
Two-year 24-hr precip. (in)	= 2.20	0.00	0.00	
Land slope (%)	= 2.00	0.00	0.00	
Travel Time (min)	**= 7.85**	**+ 0.00**	**+ 0.00**	**= 7.85**
Shallow Concentrated Flow				
Flow length (ft)	= 2546.00	0.00	0.00	
Watercourse slope (%)	= 1.00	0.00	0.00	
Surface description	= Unpaved	Paved	Paved	
Average velocity (ft/s)	=1.61	0.00	0.00	
Travel Time (min)	**= 26.30**	**+ 0.00**	**+ 0.00**	**= 26.30**
Channel Flow				
X sectional flow area (sqft)	= 0.00	0.00	0.00	
Wetted perimeter (ft)	= 0.00	0.00	0.00	
Channel slope (%)	= 0.00	0.00	0.00	
Manning's n-value	= 0.015	0.015	0.015	
Velocity (ft/s)	=0.00	0.00	0.00	
Flow length (ft)	({0})0.0	0.0	0.0	
Travel Time (min)	**= 0.00**	**+ 0.00**	**+ 0.00**	**= 0.00**

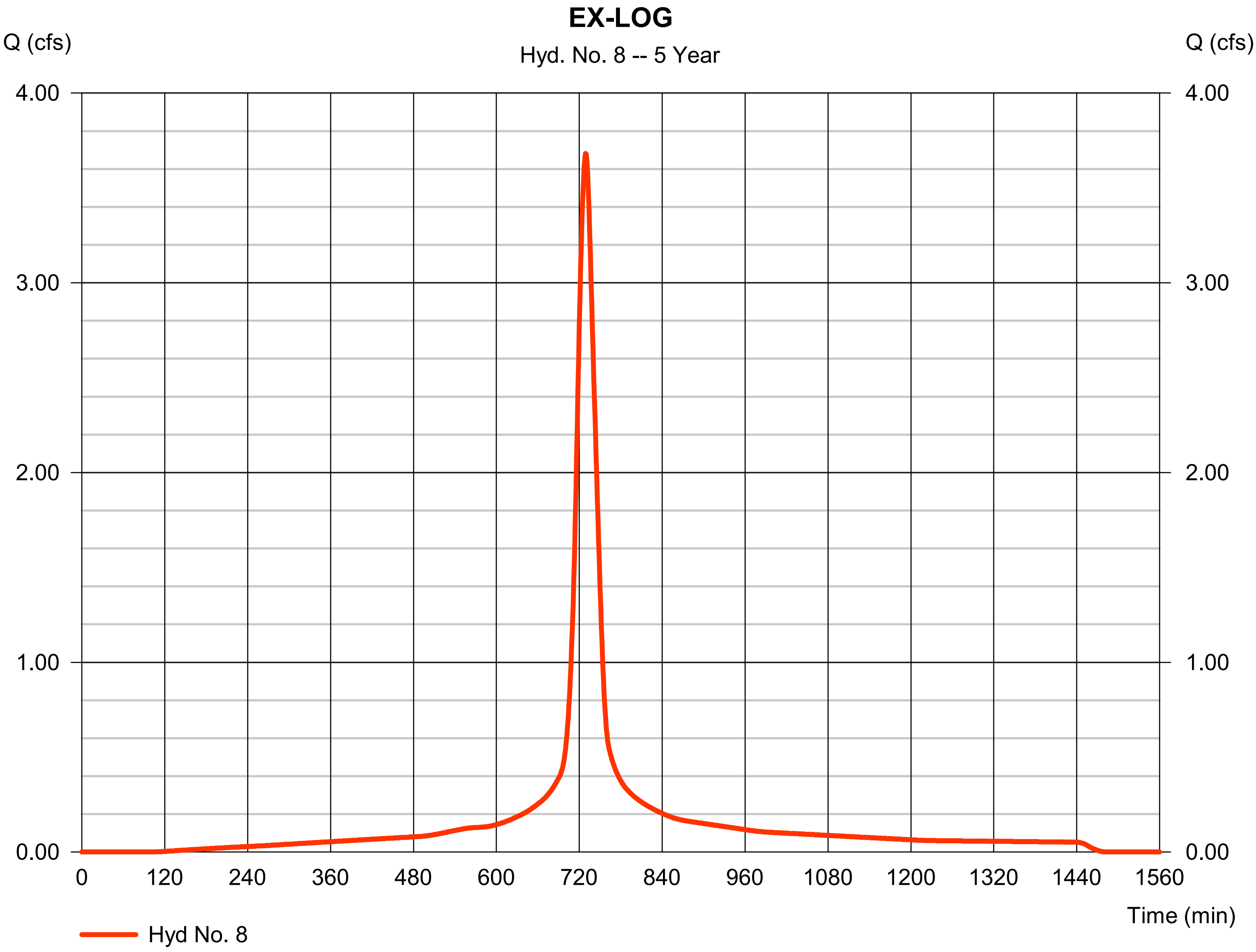
Total Travel Time, Tc .... 34.20 min

Hydrograph Report

Hyd. No. 8

EX-LOG

Hydrograph type	= SCS Runoff	Peak discharge	= 3.682 cfs
Storm frequency	= 5 yrs	Time to peak	= 729 min
Time interval	= 1 min	Hyd. volume	= 15,373 cuft
Drainage area	= 1.800 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 27.06 min
Total precip.	= 2.60 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



TR55 Tc Worksheet

Hyd. No. 8

EX-LOG

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.013		0.011		0.011		
Flow length (ft)	=	11.0		0.0		0.0		
Two-year 24-hr precip. (in)	=	2.20		0.00		0.00		
Land slope (%)	=	2.00		0.00		0.00		
Travel Time (min)	**=**	**0.29**	**+**	**0.00**	**+**	**0.00**	**=**	**0.29**
Shallow Concentrated Flow								
Flow length (ft)	=	2592.00		0.00		0.00		
Watercourse slope (%)	=	1.00		0.00		0.00		
Surface description	=	Unpaved		Paved		Paved		
Average velocity (ft/s)	=	1.61		0.00		0.00		
Travel Time (min)	**=**	**26.77**	**+**	**0.00**	**+**	**0.00**	**=**	**26.77**
Channel Flow								
X sectional flow area (sqft)	=	0.00		0.00		0.00		
Wetted perimeter (ft)	=	0.00		0.00		0.00		
Channel slope (%)	=	0.00		0.00		0.00		
Manning's n-value	=	0.015		0.015		0.015		
Velocity (ft/s)	=	0.00						
				0.00				
						0.00		
Flow length (ft)	({0})	0.0		0.0		0.0		
Travel Time (min)	**=**	**0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

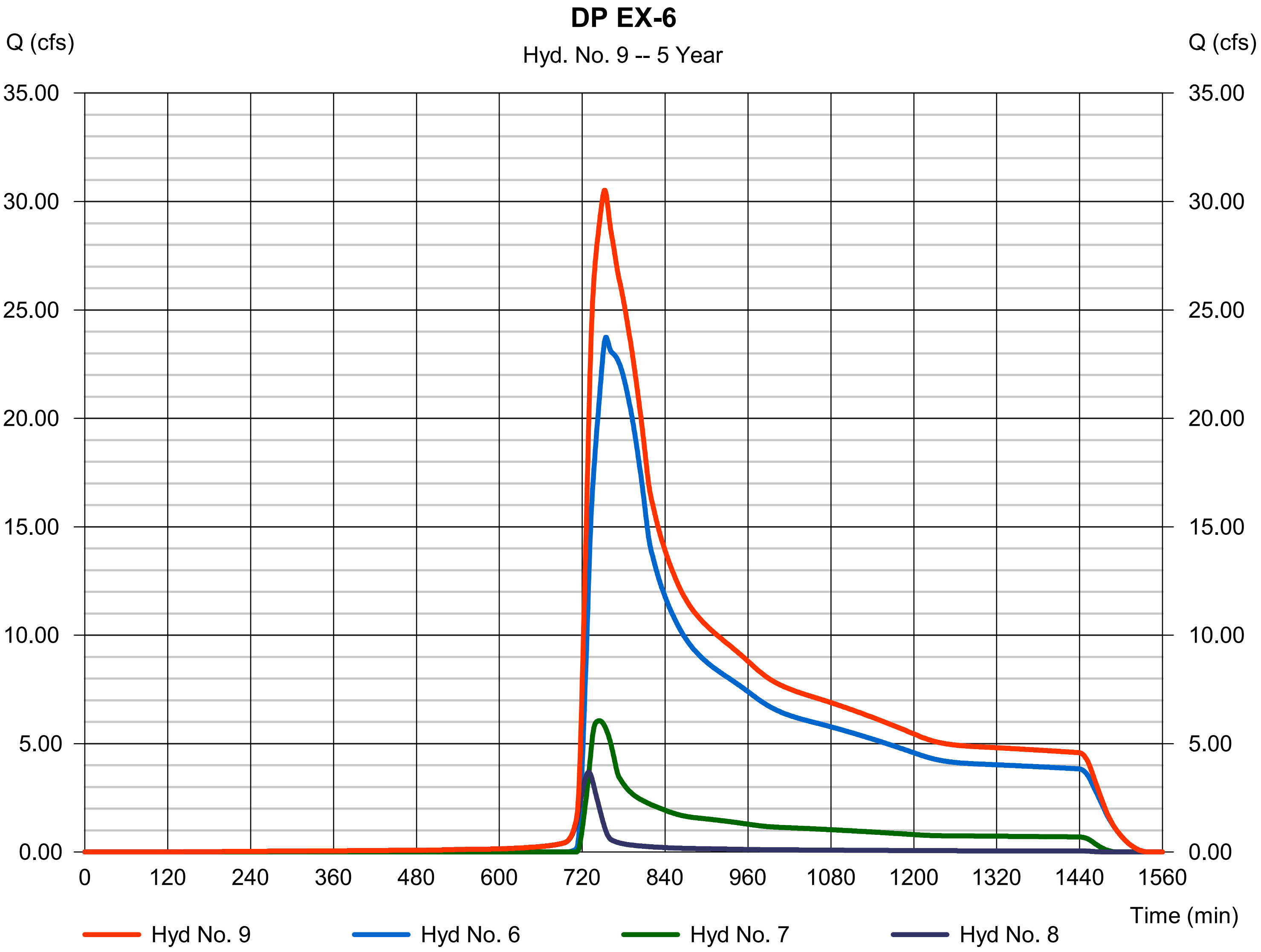
Total Travel Time, Tc .... 27.06 min

Hydrograph Report

Hyd. No. 9

DP EX-6

Hydrograph type	= Combine	Peak discharge	= 30.51 cfs
Storm frequency	= 5 yrs	Time to peak	= 752 min
Time interval	= 1 min	Hyd. volume	= 422,497 cuft
Inflow hyds.	= 6, 7, 8	Contrib. drain. area	= 77.800 ac

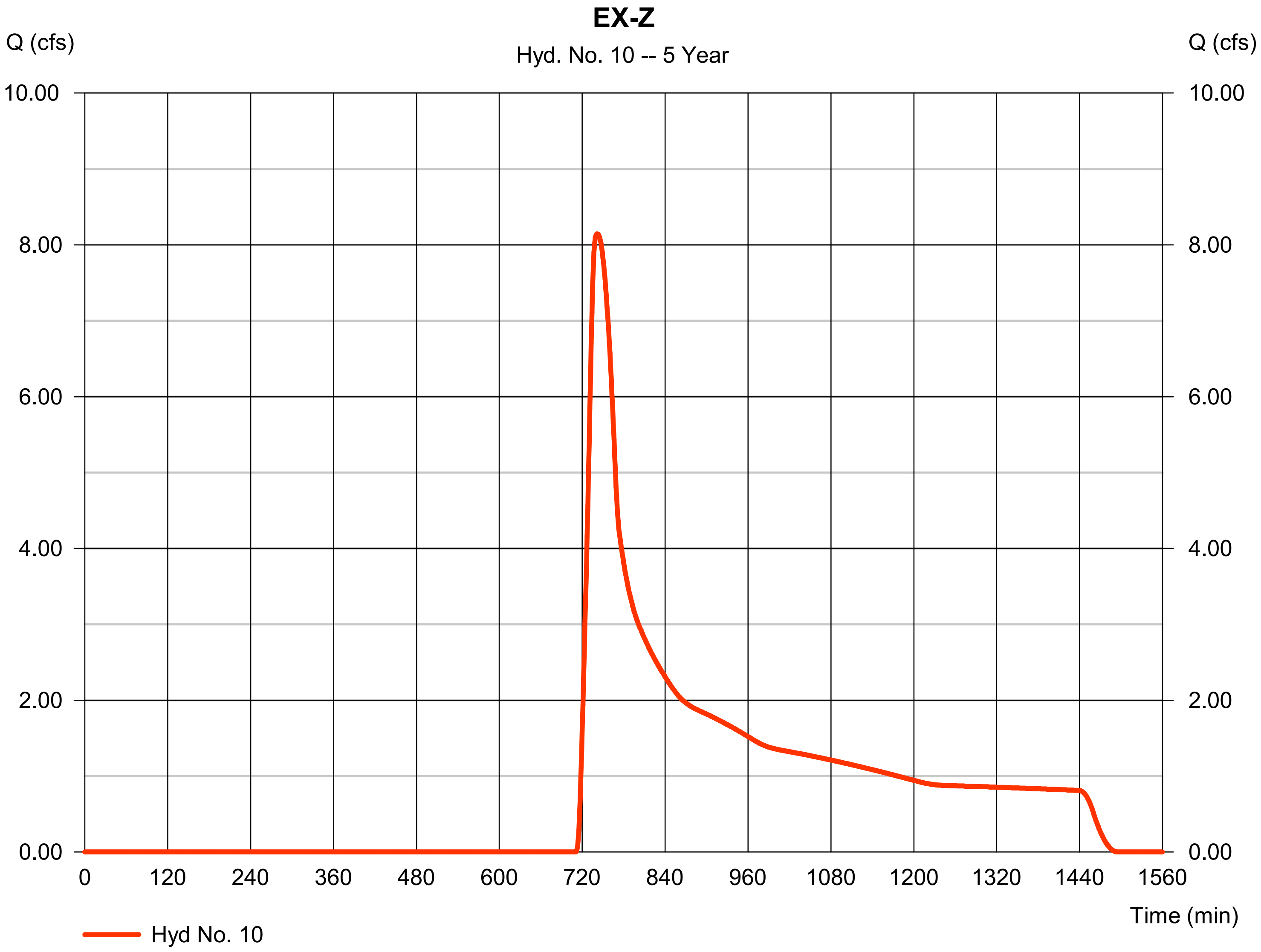


Hydrograph Report

Hyd. No. 10

EX-Z

Hydrograph type	= SCS Runoff	Peak discharge	= 8.146 cfs
Storm frequency	= 5 yrs	Time to peak	= 742 min
Time interval	= 1 min	Hyd. volume	= 76,284 cuft
Drainage area	= 83.500 ac	Curve number	= 62
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 35.00 min
Total precip.	= 2.60 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



TR55 Tc Worksheet

Hyd. No. 10

EX-Z

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.030		0.011		0.011		
Flow length (ft)	=	300.0		0.0		0.0		
Two-year 24-hr precip. (in)	=	2.20		0.00		0.00		
Land slope (%)	=	2.00		0.00		0.00		
Travel Time (min)	**=**	**7.85**	**+**	**0.00**	**+**	**0.00**	**=**	**7.85**
Shallow Concentrated Flow								
Flow length (ft)	=	2627.00		0.00		0.00		
Watercourse slope (%)	=	1.00		0.00		0.00		
Surface description	=	Unpaved		Paved		Paved		
Average velocity (ft/s)	=1.61			0.00		0.00		
Travel Time (min)	**=**	**27.14**	**+**	**0.00**	**+**	**0.00**	**=**	**27.14**
Channel Flow								
X sectional flow area (sqft)	=	0.00		0.00		0.00		
Wetted perimeter (ft)	=	0.00		0.00		0.00		
Channel slope (%)	=	0.00		0.00		0.00		
Manning's n-value	=	0.015		0.015		0.015		
Velocity (ft/s)	=0.00							
				0.00				
						0.00		
Flow length (ft)	({0})0.0			0.0		0.0		
Travel Time (min)	**=**	**0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

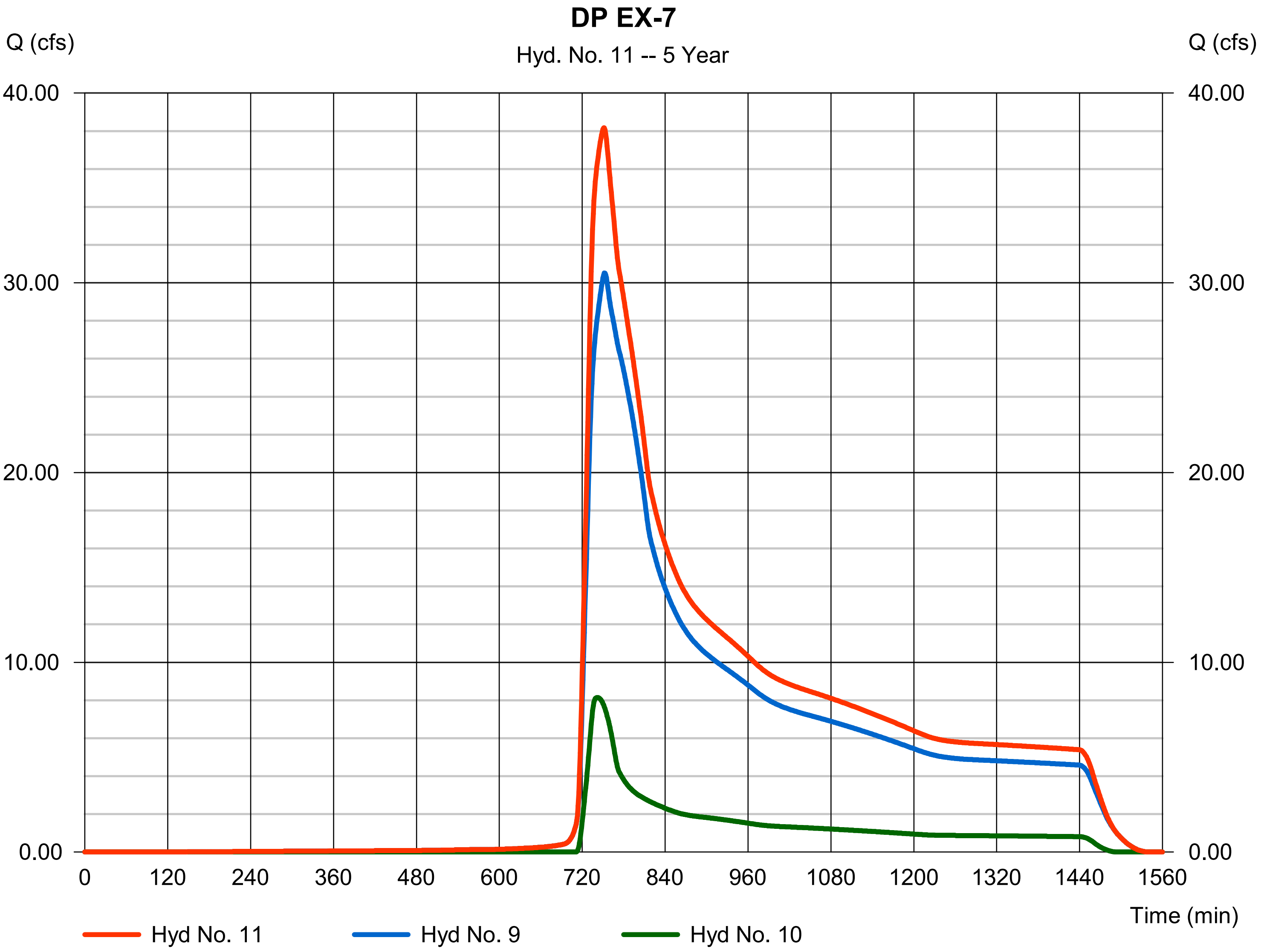
Total Travel Time, Tc .... 35.00 min

Hydrograph Report

Hyd. No. 11

DP EX-7

Hydrograph type	= Combine	Peak discharge	= 38.16 cfs
Storm frequency	= 5 yrs	Time to peak	= 751 min
Time interval	= 1 min	Hyd. volume	= 498,780 cuft
Inflow hyds.	= 9, 10	Contrib. drain. area	= 83.500 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

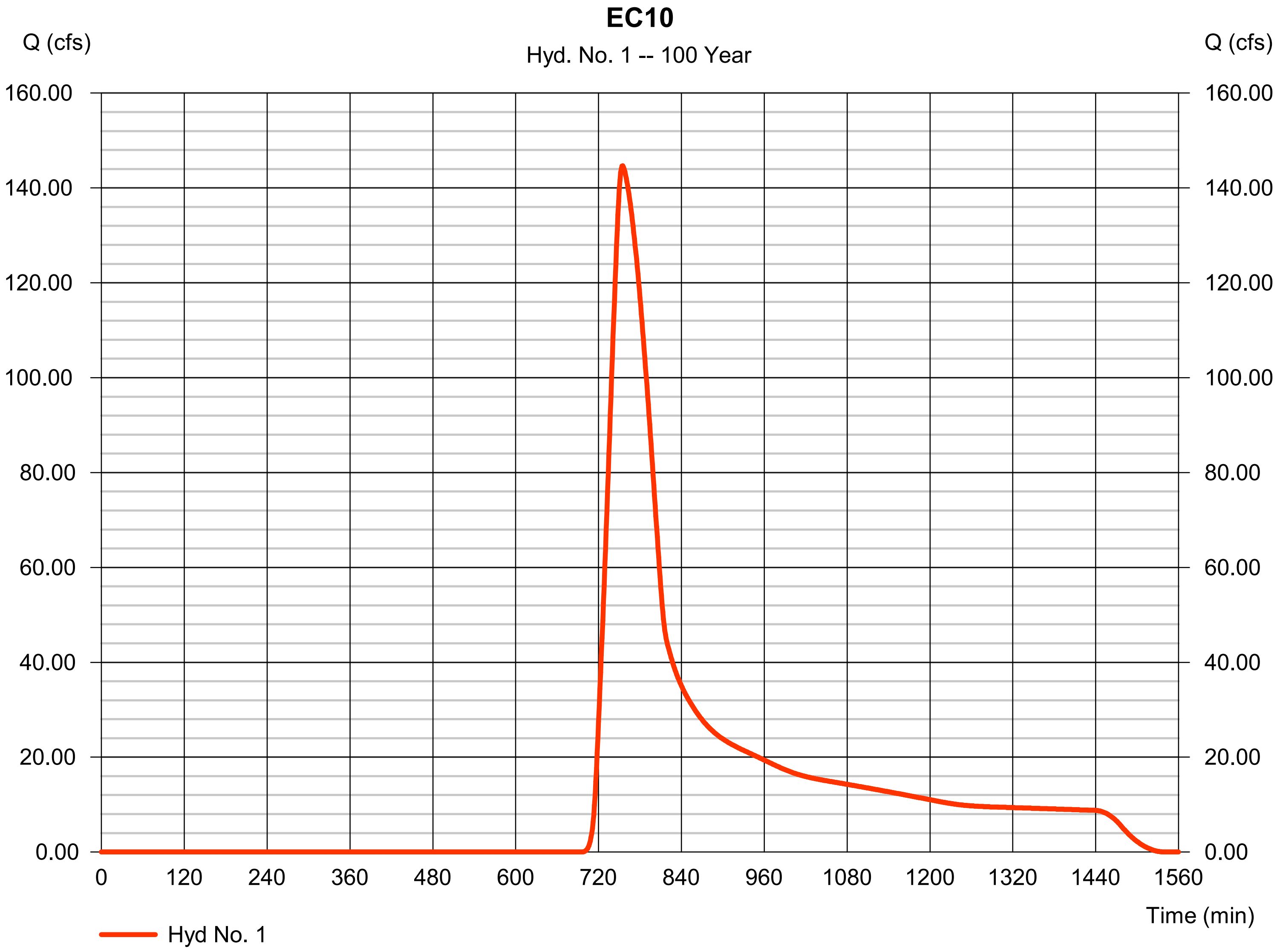
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	144.67	1	755	1,185,497	------	------	------	EC10
2	SCS Runoff	4.333	1	733	18,356	------	------	------	OS-1
3	SCS Runoff	76.23	1	732	344,975	------	------	------	EX-D1
4	SCS Runoff	12.54	1	725	42,259	------	------	------	EX-D2
5	Combine	86.19	1	731	387,234	3, 4	------	------	TOTAL ONSITE FLOW
6	Combine	183.85	1	749	1,548,829	1, 2, 3,	------	------	DP EX-5
7	SCS Runoff	53.32	1	736	282,485	------	------	------	EX-E
8	SCS Runoff	6.317	1	729	27,009	------	------	------	EX-LOG
9	Combine	231.35	1	745	1,858,321	6, 7, 8	------	------	DP EX-6
10	SCS Runoff	63.40	1	736	328,266	------	------	------	EX-Z
11	Combine	289.85	1	740	2,186,588	9, 10	------	------	DP EX-7

Hydrograph Report

Hyd. No. 1

EC10

Hydrograph type	= SCS Runoff	Peak discharge	= 144.67 cfs
Storm frequency	= 100 yrs	Time to peak	= 755 min
Time interval	= 1 min	Hyd. volume	= 1,185,497 cuft
Drainage area	= 320.000 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 63.00 min
Total precip.	= 4.40 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

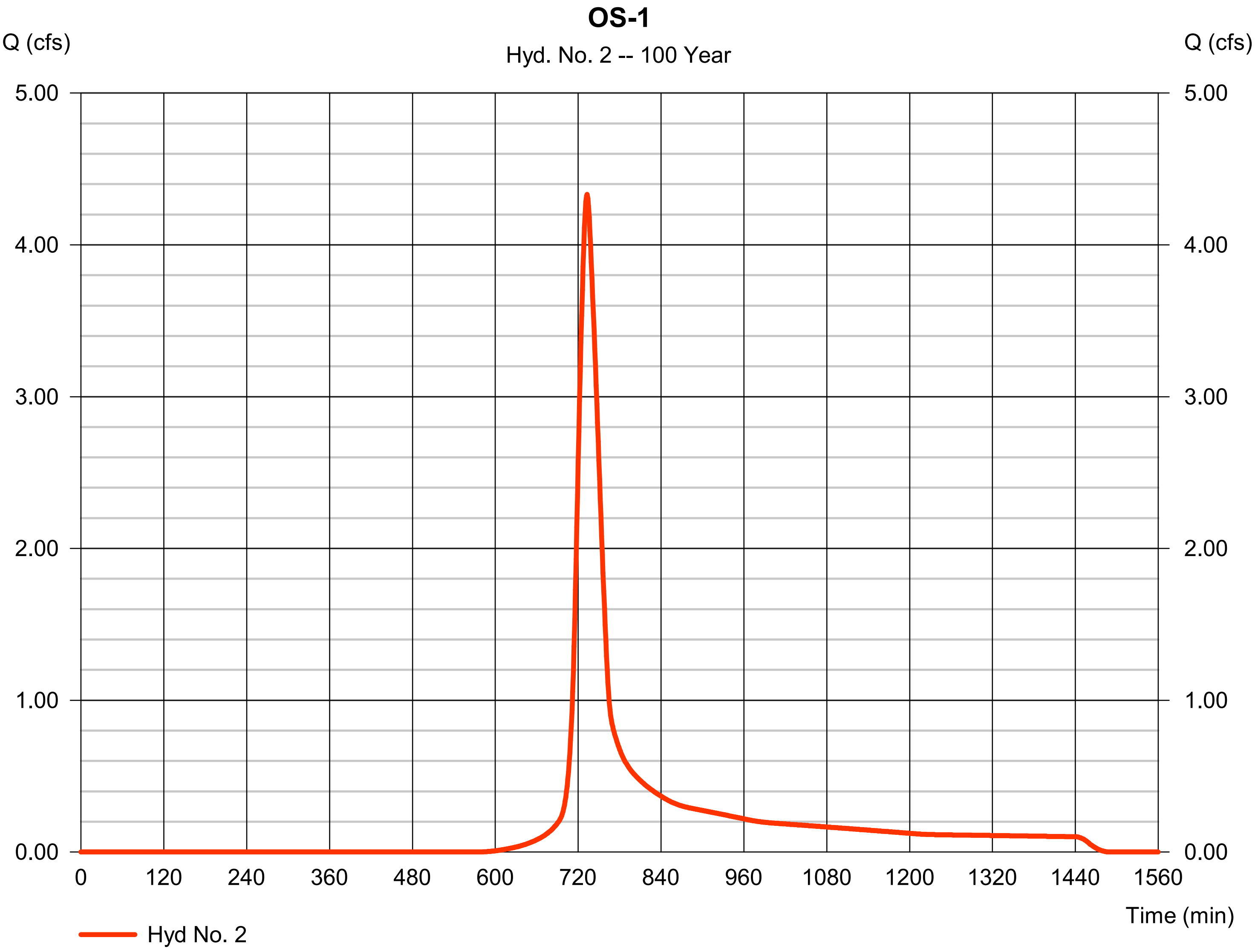


Hydrograph Report

Hyd. No. 2

OS-1

Hydrograph type	= SCS Runoff	Peak discharge	= 4.333 cfs
Storm frequency	= 100 yrs	Time to peak	= 733 min
Time interval	= 1 min	Hyd. volume	= 18,356 cuft
Drainage area	= 2.650 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 32.10 min
Total precip.	= 4.40 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

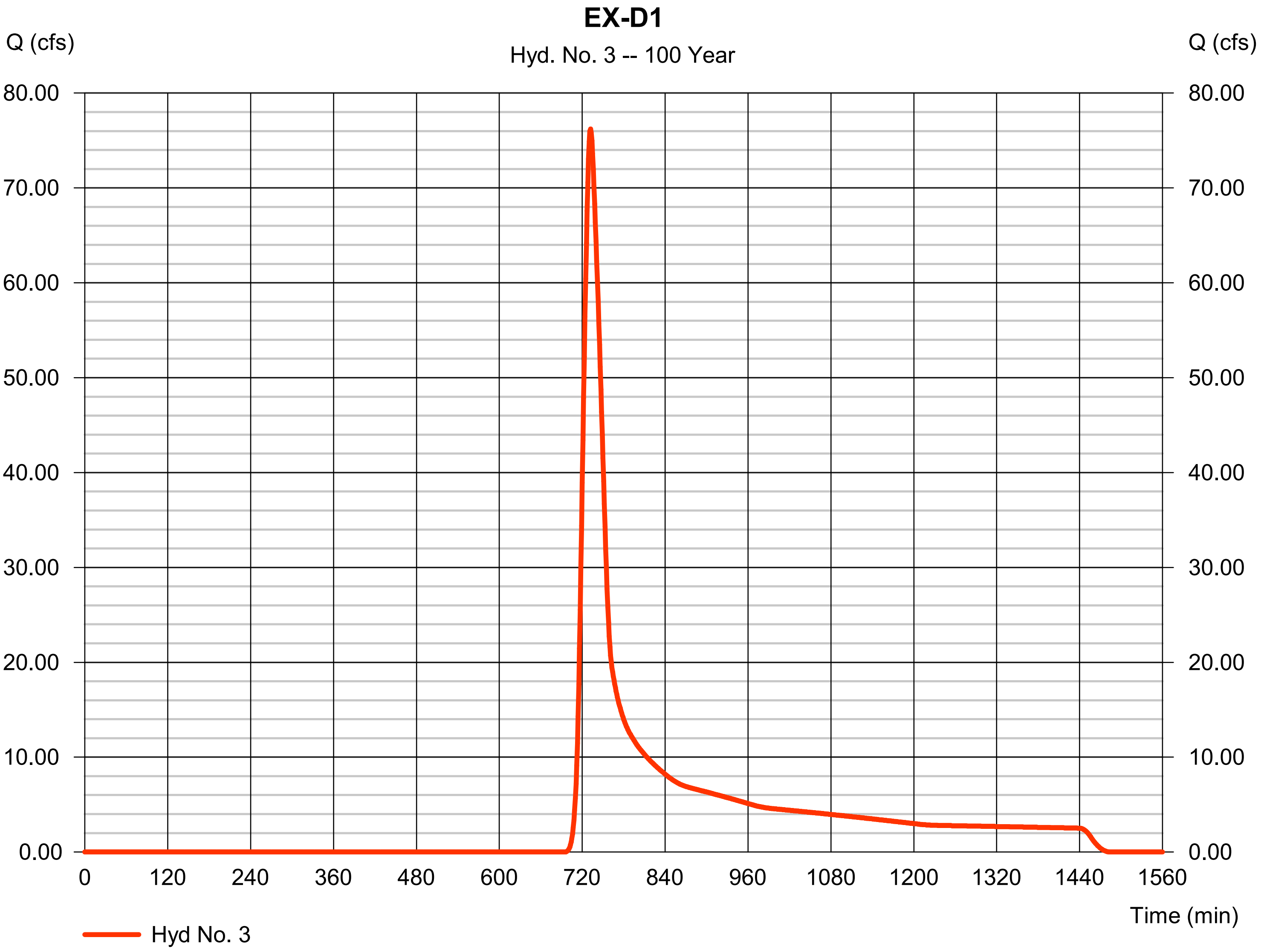


Hydrograph Report

Hyd. No. 3

EX-D1

Hydrograph type	= SCS Runoff	Peak discharge	= 76.23 cfs
Storm frequency	= 100 yrs	Time to peak	= 732 min
Time interval	= 1 min	Hyd. volume	= 344,975 cuft
Drainage area	= 93.500 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 28.60 min
Total precip.	= 4.40 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



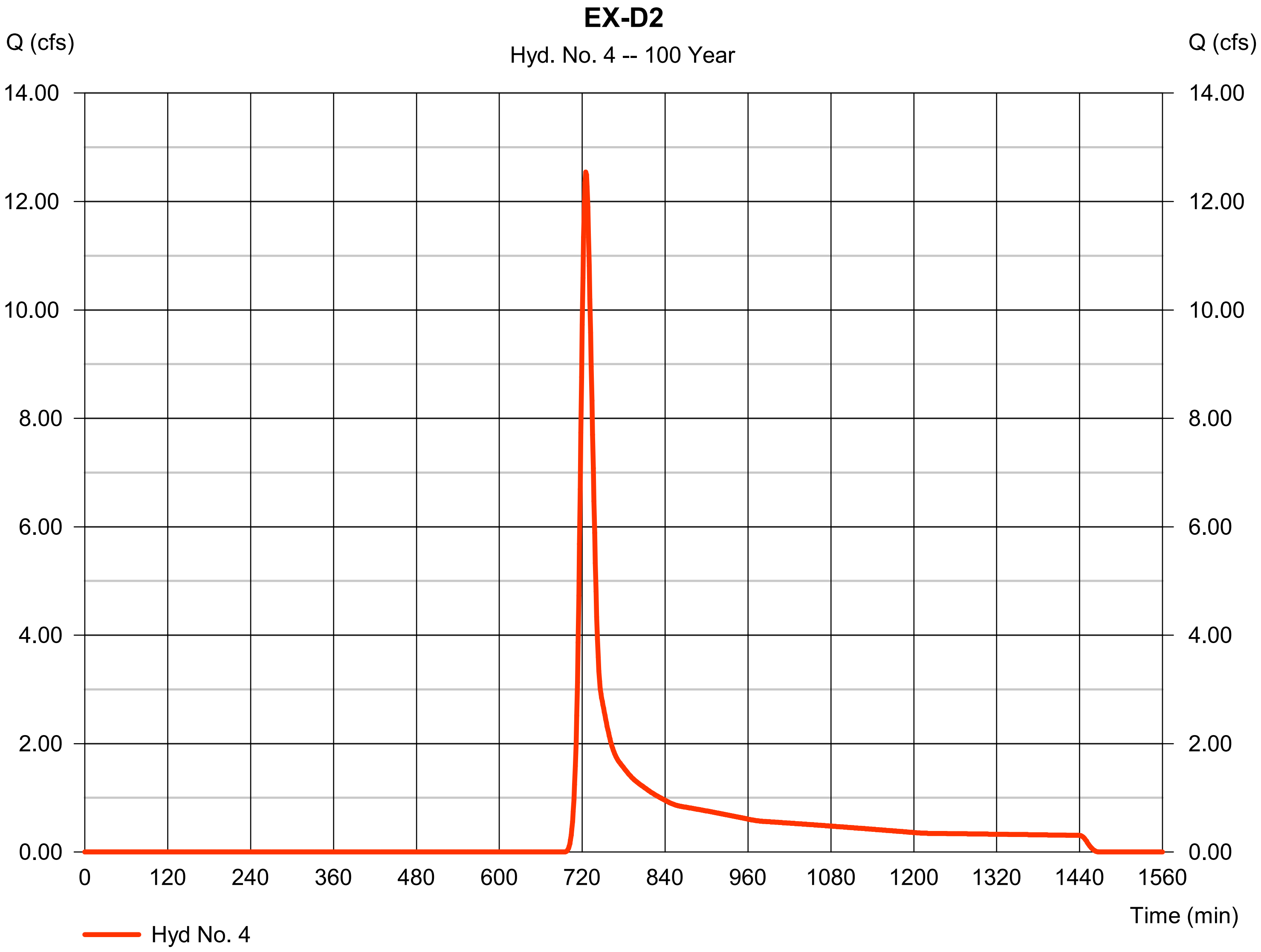
Hydrograph Report

Hyd. No. 4

EX-D2

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Time interval = 1 min
Drainage area = 11.500 ac
Basin Slope = 0.0 %
Tc method = TR55
Total precip. = 4.40 in
Storm duration = 24 hrs

Peak discharge = 12.54 cfs
Time to peak = 725 min
Hyd. volume = 42,259 cuft
Curve number = 61
Hydraulic length = 0 ft
Time of conc. (Tc) = 18.00 min
Distribution = Type II
Shape factor = 484



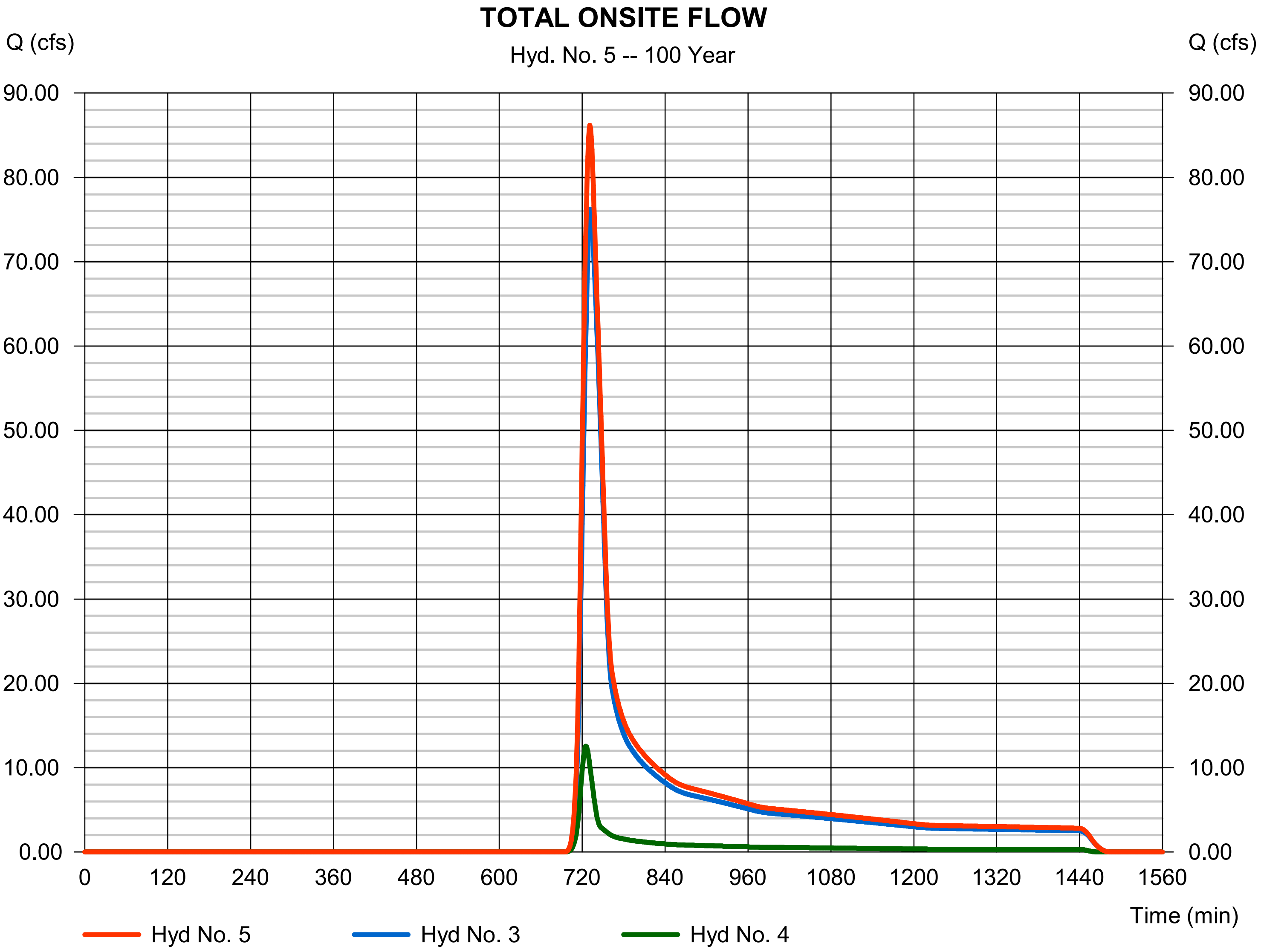
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Thursday, 01 / 5 / 2023

Hyd. No. 5

TOTAL ONSITE FLOW

Hydrograph type	= Combine	Peak discharge	= 86.19 cfs
Storm frequency	= 100 yrs	Time to peak	= 731 min
Time interval	= 1 min	Hyd. volume	= 387,234 cuft
Inflow hyds.	= 3, 4	Contrib. drain. area	= 105.000 ac



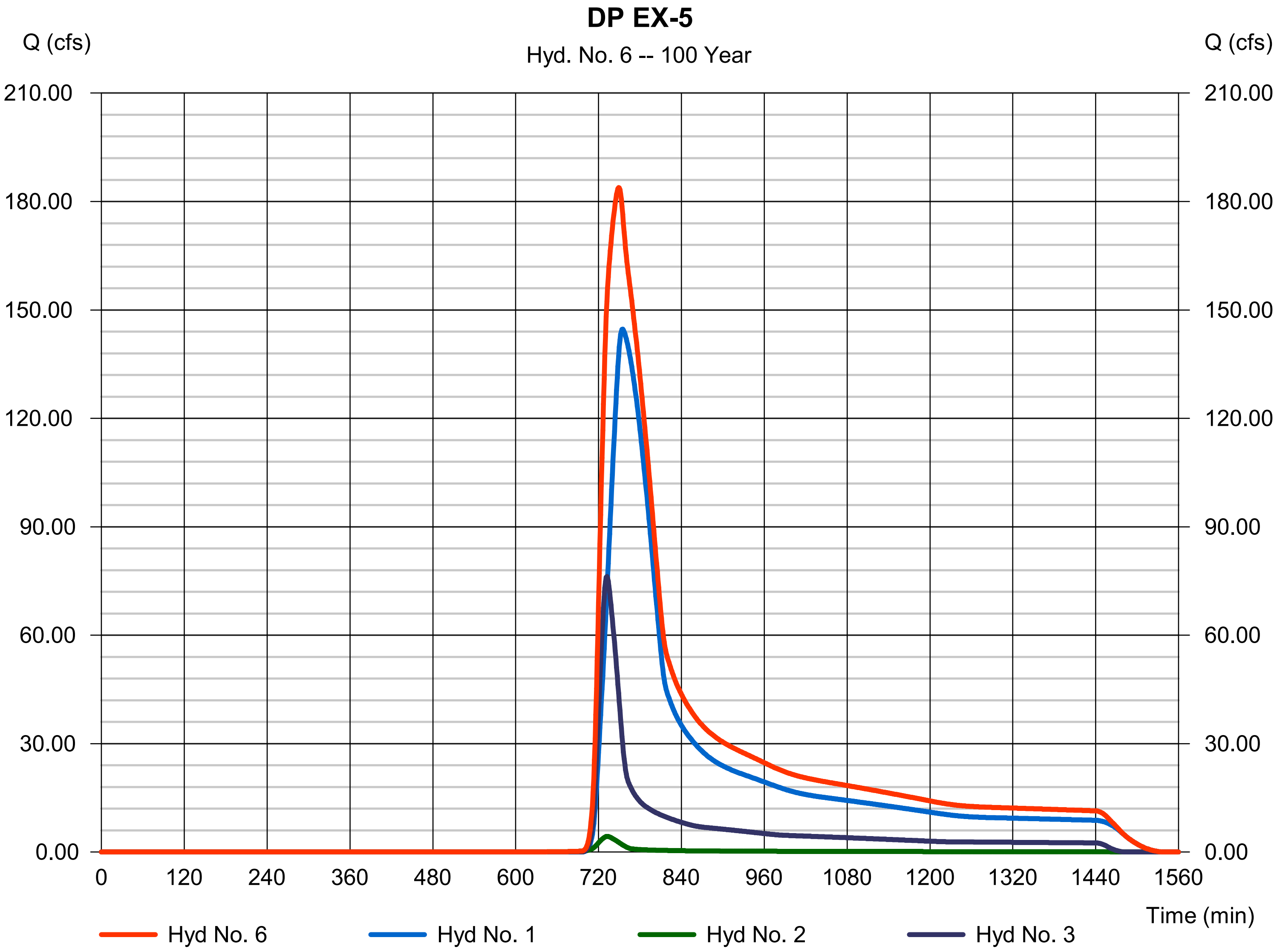
Hydrograph Report

Hyd. No. 6

DP EX-5

Hydrograph type = Combine
Storm frequency = 100 yrs
Time interval = 1 min
Inflow hyds. = 1, 2, 3

Peak discharge = 183.85 cfs
Time to peak = 749 min
Hyd. volume = 1,548,829 cuft
Contrib. drain. area = 416.150 ac

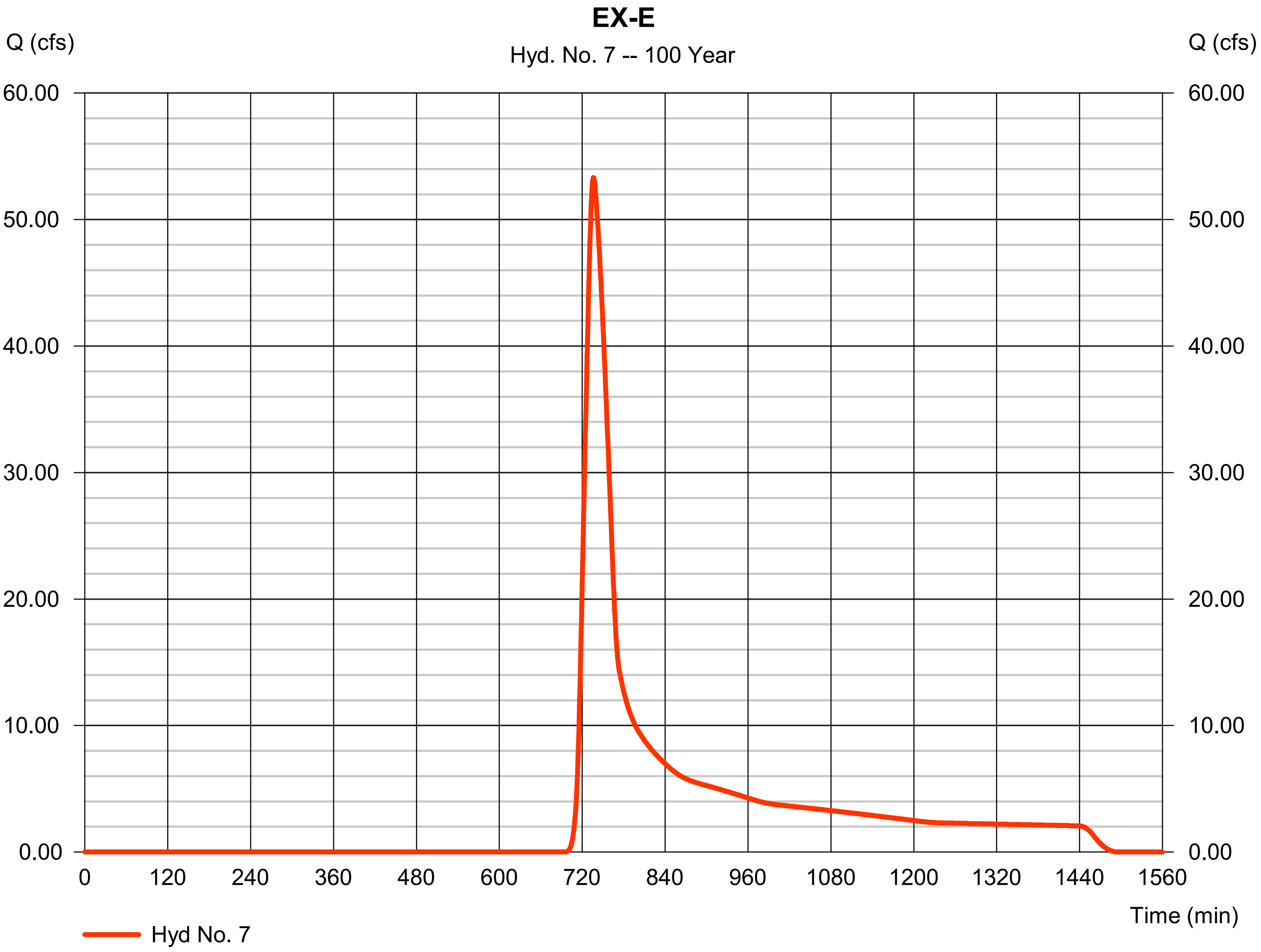


Hydrograph Report

Hyd. No. 7

EX-E

Hydrograph type	= SCS Runoff	Peak discharge	= 53.32 cfs
Storm frequency	= 100 yrs	Time to peak	= 736 min
Time interval	= 1 min	Hyd. volume	= 282,485 cuft
Drainage area	= 76.000 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 34.20 min
Total precip.	= 4.40 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

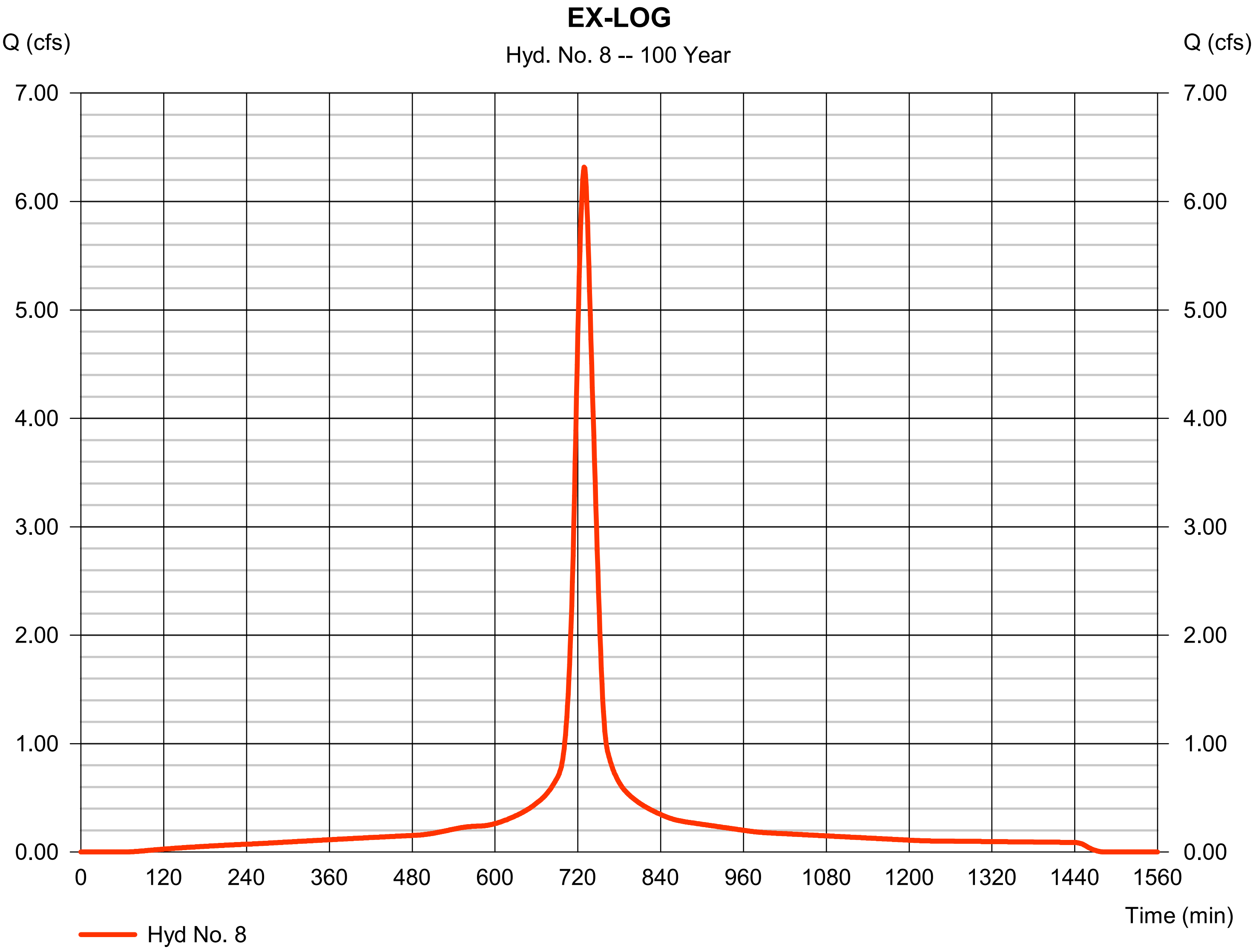


Hydrograph Report

Hyd. No. 8

EX-LOG

Hydrograph type	= SCS Runoff	Peak discharge	= 6.317 cfs
Storm frequency	= 100 yrs	Time to peak	= 729 min
Time interval	= 1 min	Hyd. volume	= 27,009 cuft
Drainage area	= 1.800 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 27.06 min
Total precip.	= 4.40 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



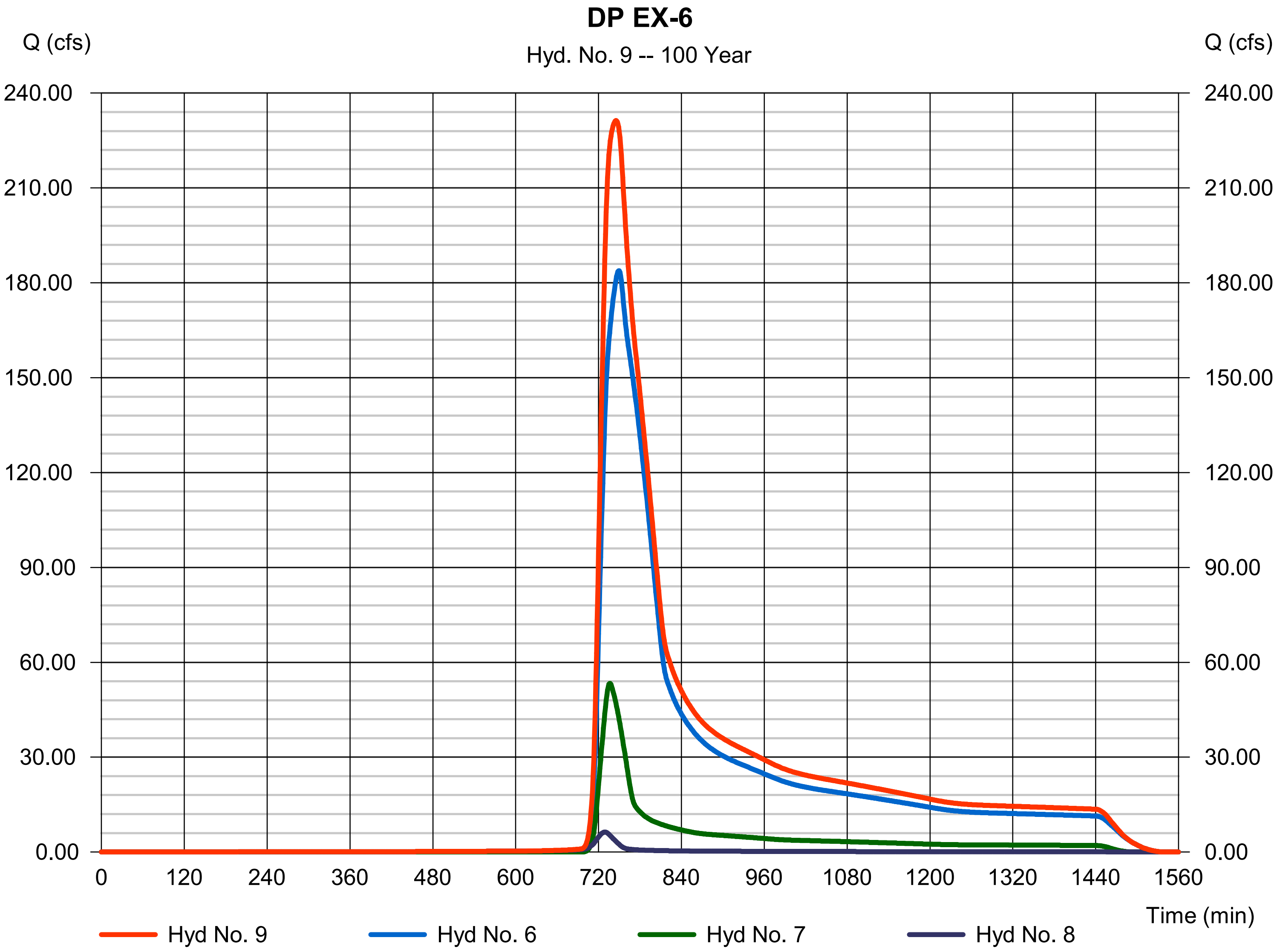
Hydrograph Report

Hyd. No. 9

DP EX-6

Hydrograph type = Combine
Storm frequency = 100 yrs
Time interval = 1 min
Inflow hyds. = 6, 7, 8

Peak discharge = 231.35 cfs
Time to peak = 745 min
Hyd. volume = 1,858,321 cuft
Contrib. drain. area = 77.800 ac

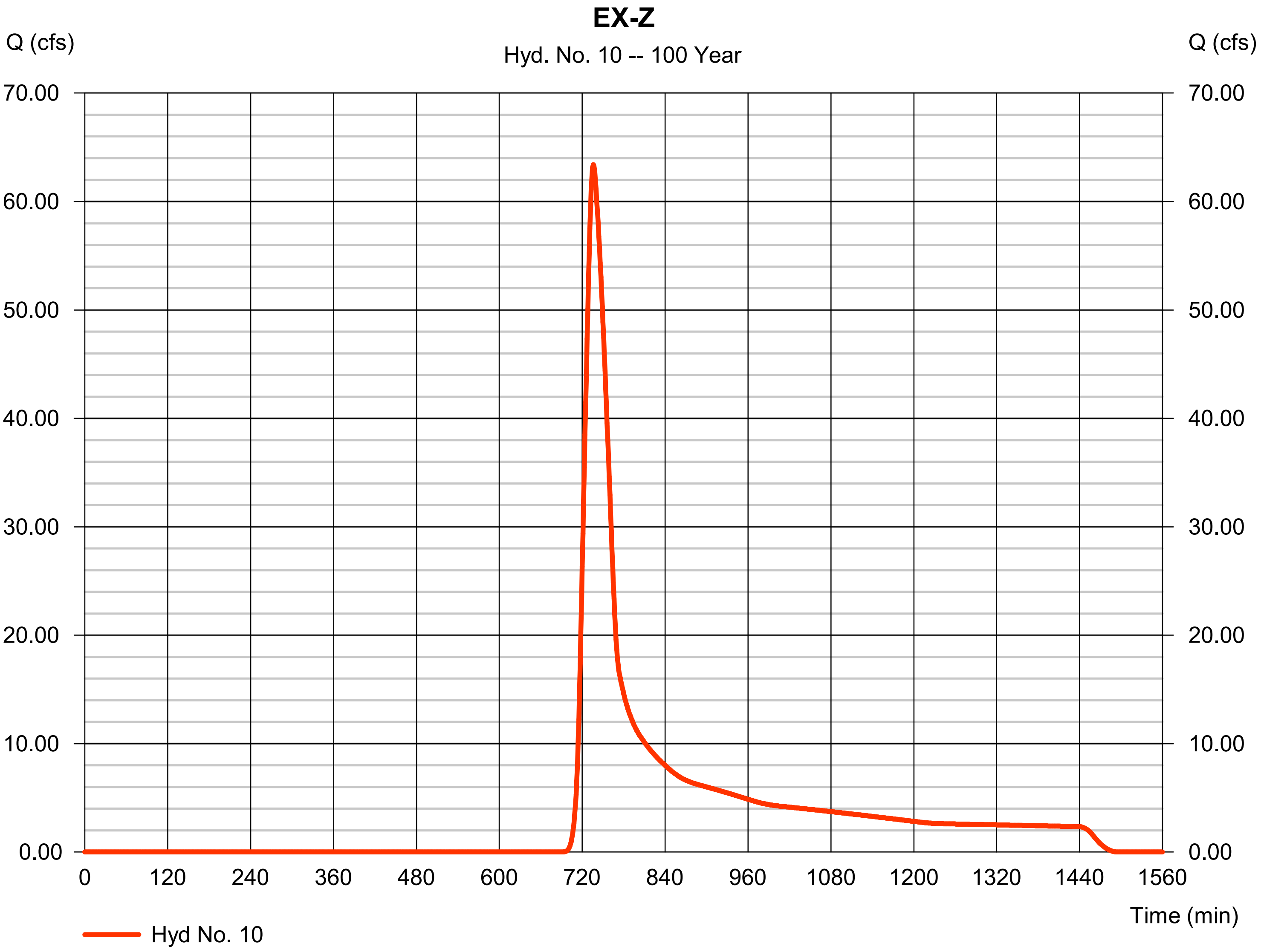


Hydrograph Report

Hyd. No. 10

EX-Z

Hydrograph type	= SCS Runoff	Peak discharge	= 63.40 cfs
Storm frequency	= 100 yrs	Time to peak	= 736 min
Time interval	= 1 min	Hyd. volume	= 328,266 cuft
Drainage area	= 83.500 ac	Curve number	= 62
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 35.00 min
Total precip.	= 4.40 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

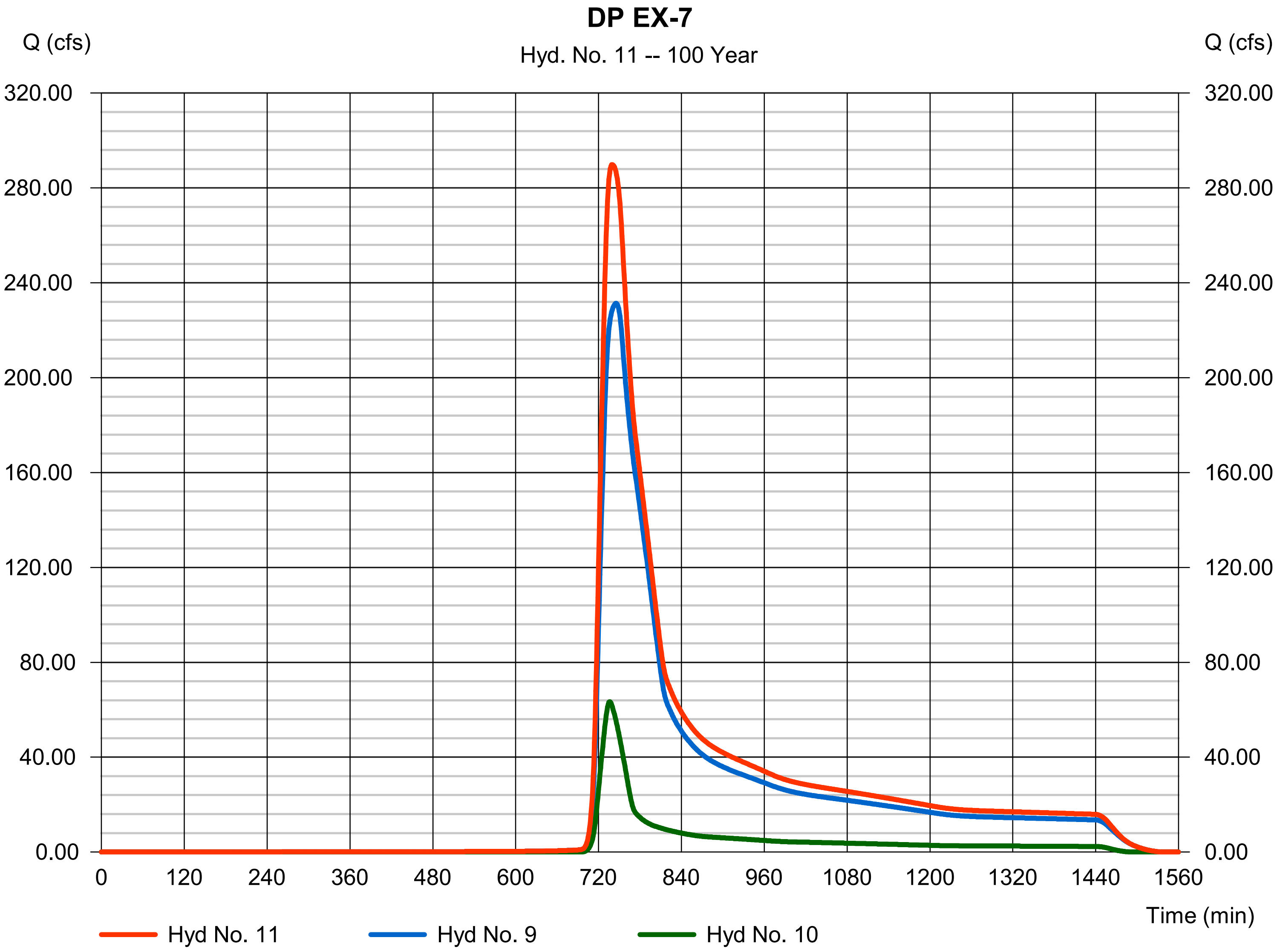


Hydrograph Report

Hyd. No. 11

DP EX-7

Hydrograph type	= Combine	Peak discharge	= 289.85 cfs
Storm frequency	= 100 yrs	Time to peak	= 740 min
Time interval	= 1 min	Hyd. volume	= 2,186,588 cuft
Inflow hyds.	= 9, 10	Contrib. drain. area	= 83.500 ac



Hydraflow Rainfall Report

Precip. file name: Sample.pcp

Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour		2.20		2.60				4.40

POST-DEVELOPMENT C VALUES

Designer: ESJ
Company: R&R Engineers-Surveyors
Date: 1/5/2023
Project: Mayberry Filing 3
Location: El Paso County

Global Parameters[1]			
Land Use	% Imp.	C_5	C_{100}
SF LOTS (1/6 AC)	47.5	0.375	0.545
Hardscape	100	0.9	0.96
Commercial	95	0.81	0.88
Landscape/Park	2	0.08	0.35

Summary	
Total Area (ac)	561.92
Composite Impervious	33.1%
Cells of this color are for required user-input	
Cells of this color are for optional user-input	

[1] From Table 6-6 in El Paso County DCM

[2] From Table 6-6 in El Paso County DCM

Basin Name	Area (ac)	NRCS Hydrologic Soil Group	SF LOTS (1/6 AC)		Hardscape		Commercial		Landscape/Park		% Check	Percent Imperviousness	Runoff Coefficient, C[2]				
			Area (ac)	%	Area (ac)	%	Area (ac)	%	Area (ac)	%			2-yr	5-yr	10-yr	25-yr	100-yr
C2.1	0.77	A	0.77	100.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	100.00%	47.5%		0.38			0.55
C2.2	0.33	A	0.33	100.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	100.00%	47.5%		0.38			0.55
C2.3	1.81	A	1.81	100.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	100.00%	47.5%		0.38			0.55
C2.4	1.16	A	0.00	0.0%	0.93	80.0%	0.00	0.0%	0.23	20.0%	100.00%	80%		0.74			0.84
C2.5	9.61	A	9.61	100.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	100.00%	47.5%		0.38			0.55
C3.0	35.40	A	17.70	50.0%	0.00	0.0%	0.00	0.0%	17.70	50.0%	100.00%	25%		0.23			0.45
D1.1	1.73	A	0.00	0.0%	0.00	0.0%	1.73	100.0%	0.00	0.0%	100.00%	95%		0.81			0.88
D1.2	2.56	A	2.56	100.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	100.00%	47.5%		0.38			0.55
D1.3	2.02	A	2.02	100.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	100.00%	47.5%		0.38			0.55
D1.4	3.75	A	3.52	93.9%	0.00	0.0%	0.23	6.1%	0.00	0.0%	100.00%	50%		0.40			0.57
D1.5	9.88	A	0.00	0.0%	0.00	0.0%	9.88	100.0%	0.00	0.0%	100.00%	95%		0.81			0.88
D1.6	1.96	A	1.96	100.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	100.00%	47.5%		0.38			0.55
D1.7	1.56	A	1.56	100.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	100.00%	47.5%		0.38			0.55
D1.8	1.27	A	1.27	100.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	100.00%	47.5%		0.38			0.55
D1.9	0.54	A	0.54	100.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	100.00%	47.5%		0.38			0.55
D1.10	2.13	A	2.13	100.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	100.00%	47.5%		0.38			0.55
D1.11	1.23	A	0.00	0.0%	0.98	80.0%	0.00	0.0%	0.25	20.0%	100.00%	80%		0.74			0.84
D1.12	3.42	A	3.42	100.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	100.00%	47.5%		0.38			0.55
D1.13	3.07	A	0.00	0.0%	0.00	0.0%	3.07	100.0%	0.00	0.0%	100.00%	95%		0.81			0.88
D1.14	0.91	A	0.60	65.9%	0.00	0.0%	0.31	34.1%	0.00		100.00%	64%		0.52			0.66
D2.0	11.90	A	9.50	79.8%	0.00	0.0%	0.00	0.0%	2.40	20.2%	100.00%	38%		0.32			0.51
E1	3.92	A	0.00	0.0%	0.00	0.0%	0.00	0.0%	3.92	100.0%	100.00%	2%		0.08			0.35
D2.1	3.15	A	0.00	0.0%	0.00	0.0%	0.00	0.0%	3.15	100.0%	100.00%	2%		0.08			0.35
OS-1	2.65	A	0.00	0.0%	0.91	34.3%	0.00	0.0%	1.74	65.7%	100.00%	36%		0.36			0.56
C Basins	49.08	A	30.22	61.6%	0.93	1.9%	0.00	0.0%	17.93	36.5%	100.00%	32%		0.28			0.48
D Basins	51.08	A	29.08	56.9%	0.98	1.9%	15.22	29.8%	2.65	5.2%	93.83%	57%		0.48			0.61
Pond - Developed	100.16	A	59.30	59.2%	1.91	1.9%	15.22	15.2%	20.58	20.5%	96.86%	45%		0.38			0.55
D1.5 (pre-dev)	9.88	A	0.00	0.0%	0.00	0.0%	0.00	0.0%	9.88	100.0%	100.00%	2%		0.08			0.35
D2.0 (pre-dev)	11.90	A	0.00	0.0%	0.00	0.0%	0.00	0.0%	11.90	100.0%	100.00%	2%		0.08			0.35
C3.0 (pre-dev)	35.40	A	0.00	0.0%	0.00	0.0%	0.00	0.0%	35.40	100.0%	100.00%	2%		0.08			0.35
Pond - F2 & F3 Dev only	100.16	A	32.10	32.0%	1.91	1.9%	5.34	5.3%	60.81	60.7%	100.00%	23%					
*highlighted basins are tributary to Pond D in Interim condition																	
GALV	4.44	A	4.44	100.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	100.00%	47.5%		0.38			0.55
C Basins - Pre Dev	49.08	A	12.52	25.5%	0.93	1.9%	0.00	0.0%	35.63	72.6%	100.00%	15.5%		0.17			0.41
D Basins - Pre Dev	47.93	A	19.58	40.9%	0.98	2.1%	5.34	11.1%	22.03	46.0%	100.00%	33.0%		0.30			0.50

POST-DEVELOPMENT CN VALUES

Designer: ESJ
Company: R&R Engineers-Surveyors
Date: 1/5/2023
Project: Mayberry Filing 3
Location: El Paso County

Global Parameters[1]	
Land Use	CN
SF LOTS (1/6 AC)	80
PASTURE - GOOD	61
COMMERCIAL	92
OPEN SPACE - GOOD	61
PAVED STREETS	98

Basin Name	Area (ac)	NRCS Hydrologic Soil Group	SF LOTS (1/6 AC)		PASTURE - GOOD		COMMERCIAL		OPEN SPACE - GOOD		PAVED STREETS		% Check	SCS CN
			Area (ac)	%	Area (ac)	%	Area (ac)	%	Area (ac)	%	Area (ac)	%		CN
E1	3.92	A	0.00	0.0%	0.00	0.0%	0.00	0.0%	3.92	100.0%	0.00	0.0%	100.00%	61
EC10	320.00	A	0.00	0.0%	320.00	100.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	100.00%	61
D1.5 (pre-dev)	9.88	A	0.00	0.0%	0.00	0.0%	0.00	0.0%	9.88	100.0%	0.00	0.0%	100.00%	61
OS-1	2.65	A	0.00	0.0%	0.00	0.0%	0.00	0.0%	1.74	65.7%	0.91	34.3%	100.00%	74

