EPC STORMWATER REVIEW COMMENTS
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FINAL DRAINAGE REPORT

for

THE COMMONS AT FALCON FIELD FILING NO. 1

El Paso County, Colorado

April 2026

PCD FILE NO. SF-2435

Prepared for:

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FINAL DRAINAGE REPORT

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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: PT Falcon Field, LLC

By: _____

Steve Rossoll Date
Title: Director
Address: 1864 Woodmoor Drive, Suite 100
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

J.

2.0 PURPOSE

This report is prepared by Drexel, Barrel & Co in support of The Commons at Falcon Field Filing No. 1 project. The purpose of this report is to ensure compliance with the approved Preliminary Drainage Report and 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

Location

The Commons at Falcon Field Filing No. 1 site is approximately 57.7 acres and is bounded by U.S. Highway 24 along the northwest and a large-lot residential development to the northeast and south. The site is in the east half of Section 7, Township 13 South, Range 64 West of the 6th PM. Overlot grading is proposed to occur across the full 57.7 acres with this Filing. The proposed residential areas to the south and east are proposed to be platted as tracts at this time and replatted as additional Filings in the future.

Existing Site Conditions

The site is currently open grass land. There are no known utilities on site. Offsite runoff enters the site through a box culvert under Highway 24, along the northern boundary of the property. The box culvert discharges through the site in an open drainage to the south. Smaller offsite basins, including Highway 24 along the northern boundary currently discharge onto the property, these basins are further described below.

Stockpiling of import fill on the property has begun, in anticipation of overlot grading for the Falcon Field Filing No. 1 development. This work is monitored by El Paso County under CDR2411. See Soils section below for a discussion of the imported soils.

Proposed Site Conditions

The Commons at Falcon Field Filing No. 1 is proposed as a commercial development to consist of 8 commercial pads, along with associated roadways and open space. As mentioned above the proposed residential areas to the south and east will be overlot graded but remain undeveloped with this filing. Utility infrastructure will be installed to provide service to all areas of the property.

Soils

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 partially underlain by Blakeland Loamy Sand (Soil No. 8), and predominantly by Columbine gravelly sandy loam (Soil No. 19). Both soils are type 'A' hydrological soil group. See appendix for map. Imported soils are also considered to meet the same hydrological parameters as indicated by the soils report included in the appendix.

Is the type of soil used for fill on-site unknown? We should know the type of soils brought in in order to accurately design the site

Climate

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.

Floodplain Statement

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 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).

Previous Drainage Studies

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.

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, the following Mile High Flood District (MHFD) provided spreadsheet MHFD-Detention v4.04 was used for design of the detention facilities.

5.0 DBPS ANALYSIS

Existing Conditions

The Falcon DBPS watershed establishes three major basins, including the "East Tributary" which covers this property. The DBPS completed hydrologic analysis for the Falcon Basin Watershed, using HEC-HMS v.3.5 software, for historical, existing and future land use conditions by applying a 24-hour storm event with 2-, 5-, 10-, 25-, 50-, and 100-year recurrence intervals and current drainage conveyance infrastructure.

As mentioned earlier, offsite flows from the Woodmen Hills Detention Pond #4 enter the Commons at Falcon Field site via two 12'x6' box culverts underneath U.S. Highway 24 (DBPS identifier ET14), these combine with onsite flows and follow the historic reach RET100 of the Falcon Creek East Tributary to the south.

The following table details the HEC-HMS analysis of existing conditions across the

Commons at Falcon Field development.

The DBPS flow rates shown in the table above were used as the basis of the existing condition analysis of the Commons at Falcon Field development. Site specific basins have been allocated and referenced on the existing conditions map in the appendix.

Peak Discharges for the Existing Condition at Points of Interest in vicinity of The Commons at Falcon Field Development (DBPS)

Location	Existing Conditions (source: Falcon Basin, Drainage Planning Study, HEC-HMS model)							
	HEC-HMS Element	Area (sq mi)	Peak Flow (cfs)					
			2-yr	5-yr	10-yr	25-yr	50-yr	100-yr
East tributary at North Property Line of Commons at Falcon Field	RET090	1.66	14	36	55	170	230	320
East tributary through Commons at Falcon Field	RET100	1.78	15	39	64	170	270	370
Local Basin	ET100	0.05	1	6	10	21	27	34
East tributary South of Commons at Falcon Field Property Line	RET110	1.83	15	40	65	170	270	390

The Falcon DBPS recommends junction and reach improvements for RET100 (reach through project site) and subsequent reach RET110 downstream junction ET13 at Pinto Pony to Falcon Highway. The existing culvert at Highway 24 was identified as undersized, but not included in the DBPS recommendations as it is a CDOT owned structure. CDOT is currently analyzing the existing culvert as part of the Highway 24 widening project that is occurring concurrently with the Falcon Field development. Coordination with CDOT is ongoing.

The DBPS reach improvements include the following recommendations:

Reach RET100 – Installation of small drop structures with toe protection
Reach RET110 – Installation of small drop structures with toe protection
Junction ET13 (Pinto Pony) – replace existing crossing with (2) 6'x8' culverts
Junction ET11 (Falcon Highway) – replace existing crossing with (2) 6'x8' culverts

The Commons at Falcon Field development proposes regrading and rerouting a portion of the East Tributary. The proposed improvements will intercept the Highway 24 (CDOT owned) culvert immediately south of the Highway 24 and convey via a private 8'x4' concrete box culvert 750-lf to the south through the project site towards an open channel. The proposed private box culvert will discharge to the proposed open channel via a headwall. The proposed open channel conveys the flow 275-lf downstream to tie into the existing creek and will be vegetated with mowable short grasses. The open channel is proposed with a 30-foot bottom width in a v-shape with two 15-foot sections set as a 2% slope to the invert. Despite this drainageway being identified in the DBPS as a County cost item, this box culvert is proposed to be privately owned and maintained by

the Commons at Falcon Field Metropolitan District. A non-exclusive permanent easement will be dedicated by Final Plat.

Hydraulic analysis of the drainageway downstream of the Commons at Falcon Marketplace project has been completed and is included as an appendix to this report.

6.0 EXISTING CONDITION

In addition to the DBPS, a site specific analysis of the existing conditions was completed. The flows determined by the DBPS for the tributary entering the site from the north (RET090), were used in combination with rational method analysis for the surrounding onsite/offsite flows. For the purposes of this analysis, the DBPS flows were directly added to the rational method flows.

RATIONAL METHOD RUNOFF SUMMARY

BASIN	DP	AREA (AC)	Q5 (cfs)	Q100 (cfs)
OS1	A	1.33	3.4	7.5
E1		15.11	3.4	24.0
RET090 (DBPS)			36.0	320.0
DPA+E1+RET090	B	16.44	41.1	347.9
OS2	C	0.60	1.4	3.2
OS3	D	2.70	0.7	4.7
E2		12.59	2.4	17.3
DPC+DPD+E2	E	15.88	3.6	22.6
OS4	F	1.50	1.5	4.5
E3	G	0.62	0.2	1.4
E4		12.50	2.4	17.9
DPF+DPG+E4	H	14.00	3.5	20.9
E5	I	1.69	0.4	2.7
E6	J	4.88	2.0	10.1
OS5	K	16.62	7.8	28.2
OS5 @ 18" culvert (max capacity)	K1		7.8	11.3
OS6	L	0.74	2.5	5.0
DPK1+DPL	L1		10.2	16.3
E7		8.78	1.5	10.9
DPL+E7	M	9.51	2.5	12.9
DPM+DPL1	M1		10.3	24.2
OS7		0.17	0.4	0.9
E8		1.53	0.4	3.1
OS7+E8	N	1.70	0.7	3.8

RET090 represents the upstream watershed tributary to the Falcon Field project. This area is identified as RET090 in the DBPS and is replicated here for clarity. DBPS established flows of Q_5=36 cfs and Q_{100}=320 cfs currently discharge into an open channel on the Falcon

Field property via existing dual 12'Wx6'H box culverts under Highway 24. There is an 8' concrete vertical drop immediately downstream of the culvert, then a short riprap channel section before the open channel returns to a vegetated section through the site.

Basin OS1 represents a portion of the southern half of U.S. Highway 24 along the northwest boundary for the Commons at Falcon Field site. Due to no curb and gutter along this stretch of U.S. Highway 24, flows from this basin discharge directly into basin E1 as overland flow and are represented by **Design Point DPA**. Runoff rates at existing DPA are Q_5=3.4 cfs and Q_{100}=7.5 cfs.

Basin E1 covers 15.11 acres of open space in the northwestern portion of the site. Flows from this basin combine with those from DPA and travel towards the existing open vegetated channel at rates of Q_5=3.4 cfs and Q_{100}=24.0 cfs. These flows are consistent with those established by the DBPS for the local basin, see table above. These flows combine with those from the DBPS RET090 at **Design Point DPB** and discharge to the south as defined channel flow at rates of Q_5=41.1 cfs and Q_{100}=347.9 cfs. As previously mentioned for the purposes of this analysis, the DBPS flows were directly added to the Rational Method flows.

Basin OS2 represents the remainder of the southern half of U.S. Highway 24 along the northwest boundary for the Commons at Falcon Field site. Due to no curb and gutter along this stretch of U.S. Highway 24, flows from this basin discharge as overland flow directly into basin E2 and are represented by **Design Point DPC**. Runoff rates at existing DPC are Q_5=1.4 cfs and Q_{100}=3.2 cfs.

Basin OS3 is located along the southeastern edge of Basin E2. This basin consists of native grasses and vegetation, a riding arena, and a small outbuilding. The flows within this basin travel to the southwest where they will discharge as overland flow into basin E2 at **Design Point DPD**. The runoff rates entering basin E2 at DPD are Q_5=0.7 cfs and Q_{100}=4.7 cfs.

Basin E2 is 12.59 acres of open space located to the west of Basin E1. The basin is sloped to the southeast at roughly 3% before turning directly south upon reaching the eastern border of the basin. Flows combine with those from Basin OS2 then travel south until roughly halfway down the basin where Basin OS3 adds to the flows. From there the combined flows from Basins OS2, OS3, and E2 continue to the south as overland flow where they are released from the site at **Design Point DPE** at rates of Q_5=3.6 cfs and Q_{100}=22.6 cfs.

Basin OS4 is an offsite basin at the northwest corner of the site and includes a portion of the southern edge of U.S. Highway 24. The 1.50 acre, offsite basin, generates flows that will travel to the southeast until they reach **Design Point DPF**, where they will enter Basin E4 as overland sheet flow at rates of Q_5=1.5 cfs and Q_{100}=4.5 cfs.

Basin E3 represents a small 0.62 acre basin at the southwest corner of the site. Basin E3 directs flows to the south exiting the site as overland sheet flow with runoff rates of Q_5=0.2 cfs and Q_{100}=1.4 cfs at **Design Point DPG**.

Basin E4 represents 12.50 acres in the central southwest corner of the site. Basin E4 receives flow from offsite basin OS4 to the north and directs flows to the south exiting the site as overland sheet flow. Along the southern boundary flows combine with those from Design Point DPF at **Design Point DPH**. with runoff rates of Q_5=3.5 cfs and Q_{100}=20.9 cfs.

Basin E5 covers a 1.69 acre basin along the western boundary of the site. Basin E5 directs flows to the south and west exiting the site as overland sheet flow with runoff rates of Q_5=0.4 cfs and Q_{100}=2.7 cfs at **Design Point DPI**.

Basin E6 is 4.88 acres located on the eastern side of the site, between the southern portions of Basin E1 and E7. The basin directs all of its flows south as overland flow towards the existing **Design Point DPJ** which sits on the southern border of the site. This basin generates runoff rates of Q_5=2.0 cfs and Q_{100}=10.1 cfs.

Basin OS5 is an offsite basin located to the north of Rio Lane and includes the northern half of Rio Lane. Runoff generated by this basin (Q_5=7.8 cfs and Q_{100}=28.2 cfs) is captured by a roadside ditch and travels towards an existing 18" CMP culvert underneath Rio Lane, located approximately two-thirds of the way along the project boundary at **Design Point DPK**. The full-flow capacity of this existing 18" CMP culvert at 1.0% (field-surveyed grade) however is 11.3 cfs. As field observations indicate no evidence of roadway overtopping in this area, it is assumed that the existing roadside ditch along the north side of Rio Lane acts as emergency overflow bypass for flows not captured by the existing culvert. Bypass flows appear to continue on to the east before reaching an additional culvert across Rio Lane and discharging via historic drainage patterns to the south. As such, **Design Point K1** (Q_5=7.8 cfs and Q_{100}=11.3 cfs) represents the flows that actually enters the site via the cross culvert.

Basin OS6 covers the southern half of Rio Lane along the northern boundary of the Commons at Falcon Field site. Due to no curb and gutter along Rio Lane, flows from this basin discharge as overland flow directly into Basin E7 and are represented by **Design Point DPL** with runoff rates of Q_5=2.5 cfs and Q_{100}=5.0 cfs. At **Design Point L1,** DPL flows are directly added to those from the upstream cross culvert Design Point K1.

Basin E7 represents a portion of the eastern area of the site. At 8.90 acres, the basin directs flows from its northwestern corner in addition to flow from DPL, southeast until they reach the existing **Design Point M** (Q_5=2.5 cfs and Q_{100}=12.9 cfs). At **Design Point M1,** DPM flows are directly added to those from the upstream cross culvert Design Point K1 to result in flows of Q_5=10.3 cfs and Q_{100}=24.2 cfs exiting the site at the southeast corner.

Basin OS7 covers the far easterly southern half of Rio Lane along the northern boundary of the Commons at Falcon Field site. Due to no curb and gutter along Rio Lane, flows from this basin discharge as overland flow directly into Basin E8 at rates of Q_5=0.4 cfs and Q_{100}=0.9 cfs.

Basin E8 represents the eastern most portion of the site. At 1.58 acres, the basin directs flows from its northwestern corner in addition to flow from basin OS7, southeast until they reach the existing **Design Point N** (Q_5=0.7 cfs and Q_{100}=3.8 cfs).

7.0 DEVELOPED CONDITION

The soils report shows cut 1' above pond bottoms and still states groundwater is anticipated in the ponds. Can you provide supporting documentation that the underdrain system will reduce the groundwater levels by 4' to support this statement?

Groundwater Analysis

A site investigation to evaluate existing groundwater conditions has been completed, see report on file with El Paso County (File No. SF-2435). In order to mitigate potential issues, the site grading in several areas of the site will be raised from the existing condition and as such, will increase the separation above shallow water areas. In addition, an active underdrain will be installed – generally alongside the proposed sanitary sewer – in order to capture and discharge groundwater into a gravel exfiltration basin located on the adjoining property to the south. An easement has been acquired from the adjacent property owner. Ownership and maintenance of the underdrain and exfiltration basin will be by the Falcon Field Metropolitan District.

Captured groundwater will not be discharged above grade, nor into the storm system or detention facilities. This system will be responsibility of the Falcon Field Metropolitan District. In accordance with a maintenance agreement and O&M plan, any State and Groundwater District permitting for discharges will also be the responsibility of the Falcon Field Metropolitan District.

has monitoring been ongoing?

Detention Facilities: It is anticipated that the underdrain system will reduce the groundwater levels below the bottom of proposed detention facilities, thereby eliminating the potential for groundwater seepage. Groundwater depths will be monitored during construction of the detention facilities to ensure at least 2' clearance between pond bottom and groundwater elevations. If groundwater is encountered at shallower depths measures will be taken in coordination with County staff to determine what further mitigation is required, e.g. impermeable clay liner or synthetic liner.

The groundwater should be at least 3' below the pond bottom - the micropool will be 2.5' deep and groundwater can and does seep through concrete.

Existing Floodplain

The existing channel through the site 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.

In coordination with CDOT, and in anticipation of a future widening of US Highway 24, the existing dual 12'x6' box culvert is proposed to be extended to the southwest, tying into a proposed junction box that will connect the proposed Falcon Field 8'x4' culvert to the existing dual 12'x6'. A hydraulic analysis of the culvert extension and junction box has been completed and is included in appendix. It is anticipated that the two systems will remain hydraulically separate. These changes to the CLOMR study will be addressed with FEMA at the LOMR stage.

Developed Drainage Analysis

The Rational Method was used to determine runoff quantities for the 5- and 100-year storm recurrence intervals. Mile High Flood District MHFD-Detention v,4.04 was used for pond sizing, see appendix for calculations and below for a summary runoff table.

Provide recommendation for liner even if it will only be used if groundwater is encountered

A-group basins represent flows at the eastern residential portion of the site that will be intercepted by a Temporary Sedimentation Basin (Future Pond A), ultimately discharging out to the redefined tributary open channel. This area of the site is intended to be platted with Filing 1 as Tract F and is to be replatted in the future as Filing No. 2, a residential subdivision. A Final Drainage Report for this portion of the site will be completed prior to its development. Currently, this portion of the site is to be overlot graded but remain undeveloped.

Basin OSA is an offsite basin north of Rio Lane. This basin is generally as described in the existing condition as Existing Basin OS5, with the exception of the proposed asphalt knuckle at the intersection of Jackdaw Drive and Rio Lane. The existing 18" CMP culvert across Rio Lane is proposed to remain in place, and as such the flows entering the site will remain as established by the max. culvert capacity at Q_5=7.8 cfs and Q_{100}=11.3 cfs as **Design Point OSA1**. Bypass flows of Q_5=0.0 cfs and Q_{100}=17.0 cfs will continue to the east via existing roadside ditch.

Rational Method Runoff Summary (A-group)

BASIN & DESIGN POINT SUMMARY				
BASIN	**DP**	**AREA (AC)**	**Q5**	**Q100**
A-BASINS				
OSA		16.62	7.8	28.3
OSA @ 18" culvert (max capacity)	OSA1		7.8	11.3
A1	A1	0.18	0.8	1.5
A2		2.56	0.7	4.8
DPA1+A2	A2	2.74	1.1	5.4
A3	A3	4.15	0.9	6.6
A4		3.86	1.1	7.6
DPA3+A4	A4	8.02	1.7	12.0
A5		3.80	0.8	5.9
DPA2+DPA4+A5	A5	14.55	3.4	22.1
A6		0.69	0.2	1.5
DPA5+A6	A6	15.24	3.5	23.1
A7	A7	0.33	1.5	2.6
A8		1.03	0.3	2.1
DPA7+A8	A8	1.36	1.3	4.0
OSA1+A8	A8A	0.00	9.2	15.3
A9		1.86	1.0	4.9
DPA8+A9	A9	3.22	1.8	6.9
OSA1+A9	A9A	0.00	9.7	18.2
A10	A10	1.08	0.4	2.9
A11		0.10	0.4	0.8

Basin A1 covers a 0.18-acre portion of the Rio Lane south side improvements. Installation of curb, gutter and sidewalk along the south side of Rio Lane will occur as part of this Filing 1 development. Runoff generated by this basin (Q_5=0.8 cfs and Q_{100}=1.5 cfs) will be directed via curb and gutter to the east where it will ultimately discharge into Basin A2 to

the south at **Design Point DPA1.** As the impervious portion of this basin is not tributary to a full spectrum detention facility during the overlot stage, application of WQCV exclusion ECM 1.7.1.C.1 is requested. See further discussion below.

Basin A2 covers a 2.56-acre area along the west side of Tract F. This basin will be overlot graded as part of the Filing 1 development but remain undeveloped. Runoff generated by this basin (Q_5=0.7 cfs and Q_{100}=4.8 cfs) will combine with runoff from upstream Basin A1 and be directed along the anticipated future roadway alignment (rough cut streets), and then by diversion swale towards **Design Point DPA2** and a Temporary Sedimentation Basin (Future Pond A) in the southwest corner of Tract F.

Basin A3 covers a central 4.15-acre area of Tract F. This basin will be overlot graded as part of the Filing 1 development but remain undeveloped. Runoff generated by this basin (Q_5=0.9 cfs and Q_{100}=6.6 cfs) will be directed along the anticipated future roadway alignment (rough cut streets) towards **Design Point DPA3.**

Basin A4 covers a 3.86-acre central area of side of Tract F. This basin will be overlot graded as part of the Filing 1 development but remain undeveloped. Runoff generated by this basin (Q_5=1.1 cfs and Q_{100}=7.6 cfs) will combine with runoff from upstream Basin A3 and be directed along the anticipated future roadway alignment (rough cut streets), and then by diversion swale **Design Point DPA4** and a Temporary Sedimentation Basin (Future Pond A) in the southwest corner of Tract F.

Basin A5 covers 3.80-acres along the east and south sides of side of Tract F. This basin will be overlot graded as part of the Filing 1 development but remain undeveloped. Runoff generated by this basin (Q_5=0.8 cfs and Q_{100}=5.9 cfs) will be directed along the anticipated future roadway alignment (rough cut streets), and then by diversion swale towards **Design Point DPA5** and a Temporary Sedimentation Basin (Future Pond A) in the southwest corner of Tract F.

Design Point A5 is located at the low point in the future roadway alignment and in the overlot condition will act as the entry point for concentrated flows to enter the temporary sediment basin. A riprap rundown will be provided for flows to be safely conveyed into the detention basin. See appendix for calculations and sizing.

Basin A6 covers the temporary sediment basin and is the location of the future pond A. Runoff generated by this basin will be captured by the temporary sediment basin in its entirety at **Design Point DPA6.** The temporary sediment basin will discharge into the proposed redefined channel to the west.

Basin A7 covers a 0.33-acre portion of the Rio Lane south side improvements. Installation of curb, gutter and sidewalk along the south side of Rio Lane will occur as part of this Filing 1 development. Runoff generated by this basin (Q_5=1.5 cfs and Q_{100}=2.6 cfs) will be directed via curb and gutter to the east where it will ultimately discharge into Basin A8 to the south at **Design Point DPA7.** As the impervious portion of this basin is not tributary to a full spectrum detention facility during the overlot stage, application of WQCV exclusion ECM 1.7.1.C.1 is requested. See further discussion below.

A9 per the revised drainage map

Basin A8 covers a portion of Tract F along the northern boundary at Rio Lane and will consist of overlot graded undeveloped land. Flows generated by this 1.03-acre basin (Q_5=0.3 cfs and Q_{100}=2.1 cfs) are proposed to be channelized along the northern boundary via 2' deep open grass lined swale – owned and maintained by the Falcon Field Metropolitan District where they will combine with flows from Basin A7 **(Design Point DPA8)** before continuing into Basin A9 to the east. Flows from the upstream cross culvert are added in at **Design Point DPA8A.** In the interim condition Basin A8 will discharge offsite without treatment for water quality, however as the basin will remain undeveloped it is considered to be self-treating and not subject to any further requirements.

Basin A9 covers the northeasterly corner and eastern boundary of Tract F and will consist of overlot graded undeveloped land. Flows generated by this 1.86-acre basin (Q_5=1.0 cfs and Q_{100}=4.9 cfs) combine with flows from DPA7 and are proposed to be channelized along the eastern boundary via 2' deep open grass lined swale – owned and maintained by the Falcon Field Metropolitan District, before discharging via level spreader as offsite overland sheet flow at **Design Point DPA9**. Flows from the upstream cross culvert are added in at **Design Point DPA9A.** Flows reaching this design point are intended to match existing rates upon completion of the development of Filing 2, thereby mitigating any potential for downstream change in flows. In the interim condition Basin A9 will discharge offsite without treatment for water quality, however as the basin will remain undeveloped it is considered to be self-treating and not subject to any further requirements. A level spreader installed at the outfall will aid in dissipating concentrated flows prior to discharge. See appendix for calculations and design details.

Basin A10 covers a portion of Tract F along the southern boundary. Flows generated by this 1.08-acre basin (Q_5=0.4 cfs and Q_{100}=2.9 cfs) are directed offsite as overland sheet flow at **Design Point DPA10.** Basin A10 will discharge offsite without treatment for water quality, however as the basin will remain undeveloped it is considered to be self-treating and not subject to any further requirements.

Basin A11 covers a portion of Rio Lane along the northern boundary that will drain directly offsite due to the installation of curb and gutter along the south side of Rio Lane. Flows generated by this 0.10-acre basin (Q_5=0.4 cfs and Q_{100}=0.8 cfs) are directed offsite to the east following existing drainage patterns**.** As the impervious portion of this basin is not tributary to a full spectrum detention facility, application of WQCV exclusion ECM 1.7.1.C.1 is requested. See further discussion below.

A-group Water Quality Exclusions

Basin A1 is not tributary to a full spectrum detention facility during the overlot stage. The development of Filing 2 will bring this basin into compliance with the installation of the detention facility. In the interim condition, application of WQCV exclusion ECM 1.7.1.C.1 is requested for this 0.18-acre area.

Basins A7-A10 are not tributary to the proposed detention facility. The widening of Rio Lane will occur with the development of Filing 1, however the remaining area will be overlot graded but remain undeveloped. The development of Filing 2 will bring these basins into compliance with the consideration of the proposed open swale along the eastern boundary as RPA - to be owned and maintained by the Falcon Field

Metropolitan District. In the interim condition, application of WQCV exclusion ECM 1.7.1.C.1 is requested for Basin A7 (0.33)-acre impervious area, with the rest (Basins A8-A10) considered as self-treating SPA.

Basin A11 is not tributary to a full spectrum detention facility. This basin will discharge offsite without treatment as a result of the existing grade of Rio Lane. Application of WQCV exclusion ECM 1.7.1.C.1 is requested for this 0.10-acre area.

Total ECM 1.7.1.C.1 exclusion area requested: 0.61-acres.

B-group basins represent the east-central commercial portion of the site that will be intercepted by Pond B, ultimately discharging out to the redefined tributary open channel.

Tract A and Tract B located in the northeast corner of the B-group basins are to be platted as tracts until the LOMR is approved. Once the LOMR is approved, the floodplain encumbrance will be removed from these areas, and they will be replatted for commercial use, as approved by the Preliminary Plan. For the purposes of this rational method analysis, these tracts are considered in their ultimate commercial condition. However, these tracts have been considered as undeveloped for the interim pond condition – see further discussion below.

Basin OSB1 represents a portion of the south side of US-HWY 24, along the northern boundary of the site, and the area covered by the Rio Lane intersection that is to be removed with this development. As no curb and gutter is proposed along the Highway 24 improvements, flows of Q_5=1.6 cfs and Q_{100}=4.0 cfs from this basin will discharge directly into Basin B1 on the Falcon Field property.

Basin B1 covers 2.24 acres at the northeast corner of the commercial area. Flows from this basin (Q_5=9.4 cfs and Q_{100}=17.1 cfs) combine with those from offsite basin OSB1 and are intended to be captured and routed to a proposed private 18" storm sewer stub at the southwest corner. During the overlot grading phase, temporary diversion swales will be utilized to direct the basin towards the associated storm sewer stub and interim FES at **Design Point DPB1.** Flows from this stub will travel to the southwest via proposed private 18" storm sewer.

The intent of the proposed storm sewer stub and interim FES at each of the commercial lots is to provide for a connection point to the storm sewer system, once development of the specific lot occurs. The developer of each lot will need to provide a Drainage Report to ensure compliance with this Final Drainage Report, in addition to addressing all runoff reduction methods proposed as part of the lot development. See Section 9.0 for further discussion.

Basins OSB2 represents a central portion of the south side of US-HWY 24, along the northern boundary of the site. As no curb and gutter is proposed along the Highway 24 improvements, flows of Q_5=1.0 cfs and Q_{100}=2.0 cfs from this basin will discharge directly into Basin B2 on the Falcon Field property.

Basin B2 is located along the northern boundary of the commercial area. Flows of Q_5=4.7

cfs and Q_{100}=8.6 cfs are generated by this basin and after combining with flows from offsite basin OSB2, are intended be captured and routed to a proposed private 18" storm sewer stub and interim FES at the southwest corner at **Design Point DPB2.** During the overlot grading phase, temporary diversion swales will be utilized to direct the basin towards the associated storm sewer stub.

Rational Method Runoff Summary (B-group)

BASIN & DESIGN POINT SUMMARY				
BASIN	**DP**	**AREA (AC)**	**Q5**	**Q100**
B-BASINS				
RET090 (DBPS)			36.0	320.0
OSB1		0.87	1.6	4.0
OSB2		0.31	1.0	2.0
OSB3		0.52	2.0	3.9
B1		2.24	9.4	17.1
OSB1+B1	B1	3.12	9.3	17.8
B2		1.12	4.7	8.6
OSB2+B2	B2	1.43	5.4	10.1
B3	B3	0.44	2.1	3.7
B4		1.54	6.5	11.8
OSB3+B4	B4	2.07	7.8	14.4
DPB3+DP4	B4A	2.51	10.2	18.7
DPB1+DPB2+DPB4A	B4B	7.06	22.3	41.7
B5	B5	0.35	1.6	2.9
B6		0.50	2.3	4.2
DPB5+B6	B6	0.85	3.9	7.1
B7		1.57	6.6	12.0
DPB4B+DPB6+B7	B7	9.49	30.1	56.0
B8	B8	1.33	5.6	10.2
B9		1.76	7.4	13.2
DPB8+B9	B9	3.09	12.4	22.3
B10		1.18	5.4	9.7
DPB9+B10	B10	4.27	17.2	31.0
B11		1.20	0.5	3.6
DPB7+DPB10+B11	B11	14.96	45.2	85.3
B12		0.72	0.3	2.0
Pond A (TSB) Out			1.0	1.0
Pond B Out (Ultimate)			0.3	3.8
B12+Pond A+Pond B+RET090	B12	0.00	37.6	326.8
B13		0.19	0.1	0.6

Basins OSB3 represents a central portion the south side of US-HWY 24, along the northern boundary of the site. As no curb and gutter is proposed along the Highway 24 improvements, flows of Q_5=2.0 cfs and Q_{100}=3.9 cfs from this basin will discharge directly into Basin B4 on the Falcon Field property.

Basin B3 covers a portion of the proposed E. Woodmen Road right-of-way at the center of the commercial area. Flows of Q_5=2.1 cfs and Q_{100}=3.7 cfs are generated by this basin, and travel via curb and gutter to the south where they are all captured by a proposed public at-grade 5' Type R curb inlet at **Design Point DPB3.** Captured flows continue to the east via proposed private 18" storm sewer. Any bypass flows will continue to the south as curb and gutter flow towards DPB9.

Basin B4 is located along the northern boundary of the commercial area, to the southwest of Basin B2. Flows of Q_5=6.5 cfs and Q_{100}=11.8 cfs are generated by this basin, combine with those from offsite basin OSB3 and travel overland to the southeast towards **Design Point DPB4** and a proposed private 18" storm sewer stub and interim FES. As with the previous commercial lot basins, the intention is to provide a storm sewer stub for the future lot developer to connect to. During the overlot grading phase, temporary diversion swales will be utilized to direct the basin towards the associated storm sewer stub and interim FES.

Design Point B4A represents the combining of routed flows from DPB3 and DPB4 at a proposed private 4' storm sewer manhole. Flows reaching this Design Point will continue to the east via proposed private 24" storm sewer.

Design Point B4B represents the combining of routed flows from DPB1, DPB2, and DPB4A at a proposed private 4' storm sewer manhole. Flows reaching this Design Point will continue to the south via a proposed private 36" storm sewer.

Basin B5 covers a portion of the east side of proposed Perula Pt and Limpkin Pt at the center of the commercial area. Flows of Q_5=1.6 cfs and Q_{100}=2.9 cfs are generated by this basin, and travel via curb and gutter to the south towards a proposed private 5' Type R at-grade curb inlet at **Design Point DPB5.** Captured flows continue to the west via proposed private 24" storm sewer. Any bypass flows will continue to the south along Limpkin Pt.

Basin B6 covers a portion of the west side of proposed Perula Pt and Limpkin Pt at the center of the commercial area. Flows of Q_5=2.3 cfs and Q_{100}=4.2 cfs are generated by this basin, and travel via curb and gutter to the south towards a proposed private 5' Type R at-grade curb inlet at **Design Point DPB6.** Captured flows combine with those from Design Point B5 and continue to the west via proposed private 24" storm sewer. Any bypass flows will continue to the south along Limpkin Pt.

Basin B7 is located in the central portion of the commercial area. Flows of Q_5=6.6 cfs and Q_{100}=12.0 cfs are generated by this basin and travel overland to the east towards **Design Point DPB7** at a proposed private 24" storm sewer stub and interim FES. As with the previous commercial lot basins, the intention is to provide a storm sewer stub and interim FES, located at the southeast corner for the future lot developer to connect to. During the overlot grading phase, temporary diversion swales will be utilized to direct the basin

towards the associated storm sewer stub.

Design Point DPB7 represents the combining of routed flows from DPB4B and DPB6 and Basin B7 at a proposed private 4' storm sewer manhole. Flows reaching this Design Point will continue to the south via proposed private 36" storm sewer.

Basin B8 covers 1.33-acres in the central portion of the commercial area. Flows of Q_5=5.6 cfs and Q_{100}=10.2 cfs are generated by this basin and travel overland to the south towards **Design Point DPB8** at a proposed private 24" storm sewer stub and interim FES. As with the previous commercial lot basins, the intention is to provide a storm sewer stub and interim FES, located at the southeast corner for the future lot developer to connect to with temporary diversion swales installed at the overlot grading stage.

Basin B9 covers a portion of Woodmen Road, Retail Row St. and Jackdaw Dr right-of-way at the center of the commercial area. Flows of Q_5=7.4 cfs and Q_{100}=13.2 cfs are generated by this basin, and travel via curb and gutter to a proposed public sump 10' Type R curb inlet at **Design Point DPB9**. Captured flows at this inlet combine with those from DPB8 and continue to the south via proposed public 24" storm sewer. In the event where emergency overflow conditions are present, the runoff will overtop the roadway crown and curb to the south and flow directly into the proposed detention pond B.

Basin B10 covers a portion of Retail Row St. and Jackdaw Dr right-of-way at the center of the commercial area, to the south of Basin B9. Flows of Q_5=5.4 cfs and Q_{100}=9.7 cfs are generated by this basin, and travel via curb and gutter to a proposed public sump 5' Type R curb inlet. At **Design Point DPB10,** flows captured by this inlet combine with the piped flows from DPB9 and continue to the south via proposed private 24" storm sewer into the full-spectrum detention facility **Pond B.** In the event where emergency overflow conditions are present, the runoff will overtop the curb to the south and flow directly into the proposed detention pond B.

Basin B11 covers the area of the proposed full-spectrum detention facility Pond B. Flows generated by this basin (Q_5=0.5 cfs and Q_{100}=3.6 cfs) will be captured by the pond in their entirety.

Design Point DPB11 represents all flows reaching the full-spectrum detention facility (Offsite Basins OS1-3 and Basins B1-B11), Q_5=45.2 cfs and Q_{100}=85.3 cfs. Pond B will discharge at historic rates into the redefined open channel. See further detention facility discussion below.

Basin B12 is 0.72-acres of open channel located between the proposed detention facilities, Temporary Sedimentation Basin (Future Pond A) and Pond B. This basin will generate runoff at rates of Q_5=0.3 cfs and Q_{100}=2.0 cfs. These rates will combine with those discharged via the proposed box culvert, and the two detention ponds before discharging from the site at **Design Point DPB12** at rates of Q_5=37.6 cfs and Q_{100}=326.8 cfs. These flows are comparable with those anticipated by the DBPS (Q_5=40 cfs and Q_{100}=390 cfs) as listed in the table in Section 5.0. This basin will discharge offsite without treatment for water quality, however as the basin will remain undeveloped it is considered to be self-treating and not subject to any further requirements. Pond B has been oversized to account for detention for this basin.

Basin B13 covers the downstream edge of the Pond B embankment along the southern boundary. The flows within this basin will discharge offsite at rates of Q_5=0.1 cfs and Q_{100}=0.6 cfs without treatment for water quality. However, as the basin will remain undeveloped it is considered to be self-treating and not subject to any further requirements. Pond B has been oversized to account for detention for this basin.

C-group basins represent the western commercial portion of the site that will be intercepted by Pond C, ultimately discharging out to follow historic conditions to the south.

Basin OSC1 represents 0.33-acres of US-HWY 24, which acts as the northwestern boundary for the site. A portion of this basin is to be widened to allow for turn lane access onto the Falcon Field property. The runoff generated by this basin, Q_5=1.5 cfs and Q_{100}=2.7 cfs, is discharged directly into Basin C4 on the Falcon Field property.

Rational Method Runoff Summary (C-group)

BASIN & DESIGN POINT SUMMARY				
BASIN	**DP**	**AREA (AC)**	**Q5**	**Q100**
C-BASINS				
OSC1		0.33	1.5	2.7
C1	C1	0.37	1.7	3.1
C2		0.91	3.8	6.9
DPC1+C2	C2	1.27	5.0	9.1
C3	C3	1.08	4.5	8.2
OSC2		1.36	1.5	5.1
C4		2.62	11.0	20.0
OSC1+OSC2+C4	C4	4.31	12.4	24.8
C5		0.24	1.1	2.0
DPC3+C5	C5	1.32	5.6	10.2
C6		0.25	1.2	2.1
DPC5+C6	C6	1.58	6.7	12.2
DPC2+DPC4+DPC6	C6A	7.16	23.2	42.9
C7	C7	0.88	3.8	6.8
C8	C8	0.65	3.0	5.4
DPC6A+DPC7+DPC8	C8A	8.69	28.7	52.7

Basin C1 covers a portion of Woodmen Road right-of-way at the center of the commercial area, adjacent to Basin B3. Flows of Q_5=1.7 cfs and Q_{100}=3.1 cfs are generated by this basin, and travel via curb and gutter to the south towards a proposed public at-grade 5' Type R curb inlet at **Design Point DPC1.**

Basin C2 covers 0.91-acres in the west-central portion of the commercial area. Flows of Q_5=3.8 cfs and Q_{100}=6.9 cfs are generated by this basin and are intended be captured and routed to a proposed private 24" storm sewer stub and interim FES at the southwest corner. As with the previous commercial lot basins, the intention is to provide a storm sewer stub and interim FES, located at the southeast corner for the future lot developer to

1.08 indicated on the drainage plan

connect to. During the overlot grading phase, temporary diversion swales will be utilized to direct the basin towards the associated storm sewer stub and interim FES.

Design Point DPC2 is located at a proposed private 4' storm manhole and combines piped flows from DPC1 and Basin C2 and continues on to the west via proposed private 24" storm sewer.

Basin C3 covers 1.08-acres in the commercial area. Runoff rates of Q_5=4.5 cfs and Q_{100}=8.2 cfs are generated by this basin and as with other commercial basins, are intended be captured and routed to a proposed private 24" storm sewer stub and interim FES at the southwest corner at **Design Point DPC3**. As with the previous commercial lot basins, the intention is to provide a storm sewer stub and interim FES, located at the southwest corner for the future lot developer to connect to. During the overlot grading phase, temporary diversion swales will be utilized to direct the basin towards the associated storm sewer stub and interim FES.

Basin OSC2 covers an offsite area along the western boundary of the project site, and includes a portion of U.S. Highway 24 that is to be widened to allow for turn lane access onto the Falcon Field property. The 1.36-acre offsite basin, will sheet flow into basin C4 at rates of Q_5=1.5 cfs and Q_{100}=5.1 cfs.

Basin C4 is located along the western boundary of the commercial area. Runoff rates of Q_5=11.0 cfs and Q_{100}=20.0 cfs are generated by this basin, combine with overland flows from offsite Basins OSC1 and OSC2, and as with other commercial basins, are intended be captured and routed to a proposed private 24" storm sewer stub and interim FES at the southeast corner at **Design Point DPC4**. As with the previous commercial lot basins, the intention is to provide a storm sewer stub and interim FES, located at the southeast corner for the future lot developer to connect to. During the overlot grading phase, temporary diversion swales will be utilized to direct the basin towards the associated storm sewer stub and interim FES.

Basin C5 covers a portion of the proposed Dunlin Heights at the center of the commercial area. Flows of Q_5=1.1 cfs and Q_{100}=2.0 cfs are generated by this basin, and travel via curb and gutter to the south towards a proposed private at-grade 5' Type R curb inlet at **Design Point DPC5.** Captured flows combine with those piped from Design Point 3 and continue to the southwest via proposed private 24" storm sewer.

Basin C6 covers a portion of the proposed Dunlin Heights at the center of the commercial area. Flows of Q_5=1.2 cfs and Q_{100}=2.1 cfs are generated by this basin, and travel via curb and gutter to the south towards a proposed private at-grade 5' Type R curb inlet at **Design Point DPC6.** These flows combine with piped flows from upstream DPC5 and discharge to the southwest via private 24" storm sewer.

Design Point DPC6A represents the combining of flows from Basins OSC1-OSC2 & C1-C6 at a proposed private 4' storm sewer manhole. Flows reaching this Design Point will continue to the south via proposed private 36" storm sewer at rates of Q_5=23.2 cfs and Q_{100}=42.9 cfs.

Basin C7 covers a portion of Woodmen Road and Retail Row St. right-of-way to the west

and south of the commercial area. Flows of Q_5=3.8 cfs and Q_{100}=6.8 cfs are generated by this basin, and travel via curb and gutter to the south and west towards a proposed public sump 5' Type R inlet at **Design Point DPC7.** From this point flows will continue to the south via proposed public 18" storm sewer. In the event where emergency overflow conditions are present, the runoff will overtop the roadway crown and curb to the south and flow directly into downstream Basin D2. An overflow pathway will be established with the final grading for Filing 3 to ensure overflows are not directed towards any structures.

Basin C8 covers a portion of Retail Row St. right-of-way to the south of the commercial area. Flows of Q_5=3.0 cfs and Q_{100}=5.4 cfs are generated by this basin, and travel via curb and gutter to the southwest towards a proposed public sump 5' Type R curb inlet at **Design Point DPC8**. Flows captured by this inlet continue to the north via proposed public 18" storm sewer. In the event where emergency overflow conditions are present, the runoff will overtop the curb to the south and flow directly into downstream Basin D2. An overflow pathway will be established with the final grading for Filing 3 to ensure emergency flows are not directed towards any structures.

Design Point DPC8A represents the combining of routed flows from Basins OSC1-OSC2 & C1-C8 at a proposed public 4' storm sewer manhole. Piped flows reaching this Design Point will continue to the southwest via proposed public 36" storm sewer into the D-group basins at rates of Q_5=28.7 cfs and Q_{100}=52.7 cfs.

D-group basins represent the southern future residential portion of the site that will be intercepted by Pond C, ultimately discharging out to follow historic conditions to the south. This area of the site is intended to be platted with Filing 1 as Tract G and is to be replatted in the future as Filing No. 3, a residential subdivision. A Final Drainage Report for this portion of the site will be completed prior to its development. This portion of the site is to be overlot graded but remain undeveloped at this time. The following are the flows for this undeveloped portion of the site.

Rational Method Runoff Summary (D-group)

BASIN & DESIGN POINT SUMMARY				
BASIN	**DP**	**AREA (AC)**	**Q5**	**Q100**
D-BASINS				
OSD1		2.70	0.8	5.5
D1	D1	4.91	1.3	9.4
D2	D2	6.53	1.8	13.0
D3		2.46	0.7	4.8
DPD1+DPD2+D3+DPC8A	D3	22.59	24.1	63.6
D4		3.26	1.0	7.3
OSD1+D4	D4	5.96	1.6	11.2
D5	D5	0.14	0.1	0.4
Pond C Out (Interim condition)		0.00	0.2	1.0
D6	D6	0.16	0.1	0.5
D7		0.23	0.1	0.6
D7+POND OUT	D7	0.00	0.3	1.6

Basin D1 consists of the eastern half of Tract G (Future Filing 3). This basin will consist of overlot graded undeveloped land. Runoff (Q_5=1.3 cfs and Q_{100}=9.4 cfs) will be directed along the anticipated future roadway alignment (rough cut streets) towards **Design Point DPD1.** Flows will be captured by a temporary diversion swale before discharging via riprap rundown into the proposed private full spectrum Extended Detention Basin Pond C at the south end of the tract. See appendix for calculations and sizing.

Basin D2 consists of the western half of Tract G (Future Filing 3). This basin will consist of overlot graded undeveloped land. Runoff (Q_5=1.8 cfs and Q_{100}=13.0 cfs) will be directed along the anticipated future roadway alignment (rough cut streets), and then by diversion swale from **Design Point DPD2** towards the proposed private full spectrum Extended Detention Basin Pond C at the south end of the tract. A riprap rundown will be provided for flows to be safely conveyed into the detention basin. See appendix for calculations and sizing.

Basin D3 covers the area of the proposed full-spectrum detention facility Pond C and upstream areas directly overland runoff towards the pond. Flows generated by this basin (Q_5=0.7 cfs and Q_{100}=4.8 cfs) will be captured by the pond in their entirety.

Design Point DPD3 represents all of the flows captured by Pond C. These flows combine the developed flows from the C-basins that are carried to the pond via storm pipe from DPC8A, and the undeveloped flows from Basins D1, D2 & D3. Pond C has been designed to accommodate the anticipated full build-out of Filings 1 and 3. However, for the interim condition of Filing 3 remaining undeveloped, an orifice plate with smaller holes will be installed to restrict flows so that water quality treatment can be provided for the lower flow rates. See further discussion in Section 8.0 below.

Basin OSD1 is an offsite basin located along the eastern edge of Tract G. This basin consists almost entirely of native grasses and vegetation, aside from a riding arena and a single small shed. The flows within this basin will flow to the southwest where they will be captured by a proposed 1' deep open grass lined swale – owned and maintained by the Falcon Field Metropolitan District - along the easterly edge of Tract G, at rates of Q_5=0.8 cfs and Q_{100}=5.5 cfs.

Basin D4 covers the eastern portion of Tract G along the eastern boundary. Flows generated by this 3.26-acre basin (Q_5=1.0 cfs and Q_{100}=7.3 cfs) are proposed to be channelized along the eastern boundary via 2' deep open grass lined swale – owned and maintained by the Falcon Field Metropolitan District - where they combine with the flows from Basin OSD1 and are directed to the south towards **Design Point DPDP4.** A level spreader will be installed approximately 65-lf north of the south property line in order to accommodate Filing 3 improvements in the future. This level spreader will aid in dissipating concentrated flows prior to discharge. See appendix for calculations and design details. Basin D4 is not tributary to the proposed detention facility. The area will be overlot graded but remain undeveloped. The development of Filing 3 will bring this basin into compliance with the consideration of the proposed open swale along the eastern boundary as RPA - to be owned and maintained by the Falcon Field Metropolitan District. In the interim condition this basin is considered as self-treating SPA.

Swales have been checked for velocity per the EPC DCM Chapter 10, Table 10-4. Swale

cross sections with a 100-year velocity greater than 5 fps will be lined with turf reinforced mat and native grasses, or another approved method of stabilization to limit erosive potential. Swale design sheets are included in the appendix and TRM areas outlined on the drainage maps and GEC plans accordingly.

Basin D5 covers a small area along the west side of Tract G that will discharge offsite to the west at **Design Point DPD5** at rates of Q_5=0.1 cfs and Q_{100}=0.4 cfs. This basin will be regraded but will remain undeveloped. This basin will discharge offsite without treatment for water quality, however as the basin will remain undeveloped it is considered to be self-treating and not subject to any further requirements. Pond C has been oversized to account for detention for this basin.

Basin D6 covers a small area in the southwest corner of Tract G that will discharge offsite to the south at **Design Point DPD6** at rates of Q_5=0.1 cfs and Q_{100}=0.5 cfs. This basin will be regraded but will remain undeveloped. This basin will discharge offsite without treatment for water quality, however as the basin will remain undeveloped it is considered to be self-treating and not subject to any further requirements. Pond C has been oversized to account for detention for this basin.

Basin D7 covers the downstream edge of the Pond C embankment along the southern boundary of Tract G. The flows within this basin will combine with those from the Pond C outfall at **Design Point DPD7** and discharge offsite at rates of Q_5=0.3 cfs and Q_{100}=1.6 cfs, in the interim condition. Basin D7 will discharge offsite without treatment for water quality, however as the basin will remain undeveloped it is considered to be self-treating and not subject to any further requirements. Pond C has been oversized to account for detention for this basin. A level spreader will be installed at the end of the pond outfall pipe. This level spreader will aid in dissipating concentrated flows prior to discharge. See appendix for calculations and design details.

Existing vs. Developed Flow Comparison

The tables below outline the comparison between existing and propo the Falcon Field site at comparable design point locations.

These are two different design point locations.

East Sub-Basin

To preserve the historic flows exiting the Falcon Field property at existing Design Point M1 (southeast corner of Tract F), developed basins A7 & A8 (DPA8) have been designed to follow the historic direction.

Existing			Developed (Interim)		
DP	Q5	Q100	DP	Q5	Q100
DPN	0.7	3.8	BASIN A10	0.4	0.8
DPM1	10.3	24.2	DPA9A	9.7	18.2

The table above lists runoff rates in the interim condition. The anticipated developed runoff rates are listed below but are to be confirmed by the Final Drainage Report for Filing 2.

see comment above

Existing			Developed (Ultimate - Developed)		
DP	Q5	Q100	DP	Q5	Q100
DPN	0.7	3.8	BASIN A10	0.4	0.8
DPM1	10.3	24.2	DPA9A	11.4	20.7

Central Sub-Basin

Existing			Developed (Interim)		
DP	Q5	Q100	DP/BASIN	Q5	Q100
DPB	41.2	348.1	DPB12 (Ponds A & B Interim)	37.6	326.8
DPJ	2.1	10.4	BASIN A10	0.4	2.9

The table above lists runoff rates in the interim condition. The anticipated developed runoff rates are listed below. Final detention calculations for Ponds A&B are included in the appendix for reference, but are to be confirmed by the Final Drainage Report for Filing 2 and the future replat of Tracts A & B.

Existing			Developed (Ultimate)		
DP	Q5	Q100	DP/BASIN	Q5	Q100
DPB	41.2	348.1	DPB12 (Ponds A & B Ultimate)	37.1	347.3
DPJ	2.1	10.4	BASIN A10	0.4	2.9

Southwest Sub-Basin

Existing			Developed		
DP	Q5	Q100	DP	Q5	Q100
DPE	3.6	22.6	DPD4	1.6	11.2
DPG	0.2	1.4	DPD6	0.1	0.5
DPH	3.6	21.9	DPD7 (Pond C Interim)	0.3	1.6
DPI	0.4	2.7	DPD5	0.1	0.4

3.5 and 20.9 indicated on the drainage map table

The table above lists runoff ra ition. The anticipated developed runoff rates are listed below. Fi ns for Pond C are included in the appendix for reference, but are to be confirmed by the Final Drainage Report for Filing 3.

Existing			Developed		
DP	Q5	Q100	DP	Q5	Q100
DPE	3.6	22.6	DPD3	2.9	13.0
DPG	0.2	1.4	DPD6	0.1	0.5
DPH	3.6	21.9	DPD7 (Pond C Ultimate)	2.7	21.0
DPI	0.4	2.7	DPD5	0.1	0.4

8.0 PROPOSED FULL-SPECTRUM DETENTION FACILITIES

Three separate full-spectrum Extended Detention Basin facilities are proposed with this development. Each pond has been designed to detain flows and release at rates applicable for the historic contributing area.

Pond A – Tract F (future residential Filing 2)

Pond A is a proposed private 2.56 ac-ft full-spectrum Extended Detention Basin located at the southwestern corner of the northeast residential area **(A-basins).** Pond A has been oversized to account for non-tributary basins A7-A10 for a watershed area of 19.65-acres. Overdetention has been provided in order to meet ECM detention requirements for land disturbance areas over 1-acre. Applicable WQ exclusions for the non-tributary basins (A7-A10) are noted above in Section 7.0.

For the development of Filing 1, this facility will be graded per design, but act as a temporary sediment basin with a temporary outlet, per standard GEC details. Development of Filing 2 will require further drainage analysis to determine whether the anticipated outlet design in this report is adequate for the development. This facility will outfall into the proposed redefined open channel to the west at historic rates.

The Pond A final design MHFD-Detention v4.06 calculations are provided in the appendix for reference.

