FINAL DRAINAGE REPORT

for

THE COMMONS AT FALCON FIELD FILING NO. 2

El Paso County, Colorado

January 2025

PCD FILE NO.

Prepared for:

Proterra Properties
1864 Woodmoor Dr.
Monument, CO 80132
Contact: Steve Rossoll
(719) 476-0800

Prepared by:

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101 Sahwatch Street, #100
Colorado Springs, CO 80903
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Falcon, Colorado

1.0 CERTIFICATION STATEMENTS

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 El Paso County for drainage reports, and said report is in conformity with the master plan of the drainage basin. I accept responsibility for any liability caused by any negligent acts, errors or omission on my part in preparing this report.

____

Tim D. McConnell, P.E. Date
Colorado P.E. License No. 33797
For and on Behalf of Drexel, Barrell & Co.

DEVELOPER'S STATEMENT

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

Business Name: Proterra Properties

By: ____

Steve Rossoll Date

Address: 1864 Woodmoor Dr.
Monument, CO 80132

EL PASO COUNTY

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

____

Joshua Palmer, P.E. Date
County Engineer/ECM Administrator
CONDITIONS

2.0 PURPOSE

This report is prepared by Drexel, Barrel & Co in support of The Commons at Falcon Field Filing No. 2 project. The purpose of this report is to identify onsite and offsite drainage patterns, storm sewer, inlet locations, and areas tributary to the site, and to safely route developed storm water runoff to adequate outfall facilities.

3.0 GENERAL SITE DESCRIPTION

<u>Location</u>

The Commons at Falcon Field Filing No. 2 site is approximately 20.4 acres and is bounded by Rio Lane to the north and west, and a large-lot residential development to the east and south. The site is in the east half of Section 7, Township 13 South, Range 64 West of the 6th PM.

<u>Historic Site Conditions</u>

The historic conditions of the site is open grass land. There are no known utilities on site. Offsite runoff enters the site through a culvert under Rio Land, along the northern boundary of the property. The culvert discharges through the site via open drainage to the south.

<u>Proposed Site Conditions</u>

The Commons at Falcon Field Filing No. 2 is a proposed single-family development and is proposed to consist of 74 lots, along with associated roadways, open space and a private full-spectrum extended detention basin.

<u>Soils</u>

According to the Soil Survey of El Paso County Area, Colorado, prepared by the U.S. Department of Agriculture Soil Conservation Service, the site is underlain by Columbine gravelly sandy loam (Soil No. 19), which is a type ‘A’ hydrological soil group. See appendix for map.

<u>Climate</u>

This area of El Paso County can be described as the foothills, with total precipitation amounts typical of a semi-arid region, roughly 15 inches annually. The climate of the site is typical of a sub-humid to semi-arid climate with mild summers and winters. The average temperature is 31 degrees F in the winter and 68.4 degrees F in the summer.

<u>Floodplain Statement</u>

The Flood Insurance Rate Maps (FIRM No. 08041C0553G & 08041C0561G both dated 12/7/18) indicate that there is a Zone A floodplain area that covers the “Falcon Creek East Tributary” that bisects Filing No. 2 at the southwest corner of the site, but this area is not a designated regulatory floodway. This floodway is proposed to be contained with an 8'x4' box culvert through the site before discharging into an open channel and following historic drainage patterns to the southeast. A CLOMR for this reach was approved as case number 23-08-0708R (July 23, 2024).

<u>Previous Drainage Studies</u>

The site is located within the East Tributary Basin of the Falcon Basin Watershed, as studied in the Falcon Drainage Basin Planning Study, prepared by Matrix Design Group, September, 2015. DBPS recommendations are presented later in this report.

Please reference the approved "Preliminary Drainage Report for The Commons at Falcon Field," by Drexel Barrell & Co, approved July 2024. This report covers all of Filings 1-3 and the existing conditions map and report section are to be referenced.

Also to be referenced is the "Final Drainage Report for The Commons at Falcon Field Filing No. 1," by Drexel Barrell & Co, December 2024. Filing No. 1 is located just west of this project site. Both Pond B from Filing No. 1 and Pond A from Filing No. 2 discharge into the proposed open channel before discharging off property to the south, following historic drainage patterns.

4.0 DRAINAGE CRITERIA

The drainage analysis has been prepared in accordance with the current El Paso County Drainage Criteria Manual. Calculations were performed to determine runoff quantities during the 5-year and 100-year frequency storms for historic and developed conditions using the Rational Method as required for basins containing less than 100 acres.

In addition, Inlet Capacity Charts from the El Paso County Drainage Criteria Manual, and the following Mile High Flood District (MHFD) provided spreadsheets, MHFD-Detention v4.06 and MHFD-BMP v3.07 were used for the design of the detention facility, WQCV reduction, and associated storm sewer infrastructure.

Hydraulic grade line calculations utilizing Autodesk Hydraflow (Standard Step Headloss Method) for the 5-year and 100-year condition are included in the appendix. Tailwater elevations are based upon 80% of the downstream invert for the 5-year condition, and the pipe crown at the outfall for the 100-year condition. Where piping discharges into the proposed detention facility, tailwater elevations are based on the water surface elevation listed on the MHFD-Detention spreadsheet for the respective design storm.

5.0 HISTORIC CONDITION

In addition to the DBPS, a site specific analysis of the existing conditions was completed. The Overall Existing Drainage Map and the Rational Method calculations for all existing flows for the entire site (Filings 1-3) can be found in the approved "Preliminary Drainage Report for The Commons at Falcon Field," by Drexel Barrell & Co, approved July 2024. Filing 2 covers portions of Basins E1, E5 and E6.

6.0 DEVELOPED CONDITION

The proposed development consists of 74 residential lots, along with associated roadway and utility improvements. There are two significant features of the property that have been incorporated into the site design:

Groundwater: Areas of the site have been identified as being subject to seasonal and potentially seasonal shallow groundwater. A site investigation is currently underway to evaluate existing groundwater conditions. In order to mitigate potential issues, the site grading in several areas of the site is proposed to be raised from the existing condition in order to aid in the separation from shallow water areas. In addition to this, a geotechnical study is also underway to determine the feasibility of groundwater infiltration trenches along the north side of the property to further lower the groundwater levels through the site, and minimize the possibility of groundwater reaching the surface. This analysis will be provided as part of overall Commons at Falcon Field Filing No. 1 Final Drainage Report.

Pending the findings of the infiltration study, an underdrain may be necessary. This underdrain will be designed as a passive system to pick up foundation drains from the residential properties. In the event of a need for an underdrain system, installation will be the responsibility of the Falcon Field District, along with any State and Groundwater District permitting for discharges.

Floodplain: As part of the development of The Commons at Falcon Field Filing 1 development, the existing drainage through the property 1 is proposed to be piped via 8'x4' box culvert from the existing outfall south of U.S. Highway 24, through the site before discharging into a redefined open channel to the south of the proposed Retail Row St. A CLOMR study for this reach has been approved by FEMA, case No. 23-08-0708R, 7/23/24.

The following describes the individual basins established for the developed condition, runoff rates listed are those calculated by the rational method.

Basin OSA is an offsite basin north of Rio Lane. This basin is as described in the existing condition as Existing Basin OS5. An existing 18" CMP culvert currently discharges onto the project site. In the developed condition, it is proposed that this culvert flow be directed to the east via 18" RCP storm sewer extension, under the proposed Tody Way intersection with Rio Lane. The roadside ditch east of the proposed Tody Way and Rio Lane intersection is to be redefined and ultimately directed south along the east property line via proposed swale, with outfall protection to protect from downstream erosion and scour. Existing drainage easements exists along the rear of the adjacent properties and as such no additional easements are necessary.

Basin A1 is located at the north and central portion of the site, just south of Rio Lane. Runoff will flow east via a grass lined swale at rates of Q_5=0.6 cfs and Q_{100}=2.3 cfs towards **Design Point DP1.** At DP1, flows will be captured by a proposed private Type C area inlet before continuing east and south towards Design Point DP2.

BASIN & DESIGN POINT SUMMARY				
BASIN	DP	AREA (AC)	Q5	Q100
OSA		16.62	6.3	22.7
A1	1	0.97	0.6	2.3
A2		0.38	1.5	2.9
DP1+A2	2	1.35	1.6	4.2
A3	3	0.23	0.6	1.2
DP2+DP3	J1	1.58	2.1	5.1
A4	4	1.16	2.6	5.4
A5		2.99	6.3	13.2
DP4+A5	5	4.15	8.4	17.4
A6	6	2.63	5.4	11.4
DPJ1+DP5+DP6	J2	8.36	14.8	32.2
A7	7	0.58	1.4	2.8
A8		3.21	7.0	14.6
DP7+A8	8	3.80	8.0	16.4
A9		2.66	3.5	9.4
A10		1.16	2.5	5.2
A9+A10	9	4.40	5.9	20.2
DP8+DP9	J3	5.56	21.1	24.0
DPJ2+DPJ3	J4	13.91	37.8	61.5
A11		0.86	0.3	2.4
DPJ4+A11	10	14.78	37.9	63.1
A12		1.77	1.8	5.9
OSA+A12	12	18.39	6.9	24.7
A13	13	1.05	0.5	3.0

Basin A2 is positioned directly north of Basin A1 and contains the southern half of Rio Lane. This basin will generate runoff at rates of Q_5=1.5 cfs and Q_{100}=2.9, channeling them east via curb and gutter, towards **Design Point DP2**. DP2 is a proposed public 5' Type R inlet located directly east of DP1.

Basin A3 is a relatively small, 0.23-acre, basin that makes up the 2 northern most lots along the east side of Tody Way. This basin will direct runoff northwest towards **Design Point DP3** via curb and gutter at rates of Q_5=0.6 cfs and Q_{100}=1.2. This runoff will be captured by a proposed public 5' Type R inlet.

Design Point DPJ1 is the location at which the flows from DP2 and DP3 will combine within the storm sewer pipe network. Located directly between DP2 and DP3, the flows will combine and continue south at rates of Q_5=2.1 cfs and Q_{100}=5.1 cfs.

Basin A4 is located directly south of Basin A1 and is bound by Sapoya Place to the south. Runoff will flow east via curb and gutter at rates of Q_5=2.6 cfs and Q_{100}=5.4 cfs towards **Design Point DP4.** At DP4, flows will continue south, into basin A5, via the western curb and gutter along Tody Way.

Basin A5 is the eastern island of the 2 central islands within the Filing 2 residential development. Runoff generated within this basin will flow around the island via the curb and gutters at rates of Q_5=6.3 cfs and Q_{100}=13.2 cfs towards **Design Point DP5.** At DP5, flows will be captured by a proposed public 15' Type R at-grade inlet which is located at the southwest corner of the basin. All flows are anticipated to be collected by this inlet, but any bypass flows will continue on to the low point to the west.

Basin A6 makes up the majority of the residential lots east of Tody Way stretching down around the knuckle of Buteos Lane. Runoff will flow south via curb and gutter before turning east towards **Design Point DP6** at rates of Q_5=5.4 cfs and Q_{100}=11.4 cfs**.** At DP6, flows will be captured by a proposed public 10' Type R at-grade inlet. All flows are anticipated to be collected by this inlet, but any bypass flows will continue on to the low point to the west.

Design Point DPJ2 is the location at which the flows from DPJ1, DP5 and DP6 will combine within the storm sewer pipe network. Located directly between DP5 and DP6, the flows will combine and continue west via public 36" storm sewer towards the proposed detention pond A at rates of Q_5=14.8 cfs and Q_{100}=32.2 cfs.

Basin A7 makes up a small, 0.58-acres, of residential development on the northeast side of the intersection of Sapoya Place and Jacamar Place. This basin will direct flows via curb and gutter towards the southwest corner of the basin. Where, at rates of Q_5=1.4 cfs and Q_{100}=2.8 cfs, runoff will travel through **Design Point DP7** and continue south via curb and gutter.

Basin A8 is located directly south of Basin A7, and is the western of the 2 central islands within the Filing 2 residential development. Basin A8 will receive all of the runoff coming from DP6, continuing to carry them south with its own runoff. Similar to Basin A5, runoff will flow around the island via curb and gutter, making their way towards the southwest corner of the basin to be captured by a proposed public 15' Type R sump inlet, **Design Point 8.** DP8 will receive runoff at rates of Q_5=8.0 cfs and Q_{100}=16.4 cfs.

Basin A9 is bounded by Rio Lane to the west and north, Jacamar Place to the east, and Basin A11 to the south. This 2.66-acre basin will direct runoff south via curb and gutter towards a proposed public 15' Type R sump inlet, **Design Point 9**, generating runoff rates of Q_5=3.5 cfs and Q_{100}=9.4 cfs

Basin A10 is 1.16-acres of residential development along the southwest side of Buteos Lane. This basin will direct runoff to the northwest via curb and gutter at rates of Q_5=2.5 cfs and Q_{100}=5.2 cfs, where they will eventually be captured by **Design Point 9**, and the aforementioned proposed public 15' Type R inlet.

Design Point DPJ3 is the location at which the flows from DP8 and DP9 will combine within the storm sewer pipe network. Located directly below the inlet at DP9, the flows will combine and continue southwest towards the proposed detention pond A at rates of Q_5=21.1 cfs and Q_{100}=24.0 cfs.

Design Point DPJ4 is the location at which the flows from DPJ2 and DPJ3 will combine within the storm sewer pipe network. Located 30' east of the proposed detention pond A, the flows will combine and before being discharged into the proposed detention pond at rates of Q_5=37.8 cfs and Q_{100}=61.5 cfs.

Basin A11 is located in the southwestern corner of the site and contains Pond A, the proposed full-spectrum Extended Detention Basin. Runoff generated within this basin will total Q_5=0.3 cfs and Q_{100}=2.5 cfs before combining with the runoff from DPJ4 and being released at or below historical rates**. Design Point 10** is located at the bottom of Pond A and represents all captured flows, which equate to Q_5=38.0 cfs and Q_{100}=63.3 cfs.

Basin A12 covers the entire eastern boundary of the site. Flows generated by this 1.77-acre basin combine with redirected flows from offsite basin OSA and are proposed to be channelized along the eastern boundary via grass lined swale, before discharging via level spreader as offsite overland sheet flow at **Design Point DP12** with rates of Q_5=6.9 cfs and Q_{100}=24.7 cfs. Basin A13 will be regraded but will remain undeveloped as an open space tract.

Basin A13 makes up 1.10-acres along the southern boundary of the site. Similar to Basin A13, Basin A14 will be regraded but remain undeveloped as an open space tract. Although with no larger basin feeding into it, this basin will only generate runoff rates of Q_5=0.5 cfs and Q_{100}=3.1 cfs as overland sheet flow through **Design Point 13.**

Due to the location, and nature of the grading of Basins A12 and A13 to tie into the existing subdivisions, the runoff generated by these basins is not able to be routed to the proposed detention facility. To mitigate this, Pond A has been oversized to account for the equivalent area and imperviousness of these basins. It is also requested that basin A13 be accepted as falling under exclusion ECM 1.7.1.C.1. as the ability to capture and treat flows generated by this basin is restricted due to grading constraints. Basin A12 has been considered for water quality reduction separately, see appendix. The calculated reduction achieved is acceptable.

7.0 PROPOSED FULL-SPECTRUM DETENTION FACILITY

Pond A, a private 2.6 ac-ft full-spectrum Extended Detention Basin is proposed in the southwestern corner of Filing No. 1, to intercept and treat flows from Basins A1-A13 and discharge at historic rates into the adjacent redefined open drainage.

Basins A1-A11 have been considered for runoff reduction utilizing a conservative lot template, and the MHFD-BMP v3.07 worksheet. This template is based on building size and standards provided from the anticipated home developer, and determines a ratio for the smallest lot that is then applied to all lot areas. The worksheet establishes a 55% reduction in required water quality capture volume. The untreated value (7,161 cf) is then input into the MHFD-Detention v4.06 worksheet and incorporated into the detention facility design.

The proposed facility is based on a 19.65 ac-ft watershed area with a tributary imperviousness of 53.5%. This includes the overdetention for basins A12 and A13. The outlet structure will consist of a modified Type C outlet structure with an orifice plate and a grate on top. The orifice plate will have one 1.84 sq. inch round orifice and then two 10 sq.inch orifices, in order to release the EURV within the timeline established by criteria. The elevation of the grate is set at 6829.50, which is below the 100-year detention volume elevation. The outlet pipe has been set as a 18" private storm pipe with a restrictor plate set 14" above invert that will release the 100-year flow at historic rates. The outlet pipe discharges to the east into the redefined drainage to the west. With these release rates the WQCV will drain in 40 hours, the EURV in 76 hours, and the 100-year storm volume in 75 hours.

A 35' long spillway is located on the east side of the pond and is placed 1.65' below the crest of the pond to allow for 1' of freeboard above the spillway design flow depth. In the event that water overtops the spillway, it will discharge to the west following historic drainage patterns.

Maintenance access will be provided and is further outlined in the detention facility construction documents.

8.0 FOUR-STEP PROCESS

1. ***Employ Runoff Reduction Practices*:** Proposed impervious areas on this site (roofs, asphalt/sidewalk) will be captured by onsite roadways and storm sewer systems as much as possible to slow runoff and increase time of concentration prior to being conveyed to the proposed detention ponds. This will minimize directly connected impervious areas within the project site.

2. ***Implement CM's that provide a Water Quality Capture Volume with slow release*:** The majority of runoff generated by Filing 2 will be treated through capture and slow release of the WQCV in the permanent full spectrum extended detention facility designed per current drainage criteria.

3. ***Stabilize Drainage Ways*:** Stabilization of the existing drainageway through the site will occur via installation of a proposed 8'x4' concrete box culvert and a small section of open channel as the drainageway exits the property.

4. ***Implement Site Specific and Other Source Control CM's*:** Standard residential source control will be utilized in order to minimize potential pollutants entering the storm system. Example source control measures consist of: indoor storage of household chemicals; and trash receptacles in common areas.

9.0 DRAINAGE/BRIDGE FEES

Drainage and Bridge Fees are anticipated to be paid at recording of The Commons at Falcon Field Filing 1 plat, and as such no drainage and bridge fees are due with this filing.

10.0 CONSTRUCTION COST ESTIMATE

Public Drainage Facilities (Non-Reimbursable)

Description	Unit	Quantity	Unit Cost	Cost
Type C Area Inlet	EA	1	$6,037	$6,037
5' Type R Inlet	EA	2	$7,212	$14,424
10' Type R Inlet	EA	1	$9,925	$29,775
15' Type R Inlet	EA	3	$12,907	$12,907
12" RCP Storm	LF	24	$66	$1,584
18" RCP Storm	LF	946	$82	$77,572
24" RCP Storm	LF	79	$98	$7,742
30" RCP Storm	LF	50	$123	$6,150
36" RCP Storm	LF	400	$151	$60,400
36" FES	EA	1	$906	$906
Manhole, Slab Base	EA	2	$8,322	$16,644
			Subtotal	$234,141
			Engineering & Contingency (10%)	$23,414
			TOTAL	$257,555

Private Drainage Facilities (Non-Reimbursable)

Description	Unit	Quantity	Unit Cost	Cost
18" RCP Storm	LF	57	$82	$4,674
18" FES	EA	1	$492	$492
Permanent EDB	EA	1	$50,000	$50,000
			Subtotal	$55,166
			Engineering & Contingency (10%)	$5,517
			TOTAL	$60,683

11.0 CONCLUSIONS

The Commons at Falcon Field Filing No. 2 project has been designed in accordance with El Paso County criteria. The full-spectrum detention facility has been designed to limit the release of storm runoff to historic flows. This development will not negatively impact the downstream facilities.

12.0 REFERENCES

The sources of information used in the development of this study are listed below:

1. City of Colorado Springs/El Paso County Drainage Criteria Manual, May 2014.

2. Urban Storm Drainage Criteria Manuals, Urban Drainage and Flood Control District. June 2001, Revised April 2008.

3. Natural Resources Conservation Service (NRCS) Web Soil Survey

4. Federal Emergency Management Agency, Flood Insurance Rate Map, El Paso County, Colorado and Unincorporated Areas, Map Numbers 8041C0553G & 8041C0561G, Effective Date December 7, 2018.