TIME OF CONCENTRATION

Designer: ESJ
Company: R&R Engineers-Surveyors
Date: 1/5/2023
Project: Mayberry Filing 3
Location: El Paso County

$$t_i = \frac{0.395(1.1 - C_5)\sqrt{L_i}}{S_i^{0.33}}$$

$$t_t = \frac{L_t}{60K\sqrt{S_t}} = \frac{L_t}{60V_t}$$

$$\text{Regional } t_c = (26 - 17i) + \frac{L_t}{60(14i + 9)\sqrt{S_t}}$$

$$\text{Computed } t_c = t_i + t_t$$

$t_{minimum} = 5$ (urban)
$t_{minimum} = 10$ (non-urban)

$$\text{Selected } t_c = \max\{t_{minimum}, \min(\text{Computed } t_c, \text{Regional } t_c)\}$$

Non Urban Li max = 300'
Urban Li Max = 100'

Cells of this color are for required user-input

R&R
ENGINEERS
SURVEYORS
INC

Subbasin Data				Overland (Initial) Flow Time			Channelized (Travel) Flow Time					Time of Concentration			
Basin	Area	% Impervious	C5	Overland Flow Length L_i (ft)	Overland Flow Slope S_i (ft/ft)	Overland Flow Time t_i (min)	Channelized Flow Length L_t (ft)	Channelized Flow Slope S_t (ft/ft)	NRCS Conveyance Factor K	Channelized Flow Velocity V_t (ft/sec)	Channelized Flow Time t_t (min)	Computed t_c (min)	Regional t_c (min)	Selected t_c (min)	Remarks
C2.1	0.77	47.5%	0.38	100.00	0.020	10.41	242.00	0.020	20	2.83	1.43	11.84	19.75	11.84	
C2.2	0.33	47.5%	0.38	36.00	0.020	6.25	152.00	0.020	20	2.83	0.90	7.14	19.07	7.14	
C2.3	1.81	47.5%	0.38	100.00	0.020	10.41	1033.00	0.010	20	2.00	8.61	19.02	28.93	19.02	
C2.4	1.16	80.4%	0.74	12.00	0.020	1.81	534.00	0.009	20	1.90	4.69	6.50	16.96	6.50	
C2.5	9.61	47.5%	0.38	36.00	0.020	6.25	513.00	0.007	20	1.67	5.11	11.36	24.45	11.36	
C3.0	35.40	24.8%	0.23	100.00	0.020	12.53	1536.00	0.010	20	2.00	12.80	25.33	42.33	25.33	
D1.1	1.73	95.0%	0.81	100.00	0.020	4.17	405.00	0.020	20	2.83	2.39	6.55	11.99	6.55	
D1.2	2.56	47.5%	0.38	100.00	0.020	10.41	533.00	0.010	20	2.00	4.44	14.86	23.60	14.86	
D1.3	2.02	47.5%	0.38	36.00	0.020	6.25	495.00	0.010	20	2.00	4.13	10.37	23.20	10.37	
D1.4	3.75	50.4%	0.40	100.00	0.020	10.03	634.00	0.014	20	2.37	4.47	14.50	22.99	14.50	
D1.5	9.88	95.0%	0.81	100.00	0.020	4.17	856.00	0.010	20	2.00	7.13	11.30	16.25	11.30	
D1.6	1.96	47.5%	0.38	100.00	0.020	10.41	534.00	0.010	20	2.00	4.45	14.86	23.61	14.86	
D1.7	1.56	47.5%	0.38	100.00	0.020	10.41	530.00	0.010	20	2.00	4.42	14.83	23.57	14.83	
D1.8	1.27	47.5%	0.38	100.00	0.020	10.41	325.00	0.010	20	2.00	2.71	13.12	21.39	13.12	
D1.9	0.54	47.5%	0.38	36.00	0.020	6.25	389.00	0.010	20	2.00	3.24	9.49	22.07	9.49	
D1.10	2.13	47.5%	0.38	36.00	0.020	6.25	465.00	0.010	20	2.00	3.88	10.12	22.88	10.12	
D1.11	1.23	80.4%	0.74	12.00	0.020	1.81	962.00	0.017	20	2.61	6.15	7.96	18.40	7.96	
D1.12	3.42	47.5%	0.38	100.00	0.020	10.41	1356.00	0.010	20	2.00	11.30	21.71	32.37	21.71	
D1.13	3.07	95.0%	0.81	100.00	0.020	4.17	456.00	0.008	20	1.79	4.25	8.41	13.66	8.41	
D1.14	0.91	63.7%	0.52	100.00	0.020	8.28	400.00	0.008	20	1.79	3.73	12.01	19.33	12.01	
D2.0	11.90	38.3%	0.32	100.00	0.020	11.27	1750.00	0.011	20	2.10	13.90	25.17	38.84	25.17	
D2.1	3.15	2.0%	0.08	100.00	0.021	14.42						14.42		14.42	
E1	3.92	2.0%	0.08				2811.00	0.008							Tc calculated using TR55 - see Hydraflow Hydrographs Model
EC10	320.00		0.08	300.00	0.020		5250.00	0.013							Tc calculated using TR55 - see Hydraflow Hydrographs Model
OS-1	2.65	35.7%	0.36	50.00	0.020		2525.00	0.007							Tc calculated using TR55 - see Hydraflow Hydrographs Model
GALV	4.44	47.5%	0.38	36.00	0.020	6.25	1007.00	0.010	20	2.00	8.39	14.64	28.65	14.64	
D2.0 (pre-dev)	11.90	2.0%	0.08	100.00	0.020	14.65	1750.00	0.011	20	2.10	13.90	28.56	55.63	28.56	
C3.0 (pre-dev)	35.40	2.0%	0.08	100.00	0.020	14.65	1536.00	0.010	20	2.00	12.80	27.45	53.25	27.45	

PROPOSED STORM DRAINAGE SYSTEM DESIGN - 5-YEAR DESIGN STORM

Designer: ESJ
Company: R&R Engineers-Surveyors
Date: 1/5/2023
Project: Mayberry Filing 3
Location: El Paso County

Cells of this color are for required user-input
Cells of this color are for optional user-input

$I_5 = -1.50 \ln(D) + 7.583$

DESGIN POINT	STREET/ CONTRIBUTING BASINS	DIRECT RUNOFF							TOTAL RUNOFF					STREET BYPASS		PIPE			TRAVEL TIME				Remarks
		Basin Name	Area (ac)	Coeff C	Tc (min)	C*A (ac)	I	Q (cfs)	Tc (min)	Sum Area (ac)	Sum C*A (ac)	I in/hr	Q cfs	Slope %	Street Q cfs	Design Q cfs	Slope %	PIPE SIZE	L ft	VEL ft/sec	Tt min	Q add'l	
		C2.1	0.77	0.38	11.8	0.29	3.88	1.12															
1	C2.1								11.8	0.77	0.29	3.88	1.12						33	4	0.10		
		C2.2	0.33	0.38	7.1	0.12	4.63	0.57															
2	DP1, C2.2								11.9	1.10	0.41	3.86	1.59						450	4	1.90		
		C2.5	9.61	0.38	11.4	3.60	3.94	14.19											10	4	0.00		
3A	C2.5								11.4	9.61	3.60	3.94	14.19						196	4	0.80		
		C2.3	1.81	0.38	19.0	0.68	3.16	2.15															
3B	C2.3, DP3A								19.0	12.52	4.70	3.16	14.86						70	4	0.30		
		C2.4	1.16	0.74	6.5	0.85	4.77	4.08															
4	C2.4, DP3B								19.3	13.68	5.55	3.14	17.43						1590	4	6.60		
		D1.12	3.42	0.38	21.7	1.28	2.97	3.80															
5A	D1.12								21.7	3.42	1.28	2.97	3.80						72	4	0.30		
		D1.14	0.91	0.52	12.0	0.48	3.85	1.83															
5B	D1.14, DP5A								22.0	4.33	1.76	2.95	5.18						28	4	0.10		
		D1.2	2.56	0.38	14.9	0.96	3.54	3.39															
6	D1.2								14.9	2.56	0.96	3.54	3.39						10	4	0.00		
7A	DP5B, DP6								22.1	6.89	2.72	2.94	7.99						44	4	0.20		
		D1.13	3.07	0.81	8.4	2.49	4.39	10.91															
7B	D1.13								8.4	3.07	2.49	4.39	10.91						150	4	0.60		
		D1.1	1.73	0.81	6.6	1.40	4.76	6.67															
7C	D1.1								6.6	1.73	1.40	4.76	6.67						63	4	0.30		
7D	DP7B, DP7C								9.0	4.80	3.89	4.28	16.66						280	4	1.20		
7E	DP7D, DP7A								22.3	11.69	6.61	2.93	19.33						513	4	2.10		
		D1.3	2.02	0.38	10.4	0.76	4.07	3.09															
8	D1.3								10.4	2.02	0.76	4.07	3.09						27	4	0.10		
9	DP7, DP8								24.41	13.71	7.36	2.79	20.55						10	4	0.00		
		D1.4	3.75	0.40	14.5	1.51	3.57	5.38															
10	DP9, D1.4								24.41	17.5	8.9	2.79	24.75						827	4	3.40		
		EC10	320.00		0.0								18.43										Offsite flow, Input from Hydraflow Hydrographs, Calculated via SCS Method
		OS-1	2.65		0.0								1.40										Offsite flow, Input from Hydraflow Hydrographs, Calculated via SCS Method
		E1	3.92		0.0								0.30										Input from Hydraflow Hydrographs, Calculated via SCS Method
11	EC10, OS-1, E1												18.90						2811.6	4	11.70		Input from Hydraflow Hydrographs, Calculated via SCS Method

DESGIN POINT	STREET/ CONTRIBUTING BASINS	DIRECT RUNOFF							TOTAL RUNOFF					STREET BYPASS		PIPE			TRAVEL TIME				
		Basin Name	Area (ac)	Coeff C	Tc (min)	C*A (ac)	I	Q (cfs)	Tc (min)	Sum Area (ac)	Sum C*A (ac)	I in/hr	Q cfs	Slope %	Street Q cfs	Design Q cfs	Slope %	PIPE SIZE	L ft	VEL ft/sec	Tt min	Q add'l	Remarks
		D1.5	9.88	0.81	11.3	8.00	3.95	31.6															
12	D1.5								11.3	9.88	8.00	3.95	31.58						135	4	0.60		
		D1.6	1.96	0.38	14.9	0.74	3.53	2.6															
13	DP12, D1.6								14.86	11.8	8.7	3.53	30.88						35	4	0.10		
		D1.7	1.56	0.38	14.8	0.59	3.54	2.1															
14	DP13, D1.7								14.96	13.4	9.3	3.52	32.86						232	4	1.00		
		D1.8	1.27	0.38	13.1	0.48	3.72	1.8															
15	DP14, D1.8								15.96	14.7	9.8	3.43	33.59						35	4	0.10		
		D1.9	0.54	0.38	9.5	0.20	4.21	0.9															
16	DP15, D1.9								16.06	15.2	10.0	3.42	34.19						137	4	0.60		
		D1.10	2.13	0.38	10.1	0.80	4.11	3.3															
17	D1.10								10.12	2.1	0.8	4.11	3.28						20	4	0.10		
		D1.11	1.23	0.74	8.0	0.91	4.47	4.0											10	4	0.00		
18	D1.11, DP17, DP10								27.8	20.8	10.6	2.59	27.44						63	4	0.30		
19	DP16, DP18								28.1	36.0	20.6	2.58	53.06						1024	4	4.30		Total into upper Channel D
		D2.0	11.9	0.32	25.2	3.75	2.74	10.3															
20	DP19, D2.0								32.41	47.9	24.3	2.37	57.54										
		C3.0	35.4	0.23	25.3	8.05	2.73	22.0															
21	DP4, C3.0								25.9	49.1	13.6	2.70	36.73										To channel C2
		D2.1	3.15	0.08	14.4	0.25	3.58	0.9															
22	D2.1, DP20, DP21								28.1	100.2	38.2	2.58	98.46										
23	POND D OUTFLOW												1.20										5 YEAR RELEASE RATE FOR POND D
24	CHANNEL E OUTFLOW												17.60										Input from Hydraflow Hydrographs, Calculated via SCS Method
EX5	DP23, DP24												18.70										Input from Hydraflow Hydrographs, Calculated via SCS Method
		GALV	4.44	0.38	14.6	1.67	3.56	5.9															
		D2.0 (pre-dev)	11.9	0.08	28.6	0.95	2.56	2.4															
		C3.0 (pre-dev)	35.4	0.08	27.5	2.83	2.61	7.4															
		D1.5 (pre-dev)	9.88	0.08	21.8	0.79	2.96	2.3															

PROPOSED STORM DRAINAGE SYSTEM DESIGN - 100-YEAR DESIGN STORM

Designer: ESJ
Company: R&R Engineers-Surveyors
Date: 1/5/2023
Project: Mayberry Filing 3
Location: El Paso County

Cells of this color are for required user-input
Cells of this color are for optional user-input

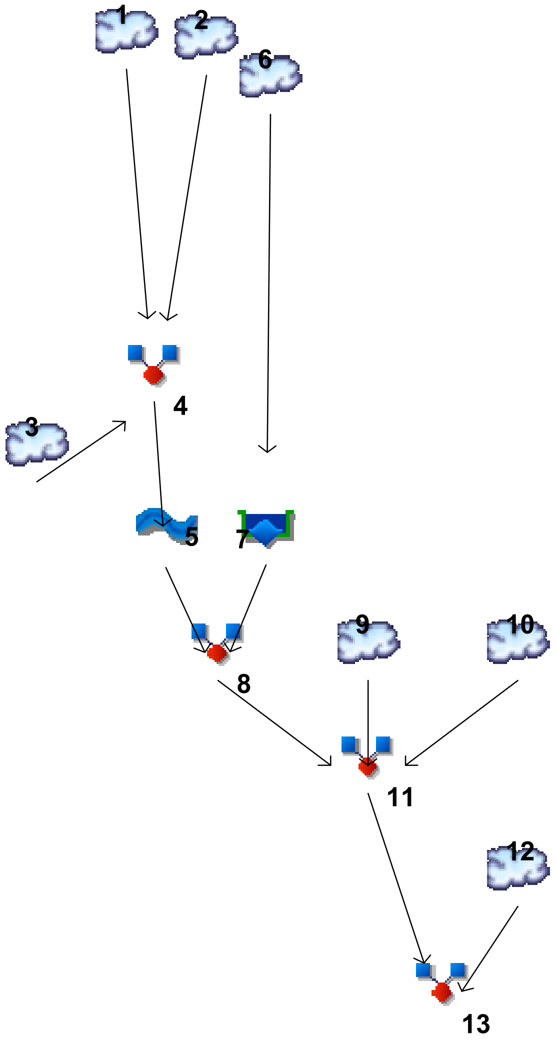
$$I_{100} = -2.52 \ln(D) + 12.735$$

DESGIN POINT	STREET/ CONTRIBUTING BASINS	DIRECT RUNOFF							TOTAL RUNOFF					STREET BYPASS		PIPE			TRAVEL TIME				
		Basin Name	Area	Coeff	Tc	C*A	I	Q	Tc	Sum Area	Sum C*A	I	Q	Slope	Street Q	Design Q	Slope	PIPE	L	VEL	Tt	Q add'l	Remarks
			(ac)	C	(min)	(ac)		(cfs)	(min)	(ac)	(ac)	in/hr	cfs	%	cfs	cfs	%	SIZE	ft	ft/sec	min		
		C2.1	0.77	0.55	11.8	0.42	6.51	2.73															
1	C2.1								11.8	0.77	0.42	6.51	2.73						33	4	0.10		
		C2.2	0.33	0.55	7.1	0.18	7.78	1.40															
2	DP1, C2.2								11.9	1.10	0.60	6.49	3.89						450	4	1.90		
		C2.5	9.61	0.55	11.4	5.24	6.61	34.63											10	4	0.00		
3A	C2.5								11.4	9.61	5.24	6.61	34.63						196	4	0.80		
		C2.3	1.81	0.55	19.0	0.99	5.31	5.24															
3B	C2.3, DP3A								19.0	12.52	6.82	5.31	36.25						70	4	0.30		
		C2.4	1.16	0.84	6.5	0.97	8.02	7.79															
4	C2.4, DP3B								19.3	13.68	7.80	5.27	41.10						1590	4	7.60		
		D1.12	3.42	0.55	21.7	1.86	4.98	9.28															
5A	D1.12								21.7	3.42	1.86	4.98	9.28						72	4	0.30		
		D1.14	0.91	0.66	12.0	0.60	6.47	3.88															
5B	D1.14, DP5A								22.0	4.33	2.46	4.94	12.18						28	4	0.10		
		D1.2	2.56	0.55	14.9	1.40	5.94	8.28															
6	D1.2								14.9	2.56	1.40	5.94	8.28						10	4	0.00		
7A	DP5B, DP6								22.1	6.89	3.86	4.93	19.03						44	4	0.20		
		D1.13	3.07	0.88	8.4	2.70	7.37	19.90															
7B	D1.13								8.4	3.07	2.70	7.37	19.90						150	4	0.70		
		D1.1	1.73	0.88	6.6	1.52	8.00	12.18															
7C	D1.1								6.6	1.73	1.52	8.00	12.18						63	4	0.30		
7D	DP7B, DP7C								9.1	4.80	4.22	7.17	30.27						280	4	1.30		
7E	DP7D, DP7A								22.3	11.69	8.08	4.91	39.69						513	4	2.40		
		D1.3	2.02	0.55	10.4	1.10	6.84	7.53															
8	D1.3								10.4	2.02	1.10	6.84	7.53						27	4	0.10		
9	DP7E, DP8								24.71	13.71	9.18	4.65	42.73						10	4	0.00		
		D1.4	3.75	0.57	14.5	2.12	6.00	12.72															
10	DP9, D1.4								24.71	17.5	11.3	4.65	52.59						827	4	3.90		
		EC10	320.00		0.0								144.70										Offsite flow, Input from Hydraflow Hydrographs, Calculated via SCS Method
		OS-1	2.65		0.0								4.30										Offsite flow, Input from Hydraflow Hydrographs, Calculated via SCS Method
		E1	3.92		0.0								2.90										Input from Hydraflow Hydrographs, Calculated via SCS Method
11	EC10, OS-1, E1												148.50						2811.6	4	11.70		Input from Hydraflow Hydrographs, Calculated via SCS Method
		D1.5	9.88	0.88	11.3	8.69	6.62	57.6															

DESGIN POINT	STREET/ CONTRIBUTING BASINS	DIRECT RUNOFF							TOTAL RUNOFF					STREET BYPASS		PIPE			TRAVEL TIME				
		Basin Name	Area (ac)	Coeff C	Tc (min)	C*A (ac)	I	Q (cfs)	Tc (min)	Sum Area (ac)	Sum C*A (ac)	I in/hr	Q cfs	Slope %	Street Q cfs	Design Q cfs	Slope %	PIPE SIZE	L ft	VEL ft/sec	Tt min	Q add'l	Remarks
12	D1.5								11.3	9.88	8.69	6.62	57.60						135	4	0.60		
		D1.6	1.96	0.55	14.9	1.07	5.93	6.3															
13	DP12, D1.6								14.86	11.8	9.8	5.93	57.93						35	4	0.10		
		D1.7	1.56	0.55	14.8	0.85	5.94	5.0															
14	DP13, D1.7								14.96	13.4	10.6	5.92	62.79						232	4	1.10		
		D1.8	1.27	0.55	13.1	0.69	6.25	4.3															
15	DP14, D1.8								16.06	14.7	11.3	5.74	64.87						35	4	0.10		
		D1.9	0.54	0.55	9.5	0.29	7.06	2.1															
16	DP15, D1.9								16.16	15.2	11.6	5.72	66.38						137	4	0.60		
		D1.10	2.13	0.55	10.1	1.16	6.90	8.0															
17	D1.10								10.12	2.1	1.2	6.90	8.01						20	4	0.10		
		D1.11	1.23	0.84	8.0	1.03	7.51	7.7											10	4	0.00		
18	D1.11, DP17, DP10								28.6	20.8	13.5	4.28	57.81						63	4	0.30		
19	DP16, DP18								28.9	36.0	25.1	4.26	106.83						1024	4	4.30		Total into upper Channel D
		D2.0	11.9	0.51	25.2	6.02	4.61	27.7															
20	DP19, D2.0								33.21	47.9	31.1	3.91	121.58										
		C3.0	35.4	0.45	25.3	15.84	4.59	72.7															
21	DP4, C3.0								26.9	49.1	23.6	4.44	104.87										To channel C2
		D2.1	3.15	0.35	14.4	1.10	6.01	6.6															
22	D2.1, DP20, DP21								28.9	100.2	55.9	4.26	237.76			237.8							
23	POND D OUTFLOW												39.60										100 YEAR RELEASE RATE FOR POND D
24	CHANNEL E OUTFLOW												138.50										Input from Hydraflow Hydrographs, Calculated via SCS Method
EX5	DP23, DP24												177.50										Input from Hydraflow Hydrographs, Calculated via SCS Method
		GALV	4.44	0.55	14.6	2.42	5.97	14.5								14.5							
		D2.0 (pre-dev)	11.9	0.35	28.6	4.17	4.29	17.9															
		C3.0 (pre-dev)	35.4	0.35	27.5	12.39	4.39	54.4															
		D1.5 (pre-dev)	9.88	0.35	21.8	3.46	4.97	17.2															
20 - Pre Dev	DP4, C3.0 (pre-dev)								27.5	49.1	20.19	4.39	88.57			88.6							Used for sizing for interim forebay release rate
21 - Pre Dev	DP19, D2.0 Pre-Dev, D1.5 (pre-dev)								33.2	47.9	24.0	3.91	93.88			93.9							Used for sizing for interim forebay release rate

Hydraflow Table of Contents

Watershed Model Schematic



Legend

Hyd.	Origin	Description
1	SCS Runoff	EC10 - PRESENT
2	SCS Runoff	E1
3	SCS Runoff	OS-1
4	Combine	DP11
5	Reach	CHANNEL TO DP24
6	SCS Runoff	BASIN D
7	Reservoir	POND D
8	Combine	EX-5
9	SCS Runoff	EX-E
10	SCS Runoff	EX-LOG
11	Combine	EX-6
12	SCS Runoff	EX-Z
13	Combine	EX-7

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	18.43	1	772	262,007	------	------	------	EC10 - PRESENT
2	SCS Runoff	0.320	1	742	3,200	------	------	------	E1
3	SCS Runoff	1.349	1	734	6,442	------	------	------	OS-1
4	Combine	18.93	1	771	271,649	1, 2, 3	------	------	DP11
5	Reach	17.61	1	789	271,640	4	------	------	CHANNEL TO DP24
6	SCS Runoff	61.50	1	730	256,733	------	------	------	BASIN D
7	Reservoir	1.722	1	1443	150,906	6	6031.02	201,385	POND D
8	Combine	18.66	1	789	422,546	5, 7	------	------	EX-5
9	SCS Runoff	6.054	1	745	62,432	------	------	------	EX-E
10	SCS Runoff	3.682	1	729	15,373	------	------	------	EX-LOG
11	Combine	21.86	1	784	500,351	8, 9, 10	------	------	EX-6
12	SCS Runoff	8.146	1	742	76,284	------	------	------	EX-Z
13	Combine	26.53	1	761	576,634	11, 12	------	------	EX-7

Basin D and Pond D (Hyd. #6 and #7) is included only to ensure Pond Release Rates are incorporated into the SCS model to accurately model downstream flows.

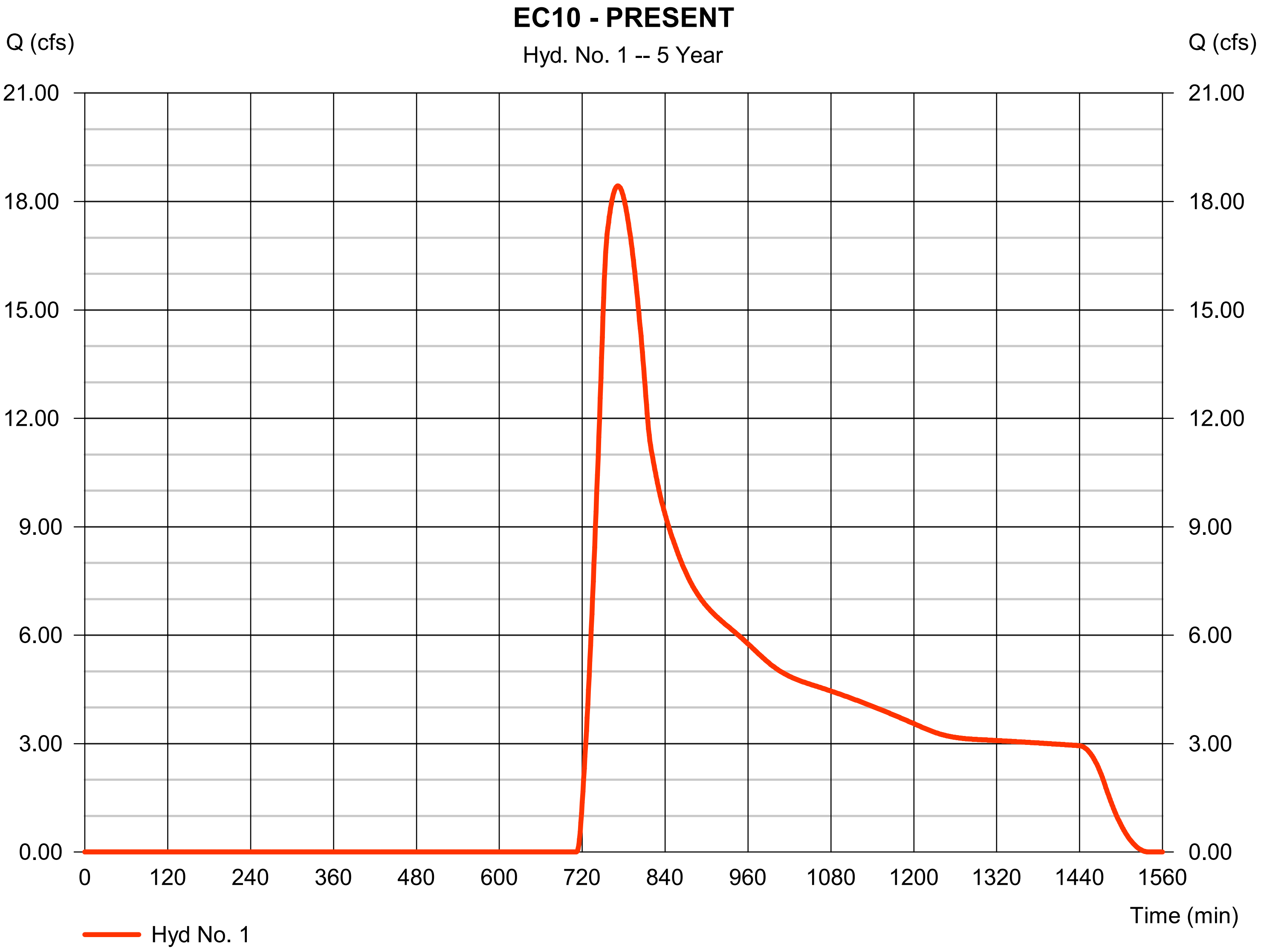
Please see the UD Detention printout in Appendix B for all release rate and volume analysis and the Rational Method printouts in this section for peak flow generations in areas tributary to Pond D

Hydrograph Report

Hyd. No. 1

EC10 - PRESENT

Hydrograph type	= SCS Runoff	Peak discharge	= 18.43 cfs
Storm frequency	= 5 yrs	Time to peak	= 772 min
Time interval	= 1 min	Hyd. volume	= 262,007 cuft
Drainage area	= 320.000 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 63.00 min
Total precip.	= 2.60 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



TR55 Tc Worksheet

Hyd. No. 1

EC10 - PRESENT

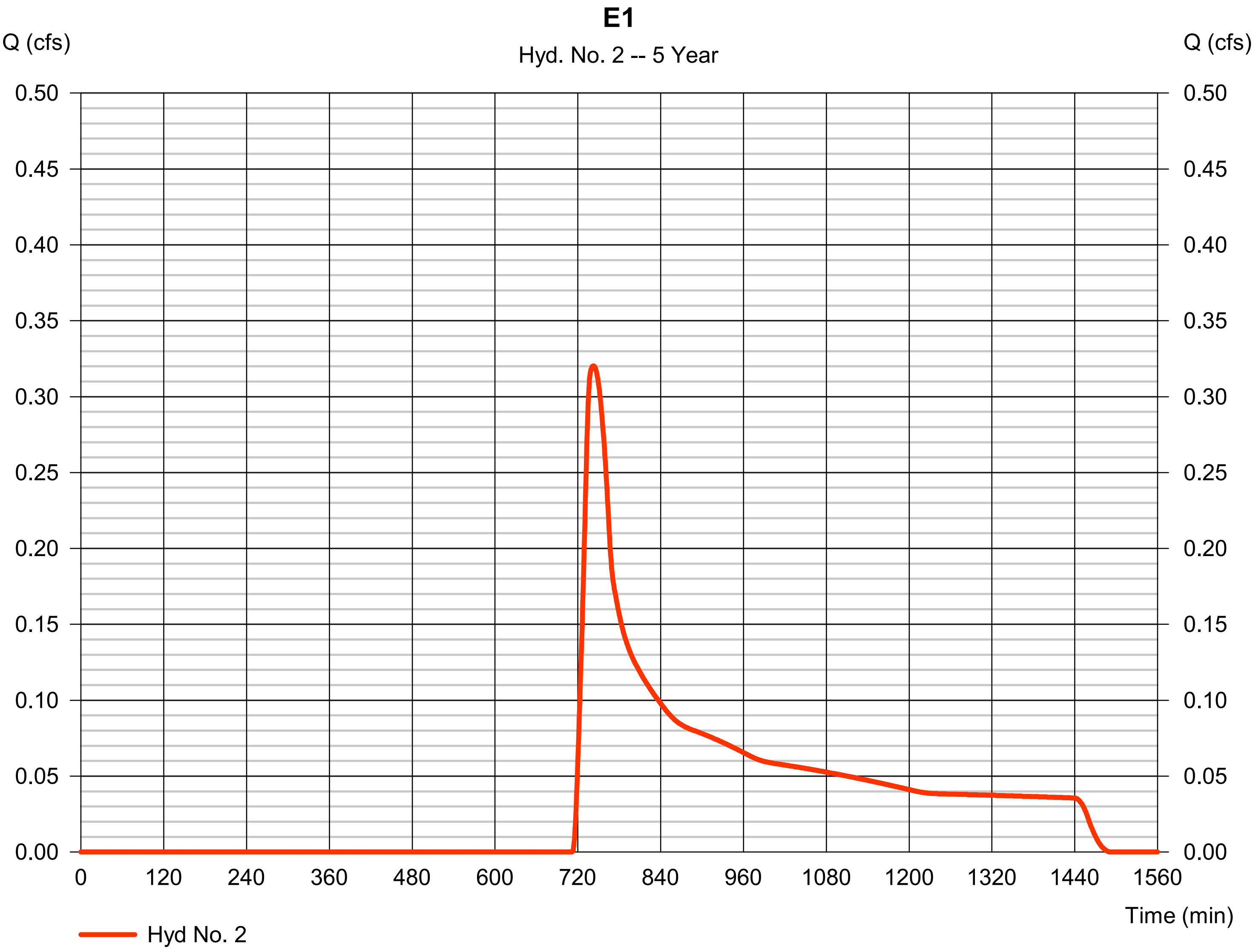
Description	A	B	C	Totals
Sheet Flow				
Manning's n-value	= 0.030	0.011	0.011	
Flow length (ft)	= 300.0	0.0	0.0	
Two-year 24-hr precip. (in)	= 2.20	0.00	0.00	
Land slope (%)	= 2.00	0.00	0.00	
Travel Time (min)	**= 7.85 +**	**0.00 +**	**0.00 =**	**7.85**
Shallow Concentrated Flow				
Flow length (ft)	= 6086.00	0.00	0.00	
Watercourse slope (%)	= 1.30	0.00	0.00	
Surface description	= Unpaved	Paved	Paved	
Average velocity (ft/s)	=1.84	0.00	0.00	
Travel Time (min)	**= 55.14 +**	**0.00 +**	**0.00 =**	**55.14**
Channel Flow				
X sectional flow area (sqft)	= 0.00	0.00	0.00	
Wetted perimeter (ft)	= 0.00	0.00	0.00	
Channel slope (%)	= 0.00	0.00	0.00	
Manning's n-value	= 0.015	0.015	0.015	
Velocity (ft/s)	=0.00	0.00	0.00	
Flow length (ft)	({0})0.0	0.0	0.0	
Travel Time (min)	**= 0.00 +**	**0.00 +**	**0.00 =**	**0.00**
Total Travel Time, Tc				**63.00 min**

Hydrograph Report

Hyd. No. 2

E1

Hydrograph type	= SCS Runoff	Peak discharge	= 0.320 cfs
Storm frequency	= 5 yrs	Time to peak	= 742 min
Time interval	= 1 min	Hyd. volume	= 3,200 cuft
Drainage area	= 3.920 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 32.50 min
Total precip.	= 2.60 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



TR55 Tc Worksheet

Hyd. No. 2

E1

Description	A	B	C	Totals
Sheet Flow				
Manning's n-value	= 0.011	0.011	0.011	
Flow length (ft)	= 0.0	0.0	0.0	
Two-year 24-hr precip. (in)	= 0.00	0.00	0.00	
Land slope (%)	= 0.00	0.00	0.00	
Travel Time (min)	**= 0.00**	**+ 0.00**	**+ 0.00**	**= 0.00**
Shallow Concentrated Flow				
Flow length (ft)	= 2811.00	0.00	0.00	
Watercourse slope (%)	= 0.80	0.00	0.00	
Surface description	= Unpaved	Paved	Paved	
Average velocity (ft/s)	=1.44	0.00	0.00	
Travel Time (min)	**= 32.46**	**+ 0.00**	**+ 0.00**	**= 32.46**
Channel Flow				
X sectional flow area (sqft)	= 0.00	0.00	0.00	
Wetted perimeter (ft)	= 0.00	0.00	0.00	
Channel slope (%)	= 0.00	0.00	0.00	
Manning's n-value	= 0.015	0.015	0.015	
Velocity (ft/s)	=0.00			
		0.00		
			0.00	
Flow length (ft)	({0})0.0	0.0	0.0	
Travel Time (min)	**= 0.00**	**+ 0.00**	**+ 0.00**	**= 0.00**

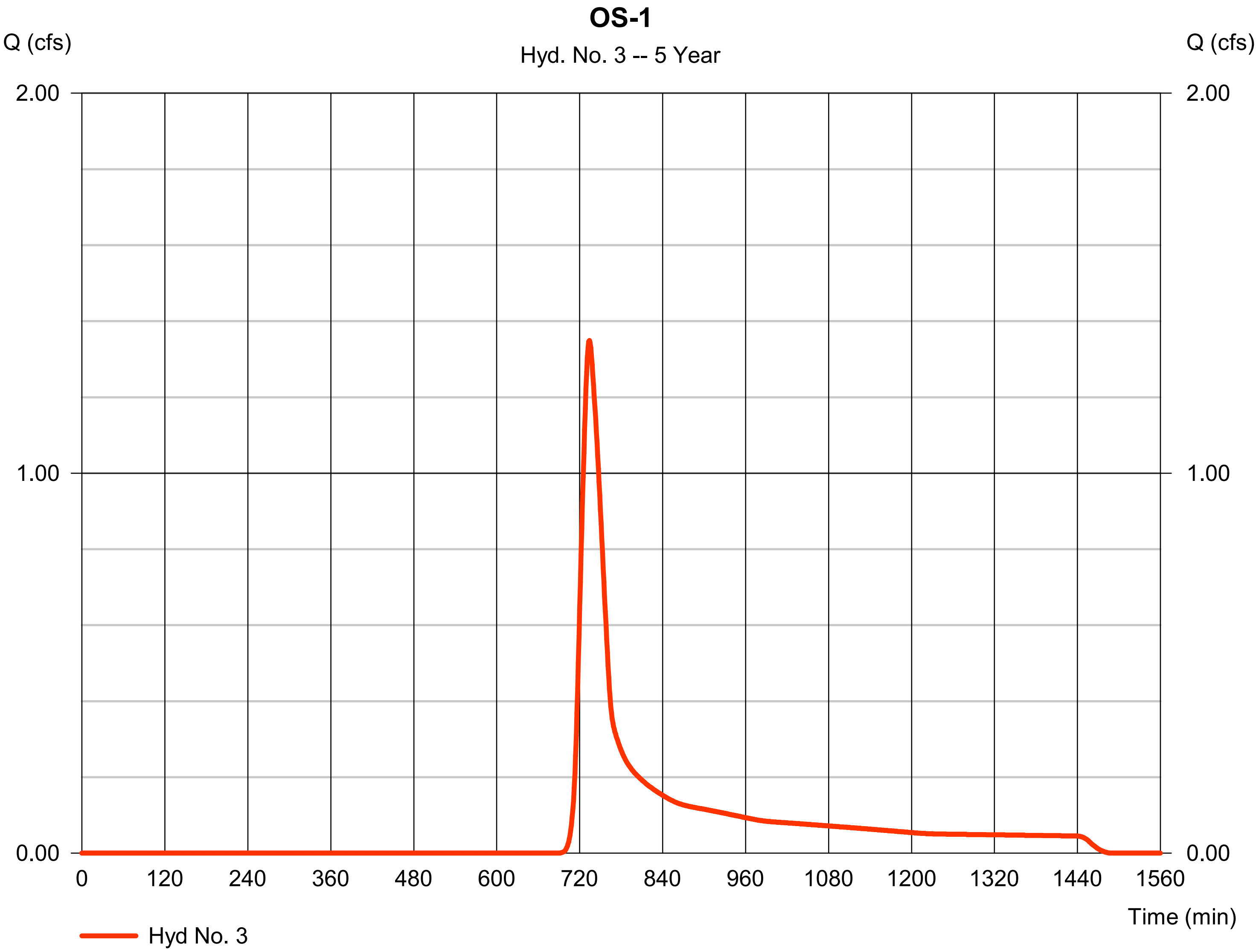
Total Travel Time, Tc .... 32.50 min

Hydrograph Report

Hyd. No. 3

OS-1

Hydrograph type	= SCS Runoff	Peak discharge	= 1.349 cfs
Storm frequency	= 5 yrs	Time to peak	= 734 min
Time interval	= 1 min	Hyd. volume	= 6,442 cuft
Drainage area	= 2.650 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 32.10 min
Total precip.	= 2.60 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



TR55 Tc Worksheet

Hyd. No. 3

OS-1

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.013		0.011		0.011		
Flow length (ft)	=	50.0		0.0		0.0		
Two-year 24-hr precip. (in)	=	2.20		0.00		0.00		
Land slope (%)	=	2.00		0.00		0.00		
Travel Time (min)	**=**	**0.96**	**+**	**0.00**	**+**	**0.00**	**=**	**0.96**
Shallow Concentrated Flow								
Flow length (ft)	=	2525.00		0.00		0.00		
Watercourse slope (%)	=	0.70		0.00		0.00		
Surface description	=	Unpaved		Paved		Paved		
Average velocity (ft/s)	=1.35			0.00		0.00		
Travel Time (min)	**=**	**31.17**	**+**	**0.00**	**+**	**0.00**	**=**	**31.17**
Channel Flow								
X sectional flow area (sqft)	=	0.00		0.00		0.00		
Wetted perimeter (ft)	=	0.00		0.00		0.00		
Channel slope (%)	=	0.00		0.00		0.00		
Manning's n-value	=	0.015		0.015		0.015		
Velocity (ft/s)	=0.00							
				0.00				
						0.00		
Flow length (ft)	({0})0.0			0.0		0.0		
Travel Time (min)	**=**	**0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

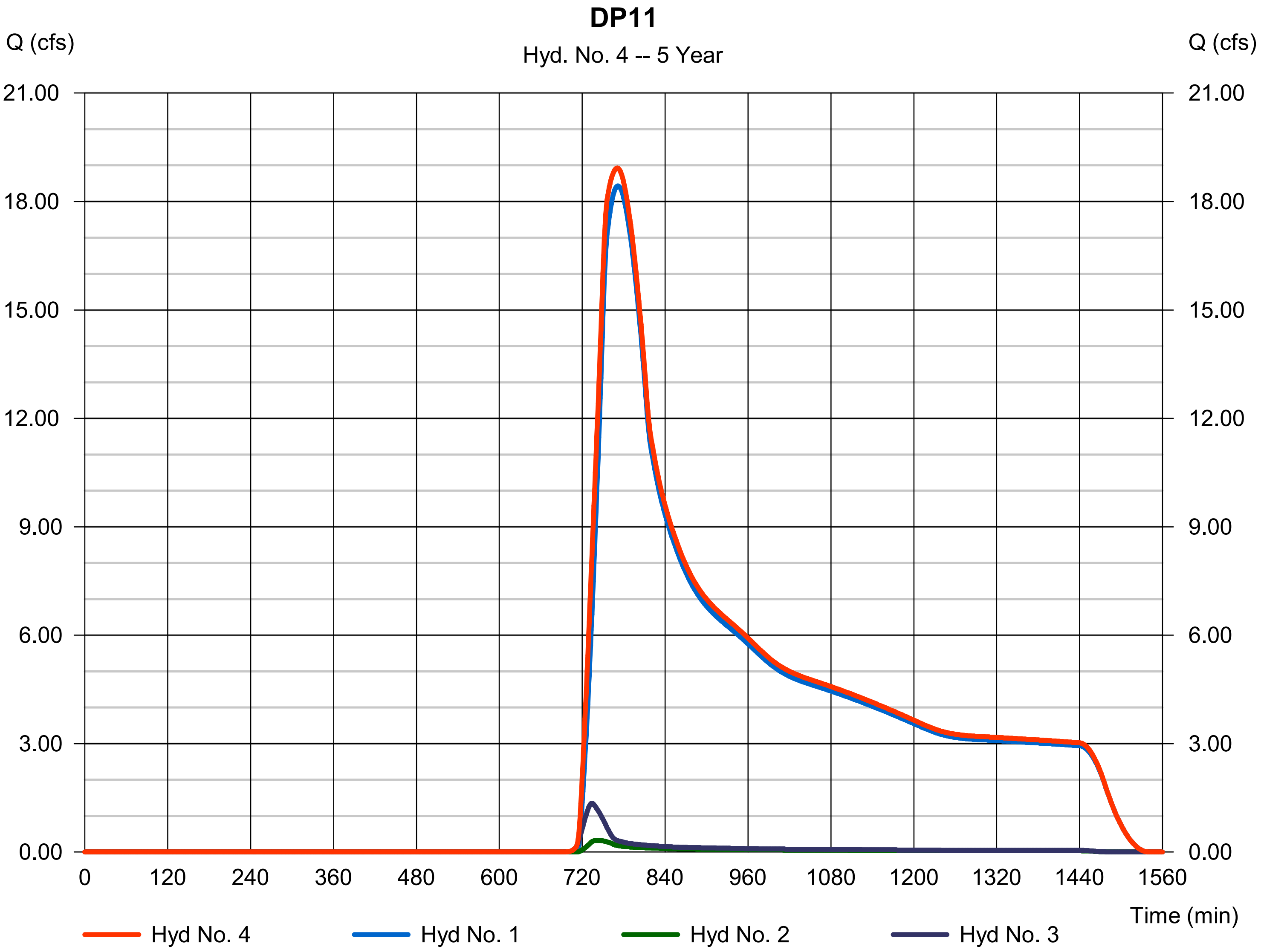
Total Travel Time, Tc .... 32.10 min

Hydrograph Report

Hyd. No. 4

DP11

Hydrograph type	= Combine	Peak discharge	= 18.93 cfs
Storm frequency	= 5 yrs	Time to peak	= 771 min
Time interval	= 1 min	Hyd. volume	= 271,649 cuft
Inflow hyds.	= 1, 2, 3	Contrib. drain. area	= 326.570 ac



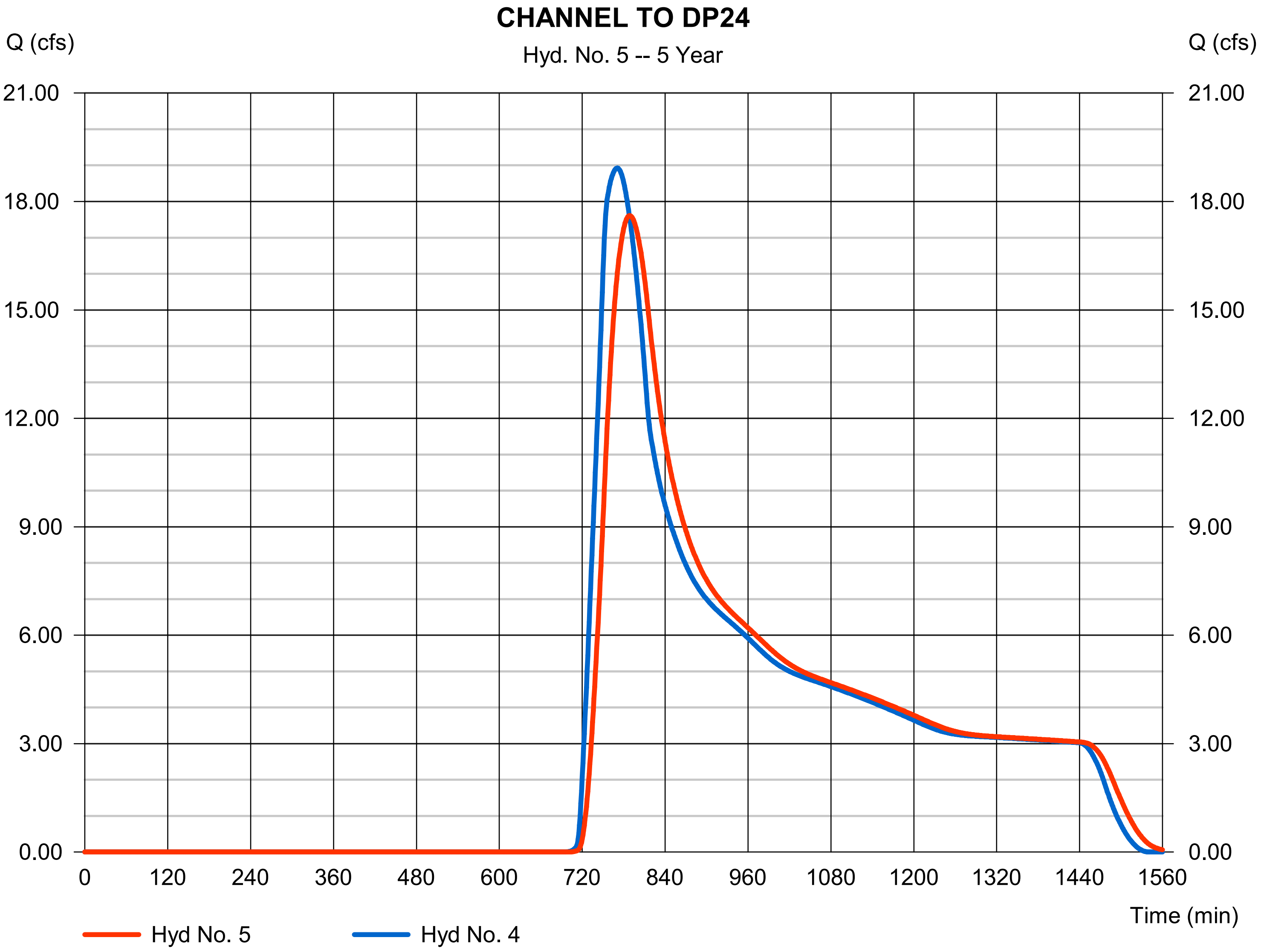
Hydrograph Report

Hyd. No. 5

CHANNEL TO DP24

Hydrograph type	= Reach	Peak discharge	= 17.61 cfs
Storm frequency	= 5 yrs	Time to peak	= 789 min
Time interval	= 1 min	Hyd. volume	= 271,640 cuft
Inflow hyd. No.	= 4 - DP11	Section type	= Trapezoidal
Reach length	= 2902.0 ft	Channel slope	= 0.8 %
Manning's n	= 0.030	Bottom width	= 8.0 ft
Side slope	= 4.0:1	Max. depth	= 3.3 ft
Rating curve x	= 1.110	Rating curve m	= 1.349
Ave. velocity	= 0.00 ft/s	Routing coeff.	= 0.0625

Modified Att-Kin routing method used.



Hydrograph Report

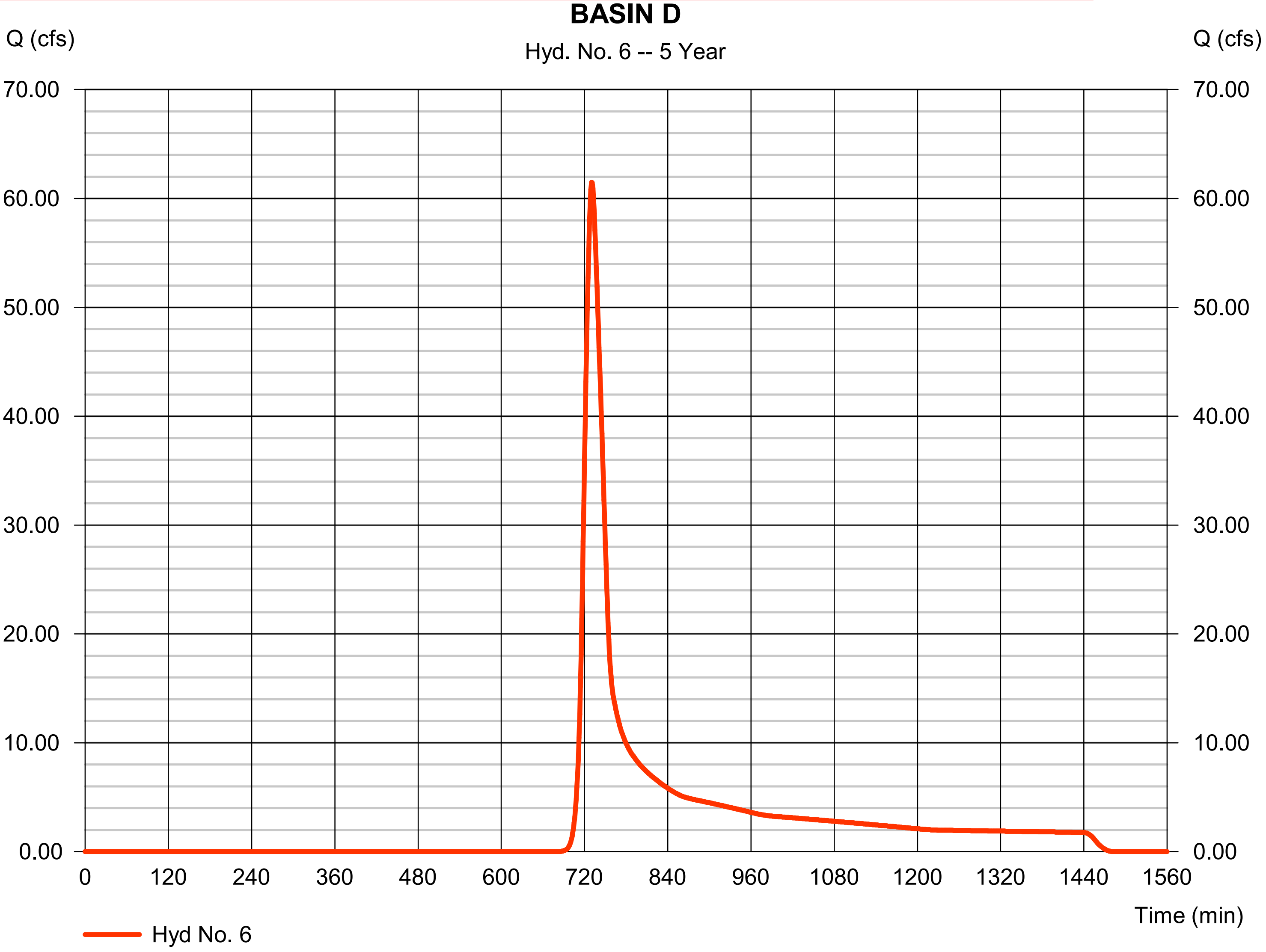
Hyd. No. 6

BASIN D

Hydrograph type	= SCS Runoff	Peak discharge	= 61.50 cfs
Storm frequency	= 5 yrs	Time to peak	= 730 min
Time interval	= 1 min	Hyd. volume	= 256,733 cuft
Drainage area	= 100.800 ac	Curve number	= 74.7
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 27.00 min
Total precip.	= 2.60 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Basin D and Pond D (Hyd. #6 and #7) is included only to ensure Pond Release Rates are incorporated into the SCS model to accurately model downstream flows.

Please see the UD Detention printout in Appendix B for all release rate and volume analysis and the Rational Method printouts in this section for peak flow generations in areas tributary to Pond D



Hydrograph Report

Hyd. No. 7

POND D

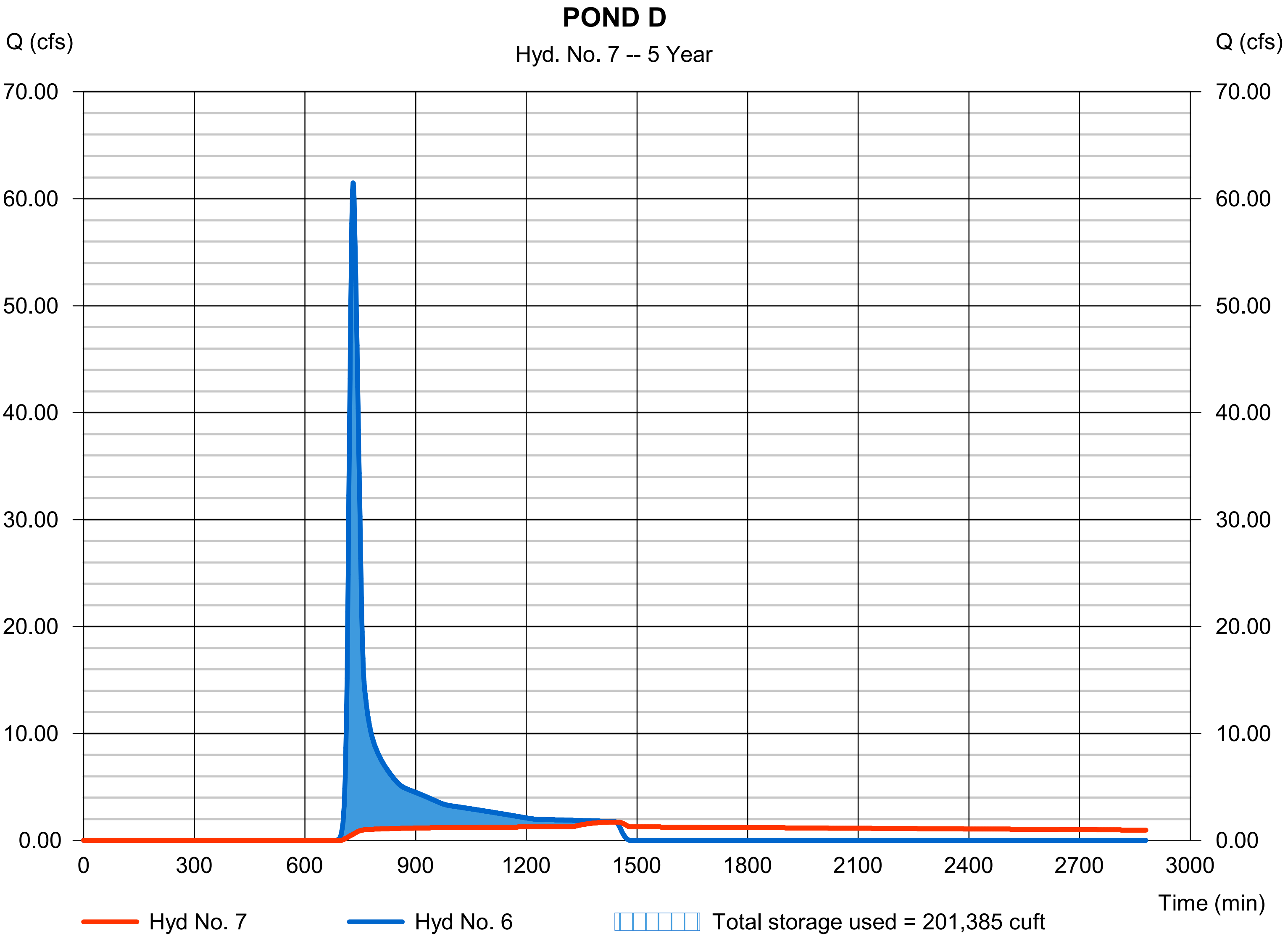
Hydrograph type = Reservoir
Storm frequency = 5 yrs
Time interval = 1 min
Inflow hyd. No. = 6 - BASIN D
Reservoir name = D

Peak discharge = 1.722 cfs
Time to peak = 1443 min
Hyd. volume = 150,906 cuft
Max. Elevation = 6031.02 ft
Max. Storage = 201,385 cuft

Storage Indication method used.

Basin D and Pond D (Hyd. #6 and #7) is included only to ensure Pond Release Rates are incorporated into the SCS model to accurately model downstream flows.

Please see the UD Detention printout in Appendix B for all release rate and volume analysis and the Rational Method printouts in this section for peak flow generations in areas tributary to Pond D



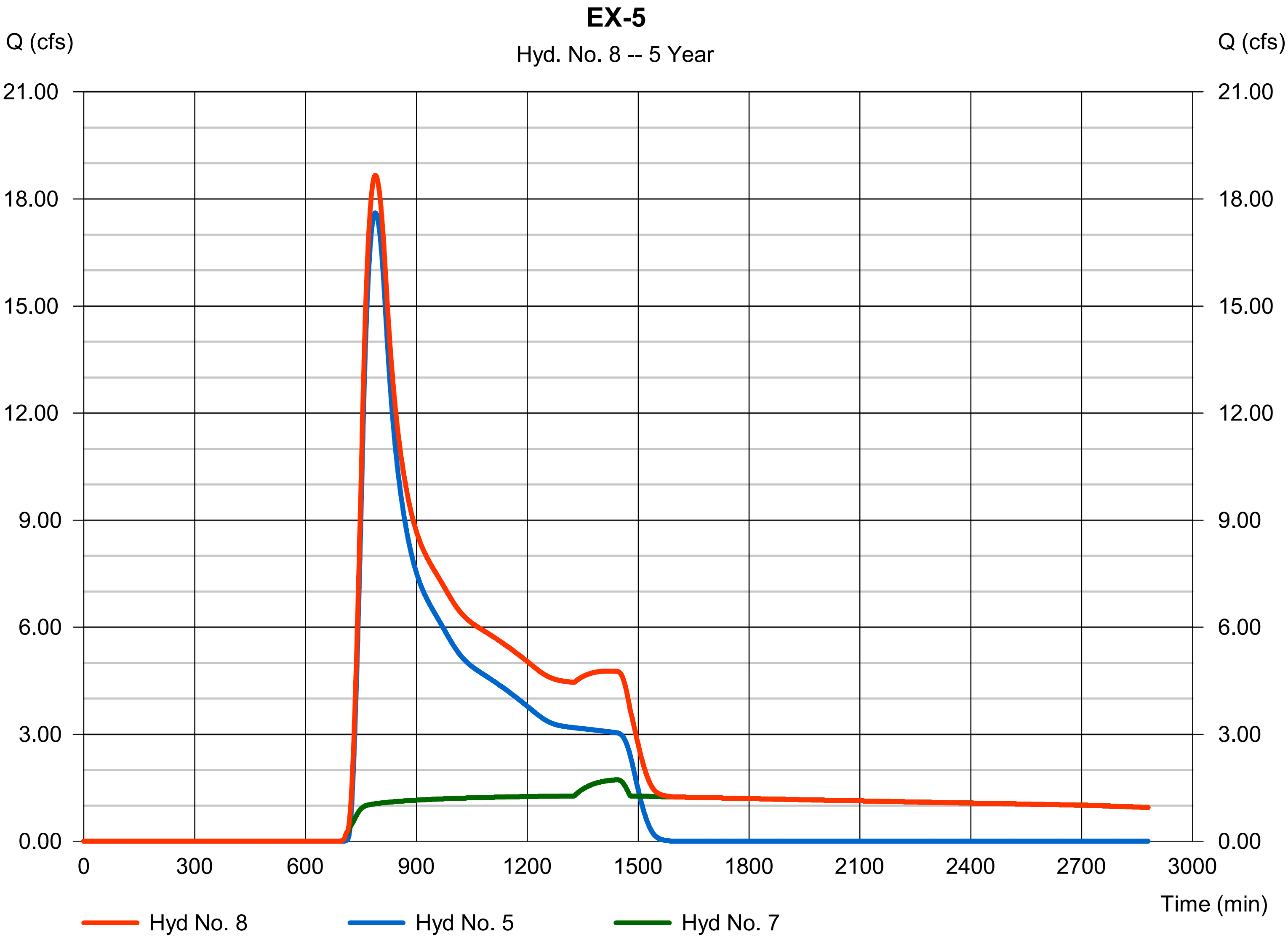
Hydrograph Report

Hyd. No. 8

EX-5

Hydrograph type = Combine
Storm frequency = 5 yrs
Time interval = 1 min
Inflow hyds. = 5, 7

Peak discharge = 18.66 cfs
Time to peak = 789 min
Hyd. volume = 422,546 cuft
Contrib. drain. area = 0.000 ac

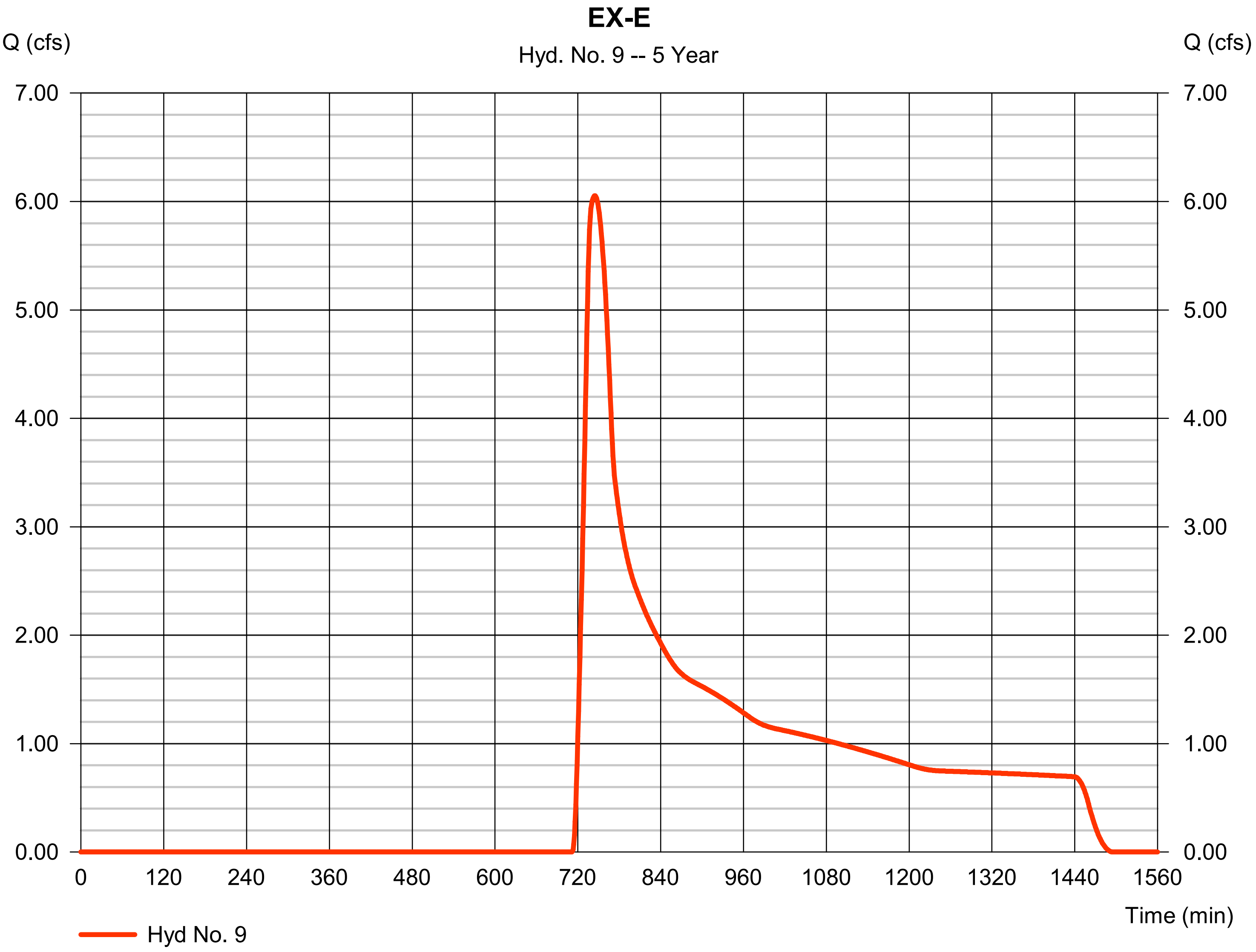


Hydrograph Report

Hyd. No. 9

EX-E

Hydrograph type	= SCS Runoff	Peak discharge	= 6.054 cfs
Storm frequency	= 5 yrs	Time to peak	= 745 min
Time interval	= 1 min	Hyd. volume	= 62,432 cuft
Drainage area	= 76.000 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 34.20 min
Total precip.	= 2.60 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



TR55 Tc Worksheet

Hyd. No. 9

EX-E

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.030		0.011		0.011		
Flow length (ft)	=	300.0		0.0		0.0		
Two-year 24-hr precip. (in)	=	2.20		0.00		0.00		
Land slope (%)	=	2.00		0.00		0.00		
Travel Time (min)	**=**	**7.85**	**+**	**0.00**	**+**	**0.00**	**=**	**7.85**
Shallow Concentrated Flow								
Flow length (ft)	=	2546.00		0.00		0.00		
Watercourse slope (%)	=	1.00		0.00		0.00		
Surface description	=	Unpaved		Paved		Paved		
Average velocity (ft/s)	=	1.61		0.00		0.00		
Travel Time (min)	**=**	**26.30**	**+**	**0.00**	**+**	**0.00**	**=**	**26.30**
Channel Flow								
X sectional flow area (sqft)	=	0.00		0.00		0.00		
Wetted perimeter (ft)	=	0.00		0.00		0.00		
Channel slope (%)	=	0.00		0.00		0.00		
Manning's n-value	=	0.015		0.015		0.015		
Velocity (ft/s)	=	0.00						
				0.00				
						0.00		
Flow length (ft)		({0})0.0		0.0		0.0		
Travel Time (min)	**=**	**0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

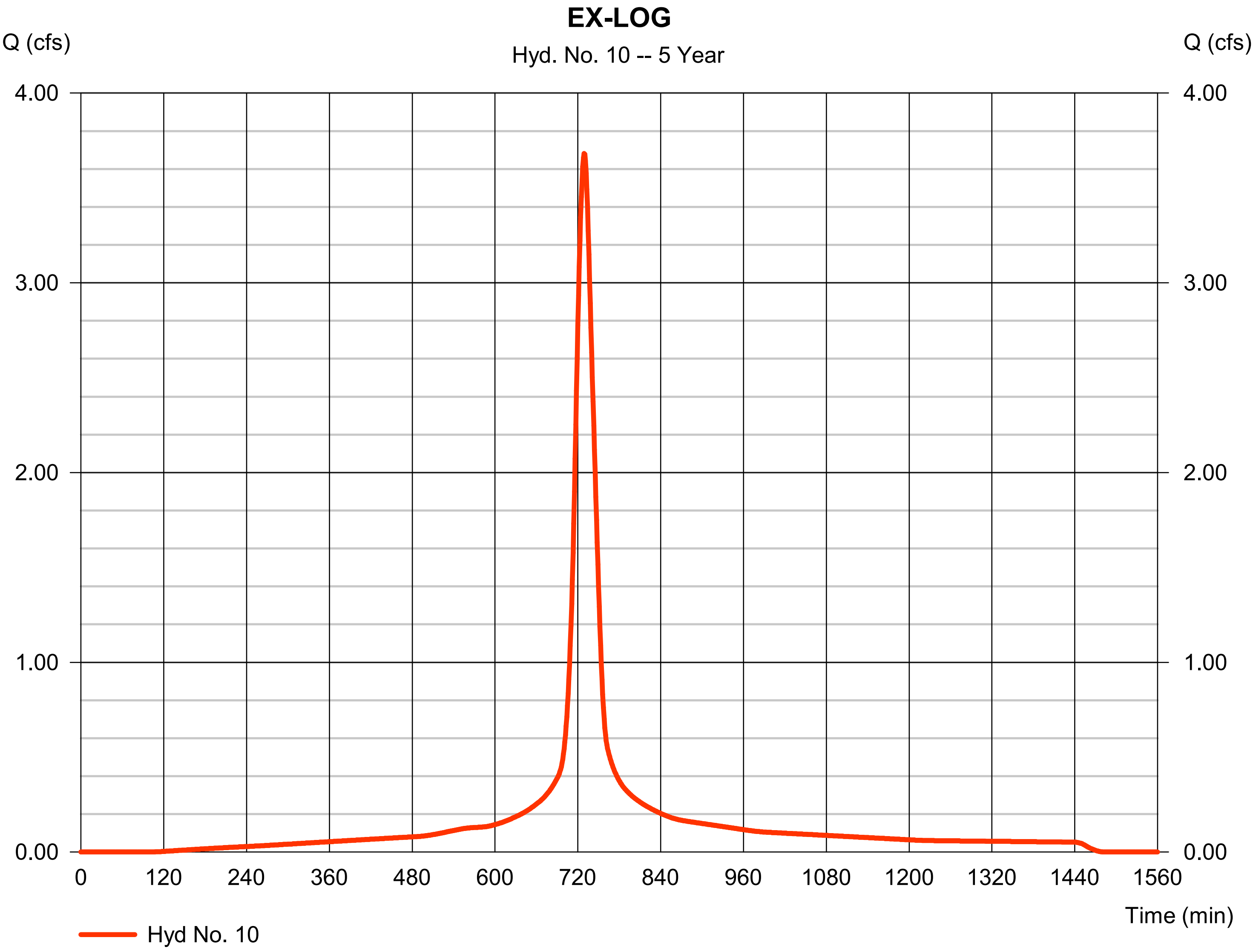
Total Travel Time, Tc .... **34.20 min**

Hydrograph Report

Hyd. No. 10

EX-LOG

Hydrograph type	= SCS Runoff	Peak discharge	= 3.682 cfs
Storm frequency	= 5 yrs	Time to peak	= 729 min
Time interval	= 1 min	Hyd. volume	= 15,373 cuft
Drainage area	= 1.800 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 27.10 min
Total precip.	= 2.60 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



TR55 Tc Worksheet

Hyd. No. 10

EX-LOG

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.013		0.011		0.011		
Flow length (ft)	=	11.0		0.0		0.0		
Two-year 24-hr precip. (in)	=	2.20		0.00		0.00		
Land slope (%)	=	2.00		0.00		0.00		
Travel Time (min)	**=**	**0.29**	**+**	**0.00**	**+**	**0.00**	**=**	**0.29**
Shallow Concentrated Flow								
Flow length (ft)	=	2592.00		0.00		0.00		
Watercourse slope (%)	=	1.00		0.00		0.00		
Surface description	=	Unpaved		Paved		Paved		
Average velocity (ft/s)	=1.61			0.00		0.00		
Travel Time (min)	**=**	**26.77**	**+**	**0.00**	**+**	**0.00**	**=**	**26.77**
Channel Flow								
X sectional flow area (sqft)	=	0.00		0.00		0.00		
Wetted perimeter (ft)	=	0.00		0.00		0.00		
Channel slope (%)	=	0.00		0.00		0.00		
Manning's n-value	=	0.015		0.015		0.015		
Velocity (ft/s)	=0.00			0.00		0.00		
Flow length (ft)	({0})0.0			0.0		0.0		
Travel Time (min)	**=**	**0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc .... 27.10 min

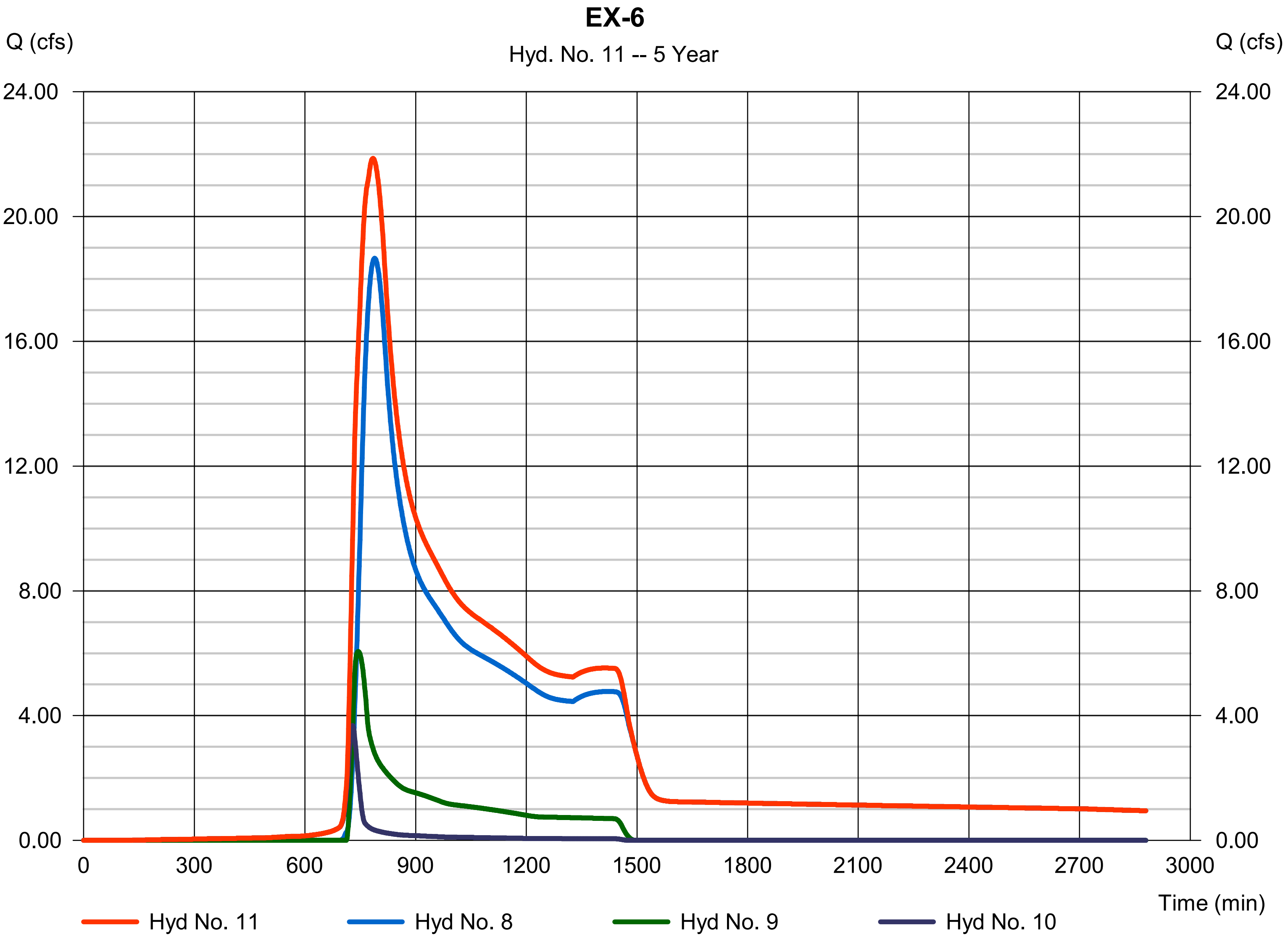
Hydrograph Report

Hyd. No. 11

EX-6

Hydrograph type = Combine
Storm frequency = 5 yrs
Time interval = 1 min
Inflow hyds. = 8, 9, 10