Pond B

Pond B is a proposed private 3.36 ac-ft full-spectrum Extended Detention Basin, designed to intercept the flows generated by the **B-basin** commercial region of the site. For the purposes of this analysis, Tracts A & B are considered in their undeveloped interim condition, pending replat when the project LOMR is approved. Pond B is proposed to be constructed in its entirety with this Filing No. 1 development, with an interim orifice plate installed for the interim condition. Development of Tracts A&B will require further drainage analysis to establish the new orifice plate design, all other features of the detention facility are expected to remain.

Both the interim and final design MHFD-Detention v4.06 calculations are provided in the appendix. Pond B has been oversized to account for non-tributary basins B12 & B13 for a watershed area of 15.87-acres. Overdetention has been provided in order to meet ECM detention requirements for land disturbance areas over 1-acre. Applicable WQ exclusions for the non-tributary basins (B12 & B13) are noted above in Section 7.0.

Interim Design

See final design section below for volume, forebay, trickle channel, outlet structure and spillway details.

Based on a watershed area of 15.87 acres and a site imperviousness of 58.3%. The interim orifice plate design will have a 1.42-sq in orifice, a 1.75-sq in orifice and a 3.50 sq. inch orifice to meet mandated WQCV and EURV drain times.

Treatment or acknowledging excluded areas are required for soil disturbances over 1-ac, but detention is not tied to the 1-ac threshold in EPC's ECM criteria. Expand on this sentence and clarify what criteria you are meeting. If the runoff does not drain to the pond, oversizing the pond could lead to the drain times for the actual areas draining to the pond to not meet state or County requirements. If you are overdetaining the calculations still should reflect the actual areas draining to the pond otherwise the calcs vs the actuals may not work with water quality and state drain time requirements. Overdetention is an approach that is acceptable but the calcs should acknowledge the actuals as well.

Final Design

Based on a watershed area of 15.87 acres and a site imperviousness of 79.7%, the required pond volume for 100-yr detention is 2.37 acre-ft.

The forebay volume was calculated based on the inflow share of 3% of the WQCV volume. Each forebay includes a dissipator as the flows enter, and a notch through which to exit to the trickle channel. In order to release the flows from the forebay at 2% of the peak 100-yr inflow, each forebay has a minimum 3" wide notch. A 6' wide concrete trickle channel will run along the bottom of the pond from the forebay to the micropool. The micropool surface area is a minimum of 40-sf and it has a depth of 2.5' with an additional 4" for surcharge volume.

The outlet structure will consist of a modified (5'x5') Type C outlet structure with an orifice plate and a grate on top. The final orifice plate is anticipated to need a 1.72-sq in orifice, a 1.97 sq.inch orifice and a 4.25 sq. inch orifice to meet mandated WQCV and EURV drain times. The elevation of the grate is set at 6829.90, which is below the 100-year detention volume elevation. The outlet pipe has been set as an 18" private storm pipe, with a restrictor plate set at 10.65" above the invert. The outlet pipe discharges into the redefined open channel to the southeast following historic drainage patterns.

A 50' long spillway is located on the east side of the pond and is placed 1.5' 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 east into the redefined open channel where it will continue to the south following historic drainage patterns.

Pond C – Tract G (future residential Filing 3)

Pond C is a proposed private 4.06 ac-ft full-spectrum Extended Detention Basin, designed to intercept the flows generated by the **C-basin and D-basin** regions of the site. For the purposes of this analysis, Tract G (D-basins) is considered in its undeveloped interim condition, pending Filing 3 development. Pond C is proposed to be constructed in its entirety with this Filing No. 1 development, with an interim orifice plate installed for the interim condition. Development of Tract G will require further drainage analysis to establish the new orifice plate design, all other features of the detention facility are expected to remain.

Both the interim and final design MHFD-Detention v4.06 calculations are provided in the appendix. Pond C has been oversized to account for non-tributary basins D3 & D5-D7, for a watershed area of 26.38-acres**.** Overdetention has been provided in order to meet ECM detention requirements for land disturbance areas over 1-acre. Applicable WQ exclusions for the non-tributary basins (D4--D7) are noted above in Section 7.0.

Interim Design

See final design section below for volume, forebay, trickle channel, outlet structure and spillway details.

Based on a watershed area of 26.38 acres and a site imperviousness of 27.8%. The interim

orifice plate design will have a 1.60-sq in orifice, a 1.35-sq in orifice, a 1.00-sq in orifice and a rectangular 18.00 sq. inch orifice to meet mandated WQCV and EURV drain times.

Final Design

Based on a watershed area of 26.38 acres and a site imperviousness of 60.2%, the required pond volume for 100-yr detention is 2.93 acre-ft.

The forebay volume was calculated based on the inflow share of 3% of the WQCV volume. The forebay includes a dissipator as the flows enter, and a notch through which to exit to the trickle channel. In order to release the flows from the forebay at 2% of the peak 100-yr inflow, with a minimum 3" wide notch. A 6' wide concrete trickle channel will run along the bottom of the pond from the forebay to the micropool. The micropool surface area is a minimum of 40-sf and it has a depth of 2.5' with an additional 4" for surcharge volume.

Any runoff reduction requirements on future lots should be noted in the final plat.

The outlet structure will consist of a modified (5'x5') Type C outlet structure with an orifice plate and a grate on top. The final orifice plate is anticipated to need a 2.20-sq in orifice, a 2.10 sq.inch orifice and a 5.00 sq. inch orifice to meet mandated WQCV and EURV drain times. The elevation of the grate is set at 6805.09, which is below the 100-year detention volume elevation. The outlet pipe has been set as an 30" private storm pipe that discharges to the south following historic drainage patterns. A level spreader installed at the outfall will aid in dissipating concentrated flows prior to discharge. See appendix for calculations and design details.

A 50' long spillway is located on the south side of the pond and is placed 1.67' 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 south following historic drainage patterns.

Replace the requirements that will be placed on the commercial areas and any in the residential areas as well.

9.0 FOUR-STEP PROCESS

1. ***Employ Runoff Reduction Practices*:**
   As this Filing 1 development primarily involves overlot grading and the construction of pad sites for future commercial use, implementation of runoff reduction practices is limited. Future development of the pad sites and residential filings are anticipated to employ runoff reduction practices and will be further outlined in their respective drainage reports to minimize directly connected impervious areas.

   As outlined by Section 8.0 in this report and in the downstream drainage analysis in the appendix, developed flows are less than historic and as such will not significantly affect downstream flow volumes, durations or velocities.

2. ***Implement CM's that provide a Water Quality Capture Volume with slow release*:**
   The majority of runoff generated by Filing 1 will be treated through capture and slow release of the WQCV in one of the two permanent full spectrum extended detention facilities (Ponds B & C) designed per current drainage criteria. Pond A will be installed as a temporary sediment basin (TSB) until the tributary basins to the facility are developed.

Curb and gutter and sidewalk improvements along Rio Lane will be installed with this fling. As discussed earlier in Section 7.0 of this report, application of WQCV exclusion ECM 1.7.1.C.1 is requested for this area (Basins A1, A7 & A11). Further analysis of this area will be required to ensure conformance with WQCV requirements at full build out of the subdivision.

separate pervious areas (SPAs).

All other basins that discharge offsite (A8-A10, B12, B13, D4-D7) without treatment are to remain undeveloped and are therefore considered as self-treating. Areas affected by the future residential filings will be addressed in the subsequent drainage report.

3. ***Stabilize Drainage Ways*:** Stabilization of the existing drainageway through the site will occur via extension of the existing dual 12'x6' box culvert and installation of a proposed 8'x4' concrete box culvert through the site with a small section of open channel as the drainageway exits the property.

   A hydraulic analysis of the downstream drainageway has been completed (see appendix). This analysis, factored in the runoff reduction efforts and established that the Falcon Field development will not significantly affect downstream flow volumes, durations or velocities.

4. ***Implement Site Specific and Other Source Control CM's*:** Standard residential and commercial 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.

10.0 DOWNSTREAM ANALYSIS

As mentioned earlier in this report and at the request of El Paso County, a hydraulic analysis of the downstream drainageway has been completed and is included in the appendix of this report.

Key points to note from the analysis are as follows:

- By carefully mimicking existing sub-basin flow patterns, implementation of runoff reduction techniques and strategic placement of full-spectrum detention facilities to match existing flow rates exiting the property, the increase in volume and release time duration was kept to a minimum. While minor increases are inevitable as a result of development, the percentage change is minimal and below thresholds acceptable to the County.

- The hydrograph for the modeled scenarios indicates 10-hour flow duration ranging from 34- to 40-cfs downstream of the development for the 100-year flow. Proposed channel velocities at the 40-cfs range from 1.6- to 2.1-fps along the reach, which are below the allowable 3.28 fps at and beyond 10 hours of flow.

Provide comparison. The runoff reduction measures and retained volume quantities required need to be addressed to back up these statements and justify not requiring downstream improvements.

If runoff reduction measures are not quantified, additional analysis of the downstream drainageway and potential immediate improvements will need to be provided.

- The downstream area of "immediate action" identified by the Falcon DBPS at Pinto Pony will not be impacted by the Falcon Field development. This area of roadway was closed in 2019, due to erosion from the upstream tributary prior to any development on the Falcon Field property. The Falcon Field development meets or exceeds County drainage criteria by implementing extended detention facilities to mitigate sediment and downstream erosion. As noted above, the analysis also determines that the development will not significantly affect downstream flow volumes, durations and velocities. Therefore, this project development should not be responsible for any downstream improvements.

To summarize the analysis – the development of Falcon Field will not significantly affect downstream flow volumes, durations or velocities. Zero impact downstream is anticipated as a result of this development.

11.0 OWNERSHIP AND MAINTENANCE

All public drainage facilities within the public right-of-way are to be owned and maintained by El Paso County, except District facilities as identified and covered by a license agreement. All private drainage facilities are to be owned and maintained initially by Falcon Field Metropolitan District, until such time that the individual commercial lots transfer ownership upon development, if applicable. stormwater facility maintenance agreements will be provided with the development of each facility.

An offsite temporary construction easement will be provided for construction of the open channel to the south of the development. The proposed offsite portion sits within the existing open channel area in an existing no-build area on the lot (Lot 13, Arrowhead Estates Filing No. 1), and as such no additional drainage easement is needed.

An offsite Exfiltration Gallery Easement will be provided to the south of Tract G, this easement is to accommodate the proposed groundwater exfiltration gallery and underdrain outfall. This easement will be owned and maintained by the Falcon Field Metropolitan District.

Separate metropolitan districts have been established for the future residential filings, and will be outlined by their respective drainage reports.

Maintenance access will be provided to each of the ponds and swales. Drainage easements within the commercial lots and tracts of the subdivision shall give El Paso County access for inspection and maintenance of County facilities. Private maintenance agreements and O&M manuals will be established for all three ponds and swales as required by the County.

12.0 REIMBURSABLE COSTS

The Falcon DBPS – Fee Development categorizes improvements into Developer Costs, County Costs, and Metro District Costs. Items identified as Developer Costs (those incurred by the Developer) are eligible for reimbursement. County Costs and Metro District Costs are not eligible for reimbursement. The applicable reach is classified in the DBPS as follows:

Reach/Feature	Reach Length (ft)	Improvement	Cost Category	Eligible for Reimbursement	Cost As Shown in Falcon DBPS
RET100	1,791	Small Drop Structures w/Toe Protection	County	No	$1,342,120 ($749.37/LF)

The developer has submitted a request to amend the Falcon DBPS to allow for the costs of 1,116-LF of RET100 to become reimbursable by the process outlined in County criteria.

The reimbursable estimate related to the drainage channel improvements is listed below. The final reimbursable cost is pending approval of the DBPS revisions.

PRIVATE (REIMBURSABLE) – PER DBPS				
Description	**Unit**	**Quantity**	**Unit Cost**	**Cost**
Open Channel Improvements	LF	1116	$749.37	$836,296.92
Basin fee % increases 2014-2026				$684,751.56
Engineering Allowance (15%)				$228,157.27
Contingency (20%				$304,209.70
TOTAL				$2,053,415.45

PROPOSED PRIVATE (REIMBURSABLE) - pending DBPS Amendment				
Description	**Unit**	**Quantity**	**Unit Cost**	**Cost**
Junction Box Structure	EA	1	$92,000	$92,000.00
8'x4' Box Culvert	LF	753	$1,760	$1,322,710.00
Manhole, Box Base	EA	3	$21,000	$63,000.00
Headwall and riprap outfall	LS	1	$103,650	$103,650.00
Channel grading	LS	1	$40,000	$40,000.00
Subtotal				$1,621,360.00
Engineering Allowance (15%)				$243,204.00
Contingency				$324,272.00
TOTAL				$2,188,836.00

These anticipated costs are subject to change and will be addressed as outlined by County criteria at the time of DBPS reimbursement request.

13.0 DRAINAGE/BRIDGE FEES

The project lies within the Falcon Drainage Basin and based on impervious area the following fees will be due or deferred (based upon the DBPS amendment) at final plat recording. Development of the residential filings, and the commercial lot replats will be subject to additional fees dependent on the actual impervious acreage at time of development.

Filing 1 Total Area: **57.669 Acres**			
	Area (ac)	Impervious %	Impervious Acres
ROW	4.928	95%	4.6816
Lots/Tracts			
1	1.743	95%	1.656
2	1.761	95%	1.673
3	1.224	95%	1.163
4	1.407	95%	1.337
5	0.971	95%	0.922
6	2.025	95%	1.924
Tract A	1.879	0%	0.000
Tract B	1.721	0%	0.000
Tracts C-G	40.01	0%	0.000
Total	**57.669**		**13.356**

2024 Falcon Drainage Basin		Filing 1 Impervious Acreage (ac)	Total
Drainage Fee	$40,088.00	13.356	$535,415.33
Bridge Fee	$5,507.00	13.356	$73,551.49

14.0 CONSTRUCTION COST ESTIMATE

PROPOSED PUBLIC (NON-REIMBURSABLE)				
Description	**Unit**	**Quantity**	**Unit Cost**	**Cost**
5' Type R Inlet	EA	5	$7,753	$38,765
10' Type R Inlet	EA	1	$10,669	$10,669
18" RCP Storm	LF	69	$88	$6,072
24" RCP Storm	LF	58	$105	$6,090
36" RCP Storm	LF	460	$162	$74,520
Manhole, Slab Base	EA	4	$8,946	$35,784
			Subtotal	$171,900
			Engineering & Contingency (10%)	$17,190
			PUBLIC (NON-REIMBURSEABLE) TOTAL	$189,090

PROPOSED PRIVATE (NON-REIMBURSABLE)				
Description	**Unit**	**Quantity**	**Unit Cost**	**Cost**
5' Type R Inlet	EA	4	$7,753	$31,012
18" RCP Storm	LF	542	$88	$47,696
24" RCP Storm	LF	769	$105	$80,745
36" RCP Storm	LF	1183	$162	$191,646
Manhole, Slab Base	EA	13	$8,946	$116,298
			Subtotal	$467,397
Pond B				
Concrete Forebay	2	EA	$5,000	$10,000
Concrete Trickle Channel	1500	SF	$15	$22,500
Concrete Micropool	1	EA	$3,500	$3,500
Modified Type C Outlet Structure	1	EA	$10,000	$10,000
18" Outlet Pipe	53	LF	$88	$4,664
Maintenance Access	2950	SF	$1.50	$4,425
Spillway - Type L Riprap	164	CY	$70	$11,472
			Subtotal	$66,561
Pond C				
Concrete Forebay	1	EA	$5,000	$5,000
Concrete Trickle Channel	498	SF	$15	$7,470
Concrete Micropool	1	EA	$3,500	$3,500
Modified Type C Outlet Structure	1	EA	$10,000	$10,000
30" Outlet Pipe	62	LF	$132	$8,184
Maintenance Access	2775	SF	$1.50	$4,163
Spillway - Type L Riprap	194	CY	$70	$13,572
			Subtotal	$51,889

Even if optional, include estimates for clay liner for ponds. Currently the soils report still indicates that groundwater will impact the pond (1' above the pond bottom) and there is no discussions of how the underdrains will reduce the groundwater table by a minimum of 4'.

Engineering & Contingency (10%)	$58,585
PRIVATE (NON-REIMBURSABLE) TOTAL	$644,432

15.0 CONCLUSIONS

The Commons at Falcon Field project has been designed in accordance with El Paso County criteria. The full-spectrum detention facilities have been designed to limit the release of storm runoff to historic flows and volumes and as such, this development will not negatively impact the downstream properties.

16.0 REFERENCES

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

1. El Paso County Drainage Crtieria Manual, October 2018

2. El Paso County Engineering Criteria Manual, January 2025

3. City of Colorado Springs Drainage Criteria Manual Volumes 1 & 2, May 2014, Revised January 2021.

4. Urban Storm Drainage Criteria Manual Volumes 1, 2 & 3 - Mile High Flood District. January 2016

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

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

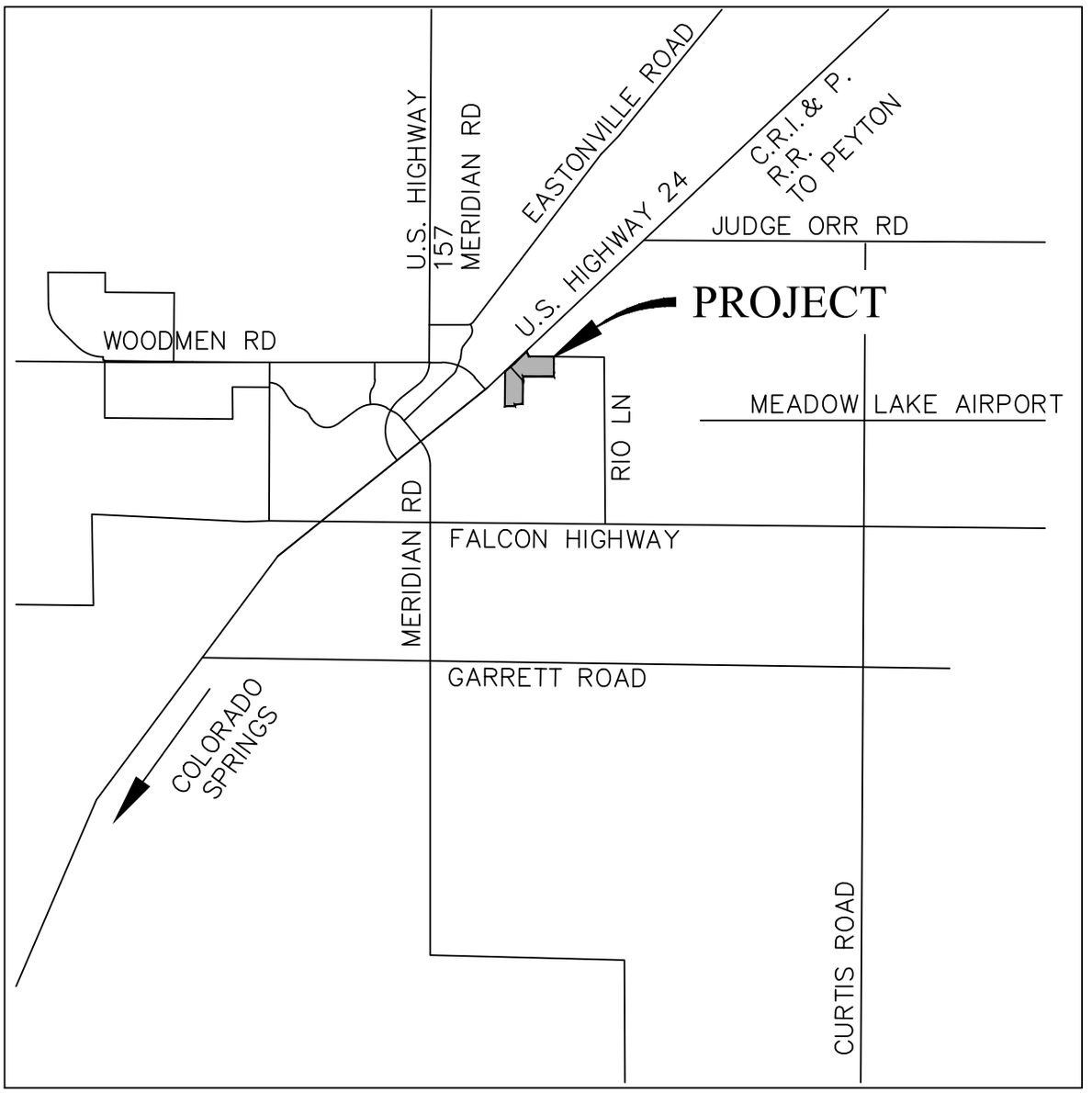
7. EL Paso County Board Resolution No 15-042: El Paso County adoption of Chapter 6 and Section 3.2.1, Chapter 13 of the City of Colorado Springs Drainage Criteria Manual, May 2014.

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

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

Appendix

Vicinity Map



Vicinity Map
Not to scale

-N-

THE COMMONS AT FALCON FIELD
EL PASO COUNTY, CO
VICINITY MAP

Drexel, Barrell & Co.
Engineers • Surveyors

DATE:

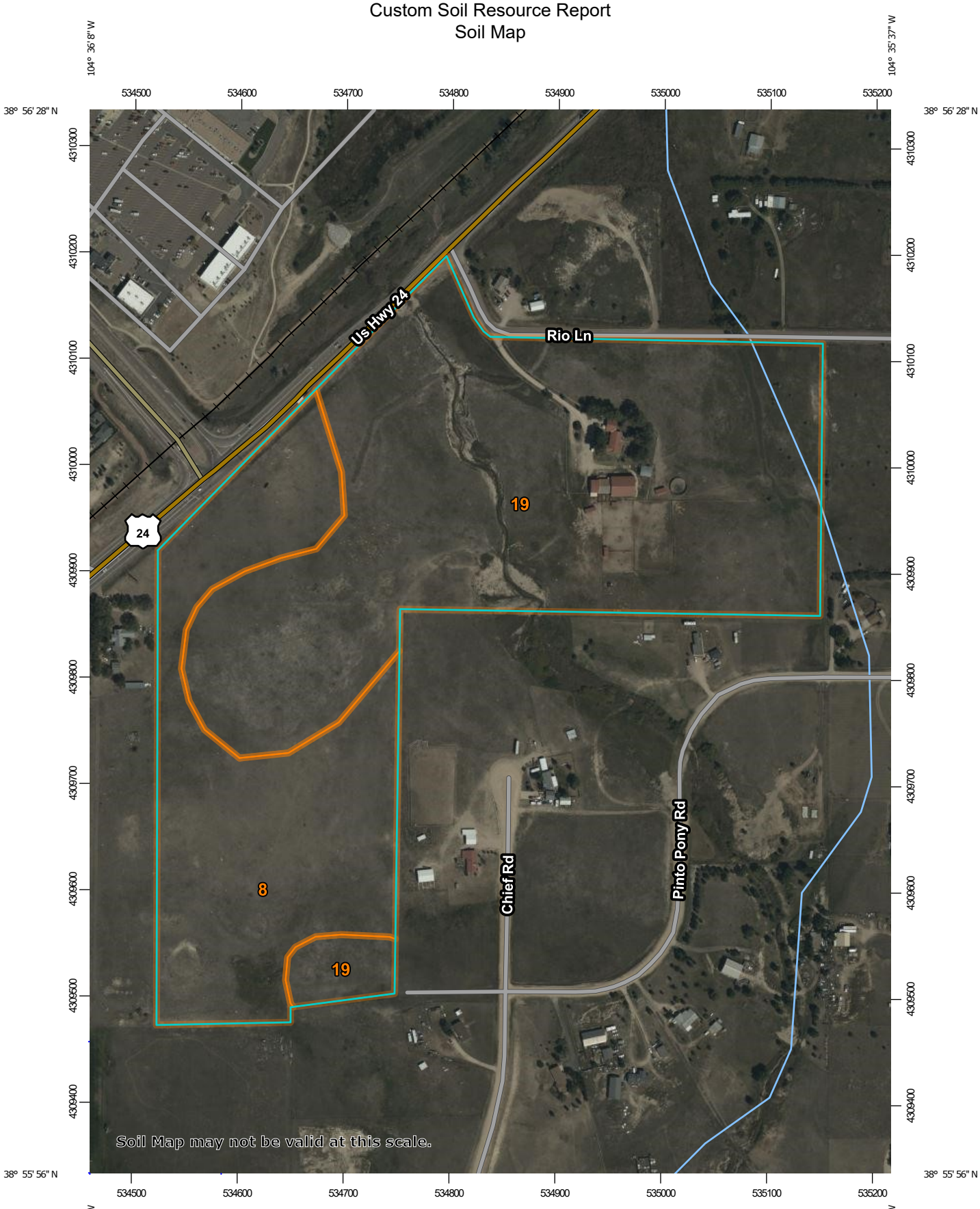
JOB NO: 21604-00CSCV

DWG. NO. VMAP

SHEET 1 OF 1

Soils Map

Custom Soil Resource Report
Soil Map



Map Scale: 1:4,880 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 200 400 800 1200

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

Because so much of the site has new fill, provide some soil data for the new fill as well.

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 19, Aug 31, 2021

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
8	Blakeland loamy sand, 1 to 9 percent slopes	18.8	32.8%
19	Columbine gravelly sandy loam, 0 to 3 percent slopes	38.6	67.2%
Totals for Area of Interest		**57.4**	**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

8—Blakeland loamy sand, 1 to 9 percent slopes

Map Unit Setting

National map unit symbol: 369v
Elevation: 4,600 to 5,800 feet
Mean annual precipitation: 14 to 16 inches
Mean annual air temperature: 46 to 48 degrees F
Frost-free period: 125 to 145 days
Farmland classification: Not prime farmland

Map Unit Composition

Blakeland and similar soils: 98 percent
Minor components: 2 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Blakeland

Setting

Landform: Hills, flats
Landform position (three-dimensional): Side slope, talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from sedimentary rock and/or eolian deposits derived from sedimentary rock

Typical profile

A - 0 to 11 inches: loamy sand
AC - 11 to 27 inches: loamy sand
C - 27 to 60 inches: sand

Properties and qualities

Slope: 1 to 9 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: 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
Calcium carbonate, maximum content: 5 percent
Available water supply, 0 to 60 inches: Low (about 4.5 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A
Ecological site: R049XB210CO - Sandy Foothill
Hydric soil rating: No

Minor Components

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

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: Flood plains, fan terraces, fans
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

Floodplain Map

National Flood Hazard Layer FIRMette

FEMA

104°36'16"W 38°56'26"N



104°35'38"W 38°55'58"N

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

1:6,000

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
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- 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.

Hydrology Calculations

PROJECT INFORMATION

PROJECT: Commons at Falcon Field
PROJECT NO: 21604-00
DESIGN BY: KGV
REV. BY: TDM
AGENCY: El Paso County
REPORT TYPE: Final
DATE: 4/2/2026

Drexel, Barrell & Co.

	C2*	C5*	C10*	C100*	% IMPERV
Pasture/Meadow		0.08		0.35	0
Roofs		0.73		0.81	90
Lawns		0.08		0.35	0
Streets: Paved		0.90		0.96	100
Streets: Gravel		0.59		0.70	80

EXISTING CONIDTION

SUB-BASIN	SURFACE DESIGNATION	AREA	COMPOSITE RUNOFF COEFFICIENTS				% IMPERV
		ACRE	C2	C5	C10	C100	
OS1	Pasture/Meadow	0.66		0.08		0.35	0
	Roofs	0.00		0.73		0.81	90
	Lawns	0.00		0.08		0.35	0
	Streets: Paved	0.66		0.90		0.96	100
	Streets: Gravel	0.00		0.59		0.70	80
	WEIGHTED AVERAGE			0.49		0.66	50%
TOTAL OS1		1.33					
OS2	Pasture/Meadow	0.30		0.08		0.35	0
	Roofs	0.00		0.73		0.81	90
	Lawns	0.00		0.08		0.35	0
	Streets: Paved	0.30		0.90		0.96	100
	Streets: Gravel	0.00		0.59		0.70	80
	WEIGHTED AVERAGE			0.49		0.66	50%
TOTAL OS2		0.60					
OS3	Pasture/Meadow	2.70		0.08		0.35	0
	Roofs	0.04		0.73		0.81	90
	Lawns	0.00		0.08		0.35	0
	Streets: Paved	0.00		0.90		0.96	100
	Streets: Gravel	0.00		0.59		0.70	80
	WEIGHTED AVERAGE			0.09		0.36	1%
TOTAL OS3		2.70					
OS4	Pasture/Meadow	1.10		0.08		0.35	0
	Roofs	0.10		0.73		0.81	90
	Lawns	0.00		0.08		0.35	0
	Streets: Paved	0.29		0.90		0.96	100
	Streets: Gravel	0.00		0.59		0.70	80
	WEIGHTED AVERAGE			0.28		0.50	26%
TOTAL OS4		1.50					
OS5	Pasture/Meadow	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

PROJECT INFORMATION

PROJECT: Commons at Falcon Field
PROJECT NO: 21604-00
DESIGN BY: KGV
REV. BY: TDM
AGENCY: El Paso County
REPORT TYPE: Final
DATE: 4/2/2026

Drexel, Barrell & Co.

	C2*	C5*	C10*	C100*	% IMPERV
Pasture/Meadow		0.08		0.35	0
Roofs		0.73		0.81	90
Lawns		0.08		0.35	0
Streets: Paved		0.90		0.96	100
Streets: Gravel		0.59		0.70	80

	WEIGHTED AVERAGE			0.20		0.44	16%
TOTAL OS5		16.62					
OS6	Pasture/Meadow	0.23		0.08		0.35	0
	Roofs	0.00		0.73		0.81	90
	Lawns	0.00		0.08		0.35	0
	Streets: Paved	0.51		0.90		0.96	100
	Streets: Gravel	0.00		0.59		0.70	80
	WEIGHTED AVERAGE			0.65		0.77	69%
TOTAL OS6		0.74					
E1	Pasture/Meadow	15.01		0.08		0.35	0
	Roofs	0.00		0.73		0.81	90
	Lawns	0.00		0.08		0.35	0
	Streets: Paved	0.00		0.90		0.96	100
	Streets: Gravel	0.11		0.59		0.70	80
	WEIGHTED AVERAGE			0.08		0.35	1%
TOTAL E1		15.11					
E2	Pasture/Meadow	12.59		0.08		0.35	0
	Roofs	0.00		0.73		0.81	90
	Lawns	0.00		0.08		0.35	0
	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 E2		12.59					
E3	Pasture/Meadow	0.62		0.08		0.35	0
	Roofs	0.00		0.73		0.81	90
	Lawns	0.00		0.08		0.35	0
	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 E3		0.62					
E4	Pasture/Meadow	12.50		0.08		0.35	0
	Roofs	0.00		0.73		0.81	90

PROJECT INFORMATION

PROJECT: Commons at Falcon Field
PROJECT NO: 21604-00
DESIGN BY: KGV
REV. BY: TDM
AGENCY: El Paso County
REPORT TYPE: Final
DATE: 4/2/2026

Drexel, Barrell & Co.

	C2*	C5*	C10*	C100*	% IMPERV
Pasture/Meadow		0.08		0.35	0
Roofs		0.73		0.81	90
Lawns		0.08		0.35	0
Streets: Paved		0.90		0.96	100
Streets: Gravel		0.59		0.70	80

	Lawns	0.00		0.08		0.35	0
	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 E4		12.50					
E5	Pasture/Meadow	1.69		0.08		0.35	0
	Roofs	0.00		0.73		0.81	90
	Lawns	0.00		0.08		0.35	0
	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 E5		1.69					
E6	Pasture/Meadow	4.47		0.08		0.35	0
	Roofs	0.25		0.73		0.81	90
	Lawns	0.00		0.08		0.35	0
	Streets: Paved	0.00		0.90		0.96	100
	Streets: Gravel	0.17		0.59		0.70	80
	WEIGHTED AVERAGE			0.13		0.39	7%
TOTAL E6		4.88					
E7	Pasture/Meadow	8.78		0.08		0.35	0
	Roofs	0.00		0.73		0.81	90
	Lawns	0.00		0.08		0.35	0
	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 E7		8.78					
OS7	Pasture/Meadow	0.09		0.08		0.35	0
	Roofs	0.00		0.73		0.81	90
	Lawns	0.00		0.08		0.35	0

PROJECT INFORMATION

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REV. BY: TDM
AGENCY: El Paso County
REPORT TYPE: Final
DATE: 4/2/2026

Drexel, Barrell & Co.

	C2*	C5*	C10*	C100*	% IMPERV
Pasture/Meadow		0.08		0.35	0
Roofs		0.73		0.81	90
Lawns		0.08		0.35	0
Streets: Paved		0.90		0.96	100
Streets: Gravel		0.59		0.70	80

	Streets: Paved	0.08		0.90		0.96	100
	Streets: Gravel	0.00		0.59		0.70	80
	WEIGHTED AVERAGE			0.48		0.65	48%
TOTAL OS7		0.17					
E8	Pasture/Meadow	1.53		0.08		0.35	0
	Roofs	0.00		0.73		0.81	90
	Lawns	0.00		0.08		0.35	0
	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 E8		1.53					

PROJECT INFORMATION

PROJECT: Commons at Falcon Field
PROJECT NO: 21604-00
DESIGN BY: KGV
REV. BY: TDM
AGENCY: El Paso County
REPORT TYPE: Final
DATE: 4/2/2026

RATIONAL METHOD CALCULATIONS FOR STORM WATER RUNOFF

EXISTING TIME OF CONCENTRATION

SUB-BASIN DATA							INITIAL/OVERLAND TIME (t_i)			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	COMP.	MINIMUM	
				Ac			Ft	%	Min	Ft	%	FPS	Min	t_c	t_c	Min
OS1	A	0.49	0.66	1.33	*0.65*	*0.87*	30	2.0	5.0	20	5.0	3.4	0.1	5.1	5.0	**5.1**
E1		0.08	0.35	15.11	*1.26*	*5.33*	300	3.0	22.8	530	3.0	2.6	3.4	26.2	5.0	**26.2**
DPA+E1	B	0.12	0.38	16.44	*1.92*	*6.20*	From E1		26.2					26.2	5.0	**26.2**
OS2	C	0.49	0.66	0.60	*0.29*	*0.39*	30	1.0	6.2	20	5.0	3.4	0.1	6.3	5.0	**6.3**
OS3	D	0.09	0.36	2.70	*0.24*	*0.96*	200	2.1	20.9	250	4.0	3.0	1.4	22.3	5.0	**22.3**
E2		0.08	0.35	12.59	*1.01*	*4.41*	300	2.3	24.9	1360	3.5	2.8	8.1	33.0	5.0	**33.0**
DPC+DPD+E2	E	0.10	0.36	15.88	*1.54*	*5.76*	From E2		33.0					33.0	5.0	**33.0**
OS4	F	0.28	0.50	1.50	*0.42*	*0.75*	75	2.0	10.5	825	5.0	3.4	4.1	14.6	5.0	**14.6**
E3	G	0.08	0.35	0.62	*0.05*	*0.22*	100	5.0	11.2	100	5.0	3.4	0.5	11.7	5.0	**11.7**
E4		0.08	0.35	12.50	*1.00*	*4.38*	300	2.3	24.9	1120	4.2	3.1	6.1	31.0	5.0	**31.0**
DPF+E4	H	0.10	0.37	14.00	*1.42*	*5.12*	From E4		31.0					31.0	5.0	**31.0**
E5	I	0.08	0.35	1.69	*0.13*	*0.59*	300	2.7	23.8	250	4.0	3.0	1.4	25.2	5.0	**25.2**
E6	J	0.13	0.39	4.88	*0.64*	*1.88*	100	2.0	14.4	550	2.2	2.2	4.1	18.5	5.0	**18.5**
OS5	K	0.20	0.44	16.62	*3.40*	*7.34*	75	2.0	11.5	2500	1.5	1.8	22.7	34.2	5.0	**34.2**
OS6	L	0.65	0.77	0.74	*0.48*	*0.57*	30	2.0	3.7					3.7	5.0	**5.0**
E7		0.08	0.35	8.78	*0.70*	*3.07*	300	1.8	27.2	1375	1.8	2.0	11.3	38.5	5.0	**38.5**
DPL+E7	M	0.12	0.38	9.51	*1.18*	*3.64*	From E7		38.5					38.5	5.0	**38.5**
OS7		0.48	0.65	0.17	*0.08*	*0.11*	30	2.0	5.1					5.1	5.0	**5.1**
E8		0.08	0.35	1.53	*0.12*	*0.53*	50	2.0	10.7	575	1.8	2.0	4.8	15.5	5.0	**15.5**
OS7+E8	N	0.12	0.38	1.70	*0.20*	*0.64*	From E8		15.5					15.5	5.0	**15.5**

PROJECT INFORMATION

PROJECT: Commons at Falcon Field
PROJECT NO: 21604-00
DESIGN BY: KGV
REV. BY: TDM
AGENCY: El Paso County
REPORT TYPE: Final
DATE: 4/2/2026

Drexel, Barrell & Co.

RATIONAL METHOD CALCULATIONS FOR STORM WATER RUNOFF

EXISTING 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)**
OS1	A	1.33	0.49	5.1	0.65	5.15	**3.4**
E1		15.11	0.08	26.2	1.26	2.68	**3.4**
RET090 (DBPS)							**36.0**
DPA+E1+RET090	B	16.44	0.12	26.2	1.92	2.68	**41.1**
OS2	C	0.60	0.49	6.3	0.29	4.81	**1.4**
OS3	D	2.70	0.09	22.3	0.24	2.93	**0.7**
E2		12.59	0.08	33.0	1.01	2.34	**2.4**
DPC+DPD+E2	E	15.88	0.10	33.0	1.54	2.34	**3.6**
OS4	F	1.50	0.28	14.6	0.42	3.56	**1.5**
E3	G	0.62	0.08	11.7	0.05	3.90	**0.2**
E4		12.50	0.08	31.0	1.00	2.43	**2.4**
DPF+E4	H	14.00	0.10	31.0	1.42	2.43	**3.5**
E5	I	1.69	0.08	25.2	0.13	2.74	**0.4**
E6	J	4.88	0.13	18.5	0.64	3.20	**2.0**
OS5	K	16.62	0.20	34.2	3.40	2.29	**7.8**
OS5 @ 18" culvert (max capacity)	K1						**7.8**
OS6	L	0.74	0.65	5.0	0.48	5.17	**2.5**
DPK1+DPL	L1						**10.2**
E7		8.78	0.08	38.5	0.70	2.11	**1.5**
DPL+E7	M	9.51	0.12	38.5	1.18	2.11	**2.5**
DPM+DPK1	M1						**10.3**
OS7		0.17	0.48	5.1	0.08	5.15	**0.4**
E8		1.53	0.08	15.5	0.12	3.47	**0.4**
OS7+E8	N	1.70	0.12	15.5	0.20	3.47	**0.7**

PROJECT INFORMATION

PROJECT:	Commons at Falcon Field
PROJECT NO:	21604-00
DESIGN BY:	KGV
REV. BY:	TDM
AGENCY:	El Paso County
REPORT TYPE:	Final
DATE:	4/2/2026

Drexel, Barrell & Co.

RATIONAL METHOD CALCULATIONS FOR STORM WATER RUNOFF

EXISTING RUNOFF 100 YR STORM P1= 2.52

			DIRECT RUNOFF				
BASIN (S)	**DESIGN POINT**	**AREA (AC)**	**RUNOFF COEFF**	**t_c (MIN)**	**C * A**	**I (IN/HR)**	**Q (CFS)**
OS1	A	1.33	0.66	5.1	0.87	8.65	**7.5**
E1		15.11	0.35	26.2	5.33	4.50	**24.0**
RET090 (DBPS)							**320.0**
DPA+E1+RET090	B	16.44	0.38	26.2	6.20	4.50	**347.9**
OS2	C	0.60	0.66	6.3	0.39	8.08	**3.2**
OS3	D	2.70	0.36	22.3	0.96	4.92	**4.7**
E2		12.59	0.35	33.0	4.41	3.92	**17.3**
DPC+DPD+E2	E	15.88	0.36	33.0	5.76	3.92	**22.6**
OS4	F	1.50	0.50	14.6	0.75	5.98	**4.5**
E3	G	0.62	0.35	11.7	0.22	6.55	**1.4**
E4		12.50	0.35	31.0	4.38	4.08	**17.9**
DPF+E4	H	14.00	0.37	31.0	5.12	4.08	**20.9**
E5	I	1.69	0.35	25.2	0.59	4.60	**2.7**
E6	J	4.88	0.39	18.5	1.88	5.38	**10.1**
OS5	K	16.62	0.44	34.2	7.34	3.83	**28.2**
OS5 @ 18" culvert (max capacity)	K1						**11.3**
OS6	L	0.74	0.77	5.0	0.57	8.68	**5.0**
DPK1+DPL	L1						**16.3**
E7		8.78	0.35	38.5	3.07	3.54	**10.9**
DPL+E7	M	9.51	0.38	38.5	3.64	3.54	**12.9**
DPM+DPK1	M1						**24.2**
OS7		0.17	0.65	5.1	0.11	8.65	**0.9**
E8		1.53	0.35	15.5	0.53	5.83	**3.1**
OS7+E8	N	1.70	0.38	15.5	0.64	5.83	**3.8**

PROJECT INFORMATION

PROJECT: Commons at Falcon Field Filing 1
PROJECT NO: 21604-00
DESIGN BY: CGH
REV. BY: TDM
AGENCY: El Paso County
REPORT TYPE: Final
DATE: 4/2/2026

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	
A-BASINS							
OSA	Open Space	13.96		0.08		0.35	0
	Roofs	0.05		0.73		0.81	90
	Lawns	0.00		0.08		0.35	0
	Streets: Paved	2.27		0.90		0.96	100
	Streets: Gravel	0.39		0.59		0.70	80
	WEIGHTED AVERAGE			0.21		0.44	16%
TOTAL OSA		16.62					
A1	Open Space	0.00		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	0.18		0.90		0.96	100
	Streets: Gravel	0.00		0.59		0.70	80
	WEIGHTED AVERAGE			0.90		0.96	100%
TOTAL A1		0.18					
A2	Open Space	2.56		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 A2		2.56					
A3	Open Space	4.13		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	0.02		0.90		0.96	100
	Streets: Gravel	0.00		0.59		0.70	80
	WEIGHTED AVERAGE			0.08		0.35	1%
TOTAL A3		4.15					
A4	Open Space	3.84		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	0.02		0.90		0.96	100
	Streets: Gravel	0.00		0.59		0.70	80
	WEIGHTED AVERAGE			0.08		0.35	1%
TOTAL A4		3.86					

PROJECT INFORMATION

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PROJECT NO: 21604-00
DESIGN BY: CGH
REV. BY: TDM
AGENCY: El Paso County
REPORT TYPE: Final
DATE: 4/2/2026

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

A5	Open Space	3.80		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 A5		3.80					
A6	Open Space	0.69		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 A6		0.69					
A7	Open Space	0.00		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	0.33		0.90		0.96	100
	Streets: Gravel	0.00		0.59		0.70	80
	WEIGHTED AVERAGE			0.90		0.96	100%
TOTAL A7		0.33					
A8	Open Space	1.03		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 A8		1.03					
A9	Open Space	1.75		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	0.11		0.90		0.96	100
	Streets: Gravel	0.00		0.59		0.70	80
	WEIGHTED AVERAGE			0.13		0.39	6%
TOTAL A9		1.86					
A10	Open Space	1.08		0.08		0.35	0
	Commercial Development	0.00		0.81		0.88	95

PROJECT INFORMATION

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PROJECT NO: 21604-00
DESIGN BY: CGH
REV. BY: TDM
AGENCY: El Paso County
REPORT TYPE: Final
DATE: 4/2/2026

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

	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 A10		1.08					
A11	Open Space	0.00		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	0.10		0.90		0.96	100
	Streets: Gravel	0.00		0.59		0.70	80
	WEIGHTED AVERAGE			0.90		0.96	100%
TOTAL A11		0.10					

Area tributary to TSB (Future Pond A) **19.64** **0.11** **0.37** **3.88%**
Including overdetention

B-BASINS							
OSB1	Open Space	0.51		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	0.36		0.90		0.96	100
	Streets: Gravel	0.00		0.59		0.70	80
	WEIGHTED AVERAGE			0.42		0.60	41%
TOTAL OSB1		0.87					
OSB2	Open Space	0.11		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	0.20		0.90		0.96	100
	Streets: Gravel	0.00		0.59		0.70	80
	WEIGHTED AVERAGE			0.61		0.74	64%
TOTAL OSB2		0.31					
OSB3	Open Space	0.09		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	0.43		0.90		0.96	100
	Streets: Gravel	0.00		0.59		0.70	80
	WEIGHTED AVERAGE			0.76		0.85	82%
TOTAL OSB3		0.52					

PROJECT INFORMATION

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DESIGN BY: CGH
REV. BY: TDM
AGENCY: El Paso County
REPORT TYPE: Final
DATE: 4/2/2026

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

B1	Open Space	0.00		0.08		0.35	0
	Commercial Development	2.24		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			0.81		0.88	95%
TOTAL B1		2.24					
INTERIM B1	*Open Space*	*2.24*		*0.08*		*0.35*	*0*
POND CALCS	*Commercial Development*	*0.00*		*0.81*		*0.88*	*95*
ONLY	*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%*
INTERIM B1		*2.24*					
B2	Open Space	0.00		0.08		0.35	0
	Commercial Development	1.12		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			0.81		0.88	95%
TOTAL B2		1.12					
B3	Open Space	0.00		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	0.44		0.90		0.96	100
	Streets: Gravel	0.00		0.59		0.70	80
	WEIGHTED AVERAGE			0.90		0.96	100%
TOTAL B3		0.44					
B4	Open Space	0.00		0.08		0.35	0
	Commercial Development	1.54		0.81		0.88	95
	Residential (< 1/8 Acre)	0.00		0.45		0.59	65

PROJECT INFORMATION

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PROJECT NO: 21604-00
DESIGN BY: CGH
REV. BY: TDM
AGENCY: El Paso County
REPORT TYPE: Final
DATE: 4/2/2026

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	0.00		0.90		0.96	100
	Streets: Gravel	0.00		0.59		0.70	80
	WEIGHTED AVERAGE			0.81		0.88	95%
TOTAL B4		1.54					
B5	Open Space	0.00		0.08		0.35	0
	Commercial Development	0.00		0.81		0.88	95
	Streets: Paved	0.35		0.90		0.96	100
	Streets: Gravel	0.00		0.59		0.70	80
	WEIGHTED AVERAGE			0.90		0.96	100%
TOTAL B5		0.35					
B6	Open Space	0.00		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	0.50		0.90		0.96	100
	Streets: Gravel	0.00		0.59		0.70	80
	WEIGHTED AVERAGE			0.90		0.96	100%
TOTAL B6		0.50					
B7	Open Space	0.00		0.08		0.35	0
	Commercial Development	1.57		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			0.81		0.88	95%
TOTAL B7		1.57					
B8	Open Space	0.00		0.08		0.35	0
	Commercial Development	1.33		0.81		0.88	95
	Streets: Paved	0.00		0.90		0.96	100
	Streets: Gravel	0.00		0.59		0.70	80
	WEIGHTED AVERAGE			0.81		0.88	95%
TOTAL B8		1.33					
INTERIM B8	*Open Space*	*1.33*		*0.08*		*0.35*	*0*

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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

POND CALCS	*Commercial Development*	*0.00*		*0.81*		*0.88*	*95*
ONLY	*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%*
INTERIM B8		*1.33*					
B9	Open Space	0.00		0.08		0.35	0
	Commercial Development	0.00		0.81		0.88	95
	Streets: Paved	1.76		0.90		0.96	100
	Streets: Gravel	0.00		0.59		0.70	80
	WEIGHTED AVERAGE			0.90		0.96	100%
TOTAL B9		1.76					
B10	Open Space	0.00		0.08		0.35	0
	Commercial Development	0.00		0.81		0.88	95
	Streets: Paved	1.18		0.90		0.96	100
	Streets: Gravel	0.00		0.59		0.70	80
	WEIGHTED AVERAGE			0.90		0.96	100%
TOTAL B10		1.18					
B11	Open Space	1.20		0.08		0.35	0
	Commercial Development	0.00		0.81		0.88	95
	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 B11		1.20					
B12	Open Space	0.72		0.08		0.35	0
	Commercial Development	0.00		0.81		0.88	95
	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 B12		0.72					
B13	Open Space	0.19		0.08		0.35	0
	Commercial Development	0.00		0.81		0.88	95

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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	0.00		0.90		0.96	100
	Streets: Gravel	0.00		0.59		0.70	80
	WEIGHTED AVERAGE			0.08		0.35	0%
TOTAL B13		0.19					

Area tributary to Pond B (OSB1-B13) **15.87** **0.71** **0.81** **79.7%**
including overdetention for B12+B13

Pond B Interim **15.87** **0.54** **0.69** **58.3%**
(undeveloped Tracts A & B)

C-BASINS							
OSC1	Open Space	0.00		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	0.33		0.90		0.96	100
	Streets: Gravel	0.00		0.59		0.70	80
	WEIGHTED AVERAGE			0.90		0.96	100%
TOTAL OSC1		0.33					
OSC2	Open Space	1.11		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	0.25		0.90		0.96	100
	Streets: Gravel	0.00		0.59		0.70	80
	WEIGHTED AVERAGE			0.23		0.46	18%
TOTAL OSC2		1.36					
C1	Open Space	0.00		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	0.37		0.90		0.96	100
	Streets: Gravel	0.00		0.59		0.70	80
	WEIGHTED AVERAGE			0.90		0.96	100%
TOTAL C1		0.37					

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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

C2	Open Space	0.00		0.08		0.35	0
	Commercial Development	0.91		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			0.81		0.88	95%
TOTAL C2		0.91					
C3	Open Space	0.00		0.08		0.35	0
	Commercial Development	1.08		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			0.81		0.88	95%
TOTAL C3		1.08					
C4	Open Space	0.00		0.08		0.35	0
	Commercial Development	2.62		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			0.81		0.88	95%
TOTAL C4		2.62					
C5	Open Space	0.00		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	0.24		0.90		0.96	100
	Streets: Gravel	0.00		0.59		0.70	80
	WEIGHTED AVERAGE			0.90		0.96	100%
TOTAL C5		0.24					
C6	Open Space	0.00		0.08		0.35	0
	Commercial Development	0.00		0.81		0.88	95

PROJECT INFORMATION

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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

	Residential (< 1/8 Acre)	0.00		0.45		0.59	65
	Streets: Paved	0.25		0.90		0.96	100
	Streets: Gravel	0.00		0.59		0.70	80
	WEIGHTED AVERAGE			0.90		0.96	100%
TOTAL C6		0.25					
C7	Open Space	0.00		0.08		0.35	0
	Commercial Development	0.00		0.81		0.88	95
	Streets: Paved	0.88		0.90		0.96	100
	Streets: Gravel	0.00		0.59		0.70	80
	WEIGHTED AVERAGE			0.90		0.96	100%
TOTAL C7		0.88					
C8	Open Space	0.00		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	0.65		0.90		0.96	100
	Streets: Gravel	0.00		0.59		0.70	80
	WEIGHTED AVERAGE			0.90		0.96	100%
TOTAL C8		0.65					
D-BASINS							
OSD1	Open Space	2.66		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	0.04		0.90		0.96	100
	Streets: Gravel	0.00		0.59		0.70	80
	WEIGHTED AVERAGE			0.09		0.36	1%
TOTAL OSD1		2.70					
D1	Open Space	4.91		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%

PROJECT INFORMATION

PROJECT: Commons at Falcon Field Filing 1
PROJECT NO: 21604-00
DESIGN BY: CGH
REV. BY: TDM
AGENCY: El Paso County
REPORT TYPE: Final
DATE: 4/2/2026

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

TOTAL D1		4.91					
D2	Open Space	6.53		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 D2		6.53					
D3	Open Space	2.46		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 D3		2.46					
D4	Open Space	3.26		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 D4		3.26					
D5	Open Space	0.14		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 D5		0.14					
D6	Open Space	0.16		0.08		0.35	0

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	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

	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 D6		0.16					
D7	Open Space	0.23		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 D7		0.23					

Area tributary to Pond C	**26.38**	**0.30**	**0.51**	**27.8%**
(OSC1-C8 & D1-D4)				
Inc overdetain for D3 & D5-D7				