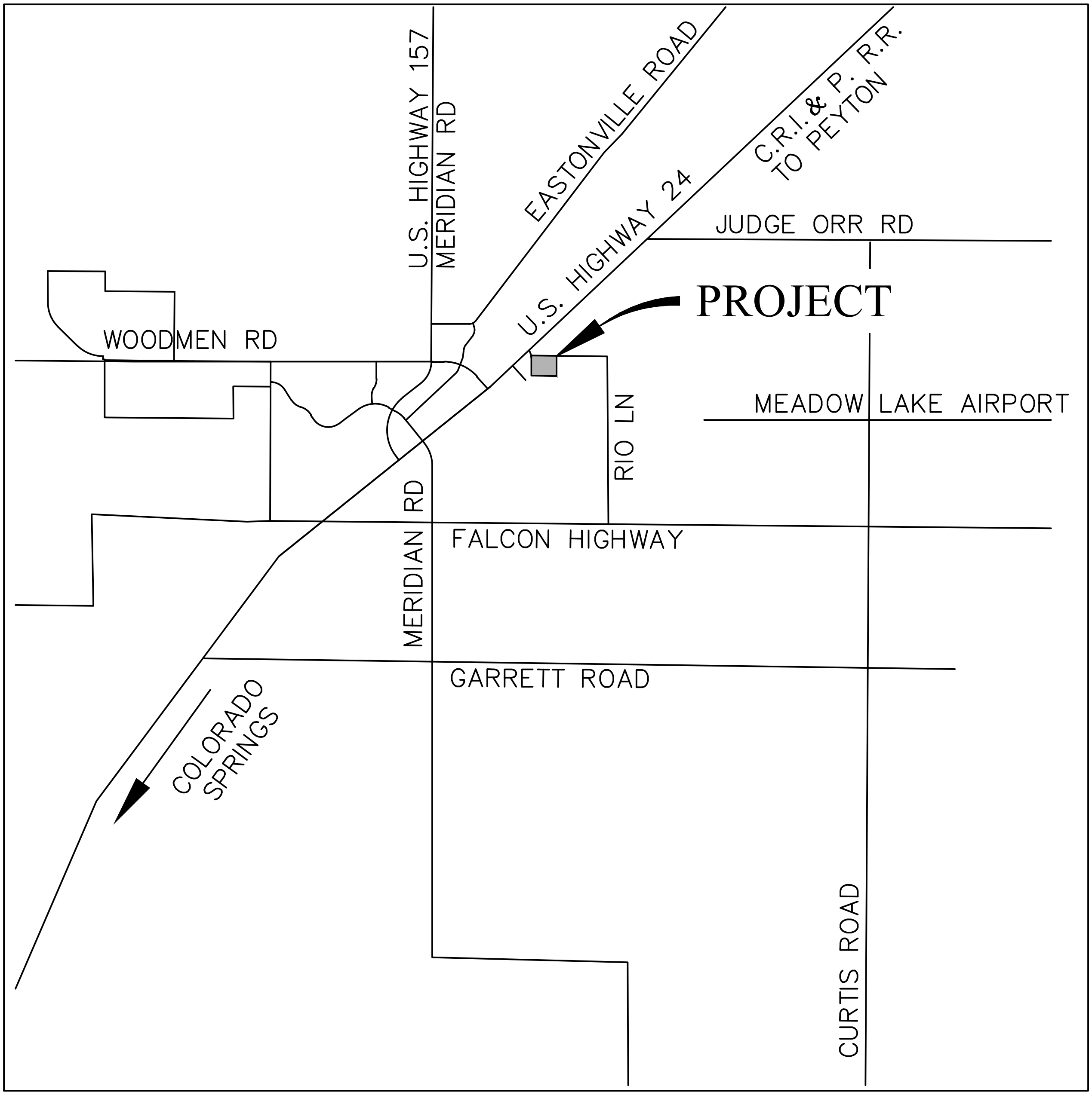
6. EL Paso County Board Resolution No 15-042: El Paso County adoption of Chapter 6 and Section 3.2.1, Chapter 13 of the City of Colorado Springs Drainage Criteria Manual, May 2014.

7. Falcon Drainage Basin Planning Study. Prepared by Matrix Design Group, September 2015.

8. Preliminary Drainage Report for The Commons at Falcon Field, by Drexel Barrell & Co., July 2024

9. Final Drainage Report for The Commons at Falcon Field Filing No. 1, by Drexel Barrell & Co, December 2024.

Appendix



Vicinity Map
Not to scale

-N-

THE COMMONS AT FALCON FIELD
FILING NO. 2
EL PASO COUNTY, CO
VICINITY MAP

Drexel, Barrell & Co.
Engineers • Surveyors

DATE: 10-4-2024	DWG. NO. VMAP
JOB NO: 21604-00CSCV	SHEET 1 OF 1

Soil Map

Map Scale: 1:2,260 if printed on A landscape (11" x 8.5") sheet.

Meters: 0, 30, 60, 120, 180

Feet: 0, 100, 200, 400, 600

N

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

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Unit Polygons

Soil Map Unit Lines

Soil Map Unit Points

Special Point Features

Blowout

Borrow Pit

Clay Spot

Closed Depression

Gravel Pit

Gravelly Spot

Landfill

Lava Flow

Marsh or swamp

Mine or Quarry

Miscellaneous Water

Perennial Water

Rock Outcrop

Saline Spot

Sandy Spot

Severely Eroded Spot

Sinkhole

Slide or Slip

Sodic Spot

Spoil Area

Stony Spot

Very Stony Spot

Wet Spot

Other

Special Line Features

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

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

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

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

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

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

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

Soil Survey Area: El Paso County Area, Colorado
Survey Area Data: Version 22, Sep 3, 2024

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

Date(s) aerial images were photographed: Sep 11, 2018—Oct 20, 2018

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
19	Columbine gravelly sandy loam, 0 to 3 percent slopes	17.8	100.0%
Totals for Area of Interest		**17.8**	**100.0%**

Map Unit Descriptions

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

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

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

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

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

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

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

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

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

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

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

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

El Paso County Area, Colorado

19—Columbine gravelly sandy loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 367p
Elevation: 6,500 to 7,300 feet
Mean annual precipitation: 14 to 16 inches
Mean annual air temperature: 46 to 50 degrees F
Frost-free period: 125 to 145 days
Farmland classification: Not prime farmland

Map Unit Composition

Columbine and similar soils: 97 percent
Minor components: 3 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Columbine

Setting

Landform: Fans, fan terraces, flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Typical profile

A - 0 to 14 inches: gravelly sandy loam
C - 14 to 60 inches: very gravelly loamy sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 2.5 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A
Ecological site: R049XY214CO - Gravelly Foothill
Hydric soil rating: No

Minor Components

Fluvaquentic haplaquolls

Percent of map unit: 1 percent
Landform: Swales
Hydric soil rating: Yes

Other soils

Percent of map unit: 1 percent
Hydric soil rating: No

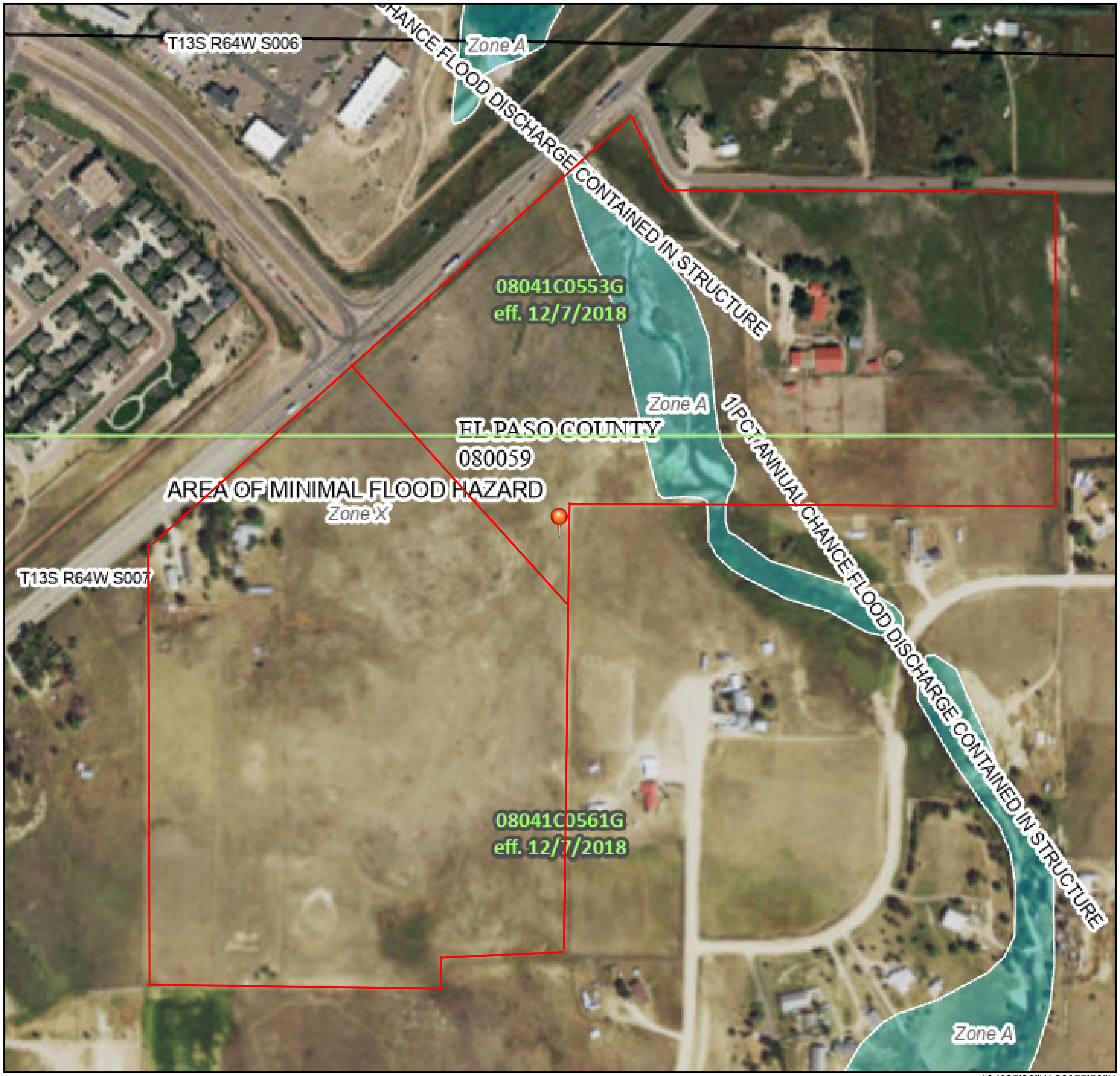
Pleasant

Percent of map unit: 1 percent
Landform: Depressions
Hydric soil rating: Yes

National Flood Hazard Layer FIRMette

FEMA

104°36'16"W 38°56'26"N



104°35'38"W 38°55'58"N

Feet 1:6,000

0 250 500 1,000 1,500 2,000

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE) *Zone A, V, A99*
		With BFE or Depth *Zone AE, AO, AH, VE, AR*
		Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD		0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
		Future Conditions 1% Annual Chance Flood Hazard *Zone X*
		Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
		Area with Flood Risk due to Levee *Zone D*
OTHER AREAS	NO SCREEN	Area of Minimal Flood Hazard *Zone X*
		Effective LOMRs
		Area of Undetermined Flood Hazard *Zone D*
GENERAL STRUCTURES		Channel, Culvert, or Storm Sewer
		Levee, Dike, or Floodwall
OTHER FEATURES	B 20.2 / 17.5	Cross Sections with 1% Annual Chance Water Surface Elevation
	8	Coastal Transect
	513	Base Flood Elevation Line (BFE)
		Limit of Study
		Jurisdiction Boundary
		Coastal Transect Baseline
		Profile Baseline
		Hydrographic Feature
MAP PANELS		Digital Data Available
		No Digital Data Available
		Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 4/12/2022 at 2:02 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

PROJECT INFORMATION

PROJECT:	Commons at Falcon Field
PROJECT NO:	21604-00
DESIGN BY:	CGH
REV. BY:	TDM
AGENCY:	El Paso County
REPORT TYPE:	Preliminary
DATE:	2/3/2025

Drexel, Barrell & Co.

	C2*	C5*	C10*	C100*	% IMPERV
Open Space		0.08		0.35	0
Commercial Development		0.81		0.88	95
Residential (< 1/8 Acre)		0.45		0.59	65
Streets: Paved		0.90		0.96	100
Streets: Gravel		0.59		0.70	80

DEVELOPED CONIDTION

SUB-BASIN	SURFACE DESIGNATION	AREA	COMPOSITE RUNOFF COEFFICIENTS				% IMPERV
		ACRE	C2	C5	C10	C100	
OSA	Open Space	13.94		0.08		0.35	0
	Roofs	0.05		0.73		0.81	90
	Lawns	0.00		0.08		0.35	0
	Streets: Paved	2.25		0.90		0.96	100
	Streets: Gravel	0.39		0.59		0.70	80
	WEIGHTED AVERAGE			0.20		0.44	16%
TOTAL OSA		16.62					
A1	Open Space	0.67		0.08		0.35	0
	Commercial Development	0.00		0.81		0.88	95
	Residential (< 1/8 Acre)	0.30		0.45		0.59	65
	Streets: Paved	0.00		0.90		0.96	100
	Streets: Gravel	0.00		0.59		0.70	80
	WEIGHTED AVERAGE			0.20		0.42	20%
TOTAL A1		0.97					
A2	Open Space	0.00		0.08		0.35	0
	Commercial Development	0.00		0.81		0.88	95
	Residential (< 1/8 Acre)	0.10		0.45		0.59	65
	Streets: Paved	0.28		0.90		0.96	100
	Streets: Gravel	0.00		0.59		0.70	80
	WEIGHTED AVERAGE			0.78		0.86	91%
TOTAL A2		0.38					
A3	Open Space	0.00		0.08		0.35	0
	Commercial Development	0.00		0.81		0.88	95
	Residential (< 1/8 Acre)	0.17		0.45		0.59	65
	Streets: Paved	0.06		0.90		0.96	100
	Streets: Gravel	0.00		0.59		0.70	80
	WEIGHTED AVERAGE			0.56		0.68	74%
TOTAL A3		0.23					
A4	Open Space	0.00		0.08		0.35	0
	Commercial Development	0.00		0.81		0.88	95
	Residential (< 1/8 Acre)	0.86		0.45		0.59	65
	Streets: Paved	0.30		0.90		0.96	100
	Streets: Gravel	0.00		0.59		0.70	80
	WEIGHTED AVERAGE			0.57		0.68	74%
TOTAL A4		1.16					
A5	Open Space	0.00		0.08		0.35	0

PROJECT INFORMATION

Drexel, Barrell & Co.

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AGENCY:	El Paso County
REPORT TYPE:	Preliminary
DATE:	2/3/2025

	C2*	C5*	C10*	C100*	% IMPERV
Open Space		0.08		0.35	0
Commercial Development		0.81		0.88	95
Residential (< 1/8 Acre)		0.45		0.59	65
Streets: Paved		0.90		0.96	100
Streets: Gravel		0.59		0.70	80

			C2*	C5*	C10*	C100*	% IMPERV
	Commercial Development	0.00		0.81		0.88	95
	Residential (< 1/8 Acre)	2.55		0.45		0.59	65
	Streets: Paved	0.44		0.90		0.96	100
	Streets: Gravel	0.00		0.59		0.70	80
	WEIGHTED AVERAGE			0.52		0.64	70%
TOTAL A5		2.99					
A6	Open Space	0.00		0.08		0.35	0
	Commercial Development	0.00		0.81		0.88	95
	Residential (< 1/8 Acre)	2.30		0.45		0.59	65
	Streets: Paved	0.33		0.90		0.96	100
	Streets: Gravel	0.00		0.59		0.70	80
	WEIGHTED AVERAGE			0.51		0.64	69%
TOTAL A6		2.63					
A7	Open Space	0.00		0.08		0.35	0
	Commercial Development	0.00		0.81		0.88	95
	Residential (< 1/8 Acre)	0.37		0.45		0.59	65
	Streets: Paved	0.21		0.90		0.96	100
	Streets: Gravel	0.00		0.59		0.70	80
	WEIGHTED AVERAGE			0.61		0.72	77%
TOTAL A7		0.58					
A8	Open Space	0.00		0.08		0.35	0
	Commercial Development	0.00		0.81		0.88	95
	Residential (< 1/8 Acre)	2.65		0.45		0.59	65
	Streets: Paved	0.57		0.90		0.96	100
	Streets: Gravel	0.00		0.59		0.70	80
	WEIGHTED AVERAGE			0.53		0.66	71%
TOTAL A8		3.21					
A9	Open Space	1.32		0.08		0.35	0
	Commercial Development	0.00		0.81		0.88	95
	Residential (< 1/8 Acre)	0.97		0.45		0.59	65
	Streets: Paved	0.36		0.90		0.96	100
	Streets: Gravel	0.00		0.59		0.70	80
	WEIGHTED AVERAGE			0.33		0.52	37%
TOTAL A9		2.66					
A10	Open Space	0.00		0.08		0.35	0
	Commercial Development	0.00		0.81		0.88	95
	Residential (< 1/8 Acre)	0.99		0.45		0.59	65

PROJECT INFORMATION

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DESIGN BY:	CGH
REV. BY:	TDM
AGENCY:	El Paso County
REPORT TYPE:	Preliminary
DATE:	2/3/2025

Drexel, Barrell & Co.

	C2*	C5*	C10*	C100*	% IMPERV
Open Space		0.08		0.35	0
Commercial Development		0.81		0.88	95
Residential (< 1/8 Acre)		0.45		0.59	65
Streets: Paved		0.90		0.96	100
Streets: Gravel		0.59		0.70	80

	Streets: Paved	0.17		0.90		0.96	100
	Streets: Gravel	0.00		0.59		0.70	80
	WEIGHTED AVERAGE			0.52		0.65	70%
TOTAL A10		1.16					
A11	Open Space	0.86		0.08		0.35	0
	Commercial Development	0.00		0.81		0.88	95
	Residential (< 1/8 Acre)	0.00		0.45		0.59	65
	Streets: Paved	0.00		0.90		0.96	100
	Streets: Gravel	0.00		0.59		0.70	80
	WEIGHTED AVERAGE			0.08		0.35	0%
TOTAL A11		0.86					
A12	Open Space	1.16		0.08		0.35	0
	Commercial Development	0.00		0.81		0.88	95
	Residential (< 1/8 Acre)	0.54		0.45		0.59	65
	Streets: Paved	0.07		0.90		0.96	100
	Streets: Gravel	0.00		0.59		0.70	80
	WEIGHTED AVERAGE			0.23		0.45	24%
TOTAL A12		1.77					
A13	Open Space	0.98		0.08		0.35	0
	Commercial Development	0.00		0.81		0.88	95
	Residential (< 1/8 Acre)	0.07		0.45		0.59	65
	Streets: Paved	0.00		0.90		0.96	100
	Streets: Gravel	0.00		0.59		0.70	80
	WEIGHTED AVERAGE			0.11		0.37	5%
TOTAL A13		1.05					

Area tributary to Pond A (A1-A11)	**16.83**	**0.46**		**0.61**	**59.6%**
Inc. overdetain for A12+A13	**19.65**				**53.5%**

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Drexel, Barrell & Co.

RATIONAL METHOD CALCULATIONS FOR STORM WATER RUNOFF

DEVELOPED TIME OF CONCENTRATION

SUB-BASIN DATA							INITIAL/OVERLAND TIME (t_i)			TRAVEL TIME (t_t)				PIPE TRAVEL TIME (t_t)				TIME OF CONCENTRATION		FINAL t_c
BASIN	DESIGN PT:	C_5	C_{100}	AREA	COMP		LENGTH	SLOPE	t_i	LENGTH	SLOPE	VEL.	t_t	LENGTH	SLOPE	VEL.	t_t	COMP.	MINIMUM	
				Ac			Ft	%	Min	Ft	%	FPS	Min	Ft	%	FPS	Min	t_c	t_c	Min
A-BASINS																				
OSA		0.20	0.44	16.62	3.40	7.35	75	2.0	11.3	2500	1.5	1.2	34.7					46.0	5.0	**46.0**
A1	1	0.20	0.42	0.97	0.19	0.41	100	1.7	13.9	513	1.1	3.3	2.6					16.5	5.0	**16.5**
A2		0.78	0.86	0.38	0.30	0.33	15	1.5	2.0	550	1.0	5.9	1.6					3.5	5.0	**5.0**
DP1+A2	2	0.36	0.55	1.35	0.49	0.74	From DP1		16.5					26	0.5	4.1	0.1	16.6	5.0	**16.6**
A3	3	0.56	0.68	0.23	0.13	0.15	75	2.1	6.7	185	3.0	8.3	0.4					7.0	5.0	**7.0**
DP2+DP3	J1	0.39	0.57	1.58	0.61	0.90	From DP2		16.6					7	0.5	4.1	0.0	16.6	5.0	**16.6**
A4	4	0.57	0.68	1.16	0.66	0.79	100	1.3	9.0	516	0.9	4.9	1.8					10.7	5.0	**10.7**
A5		0.52	0.64	2.99	1.54	1.93	100	1.9	8.6	652	1.3	6.7	1.6					10.3	5.0	**10.3**
DP4+A5	5	0.53	0.66	4.15	2.20	2.72	From DP4		10.7	622	1.3	6.7	1.6					12.3	5.0	**12.3**
A6	6	0.51	0.64	2.63	1.33	1.68	100	2.2	8.4	871	1.4	6.9	2.1					10.5	5.0	**10.5**
DPJ1+DP5+DP6	J2	0.57	0.74	8.36	4.76	6.19	From DPJ1		16.6					902	0.7	4.8	3.2	19.8	5.0	**19.8**
A7	7	0.61	0.72	0.58	0.36	0.42	100	0.6	10.6	207	1.8	8.7	0.4					11.0	5.0	**11.0**
A8		0.53	0.66	3.21	1.70	2.11	100	1.9	8.4	804	2.7	8.7	1.5					10.0	5.0	**10.0**
DP7+A8	8	0.54	0.67	3.80	2.06	2.53	From DP7		11.0	438	2.2	8.7	0.8					11.9	5.0	**11.9**
A9		0.33	0.52	2.66	0.87	1.38	100	4.0	8.9	873	2.9	8.7	1.7					10.6	5.0	**10.6**
A10		0.52	0.65	1.16	0.60	0.75	100	2.2	8.2	453	1.3	4.9	1.6					9.8	5.0	**9.8**
A9+A10	9	0.33	0.68	4.40	1.47	2.97	From A9		10.6									10.6	5.0	**10.6**
DP8+DP9	J3	0.98	0.67	5.56	5.47	3.72	From DP8		11.9					43	0.5	4.1	0.2	12.1	5.0	**12.1**
DPJ2+DPJ3	J4	0.74	0.71	13.91	10.23	9.91	From DPJ3		12.1					369	0.7	4.8	1.3	13.3	5.0	**13.3**
A11		0.08	0.35	0.86	0.07	0.30	75	15.9	6.4	250	3.8	6.1	0.7					7.1	5.0	**7.1**
DPJ4+A11	10	0.70	0.69	14.78	10.30	10.21	From DPJ4		13.3					31	0.5	4.1	0.1	13.5	5.0	**13.5**
A12		0.23	0.45	1.77	0.40	0.79	25	10.0	3.7	957	1.4	3.7	4.3					8.0	5.0	**8.0**
OSA+A12	12	0.21	0.44	18.39	3.80	8.14	From OSA		46.0					209	0.5	4.1	0.8	46.8	5.0	**46.8**
A13	13	0.11	0.37	1.05	0.11	0.39	100	17.8	7.0	169	12.6	11.1	0.3					7.2	5.0	**7.2**

PROJECT INFORMATION

Drexel, Barrell & Co.