Peak discharge = 21.86 cfs
Time to peak = 784 min
Hyd. volume = 500,351 cuft
Contrib. drain. area = 77.800 ac

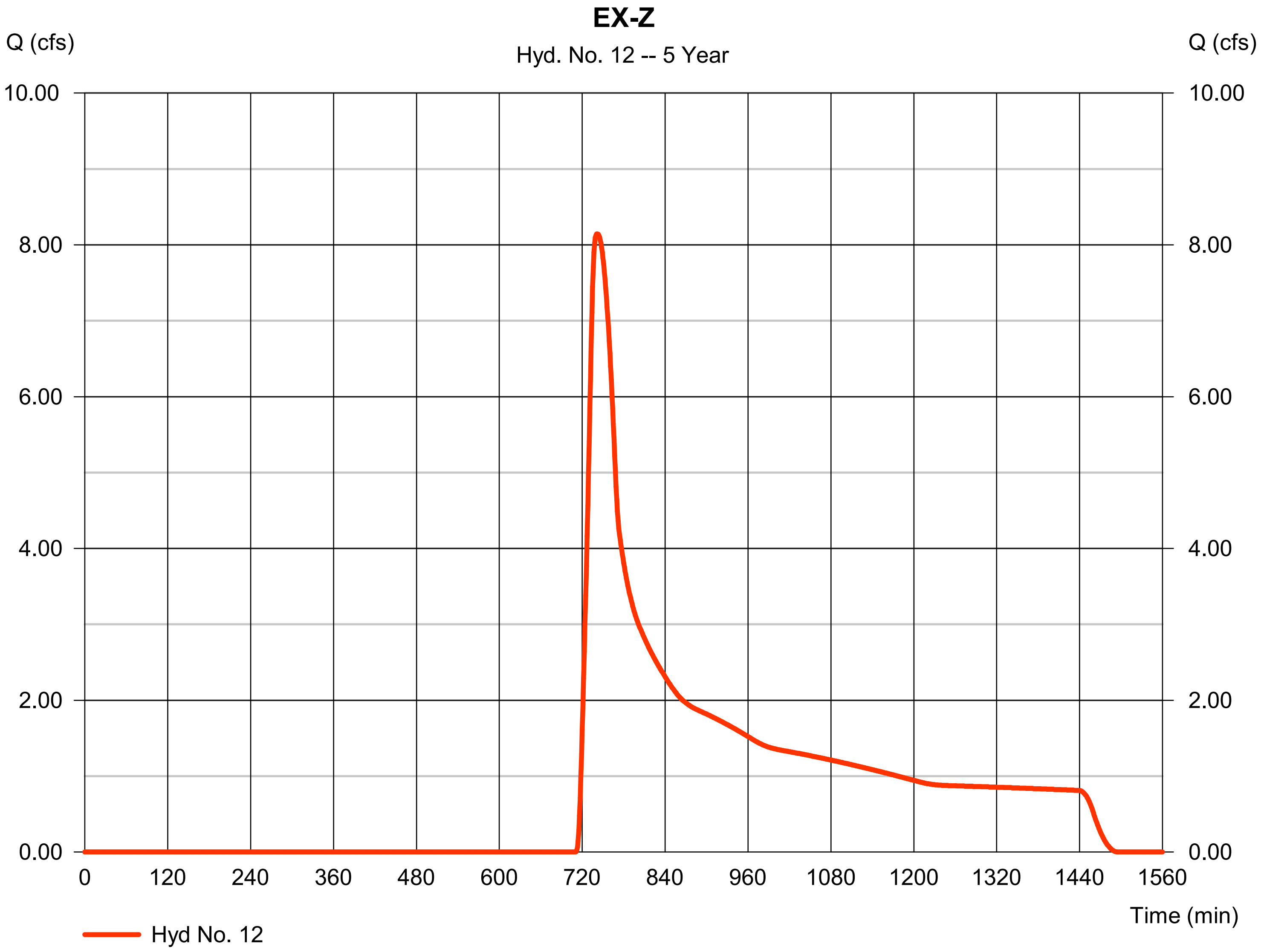


Hydrograph Report

Hyd. No. 12

EX-Z

Hydrograph type	= SCS Runoff	Peak discharge	= 8.146 cfs
Storm frequency	= 5 yrs	Time to peak	= 742 min
Time interval	= 1 min	Hyd. volume	= 76,284 cuft
Drainage area	= 83.500 ac	Curve number	= 62
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 35.00 min
Total precip.	= 2.60 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



TR55 Tc Worksheet

Hyd. No. 12

EX-Z

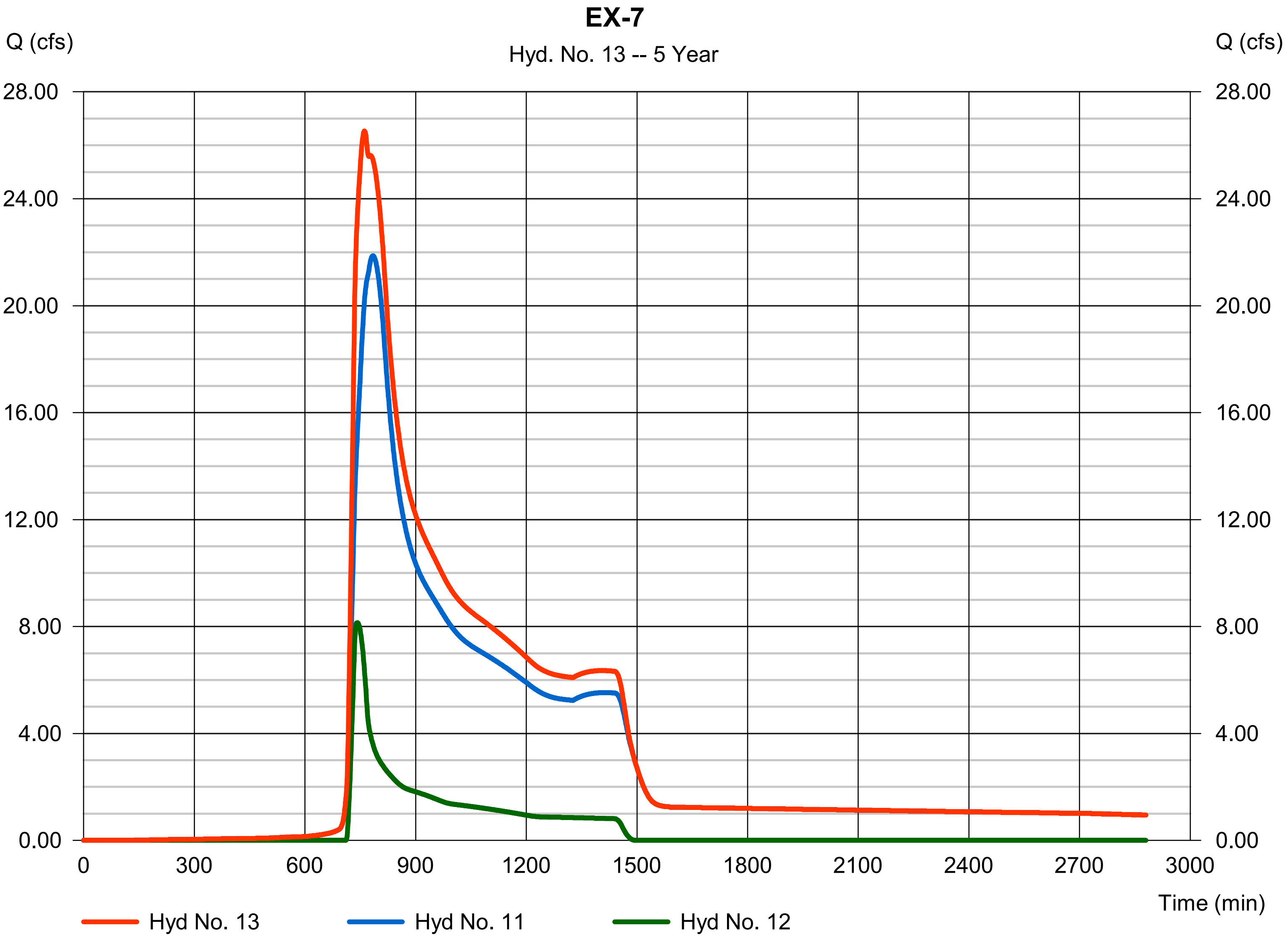
Description	A	B	C	Totals
Sheet Flow				
Manning's n-value	= 0.030	0.011	0.011	
Flow length (ft)	= 300.0	0.0	0.0	
Two-year 24-hr precip. (in)	= 2.20	0.00	0.00	
Land slope (%)	= 2.00	0.00	0.00	
Travel Time (min)	**= 7.85 +**	**0.00 +**	**0.00 =**	**7.85**
Shallow Concentrated Flow				
Flow length (ft)	= 2627.00	0.00	0.00	
Watercourse slope (%)	= 1.00	0.00	0.00	
Surface description	= Unpaved	Paved	Paved	
Average velocity (ft/s)	=1.61	0.00	0.00	
Travel Time (min)	**= 27.14 +**	**0.00 +**	**0.00 =**	**27.14**
Channel Flow				
X sectional flow area (sqft)	= 0.00	0.00	0.00	
Wetted perimeter (ft)	= 0.00	0.00	0.00	
Channel slope (%)	= 0.00	0.00	0.00	
Manning's n-value	= 0.015	0.015	0.015	
Velocity (ft/s)	=0.00			
		0.00		
			0.00	
Flow length (ft)	({0})0.0	0.0	0.0	
Travel Time (min)	**= 0.00 +**	**0.00 +**	**0.00 =**	**0.00**
Total Travel Time, Tc				**35.00 min**

Hydrograph Report

Hyd. No. 13

EX-7

Hydrograph type	= Combine	Peak discharge	= 26.53 cfs
Storm frequency	= 5 yrs	Time to peak	= 761 min
Time interval	= 1 min	Hyd. volume	= 576,634 cuft
Inflow hyds.	= 11, 12	Contrib. drain. area	= 83.500 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	144.67	1	755	1,185,497	------	------	------	EC10 - PRESENT
2	SCS Runoff	2.846	1	735	14,479	------	------	------	E1
3	SCS Runoff	4.333	1	733	18,356	------	------	------	OS-1
4	Combine	148.45	1	754	1,218,333	1, 2, 3	------	------	DP11
5	Reach	138.52	1	766	1,218,326	4	------	------	CHANNEL TO DP24
6	SCS Runoff	190.38	1	730	718,796	------	------	------	BASIN D
7	Reservoir	39.58	1	759	610,089	6	6032.21	333,480	POND D
8	Combine	177.50	1	765	1,828,414	5, 7	------	------	EX-5
9	SCS Runoff	53.32	1	736	282,485	------	------	------	EX-E
10	SCS Runoff	6.317	1	729	27,009	------	------	------	EX-LOG
11	Combine	204.65	1	758	2,137,908	8, 9, 10	------	------	EX-6
12	SCS Runoff	63.40	1	736	328,266	------	------	------	EX-Z
13	Combine	244.45	1	754	2,466,175	11, 12	------	------	EX-7

Basin D and Pond D (Hyd. #6 and #7) is included only to ensure Pond Release Rates are incorporated into the SCS model to accurately model downstream flows.

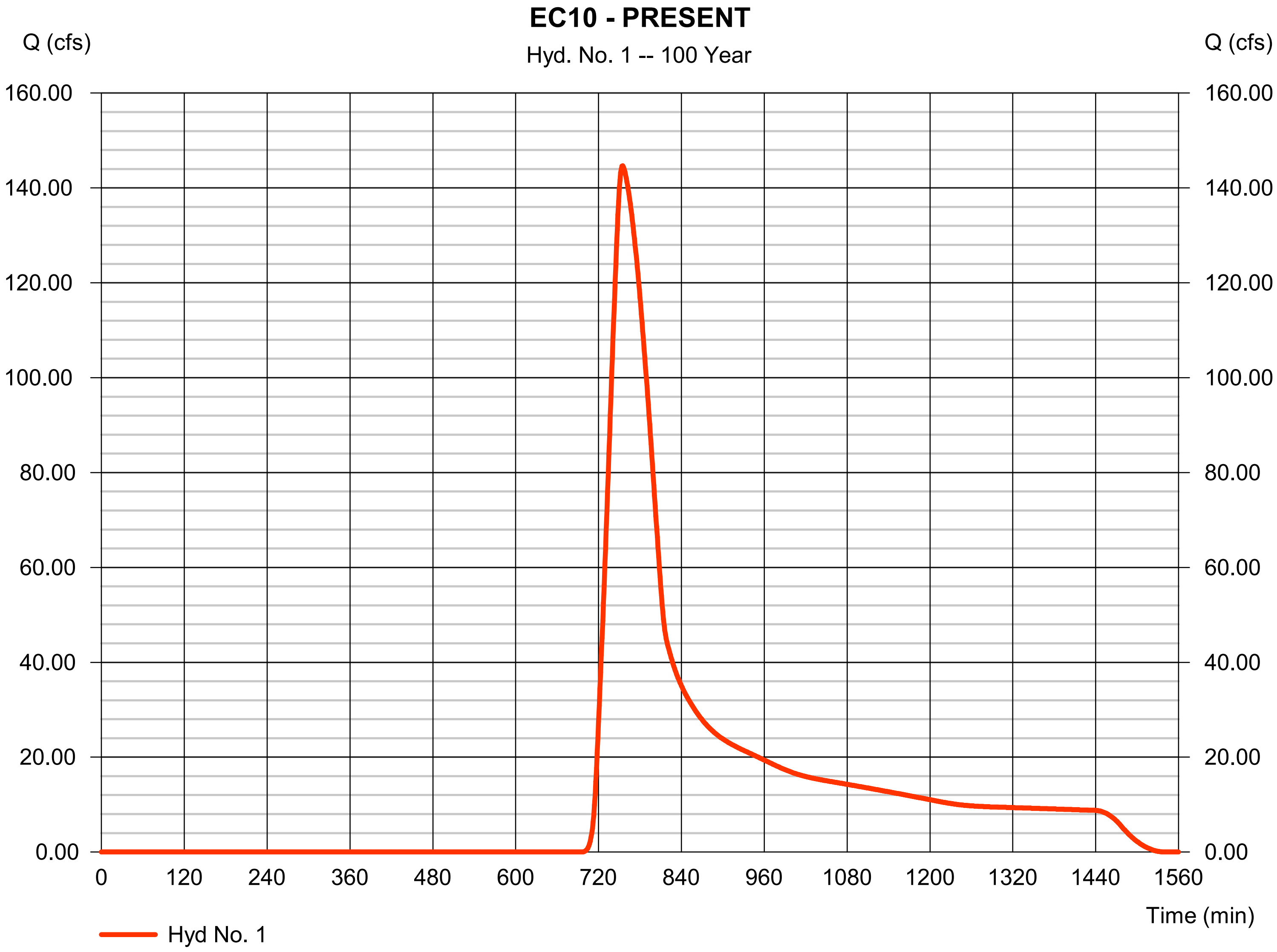
Please see the UD Detention printout in Appendix B for all release rate and volume analysis and the Rational Method printouts in this section for peak flow generations in areas tributary to Pond D

Hydrograph Report

Hyd. No. 1

EC10 - PRESENT

Hydrograph type	= SCS Runoff	Peak discharge	= 144.67 cfs
Storm frequency	= 100 yrs	Time to peak	= 755 min
Time interval	= 1 min	Hyd. volume	= 1,185,497 cuft
Drainage area	= 320.000 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 63.00 min
Total precip.	= 4.40 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



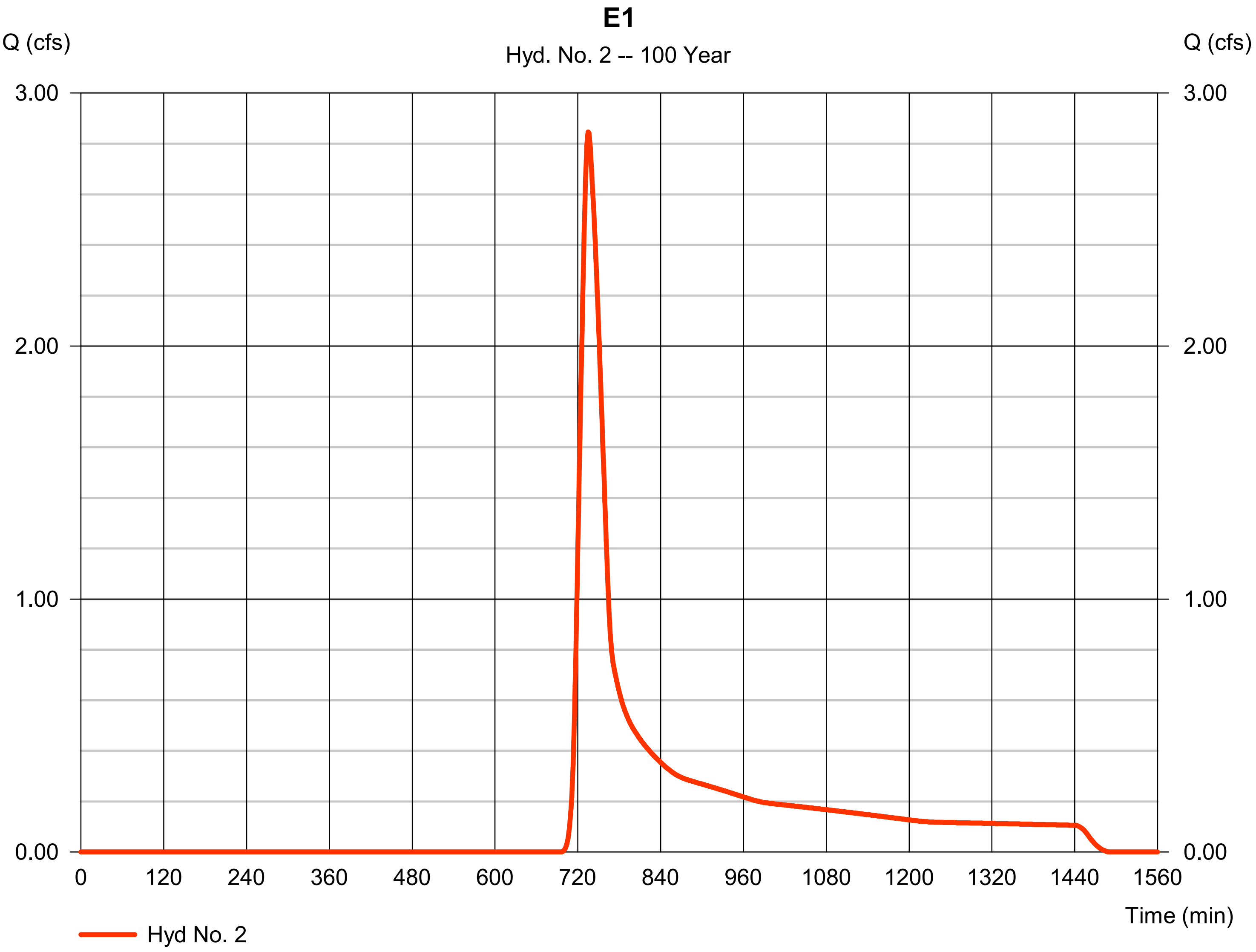
Hydrograph Report

Hyd. No. 2

E1

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Time interval = 1 min
Drainage area = 3.920 ac
Basin Slope = 0.0 %
Tc method = TR55
Total precip. = 4.40 in
Storm duration = 24 hrs

Peak discharge = 2.846 cfs
Time to peak = 735 min
Hyd. volume = 14,479 cuft
Curve number = 61
Hydraulic length = 0 ft
Time of conc. (Tc) = 32.50 min
Distribution = Type II
Shape factor = 484



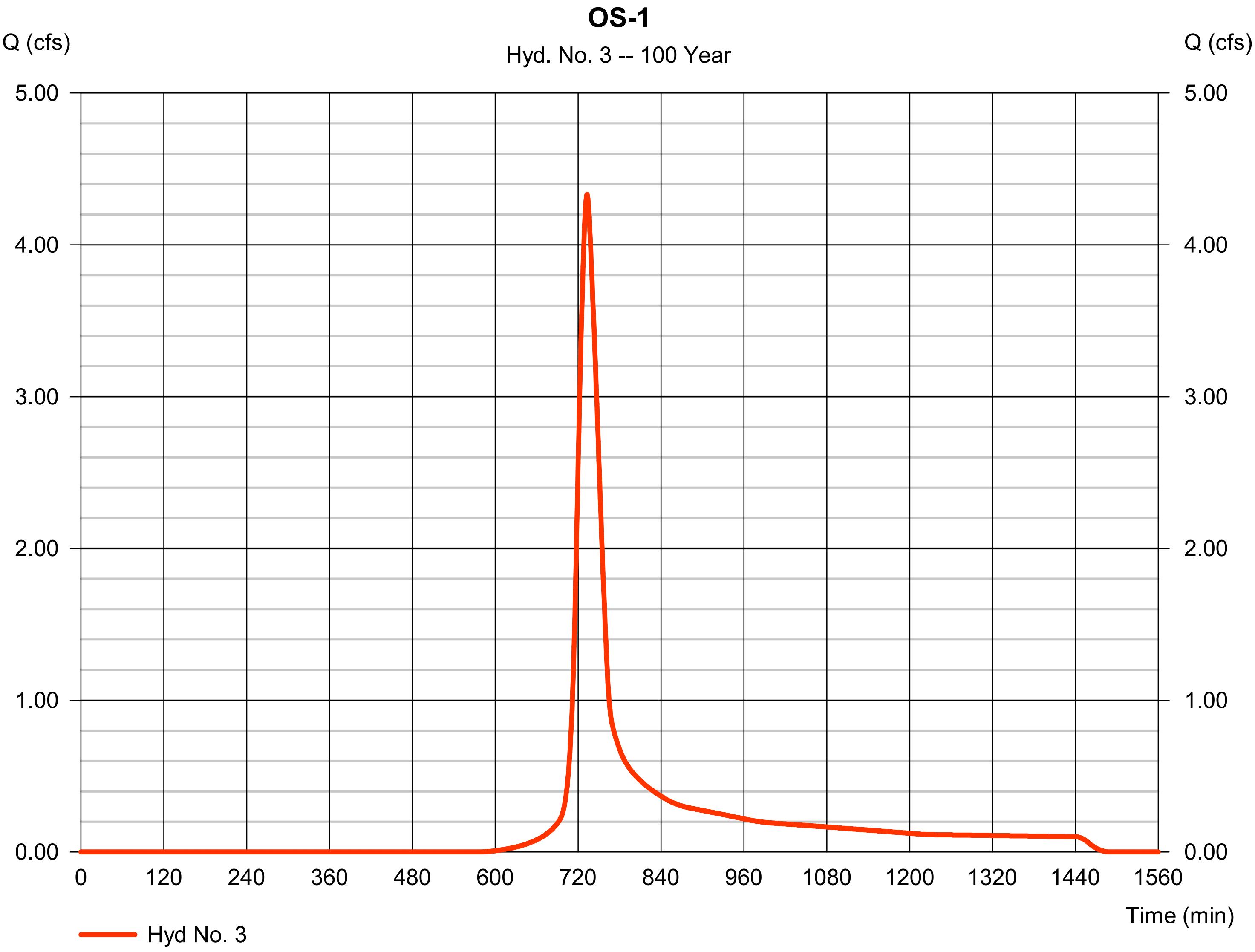
Hydrograph Report

Hyd. No. 3

OS-1

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Time interval = 1 min
Drainage area = 2.650 ac
Basin Slope = 0.0 %
Tc method = TR55
Total precip. = 4.40 in
Storm duration = 24 hrs

Peak discharge = 4.333 cfs
Time to peak = 733 min
Hyd. volume = 18,356 cuft
Curve number = 74
Hydraulic length = 0 ft
Time of conc. (Tc) = 32.10 min
Distribution = Type II
Shape factor = 484

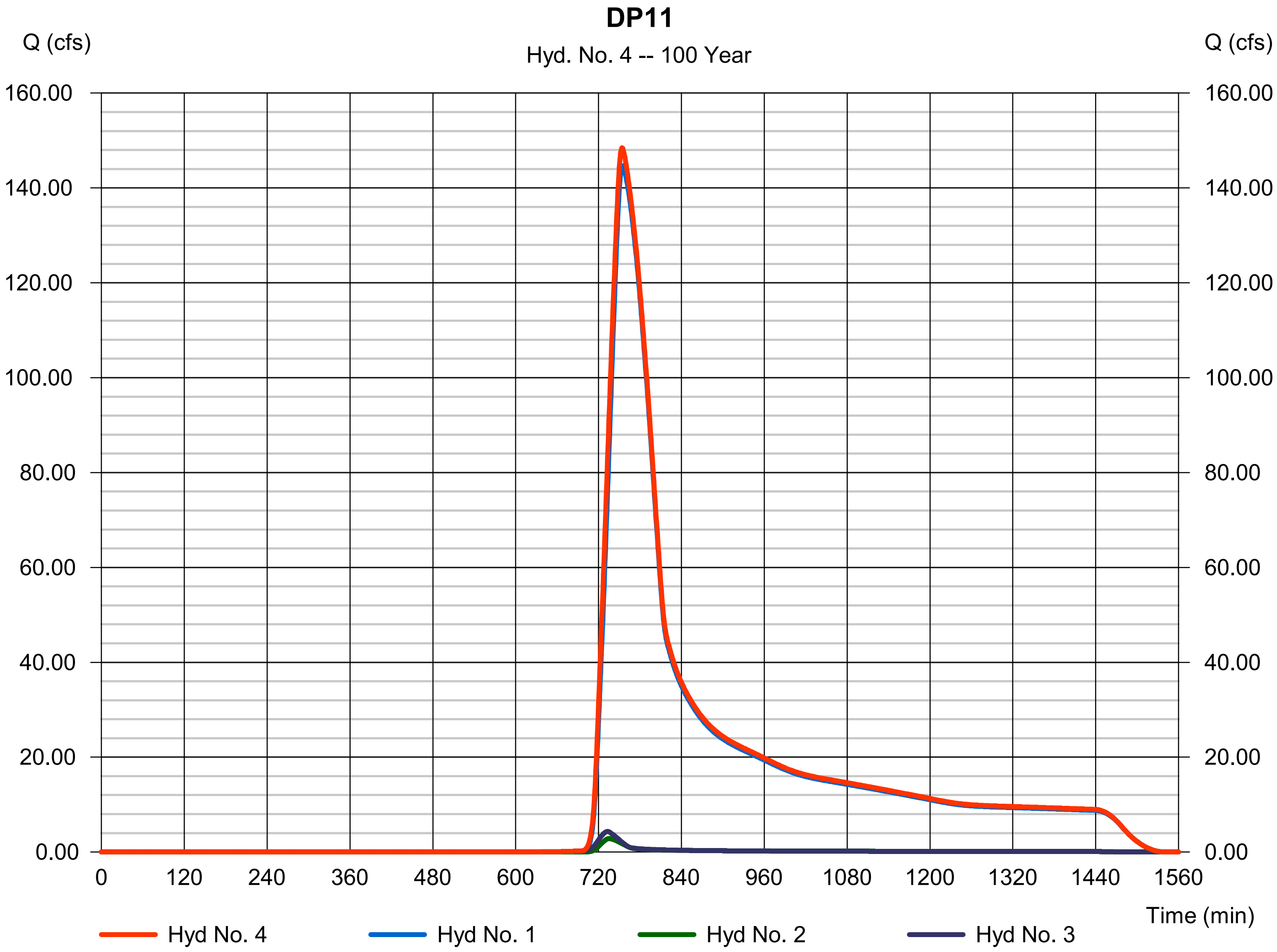


Hydrograph Report

Hyd. No. 4

DP11

Hydrograph type	= Combine	Peak discharge	= 148.45 cfs
Storm frequency	= 100 yrs	Time to peak	= 754 min
Time interval	= 1 min	Hyd. volume	= 1,218,333 cuft
Inflow hyds.	= 1, 2, 3	Contrib. drain. area	= 326.570 ac



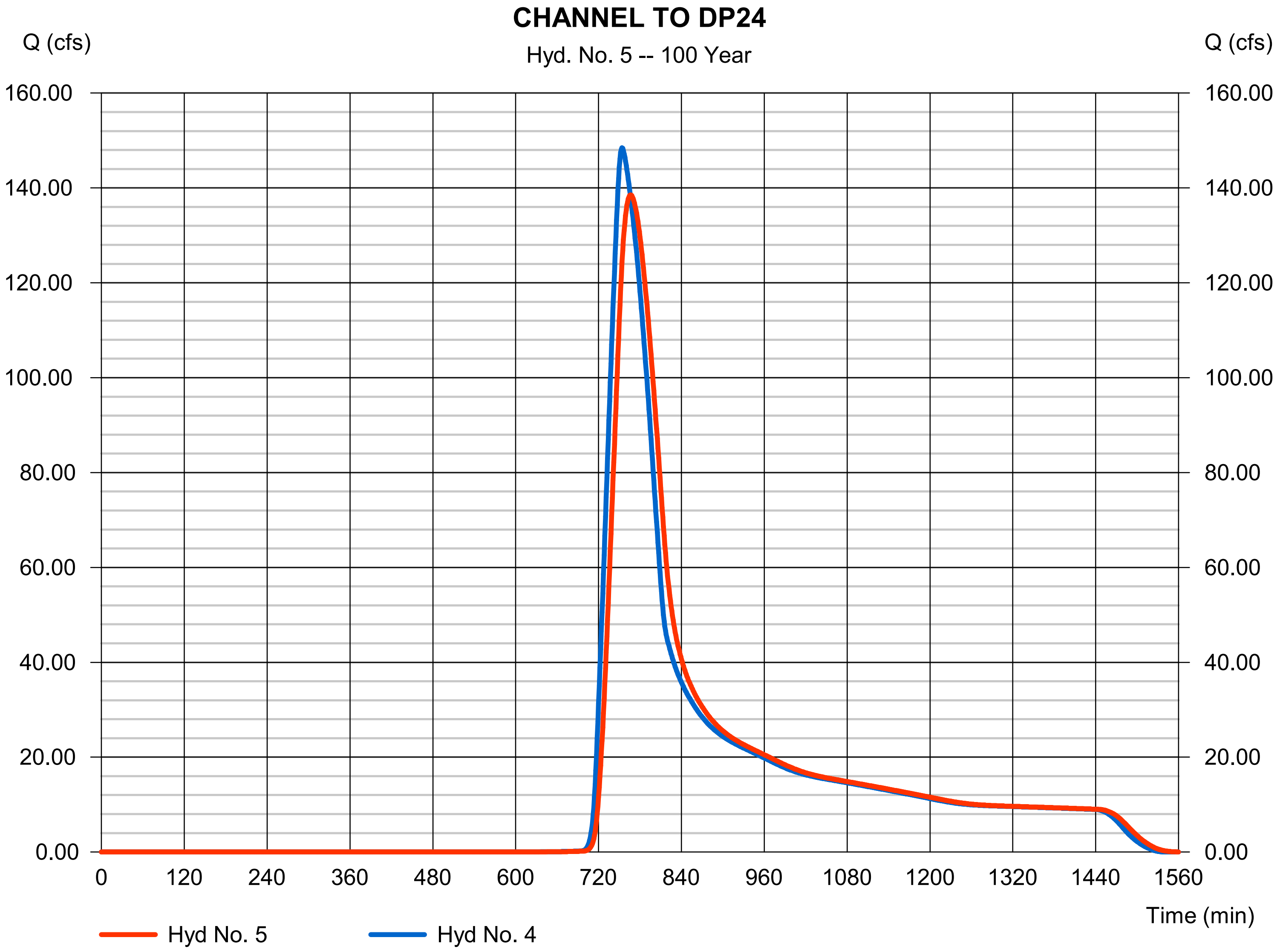
Hydrograph Report

Hyd. No. 5

CHANNEL TO DP24

Hydrograph type	= Reach	Peak discharge	= 138.52 cfs
Storm frequency	= 100 yrs	Time to peak	= 766 min
Time interval	= 1 min	Hyd. volume	= 1,218,326 cuft
Inflow hyd. No.	= 4 - DP11	Section type	= Trapezoidal
Reach length	= 2902.0 ft	Channel slope	= 0.8 %
Manning's n	= 0.030	Bottom width	= 8.0 ft
Side slope	= 4.0:1	Max. depth	= 3.3 ft
Rating curve x	= 1.110	Rating curve m	= 1.349
Ave. velocity	= 0.00 ft/s	Routing coeff.	= 0.1042

Modified Att-Kin routing method used.



Hydrograph Report

Hyd. No. 6

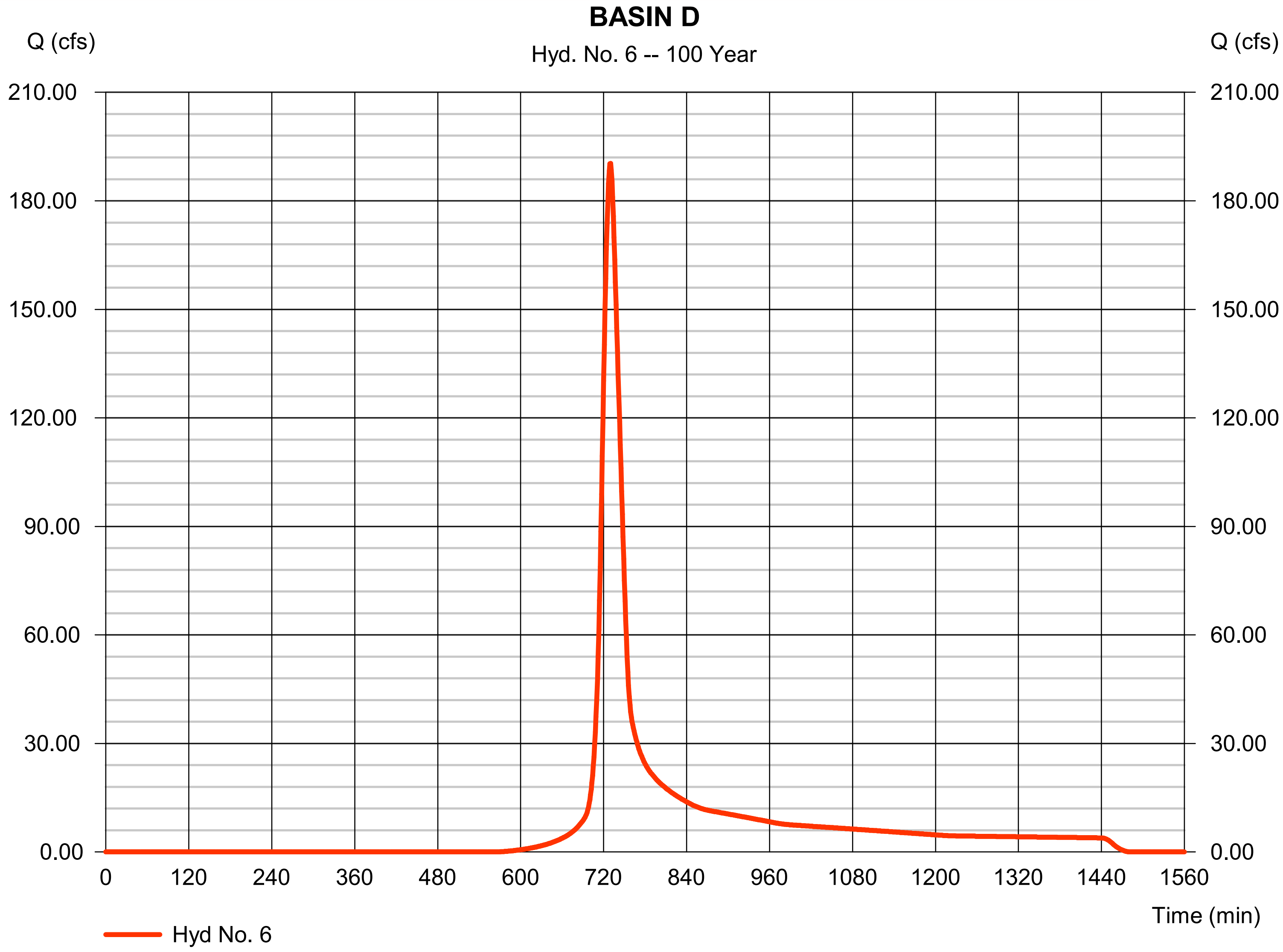
BASIN D

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Time interval = 1 min
Drainage area = 100.800 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 4.40 in
Storm duration = 24 hrs

Peak discharge = 190.38 cfs
Time to peak = 730 min
Hyd. volume = 718,796 cuft
Curve number = 74.7
Hydraulic length = 0 ft
Time of conc. (Tc) = 27.00 min
Distribution = Type II
Shape factor = 484

Basin D and Pond D (Hyd. #6 and #7) is included only to ensure Pond Release Rates are incorporated into the SCS model to accurately model downstream flows.

Please see the UD Detention printout in Appendix B for all release rate and volume analysis and the Rational Method printouts in this section for peak flow generations in areas tributary to Pond D



Hydrograph Report

Hyd. No. 7

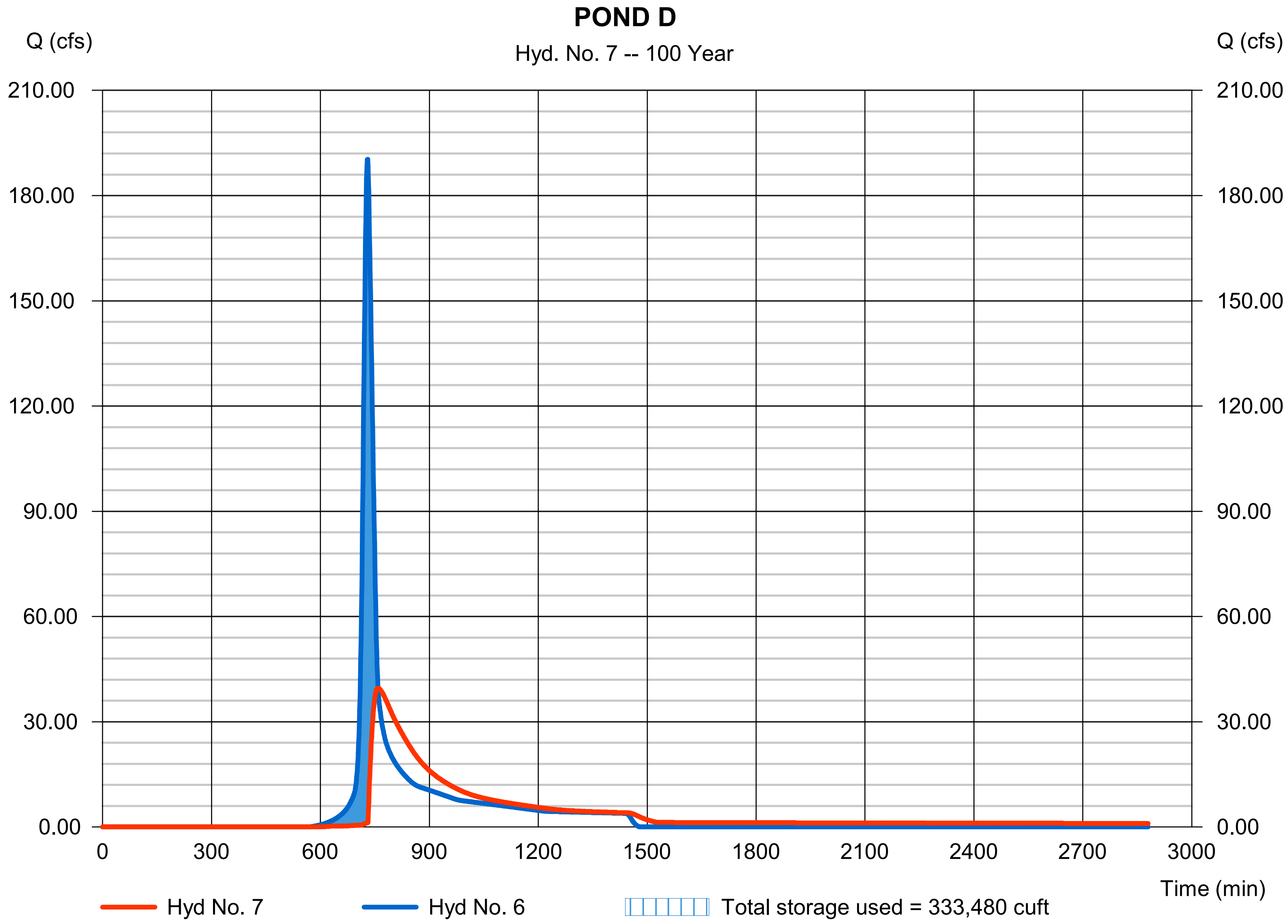
POND D

Hydrograph type	= Reservoir	Peak discharge	= 39.58 cfs
Storm frequency	= 100 yrs	Time to peak	= 759 min
Time interval	= 1 min	Hyd. volume	= 610,089 cuft
Inflow hyd. No.	= 6 - BASIN D	Max. Elevation	= 6032.21 ft
Reservoir name	= D	Max. Storage	= 333,480 cuft

Storage Indication method used.

Basin D and Pond D (Hyd. #6 and #7) is included only to ensure Pond Release Rates are incorporated into the SCS model to accurately model downstream flows.

Please see the UD Detention printout in Appendix B for all release rate and volume analysis and the Rational Method printouts in this section for peak flow generations in areas tributary to Pond D

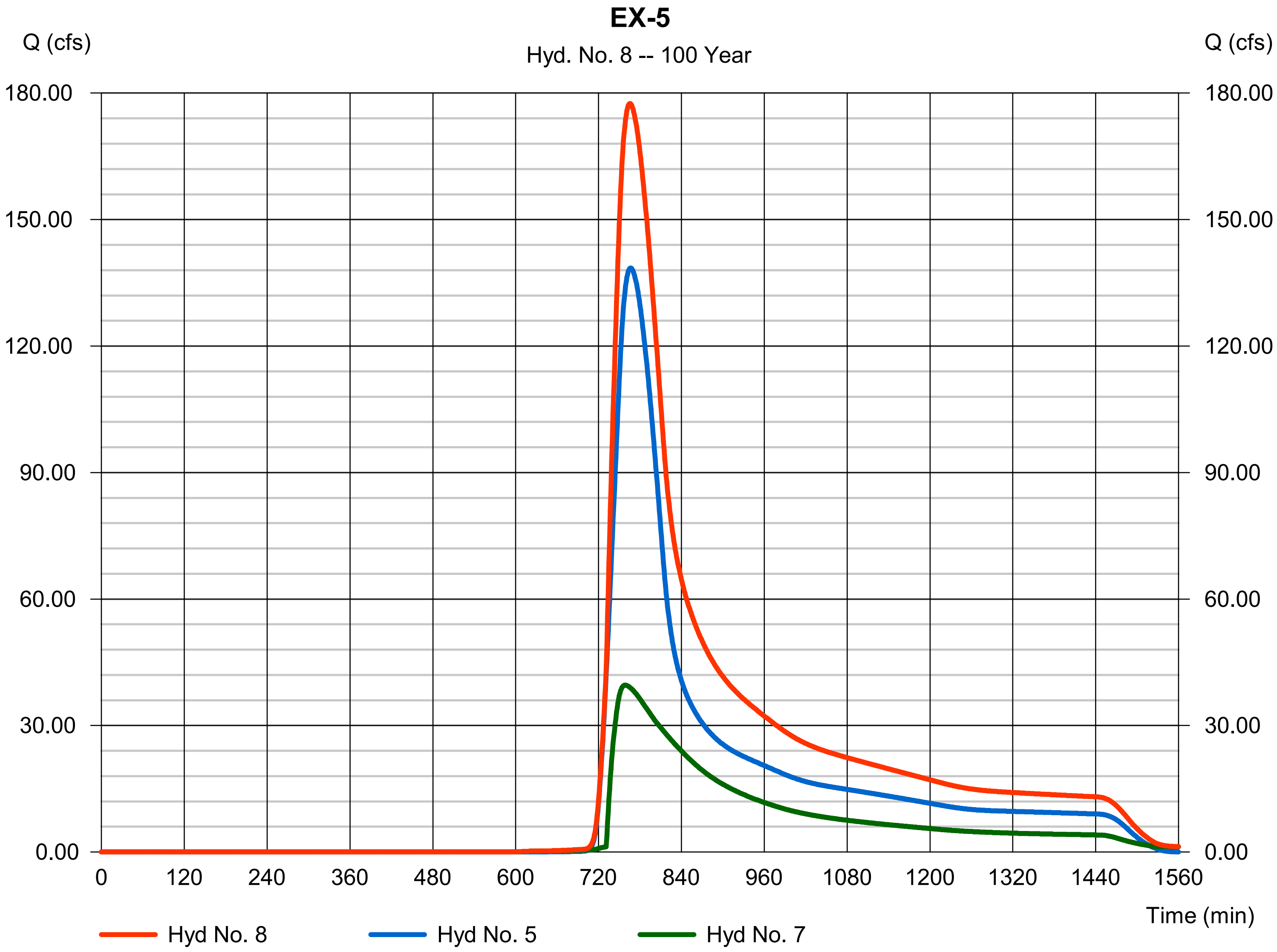


Hydrograph Report

Hyd. No. 8

EX-5

Hydrograph type	= Combine	Peak discharge	= 177.50 cfs
Storm frequency	= 100 yrs	Time to peak	= 765 min
Time interval	= 1 min	Hyd. volume	= 1,828,414 cuft
Inflow hyds.	= 5, 7	Contrib. drain. area	= 0.000 ac

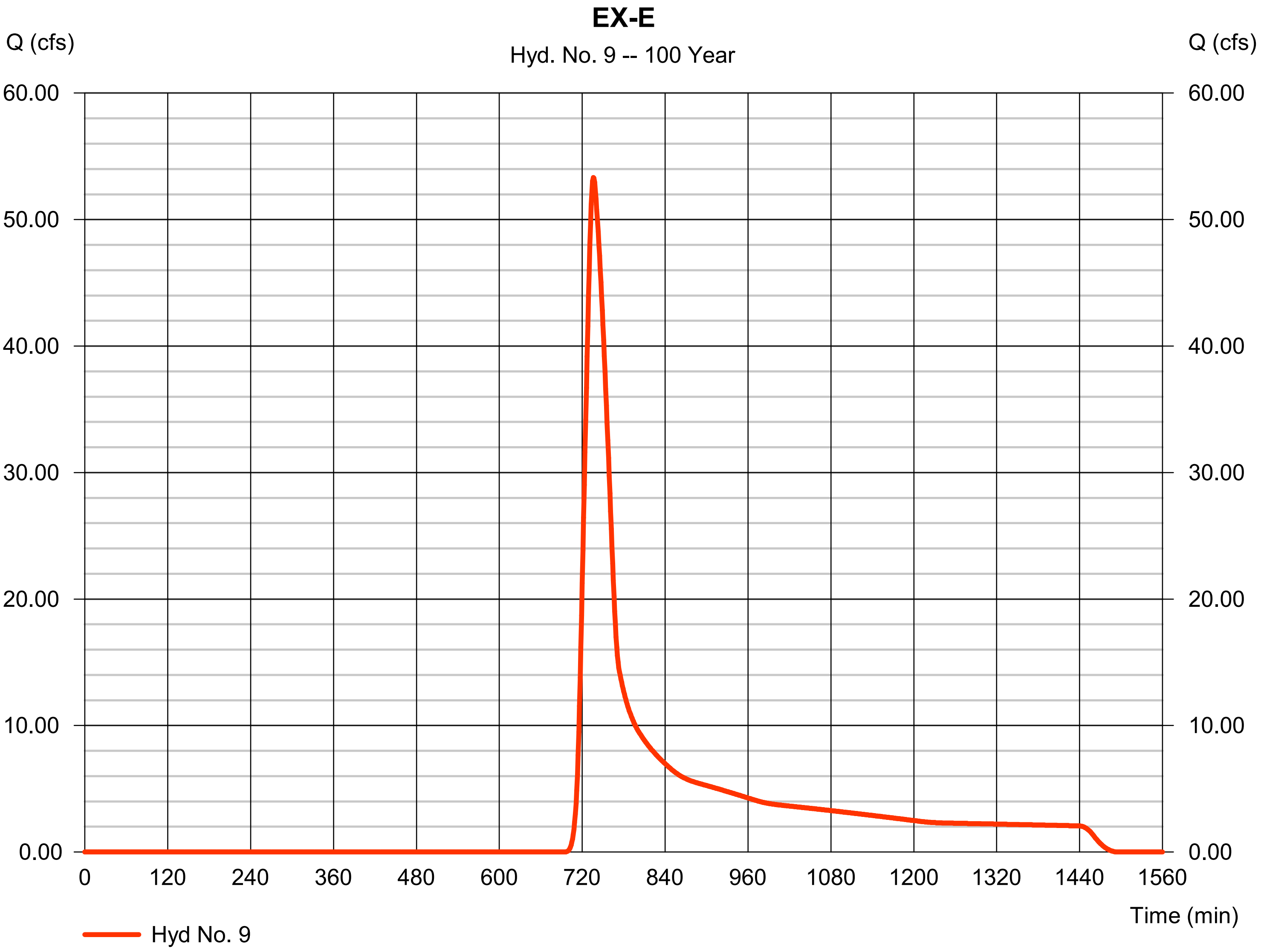


Hydrograph Report

Hyd. No. 9

EX-E

Hydrograph type	= SCS Runoff	Peak discharge	= 53.32 cfs
Storm frequency	= 100 yrs	Time to peak	= 736 min
Time interval	= 1 min	Hyd. volume	= 282,485 cuft
Drainage area	= 76.000 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 34.20 min
Total precip.	= 4.40 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

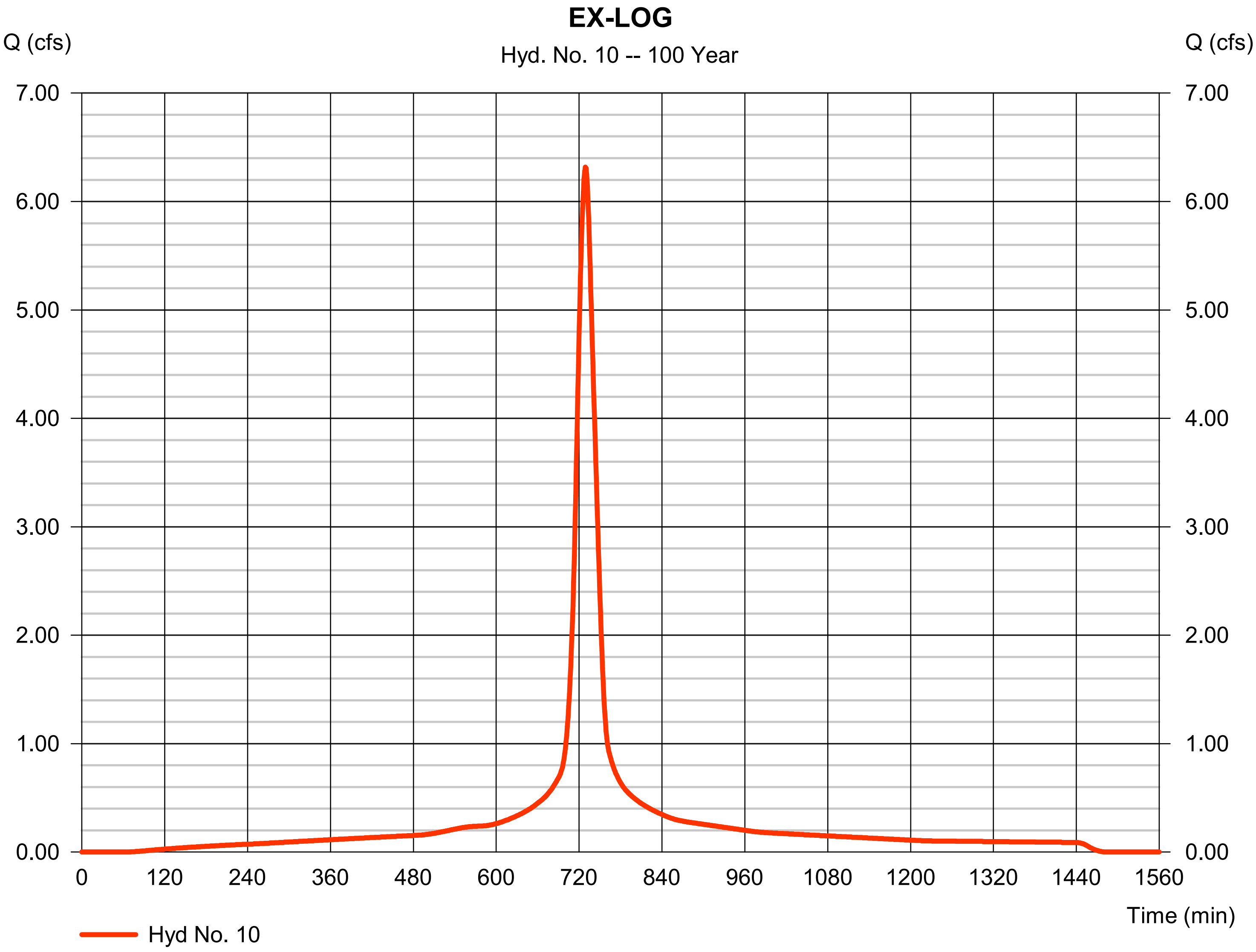


Hydrograph Report

Hyd. No. 10

EX-LOG

Hydrograph type	= SCS Runoff	Peak discharge	= 6.317 cfs
Storm frequency	= 100 yrs	Time to peak	= 729 min
Time interval	= 1 min	Hyd. volume	= 27,009 cuft
Drainage area	= 1.800 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 27.10 min
Total precip.	= 4.40 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

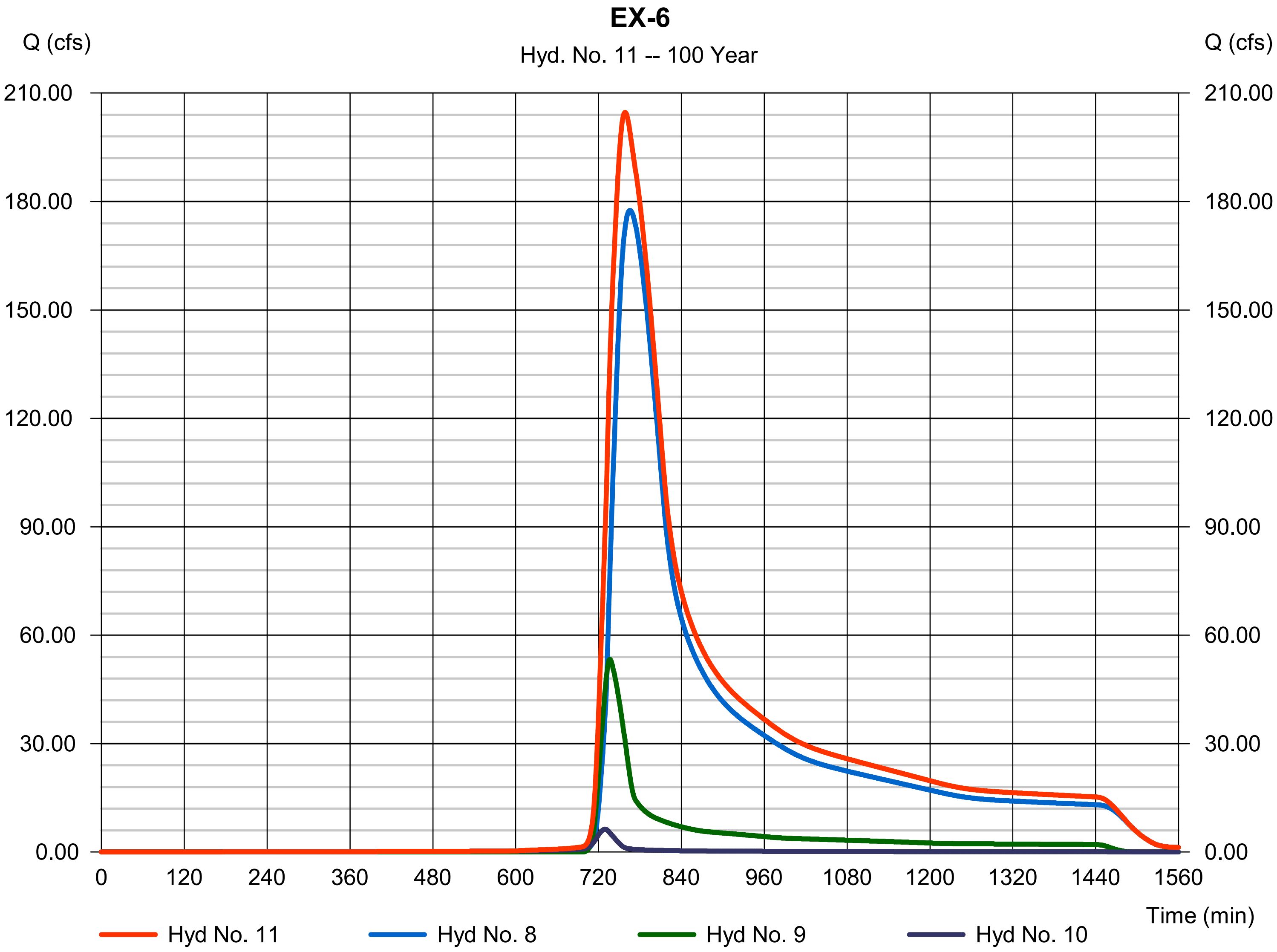


Hydrograph Report

Hyd. No. 11

EX-6

Hydrograph type	= Combine	Peak discharge	= 204.65 cfs
Storm frequency	= 100 yrs	Time to peak	= 758 min
Time interval	= 1 min	Hyd. volume	= 2,137,908 cuft
Inflow hyds.	= 8, 9, 10	Contrib. drain. area	= 77.800 ac

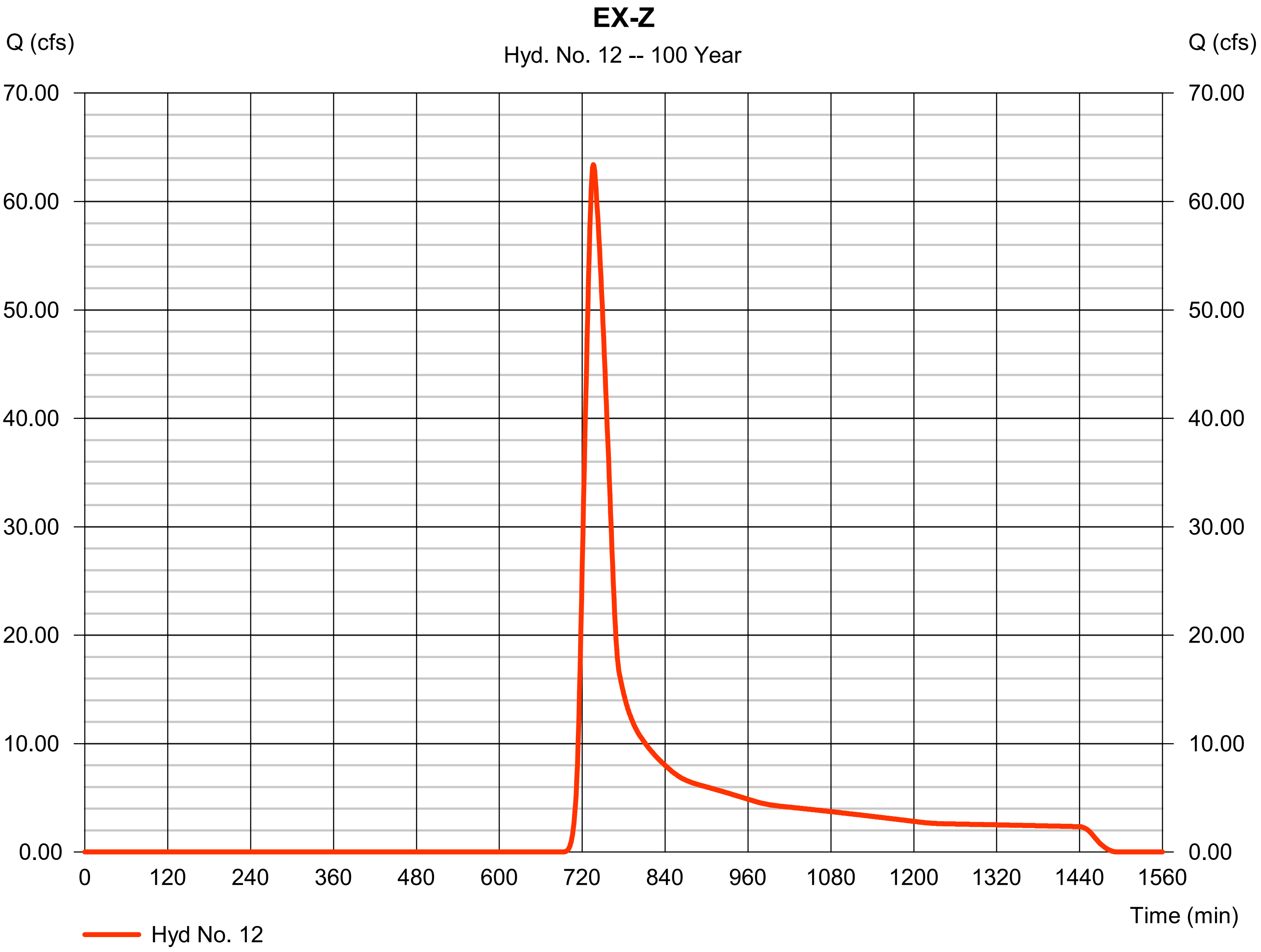


Hydrograph Report

Hyd. No. 12

EX-Z

Hydrograph type	= SCS Runoff	Peak discharge	= 63.40 cfs
Storm frequency	= 100 yrs	Time to peak	= 736 min
Time interval	= 1 min	Hyd. volume	= 328,266 cuft
Drainage area	= 83.500 ac	Curve number	= 62
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 35.00 min
Total precip.	= 4.40 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



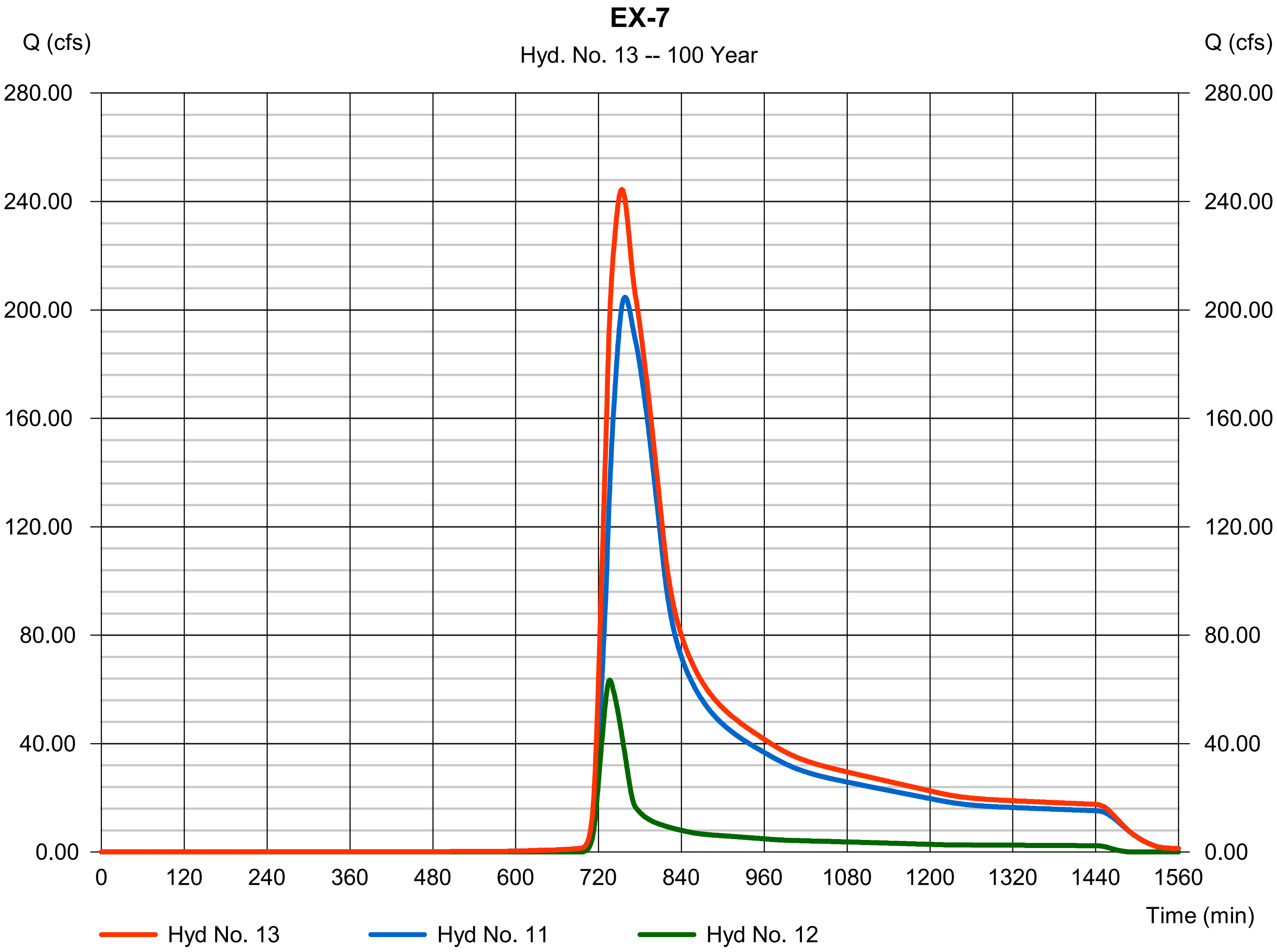
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Thursday, 01 / 5 / 2023

Hyd. No. 13

EX-7

Hydrograph type	= Combine	Peak discharge	= 244.45 cfs
Storm frequency	= 100 yrs	Time to peak	= 754 min
Time interval	= 1 min	Hyd. volume	= 2,466,175 cuft
Inflow hyds.	= 11, 12	Contrib. drain. area	= 83.500 ac



Hydraflow Rainfall Report

Precip. file name: Sample.pcp

Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour		2.20		2.60				4.40

TR55 Tc Worksheet

Hyd. No. 1

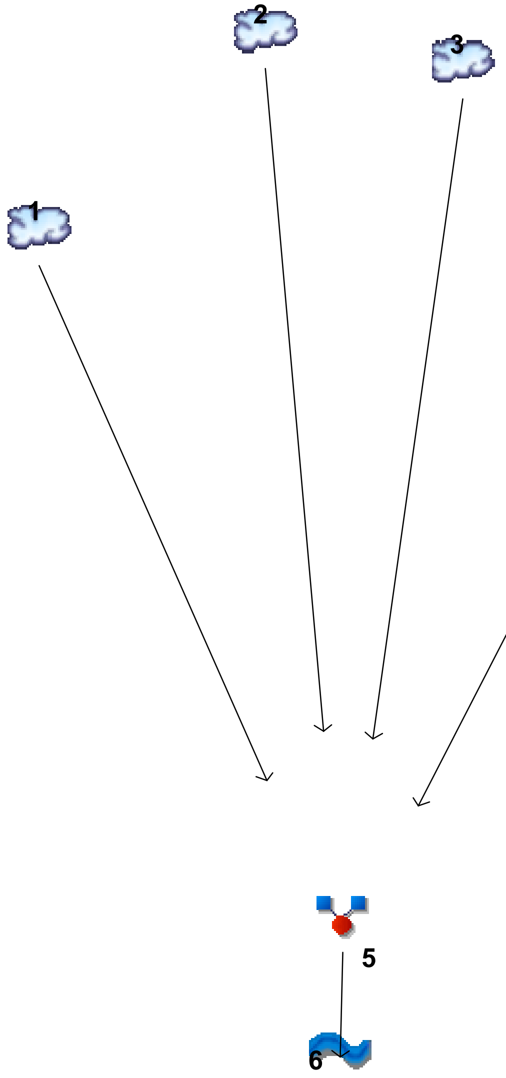
EC10 - PRESENT

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.030		0.011		0.011		
Flow length (ft)	=	300.0		0.0		0.0		
Two-year 24-hr precip. (in)	=	2.20		0.00		0.00		
Land slope (%)	=	2.00		0.00		0.00		
Travel Time (min)	**=**	**7.85**	**+**	**0.00**	**+**	**0.00**	**=**	**7.85**
Shallow Concentrated Flow								
Flow length (ft)	=	6086.00		0.00		0.00		
Watercourse slope (%)	=	1.30		0.00		0.00		
Surface description	=	Unpaved		Paved		Paved		
Average velocity (ft/s)		=1.84		0.00		0.00		
Travel Time (min)	**=**	**55.14**	**+**	**0.00**	**+**	**0.00**	**=**	**55.14**
Channel Flow								
X sectional flow area (sqft)	=	0.00		0.00		0.00		
Wetted perimeter (ft)	=	0.00		0.00		0.00		
Channel slope (%)	=	0.00		0.00		0.00		
Manning's n-value	=	0.015		0.015		0.015		
Velocity (ft/s)		=0.00						
				0.00				
						0.00		
Flow length (ft)		({0})0.0		0.0		0.0		
Travel Time (min)	**=**	**0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc .... 63.00 min

Watershed Model Schematic

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023



Legend

Hyd.	Origin	Description
1	SCS Runoff	EC10 - PRESENT
2	SCS Runoff	OS-1
3	SCS Runoff	E1
4	SCS Runoff	BASIN D1.5
5	Combine	DP11
6	Reach	Channel to DP24

Project: SCS ROUTING CHAN E Peak Flow - Pre Dev D1.5.gpw

Thursday, 01 / 5 / 2023

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

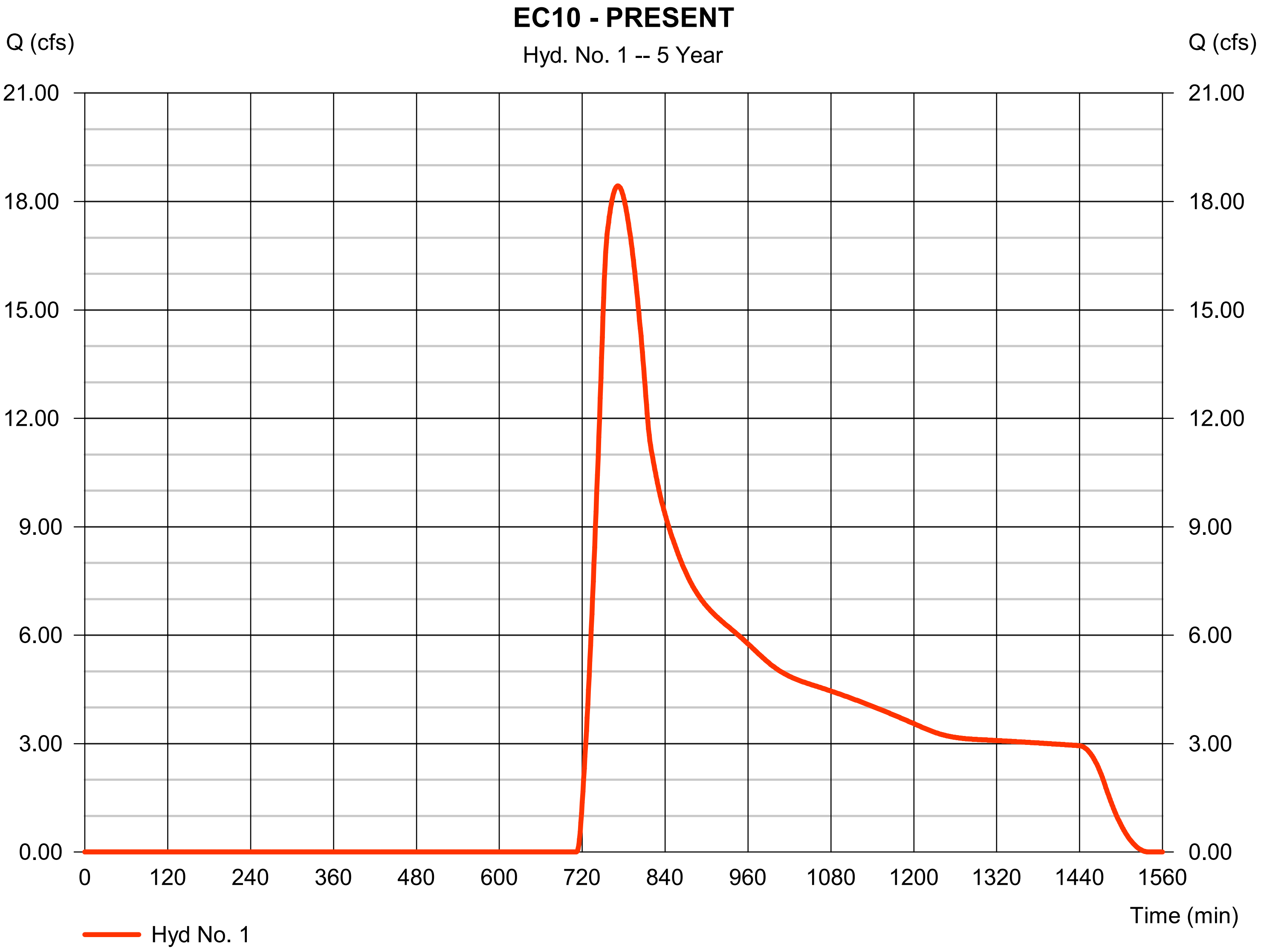
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	18.43	1	772	262,007	------	------	------	EC10 - PRESENT
2	SCS Runoff	1.349	1	734	6,442	------	------	------	OS-1
3	SCS Runoff	0.320	1	742	3,200	------	------	------	E1
4	SCS Runoff	1.348	1	726	8,116	------	------	------	BASIN D1.5
5	Combine	19.29	1	770	279,765	1, 2, 3, 4	------	------	DP11
6	Reach	18.66	1	783	279,759	5	------	------	Channel to DP24