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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		0.21	0.44	16.62	3.42	7.36	75	2.0	11.3	2500	1.5	1.8	22.7					34.0	5.0	**34.0**
A1	A1	0.90	0.96	0.18	0.16	0.17	25	2.0	1.5	215	1.0	2.0	1.8					3.2	5.0	**5.0**
A2		0.08	0.35	2.56	0.21	0.90	100	2.2	14.4	825	2.9	3.4	4.0					18.4	5.0	**18.4**
DPA1+A2	A2	0.13	0.39	2.74	0.37	1.07	From A2		18.4	325	0.8	1.8	3.0					21.4	5.0	**21.4**
A3	A3	0.08	0.35	4.15	0.35	1.47	80	0.8	17.9	1223	1.6	2.5	8.1					26.0	5.0	**26.0**
A4		0.08	0.35	3.86	0.33	1.36	80	2.2	12.8	720	2.0	2.8	4.2					17.0	5.0	**17.0**
DPA3+A4	A4	0.08	0.35	8.02	0.68	2.83	From DPA3		26.0	325	0.8	1.8	3.0					29.0	5.0	**29.0**
A5		0.08	0.35	3.80	0.30	1.33	80	0.8	18.0	1265	1.3	2.3	9.2					27.3	5.0	**27.3**
DPA2+DPA4+A5	A5	0.09	0.36	14.55	1.35	5.23	From DPA4		29.0	25	1.3	2.3	0.2					29.2	5.0	**29.2**
A6		0.08	0.35	0.69	0.05	0.24	25	0.5	11.8	215	1.4	2.4	1.5					13.3	5.0	**13.3**
DPA5+A6	A6	0.09	0.36	15.24	1.40	5.47	From DPA5		29.2	50	20.0	8.9	0.1					29.3	5.0	**29.3**
A7	A7	0.90	0.96	0.33	0.30	0.32	25	2.0	1.5	485	1.4	1.8	4.6					6.0	5.0	**6.0**
A8		0.08	0.35	1.03	0.08	0.36	50	2.0	10.5	515	1.4	1.8	4.8					15.3	5.0	**15.3**
DPA7+A8	A8	0.28	0.50	1.36	0.38	0.68	From DPA8		15.3									15.3	5.0	**15.3**
A9		0.13	0.39	1.86	0.24	0.72	25	10.0	4.1	957	1.5	2.4	6.5					10.6	5.0	**10.6**
DPA8+A9	A9	0.19	0.43	3.22	0.62	1.40	From DPA8		15.3	957	1.5	2.4	6.5					21.8	5.0	**21.8**
A10	A10	0.08	0.35	1.08	0.09	0.38	100	17.8	7.2	169	12.6	7.1	0.4					7.6	5.0	**7.6**
A11		0.90	0.96	0.10	0.09	0.09	15	2.0	1.1	170	1.0	2.0	1.4					2.5	5.0	**5.0**
B-BASINS																				
OSB1		0.42	0.60	0.87	0.37	0.53	40	2.0	6.4	250	2.0	2.8	1.5					7.9	5.0	**7.9**
OSB2		0.61	0.74	0.31	0.19	0.23	40	2.0	4.6	30	20.0	8.9	0.1					4.7	5.0	**5.0**
OSB3		0.76	0.85	0.52	0.40	0.45	40	2.0	3.2	20	20.0	8.9	0.0					3.3	5.0	**5.0**
B1		0.81	0.88	2.24	1.82	1.98	60	2.3	3.2	285	3.3	3.6	1.3					4.5	5.0	**5.0**
OSB1+B1	B1	0.70	0.80	3.12	2.18	2.50	From OSB1		7.9	300	3.3	3.6	1.4					9.2	5.0	**9.2**
B2		0.81	0.88	1.12	0.91	0.99	40	4.0	2.2	200	4.0	4.0	0.8					3.0	5.0	**5.0**
OSB2+B2	B2	0.77	0.85	1.43	1.10	1.22	From OSB2		5.0	200	4.0	4.0	0.8					5.8	5.0	**5.8**
B3	B3	0.90	0.96	0.44	0.40	0.42	20	2.0	1.3	200	3.3	3.6	0.9					2.2	5.0	**5.0**
B4		0.81	0.88	1.54	1.25	1.36	50	3.5	2.5	280	2.0	2.8	1.6					4.2	5.0	**5.0**
OSB3+B4	B4	0.80	0.87	2.07	1.65	1.81	From OSB3		5.0	280	2.0	2.8	1.6					6.6	5.0	**6.6**
DPB3+DP4	B4A	0.81	0.89	2.51	2.04	2.23	From DPB3		5.0					280	1.0	7.2	0.6	5.6	5.0	**5.6**
DPB1+DPB2+DPB4A	B4B	0.75	0.84	7.06	5.33	5.95	From DPB1		9.2					195	1.0	7.2	0.5	9.7	5.0	**9.7**
B5	B5	0.90	0.96	0.35	0.32	0.34	20	2.0	1.3	400	1.5	2.4	2.7					4.0	5.0	**5.0**
B6		0.90	0.96	0.50	0.45	0.48	20	2.0	1.3	340	1.5	2.4	2.3					3.6	5.0	**5.0**
DPB5+B6	B6	0.90	0.96	0.85	0.77	0.82	From DPB5		5.0					30	1.0	7.2	0.1	5.1	5.0	**5.1**
B7		0.81	0.88	1.57	1.28	1.39	40	2.0	2.7	310	2.3	3.0	1.7					4.4	5.0	**5.0**
DPB4B+DPB6+B7	B7	0.78	0.86	9.49	7.37	8.15	From DPB4B		9.7					251	1.0	7.2	0.6	10.3	5.0	**10.3**
B8	B8	0.81	0.88	1.33	1.08	1.17	40	1.0	3.4	210	2.8	3.3	1.1					4.5	5.0	**5.0**
B9		0.90	0.96	1.76	1.58	1.69	30	2.0	1.6	800	1.5	2.4	5.4					7.1	5.0	**7.1**
DPB8+B9	B9	0.86	0.93	3.09	2.66	2.86	From Basin B9		7.1									7.1	5.0	**7.1**
B10		0.90	0.96	1.18	1.06	1.13	30	2.0	1.6	530	1.5	2.4	3.6					5.2	5.0	**5.2**
DPB9+B10	B10	0.87	0.94	4.27	3.72	3.99	From DPB9		7.1					46	1.0	7.2	0.1	7.2	5.0	**7.2**
B11		0.08	0.35	1.20	0.10	0.42	30	13.0	4.4	150	3.0	3.5	0.7					5.2	5.0	**5.2**
DPB7+DPB10+B11	B11	0.75	0.84	14.96	11.19	12.57	From DPB7		10.3					142	2.0	7.2	0.3	10.6	5.0	**10.6**
B12		0.08	0.35	0.72	0.06	0.25	25	25.0	3.3	250	0.5	1.4	2.9					6.2	5.0	**6.2**
B13		0.08	0.35	0.19	0.02	0.07	25	25.0	3.3	25	25.0	10.0	0.0					3.3	5.0	**5.0**

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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
C-BASINS																				
OSC1		0.90	0.96	0.33	*0.29*	*0.31*	40	2.5	1.7	100	2.0	2.8	0.6					2.3	5.0	**5.0**
C1	C1	0.90	0.96	0.37	*0.33*	*0.35*	40	2.5	1.7	193	2.0	2.8	1.1					2.9	5.0	**5.0**
C2		0.81	0.88	0.91	*0.73*	*0.80*	60	3.2	2.9	430	3.0	3.5	2.1					4.9	5.0	**5.0**
DPC1+C2	C2	0.84	0.90	1.27	*1.06*	*1.15*	From DPC1		5.0	300	2.0	2.8	1.8					6.8	5.0	**6.8**
C3	C3	0.81	0.88	1.08	*0.87*	*0.95*	70	2.6	3.3	300	2.0	2.8	1.8					5.1	5.0	**5.1**
OSC2		0.23	0.46	1.36	*0.31*	*0.63*	50	2.5	8.5	200	2.0	2.8	1.2					6.2	5.0	**6.2**
C4		0.81	0.88	2.62	*2.12*	*2.31*	50	2.5	2.8	555	4.7	4.3	2.1					5.0	5.0	**5.0**
OSC1+OSC2+C4	C4	0.63	0.75	4.31	*2.73*	*3.25*	From OS2		6.2	350	4.7	4.3	1.3					7.6	5.0	**7.6**
C5		0.90	0.96	0.24	*0.22*	*0.23*	20	2.0	1.3	450	2.0	2.8	2.7					4.0	5.0	**5.0**
DPC3+C5	C5	0.83	0.89	1.32	*1.09*	*1.18*	From DPC3		5.1					20	1.0	7.2	0.0	5.1	5.0	**5.1**
C6		0.90	0.96	0.25	*0.23*	*0.24*	20	2.0	1.3	450	2.0	2.8	2.7					4.0	5.0	**5.0**
DPC5+C6	C6	0.84	0.91	1.58	*1.32*	*1.43*	From DPC5		5.1					40	1.0	7.2	0.1	5.2	5.0	**5.2**
DPC2+DPC4+DPC6	C6A	0.71	0.79	7.16	*5.11*	*5.62*	From DPC4		7.6									7.6	5.0	**7.6**
C7	C7	0.90	0.96	0.88	*0.79*	*0.84*	40	2.0	1.9	750	2.0	2.8	4.4					6.3	5.0	**6.3**
C8	C8	0.90	0.96	0.65	*0.59*	*0.63*	40	2.0	1.9	540	2.0	2.8	3.2					5.1	5.0	**5.1**
DPC6A+DPC7+DPC8	C8A	0.75	0.82	8.69	*6.49*	*7.09*	From DPC6A		7.6					270	1.0	7.2	0.6	8.2	5.0	**8.2**
D-BASINS																				
OSD1		0.09	0.36	2.70	*0.25*	*0.97*	100	2.5	13.9	350	2.0	2.1	2.7					16.6	5.0	**16.6**
D1	D1	0.08	0.35	4.91	*0.39*	*1.72*	100	4.0	12.0	980	3.5	2.8	5.8					17.8	5.0	**17.8**
D2	D2	0.08	0.35	6.53	*0.52*	*2.29*	100	4.0	12.0	560	2.0	2.1	4.4					16.4	5.0	**16.4**
D3		0.08	0.35	2.46	*0.20*	*0.86*	100	7.1	9.9	1155	3.1	2.6	7.3					17.2	5.0	**17.2**
DPD1+DPD2+D3+DPC8A	D3	0.34	0.53	22.59	*7.60*	*11.96*	From DPD1		17.8	100	1.0	1.5	1.1					18.9	5.0	**18.9**
D4		0.08	0.35	3.26	*0.26*	*1.14*	100	4.0	12.0	50	1.0	1.5	0.6					12.6	5.0	**12.6**
OSD1+D4	D4	0.09	0.35	5.96	*0.51*	*2.11*	From OSD1		16.6	330	2.0	2.1	2.6					19.2	5.0	**19.2**
D5	D5	0.08	0.35	0.14	*0.01*	*0.05*	40	25.0	4.1	20	25.0	7.5	0.0					4.2	5.0	**5.0**
D6	D6	0.08	0.35	0.16	*0.01*	*0.06*	60	25.0	5.1	10	4.0	3.0	0.1					5.1	5.0	**5.1**
D7	D7	0.08	0.35	0.23	*0.02*	*0.08*	40	2.0	9.6	20	25.0	7.5	0.0					9.6	5.0	**9.6**

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REV. BY:	TDM
AGENCY:	El Paso County
REPORT TYPE:	Final
DATE:	4/2/2026

Drexel, Barrell & Co.

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	0.21	34.0	3.42	2.30	**7.8**
OSA @ 18" culvert (max capacity)	OSA1						**7.8**
A1	A1	0.18	0.90	5.0	0.16	5.17	**0.8**
A2		2.56	0.08	18.4	0.21	3.21	**0.7**
DPA1+A2	A2	2.74	0.13	21.4	0.37	2.98	**1.1**
A3	A3	4.15	0.08	26.0	0.35	2.70	**0.9**
A4		3.86	0.08	17.0	0.33	3.33	**1.1**
DPA3+A4	A4	8.02	0.08	29.0	0.68	2.53	**1.7**
A5		3.80	0.08	27.3	0.30	2.62	**0.8**
DPA2+DPA4+A5	A5	14.55	0.09	29.2	1.35	2.52	**3.4**
A6		0.69	0.08	13.3	0.05	3.70	**0.2**
DPA5+A6	A6	15.24	0.09	29.3	1.40	2.52	**3.5**
A7	A7	0.33	0.90	6.0	0.30	4.89	**1.5**
A8		1.03	0.08	15.3	0.08	3.49	**0.3**
DPA7+A8	A8	1.36	0.28	15.3	0.38	3.49	**1.3**
OSA1+A8							**9.2**
A9		1.86	0.13	10.6	0.24	4.04	**1.0**
DPA8+A9	A9	3.22	0.19	21.8	0.62	2.96	**1.8**
OSA1+A9							**9.7**
A10	A10	1.08	0.08	7.6	0.09	4.55	**0.4**
A11		0.10	0.90	5.0	0.09	5.17	**0.4**
B-BASINS							
RET090 (DBPS)							**36.0**
OSB1		0.87	0.42	7.9	0.37	4.49	**1.6**
OSB2		0.31	0.61	5.0	0.19	5.17	**1.0**
OSB3		0.52	0.76	5.0	0.40	5.17	**2.0**
B1		2.24	0.81	5.0	1.82	5.17	**9.4**
OSB1+B1	B1	3.12	0.70	9.2	2.18	4.25	**9.3**
B2		1.12	0.81	5.0	0.91	5.17	**4.7**
OSB2+B2	B2	1.43	0.77	5.8	1.10	4.94	**5.4**
B3	B3	0.44	0.90	5.0	0.40	5.17	**2.1**
B4		1.54	0.81	5.0	1.25	5.17	**6.5**
OSB3+B4	B4	2.07	0.80	6.6	1.65	4.74	**7.8**
DPB3+DP4	B4A	2.51	0.81	5.6	2.04	4.99	**10.2**
DPB1+DPB2+DPB4A	B4B	7.06	0.75	9.7	5.33	4.18	**22.3**
B5	B5	0.35	0.90	5.0	0.32	5.17	**1.6**

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PROJECT:	Commons at Falcon Field Filing 1
PROJECT NO:	21604-00
DESIGN BY:	CGH
REV. BY:	TDM
AGENCY:	El Paso County
REPORT TYPE:	Final
DATE:	4/2/2026

Drexel, Barrell & Co.

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)**
B6		0.50	0.90	5.0	0.45	5.17	**2.3**
DPB5+B6	B6	0.85	0.90	5.1	0.77	5.15	**3.9**
B7		1.57	0.81	5.0	1.28	5.17	**6.6**
DPB4B+DPB6+B7	B7	9.49	0.78	10.3	7.37	4.09	**30.1**
B8	B8	1.33	0.81	5.0	1.08	5.17	**5.6**
B9		1.76	0.90	7.1	1.58	4.65	**7.4**
DPB8+B9	B9	3.09	0.86	7.1	2.66	4.65	**12.4**
B10		1.18	0.90	5.2	1.06	5.10	**5.4**
DPB9+B10	B10	4.27	0.87	7.2	3.72	4.63	**17.2**
B11		1.20	0.08	5.2	0.10	5.12	**0.5**
DPB7+DPB10+B11	B11	14.96	0.75	10.6	11.19	4.04	**45.2**
B12		0.72	0.08	6.2	0.06	4.84	**0.3**
Pond A (TSB) Out							**1.0**
Pond B Out (Interim)							**0.3**
B12+Pond A+Pond B+RET090	B12						**37.6**
B13		0.19	0.08	5.0	0.02	5.17	**0.1**
B12+B13	B13						**37.7**
C-BASINS							
OSC1		0.33	0.90	5.0	0.29	5.17	**1.5**
C1	C1	0.37	0.90	5.0	0.33	5.17	**1.7**
C2		0.91	0.81	5.0	0.73	5.17	**3.8**
DPC1+C2	C2	1.27	0.84	6.8	1.06	4.71	**5.0**
C3	C3	1.08	0.81	5.1	0.87	5.15	**4.5**
OSC2		1.36	0.23	6.2	0.31	4.84	**1.5**
C4		2.62	0.81	5.0	2.12	5.17	**11.0**
OSC1+OSC2+C4	C4	4.31	0.63	7.6	2.73	4.54	**12.4**
C5		0.24	0.90	5.0	0.22	5.17	**1.1**
DPC3+C5	C5	1.32	0.83	5.1	1.09	5.14	**5.6**
C6		0.25	0.90	5.0	0.23	5.17	**1.2**
DPC5+C6	C6	1.58	0.84	5.2	1.32	5.11	**6.7**
DPC2+DPC4+DPC6	C6A	7.16	0.71	7.6	5.11	4.54	**23.2**
C7	C7	0.88	0.90	6.3	0.79	4.82	**3.8**
C8	C8	0.65	0.90	5.1	0.59	5.15	**3.0**
DPC6A+DPC7+DPC8	C8A	8.69	0.75	8.2	6.49	4.42	**28.7**
D-BASINS							
OSD1		2.70	0.09	16.6	0.25	3.37	**0.8**

PROJECT INFORMATION

PROJECT: Commons at Falcon Field Filing 1
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DATE: 4/2/2026

Drexel, Barrell & Co.

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)**
D1	D1	4.91	0.08	17.8	0.39	3.26	**1.3**
D2	D2	6.53	0.08	16.4	0.52	3.39	**1.8**
D3		2.46	0.08	17.2	0.20	3.31	**0.7**
DPD1+DPD2+D3+DPC8A	D3	22.59	0.34	18.9	7.60	3.17	**24.1**
D4		3.26	0.08	12.6	0.26	3.79	**1.0**
OSD1+D4	D4	5.96	0.09	19.2	0.51	3.15	**1.6**
D5	D5	0.14	0.08	5.0	0.01	5.17	**0.1**
Pond C Out (Interim condition)							**0.2**
D6	D6	0.16	0.08	5.1	0.01	5.14	**0.1**
D7		0.23	0.08	9.6	0.02	4.19	**0.1**
D7+POND OUT	D7						**0.3**

PROJECT INFORMATION

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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	34.0	7.36	3.85	**28.3**
OSA @ 18" culvert (max capacity)	OSA1						**11.3**
A1	A1	0.18	0.96	5.0	0.17	8.68	**1.5**
A2		2.56	0.35	18.4	0.90	5.39	**4.8**
DPA1+A2	A2	2.74	0.39	21.4	1.07	5.01	**5.4**
A3	A3	4.15	0.35	26.0	1.47	4.52	**6.6**
A4		3.86	0.35	17.0	1.36	5.59	**7.6**
DPA3+A4	A4	8.02	0.35	29.0	2.83	4.25	**12.0**
A5		3.80	0.35	27.3	1.33	4.40	**5.9**
DPA2+DPA4+A5	A5	14.55	0.36	29.2	5.23	4.23	**22.1**
A6		0.69	0.35	13.3	0.24	6.21	**1.5**
DPA5+A6	A6	15.24	0.36	29.3	5.47	4.22	**23.1**
A7	A7	0.33	0.96	6.0	0.32	8.22	**2.6**
A8		1.03	0.35	15.3	0.36	5.86	**2.1**
DPA7+A8	A8	1.36	0.50	15.3	0.68	5.86	**4.0**
OSA1+A8	A8A						**15.3**
A9		1.86	0.39	10.6	0.72	6.78	**4.9**
DPA8+A9	A9	3.22	0.43	21.8	1.40	4.96	**6.9**
OSA1+A9	A9A						**18.2**
A10	A10	1.08	0.35	7.6	0.38	7.64	**2.9**
A11		0.10	0.96	5.0	0.09	8.68	**0.8**
B-BASINS							
RET090 (DBPS)							**320.0**
OSB1		0.87	0.60	7.9	0.53	7.54	**4.0**
OSB2		0.31	0.74	5.0	0.23	8.68	**2.0**
OSB3		0.52	0.85	5.0	0.45	8.68	**3.9**
B1		2.24	0.88	5.0	1.98	8.68	**17.1**
OSB1+B1	B1	3.12	0.80	9.2	2.50	7.13	**17.8**
B2		1.12	0.88	5.0	0.99	8.68	**8.6**
OSB2+B2	B2	1.43	0.85	5.8	1.22	8.29	**10.1**
B3	B3	0.44	0.96	5.0	0.42	8.68	**3.7**
B4		1.54	0.88	5.0	1.36	8.68	**11.8**
OSB3+B4	B4	2.07	0.87	6.6	1.81	7.96	**14.4**
DPB3+DP4	B4A	2.51	0.89	5.6	2.23	8.37	**18.7**
DPB1+DPB2+DPB4A	B4B	7.06	0.84	9.7	5.95	7.01	**41.7**
B5	B5	0.35	0.96	5.0	0.34	8.68	**2.9**

PROJECT INFORMATION

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Drexel, Barrell & Co.

RATIONAL METHOD CALCULATIONS FOR STORM WATER RUNOFF

DEVELOPED RUNOFF 100 YR STORM P1= 2.52

			DIRECT RUNOFF				
BASIN (S)	**DESIGN POINT**	**AREA (AC)**	**RUNOFF COEFF**	**t_c (MIN)**	**C * A**	**I (IN/HR)**	**Q (CFS)**
B6		0.50	0.96	5.0	0.48	8.68	**4.2**
DPB5+B6	B6	0.85	0.96	5.1	0.82	8.64	**7.1**
B7		1.57	0.88	5.0	1.39	8.68	**12.0**
DPB4B+DPB6+B7	B7	9.49	0.86	10.3	8.15	6.87	**56.0**
B8	B8	1.33	0.88	5.0	1.17	8.68	**10.2**
B9		1.76	0.96	7.1	1.69	7.81	**13.2**
DPB8+B9	B9	3.09	0.93	7.1	2.86	7.81	**22.3**
B10		1.18	0.96	5.2	1.13	8.56	**9.7**
DPB9+B10	B10	4.27	0.94	7.2	3.99	7.77	**31.0**
B11		1.20	0.35	5.2	0.42	8.60	**3.6**
DPB7+DPB10+B11	B11	14.96	0.84	10.6	12.57	6.79	**85.3**
B12		0.72	0.35	6.2	0.25	8.13	**2.0**
Pond A (TSB) Out							**1.0**
Pond B Out (Ultimate)							**3.8**
B12+Pond A+Pond B+RET090	B12						**326.8**
B13		0.19	0.35	5.0	0.07	8.68	**0.6**
B12+B13	B13						**327.4**
C-BASINS							
OSC1		0.33	0.96	5.0	0.31	8.68	**2.7**
C1	C1	0.37	0.96	5.0	0.35	8.68	**3.1**
C2		0.91	0.88	5.0	0.80	8.68	**6.9**
DPC1+C2	C2	1.27	0.90	6.8	1.15	7.91	**9.1**
C3	C3	1.08	0.88	5.1	0.95	8.65	**8.2**
OSC2		1.36	0.46	6.2	0.63	8.12	**5.1**
C4		2.62	0.88	5.0	2.31	8.68	**20.0**
OSC1+OSC2+C4	C4	4.31	0.75	7.6	3.25	7.63	**24.8**
C5		0.24	0.96	5.0	0.23	8.68	**2.0**
DPC3+C5	C5	1.32	0.89	5.1	1.18	8.62	**10.2**
C6		0.25	0.96	5.0	0.24	8.68	**2.1**
DPC5+C6	C6	1.58	0.91	5.2	1.43	8.58	**12.2**
DPC2+DPC4+DPC6	C6A	7.16	0.79	7.6	5.62	7.63	**42.9**
C7	C7	0.88	0.96	6.3	0.84	8.10	**6.8**
C8	C8	0.65	0.96	5.1	0.63	8.65	**5.4**
DPC6A+DPC7+DPC8	C8A	8.69	0.82	8.2	7.09	7.43	**52.7**
D-BASINS							
OSD1		2.70	0.36	16.6	0.97	5.65	**5.5**

PROJECT INFORMATION

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DATE:	4/2/2026

Drexel, Barrell & Co.

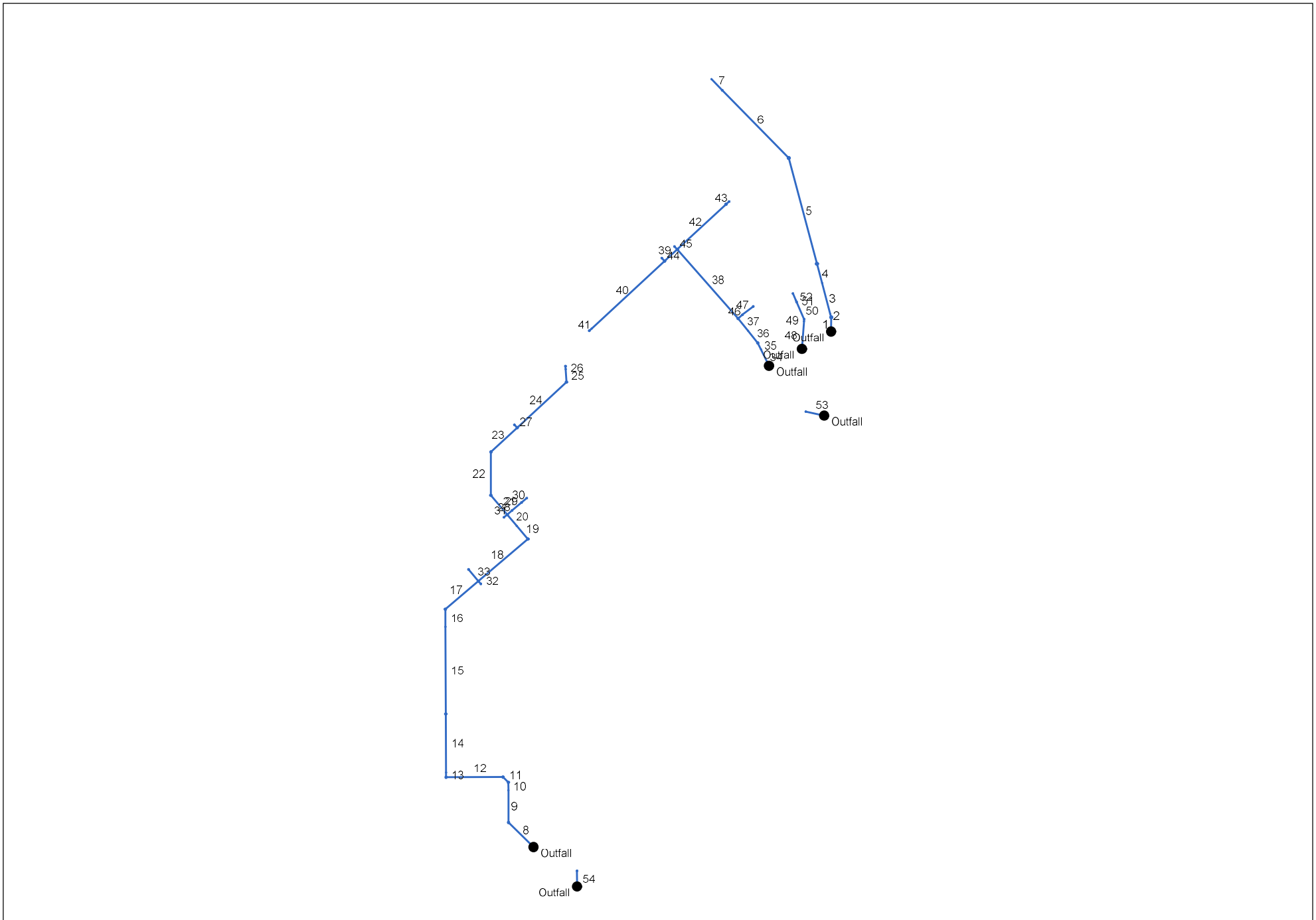
RATIONAL METHOD CALCULATIONS FOR STORM WATER RUNOFF

DEVELOPED RUNOFF 100 YR STORM P1= 2.52

			DIRECT RUNOFF				
BASIN (S)	**DESIGN POINT**	**AREA (AC)**	**RUNOFF COEFF**	**t_c (MIN)**	**C * A**	**I (IN/HR)**	**Q (CFS)**
D1	D1	4.91	0.35	17.8	1.72	5.47	**9.4**
D2	D2	6.53	0.35	16.4	2.29	5.68	**13.0**
D3		2.46	0.35	17.2	0.86	5.56	**4.8**
DPD1+DPD2+D3+DPC8A	D3	22.59	0.53	18.9	11.96	5.32	**63.6**
D4		3.26	0.35	12.6	1.14	6.36	**7.3**
OSD1+D4	D4	5.96	0.35	19.2	2.11	5.28	**11.2**
D5	D5	0.14	0.35	5.0	0.05	8.68	**0.4**
Pond C Out (Interim condition)							**1.0**
D6	D6	0.16	0.35	5.1	0.06	8.63	**0.5**
D7		0.23	0.35	9.6	0.08	7.03	**0.6**
D7+POND OUT	D7						**1.6**

Hydraulic Calculations

Hydraflow Storm Sewers Extension for Autodesk® Civil 3D® Plan



Project File: New.stm	Number of lines: 54	Date: 3/4/2026

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	CBC1	36.00	48x96	Box	39.284	6823.93	6824.87	2.393	6827.13	6825.73	0.13	6825.73	End	Manhole
2	CBC2	36.00	48x96	Box	9.887	6824.87	6825.11	2.425	6825.73	6825.97	0.06	6825.97	1	Manhole
3	CBC3	36.00	48x96	Box	87.780	6825.11	6827.21	2.392	6825.97	6828.07	0.06	6828.07	2	Manhole
4	CBC4	36.00	48x96	Box	55.222	6827.21	6828.54	2.409	6828.07	6829.40	0.06	6829.40	3	Manhole
5	CBC5	36.00	48x96	Box	302.466	6828.54	6835.79	2.397	6829.40	6836.65	0.24	6836.65	4	Manhole
6	CBC6	36.00	48x96	Box	262.178	6835.79	6846.00	3.894	6836.65	6846.86	0.06	6846.86	5	Manhole
7	CBC7	36.00	72x144	Box(2b)	43.152	6849.17	6849.39	0.510	6849.45	6849.80	0.21	6849.80	6	Manhole
8	19C	31.50	36	Cir	96.698	6801.57	6811.31	10.073	6802.88	6813.13	0.58	6813.13	End	Manhole
9	18C	31.50	36	Cir	89.298	6811.60	6813.39	2.005	6813.13	6815.21	0.12	6815.21	8	Manhole
10	17C	31.50	36	Cir	21.694	6813.39	6813.83	2.028	6815.21	6815.65	0.58	6815.65	9	Manhole
11	16C	31.50	36	Cir	20.939	6813.78	6814.20	2.008	6815.65	6816.02	n/a	6816.02 j	10	Manhole
12	15C	31.50	36	Cir	157.100	6814.50	6817.64	1.999	6816.02	6819.46	0.77	6819.46	11	Manhole
13	14C	31.50	36	Cir	13.500	6817.94	6818.21	2.000	6819.46	6820.03	0.12	6820.03	12	Manhole
14	13C	31.50	36	Cir	161.364	6818.21	6821.44	2.002	6820.03	6823.26	0.12	6823.26	13	Manhole
15	12C	31.50	36	Cir	240.450	6821.44	6829.30	3.269	6823.26	6831.12	0.12	6831.12	14	Manhole
16	11C	31.50	36	Cir	48.914	6829.30	6830.90	3.271	6831.12	6832.72	0.61	6832.72	15	Manhole
17	10C	31.50	36	Cir	119.927	6831.20	6832.60	1.167	6832.72	6834.42	0.77	6834.42	16	Manhole
18	9C	24.70	36	Cir	179.578	6832.60	6834.70	1.169	6834.42	6836.30	n/a	6836.30 j	17	Manhole
19	8C	24.70	36	Cir	47.500	6835.00	6835.55	1.157	6836.30	6837.15	0.10	6837.15	18	Manhole
20	7C	24.70	36	Cir	40.874	6835.55	6836.03	1.174	6837.15	6837.63	0.64	6837.63	19	Manhole
21	6C	5.50	24	Cir	70.009	6837.03	6839.74	3.872	6837.63	6840.57	0.22	6840.57	20	Manhole
22	5C	5.50	24	Cir	119.927	6840.04	6841.70	1.384	6840.66	6842.53	0.24	6842.53	21	Manhole
23	4C	5.50	24	Cir	98.561	6842.00	6843.06	1.076	6842.66	6843.89	0.31	6843.89	22	Manhole
24	3C	1.70	18	Cir	185.453	6843.66	6846.39	1.472	6844.03	6846.88	n/a	6846.88	23	Manhole

Project File: 5-yr Storm Sewer.stm | Number of lines: 54 | Run Date: 4/2/2026

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

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line Size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line Slope (%)	HGL Down (ft)	HGL Up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns Line No.	Junction Type
25	2C	1.70	18	Cir	35.323	6846.59	6846.94	0.991	6847.00	6847.43	n/a	6847.43	24	Manhole
26	1C	1.70	18	Cir	8.717	6846.94	6847.03	1.031	6847.43	6847.52	n/a	6847.52	25	Manhole
27	3C1	3.80	24	Cir	11.000	6843.16	6843.24	0.728	6843.89	6843.92	n/a	6843.92 j	23	Manhole
28	21C	6.80	24	Cir	17.683	6837.03	6837.21	1.019	6837.78	6838.13	0.05	6838.13	20	Manhole
29	22C	5.60	24	Cir	34.348	6837.21	6838.11	2.620	6838.13	6838.95	n/a	6838.95 j	28	Manhole
30	23C	4.50	24	Cir	19.013	6838.11	6838.24	0.686	6838.95	6838.99	0.28	6838.99	29	Manhole
31	20C	12.40	24	Cir	11.431	6837.03	6837.13	0.876	6838.13	6838.40	0.54	6838.40	20	Manhole
32	25C	3.00	18	Cir	10.182	6834.10	6834.50	3.928	6834.49	6835.16	0.25	6835.16	17	Manhole
33	24C	3.80	18	Cir	42.125	6834.10	6834.82	1.709	6834.64	6835.56	0.29	6835.56	17	Manhole
34	6B	28.50	36	Cir	50.137	6826.72	6830.27	7.080	6828.81	6832.00	n/a	6832.00 j	End	Manhole
35	7B	28.50	36	Cir	20.173	6830.27	6831.71	7.138	6832.00	6833.44	0.19	6833.44	34	Manhole
36	8B	28.50	36	Cir	43.511	6831.71	6832.14	0.989	6833.44	6833.87	0.11	6833.87	35	Manhole
37	9B	28.50	36	Cir	43.052	6832.14	6832.57	0.998	6833.87	6834.30	0.71	6834.30	36	Manhole
38	10B	24.60	36	Cir	254.442	6832.57	6837.61	1.981	6834.30	6839.21	n/a	6839.21 j	37	Manhole
39	3B	9.90	24	Cir	47.579	6838.60	6839.01	0.861	6839.57	6840.14	0.46	6840.14	38	Manhole
40	2B	2.10	18	Cir	274.159	6839.51	6845.48	2.178	6840.14	6846.03	n/a	6846.03 j	39	Manhole
41	1B	2.10	18	Cir	9.022	6845.48	6845.68	2.219	6846.03	6846.23	n/a	6846.23	40	Manhole
42	4B	9.30	24	Cir	183.819	6838.61	6840.44	0.996	6839.51	6841.53	n/a	6841.53	38	Manhole
43	5B	9.30	18	Cir	11.055	6840.94	6841.05	0.994	6842.04	6842.23	n/a	6842.23	42	Manhole
44	2B1	7.80	18	Cir	11.224	6839.51	6839.68	1.518	6840.35	6840.76	0.51	6840.76	39	Manhole
45	11B	5.40	18	Cir	11.088	6839.11	6839.21	0.903	6839.90	6840.10	n/a	6840.10	38	Manhole
46	13B	3.90	24	Cir	15.253	6833.57	6833.70	0.855	6834.30	6834.39	n/a	6834.39 j	37	Manhole
47	14B	1.60	24	Cir	38.000	6833.70	6833.80	0.262	6834.39	6834.41	0.06	6834.47	46	Manhole
48	15B	18.40	24	Cir	76.146	6827.51	6830.55	3.992	6828.81	6832.09	n/a	6832.09	End	Manhole

Project File: 5-yr Storm Sewer.stm | Number of lines: 54 | Run Date: 4/2/2026

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

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line Size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line Slope (%)	HGL Down (ft)	HGL Up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns Line No.	Junction Type
49	16B	18.40	24	Cir	6.000	6830.55	6830.79	4.004	6832.09	6832.33	n/a	6832.33	48	Manhole
50	17B	13.00	24	Cir	52.000	6830.79	6831.76	1.865	6832.33	6833.06	n/a	6833.06 j	49	Manhole
51	18B	5.60	24	Cir	5.373	6831.76	6831.82	1.118	6833.06	6832.66	0.05	6832.66	50	Manhole
52	19B	5.60	24	Cir	20.000	6831.82	6832.02	1.001	6832.66	6832.86	0.32	6832.86	51	Manhole
53	20B	0.30	18	Cir	52.000	6825.50	6826.00	0.962	6826.70	6826.20	n/a	6826.20	End	Manhole
54	PND C PIPE	0.20	30	Cir	43.089	6799.80	6800.00	0.465	6801.80	6801.80	0.00	6801.80	End	Manhole

Project File: 5-yr Storm Sewer.stm | Number of lines: 54 | Run Date: 4/2/2026

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

Hydraulic Grade Line Computations

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
			Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf		Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf	Ave Sf	Enrgy loss		
	(in)	(cfs)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(ft)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(%)	(ft)	(K)	(ft)
1	48 96 B	36.00	6823.93	6827.13	3.20	25.60	1.41	0.43	6827.56	0.000	39.284	6824.87	6825.73	0.86**	6.86	5.25	0.43	6826.16	0.000	0.000	n/a	0.30	0.13
2	48 96 B	36.00	6824.87	6825.73	0.86*	6.86	5.25	0.43	6826.16	0.000	9.887	6825.11	6825.97	0.86**	6.86	5.25	0.43	6826.40	0.000	0.000	n/a	0.15	0.06
3	48 96 B	36.00	6825.11	6825.97	0.86*	6.86	5.25	0.43	6826.40	0.000	87.780	6827.21	6828.07	0.86**	6.86	5.25	0.43	6828.50	0.000	0.000	n/a	0.15	0.06
4	48 96 B	36.00	6827.21	6828.07	0.86*	6.86	5.25	0.43	6828.50	0.000	55.222	6828.54	6829.40	0.86**	6.86	5.25	0.43	6829.83	0.000	0.000	n/a	0.15	0.06
5	48 96 B	36.00	6828.54	6829.40	0.86*	6.86	5.25	0.43	6829.83	0.000	302.466	6835.79	6836.65	0.86**	6.86	5.25	0.43	6837.08	0.000	0.000	n/a	0.55	0.24
6	48 96 B	36.00	6835.79	6836.65	0.86*	6.86	5.25	0.43	6837.08	0.000	262.178	6846.00	6846.86	0.86**	6.86	5.25	0.43	6847.29	0.000	0.000	n/a	0.15	0.06
7	72(2b) 144 B	36.00	6849.17	6849.45	0.28*	6.71	5.36	0.21	6849.66	0.000	43.152	6849.39	6849.80	0.41**	9.90	3.64	0.21	6850.01	0.000	0.000	n/a	1.00	0.21
8	36	31.50	6801.57	6802.88	1.31	2.97	10.62	0.77	6803.65	0.000	96.698	6811.31	6813.13	1.82**	4.48	7.03	0.77	6813.90	0.000	0.000	n/a	0.75	0.58
9	36	31.50	6811.60	6813.13	1.53	3.62	8.70	0.77	6813.90	0.000	89.298	6813.39	6815.21	1.82**	4.48	7.03	0.77	6815.98	0.000	0.000	n/a	0.15	0.12
10	36	31.50	6813.39	6815.21	1.82*	4.48	7.03	0.77	6815.98	0.000	21.694	6813.83	6815.65	1.82**	4.48	7.03	0.77	6816.42	0.000	0.000	n/a	0.75	0.58
11	36	31.50	6813.78	6815.65	1.87	4.48	6.80	0.77	6816.42	0.000	20.939	6814.20	6816.02 j	1.82**	4.48	7.03	0.77	6816.79	0.000	0.000	n/a	0.75	0.58
12	36	31.50	6814.50	6816.02	1.52	3.59	8.77	0.77	6816.79	0.000	157.100	6817.64	6819.46	1.82**	4.48	7.03	0.77	6820.23	0.000	0.000	n/a	1.00	0.77
13	36	31.50	6817.94	6819.46	1.52	3.59	8.77	0.77	6820.23	0.000	13.500	6818.21	6820.03	1.82**	4.48	7.03	0.77	6820.80	0.000	0.000	n/a	0.15	0.12
14	36	31.50	6818.21	6820.03	1.82*	4.48	7.03	0.77	6820.80	0.000	161.364	6821.44	6823.26	1.82**	4.48	7.03	0.77	6824.03	0.000	0.000	n/a	0.15	0.12
15	36	31.50	6821.44	6823.26	1.82*	4.48	7.03	0.77	6824.03	0.000	240.450	6829.30	6831.12	1.82**	4.48	7.03	0.77	6831.89	0.000	0.000	n/a	0.15	0.12
16	36	31.50	6829.30	6831.12	1.82*	4.48	7.03	0.77	6831.89	0.000	48.914	6830.90	6832.72	1.82**	4.48	7.03	0.77	6833.49	0.000	0.000	n/a	0.80	0.61
17	36	31.50	6831.20	6832.72	1.52	3.59	8.77	0.77	6833.49	0.000	119.927	6832.60	6834.42	1.82**	4.48	7.03	0.77	6835.19	0.000	0.000	n/a	1.00	0.77
18	36	24.70	6832.60	6834.42	1.82	3.84	5.51	0.64	6835.06	0.000	179.578	6834.70	6836.30 j	1.60**	3.84	6.43	0.64	6836.95	0.000	0.000	n/a	1.00	0.64
19	36	24.70	6835.00	6836.30	1.30	2.94	8.40	0.64	6836.95	0.000	47.500	6835.55	6837.15	1.60**	3.84	6.43	0.64	6837.80	0.000	0.000	n/a	0.15	0.10

Project File: 5-yr Storm Sewer.stm | Number of lines: 54 | Run Date: 4/2/2026

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

Hydraulic Grade Line Computations

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
			Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf		Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf	Ave Sf	Enrgy loss		
	(in)	(cfs)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(ft)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(%)	(ft)	(K)	(ft)
20	36	24.70	6835.55	6837.15	1.60*	3.84	6.43	0.64	6837.80	0.000	40.874	6836.03	6837.63	1.60**	3.84	6.43	0.64	6838.28	0.000	0.000	n/a	1.00	0.64
21	24	5.50	6837.03	6837.63	0.60	0.80	6.91	0.31	6837.94	0.000	70.009	6839.74	6840.57	0.83**	1.23	4.48	0.31	6840.88	0.000	0.000	n/a	0.70	0.22
22	24	5.50	6840.04	6840.66	0.62*	0.82	6.67	0.31	6840.97	0.000	119.927	6841.70	6842.53	0.83**	1.23	4.48	0.31	6842.84	0.000	0.000	n/a	0.77	0.24
23	24	5.50	6842.00	6842.66	0.66*	0.90	6.09	0.31	6842.97	0.000	98.561	6843.06	6843.89	0.83**	1.23	4.48	0.31	6844.20	0.000	0.000	n/a	1.00	0.31
24	18	1.70	6843.66	6844.03	0.37*	0.34	5.01	0.18	6844.21	0.000	185.453	6846.39	6846.88	0.49**	0.50	3.39	0.18	6847.06	0.000	0.000	n/a	0.81	n/a
25	18	1.70	6846.59	6847.00	0.41*	0.39	4.35	0.18	6847.18	0.000	35.323	6846.94	6847.43	0.49**	0.50	3.39	0.18	6847.61	0.000	0.000	n/a	0.15	n/a
26	18	1.70	6846.94	6847.43	0.49*	0.50	3.39	0.18	6847.61	0.000	8.717	6847.03	6847.52	0.49**	0.50	3.39	0.18	6847.70	0.000	0.000	n/a	1.00	n/a
27	24	3.80	6843.16	6843.89	0.73	0.95	3.68	0.25	6844.14	0.000	11.000	6843.24	6843.92 j	0.68**	0.95	4.02	0.25	6844.17	0.000	0.000	n/a	1.00	n/a
28	24	6.80	6837.03	6837.78	0.75*	1.07	6.34	0.36	6838.14	0.000	17.683	6837.21	6838.13	0.92**	1.42	4.79	0.36	6838.49	0.000	0.000	n/a	0.15	0.05
29	24	5.60	6837.21	6838.13	0.92	1.24	3.95	0.32	6838.45	0.000	34.348	6838.11	6838.95 j	0.83**	1.24	4.51	0.32	6839.26	0.000	0.000	n/a	0.15	0.05
30	24	4.50	6838.11	6838.95	0.83	1.07	3.62	0.28	6839.22	0.000	19.013	6838.24	6838.99	0.75**	1.07	4.22	0.28	6839.26	0.000	0.000	n/a	1.00	0.28
31	24	12.40	6837.03	6838.13	1.10*	1.77	7.00	0.54	6838.68	0.000	11.431	6837.13	6838.40	1.27**	2.09	5.92	0.54	6838.94	0.000	0.000	n/a	1.00	0.54
32	18	3.00	6834.10	6834.49	0.38*	0.36	8.37	0.25	6834.74	0.000	10.182	6834.50	6835.16	0.66**	0.75	4.02	0.25	6835.41	0.000	0.000	n/a	1.00	0.25
33	18	3.80	6834.10	6834.64	0.54*	0.57	6.64	0.29	6834.93	0.000	42.125	6834.82	6835.56	0.74**	0.88	4.34	0.29	6835.86	0.000	0.000	n/a	1.00	0.29
34	36	28.50	6826.72	6828.81	2.09	4.21	5.42	0.71	6829.52	0.000	50.137	6830.27	6832.00 j	1.73**	4.21	6.77	0.71	6832.71	0.000	0.000	n/a	0.15	0.11
35	36	28.50	6830.27	6832.00	1.73*	4.21	6.77	0.71	6832.71	0.000	20.173	6831.71	6833.44	1.73**	4.21	6.77	0.71	6834.15	0.000	0.000	n/a	0.26	0.19
36	36	28.50	6831.71	6833.44	1.73*	4.21	6.77	0.71	6834.15	0.000	43.511	6832.14	6833.87	1.73**	4.21	6.77	0.71	6834.58	0.000	0.000	n/a	0.15	0.11
37	36	28.50	6832.14	6833.87	1.73*	4.21	6.77	0.71	6834.58	0.000	43.052	6832.57	6834.30	1.73**	4.21	6.77	0.71	6835.01	0.000	0.000	n/a	1.00	0.71
38	36	24.60	6832.57	6834.30	1.73	3.83	5.84	0.64	6834.94	0.000	254.442	6837.61	6839.21 j	1.60**	3.83	6.43	0.64	6839.85	0.000	0.000	n/a	1.00	n/a
39	24	9.90	6838.60	6839.57	0.97*	1.50	6.58	0.46	6840.03	0.000	47.579	6839.01	6840.14	1.13**	1.82	5.44	0.46	6840.60	0.000	0.000	n/a	1.00	0.46
40	18	2.10	6839.51	6840.14	0.63	0.58	3.01	0.20	6840.34	0.000	274.159	6845.48	6846.03 j	0.55**	0.58	3.61	0.20	6846.23	0.000	0.000	n/a	0.15	n/a
41	18	2.10	6845.48	6846.03	0.55*	0.58	3.61	0.20	6846.23	0.000	9.022	6845.68	6846.23	0.55**	0.58	3.61	0.20	6846.43	0.000	0.000	n/a	1.00	n/a

Project File: 5-yr Storm Sewer.stm | Number of lines: 54 | Run Date: 4/2/2026

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

Hydraulic Grade Line Computations

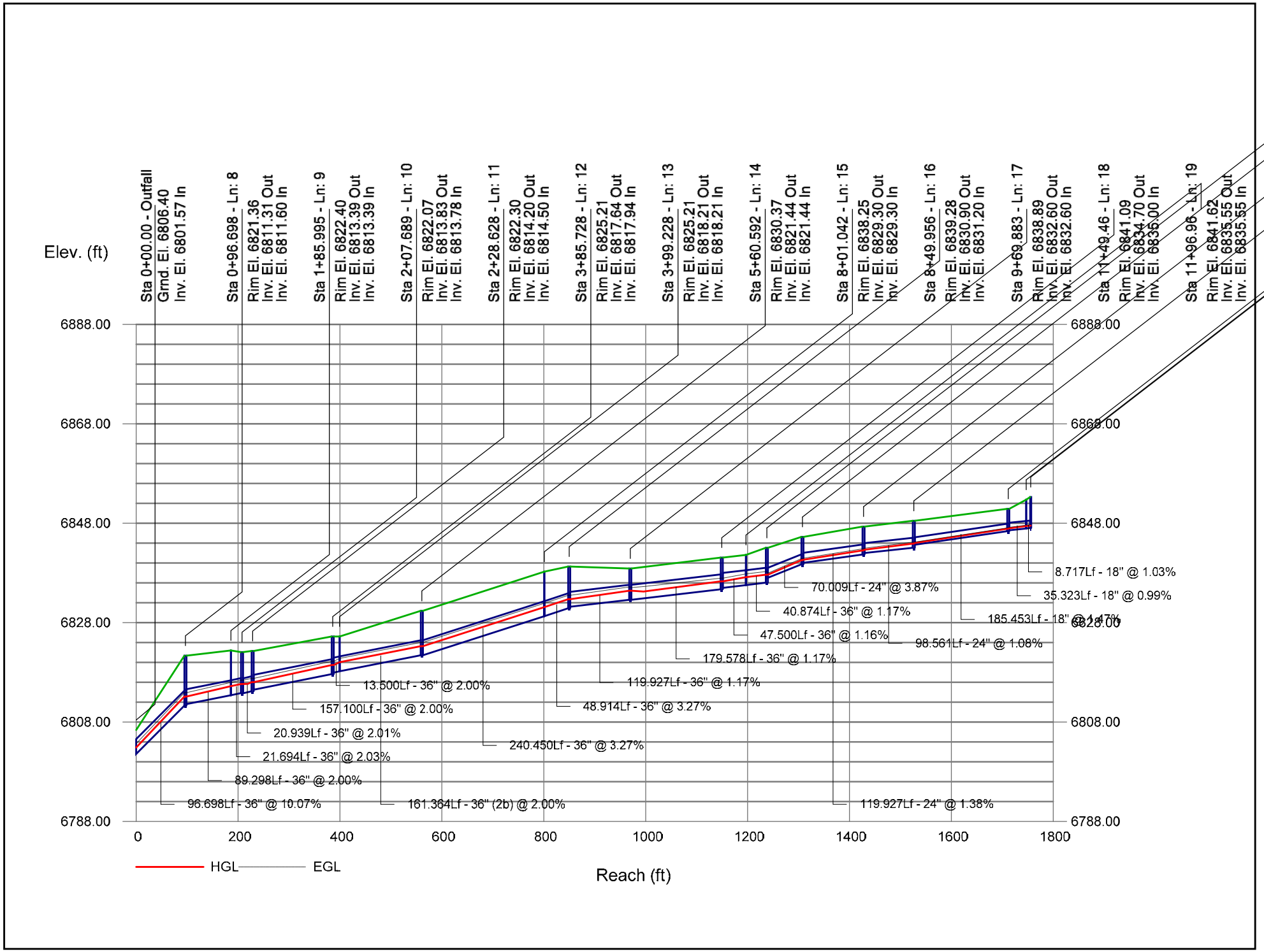
Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
			Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf		Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf	Ave Sf	Enrgy loss		
	(in)	(cfs)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(ft)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(%)	(ft)	(K)	(ft)
42	24	9.30	6838.61	6839.51	0.90*	1.36	6.83	0.44	6839.95	0.000	183.819	6840.44	6841.53	1.09**	1.75	5.32	0.44	6841.97	0.000	0.000	n/a	0.15	n/a
43	18	9.30	6840.94	6842.04	1.10*	1.39	6.69	0.61	6842.65	0.000	11.055	6841.05	6842.23	1.18**	1.49	6.25	0.61	6842.83	0.000	0.000	n/a	1.00	n/a
44	18	7.80	6839.51	6840.35	0.84*	1.02	7.66	0.51	6840.86	0.000	11.224	6839.68	6840.76	1.08**	1.36	5.72	0.51	6841.27	0.000	0.000	n/a	1.00	0.51
45	18	5.40	6839.11	6839.90	0.79*	0.94	5.75	0.38	6840.27	0.000	11.088	6839.21	6840.10	0.89**	1.10	4.91	0.38	6840.48	0.000	0.000	n/a	1.00	n/a
46	24	3.90	6833.57	6834.30	0.73	0.96	3.79	0.25	6834.55	0.000	15.253	6833.70	6834.39 j	0.69**	0.96	4.04	0.25	6834.65	0.000	0.000	n/a	0.15	0.04
47	24	1.60	6833.70	6834.39	0.69	0.96	1.66	0.04	6834.44	0.076	38.000	6833.80	6834.41	0.61	0.82	1.96	0.06	6834.47	0.120	0.098	0.037	1.00	0.06
48	24	18.40	6827.51	6828.81	1.30	2.16	8.51	0.78	6829.59	0.000	76.146	6830.55	6832.09	1.54**	2.60	7.07	0.78	6832.87	0.000	0.000	n/a	0.15	n/a
49	24	18.40	6830.55	6832.09	1.54*	2.60	7.07	0.78	6832.87	0.000	6.000	6830.79	6832.33	1.54**	2.60	7.07	0.78	6833.11	0.000	0.000	n/a	0.52	n/a
50	24	13.00	6830.79	6832.33	1.54	2.15	5.00	0.57	6832.90	0.000	52.000	6831.76	6833.06 j	1.30**	2.15	6.03	0.57	6833.62	0.000	0.000	n/a	0.15	0.08
51	24	5.60	6831.76	6833.06	1.30	1.24	2.60	0.32	6833.37	0.000	5.373	6831.82	6832.66	0.83**	1.24	4.51	0.32	6832.97	0.000	0.000	n/a	0.15	0.05
52	24	5.60	6831.82	6832.66	0.83*	1.24	4.51	0.32	6832.97	0.000	20.000	6832.02	6832.86	0.83**	1.24	4.51	0.32	6833.17	0.000	0.000	n/a	1.00	0.32
53	18	0.30	6825.50	6826.70	1.20	0.14	0.20	0.07	6826.77	0.000	52.000	6826.00	6826.20	0.20**	0.14	2.12	0.07	6826.27	0.000	0.000	n/a	1.00	n/a
54	30	0.20	6799.80	6801.80	2.00	4.21	0.05	0.00	6801.80	0.000	43.089	6800.00	6801.80	1.80	3.78	0.05	0.00	6801.80	0.000	0.000	0.000	1.00	0.00