PROJECT: Commons at Falcon Field
PROJECT NO: 21604-00
DESIGN BY: CGH
REV. BY: TDM
AGENCY: El Paso County
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DATE: 2/3/2025

RATIONAL METHOD CALCULATIONS FOR STORM WATER RUNOFF

DEVELOPED RUNOFF 5 YR STORM P1= 1.50

			DIRECT RUNOFF				
BASIN (S)	**DESIGN POINT**	**AREA (AC)**	**RUNOFF COEFF**	**t_c (MIN)**	**C * A**	**I (IN/HR)**	**Q (CFS)**
A-BASINS							
OSA		16.62	0.20	46.0	3.40	1.84	**6.3**
A1	1	0.97	0.20	16.5	0.19	3.38	**0.6**
A2		0.38	0.78	5.0	0.30	5.17	**1.5**
DP1+A2	2	1.35	0.36	16.6	0.49	3.37	**1.6**
A3	3	0.23	0.56	7.0	0.13	4.66	**0.6**
DP2+DP3	J1	1.58	0.39	16.6	0.61	3.36	**2.1**
A4	4	1.16	0.57	10.7	0.66	4.02	**2.6**
A5		2.99	0.52	10.3	1.54	4.09	**6.3**
DP4+A5	5	4.15	0.53	12.3	2.20	3.82	**8.4**
A6	6	2.63	0.51	10.5	1.33	4.06	**5.4**
DPJ1+DP5+DP6	J2	8.36	0.57	19.8	4.76	3.10	**14.8**
A7	7	0.58	0.61	11.0	0.36	3.98	**1.4**
A8		3.21	0.53	10.0	1.70	4.13	**7.0**
DP7+A8	8	3.80	0.54	11.9	2.06	3.87	**8.0**
A9		2.66	0.33	10.6	0.87	4.04	**3.5**
A10		1.16	0.52	9.8	0.60	4.16	**2.5**
A9+A10	9	4.40	0.33	10.6	1.47	4.04	**5.9**
DP8+DP9	J3	5.56	0.98	12.1	5.47	3.85	**21.1**
DPJ2+DPJ3	J4	13.91	0.74	13.3	10.23	3.70	**37.8**
A11		0.86	0.08	7.1	0.07	4.64	**0.3**
DPJ4+A11	10	14.78	0.70	13.5	10.30	3.68	**37.9**
A12		1.77	0.23	8.0	0.40	4.46	**1.8**
OSA+A12	12	18.39	0.21	46.8	3.80	1.81	**6.9**
A13	13	1.05	0.11	7.2	0.11	4.61	**0.5**

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AGENCY: El Paso County
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Drexel, Barrell & Co.

RATIONAL METHOD CALCULATIONS FOR STORM WATER RUNOFF

DEVELOPED RUNOFF 100 YR STORM P1= 2.52

BASIN (S)	DESIGN POINT	AREA (AC)	DIRECT RUNOFF RUNOFF COEFF	t_c (MIN)	C * A	I (IN/HR)	Q (CFS)
A-BASINS							
OSA		16.62	0.44	46.0	7.35	3.09	**22.7**
A1	1	0.97	0.42	16.5	0.41	5.67	**2.3**
A2		0.38	0.86	5.0	0.33	8.68	**2.9**
DP1+A2	2	1.35	0.55	16.6	0.74	5.65	**4.2**
A3	3	0.23	0.68	7.0	0.15	7.82	**1.2**
DP2+DP3	J1	1.58	0.57	16.6	0.90	5.65	**5.1**
A4	4	1.16	0.68	10.7	0.79	6.75	**5.4**
A5		2.99	0.64	10.3	1.93	6.87	**13.2**
DP4+A5	5	4.15	0.66	12.3	2.72	6.41	**17.4**
A6	6	2.63	0.64	10.5	1.68	6.82	**11.4**
DPJ1+DP5+DP6	J2	8.36	0.74	19.8	6.19	5.21	**32.2**
A7	7	0.58	0.72	11.0	0.42	6.68	**2.8**
A8		3.21	0.66	10.0	2.11	6.93	**14.6**
DP7+A8	8	3.80	0.67	11.9	2.53	6.50	**16.4**
A9		2.66	0.52	10.6	1.38	6.78	**9.4**
A10		1.16	0.65	9.8	0.75	6.99	**5.2**
A9+A10	9	4.40	0.68	10.6	2.97	6.78	**20.2**
DP8+DP9	J3	5.56	0.67	12.1	3.72	6.46	**24.0**
DPJ2+DPJ3	J4	13.91	0.71	13.3	9.91	6.21	**61.5**
A11		0.86	0.35	7.1	0.30	7.79	**2.4**
DPJ4+A11	10	14.78	0.69	13.5	10.21	6.18	**63.1**
A12		1.77	0.45	8.0	0.79	7.48	**5.9**
OSA+A12	12	18.39	0.44	46.8	8.14	3.04	**24.7**
A13	13	1.05	0.37	7.2	0.39	7.75	**3.0**

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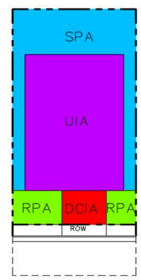
IRF CALCULATIONS PER BASIN FOR INPUT INTO UDFCD WORKSHEET

SUB-BASIN						
				Linked to Ratios		
BASIN	AREA	ACREAGE	DCIA	UIA	RPA	SPA
A1	Open Space	0.67				0.67
	Residential (< 1/8 Acre)	0.30	0.03	0.13	0.05	0.09
	Streets: Paved	0.00	0.00			
A2	Open Space	0.00				0.00
	Residential (< 1/8 Acre)	0.10	0.01	0.04	0.02	0.03
	Streets: Paved	0.28	0.28			
A3	Open Space	0.00				0.00
	Residential (< 1/8 Acre)	0.17	0.02	0.07	0.03	0.05
	Streets: Paved	0.06	0.06			
A4	Open Space	0.00				0.00
	Residential (< 1/8 Acre)	0.86	0.09	0.38	0.14	0.25
	Streets: Paved	0.30	0.30			
A5	Open Space	0.00				0.00
	Residential (< 1/8 Acre)	2.55	0.28	1.11	0.42	0.74
	Streets: Paved	0.44	0.44			
A6	Open Space	0.00				0.00
	Residential (< 1/8 Acre)	2.30	0.25	1.00	0.38	0.67
	Streets: Paved	0.33	0.33			
A7	Open Space	0.00				0.00
	Residential (< 1/8 Acre)	0.37	0.04	0.16	0.06	0.11
	Streets: Paved	0.21	0.21			
A8	Open Space	0.00				0.00
	Residential (< 1/8 Acre)	2.65	0.29	1.16	0.43	0.77
	Streets: Paved	0.57	0.57			
A9	Open Space	1.32				1.32
	Residential (< 1/8 Acre)	0.97	0.11	0.42	0.16	0.28
	Streets: Paved	0.36	0.36			
A10	Open Space	0.00				0.00
	Residential (< 1/8 Acre)	0.99	0.11	0.43	0.16	0.29
	Streets: Paved	0.17	0.17			
A11	Open Space	0.86				0.86
	Residential (< 1/8 Acre)	0.00	0.00	0.00	0.00	0.00
	Streets: Paved	0.00	0.00			
A12	Open Space	1.16				1.16
	Residential (< 1/8 Acre)	0.54	0.06	0.24	0.09	0.16
	Streets: Paved	0.07	0.07			

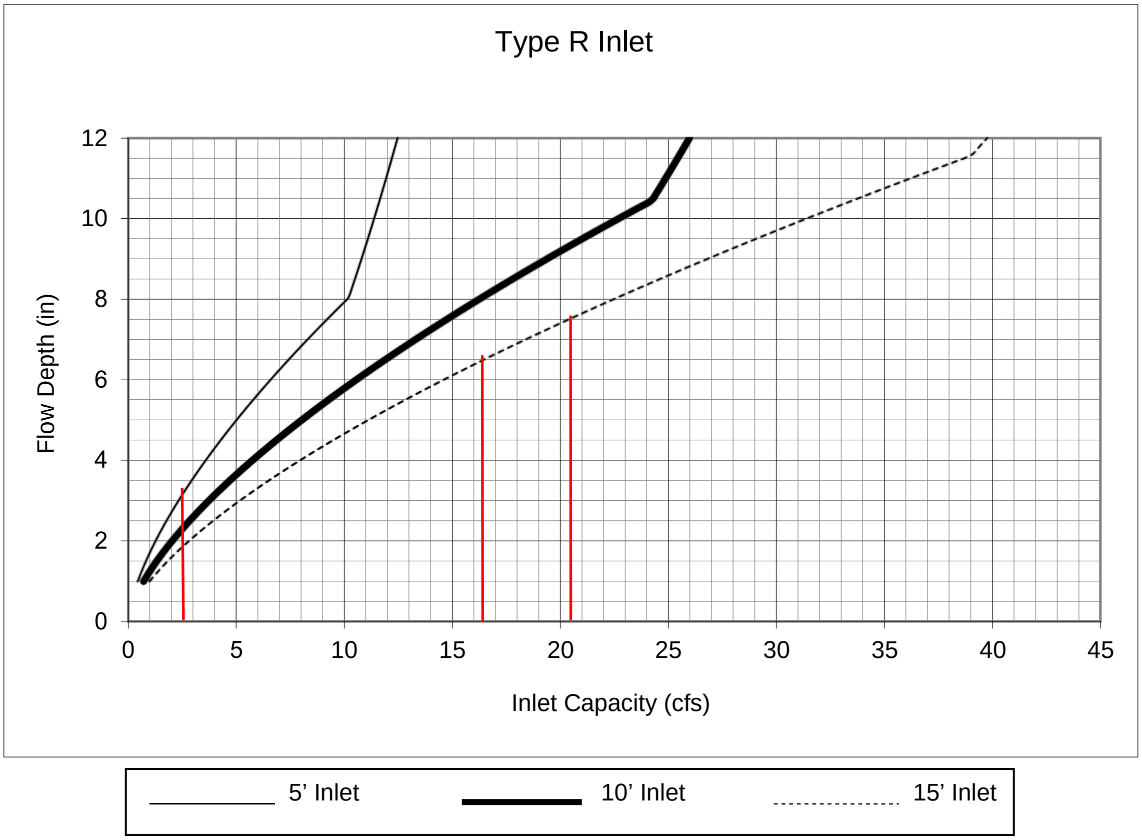
SINGLE FAMILY RATIOS

	SF	Ratio	
DCIA	600	11%	Directly Connected Impervious Area
UIA	2400	44%	Unconnected Impervious Area
RPA	900	16%	Receiving Pervious Area
SPA	1600	29%	Separate Pervious Area
TOTAL	5500	100%	



SINGLE FAMILY TYPICAL LOT

Figure 8-11. Inlet Capacity Chart Sump Conditions , Curb Opening (Type R) Inlet



DP2:
Q100=2.9 cfs
5' Type R

DP3
Q100=1.2 cfs
5' Type R

DP8:
Q100=16.4 cfs
15' Type R

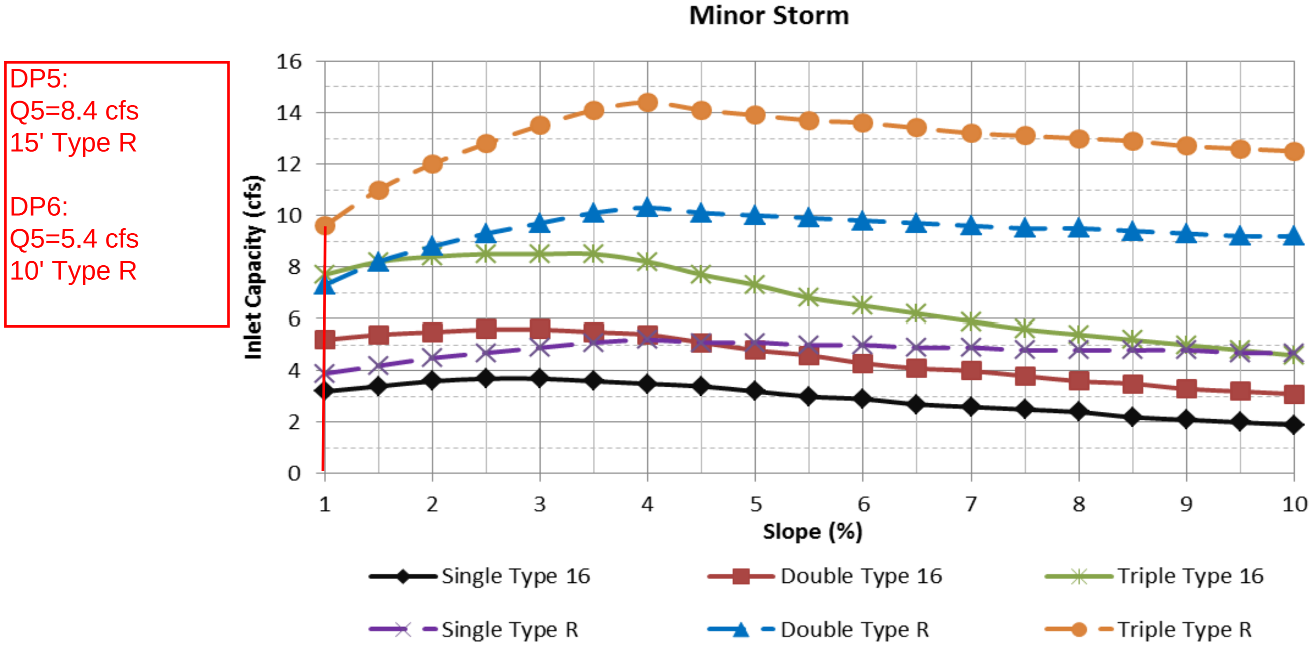
DP9:
Q100=20.2 cfs
15' Type R

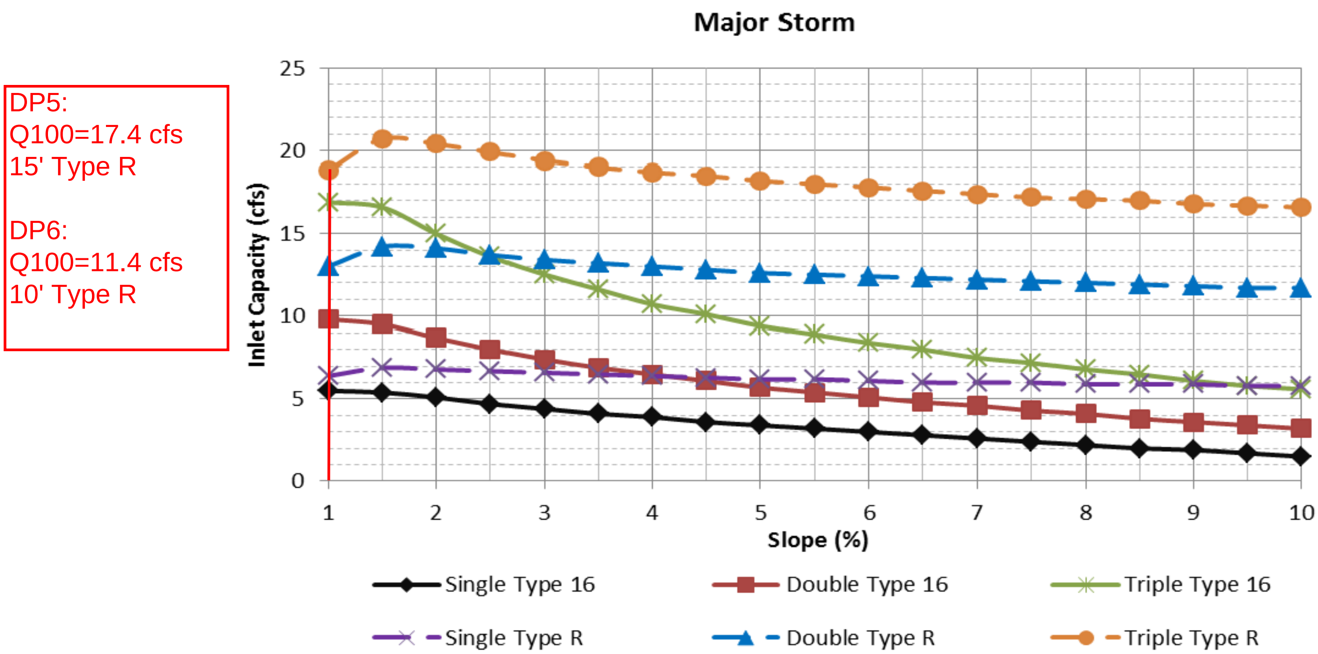
Notes:

1. The standard inlet parameters must apply to use this chart.

Figure 8-7. Inlet Capacity Chart Continuous Grade Conditions, Residential (Local)
(Attached and Detached Sidewalk)

Street Section Data: Street Width Flowline to Flowline = 34'
Type of Curb and Gutter: D-10-R = 8" vertical
Type 16 = 6" vertical





The standard street section parameters as defined in Chapter 7 must apply to use these charts. For non-standard sections, the inlet capacity shall be calculated using the UDFCD spreadsheets. The maximum spread width is limited by the curb height based on no curb overtopping during a minor storm and flow being contained within the public right-of-way during the major storm. Calculations were done using UD-Inlet 3.00.xls, Mar., 2011 with the default clogging factors.

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line Size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line Slope (%)	HGL Down (ft)	HGL Up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns Line No.	Junction Type
1	1	30.40	36	Cir	30.568	6825.80	6826.11	1.014	6828.22	6827.90	0.74	6827.90	End	Manhole
2	2	16.50	36	Cir	369.238	6826.11	6828.88	0.750	6827.90	6830.18	n/a	6830.18 j	1	Manhole
3	3	2.70	24	Cir	235.795	6829.88	6831.47	0.674	6830.38	6832.04	n/a	6832.04	2	Manhole
4	4	2.70	24	Cir	332.869	6831.47	6833.72	0.676	6832.04	6834.29	n/a	6834.29	3	Manhole
5	5	2.70	18	Cir	332.869	6834.22	6836.47	0.676	6834.77	6837.09	0.24	6837.09	4	Manhole
6	6	2.10	18	Cir	9.167	6836.47	6836.53	0.650	6837.09	6837.08	n/a	6837.08	5	Manhole
7	7	0.60	12	Cir	23.393	6837.03	6837.22	0.814	6837.31	6837.54	n/a	6837.54	6	Manhole
8	8	0.60	18	Cir	29.122	6836.47	6836.62	0.515	6837.09	6836.91	0.10	6836.91	5	Manhole
9	9	8.40	24	Cir	30.965	6829.88	6830.55	2.163	6830.54	6831.58	0.41	6831.58	2	Manhole
10	10	5.40	24	Cir	12.032	6829.88	6830.70	6.818	6830.27	6831.52	0.31	6831.52	2	Manhole
11	11	13.90	30	Cir	53.762	6826.61	6826.88	0.502	6827.90	6828.13	n/a	6828.13 j	1	Manhole
12	12	8.00	24	Cir	46.856	6827.38	6827.65	0.576	6828.30	6828.66	0.40	6828.66	11	Manhole

Project File: 5-YEAR KV.stm | Number of lines: 12 | Run Date: 1/31/2025

NOTES: Known Qs only ; j - Line contains hyd. jump.