Hydrograph Report

Hyd. No. 1

EC10 - PRESENT

Hydrograph type	= SCS Runoff	Peak discharge	= 18.43 cfs
Storm frequency	= 5 yrs	Time to peak	= 772 min
Time interval	= 1 min	Hyd. volume	= 262,007 cuft
Drainage area	= 320.000 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 63.00 min
Total precip.	= 2.60 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



TR55 Tc Worksheet

Hyd. No. 1

EC10 - PRESENT

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.030		0.011		0.011		
Flow length (ft)	=	300.0		0.0		0.0		
Two-year 24-hr precip. (in)	=	2.20		0.00		0.00		
Land slope (%)	=	2.00		0.00		0.00		
Travel Time (min)	**=**	**7.85**	**+**	**0.00**	**+**	**0.00**	**=**	**7.85**
Shallow Concentrated Flow								
Flow length (ft)	=	6086.00		0.00		0.00		
Watercourse slope (%)	=	1.30		0.00		0.00		
Surface description	=	Unpaved		Paved		Paved		
Average velocity (ft/s)	=	1.84		0.00		0.00		
Travel Time (min)	**=**	**55.14**	**+**	**0.00**	**+**	**0.00**	**=**	**55.14**
Channel Flow								
X sectional flow area (sqft)	=	0.00		0.00		0.00		
Wetted perimeter (ft)	=	0.00		0.00		0.00		
Channel slope (%)	=	0.00		0.00		0.00		
Manning's n-value	=	0.015		0.015		0.015		
Velocity (ft/s)	=	0.00		0.00		0.00		
Flow length (ft)		({0})0.0		0.0		0.0		
Travel Time (min)	**=**	**0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

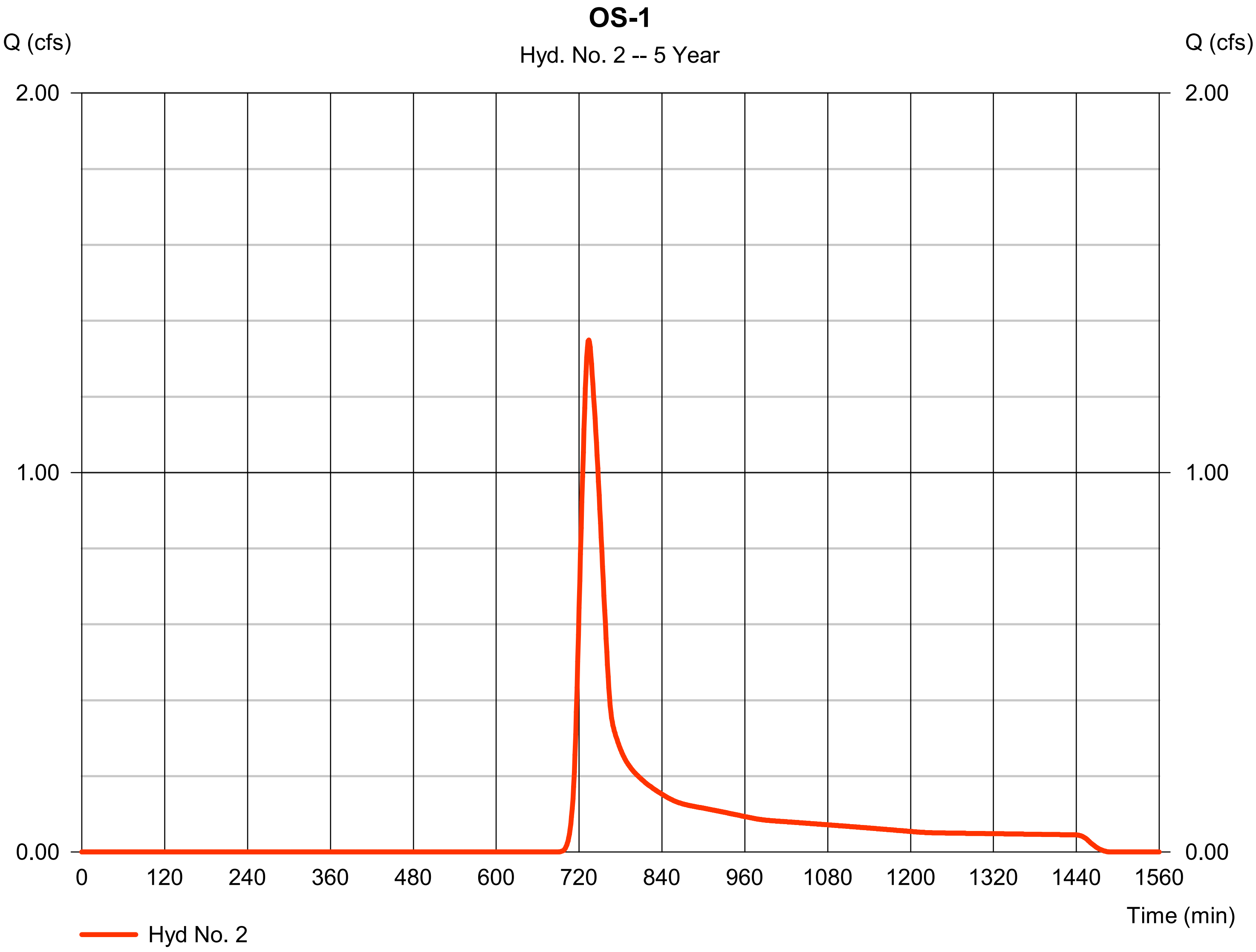
Total Travel Time, Tc .... 63.00 min

Hydrograph Report

Hyd. No. 2

OS-1

Hydrograph type	= SCS Runoff	Peak discharge	= 1.349 cfs
Storm frequency	= 5 yrs	Time to peak	= 734 min
Time interval	= 1 min	Hyd. volume	= 6,442 cuft
Drainage area	= 2.650 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 32.10 min
Total precip.	= 2.60 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



TR55 Tc Worksheet

Hyd. No. 2

OS-1

Description	A	B	C	Totals
Sheet Flow				
Manning's n-value	= 0.013	0.011	0.011	
Flow length (ft)	= 50.0	0.0	0.0	
Two-year 24-hr precip. (in)	= 2.20	0.00	0.00	
Land slope (%)	= 2.00	0.00	0.00	
Travel Time (min)	**= 0.96 +**	**0.00 +**	**0.00 =**	**0.96**
Shallow Concentrated Flow				
Flow length (ft)	= 2525.00	0.00	0.00	
Watercourse slope (%)	= 0.70	0.00	0.00	
Surface description	= Unpaved	Paved	Paved	
Average velocity (ft/s)	=1.35	0.00	0.00	
Travel Time (min)	**= 31.17 +**	**0.00 +**	**0.00 =**	**31.17**
Channel Flow				
X sectional flow area (sqft)	= 0.00	0.00	0.00	
Wetted perimeter (ft)	= 0.00	0.00	0.00	
Channel slope (%)	= 0.00	0.00	0.00	
Manning's n-value	= 0.015	0.015	0.015	
Velocity (ft/s)	=0.00			
		0.00		
			0.00	
Flow length (ft)	({0})0.0	0.0	0.0	
Travel Time (min)	**= 0.00 +**	**0.00 +**	**0.00 =**	**0.00**

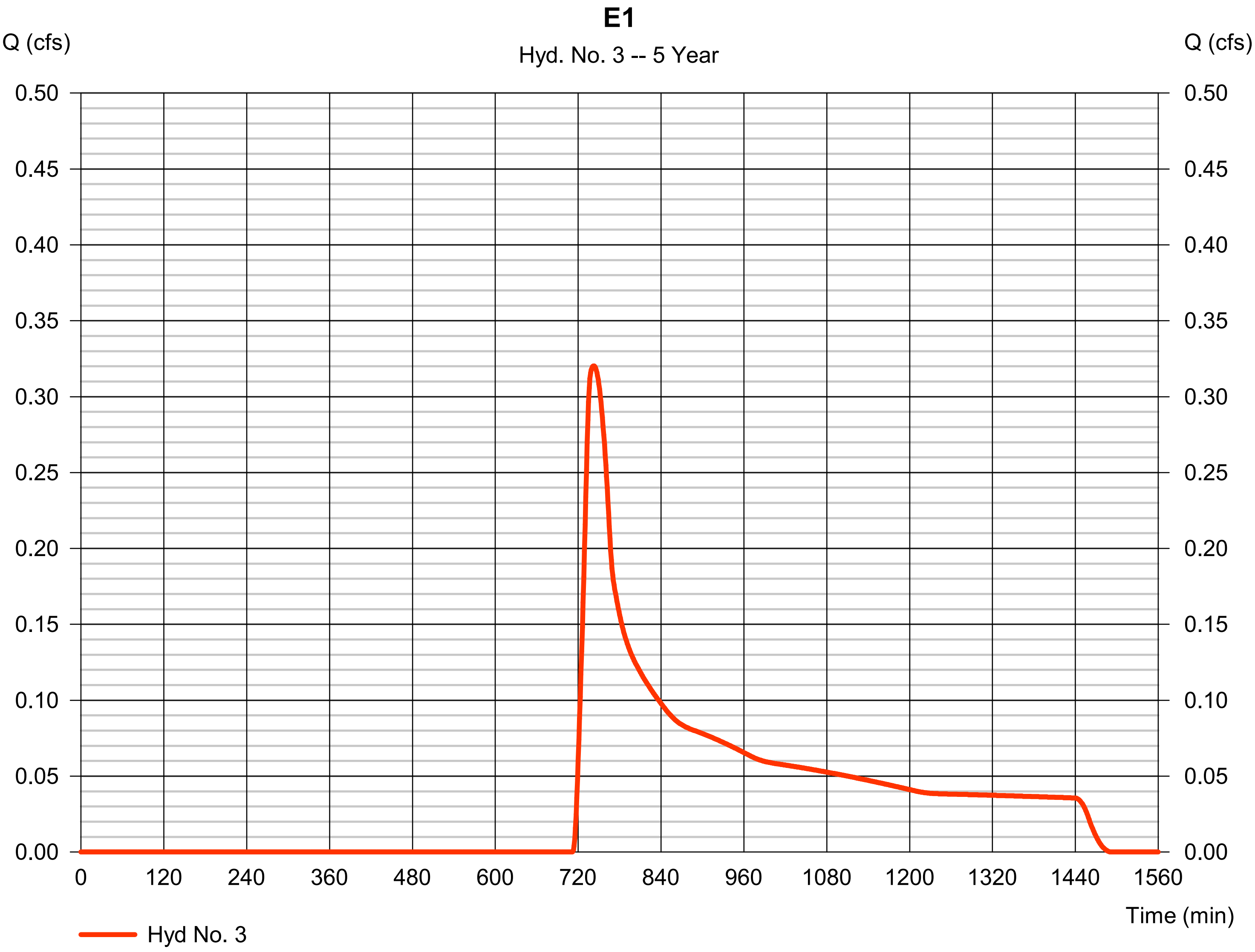
Total Travel Time, Tc .... 32.10 min

Hydrograph Report

Hyd. No. 3

E1

Hydrograph type	= SCS Runoff	Peak discharge	= 0.320 cfs
Storm frequency	= 5 yrs	Time to peak	= 742 min
Time interval	= 1 min	Hyd. volume	= 3,200 cuft
Drainage area	= 3.920 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 32.50 min
Total precip.	= 2.60 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



TR55 Tc Worksheet

Hyd. No. 3

E1

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.011		0.011		0.011		
Flow length (ft)	=	0.0		0.0		0.0		
Two-year 24-hr precip. (in)	=	0.00		0.00		0.00		
Land slope (%)	=	0.00		0.00		0.00		
Travel Time (min)	**=**	**0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Shallow Concentrated Flow								
Flow length (ft)	=	2811.00		0.00		0.00		
Watercourse slope (%)	=	0.80		0.00		0.00		
Surface description	=	Unpaved		Paved		Paved		
Average velocity (ft/s)	=	1.44		0.00		0.00		
Travel Time (min)	**=**	**32.46**	**+**	**0.00**	**+**	**0.00**	**=**	**32.46**
Channel Flow								
X sectional flow area (sqft)	=	0.00		0.00		0.00		
Wetted perimeter (ft)	=	0.00		0.00		0.00		
Channel slope (%)	=	0.00		0.00		0.00		
Manning's n-value	=	0.015		0.015		0.015		
Velocity (ft/s)	=	0.00						
				0.00				
						0.00		
Flow length (ft)	({0})	0.0		0.0		0.0		
Travel Time (min)	**=**	**0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc .... 32.50 min

Hydrograph Report

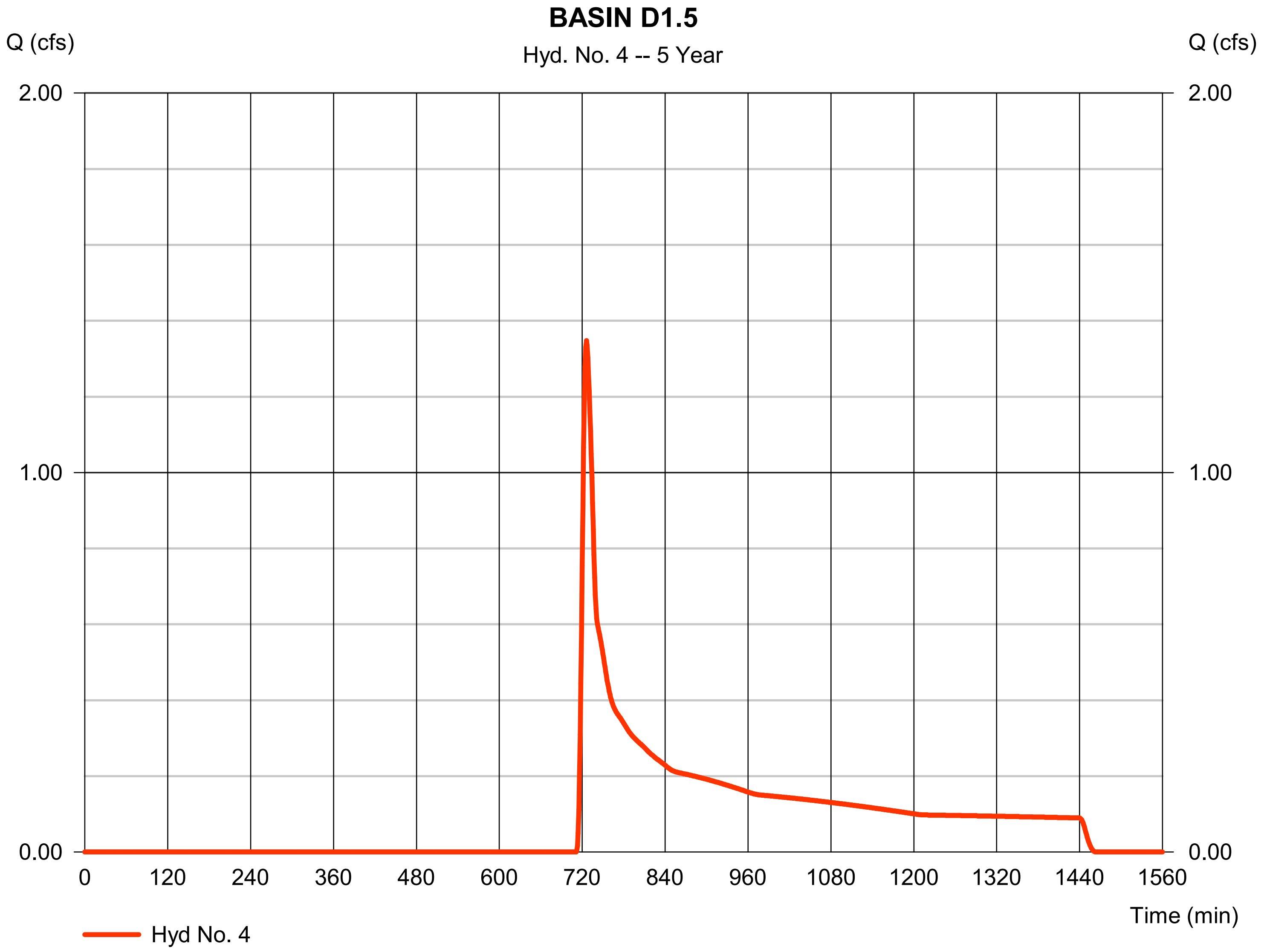
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Thursday, 01 / 5 / 2023

Hyd. No. 4

BASIN D1.5

Hydrograph type = SCS Runoff
Storm frequency = 5 yrs
Time interval = 1 min
Drainage area = 9.880 ac
Basin Slope = 0.0 %
Tc method = TR55
Total precip. = 2.60 in
Storm duration = 24 hrs

Peak discharge = 1.348 cfs
Time to peak = 726 min
Hyd. volume = 8,116 cuft
Curve number = 61
Hydraulic length = 0 ft
Time of conc. (Tc) = 14.00 min
Distribution = Type II
Shape factor = 484



TR55 Tc Worksheet

Hyd. No. 4

BASIN D1.5

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.030		0.011		0.011		
Flow length (ft)	=	300.0		0.0		0.0		
Two-year 24-hr precip. (in)	=	2.20		0.00		0.00		
Land slope (%)	=	2.00		0.00		0.00		
Travel Time (min)	**=**	**7.85**	**+**	**0.00**	**+**	**0.00**	**=**	**7.85**
Shallow Concentrated Flow								
Flow length (ft)	=	840.00		0.00		0.00		
Watercourse slope (%)	=	2.00		0.00		0.00		
Surface description	=	Unpaved		Paved		Paved		
Average velocity (ft/s)	=2.28			0.00		0.00		
Travel Time (min)	**=**	**6.14**	**+**	**0.00**	**+**	**0.00**	**=**	**6.14**
Channel Flow								
X sectional flow area (sqft)	=	0.00		0.00		0.00		
Wetted perimeter (ft)	=	0.00		0.00		0.00		
Channel slope (%)	=	0.00		0.00		0.00		
Manning's n-value	=	0.015		0.015		0.015		
Velocity (ft/s)	=0.00							
				0.00				
						0.00		
Flow length (ft)	({0})0.0			0.0		0.0		
Travel Time (min)	**=**	**0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

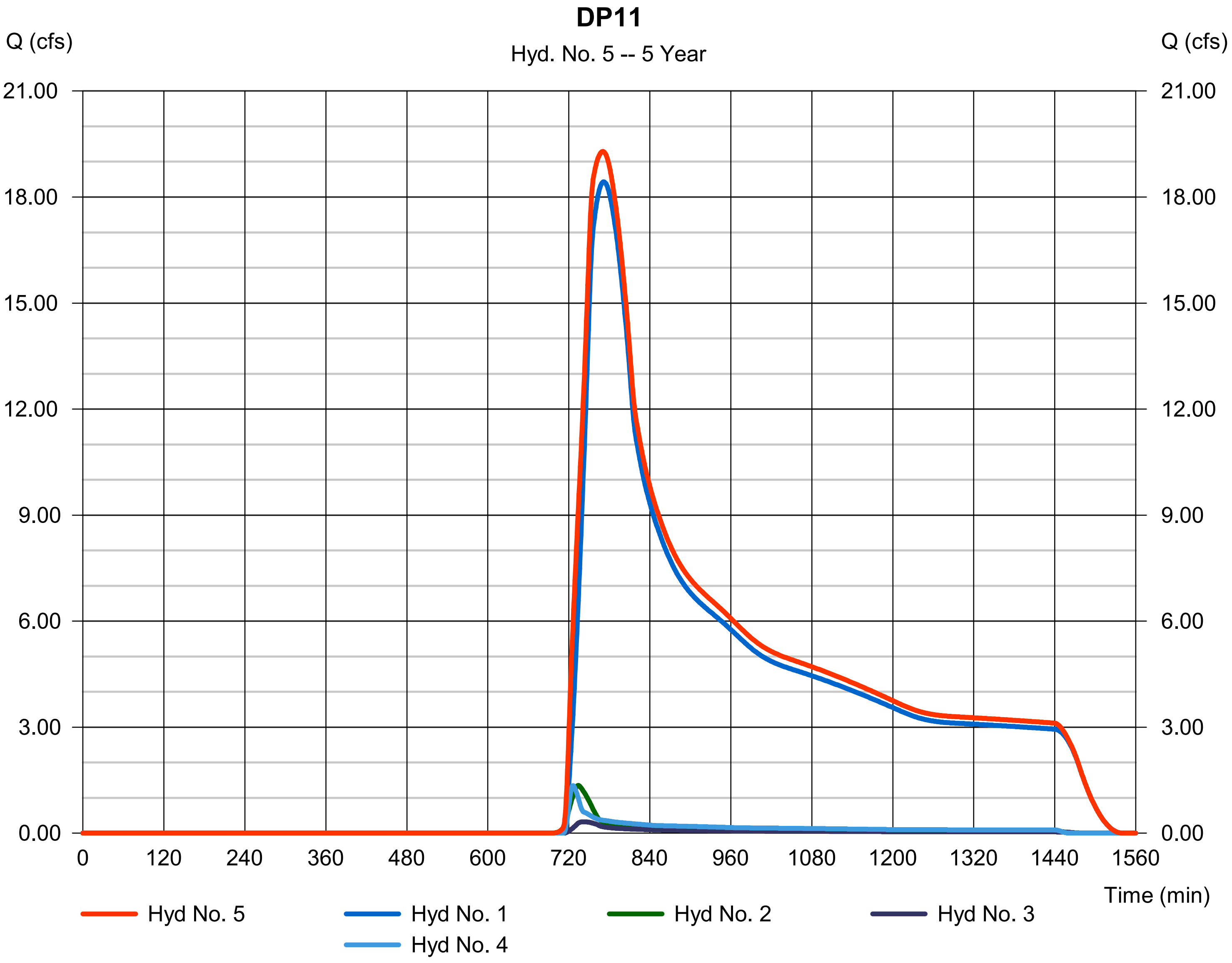
Total Travel Time, Tc .... 14.00 min

Hydrograph Report

Hyd. No. 5

DP11

Hydrograph type	= Combine	Peak discharge	= 19.29 cfs
Storm frequency	= 5 yrs	Time to peak	= 770 min
Time interval	= 1 min	Hyd. volume	= 279,765 cuft
Inflow hyds.	= 1, 2, 3, 4	Contrib. drain. area	= 336.450 ac



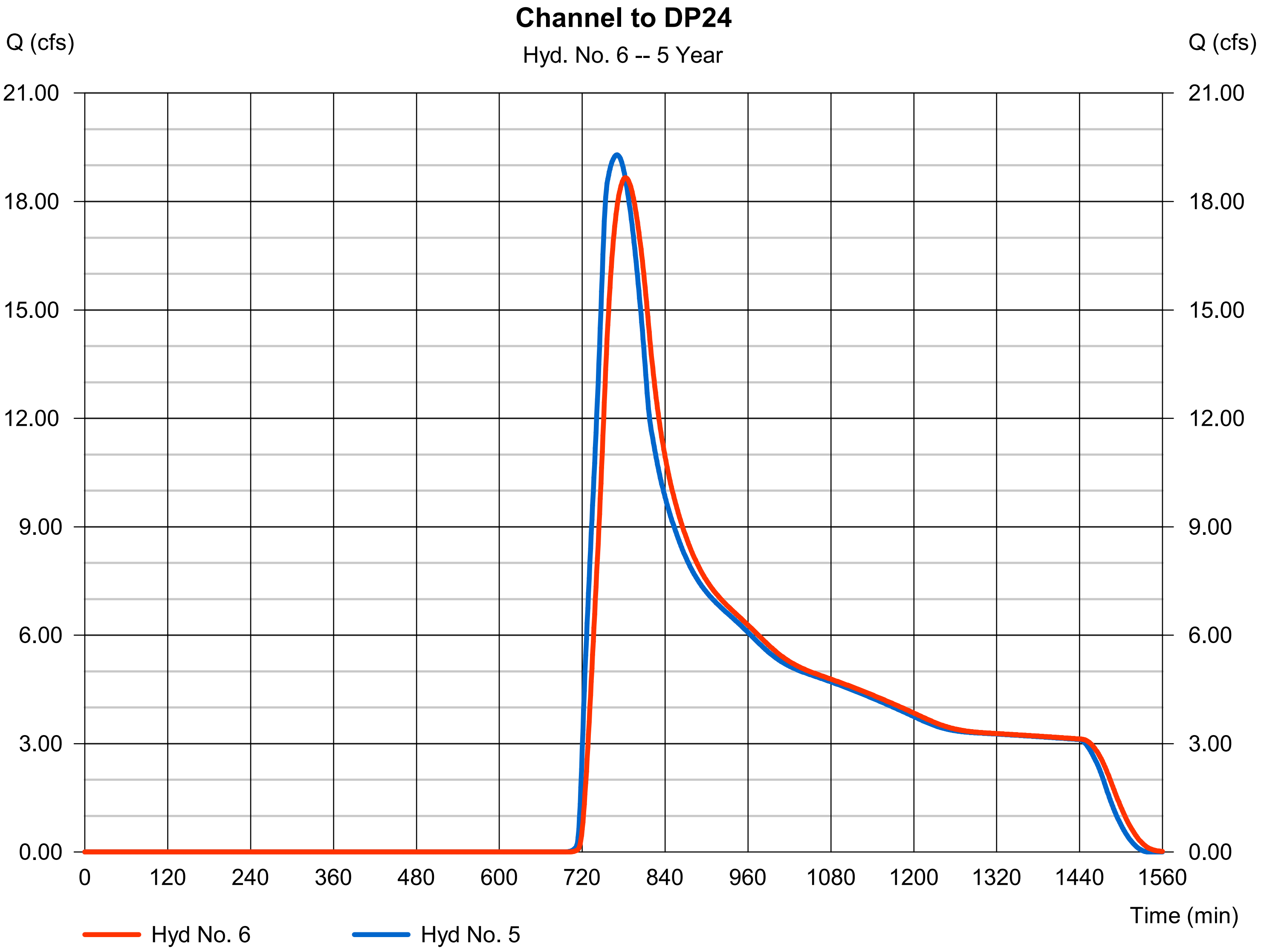
Hydrograph Report

Hyd. No. 6

Channel to DP24

Hydrograph type	= Reach	Peak discharge	= 18.66 cfs
Storm frequency	= 5 yrs	Time to peak	= 783 min
Time interval	= 1 min	Hyd. volume	= 279,759 cuft
Inflow hyd. No.	= 5 - DP11	Section type	= Trapezoidal
Reach length	= 1976.0 ft	Channel slope	= 0.8 %
Manning's n	= 0.030	Bottom width	= 8.0 ft
Side slope	= 4.0:1	Max. depth	= 3.3 ft
Rating curve x	= 1.110	Rating curve m	= 1.349
Ave. velocity	= 0.00 ft/s	Routing coeff.	= 0.0909

Modified Att-Kin routing method used.



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

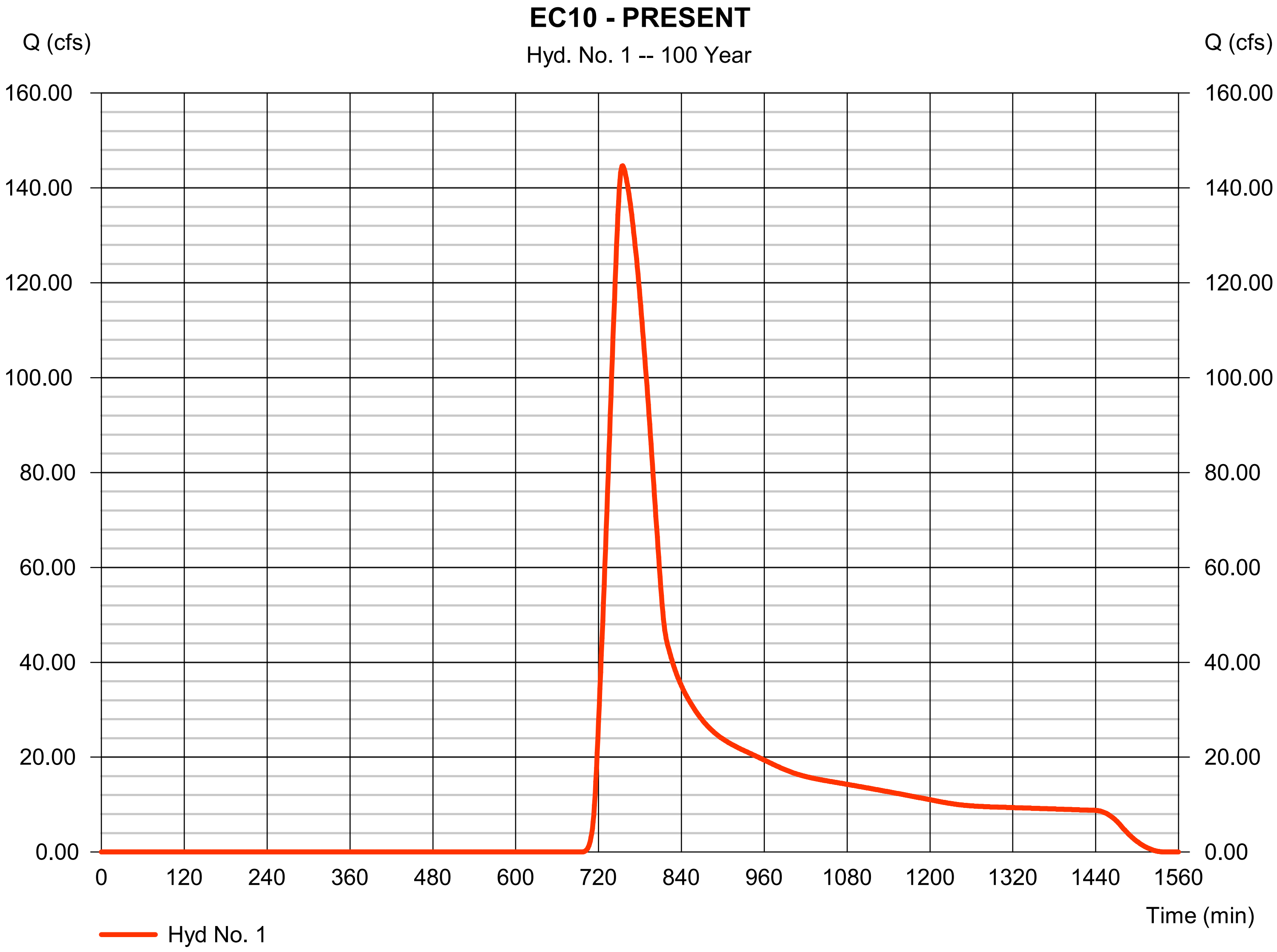
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	144.67	1	755	1,185,497	------	------	------	EC10 - PRESENT
2	SCS Runoff	4.333	1	733	18,356	------	------	------	OS-1
3	SCS Runoff	2.846	1	735	14,479	------	------	------	E1
4	SCS Runoff	12.23	1	723	36,723	------	------	------	BASIN D1.5
5	Combine	150.44	1	754	1,255,054	1, 2, 3, 4	------	------	DP11
6	Reach	144.76	1	762	1,255,052	5	------	------	Channel to DP24

Hydrograph Report

Hyd. No. 1

EC10 - PRESENT

Hydrograph type	= SCS Runoff	Peak discharge	= 144.67 cfs
Storm frequency	= 100 yrs	Time to peak	= 755 min
Time interval	= 1 min	Hyd. volume	= 1,185,497 cuft
Drainage area	= 320.000 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 63.00 min
Total precip.	= 4.40 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

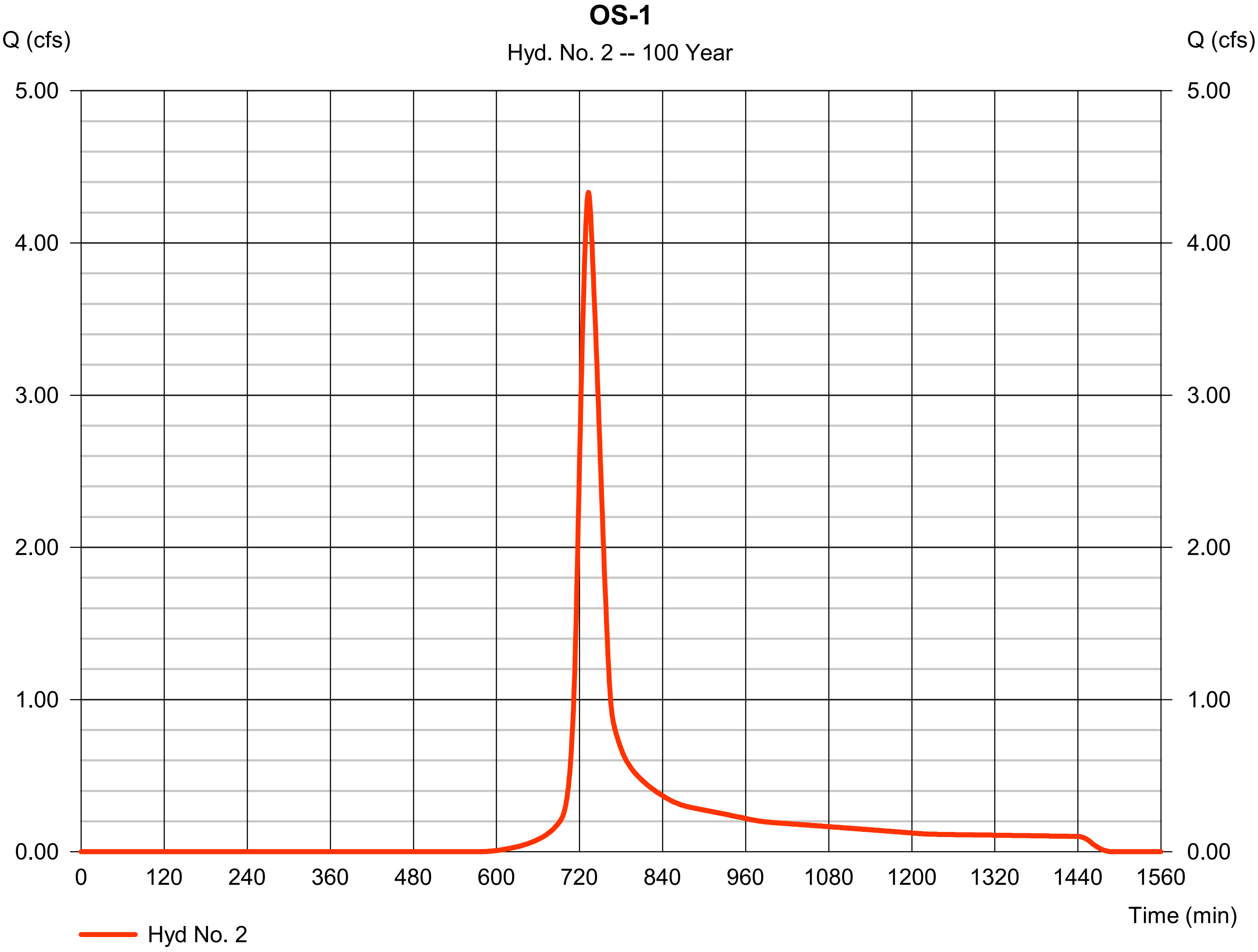


Hydrograph Report

Hyd. No. 2

OS-1

Hydrograph type	= SCS Runoff	Peak discharge	= 4.333 cfs
Storm frequency	= 100 yrs	Time to peak	= 733 min
Time interval	= 1 min	Hyd. volume	= 18,356 cuft
Drainage area	= 2.650 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 32.10 min
Total precip.	= 4.40 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



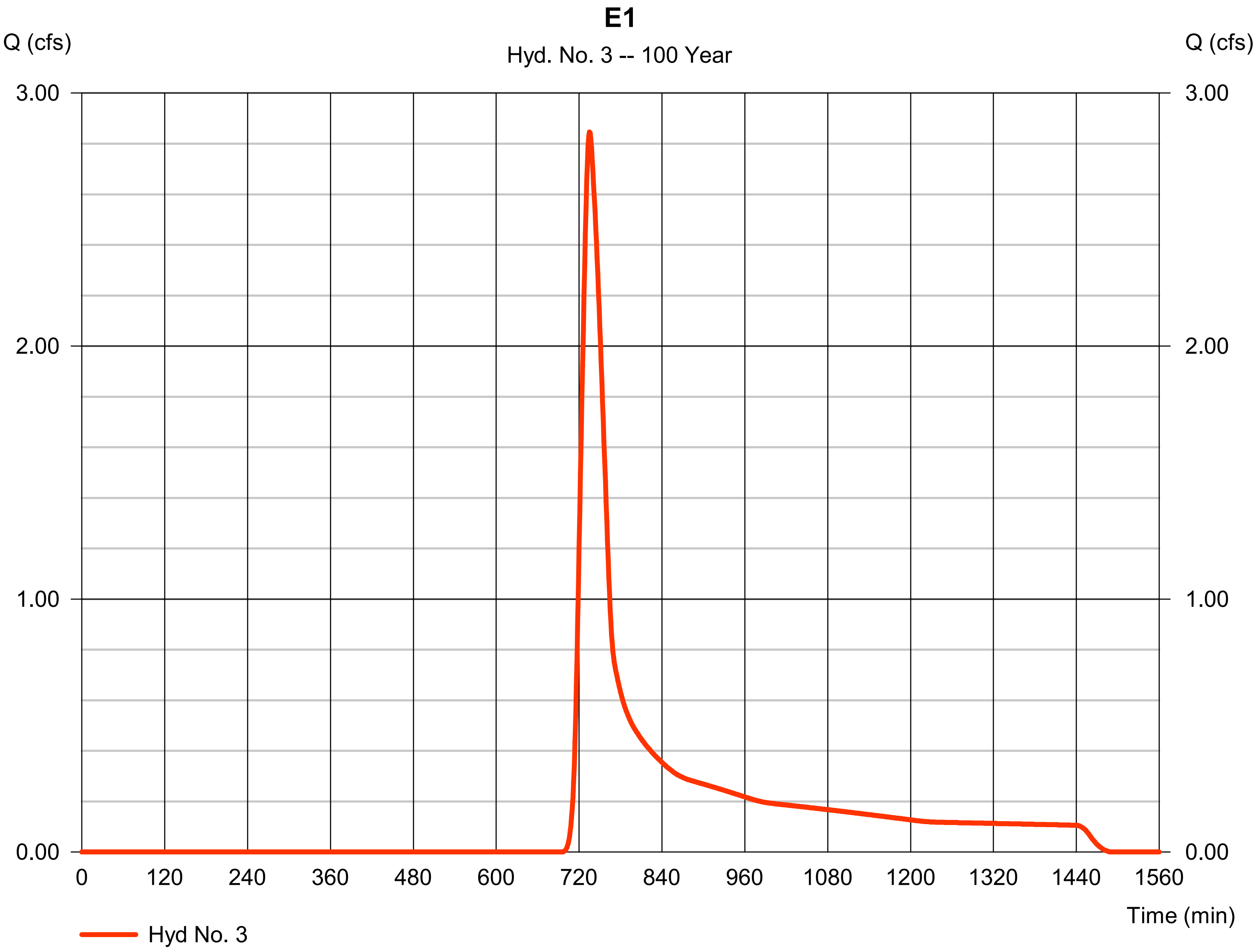
Hydrograph Report

Hyd. No. 3

E1

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Time interval = 1 min
Drainage area = 3.920 ac
Basin Slope = 0.0 %
Tc method = TR55
Total precip. = 4.40 in
Storm duration = 24 hrs

Peak discharge = 2.846 cfs
Time to peak = 735 min
Hyd. volume = 14,479 cuft
Curve number = 61
Hydraulic length = 0 ft
Time of conc. (Tc) = 32.50 min
Distribution = Type II
Shape factor = 484

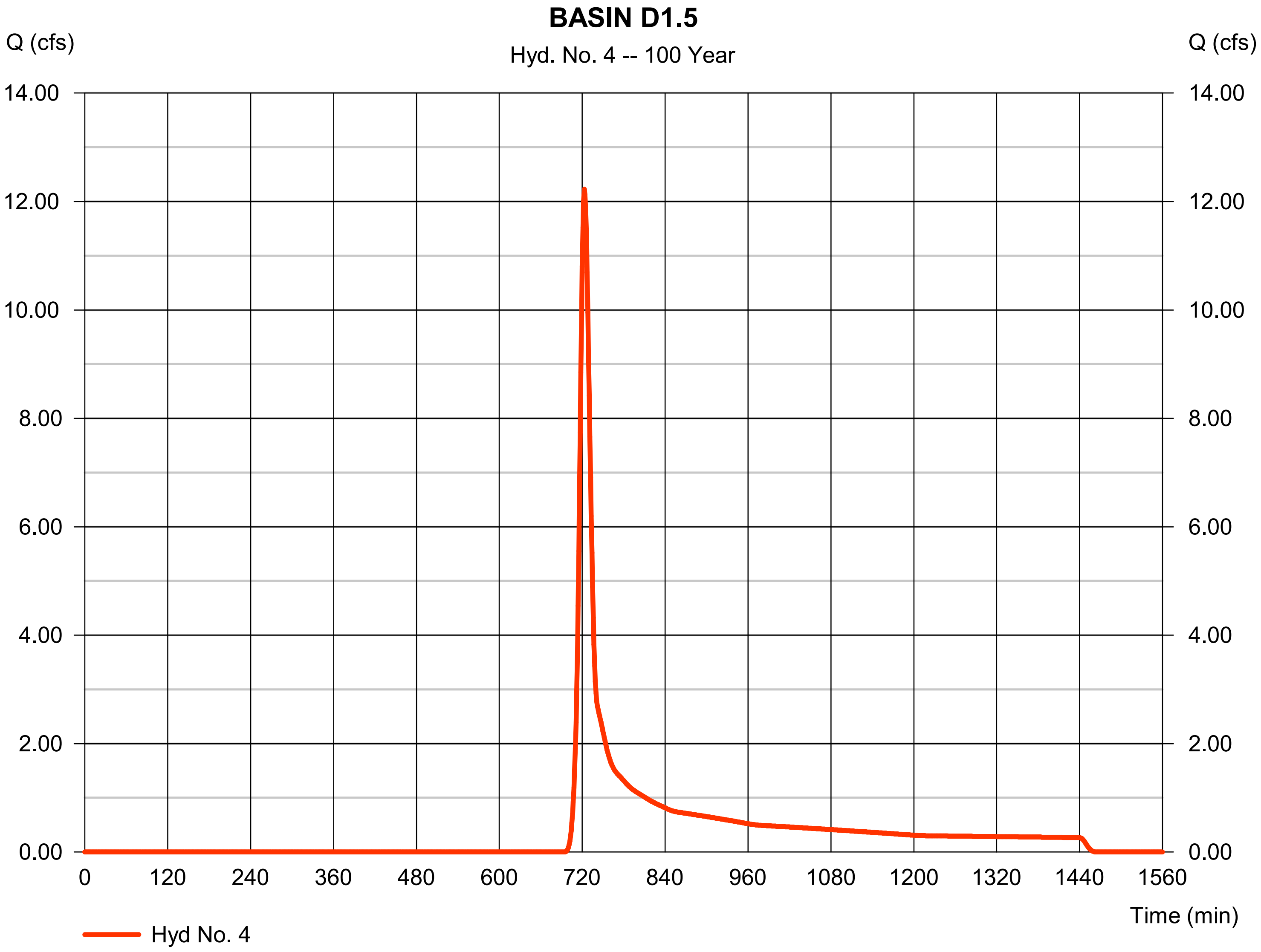


Hydrograph Report

Hyd. No. 4

BASIN D1.5

Hydrograph type	= SCS Runoff	Peak discharge	= 12.23 cfs
Storm frequency	= 100 yrs	Time to peak	= 723 min
Time interval	= 1 min	Hyd. volume	= 36,723 cuft
Drainage area	= 9.880 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 14.00 min
Total precip.	= 4.40 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

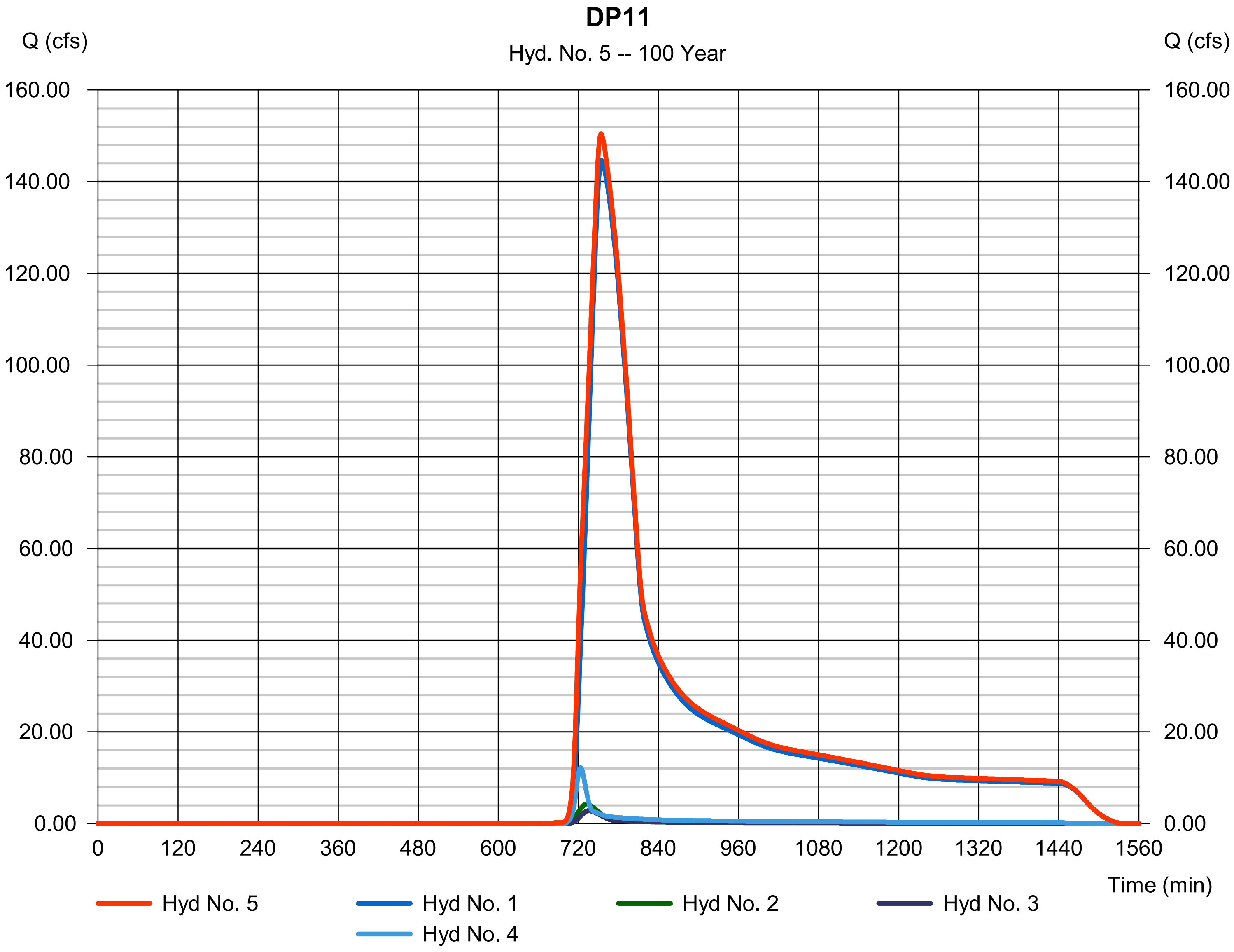


Hydrograph Report

Hyd. No. 5

DP11

Hydrograph type	= Combine	Peak discharge	= 150.44 cfs
Storm frequency	= 100 yrs	Time to peak	= 754 min
Time interval	= 1 min	Hyd. volume	= 1,255,054 cuft
Inflow hyds.	= 1, 2, 3, 4	Contrib. drain. area	= 336.450 ac



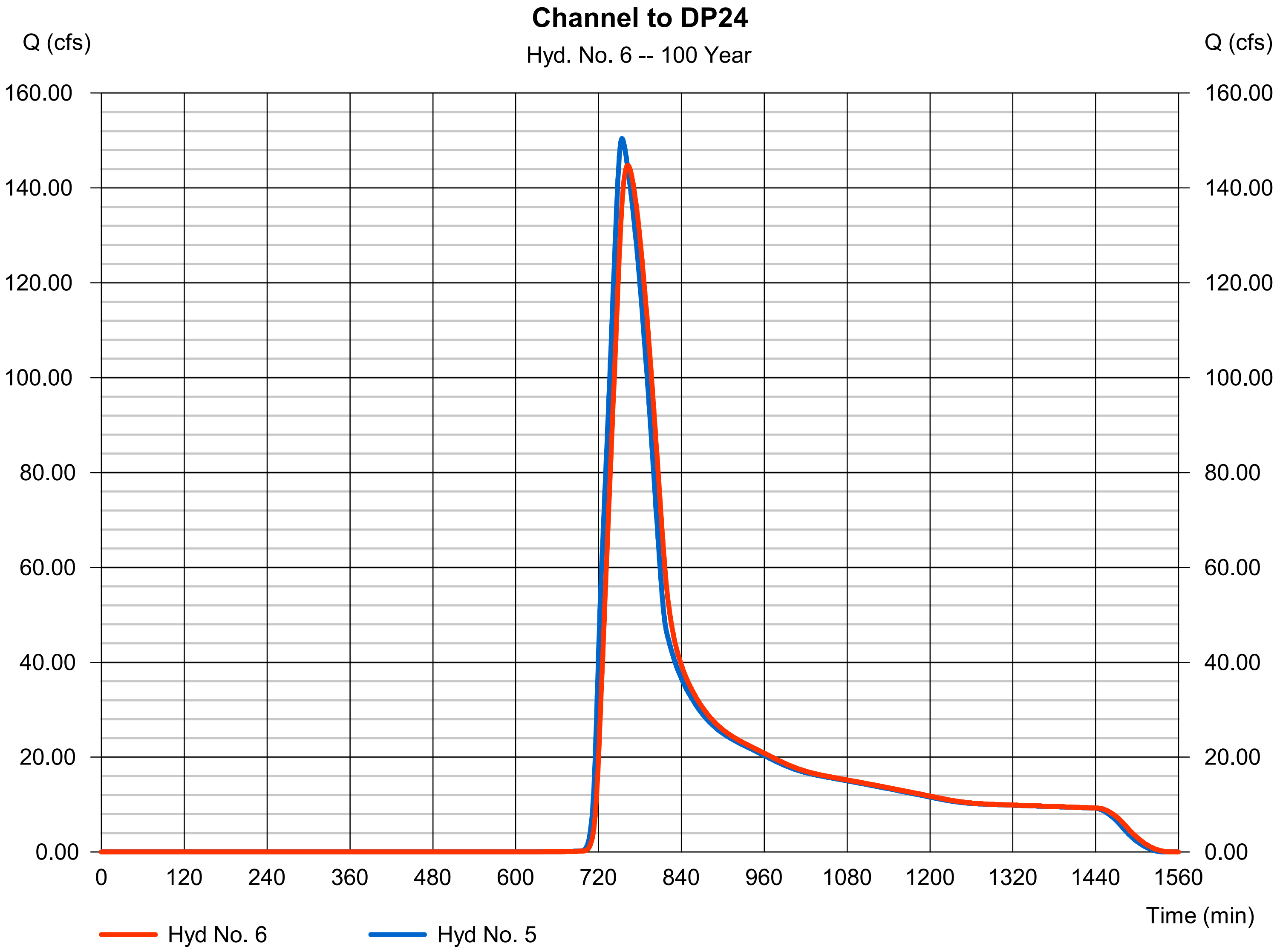
Hydrograph Report

Hyd. No. 6

Channel to DP24

Hydrograph type	= Reach	Peak discharge	= 144.76 cfs
Storm frequency	= 100 yrs	Time to peak	= 762 min
Time interval	= 1 min	Hyd. volume	= 1,255,052 cuft
Inflow hyd. No.	= 5 - DP11	Section type	= Trapezoidal
Reach length	= 1976.0 ft	Channel slope	= 0.8 %
Manning's n	= 0.030	Bottom width	= 8.0 ft
Side slope	= 4.0:1	Max. depth	= 3.3 ft
Rating curve x	= 1.110	Rating curve m	= 1.349
Ave. velocity	= 0.00 ft/s	Routing coeff.	= 0.1499

Modified Att-Kin routing method used.



Hydraflow Rainfall Report

Precip. file name: Sample.pcp

Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour		2.20		2.60				4.40

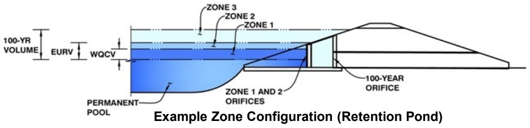
APPENDIX B - HYDRAULIC COMPUTATIONS

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)

Project: MAYBERRY FILING 3

Basin ID: INTERIM DETENTION POND D



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type = **EDB**
Watershed Area = 100.20 acres
Watershed Length = 2,867 ft
Watershed Length to Centroid = 1,433 ft
Watershed Slope = 0.010 ft/ft
Watershed Imperviousness = 23.00% percent
Percentage Hydrologic Soil Group A = 100.0% percent
Percentage Hydrologic Soil Group B = 0.0% percent
Percentage Hydrologic Soil Groups C/D = 0.0% percent
Target WQCV Drain Time = 40.0 hours
Location for 1-hr Rainfall Depths = User Input

After providing required inputs above including 1-hour rainfall depths, click 'Run CUHP' to generate runoff hydrographs using the embedded Colorado Urban Hydrograph Procedure.

			Optional User Overrides	
Water Quality Capture Volume (WQCV) =	1.065	acre-feet		acre-feet
Excess Urban Runoff Volume (EURV) =	2.138	acre-feet		acre-feet
2-yr Runoff Volume (P1 = 1.19 in.) =	1.404	acre-feet	1.19	inches
5-yr Runoff Volume (P1 = 1.5 in.) =	1.992	acre-feet	1.50	inches
10-yr Runoff Volume (P1 = 1.75 in.) =	2.522	acre-feet	1.75	inches
25-yr Runoff Volume (P1 = 2 in.) =	4.117	acre-feet	2.00	inches
50-yr Runoff Volume (P1 = 2.25 in.) =	5.623	acre-feet	2.25	inches
100-yr Runoff Volume (P1 = 2.52 in.) =	7.666	acre-feet	2.52	inches
500-yr Runoff Volume (P1 = 3.14 in.) =	12.108	acre-feet	3.14	inches
Approximate 2-yr Detention Volume =	1.329	acre-feet		
Approximate 5-yr Detention Volume =	1.785	acre-feet		
Approximate 10-yr Detention Volume =	2.259	acre-feet		
Approximate 25-yr Detention Volume =	2.902	acre-feet		
Approximate 50-yr Detention Volume =	3.440	acre-feet		
Approximate 100-yr Detention Volume =	4.428	acre-feet		

Define Zones and Basin Geometry

Zone 1 Volume (WQCV) = 1.065 acre-feet
Zone 2 Volume (EURV - Zone 1) = 1.073 acre-feet
Zone 3 (100yr + 1 / 2 WQCV - Zones 1 & 2) = 2.823 acre-feet
Total Detention Basin Volume = 4.961 acre-feet
Initial Surcharge Volume (ISV) = user ft^3
Initial Surcharge Depth (ISD) = user ft
Total Available Detention Depth (H_{total}) = user ft
Depth of Trickle Channel (H_{TC}) = user ft
Slope of Trickle Channel (S_{TC}) = user ft/ft
Slopes of Main Basin Sides (S_{main}) = user H:V
Basin Length-to-Width Ratio ($R_{L/W}$) = user

Initial Surcharge Area (A_{ISV}) = user ft^2
Surcharge Volume Length (L_{ISV}) = user ft
Surcharge Volume Width (W_{ISV}) = user ft
Depth of Basin Floor (H_{FLOOR}) = user ft
Length of Basin Floor (L_{FLOOR}) = user ft
Width of Basin Floor (W_{FLOOR}) = user ft
Area of Basin Floor (A_{FLOOR}) = user ft^2
Volume of Basin Floor (V_{FLOOR}) = user ft^3
Depth of Main Basin (H_{MAIN}) = user ft
Length of Main Basin (L_{MAIN}) = user ft
Width of Main Basin (W_{MAIN}) = user ft
Area of Main Basin (A_{MAIN}) = user ft^2
Volume of Main Basin (V_{MAIN}) = user ft^3
Calculated Total Basin Volume (V_{total}) = **user** acre-feet

Depth Increment = ft

Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool	--	0.00	--	--	--	170	0.004		
6027	--	1.00	--	--	--	3,344	0.077	1,757	0.040
6028	--	2.00	--	--	--	25,396	0.583	16,127	0.370
6029	--	3.00	--	--	--	50,286	1.154	53,968	1.239
6030	--	4.00	--	--	--	72,956	1.675	115,589	2.654
6031	--	5.00	--	--	--	95,393	2.190	199,763	4.586
6032	--	6.00	--	--	--	118,525	2.721	306,722	7.041
6033	--	7.00	--	--	--	141,085	3.239	436,527	10.021
6034	--	8.00	--	--	--	164,866	3.785	589,503	13.533
6035	--	9.00	--	--	--	191,669	4.400	767,770	17.626
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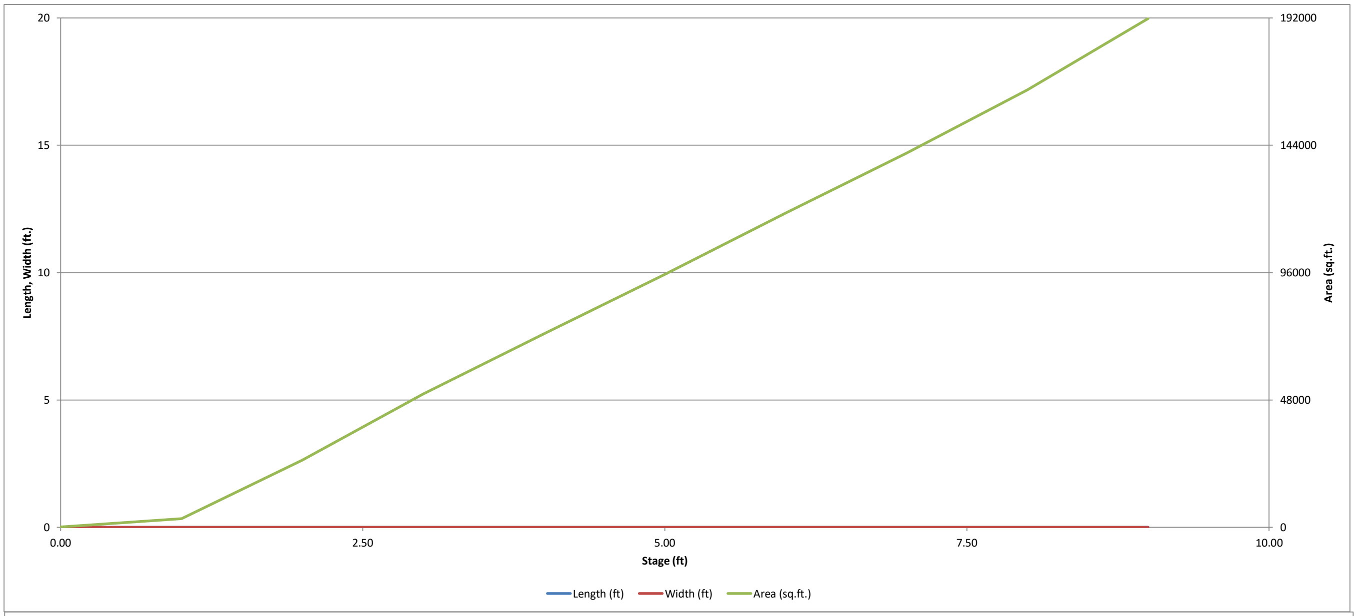
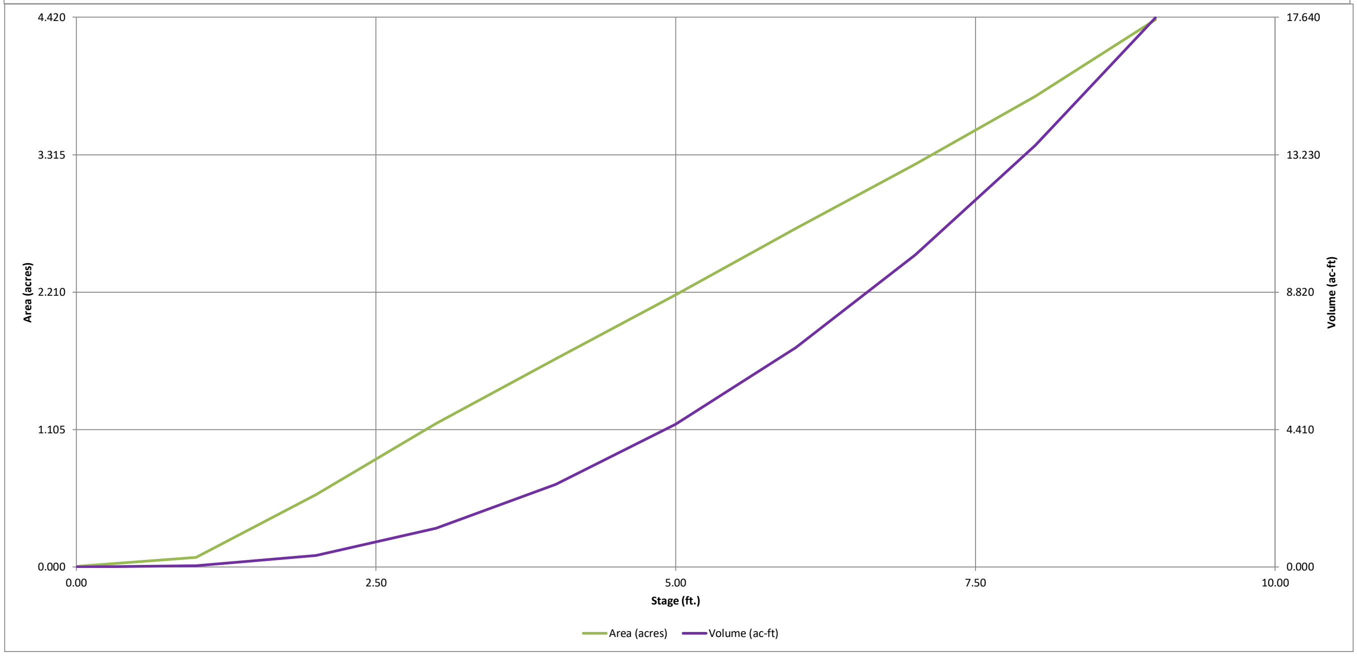
DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)

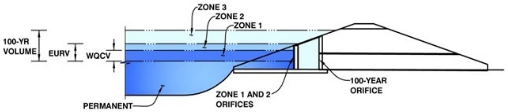




DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)

Project: MAYBERRY FILING 3
Basin ID: INTERIM DETENTION POND D



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	2.85	1.065	Orifice Plate
Zone 2 (EURV)	3.68	1.073	Orifice Plate
Z3 (100+1/2WQCV)	5.17	2.823	Weir&Pipe (Restrict)
Total (all zones)		4.961	

User Input: Orifice at Underdrain Outlet (typically used to drain WQCV in a Filtration BMP)

Underdrain Orifice Invert Depth =	N/A	ft (distance below the filtration media surface)
Underdrain Orifice Diameter =	N/A	inches

Calculated Parameters for Underdrain

Underdrain Orifice Area =	N/A	ft^2
Underdrain Orifice Centroid =	N/A	feet

User Input: Orifice Plate with one or more orifices or Elliptical Slot Weir (typically used to drain WQCV and/or EURV in a sedimentation BMP)

Centroid of Lowest Orifice =	0.00	ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Orifice Plate =	3.60	ft (relative to basin bottom at Stage = 0 ft)
Orifice Plate: Orifice Vertical Spacing =	14.40	inches
Orifice Plate: Orifice Area per Row =	N/A	sq. inches

Calculated Parameters for Plate

WQ Orifice Area per Row =	N/A	ft^2
Elliptical Half-Width =	N/A	feet
Elliptical Slot Centroid =	N/A	feet
Elliptical Slot Area =	N/A	ft^2

User Input: Stage and Total Area of Each Orifice Row (numbered from lowest to highest)

	Row 1 (required)	Row 2 (optional)	Row 3 (optional)	Row 4 (optional)	Row 5 (optional)	Row 6 (optional)	Row 7 (optional)	Row 8 (optional)
Stage of Orifice Centroid (ft)	0.00	1.20	2.40					
Orifice Area (sq. inches)	4.00	4.00	4.00					

	Row 9 (optional)	Row 10 (optional)	Row 11 (optional)	Row 12 (optional)	Row 13 (optional)	Row 14 (optional)	Row 15 (optional)	Row 16 (optional)
Stage of Orifice Centroid (ft)								
Orifice Area (sq. inches)								

User Input: Vertical Orifice (Circular or Rectangular)

	Not Selected	Not Selected	
Invert of Vertical Orifice =	N/A	N/A	ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Vertical Orifice =	N/A	N/A	ft (relative to basin bottom at Stage = 0 ft)
Vertical Orifice Diameter =	N/A	N/A	inches

Calculated Parameters for Vertical Orifice

	Not Selected	Not Selected	
Vertical Orifice Area =	N/A	N/A	ft^2
Vertical Orifice Centroid =	N/A	N/A	feet

User Input: Overflow Weir (Dropbox with Flat or Sloped Grate and Outlet Pipe OR Rectangular/Trapezoidal Weir and No Outlet Pipe)

	Zone 3 Weir	Not Selected	
Overflow Weir Front Edge Height, Ho =	5.50	N/A	ft (relative to basin bottom at Stage = 0 ft)
Overflow Weir Front Edge Length =	7.00	N/A	feet
Overflow Weir Grate Slope =	0.00	N/A	H:V
Horiz. Length of Weir Sides =	6.00	N/A	feet
Overflow Grate Type =	Type C Grate	N/A	
Debris Clogging % =	50%	N/A	%

Calculated Parameters for Overflow Weir

	Zone 3 Weir	Not Selected	
Height of Grate Upper Edge, H_t =	5.50	N/A	feet
Overflow Weir Slope Length =	6.00	N/A	feet
Grate Open Area / 100-yr Orifice Area =	6.46	N/A	
Overflow Grate Open Area w/o Debris =	29.23	N/A	ft^2
Overflow Grate Open Area w/ Debris =	14.62	N/A	ft^2

User Input: Outlet Pipe w/ Flow Restriction Plate (Circular Orifice, Restrictor Plate, or Rectangular Orifice)

	Zone 3 Restrictor	Not Selected	
Depth to Invert of Outlet Pipe =	0.00	N/A	ft (distance below basin bottom at Stage = 0 ft)
Outlet Pipe Diameter =	36.00	N/A	inches
Restrictor Plate Height Above Pipe Invert =	22.00		inches

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

	Zone 3 Restrictor	Not Selected	
Outlet Orifice Area =	4.53	N/A	ft^2
Outlet Orifice Centroid =	1.04	N/A	feet
Half-Central Angle of Restrictor Plate on Pipe =	1.79	N/A	radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage=	6.75	ft (relative to basin bottom at Stage = 0 ft)
Spillway Crest Length =	50.00	feet
Spillway End Slopes =	4.00	H:V
Freeboard above Max Water Surface =	1.00	feet

Calculated Parameters for Spillway

Spillway Design Flow Depth=	0.65	feet
Stage at Top of Freeboard =	8.40	feet
Basin Area at Top of Freeboard =	4.03	acres
Basin Volume at Top of Freeboard =	15.10	acre-ft

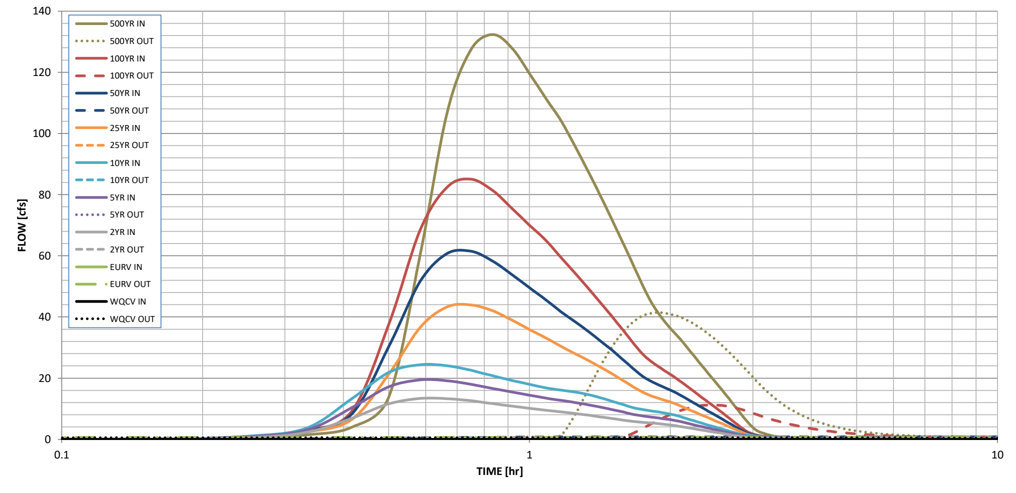
Routed Hydrograph Results

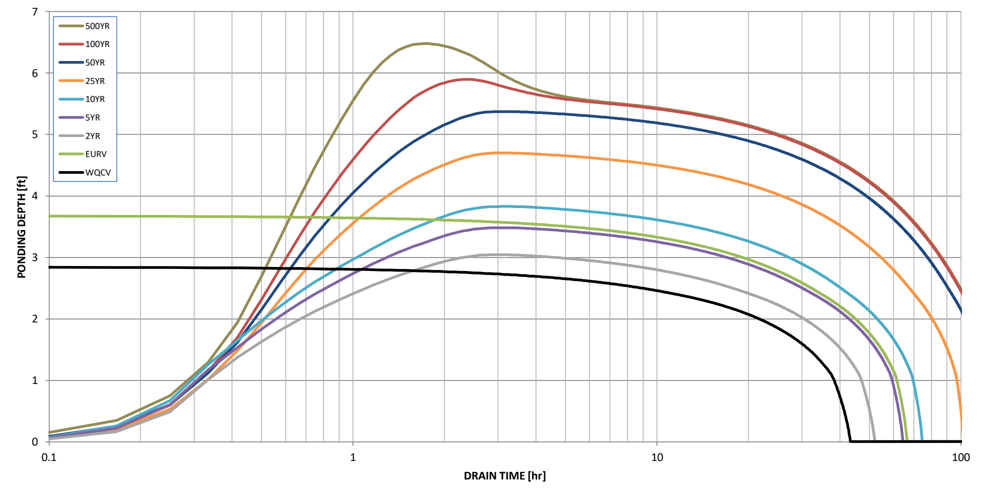
The user can override the default CUHP hydrographs and runoff volumes by entering new values in the Inflow Hydrographs table (Columns W through AF).