Project File: 5-yr Storm Sewer.stm | Number of lines: 54 | Run Date: 4/2/2026

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

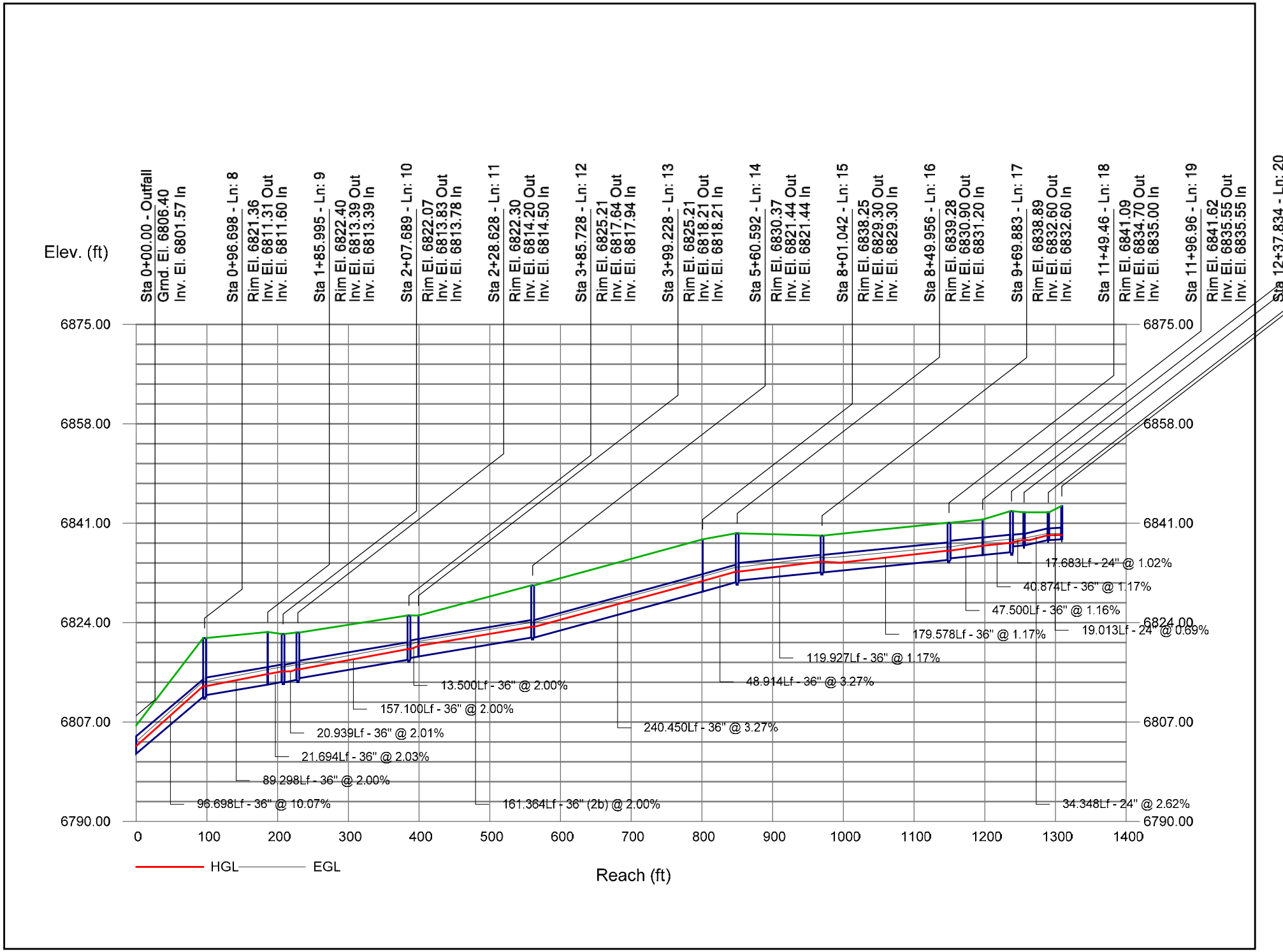
Storm Sewer Profile

Proj. file: 5-yr Storm Sewer.stm



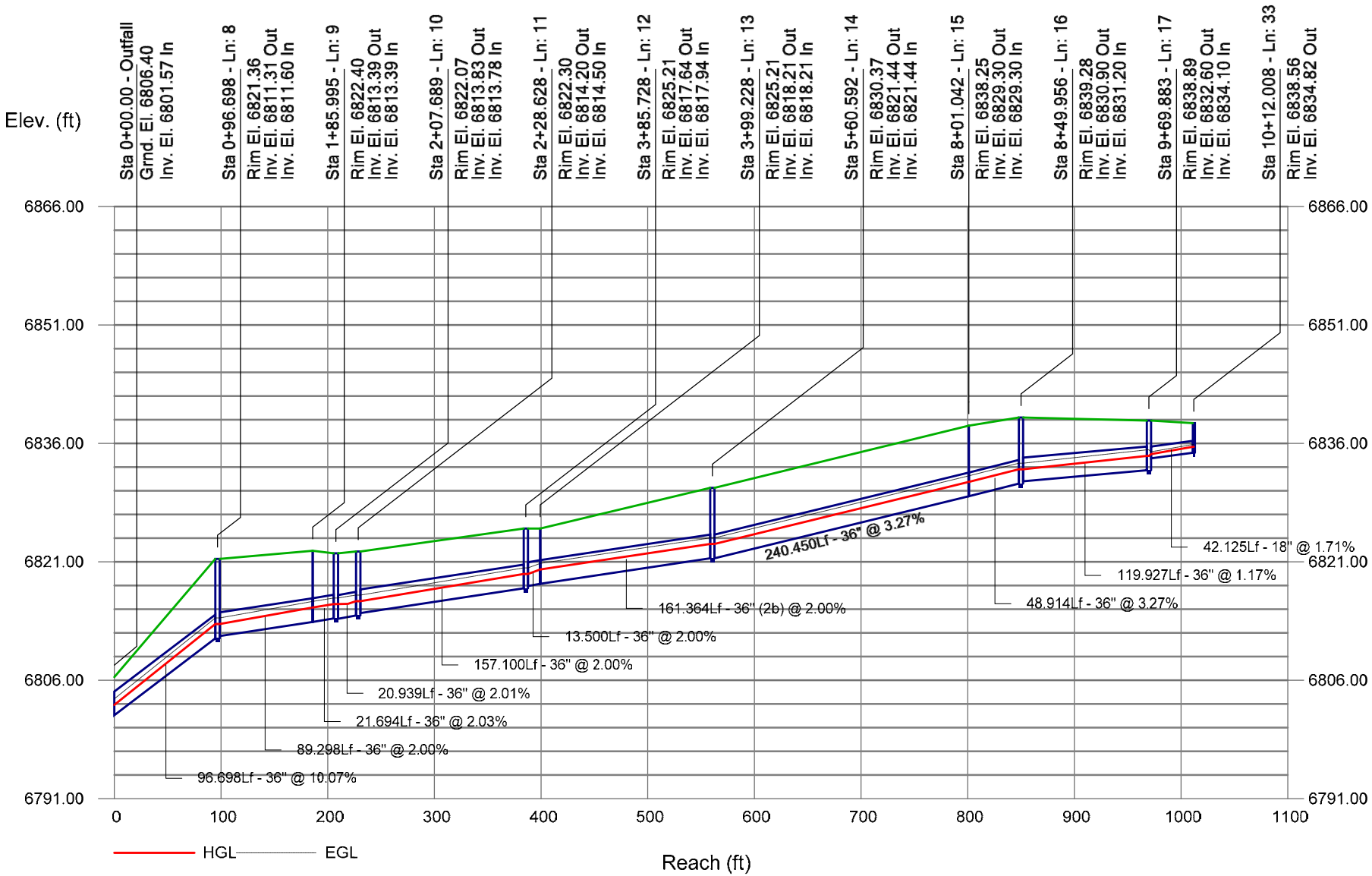
Storm Sewer Profile

Proj. file: 5-yr Storm Sewer.stm



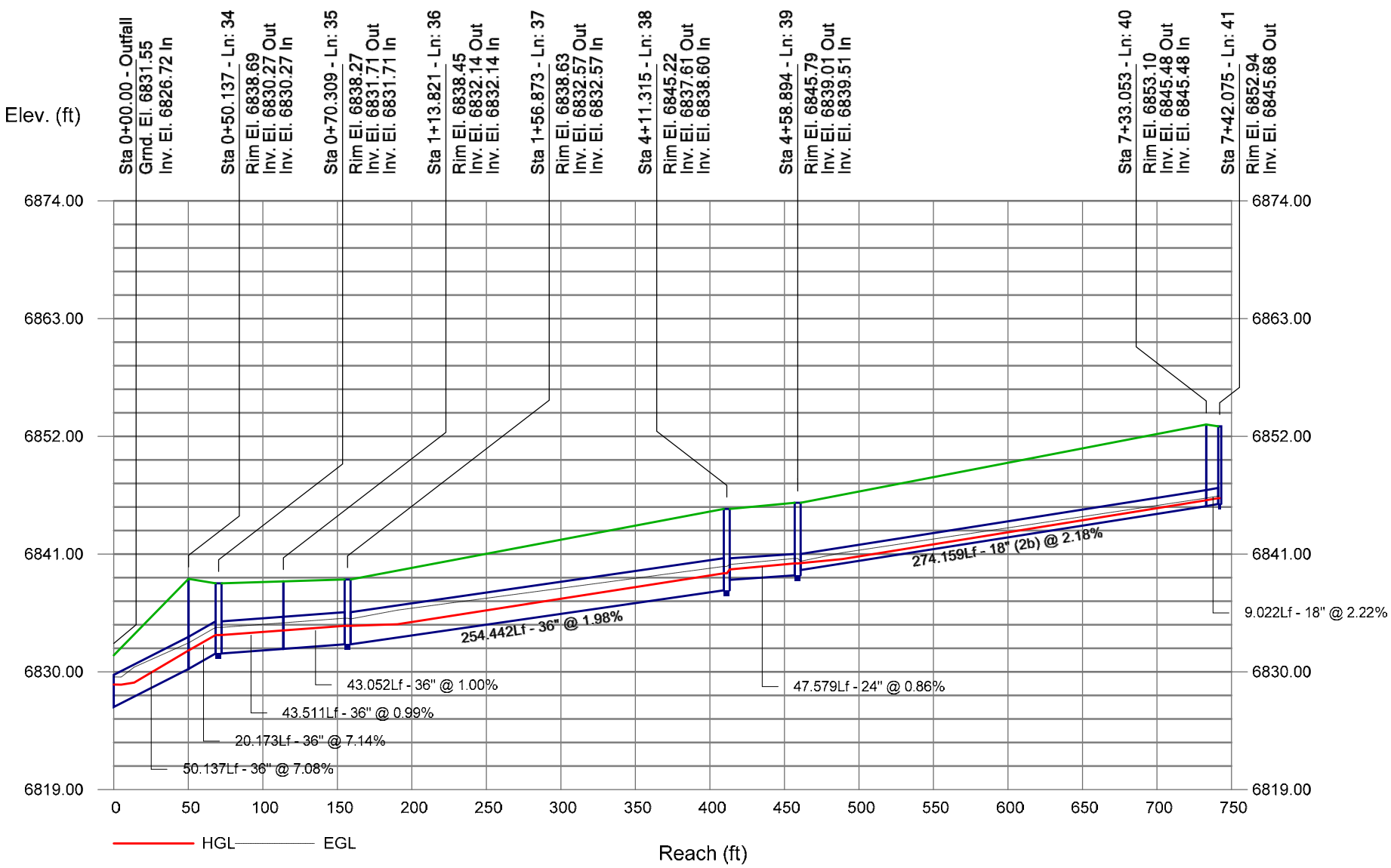
Storm Sewer Profile

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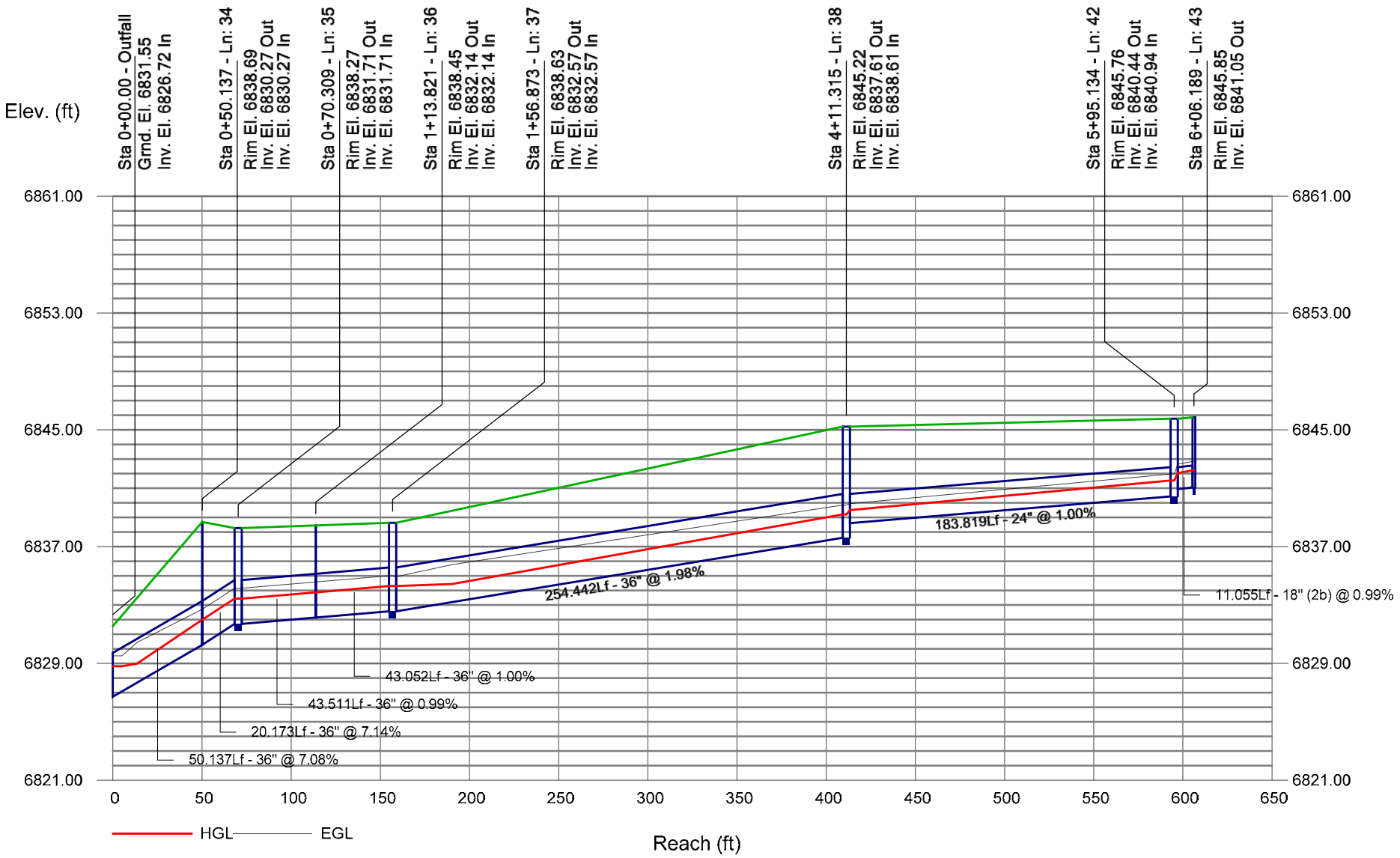
Storm Sewer Profile

Proj. file: 5-yr Storm Sewer.stm



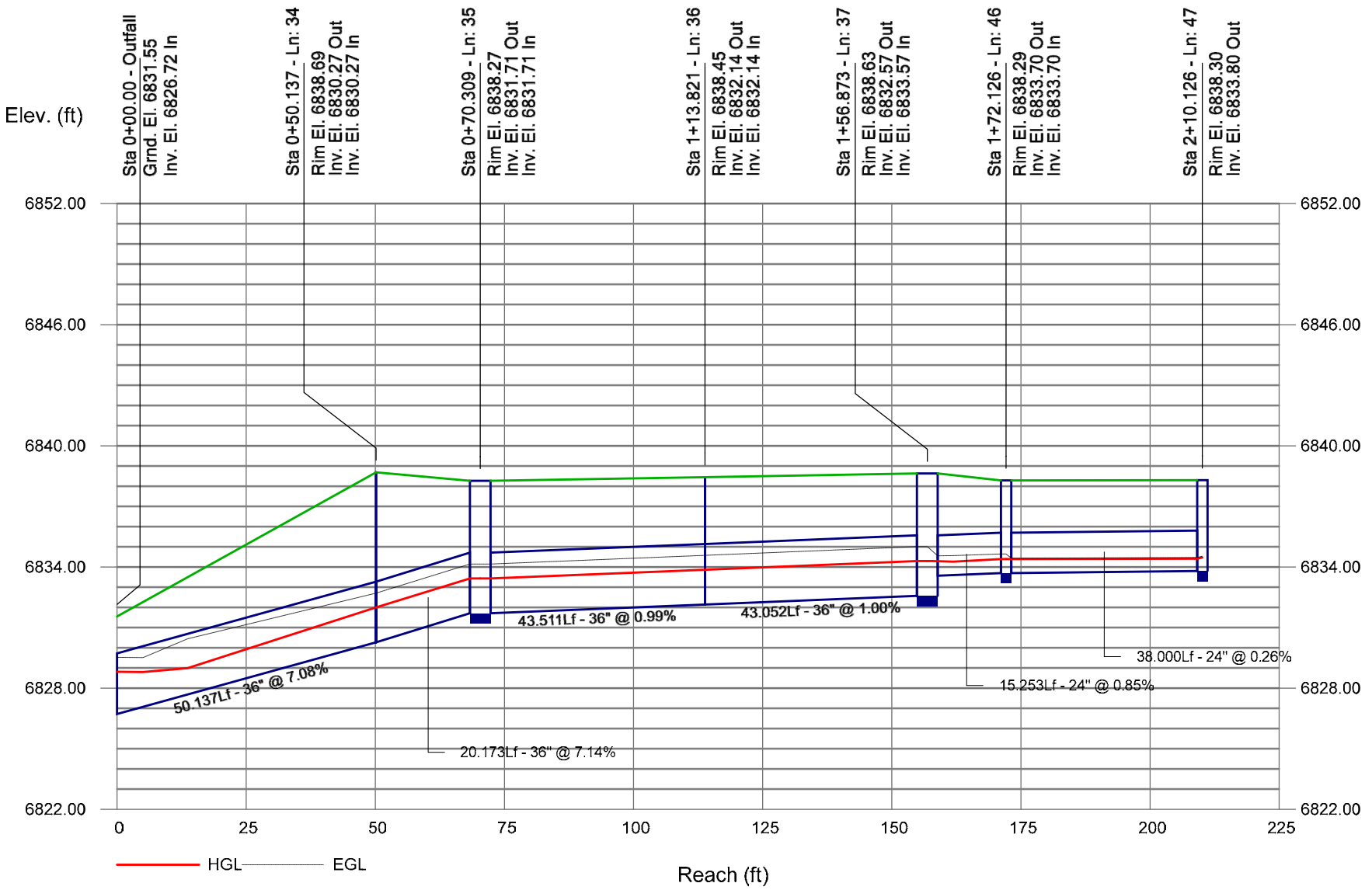
Storm Sewer Profile

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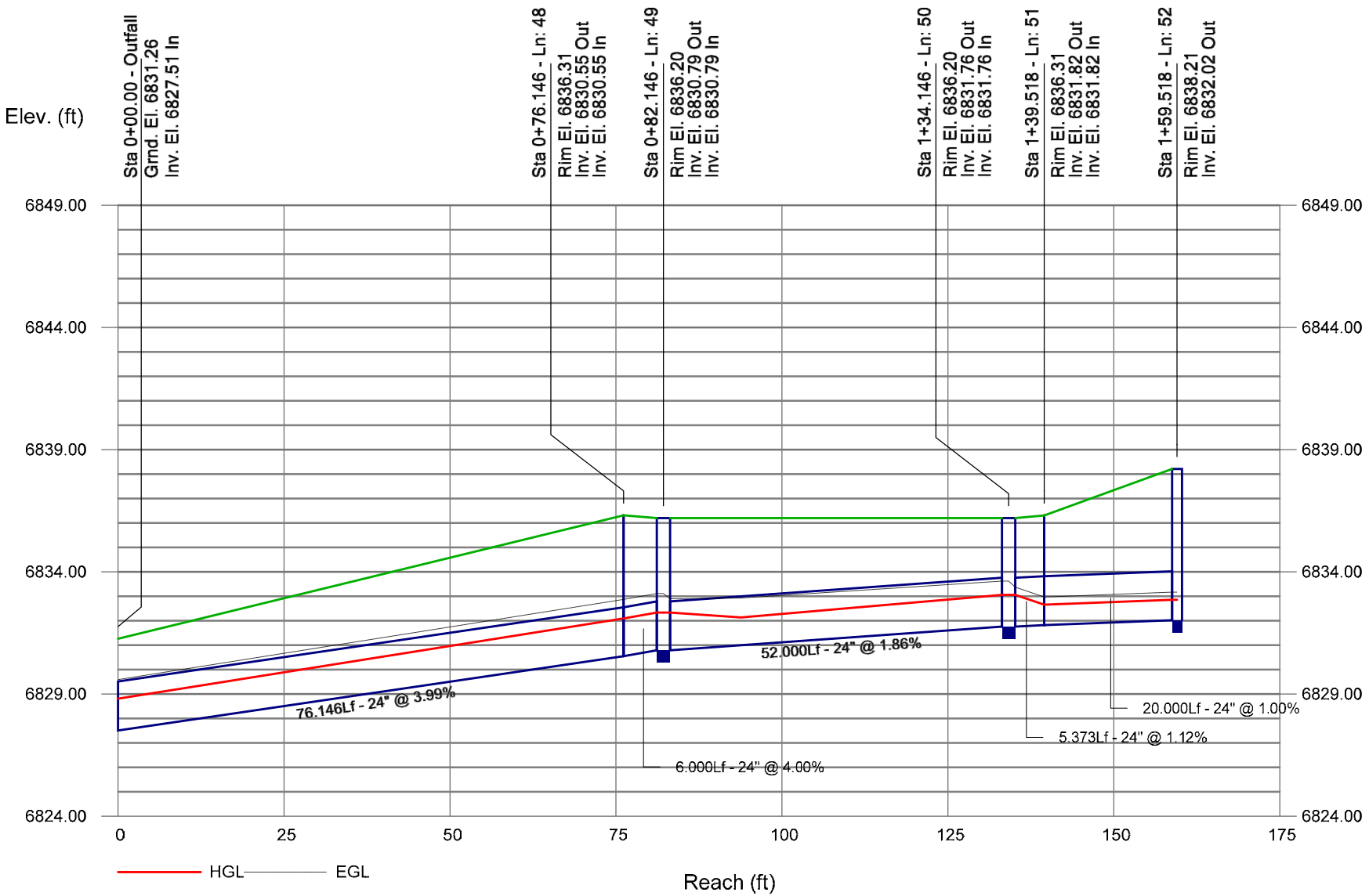
Storm Sewer Profile

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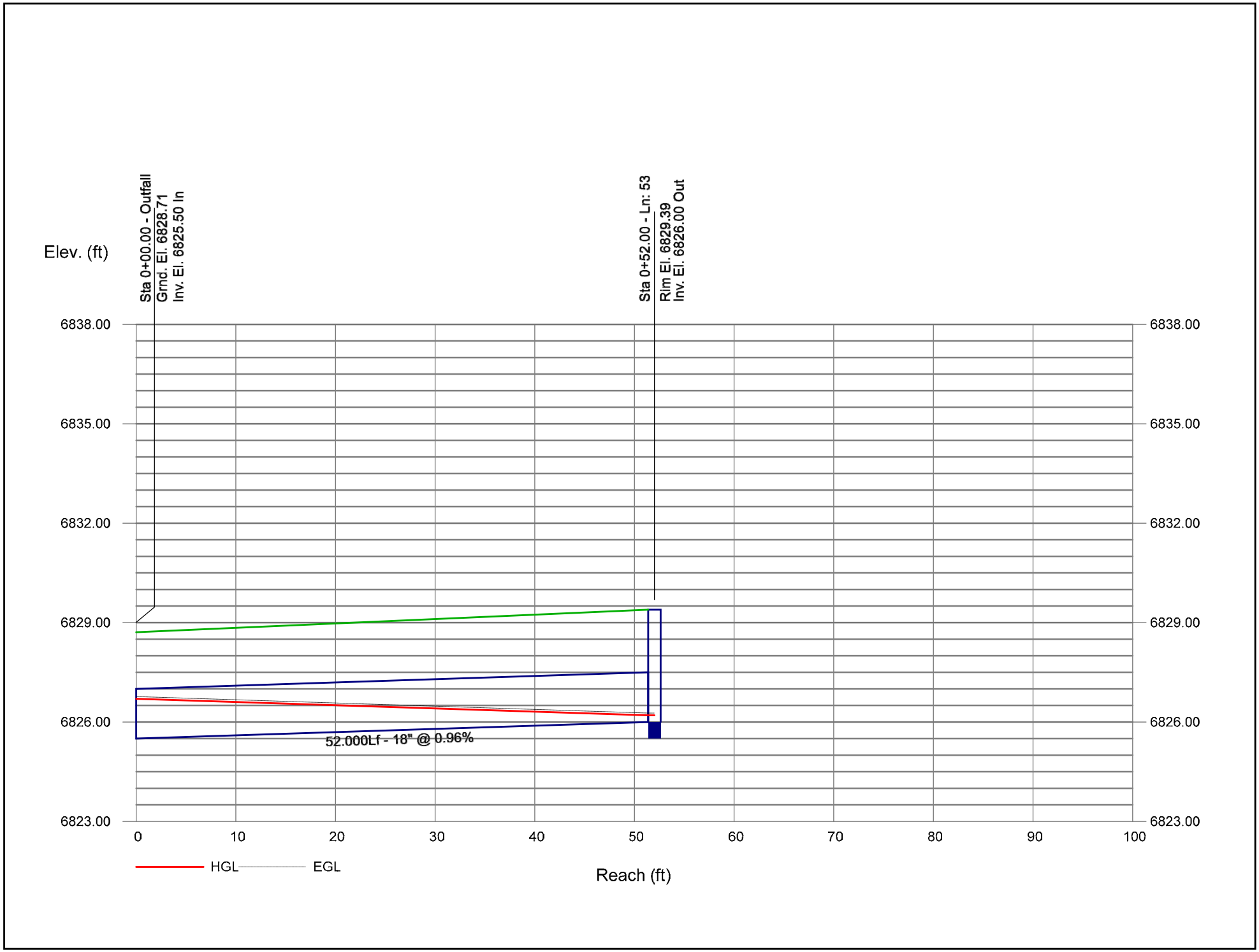
Storm Sewer Profile

Proj. file: 5-yr Storm Sewer.stm



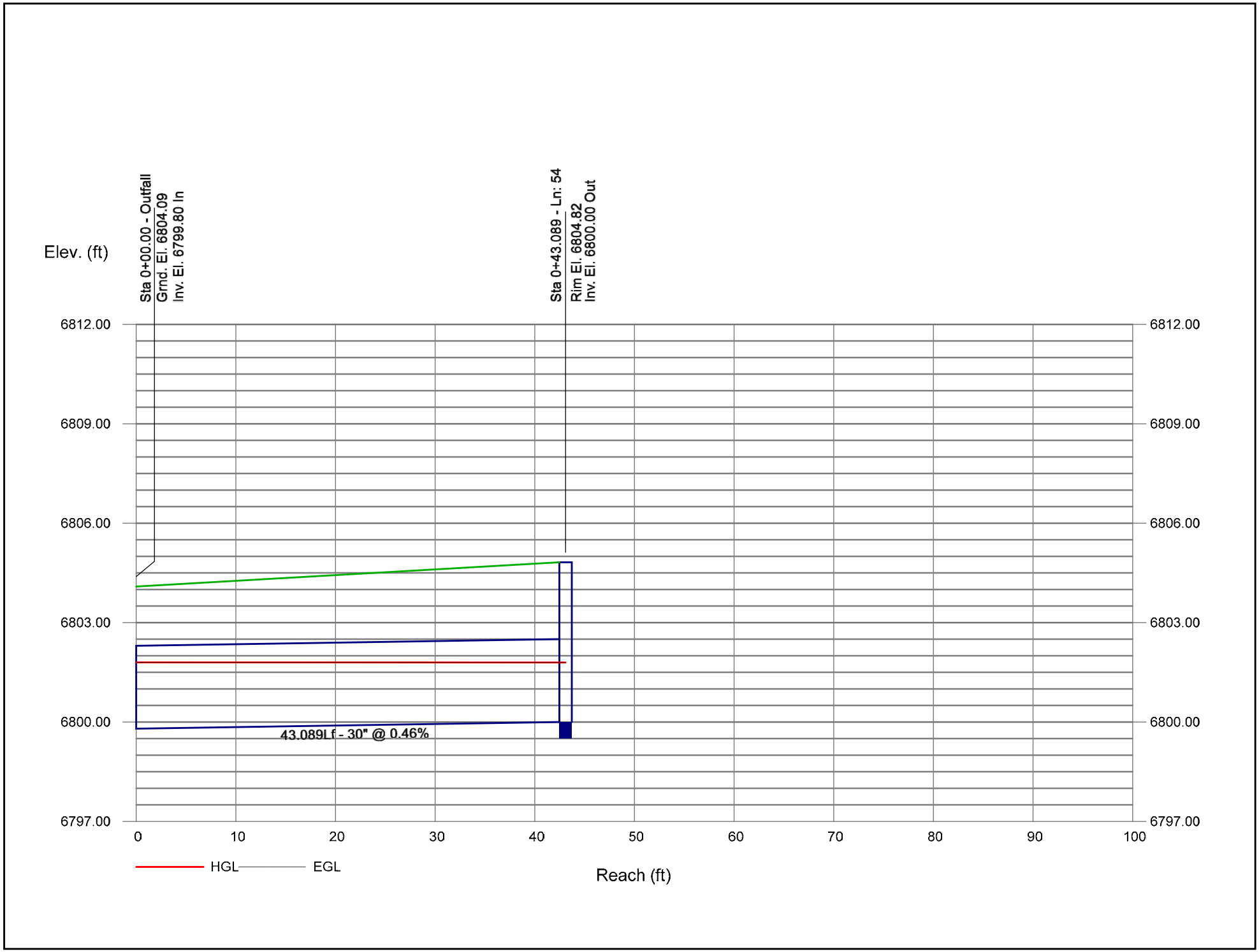
Storm Sewer Profile

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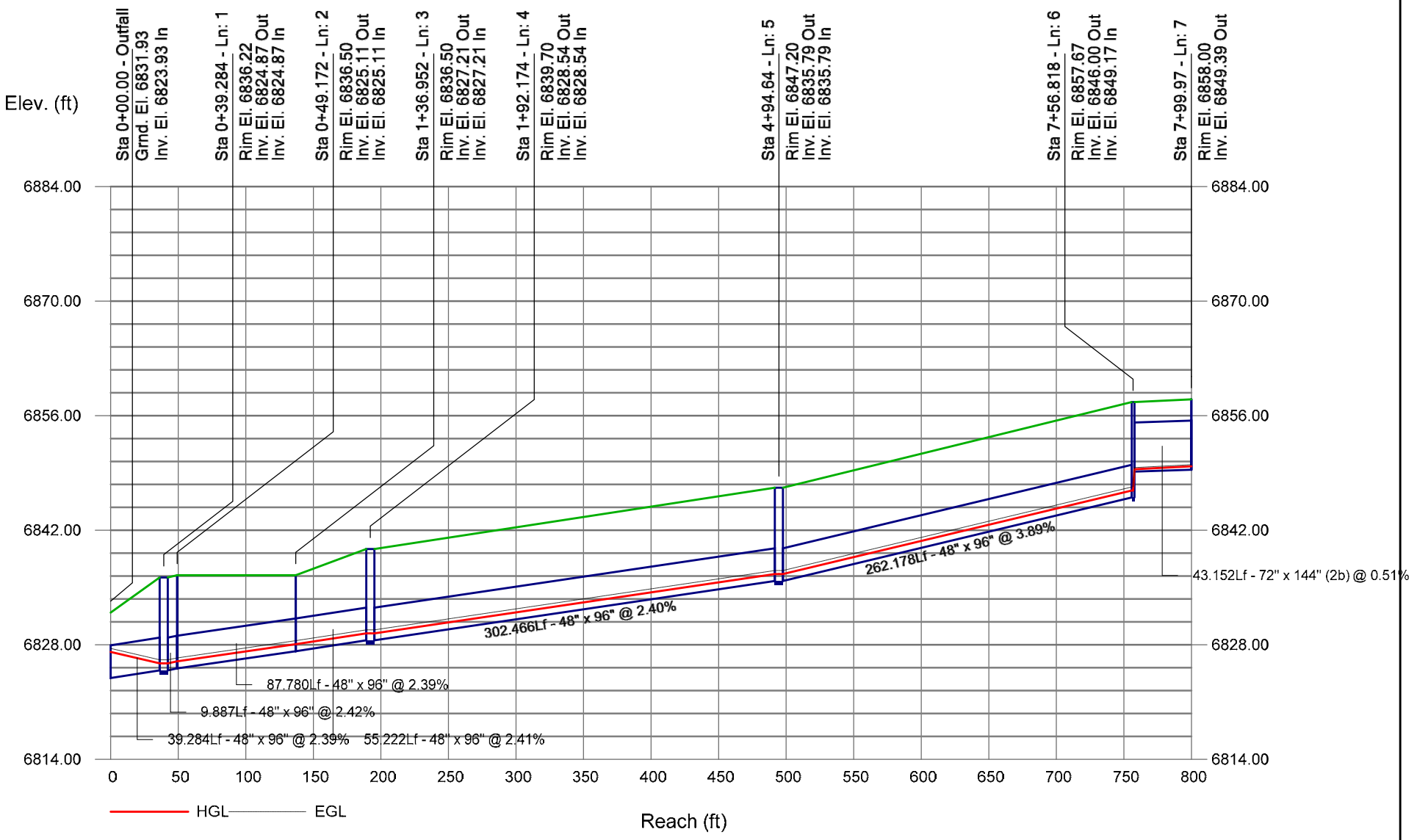
Storm Sewer Profile

Proj. file: 5-yr Storm Sewer.stm



Storm Sewer Profile

Proj. file: 5-yr Storm Sewer.stm



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	CBC1	320.0	48x96	Box	39.284	6823.93	6824.87	2.393	6827.93	6828.54	n/a	6828.54 j	End	Manhole
2	CBC2	320.0	48x96	Box	9.887	6824.87	6825.11	2.425	6828.54	6828.78	0.28	6828.78	1	Manhole
3	CBC3	320.0	48x96	Box	87.780	6825.11	6827.21	2.392	6828.78	6830.88	0.28	6830.88	2	Manhole
4	CBC4	320.0	48x96	Box	55.222	6827.21	6828.54	2.409	6830.88	6832.21	0.28	6832.21	3	Manhole
5	CBC5	320.0	48x96	Box	302.466	6828.54	6835.79	2.397	6832.21	6839.46	1.01	6839.46	4	Manhole
6	CBC6	320.0	48x96	Box	262.178	6835.79	6846.00	3.894	6839.46	6849.67	0.28	6849.67	5	Manhole
7	CBC7	320.0	72x144	Box(2b)	43.152	6849.17	6849.39	0.510	6850.27	6851.16	n/a	6851.16	6	Manhole
8	19C	59.30	36	Cir	96.698	6801.57	6811.31	10.073	6805.08	6813.80	n/a	6813.80	End	Manhole
9	18C	59.30	36	Cir	89.298	6811.60	6813.39	2.005	6813.80	6815.88	n/a	6815.88	8	Manhole
10	17C	59.30	36	Cir	21.694	6813.39	6813.83	2.028	6815.88	6816.32	n/a	6816.32	9	Manhole
11	16C	59.30	36	Cir	20.939	6813.78	6814.20	2.008	6816.32	6816.69	n/a	6816.69	10	Manhole
12	15C	59.30	36	Cir	157.100	6814.50	6817.64	1.999	6816.69	6820.13	n/a	6820.13	11	Manhole
13	14C	59.30	36	Cir	13.500	6817.94	6818.21	2.000	6820.13	6820.70	n/a	6820.70	12	Manhole
14	13C	59.30	36	Cir	161.364	6818.21	6821.44	2.002	6820.70	6823.93	n/a	6823.93	13	Manhole
15	12C	59.30	36	Cir	240.450	6821.44	6829.30	3.269	6823.93	6831.79	n/a	6831.79	14	Manhole
16	11C	59.30	36	Cir	48.914	6829.30	6830.90	3.271	6831.79	6833.39	n/a	6833.39	15	Manhole
17	10C	59.30	36	Cir	119.927	6831.20	6832.60	1.167	6833.39	6835.09	n/a	6835.09	16	Manhole
18	9C	47.10	36	Cir	179.578	6832.60	6834.70	1.169	6835.09	6836.93	n/a	6836.93 j	17	Manhole
19	8C	47.10	36	Cir	47.500	6835.00	6835.55	1.157	6836.93	6837.78	n/a	6837.78	18	Manhole
20	7C	47.10	36	Cir	40.874	6835.55	6836.03	1.174	6837.78	6838.26	n/a	6838.26	19	Manhole
21	6C	10.00	24	Cir	70.009	6837.03	6839.74	3.872	6838.26	6840.87	n/a	6840.87 j	20	Manhole
22	5C	10.00	24	Cir	119.927	6840.04	6841.70	1.384	6840.89	6842.83	0.36	6842.83	21	Manhole
23	4C	10.00	24	Cir	98.561	6842.00	6843.06	1.076	6842.91	6844.19	0.46	6844.19	22	Manhole
24	3C	3.10	18	Cir	185.453	6843.66	6846.39	1.472	6844.19	6847.06	0.21	6847.06	23	Manhole

Project File: 100-yr Storm Sewer.stm | Number of lines: 54 | Run Date: 4/2/2026

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

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line Size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line Slope (%)	HGL Down (ft)	HGL Up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns Line No.	Junction Type
25	2C	3.10	18	Cir	35.323	6846.59	6846.94	0.991	6847.15	6847.61	0.04	6847.61	24	Manhole
26	1C	3.10	18	Cir	8.717	6846.94	6847.03	1.031	6847.61	6847.70	0.26	6847.70	25	Manhole
27	3C1	6.90	24	Cir	11.000	6843.16	6843.24	0.728	6844.19	6844.17	n/a	6844.17	23	Manhole
28	21C	12.30	24	Cir	17.683	6837.03	6837.21	1.019	6838.26	6838.47	0.08	6838.47	20	Manhole
29	22C	10.20	24	Cir	34.348	6837.21	6838.11	2.620	6838.47	6839.25	n/a	6839.25 j	28	Manhole
30	23C	8.20	24	Cir	19.013	6838.11	6838.24	0.686	6839.25	6839.26	n/a	6839.26	29	Manhole
31	20C	24.80	24	Cir	11.431	6837.03	6837.13	0.876	6839.03	6839.13	0.97	6840.10	20	Manhole
32	25C	5.40	18	Cir	10.182	6834.10	6834.50	3.928	6835.09	6835.40	n/a	6835.40 j	17	Manhole
33	24C	6.80	18	Cir	42.125	6834.10	6834.82	1.709	6835.09	6835.83	n/a	6835.83	17	Manhole
34	6B	53.10	36	Cir	50.137	6826.72	6830.27	7.080	6830.12	6832.64	n/a	6832.64	End	Manhole
35	7B	53.10	36	Cir	20.173	6830.27	6831.71	7.138	6832.64	6834.08	n/a	6834.08	34	Manhole
36	8B	53.10	36	Cir	43.511	6831.71	6832.14	0.989	6834.08	6834.51	n/a	6834.51	35	Manhole
37	9B	53.10	36	Cir	43.052	6832.14	6832.57	0.998	6834.51	6834.94	n/a	6834.94	36	Manhole
38	10B	46.00	36	Cir	254.442	6832.57	6837.61	1.981	6834.94	6839.82	n/a	6839.82 j	37	Manhole
39	3B	18.10	24	Cir	47.579	6838.60	6839.01	0.861	6840.03	6840.54	n/a	6840.54	38	Manhole
40	2B	3.70	18	Cir	274.159	6839.51	6845.48	2.178	6840.54	6846.21	n/a	6846.21 j	39	Manhole
41	1B	3.70	18	Cir	9.022	6845.48	6845.68	2.219	6846.21	6846.42	n/a	6846.42	40	Manhole
42	4B	17.80	24	Cir	183.819	6838.61	6840.44	0.996	6839.95	6841.96	0.11	6841.96	38	Manhole
43	5B	17.80	18	Cir	11.055	6840.94	6841.05	0.994	6842.44*	6842.76*	1.58	6844.34	42	Manhole
44	2B1	14.40	18	Cir	11.224	6839.51	6839.68	1.518	6841.01	6841.18	1.03	6842.21	39	Manhole
45	11B	10.10	18	Cir	11.088	6839.11	6839.21	0.903	6840.36	6840.45	0.65	6841.10	38	Manhole
46	13B	7.10	24	Cir	15.253	6833.57	6833.70	0.855	6834.94	6834.65	0.06	6834.65	37	Manhole
47	14B	2.90	24	Cir	38.000	6833.70	6833.80	0.262	6834.65	6834.67	0.08	6834.74	46	Manhole
48	15B	33.10	24	Cir	76.146	6827.51	6830.55	3.992	6830.12	6832.45	n/a	6832.45 j	End	Manhole

Project File: 100-yr Storm Sewer.stm | Number of lines: 54 | Run Date: 4/2/2026

NOTES: Known Qs only ; *Surcharged (HGL above crown). ; j - Line contains hyd. jump.

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line Size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line Slope (%)	HGL Down (ft)	HGL Up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns Line No.	Junction Type
49	16B	33.10	24	Cir	6.000	6830.55	6830.79	4.004	6832.45	6832.69	0.93	6832.69	48	Manhole
50	17B	23.40	24	Cir	52.000	6830.79	6831.76	1.865	6832.69	6833.48	0.16	6833.48	49	Manhole
51	18B	10.20	24	Cir	5.373	6831.76	6831.82	1.118	6833.48	6832.96	n/a	6832.96	50	Manhole
52	19B	10.20	24	Cir	20.000	6831.82	6832.02	1.001	6832.96	6833.16	n/a	6833.16	51	Manhole
53	20B	3.80	18	Cir	52.000	6825.50	6826.00	0.962	6827.00	6827.02	0.14	6827.16	End	Manhole
54	PND C PIPE	1.00	30	Cir	43.089	6799.80	6800.00	0.465	6802.30	6802.30	0.00	6802.30	End	Manhole

Project File: 100-yr Storm Sewer.stm | Number of lines: 54 | Run Date: 4/2/2026

NOTES: Known Qs only ; *Surcharged (HGL above crown). ; j - Line contains hyd. jump.