Hydraulic Grade Line Computations

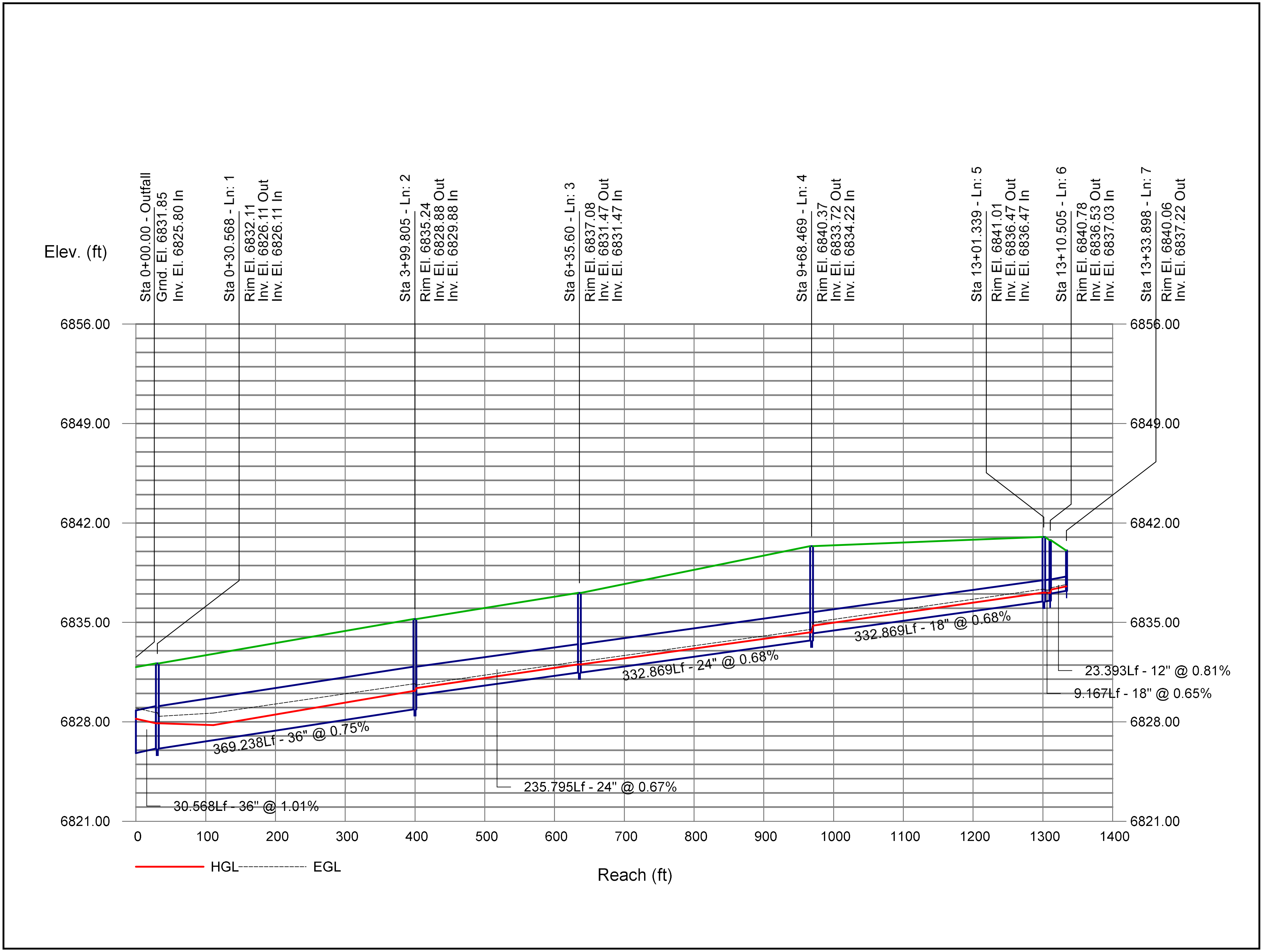
Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
	(in)	(cfs)	Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)	(ft)	Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)	Ave Sf (%)	Enrgy loss (ft)	(K)	(ft)
1	36	30.40	6825.80	6828.22	2.42	4.38	4.97	0.75	6828.97	0.000	30.568	6826.11	6827.90	1.79**	4.38	6.93	0.75	6828.64	0.000	0.000	n/a	0.99	0.74
2	36	16.50	6826.11	6827.90	1.79	2.93	3.76	0.49	6828.39	0.000	369.238	6828.88	6830.18 j	1.30**	2.93	5.64	0.49	6830.67	0.000	0.000	n/a	1.00	n/a
3	24	2.70	6829.88	6830.38	0.50*	0.61	4.46	0.21	6830.58	0.000	235.795	6831.47	6832.04	0.57**	0.74	3.64	0.21	6832.25	0.000	0.000	n/a	1.00	n/a
4	24	2.70	6831.47	6832.04	0.57*	0.74	3.64	0.21	6832.25	0.000	332.869	6833.72	6834.29	0.57**	0.74	3.64	0.21	6834.50	0.000	0.000	n/a	0.15	n/a
5	18	2.70	6834.22	6834.77	0.55*	0.59	4.58	0.24	6835.01	0.000	332.869	6836.47	6837.09	0.62**	0.69	3.89	0.24	6837.33	0.000	0.000	n/a	1.00	0.24
6	18	2.10	6836.47	6837.09	0.62	0.58	3.03	0.20	6837.30	0.000	9.167	6836.53	6837.08	0.55**	0.58	3.61	0.20	6837.28	0.000	0.000	n/a	0.15	n/a
7	12	0.60	6837.03	6837.31	0.28*	0.18	3.31	0.12	6837.43	0.000	23.393	6837.22	6837.54	0.32**	0.22	2.75	0.12	6837.66	0.000	0.000	n/a	1.00	n/a
8	18	0.60	6836.47	6837.09	0.62	0.24	0.86	0.10	6837.19	0.000	29.122	6836.62	6836.91	0.29**	0.24	2.54	0.10	6837.01	0.000	0.000	n/a	1.00	0.10
9	24	8.40	6829.88	6830.54	0.66*	0.90	9.34	0.41	6830.95	0.000	30.965	6830.55	6831.58	1.03**	1.64	5.14	0.41	6831.99	0.000	0.000	n/a	1.00	0.41
10	24	5.40	6829.88	6830.27	0.39*	0.44	12.38	0.31	6830.58	0.000	12.032	6830.70	6831.52	0.82**	1.21	4.46	0.31	6831.83	0.000	0.000	n/a	1.00	0.31
11	30	13.90	6826.61	6827.90	1.29	2.46	5.47	0.49	6828.39	0.000	53.762	6826.88	6828.13 j	1.25**	2.46	5.64	0.49	6828.63	0.000	0.000	n/a	0.99	n/a
12	24	8.00	6827.38	6828.30	0.92*	1.40	5.69	0.40	6828.69	0.000	46.856	6827.65	6828.66	1.01**	1.58	5.06	0.40	6829.05	0.000	0.000	n/a	1.00	0.40

Project File: 5-YEAR KV.stm | Number of lines: 12 | Run Date: 1/31/2025

Notes: * depth assumed; ** Critical depth.; j-Line contains hyd. jump ; c = cir e = ellip b = box

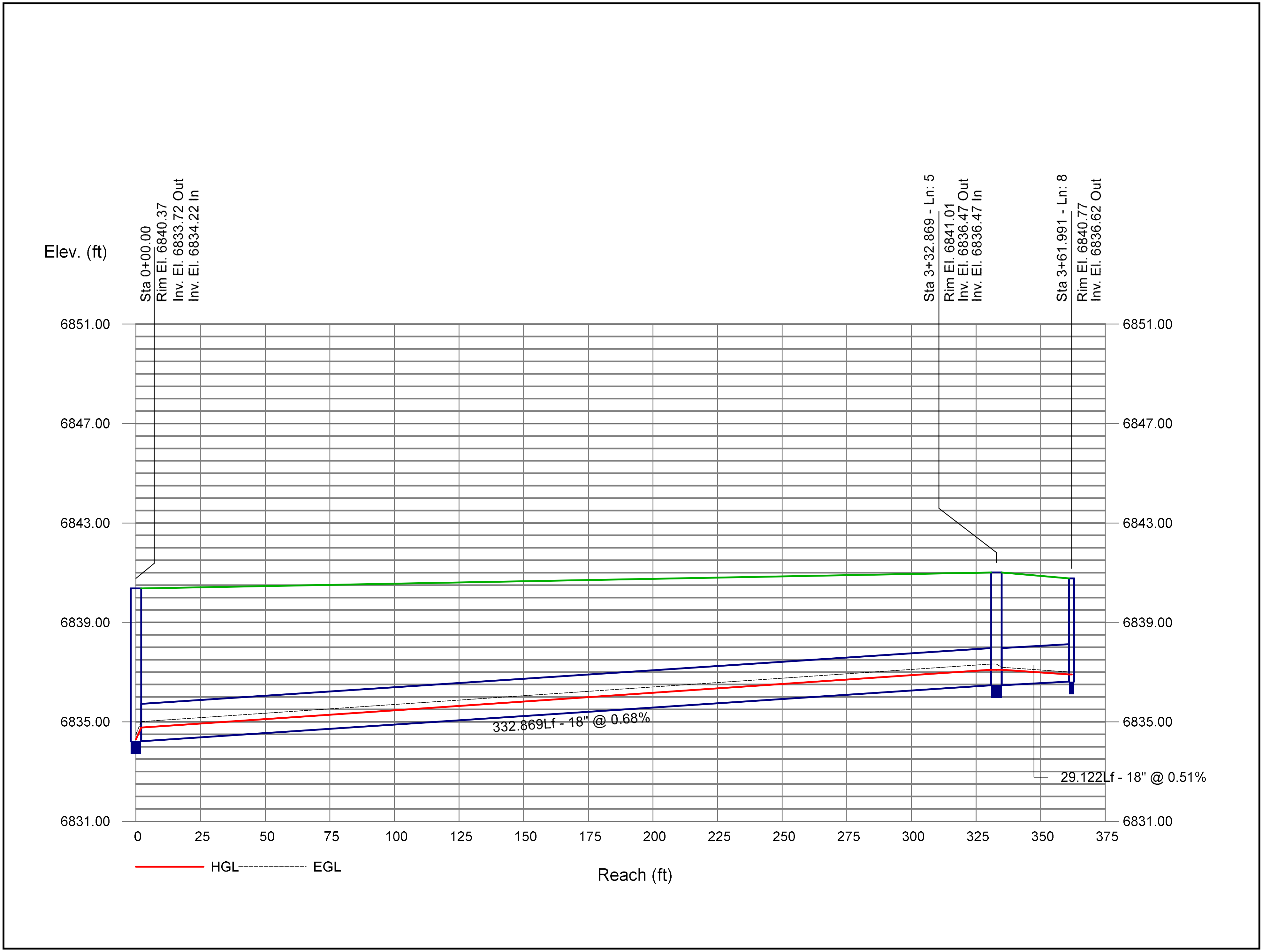
Storm Sewer Profile

Proj. file: 5-YEAR KV.stm



Storm Sewer Profile

Proj. file: 5-YEAR KV.stm



Storm Sewer Profile

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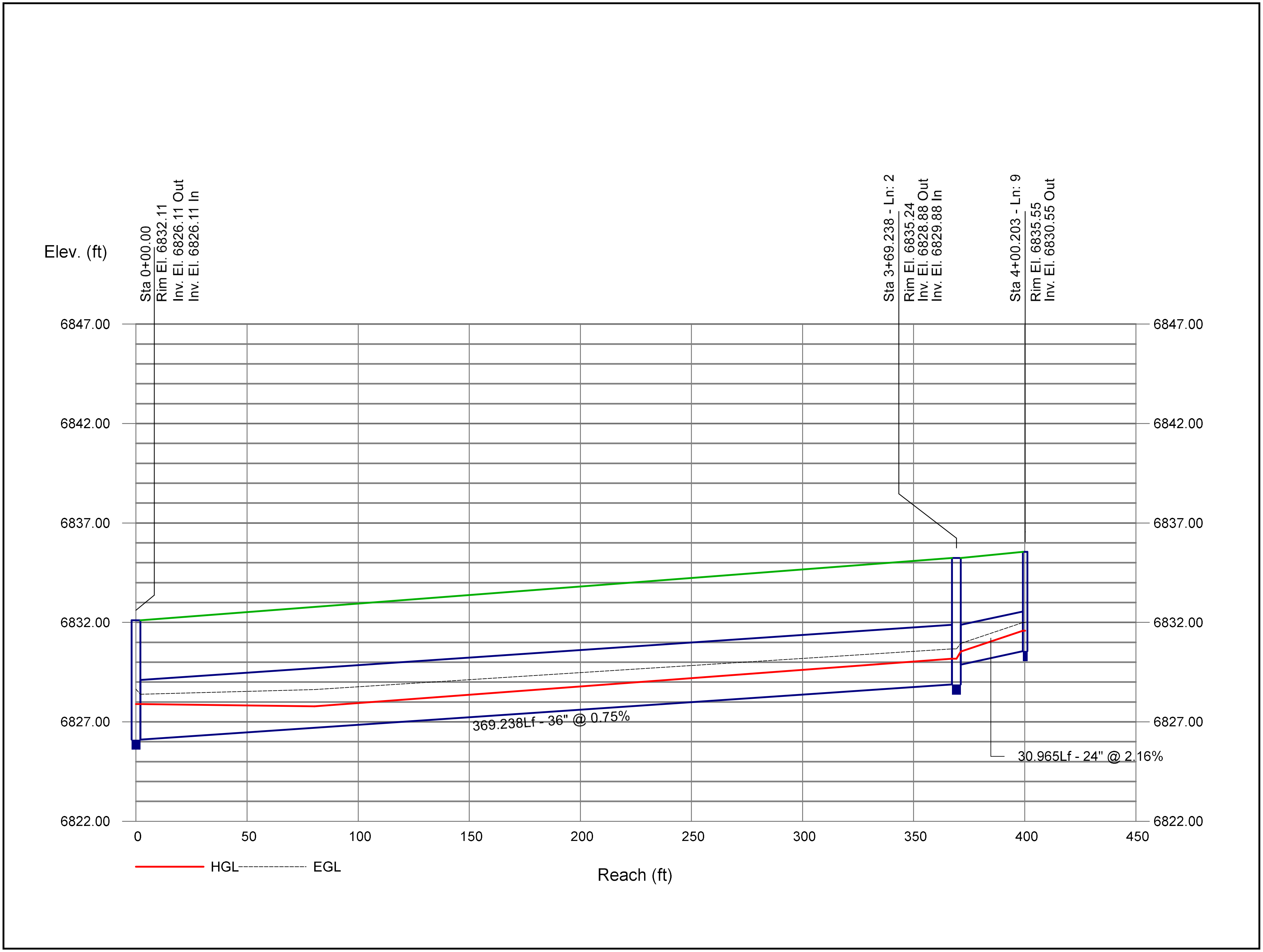

Storm Sewer Profile

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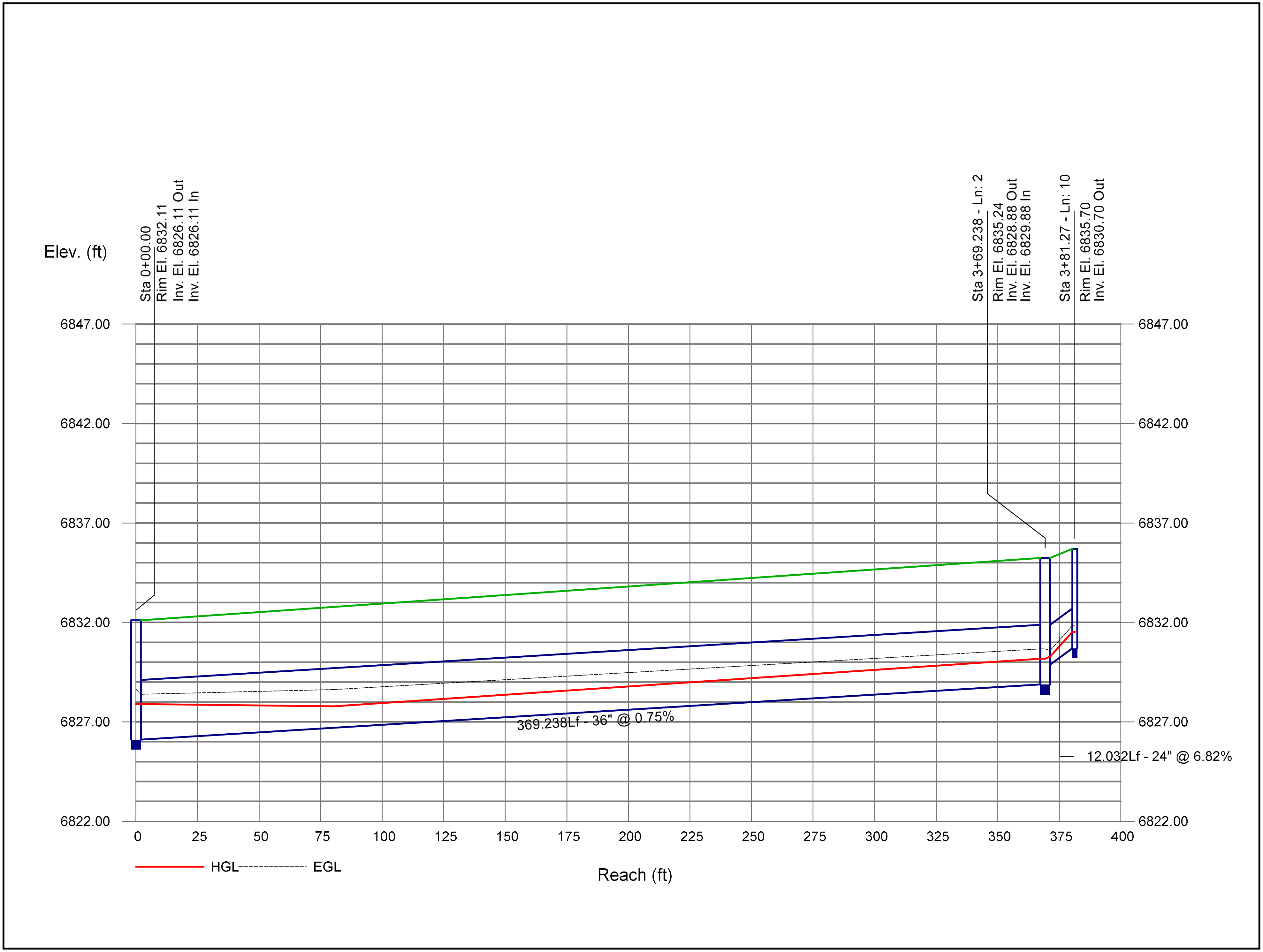

Storm Sewer Profile

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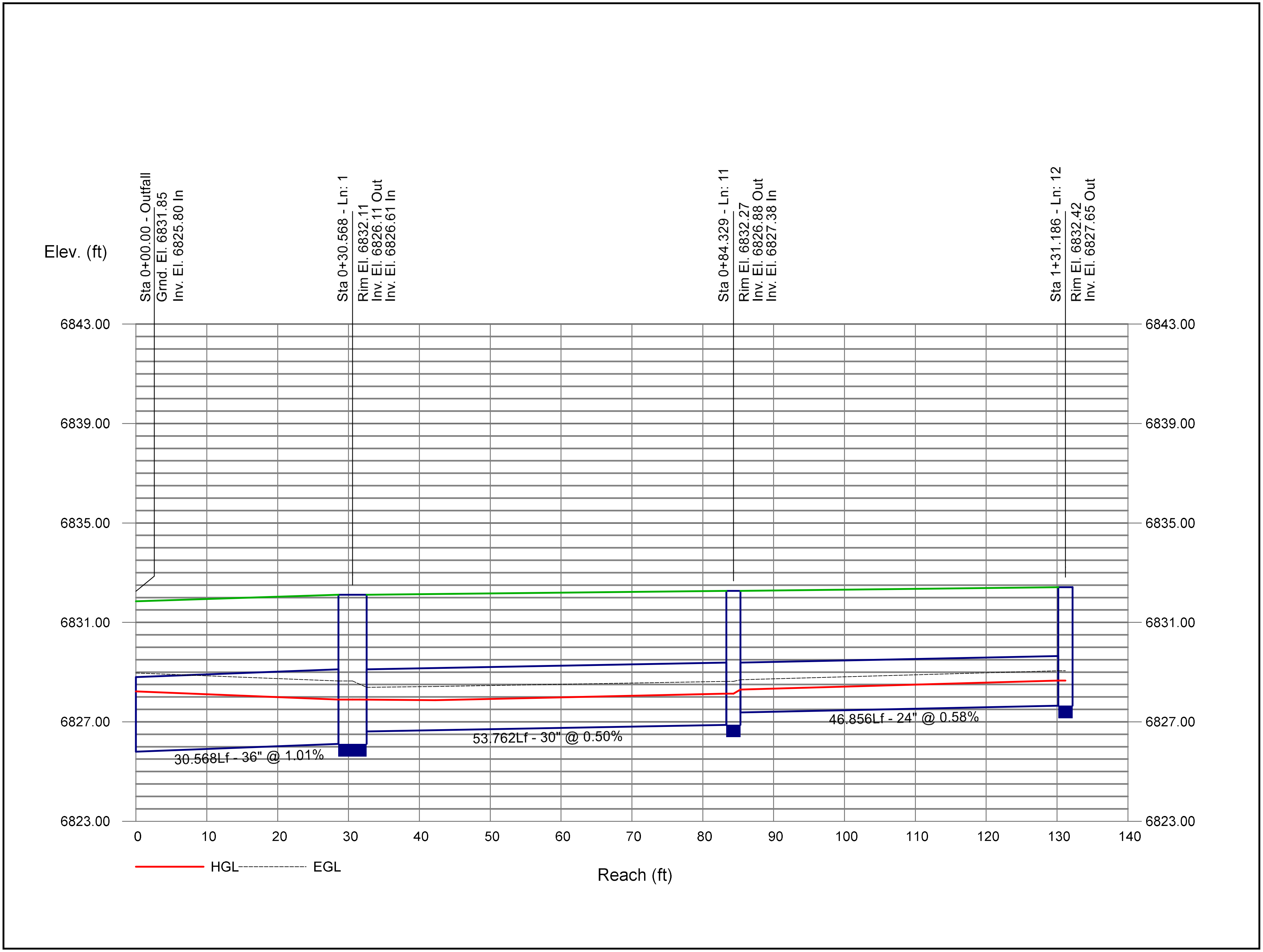


Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line Size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line Slope (%)	HGL Down (ft)	HGL Up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns Line No.	Junction Type
1	1	71.80	36	Cir	30.568	6825.80	6826.11	1.014	6828.22	6828.79	n/a	6828.79	End	Manhole
2	2	35.20	36	Cir	369.238	6826.11	6828.53	0.655	6828.79	6830.46	n/a	6830.46 j	1	Manhole
3	3	6.40	18	Cir	235.795	6830.03	6831.57	0.653	6830.95	6832.55	0.43	6832.55	2	Manhole
4	4	6.40	18	Cir	332.869	6831.57	6833.75	0.655	6832.55	6834.73	0.06	6834.73	3	Manhole
5	5	6.40	18	Cir	339.023	6833.75	6835.44	0.498	6834.76	6836.45	0.40	6836.85	4	Manhole
6	6	5.20	18	Cir	9.177	6835.45	6835.86	4.464	6836.85	6836.74	0.05	6836.74	5	Manhole
7	7	2.30	12	Cir	23.407	6836.36	6836.69	1.410	6836.86	6837.34	0.28	6837.34	6	Manhole
8	8	1.20	18	Cir	29.116	6835.45	6835.74	0.996	6836.85	6836.15	0.15	6836.15	5	Manhole
9	9	17.40	24	Cir	30.965	6829.53	6830.55	3.294	6830.46	6832.05	0.73	6832.05	2	Manhole
10	10	11.40	24	Cir	12.655	6829.53	6830.70	9.248	6830.46	6831.91	n/a	6831.91	2	Manhole
11	11	36.60	30	Cir	53.762	6826.61	6827.54	1.730	6828.79	6829.59	n/a	6829.59 j	1	Manhole
12	12	16.40	24	Cir	46.856	6828.04	6828.59	1.173	6829.59	6830.05	0.69	6830.05	11	Manhole

Project File: 100-YEAR KV.stm | Number of lines: 12 | Run Date: 1/31/2025

NOTES: Known Qs only ; j - Line contains hyd. jump.