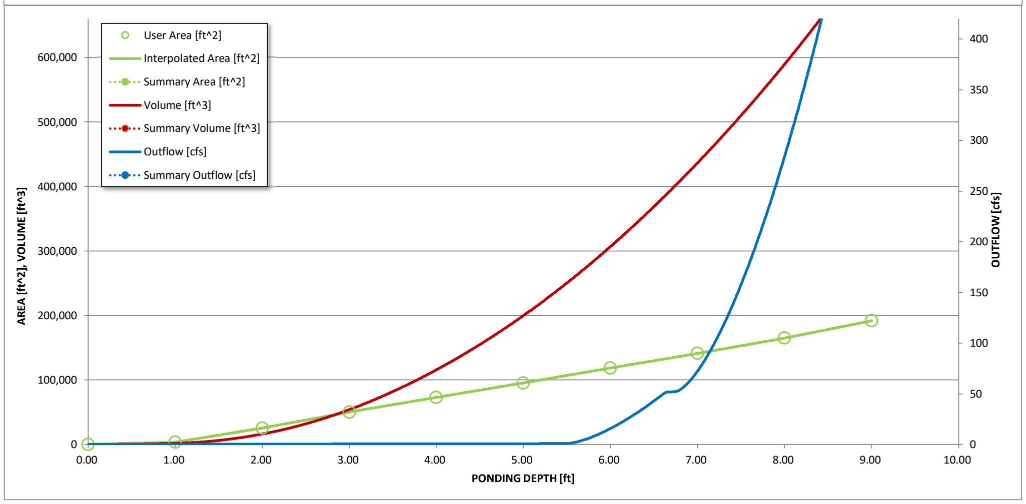
Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
One-Hour Rainfall Depth (in) =	N/A	N/A	1.19	1.50	1.75	2.00	2.25	2.52	3.14
CUHP Runoff Volume (acre-ft) =	1.065	2.138	1.404	1.992	2.522	4.117	5.623	7.666	12.108
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	1.404	1.992	2.522	4.117	5.623	7.666	12.108
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A	0.6	1.2	1.7	15.6	31.3	51.8	94.2
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A							
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	0.01	0.01	0.02	0.16	0.31	0.52	0.94
Peak Inflow Q (cfs) =	N/A	N/A	13.3	19.4	24.4	43.9	61.4	85.0	132.3
Peak Outflow Q (cfs) =	0.5	0.6	0.5	0.6	0.6	0.7	0.8	11.2	41.4
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	0.5	0.4	0.0	0.0	0.2	0.4
Structure Controlling Flow =	Plate	Plate	Plate	Plate	Plate	Plate	Plate	Overflow Weir 1	)verflow Weir
Max Velocity through Grate 1 (fps) =	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.3	1.4
Max Velocity through Grate 2 (fps) =	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Time to Drain 97% of Inflow Volume (hours) =	39	60	47	58	67	92	112	118	113
Time to Drain 99% of Inflow Volume (hours) =	**42**	64	50	62	71	97	119	>120	>120
Maximum Ponding Depth (ft) =	2.85	3.68	3.04	3.48	3.83	4.70	5.37	5.89	6.48
Area at Maximum Ponding Depth (acres) =	1.07	1.51	1.18	1.40	1.58	2.03	2.39	2.66	2.96
Maximum Volume Stored (acre-ft) =	1.072	2.144	1.286	1.853	2.361	3.932	5.433	6.745	8.377

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)







S-A-V-D Chart Axis Override	X-axis	Left Y-Axis	Right Y-Axis
minimum bound			
maximum bound			

DETENTION BASIN OUTLET STRUCTURE DESIGN

Outflow Hydrograph Workbook Filename:

Inflow Hydrographs

The user can override the calculated inflow hydrographs from this workbook with inflow hydrographs developed in a separate program.

	SOURCE	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP
Time Interval	TIME	WQCV [cfs]	EURV [cfs]	2 Year [cfs]	5 Year [cfs]	10 Year [cfs]	25 Year [cfs]	50 Year [cfs]	100 Year [cfs]	500 Year [cfs]
5.00 min	0:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.01	0.19
	0:15:00	0.00	0.00	0.52	0.84	1.05	0.71	0.93	0.88	1.40
	0:20:00	0.00	0.00	2.21	3.02	3.61	2.32	2.77	2.90	3.93
	0:25:00	0.00	0.00	6.84	10.28	13.24	6.42	8.22	9.22	13.63
	0:30:00	0.00	0.00	11.56	17.17	21.81	21.20	30.19	37.45	60.06
	0:35:00	0.00	0.00	13.31	19.38	24.37	36.53	51.53	68.30	106.83
	0:40:00	0.00	0.00	13.29	19.14	24.06	43.28	60.70	82.43	127.49
	0:45:00	0.00	0.00	12.57	17.98	22.51	43.90	61.45	85.01	132.35
	0:50:00	0.00	0.00	11.64	16.64	20.75	42.00	58.29	81.36	127.98
	0:55:00	0.00	0.00	10.85	15.49	19.26	38.96	53.86	75.47	119.59
	1:00:00	0.00	0.00	10.15	14.42	17.93	35.90	49.52	70.00	111.45
	1:05:00	0.00	0.00	9.52	13.44	16.79	33.17	45.60	65.06	104.31
	1:10:00	0.00	0.00	8.96	12.71	16.05	30.40	41.73	59.52	95.89
	1:15:00	0.00	0.00	8.42	12.03	15.46	27.99	38.44	54.32	87.69
	1:20:00	0.00	0.00	7.88	11.28	14.65	25.79	35.33	49.47	79.73
	1:25:00	0.00	0.00	7.34	10.49	13.59	23.60	32.22	44.70	71.79
	1:30:00	0.00	0.00	6.79	9.69	12.44	21.40	29.10	40.13	64.24
	1:35:00	0.00	0.00	6.27	8.93	11.32	19.25	26.03	35.71	56.97
	1:40:00	0.00	0.00	5.80	8.15	10.32	17.16	23.07	31.46	50.01
	1:45:00	0.00	0.00	5.49	7.60	9.69	15.30	20.46	27.72	44.02
	1:50:00	0.00	0.00	5.29	7.19	9.21	14.00	18.67	25.06	39.74
	1:55:00	0.00	0.00	5.01	6.80	8.75	13.02	17.30	23.03	36.32
	2:00:00	0.00	0.00	4.69	6.41	8.24	12.16	16.09	21.24	33.29
	2:05:00	0.00	0.00	4.29	5.88	7.55	11.14	14.71	19.36	30.22
	2:10:00	0.00	0.00	3.84	5.28	6.76	10.04	13.25	17.41	27.12
	2:15:00	0.00	0.00	3.41	4.68	5.99	8.96	11.81	15.51	24.13
	2:20:00	0.00	0.00	3.00	4.12	5.25	7.92	10.42	13.70	21.28
	2:25:00	0.00	0.00	2.62	3.58	4.55	6.93	9.09	11.97	18.58
	2:30:00	0.00	0.00	2.26	3.08	3.90	5.98	7.81	10.28	15.92
	2:35:00	0.00	0.00	1.91	2.59	3.29	5.05	6.56	8.62	13.31
	2:40:00	0.00	0.00	1.58	2.13	2.70	4.14	5.34	6.99	10.74
	2:45:00	0.00	0.00	1.26	1.69	2.14	3.27	4.15	5.39	8.22
	2:50:00	0.00	0.00	0.98	1.30	1.64	2.43	3.01	3.85	5.80
	2:55:00	0.00	0.00	0.77	1.02	1.32	1.68	2.01	2.50	3.79
	3:00:00	0.00	0.00	0.64	0.85	1.10	1.21	1.44	1.70	2.62
	3:05:00	0.00	0.00	0.54	0.72	0.93	0.94	1.11	1.26	1.90
	3:10:00	0.00	0.00	0.46	0.61	0.79	0.75	0.88	0.95	1.40
	3:15:00	0.00	0.00	0.39	0.51	0.67	0.61	0.71	0.74	1.04
	3:20:00	0.00	0.00	0.33	0.43	0.56	0.50	0.58	0.57	0.78
	3:25:00	0.00	0.00	0.28	0.36	0.47	0.41	0.47	0.44	0.57
	3:30:00	0.00	0.00	0.23	0.30	0.38	0.33	0.38	0.34	0.43
	3:35:00	0.00	0.00	0.19	0.24	0.31	0.27	0.30	0.28	0.35
	3:40:00	0.00	0.00	0.15	0.20	0.24	0.22	0.24	0.23	0.28
	3:45:00	0.00	0.00	0.12	0.15	0.19	0.17	0.19	0.18	0.22
	3:50:00	0.00	0.00	0.09	0.12	0.15	0.13	0.15	0.14	0.17
	3:55:00	0.00	0.00	0.07	0.09	0.11	0.10	0.11	0.10	0.13
	4:00:00	0.00	0.00	0.05	0.06	0.08	0.07	0.08	0.07	0.09
	4:05:00	0.00	0.00	0.03	0.04	0.05	0.05	0.05	0.05	0.06
	4:10:00	0.00	0.00	0.02	0.03	0.03	0.03	0.03	0.03	0.03
	4:15:00	0.00	0.00	0.01	0.01	0.02	0.01	0.02	0.01	0.02
	4:20:00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.00	0.00
	4:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

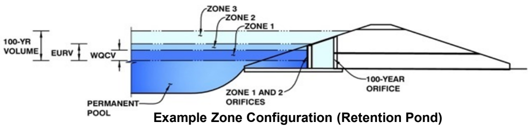
DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)

Project: **Mayberry Filing 3**

Basin ID: **Pond D** ULTIMATE CONDITION

ULTIMATE CONDITION IS INCLUDED TO PROJECT RELEASE RATES IN THE FULLY DEVELOPED CONDITION. DOWNSTREAM CHANNELS AND RIPRAP ARE SIZED FOR THESE RELEASE RATES



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type = **EDB**
Watershed Area = 100.20 acres
Watershed Length = 2,867 ft
Watershed Length to Centroid = 1,433 ft
Watershed Slope = 0.010 ft/ft
Watershed Imperviousness = 45.00% percent
Percentage Hydrologic Soil Group A = 100.0% percent
Percentage Hydrologic Soil Group B = 0.0% percent
Percentage Hydrologic Soil Groups C/D = 0.0% percent
Target WQCV Drain Time = 40.0 hours
Location for 1-hr Rainfall Depths = User Input

After providing required inputs above including 1-hour rainfall depths, click 'Run CUHP' to generate runoff hydrographs using the embedded Colorado Urban Hydrograph Procedure.

			Optional User Overrides	
Water Quality Capture Volume (WQCV) =	1.611	acre-feet		acre-feet
Excess Urban Runoff Volume (EURV) =	5.048	acre-feet		acre-feet
2-yr Runoff Volume (P1 = 1.19 in.) =	3.827	acre-feet	1.19	inches
5-yr Runoff Volume (P1 = 1.5 in.) =	5.115	acre-feet	1.50	inches
10-yr Runoff Volume (P1 = 1.75 in.) =	6.145	acre-feet	1.75	inches
25-yr Runoff Volume (P1 = 2 in.) =	7.908	acre-feet	2.00	inches
50-yr Runoff Volume (P1 = 2.25 in.) =	9.626	acre-feet	2.25	inches
100-yr Runoff Volume (P1 = 2.52 in.) =	11.845	acre-feet	2.52	inches
500-yr Runoff Volume (P1 = 3.14 in.) =	16.637	acre-feet	3.14	inches
Approximate 2-yr Detention Volume =	3.231	acre-feet		
Approximate 5-yr Detention Volume =	4.265	acre-feet		
Approximate 10-yr Detention Volume =	5.231	acre-feet		
Approximate 25-yr Detention Volume =	6.442	acre-feet		
Approximate 50-yr Detention Volume =	7.233	acre-feet		
Approximate 100-yr Detention Volume =	8.260	acre-feet		

Define Zones and Basin Geometry

Zone 1 Volume (WQCV) = 1.611 acre-feet
Zone 2 Volume (EURV - Zone 1) = 3.437 acre-feet
Zone 3 (100yr + 1 / 2 WQCV - Zones 1 & 2) = 4.018 acre-feet
Total Detention Basin Volume = 9.065 acre-feet
Initial Surcharge Volume (ISV) = user ft^3
Initial Surcharge Depth (ISD) = user ft
Total Available Detention Depth (H_{total}) = user ft
Depth of Trickle Channel (H_{TC}) = user ft
Slope of Trickle Channel (S_{TC}) = user ft/ft
Slopes of Main Basin Sides (S_{main}) = user H:V
Basin Length-to-Width Ratio ($R_{L/W}$) = user

Initial Surcharge Area (A_{ISV}) = user ft^2
Surcharge Volume Length (L_{ISV}) = user ft
Surcharge Volume Width (W_{ISV}) = user ft
Depth of Basin Floor (H_{FLOOR}) = user ft
Length of Basin Floor (L_{FLOOR}) = user ft
Width of Basin Floor (W_{FLOOR}) = user ft
Area of Basin Floor (A_{FLOOR}) = user ft^2
Volume of Basin Floor (V_{FLOOR}) = user ft^3
Depth of Main Basin (H_{MAIN}) = user ft
Length of Main Basin (L_{MAIN}) = user ft
Width of Main Basin (W_{MAIN}) = user ft
Area of Main Basin (A_{MAIN}) = user ft^2
Volume of Main Basin (V_{MAIN}) = user ft^3
Calculated Total Basin Volume (V_{total}) = **user** acre-feet

Depth Increement = ft

Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool	--	0.00	--	--	--	170	0.004		
6027	--	1.00	--	--	--	3,344	0.077	1,757	0.040
6028	--	2.00	--	--	--	25,396	0.583	16,127	0.370
6029	--	3.00	--	--	--	50,286	1.154	53,968	1.239
6030	--	4.00	--	--	--	72,956	1.675	115,589	2.654
6031	--	5.00	--	--	--	95,393	2.190	199,763	4.586
6032	--	6.00	--	--	--	118,525	2.721	306,722	7.041
6033	--	7.00	--	--	--	141,085	3.239	436,527	10.021
6034	--	8.00	--	--	--	164,866	3.785	589,503	13.533
6035	--	9.00	--	--	--	191,669	4.400	767,770	17.626
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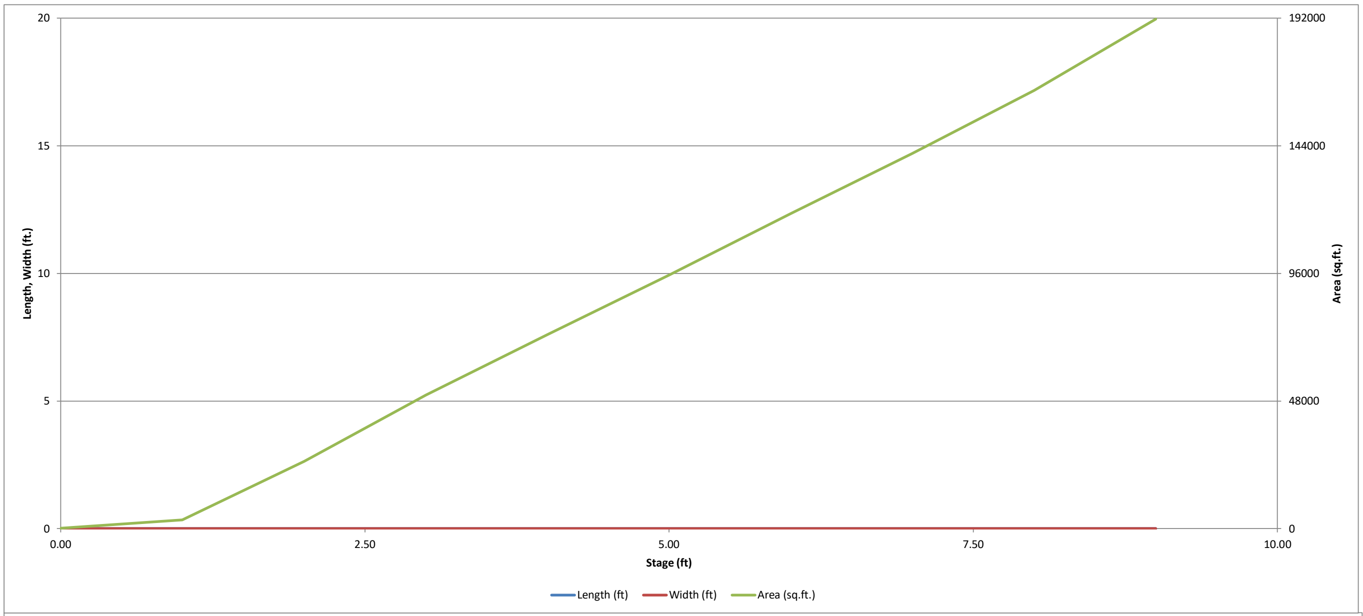
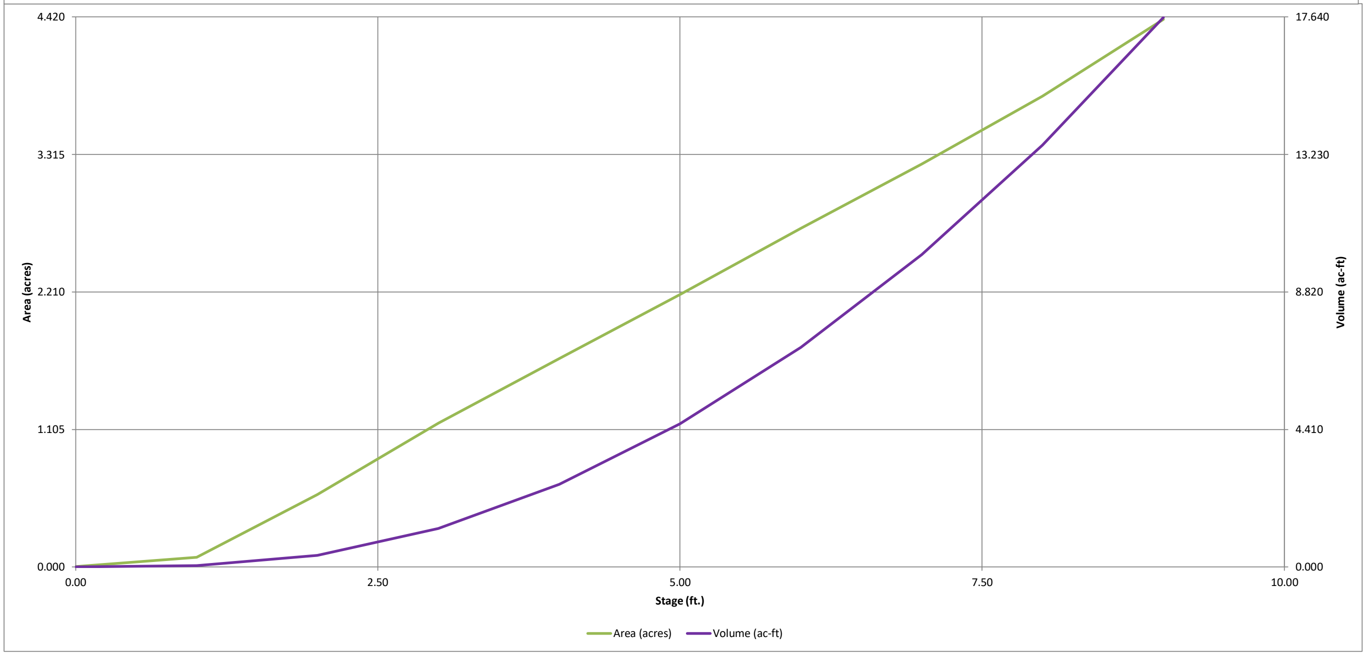
DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)



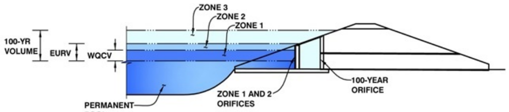


ULTIMATE CONDITION IS INCLUDED TO PROJECT RELEASE RATES IN THE FULLY DEVELOPED CONDITION. DOWNSTREAM CHANNELS AND RIPRAP ARE SIZED FOR THESE RELEASE RATES

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)

Project: Mayberry Filing 3
Basin ID: Pond D



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	3.31	1.611	Orifice Plate
Zone 2 (EURV)	5.21	3.437	Orifice Plate
Z3 (100+1/2WQCV)	6.70	4.018	Weir&Pipe (Restrict)
Total (all zones)		9.065	

User Input: Orifice at Underdrain Outlet (typically used to drain WQCV in a Filtration BMP)

Underdrain Orifice Invert Depth = N/A ft (distance below the filtration media surface)
Underdrain Orifice Diameter = N/A inches

Calculated Parameters for Underdrain

Underdrain Orifice Area = N/A ft^2
Underdrain Orifice Centroid = N/A feet

User Input: Orifice Plate with one or more orifices or Elliptical Slot Weir (typically used to drain WQCV and/or EURV in a sedimentation BMP)

Centroid of Lowest Orifice = 0.00 ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Orifice Plate = 4.97 ft (relative to basin bottom at Stage = 0 ft)
Orifice Plate: Orifice Vertical Spacing = N/A inches
Orifice Plate: Orifice Area per Row = N/A sq. inches

Calculated Parameters for Plate

WQ Orifice Area per Row = N/A ft^2
Elliptical Half-Width = N/A feet
Elliptical Slot Centroid = N/A feet
Elliptical Slot Area = N/A ft^2

User Input: Stage and Total Area of Each Orifice Row (numbered from lowest to highest)

	Row 1 (required)	Row 2 (optional)	Row 3 (optional)	Row 4 (optional)	Row 5 (optional)	Row 6 (optional)	Row 7 (optional)	Row 8 (optional)
Stage of Orifice Centroid (ft)	0.00	1.66	3.30					
Orifice Area (sq. inches)	6.00	8.30	8.30					

	Row 9 (optional)	Row 10 (optional)	Row 11 (optional)	Row 12 (optional)	Row 13 (optional)	Row 14 (optional)	Row 15 (optional)	Row 16 (optional)
Stage of Orifice Centroid (ft)								
Orifice Area (sq. inches)								

User Input: Vertical Orifice (Circular or Rectangular)

	Not Selected	Not Selected	
Invert of Vertical Orifice =	N/A	N/A	ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Vertical Orifice =	N/A	N/A	ft (relative to basin bottom at Stage = 0 ft)
Vertical Orifice Diameter =	N/A	N/A	inches

Calculated Parameters for Vertical Orifice

	Not Selected	Not Selected	
Vertical Orifice Area =	N/A	N/A	ft^2
Vertical Orifice Centroid =	N/A	N/A	feet

User Input: Overflow Weir (Dropbox with Flat or Sloped Grate and Outlet Pipe OR Rectangular/Trapezoidal Weir and No Outlet Pipe)

	Zone 3 Weir	Not Selected	
Overflow Weir Front Edge Height, Ho =	5.50	N/A	ft (relative to basin bottom at Stage = 0 ft)
Overflow Weir Front Edge Length =	7.00	N/A	feet
Overflow Weir Grate Slope =	0.00	N/A	H:V
Horiz. Length of Weir Sides =	6.00	N/A	feet
Overflow Grate Type =	Type C Grate	N/A	
Debris Clogging % =	50%	N/A	%

Calculated Parameters for Overflow Weir

	Zone 3 Weir	Not Selected	
Height of Grate Upper Edge, H_t =	5.50	N/A	feet
Overflow Weir Slope Length =	6.00	N/A	feet
Grate Open Area / 100-yr Orifice Area =	8.51	N/A	
Overflow Grate Open Area w/o Debris =	29.23	N/A	ft^2
Overflow Grate Open Area w/ Debris =	14.62	N/A	ft^2

User Input: Outlet Pipe w/ Flow Restriction Plate (Circular Orifice, Restrictor Plate, or Rectangular Orifice)

	Zone 3 Restrictor	Not Selected	
Depth to Invert of Outlet Pipe =	0.00	N/A	ft (distance below basin bottom at Stage = 0 ft)
Outlet Pipe Diameter =	36.00	N/A	inches
Restrictor Plate Height Above Pipe Invert =	17.60		inches

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

	Zone 3 Restrictor	Not Selected	
Outlet Orifice Area =	3.43	N/A	ft^2
Outlet Orifice Centroid =	0.85	N/A	feet
Half-Central Angle of Restrictor Plate on Pipe =	1.55	N/A	radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage= 6.75 ft (relative to basin bottom at Stage = 0 ft)
Spillway Crest Length = 50.00 feet
Spillway End Slopes = 4.00 H:V
Freeboard above Max Water Surface = 1.00 feet

Calculated Parameters for Spillway

Spillway Design Flow Depth= 0.97 feet
Stage at Top of Freeboard = 8.72 feet
Basin Area at Top of Freeboard = 4.22 acres
Basin Volume at Top of Freeboard = 16.38 acre-ft

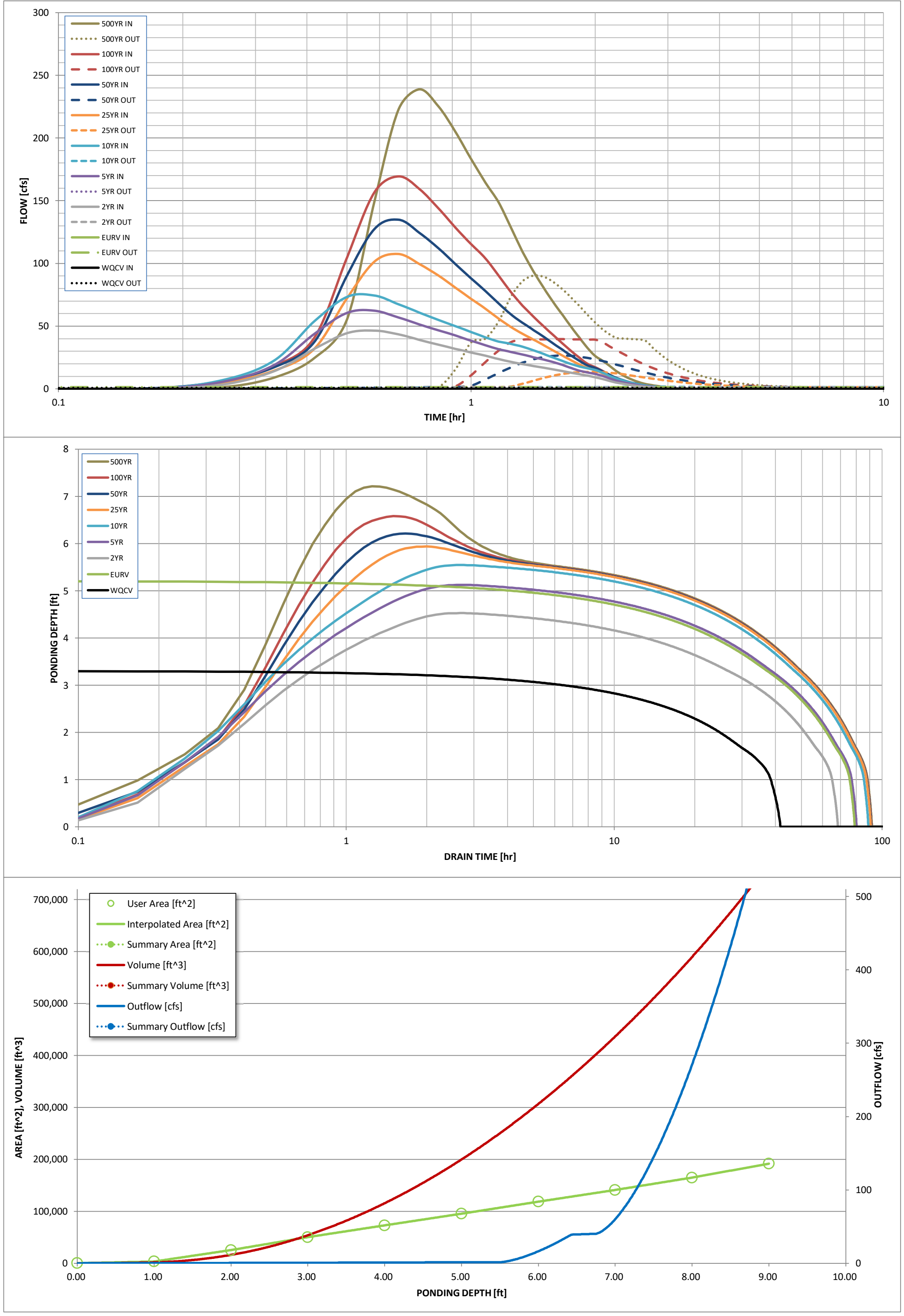
Routed Hydrograph Results

The user can override the default CUHP hydrographs and runoff volumes by entering new values in the Inflow Hydrographs table (Columns W through AF).

Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
One-Hour Rainfall Depth (in) =	N/A	N/A	1.19	1.50	1.75	2.00	2.25	2.52	3.14
CUHP Runoff Volume (acre-ft) =	1.611	5.048	3.827	5.115	6.145	7.908	9.626	11.845	16.637
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	3.827	5.115	6.145	7.908	9.626	11.845	16.637
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A	0.6	1.2	1.7	15.6	31.3	51.8	94.2
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A							
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	0.01	0.01	0.02	0.16	0.31	0.52	0.94
Peak Inflow Q (cfs) =	N/A	N/A	46.5	62.3	74.4	107.5	134.9	169.4	238.9
Peak Outflow Q (cfs) =	0.7	1.4	1.2	1.3	1.82	13.5	26.6	39.6	90.2
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	1.1	1.1	0.9	0.9	0.8	1.0
Structure Controlling Flow =	Plate	Plate	Plate	Plate	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Outlet Plate 1	Spillway
Max Velocity through Grate 1 (fps) =	N/A	N/A	N/A	N/A	0.0	0.4	0.9	1.3	1.4
Max Velocity through Grate 2 (fps) =	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Time to Drain 97% of Inflow Volume (hours) =	38	70	61	71	78	78	77	75	72
Time to Drain 99% of Inflow Volume (hours) =	**40**	75	65	77	85	85	85	84	82
Maximum Ponding Depth (ft) =	3.31	5.21	4.53	5.12	5.54	5.94	6.21	6.58	7.21
Area at Maximum Ponding Depth (acres) =	1.32	2.30	1.94	2.25	2.48	2.68	2.82	3.02	3.35
Maximum Volume Stored (acre-ft) =	1.622	5.058	3.594	4.853	5.846	6.852	7.596	8.676	10.713

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)



S-A-V-D Chart Axis Override	X-axis	Left Y-Axis	Right Y-Axis
minimum bound			
maximum bound			

R&R Engineers-Surveyors

Mayberry Filing 3

MC22110

12/30/2022

Extended Detention Basin Interim Condition - Forebay 1 Sizing Calculations (DP21)

SEDIMENT FOREBAY SIZING		
Contributing Tributary Area	47.90	AC
Imperviousness	33.0%	
Contributing Area WQCV	0.161	watershed inches
Required WQCV	0.641 27,909	AC-ft ft^3
Contributing Impervious Acres	> 20 Acres	
Req. % of WQCV	3%	
Minimum Forebay Volume	837	ft^3
Maximum Forebay Depth	2.5	ft
Provided Forebay Depth	1.00	ft
Provided Forebay Volume	1,360	ft^3

FOREBAY RELEASE RATE CALCULATIONS - Restrictor Plate			
Depth from Notch Bottom to Top of Restrictor Plate	0.50	H (ft)	0.41
Notch Width	0.67	W (ft)	UD-BMP for Forebay 1 calculates a 9.1" notch MHFD weir calc: W=Qf/(3.33*(Df/12)^1.5)*12+0.2*Df
Undetained 100-Year Peak Flow	93.3	cfs	
Required Outlet Flow (q)	1.9	cfs	
Provided Max Outlet Flow	1.7	cfs	$Q = CA(2gH)^{0.5}$,

R&R Engineers-Surveyors

Mayberry Filing 3

MC22110

12/30/2022

Extended Detention Basin Fully Developed - Forebay 1 Sizing Calculations

SEDIMENT FOREBAY SIZING		
Contributing Tributary Area	47.90	AC
Imperviousness	57.0%	
Contributing Area WQCV	0.226	watershed inches
Required WQCV	0.904	AC-ft
	39,382	ft^3
Contributing Impervious Acres	> 20 Acres	
Req. % of WQCV	3%	
Minimum Forebay Volume	1,181	ft^3
Maximum Forebay Depth	2.5	ft
Provided Forebay Depth	1.00	ft
Provided Forebay Volume	1,360	ft^3

FOREBAY RELEASE RATE CALCULATIONS			
Notch Width	0.67	ft	UD-BMP for Forebay 1 calculates a 11.2" notch
Undetained 100-Year Peak Flow	121.6	cfs	
Required Outlet Flow (q)	2.4	cfs	
Provided Max Outlet Flow	2.1	cfs	* From Hydraflow Express

R&R Engineers-Surveyors

Mayberry Filing 3

MC22110

12/30/2022

Extended Detention Basin Interim Condition - Forebay 2 Sizing Calculations (DP20)

SEDIMENT FOREBAY SIZING		
Contributing Tributary Area	49.10	AC
Imperviousness	16.0%	
Contributing Area WQCV	0.098	watershed inches
Required WQCV	0.401	AC-ft
	17,478	ft^3
Contributing Impervious Acres	5-20 Acres	
Req. % of WQCV	3%	
Minimum Forebay Volume	524	ft^3
Maximum Forebay Depth	2.5	ft
Provided Forebay Depth	1.00	ft
Provided Forebay Volume	1,370	ft^3

FOREBAY RELEASE RATE CALCULATIONS - Restrictor Plate			
Depth from Notch Bottom to Top of Restrictor Plate	0.50	H (ft)	0.41
Notch Width	0.67	W (ft)	UD-BMP for Forebay 2 calculates a 8.8" notch
Undetained 100-Year Peak Flow	88.6	cfs	
Required Outlet Flow (q)	1.8	cfs	
Provided Max Outlet Flow	1.7	cfs	$Q = CA(2gH)^{0.5}$,

Weir Report

Forebay 1 and 2 Weir Notch - Full Development

Rectangular Weir

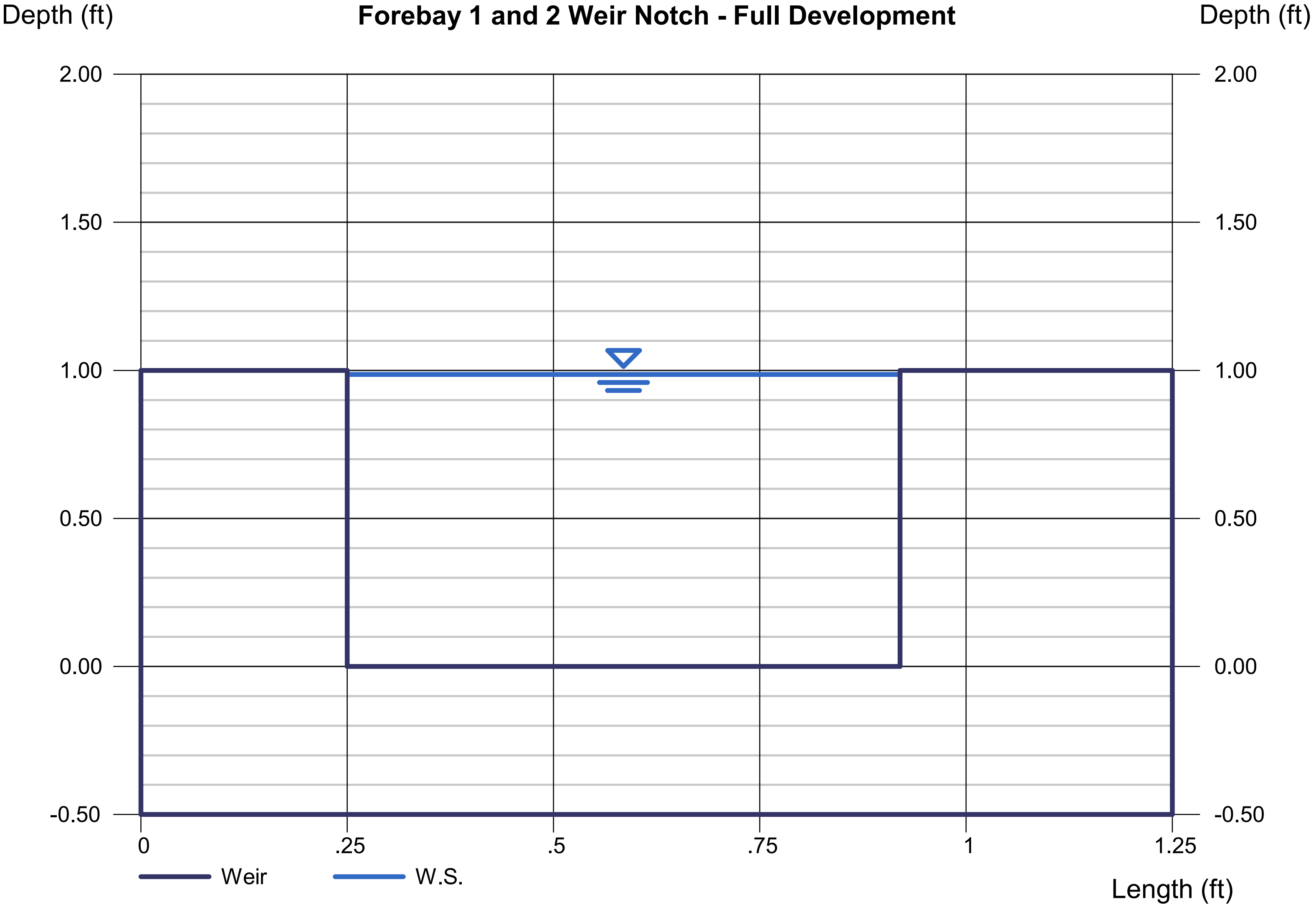
Crest = Sharp
Bottom Length (ft) = 0.67
Total Depth (ft) = 1.00

Calculations

Weir Coeff. Cw = 3.20
Compute by: Known Q
Known Q (cfs) = 2.10

Highlighted

Depth (ft) = 0.99
Q (cfs) = 2.100
Area (sqft) = 0.66
Velocity (ft/s) = 3.18
Top Width (ft) = 0.67



R&R Engineers-Surveyors

Mayberry Filing 3

MC22110

12/30/2022

Extended Detention Basin Fully Developed - Forebay 2 Sizing Calculations

SEDIMENT FOREBAY SIZING		
Contributing Tributary Area	49.10	AC
Imperviousness	32.0%	
Contributing Area WQCV	0.158	watershed inches
Required WQCV	0.645	AC-ft
	28,083	ft^3
Contributing Impervious Acres	5-20 Acres	
Req. % of WQCV	3%	
Minimum Forebay Volume	842	ft^3
Maximum Forebay Depth	2.5	ft
Provided Forebay Depth	1.00	ft
Provided Forebay Volume	1,370	ft^3

FOREBAY RELEASE RATE CALCULATIONS			
Notch Width	0.67	ft	UD-BMP for Forebay 2 calculates a 10" notch
Undetained 100-Year Peak Flow	105.0	cfs	
Required Outlet Flow (q)	2.1	cfs	
Provided Max Outlet Flow	2.1	cfs	* From Hydraflow Express

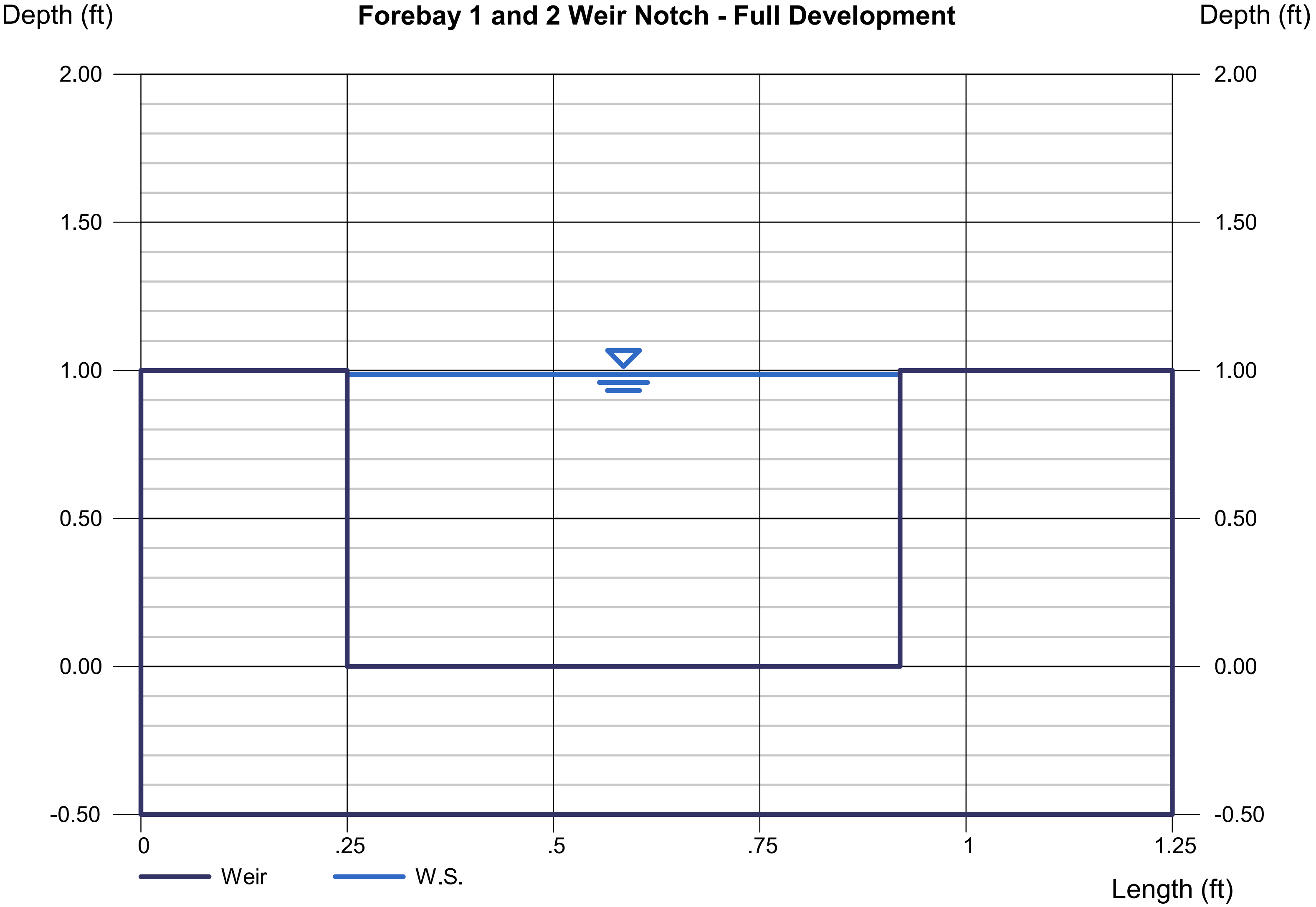
Weir Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Friday, Dec 30 2022

Forebay 1 and 2 Weir Notch - Full Development

Rectangular Weir	
Crest	= Sharp
Bottom Length (ft)	= 0.67
Total Depth (ft)	= 1.00
Calculations	
Weir Coeff. Cw	= 3.20
Compute by:	Known Q
Known Q (cfs)	= 2.10

Highlighted	
Depth (ft)	= 0.99
Q (cfs)	= 2.100
Area (sqft)	= 0.66
Velocity (ft/s)	= 3.18
Top Width (ft)	= 0.67



Design Procedure Form: Extended Detention Basin (EDB)

UD-BMP (Version 3.07, March 2018)

Sheet 1 of 3

Designer: **ESJ**

Company: **R&R ENGINEERS**

Date: **December 30, 2022**

Project: **Mayberry, Colorado Springs**

Location: **Detention Basin D - Interim**

1. Basin Storage Volume

A) Effective Imperviousness of Tributary Area, I_a — I_a = 23.0 %

B) Tributary Area's Imperviousness Ratio ($i = I_a / 100$) — i = 0.230

C) Contributing Watershed Area — Area = 100.200 ac

D) For Watersheds Outside of the Denver Region, Depth of Average Runoff Producing Storm — d_6 = in

E) Design Concept
(Select EURV when also designing for flood control)

Choose One
○ Water Quality Capture Volume (WQCV)
● Excess Urban Runoff Volume (EURV)

F) Design Volume (WQCV) Based on 40-hour Drain Time
($V_{DESIGN} = (1.0 * (0.91 * i^3 - 1.19 * i^2 + 0.78 * i) / 12 * Area$) — V_{DESIGN}= 1.065 ac-ft

G) For Watersheds Outside of the Denver Region,
Water Quality Capture Volume (WQCV) Design Volume
($V_{WQCV\ OTHER} = (d_6*(V_{DESIGN}/0.43))$) — $V_{DESIGN\ OTHER}$= ac-ft

H) User Input of Water Quality Capture Volume (WQCV) Design Volume
(Only if a different WQCV Design Volume is desired) — $V_{DESIGN\ USER}$= ac-ft

I) NRCS Hydrologic Soil Groups of Tributary Watershed
- i) Percentage of Watershed consisting of Type A Soils — HSG_A = 100 %
- ii) Percentage of Watershed consisting of Type B Soils — HSG_B = 0 %
- iii) Percentage of Watershed consisting of Type C/D Soils — $HSG_{C/D}$ = 0 %

J) Excess Urban Runoff Volume (EURV) Design Volume
For HSG A: $EURV_A = 1.68 * i^{1.28}$
For HSG B: $EURV_B = 1.36 * i^{1.08}$
For HSG C/D: $EURV_{C/D} = 1.20 * i^{1.08}$
$EURV_{DESIGN}$ = 2.138 ac-f t

K) User Input of Excess Urban Runoff Volume (EURV) Design Volume
(Only if a different EURV Design Volume is desired) — $EURV_{DESIGN\ USER}$= ac-f t

2. Basin Shape: Length to Width Ratio
(A basin length to width ratio of at least 2:1 will improve TSS reduction.) — L : W = 2.0 : 1

3. Basin Side Slopes

A) Basin Maximum Side Slopes
(Horizontal distance per unit vertical, 4:1 or flatter preferred) — Z = 4.00 ft / ft

4. Inlet

A) Describe means of providing energy dissipation at concentrated inflow locations: — Concrete Forebay

5. Forebay

A) Minimum Forebay Volume
(V_{FMIN} = 3% of the WQCV) — V_{FMIN} = 0.032 ac-ft

B) Actual Forebay Volume — V_F = 0.060 ac-ft

C) Forebay Depth
(D_F = 30 inch maximum) — D_F = 12.0 in

D) Forebay Discharge
- i) Undetained 100-year Peak Discharge — Q_{100} = 181.90 cfs
- ii) Forebay Discharge Design Flow
($Q_F = 0.02 * Q_{100}$) — Q_F = 3.64 cfs

E) Forebay Discharge Design

Choose One
○ Berm With Pipe
● Wall with Rect. Notch
○ Wall with V-Notch Weir

F) Discharge Pipe Size (minimum 8-inches) — Calculated D_P = in

G) Rectangular Notch Width — Calculated W_N = 15.5 in

Design Procedure Form: Extended Detention Basin (EDB)

Sheet 2 of 3

Designer: **ESJ**
Company: **R&R ENGINEERS**
Date: **December 30, 2022**
Project: **Mayberry, Colorado Springs**
Location: **Detention Basin D - Interim**

6. Trickle Channel

A) Type of Trickle Channel

Choose One
● Concrete
○ Soft Bottom

F) Slope of Trickle Channel — S = 0.0050 ft / ft

7. Micropool and Outlet Structure

A) Depth of Micropool (2.5-feet minimum) — D_M = 2.5 ft

B) Surface Area of Micropool (10 ft^2 minimum) — A_M = 170 sq ft

C) Outlet Type

Choose One
● Orifice Plate
○ Other (Describe):

D) Smallest Dimension of Orifice Opening Based on Hydrograph Routing (Use UD-Detention) — $D_{orifice}$ = 2.00 inches

E) Total Outlet Area — A_{ot} = 16.50 square inches

8. Initial Surcharge Volume

A) Depth of Initial Surcharge Volume (Minimum recommended depth is 4 inches) — D_{IS} = 4 in

B) Minimum Initial Surcharge Volume (Minimum volume of 0.3% of the WQCV) — V_{IS} = 139 cu ft

C) Initial Surcharge Provided Above Micropool — V_s= 56.7 cu ft

9. Trash Rack

A) Water Quality Screen Open Area: $A_t = A_{ot} * 38.5*(e^{-0.095D})$ — A_t = 525 square inches

B) Type of Screen (If specifying an alternative to the materials recommended in the USDCM, indicate "other" and enter the ratio of the total open are to the total screen are for the material specified.) — *Aluminum Amico-Klemp SR Series with Cross Rods 2" O.C.*

Other (Y/N): N

C) Ratio of Total Open Area to Total Area (only for type 'Other') — User Ratio =

D) Total Water Quality Screen Area (based on screen type) — A_{total} = 740 sq. in.

E) Depth of Design Volume (EURV or WQCV) (Based on design concept chosen under 1E) — H= 3.68 feet

F) Height of Water Quality Screen (H_{TR}) — H_{TR}= 72.16 inches

G) Width of Water Quality Screen Opening ($W_{opening}$) (Minimum of 12 inches is recommended) — $W_{opening}$ = 12.0 inches **VALUE LESS THAN RECOMMENDED MIN. WIDTH. WIDTH HAS BEEN SET TO 12 INCHES.**

Design Procedure Form: Extended Detention Basin (EDB)

Sheet 3 of 3

Designer: **ESJ**
Company: **R&R ENGINEERS**
Date: **December 30, 2022**
Project: **Mayberry, Colorado Springs**
Location: **Detention Basin D - Interim**

10. Overflow Embankment

A) Describe embankment protection for 100-year and greater overtopping: Buried Riprap Spillway

B) Slope of Overflow Embankment (Horizontal distance per unit vertical, 4:1 or flatter preferred) Ze = 4.00 ft / ft

11. Vegetation

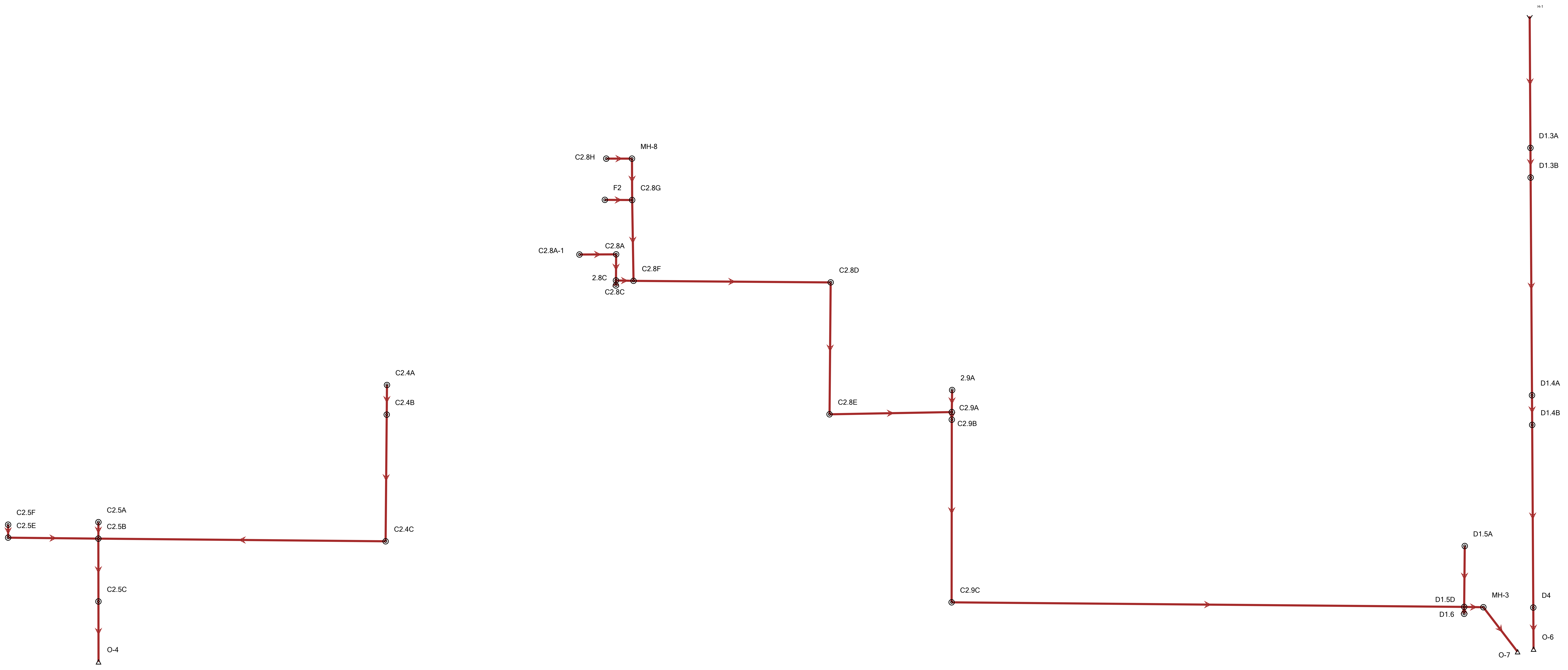
Choose One
○ Irrigated
● Not Irrigated

12. Access

A) Describe Sediment Removal Procedures
Periodic inspection and sediment removal as required;
Access ramp provided to pond bottom

Notes:

Scenario: 100 Year



Scenario: 5 year
Current Time Step: 0.000 h
FlexTable: Conduit Table

Start Node	Stop Node	Section Type	Span (ft)	Rise (ft)	Diameter (in)	Manning's n	Length (User Defined) (ft)	Invert (Start) (ft)	Invert (Stop) (ft)	Slope (Calculated) (ft/ft)	Flow (cfs)	Velocity (ft/s)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)
C2.4C	C2.5B	Circle	-	-	24.0	0.013	313.6	6,046.92	6,045.04	0.006	1.60	3.47	6,047.36	6,046.80
C2.4A	C2.4B	Circle	-	-	18.0	0.013	37.3	6,048.57	6,048.35	0.006	1.10	3.19	6,048.96	6,048.72
C2.4B	C2.4C	Circle	-	-	24.0	0.013	138.3	6,047.85	6,047.02	0.006	1.60	3.47	6,048.29	6,047.43
C2.5B	C2.5C	Circle	-	-	36.0	0.013	68.6	6,044.94	6,044.60	0.005	14.90	5.90	6,046.57	6,046.58
C2.5A	C2.5B	Circle	-	-	30.0	0.013	5.4	6,045.09	6,045.04	0.009	8.50	6.42	6,046.72	6,046.73
C2.5C	O-4	Circle	-	-	36.0	0.013	65.9	6,044.50	6,044.17	0.005	17.40	6.17	6,046.53	6,046.52
2.8C	C2.8F	Circle	-	-	36.0	0.013	44.2	6,042.53	6,042.31	0.005	8.00	4.96	6,044.18	6,044.18
C2.8C	2.8C	Circle	-	-	18.0	0.013	5.5	6,042.85	6,042.82	0.005	3.40	4.11	6,044.19	6,044.19
C2.8A	2.8C	Circle	-	-	30.0	0.013	27.5	6,043.21	6,043.03	0.007	9.70	5.87	6,044.25	6,043.97
C2.9C	D1.5D	Ellipse	3.8	2.4	-	0.013	559.5	6,037.56	6,034.76	0.005	24.80	6.65	6,038.91	6,036.29
C2.8D	C2.8E	Circle	-	-	36.0	0.013	144.0	6,041.07	6,039.92	0.008	19.30	7.53	6,042.48	6,041.76
C2.8E	C2.9A	Circle	-	-	36.0	0.013	133.6	6,039.82	6,038.89	0.007	19.30	7.16	6,041.23	6,040.11
C2.9A	C2.9B	Ellipse	3.8	2.4	-	0.013	5.7	6,038.79	6,038.76	0.005	20.50	6.39	6,040.01	6,040.01
C2.9B	C2.9C	Ellipse	3.8	2.4	-	0.013	199.3	6,038.66	6,037.66	0.005	24.80	6.66	6,040.01	6,039.48
2.9A	C2.9A	Circle	-	-	30.0	0.013	32.5	6,039.73	6,039.39	0.010	3.10	5.00	6,040.45	6,040.50
D1.3B	D1.4A	Ellipse	3.8	2.4	-	0.013	237.7	6,038.48	6,036.82	0.007	32.90	8.13	6,040.05	6,038.14
D1.3A	D1.3B	Ellipse	3.8	2.4	-	0.013	32.3	6,039.00	6,038.78	0.007	30.90	7.91	6,040.52	6,040.12
D1.4B	D4	Ellipse	3.8	2.4	-	0.013	199.4	6,036.42	6,034.71	0.009	34.20	8.84	6,038.02	6,035.99
D1.4A	D1.4B	Ellipse	3.8	2.4	-	0.013	32.3	6,036.72	6,036.52	0.006	33.60	7.84	6,038.30	6,037.95
D4	O-6	Ellipse	3.8	2.4	-	0.013	45.4	6,034.18	6,033.86	0.007	34.20	8.25	6,035.78	6,035.51
D1.5D	MH-3	Ellipse	3.8	2.4	-	0.013	34.5	6,034.66	6,034.48	0.005	27.40	6.95	6,036.09	6,035.79
D1.6	D1.5D	Circle	-	-	18.0	0.013	7.5	6,035.01	6,034.86	0.020	4.00	7.14	6,036.28	6,036.29
D1.5A	D1.5D	Circle	-	-	18.0	0.013	66.5	6,035.53	6,034.86	0.010	3.30	5.27	6,036.22	6,036.29
H-1	D1.3A	Ellipse	3.8	2.4	-	0.013	136.0	6,039.79	6,039.11	0.005	31.60	7.15	6,041.34	6,040.55
MH-3	O-7	Ellipse	4.4	2.8	-	0.013	63.3	6,034.38	6,034.06	0.005	27.40	6.72	6,035.74	6,035.51
C2.5E	C2.5B	Circle	-	-	24.0	0.013	189.3	6,046.32	6,045.37	0.005	7.80	5.07	6,047.31	6,046.63
C2.5F	C2.5E	Circle	-	-	24.0	0.013	5.5	6,046.45	6,046.42	0.005	7.80	5.23	6,047.69	6,047.69
C2.8A-1	C2.8A	Circle	-	-	24.0	0.013	74.4	6,044.05	6,043.31	0.010	3.80	5.34	6,044.73	6,044.81
C2.8F	C2.8D	Circle	-	-	36.0	0.013	189.3	6,042.21	6,041.27	0.005	19.30	6.32	6,043.62	6,042.93
MH-8	C2.8G	Circle	-	-	24.0	0.013	142.8	6,046.57	6,045.21	0.010	9.20	6.71	6,047.65	6,046.88
C2.8H	MH-8	Circle	-	-	24.0	0.013	7.5	6,046.74	6,046.67	0.009	9.20	6.66	6,048.09	6,048.10
C2.8G	C2.8F	Circle	-	-	30.0	0.013	279.8	6,045.11	6,042.31	0.010	15.90	7.83	6,046.46	6,044.07
F2	C2.8G	Circle	-	-	24.0	0.013	62.4	6,047.47	6,046.37	0.018	6.70	7.70	6,048.39	6,047.02

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Scenario: 100 Year
Current Time Step: 0.000 h
FlexTable: Conduit Table

Start Node	Stop Node	Section Type	Span (ft)	Rise (ft)	Diameter (in)	Manning's n	Length (User Defined) (ft)	Invert (Start) (ft)	Invert (Stop) (ft)	Slope (Calculated) (ft/ft)	Flow (cfs)	Velocity (ft/s)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)
C2.4C	C2.5B	Circle	-	-	24.0	0.013	313.6	6,046.92	6,045.04	0.006	3.90	4.49	6,048.35	6,048.27
C2.4A	C2.4B	Circle	-	-	18.0	0.013	37.3	6,048.57	6,048.35	0.006	2.73	4.12	6,049.20	6,048.95
C2.4B	C2.4C	Circle	-	-	24.0	0.013	138.3	6,047.85	6,047.02	0.006	3.90	4.49	6,048.54	6,048.38
C2.5B	C2.5C	Circle	-	-	36.0	0.013	68.6	6,044.94	6,044.60	0.005	36.20	7.33	6,047.86	6,047.67
C2.5A	C2.5B	Circle	-	-	30.0	0.013	5.4	6,045.09	6,045.04	0.009	28.50	5.81	6,047.82	6,047.80
C2.5C	O-4	Circle	-	-	36.0	0.013	65.9	6,044.50	6,044.17	0.005	41.10	5.81	6,047.53	6,047.28
2.8C	C2.8F	Circle	-	-	36.0	0.013	44.2	6,042.53	6,042.31	0.005	19.00	2.69	6,046.48	6,046.45
C2.8C	2.8C	Circle	-	-	18.0	0.013	5.5	6,042.85	6,042.82	0.005	8.30	4.70	6,046.32	6,046.29
C2.8A	2.8C	Circle	-	-	30.0	0.013	27.5	6,043.21	6,043.03	0.007	12.20	2.49	6,046.58	6,046.56
C2.9C	D1.5D	Ellipse	3.8	2.4	-	0.013	559.5	6,037.56	6,034.76	0.005	52.60	7.34	6,040.79	6,037.20
C2.8D	C2.8E	Circle	-	-	36.0	0.013	144.0	6,041.07	6,039.92	0.008	39.70	5.62	6,044.86	6,044.35
C2.8E	C2.9A	Circle	-	-	36.0	0.013	133.6	6,039.82	6,038.89	0.007	39.70	5.62	6,043.89	6,043.42
C2.9A	C2.9B	Ellipse	3.8	2.4	-	0.013	5.7	6,038.79	6,038.76	0.005	42.70	5.96	6,042.85	6,042.83
C2.9B	C2.9C	Ellipse	3.8	2.4	-	0.013	199.3	6,038.66	6,037.66	0.005	52.60	7.34	6,042.83	6,041.55
2.9A	C2.9A	Circle	-	-	30.0	0.013	32.5	6,039.73	6,039.39	0.010	7.50	1.53	6,043.46	6,043.45
D1.3B	D1.4A	Ellipse	3.8	2.4	-	0.013	237.7	6,038.48	6,036.82	0.007	62.80	8.77	6,041.57	6,039.40
D1.3A	D1.3B	Ellipse	3.8	2.4	-	0.013	32.3	6,039.00	6,038.78	0.007	57.90	8.08	6,042.06	6,041.81
D1.4B	D4	Ellipse	3.8	2.4	-	0.013	199.4	6,036.42	6,034.71	0.009	66.40	9.27	6,038.82	6,036.87
D1.4A	D1.4B	Ellipse	3.8	2.4	-	0.013	32.3	6,036.72	6,036.52	0.006	64.90	9.06	6,039.26	6,038.94
D4	O-6	Ellipse	3.8	2.4	-	0.013	45.4	6,034.18	6,033.86	0.007	66.40	9.27	6,036.67	6,036.18
D1.5D	MH-3	Ellipse	3.8	2.4	-	0.013	34.5	6,034.66	6,034.48	0.005	57.75	8.06	6,037.00	6,036.74
D1.6	D1.5D	Circle	-	-	18.0	0.013	7.5	6,035.01	6,034.86	0.020	7.70	4.36	6,037.24	6,037.20
D1.5A	D1.5D	Circle	-	-	18.0	0.013	66.5	6,035.53	6,034.86	0.010	8.00	4.53	6,037.58	6,037.20
H-1	D1.3A	Ellipse	3.8	2.4	-	0.013	136.0	6,039.79	6,039.11	0.005	57.60	8.08	6,043.17	6,042.11
MH-3	O-7	Ellipse	4.4	2.8	-	0.013	63.3	6,034.38	6,034.06	0.005	57.75	8.34	6,036.39	6,036.18
C2.5E	C2.5B	Circle	-	-	24.0	0.013	189.3	6,046.32	6,045.37	0.005	11.30	3.60	6,048.62	6,048.15
C2.5F	C2.5E	Circle	-	-	24.0	0.013	5.5	6,046.45	6,046.42	0.005	11.30	3.60	6,048.81	6,048.79
C2.8A-1	C2.8A	Circle	-	-	24.0	0.013	74.4	6,044.05	6,043.31	0.010	8.40	2.67	6,046.75	6,046.65
C2.8F	C2.8D	Circle	-	-	36.0	0.013	189.3	6,042.21	6,041.27	0.005	39.70	5.62	6,045.97	6,045.30
MH-8	C2.8G	Circle	-	-	24.0	0.013	142.8	6,046.57	6,045.21	0.010	12.80	7.29	6,047.86	6,047.51
C2.8H	MH-8	Circle	-	-	24.0	0.013	7.5	6,046.74	6,046.67	0.009	12.80	7.23	6,048.48	6,048.47
C2.8G	C2.8F	Circle	-	-	30.0	0.013	279.8	6,045.11	6,042.31	0.010	25.00	8.77	6,047.22	6,046.29
F2	C2.8G	Circle	-	-	24.0	0.013	62.4	6,047.47	6,046.37	0.018	12.20	9.06	6,048.73	6,047.28

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Culvert Report

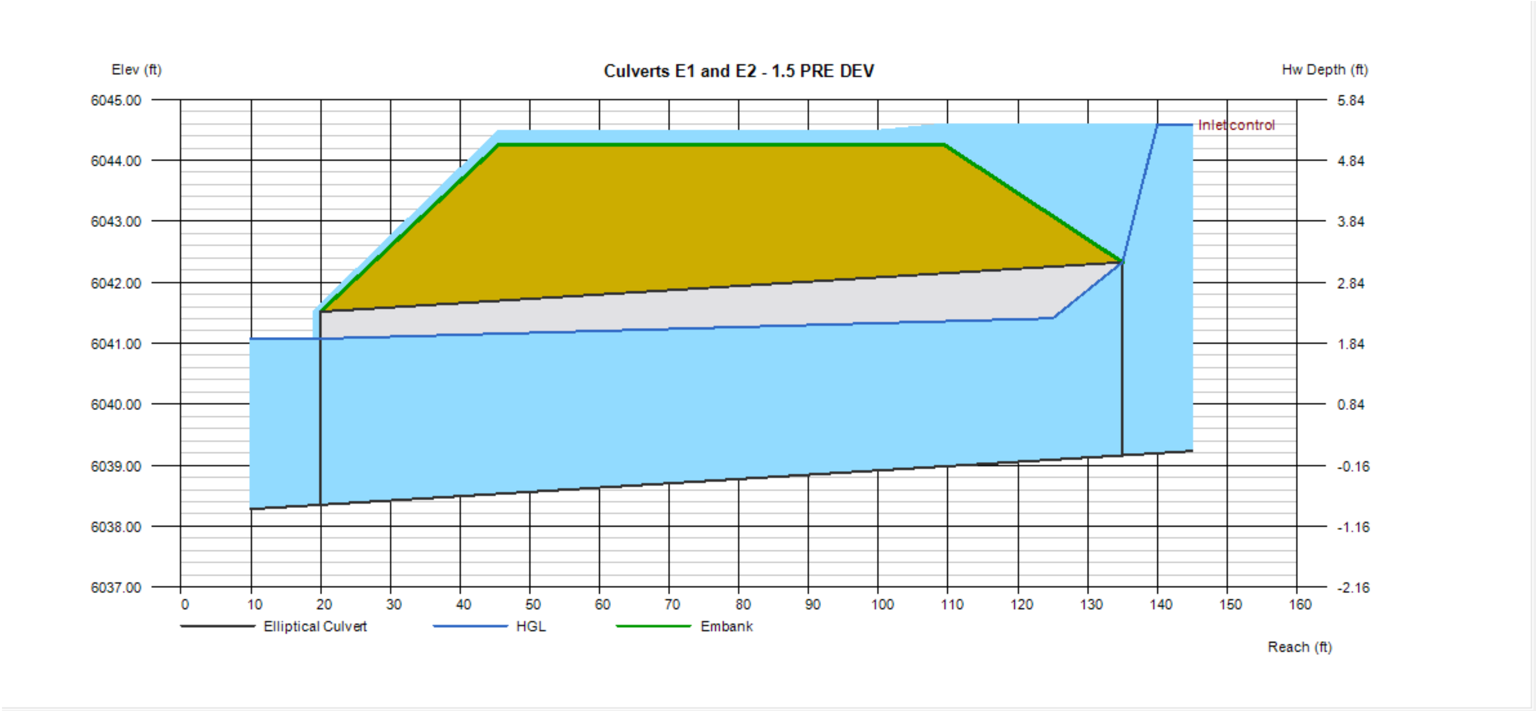
Culverts E1 and E2 - 1.5 PRE DEV

Invert Elev Dn (ft) = 6038.35
Pipe Length (ft) = 115.00
Slope (%) = 0.70
Invert Elev Up (ft) = 6039.16
Rise (in) = 38.0
Shape = Elliptical
Span (in) = 60.0
No. Barrels = 1
n-Value = 0.013
Culvert Type = Horizontal Ellipse Concrete
Culvert Entrance = Square edge w/headwall (H)
Coeff. K,M,c,Y,k = 0.01, 2, 0.0398, 0.67, 0.5

Embankment
Top Elevation (ft) = 6044.25
Top Width (ft) = 64.00
Crest Width (ft) = 60.80

Calculations
Qmin (cfs) = 50.44
Qmax (cfs) = 150.44
Tailwater Elev (ft) = (dc+D)/2

Highlighted
Qtotal (cfs) = 150.44
Qpipe (cfs) = 113.52
Qovertop (cfs) = 36.92
Veloc Dn (ft/s) = 9.76
Veloc Up (ft/s) = 11.48
HGL Dn (ft) = 6041.07
HGL Up (ft) = 6041.44
Hw Elev (ft) = 6044.59
Hw/D (ft) = 1.71
Flow Regime = Inlet Control



MHFD-Inlet, Version 5.01 (April 2021)

INLET MANAGEMENT

Worksheet Protected

INLET NAME	C2.3 - DP3	C2.1 - DP1	C2.2	D1.12 - DP5
Site Type (Urban or Rural)	URBAN	URBAN	URBAN	URBAN
Inlet Application (Street or Area)	STREET	STREET	STREET	STREET
Hydraulic Condition	In Sump	In Sump	In Sump	On Grade
Inlet Type	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening

USER-DEFINED INPUT

User-Defined Design Flows

Minor Q_{Known} (cfs)	2.1	1.1	0.6	3.8
Major Q_{Known} (cfs)	5.2	2.7	1.4	9.3

Bypass (Carry-Over) Flow from Upstream

Receive Bypass Flow from:	User-Defined	No Bypass Flow Received	No Bypass Flow Received	User-Defined
Minor Bypass Flow Received, Q_b (cfs)	6.4	0.0	0.0	0.0
Major Bypass Flow Received, Q_b (cfs)	23.3	0.0	0.0	0.0

Watershed Characteristics

Subcatchment Area (acres)				
Percent Impervious				
NRCS Soil Type				

Watershed Profile

Overland Slope (ft/ft)				
Overland Length (ft)				
Channel Slope (ft/ft)				
Channel Length (ft)				

Minor Storm Rainfall Input

Design Storm Return Period, T_r (years)				
One-Hour Precipitation, P_1 (inches)				

Major Storm Rainfall Input

Design Storm Return Period, T_r (years)				
One-Hour Precipitation, P_1 (inches)				

CALCULATED OUTPUT

Minor Total Design Peak Flow, Q (cfs)	**8.5**	**1.1**	**0.6**	**3.8**
Major Total Design Peak Flow, Q (cfs)	**28.5**	**2.7**	**1.4**	**9.3**
Minor Flow Bypassed Downstream, Q_b (cfs)	N/A	N/A	N/A	0.0
Major Flow Bypassed Downstream, Q_b (cfs)	N/A	N/A	N/A	0.9

MHFD-Inlet, Version 5.01 (April 2021)

INLET MANAGEMENT

Worksheet Protected

INLET NAME	D1.2 - DP6	D1.3 - DP8	D1.4	D1.6	D1.7
Site Type (Urban or Rural)	URBAN	URBAN	URBAN	URBAN	URBAN
Inlet Application (Street or Area)	STREET	STREET	STREET	STREET	STREET
Hydraulic Condition	In Sump	In Sump	In Sump	In Sump	In Sump
Inlet Type	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening

USER-DEFINED INPUT

User-Defined Design Flows

Minor Q_{Known} (cfs)	3.4	3.1	5.4	2.6	2.1
Major Q_{Known} (cfs)	8.3	7.5	12.7	6.3	5.0

Bypass (Carry-Over) Flow from Upstream

Receive Bypass Flow from:	No Bypass Flow Received	No Bypass Flow Received	No Bypass Flow Received	No Bypass Flow Received	No Bypass Flow Received
Minor Bypass Flow Received, Q_b (cfs)	0.0	0.0	0.0	0.0	0.0
Major Bypass Flow Received, Q_b (cfs)	0.0	0.0	0.0	0.0	0.0

Watershed Characteristics

Subcatchment Area (acres)					
Percent Impervious					
NRCS Soil Type					

Watershed Profile

Overland Slope (ft/ft)					
Overland Length (ft)					
Channel Slope (ft/ft)					
Channel Length (ft)					

Minor Storm Rainfall Input

Design Storm Return Period, T_r (years)					
One-Hour Precipitation, P_1 (inches)					

Major Storm Rainfall Input

Design Storm Return Period, T_r (years)					
One-Hour Precipitation, P_1 (inches)					

CALCULATED OUTPUT

Minor Total Design Peak Flow, Q (cfs)	**3.4**	**3.1**	**5.4**	**2.6**	**2.1**
Major Total Design Peak Flow, Q (cfs)	**8.3**	**7.5**	**12.7**	**6.3**	**5.0**
Minor Flow Bypassed Downstream, Q_b (cfs)	N/A	N/A	N/A	N/A	N/A
Major Flow Bypassed Downstream, Q_b (cfs)	N/A	N/A	N/A	N/A	N/A

MHFD-Inlet, Version 5.01 (April 2021)

INLET MANAGEMENT

Worksheet Protected

INLET NAME	D1.8	D1.9	D1.10	Mayberry Drive	50' ROW - 6" Rollover Curb
Site Type (Urban or Rural)	URBAN	URBAN	URBAN	URBAN	URBAN
Inlet Application (Street or Area)	STREET	STREET	STREET	STREET	STREET
Hydraulic Condition	In Sump	In Sump	In Sump	On Grade	On Grade
Inlet Type	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening		

USER-DEFINED INPUT

User-Defined Design Flows

Minor Q_{Known} (cfs)	1.8	0.9	3.3	14.2	5.4
Major Q_{Known} (cfs)	4.3	2.1	8.0	34.6	12.7

Bypass (Carry-Over) Flow from Upstream

Receive Bypass Flow from:	No Bypass Flow Received	No Bypass Flow Received	No Bypass Flow Received	No Bypass Flow Received	No Bypass Flow Received
Minor Bypass Flow Received, Q_b (cfs)	0.0	0.0	0.0	0.0	0.0
Major Bypass Flow Received, Q_b (cfs)	0.0	0.0	0.0	0.0	0.0