Hydraulic Grade Line Computations

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
			Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf		Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf	Ave Sf	Enrgy loss		
	(in)	(cfs)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(ft)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(%)	(ft)	(K)	(ft)
1	48 96 B	320.0	6823.93	6827.93	4.00	32.00	10.00	1.55	6829.49	0.521	39.284	6824.87	6828.54 j	3.67**	29.39	10.89	1.84	6830.39	0.381	0.451	n/a	0.30	0.55
2	48 96 B	320.0	6824.87	6828.54	3.67*	29.39	10.89	1.84	6830.39	0.000	9.887	6825.11	6828.78	3.67**	29.39	10.89	1.84	6830.63	0.000	0.000	n/a	0.15	0.28
3	48 96 B	320.0	6825.11	6828.78	3.67*	29.39	10.89	1.84	6830.63	0.000	87.780	6827.21	6830.88	3.67**	29.39	10.89	1.84	6832.73	0.000	0.000	n/a	0.15	0.28
4	48 96 B	320.0	6827.21	6830.88	3.67*	29.39	10.89	1.84	6832.73	0.000	55.222	6828.54	6832.21	3.67**	29.39	10.89	1.84	6834.06	0.000	0.000	n/a	0.15	0.28
5	48 96 B	320.0	6828.54	6832.21	3.67*	29.39	10.89	1.84	6834.06	0.000	302.466	6835.79	6839.46	3.67**	29.39	10.89	1.84	6841.31	0.000	0.000	n/a	0.55	1.01
6	48 96 B	320.0	6835.79	6839.46	3.67*	29.39	10.89	1.84	6841.31	0.000	262.178	6846.00	6849.67	3.67**	29.39	10.89	1.84	6851.52	0.000	0.000	n/a	0.15	0.28
7	72(2b) 144 B	320.0	6849.17	6850.27	1.10*	26.40	12.12	0.89	6851.16	0.000	43.152	6849.39	6851.16	1.77**	42.41	7.55	0.89	6852.04	0.000	0.000	n/a	1.00	n/a
8	36	59.30	6801.57	6805.08	3.00	6.26	8.39	1.09	6806.18	0.791	96.698	6811.31	6813.80	2.49**	6.26	9.47	1.39	6815.19	0.775	0.783	n/a	0.75	n/a
9	36	59.30	6811.60	6813.80	2.20	5.55	10.69	1.39	6815.19	0.000	89.298	6813.39	6815.88	2.49**	6.26	9.47	1.39	6817.27	0.000	0.000	n/a	0.15	n/a
10	36	59.30	6813.39	6815.88	2.49*	6.26	9.47	1.39	6817.27	0.000	21.694	6813.83	6816.32	2.49**	6.26	9.47	1.39	6817.71	0.000	0.000	n/a	0.75	n/a
11	36	59.30	6813.78	6816.32	2.54	6.26	9.30	1.39	6817.71	0.000	20.939	6814.20	6816.69	2.49**	6.26	9.47	1.39	6818.08	0.000	0.000	n/a	0.75	n/a
12	36	59.30	6814.50	6816.69	2.19	5.52	10.74	1.39	6818.08	0.000	157.100	6817.64	6820.13	2.49**	6.26	9.47	1.39	6821.52	0.000	0.000	n/a	1.00	n/a
13	36	59.30	6817.94	6820.13	2.19	5.52	10.74	1.39	6821.52	0.000	13.500	6818.21	6820.70	2.49**	6.26	9.47	1.39	6822.09	0.000	0.000	n/a	0.15	n/a
14	36	59.30	6818.21	6820.70	2.49*	6.26	9.47	1.39	6822.09	0.000	161.364	6821.44	6823.93	2.49**	6.26	9.47	1.39	6825.32	0.000	0.000	n/a	0.15	n/a
15	36	59.30	6821.44	6823.93	2.49*	6.26	9.47	1.39	6825.32	0.000	240.450	6829.30	6831.79	2.49**	6.26	9.47	1.39	6833.18	0.000	0.000	n/a	0.15	n/a
16	36	59.30	6829.30	6831.79	2.49*	6.26	9.47	1.39	6833.18	0.000	48.914	6830.90	6833.39	2.49**	6.26	9.47	1.39	6834.78	0.000	0.000	n/a	0.80	n/a
17	36	59.30	6831.20	6833.39	2.19	5.52	10.74	1.39	6834.78	0.000	119.927	6832.60	6835.09	2.49**	6.26	9.47	1.39	6836.48	0.000	0.000	n/a	1.00	n/a
18	36	47.10	6832.60	6835.09	2.49	5.64	7.52	1.08	6836.17	0.000	179.578	6834.70	6836.93 j	2.23**	5.64	8.35	1.08	6838.02	0.000	0.000	n/a	1.00	n/a
19	36	47.10	6835.00	6836.93	1.93	4.82	9.78	1.08	6838.02	0.000	47.500	6835.55	6837.78	2.23**	5.64	8.35	1.08	6838.87	0.000	0.000	n/a	0.15	n/a

Project File: 100-yr Storm Sewer.stm | Number of lines: 54 | Run Date: 4/2/2026

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

Hydraulic Grade Line Computations

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
			Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf		Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf	Ave Sf	Enrgy loss		
	(in)	(cfs)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(ft)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(%)	(ft)	(K)	(ft)
20	36	47.10	6835.55	6837.78	2.23*	5.64	8.35	1.08	6838.87	0.000	40.874	6836.03	6838.26	2.23**	5.64	8.35	1.08	6839.35	0.000	0.000	n/a	1.00	n/a
21	24	10.00	6837.03	6838.26	1.23	1.83	4.92	0.46	6838.73	0.000	70.009	6839.74	6840.87 j	1.13**	1.83	5.46	0.46	6841.33	0.000	0.000	n/a	0.70	0.32
22	24	10.00	6840.04	6840.89	0.85*	1.27	7.87	0.46	6841.35	0.000	119.927	6841.70	6842.83	1.13**	1.83	5.46	0.46	6843.29	0.000	0.000	n/a	0.77	0.36
23	24	10.00	6842.00	6842.91	0.91*	1.40	7.17	0.46	6843.38	0.000	98.561	6843.06	6844.19	1.13**	1.83	5.46	0.46	6844.65	0.000	0.000	n/a	1.00	0.46
24	18	3.10	6843.66	6844.19	0.53	0.56	5.54	0.26	6844.45	0.000	185.453	6846.39	6847.06	0.67**	0.76	4.06	0.26	6847.32	0.000	0.000	n/a	0.81	0.21
25	18	3.10	6846.59	6847.15	0.56*	0.60	5.15	0.26	6847.41	0.000	35.323	6846.94	6847.61	0.67**	0.76	4.06	0.26	6847.87	0.000	0.000	n/a	0.15	0.04
26	18	3.10	6846.94	6847.61	0.67*	0.76	4.06	0.26	6847.87	0.000	8.717	6847.03	6847.70	0.67**	0.76	4.06	0.26	6847.96	0.000	0.000	n/a	1.00	0.26
27	24	6.90	6843.16	6844.19	1.03	1.43	4.23	0.36	6844.55	0.000	11.000	6843.24	6844.17	0.93**	1.43	4.81	0.36	6844.53	0.000	0.000	n/a	1.00	n/a
28	24	12.30	6837.03	6838.26	1.23	2.03	6.05	0.54	6838.80	0.000	17.683	6837.21	6838.47	1.26**	2.08	5.90	0.54	6839.01	0.000	0.000	n/a	0.15	0.08
29	24	10.20	6837.21	6838.47	1.26	1.85	4.89	0.47	6838.94	0.000	34.348	6838.11	6839.25 j	1.14**	1.85	5.50	0.47	6839.72	0.000	0.000	n/a	0.15	n/a
30	24	8.20	6838.11	6839.25	1.14	1.61	4.42	0.40	6839.66	0.000	19.013	6838.24	6839.26	1.02**	1.61	5.10	0.40	6839.66	0.000	0.000	n/a	1.00	n/a
31	24	24.80	6837.03	6839.03	2.00*	3.14	7.90	0.97	6840.00	1.203	11.431	6837.13	6839.13	2.00	3.14	7.89	0.97	6840.10	1.185	1.194	0.136	1.00	0.97
32	18	5.40	6834.10	6835.09	0.99	1.10	4.38	0.38	6835.46	0.000	10.182	6834.50	6835.40 j	0.89**	1.10	4.91	0.38	6835.77	0.000	0.000	n/a	1.00	n/a
33	18	6.80	6834.10	6835.09	0.99	1.23	5.52	0.45	6835.54	0.000	42.125	6834.82	6835.83	1.01**	1.26	5.38	0.45	6836.28	0.000	0.000	n/a	1.00	n/a
34	36	53.10	6826.72	6830.12	3.00	5.98	7.51	0.88	6831.00	0.634	50.137	6830.27	6832.64	2.37**	5.98	8.88	1.23	6833.86	0.683	0.658	n/a	0.15	n/a
35	36	53.10	6830.27	6832.64	2.37*	5.98	8.88	1.23	6833.86	0.000	20.173	6831.71	6834.08	2.37**	5.98	8.88	1.23	6835.30	0.000	0.000	n/a	0.26	n/a
36	36	53.10	6831.71	6834.08	2.37*	5.98	8.88	1.23	6835.30	0.000	43.511	6832.14	6834.51	2.37**	5.98	8.88	1.23	6835.73	0.000	0.000	n/a	0.15	n/a
37	36	53.10	6832.14	6834.51	2.37*	5.98	8.88	1.23	6835.73	0.000	43.052	6832.57	6834.94	2.37**	5.98	8.88	1.23	6836.16	0.000	0.000	n/a	1.00	n/a
38	36	46.00	6832.57	6834.94	2.37	5.58	7.69	1.06	6836.00	0.000	254.442	6837.61	6839.82 j	2.21**	5.58	8.25	1.06	6840.88	0.000	0.000	n/a	1.00	1.06
39	24	18.10	6838.60	6840.03	1.43*	2.41	7.52	0.77	6840.80	0.000	47.579	6839.01	6840.54	1.53**	2.58	7.02	0.77	6841.31	0.000	0.000	n/a	1.00	n/a
40	18	3.70	6839.51	6840.54	1.03	0.86	2.86	0.29	6840.83	0.000	274.159	6845.48	6846.21 j	0.73**	0.86	4.30	0.29	6846.50	0.000	0.000	n/a	0.15	n/a
41	18	3.70	6845.48	6846.21	0.73*	0.86	4.30	0.29	6846.50	0.000	9.022	6845.68	6846.42	0.73**	0.86	4.30	0.29	6846.70	0.000	0.000	n/a	1.00	n/a

Project File: 100-yr Storm Sewer.stm | Number of lines: 54 | Run Date: 4/2/2026

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

Hydraulic Grade Line Computations

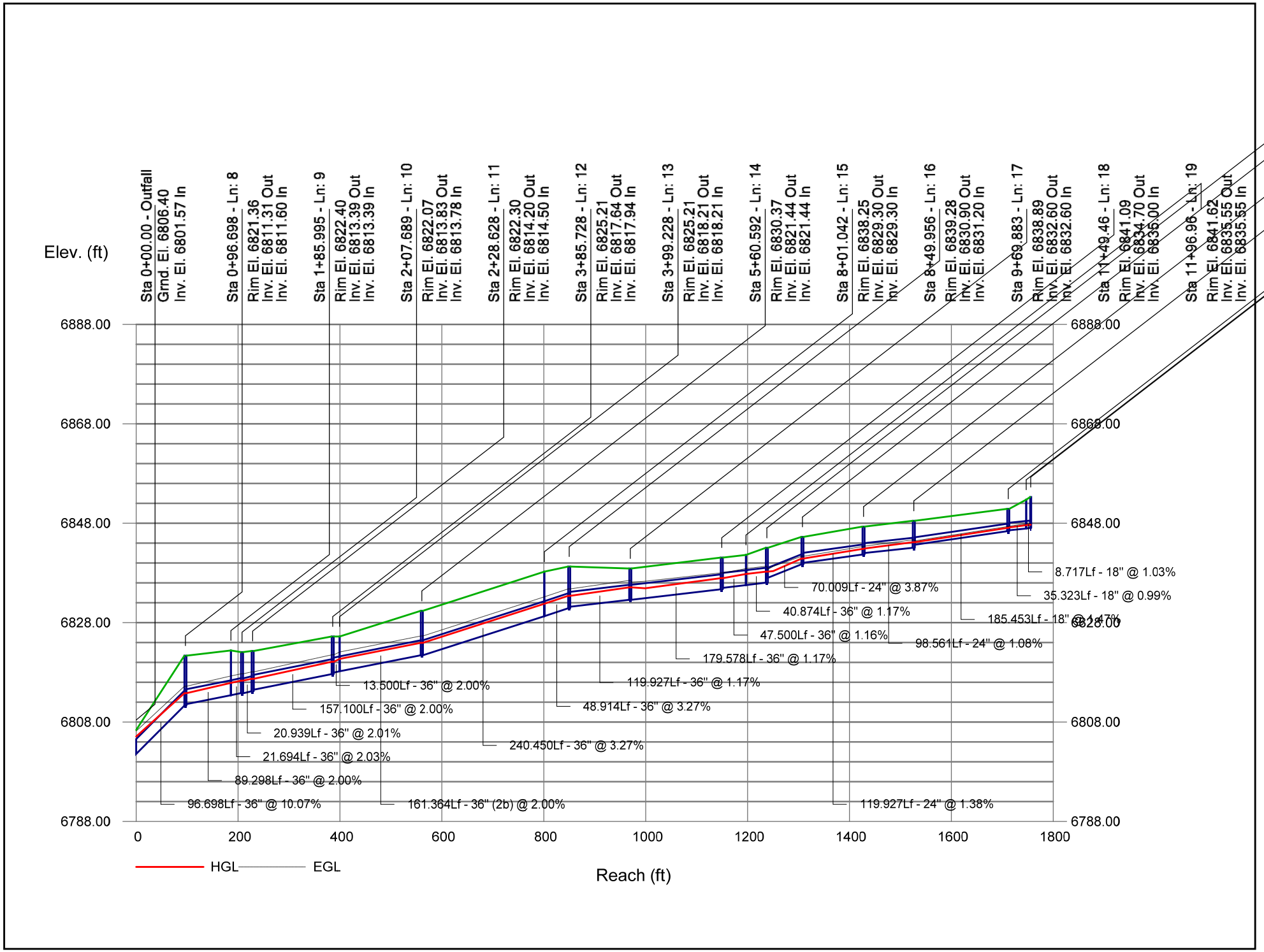
Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
			Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf		Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf	Ave Sf	Enrgy loss		
	(in)	(cfs)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(ft)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(%)	(ft)	(K)	(ft)
42	24	17.80	6838.61	6839.95	1.34*	2.24	7.96	0.75	6840.70	0.000	183.819	6840.44	6841.96	1.52**	2.56	6.95	0.75	6842.71	0.000	0.000	n/a	0.15	0.11
43	18	17.80	6840.94	6842.44	1.50*	1.77	10.07	1.58	6844.02	2.874	11.055	6841.05	6842.76	1.50	1.77	10.07	1.58	6844.34	2.873	2.874	0.318	1.00	1.58
44	18	14.40	6839.51	6841.01	1.50*	1.77	8.15	1.03	6842.04	1.881	11.224	6839.68	6841.18	1.50	1.77	8.15	1.03	6842.21	1.821	1.851	0.208	1.00	1.03
45	18	10.10	6839.11	6840.36	1.25*	1.57	6.43	0.64	6841.00	0.902	11.088	6839.21	6840.45	1.24	1.57	6.45	0.65	6841.10	0.907	0.905	0.100	1.00	0.65
46	24	7.10	6833.57	6834.94	1.37	1.46	3.11	0.37	6835.30	0.000	15.253	6833.70	6834.65	0.95**	1.46	4.86	0.37	6835.01	0.000	0.000	n/a	0.15	0.06
47	24	2.90	6833.70	6834.65	0.95	1.46	1.98	0.06	6834.71	0.080	38.000	6833.80	6834.67	0.87	1.30	2.22	0.08	6834.74	0.108	0.094	0.036	1.00	0.08
48	24	33.10	6827.51	6830.12	2.00	3.08	10.54	1.73	6831.85	2.143	76.146	6830.55	6832.45 j	1.90**	3.08	10.73	1.79	6834.24	1.856	1.999	n/a	0.15	0.27
49	24	33.10	6830.55	6832.45	1.90*	3.08	10.73	1.79	6834.24	0.000	6.000	6830.79	6832.69	1.90**	3.08	10.73	1.79	6834.48	0.000	0.000	n/a	0.52	0.93
50	24	23.40	6830.79	6832.69	1.90	2.87	7.59	1.03	6833.73	0.000	52.000	6831.76	6833.48	1.72**	2.87	8.15	1.03	6834.51	0.000	0.000	n/a	0.15	0.16
51	24	10.20	6831.76	6833.48	1.72	1.85	3.55	0.47	6833.95	0.000	5.373	6831.82	6832.96	1.14**	1.85	5.50	0.47	6833.43	0.000	0.000	n/a	0.15	n/a
52	24	10.20	6831.82	6832.96	1.14*	1.85	5.50	0.47	6833.43	0.000	20.000	6832.02	6833.16	1.14**	1.85	5.50	0.47	6833.63	0.000	0.000	n/a	1.00	n/a
53	18	3.80	6825.50	6827.00	1.50*	1.77	2.15	0.07	6827.07	0.131	52.000	6826.00	6827.02	1.02	1.28	2.97	0.14	6827.16	0.202	0.167	0.087	1.00	0.14
54	30	1.00	6799.80	6802.30	2.50*	4.91	0.20	0.00	6802.30	0.001	43.089	6800.00	6802.30	2.30	4.72	0.21	0.00	6802.30	0.001	0.001	0.000	1.00	0.00

Project File: 100-yr Storm Sewer.stm | Number of lines: 54 | Run Date: 4/2/2026

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

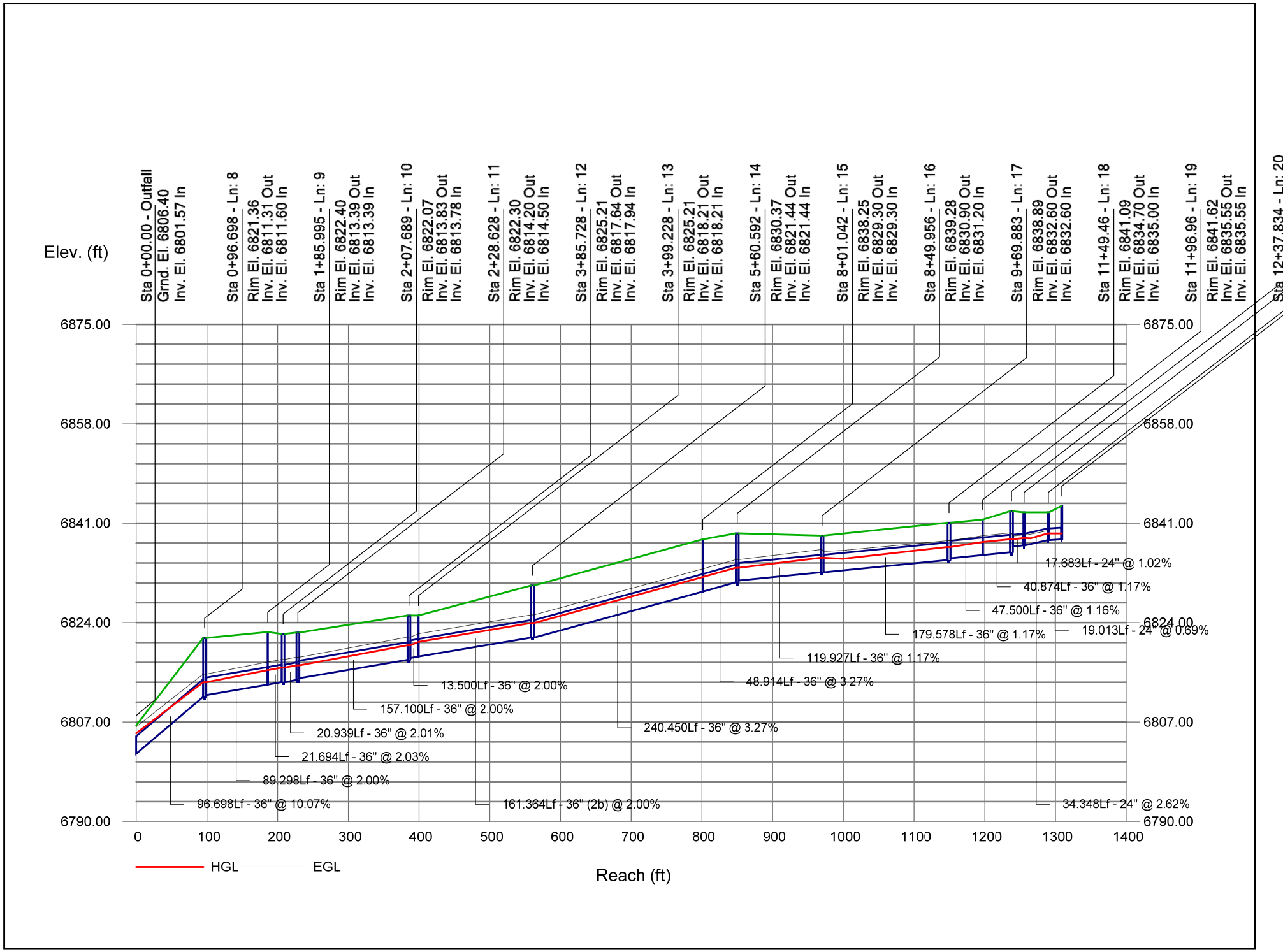
Storm Sewer Profile

Proj. file: 100-yr Storm Sewer.stm



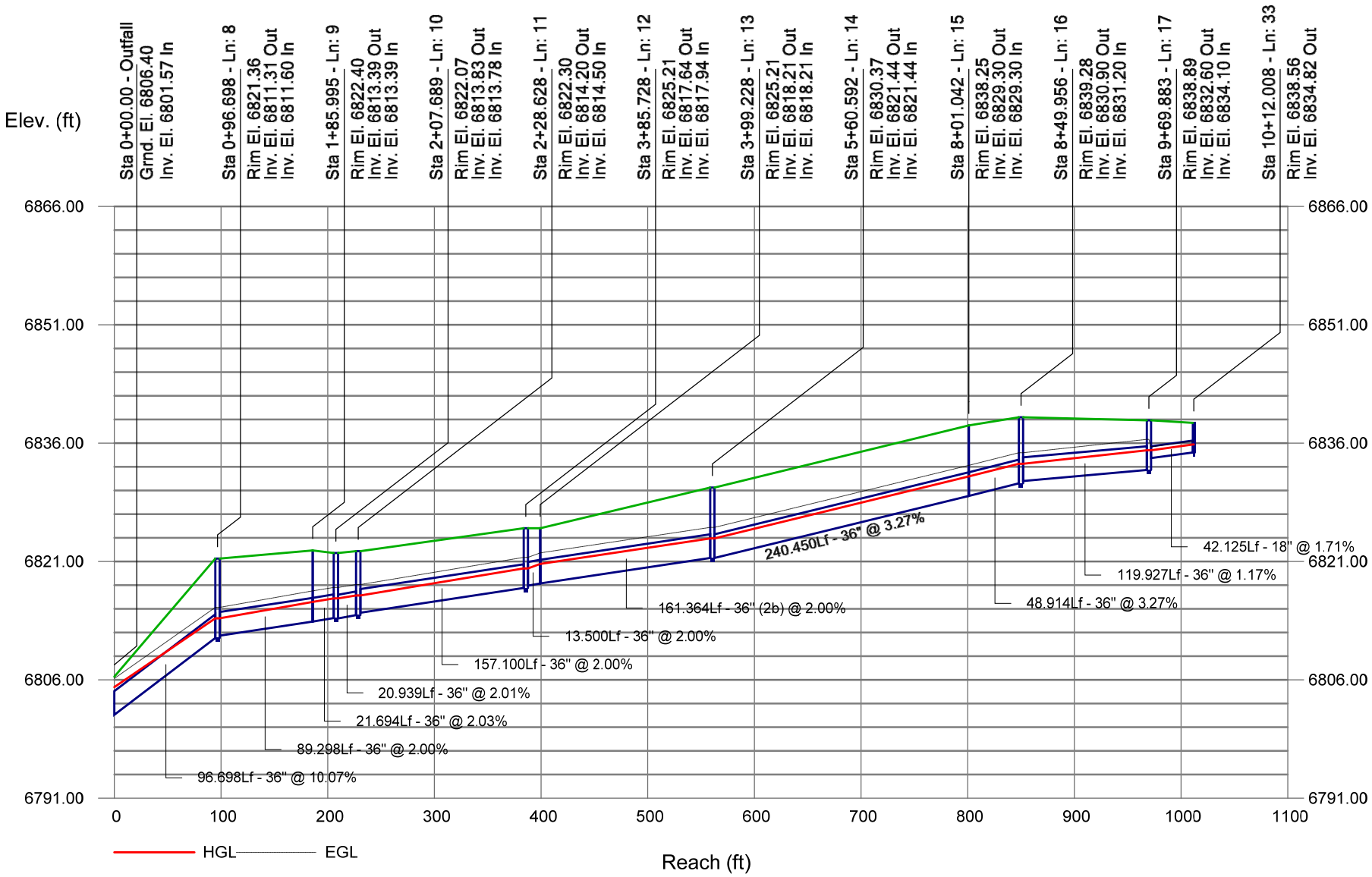
Storm Sewer Profile

Proj. file: 100-yr Storm Sewer.stm



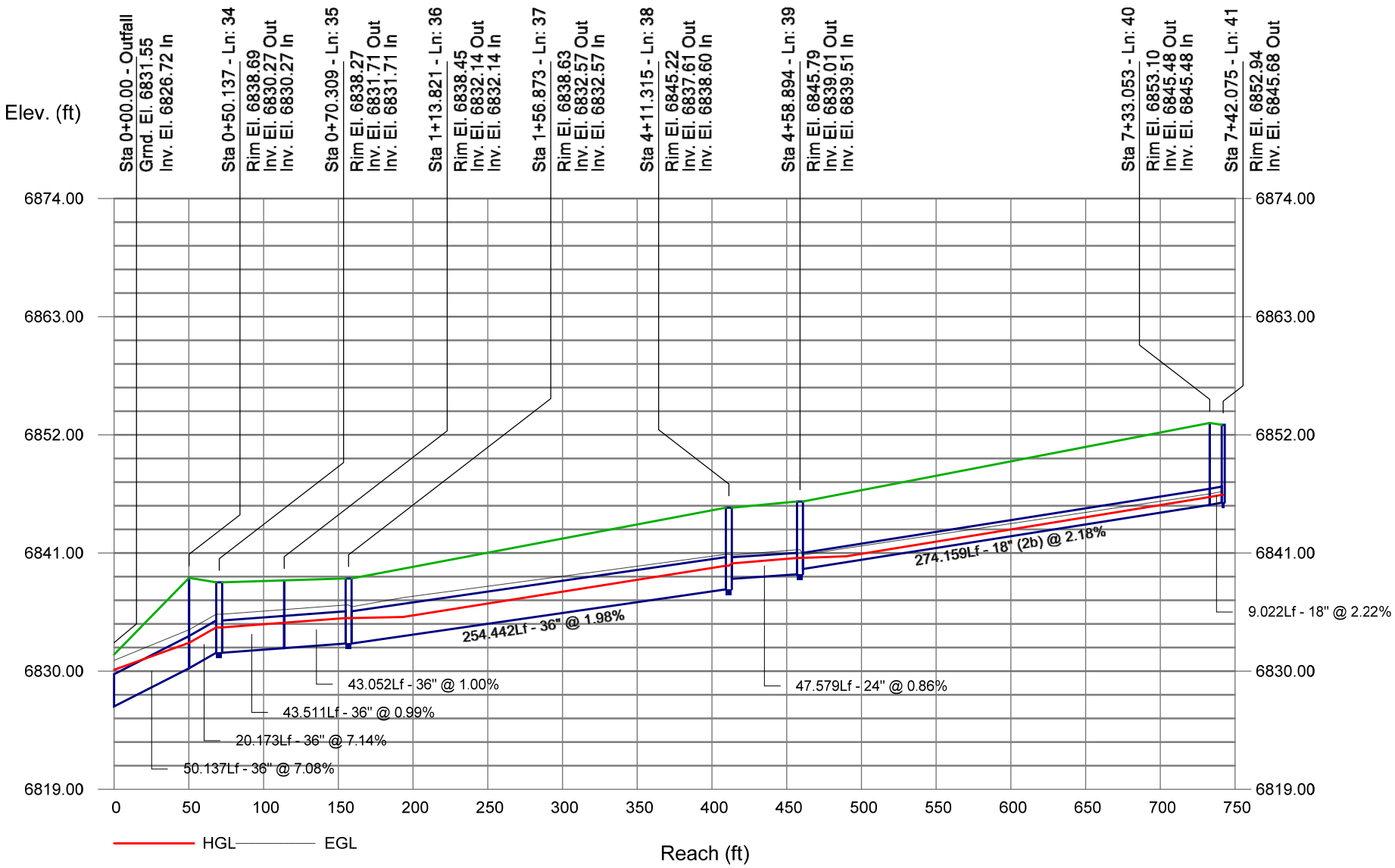
Storm Sewer Profile

Proj. file: 100-yr Storm Sewer.stm



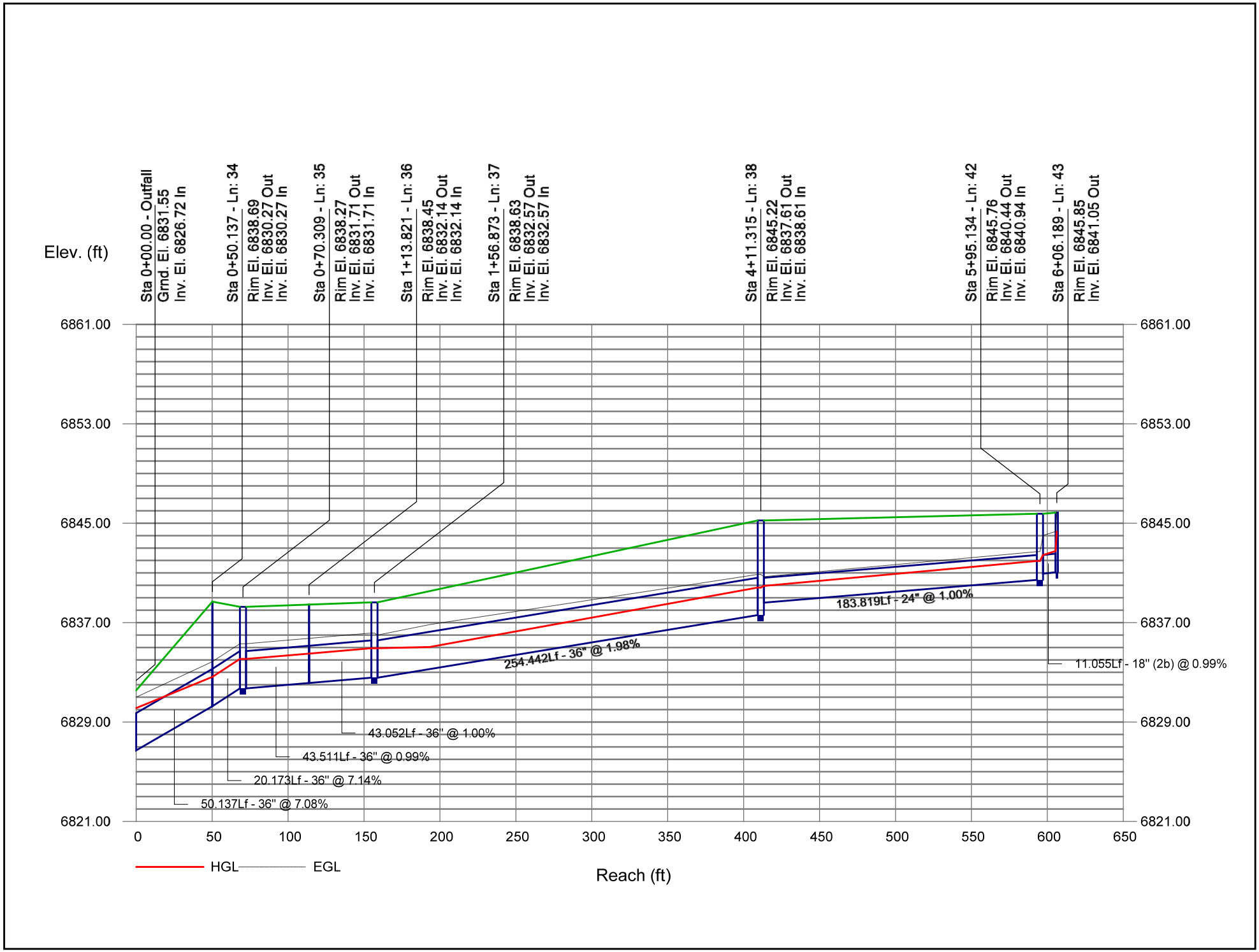
Storm Sewer Profile

Proj. file: 100-yr Storm Sewer.stm



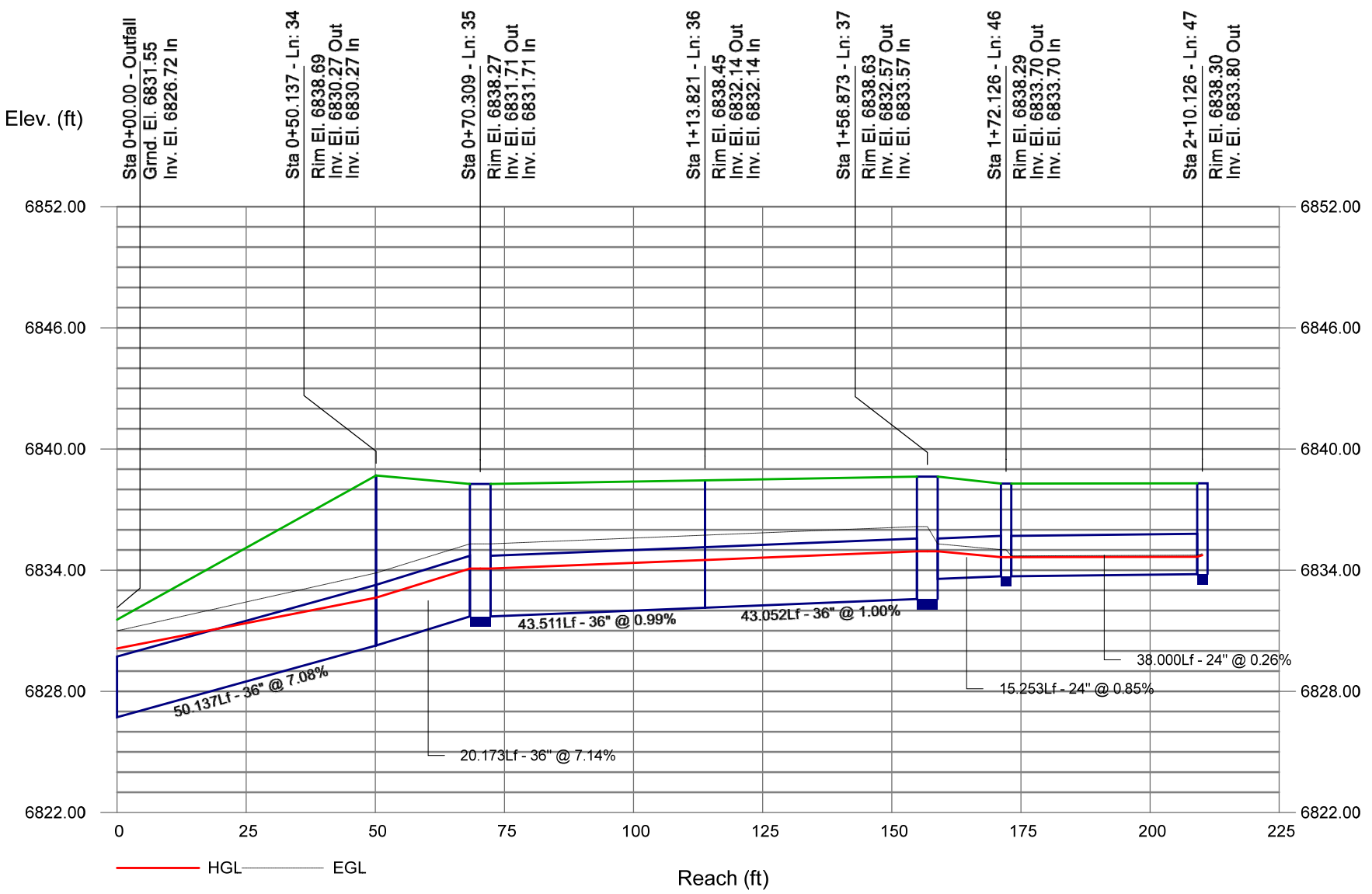
Storm Sewer Profile

Proj. file: 100-yr Storm Sewer.stm



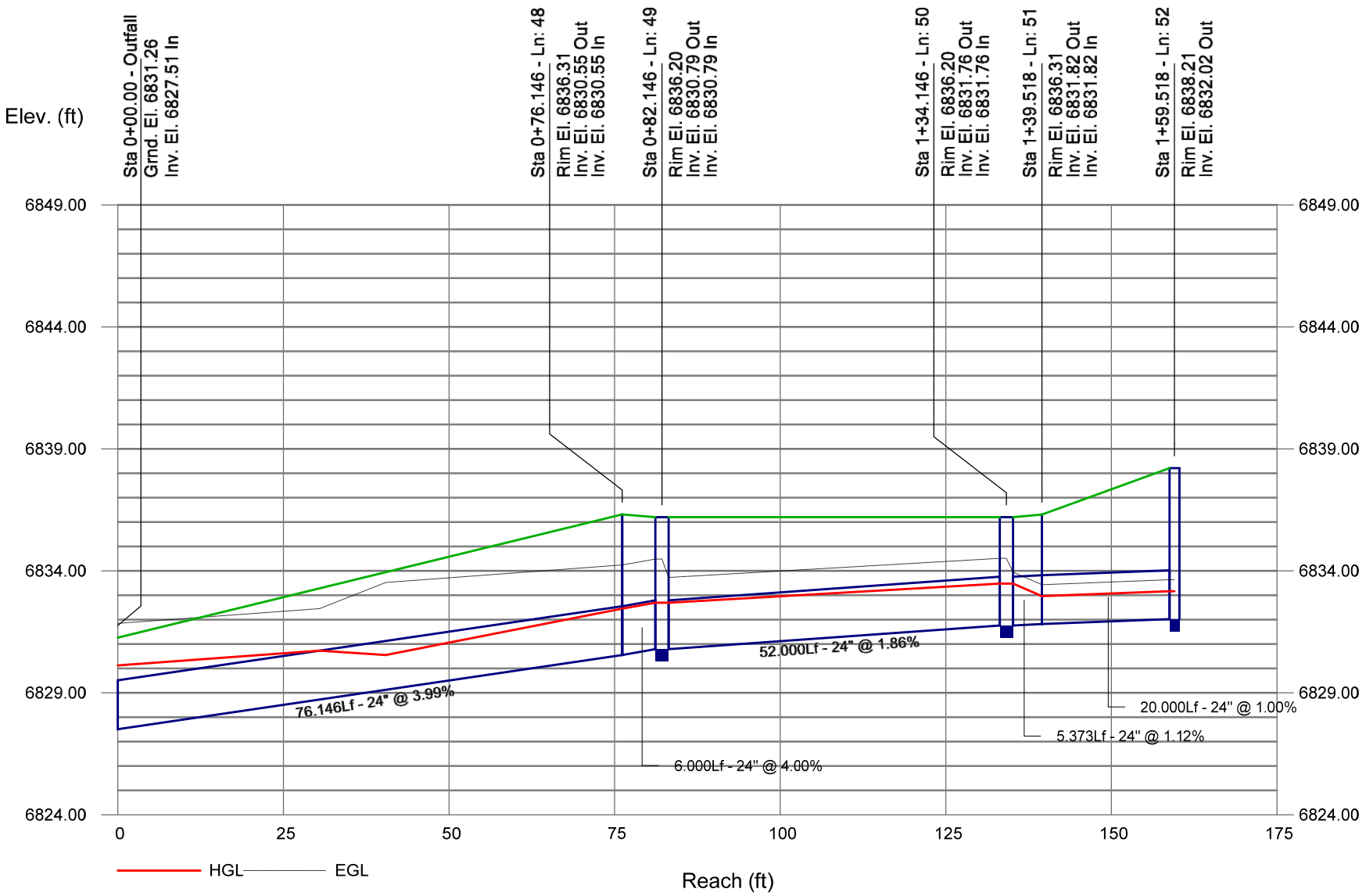
Storm Sewer Profile

Proj. file: 100-yr Storm Sewer.stm



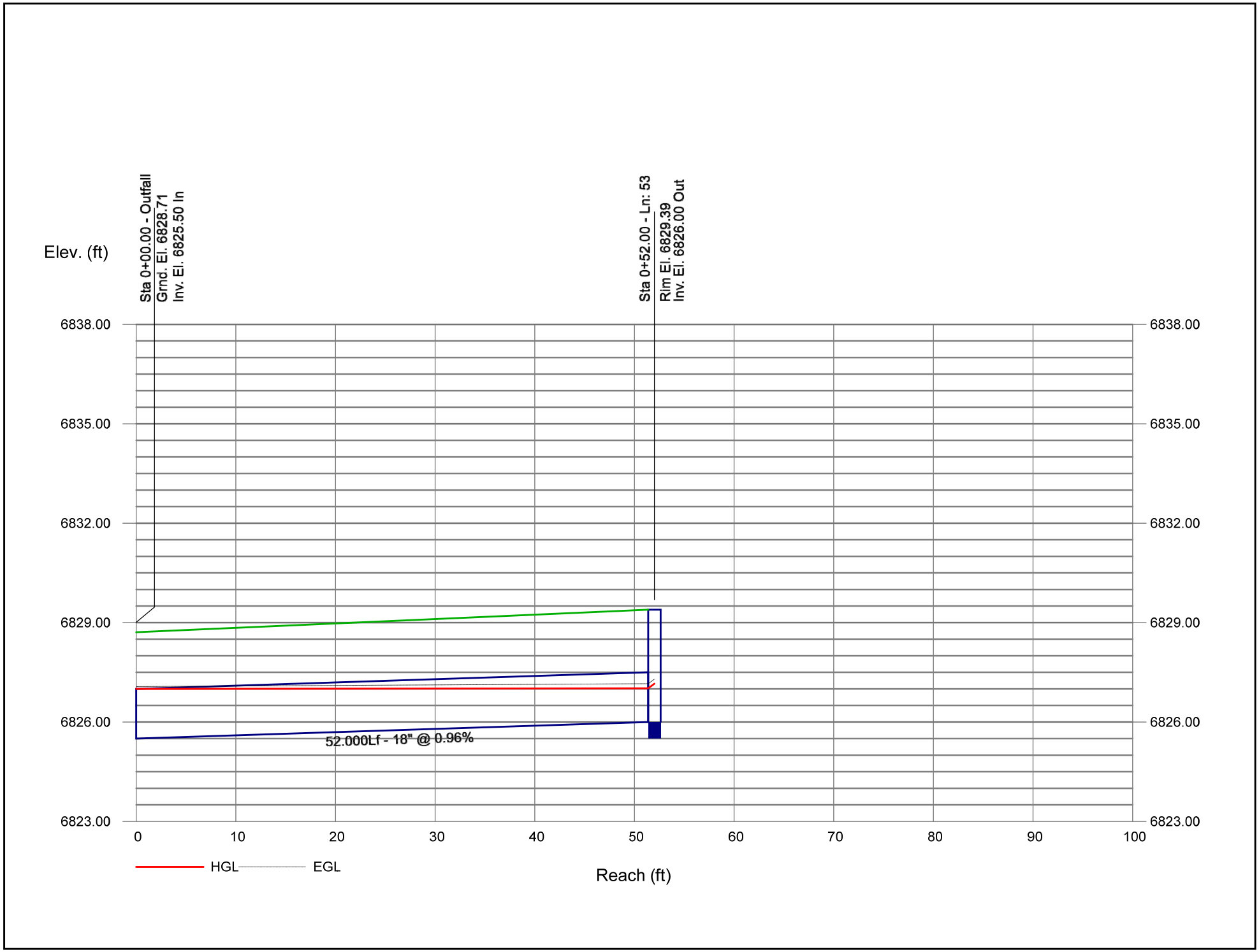
Storm Sewer Profile

Proj. file: 100-yr Storm Sewer.stm



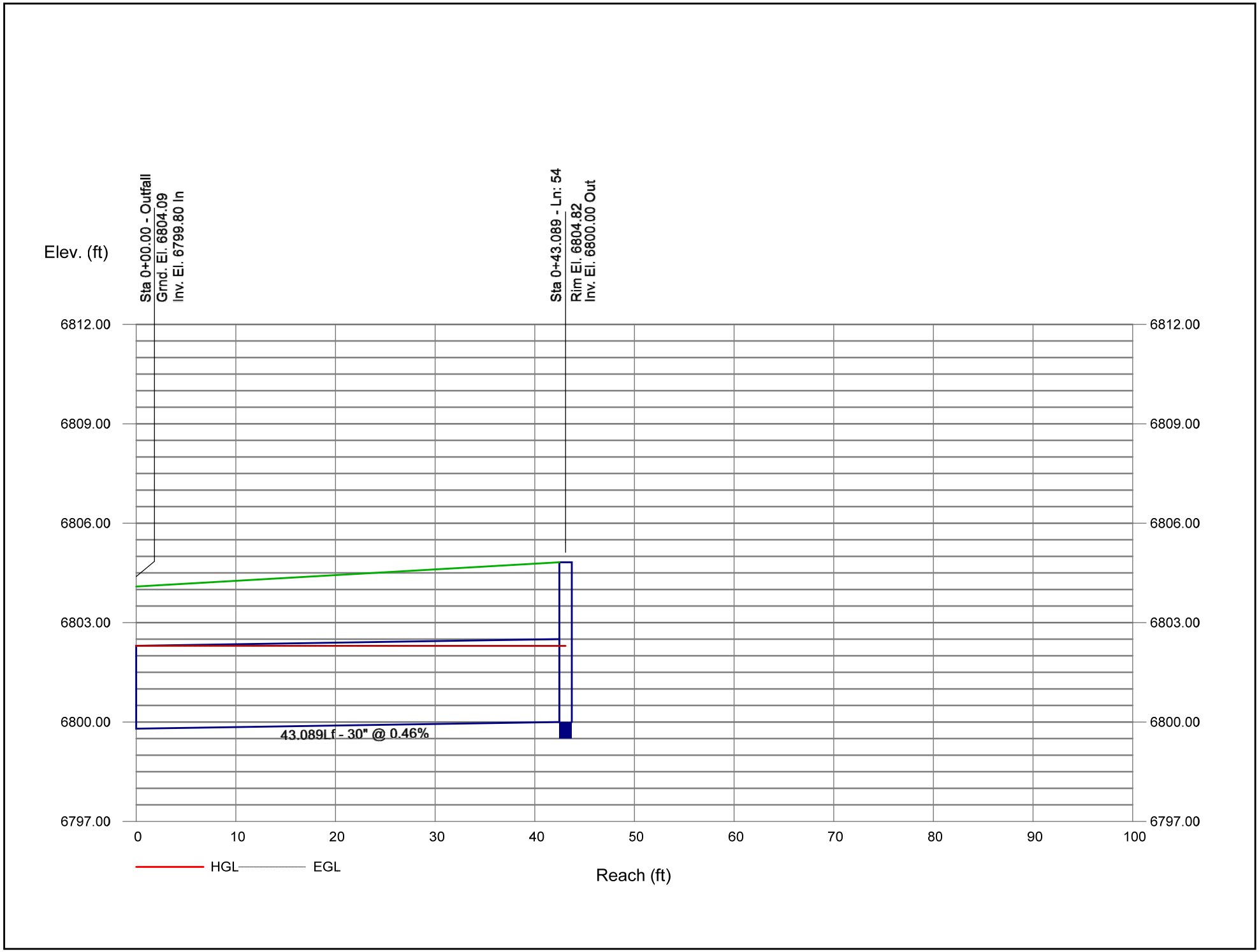
Storm Sewer Profile

Proj. file: 100-yr Storm Sewer.stm



Storm Sewer Profile

Proj. file: 100-yr Storm Sewer.stm



Storm Sewer Profile

Proj. file: 100-yr Storm Sewer.stm

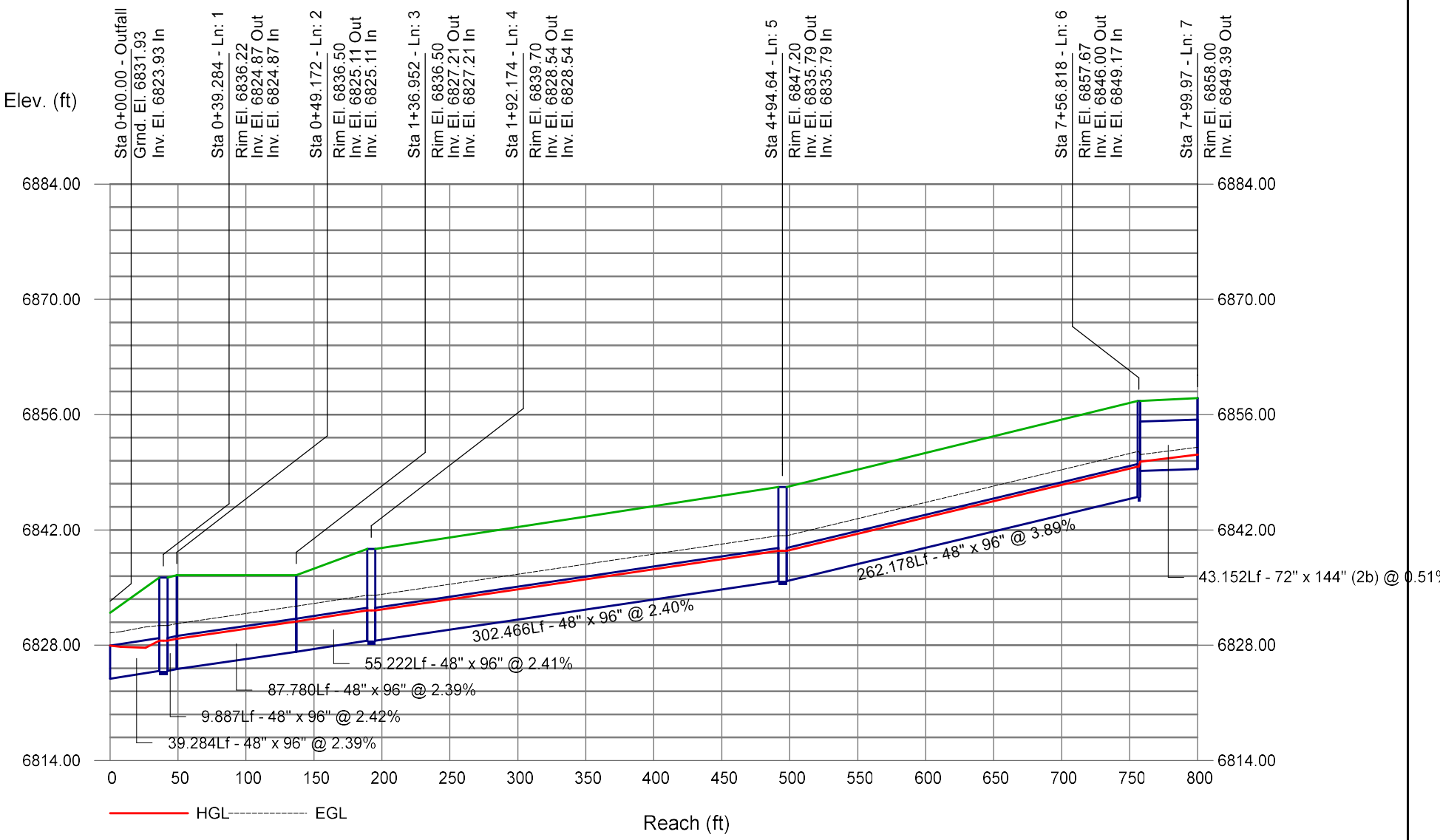
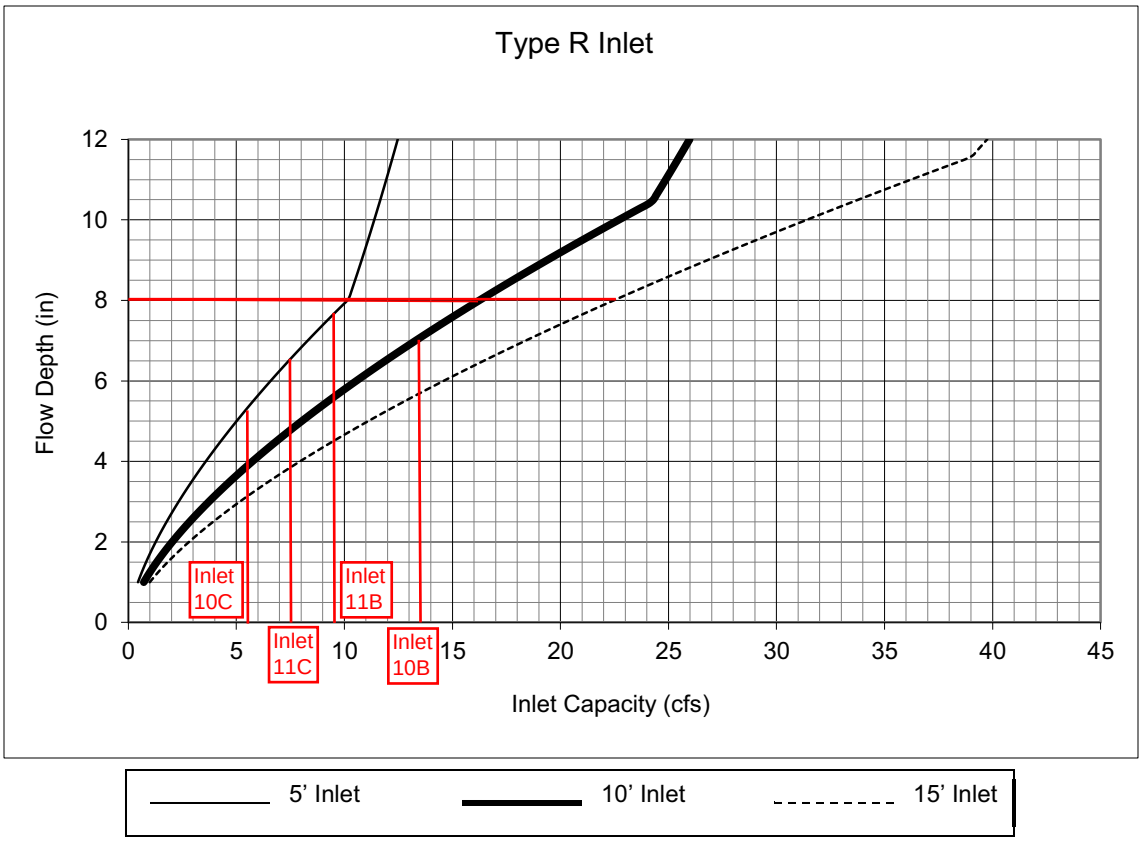


Figure 8-11. Inlet Capacity Chart Sump Conditions , Curb Opening (Type R) Inlet



SUMP INLETS Q100:

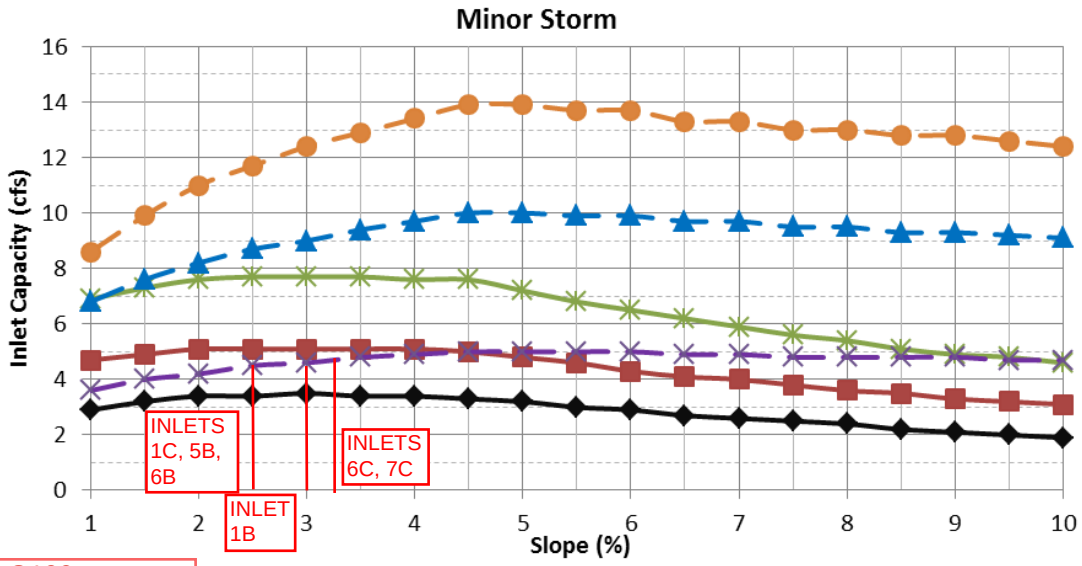
INLET 10B (BASIN B9) =13.2 CFS
INLET 11B (BASIN B10) = 9.7 CFS

INLET 10C (BASIN C8) = 5.4 CFS
INLET 11C (BASIN C7) = 6.8 CFS

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

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

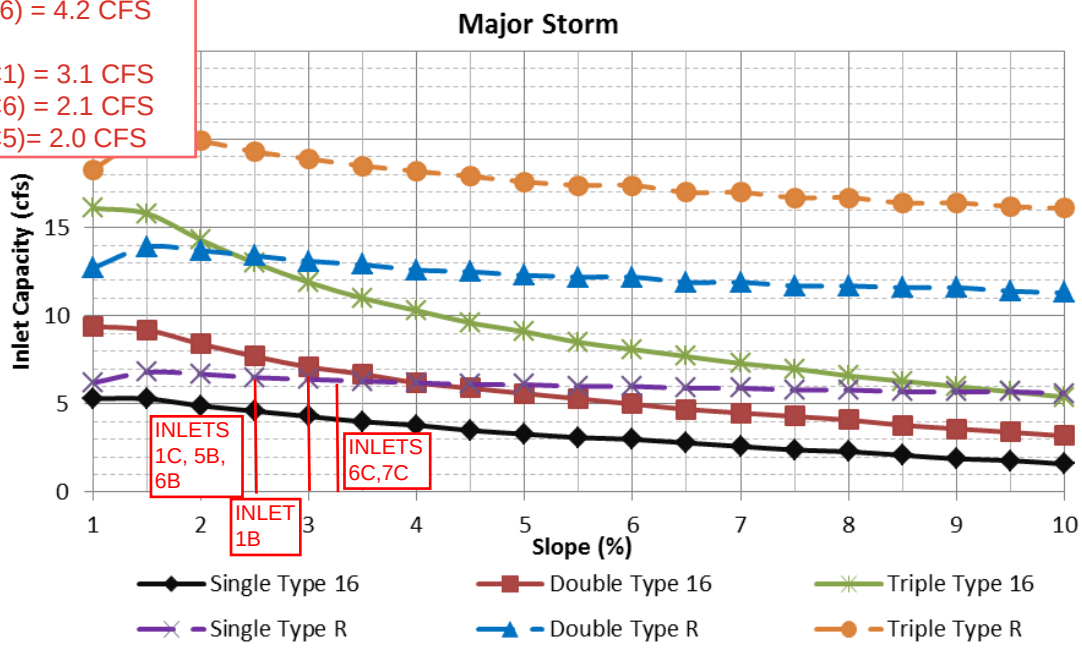
Street Section Data: Street Width Flowline to Flowline = 32'
Type of Curb and Gutter = 6" vertical



AT-GRADE INLETS Q100:

INLET 1B (BASIN B3) =3.7 CFS
INLET 5B (BASIN B5) = 2.9 CFS
INLET 6B (BASIN B6) = 4.2 CFS

INLET 1C (BASIN C1) = 3.1 CFS
INLET 6C (BASIN C6) = 2.1 CFS
INLET 7C (BASIN C5)= 2.0 CFS



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.