Hydraulic Grade Line Computations

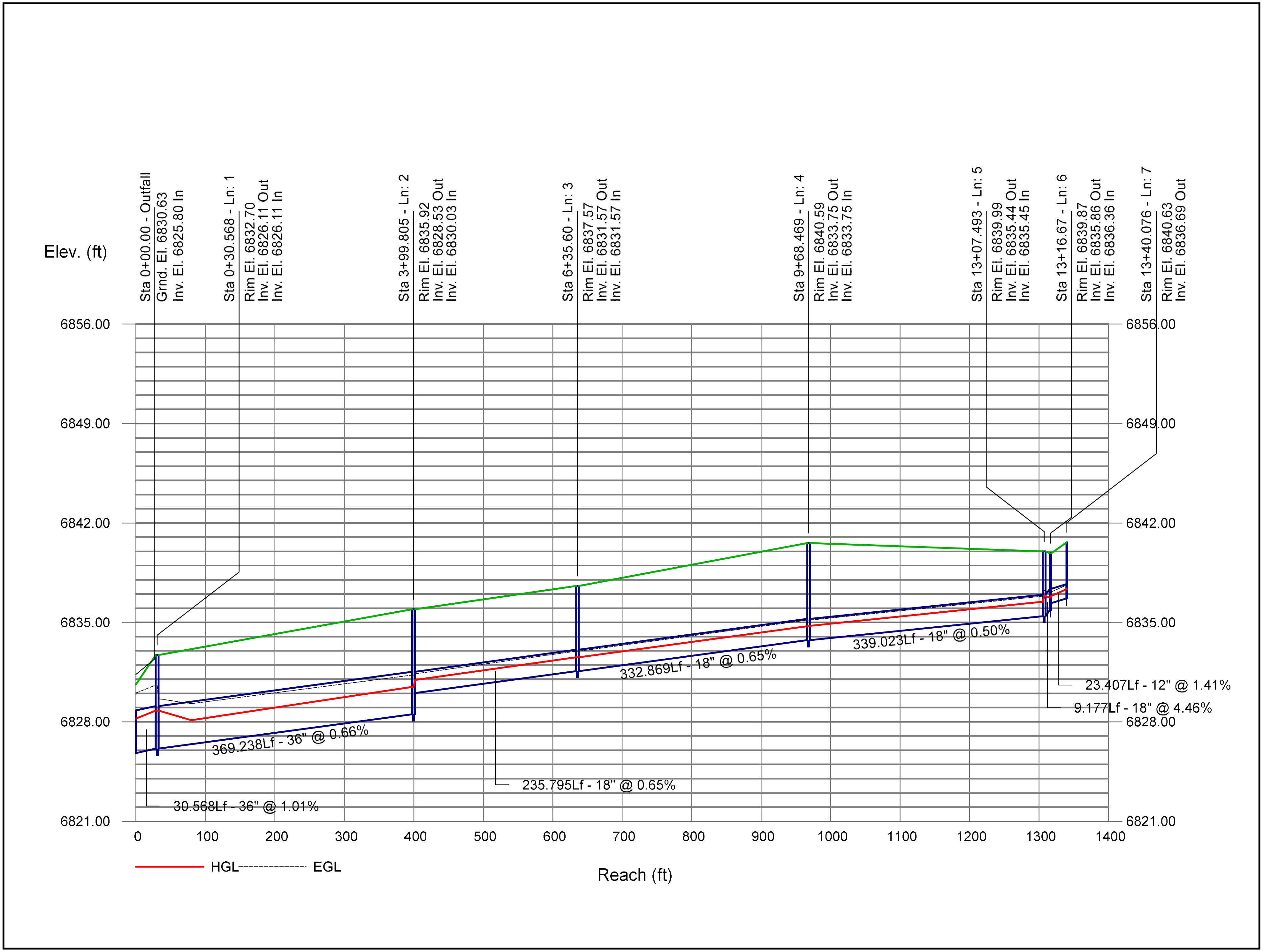
Line	Size (in)	Q (cfs)	Downstream Invert elev (ft)	Downstream HGL elev (ft)	Downstream Depth (ft)	Downstream Area (sqft)	Downstream Vel (ft/s)	Downstream Vel head (ft)	Downstream EGL elev (ft)	Downstream Sf (%)	Len (ft)	Upstream Invert elev (ft)	Upstream HGL elev (ft)	Upstream Depth (ft)	Upstream Area (sqft)	Upstream Vel (ft/s)	Upstream Vel head (ft)	Upstream EGL elev (ft)	Upstream Sf (%)	Check Ave Sf (%)	Check Enrgy loss (ft)	JL coeff (K)	Minor loss (ft)
1	36	71.80	6825.80	6828.22	2.42	6.12	11.73	1.81	6830.03	0.000	30.568	6826.11	6828.79	2.68**	6.66	10.78	1.81	6830.60	0.000	0.000	n/a	0.99	n/a
2	36	35.20	6826.11	6828.79	2.68	4.80	5.28	0.84	6829.63	0.000	369.238	6828.53	6830.46 j	1.93**	4.80	7.34	0.84	6831.29	0.000	0.000	n/a	1.00	n/a
3	18	6.40	6830.03	6830.95	0.92*	1.14	5.62	0.43	6831.38	0.000	235.795	6831.57	6832.55	0.98**	1.22	5.25	0.43	6832.98	0.000	0.000	n/a	1.00	0.43
4	18	6.40	6831.57	6832.55	0.98*	1.22	5.25	0.43	6832.98	0.000	332.869	6833.75	6834.73	0.98**	1.22	5.25	0.43	6835.16	0.000	0.000	n/a	0.15	0.06
5	18	6.40	6833.75	6834.76	1.01*	1.27	5.04	0.40	6835.16	0.498	339.023	6835.44	6836.45	1.01	1.27	5.04	0.40	6836.85	0.497	0.498	1.687	1.00	0.40
6	18	5.20	6835.45	6836.85	1.40	1.07	3.03	0.36	6837.21	0.000	9.177	6835.86	6836.74	0.88**	1.07	4.84	0.36	6837.10	0.000	0.000	n/a	0.15	0.05
7	12	2.30	6836.36	6836.86	0.50*	0.39	5.84	0.28	6837.15	0.000	23.407	6836.69	6837.34	0.65**	0.54	4.27	0.28	6837.62	0.000	0.000	n/a	1.00	0.28
8	18	1.20	6835.45	6836.85	1.40	0.39	0.70	0.15	6837.00	0.000	29.116	6835.74	6836.15	0.41**	0.39	3.07	0.15	6836.30	0.000	0.000	n/a	1.00	0.15
9	24	17.40	6829.53	6830.46	0.93	1.42	12.22	0.73	6831.19	0.000	30.965	6830.55	6832.05	1.50**	2.53	6.87	0.73	6832.79	0.000	0.000	n/a	1.00	0.73
10	24	11.40	6829.53	6830.46	0.93	1.42	8.01	0.51	6830.97	0.000	12.655	6830.70	6831.91	1.21**	1.99	5.73	0.51	6832.42	0.000	0.000	n/a	1.00	n/a
11	30	36.60	6826.61	6828.79	2.18	4.30	8.06	1.12	6829.91	0.000	53.762	6827.54	6829.59 j	2.05**	4.30	8.50	1.12	6830.71	0.000	0.000	n/a	0.99	1.11
12	24	16.40	6828.04	6829.59	1.55	2.46	6.28	0.69	6830.28	0.000	46.856	6828.59	6830.05	1.46**	2.46	6.68	0.69	6830.74	0.000	0.000	n/a	1.00	0.69

Project File: 100-YEAR KV.stm | Number of lines: 12 | Run Date: 1/31/2025

Notes: * depth assumed; ** Critical depth.; j-Line contains hyd. jump ; c = cir e = ellip b = box

Storm Sewer Profile

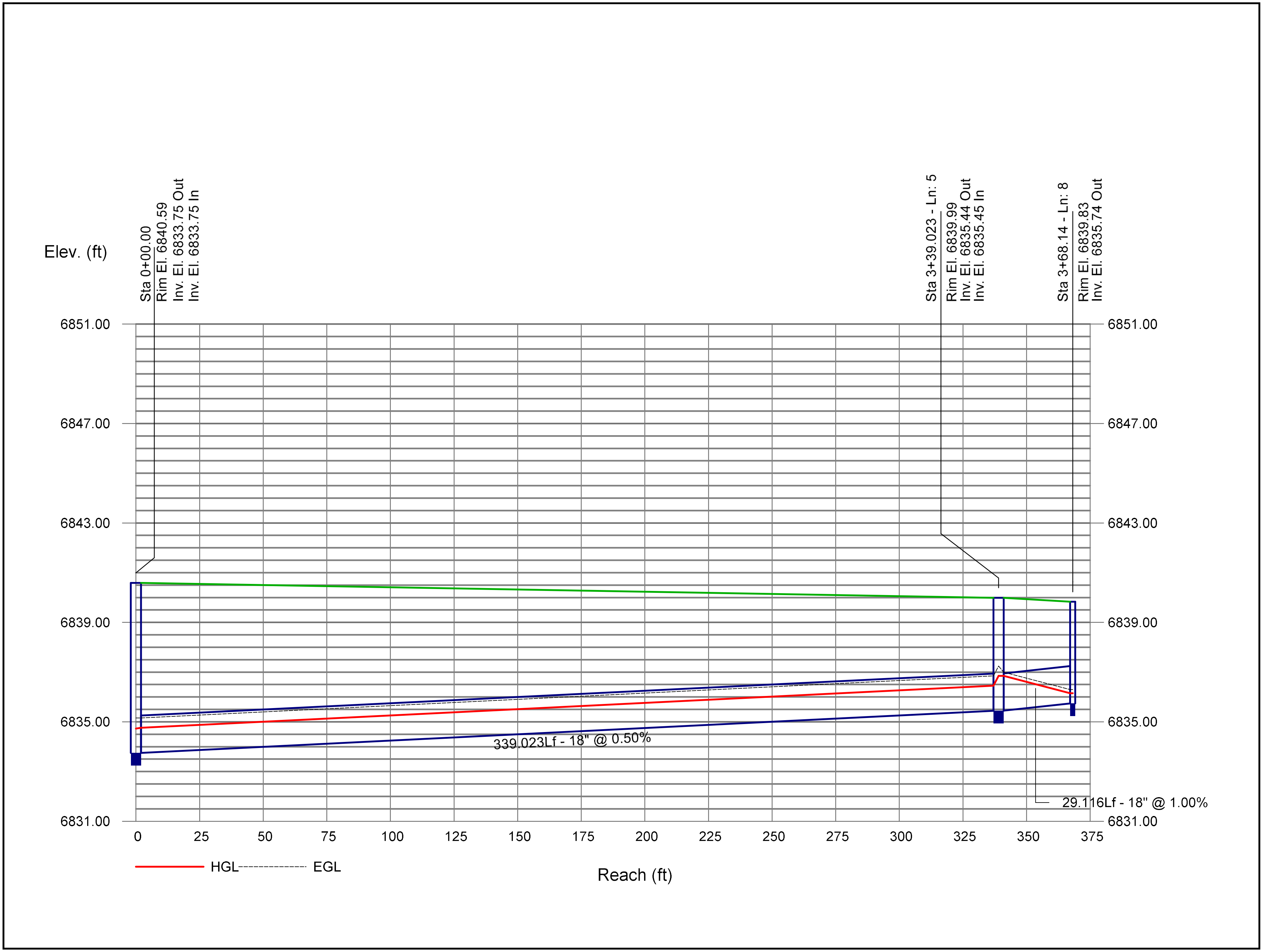
Proj. file: 100-YEAR KV.stm



Storm Sewers

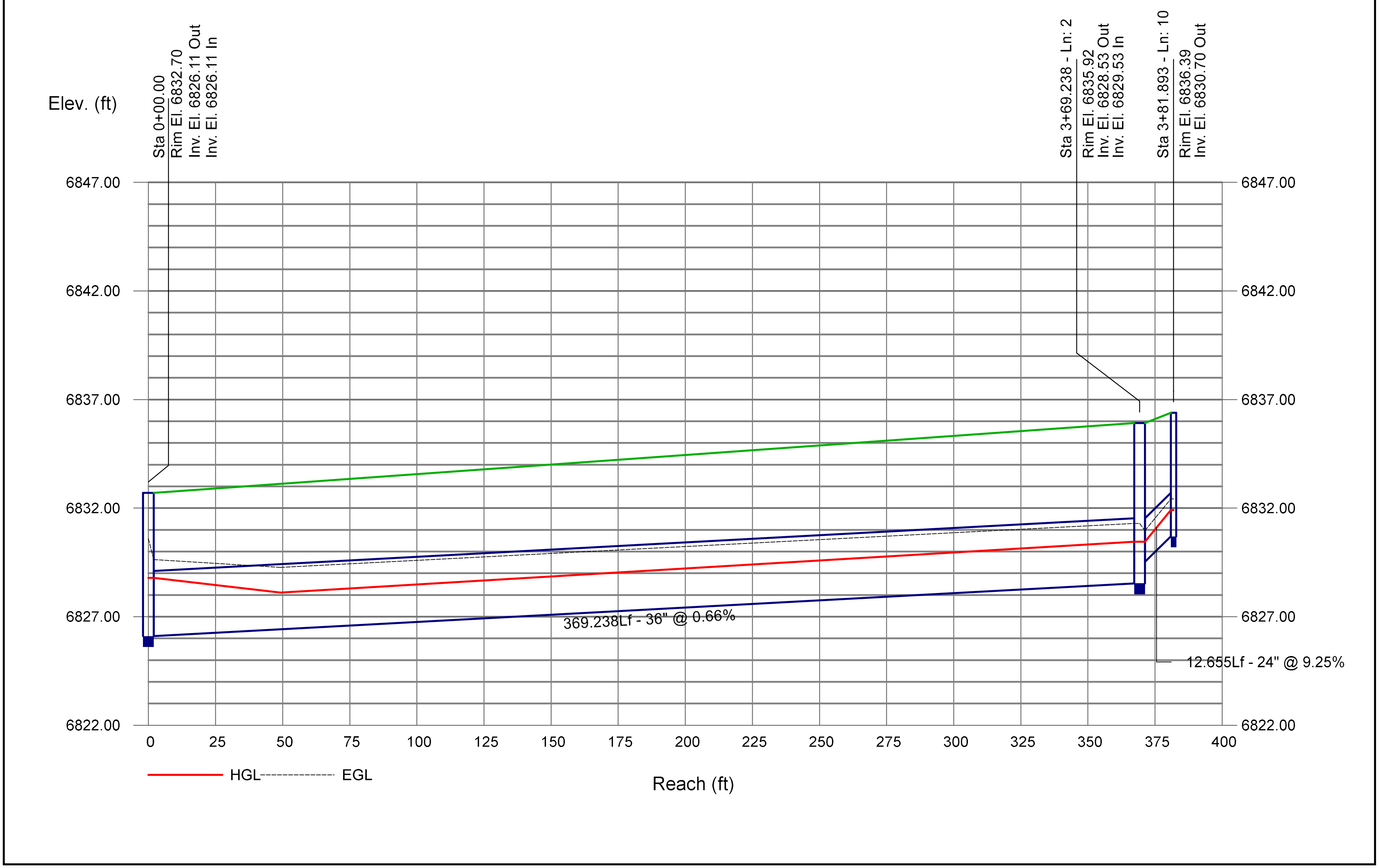
Storm Sewer Profile

Proj. file: 100-YEAR KV.stm



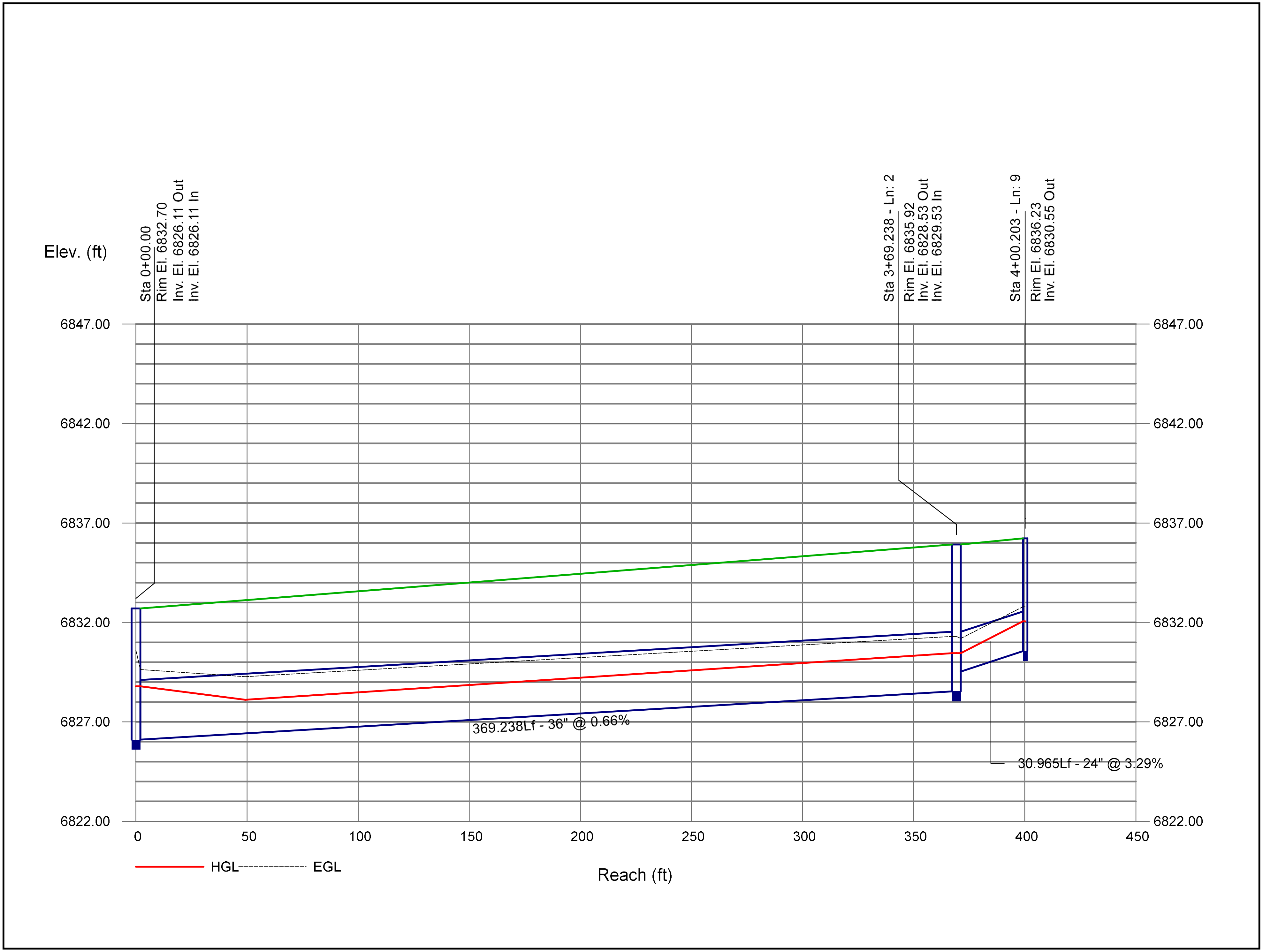
Storm Sewer Profile

Proj. file: 100-YEAR KV.stm



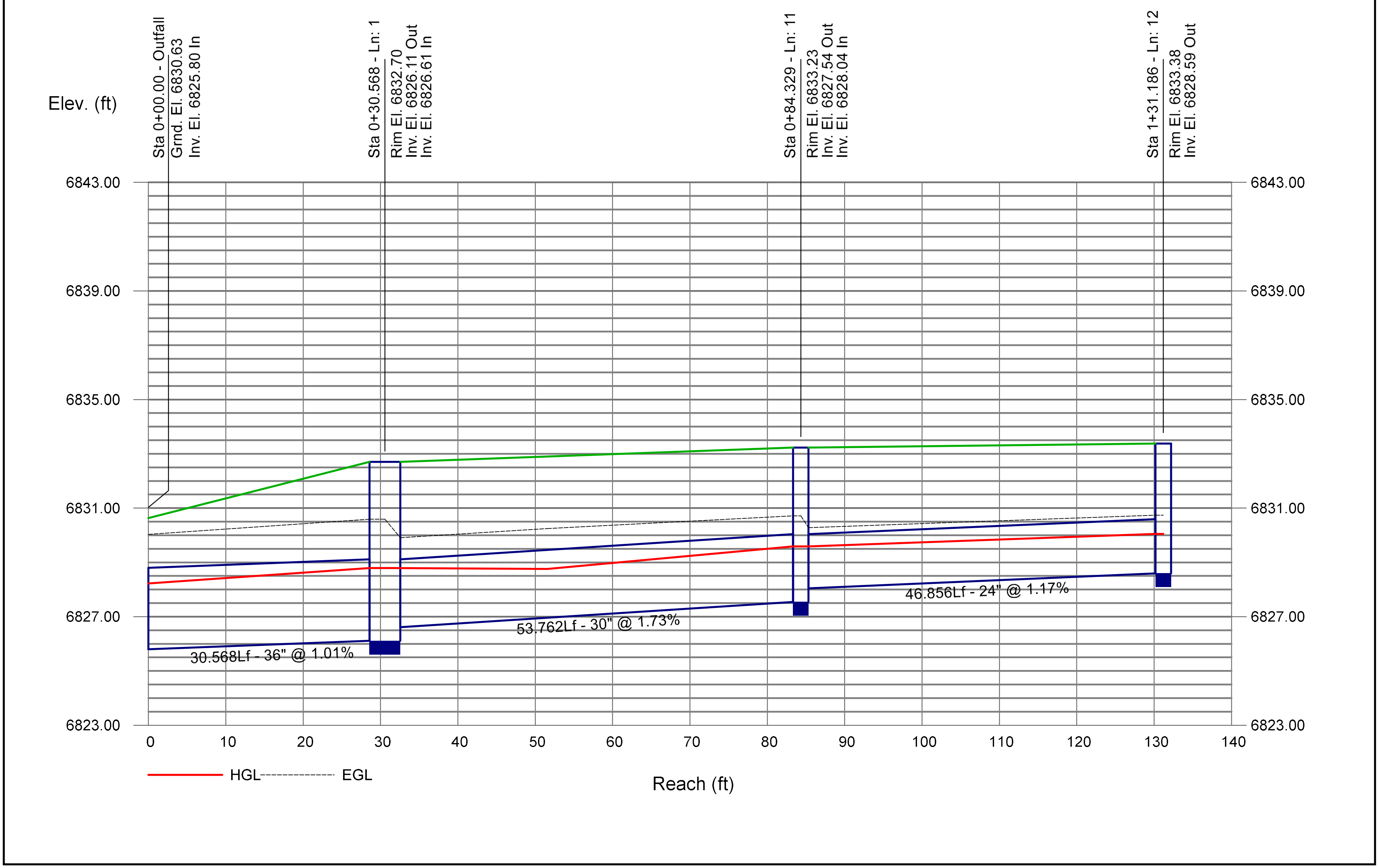
Storm Sewer Profile

Proj. file: 100-YEAR KV.stm



Storm Sewer Profile

Proj. file: 100-YEAR KV.stm



Design Procedure Form: Runoff Reduction

UD-BMP (Version 3.07, March 2018)