Watershed Characteristics

Subcatchment Area (acres)					
Percent Impervious					
NRCS Soil Type					

Watershed Profile

Overland Slope (ft/ft)					
Overland Length (ft)					
Channel Slope (ft/ft)					
Channel Length (ft)					

Minor Storm Rainfall Input

Design Storm Return Period, T_r (years)					
One-Hour Precipitation, P_1 (inches)					

Major Storm Rainfall Input

Design Storm Return Period, T_r (years)					
One-Hour Precipitation, P_1 (inches)					

CALCULATED OUTPUT

Minor Total Design Peak Flow, Q (cfs)	**1.8**	**0.9**	**3.3**	**14.2**	**5.4**
Major Total Design Peak Flow, Q (cfs)	**4.3**	**2.1**	**8.0**	**34.6**	**12.7**
Minor Flow Bypassed Downstream, Q_b (cfs)	N/A	N/A	N/A		
Major Flow Bypassed Downstream, Q_b (cfs)	N/A	N/A	N/A		

MHFD-Inlet, Version 5.01 (April 2021)

INLET MANAGEMENT

Worksheet Protected

INLET NAME	C2.4	Galveston Ter.	C2.5	D1.13	D1.14 - DP5B
Site Type (Urban or Rural)	URBAN	URBAN	URBAN	URBAN	URBAN
Inlet Application (Street or Area)	STREET	STREET	STREET	STREET	STREET
Hydraulic Condition	In Sump	On Grade	On Grade	On Grade	In Sump
Inlet Type	CDOT Type R Curb Opening		CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening

USER-DEFINED INPUT

User-Defined Design Flows

Minor Q_{Known} (cfs)	4.1	5.9	14.2	10.9	1.8
Major Q_{Known} (cfs)	7.8	14.5	34.6	19.9	3.9

Bypass (Carry-Over) Flow from Upstream

Receive Bypass Flow from:	No Bypass Flow Received	No Bypass Flow Received	No Bypass Flow Received	User-Defined	User-Defined
Minor Bypass Flow Received, Q_b (cfs)	0.0	0.0	0.0	0.0	1.7
Major Bypass Flow Received, Q_b (cfs)	0.0	0.0	0.0	0.0	8.0

Watershed Characteristics

Subcatchment Area (acres)					
Percent Impervious					
NRCS Soil Type					

Watershed Profile

Overland Slope (ft/ft)					
Overland Length (ft)					
Channel Slope (ft/ft)					
Channel Length (ft)					

Minor Storm Rainfall Input

Design Storm Return Period, T_r (years)					
One-Hour Precipitation, P_1 (inches)					

Major Storm Rainfall Input

Design Storm Return Period, T_r (years)					
One-Hour Precipitation, P_1 (inches)					

CALCULATED OUTPUT

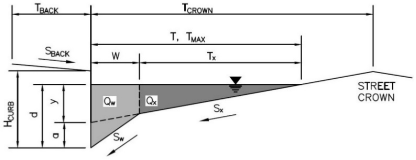
Minor Total Design Peak Flow, Q (cfs)	**4.1**	**5.9**	**14.2**	**10.9**	**3.5**
Major Total Design Peak Flow, Q (cfs)	**7.8**	**14.5**	**34.6**	**19.9**	**11.9**
Minor Flow Bypassed Downstream, Q_b (cfs)	N/A		6.4	1.7	N/A
Major Flow Bypassed Downstream, Q_b (cfs)	N/A		23.3	7.1	N/A

MHFD-Inlet, Version 5.01 (April 2021)

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: MAYBERRY FILING 3
Inlet ID: C2.3 - DP3



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	12.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.012	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	28.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.012	

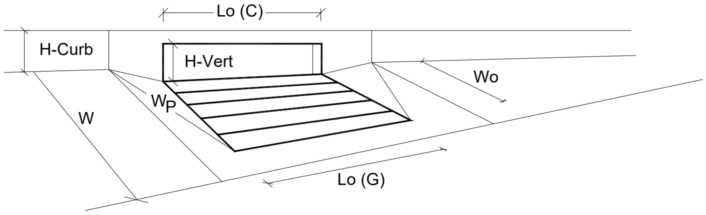
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	28.0	28.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

MINOR STORM Allowable Capacity is based on Depth Criterion
MAJOR STORM Allowable Capacity is based on Depth Criterion

	Minor Storm	Major Storm	
Q_{allow} =	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.01 (April 2021)



CDOT Type R Curb Opening ▼

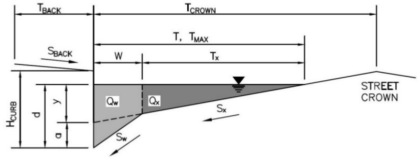
Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	6.0	12.0	☑ Override Depths
Grate Information		MINOR	MAJOR	
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	15.00	15.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Resultant Street Conditions		MINOR	MAJOR	
Total Inlet Length	L =	15.00	15.00	feet
Resultant Street Flow Spread (based on street geometry from above)	T =	18.7	43.7	ft.>T-Crown
Resultant Flow Depth at Street Crown	d_{CROWN} =	0.0	3.8	inches
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**9.7**	**39.1**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	8.5	28.5	cfs

MHFD-Inlet, Version 5.01 (April 2021)

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **MAYBERRY FILING 3**
Inlet ID: **C2.1 - DP1**



Gutter Geometry:

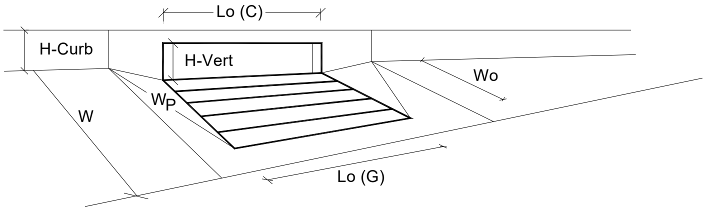
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	7.5		ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020		ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013		
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00		inches
Distance from Curb Face to Street Crown	T_{CROWN} =	16.7		ft
Gutter Width	W =	1.17		ft
Street Transverse Slope	S_X =	0.020		ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083		ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000		ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013		
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	16.7	16.7	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

MINOR STORM Allowable Capacity is based on Depth Criterion
MAJOR STORM Allowable Capacity is based on Depth Criterion

	Minor Storm	Major Storm	
Q_{allow} =	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.01 (April 2021)

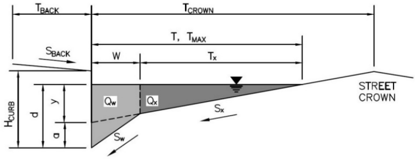


		MINOR	MAJOR	
<u>Design Information (Input)</u>		MINOR	MAJOR	
Type of Inlet — CDOT Type R Curb Opening	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	4.9	4.9	inches
<u>Grate Information</u>		MINOR	MAJOR	☐ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
<u>Curb Opening Information</u>		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	1.17	1.17	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
<u>Low Head Performance Reduction (Calculated)</u>		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.31	0.31	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.63	0.63	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	1.00	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**4.0**	**4.0**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	1.1	2.7	cfs

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **MAYBERRY FILING 3**
Inlet ID: **C2.2**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	7.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	16.7	ft
Gutter Width	W =	1.17	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

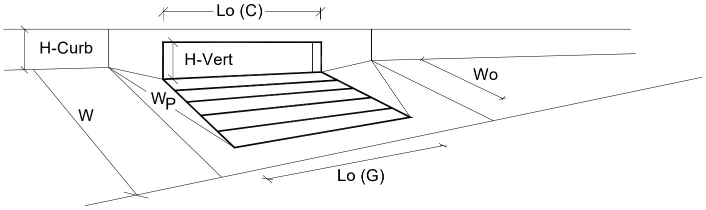
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	16.7	16.7	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

MINOR STORM Allowable Capacity is based on Depth Criterion
MAJOR STORM Allowable Capacity is based on Depth Criterion

	Minor Storm	Major Storm	
Q_{allow} =	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.01 (April 2021)



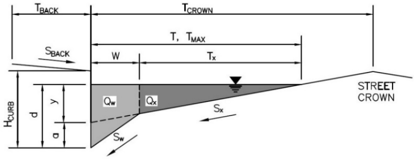
Design Information (Input)	CDOT Type R Curb Opening ▼	MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	4.9	4.9	inches
Grate Information		MINOR	MAJOR	☐ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	1.17	1.17	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.31	0.31	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.63	0.63	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	1.00	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**4.0**	**4.0**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	0.6	1.4	cfs

MHFD-Inlet, Version 5.01 (April 2021)

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: MAYBERRY FILING 3
Inlet ID: D1.12 - DP5



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	12.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.012	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.020	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.012	

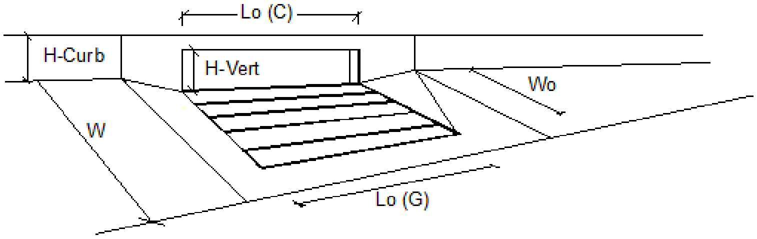
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion MAJOR STORM Allowable Capacity is based on Spread Criterion	**Q_{allow} =**	**20.5**	**20.5**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.01 (April 2021)



Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')		a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)		No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)		L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)		W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)		C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)		C_f-C =	0.10	0.10	

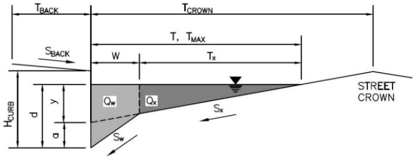
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**3.8**	**8.4**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.9**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**90**	**%**

MHFD-Inlet, Version 5.01 (April 2021)

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **MAYBERRY FILING 3**
Inlet ID: **D1.2 - DP6**



Gutter Geometry:

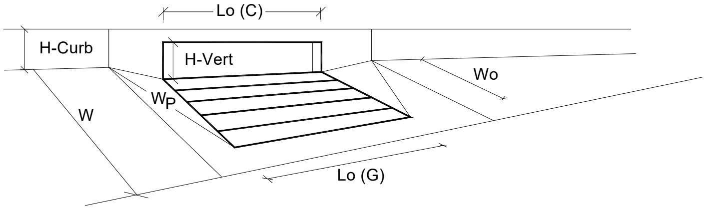
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	12.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.01 (April 2021)



Design Information (Input)		MINOR	MAJOR	
Type of Inlet CDOT Type R Curb Opening ▼	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	5.6	12.0	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.30	0.83	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.72	1.00	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	1.00	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**4.6**	**12.3**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	3.4	8.3	cfs

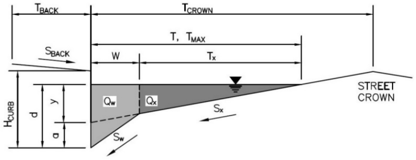
MHFD-Inlet, Version 5.01 (April 2021)

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: MAYBERRY FILING 3

Inlet ID: D1.3 - DP8



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	12.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	16.2	ft
Gutter Width	W =	1.17	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

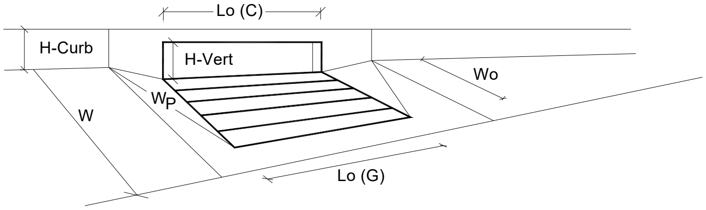
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	16.2	16.2	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

MINOR STORM Allowable Capacity is based on Depth Criterion
MAJOR STORM Allowable Capacity is based on Depth Criterion

		Minor Storm	Major Storm	
	Q_{allow} =	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.01 (April 2021)



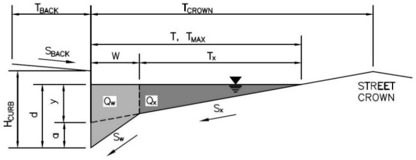
		MINOR	MAJOR	
Design Information (Input)				
Type of Inlet — CDOT Type R Curb Opening ▼	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	4.8	12.0	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	1.17	1.17	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.30	0.90	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.61	1.00	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	1.00	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**3.8**	**12.3**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	3.1	7.5	cfs

MHFD-Inlet, Version 5.01 (April 2021)

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: MAYBERRY FILING 3
Inlet ID: D1.4



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	7.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	16.2	ft
Gutter Width	W =	1.17	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

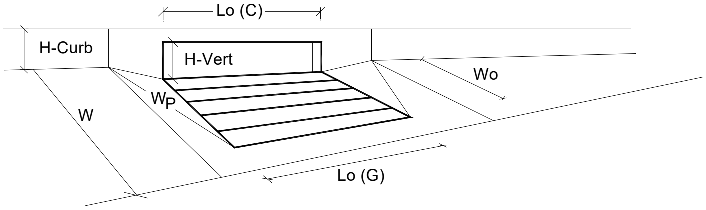
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	16.2	16.2	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

MINOR STORM Allowable Capacity is based on Depth Criterion
MAJOR STORM Allowable Capacity is based on Depth Criterion

	Minor Storm	Major Storm	
Q_{allow} =	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.01 (April 2021)

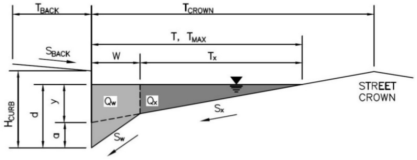


<u>Design Information (Input)</u> CDOT Type R Curb Opening ▾		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	4.8	12.0	inches
<u>Grate Information</u>		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
<u>Curb Opening Information</u>		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	10.00	10.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	1.17	1.17	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
<u>Low Head Performance Reduction (Calculated)</u>		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.30	0.90	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.45	1.00	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.85	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**5.8**	**25.5**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	5.4	12.7	cfs

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: MAYBERRY FILING 3
Inlet ID: D1.6



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb T_{BACK} = 7.5 ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb) S_{BACK} = 0.020 ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020) n_{BACK} = 0.013

Height of Curb at Gutter Flow Line H_{CURB} = 6.00 inches
Distance from Curb Face to Street Crown T_{CROWN} = 16.2 ft
Gutter Width W = 1.17 ft
Street Transverse Slope S_X = 0.020 ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft) S_W = 0.083 ft/ft
Street Longitudinal Slope - Enter 0 for sump condition S_O = 0.000 ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020) n_{STREET} = 0.013

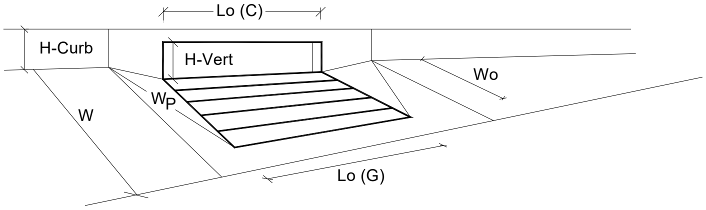
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	16.2	16.2	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

MINOR STORM Allowable Capacity is based on Depth Criterion
MAJOR STORM Allowable Capacity is based on Depth Criterion

	Minor Storm	Major Storm	
Q_{allow} =	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.01 (April 2021)



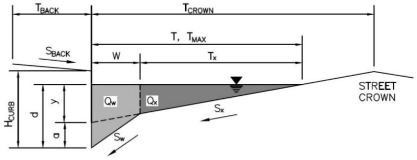
		MINOR	MAJOR	
Design Information (Input)				
Type of Inlet: CDOT Type R Curb Opening	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	4.8	12.0	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	1.17	1.17	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.30	0.90	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.61	1.00	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	1.00	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	$\mathbf{Q_a}$ **=**	**3.8**	**12.3**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{\text{PEAK REQUIRED}}$ =	2.6	6.3	cfs

MHFD-Inlet, Version 5.01 (April 2021)

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **MAYBERRY FILING 3**
Inlet ID: **D1.7**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	7.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	16.2	ft
Gutter Width	W =	1.17	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

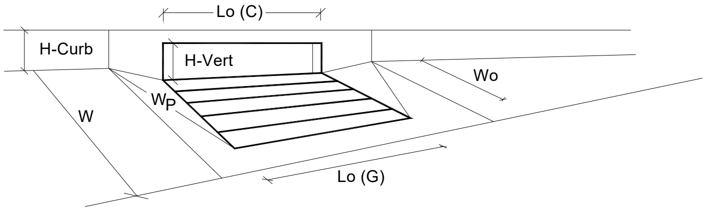
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	16.2	16.2	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

MINOR STORM Allowable Capacity is based on Depth Criterion
MAJOR STORM Allowable Capacity is based on Depth Criterion

	Minor Storm	Major Storm	
Q_{allow} =	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.01 (April 2021)



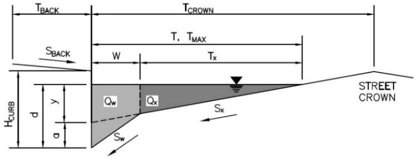
Design Information (Input)		MINOR	MAJOR	
Type of Inlet — CDOT Type R Curb Opening	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	4.8	12.0	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	1.17	1.17	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.30	0.90	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.61	1.00	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	1.00	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**3.8**	**12.3**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	2.1	5.0	cfs

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: MAYBERRY FILING 3

Inlet ID: D1.8



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb T_{BACK} = 7.5 ft

Side Slope Behind Curb (leave blank for no conveyance credit behind curb) S_{BACK} = 0.020 ft/ft

Manning's Roughness Behind Curb (typically between 0.012 and 0.020) n_{BACK} = 0.013

Height of Curb at Gutter Flow Line H_{CURB} = 6.00 inches

Distance from Curb Face to Street Crown T_{CROWN} = 16.2 ft

Gutter Width W = 1.17 ft

Street Transverse Slope S_X = 0.020 ft/ft

Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft) S_W = 0.083 ft/ft

Street Longitudinal Slope - Enter 0 for sump condition S_O = 0.000 ft/ft

Manning's Roughness for Street Section (typically between 0.012 and 0.020) n_{STREET} = 0.013

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	16.2	16.2	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

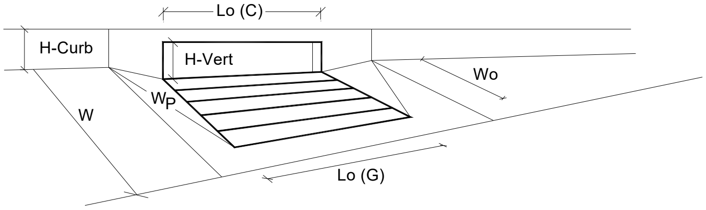
MINOR STORM Allowable Capacity is based on Depth Criterion

MAJOR STORM Allowable Capacity is based on Depth Criterion

	Minor Storm	Major Storm	
Q_{allow} =	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.01 (April 2021)

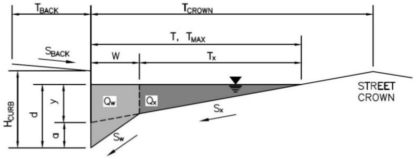


<u>Design Information (Input)</u>	CDOT Type R Curb Opening	MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	4.8	12.0	inches
<u>Grate Information</u>		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
<u>Curb Opening Information</u>		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	1.17	1.17	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
<u>Low Head Performance Reduction (Calculated)</u>		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.30	0.90	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.61	1.00	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	1.00	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**3.8**	**12.3**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	1.8	4.3	cfs

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: MAYBERRY FILING 3
Inlet ID: D1.9



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb T_{BACK} = 7.5 ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb) S_{BACK} = 0.020 ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020) n_{BACK} = 0.013

Height of Curb at Gutter Flow Line H_{CURB} = 6.00 inches
Distance from Curb Face to Street Crown T_{CROWN} = 16.2 ft
Gutter Width W = 1.17 ft
Street Transverse Slope S_X = 0.020 ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft) S_W = 0.083 ft/ft
Street Longitudinal Slope - Enter 0 for sump condition S_O = 0.000 ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020) n_{STREET} = 0.013

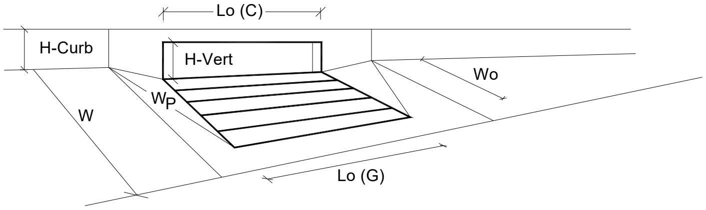
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	16.2	16.2	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

MINOR STORM Allowable Capacity is based on Depth Criterion
MAJOR STORM Allowable Capacity is based on Depth Criterion

	Minor Storm	Major Storm	
Q_{allow} =	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.01 (April 2021)

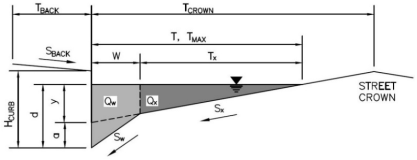


Design Information (Input)		MINOR	MAJOR	
Type of Inlet — CDOT Type R Curb Opening	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	4.8	12.0	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	1.17	1.17	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.30	0.90	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.61	1.00	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	1.00	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**3.8**	**12.3**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	Q PEAK REQUIRED =	0.9	2.1	cfs

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **MAYBERRY FILING 3**
Inlet ID: **D1.10**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	12.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	28.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

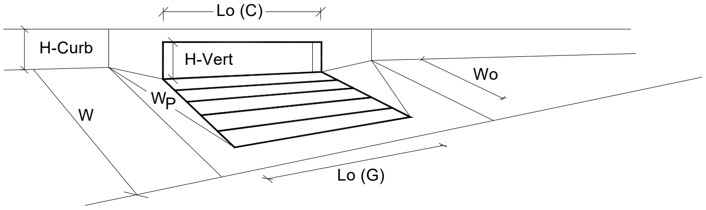
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	28.0	28.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

MINOR STORM Allowable Capacity is based on Depth Criterion
MAJOR STORM Allowable Capacity is based on Depth Criterion

	Minor Storm	Major Storm	
Q_{allow} =	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.01 (April 2021)



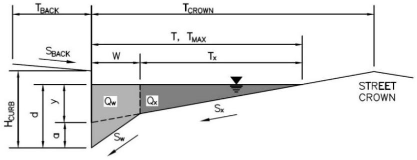
Design Information (Input) CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	6.0	8.2	inches
Grate Information		MINOR	MAJOR	☐ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.33	0.52	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.77	1.00	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	1.00	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**5.4**	**9.6**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	3.3	8.0	cfs

MHFD-Inlet, Version 5.01 (April 2021)

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **MAYBERRY FILING 3**
Inlet ID: **Mayberry Drive**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	12.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.012	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	28.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.010	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.012	

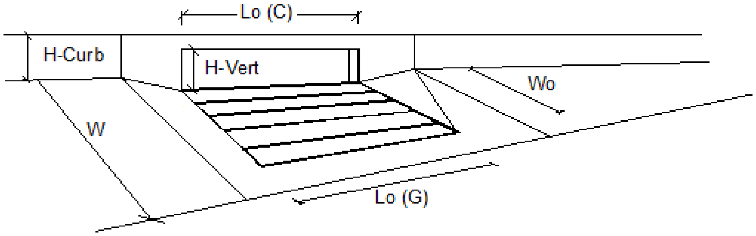
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	28.0	28.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion MAJOR STORM Allowable Capacity is based on Spread Criterion	**Q_{allow} =**	**18.4**	**54.2**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.01 (April 2021)



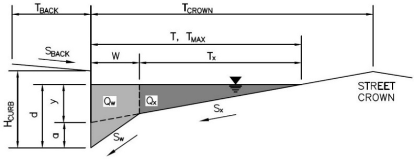
Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =			
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =			inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =			
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =			ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =			ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =			
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =			

		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**			**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**			**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**			**%**

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: MAYBERRY FILING 3
Inlet ID: 50' ROW - 6" Rollover Curb



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	7.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	16.7	ft
Gutter Width	W =	1.17	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.008	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

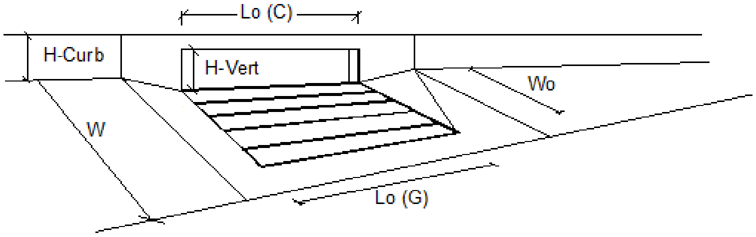
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	16.7	16.7	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☑	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**10.7**	**128.7**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.01 (April 2021)



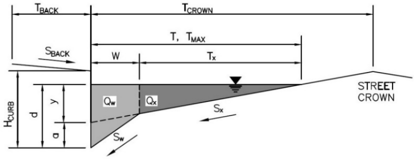
		MINOR	MAJOR	
Design Information (Input)				
Type of Inlet	Type =			
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =			inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =			
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =			ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =			ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =			
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =			

		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**			**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**			**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**			**%**

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: MAYBERRY FILING 3
Inlet ID: C2.4



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	12.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	28.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

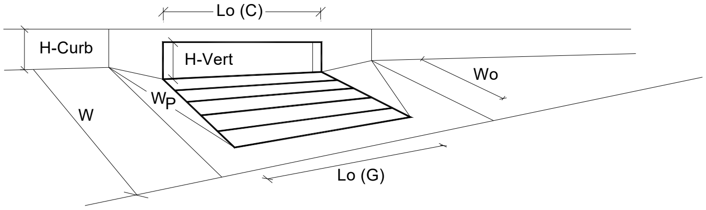
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	28.0	28.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

MINOR STORM Allowable Capacity is based on Depth Criterion
MAJOR STORM Allowable Capacity is based on Depth Criterion

		Minor Storm	Major Storm	
	Q_{allow} =	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.01 (April 2021)



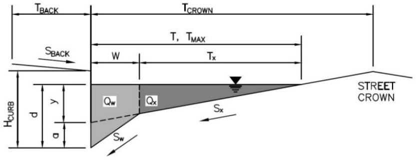
Design Information (Input)		MINOR	MAJOR	
Type of Inlet CDOT Type R Curb Opening ▾	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	6.0	8.2	inches
Grate Information		MINOR	MAJOR	☐ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	15.00	15.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.33	0.52	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.57	0.78	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.79	0.90	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**9.7**	**21.7**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	4.1	7.8	cfs

MHFD-Inlet, Version 5.01 (April 2021)

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **MAYBERRY FILING 3**
Inlet ID: **Galveston Ter.**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	12.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.012	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.010	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.012	

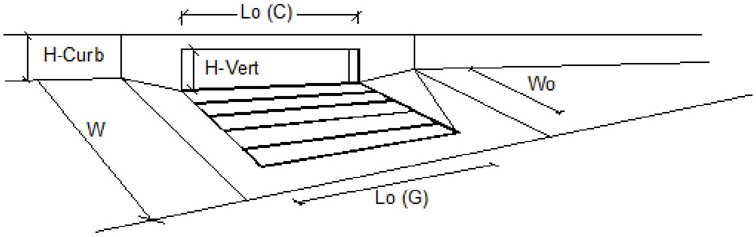
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	6.0	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☑	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**14.1**	**17.9**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.01 (April 2021)



<u>Design Information (Input)</u>		MINOR	MAJOR	
Type of Inlet	Type =			
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =			inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =			
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =			ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =			ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =			
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =			

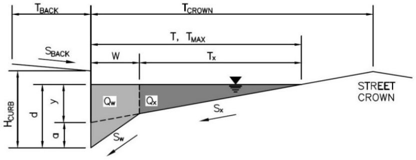
		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**			**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**			**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**			**%**

MHFD-Inlet, Version 5.01 (April 2021)

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **MAYBERRY FILING 3**
Inlet ID: **C2.5**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	12.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	28.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.007	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.012	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	28.0	28.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☐	

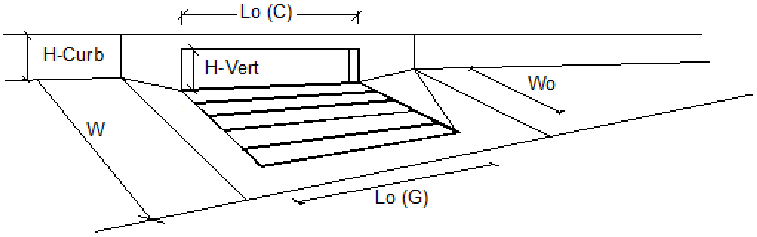
MINOR STORM Allowable Capacity is based on Depth Criterion
MAJOR STORM Allowable Capacity is based on Spread Criterion

		Minor Storm	Major Storm	
	Q_{allow} =	**15.4**	**45.2**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.01 (April 2021)



CDOT Type R Curb Opening ▾

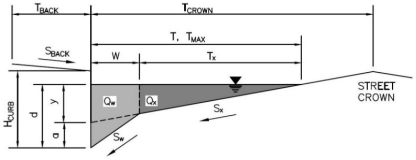
Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	10.00	10.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	

Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**7.8**	**11.3**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**6.4**	**23.3**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**55**	**33**	**%**

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **MAYBERRY FILING 3**
Inlet ID: **D1.1**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	12.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.012	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.020	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.012	

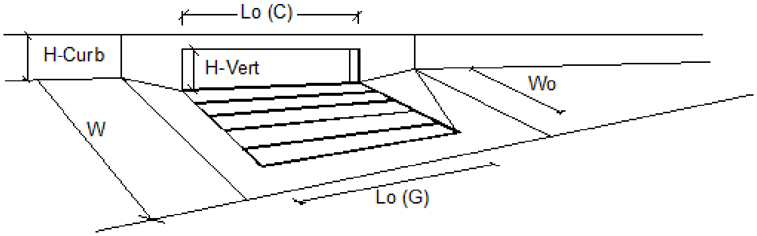
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion MAJOR STORM Allowable Capacity is based on Spread Criterion	**Q_{allow} =**	**20.5**	**20.5**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.01 (April 2021)



CDOT Type R Curb Opening ▼

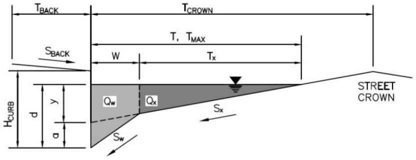
<u>Design Information (Input)</u>		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
<u>Street Hydraulics: OK - Q < Allowable Street Capacity'</u>		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**4.8**	**8.0**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.7**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**92**	**%**

MHFD-Inlet, Version 5.01 (April 2021)

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: MAYBERRY FILING 3
Inlet ID: D1.13



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	12.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.012	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	20.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.006	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.012	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	20.0	20.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☑	

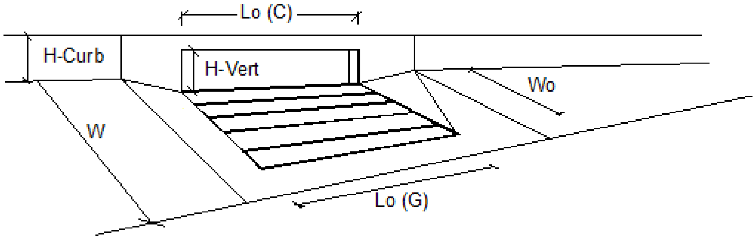
MINOR STORM Allowable Capacity is based on Depth Criterion
MAJOR STORM Allowable Capacity is based on Depth Criterion

	Minor Storm	Major Storm	
Q_{allow} =	**14.7**	**131.5**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.01 (April 2021)



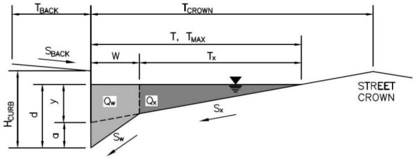
CDOT Type R Curb Opening

Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**9.2**	**12.8**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**1.7**	**7.1**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**84**	**64**	**%**

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: MAYBERRY FILING 3
Inlet ID: D1.14 - DP5B



Gutter Geometry:

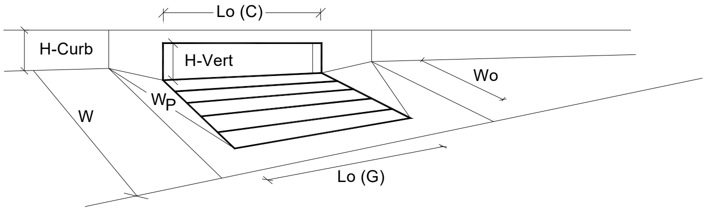
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	12.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.012	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.012	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.01 (April 2021)



Design Information (Input)	CDOT Type R Curb Opening ▾	MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	6.0	12.0	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	15.00	15.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.33	0.83	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.57	1.00	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.79	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**9.7**	**39.1**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	3.5	11.9	cfs

Channel Report

Channel C2 - 5 Year (DP21)

Trapezoidal

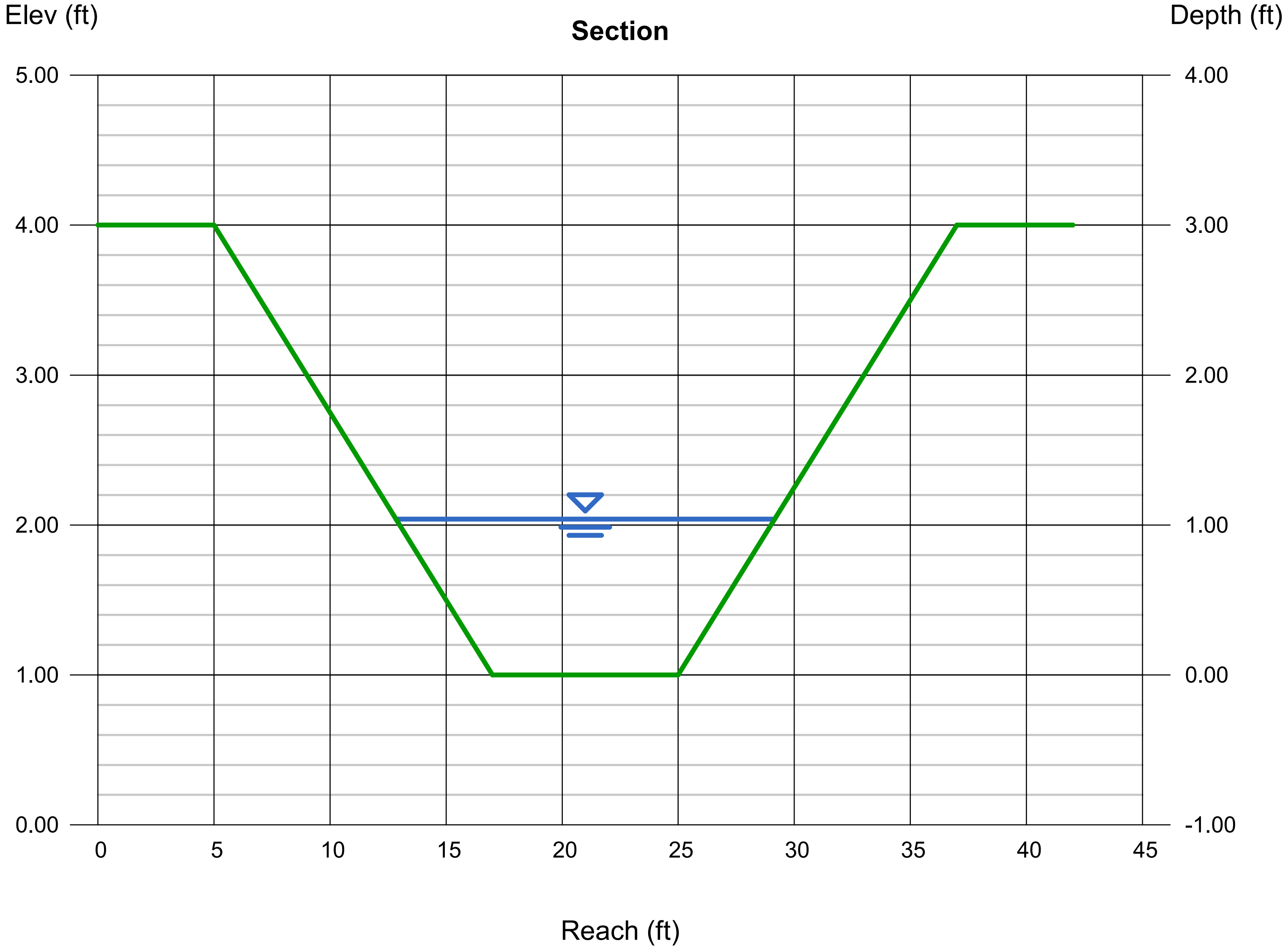
Bottom Width (ft)	= 8.00
Side Slopes (z:1)	= 4.00, 4.00
Total Depth (ft)	= 3.00
Invert Elev (ft)	= 1.00
Slope (%)	= 0.50
N-Value	= 0.030

Calculations

Compute by:	Known Q
Known Q (cfs)	= 36.70

Highlighted

Depth (ft)	= 1.04
Q (cfs)	= 36.70
Area (sqft)	= 12.65
Velocity (ft/s)	= 2.90
Wetted Perim (ft)	= 16.58
Crit Depth, Yc (ft)	= 0.76
Top Width (ft)	= 16.32
EGL (ft)	= 1.17



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Friday, Dec 30 2022

Channel C2 - 100 Year (DP21)

Trapezoidal

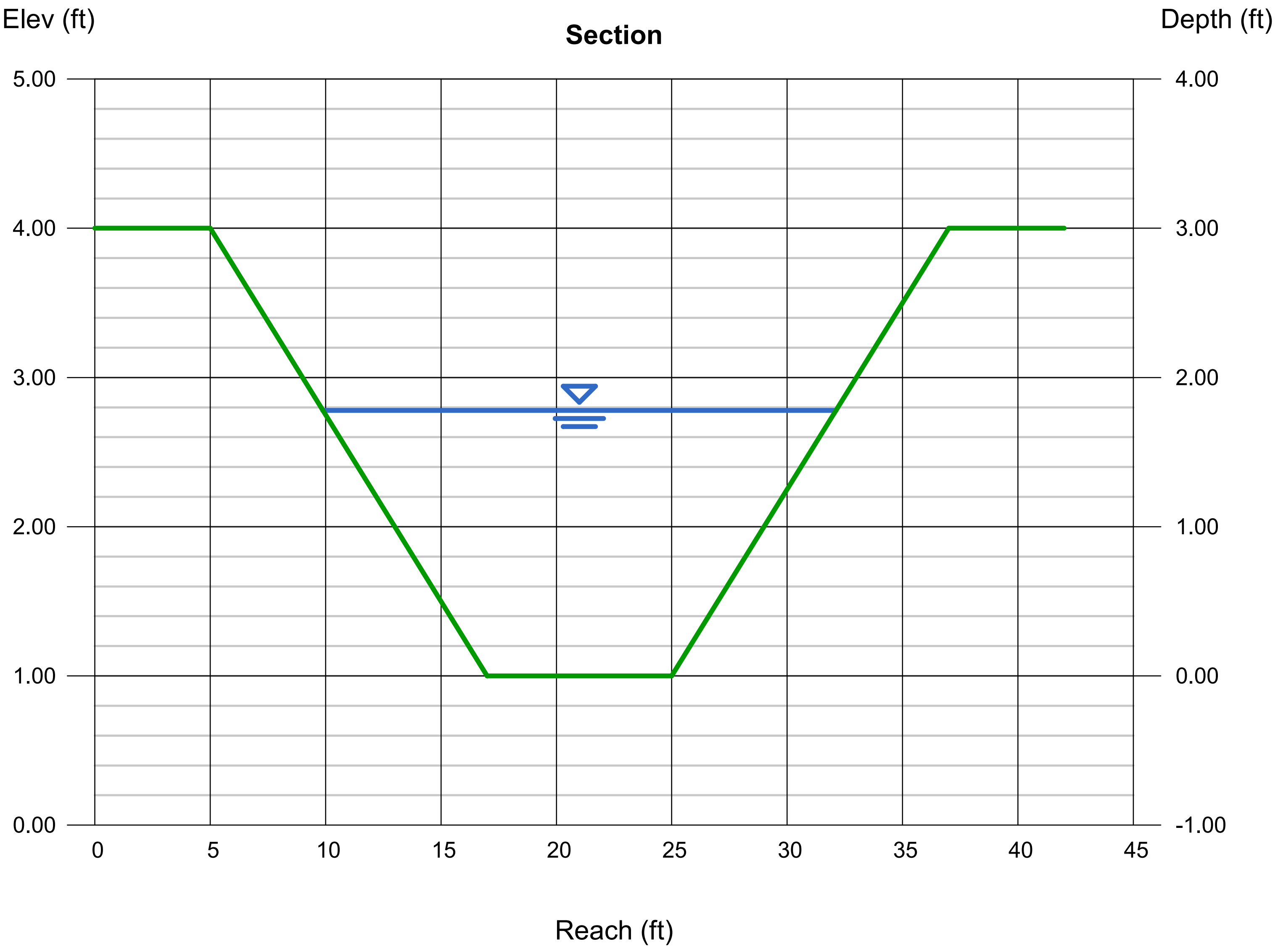
Bottom Width (ft)	= 8.00
Side Slopes (z:1)	= 4.00, 4.00
Total Depth (ft)	= 3.00
Invert Elev (ft)	= 1.00
Slope (%)	= 0.50
N-Value	= 0.030

Calculations

Compute by:	Known Q
Known Q (cfs)	= 104.90

Highlighted

Depth (ft)	= 1.78
Q (cfs)	= 104.90
Area (sqft)	= 26.91
Velocity (ft/s)	= 3.90
Wetted Perim (ft)	= 22.68
Crit Depth, Yc (ft)	= 1.39
Top Width (ft)	= 22.24
EGL (ft)	= 2.02



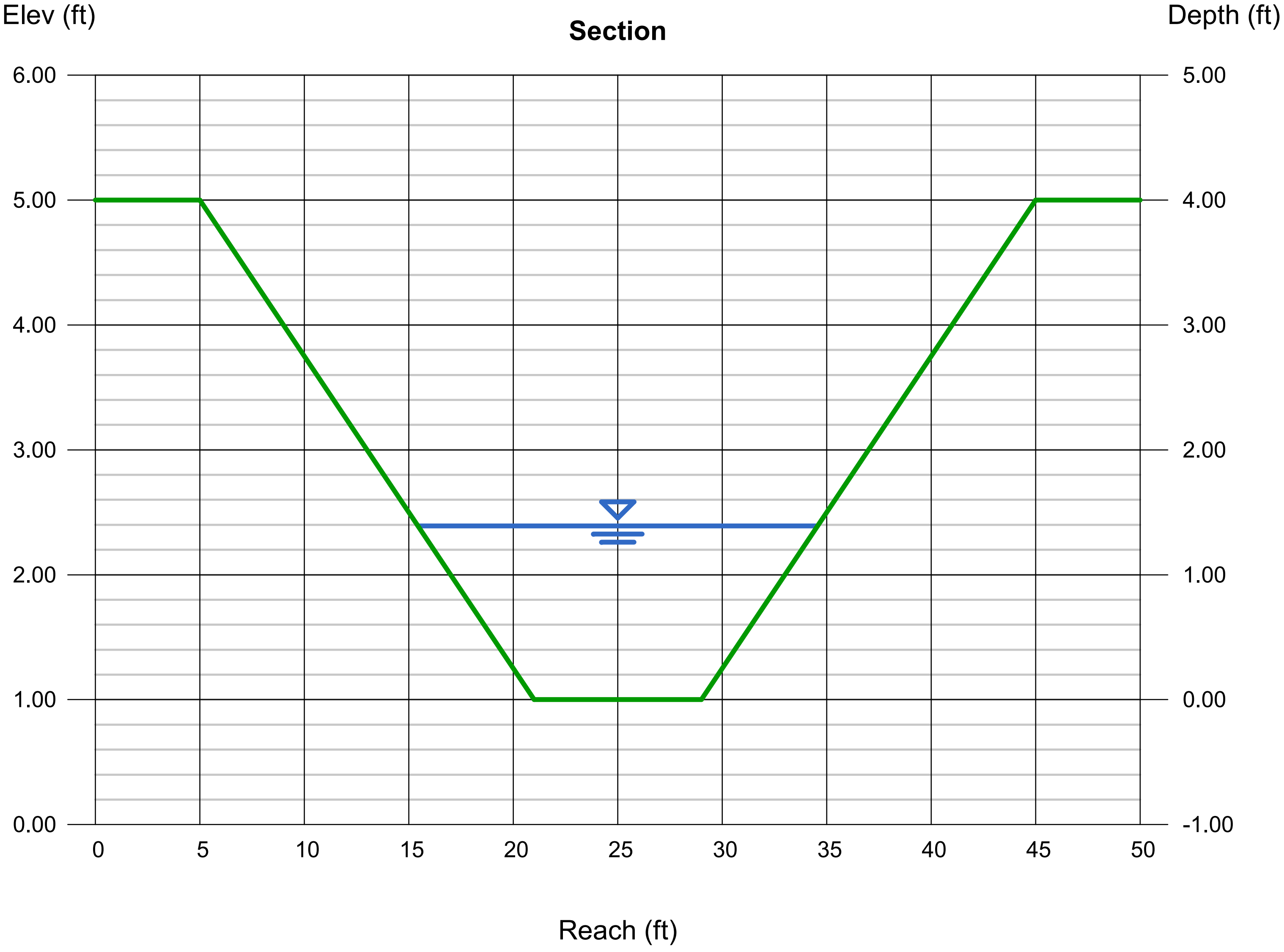
Channel Report

Channel D - DP20 5 YEAR FLOW

Trapezoidal
Bottom Width (ft) = 8.00
Side Slopes (z:1) = 4.00, 4.00
Total Depth (ft) = 4.00
Invert Elev (ft) = 1.00
Slope (%) = 0.40
N-Value = 0.030

Calculations
Compute by: Known Q
Known Q (cfs) = 57.50

Highlighted
Depth (ft) = 1.39
Q (cfs) = 57.50
Area (sqft) = 18.85
Velocity (ft/s) = 3.05
Wetted Perim (ft) = 19.46
Crit Depth, Yc (ft) = 0.99
Top Width (ft) = 19.12
EGL (ft) = 1.53



Channel Report

Channel D - DP20 100 YEAR

Trapezoidal

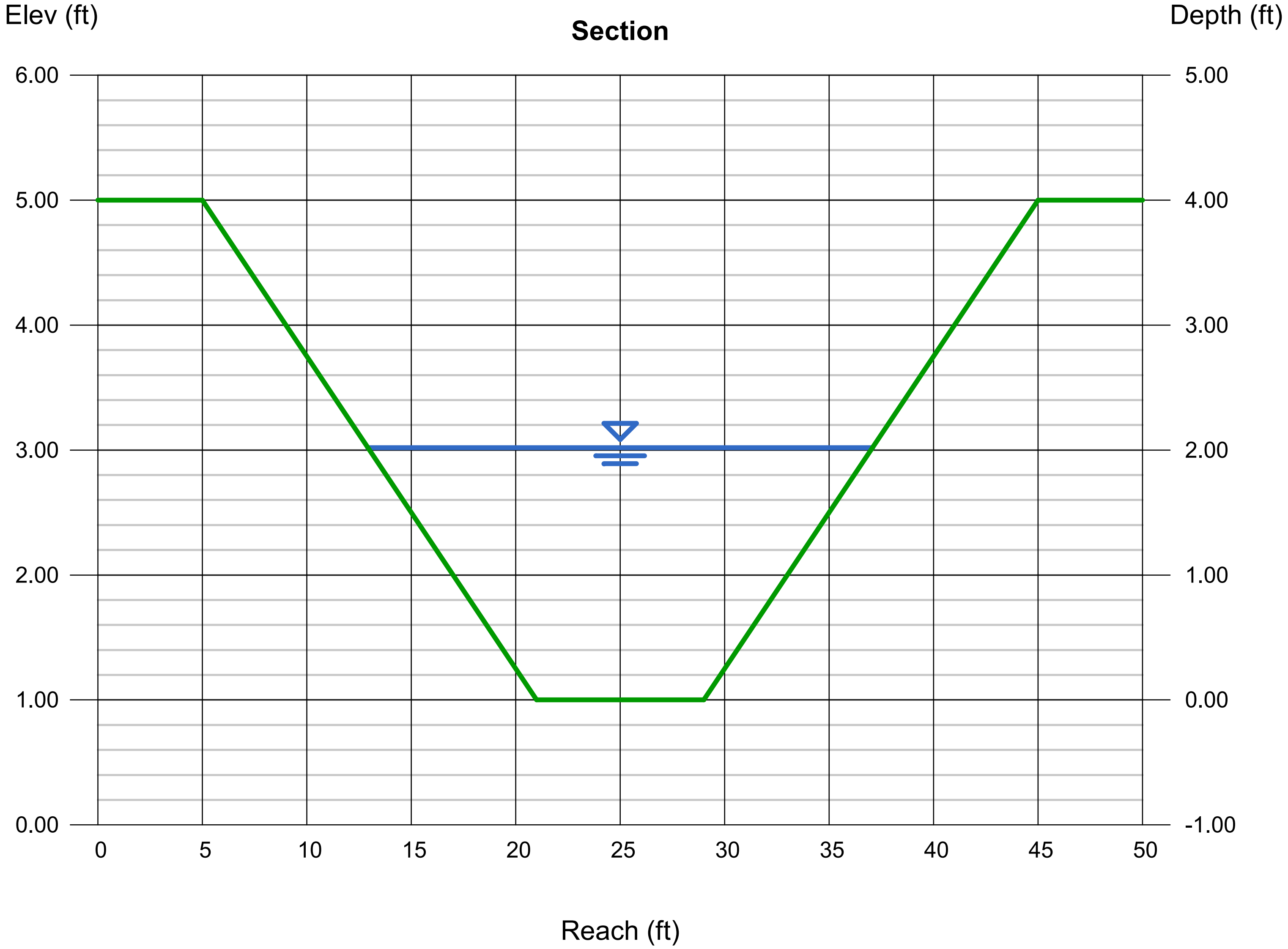
Bottom Width (ft)	= 8.00
Side Slopes (z:1)	= 4.00, 4.00
Total Depth (ft)	= 4.00
Invert Elev (ft)	= 1.00
Slope (%)	= 0.40
N-Value	= 0.030

Calculations

Compute by:	Known Q
Known Q (cfs)	= 121.60

Highlighted

Depth (ft)	= 2.02
Q (cfs)	= 121.60
Area (sqft)	= 32.48
Velocity (ft/s)	= 3.74
Wetted Perim (ft)	= 24.66
Crit Depth, Yc (ft)	= 1.50
Top Width (ft)	= 24.16
EGL (ft)	= 2.24

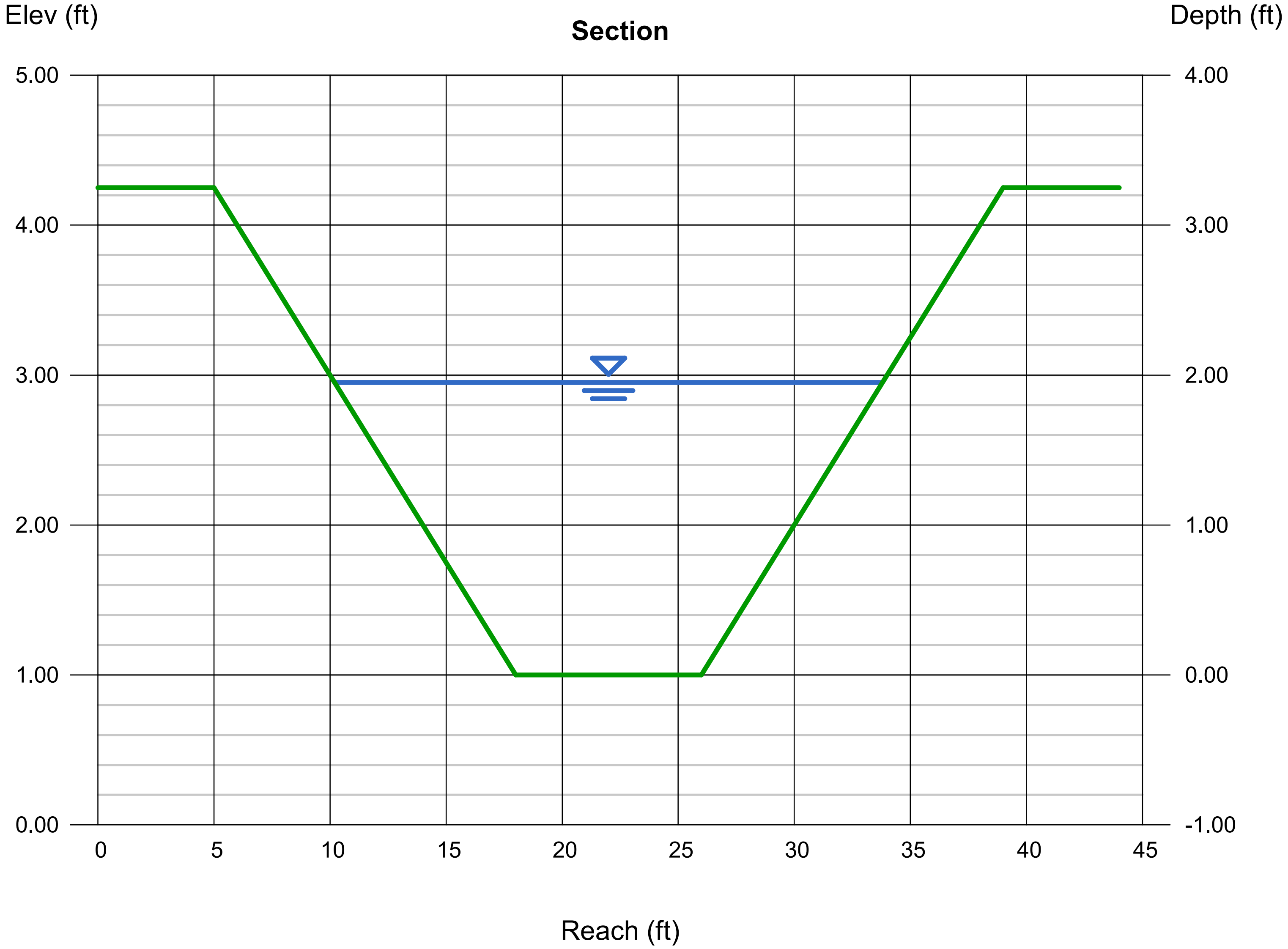


Channel Report

Channel E PRE DEV D1.5 -100 Year

Trapezoidal	
Bottom Width (ft)	= 8.00
Side Slopes (z:1)	= 4.00, 4.00
Total Depth (ft)	= 3.25
Invert Elev (ft)	= 1.00
Slope (%)	= 0.70
N-Value	= 0.030
Calculations	
Compute by:	Known Q
Known Q (cfs)	= 150.44

Highlighted	
Depth (ft)	= 1.95
Q (cfs)	= 150.44
Area (sqft)	= 30.81
Velocity (ft/s)	= 4.88
Wetted Perim (ft)	= 24.08
Crit Depth, Yc (ft)	= 1.68
Top Width (ft)	= 23.60
EGL (ft)	= 2.32



Channel Report

CHANNEL F - 100 YEAR FLOW

Trapezoidal

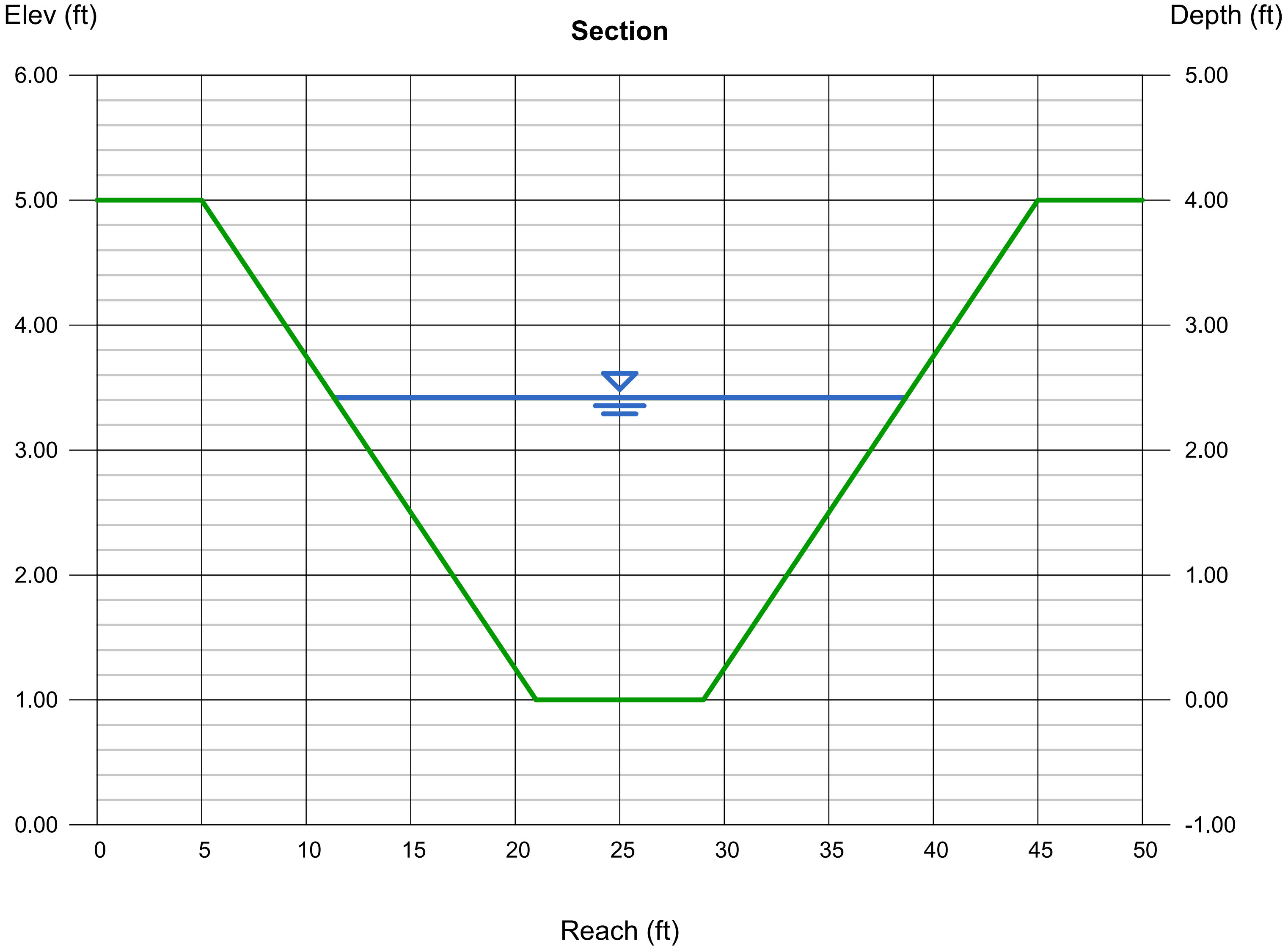
Bottom Width (ft)	= 8.00
Side Slopes (z:1)	= 4.00, 4.00
Total Depth (ft)	= 4.00
Invert Elev (ft)	= 1.00
Slope (%)	= 0.40
N-Value	= 0.030

Calculations

Compute by:	Known Q
Known Q (cfs)	= 177.50

Highlighted

Depth (ft)	= 2.42
Q (cfs)	= 177.50
Area (sqft)	= 42.79
Velocity (ft/s)	= 4.15
Wetted Perim (ft)	= 27.96
Crit Depth, Yc (ft)	= 1.84
Top Width (ft)	= 27.36
EGL (ft)	= 2.69



Channel E - Superelevation Calculation

C	0.5	
Velocity (V - fps)	4.88	*From Hydraflow Express
Channel Width (W - ft)	23.6	*From Hydraflow Express
g - constant (ft/sec^2)	32.2	
Channel /Bend Radius (ft)	50	
H - additional freeboard - (ft)	0.17	
Total Freeboard Required	1.17	1 foot + additional
Depth at 100 Year Flow (ft)	1.95	*From Hydraflow Express
Channel Depth Provided (ft)	3.25	
Total Freeboard Provided (ft)	1.30	

$$H = C \frac{v^2 W}{gR} \qquad (10-4)$$

where:

C = coefficient;

= 0.5, subcritical flow, simple curve

= 1.0, supercritical flow, simple curve

v = average velocity of flow in channel, in fps;

W = channel width at level water surface

g = acceleration of gravity constant, 32.2 ft/sec ^{2};

R = channel centerline radius of curvature, in ft; and

H = additional height of freeboard on outside edge of channel, in ft.

Channel E/F Confluence - Superelevation Calculation

C	0.5	
Velocity (V - fps)	3	*From Channel E RipRap Calculation
Channel Width (W - ft)	27.96	*From Hydraflow Express
g - constant (ft/sec^2)	32.2	
Channel /Bend Radius (ft)	10	
H - additional freeboard - (ft)	0.39	
Total Freeboard Required	1.39	1 foot + additional
Depth at 100 Year Flow (ft)	2.40	*From Hydraflow Express
Channel Depth Provided (ft)	4	
Total Freeboard Provided (ft)	1.60	

$$H = C\frac{v^2W}{gR} \qquad (10-4)$$

where:

C = coefficient;

= 0.5, subcritical flow, simple curve

= 1.0, supercritical flow, simple curve

v = average velocity of flow in channel, in fps;

W = channel width at level water surface

g = acceleration of gravity constant, 32.2 ft/sec ^{2} ;

R = channel centerline radius of curvature, in ft; and

H = additional height of freeboard on outside edge of channel, in ft.

Mayberry Filing 3
Flow into Channel C2 (DP4)

Per UDFCD Section 3.2.1 - Riprap Apron

Parameter	Unit	Value
Diameter of Conduit	ft	3
Design Discharge	ft^3/s	41.1
Tailwater Depth	ft	1.78
Allowable Velocity	ft/s	5
Required Area of Flow	ft^2	8.22
Froude Parameter		2.64
Tailwater Depth/Conduit Diameter		0.59
Expansion Factor		6.6
Length of Protection	**ft**	**11**
*Length will extend until tie out to existing grade		
Expansion Angle	degrees	4.332314
Width of Protection	**ft**	**5**
RipRap Size (Figure 9-38)		
Q/D^1.5		7.91
Yt/D		0.59
RipRap Size (Figure 9-38)		TYPE L

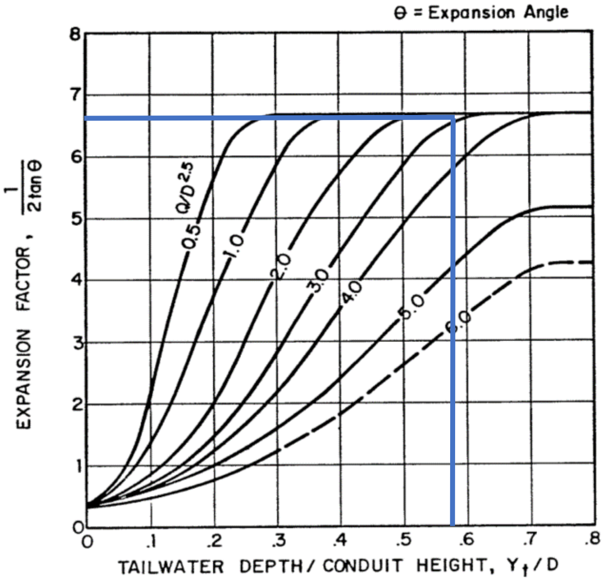
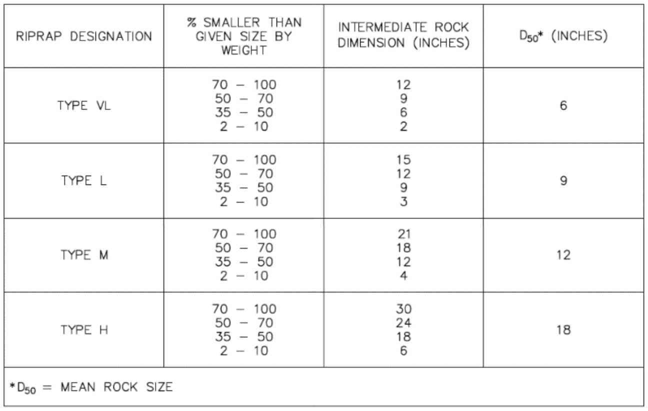


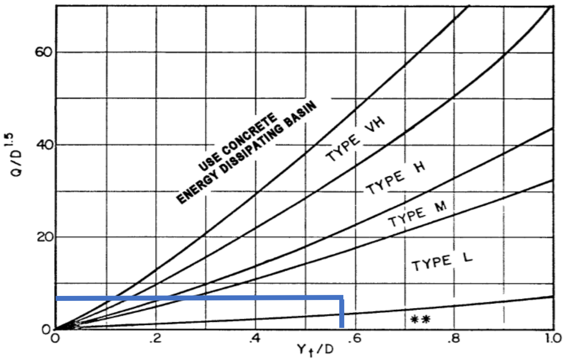
Figure 9-35. Expansion factor for circular conduits



RIPRAP DESIGNATION	% SMALLER THAN GIVEN SIZE BY WEIGHT	INTERMEDIATE ROCK DIMENSION (INCHES)	D_{50}* (INCHES)
TYPE VL	70 – 100 50 – 70 35 – 50 2 – 10	12 9 6 2	6
TYPE L	70 – 100 50 – 70 35 – 50 2 – 10	15 12 9 3	9
TYPE M	70 – 100 50 – 70 35 – 50 2 – 10	21 18 12 4	12
TYPE H	70 – 100 50 – 70 35 – 50 2 – 10	30 24 18 6	18

*D_{50} = MEAN ROCK SIZE

Figure 8-34. Riprap and soil riprap placement and gradation (part 1 of 3)



Use D_a instead of D whenever flow is supercritical in the barrel.
** Use Type L for a distance of 3D downstream.

Figure 9-38. Riprap erosion protection at circular conduit outlet (valid for Q/D2.5 ≤ 6.0)

Mayberry Filing 3
Flow into Channel D (DP19)

Per UDFCD Section 3.2.1 - Riprap Apron

Parameter	Unit	Value
Diameter of Conduit	ft	3.75
Design Discharge	ft^3/s	106.8
Tailwater Depth	ft	2
Allowable Velocity	ft/s	5
Required Area of Flow	ft^2	21.36
Froude Parameter		3.92
Tailwater Depth/Conduit Diameter		0.53
Expansion Factor		5.8
Length of Protection	**ft**	**41**
*Length will extend until tie out to existing grade		
Expansion Angle	degrees	4.92711
Width of Protection	**ft**	**11**
RipRap Size (Figure 9-38)		
Q/D^1.5		14.71
Yt/D		0.53
RipRap Size (Figure 9-38)		Type M

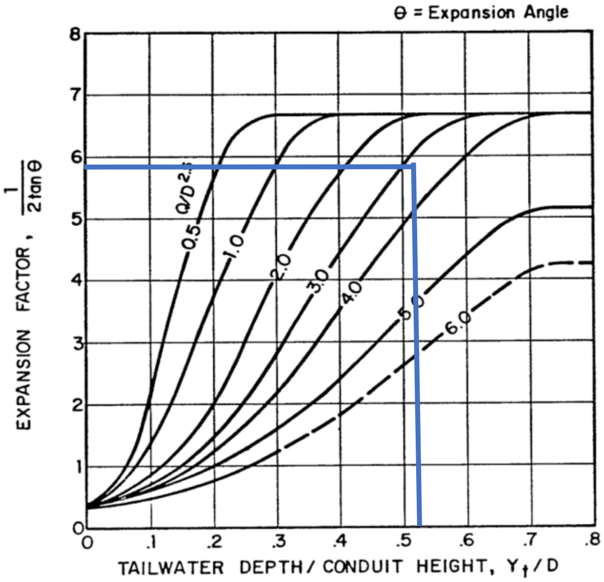
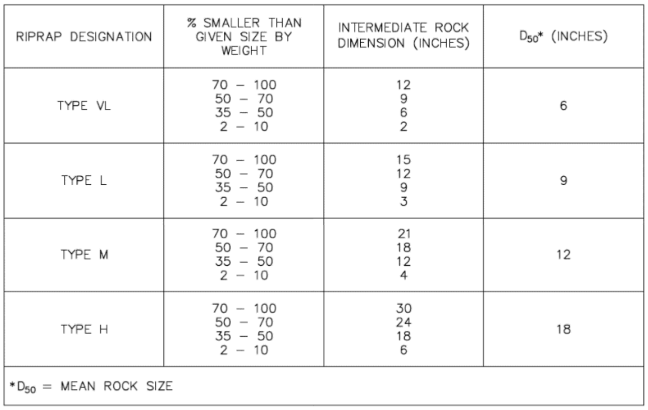


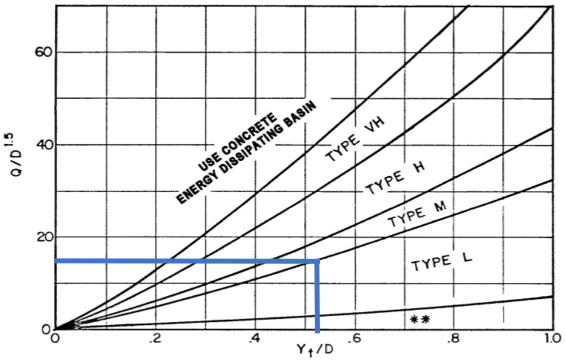
Figure 9-35. Expansion factor for circular conduits



RIPRAP DESIGNATION	% SMALLER THAN GIVEN SIZE BY WEIGHT	INTERMEDIATE ROCK DIMENSION (INCHES)	D_{50}* (INCHES)
TYPE VL	70 – 100 50 – 70 35 – 50 2 – 10	12 9 6 2	6
TYPE L	70 – 100 50 – 70 35 – 50 2 – 10	15 12 9 3	9
TYPE M	70 – 100 50 – 70 35 – 50 2 – 10	21 18 12 4	12
TYPE H	70 – 100 50 – 70 35 – 50 2 – 10	30 24 18 6	18

*D_{50} = MEAN ROCK SIZE

Figure 8-34. Riprap and soil riprap placement and gradation (part 1 of 3)



Use D_a instead of D whenever flow is supercritical in the barrel.
** Use Type L for a distance of 3D downstream.

Figure 9-38. Riprap erosion protection at circular conduit outlet (valid for Q/D2.5 ≤ 6.0)

Mayberry Filing 3
POND D OUTFALL (DP23)

Per UDFCD Section 3.2.1 - Riprap Apron

Parameter	Unit	Value
Diameter of Conduit	ft	3
Design Discharge	ft^3/s	39.6
Tailwater Depth	ft	2.42
Allowable Velocity	ft/s	1.3
Required Area of Flow	ft^2	30.46154
Froude Parameter		2.54
Tailwater Depth/Conduit Diameter		0.81
Expansion Factor		6.8
Length of Protection	**ft**	**66**
*Length will extend until tie out to existing grade		
Expansion Angle	degrees	4.205357
Width of Protection	**ft**	**13**
RipRap Size (Figure 9-38)		
Q/D^1.5		7.62
Yt/D		0.81
RipRap Size (Figure 9-38)		Type L

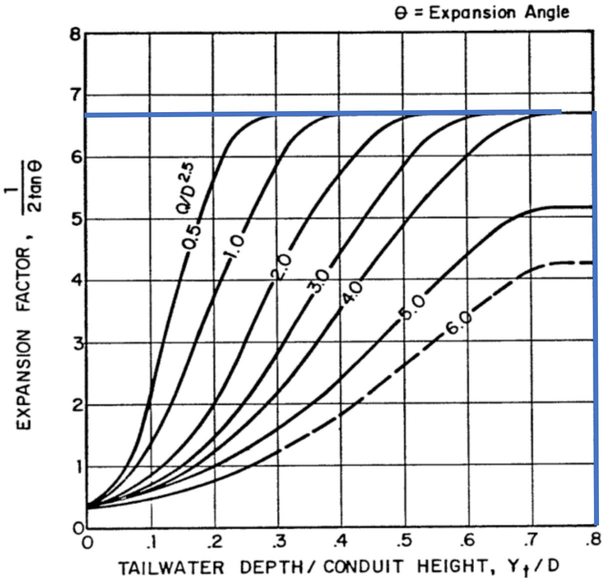
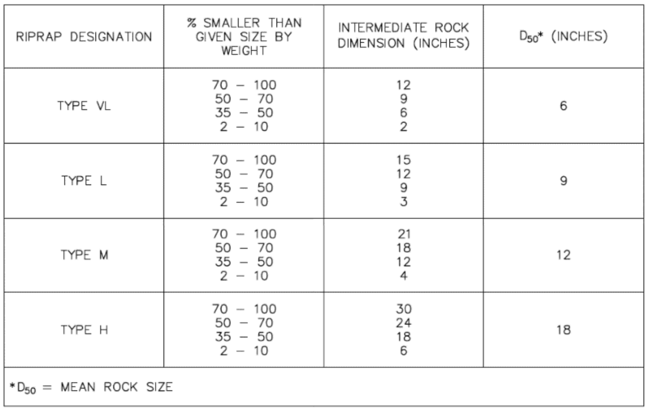


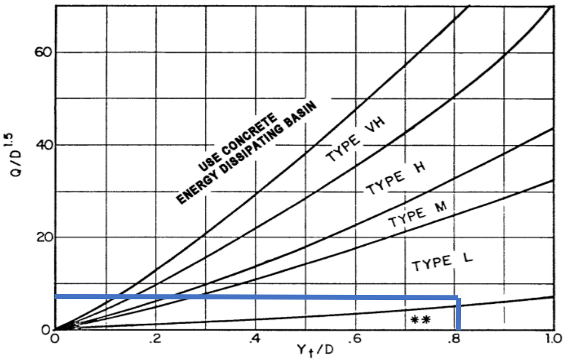
Figure 9-35. Expansion factor for circular conduits



RIPRAP DESIGNATION	% SMALLER THAN GIVEN SIZE BY WEIGHT	INTERMEDIATE ROCK DIMENSION (INCHES)	D_{50}* (INCHES)
TYPE VL	70 – 100 50 – 70 35 – 50 2 – 10	12 9 6 2	6
TYPE L	70 – 100 50 – 70 35 – 50 2 – 10	15 12 9 3	9
TYPE M	70 – 100 50 – 70 35 – 50 2 – 10	21 18 12 4	12
TYPE H	70 – 100 50 – 70 35 – 50 2 – 10	30 24 18 6	18

*D_{50} = MEAN ROCK SIZE

Figure 8-34. Riprap and soil riprap placement and gradation (part 1 of 3)



Use D_a instead of D whenever flow is supercritical in the barrel.
** Use Type L for a distance of 3D downstream.