TEMP DIVERSION SWALES

Swale Typical (see detail)

Side Slopes	3:1	
Depth	1.5 ft	
mannings, n	0.02	non-vegetated

At 1.25' flow depth and longitudinal slope = 0.5%

Capacity	**17.4 cfs**
Velocity	**3.7 fps**

At 1.25' flow depth and longitudinal slope = 1.0%

Capacity	**24.6 cfs**
Velocity	**5.2 fps**

Design Point	**Q100**	
A5	22.1	Noted at min. 1% grade
B1	17.8	Developed flow
B2	10.1	Developed flow
B4	11.8	Developed flow
B7	12.0	Developed flow
B8	10.2	Developed flow
C2	6.9	Developed flow
C3	8.2	Developed flow
C4	24.8	Developed flow
D1	9.4	
D2	13.0	

Flows listed above for basins B1-C4 are based on the fully developed condition. Temp diversion swales are intended to only be in place during the overlot pad development phase. Upon development of the lot/basin area a site specific storm system will be established and the temp. diversion swales removed. The swale typical section listed above is sufficient to accommodate the undeveloped flows.

Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Thursday, Apr 2 2026

Temp. Diversion Swale - Typical

Triangular

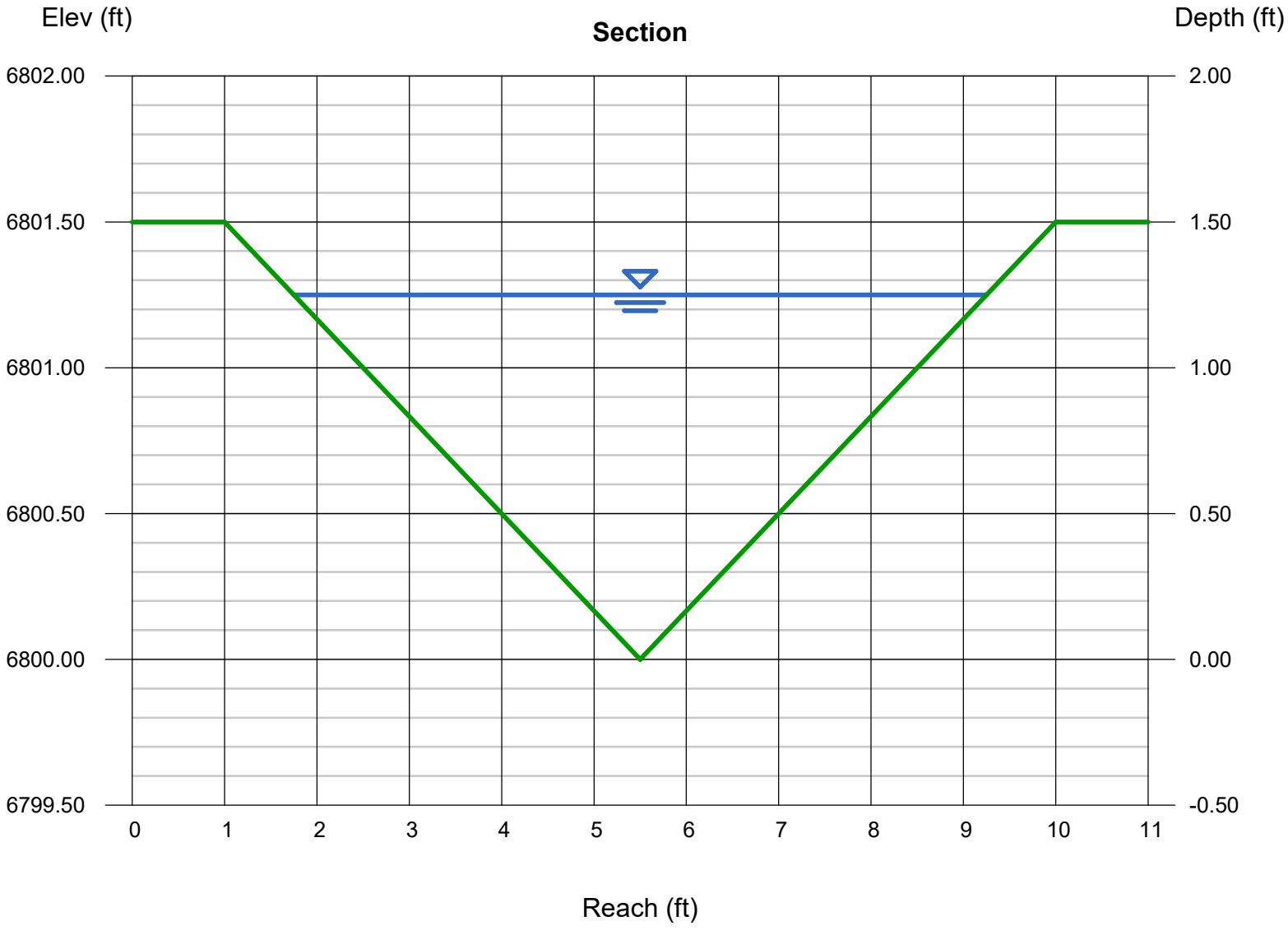
Side Slopes (z:1)	= 3.00, 3.00
Total Depth (ft)	= 1.50
Invert Elev (ft)	= 6800.00
Slope (%)	= 0.50
N-Value	= 0.020

Calculations

Compute by:	Known Depth
Known Depth (ft)	= 1.25

Highlighted

Depth (ft)	= 1.25
Q (cfs)	= 17.38
Area (sqft)	= 4.69
Velocity (ft/s)	= 3.71
Wetted Perim (ft)	= 7.91
Crit Depth, Yc (ft)	= 1.16
Top Width (ft)	= 7.50
EGL (ft)	= 1.46



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Thursday, Apr 2 2026

Temp. Diversion Swale - Typical

Triangular

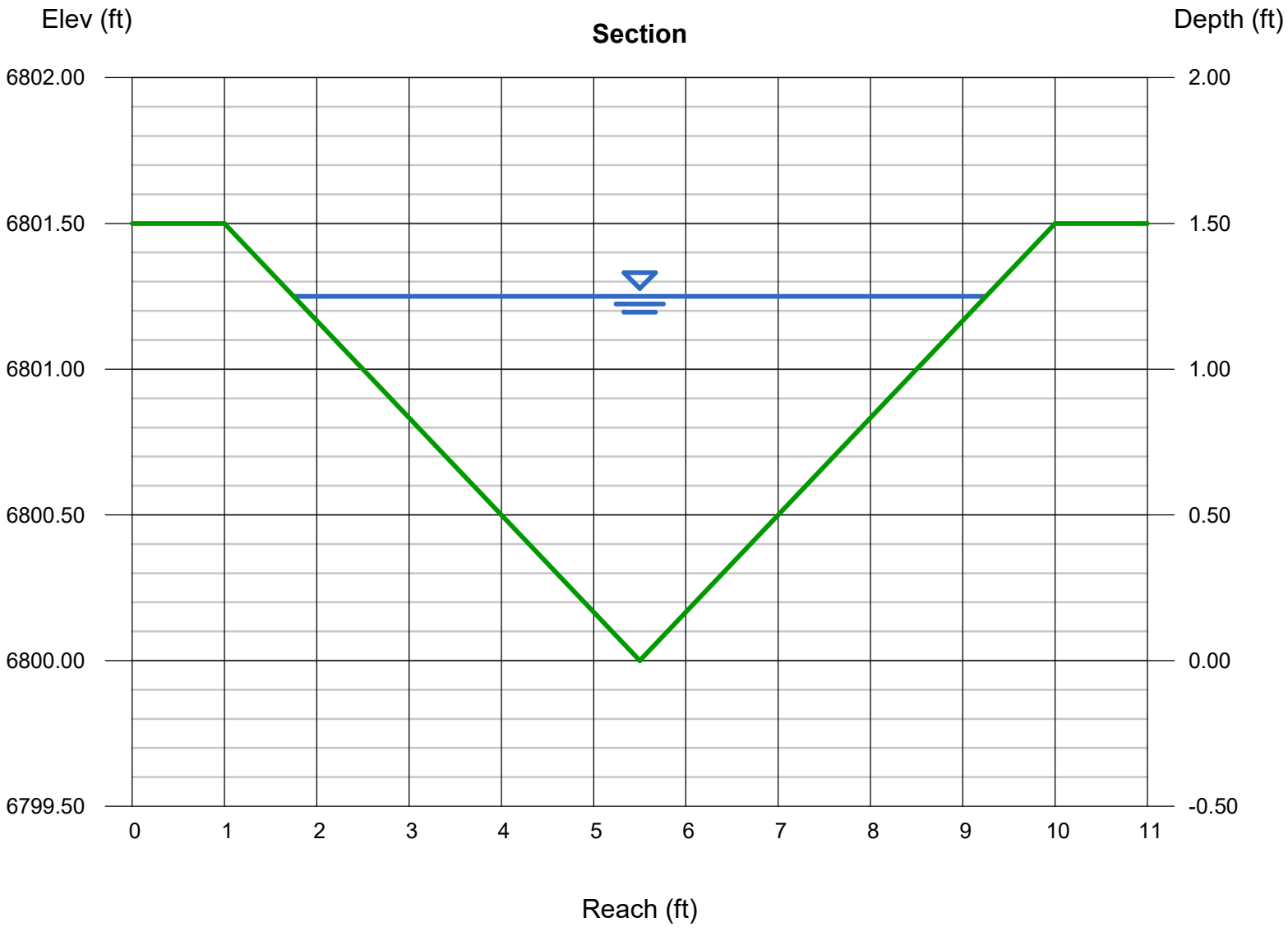
Side Slopes (z:1)	= 3.00, 3.00
Total Depth (ft)	= 1.50
Invert Elev (ft)	= 6800.00
Slope (%)	= 1.00
N-Value	= 0.020

Calculations

Compute by:	Known Depth
Known Depth (ft)	= 1.25

Highlighted

Depth (ft)	= 1.25
Q (cfs)	= 24.58
Area (sqft)	= 4.69
Velocity (ft/s)	= 5.24
Wetted Perim (ft)	= 7.91
Crit Depth, Yc (ft)	= 1.34
Top Width (ft)	= 7.50
EGL (ft)	= 1.68



Rock Chute Design Data

(Version 4.03 - 11/29/11, Based on Design of Rock Chutes by Robinson, Rice, Kadavy, ASAE, 1998)

Project: Falcon Field Pond A - DPA5 Rundown **County:**
Designer: KGV **Checked by:**
Date: 10/22/25 **Date:**

Input Channel Geometry

Inlet Channel	Chute	Outlet Channel
Bw = 0.0 ft.	Bw = 3.0 ft.	Bw = 5.0 ft.
Side slopes = 4.0 (m:1)	Factor of safety = 1.20 (F_s)	Side slopes = 0.1 (m:1)
n-value = 0.035	Side slopes = 4.0 (m:1) → 2.0:1 max.	n-value = 0.013
Bed slope = 0.0100 ft./ft.	Bed slope (3:1) = 0.330 ft./ft. → 2.5:1 max.	Bed slope = 0.0050 ft./ft.
Minimum Fill = 1.0 ft.	Outlet apron depth, d = 1.0 ft.	Base flow = 0.0 cfs
Freeboard = 1.0 ft.		

Design Storm Data (Table 2, NHCP, NRCS Grade Stabilization Structure No. 410)

Drainage area = 6.9 acres Rainfall = (●) 0 - 3 in. ( ) 3 - 5 in. ( ) 5+ in.

Apron elev. --- Inlet = 6832.0 ft. --- Outlet = 6827.0 ft. --- (H_{drop} = 4 ft.)

Chute capacity = Q5-year [*Minimum capacity (based on a 5-year,*

Total capacity = Q10-year [*24-hour storm with a 0 - 3 inch rainfall)*

Q_{high} = 22.1 cfs High flow storm through chute → Tw (ft.) = Program

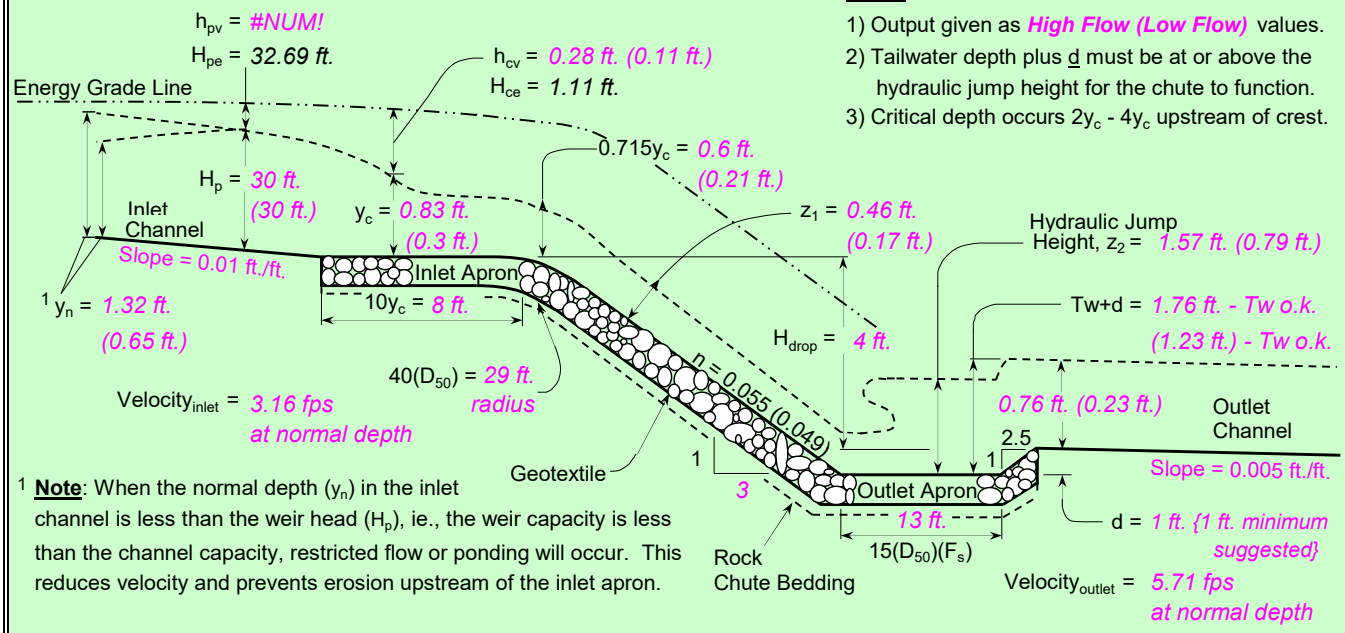
Q_{low} = 3.4 cfs Low flow storm through chute → Tw (ft.) = Program

***Note**: The total required capacity is routed through the chute (principal spillway) or in combination with an auxiliary spillway.*

***Input tailwater (Tw)**:*

0.33

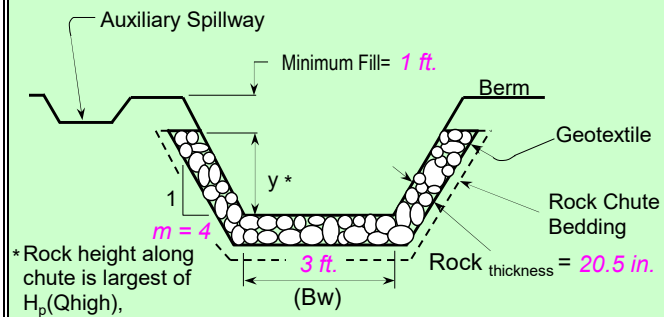
Profile and Cross Section (Output)



Notes:
1) Output given as ***High Flow (Low Flow)*** values.
2) Tailwater depth plus d must be at or above the hydraulic jump height for the chute to function.
3) Critical depth occurs 2y_c - 4y_c upstream of crest.

[1] **Note**: When the normal depth (y_n) in the inlet channel is less than the weir head (H_p), ie., the weir capacity is less than the channel capacity, restricted flow or ponding will occur. This reduces velocity and prevents erosion upstream of the inlet apron.

Profile Along Centerline of Chute



* Rock height along chute is largest of H_p(Qhigh), H_p(Qlow) + FB, and z_2.

Typical Cross Section

q_t =	4.31 cfs/ft.	Equivalent unit discharge
F_S =	1.20	Factor of safety (multiplier)
z_1 =	0.46 ft.	Normal depth in chute
n-value =	0.055	Manning's roughness coefficient
D_{50}(F_s) =	10.3 in. (79 lbs.) - angular riprap	
2(D_{50})(F_s) =	20.5 in.	Rock chute thickness
Tw + d =	1.76 ft.	Tailwater above outlet apron
z_2 =	1.57 ft.	Hydraulic jump height
*** The outlet	will	function adequately

High Flow Storm Information

Rock Chute Design Data

(Version 4.03 - 11/29/11, Based on Design of Rock Chutes by Robinson, Rice, Kadavy, ASAE, 1998)

Project: Falcon Field Pond C - DPD2 Rundown **County:**
Designer: KGV **Checked by:**
Date: 10/22/25 **Date:**

Input Channel Geometry

Inlet Channel	Chute	Outlet Channel
Bw = 0.0 ft.	Bw = 3.0 ft.	Bw = 5.0 ft.
Side slopes = 4.0 (m:1	Factor of safety = 1.20 (F_s	Side slopes = 0.1 (m:1
n-value = 0.035	Side slopes = 4.0 (m:1 → 2.0:1 max.	n-value = 0.013
Bed slope = 0.0100 ft./ft	Bed slope (4:1) = 0.250 ft./ft. → 2.5:1 max.	Bed slope = 0.0050 ft./ft
Minimum Fill = 1.0 ft.	Outlet apron depth, d = 1.0 ft.	Base flow = 0.0 cfs
Freeboard = 1.0 ft.		

Design Storm Data (Table 2, NHCP, NRCS Grade Stabilization Structure No. 410)

Drainage area = 6.9 acre — Rainfall = ◉ 0 - 3 in ○ 3 - 5 in. ○ 5+ in.

Apron elev. --- Inlet = 6820.0 ft. --- Outlet = 6802.0 ft. --- (H_{drop} = 17 ft.)

Chute capacity = Q25-year — *Minimum capacity (based on a 5-year, 24-hour storm with a 0 - 3 inch rainfall)*

Total capacity = Q100-year

Q_{high} = 13.7 cfs — High flow storm through chute → Tw (ft.) = Program

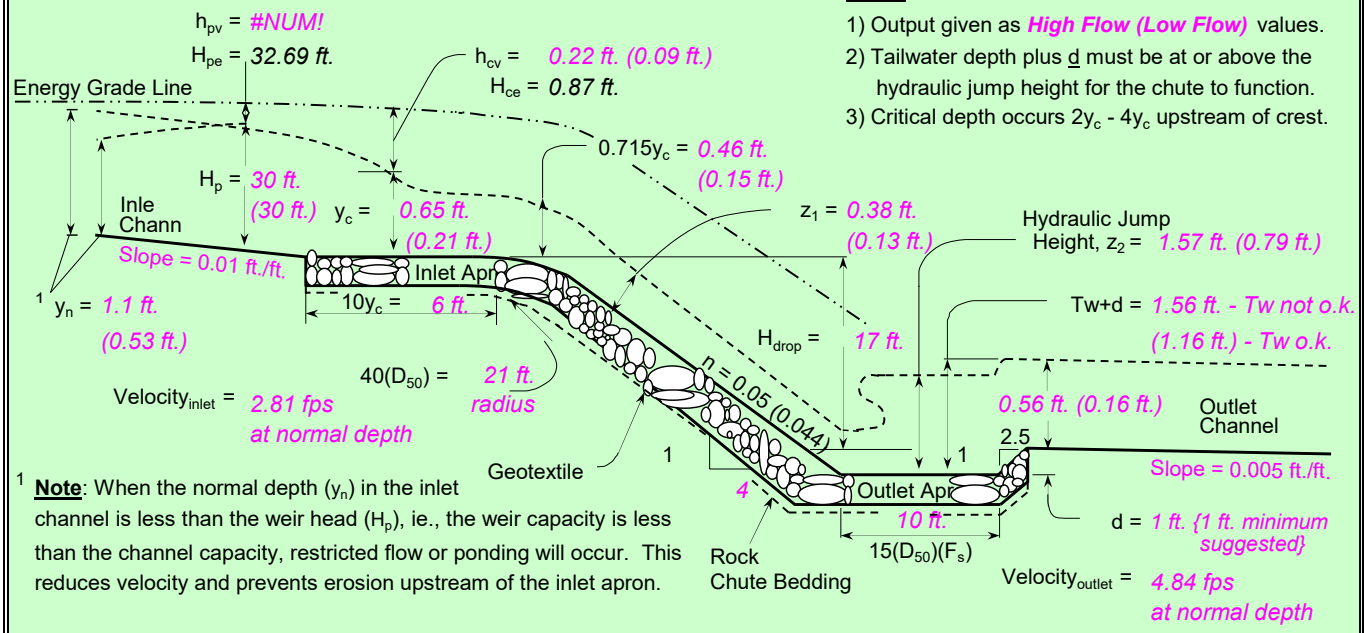
Q_{low} = 1.9 cf — Low flow storm through chute → Tw (ft.) = Program

***Note**: The total required capacity is routed through the chute (principal spillway) or in combination with an auxiliary spillway.*

***Input tailwater (Tw)**:*

0.25

Profile and Cross Section (Output)

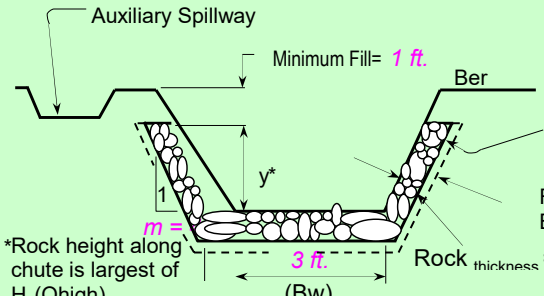


Notes:

1) Output given as ***High Flow (Low Flow)*** values.
2) Tailwater depth plus d must be at or above the hydraulic jump height for the chute to function.
3) Critical depth occurs 2y_c - 4y_c upstream of crest.

[1] **Note**: When the normal depth (y_n) in the inlet channel is less than the weir head (H_p), ie., the weir capacity is less than the channel capacity, restricted flow or ponding will occur. This reduces velocity and prevents erosion upstream of the inlet apron.

Profile Along Centerline of Chute



*Rock height along chute is largest of H_p(Qhigh), H_p(Qlow) + FB, and z_2.

Typical Cross Section

q_t =	2.96 cfs/ft.	Equivalent unit discharge
F_S =	1.20	Factor of safety (multiplier)
z_1 =	0.38 ft.	Normal depth in chute
n-value =	0.05	Manning's roughness coefficient
D_{50}(F_s) =	7.7 in. (34 lbs.) - angular riprap	
2(D_{50})(F_s) =	15.5 in.	Rock chute thickness
Tw + d =	1.56 ft.	Tailwater above outlet apron
z_2 =	1.57 ft.	Hydraulic jump height
*** ***The outlet***	***will not***	***function adequately***

High Flow Storm Information

Rock Chute Design Data

(Version 4.03 - 11/29/11, Based on Design of Rock Chutes by Robinson, Rice, Kadavy, ASAE, 1998)

Project: Falcon Field Pond C - DPD3 Rundown **County:**
Designer: KGV **Checked by:**
Date: 10/22/25 **Date:**

Input Channel Geometry

Inlet Channel	Chute	Outlet Channel
Bw = 0.0 ft.	Bw = 3.0 ft.	Bw = 5.0 ft.
Side slopes = 4.0 (m:1	Factor of safety = 1.20 (F_s)	Side slopes = 0.1 (m:1
n-value = 0.035	Side slopes = 4.0 (m:1 → 2.0:1 max.	n-value = 0.013
Bed slope = 0.0100 ft./ft	Bed slope (4:1) = 0.250 ft./ft. → 2.5:1 max.	Bed slope = 0.0050 ft./ft
Minimum Fill = 1.0 ft.	Outlet apron depth, d = 1.0 ft.	Base flow = 0.0 cfs
Freeboard = 1.0 ft.		

Design Storm Data (Table 2, NHCP, NRCS Grade Stabilization Structure No. 410)

Drainage area = 10.4 acre Rainfall = ◉ 0 - 3 in ○ 3 - 5 in. ○ 5+ in.

Apron elev. --- Inlet = 6807.0 ft. --- Outlet = 6802.0 ft. --- (H_{drop} = 4 ft.)

Chute capacity = Q5-year
Total capacity = Q10-year
Minimum capacity (based on a 5-year, 24-hour storm with a 0 - 3 inch rainfall)

Q_{high} = 19.1 cfs High flow storm through chute → Tw (ft.) = Program

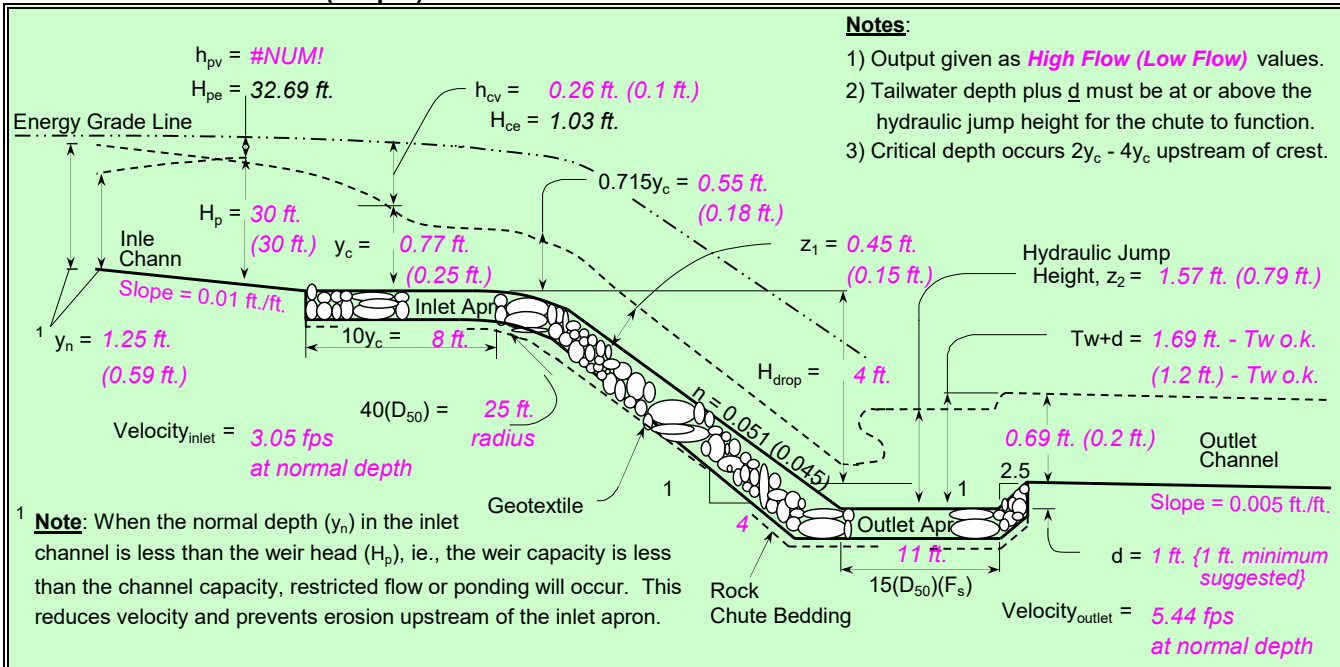
Q_{low} = 2.6 cf Low flow storm through chute → Tw (ft.) = Program

***Note**: The total required capacity is routed through the chute (principal spillway) or in combination with an auxiliary spillway.*

***Input tailwater (Tw)**:*

0.25

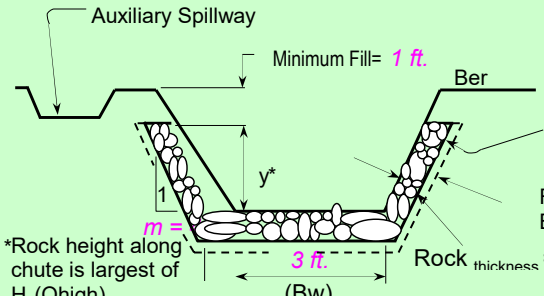
Profile and Cross Section (Output)



Notes:
1) Output given as ***High Flow (Low Flow)*** values.
2) Tailwater depth plus d must be at or above the hydraulic jump height for the chute to function.
3) Critical depth occurs $2y_c$ - $4y_c$ upstream of crest.

[1] **Note**: When the normal depth (y_n) in the inlet channel is less than the weir head (H_p), ie., the weir capacity is less than the channel capacity, restricted flow or ponding will occur. This reduces velocity and prevents erosion upstream of the inlet apron.

Profile Along Centerline of Chute



Typical Cross Section

q_t =	3.85 cfs/ft.	Equivalent unit discharge
F_S =	1.20	Factor of safety (multiplier)
z_1 =	0.45 ft.	Normal depth in chute
n-value =	0.051	Manning's roughness coefficient
$D_{50}(F_s)$ =	8.9 in. (51 lbs.) - angular riprap	
$2(D_{50})(F_s)$ =	17.8 in.	Rock chute thickness
Tw + d =	1.69 ft.	Tailwater above outlet apron
z_2 =	1.57 ft.	Hydraulic jump height
*** ***The outlet***	***will***	***function adequately***

High Flow Storm Information

Level Spreader Design

Filing 3 **DP12** **Q5** **Q100** Swale along E boundary

	1.0	2.7	
Q100	2.7	cfs	
Spreader Length	30	lf	
Mannings, n	0.03		
Slope	0.5	%	
Receving Channel Depth	0.7	ft	
Top Width, b	4.3	ft	
Area	1.6	sf	
Max Velocity	1.7	fps	<4fps no TRM required

DP15 **Q5** **Q100** Pond outfall

	2.7	10.4	
Q100	10.4	cfs	
Spreader Length	50	lf	
Mannings, n	0.03		
Slope	0.5	%	
Receving Channel Depth	1.2	ft	
Top Width, b	7.2	ft	
Area	4.3	sf	
Max Velocity	2.4	fps	<4fps no TRM required

Filing 2 **DP4** **Q5** **Q100** Swale along E boundary

	11.4	**20.7**	
Q100	20.7	cfs	
Spreader Length	30	lf	
Mannings, n	0.03		
Slope	0.5	%	
Receving Channel Depth	1.6	ft	
Top Width, b	9.3	ft	
Area	7.2	sf	
Max Velocity	2.9	fps	<4fps no TRM required

Detention Facility Calculations

Provide runoff reduction sheets for the 3 (verify the number) SPA areas just to document they are self treating. You do not need to provide runoff reduction for the rest of the site if not using it.

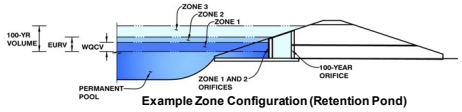
DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)

POND A: ULTIMATE DESIGN FOR REFERENCE ONLY

Project: Falcon Field Filing 2

Basin ID: Pond A (with overdetention)



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	EDB	
Watershed Area =	19.64	acres
Watershed Length =	1,100	ft
Watershed Length to Centroid =	380	ft
Watershed Slope =	0.025	ft/ft
Watershed Imperviousness =	53.60%	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) =	0.354	acre-feet	acre-feet
Excess Urban Runoff Volume (EURV) =	1.238	acre-feet	acre-feet
2-yr Runoff Volume (P1 = 1.19 in.) =	0.890	acre-feet	1.19 inches
5-yr Runoff Volume (P1 = 1.5 in.) =	1.179	acre-feet	1.50 inches
10-yr Runoff Volume (P1 = 1.75 in.) =	1.410	acre-feet	1.75 inches
25-yr Runoff Volume (P1 = 2 in.) =	1.757	acre-feet	2.00 inches
50-yr Runoff Volume (P1 = 2.25 in.) =	2.096	acre-feet	2.25 inches
100-yr Runoff Volume (P1 = 2.52 in.) =	2.523	acre-feet	2.52 inches
500-yr Runoff Volume (P1 = 3.49 in.) =	4.000	acre-feet	3.49 inches
Approximate 2-yr Detention Volume =	0.798	acre-feet	
Approximate 5-yr Detention Volume =	1.049	acre-feet	
Approximate 10-yr Detention Volume =	1.276	acre-feet	
Approximate 25-yr Detention Volume =	1.554	acre-feet	
Approximate 50-yr Detention Volume =	1.728	acre-feet	
Approximate 100-yr Detention Volume =	1.932	acre-feet	

Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	0.354	acre-feet
Zone 2 Volume (EURV - Zone 1) =	0.884	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	0.694	acre-feet
Total Detention Basin Volume =	1.932	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_{LW}) =	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

Provide Pond A Interim calcs

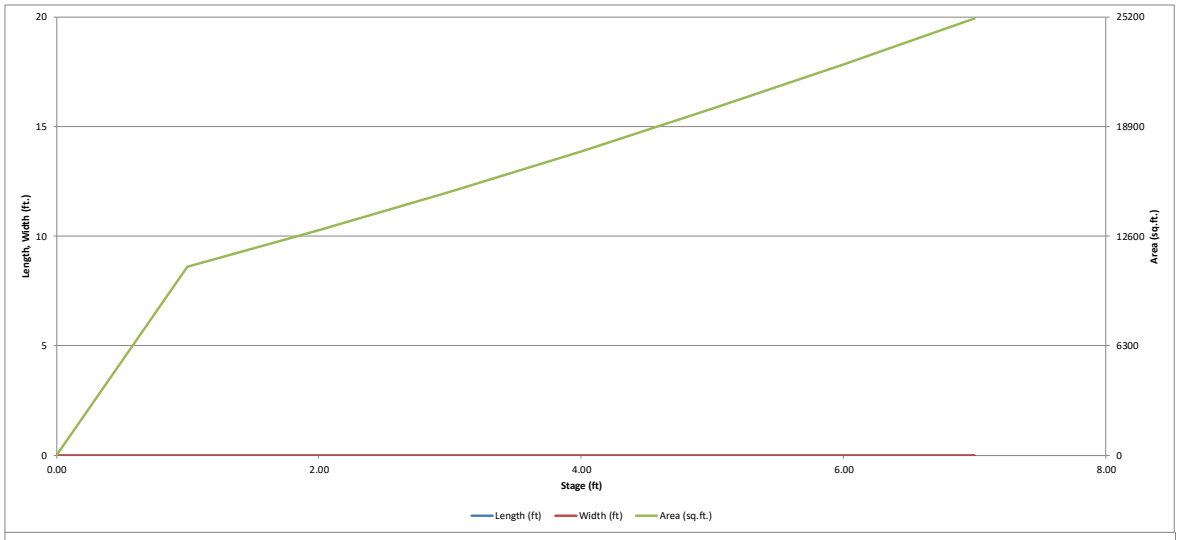
Depth Increment = ft

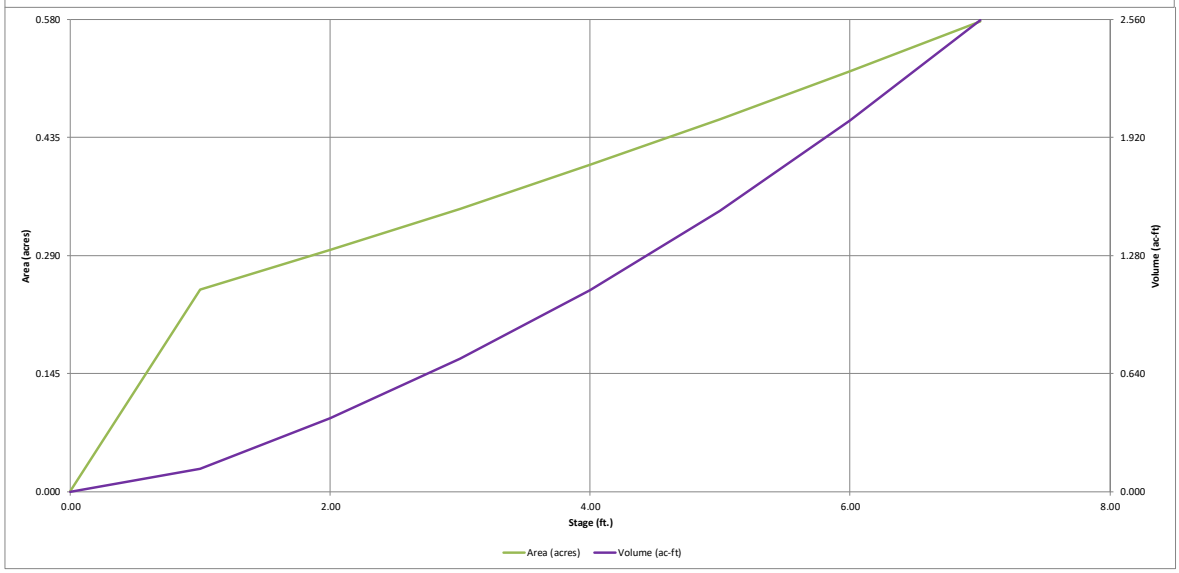
Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool	--	0.00	--	--	--	40	0.001		
6826	--	1.00	--	--	--	10,828	0.249	5,434	0.125
6827	--	2.00	--	--	--	12,923	0.297	17,309	0.397
6828	--	3.00	--	--	--	15,137	0.347	31,339	0.719
6829	--	4.00	--	--	--	17,471	0.401	47,643	1.094
6830	--	5.00	--	--	--	19,925	0.457	66,341	1.523
6831	--	6.00	--	--	--	22,478	0.516	87,543	2.010
6832	--	7.00	--	--	--	25,157	0.578	111,360	2.556

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)

POND A: ULTIMATE DESIGN FOR REFERENCE ONLY





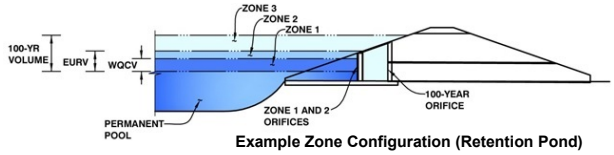
DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)

POND A: ULTIMATE DESIGN FOR REFERENCE ONLY

Project: Falcon Field Filing 2

Basin ID: Pond A (with overdetention)



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	1.86	0.354	Orifice Plate
Zone 2 (EURV)	4.36	0.884	Orifice Plate
Zone 3 (100-year)	5.85	0.694	Weir&Pipe (Restrict)
Total (all zones)		1.932	

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 Area =	N/A	ft^2
Underdrain Orifice Diameter =	N/A	inches	Underdrain Orifice Centroid =	N/A	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)

Centroid 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 =	4.36	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	sq. inches	Elliptical Slot Area =	N/A	ft^2

Calculated Parameters for Plate

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	1.42	2.84					
Orifice Area (sq. inches)	2.95	2.95	2.00					

	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)	Vertical Orifice Area =	N/A	N/A
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
Vertical Orifice Diameter =	N/A	N/A	inches			

Calculated Parameters for Vertical Orifi

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 =	4.56	N/A	ft (relative to basin bottom at Stage = 0 ft)	Height of Grate Upper Edge, H_t =	4.56	N/A
Overflow Weir Front Edge Length =	4.30	N/A	feet	Overflow Weir Slope Length =	4.30	N/A
Overflow Weir Grate Slope =	0.00	N/A	H:V	Grate Open Area / 100-yr Orifice Area =	9.42	N/A
Horiz. Length of Weir Sides =	4.30	N/A	feet	Overflow Grate Open Area w/o Debris =	12.87	N/A
Overflow Grate Type =	Type C Grate	N/A		Overflow Grate Open Area w/ Debris =	6.43	N/A
Debris Clogging % =	50%	N/A	%			

Calculated Parameters for Overflow We

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 Orifice Area =	1.37	N/A
Outlet Pipe Diameter =	18.00	N/A	inches	Outlet Orifice Centroid =	0.60	N/A
Restrictor Plate Height Above Pipe Invert =	13.00		inches	Half-Central Angle of Restrictor Plate on Pipe =	2.03	N/A

Calculated Parameters for Outlet Pipe w/ Flow Restriction Pla

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage=	5.44	ft (relative to basin bottom at Stage = 0 ft)	Spillway Design Flow Depth=	0.56	feet
Spillway Crest Length =	40.00	feet	Stage at Top of Freeboard =	7.00	feet
Spillway End Slopes =	4.00	H:V	Basin Area at Top of Freeboard =	0.58	acres
Freeboard above Max Water Surface =	1.00	feet	Basin Volume at Top of Freeboard =	2.56	acre-ft

Calculated Parameters for Spillway

Routed Hydrograph Results

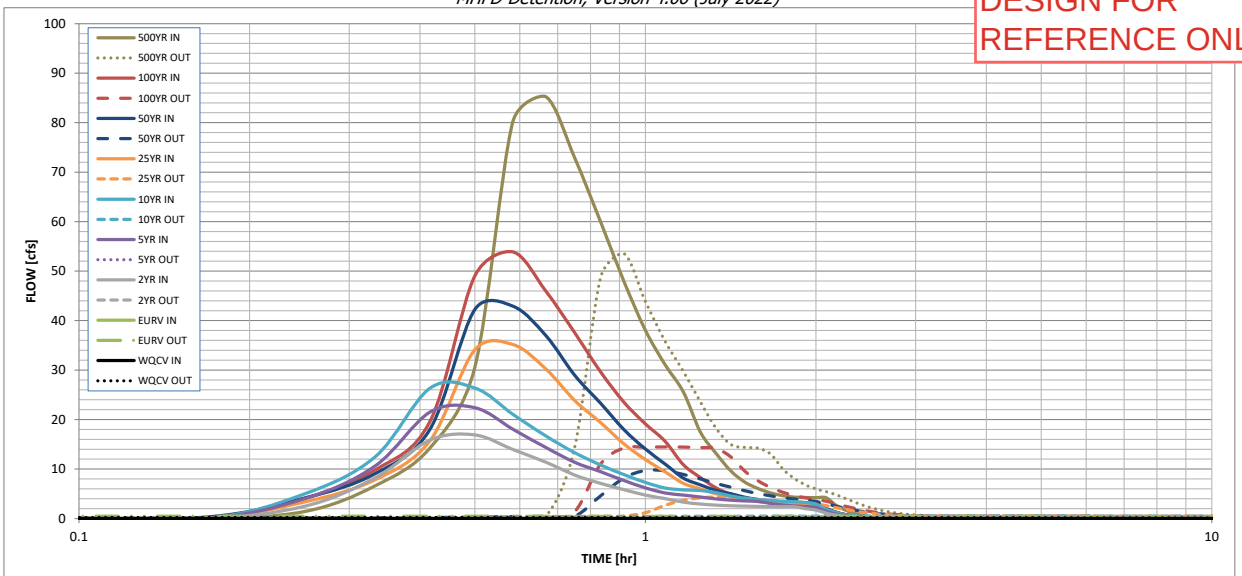
The user can override the default CUHP hydrographs and runoff volumes by entering new values in the Inflow Hydrographs table (Columns W through AF).

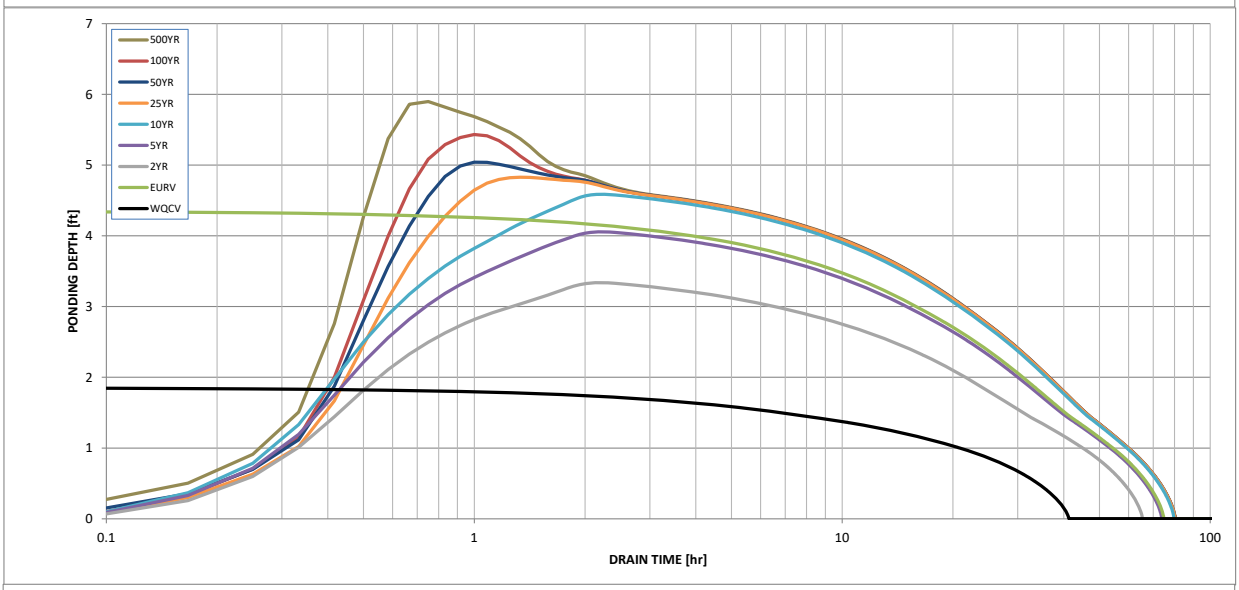
Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
One-Hour Rainfall Depth (in) =	N/A	N/A	1.19	1.50	1.75	2.00	2.25	2.52
CUHP Runoff Volume (acre-ft) =	0.354	1.238	0.890	1.179	1.410	1.757	2.096	2.523
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	0.890	1.179	1.410	1.757	2.096	2.523
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A	0.2	0.4	0.6	5.0	9.8	16.1
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
Peak Inflow Q (cfs) =	N/A	N/A	16.9	22.4	26.4	35.2	42.9	53.9
Peak Outflow Q (cfs) =	0.2	0.5	0.4	0.4	0.6	4.3	9.7	14.5
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	1.0	1.0	0.9	1.0	0.9
Structure Controlling Flow =	Plate	Plate	Plate	Plate	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Outlet Plate 1
Max Velocity through Grate 1 (fps) =	N/A	N/A	N/A	N/A	0.0	0.3	0.7	1.1
Max Velocity through Grate 2 (fps) =	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	67	59	66	71	70	68	66
Time to Drain 99% of Inflow Volume (hours) =	**40**	71	63	70	76	76	75	74
Maximum Ponding Depth (ft) =	1.86	4.36	3.34	4.05	4.59	4.83	5.04	5.43
Area at Maximum Ponding Depth (acres) =	0.29	0.42	0.37	0.40	0.43	0.45	0.46	0.48
Maximum Volume Stored (acre-ft) =	0.356	1.242	0.837	1.114	1.336	1.442	1.537	1.725

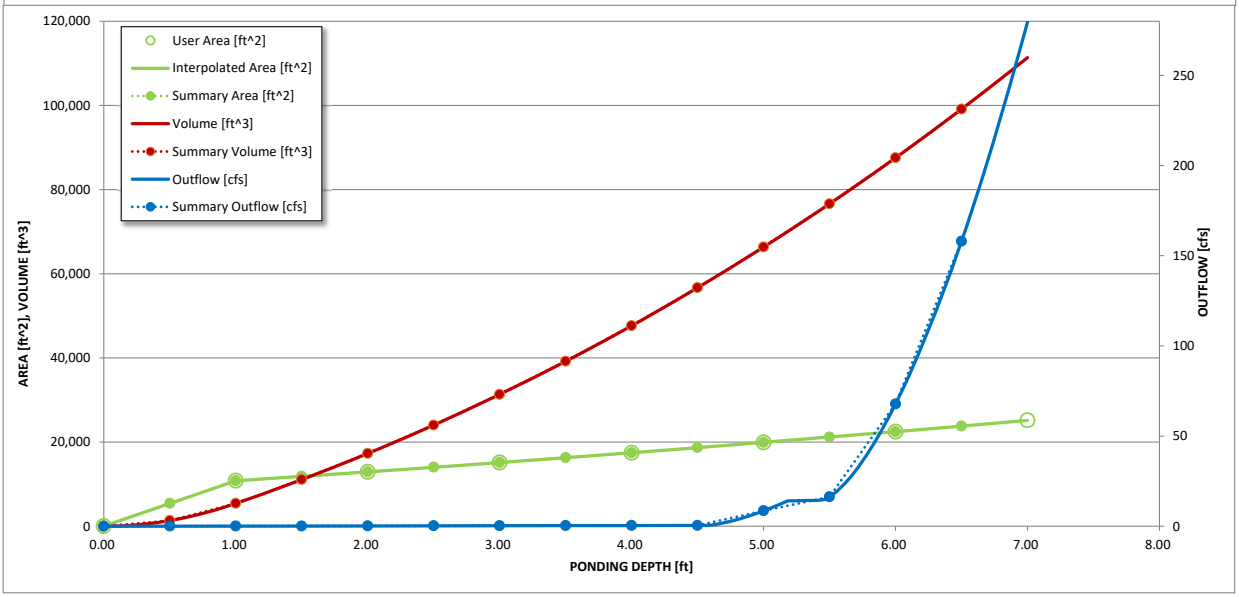
DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)

POND A: ULTIMATE DESIGN FOR REFERENCE ONLY







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

DETENTION BASIN OUTLET STRUCTURE DESIGN

POND A: ULTIMATE DESIGN FOR REFERENCE ONLY

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	4.00	4.97	3.35	4.12	4.09	6.61
	0:20:00	0.00	0.00	8.24	10.64	12.47	7.84	9.07	9.82	14.28
	0:25:00	0.00	0.00	15.85	21.52	26.34	15.74	18.06	19.65	30.57
	0:30:00	0.00	0.00	16.89	22.38	26.37	34.11	42.25	49.03	80.15
	0:35:00	0.00	0.00	13.95	18.04	21.07	35.15	42.93	53.88	85.25
	0:40:00	0.00	0.00	11.38	14.37	16.70	30.26	37.00	45.98	72.90
	0:45:00	0.00	0.00	8.79	11.37	13.31	23.86	28.94	37.55	59.95
	0:50:00	0.00	0.00	7.10	9.46	10.82	19.40	23.29	29.64	47.89
	0:55:00	0.00	0.00	5.82	7.66	8.88	15.07	17.95	23.48	38.04
	1:00:00	0.00	0.00	4.75	6.19	7.28	11.91	14.03	19.11	31.08
	1:05:00	0.00	0.00	4.02	5.16	6.17	9.44	11.01	15.61	25.60
	1:10:00	0.00	0.00	3.30	4.74	5.79	7.11	8.16	10.87	17.51
	1:15:00	0.00	0.00	2.93	4.36	5.68	5.99	6.82	8.29	13.13
	1:20:00	0.00	0.00	2.70	3.96	5.21	5.01	5.66	6.18	9.54
	1:25:00	0.00	0.00	2.58	3.71	4.54	4.42	4.99	4.88	7.32
	1:30:00	0.00	0.00	2.50	3.55	4.10	3.79	4.27	4.12	6.03
	1:35:00	0.00	0.00	2.44	3.45	3.81	3.40	3.83	3.61	5.16
	1:40:00	0.00	0.00	2.40	3.02	3.61	3.15	3.54	3.29	4.61
	1:45:00	0.00	0.00	2.39	2.73	3.49	2.99	3.36	3.12	4.33
	1:50:00	0.00	0.00	2.39	2.54	3.40	2.90	3.26	3.06	4.24
	1:55:00	0.00	0.00	1.98	2.42	3.23	2.84	3.20	3.04	4.21
	2:00:00	0.00	0.00	1.70	2.25	2.89	2.82	3.17	3.04	4.21
	2:05:00	0.00	0.00	1.10	1.46	1.88	1.83	2.06	1.97	2.73
	2:10:00	0.00	0.00	0.69	0.92	1.20	1.18	1.32	1.26	1.74
	2:15:00	0.00	0.00	0.43	0.57	0.74	0.73	0.82	0.78	1.08
	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	0.26	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

POND A: ULTIMATE DESIGN FOR REFERENCE ONLY

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)

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 [ft^2]	Area [acres]	Volume [ft^3]	Volume [ac-ft]	Total Outflow [cfs]
	0.00	40	0.001	0	0.000	0.00
	0.50	5,434	0.125	1,368	0.031	0.07
	1.00	10,828	0.249	5,434	0.125	0.10
	1.50	11,876	0.273	11,110	0.255	0.15
	2.00	12,923	0.297	17,309	0.397	0.21
	2.50	14,030	0.322	24,047	0.552	0.26
	3.00	15,137	0.347	31,339	0.719	0.32
	3.50	16,304	0.374	39,199	0.900	0.38
	4.00	17,471	0.401	47,643	1.094	0.43
	4.50	18,698	0.429	56,685	1.301	0.47
	5.00	19,925	0.457	66,341	1.523	8.59
	5.50	21,201	0.487	76,623	1.759	16.33
	6.00	22,478	0.516	87,543	2.010	67.83
	6.50	23,817	0.547	99,117	2.275	158.05

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).