Sheet 1 of 1

Designer: SBN
Company: DBCO
Date: February 3, 2025
Project: Falcon Field Filing No. 2
Location: Tributary to Pond A

SITE INFORMATION (User Input in Blue Cells)

WQCV Rainfall Depth: 0.60 inches

Depth of Average Runoff Producing Storm, d_6 = 0.43 inches (for Watersheds Outside of the Denver Region, Figure 3-1 in USDCM Vol. 3)

Area Type	DCIA	SPA	UIA:RPA	UIA:RPA	UIA:RPA	UIA:RPA	UIA:RPA	UIA:RPA	UIA:RPA	UIA:RPA	UIA:RPA	UIA:RPA
Area ID	A1-A10	A1-A11	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10
Downstream Design Point ID	J4	11	1	2	3	4	5	6	7	8	9	10
Downstream BMP Type	EDB	EDB	EDB	EDB	EDB	EDB	EDB	EDB	EDB	EDB	EDB	EDB
DCIA (ft^2)	171,869	--	--	--	--	--	--	--	--	--	--	--
UIA (ft^2)	--	--	5,753	1,869	3,207	16,399	48,438	43,682	7,110	50,333	18,480	18,742
RPA (ft^2)	--	--	2,157	701	1,203	6,150	18,164	16,381	2,666	18,875	6,930	7,028
SPA (ft^2)	--	267,186	--	--	--	--	--	--	--	--	--	--
HSG A (%)	--	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
HSG B (%)	--	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
HSG C/D (%)	--	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Average Slope of RPA (ft/ft)	--	--	0.010	0.010	0.010	0.010	0.025	0.010	0.010	0.025	0.025	0.010
UIA:RPA Interface Width (ft)	--	--	50.00	50.00	50.00	50.00	75.00	75.00	50.00	75.00	50.00	50.00

CALCULATED RUNOFF RESULTS

Area ID	A1-A10	A1-A11	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10
UIA:RPA Area (ft^2)	--	--	7,910	2,570	4,410	22,549	66,602	60,063	9,776	69,208	25,410	25,770
L / W Ratio	--	--	3.16	1.03	1.76	9.02	11.84	10.68	3.91	12.30	10.16	10.31
UIA / Area	--	--	0.7273	0.7272	0.7272	0.7273	0.7273	0.7273	0.7273	0.7273	0.7273	0.7273
Runoff (in)	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Runoff (ft^3)	7161	0	0	0	0	0	0	0	0	0	0	0
Runoff Reduction (ft^3)	0	13359	240	78	134	683	2018	1820	296	2097	770	781

CALCULATED WQCV RESULTS

Area ID	A1-A10	A1-A11	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10
WQCV (ft^3)	7161	0	240	78	134	683	2018	1820	296	2097	770	781
WQCV Reduction (ft^3)	0	0	240	78	134	683	2018	1820	296	2097	770	781
WQCV Reduction (%)	0%	0%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Untreated WQCV (ft^3)	7161	0	0	0	0	0	0	0	0	0	0	0

CALCULATED DESIGN POINT RESULTS (sums results from all columns with the same Downstream Design Point ID)

Downstream Design Point ID	J4	11	1	2	3	4	5	6	7	8	9	10
DCIA (ft^2)	171,869	0	0	0	0	0	0	0	0	0	0	0
UIA (ft^2)	0	0	5,753	1,869	3,207	16,399	48,438	43,682	7,110	50,333	18,480	18,742
RPA (ft^2)	0	0	2,157	701	1,203	6,150	18,164	16,381	2,666	18,875	6,930	7,028
SPA (ft^2)	0	267,186	0	0	0	0	0	0	0	0	0	0
Total Area (ft^2)	171,869	267,186	7,910	2,570	4,410	22,549	66,602	60,063	9,776	69,208	25,410	25,770
Total Impervious Area (ft^2)	171,869	0	5,753	1,869	3,207	16,399	48,438	43,682	7,110	50,333	18,480	18,742
WQCV (ft^3)	7,161	0	240	78	134	683	2,018	1,820	296	2,097	770	781
WQCV Reduction (ft^3)	0	0	240	78	134	683	2,018	1,820	296	2,097	770	781
WQCV Reduction (%)	0%	0%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Untreated WQCV (ft^3)	7,161	0	0	0	0	0	0	0	0	0	0	0

CALCULATED SITE RESULTS (sums results from all columns in worksheet)

Total Area (ft^2)	733,323
Total Impervious Area (ft^2)	385,882
WQCV (ft^3)	16,078
WQCV Reduction (ft^3)	8,917
WQCV Reduction (%)	55%
Untreated WQCV (ft^3)	7,161

Design Procedure Form: Runoff Reduction

UD-BMP (Version 3.07, March 2018)

Sheet 1 of 1

Designer: SBN
Company: DBCO
Date: February 3, 2025
Project: Falcon Field Filing No. 2
Location: Basin A12

SITE INFORMATION (User Input in Blue Cells)

WQCV Rainfall Depth: 0.60 inches

Depth of Average Runoff Producing Storm, d_6 = 0.43 inches (for Watersheds Outside of the Denver Region, Figure 3-1 in USDCM Vol. 3)

Area Type	UIA:RPA	DCIA	SPA									
Area ID	A12-1	A12-2	A12-3									
Downstream Design Point ID	1	2	3									
Downstream BMP Type	None	None	None									
DCIA (ft^2)	--	5,598	--									
UIA (ft^2)	10,287	--	--									
RPA (ft^2)	3,858	--	--									
SPA (ft^2)	--	--	57,236									
HSG A (%)	100%	--	100%									
HSG B (%)	0%	--	0%									
HSG C/D (%)	0%	--	0%									
Average Slope of RPA (ft/ft)	0.010	--	--									
UIA:RPA Interface Width (ft)	50.00	--	--									

CALCULATED RUNOFF RESULTS

Area ID	A12-1	A12-2	A12-3									
UIA:RPA Area (ft^2)	14,145	--	--									
L / W Ratio	5.66	--	--									
UIA / Area	0.7273	--	--									
Runoff (in)	0.00	0.50	0.00									
Runoff (ft^3)	0	233	0									
Runoff Reduction (ft^3)	429	0	2862									

CALCULATED WQCV RESULTS

Area ID	A12-1	A12-2	A12-3									
WQCV (ft^3)	429	233	0									
WQCV Reduction (ft^3)	429	0	0									
WQCV Reduction (%)	100%	0%	0%									
Untreated WQCV (ft^3)	0	233	0									

CALCULATED DESIGN POINT RESULTS (sums results from all columns with the same Downstream Design Point ID)

Downstream Design Point ID	1	2	3									
DCIA (ft^2)	0	5,598	0									
UIA (ft^2)	10,287	0	0									
RPA (ft^2)	3,858	0	0									
SPA (ft^2)	0	0	57,236									
Total Area (ft^2)	14,145	5,598	57,236									
Total Impervious Area (ft^2)	10,287	5,598	0									
WQCV (ft^3)	429	233	0									
WQCV Reduction (ft^3)	429	0	0									
WQCV Reduction (%)	100%	0%	0%									
Untreated WQCV (ft^3)	0	233	0									

CALCULATED SITE RESULTS (sums results from all columns in worksheet)

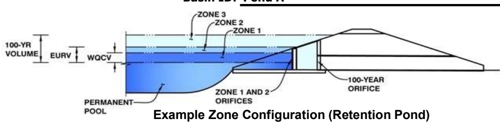
Total Area (ft^2)	76,979
Total Impervious Area (ft^2)	15,885
WQCV (ft^3)	662
WQCV Reduction (ft^3)	429
WQCV Reduction (%)	65%
Untreated WQCV (ft^3)	233

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.04 (February 2021)

Project: **The Commons at Falcon Field Filing 2**

Basin ID: **Pond A**



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	**EDB**			
Watershed Area =	19.65	acres		
Watershed Length =	1,191	ft		
Watershed Length to Centroid =	350	ft		
Watershed Slope =	0.025	ft/ft		
Watershed Imperviousness =	53.50%	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) =	0.164	acre-feet	0.164	acre-feet
Excess Urban Runoff Volume (EURV) =	1.235	acre-feet		acre-feet
2-yr Runoff Volume (P1 = 1.19 in.) =	0.888	acre-feet	1.19	inches
5-yr Runoff Volume (P1 = 1.5 in.) =	1.177	acre-feet	1.50	inches
10-yr Runoff Volume (P1 = 1.75 in.) =	1.408	acre-feet	1.75	inches
25-yr Runoff Volume (P1 = 2 in.) =	1.755	acre-feet	2.00	inches
50-yr Runoff Volume (P1 = 2.25 in.) =	2.094	acre-feet	2.25	inches
100-yr Runoff Volume (P1 = 2.52 in.) =	2.520	acre-feet	2.52	inches
500-yr Runoff Volume (P1 = 3.49 in.) =	3.998	acre-feet	3.49	inches
Approximate 2-yr Detention Volume =	0.797	acre-feet		
Approximate 5-yr Detention Volume =	1.047	acre-feet		
Approximate 10-yr Detention Volume =	1.274	acre-feet		
Approximate 25-yr Detention Volume =	1.552	acre-feet		
Approximate 50-yr Detention Volume =	1.725	acre-feet		
Approximate 100-yr Detention Volume =	1.929	acre-feet		

Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	0.164	acre-feet
Zone 2 Volume (EURV - Zone 1) =	1.071	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	0.694	acre-feet
Total Detention Basin Volume =	1.929	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	--	--	--	400	0.009		
6826	--	1.00	--	--	--	10,828	0.249	5,614	0.129
6827	--	2.00	--	--	--	12,923	0.297	17,489	0.402
6828	--	3.00	--	--	--	15,137	0.347	31,519	0.724
6829	--	4.00	--	--	--	17,471	0.401	47,823	1.098
6830	--	5.00	--	--	--	19,925	0.457	66,521	1.527
6831	--	6.00	--	--	--	22,478	0.516	87,723	2.014
6832	--	7.00	--	--	--	25,157	0.578	111,540	2.561
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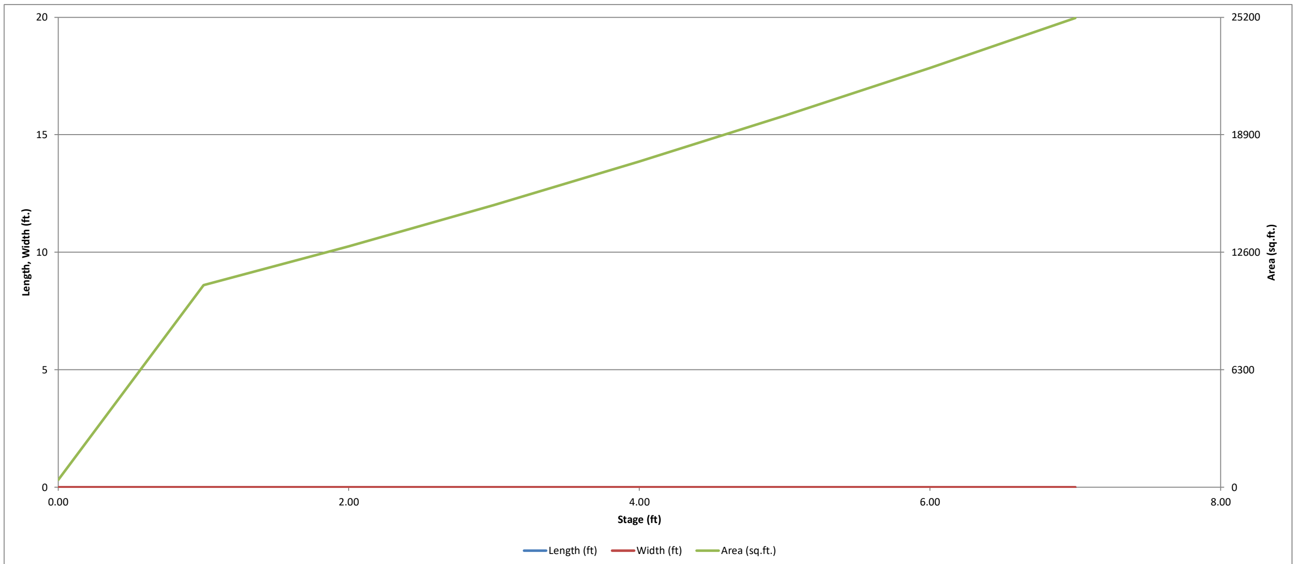
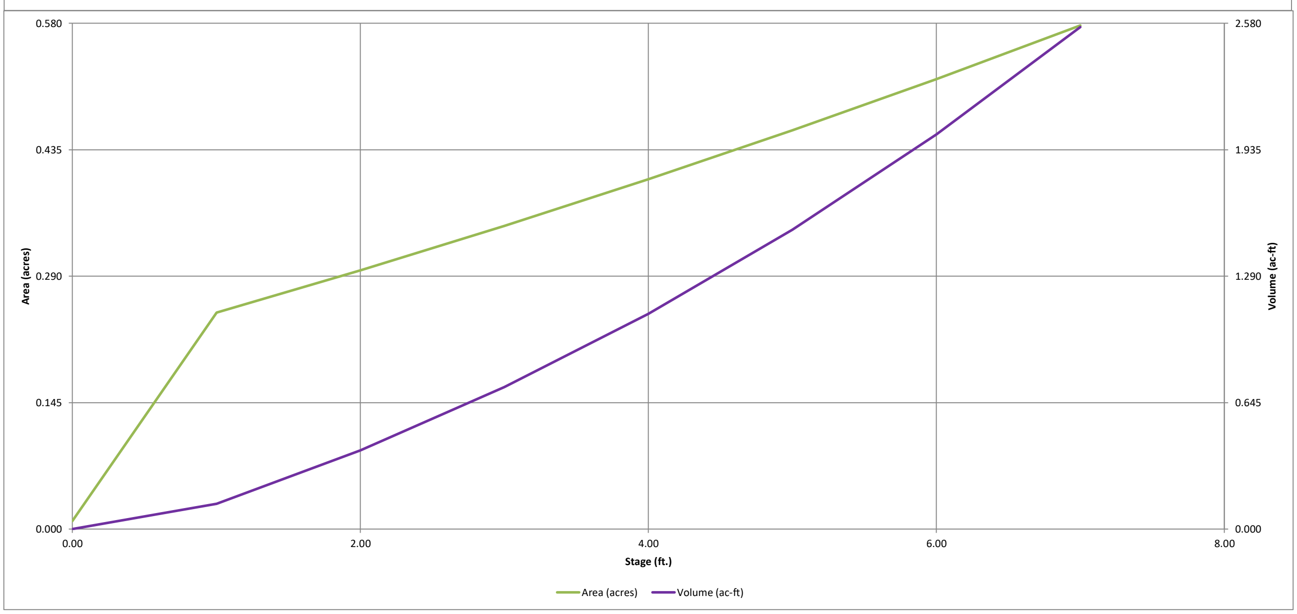
DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.04 (February 2021)



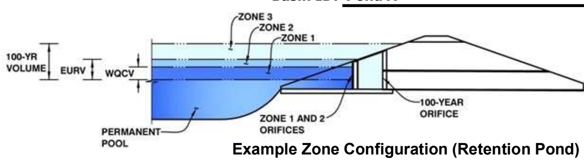


DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.04 (February 2021)

Project: **The Commons at Falcon Field Filing 2**

Basin ID: **Pond A**



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	1.14	0.164	Orifice Plate
Zone 2 (EURV)	4.34	1.071	Orifice Plate
Zone 3 (100-year)	5.84	0.694	Weir&Pipe (Restrict)
Total (all zones)		1.929	

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

Underdrain Orifice Invert Depth =		ft (distance below the filtration media surface)	Underdrain Orifice Area =		ft^2
Underdrain Orifice Diameter =		inches	Underdrain Orifice Centroid =		feet

(Calculated Parameters for Underdrain)

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)

Calculated Parameters for Plate

Invert of Lowest Orifice =	0.00	ft (relative to basin bottom at Stage = 0 ft)	WQ Orifice Area per Row =	N/A	ft^2
Depth at top of Zone using Orifice Plate =	4.34	ft (relative to basin bottom at Stage = 0 ft)	Elliptical Half-Width =	N/A	feet
Orifice Plate: Orifice Vertical Spacing =	N/A	inches	Elliptical Slot Centroid =	N/A	feet
Orifice Plate: Orifice Area per Row =	N/A	inches	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	1.50	3.00					
Orifice Area (sq. inches)	1.84	10.00	10.00					

	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)

Calculated Parameters for Vertical Orifice

	Not Selected	Not Selected			Not Selected	Not Selected	
Invert of Vertical Orifice =	N/A	N/A	ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Area =	N/A	N/A	ft^2
Depth at top of Zone using Vertical Orifice =	N/A	N/A	ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Centroid =	N/A	N/A	feet
Vertical Orifice Diameter =	N/A	N/A	inches				

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

Calculated Parameters for Overflow Weir

	Zone 3 Weir	Not Selected			Zone 3 Weir	Not Selected	
Overflow Weir Front Edge Height, Ho =	4.50	N/A	ft (relative to basin bottom at Stage = 0 ft)	Height of Grate Upper Edge, H_t =	4.50	N/A	feet
Overflow Weir Front Edge Length =	5.00	N/A	feet	Overflow Weir Slope Length =	5.00	N/A	feet
Overflow Weir Grate Slope =	0.00	N/A	H:V	Grate Open Area / 100-yr Orifice Area =	11.80	N/A	
Horiz. Length of Weir Sides =	5.00	N/A	feet	Overflow Grate Open Area w/o Debris =	17.40	N/A	ft^2
Overflow Grate Type =	Type C Grate	N/A		Overflow Grate Open Area w/ Debris =	8.70	N/A	ft^2
Debris Clogging % =	50%	N/A	%				

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

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

	Zone 3 Restrictor	Not Selected			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 Orifice Area =	1.47	N/A	ft^2
Outlet Pipe Diameter =	18.00	N/A	inches	Outlet Orifice Centroid =	0.64	N/A	feet
Restrictor Plate Height Above Pipe Invert =	14.00		inches	Half-Central Angle of Restrictor Plate on Pipe =	2.16	N/A	radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Calculated Parameters for Spillway

Spillway Invert Stage=	5.35	ft (relative to basin bottom at Stage = 0 ft)	Spillway Design Flow Depth=	0.57	feet
Spillway Crest Length =	35.00	feet	Stage at Top of Freeboard =	6.92	feet
Spillway End Slopes =	4.00	H:V	Basin Area at Top of Freeboard =	0.57	acres
Freeboard above Max Water Surface =	1.00	feet	Basin Volume at Top of Freeboard =	2.51	acre-ft

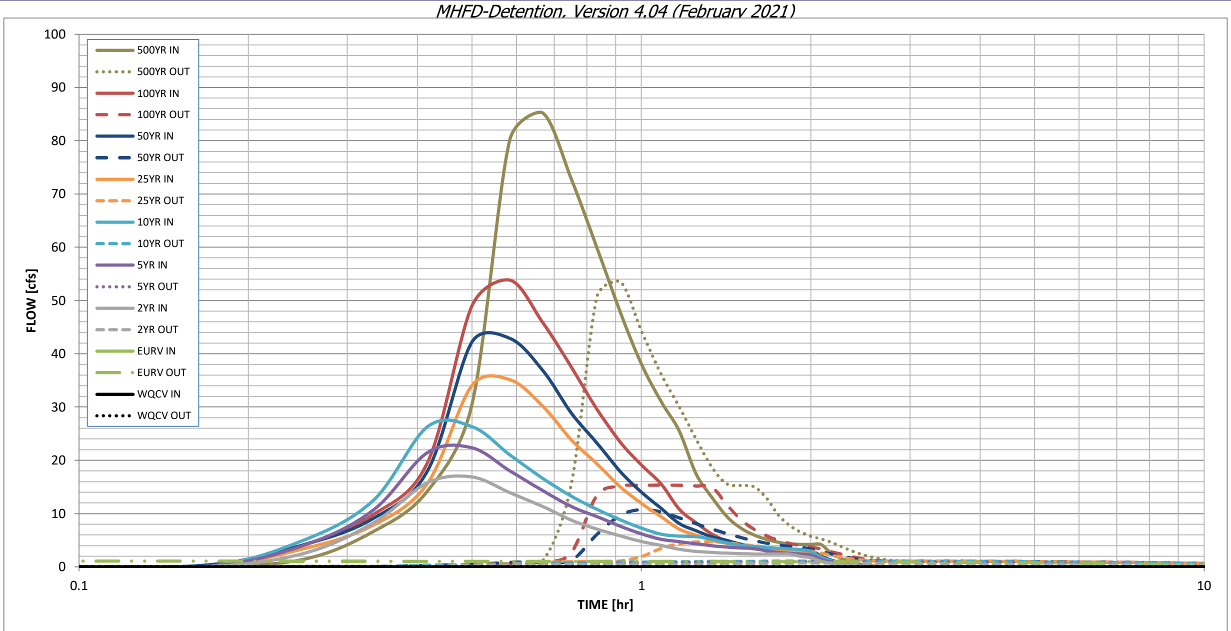
Routed Hydrograph Results

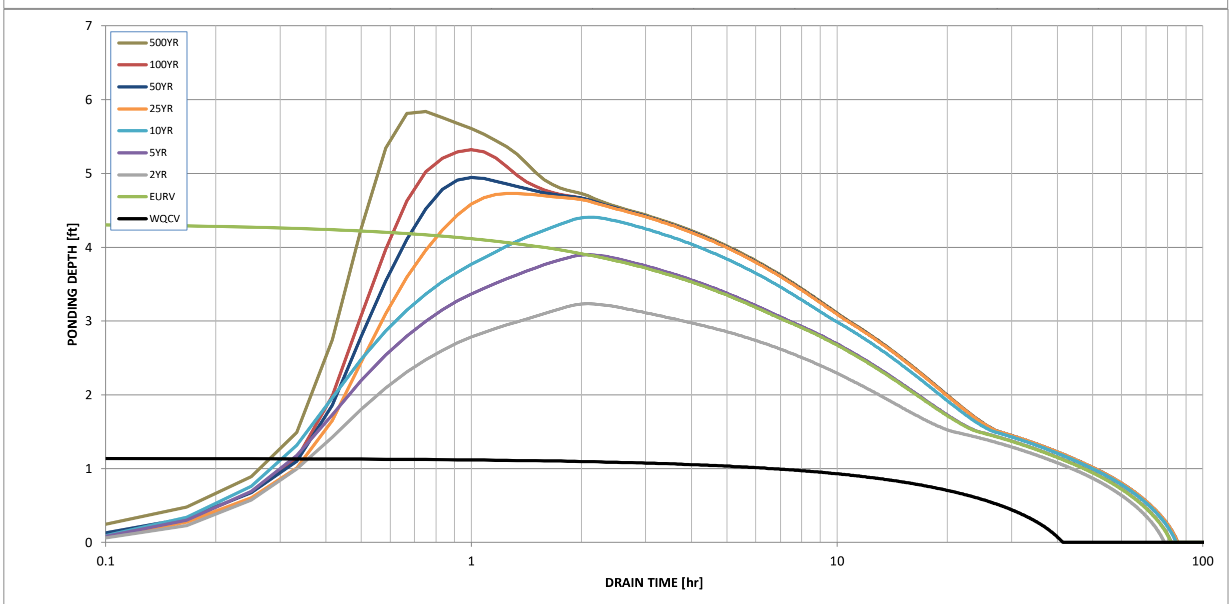
The user can override the default CUHP hydrographs and runoff volumes by entering new values in the Inflow Hydrographs table (Columns W through AF).