Figure 9-38. Riprap erosion protection at circular conduit outlet (valid for Q/D2.5 ≤ 6.0)

Mayberry Filing 3
HWY 94

Per UDFCD Section 3.2.1 - Riprap Apron

Parameter	Unit	Value
Diameter of Conduit	ft	5
Design Discharge	ft^3/s	144.7
Tailwater Depth	ft	1.96
Allowable Velocity	ft/s	5
Required Area of Flow	ft^2	28.94
Froude Parameter		2.59
Tailwater Depth/Conduit Diameter		0.39
Expansion Factor		4.8
Length of Protection	**ft**	**47**
*Length will extend until tie out to existing grade		
Expansion Angle	degrees	5.946863
Width of Protection	**ft**	**15**
RipRap Size (Figure 9-38)		
Q/D^1.5		12.94
Yt/D		0.39
RipRap Size (Figure 9-38)		Type M

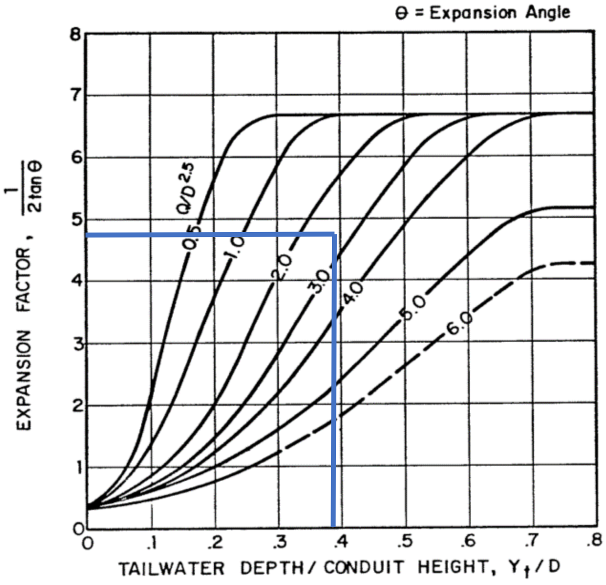
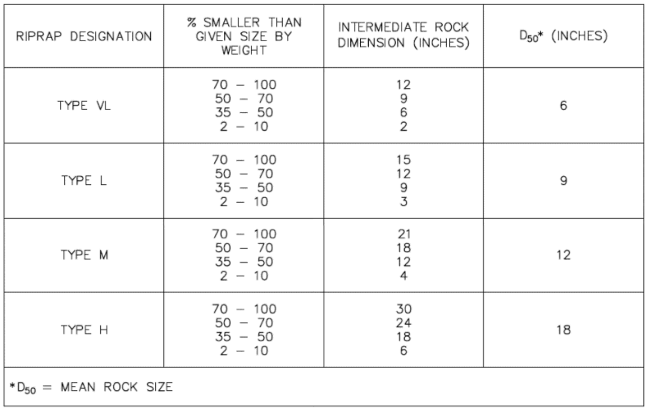


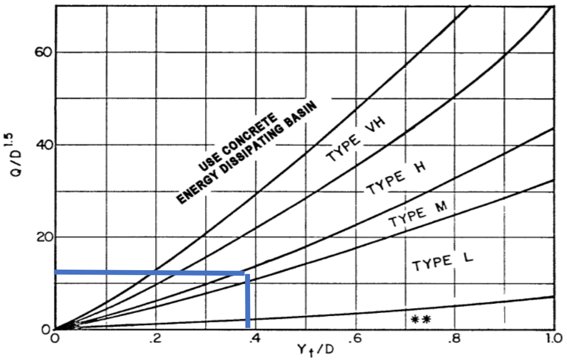
Figure 9-35. Expansion factor for circular conduits



RIPRAP DESIGNATION	% SMALLER THAN GIVEN SIZE BY WEIGHT	INTERMEDIATE ROCK DIMENSION (INCHES)	D_{50}* (INCHES)
TYPE VL	70 – 100 50 – 70 35 – 50 2 – 10	12 9 6 2	6
TYPE L	70 – 100 50 – 70 35 – 50 2 – 10	15 12 9 3	9
TYPE M	70 – 100 50 – 70 35 – 50 2 – 10	21 18 12 4	12
TYPE H	70 – 100 50 – 70 35 – 50 2 – 10	30 24 18 6	18

*D_{50} = MEAN ROCK SIZE

Figure 8-34. Riprap and soil riprap placement and gradation (part 1 of 3)



Use D_a instead of D whenever flow is supercritical in the barrel.
** Use Type L for a distance of 3D downstream.

Figure 9-38. Riprap erosion protection at circular conduit outlet (valid for Q/D2.5 ≤ 6.0)

Mayberry Filing 3
CULVERTS E1 & E2

Per UDFCD Section 3.2.1 - Riprap Apron

Parameter	Unit	Value
Diameter of Conduit	ft	5
Design Discharge	ft^3/s	150.8
Tailwater Depth	ft	1.95
Allowable Velocity	ft/s	5
Required Area of Flow	ft^2	30.16
Froude Parameter		2.70
Tailwater Depth/Conduit Diameter		0.39
Expansion Factor		4.4
Length of Protection	**ft**	**47**
*Length will extend until tie out to existing grade		
Expansion Angle	degrees	6.483074
Width of Protection	**ft**	**16**
RipRap Size (Figure 9-38)		
Q/D^1.5		13.49
Yt/D		0.39
RipRap Size (Figure 9-38)		Type M

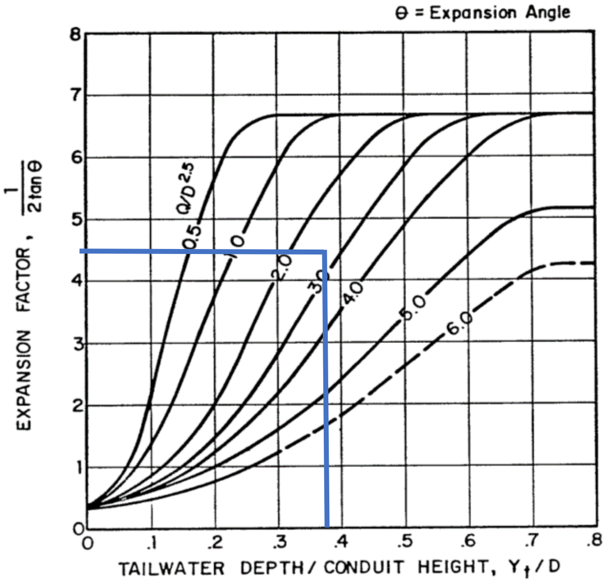
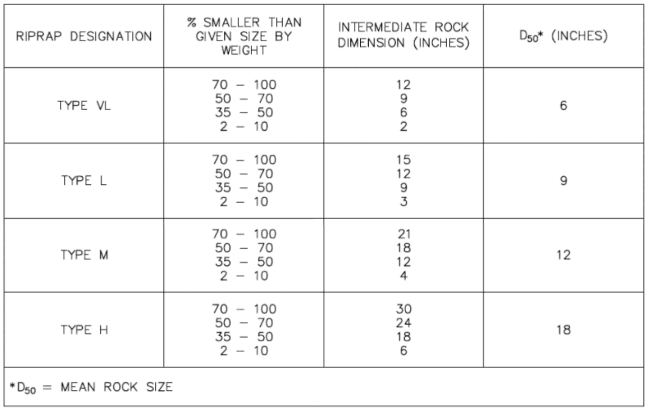


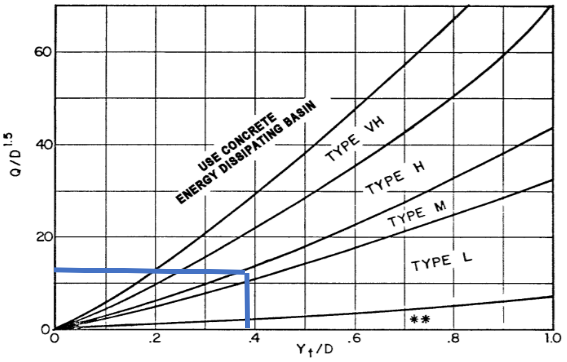
Figure 9-35. Expansion factor for circular conduits



RIPRAP DESIGNATION	% SMALLER THAN GIVEN SIZE BY WEIGHT	INTERMEDIATE ROCK DIMENSION (INCHES)	D_{50}* (INCHES)
TYPE VL	70 – 100 50 – 70 35 – 50 2 – 10	12 9 6 2	6
TYPE L	70 – 100 50 – 70 35 – 50 2 – 10	15 12 9 3	9
TYPE M	70 – 100 50 – 70 35 – 50 2 – 10	21 18 12 4	12
TYPE H	70 – 100 50 – 70 35 – 50 2 – 10	30 24 18 6	18

*D_{50} = MEAN ROCK SIZE

Figure 8-34. Riprap and soil riprap placement and gradation (part 1 of 3)



Use D_a instead of D whenever flow is supercritical in the barrel.
** Use Type L for a distance of 3D downstream.

Figure 9-38. Riprap erosion protection at circular conduit outlet (valid for Q/D2.5 ≤ 6.0)

Mayberry Filing 3
Channel E Confluence with channel F (EX-5)

Per UDFCD Section 3.2.1 - Riprap Apron

Parameter	Unit	Value
Diameter of Conduit	ft	8
Design Discharge	ft^3/s	150.5
Tailwater Depth	ft	2.42
Allowable Velocity	ft/s	3
Required Area of Flow	ft^2	50.16667
Froude Parameter		0.83
Tailwater Depth/Conduit Diameter		0.30
Expansion Factor		6.67
Length of Protection	**ft**	**85**
*Length will extend until tie out to existing grade		
Expansion Angle	degrees	4.287018
Width of Protection	**ft**	**21**
RipRap Size (Figure 9-38)		
Q/D^1.5		6.65
Yt/D		0.30
RipRap Size (Figure 9-38)		Type L

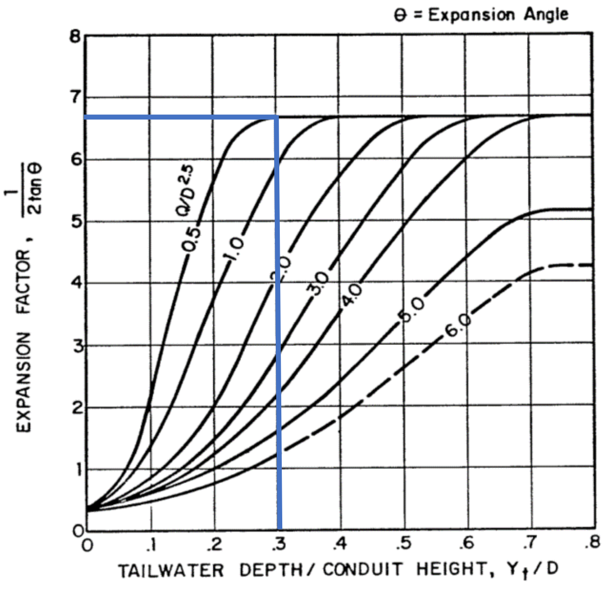
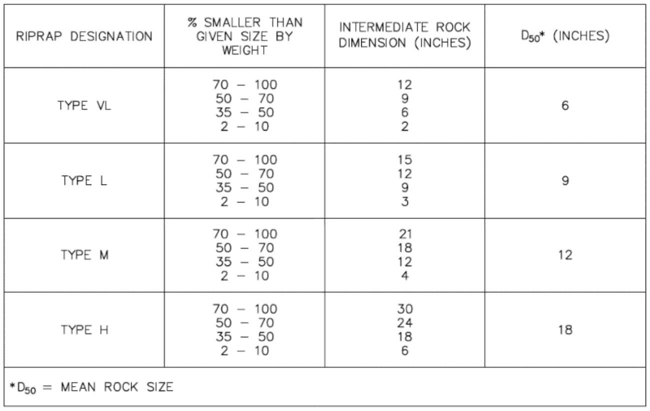


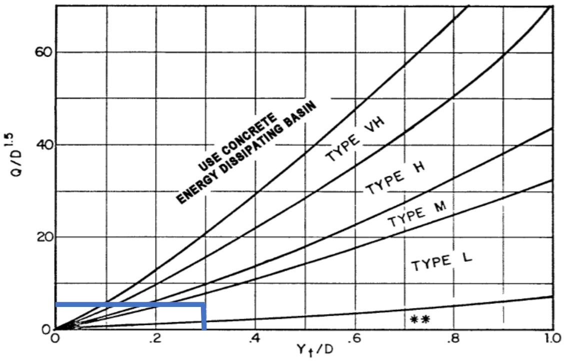
Figure 9-35. Expansion factor for circular conduits



RIPRAP DESIGNATION	% SMALLER THAN GIVEN SIZE BY WEIGHT	INTERMEDIATE ROCK DIMENSION (INCHES)	D_{50}* (INCHES)
TYPE VL	70 – 100 50 – 70 35 – 50 2 – 10	12 9 6 2	6
TYPE L	70 – 100 50 – 70 35 – 50 2 – 10	15 12 9 3	9
TYPE M	70 – 100 50 – 70 35 – 50 2 – 10	21 18 12 4	12
TYPE H	70 – 100 50 – 70 35 – 50 2 – 10	30 24 18 6	18

*D_{50} = MEAN ROCK SIZE

Figure 8-34. Riprap and soil riprap placement and gradation (part 1 of 3)



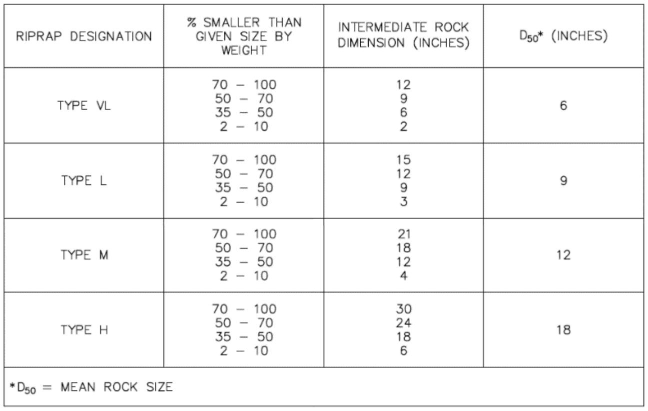
Use D_a instead of D whenever flow is supercritical in the barrel.
** Use Type L for a distance of 3D downstream.

Figure 9-38. Riprap erosion protection at circular conduit outlet (valid for Q/D2.5 ≤ 6.0)

Mayberry Filing 3
Channel F Plunge Pool

Per UDFCD Section 3.2.1 - Riprap Apron

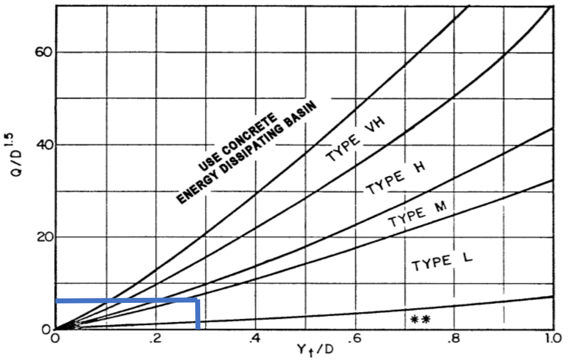
Parameter	Unit	Value
Diameter of Conduit	ft	8
Design Discharge	ft^3/s	177.5
Tailwater Depth	ft	3
Allowable Velocity	ft/s	1.3
RipRap Size (Figure 9-38)		
Q/D^1.5		7.84
Yt/D		0.38
RipRap Size (Figure 9-38)		Type L



RIPRAP DESIGNATION	% SMALLER THAN GIVEN SIZE BY WEIGHT	INTERMEDIATE ROCK DIMENSION (INCHES)	D_{50}* (INCHES)
TYPE VL	70 – 100 50 – 70 35 – 50 2 – 10	12 9 6 2	6
TYPE L	70 – 100 50 – 70 35 – 50 2 – 10	15 12 9 3	9
TYPE M	70 – 100 50 – 70 35 – 50 2 – 10	21 18 12 4	12
TYPE H	70 – 100 50 – 70 35 – 50 2 – 10	30 24 18 6	18

*D_{50} = MEAN ROCK SIZE

Figure 8-34. Riprap and soil riprap placement and gradation (part 1 of 3)



Use D_a instead of D whenever flow is supercritical in the barrel.
** Use Type L for a distance of 3D downstream.

Figure 9-38. Riprap erosion protection at circular conduit outlet (valid for Q/D2.5 ≤ 6.0)

DP EX-6 (EX. 100 YEAR FLOW)

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.010 ft/ft
Normal Depth	19.8 in

Section Definitions

Station (ft)	Elevation (ft)
12+21	6,023.20
14+15	6,022.90
15+21	6,022.50
15+30	6,021.50
15+38	6,022.90
15+50	6,023.20

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(12+21, 6,023.20)	(15+38, 6,022.90)	0.025
(15+38, 6,022.90)	(15+50, 6,023.20)	0.013

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Discharge	231.42 cfs
Roughness Coefficient	0.025
Elevation Range	6,021.5 to 6,023.2 ft
Flow Area	86.7 ft²
Wetted Perimeter	293.2 ft
Hydraulic Radius	3.5 in
Top Width	293.05 ft
Normal Depth	19.8 in
Critical Depth	19.3 in
Critical Slope	0.014 ft/ft
Velocity	2.67 ft/s
Velocity Head	0.11 ft
Specific Energy	1.76 ft
Froude Number	0.865

DP EX-6 (EX. 100 YEAR FLOW)

Results

Flow Type	Subcritical

GVF Input Data

Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data

Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	0.00 ft/s
Upstream Velocity	0.00 ft/s
Normal Depth	19.8 in
Critical Depth	19.3 in
Channel Slope	0.010 ft/ft
Critical Slope	0.014 ft/ft

DP EX-7 (EX. 100 YEAR FLOW)

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.010 ft/ft
Normal Depth	17.1 in

Section Definitions

Station (ft)	Elevation (ft)
13+06	6,001.10
13+22	6,000.72
15+41	6,000.72
15+51	5,999.65
15+59	6,001.10
15+71	6,001.39

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(13+06, 6,001.10)	(15+59, 6,001.10)	0.025
(15+59, 6,001.10)	(15+71, 6,001.39)	0.013

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Discharge	289.90 cfs
Roughness Coefficient	0.025
Elevation Range	5,999.7 to 6,001.4 ft
Flow Area	94.0 ft²
Wetted Perimeter	251.7 ft
Hydraulic Radius	4.5 in
Top Width	251.48 ft
Normal Depth	17.1 in
Critical Depth	16.7 in
Critical Slope	0.013 ft/ft
Velocity	3.08 ft/s
Velocity Head	0.15 ft
Specific Energy	1.57 ft
Froude Number	0.889

DP EX-7 (EX. 100 YEAR FLOW)

Results	
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	17.1 in
Critical Depth	16.7 in
Channel Slope	0.010 ft/ft
Critical Slope	0.013 ft/ft

APPENDIX C – REFERENCE INFORMATION

R&R ENGINEERS SURVEYORS INC

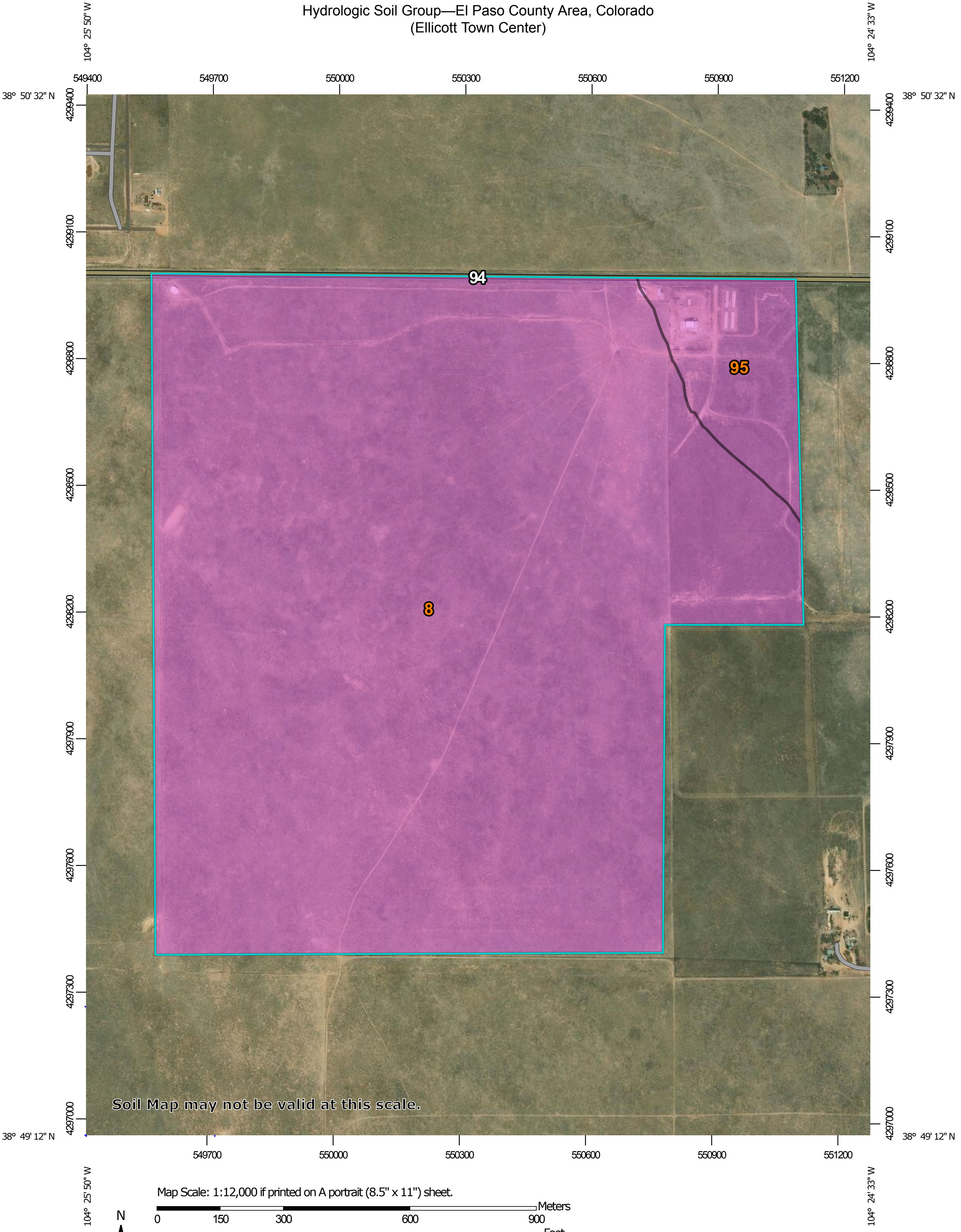
ENGINEER'S OPINION OF PROBABLE COSTS

FOR

Mayberry Filing 3 - Drainage Improvements

Item	Description	Total Work Units	Unit Price ($)	Total Cost ($)
Riprap		15 Ton	89.00 Ton	1,340.34
18" RCP		104 LF	$ 70.00 LF	$ 7,280.00
24" RCP		1,592 LF	$ 83.00 LF	$ 132,136.00
30" RCP		989 LF	$ 104.00 LF	$ 102,856.00
36" RCP		2,712 LF	$ 128.00 LF	$ 347,136.00
48" RCP		927 LF	$ 209.00 LF	$ 193,743.00
5' Type R		6 EA	$ 6,138.00 EA	$ 36,828.00
10' Type R		6 EA	$ 8,447.00 EA	$ 50,682.00
15' Type R		7 EA	$ 10,984.00 EA	$ 76,888.00
Storm Manhole		18 EA	$ 7,082.00 EA	$ 127,476.00
36" FES		1 EA	$ 744.00 EA	$ 744.00
60" FES		6 EA	$ 1,788.00 EA	$ 10,728.00
Pond Forebay		2 EA	$ 12,000.00 EA	$ 24,000.00
Pond Outlet Structure		1 EA	$ 12,000.00 EA	$ 12,000.00
Grass Channels		3 AC	$ 1,520.00 EA	$ 4,560.00
SUBTOTAL				$ 1,123,837.34
Contingency (15%)				$ 168,575.60
TOTAL				**$ 1,292,412.94**

Hydrologic Soil Group—El Paso County Area, Colorado
(Ellicott Town Center)



Map Scale: 1:12,000 if printed on A portrait (8.5" x 11") sheet.

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 13N WGS84

~~is severely eroded and blowouts have developed, the new seeding should be fertilized.~~

~~Windbreaks and environmental plantings are generally suited to this soil. Soil blowing is the main limitation for the establishment of trees and shrubs. This limitation can be overcome by cultivating only in the tree rows and leaving a strip of vegetation between the rows. Supplemental irrigation may be necessary when planting and during dry periods. Trees that are best suited and have good survival are Rocky Mountain juniper, eastern redcedar, ponderosa pine, Siberian elm, Russian-olive, and hackberry. Shrubs that are best suited are skunkbush sumac, lilac, and Siberian peashrub.~~

~~This soil is suited to wildlife habitat. It is best suited to habitat for openland and rangeland wildlife. In cropland areas, habitat favorable for ring-necked pheasant, mourning dove, and many nongame species can be developed by establishing areas for nesting and escape cover. For pheasant, the provision of undisturbed nesting cover is vital and should be included in plans for habitat development. Rangeland wildlife, such as pronghorn antelope, can be encouraged by developing livestock watering facilities, properly managing livestock grazing, and reseeding range where needed.~~

~~This soil has good potential for use as homesites. Shallow excavation is severely limited because cut banks cave in. This sandy soil requires special management practices to reduce water erosion and soil blowing. Capability subclasses IIIe, irrigated, and IVe, nonirrigated.~~

~~**7—Bijou sandy loam, 3 to 8 percent slopes.** This deep, well drained soil is on flood plains, terraces, and uplands. It formed in sandy alluvium and eolian material derived from arkose deposits. Elevation ranges from 5,400 to 6,200 feet. The average annual precipitation is about 13 inches, the average annual air temperature is about 49 degrees F, and the average frost-free period is about 145 days.~~

~~Typically, the surface layer is brown sandy loam about 4 inches thick. The subsoil is brown or grayish brown sandy loam about 24 inches thick. The substratum is pale brown loamy coarse sand.~~

~~Included with this soil in mapping are small areas of Olney sandy loam, 3 to 5 percent slopes; Valent sand, 1 to 9 percent slopes; Vona sandy loam, 3 to 9 percent slopes; and Wigton loamy sand, 1 to 8 percent slopes.~~

~~Permeability of this Bijou soil is rapid. Effective rooting depth is 60 inches or more. Available water capacity is moderate. Organic matter content of the surface layer is low. Surface runoff is slow, and the hazards of erosion and soil blowing are moderate.~~

~~Almost all areas of this soil are used for range.~~

~~This soil is suited to the production of native vegetation suitable for grazing. Because of the hazards of water erosion and soil blowing, the soil is not suited to nonirrigated crops.~~

~~Native vegetation is dominantly blue grama, sand dropseed, needleandthread, side-oats grama, and buckwheat.~~

~~Seeding is a suitable practice if the range has deteriorated. Seeding the native grasses is a good practice. If the range is severely eroded and blowouts have developed, the new seeding should be fertilized. Brush control and grazing management may be needed to improve the depleted range. Grazing should be managed so that enough forage is left standing to protect the soil from blowing, to increase infiltration of water, and to catch and hold snow.~~

~~Windbreaks and environmental plantings are generally suited to this soil. Soil blowing is the main limitation for the establishment of trees and shrubs. This limitation can be overcome by cultivating only in the tree rows and leaving a strip of vegetation between the rows. Supplemental irrigation may be needed when planting and during dry periods. Trees that are best suited and have good survival are Rocky Mountain juniper, eastern redcedar, ponderosa pine, Siberian elm, Russian-olive, and hackberry. Shrubs that are best suited are skunkbush sumac, lilac, and Siberian peashrub.~~

~~This soil is suited to wildlife habitat. It is best suited to habitat for openland and rangeland wildlife. Rangeland wildlife, such as pronghorn antelope, can be encouraged by developing livestock watering facilities, by properly managing livestock grazing, and by reseeding range where needed.~~

~~This soil has good potential for use as homesites. Shallow excavation is severely limited because cut banks cave in. This soil requires special management practices to reduce water erosion and soil blowing. Capability subclass VIe.~~

✱ **8—Blakeland loamy sand, 1 to 9 percent slopes.** This deep, somewhat excessively drained soil formed in alluvial and eolian material derived from arkosic sedimentary rock on uplands. The average annual precipitation is about 15 inches, the average annual air temperature is about 47 degrees F, and the average frost-free period is about 135 days.

Typically, the surface layer is dark grayish brown loamy sand about 11 inches thick. The substratum, to a depth of 27 inches, is brown loamy sand; it grades to pale brown sand that extends to a depth of 60 inches.

Included with this soil in mapping are small areas of Bresser sandy loam, 0 to 3 percent slopes; Bresser sandy loam, 3 to 5 percent slopes; Truckton sandy loam, 0 to 3 percent slopes; Truckton sandy loam, 3 to 9 percent slopes; and Stapleton sandy loam, 3 to 8 percent slopes. In some areas, mainly north of Colorado Springs in the Cottonwood Creek area, arkosic beds of sandstone and shale are at a depth of 0 to 40 inches.

Permeability of this Blakeland soil is rapid. Effective rooting depth is 60 inches or more. Available water capacity is low to moderate. Organic matter content of the surface layer is medium. Surface runoff is slow, the hazard of erosion is moderate, and the hazard of soil blowing is severe.

Most areas of this soil are used for range, homesites, and wildlife habitat.

Native vegetation is dominantly western wheatgrass, side-oats grama, and needleandthread. This soil is best suited to deep-rooted grasses.

Proper range management is necessary to prevent excessive removal of plant cover from the soil. Interseeding improves the existing vegetation. Deferment of grazing in spring increases plant vigor and soil stability. Proper location of livestock watering facilities helps to control grazing.

Windbreaks and environmental plantings are fairly well suited to this soil. Blowing sand and low available water capacity are the main limitations for the establishment of trees and shrubs. The soil is so loose that trees need to be planted in shallow furrows and plant cover needs to be maintained between the rows. Supplemental irrigation may be needed to insure survival. Trees that are best suited and have good survival are Rocky Mountain juniper, eastern redcedar, ponderosa pine, and Siberian elm. Shrubs that are best suited are skunkbush sumac, lilac, and Siberian peashrub.

This soil is suited to wildlife habitat. It is best suited to habitat for openland and rangeland wildlife. Rangeland wildlife, such as pronghorn antelope, can be encouraged by developing livestock watering facilities, properly managing livestock grazing, and reseeding range where needed.

This soil has good potential for urban development. Soil blowing is a hazard if protective vegetation is removed. Special erosion control practices must be provided to minimize soil losses. Capability subclass VIe.

~~**9—Blakeland complex, 1 to 9 percent slopes.** This complex is on uplands, mostly in the Falcon area. The average annual precipitation is about 15 inches, the average annual air temperature is about 47 degrees F, and the frost-free period is about 135 days.~~

~~This complex is about 60 percent Blakeland loamy sand, about 30 percent Fluvaquentic Haplaquolls, and 10 percent other soils.~~

~~Included with these soils in mapping are areas of Columbine gravelly sandy loam, 0 to 3 percent slopes, Ellicott loamy coarse sand, 0 to 5 percent slopes, and Ustic Torrifluvents, loamy.~~

~~The Blakeland soil is in the more sloping areas. It is deep and somewhat excessively drained. It formed in sandy alluvium and eolian material derived from arkosic sedimentary rock. Typically, the surface layer is dark grayish brown loamy sand about 11 inches thick. The substratum, to a depth of 27 inches, is brown loamy sand; it grades to pale brown sand that extends to a depth of 60 inches or more.~~

~~Permeability of the Blakeland soil is rapid. The effective rooting depth is more than 60 inches. The available water capacity is moderate to low. Surface runoff is slow, and the hazard of erosion is moderate.~~

~~The Fluvaquentic Haplaquolls are in swale areas. They are deep, poorly drained soils. They formed in alluvium derived from arkosic sedimentary rock. Typically, the surface layer is brown. The texture is variable throughout. The water table is at a depth of 0 to 3 feet.~~

~~The Blakeland soil is well suited to deep-rooted grasses. Native vegetation is dominantly western wheatgrass, side-oats grama, and needleandthread. Rangeland vegetation on the Fluvaquentic Haplaquolls is dominantly tall grasses, including sand bluestem, switchgrass, prairie cordgrass, little bluestem, and sand reedgrass. Cattails and bulrushes are common in the swampy areas.~~

~~Proper range management is needed to prevent excess removal of plant cover from these soils. It is also needed to maintain the productive grasses. Interseeding improves the existing vegetation. Deferment of grazing during the growing season increases plant vigor and soil stability, and it helps to maintain and improve range condition. Proper location of livestock watering facilities helps to control grazing of animals.~~

~~Windbreaks and environmental plantings are fairly well suited to these soils. Blowing sand and low available water capacity are the main limitations to the establishment of trees and shrubs. The soils are so loose that trees need to be planted in shallow furrows and plant cover needs to be maintained between the rows. Supplemental irrigation may be needed to insure survival. Trees that are best suited and have good survival are Rocky Mountain juniper, eastern redcedar, ponderosa pine, and Siberian elm. Shrubs that are best suited are skunkbush sumac, lilac, and Siberian peashrub.~~

~~The Blakeland soil is well suited to wildlife habitat. It is best suited to habitat for openland and rangeland wildlife. Rangeland wildlife, such as pronghorn antelope, can be encouraged by developing livestock watering facilities, properly managing livestock grazing, and reseeding range where needed. Wetland wildlife can be attracted to the Fluvaquentic Haplaquolls and the wetland habitat can be enhanced by several means. Shallow water developments can be created by digging or by blasting potholes to create open-water areas. Fencing to control livestock grazing is beneficial, and it allows wetland plants such as cattails, reed canarygrass, and rushes to grow. Control of unplanned burning and prevention of drainage that would remove water from the wetlands are good practices. Openland wildlife use the vegetation on these soils for nesting and escape cover. These shallow marsh areas are especially important for winter cover if natural vegetation is allowed to grow.~~

~~The Blakeland soil has good potential for homesites, roads, and streets. It needs to be protected from erosion when vegetation has been removed from building sites. The Fluvaquentic Haplaquolls have poor potential for homesites. Their main limitations for this use are the high water table and the hazard of flooding. Capability subclass VIe.~~

~~**10—Blendon sandy loam, 0 to 3 percent slopes.** This deep, well drained soil formed in sandy arkosic alluvium on alluvial fans and terraces. The average annual precipitation is about 15 inches, the mean annual air temperature is about 47 degrees F, and the average frost-free period is about 135 days.~~

~~Permeability of the Crowfoot soil is moderate. Effective rooting depth is 60 inches or more. Available water capacity is moderate. Surface runoff is medium, and the hazard of erosion is moderate. Some gullies are present in some drainageways and along stock trails.~~

~~The soils in this complex are used as rangeland, for recreation and wildlife habitat, and as homesites.~~

~~Native vegetation is mainly mountain muhly, bluestem, mountain brome, needleandthread, and blue grama. These soils are subject to invasion by Kentucky bluegrass and Gambel oak. Noticeable forbs are hairy goldenrod, geranium, milkvetch, low larkspur, fringed sage, and buckwheat.~~

~~Proper location of livestock watering facilities helps to control grazing. Timely deferment of grazing is needed to protect the plant cover.~~

~~Windbreaks and environmental plantings are fairly well suited to these soils. Blowing sand and moderate available water capacity are the main limitations for the establishment of trees and shrubs. The soils are so loose that trees need to be planted in shallow furrows and plant cover needs to be maintained between the rows. Supplemental irrigation may be needed to insure survival. Trees that are best suited and have good survival are Rocky Mountain juniper, eastern redcedar, ponderosa pine, and Siberian elm. Shrubs that are best suited are skunkbush sumac, lilac, and Siberian peashrub.~~

~~These soils are best suited to habitat for openland wildlife species, such as pronghorn antelope and sharp-tailed grouse. Although sharp-tailed grouse are not plentiful, they could be encouraged on these soils, especially where brush species are interspersed with grasses and forbs. If these soils are used as rangeland, wildlife production can be increased by managing livestock grazing to preclude overuse of the more desirable grass species and depletion of the various brush species.~~

~~The main limitations for urban uses are frost-action potential and slope on the Crowfoot soil and slope on the Tomah soil. Buildings and roads must be designed to overcome these limitations. Access roads must have adequate cut-slope grade and be provided with drains to control surface runoff. Maintaining the existing vegetation on building sites during construction helps to control erosion. Capability subclass VIe.~~

~~**94—Travessilla-Rock outcrop complex, 8 to 90 percent slopes.** This moderately sloping to extremely steep complex is mostly on rocky uplands (fig. 5). Elevation ranges from 6,200 to 6,700 feet. The average annual precipitation is about 15 inches, the average annual air temperature is about 47 degrees F, and the average frost-free period is about 140 days.~~

~~The Travessilla soil makes up about 45 percent of the complex, Rock outcrop about 30 percent, and included areas about 25 percent.~~

~~Included with this complex in mapping are areas of Bresser sandy loam, 5 to 9 percent slopes, Elbeth sandy loam, 8 to 15 percent slopes, Kettle gravelly loamy sand, 8 to 40 percent slopes, and Louviers silty clay loam, 3 to 18 percent slopes. The Elbeth and Kettle soils commonly are on the north-facing slopes.~~

~~The Travessilla soil is shallow and well drained. It formed in residuum derived from sandstone. Typically, the surface layer is light brownish gray sandy loam about 3 inches thick. The underlying material is pale brown sandy loam about 8 inches thick. Hard arkosic sandstone that has some fractures is at a depth of about 11 inches.~~

~~Permeability of the Travessilla soil is moderately rapid. Effective rooting depth is 6 to 20 inches. Available water capacity is low. Surface runoff is medium to rapid, and the hazard of erosion is high. Gullies are common along drainageways and trails.~~

~~Rock outcrop occurs mostly as ledges on cliffs.~~

~~This complex is used for urban development, as homesites, and for recreation and wildlife habitat.~~

~~This complex is suited to the production of ponderosa pine. The main limitations are the presence of stones and rock outcrop on the surface and a high hazard of erosion. Stones on the surface can hinder felling, yarding, and other operations involving the use of equipment. Practices must be used to minimize soil erosion when harvesting timber. The low available water capacity can influence seedling survival.~~

~~Wildlife on these soils is limited mostly to small animals such as cottontail, squirrel, and birds because of the extent of urban development. Ponderosa pine, mountain-mahogany, Gambel oak, and various grasses provide food, cover, and nesting areas.~~

~~This complex is extensively used for urban development and as homesites (fig. 6). The main limitations for these uses are depth to bedrock, rock outcrop, and steep slopes. Septic tank absorption fields do not function properly because of the depth to bedrock. Special designs for buildings and roads and streets are needed to overcome the limitations. Plans for homesite development should provide for the preservation of as many trees as possible because of their esthetic value. Capability subclass VIIe.~~

95—Truckton loamy sand, 1 to 9 percent slopes. This deep, well drained soil formed in alluvium and residuum derived from arkosic sedimentary rock on uplands. Elevation ranges from 6,000 to 7,000 feet. The average annual precipitation is about 15 inches, the average annual air temperature is about 47 degrees F, and the average frost-free period is about 135 days.

Typically, the surface layer is grayish brown loamy sand about 8 inches thick. The subsoil is brown sandy loam about 18 inches thick. The substratum is light yellowish brown coarse sandy loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Blakeland loamy sand, 1 to 9 percent slopes; Bresser sandy loam, 3 to 5 percent sloeps; Bresser sandy loam, 5 to 9 percent slopes; Truckton sandy loam, 0 to 3 percent slopes; and Truckton sandy loam, 3 to 9 percent slopes.

Permeability of this Truckton soil is moderately rapid. Effective rooting depth is 60 inches or more. Available water capacity is moderate. Surface runoff is slow, and the hazard of erosion is moderate to high.

Almost all areas of this soil are used as rangeland. A few areas of crops such as alfalfa and corn are grown under sprinkler irrigation.

This soil is well suited to the production of native vegetation suitable for grazing. It is best suited to deep-rooted grasses. The native vegetation is mainly cool- and warm-season grasses such as western wheatgrass, sideoats grama, and needleandthread.

Proper range management is needed to prevent excessive removal of the plant cover. Interseeding is used to improve the existing vegetation. Deferment of grazing in spring increases plant vigor and soil stability. Properly locating livestock watering facilities helps to control grazing.

Windbreaks and environmental plantings are fairly well suited to this soil. Blowing sand is the main limitation for the establishment of trees and shrubs. The soil is so loose that trees need to be planted in shallow furrows and plant cover needs to be maintained between the rows. Supplemental irrigation may be needed to insure survival. Trees that are best suited and have good survival are Rocky Mountain juniper, eastern redcedar, ponderosa pine, and Siberian elm. Shrubs that are best suited are skunkbush sumac, lilac, and Siberian peashrub.

This soil is suited to wildlife habitat. It is best suited to openland and rangeland wildlife habitat. Rangeland wildlife, such as pronghorn antelope, can be encouraged by developing livestock watering facilities, properly managing livestock grazing, and reseeding range where needed.

This soil has good potential for use as homesites. The main limitation of this soil for roads and streets is frost action potential. Special designs for roads are needed to minimize this limitation. Practices are needed to control soil blowing and water erosion on construction sites where the plant cover has been removed. Capability subclass VIe, nonirrigated.

~~**96—Truckton sandy loam, 0 to 3 percent slopes.** This deep, well drained soil formed in alluvium and residuum derived from arkosic sedimentary rock on uplands. Elevation ranges from 6,000 to 7,000 feet. The average annual precipitation is about 15 inches, the average annual air temperatue is about 47 degrees F, and the average frost-free period is about 135 days.~~

~~Typically, the surface layer is grayish brown sandy loam about 5 inches thick. The next layer is dark grayish brown sandy loam about 3 inches thick. The subsoil is brown sandy loam about 16 inches thick. The substratum is light yellowish brown coarse sandy loam to a depth of 60 inches or more.~~

~~Included with this soil in mapping are small areas of Blakeland loamy sand, 1 to 9 percent slopes; Bresser sandy loam, 0 to 3 percent slopes; Ellicott loamy coarse sand, 0 to 5 percent slopes; and Ustic Torrifluvents, loamy.~~

~~Permeability of this Truckton soil is moderately rapid. Effective rooting depth is 60 inches or more. Available water capacity is moderate. Surface runoff is slow, and the hazards of erosion and soil blowing are moderate.~~

~~This soil is used mainly for cultivated crops. It is also used for livestock grazing, for wildlife habitat, and as homesites.~~

~~Crops are commonly grown in combination with summer fallow because moisture is insufficient for annual cropping. Alfalfa can also be grown on this soil. When this soil is used as cropland, crop residue management and minimum tillage are necessary conservation practices.~~

~~This soil is well suited to the production of native vegetation suitable for grazing (fig. 7). It favors deep-rooted grasses. The native vegetation is mainly cool- and warm-season grasses such as western wheatgrass, sideoats grama, and needleandthread.~~

~~Proper range management is needed to prevent excessive removal of the plant cover. Interseeding is used to improve the existing vegetation. Deferment of grazing in spring increases plant vigor and soil stability. Properly locating livestock watering facilities helps to control grazing.~~

~~Windbreaks and environmental plantings generally are suited to this soil. Soil blowing is the main limitation to the establishment of trees and shrubs. This limitation can be overcome by cultivating only in the tree rows and leaving a strip of vegetation between the rows. Supplemental irrigation may be needed when planting and during dry periods. Trees that are best suited and have good survival are Rocky Mountain juniper, eastern redcedar, ponderosa pine, Siberian elm, Russian-olive, and hackberry. Shrubs that are best suited are skunkbush sumac, lilac, and Siberian peashrub.~~

~~This soil is suited to wildlife habitat. It is best suited to habitat for openland and rangeland wildlife. In cropland areas, habitat favorable for ring-necked pheasant, mourning dove, and many nongame species can be developed by establishing areas for nesting and escape cover. For pheasant, undisturbed nesting cover is vital and should be provided in plans for habitat development. This is especially true in areas of intensive farming. Rangeland wildlife, such as pronghorn antelope, can be encouraged by developing livestock watering facilities, properly managing livestock grazing, and reseeding range where needed.~~

~~This soil has good potential for use as homesites. The main limitation of this soil for roads and streets is frost-action potential. Special designs for roads are needed to overcome this limitation. Capability subclasses IIIe, nonirrigated, and IIe, irrigated.~~

~~**97—Truckton sandy loam, 3 to 9 percent slopes.** This deep, well drained soil formed in alluvium and residuum derived from arkosic sedimentary rock on uplands. Elevation ranges from 6,000 to 7,000 feet. The average annual precipitation is about 15 inches, the average annual air temperature is about 47 degrees F, and the average frost-free period is about 135 days.~~

~~Typically, the surface layer is grayish brown sandy loam about 5 inches thick. The next layer is dark grayish brown sandy loam about 3 inches thick. The subsoil is brown sandy loam about 16 inches thick. The substratum is light yellowish brown coarse sandy loam to a depth of 60 inches or more.~~

TABLE 16.--SOIL AND WATER FEATURES

[Absence of an entry indicates the feature is not a concern. See "flooding" in Glossary for definition of terms as "rare," "brief," and "very brief." The symbol > means greater than]

Soil name and map symbol	Hydrologic group	Flooding			Bedrock		Potential frost action
		Frequency	Duration	Months	Depth	Hardness	
					In		
Alamosa:							
1	C	Frequent	Brief	May-Jun	>60	---	High.
Ascalon:							
2, 3	B	None	---	---	>60	---	Moderate.
Badland:							
4	D	---	---	---	---	---	---
Bijou:							
5, 6, 7	B	None	---	---	>60	---	Low.
Blakeland:							
8	A	None	---	---	>60	---	Low.
[1]9:							
Blakeland part	A	None	---	---	>60	---	Low.
Fluvaquentic Haplaquolls part	D	Common	Very brief	Mar-Aug	>60	---	High.
Blendon:							
10	B	None	---	---	>60	---	Moderate.
Bresser:							
11, 12, 13	B	None	---	---	>60	---	Low.
Brussett:							
14, 15	B	None	---	---	>60	---	Moderate.
Chaseville:							
16, 17	A	None	---	---	>60	---	Low.
[1]18:							
Chaseville part	A	None	---	---	>60	---	Low.
Midway part	D	None	---	---	10-20	Rippable	Moderate.
Columbine:							
19	A	None to rare	---	---	>60	---	Low.
Connerton:							
[1]20:							
Connerton part	B	None	---	---	>60	---	High.
Rock outcrop part	D	---	---	---	---	---	---
Cruckton:							
21	B	None	---	---	>60	---	Moderate.
Cushman:							
22, 23	C	None	---	---	20-40	Rippable	Moderate.
[1]24:							
Cushman part	C	None	---	---	20-40	Rippable	Moderate.
Kutch part	C	None	---	---	20-40	Rippable	Moderate.
Elbeth:							
25, 26	B	None	---	---	>60	---	Moderate.
[1]27:							
Elbeth part	B	None	---	---	>60	---	Moderate.

See footnote at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			Bedrock		Potential frost action
		Frequency	Duration	Months	Depth	Hardness	
					In		
Tomah:							
[1]92, [1]93:							
Tomah part-----	B	None-----------	---	---	>60	---	Moderate.
Crowfoot part--	B	None-----------	---	---	>60	---	Moderate.
Travessilla:							
[1]94:							
Travessilla part----------	D	None-----------	---	---	6-20	Hard	Low.
Rock outcrop part----------	D	---	---	---	---	---	---
Truckton:							
95, 96, 97--------	B	None-----------	---	---	>60	---	Moderate.
[1]98:							
Truckton part--	B	None-----------	---	---	>60	---	Moderate.
Blakeland part-	A	None-----------	---	---	>60	---	Low.
[1]99, [1]100:							
Truckton part--	B	None-----------	---	---	>60	---	Moderate.
Bresser part---	B	None-----------	---	---	>60	---	Low.
Ustic Torrifluvents:							
101--------------	B	Occasional----	Very brief----	Mar-Aug	>60	---	Moderate.
Valent:							
102, 103---------	A	None-----------	---	---	>60	---	Low.
Vona:							
104, 105---------	B	None-----------	---	---	>60	---	Moderate.
Wigton:							
106--------------	A	None-----------	---	---	>60	---	Low.
Wiley:							
107, 108---------	B	None-----------	---	---	>60	---	Low.
Yoder:							
109, 110---------	B	None-----------	---	---	>60	---	Low.

---

[1] This map unit is made up of two or more dominant kinds of soil. See map unit description for the composition and behavior characteristics of the map unit.

NOTES TO USERS

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To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 13. The **horizontal datum** was NAD83, GRS80 spheroid. Differences in datum, spheroid, projection or UTM zones zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the **North American Vertical Datum of 1988 (NAVD88)**. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, MD 20910-3282

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This map reflects more detailed and up-to-date **stream channel configurations and floodplain delineations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map. The profile baselines depicted on this map represent the hydraulic modeling baselines that match the flood profiles and Floodway Data Tables if applicable, in the FIS report. As a result, the profile baselines may deviate significantly from the new base map channel representation and may appear outside of the floodplain.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

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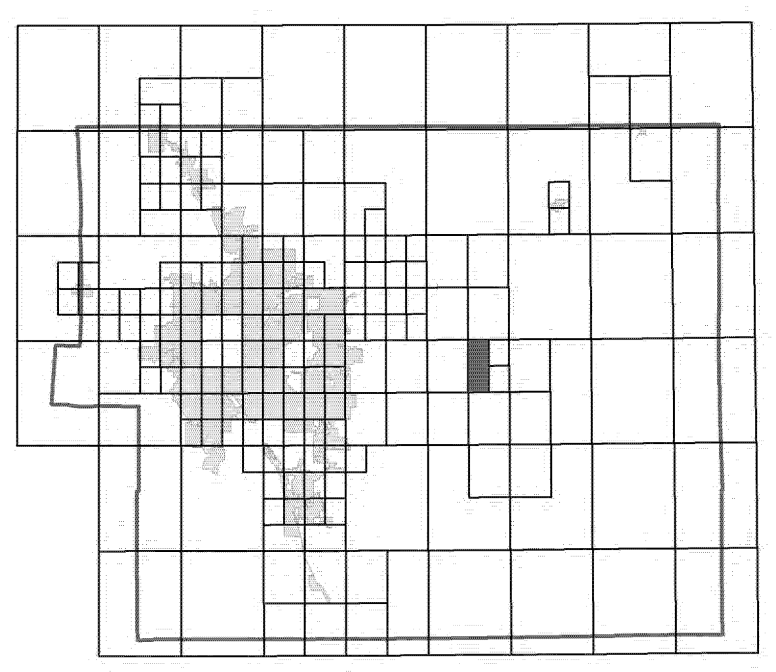
El Paso County Vertical Datum Offset Table

Flooding Source	Vertical Datum Offset (ft)
REFER TO SECTION 3.3 OF THE EL PASO COUNTY FLOOD INSURANCE STUDY FOR STREAM BY STREAM VERTICAL DATUM CONVERSION INFORMATION	

Panel Location Map



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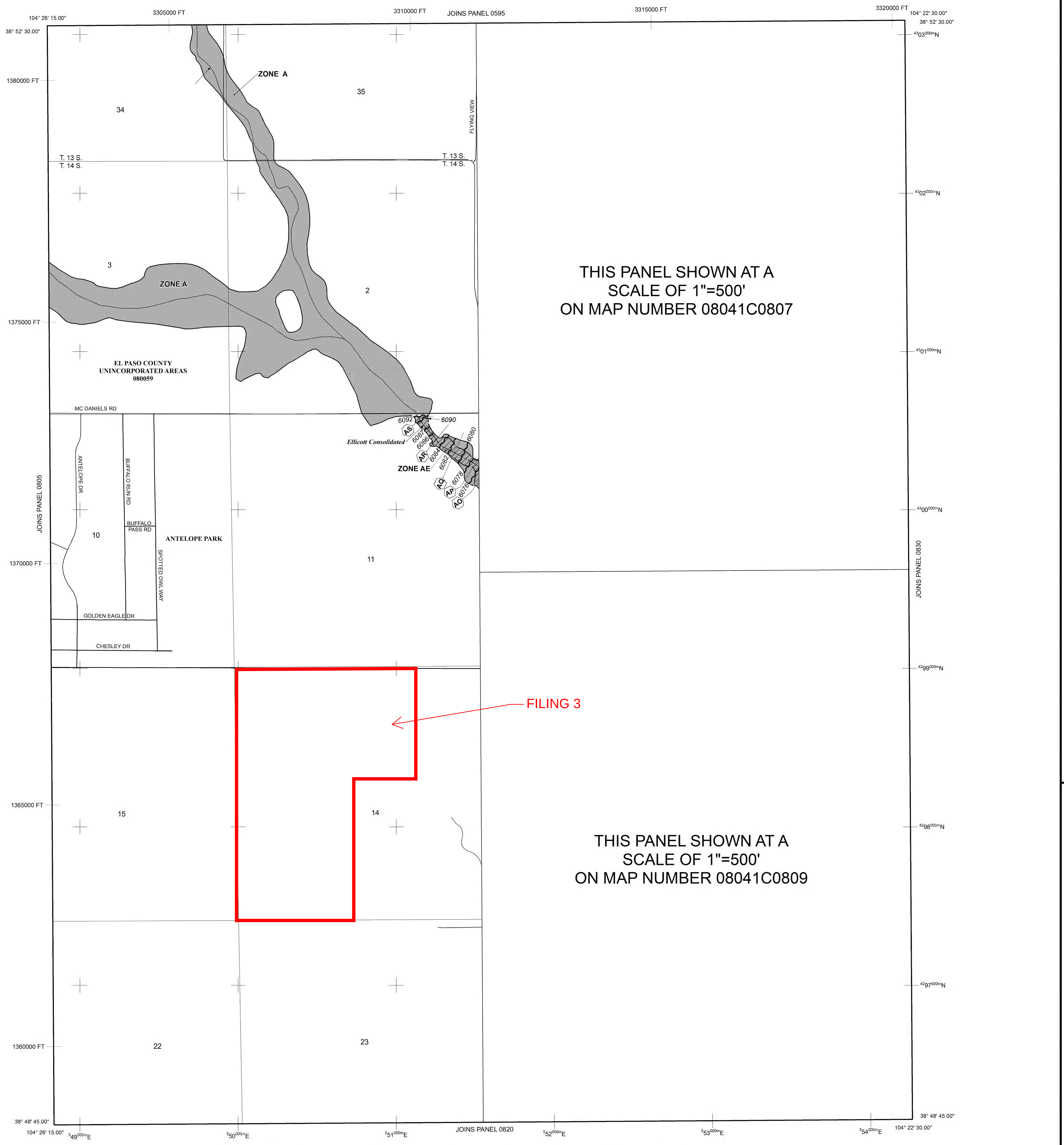

NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 13 SOUTH, RANGE 63 WEST, AND TOWNSHIP 14 SOUTH, RANGE 63 WEST.

LEGEND

▨ SPECIAL FLOOD HAZARD AREAS (SFHAS) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area Formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

▨ FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

▨ OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

☐ OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

▨ COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

▨ OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

————————	Floodplain boundary
——— ——— —	Floodway boundary
———— ————	Zone D Boundary
●●●●●●●●●●●●	CBRS and OPA boundary
▨ ←	Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
~~ *513* ~~~	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988 (NAVD 88)

(A)———(A)	Cross section line
(23)--------(23)	Transect line
97° 07' 30.00" 32° 22' 30.00"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
4275000mN	1000-meter Universal Transverse Mercator grid ticks, zone 13
6000000 FT	5000-foot grid ticks: Colorado State Plane coordinate system, central zone (FIPSZONE 0502), Lambert Conformal Conic Projection
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
● M1.5	River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
MARCH 17, 1997

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
DECEMBER 7, 2018 - to update corporate limits, to change Base Flood Elevations and Special Flood Hazard Areas, to update map format, to add roads and road names, and to incorporate previously issued Letters of Map Revision.

For community map revision history prior to countywide mapping, refer to the Community Map History Table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 1000'

500 0 1000 2000 FEET

300 0 300 600 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0810G

FIRM
FLOOD INSURANCE RATE MAP
EL PASO COUNTY, COLORADO
AND INCORPORATED AREAS

PANEL 810 OF 1300

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
EL PASO COUNTY	080059	0810	G

Notice to User: The **Map Number** shown below should be used when placing map orders: the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
08041C0810G

MAP REVISED
DECEMBER 7, 2018

Federal Emergency Management Agency

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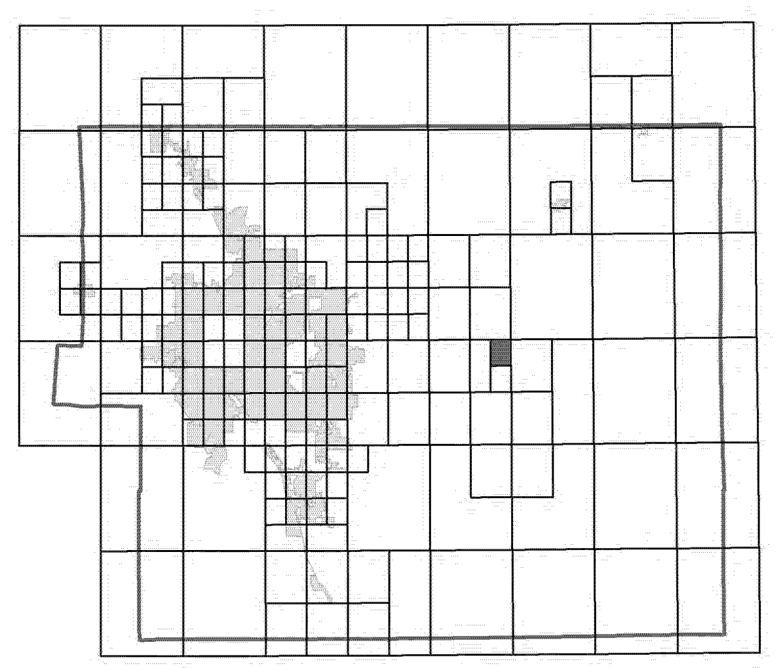

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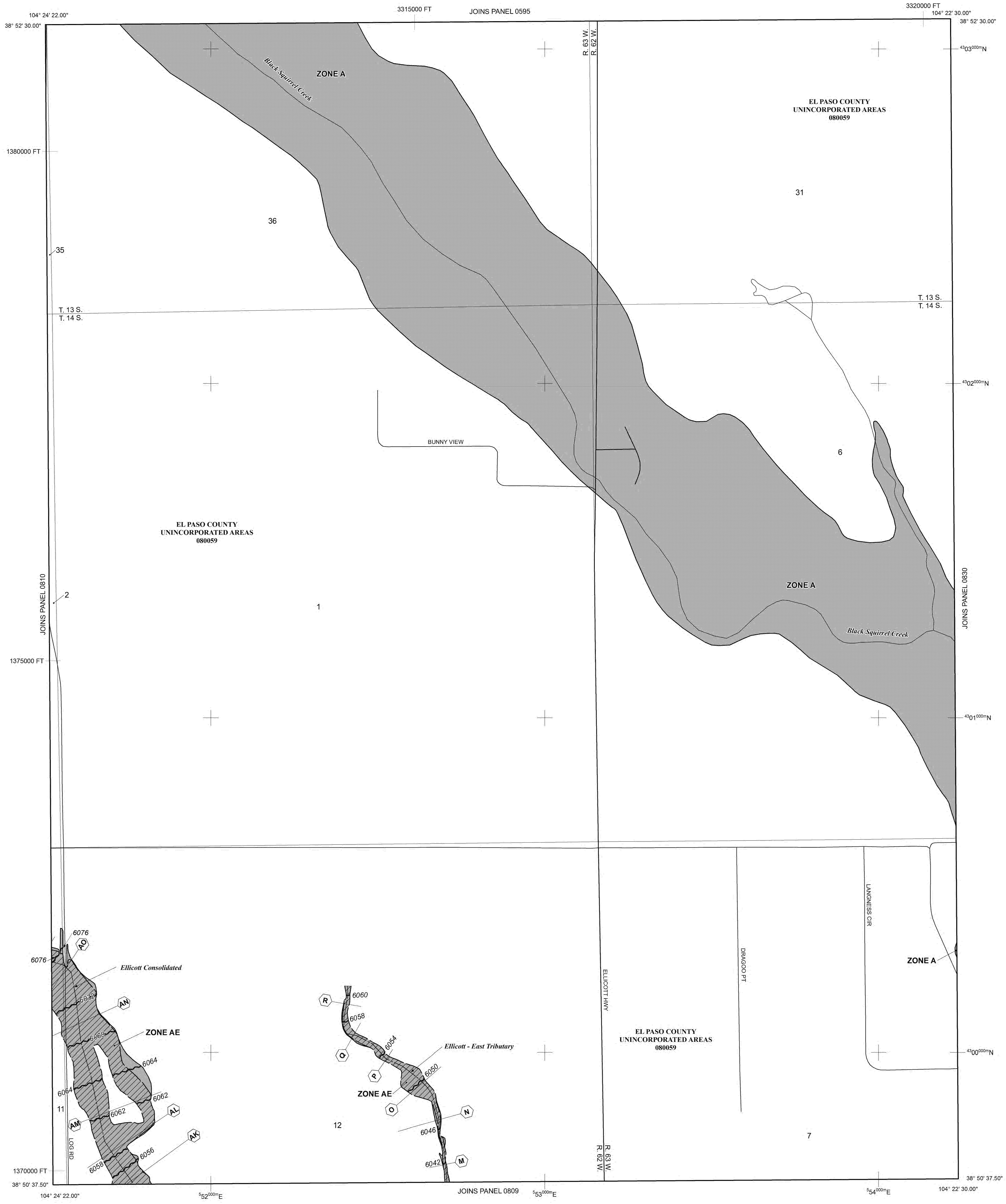

LEGEND

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ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area Formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

▨ FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

▨ OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

☐ OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

▨ COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

▨ OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

———	Floodplain boundary
— — —	Floodway boundary
—— ——	Zone D Boundary
●●●●●●●●●●●●	CBRS and OPA boundary
▨ ←	Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
~~ 513 ~~	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988 (NAVD 88)

A——A	Cross section line
(23)--------(23)	Transect line
97° 07' 30.00" 32° 22' 30.00"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
4275000mN	1000-meter Universal Transverse Mercator grid ticks, zone 13
6000000 FT	5000-foot grid ticks: Colorado State Plane coordinate system, central zone (FIPSZONE 0502), Lambert Conformal Conic Projection
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
● M1.5	River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
MARCH 17, 1997

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
DECEMBER 7, 2018 - to update corporate limits, to change Base Flood Elevations and Special Flood Hazard Areas, to update map format, to add roads and road names, and to incorporate previously issued Letters of Map Revision.

For community map revision history prior to countywide mapping, refer to the Community Map History Table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

250	0	500	1000	FEET
150	0	150	300	METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0807G

FIRM
FLOOD INSURANCE RATE MAP
EL PASO COUNTY, COLORADO
AND INCORPORATED AREAS

PANEL 807 OF 1300

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
EL PASO COUNTY	080059	0807	G

Notice to User: The **Map Number** shown below should be used when placing map orders: the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
08041C0807G

MAP REVISED
DECEMBER 7, 2018

Federal Emergency Management Agency

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 13. The **horizontal datum** was NAD83, GRS80 spheroid. Differences in datum, spheroid, projection or UTM zones zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the **North American Vertical Datum of 1988 (NAVD88)**. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, MD 20910-3282

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (301) 713-3242 or visit its website at http://www.ngs.noaa.gov/.

Base Map information shown on this FIRM was provided in digital format by El Paso County, Colorado Springs Utilities, and Anderson Consulting Engineers, Inc. These data are current as of 2008.

This map reflects more detailed and up-to-date **stream channel configurations and floodplain delineations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map. The profile baselines depicted on this map represent the hydraulic modeling baselines that match the flood profiles and Floodway Data Tables if applicable, in the FIS report. As a result, the profile baselines may deviate significantly from the new base map channel representation and may appear outside of the floodplain.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

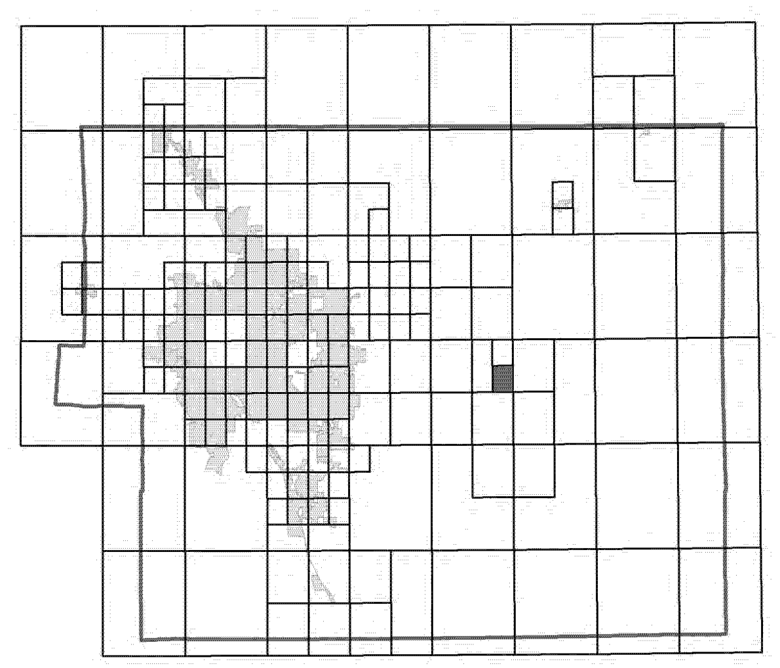
Contact **FEMA Map Service Center** (MSC) via the FEMA Map Information eXchange (FMIX) 1-877-336-2627 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. The MSC may also be reached by Fax at 1-800-358-9620 and its website at http://www.msc.fema.gov/.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/business/nfip.

El Paso County Vertical Datum Offset Table

Flooding Source	Vertical Datum Offset (ft)
REFER TO SECTION 3.3 OF THE EL PASO COUNTY FLOOD INSURANCE STUDY FOR STREAM BY STREAM VERTICAL DATUM CONVERSION INFORMATION	

Panel Location Map



This Digital Flood Insurance Rate Map (DFIRM) was produced through a Cooperating Technical Partner (CTP) agreement between the State of Colorado Water Conservation Board (CWCB) and the Federal Emergency Management Agency (FEMA).

Additional Flood Hazard information and resources are available from local communities and the Colorado Water Conservation Board.

NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 14 SOUTH, RANGE 62 WEST, AND TOWNSHIP 14 SOUTH, RANGE 63 WEST.

LEGEND

▨ SPECIAL FLOOD HAZARD AREAS (SFHAS) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area Formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

▨ FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

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▨ COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

▨ OTHERWISE PROTECTED AREAS (OPAs)

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———	Floodplain boundary
— — —	Floodway boundary
—— ——	Zone D Boundary
●●●●●●●●●●●●	CBRS and OPA boundary
▬	Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
~~ 513 ~~	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988 (NAVD 88)

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● M1.5	River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
MARCH 17, 1997

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
DECEMBER 7, 2018 - to update corporate limits, to change Base Flood Elevations and Special Flood Hazard Areas, to update map format, to add roads and road names, and to incorporate previously issued Letters of Map Revision.

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MAP SCALE 1" = 500'

250	0	500	1000	FEET
150	0	150	300	METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0809G

FIRM
FLOOD INSURANCE RATE MAP
EL PASO COUNTY, COLORADO
AND INCORPORATED AREAS

PANEL 809 OF 1300

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

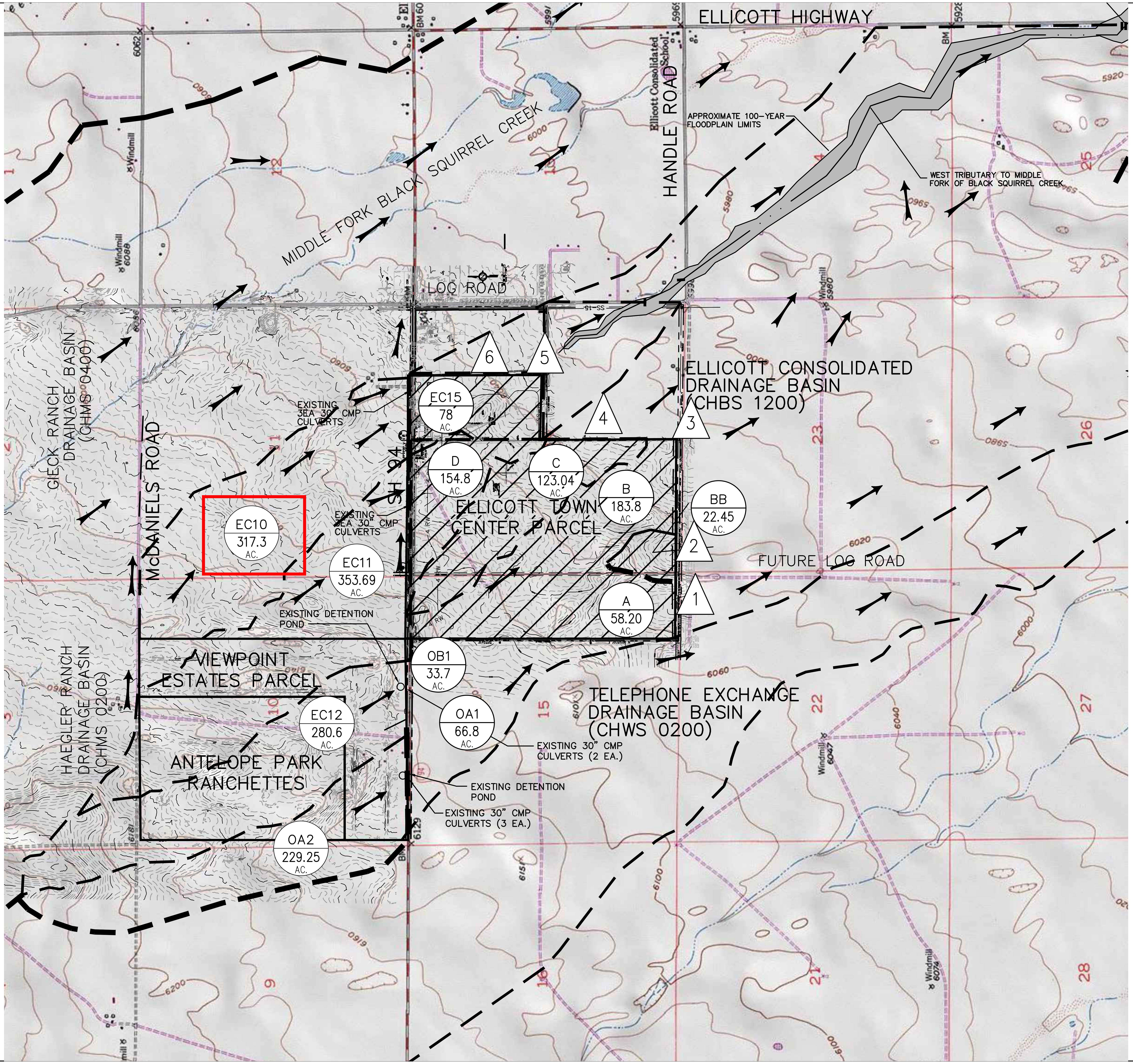
COMMUNITY	NUMBER	PANEL	SUFFIX
EL PASO COUNTY	080059	0809	G

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
08041C0809G

MAP REVISED
DECEMBER 7, 2018

Federal Emergency Management Agency



SUMMARY HYDROLOGY TABLE

DESIGN POINT	Q_5 (CFS)	Q_{100} (CFS)
1	4.9	34.4
2	11.3	28.0
3	8.7	60.8
4	5.5	42.2
(REFER TO MDDP)		
5	30.6	174.9
6	19.1	111.4

LEGEND

OD1 296 AC.	DRAINAGE BASIN AREA (AC)
5	DESIGN POINT
▬ ▬	MAJOR BASIN LINE
— —	BASIN LINE

N

ORIGINAL SCALE: 1"=1000'

1000 0 1000 2000

JPS ENGINEERING

19 E. Willamette Ave.
Colorado Springs, CO
80903

PH: 719-477-9429
FAX: 719-471-0766
john@jpsengr.com

CALL UTILITY NOTIFICATION CENTER OF COLORADO
1-800-922-1987
CALL 2-BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES.