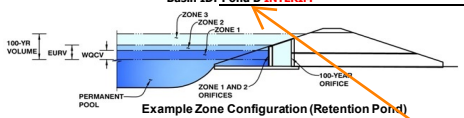
DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)

POND B: INTERIM DESIGN

Project: Falcon Field Filing 1

Basin ID: Pond B INTERIM



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	EDB	
Watershed Area =	15.87	acres
Watershed Length =	1,200	ft
Watershed Length to Centroid =	400	ft
Watershed Slope =	0.035	ft/ft
Watershed Imperviousness =	58.30%	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) =	0.305	acre-feet		acre-feet
Excess Urban Runoff Volume (EURV) =	1.114	acre-feet		acre-feet
2-yr Runoff Volume (P1 = 1.19 in.) =	0.796	acre-feet	1.19	inches
5-yr Runoff Volume (P1 = 1.5 in.) =	1.050	acre-feet	1.50	inches
10-yr Runoff Volume (P1 = 1.75 in.) =	1.254	acre-feet	1.75	inches
25-yr Runoff Volume (P1 = 2 in.) =	1.539	acre-feet	2.00	inches
50-yr Runoff Volume (P1 = 2.25 in.) =	1.820	acre-feet	2.25	inches
100-yr Runoff Volume (P1 = 2.52 in.) =	2.167	acre-feet	2.52	inches
500-yr Runoff Volume (P1 = 3.49 in.) =	3.373	acre-feet	3.49	inches
Approximate 2-yr Detention Volume =	0.721	acre-feet		
Approximate 5-yr Detention Volume =	0.945	acre-feet		
Approximate 10-yr Detention Volume =	1.145	acre-feet		
Approximate 25-yr Detention Volume =	1.388	acre-feet		
Approximate 50-yr Detention Volume =	1.537	acre-feet		
Approximate 100-yr Detention Volume =	1.702	acre-feet		

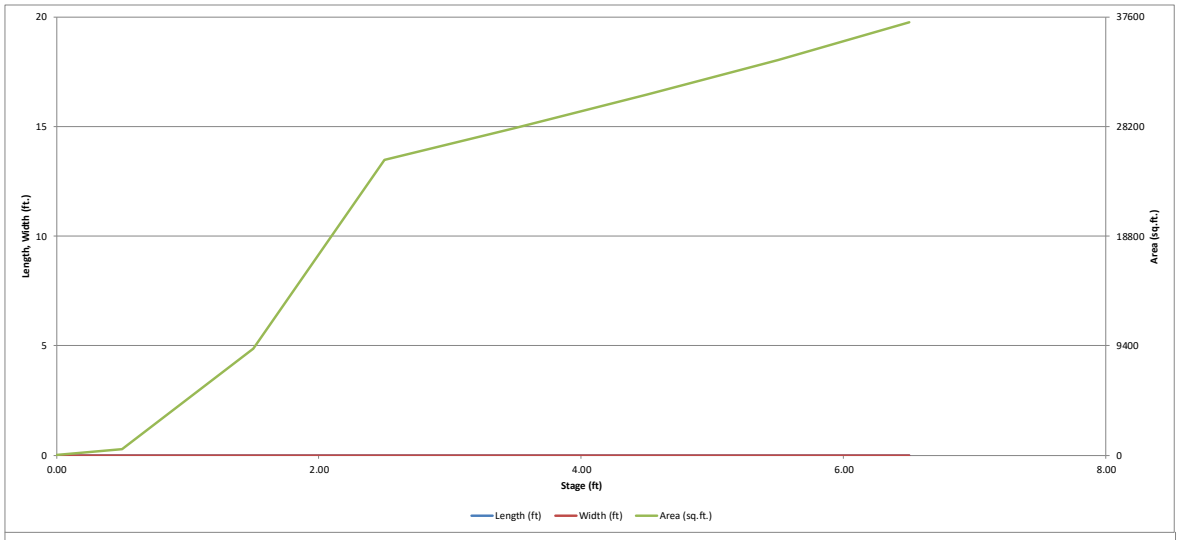
Define Zones and Basin Geometry

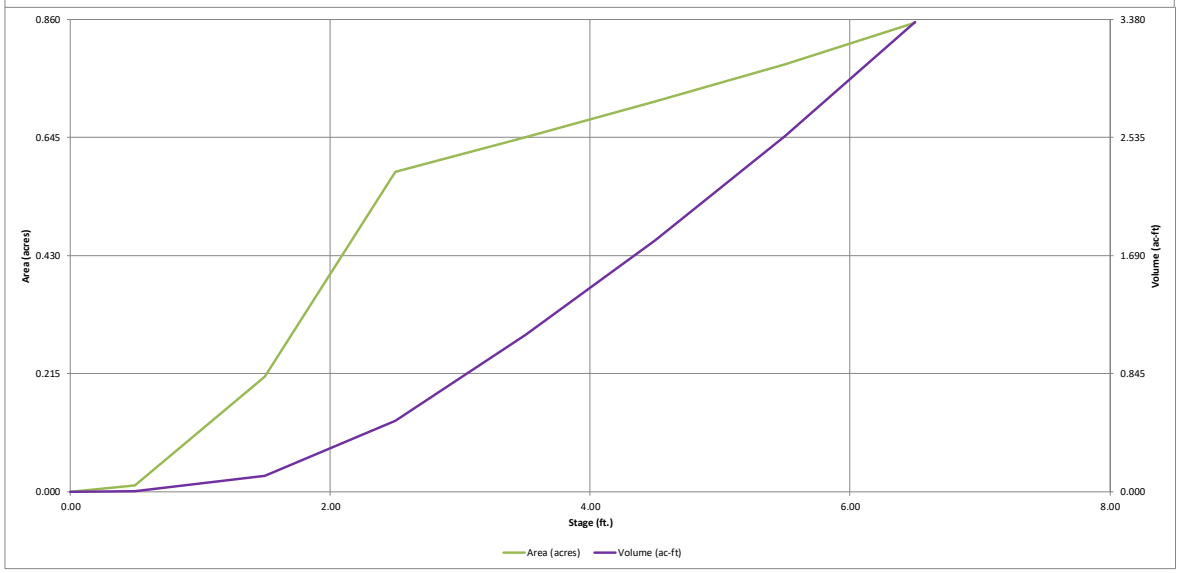
Zone 1 Volume (WQCV) =	0.305	acre-feet
Zone 2 Volume (EURV - Zone 1) =	0.809	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	0.589	acre-feet
Total Detention Basin Volume =	1.702	acre-feet
Initial Surcharge Volume (ISV) =	user	ft^3
Initial Surcharge Depth (ISD) =	user	ft
Total Available Detention Depth (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	--	--	--	40	0.001		
6826	--	0.50	--	--	--	519	0.012	140	0.003
6827	--	1.50	--	--	--	9,130	0.210	4,964	0.114
6828	--	2.50	--	--	--	25,348	0.582	22,203	0.510
6829	--	3.50	--	--	--	28,102	0.645	48,928	1.123
6830	--	4.50	--	--	--	30,958	0.711	78,458	1.801
6831	--	5.50	--	--	--	33,914	0.779	110,894	2.546
6832	--	6.50	--	--	--	37,201	0.854	146,452	3.362

Pond B can be overdetained but the calcs should look at what actually is going there and then detain the flows are a higher ratio to historic. At the least, for SDI reporting provide additional spreadsheet showing what the drain times actually are for the area the pond is receiving.


20
15
10
5
0
37600
28200
18800
9400
0
Length, Width (ft.)
Area (sq.ft.)
0.00
2.00
4.00
6.00
8.00
Stage (ft)
Length (ft)
Width (ft)
Area (sq.ft.)


0.860
0.645
0.430
0.215
0.000
3.380
2.535
1.690
0.845
0.000
Area (acres)
Volume (ac-ft)
0.00
2.00
4.00
6.00
8.00
Stage (ft.)
Area (acres)
Volume (ac-ft)

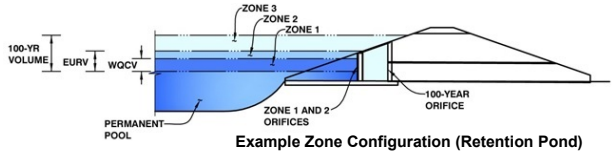
POND B: INTERIM DESIGN

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)

Project: Falcon Field Filing 1

Basin ID: Pond B INTERIM



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	2.10	0.305	Orifice Plate
Zone 2 (EURV)	3.49	0.809	Orifice Plate
Zone 3 (100-year)	4.37	0.589	Weir&Pipe (Restrict)
Total (all zones)		1.702	

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 Area =	N/A	ft^2
Underdrain Orifice Diameter =	N/A	inches	Underdrain Orifice Centroid =	N/A	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)

Centroid 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 =	4.37	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	sq. inches	Elliptical Slot Area =	N/A	ft^2

Calculated Parameters for Plate

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	1.00	2.00					
Orifice Area (sq. inches)	1.42	1.75	3.50					

	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			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
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
Vertical Orifice Diameter =	N/A	N/A	inches			

Calculated Parameters for Vertical Orifi

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			Zone 3 Weir	Not Selected
Overflow Weir Front Edge Height, Ho =	4.40	N/A	ft (relative to basin bottom at Stage = 0 ft)	Height of Grate Upper Edge, H_t =	4.40	N/A
Overflow Weir Front Edge Length =	5.00	N/A	feet	Overflow Weir Slope Length =	5.00	N/A
Overflow Weir Grate Slope =	0.00	N/A	H:V	Grate Open Area / 100-yr Orifice Area =	16.26	N/A
Horiz. Length of Weir Sides =	5.00	N/A	feet	Overflow Grate Open Area w/o Debris =	17.40	N/A
Overflow Grate Type =	Type C Grate	N/A		Overflow Grate Open Area w/ Debris =	8.70	N/A
Debris Clogging % =	50%	N/A	%			

Calculated Parameters for Overflow We

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

	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 =	1.07	N/A
Outlet Pipe Diameter =	18.00	N/A	inches	Outlet Orifice Centroid =	0.50	N/A
Restrictor Plate Height Above Pipe Invert =	10.50		inches	Half-Central Angle of Restrictor Plate on Pipe =	1.74	N/A

Calculated Parameters for Outlet Pipe w/ Flow Restriction Pla

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage=	4.97	ft (relative to basin bottom at Stage = 0 ft)	Spillway Design Flow Depth=	0.53	feet
Spillway Crest Length =	50.00	feet	Stage at Top of Freeboard =	6.50	feet
Spillway End Slopes =	4.00	H:V	Basin Area at Top of Freeboard =	0.85	acres
Freeboard above Max Water Surface =	1.00	feet	Basin Volume at Top of Freeboard =	3.36	acre-ft

Calculated Parameters for Spillway

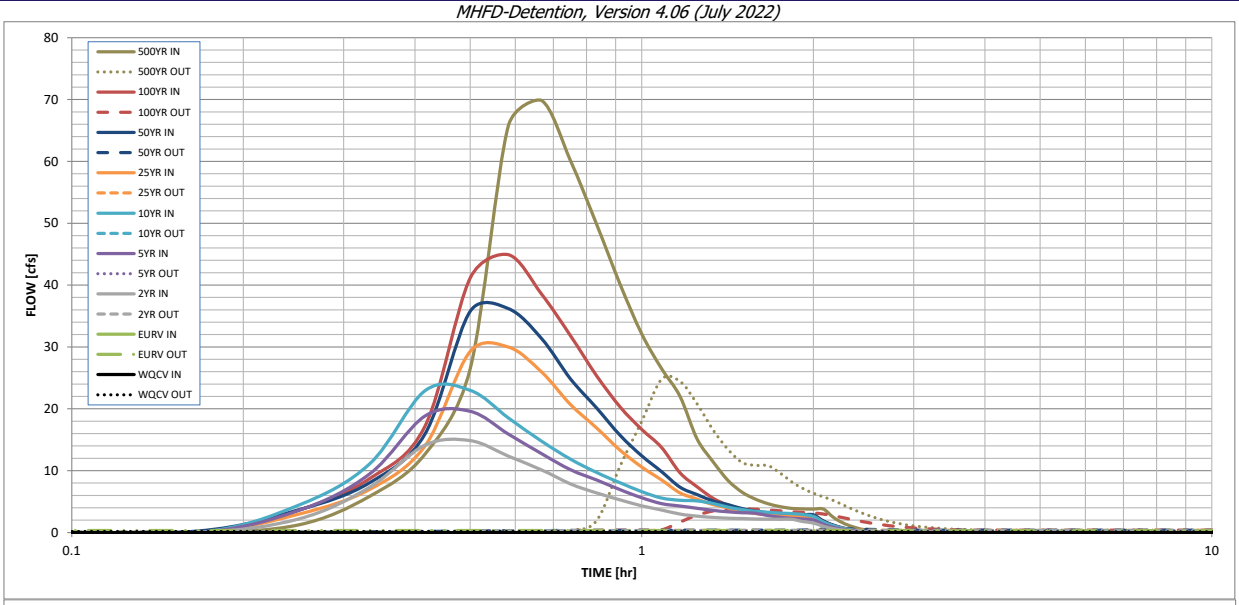
Routed Hydrograph Results

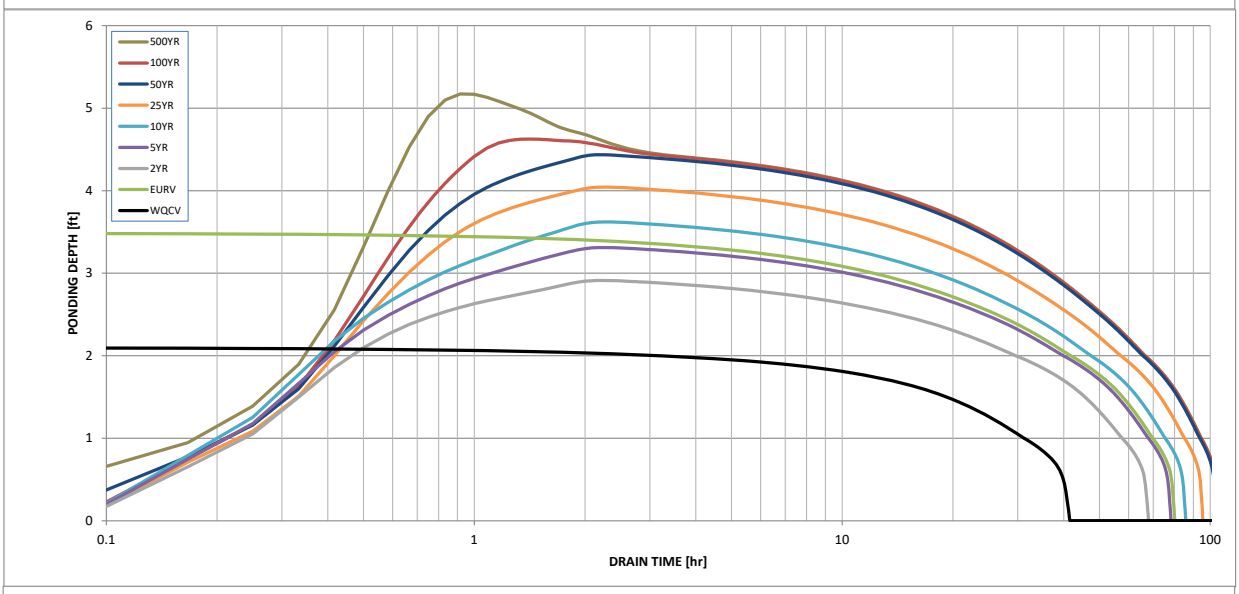
The user can override the default CUHP hydrographs and runoff volumes by entering new values in the Inflow Hydrographs table (Columns W through AF).

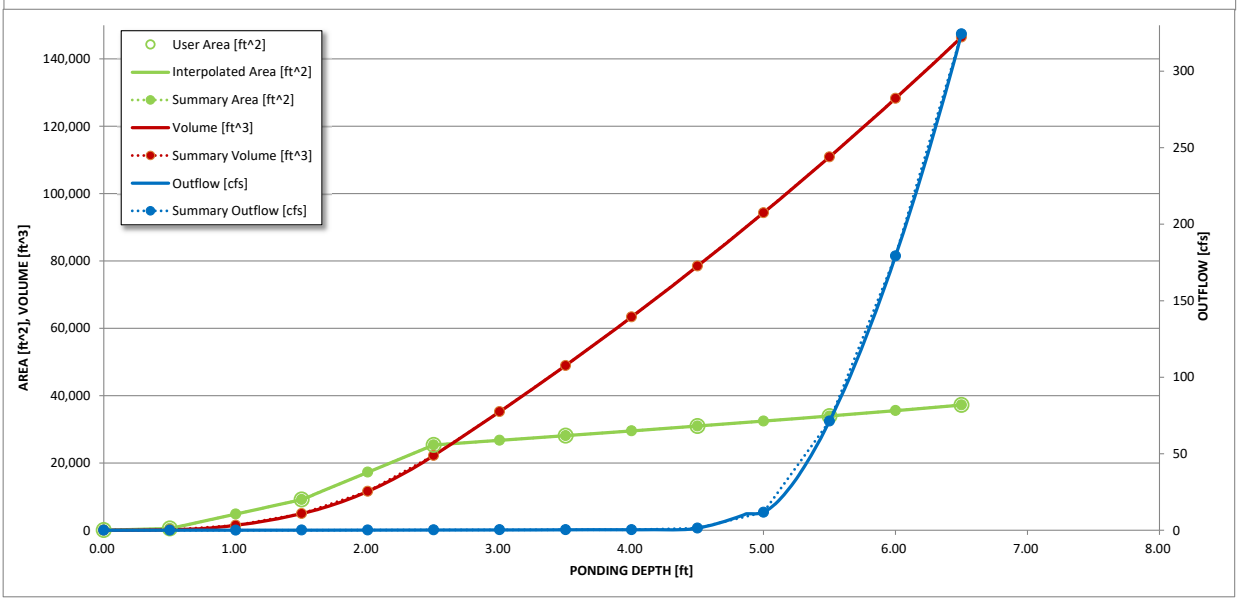
Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
One-Hour Rainfall Depth (in) =	N/A	N/A	1.19	1.50	1.75	2.00	2.25	2.52
CUHP Runoff Volume (acre-ft) =	0.305	1.114	0.796	1.050	1.254	1.539	1.820	2.167
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	0.796	1.050	1.254	1.539	1.820	2.167
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A	0.2	0.3	0.4	3.8	7.5	12.3
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	0.24	0.47	0.77
Peak Inflow Q (cfs) =	N/A	N/A	14.9	19.6	23.0	30.0	36.2	44.9
Peak Outflow Q (cfs) =	0.2	0.3	0.3	0.3	0.3	0.4	0.6	3.8
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	1.0	0.8	0.1	0.1	0.3
Structure Controlling Flow =	Plate	Plate	Plate	Plate	Plate	Plate	Overflow Weir 1	Overflow Weir 1
Max Velocity through Grate 1 (fps) =	N/A	N/A	N/A	N/A	N/A	N/A	0.0	0.2
Max Velocity through Grate 2 (fps) =	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	60	69	75	83	90	89
Time to Drain 99% of Inflow Volume (hours) =	**40**	76	65	74	81	90	98	98
Maximum Ponding Depth (ft) =	2.10	3.49	2.91	3.31	3.62	4.04	4.43	4.62
Area at Maximum Ponding Depth (acres) =	0.43	0.64	0.61	0.63	0.65	0.68	0.71	0.72
Maximum Volume Stored (acre-ft) =	0.307	1.117	0.754	1.002	1.201	1.481	1.752	1.887

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	0.25	0.02	1.24
	0:15:00	0.00	0.00	2.19	3.56	4.42	2.97	3.66	3.62	5.86
	0:20:00	0.00	0.00	7.34	9.47	11.10	6.97	8.07	8.73	12.68
	0:25:00	0.00	0.00	14.13	18.84	22.92	14.01	15.94	17.22	26.48
	0:30:00	0.00	0.00	14.85	19.59	22.99	29.26	35.75	41.14	65.72
	0:35:00	0.00	0.00	12.36	15.92	18.53	29.98	36.21	44.92	69.85
	0:40:00	0.00	0.00	10.14	12.76	14.79	25.99	31.40	38.58	60.09
	0:45:00	0.00	0.00	7.86	10.14	11.85	20.68	24.83	31.81	49.84
	0:50:00	0.00	0.00	6.39	8.49	9.71	16.92	20.13	25.34	40.06
	0:55:00	0.00	0.00	5.27	6.92	8.02	13.27	15.68	20.26	32.11
	1:00:00	0.00	0.00	4.31	5.62	6.61	10.60	12.40	16.66	26.49
	1:05:00	0.00	0.00	3.64	4.67	5.58	8.49	9.84	13.76	22.02
	1:10:00	0.00	0.00	2.98	4.28	5.22	6.41	7.33	9.66	15.18
	1:15:00	0.00	0.00	2.64	3.93	5.11	5.41	6.14	7.41	11.47
	1:20:00	0.00	0.00	2.44	3.57	4.69	4.52	5.11	5.56	8.42
	1:25:00	0.00	0.00	2.32	3.35	4.10	4.00	4.51	4.40	6.52
	1:30:00	0.00	0.00	2.25	3.20	3.70	3.43	3.86	3.73	5.40
	1:35:00	0.00	0.00	2.20	3.11	3.44	3.08	3.46	3.27	4.65
	1:40:00	0.00	0.00	2.17	2.73	3.26	2.85	3.20	2.98	4.17
	1:45:00	0.00	0.00	2.15	2.47	3.15	2.70	3.03	2.82	3.90
	1:50:00	0.00	0.00	2.15	2.29	3.06	2.61	2.94	2.76	3.82
	1:55:00	0.00	0.00	1.78	2.18	2.91	2.56	2.88	2.73	3.79
	2:00:00	0.00	0.00	1.53	2.03	2.60	2.54	2.86	2.73	3.79
	2:05:00	0.00	0.00	1.00	1.32	1.71	1.66	1.87	1.79	2.48
	2:10:00	0.00	0.00	0.63	0.84	1.10	1.07	1.20	1.15	1.59
	2:15:00	0.00	0.00	0.40	0.52	0.68	0.68	0.76	0.73	1.00
	2:20:00	0.00	0.00	0.23	0.31	0.41	0.41	0.45	0.43	0.60
	2:25:00	0.00	0.00	0.12	0.18	0.23	0.24	0.27	0.26	0.35
	2:30:00	0.00	0.00	0.05	0.09	0.11	0.12	0.13	0.12	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 4.06 (July 2022)

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 [ft^2]	Area [acres]	Volume [ft^3]	Volume [ac-ft]	Total Outflow [cfs]
	0.00	40	0.001	0	0.000	0.00
	0.50	519	0.012	140	0.003	0.03
	1.00	4,825	0.111	1,476	0.034	0.05
	1.50	9,130	0.210	4,964	0.114	0.10
	2.00	17,239	0.396	11,556	0.265	0.13
	2.50	25,348	0.582	22,203	0.510	0.23
	3.00	26,725	0.614	35,221	0.809	0.28
	3.50	28,102	0.645	48,928	1.123	0.32
	4.00	29,530	0.678	63,336	1.454	0.36
	4.50	30,958	0.711	78,458	1.801	1.41
	5.00	32,436	0.745	94,307	2.165	11.71
	5.50	33,914	0.779	110,894	2.546	71.36
	6.00	35,557	0.816	128,262	2.944	179.22
	6.50	37,201	0.854	146,452	3.362	324.30

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).

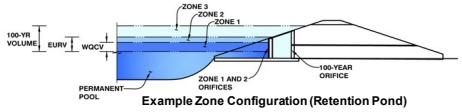
DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)

POND B: ULTIMATE DESIGN FOR REFERENCE ONLY

Project: Falcon Field Filing 1

Basin ID: Pond B (with overdetention)



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	EDB	
Watershed Area =	15.87	acres
Watershed Length =	1,200	ft
Watershed Length to Centroid =	400	ft
Watershed Slope =	0.035	ft/ft
Watershed Imperviousness =	79.70%	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) =	0.432	acre-feet	acre-feet
Excess Urban Runoff Volume (EURV) =	1.662	acre-feet	acre-feet
2-yr Runoff Volume (P1 = 1.19 in.) =	1.142	acre-feet	1.19 inches
5-yr Runoff Volume (P1 = 1.5 in.) =	1.481	acre-feet	1.50 inches
10-yr Runoff Volume (P1 = 1.75 in.) =	1.753	acre-feet	1.75 inches
25-yr Runoff Volume (P1 = 2 in.) =	2.071	acre-feet	2.00 inches
50-yr Runoff Volume (P1 = 2.25 in.) =	2.382	acre-feet	2.25 inches
100-yr Runoff Volume (P1 = 2.52 in.) =	2.743	acre-feet	2.52 inches
500-yr Runoff Volume (P1 = 3.49 in.) =	4.004	acre-feet	3.49 inches
Approximate 2-yr Detention Volume =	1.091	acre-feet	
Approximate 5-yr Detention Volume =	1.419	acre-feet	
Approximate 10-yr Detention Volume =	1.694	acre-feet	
Approximate 25-yr Detention Volume =	2.012	acre-feet	
Approximate 50-yr Detention Volume =	2.199	acre-feet	
Approximate 100-yr Detention Volume =	2.371	acre-feet	

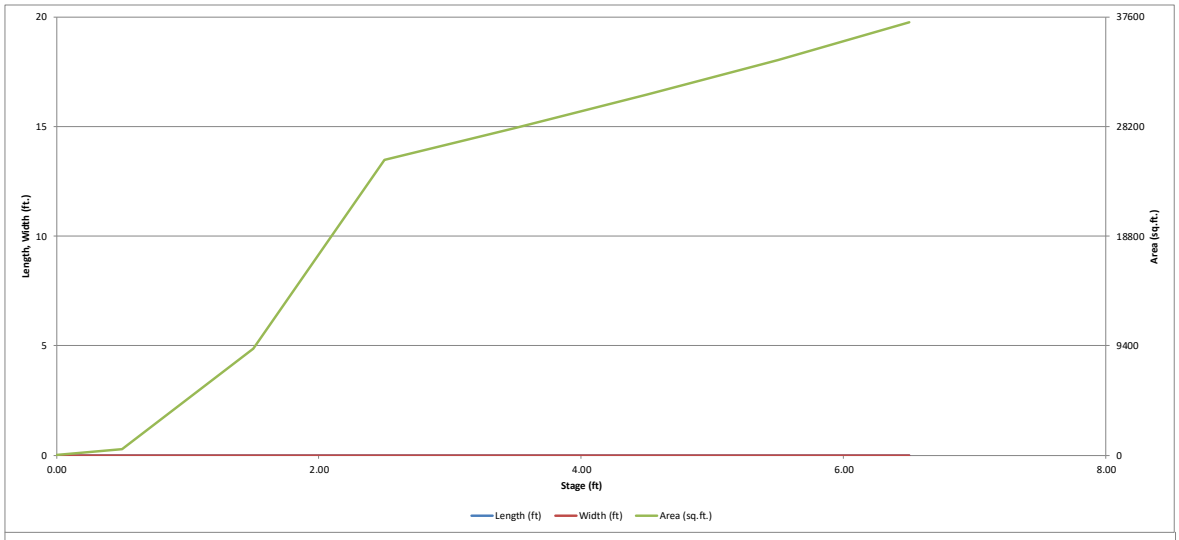
Define Zones and Basin Geometry

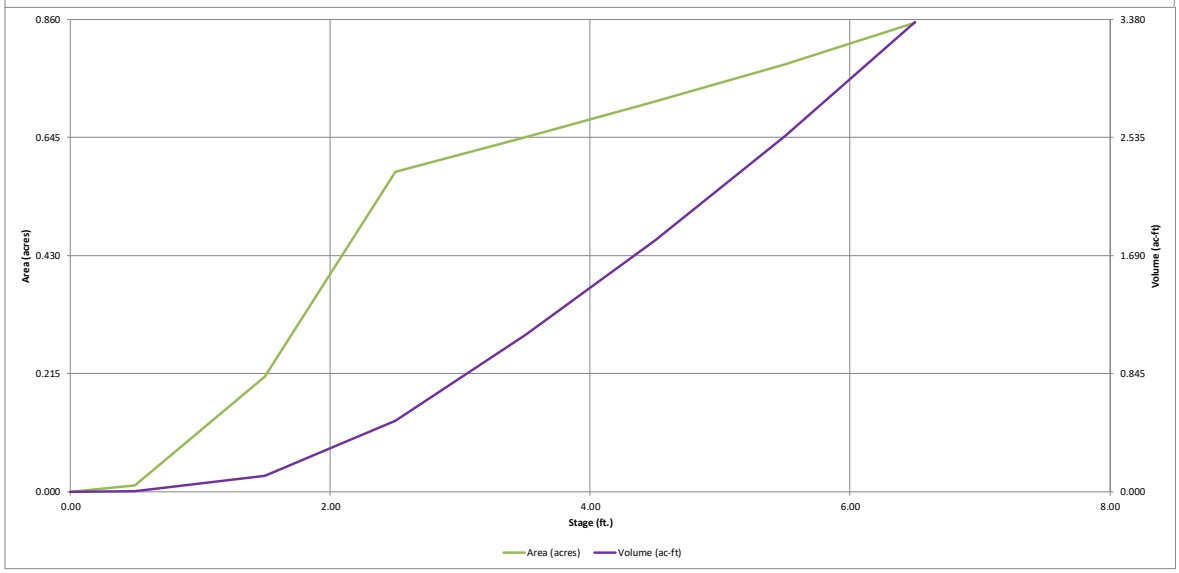
Zone 1 Volume (WQCV) =	0.432	acre-feet
Zone 2 Volume (EURV - Zone 1) =	1.230	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	0.710	acre-feet
Total Detention Basin Volume =	2.371	acre-feet
Initial Surcharge Volume (ISV) =	user	ft^3
Initial Surcharge Depth (ISD) =	user	ft
Total Available Detention Depth (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	--	--	--	40	0.001		
6826	--	0.50	--	--	--	519	0.012	140	0.003
6827	--	1.50	--	--	--	9,130	0.210	4,964	0.114
6828	--	2.50	--	--	--	25,348	0.582	22,203	0.510
6829	--	3.50	--	--	--	28,102	0.645	48,928	1.123
6830	--	4.50	--	--	--	30,958	0.711	78,458	1.801
6831	--	5.50	--	--	--	33,914	0.779	110,894	2.546
6832	--	6.50	--	--	--	37,201	0.854	146,452	3.362

POND B: ULTIMATE DESIGN FOR REFERENCE ONLY





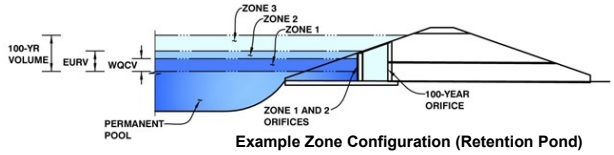
POND B: ULTIMATE DESIGN FOR REFERENCE ONLY

DETENTION BASIN OUTLET STRUCTURE DESI

MHFD-Detention, Version 4.06 (July 2022)

Project: Falcon Field Filing 1

Basin ID: Pond B (with overdetention)



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	2.36	0.432	Orifice Plate
Zone 2 (EURV)	4.31	1.230	Orifice Plate
Zone 3 (100-year)	5.28	0.710	Weir&Pipe (Restrict)
Total (all zones)		2.371	

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 Area =	N/A	ft²
Underdrain Orifice Diameter =	N/A	inches	Underdrain Orifice Centroid =	N/A	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)

Centroid of Lowest Orifice =	0.00	ft (relative to basin bottom at Stage = 0 ft)	WQ Orifice Area per Row =	N/A	ft²
Depth at top of Zone using Orifice Plate =	4.31	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	sq. inches	Elliptical Slot Area =	N/A	ft²

Calculated Parameters for Plate

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	1.00	2.00					
Orifice Area (sq. inches)	1.72	1.97	4.25					

	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			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
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
Vertical Orifice Diameter =	N/A	N/A	inches			

Calculated Parameters for Vertical Orifi

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			Zone 3 Weir	Not Selected
Overflow Weir Front Edge Height, Ho =	4.40	N/A	ft (relative to basin bottom at Stage = 0 ft)	Height of Grate Upper Edge, H_t =	4.40	N/A
Overflow Weir Front Edge Length =	5.00	N/A	feet	Overflow Weir Slope Length =	5.00	N/A
Overflow Weir Grate Slope =	0.00	N/A	H:V	Grate Open Area / 100-yr Orifice Area =	16.26	N/A
Horiz. Length of Weir Sides =	5.00	N/A	feet	Overflow Grate Open Area w/o Debris =	17.40	N/A
Overflow Grate Type =	Type C Grate	N/A		Overflow Grate Open Area w/ Debris =	8.70	N/A
Debris Clogging % =	50%	N/A	%			

Calculated Parameters for Overflow We

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

	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 =	1.07	N/A
Outlet Pipe Diameter =	18.00	N/A	inches	Outlet Orifice Centroid =	0.50	N/A
Restrictor Plate Height Above Pipe Invert =	10.50		inches	Half-Central Angle of Restrictor Plate on Pipe =	1.74	N/A

Calculated Parameters for Outlet Pipe w/ Flow Restriction Pla

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage=	4.97	ft (relative to basin bottom at Stage = 0 ft)	Spillway Design Flow Depth=	0.53	feet
Spillway Crest Length =	50.00	feet	Stage at Top of Freeboard =	6.50	feet
Spillway End Slopes =	4.00	H:V	Basin Area at Top of Freeboard =	0.85	acres
Freeboard above Max Water Surface =	1.00	feet	Basin Volume at Top of Freeboard =	3.36	acre-ft

Calculated Parameters for Spillway

Routed Hydrograph Results

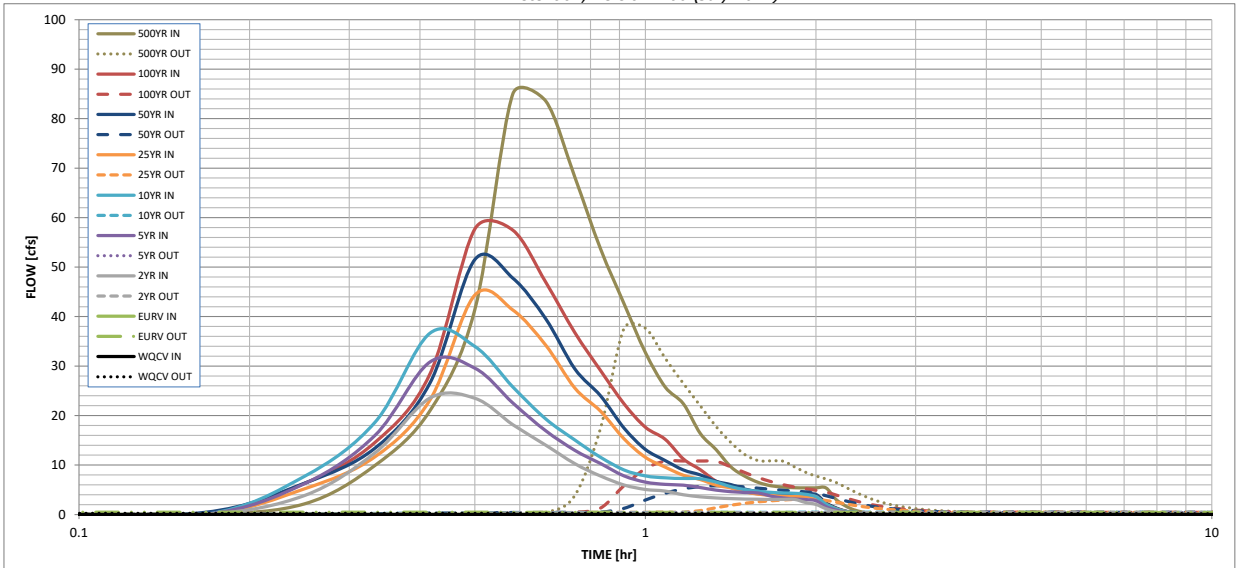
The user can override the default CUHP hydrographs and runoff volumes by entering new values in the Inflow Hydrographs table (Columns W through AF).

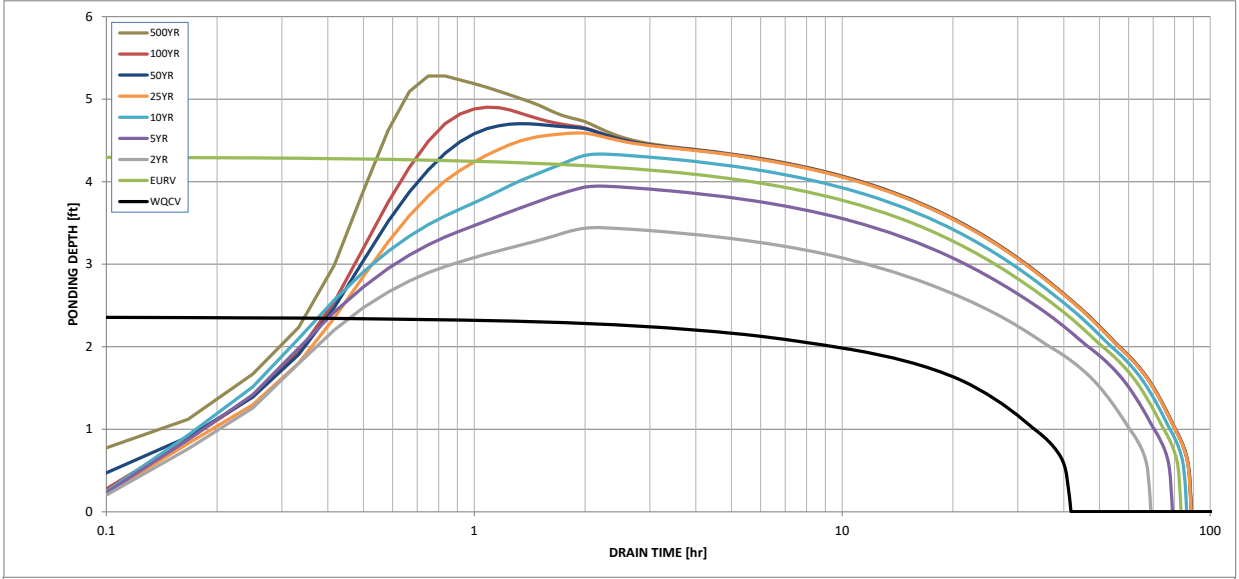
Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
One-Hour Rainfall Depth (in) =	N/A	N/A	1.19	1.50	1.75	2.00	2.25	2.52
CUHP Runoff Volume (acre-ft) =	0.432	1.662	1.142	1.481	1.753	2.071	2.382	2.743
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	1.142	1.481	1.753	2.071	2.382	2.743
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A	0.2	0.3	0.4	3.8	7.5	12.3
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	0.24	0.47	0.77
Peak Inflow Q (cfs) =	N/A	N/A	23.5	30.8	36.6	44.4	51.5	57.7
Peak Outflow Q (cfs) =	0.3	0.5	0.4	0.4	0.5	3.2	5.8	10.8
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	1.4	1.1	0.8	0.8	0.9
Structure Controlling Flow =	Plate	Plate	Plate	Plate	Plate	Overflow Weir 1	Overflow Weir 1	Outlet Plate 1
Max Velocity through Grate 1 (fps) =	N/A	N/A	N/A	N/A	N/A	0.2	0.3	0.6
Max Velocity through Grate 2 (fps) =	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	72	60	69	75	76	75	74
Time to Drain 99% of Inflow Volume (hours) =	**40**	79	66	75	81	83	83	82
Maximum Ponding Depth (ft) =	2.37	4.31	3.44	3.95	4.33	4.59	4.70	4.90
Area at Maximum Ponding Depth (acres) =	0.53	0.70	0.64	0.67	0.70	0.72	0.72	0.74
Maximum Volume Stored (acre-ft) =	0.437	1.667	1.085	1.413	1.681	1.865	1.945	2.091

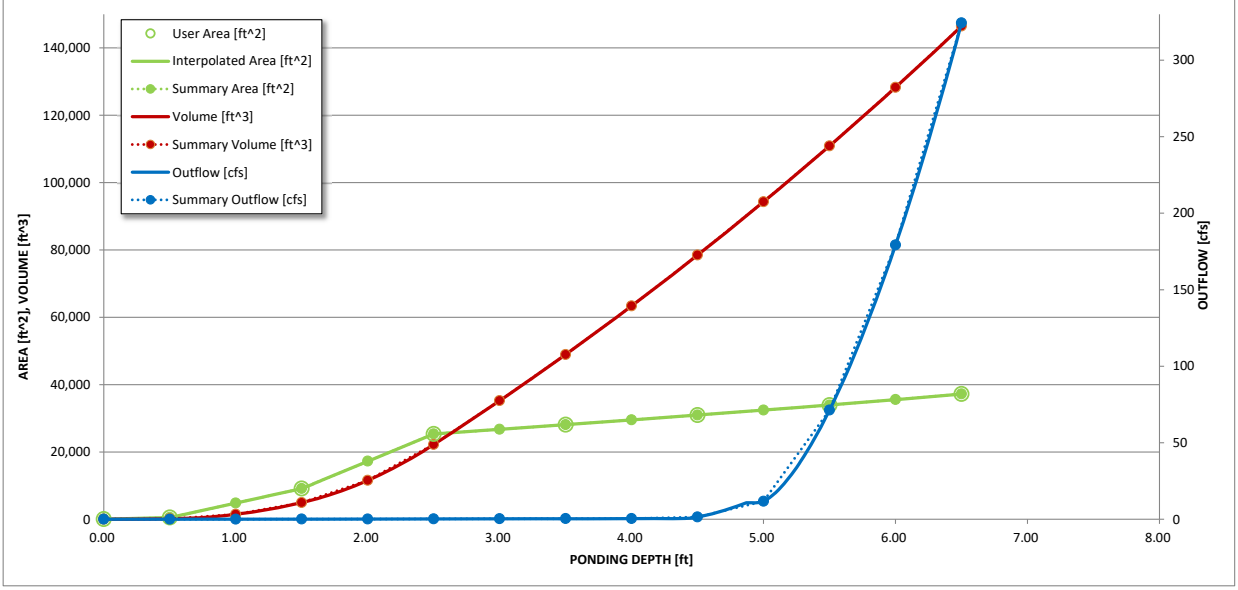
POND B: ULTIMATE DESIGN FOR REFERENCE ONLY

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			

POND B: ULTIMATE DESIGN FOR REFERENCE ONLY

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	0.43	0.04	2.14
	0:15:00	0.00	0.00	3.84	6.23	7.71	5.17	6.32	6.28	9.94
	0:20:00	0.00	0.00	12.50	16.02	18.68	11.67	13.45	14.58	21.00
	0:25:00	0.00	0.00	23.55	30.84	36.65	23.18	26.60	28.43	41.42
	0:30:00	0.00	0.00	23.50	29.58	33.95	44.36	51.51	57.70	84.97
	0:35:00	0.00	0.00	18.17	22.54	25.80	41.34	47.78	57.46	83.57
	0:40:00	0.00	0.00	14.02	16.93	19.31	34.23	39.56	46.96	68.26
	0:45:00	0.00	0.00	10.29	12.99	15.09	25.60	29.48	36.80	53.65
	0:50:00	0.00	0.00	7.78	10.29	11.56	20.86	23.96	29.09	42.63
	0:55:00	0.00	0.00	5.97	7.80	9.01	15.30	17.48	22.39	32.73
	1:00:00	0.00	0.00	5.07	6.56	7.79	11.56	13.16	17.64	25.80
	1:05:00	0.00	0.00	4.73	6.09	7.41	9.58	10.92	15.22	22.38
	1:10:00	0.00	0.00	3.98	5.92	7.28	7.93	8.99	11.24	16.38
	1:15:00	0.00	0.00	3.58	5.44	7.22	7.07	7.99	9.06	13.10
	1:20:00	0.00	0.00	3.34	4.92	6.56	5.94	6.70	6.71	9.58
	1:25:00	0.00	0.00	3.22	4.62	5.60	5.35	6.03	5.45	7.71
	1:30:00	0.00	0.00	3.13	4.45	5.02	4.56	5.14	4.63	6.48
	1:35:00	0.00	0.00	3.08	4.35	4.68	4.11	4.63	4.19	5.82
	1:40:00	0.00	0.00	3.07	3.72	4.48	3.85	4.33	3.99	5.54
	1:45:00	0.00	0.00	3.07	3.36	4.35	3.72	4.18	3.91	5.42
	1:50:00	0.00	0.00	3.07	3.14	4.29	3.65	4.10	3.90	5.39
	1:55:00	0.00	0.00	2.43	3.03	4.10	3.61	4.07	3.90	5.39
	2:00:00	0.00	0.00	2.05	2.79	3.61	3.61	4.06	3.90	5.39
	2:05:00	0.00	0.00	1.17	1.60	2.09	2.10	2.36	2.26	3.13
	2:10:00	0.00	0.00	0.67	0.92	1.19	1.21	1.36	1.30	1.80
	2:15:00	0.00	0.00	0.34	0.49	0.63	0.65	0.73	0.70	0.96
	2:20:00	0.00	0.00	0.16	0.26	0.32	0.35	0.39	0.37	0.51
	2:25:00	0.00	0.00	0.06	0.10	0.12	0.14	0.15	0.15	0.20
	2:30:00	0.00	0.00	0.01	0.02	0.02	0.02	0.03	0.02	0.03
	2:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	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

POND B: ULTIMATE DESIGN FOR REFERENCE ONLY

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)

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 [ft^2]	Area [acres]	Volume [ft^3]	Volume [ac-ft]	Total Outflow [cfs]
	0.00	40	0.001	0	0.000	0.00
	0.50	519	0.012	140	0.003	0.04
	1.00	4,825	0.111	1,476	0.034	0.06
	1.50	9,130	0.210	4,964	0.114	0.12
	2.00	17,239	0.396	11,556	0.265	0.15
	2.50	25,348	0.582	22,203	0.510	0.27
	3.00	26,725	0.614	35,221	0.809	0.33
	3.50	28,102	0.645	48,928	1.123	0.39
	4.00	29,530	0.678	63,336	1.454	0.43
	4.50	30,958	0.711	78,458	1.801	1.49
	5.00	32,436	0.745	94,307	2.165	11.71
	5.50	33,914	0.779	110,894	2.546	71.36
	6.00	35,557	0.816	128,262	2.944	179.22
	6.50	37,201	0.854	146,452	3.362	324.30

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 B: ULTIMATE DESIGN

Pond B

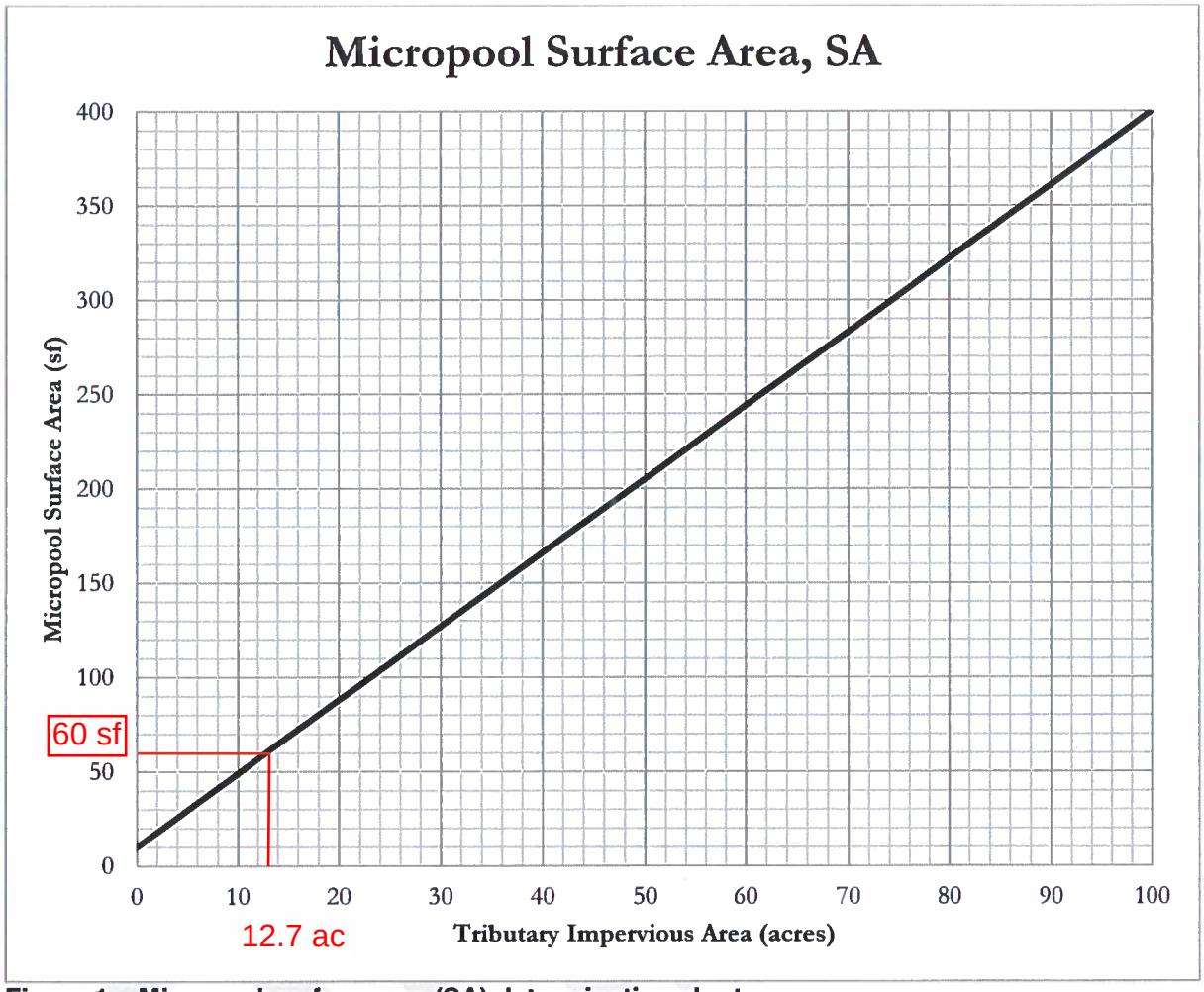


Figure 1 – Micropool surface area (SA) determination chart

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.

$$TIA = I \times A$$ = (79.7/100) x 15.9 ac = 12.7 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 B

POND B: ULTIMATE DESIGN

Figure 13-12c. Emergency Spillway Protection

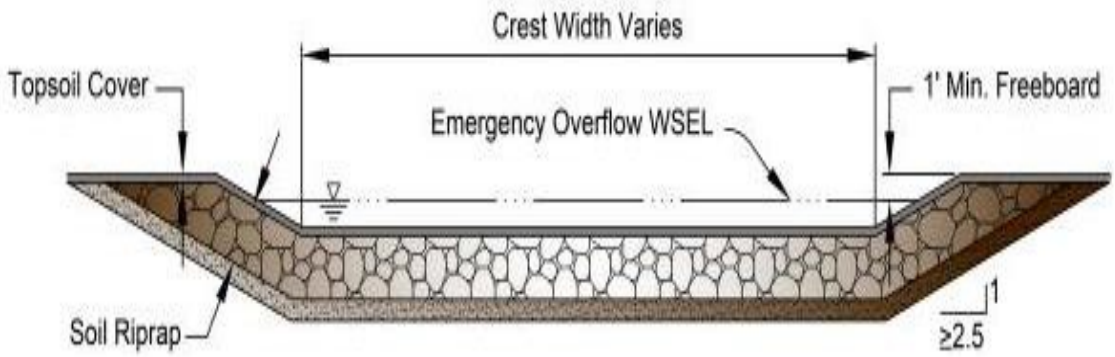
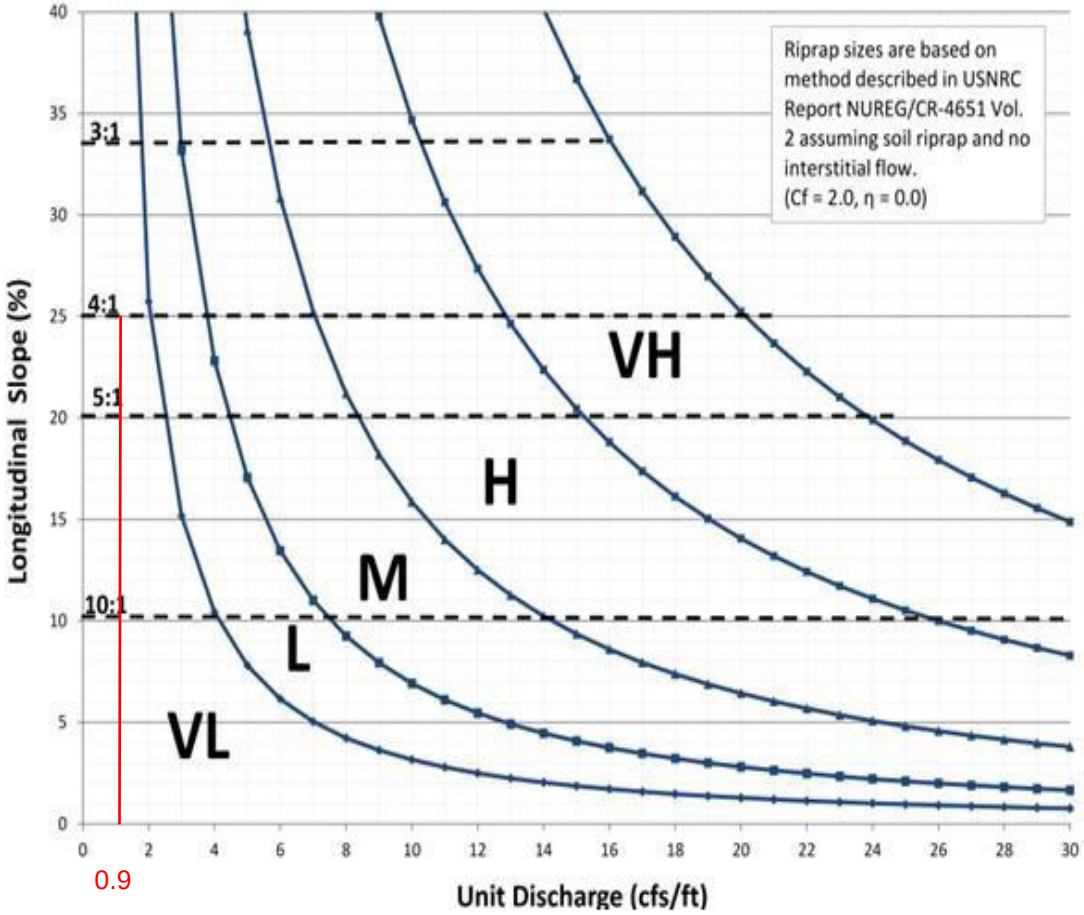


Figure 13-12d. Riprap Types for Emergency Spillway Protection



0.9

PEAK INFLOW Q100=57.7 cfs
Spillway length=50 ft
57.7 cfs/50 ft = 1.2 cfs/ft

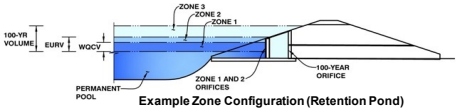
DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)

POND C: INTERIM DESIGN

Project: Falcon Field Filing 1

Basin ID: Pond C INTERIM



Example Zone Configuration (Retention Pond)

See comments on Pond B Interim regarding the areas and overdetention approach.