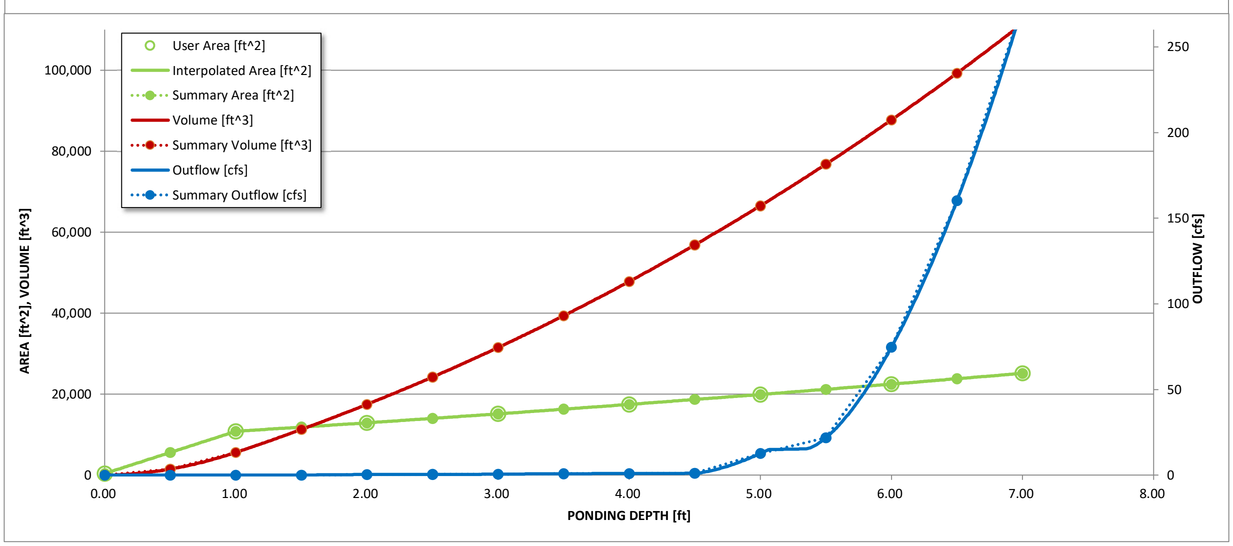
Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
One-Hour Rainfall Depth (in) =	N/A	N/A	1.19	1.50	1.75	2.00	2.25	2.52	3.49
CUHP Runoff Volume (acre-ft) =	0.164	1.235	0.888	1.177	1.408	1.755	2.094	2.520	3.998
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	0.888	1.177	1.408	1.755	2.094	2.520	3.998
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A	0.2	0.4	0.6	5.1	9.8	16.1	36.3
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A							
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	0.01	0.02	0.03	0.26	0.50	0.82	1.85
Peak Inflow Q (cfs) =	N/A	N/A	16.9	22.3	26.3	35.1	42.9	53.9	85.3
Peak Outflow Q (cfs) =	0.1	1.1	0.7	1.0	1.1	4.7	10.8	15.4	53.6
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	2.3	1.9	0.9	1.1	1.0	1.5
Structure Controlling Flow =	Plate	Plate	Plate	Plate	Plate	Overflow Weir 1	Overflow Weir 1	Outlet Plate 1	Spillway
Max Velocity through Grate 1 (fps) =	N/A	N/A	N/A	N/A	N/A	0.2	0.5	0.8	0.8
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	68	67	69	69	67	65	62	53
Time to Drain 99% of Inflow Volume (hours) =	**40**	76	74	76	78	77	76	75	71
Maximum Ponding Depth (ft) =	1.14	4.34	3.23	3.90	4.41	4.73	4.94	5.32	5.84
Area at Maximum Ponding Depth (acres) =	0.26	0.42	0.36	0.40	0.42	0.44	0.45	0.48	0.51
Maximum Volume Stored (acre-ft) =	0.164	1.237	0.805	1.054	1.263	1.401	1.500	1.676	1.927

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.04 (February 2021)







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	0.28	0.03	1.40
	0:15:00	0.00	0.00	2.46	3.99	4.96	3.34	4.12	4.08	6.59
	0:20:00	0.00	0.00	8.22	10.62	12.45	7.82	9.06	9.80	14.25
	0:25:00	0.00	0.00	15.82	21.48	26.30	15.71	18.03	19.62	30.53
	0:30:00	0.00	0.00	16.86	22.34	26.33	34.07	42.22	49.00	80.14
	0:35:00	0.00	0.00	13.93	18.01	21.04	35.12	42.90	53.85	85.25
	0:40:00	0.00	0.00	11.36	14.34	16.67	30.23	36.97	45.96	72.89
	0:45:00	0.00	0.00	8.78	11.35	13.28	23.83	28.92	37.52	59.94
	0:50:00	0.00	0.00	7.09	9.44	10.80	19.37	23.27	29.61	47.88
	0:55:00	0.00	0.00	5.81	7.65	8.87	15.05	17.93	23.46	38.03
	1:00:00	0.00	0.00	4.74	6.18	7.27	11.89	14.01	19.10	31.06
	1:05:00	0.00	0.00	4.02	5.15	6.16	9.42	10.99	15.59	25.58
	1:10:00	0.00	0.00	3.29	4.73	5.77	7.10	8.15	10.85	17.50
	1:15:00	0.00	0.00	2.92	4.35	5.67	5.98	6.81	8.28	13.12
	1:20:00	0.00	0.00	2.70	3.96	5.20	5.00	5.65	6.17	9.53
	1:25:00	0.00	0.00	2.57	3.71	4.53	4.42	4.98	4.88	7.31
	1:30:00	0.00	0.00	2.49	3.54	4.09	3.79	4.27	4.11	6.02
	1:35:00	0.00	0.00	2.44	3.44	3.80	3.40	3.82	3.61	5.15
	1:40:00	0.00	0.00	2.40	3.02	3.61	3.14	3.54	3.29	4.60
	1:45:00	0.00	0.00	2.38	2.73	3.48	2.98	3.35	3.11	4.32
	1:50:00	0.00	0.00	2.38	2.54	3.39	2.89	3.25	3.05	4.23
	1:55:00	0.00	0.00	1.97	2.42	3.22	2.84	3.19	3.03	4.20
	2:00:00	0.00	0.00	1.69	2.25	2.88	2.82	3.17	3.03	4.20
	2:05:00	0.00	0.00	1.10	1.46	1.88	1.83	2.06	1.97	2.72
	2:10:00	0.00	0.00	0.69	0.92	1.20	1.17	1.32	1.26	1.73
	2:15:00	0.00	0.00	0.43	0.57	0.74	0.73	0.82	0.78	1.07
	2:20:00	0.00	0.00	0.24	0.34	0.44	0.44	0.49	0.47	0.64
	2:25:00	0.00	0.00	0.13	0.20	0.25	0.25	0.28	0.27	0.37
	2:30:00	0.00	0.00	0.05	0.09	0.11	0.12	0.13	0.13	0.17
	2:35:00	0.00	0.00	0.02	0.03	0.03	0.04	0.04	0.04	0.05
	2:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	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 OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.04 (February 2021)

Summary Stage-Area-Volume-Discharge Relationships

The user can create a summary S-A-V-D by entering the desired stage increments and the remainder of the table will populate automatically.

The user should graphically compare the summary S-A-V-D table to the full S-A-V-D table in the chart to confirm it captures all key transition points.

Stage - Storage Description	Stage [ft]	Area [ft²]	Area [acres]	Volume [ft³]	Volume [ac-ft]	Total Outflow [cfs]
	0.00	400	0.009	0	0.000	0.00
	0.50	5,614	0.129	1,503	0.035	0.04
	1.00	10,828	0.249	5,614	0.129	0.06
	1.50	11,876	0.273	11,290	0.259	0.08
	2.00	12,923	0.297	17,489	0.402	0.32
	2.50	14,030	0.322	24,228	0.556	0.43
	3.00	15,137	0.347	31,519	0.724	0.52
	3.50	16,304	0.374	39,380	0.904	0.82
	4.00	17,471	0.401	47,823	1.098	0.99
	4.50	18,698	0.429	56,866	1.305	1.12
	5.00	19,925	0.457	66,521	1.527	12.63
	5.50	21,201	0.487	76,803	1.763	21.84
	6.00	22,478	0.516	87,723	2.014	74.73
	6.50	23,817	0.547	99,297	2.280	160.29
	7.00	25,157	0.578	111,540	2.561	274.02

For best results, include the stages of all grade slope changes (e.g. ISV and Floor) from the S-A-V table on Sheet 'Basin'.

Also include the inverts of all outlets (e.g. vertical orifice, overflow grate, and spillway, where applicable).

Pond A

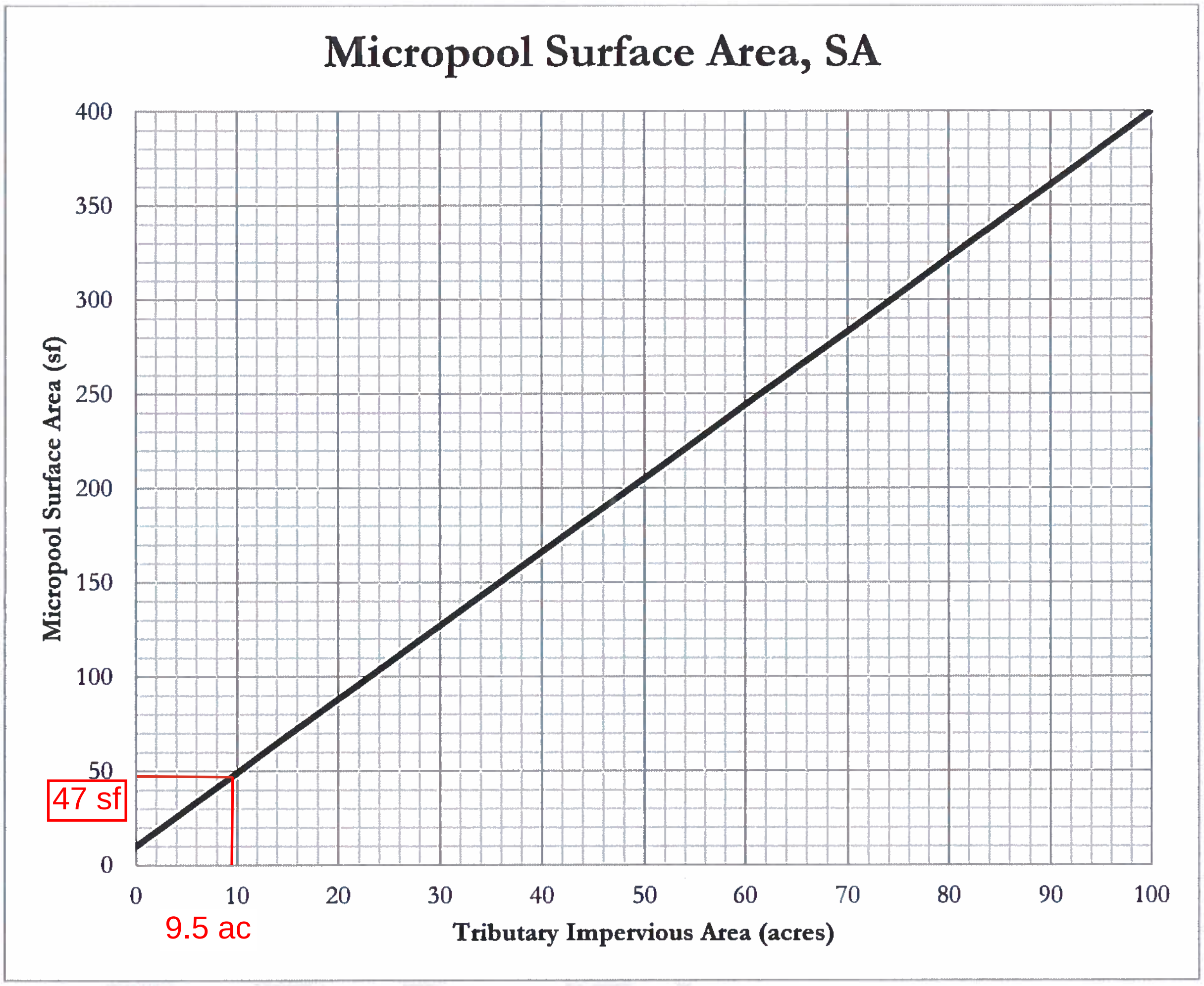


Figure 1 – Micropool surface area (SA) determination chart

The tributary impervious area is the effective number of impervious acres that will be treated by the extended detention basin (EDB). It is calculated by multiplying the tributary area to be treated by the impervious fraction of that area.

$$TIA = I \times A$$ = (56.1/100) x 16.9 ac = 9.5 ac

TIA = Tributary impervious area (acres)
I = Imperviousness (fraction)
A = Tributary catchment area upstream (acres)

For EDBs with tributary impervious areas greater than 100 acres, the micropool surface area is 400 sf. The initial surcharge depth (ISD) is defined as the depth of the initial surcharge volume (ISV). The surface area determined using Figure 1 assumes an ISD of 4 inches. The initial surcharge volume is thus calculated by multiplying the micropool surface area by 4 inches.

$$ISV = SA \times 4\ inches$$

ISV = Initial surcharge volume (cf)
SA = Surface area (from Figure 1, sf)

Pond A

Figure 13-12c. Emergency Spillway Protection

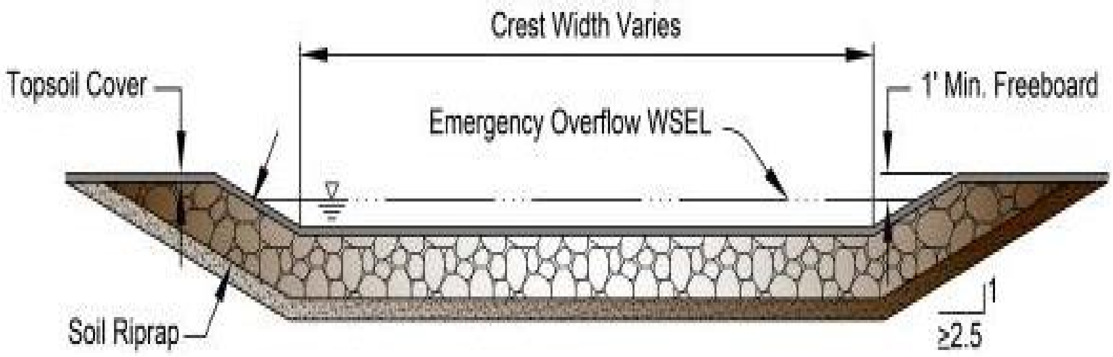
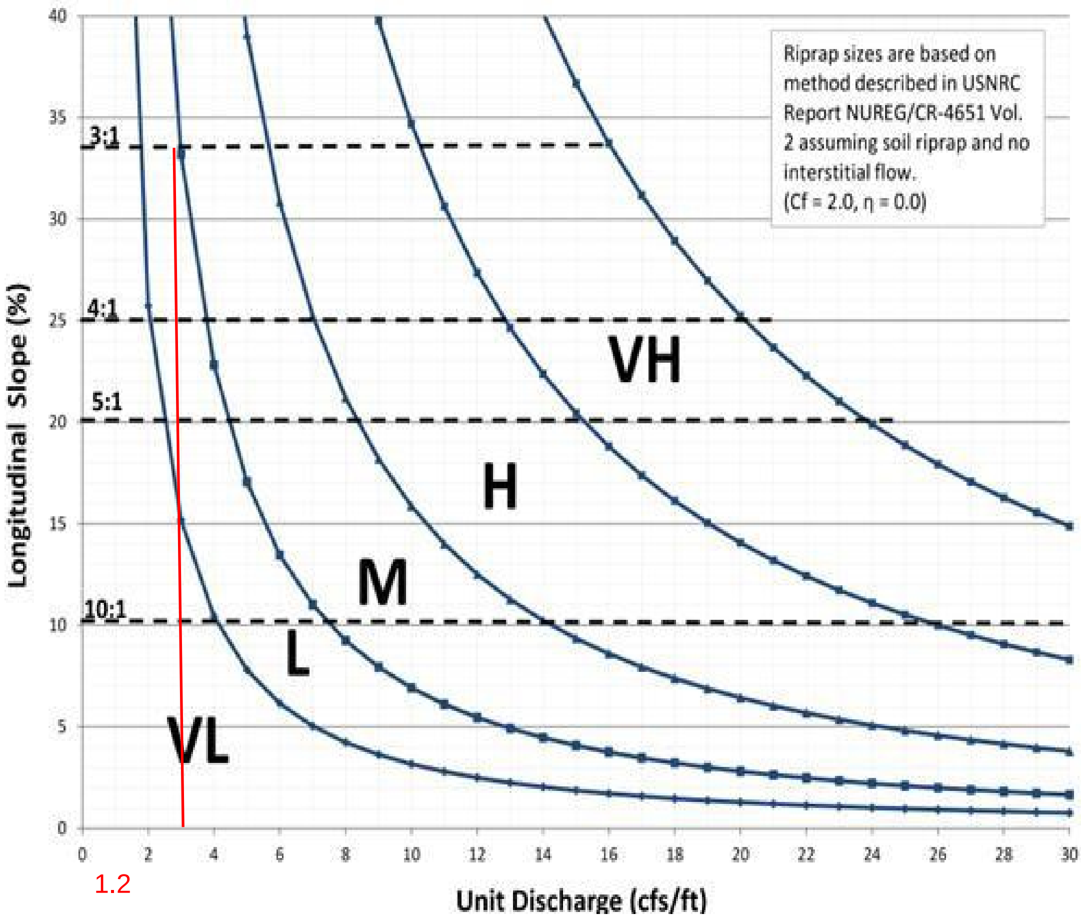