No.	REVISION	BY	DATE

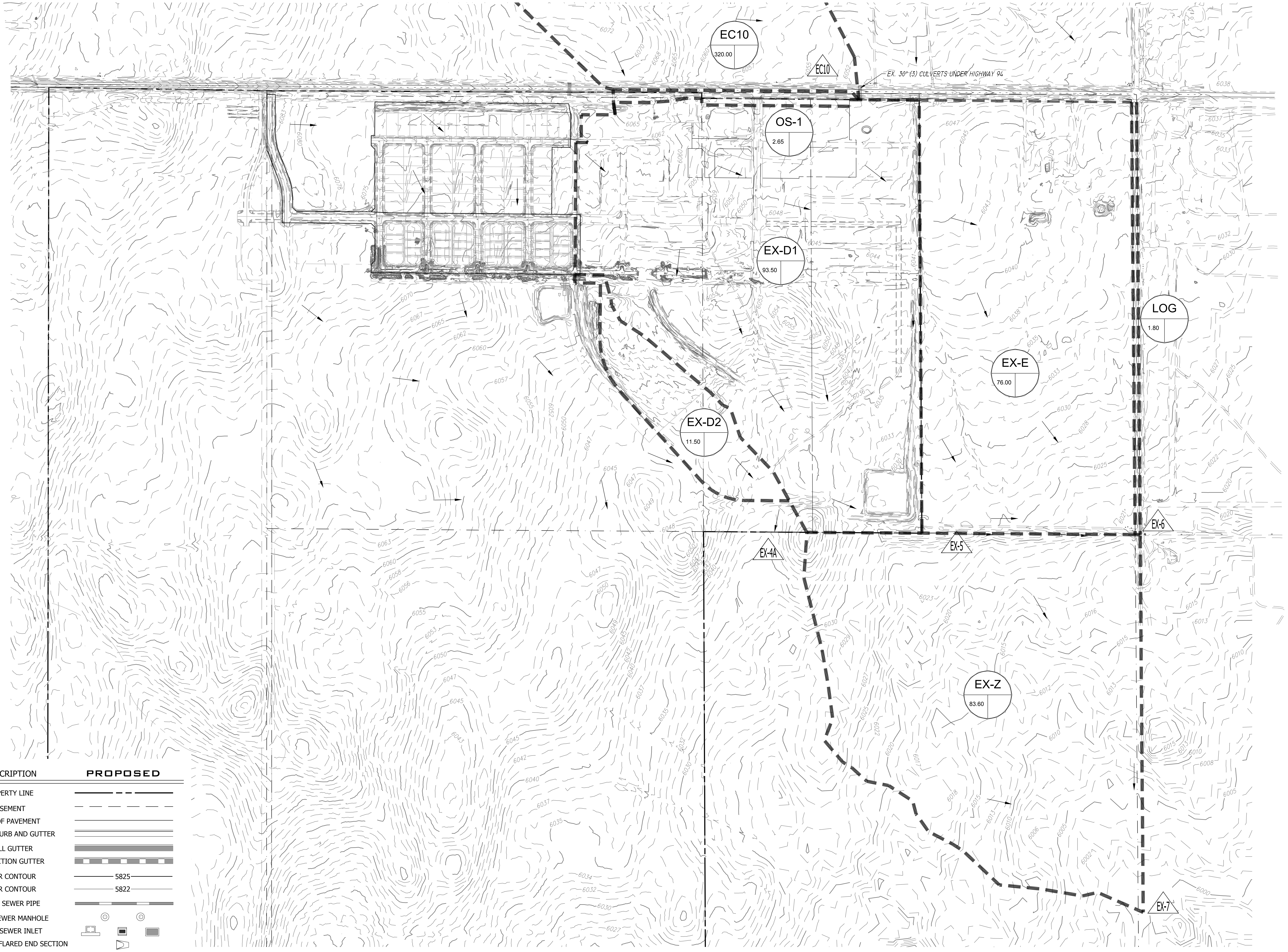
ELLICOTT TOWN CENTER

MAJOR BASIN / HISTORIC DRAINAGE PLAN

HORZ. SCALE: 1"=1000'	DRAWN: MJP
VERT. SCALE: N/A	DESIGNED: JPS
SURVEYED: UP&E	CHECKED: JPS
CREATED: 12/3/00	LAST MODIFIED: 9/12/19
PROJECT NO: 090001	MODIFIED BY: BJJ

SHEET: EX1

Z:\090001.EllicottTC\dwg\Civil\EX1 - F1.dwg Sep 16, 2019 - 8:26am



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

EXISTING	DESCRIPTION	PROPOSED
	PROPERTY LINE	
	EASEMENT	
	EDGE OF PAVEMENT	
	VERTICAL CURB AND GUTTER	
	SPILL GUTTER	
	TRANSITION GUTTER	
5825	MAJOR CONTOUR	5825
5822	MINOR CONTOUR	5822
	STORM SEWER PIPE	
○	STORM SEWER MANHOLE	◎ ◎
	STORM SEWER INLET	
	STORM SEWER FLARED END SECTION	
	STORM SEWER HEADWALL	

DRAINAGE BASIN LABEL
* BASIN LABEL
** TRIBUTARY AREA (AC)

C-1*
1**

FLOW ARROW

DESIGN POINT △1

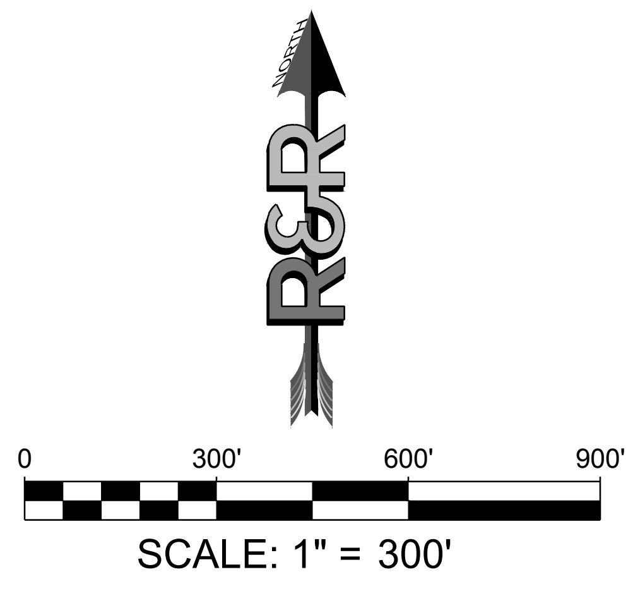
DRAINAGE AREA BOUNDARY

BASIN SUMMARY TABLE

BASIN	AREA (AC)	5-YR (CFS)	100-YR (CFS)
EC-10	320.00	18.40	144.70
OS-1	2.65	1.40	4.30
EX-D1	93.50	8.40	76.23
EX-D2	11.50	1.40	12.50
EX-E	76.00	6.10	53.30
LOG	1.80	3.70	6.30
EX-Z	83.60	8.20	63.40

DESIGN POINT SUMMARY TABLE

DESIGN POINT	CONTRIBUTING BASINS	5-YR (CFS)	100-YR (CFS)
EC-10	EC-10	18.40	144.70
EX-4A	EX-D2	1.40	12.50
EX-5	EC-10, EX-D1	23.70	183.90
EX-6	DP EX-5, EX-E, LOG	30.50	231.40
EX-7	DP EX-6, EX-Z	38.20	289.90



SCALE: 1" = 300'

NO.	REVISION	BY	DATE
	2ND SUBMISSION		9/1/22
	3RD SUBMISSION		01/09/23

R&R ENGINEERS SURVEYORS INC

R&R ENGINEERS-SURVEYORS, INC.
1635 WEST 13TH AVENUE, SUITE 310
DENVER, COLORADO 80204
PHONE: 303-753-6730

WWW.RRENGINEERS.COM

MAYBERRY PUD PH1 - FILING NO. 3

SITE ADDRESS:
MAYBERRY, COLORADO SPRINGS
EL PASO COUNTY

PREPARED FOR:
MAYBERRY COMMUNITIES, LLC
3296 DEVINE HEIGHTS #208
COLORADO SPRINGS, CO 80922

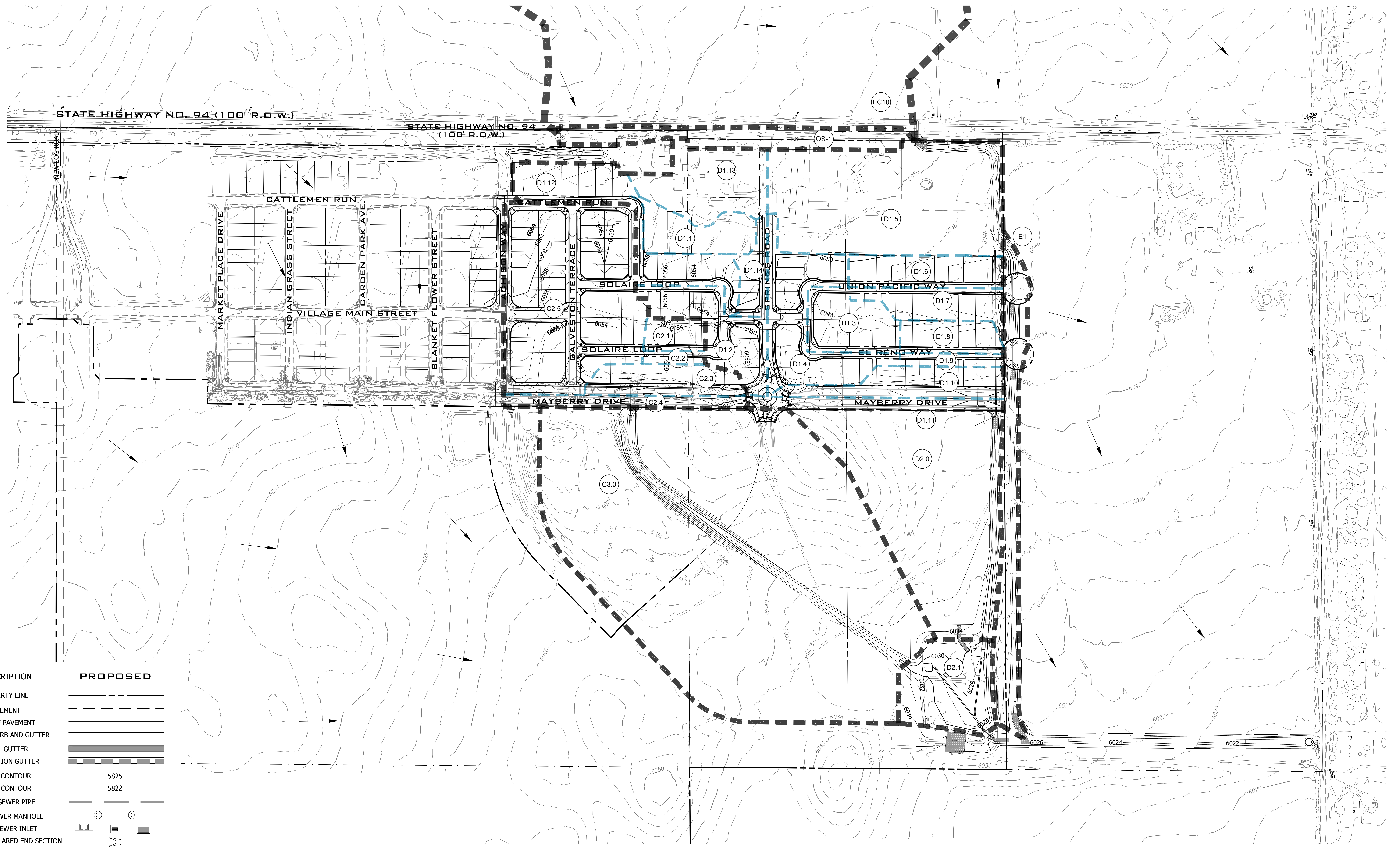
CONSTRUCTION DOCUMENTS
JOB NO. MC22110
ORG. SUBM. DATE 06/16/2022
DWN: LAO CHKD: CJD
NAME
FILING 3 HISTORIC DRAINAGE PLAN
NO.
EX2

PATH:\\192.168.100.23\PROJECTS\MC22110 MAYBERRY FILING NO. 3\ENGINEERING\4 DRAWINGS\PLANS\DRAINAGE MAPS\MC22110-XE-DRNG MAP -.DWG, PLOT DATE:1/5/2023 2:13:58 PM, BY:LIZ JONES

CDOT NOTE: MAINTAIN EXISTING ROADSIDE DITCH DRAINAGE PATTERSN & EXTEND EXISTING CULVERTS AS REQUIRED BASED ON SH94 IMPROVEMENTS; PROVIDE RIPRAP APRONS & EROSION CONTROL FOR ALL CULVERT EXTENSIONS

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

NO.	REVISION	BY	DATE
	2ND SUBMISSION		9/1/22
	3RD SUBMISSION		01/09/23



EXISTING	DESCRIPTION	PROPOSED
	PROPERTY LINE	
	EASEMENT	
	EDGE OF PAVEMENT	
	VERTICAL CURB AND GUTTER	
	SPILL GUTTER	
	TRANSITION GUTTER	
5825	MAJOR CONTOUR	5825
5822	MINOR CONTOUR	5822
	STORM SEWER PIPE	
○	STORM SEWER MANHOLE	◎ ◎
	STORM SEWER INLET	
	STORM SEWER FLARED END SECTION	
	STORM SEWER HEADWALL	

DRAINAGE BASIN LABEL
* BASIN LABEL
** TRIBUTARY AREA (AC)
*** PERCENT IMPERVIOUS (%)

C-1*
1** 50%***

FLOW ARROW ←

DESIGN POINT △1

DRAINAGE AREA BOUNDARY

0 200' 400' 600'
SCALE: 1" = 200'

R&R ENGINEERS SURVEYORS INC

R&R ENGINEERS-SURVEYORS, INC.
1635 WEST 13TH AVENUE, SUITE 310
DENVER, COLORADO 80204
PHONE: 303-753-6730

WWW.RRENGINEERS.COM

MAYBERRY PUD PH1 - FILING NO. 3

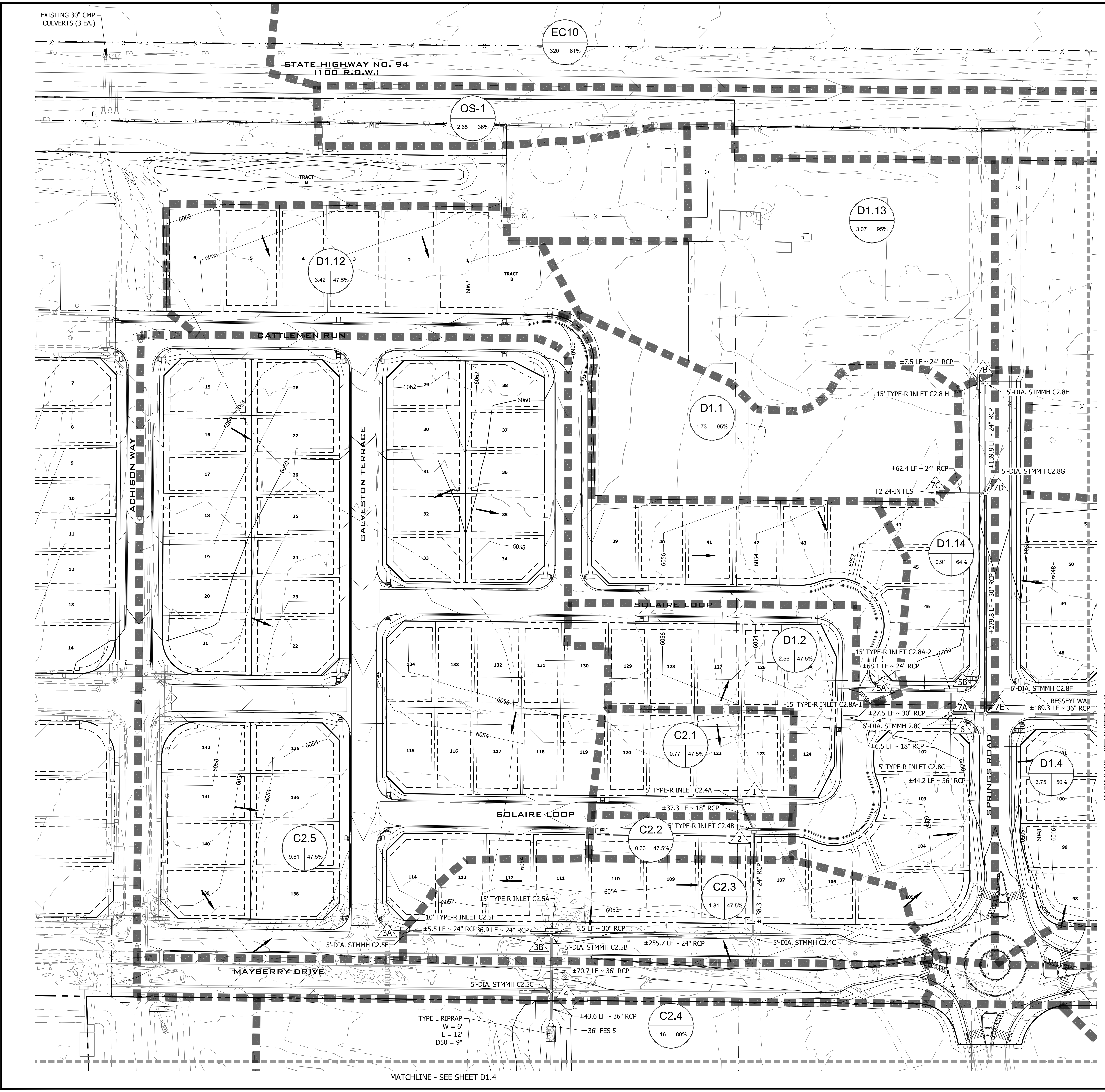
SITE ADDRESS:
MAYBERRY, COLORADO SPRINGS
EL PASO COUNTY

PREPARED FOR:
MAYBERRY COMMUNITIES, LLC
3296 DEVINE HEIGHTS #208
COLORADO SPRINGS, CO 80922

CONSTRUCTION DOCUMENTS

JOB NO. MC22110
ORG. SUBM. DATE 06/16/2022
DWN: LAO CHKD: CJD
NAME
OVERALL FILING 3
PROPOSED
DRAINAGE PLAN
NO.
D1.1

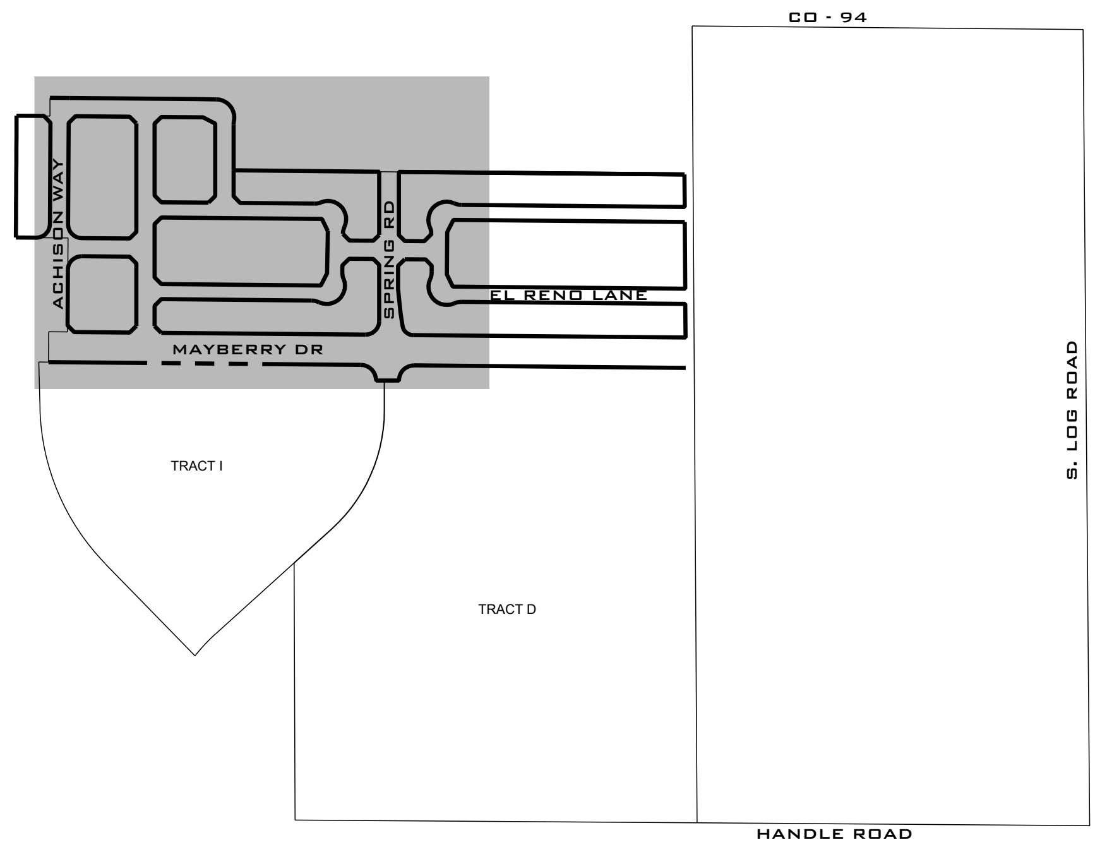
PATH: \\192.168.100.23\PROJECTS\MC22110 MAYBERRY FILING NO. 3\ENGINEERING\4 DRAWINGS\PLANS\DRAINAGE MAPS\MC22110-XP-DRNG MAP.DWG, PLOT DATE:1/5/2023 10:57:16 AM, BY:LIZ JONES



CDOT NOTE: MAINTAIN EXISTING ROADSIDE DITCH DRAINAGE PATTERSN & EXTEND EXISTING CULVERTS AS REQUIRED BASED ON SH94 IMPROVEMENTS; PROVIDE RIPRAP APRONS & EROSION CONTROL FOR ALL CULVERT EXTENSIONS

NOTE: DETAILED BASIN MAPS REPRESENT THE FULL ANTICIPATED BUILD OUT OF ALL AREAS TRIBUTARY TO POND D

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



KEY MAP

N.T.S.

EXISTING	DESCRIPTION	PROPOSED
	PROPERTY LINE	
	EASEMENT	
	EDGE OF PAVEMENT	
	VERTICAL CURB AND GUTTER	
	SPILL GUTTER	
	TRANSITION GUTTER	
5825	MAJOR CONTOUR	5825
5822	MINOR CONTOUR	5822
	STORM SEWER PIPE	
	STORM SEWER MANHOLE	
	STORM SEWER INLET	
	STORM SEWER FLARED END SECTION	
	STORM SEWER HEADWALL	

DRAINAGE BASIN LABEL
* BASIN LABEL
** TRIBUTARY AREA (AC)
*** PERCENT IMPERVIOUS (%) (FULL BUILDOUT)
C-1* 1** 50%***

FLOW ARROW

DESIGN POINT △1

DRAINAGE AREA BOUNDARY

DESIGN POINT SUMMARY TABLE				
Design Point	Contributing Basins	Area (acres)	5-yr (cfs)	100-yr (cfs)
1	C2.1	0.8	1.1	2.7
2	DP1, C2.2	1.1	1.6	3.9
3A	C2.5	9.6	14.2	34.6
3B	C2.3, DP3A	12.5	14.9	36.2
4	C2.4, DP3B	13.7	17.4	41.1
5A	D1.12	3.4	3.8	9.3
5B	D1.14, DP5A	4.3	5.2	12.2
6	D1.2	2.6	3.4	8.3
7A	DP5B, DP6	6.9	8.0	19.0
7B	D1.13	3.1	10.9	19.9
7C	D1.1	1.7	6.7	12.2
7D	DP7B, DP7C	4.8	16.7	30.3
7E	DP7D, DP7A	11.7	19.3	39.7
8	D1.3	2.0	3.1	7.5
9	DP7, DP8	13.7	20.5	42.7
10	DP9, D1.4	17.5	24.8	52.6
11	EC10, OS-1, E1	0.0	18.9	148.3
12	D1.5	9.9	31.6	57.6
13	DP12, D1.6	11.8	30.9	57.9
14	DP13, D1.7	13.4	32.9	62.8
15	DP14, D1.8	14.7	33.6	64.9
16	DP15, D1.9	15.2	34.2	66.4
17	D1.10	2.1	3.3	8.0
18	D1.11, DP17, DP10	20.8	27.4	57.8
19	DP16, DP18	36.0	53.1	106.8
20	DP19, D2.0	47.9	57.5	121.6
21	DP4, C3.0	49.1	36.7	104.9
22	D2.1, DP20, DP21	100.2	98.5	237.8
23	POND D OUTFLOW		1.2	39.6
24	CHANNEL E OUTFLOW		17.6	138.5
EX5	DP23, DP24		18.7	177.4

BASIN SUMMARY TABLE			
Basin	Area (acres)	5-yr (cfs)	100-yr (cfs)
C2.1	0.77	1.1	2.7
C2.2	0.33	0.6	1.4
C2.3	1.81	2.1	5.2
C2.4	1.16	4.1	7.8
C2.5	9.61	14.2	34.6
C3.0	35.40	22.0	72.7
D1.1	1.73	6.7	12.2
D1.2	2.56	3.4	8.3
D1.3	2.02	3.1	7.5
D1.4	3.75	5.4	12.7
D1.5	9.88	31.6	57.6
D1.6	1.96	2.6	6.3
D1.7	1.56	2.1	5.0
D1.8	1.27	1.8	4.3
D1.9	0.54	0.9	2.1
D1.10	2.13	3.3	8.0
D1.11	1.23	4.0	7.7
D1.12	3.42	3.8	9.3
D1.13	3.07	10.9	19.9
D1.14	0.91	1.8	3.9
D2.0	11.90	10.30	27.7
D2.1	3.15	0.90	6.6
E1	3.92	0.30	2.8
OS-1	2.65	0.40	2.6
EC10	320.0	18.40	144.7

NORTH

0 60' 120' 180'

SCALE: 1" = 60'

NO.	REVISION	BY	DATE
	2ND SUBMISSION		9/1/22
	3RD SUBMISSION		01/09/23

R&R ENGINEERS SURVEYORS INC

R&R ENGINEERS-SURVEYORS, INC.
1635 WEST 13TH AVENUE, SUITE 310
DENVER, COLORADO 80204
PHONE: 303-753-6730

WWW.RRENGINEERS.COM

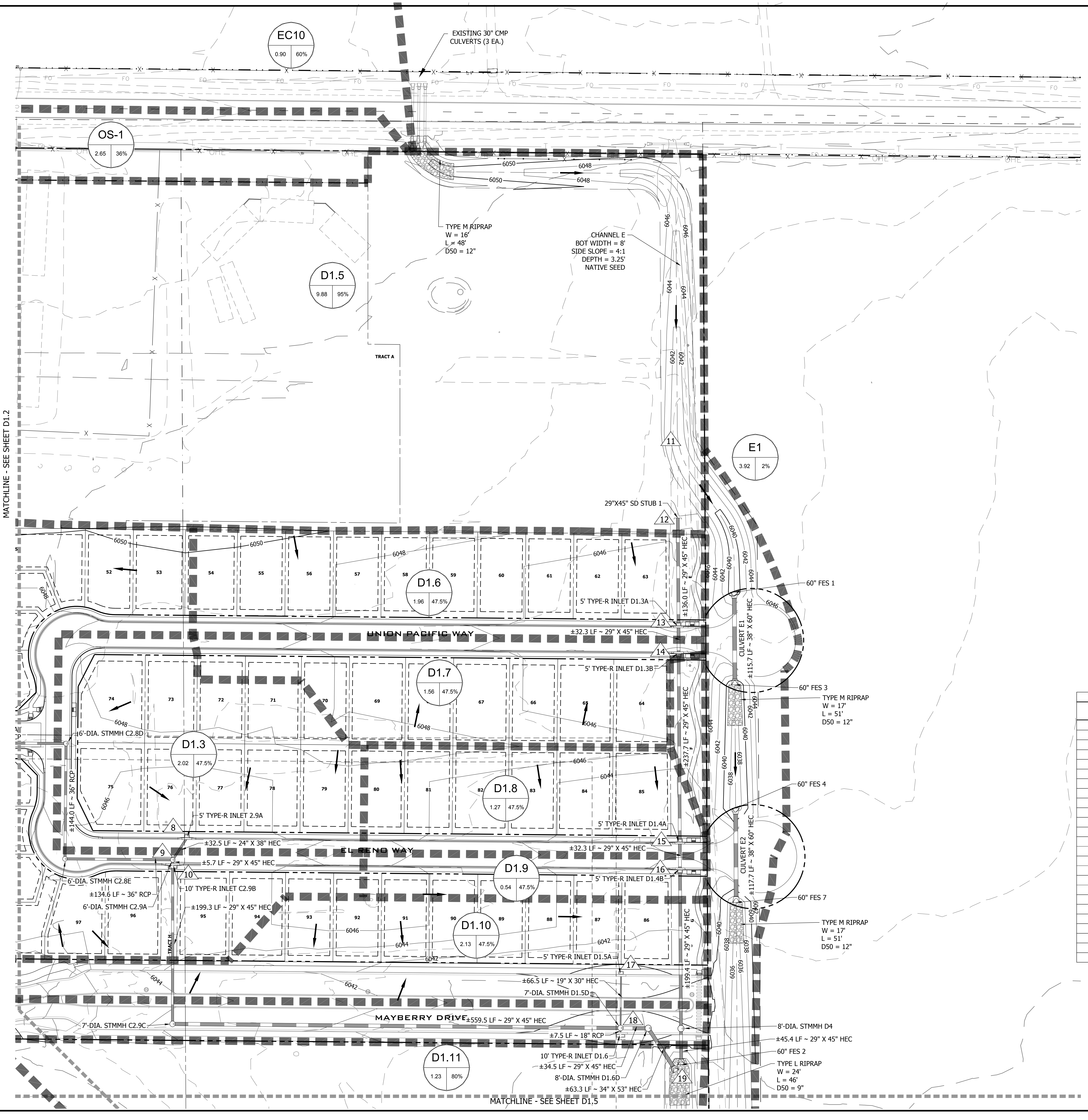
MAYBERRY PUD PH1 - FILING NO. 3

SITE ADDRESS:
MAYBERRY, COLORADO SPRINGS
EL PASO COUNTY

PREPARED FOR:
MAYBERRY COMMUNITIES, LLC
3296 DEVINE HEIGHTS #208
COLORADO SPRINGS, CO 80922

CONSTRUCTION DOCUMENTS

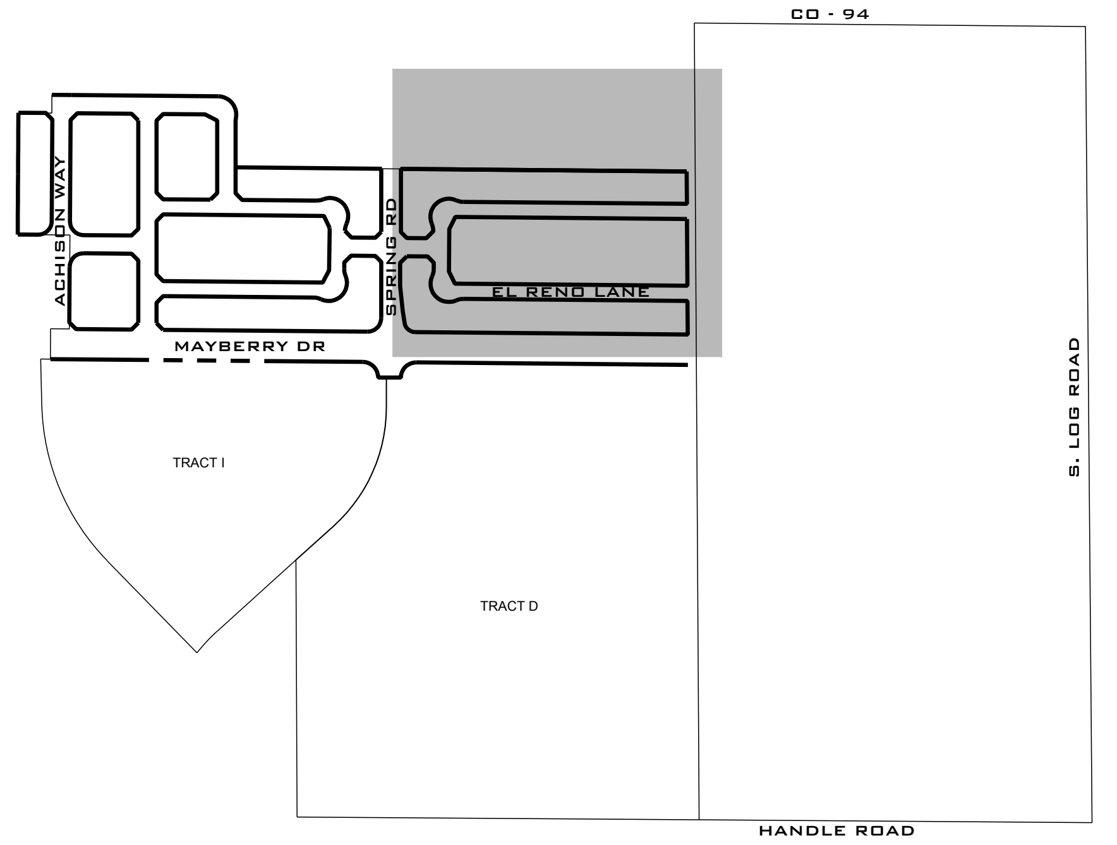
JOB NO. MC22110
ORG. SUBM. DATE 06/16/2022
DWN: LAO CHKD: CJD
NAME FILING 3 DETAILED DRAINAGE PLAN - NORTH WEST
NO. D1.2



<u>CDOT NOTE:</u> MAINTAIN EXISTING ROADSIDE DITCH DRAINAGE PATTERSN & EXTEND EXISTING CULVERTS AS REQUIRED BASED ON SH94 IMPROVEMENTS; PROVIDE RIPRAP APRONS & EROSION CONTROL FOR ALL CULVERT EXTENSIONS

<u>NOTE:</u> DETAILED BASIN MAPS REPRESENT THE FULL ANTICIPATED BUILD OUT OF ALL AREAS TRIBUTARY TO POND D

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



KEY MAP

N.T.S.

EXISTING	DESCRIPTION	PROPOSED
	PROPERTY LINE	
	EASEMENT	
	EDGE OF PAVEMENT	
	VERTICAL CURB AND GUTTER	
	SPILL GUTTER	
	TRANSITION GUTTER	
5825	MAJOR CONTOUR	5825
5822	MINOR CONTOUR	5822
	STORM SEWER PIPE	
	STORM SEWER MANHOLE	
	STORM SEWER INLET	
	STORM SEWER FLARED END SECTION	
	STORM SEWER HEADWALL	

DRAINAGE BASIN LABEL
* BASIN LABEL
** TRIBUTARY AREA (AC)
*** PERCENT IMPERVIOUS (%) (FULL BUILDOUT)

C-1*
1** 50%***

FLOW ARROW

DESIGN POINT 1

DRAINAGE AREA BOUNDARY

BASIN SUMMARY TABLE			
Basin	Area (acres)	5-yr (cfs)	100-yr (cfs)
C2.1	0.77	1.1	2.7
C2.2	0.33	0.6	1.4
C2.3	1.81	2.1	5.2
C2.4	1.16	4.1	7.8
C2.5	9.61	14.2	34.6
C3.0	35.40	22.0	72.7
D1.1	1.73	6.7	12.2
D1.2	2.56	3.4	8.3
D1.3	2.02	3.1	7.5
D1.4	3.75	5.4	12.7
D1.5	9.88	31.6	57.6
D1.6	1.96	2.6	6.3
D1.7	1.56	2.1	5.0
D1.8	1.27	1.8	4.3
D1.9	0.54	0.9	2.1
D1.10	2.13	3.3	8.0
D1.11	1.23	4.0	7.7
D1.12	3.42	3.8	9.3
D1.13	3.07	10.9	19.9
D1.14	0.91	1.8	3.9
D2.0	11.90	10.30	27.7
D2.1	3.15	0.90	6.6
E1	3.92	0.30	2.8
OS-1	2.65	0.40	2.6
EC10	320.0	18.40	144.7

DESIGN POINT SUMMARY TABLE				
Design Point	Contributing Basins	Area (acres)	5-yr (cfs)	100-yr (cfs)
1	C2.1	0.8	1.1	2.7
2	DP1, C2.2	1.1	1.6	3.9
3A	C2.5	9.6	14.2	34.6
3B	C2.3, DP3A	12.5	14.9	36.2
4	C2.4, DP3B	13.7	17.4	41.1
5A	D1.12	3.4	3.8	9.3
5B	D1.14, DP5A	4.3	5.2	12.2
6	D1.2	2.6	3.4	8.3
7A	DP5B, DP6	6.9	8.0	19.0
7B	D1.13	3.1	10.9	19.9
7C	D1.1	1.7	6.7	12.2
7D	DP7B, DP7C	4.8	16.7	30.3
7E	DP7D, DP7A	11.7	19.3	39.7
8	D1.3	2.0	3.1	7.5
9	DP7, DP8	13.7	20.5	42.7
10	DP9, D1.4	17.5	24.8	52.6
11	EC10, OS-1, E1	0.0	18.9	148.3
12	D1.5	9.9	31.6	57.6
13	DP12, D1.6	11.8	30.9	57.9
14	DP13, D1.7	13.4	32.9	62.8
15	DP14, D1.8	14.7	33.6	64.9
16	DP15, D1.9	15.2	34.2	66.4
17	D1.10	2.1	3.3	8.0
18	D1.11, DP17, DP10	20.8	27.4	57.8
19	DP16, DP18	36.0	53.1	106.8
20	DP19, D2.0	47.9	57.5	121.6
21	DP4, C3.0	49.1	36.7	104.9
22	D2.1, DP20, DP21	100.2	98.5	237.8
23	POND D OUTFLOW		1.2	39.6
24	CHANNEL E OUTFLOW		17.6	138.5
EX5	DP23, DP24		18.7	177.4

NORTH

0 60' 120' 180'
SCALE: 1" = 60'

NO.	REVISION	BY	DATE
	2ND SUBMISSION		9/1/22
	3RD SUBMISSION		01/09/23

R&R ENGINEERS SURVEYORS INC

R&R ENGINEERS-SURVEYORS, INC.
1635 WEST 13TH AVENUE, SUITE 310
DENVER, COLORADO 80204
PHONE: 303-753-6730

WWW.RRENGINEERS.COM

MAYBERRY PUD PH1 - FILING NO. 3

SITE ADDRESS:
MAYBERRY, COLORADO SPRINGS
EL PASO COUNTY

PREPARED FOR:
MAYBERRY COMMUNITIES, LLC
3296 DEVINE HEIGHTS #208
COLORADO SPRINGS, CO 80922

CONSTRUCTION DOCUMENTS

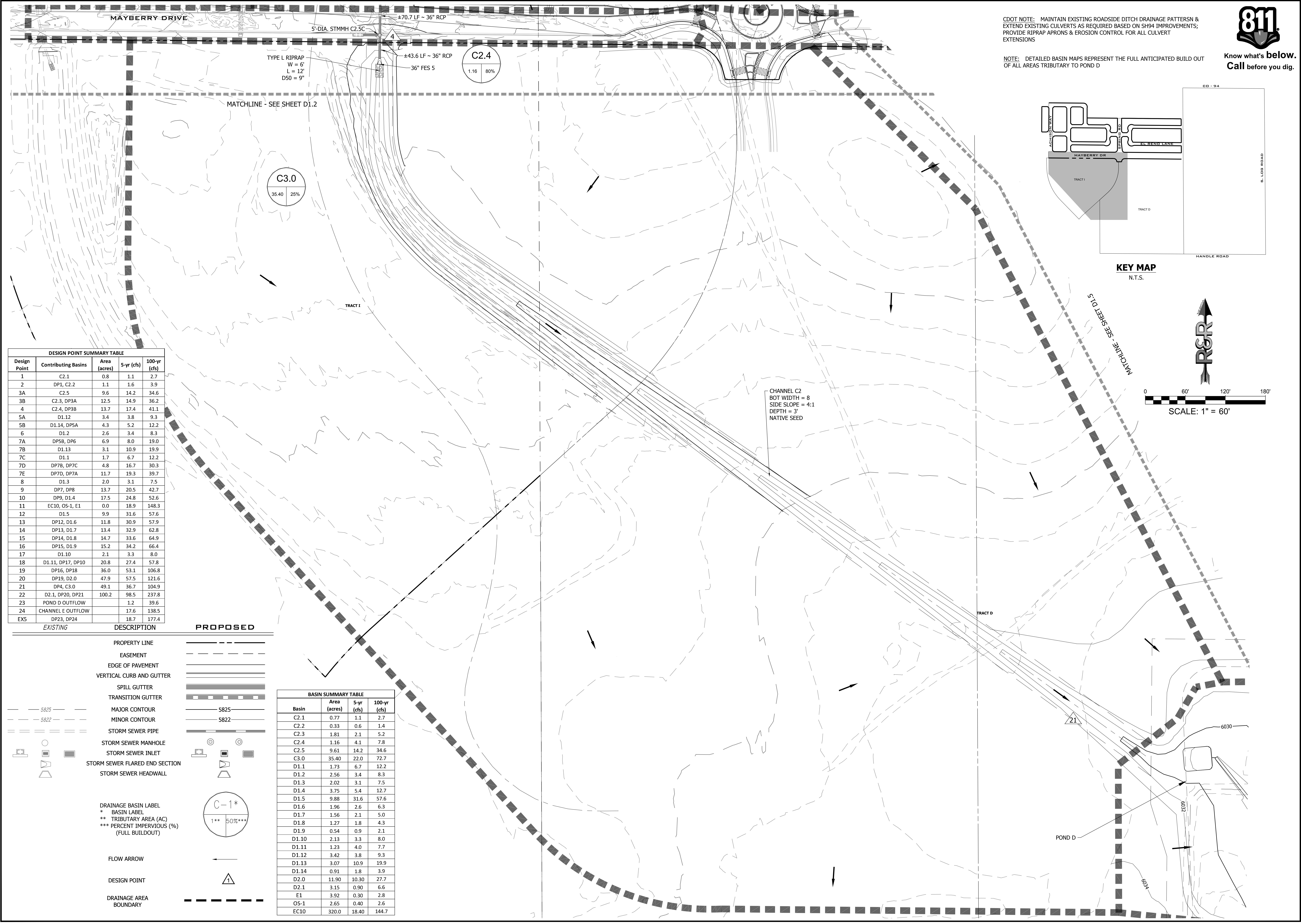
JOB NO. MC22110
ORG. SUBM. DATE 06/16/2022
DWN: LAO CHKD: CJD
NAME
FILING 3
DETAILED
DRAINAGE PLAN -
NORTH EAST
NO.
D1.3

PATH: \\192.168.100.23\PROJECTS\MC22110 MAYBERRY FILING NO. 3\ENGINEERING\4 DRAWINGS\PLANS\DRAINAGE MAPS\MC22110-XP-DRNG MAP D1L.DWG PLOT DATE:1/9/2023 2:50:16 PM BY:LIZ JONES

CDOT NOTE: MAINTAIN EXISTING ROADSIDE DITCH DRAINAGE PATTERSN & EXTEND EXISTING CULVERTS AS REQUIRED BASED ON SH94 IMPROVEMENTS; PROVIDE RIPRAP APRONS & EROSION CONTROL FOR ALL CULVERT EXTENSIONS

NOTE: DETAILED BASIN MAPS REPRESENT THE FULL ANTICIPATED BUILD OUT OF ALL AREAS TRIBUTARY TO POND D

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



DESIGN POINT SUMMARY TABLE				
Design Point	Contributing Basins	Area (acres)	5-yr (cfs)	100-yr (cfs)
1	C2.1	0.8	1.1	2.7
2	DP1, C2.2	1.1	1.6	3.9
3A	C2.5	9.6	14.2	34.6
3B	C2.3, DP3A	12.5	14.9	36.2
4	C2.4, DP3B	13.7	17.4	41.1
5A	D1.12	3.4	3.8	9.3
5B	D1.14, DP5A	4.3	5.2	12.2
6	D1.2	2.6	3.4	8.3
7A	DP5B, DP6	6.9	8.0	19.0
7B	D1.13	3.1	10.9	19.9
7C	D1.1	1.7	6.7	12.2
7D	DP7B, DP7C	4.8	16.7	30.3
7E	DP7D, DP7A	11.7	19.3	39.7
8	D1.3	2.0	3.1	7.5
9	DP7, DP8	13.7	20.5	42.7
10	DP9, D1.4	17.5	24.8	52.6
11	EC10, OS-1, E1	0.0	18.9	148.3
12	D1.5	9.9	31.6	57.6
13	DP12, D1.6	11.8	30.9	57.9
14	DP13, D1.7	13.4	32.9	62.8
15	DP14, D1.8	14.7	33.6	64.9
16	DP15, D1.9	15.2	34.2	66.4
17	D1.10	2.1	3.3	8.0
18	D1.11, DP17, DP10	20.8	27.4	57.8
19	DP16, DP18	36.0	53.1	106.8
20	DP19, D2.0	47.9	57.5	121.6
21	DP4, C3.0	49.1	36.7	104.9
22	D2.1, DP20, DP21	100.2	98.5	237.8
23	POND D OUTFLOW		1.2	39.6
24	CHANNEL E OUTFLOW		17.6	138.5
EX5	DP23, DP24		18.7	177.4

EXISTING	DESCRIPTION	PROPOSED
	PROPERTY LINE	
	EASEMENT	
	EDGE OF PAVEMENT	
	VERTICAL CURB AND GUTTER	
	SPILL GUTTER	
	TRANSITION GUTTER	
5825	MAJOR CONTOUR	5825
5822	MINOR CONTOUR	5822
	STORM SEWER PIPE	
	STORM SEWER MANHOLE	
	STORM SEWER INLET	
	STORM SEWER FLARED END SECTION	
	STORM SEWER HEADWALL	
	DRAINAGE BASIN LABEL * BASIN LABEL ** TRIBUTARY AREA (AC) *** PERCENT IMPERVIOUS (%) (FULL BUILDOUT)	C-1* 1** 50%***
	FLOW ARROW	
	DESIGN POINT	1
	DRAINAGE AREA BOUNDARY	

BASIN SUMMARY TABLE			
Basin	Area (acres)	5-yr (cfs)	100-yr (cfs)
C2.1	0.77	1.1	2.7
C2.2	0.33	0.6	1.4
C2.3	1.81	2.1	5.2
C2.4	1.16	4.1	7.8
C2.5	9.61	14.2	34.6
C3.0	35.40	22.0	72.7
D1.1	1.73	6.7	12.2
D1.2	2.56	3.4	8.3
D1.3	2.02	3.1	7.5
D1.4	3.75	5.4	12.7
D1.5	9.88	31.6	57.6
D1.6	1.96	2.6	6.3
D1.7	1.56	2.1	5.0
D1.8	1.27	1.8	4.3
D1.9	0.54	0.9	2.1
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E1	3.92	0.30	2.8
OS-1	2.65	0.40	2.6
EC10	320.0	18.40	144.7

PATH: \\192.168.100.23\PROJECTS\MC22110 MAYBERRY FILING NO. 3\ENGINEERING\4 DRAWINGS\PLANS\DRAINAGE MAPS\MC22110-XP-DRNG MAP DTL.DWG, PLOT DATE:1/5/2023 2:50:20 PM, BY:LIZ JONES

NO.	REVISION	BY	DATE
	2ND SUBMISSION		9/1/22
	3RD SUBMISSION		01/09/23

R&R ENGINEERS SURVEYORS INC

R&R ENGINEERS-SURVEYORS, INC.
1635 WEST 13TH AVENUE, SUITE 310
DENVER, COLORADO 80204
PHONE: 303-753-6730

WWW.RRENGINEERS.COM

MAYBERRY PUD PH1 - FILING NO. 3

SITE ADDRESS:
MAYBERRY, COLORADO SPRINGS
EL PASO COUNTY

PREPARED FOR:
MAYBERRY COMMUNITIES, LLC
3296 DEVINE HEIGHTS #208
COLORADO SPRINGS, CO 80922

CONSTRUCTION DOCUMENTS

JOB NO. MC22110
ORG. SUBM. DATE 06/16/2022
DWN: LAO CHKD: CJD
NAME FILING 3 DETAILED DRAINAGE PLAN - SOUTH WEST
NO. D1.4

CDOT NOTE: MAINTAIN EXISTING ROADSIDE DITCH DRAINAGE PATTERSN & EXTEND EXISTING CULVERTS AS REQUIRED BASED ON SH94 IMPROVEMENTS; PROVIDE RIPRAP APRONS & EROSION CONTROL FOR ALL CULVERT EXTENSIONS

NOTE: DETAILED BASIN MAPS REPRESENT THE FULL ANTICIPATED BUILD OUT OF ALL AREAS TRIBUTARY TO POND D

Know what's **below.**
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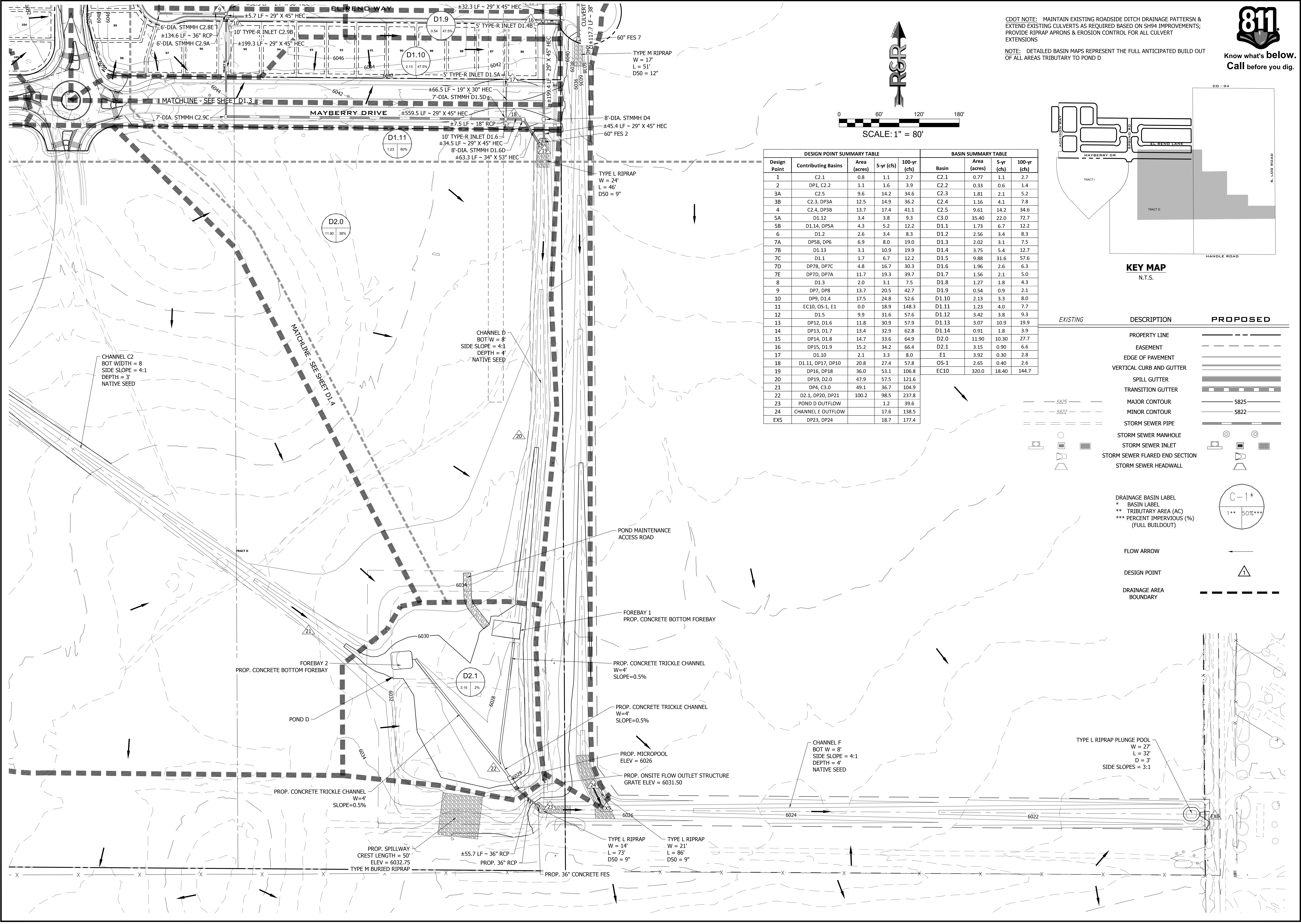

SCALE: 1" = 80'

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1	C2.1	0.8	1.1	2.7
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3B	C2.3, DP3A	12.5	14.9	36.2
4	C2.4, DP3B	13.7	17.4	41.1
5A	D1.12	3.4	3.8	9.3
5B	D1.14, DP5A	4.3	5.2	12.2
6	D1.2	2.6	3.4	8.3
7A	DP5B, DP6	6.9	8.0	19.0
7B	D1.13	3.1	10.9	19.9
7C	D1.1	1.7	6.7	12.2
7D	DP7B, DP7C	4.8	16.7	30.3
7E	DP7D, DP7A	11.7	19.3	39.7
8	D1.3	2.0	3.1	7.5
9	DP7, DP8	13.7	20.5	42.7
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14	DP13, D1.7	13.4	32.9	62.8
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EX5	DP23, DP24		18.7	177.4

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D1.2	2.56	3.4	8.3
D1.3	2.02	3.1	7.5
D1.4	3.75	5.4	12.7
D1.5	9.88	31.6	57.6
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D1.7	1.56	2.1	5.0
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D1.9	0.54	0.9	2.1
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D1.11	1.23	4.0	7.7
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E1	3.92	0.30	2.8
OS-1	2.65	0.40	2.6
EC10	320.0	18.40	144.7

KEY MAP

N.T.S.

EXISTING	DESCRIPTION	PROPOSED
	PROPERTY LINE	
	EASEMENT	
	EDGE OF PAVEMENT	
	VERTICAL CURB AND GUTTER	
	SPILL GUTTER	
	TRANSITION GUTTER	
5825	MAJOR CONTOUR	5825
5822	MINOR CONTOUR	5822
	STORM SEWER PIPE	
	STORM SEWER MANHOLE	
	STORM SEWER INLET	
	STORM SEWER FLARED END SECTION	
	STORM SEWER HEADWALL	

DRAINAGE BASIN LABEL
* BASIN LABEL
** TRIBUTARY AREA (AC)
*** PERCENT IMPERVIOUS (%) (FULL BUILDOUT)

C-1*
1** 50%***

FLOW ARROW

DESIGN POINT 1

DRAINAGE AREA BOUNDARY

NO.	REVISION	BY	DATE
	2ND SUBMISSION		9/1/22
	3RD SUBMISSION		01/09/23

R&R ENGINEERS SURVEYORS INC

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1635 WEST 13TH AVENUE, SUITE 310
DENVER, COLORADO 80204
PHONE: 303-753-6730

WWW.RRENGINEERS.COM

MAYBERRY PUD PH1 - FILING NO. 3

SITE ADDRESS:
MAYBERRY, COLORADO SPRINGS
EL PASO COUNTY

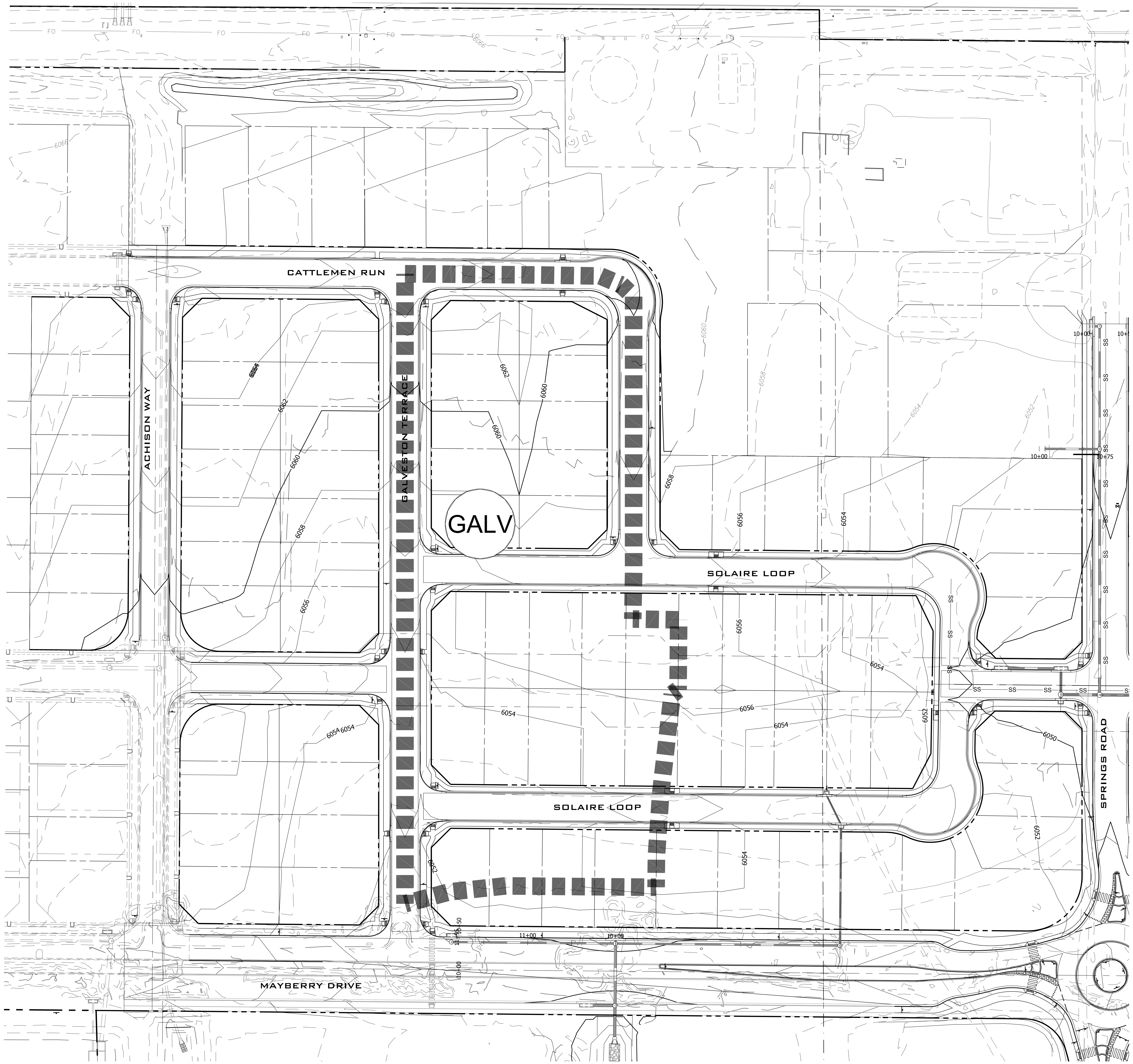
PREPARED FOR:
MAYBERRY COMMUNITIES, LLC
3296 DEVINE HEIGHTS #208
COLORADO SPRINGS, CO 80922

CONSTRUCTION DOCUMENTS

JOB NO. MC22110
ORG. SUBM. DATE 06/16/2022
DWN: LAO CHKD: CJD
NAME FILING 3 DETAILED DRAINAGE PLAN - SOUTH EAST
NO. D1.5

<u>CDOT NOTE:</u> MAINTAIN EXISTING ROADSIDE DITCH DRAINAGE PATTERSN & EXTEND EXISTING CULVERTS AS REQUIRED BASED ON SH94 IMPROVEMENTS; PROVIDE RIPRAP APRONS & EROSION CONTROL FOR ALL CULVERT EXTENSIONS

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



EXISTING	DESCRIPTION	PROPOSED
	PROPERTY LINE	
	EASEMENT	
	EDGE OF PAVEMENT	
	VERTICAL CURB AND GUTTER	
	SPILL GUTTER	
	TRANSITION GUTTER	
5825	MAJOR CONTOUR	5825
5822	MINOR CONTOUR	5822
	STORM SEWER PIPE	
	STORM SEWER MANHOLE	
	STORM SEWER INLET	
	STORM SEWER FLARED END SECTION	
	STORM SEWER HEADWALL	
	DRAINAGE BASIN LABEL * BASIN LABEL ** TRIBUTARY AREA (AC) *** PERCENT IMPERVIOUS (%)	C-1* 1** 50%***
	FLOW ARROW	←
	DESIGN POINT	1
	DRAINAGE AREA BOUNDARY	

0 60' 120' 180'

SCALE: 1" = 60'

NO.	REVISION	BY	DATE
	2ND SUBMISSION		9/1/22
	3RD SUBMISSION		01/09/23

R&R
ENGINEERS SURVEYORS INC

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DENVER, COLORADO 80204
PHONE: 303-753-6730

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MAYBERRY PUD PH1 - FILING NO. 3

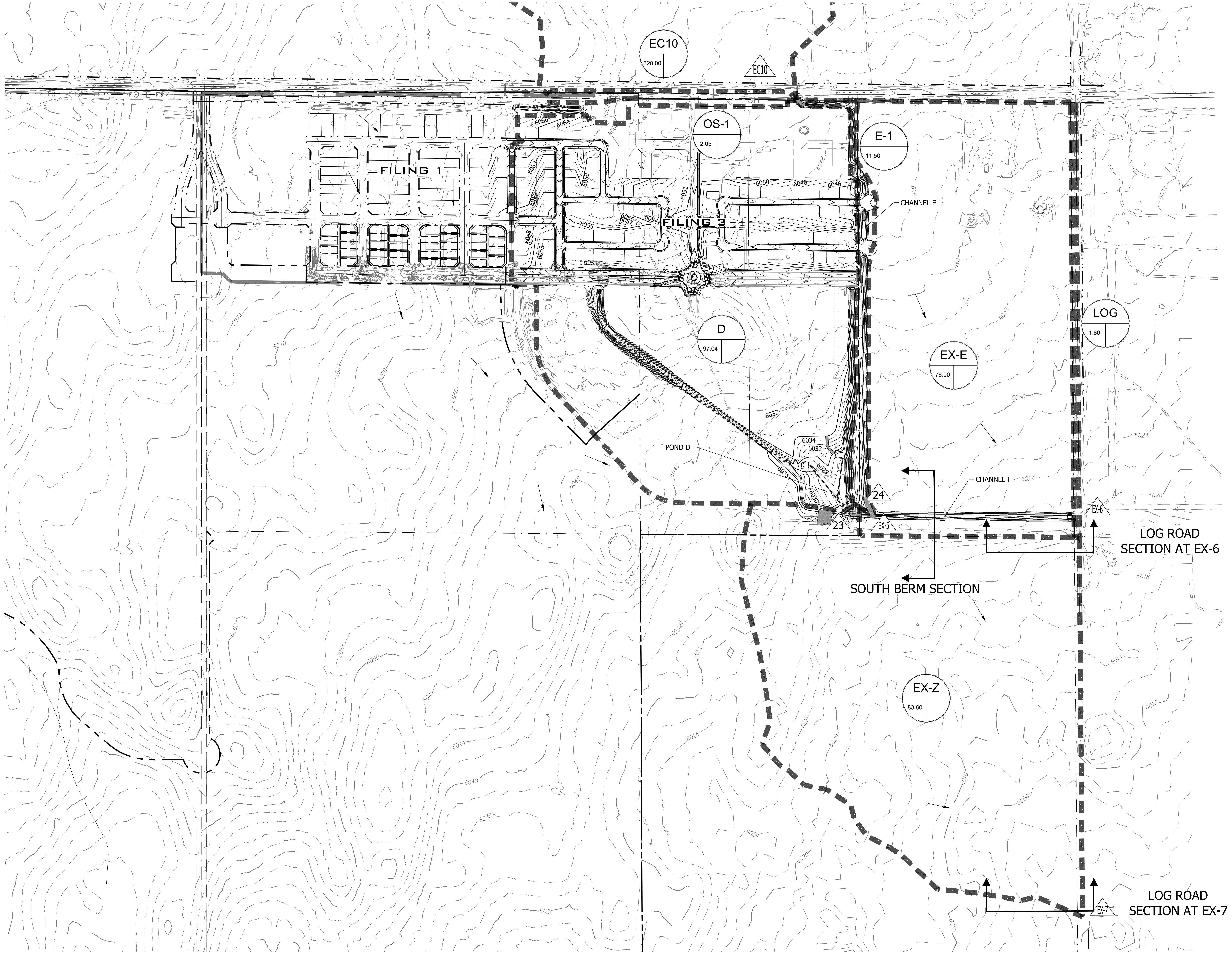
SITE ADDRESS:
MAYBERRY, COLORADO SPRINGS
EL PASO COUNTY

PREPARED FOR:
MAYBERRY COMMUNITIES, LLC
3296 DEVINE HEIGHTS #208
COLORADO SPRINGS, CO 80922

CONSTRUCTION DOCUMENTS

JOB NO. MC22110
ORG. SUBM. DATE 06/16/2022
DWN: LAO CHKD: CJD
NAME FILING 3 DETAILED DRAINAGE PLAN - GALVESTON TER.
NO. D1.6

PATH: \\192.168.100.23\PROJECTS\MC22110 MAYBERRY FILING NO. 3\ENGINEERING\4 DRAWINGS\PLANS\DRAINAGE MAPS\MC22110-XP-DRNG MAP.DWG, PLOT DATE:1/5/2023 10:57:57 AM, BY:LIZ JONES



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

EXISTING	DESCRIPTION	PROPOSED
	PROPERTY LINE	
	EASEMENT	
	EDGE OF PAVEMENT	
	VERTICAL CURB AND GUTTER	
	SPILL GUTTER	
	TRANSITION GUTTER	
5825	MAJOR CONTOUR	5825
5822	MINOR CONTOUR	5822
	STORM SEWER PIPE	
○	STORM SEWER MANHOLE	◎ ◎
	STORM SEWER INLET	
	STORM SEWER FLARED END SECTION	
	STORM SEWER HEADWALL	

DRAINAGE BASIN LABEL
* BASIN LABEL
** TRIBUTARY AREA (AC)

C-1*
1**

FLOW ARROW

DESIGN POINT △ 1

DRAINAGE AREA BOUNDARY

BASIN SUMMARY TABLE

BASIN	AREA (AC)	5-YR (CFS)	100-YR (CFS)
EC-10	320.00	18.40	144.70
OS-1	2.65	1.40	4.30
D	93.50	98.50	237.80
E1	11.50	0.40	3.20
EX-E	76.00	5.80	51.10
LOG	1.80	3.70	6.30
EX-Z	83.60	8.20	63.40

DESIGN POINT SUMMARY TABLE - DEVELOPED CONDITION

DESIGN POINT	CONTRIBUTING BASINS	5-YR (CFS)	100-YR (CFS)	*100 -YR (CFS) - HISTORIC*
EC-10	EC-10	18.40	144.70	
23	POND D	1.20	39.60	
24	EC-10, E1	17.60	138.50	
EX-5	DP23, DP24	18.70	177.50	*183.90*
EX-6	DP EX-5, EX-E, LOG	21.90	204.70	*231.40*
EX-7	DP EX-6, EX-Z	26.50	244.50	*289.90*

0 300' 600' 900'
SCALE: 1" = 300'

NO.	REVISION	BY	DATE
	2ND SUBMISSION		9/1/22
	3RD SUBMISSION		01/09/23

ENGINEERS
SURVEYORS
INC

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WWW.RRENGINEERS.COM

MAYBERRY PUD PH1 - FILING NO. 3

SITE ADDRESS:
MAYBERRY, COLORADO SPRINGS
EL PASO COUNTY

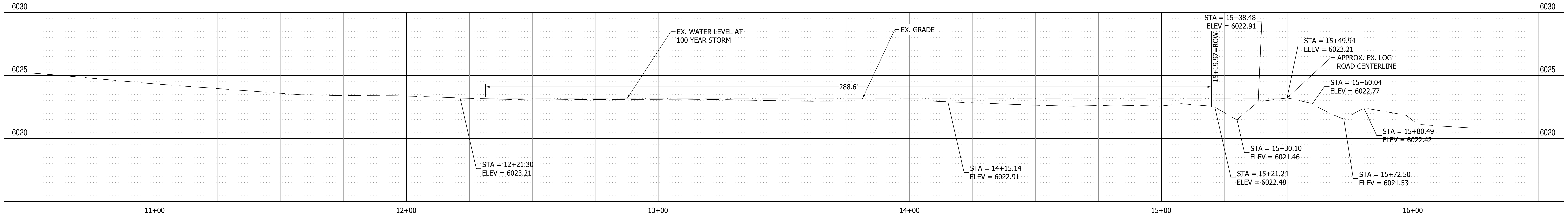
PREPARED FOR:
MAYBERRY COMMUNITIES, LLC
3296 DEVINE HEIGHTS #208
COLORADO SPRINGS, CO 80922

CONSTRUCTION DOCUMENTS

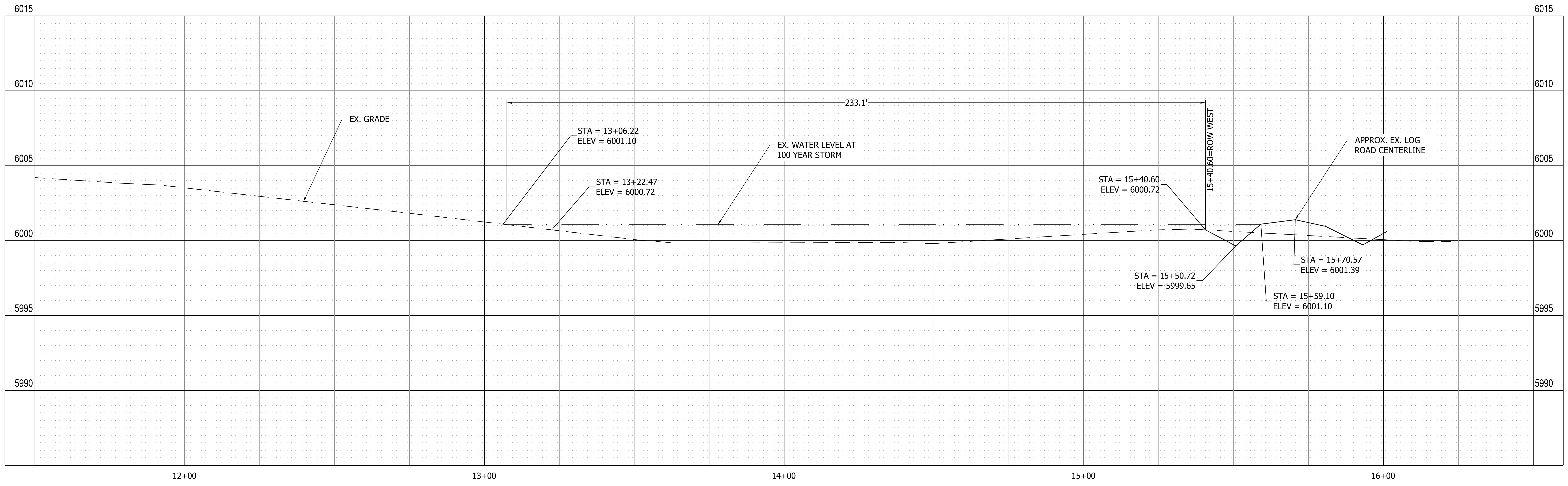
JOB NO. MC22110
ORG. SUBM. DATE 06/16/2022
DWN: LAO CHKD: CJD
NAME
FILING 3 - LOG ROAD DRAINAGE PLAN
NO.
D1.7

PATH: \\192.168.100.23\PROJECTS\MC22110 MAYBERRY FILING NO. 3\ENGINEERING\4 DRAWINGS\PLANS\DRAINAGE MAPS\MC22110-PROP-DRN-ULTI.DWG, PLOT DATE: 1/5/2023 2:14:46 PM, BY: LIZ JONES

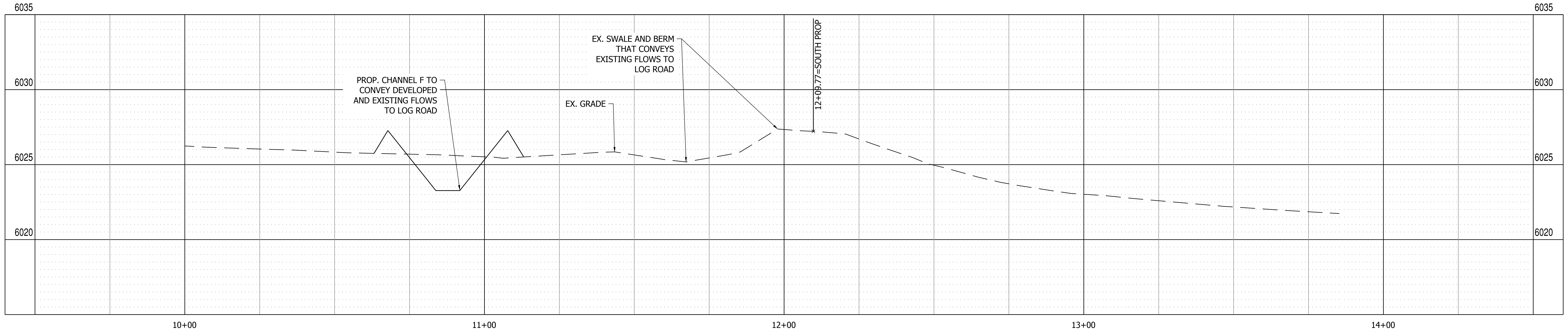
Know what's below.
Call before you dig.



Log Road Section - EX6 PROFILE VIEW
HORIZONTAL SCALE: 1"=20'
VERTICAL SCALE: 1"=4'



Log Road Section - EX7 PROFILE VIEW
HORIZONTAL SCALE: 1"=20'
VERTICAL SCALE: 1"=4'



SOUTH BERM SECTION PROFILE VIEW
HORIZONTAL SCALE: 1"=20'
VERTICAL SCALE: 1"=4'

0 20' 40' 60'
SCALE: 1" = 20'

PATH:\\192.168.100.23\PROJECTS\MC22110 MAYBERRY FILING NO. 3\ENGINEERING\4 DRAWINGS\PLANS\DRAINAGE MAPS\MC22110-PROP-DRN-SECT.DWG, PLOT DATE:1/5/2023 10:58:33 AM, BY:LIZ JONES

NO.	REVISION	BY	DATE
	2ND SUBMISSION		9/1/22
	3RD SUBMISSION		01/09/23

ENGINEERS
SURVEYORS
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JOB NO. MC22110
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FILING 3 - LOG
ROAD SECTIONS

NO.
D1.8