Figure 13-12d. Riprap Types for Emergency Spillway Protection



Q100=42.0 cfs
Spillway length=14 ft
42.0 cfs/14 ft = 3.0 cfs/ft

Channel Report

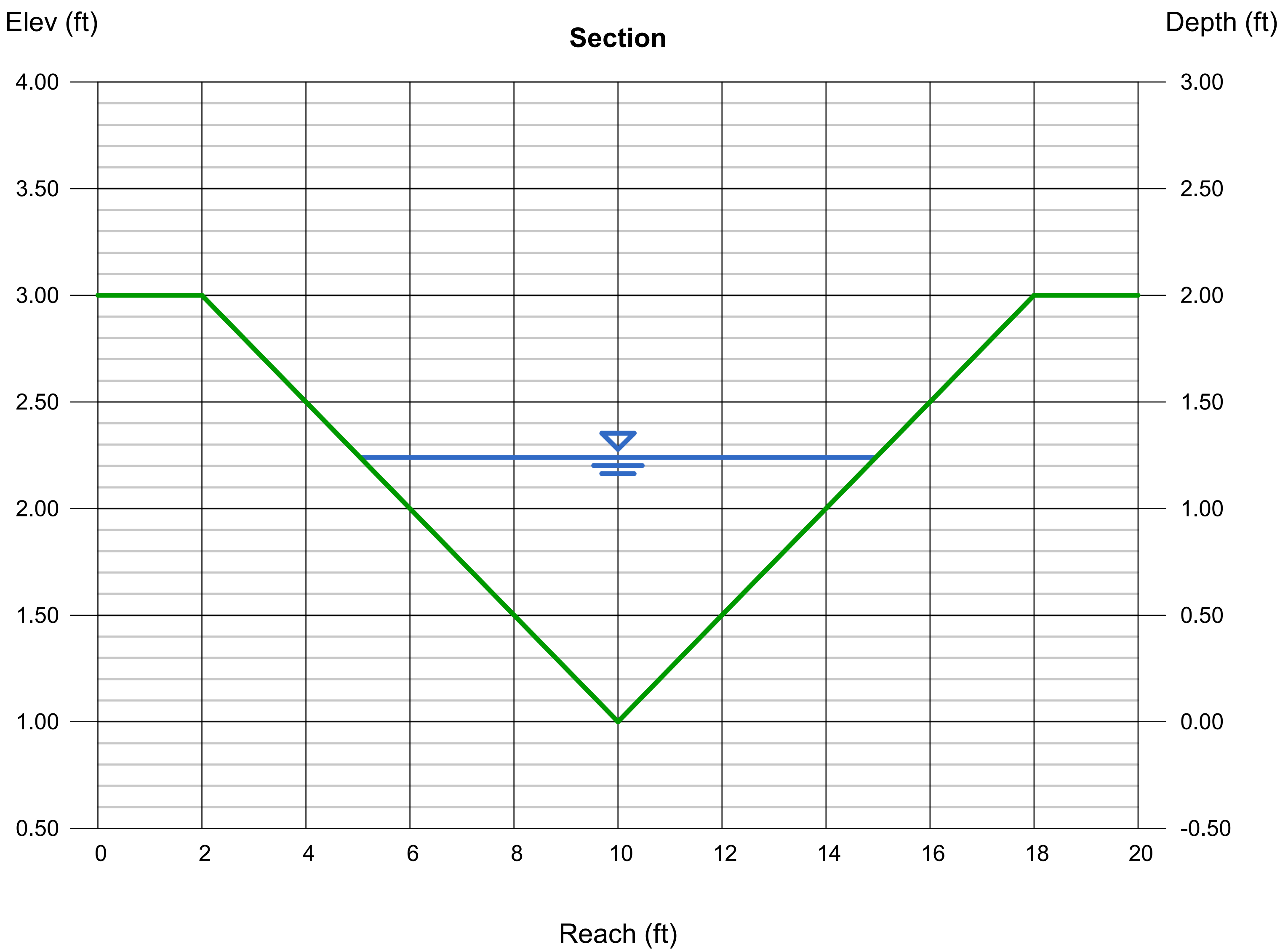
Falcon Field Filing 2 - OSA ditch

Triangular
Side Slopes (z:1) = 4.00, 4.00
Total Depth (ft) = 2.00

Invert Elev (ft) = 1.00
Slope (%) = 1.50
N-Value = 0.035

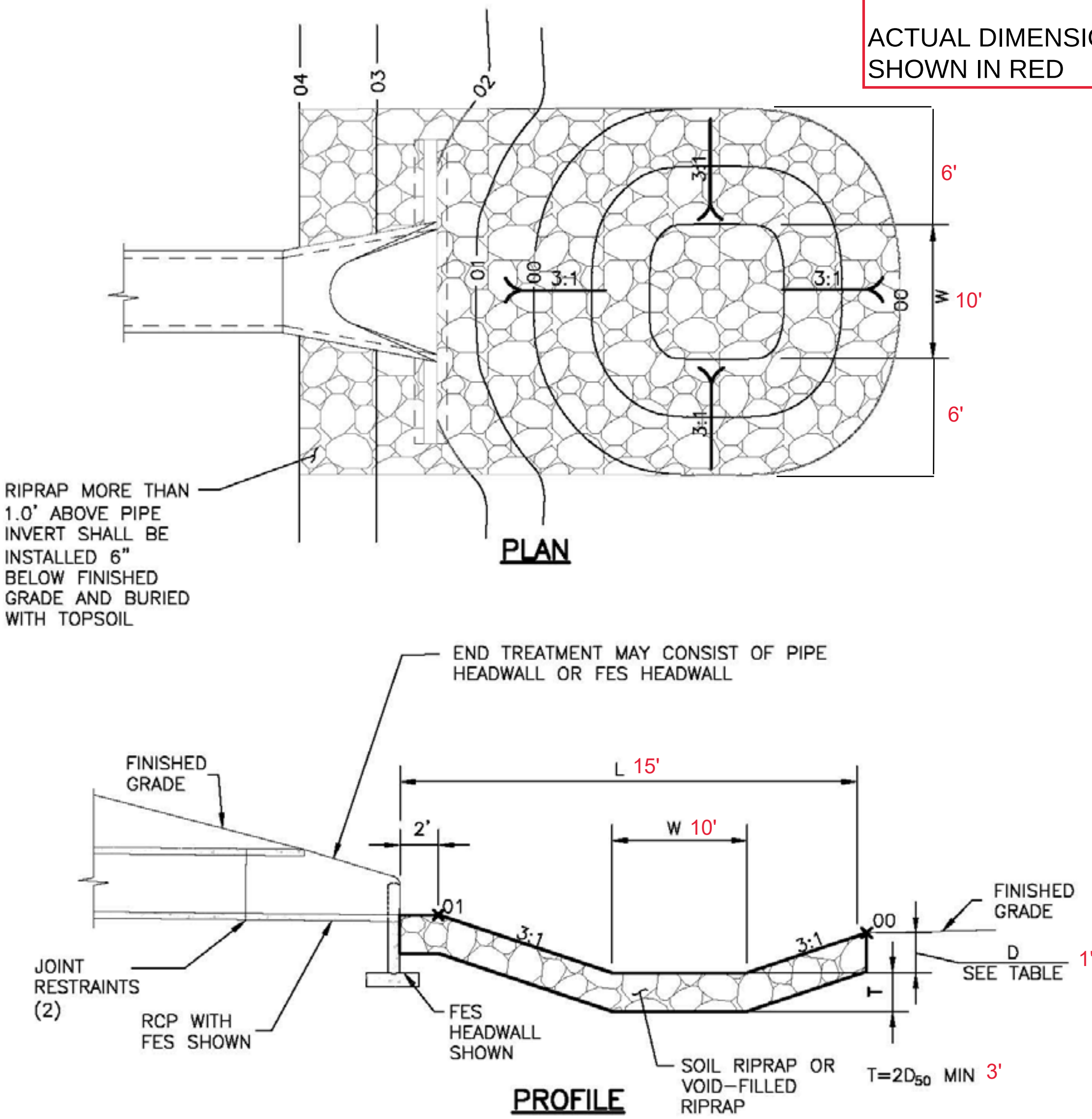
Calculations
Compute by: Known Q
Known Q (cfs) = 22.70

Highlighted
Depth (ft) = 1.24
Q (cfs) = 22.70
Area (sqft) = 6.15
Velocity (ft/s) = 3.69
Wetted Perim (ft) = 10.23
Crit Depth, Yc (ft) = 1.15
Top Width (ft) = 9.92
EGL (ft) = 1.45



EAST DITCH OUTFALL
AT SE CORNER

ACTUAL DIMENSIONS
SHOWN IN RED

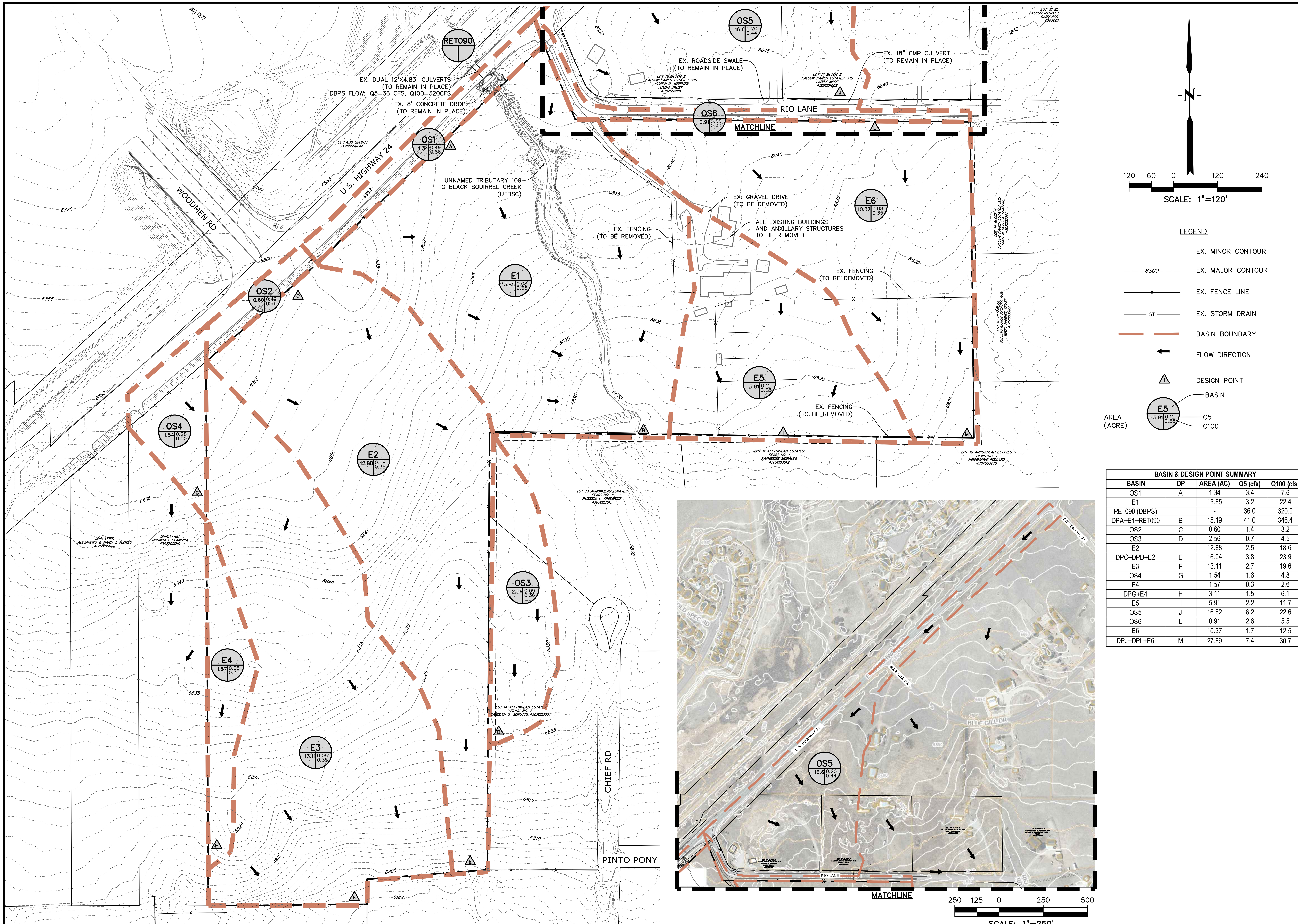


PIPE SIZE OR BOX HEIGHT	D	W*	L
18" – 24"	1'–0"	4'	15'
30" – 36"	1'–6"	6'	20'
42" – 48"	2'–0"	7'	24'
54" – 60"	2'–6"	8'	28'
66" – 72"	3'–0"	9'	32'

* IF OUTLET PIPE IS A BOX CULVERT WITH A WIDTH GREATER THAN W, THEN W = CULVERT WIDTH

FLOW DEPTH 1.24' AT 10' WIDE. EQUIVALENT TO 2'X10' BOX CULVERT

Figure 9-37. Low tailwater riprap basin



BASIN & DESIGN POINT SUMMARY				
BASIN	DP	AREA (AC)	Q5 (cfs)	Q100 (cfs)
OS1	A	1.34	3.4	7.6
E1		13.85	3.2	22.4
RET090 (DBPS)		-	36.0	320.0
DPA+E1+RET090	B	15.19	41.0	346.4
OS2	C	0.60	1.4	3.2
OS3	D	2.56	0.7	4.5
E2		12.88	2.5	18.6
DPC+DPD+E2	E	16.04	3.8	23.9
E3	F	13.11	2.7	19.6
OS4	G	1.54	1.6	4.8
E4		1.57	0.3	2.6
DPG+E4	H	3.11	1.5	6.1
E5	I	5.91	2.2	11.7
OS5	J	16.62	6.2	22.6
OS6	L	0.91	2.6	5.5
E6		10.37	1.7	12.5
DPJ+DPL+E6	M	27.89	7.4	30.7

PREPARED BY:

DREXEL, BARRELL & CO.
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FALCON FIELD, LLC.

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COLORADO SPRINGS, CO 80906
(719) 475-7474
CONTACT: PJ ANDERSON

DRAINAGE PLANS FOR
THE COMMONS AT FALCON FIELD
12445 RIO LANE, AND VACANT LAND
PEYTON, EL PASO COUNTY, COLORADO

ISSUE	DATE
INITIAL ISSUE	1/31/24
RESUBMITTAL	7/3/24

DESIGNED BY:	TDM
DRAWN BY:	CGH
CHECKED BY:	KGV
FILE NAME:	21604-00EDR

PREPARED UNDER MY DIRECT SUPERVISION FOR AND ON BEHALF OF DREXEL, BARRELL & CO.

DRAWING SCALE:
HORIZONTAL: 1" = 120"
VERTICAL: N/A

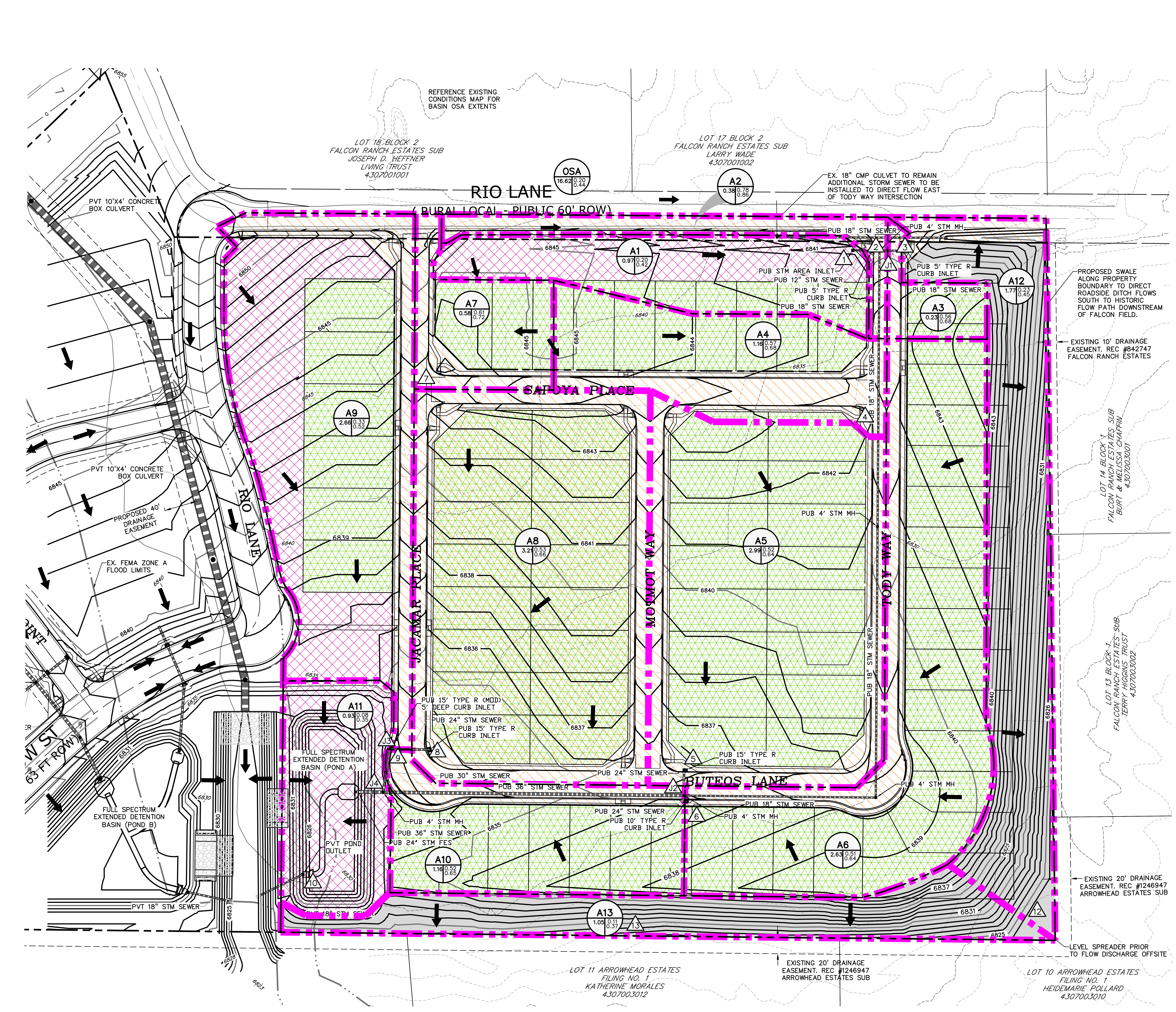
OVERALL EXISTING DRAINAGE MAP

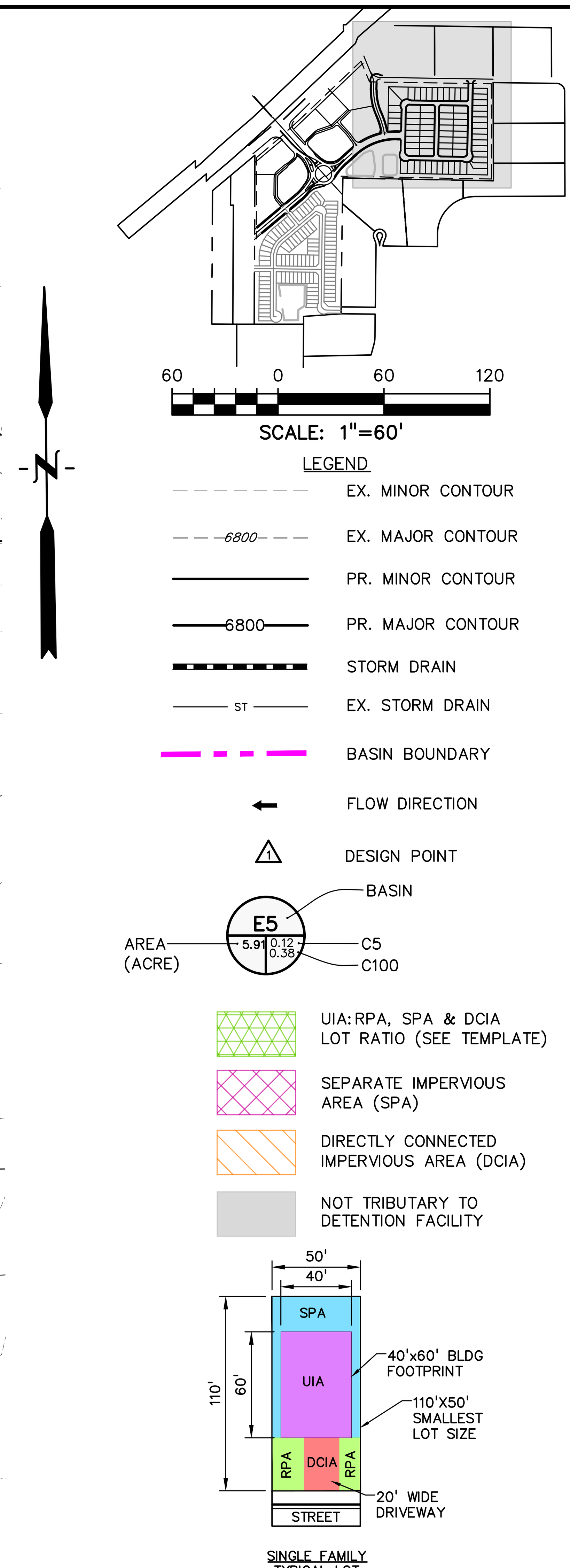
PROJECT NO. 21604-00CSCV

DRAWING NO.

EDR1

SHEET: 1 OF 6





BASIN & DESIGN POINT SUMMARY

BASIN	DP	AREA (AC)	Q5	Q100
A-BASINS				
OSA		16.62	6.3	22.7
A1	1	0.97	0.6	2.3
A2		0.38	1.5	2.9
DP1+A2	2	1.35	1.6	4.2
A3	3	0.23	0.6	1.2
DP2+DP3	J1	1.58	2.1	5.1
A4	4	1.16	2.6	5.4
A5		2.99	6.3	13.2
DP4+A5	5	4.15	8.4	17.4
A6	6	2.63	5.4	11.4
DPJ1+DP5+DP6	J2	8.36	14.8	32.2
A7	7	0.58	1.4	2.8
A8		3.21	7.0	14.6
DP7+A8	8	3.80	8.0	16.4
A9		2.66	3.5	9.4
A10		1.16	2.5	5.2
A9+A10	9	4.40	5.9	20.2
DP8+DP9	J3	5.56	21.1	24.0
DPJ2+DPJ3	J4	13.91	37.8	61.5
A11		0.86	0.3	2.4
DPJ4+A11	10	14.78	37.9	63.1
A12		1.77	1.8	5.9
OSA+A12	12	18.39	6.9	24.7
A13	13	1.05	0.5	3.0

PREPARED BY:

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PROTERRA PROPERTIES

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DRAINAGE PLANS FOR THE COMMONS AT FALCON FIELD FILING NO. 2

12445 RIO LANE, AND VACANT LAND
PEYTON, EL PASO COUNTY, COLORADO

ISSUE	DATE
INITIAL ISSUE	1/31/25

DESIGNED BY:	TDM
DRAWN BY:	CGH
CHECKED BY:	KGV
FILE NAME:	21604-00F2-PRDR

PREPARED UNDER MY DIRECT SUPERVISION FOR AND ON BEHALF OF DREXEL, BARRELL & CO.

DRAWING SCALE:
HORIZONTAL: 1" = 60"
VERTICAL: N/A

PROPOSED DRAINAGE MAP

PROJECT NO. 21604-02CSCV

DRAWING NO.

DR1

SHEET: 1 OF 1