Watershed Information

Selected BMP Type =	**EDB**	
Watershed Area =	26.38	acres
Watershed Length =	1,200	ft
Watershed Length to Centroid =	500	ft
Watershed Slope =	0.040	ft/ft
Watershed Imperviousness =	27.80%	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) =	0.317	acre-feet		acre-feet
Excess Urban Runoff Volume (EURV) =	0.717	acre-feet		acre-feet
2-yr Runoff Volume (P1 = 1.19 in.) =	0.484	acre-feet	1.19	inches
5-yr Runoff Volume (P1 = 1.5 in.) =	0.671	acre-feet	1.50	inches
10-yr Runoff Volume (P1 = 1.75 in.) =	0.832	acre-feet	1.75	inches
25-yr Runoff Volume (P1 = 2 in.) =	1.262	acre-feet	2.00	inches
50-yr Runoff Volume (P1 = 2.25 in.) =	1.663	acre-feet	2.25	inches
100-yr Runoff Volume (P1 = 2.52 in.) =	2.202	acre-feet	2.52	inches
500-yr Runoff Volume (P1 = 3.49 in.) =	4.092	acre-feet	3.49	inches
Approximate 2-yr Detention Volume =	0.450	acre-feet		
Approximate 5-yr Detention Volume =	0.601	acre-feet		
Approximate 10-yr Detention Volume =	0.754	acre-feet		
Approximate 25-yr Detention Volume =	0.957	acre-feet		
Approximate 50-yr Detention Volume =	1.114	acre-feet		
Approximate 100-yr Detention Volume =	1.377	acre-feet		

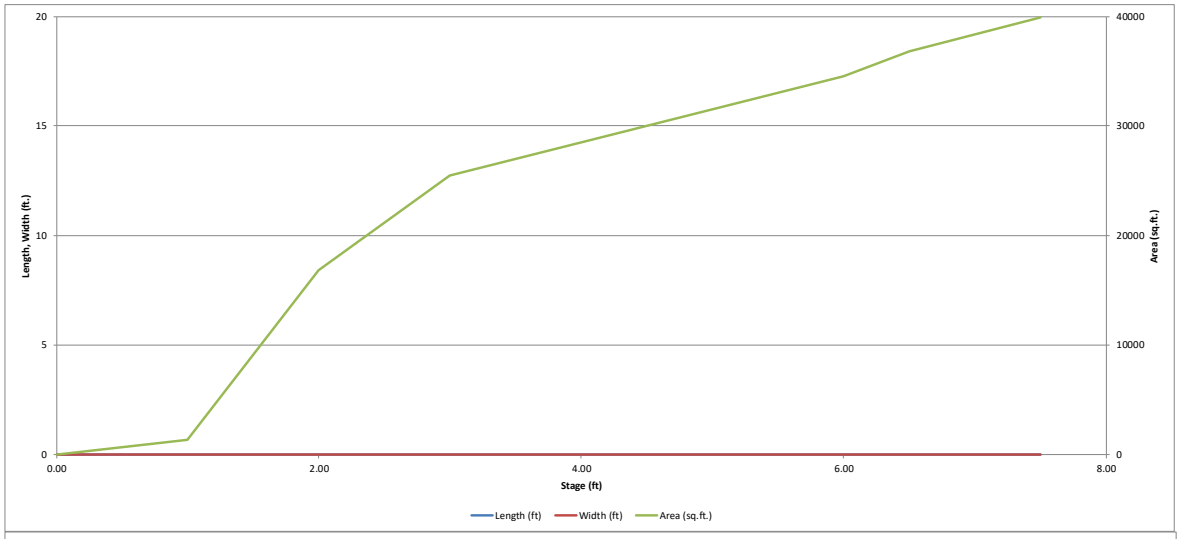
Define Zones and Basin Geometry

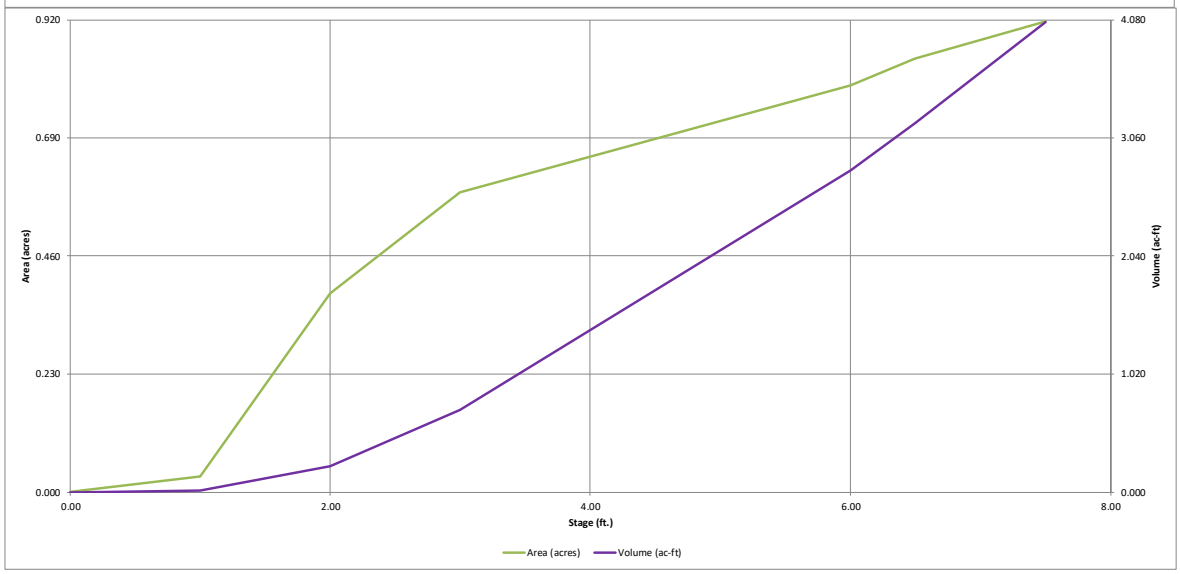
Zone 1 Volume (WQCV) =	0.317	acre-feet
Zone 2 Volume (EURV - Zone 1) =	0.400	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	0.659	acre-feet
Total Detention Basin Volume =	1.377	acre-feet
Initial Surcharge Volume (ISV) =	user	ft^3
Initial Surcharge Depth (ISD) =	user	ft
Total Available Detention Depth (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	--	--	--	40	0.001		
6801	--	1.00	--	--	--	1,320	0.030	680	0.016
6802	--	2.00	--	--	--	16,829	0.386	9,754	0.224
6803	--	3.00	--	--	--	25,446	0.584	30,892	0.709
6806	--	6.00	--	--	--	34,523	0.793	120,845	2.774
6806.5	--	6.50	--	--	--	36,800	0.845	138,676	3.184
6807.5	--	7.50	--	--	--	39,938	0.917	177,045	4.064

POND C: INTERIM DESIGN





✓ = calcs match details in plans

X = calcs do not match details in plans

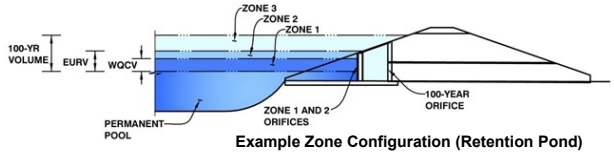
POND C: INTERIM DESIGN

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)

Project: Falcon Field Filing 1

Basin ID: Pond C INTERIM



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	2.23	0.317	Orifice Plate
Zone 2 (EURV)	3.02	0.400	Orifice Plate
Zone 3 (100-year)	4.08	0.659	Weir&Pipe (Circular)
Total (all zones)		1.377	

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 Diameter = inches

Calculated Parameters for Underdrain

Underdrain Orifice Area = ft^2

Underdrain Orifice Centroid = 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)

			Calculated Parameters for Plate	
Centroid 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 =	✓ 4.08	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	sq. 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	✓ 1.25	✓ 2.50	✓ 3.50				
Orifice Area (sq. inches)	✓ 1.60	✓ 1.35	✓ 1.00	✓ 18.00				

	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 Orifi

	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
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
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 We

	Zone 3 Weir	Not Selected			Zone 3 Weir	Not Selected
Overflow Weir Front Edge Height, Ho =	✓ 5.09	N/A	ft (relative to basin bottom at Stage = 0 ft)	Height of Grate Upper Edge, H_t =	5.09	N/A
Overflow Weir Front Edge Length =	✓ 5.00	N/A	feet	Overflow Weir Slope Length =	5.00	N/A
Overflow Weir Grate Slope =	✓ 0.00	N/A	H:V	Grate Open Area / 100-yr Orifice Area =	3.54	N/A
Horiz. Length of Weir Sides =	✓ 5.00	N/A	feet	Overflow Grate Open Area w/o Debris =	17.40	N/A
Overflow Grate Type =	Type C Grate	N/A		Overflow Grate Open Area w/ Debris =	8.70	N/A
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 Pla

	Zone 3 Circular	Not Selected			Zone 3 Circular	Not Selected
Depth to Invert of Outlet Pipe =	✓ 0.00	N/A	ft (distance below basin bottom at Stage = 0 ft)	Outlet Orifice Area =	4.91	N/A
Circular Orifice Diameter =	✓ 30.00	N/A	inches	Outlet Orifice Centroid =	1.25	N/A
				Half-Central Angle of Restrictor Plate on Pipe =	N/A	N/A

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Calculated Parameters for Spillway

Spillway Invert Stage=	✓ 5.83	ft (relative to basin bottom at Stage = 0 ft)	Spillway Design Flow Depth=	0.65 feet
Spillway Crest Length =	✓ 50.00	feet	Stage at Top of Freeboard =	7.48 feet
Spillway End Slopes =	✓ 4.00	H:V	Basin Area at Top of Freeboard =	0.92 acres
Freeboard above Max Water Surface =	1.00	feet	Basin Volume at Top of Freeboard =	4.05 acre-ft

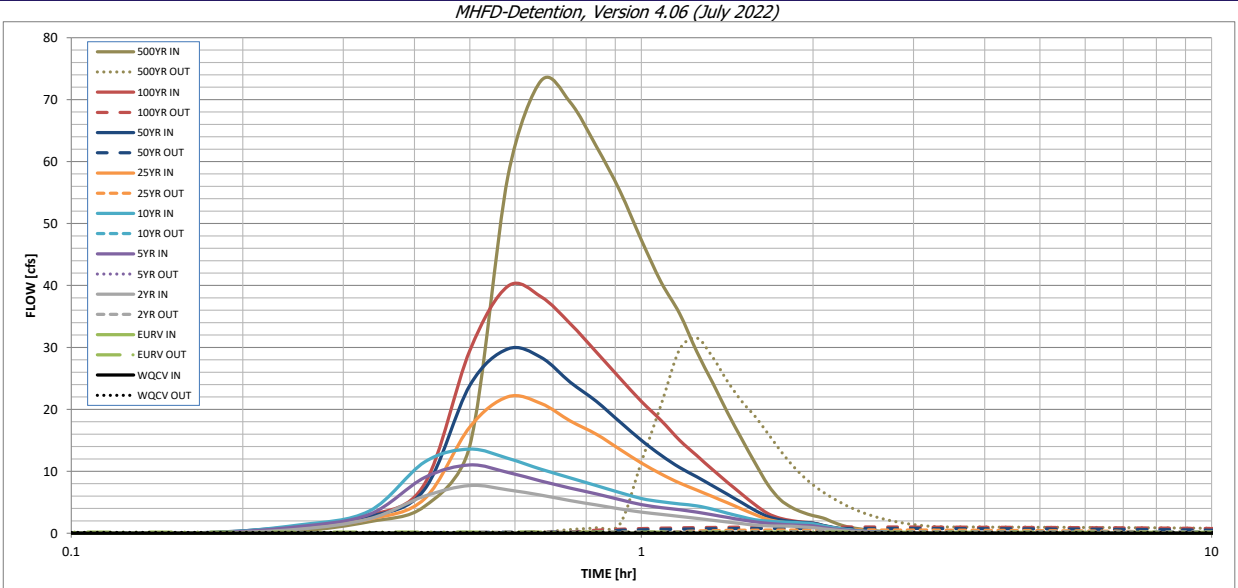
Routed Hydrograph Results

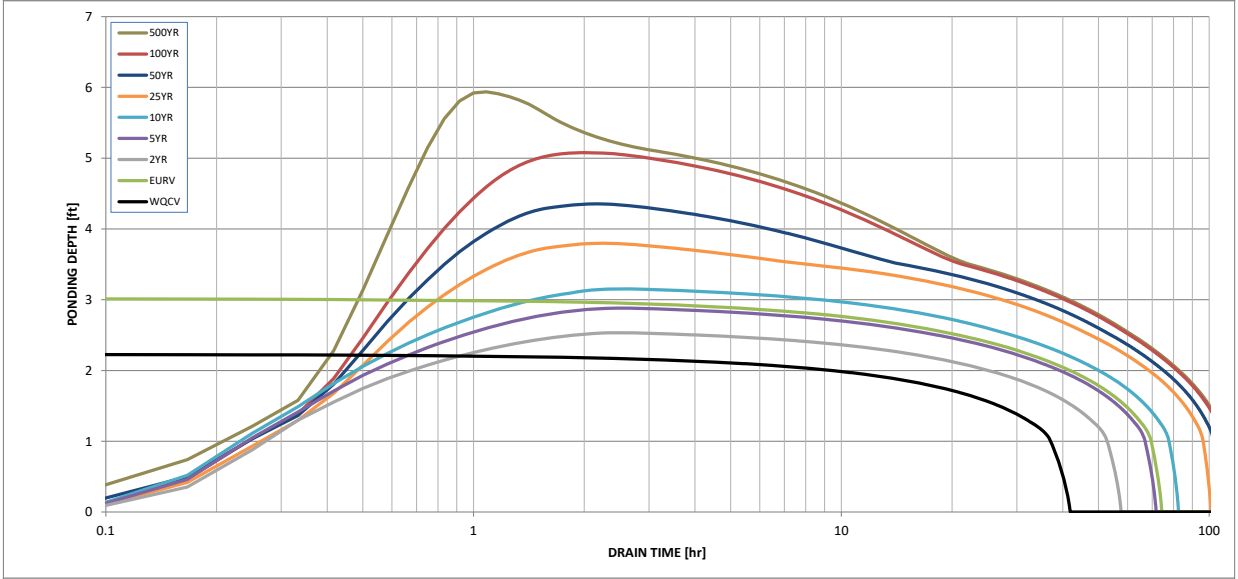
The user can override the default CUHP hydrographs and runoff volumes by entering new values in the Inflow Hydrographs table (Columns W through AF)

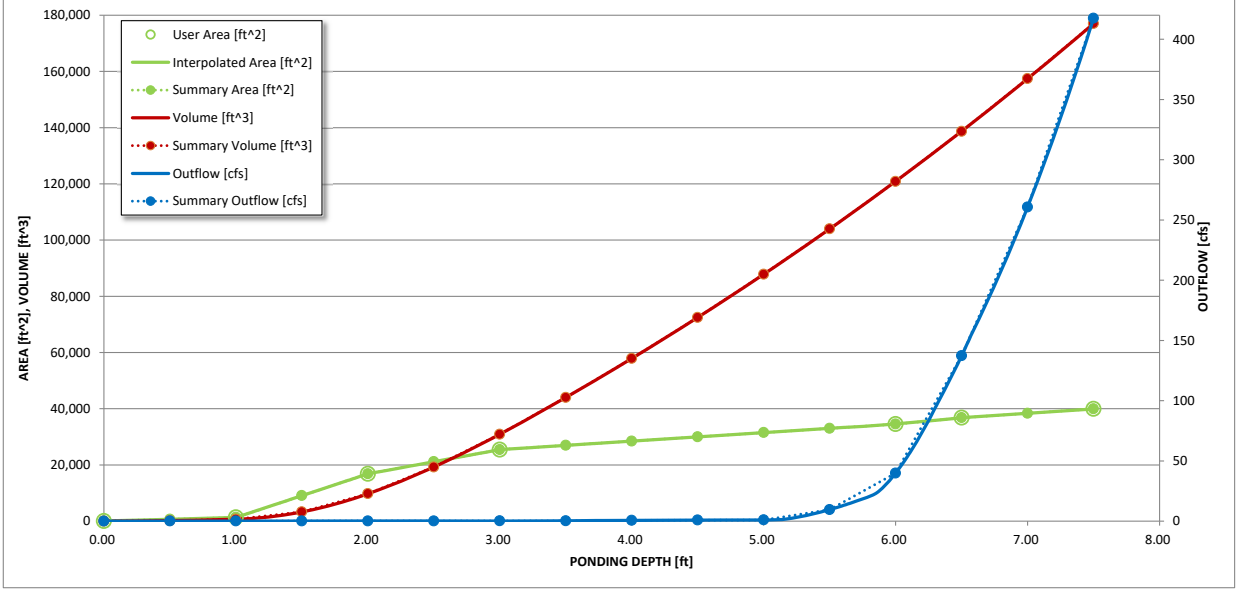
Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
One-Hour Rainfall Depth (in) =	N/A	N/A	1.19	1.50	1.75	2.00	2.25	2.52
CUHP Runoff Volume (acre-ft) =	0.317	0.717	0.484	0.671	0.832	1.262	1.663	2.202
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	0.484	0.671	0.832	1.262	1.663	2.202
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A	0.3	0.6	0.8	7.2	14.0	22.8
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	0.27	0.53	0.86
Peak Inflow Q (cfs) =	N/A	N/A	7.7	11.0	13.6	22.0	29.8	39.9
Peak Outflow Q (cfs) =	0.1	0.2	0.1	0.2	0.2	0.5	0.8	1.0
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	0.3	0.2	0.1	0.1	0.0
Structure Controlling Flow =	Plate	Plate	Plate	Plate	Plate	Plate	Plate	Plate
Max Velocity through Grate 1 (fps) =	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Max Velocity through Grate 2 (fps) =	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	68	53	66	76	92	96	101
Time to Drain 99% of Inflow Volume (hours) =	**40**	72	56	69	80	97	103	108
Maximum Ponding Depth (ft) =	2.23	3.02	2.53	2.88	3.15	3.80	4.35	5.08
Area at Maximum Ponding Depth (acres) =	0.43	0.59	0.49	0.56	0.59	0.64	0.68	0.73
Maximum Volume Stored (acre-ft) =	0.318	0.721	0.456	0.641	0.798	1.192	1.561	2.067

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	0.07	0.01	0.38
	0:15:00	0.00	0.00	0.65	1.06	1.32	0.89	1.11	1.09	1.87
	0:20:00	0.00	0.00	2.33	3.05	3.60	2.28	2.66	2.85	4.34
	0:25:00	0.00	0.00	5.99	9.00	11.51	5.56	7.09	7.97	14.13
	0:30:00	0.00	0.00	7.71	11.02	13.58	17.16	23.87	29.50	57.63
	0:35:00	0.00	0.00	7.00	9.81	12.09	22.03	29.75	39.88	73.05
	0:40:00	0.00	0.00	6.14	8.43	10.34	20.95	28.39	38.17	69.57
	0:45:00	0.00	0.00	5.28	7.29	8.94	18.14	24.40	33.84	62.48
	0:50:00	0.00	0.00	4.57	6.36	7.69	16.00	21.31	29.28	55.25
	0:55:00	0.00	0.00	3.94	5.44	6.57	13.54	17.98	25.03	47.36
	1:00:00	0.00	0.00	3.40	4.63	5.61	11.35	15.00	21.30	40.51
	1:05:00	0.00	0.00	3.06	4.15	5.09	9.57	12.57	18.20	35.47
	1:10:00	0.00	0.00	2.72	3.81	4.74	8.11	10.62	15.02	29.35
	1:15:00	0.00	0.00	2.40	3.41	4.42	6.99	9.13	12.55	24.29
	1:20:00	0.00	0.00	2.10	2.98	3.88	5.91	7.65	10.26	19.45
	1:25:00	0.00	0.00	1.81	2.55	3.24	4.90	6.27	8.20	15.18
	1:30:00	0.00	0.00	1.54	2.17	2.66	3.91	4.93	6.31	11.30
	1:35:00	0.00	0.00	1.32	1.85	2.19	3.00	3.68	4.58	7.83
	1:40:00	0.00	0.00	1.21	1.60	1.96	2.24	2.68	3.18	5.47
	1:45:00	0.00	0.00	1.17	1.45	1.84	1.84	2.17	2.44	4.18
	1:50:00	0.00	0.00	1.14	1.35	1.76	1.64	1.90	2.05	3.38
	1:55:00	0.00	0.00	1.02	1.27	1.67	1.52	1.75	1.80	2.84
	2:00:00	0.00	0.00	0.91	1.18	1.53	1.43	1.64	1.64	2.47
	2:05:00	0.00	0.00	0.71	0.93	1.20	1.12	1.28	1.24	1.80
	2:10:00	0.00	0.00	0.55	0.71	0.92	0.85	0.96	0.91	1.27
	2:15:00	0.00	0.00	0.42	0.55	0.70	0.65	0.73	0.68	0.93
	2:20:00	0.00	0.00	0.32	0.42	0.53	0.49	0.55	0.51	0.69
	2:25:00	0.00	0.00	0.24	0.31	0.39	0.37	0.41	0.39	0.52
	2:30:00	0.00	0.00	0.18	0.23	0.29	0.27	0.30	0.29	0.38
	2:35:00	0.00	0.00	0.13	0.17	0.21	0.20	0.22	0.21	0.28
	2:40:00	0.00	0.00	0.10	0.12	0.16	0.15	0.17	0.16	0.20
	2:45:00	0.00	0.00	0.07	0.08	0.11	0.11	0.12	0.11	0.14
	2:50:00	0.00	0.00	0.04	0.06	0.07	0.07	0.08	0.07	0.09
	2:55:00	0.00	0.00	0.02	0.03	0.04	0.04	0.05	0.04	0.05
	3:00:00	0.00	0.00	0.01	0.02	0.02	0.02	0.02	0.02	0.02
	3:05:00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	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 4.06 (July 2022)

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 [ft^2]	Area [acres]	Volume [ft^3]	Volume [ac-ft]	Total Outflow [cfs]
	0.00	40	0.001	0	0.000	0.00
	0.50	680	0.016	180	0.004	0.04
	1.00	1,320	0.030	680	0.016	0.05
	1.50	9,075	0.208	3,278	0.075	0.09
	2.00	16,829	0.386	9,754	0.224	0.11
	2.50	21,137	0.485	19,246	0.442	0.14
	3.00	25,446	0.584	30,892	0.709	0.18
	3.50	26,959	0.619	43,993	1.010	0.20
	4.00	28,472	0.654	57,851	1.328	0.65
	4.50	29,984	0.688	72,465	1.664	0.84
	5.00	31,497	0.723	87,835	2.016	1.00
	5.50	33,010	0.758	103,962	2.387	9.59
	6.00	34,523	0.793	120,845	2.774	39.84
	6.50	36,800	0.845	138,676	3.184	137.25
	7.00	38,369	0.881	157,468	3.615	260.72
	7.50	39,938	0.917	177,045	4.064	417.40

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).

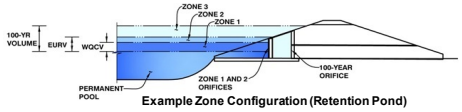
DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)

POND C: ULTIMATE DESIGN FOR REFERENCE ONLY

Project: Falcon Field Filing 3

Basin ID: Pond C (with overdetention)



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	EDB	
Watershed Area =	26.38	acres
Watershed Length =	1,200	ft
Watershed Length to Centroid =	500	ft
Watershed Slope =	0.040	ft/ft
Watershed Imperviousness =	60.20%	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) =	0.521	acre-feet	acre-feet
Excess Urban Runoff Volume (EURV) =	1.929	acre-feet	acre-feet
2-yr Runoff Volume (P1 = 1.19 in.) =	1.379	acre-feet	1.19 inches
5-yr Runoff Volume (P1 = 1.5 in.) =	1.816	acre-feet	1.50 inches
10-yr Runoff Volume (P1 = 1.75 in.) =	2.165	acre-feet	1.75 inches
25-yr Runoff Volume (P1 = 2 in.) =	2.641	acre-feet	2.00 inches
50-yr Runoff Volume (P1 = 2.25 in.) =	3.110	acre-feet	2.25 inches
100-yr Runoff Volume (P1 = 2.52 in.) =	3.687	acre-feet	2.52 inches
500-yr Runoff Volume (P1 = 3.49 in.) =	5.698	acre-feet	3.49 inches
Approximate 2-yr Detention Volume =	1.251	acre-feet	
Approximate 5-yr Detention Volume =	1.638	acre-feet	
Approximate 10-yr Detention Volume =	1.982	acre-feet	
Approximate 25-yr Detention Volume =	2.396	acre-feet	
Approximate 50-yr Detention Volume =	2.649	acre-feet	
Approximate 100-yr Detention Volume =	2.926	acre-feet	

Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	0.521	acre-feet
Zone 2 Volume (EURV - Zone 1) =	1.408	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	0.997	acre-feet
Total Detention Basin Volume =	2.926	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

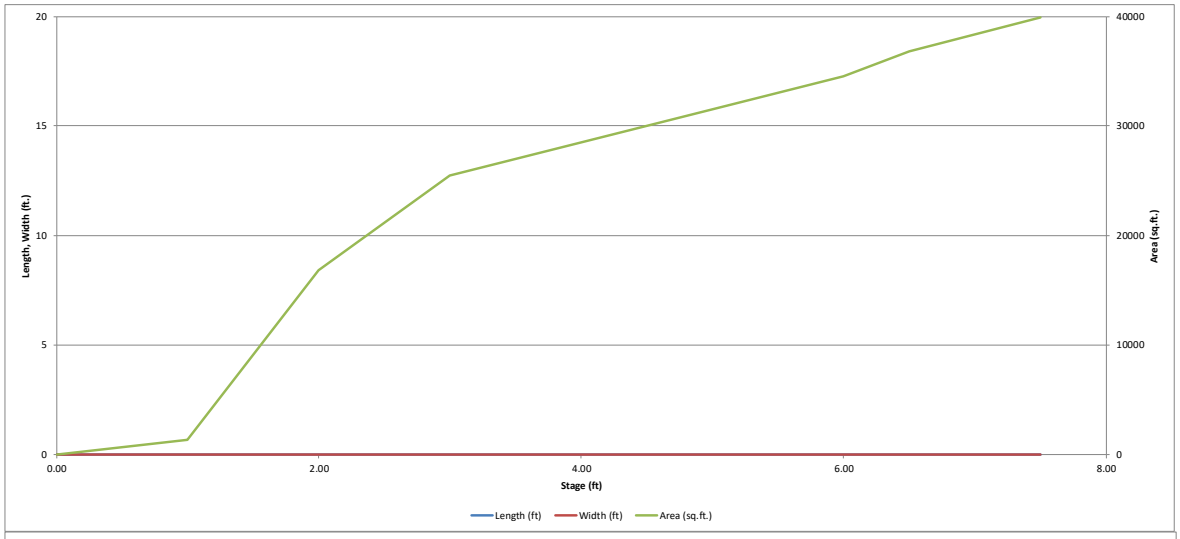
Depth Increment = ft

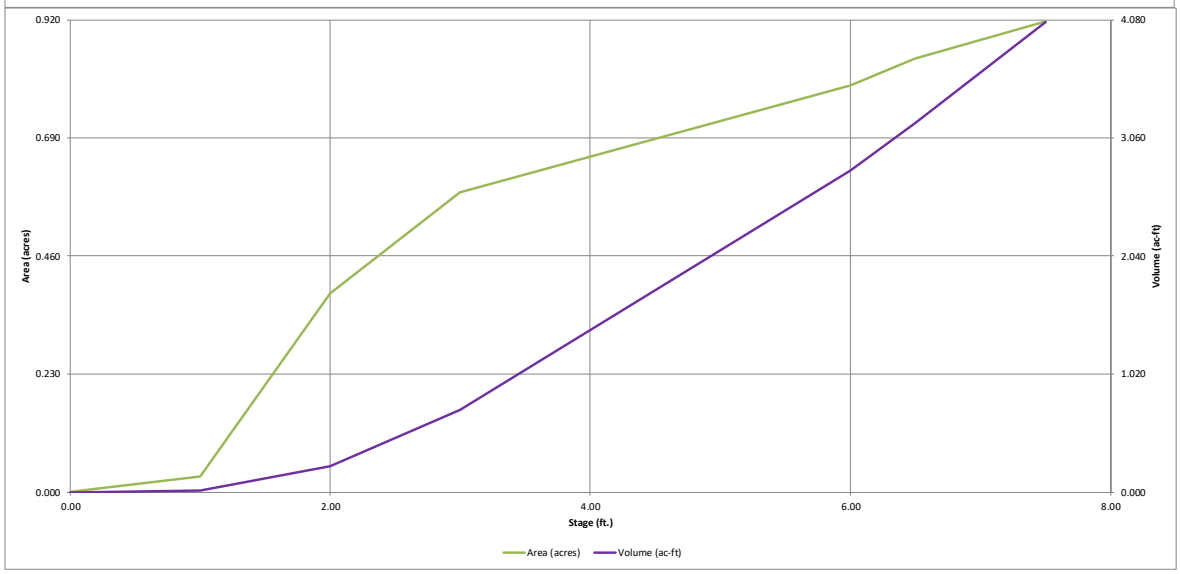
Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool	--	0.00	--	--	--	40	0.001		
6801	--	1.00	--	--	--	1,320	0.030	680	0.016
6802	--	2.00	--	--	--	16,829	0.386	9,754	0.224
6803	--	3.00	--	--	--	25,446	0.584	30,892	0.709
6806	--	6.00	--	--	--	34,523	0.793	120,845	2.774
6806.5	--	6.50	--	--	--	36,800	0.845	138,676	3.184
6807.5	--	7.50	--	--	--	39,938	0.917	177,045	4.064

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)

POND C: ULTIMATE DESIGN FOR REFERENCE ONLY





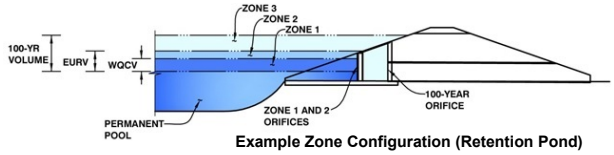
POND C: ULTIMATE DESIGN FOR REFERENCE ONLY

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)

Project: Falcon Field Filing 3

Basin ID: Pond C (with overdetention)



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	2.66	0.521	Orifice Plate
Zone 2 (EURV)	4.88	1.408	Orifice Plate
Zone 3 (100-year)	6.19	0.997	Weir&Pipe (Circular)
Total (all zones)		2.926	

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)

Centroid 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 =	4.88	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	sq. inches	Elliptical Slot Area =	N/A	ft^2

Calculated Parameters for Plate

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	1.25	2.50					
Orifice Area (sq. inches)	2.20	2.10	5.00					

	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			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
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
Vertical Orifice Diameter =	N/A	N/A	inches			

Calculated Parameters for Vertical Orifi

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			Zone 3 Weir	Not Selected
Overflow Weir Front Edge Height, Ho =	5.09	N/A	ft (relative to basin bottom at Stage = 0 ft)	Height of Grate Upper Edge, H_t =	5.09	N/A
Overflow Weir Front Edge Length =	5.00	N/A	feet	Overflow Weir Slope Length =	5.00	N/A
Overflow Weir Grate Slope =	0.00	N/A	H:V	Grate Open Area / 100-yr Orifice Area =	3.54	N/A
Horiz. Length of Weir Sides =	5.00	N/A	feet	Overflow Grate Open Area w/o Debris =	17.40	N/A
Overflow Grate Type =	Type C Grate	N/A		Overflow Grate Open Area w/ Debris =	8.70	N/A
Debris Clogging % =	50%	N/A	%			

Calculated Parameters for Overflow We

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

	Zone 3 Circular	Not Selected			Zone 3 Circular	Not Selected
Depth to Invert of Outlet Pipe =	0.00	N/A	ft (distance below basin bottom at Stage = 0 ft)	Outlet Orifice Area =	4.91	N/A
Circular Orifice Diameter =	30.00	N/A	inches	Outlet Orifice Centroid =	1.25	N/A
				Half-Central Angle of Restrictor Plate on Pipe =	N/A	N/A

Calculated Parameters for Outlet Pipe w/ Flow Restriction Pla

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage=	5.83	ft (relative to basin bottom at Stage = 0 ft)	Spillway Design Flow Depth=	0.65	feet
Spillway Crest Length =	50.00	feet	Stage at Top of Freeboard =	7.48	feet
Spillway End Slopes =	4.00	H:V	Basin Area at Top of Freeboard =	0.92	acres
Freeboard above Max Water Surface =	1.00	feet	Basin Volume at Top of Freeboard =	4.05	acre-ft

Calculated Parameters for Spillway

Routed Hydrograph Results

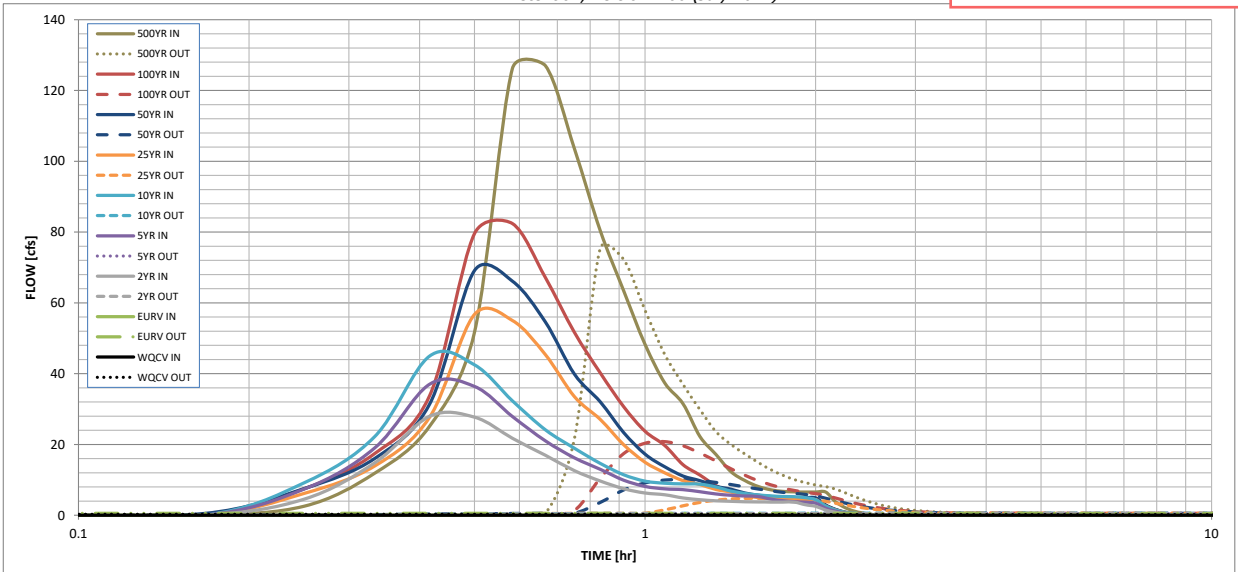
The user can override the default CUHP hydrographs and runoff volumes by entering new values in the Inflow Hydrographs table (Columns W through AF).

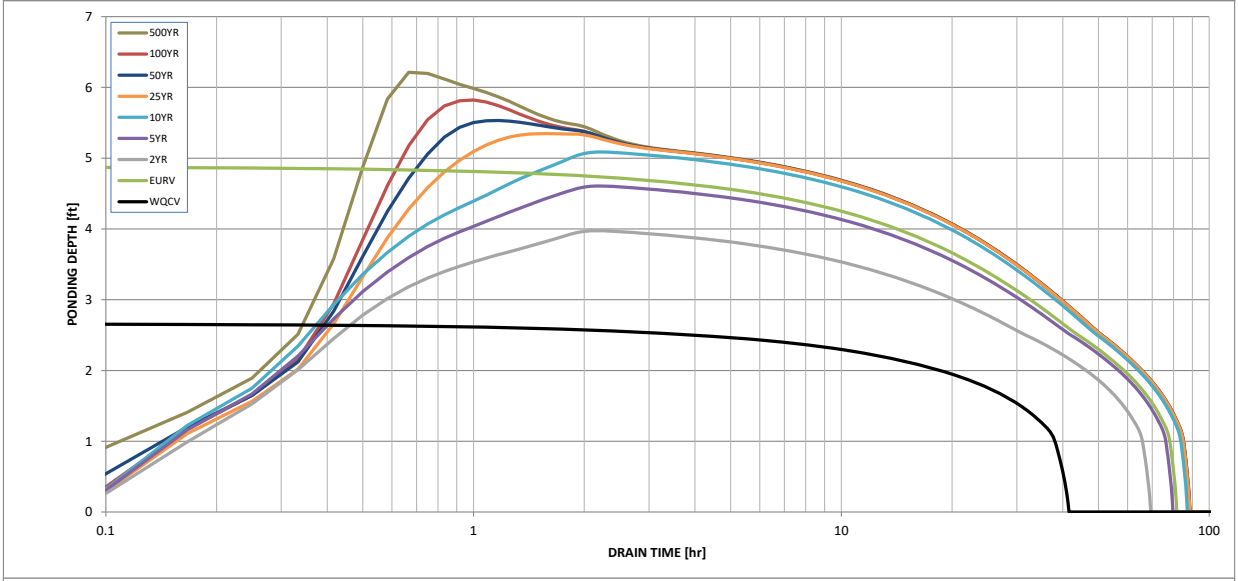
Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
One-Hour Rainfall Depth (in) =	N/A	N/A	1.19	1.50	1.75	2.00	2.25	2.52
CUHP Runoff Volume (acre-ft) =	0.521	1.929	1.379	1.816	2.165	2.641	3.110	3.687
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	1.379	1.816	2.165	2.641	3.110	3.687
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A	0.3	0.6	0.8	7.2	14.0	22.8
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	0.27	0.53	0.86
Peak Inflow Q (cfs) =	N/A	N/A	28.0	37.0	45.0	56.7	69.1	82.4
Peak Outflow Q (cfs) =	0.3	0.6	0.5	0.5	0.6	4.8	10.1	20.8
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	0.9	0.7	0.7	0.7	0.9
Structure Controlling Flow =	Plate	Plate	Plate	Plate	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1
Max Velocity through Grate 1 (fps) =	N/A	N/A	N/A	N/A	N/A	0.2	0.5	1.2
Max Velocity through Grate 2 (fps) =	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	73	62	71	78	77	76	75
Time to Drain 99% of Inflow Volume (hours) =	**40**	78	66	76	83	83	83	82
Maximum Ponding Depth (ft) =	2.66	4.88	3.97	4.61	5.09	5.35	5.53	5.82
Area at Maximum Ponding Depth (acres) =	0.52	0.71	0.65	0.70	0.73	0.75	0.76	0.78
Maximum Volume Stored (acre-ft) =	0.522	1.930	1.308	1.733	2.074	2.266	2.409	2.633

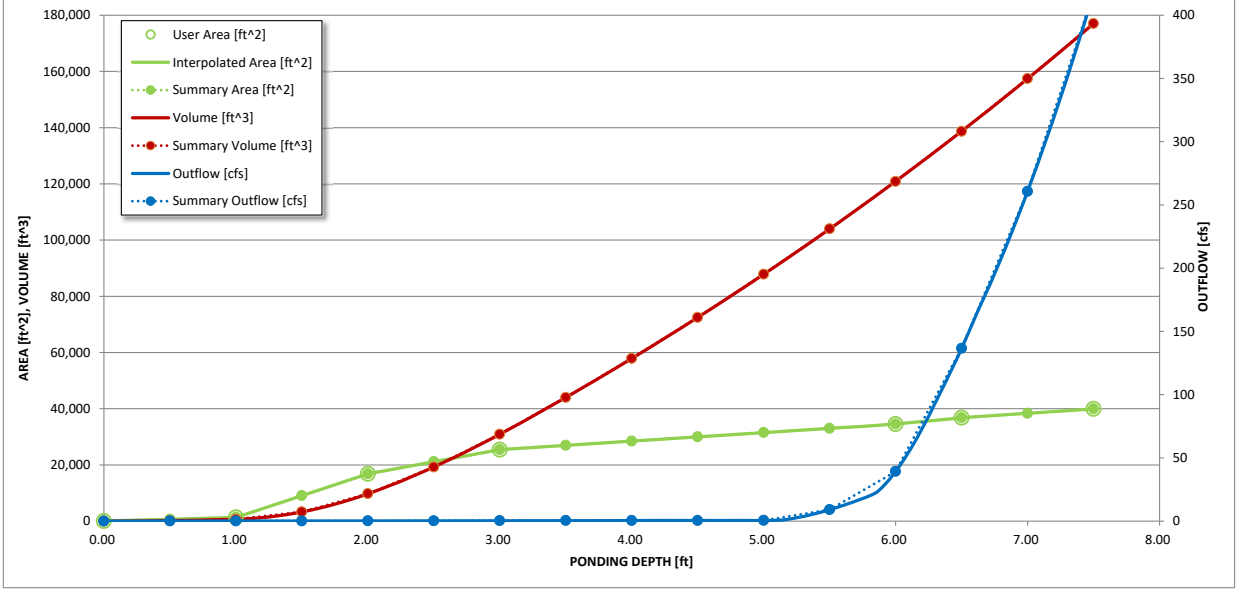
POND C: ULTIMATE DESIGN FOR REFERENCE ONLY

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			

POND C: ULTIMATE DESIGN FOR REFERENCE ONLY

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	0.51	0.05	2.55
	0:15:00	0.00	0.00	4.52	7.35	9.12	6.13	7.51	7.47	11.88
	0:20:00	0.00	0.00	14.82	19.02	22.24	13.93	16.07	17.43	25.17
	0:25:00	0.00	0.00	27.96	37.02	44.99	27.69	31.42	33.81	51.66
	0:30:00	0.00	0.00	27.72	36.40	42.47	56.71	69.10	79.54	126.18
	0:35:00	0.00	0.00	21.73	27.88	32.30	55.02	66.12	82.40	127.02
	0:40:00	0.00	0.00	16.93	21.02	24.16	45.39	54.60	67.15	103.65
	0:45:00	0.00	0.00	12.61	16.24	18.96	33.55	39.93	51.71	80.42
	0:50:00	0.00	0.00	9.68	12.98	14.66	27.08	32.07	40.22	63.45
	0:55:00	0.00	0.00	7.50	9.92	11.44	19.96	23.37	30.69	48.26
	1:00:00	0.00	0.00	6.28	8.15	9.64	14.98	17.27	23.73	37.38
	1:05:00	0.00	0.00	5.80	7.45	9.05	12.00	13.68	19.72	31.52
	1:10:00	0.00	0.00	4.88	7.22	8.86	9.79	11.08	14.27	22.25
	1:15:00	0.00	0.00	4.38	6.64	8.79	8.67	9.77	11.34	17.19
	1:20:00	0.00	0.00	4.09	6.02	7.99	7.29	8.20	8.36	12.35
	1:25:00	0.00	0.00	3.93	5.64	6.85	6.54	7.36	6.77	9.79
	1:30:00	0.00	0.00	3.82	5.43	6.14	5.59	6.28	5.73	8.12
	1:35:00	0.00	0.00	3.75	5.30	5.72	5.04	5.66	5.15	7.17
	1:40:00	0.00	0.00	3.73	4.55	5.47	4.70	5.29	4.87	6.75
	1:45:00	0.00	0.00	3.73	4.11	5.31	4.53	5.10	4.76	6.59
	1:50:00	0.00	0.00	3.73	3.84	5.23	4.44	4.99	4.73	6.55
	1:55:00	0.00	0.00	2.97	3.70	4.98	4.40	4.94	4.73	6.55
	2:00:00	0.00	0.00	2.52	3.41	4.40	4.38	4.93	4.73	6.55
	2:05:00	0.00	0.00	1.47	2.00	2.60	2.59	2.91	2.79	3.85
	2:10:00	0.00	0.00	0.85	1.16	1.50	1.51	1.69	1.62	2.23
	2:15:00	0.00	0.00	0.45	0.64	0.82	0.83	0.92	0.88	1.21
	2:20:00	0.00	0.00	0.22	0.35	0.43	0.46	0.51	0.49	0.66
	2:25:00	0.00	0.00	0.09	0.15	0.18	0.20	0.22	0.21	0.28
	2:30:00	0.00	0.00	0.02	0.04	0.04	0.05	0.05	0.05	0.06
	2:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	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
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	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

POND C: ULTIMATE DESIGN FOR REFERENCE ONLY

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)

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 [ft^2]	Area [acres]	Volume [ft^3]	Volume [ac-ft]	Total Outflow [cfs]
	0.00	40	0.001	0	0.000	0.00
	0.50	680	0.016	180	0.004	0.05
	1.00	1,320	0.030	680	0.016	0.07
	1.50	9,075	0.208	3,278	0.075	0.13
	2.00	16,829	0.386	9,754	0.224	0.16
	2.50	21,137	0.485	19,246	0.442	0.19
	3.00	25,446	0.584	30,892	0.709	0.34
	3.50	26,959	0.619	43,993	1.010	0.41
	4.00	28,472	0.654	57,851	1.328	0.47
	4.50	29,984	0.688	72,465	1.664	0.52
	5.00	31,497	0.723	87,835	2.016	0.56
	5.50	33,010	0.758	103,962	2.387	9.07
	6.00	34,523	0.793	120,845	2.774	39.24
	6.50	36,800	0.845	138,676	3.184	136.58
	7.00	38,369	0.881	157,468	3.615	260.72
	7.50	39,938	0.917	177,045	4.064	417.40

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 C

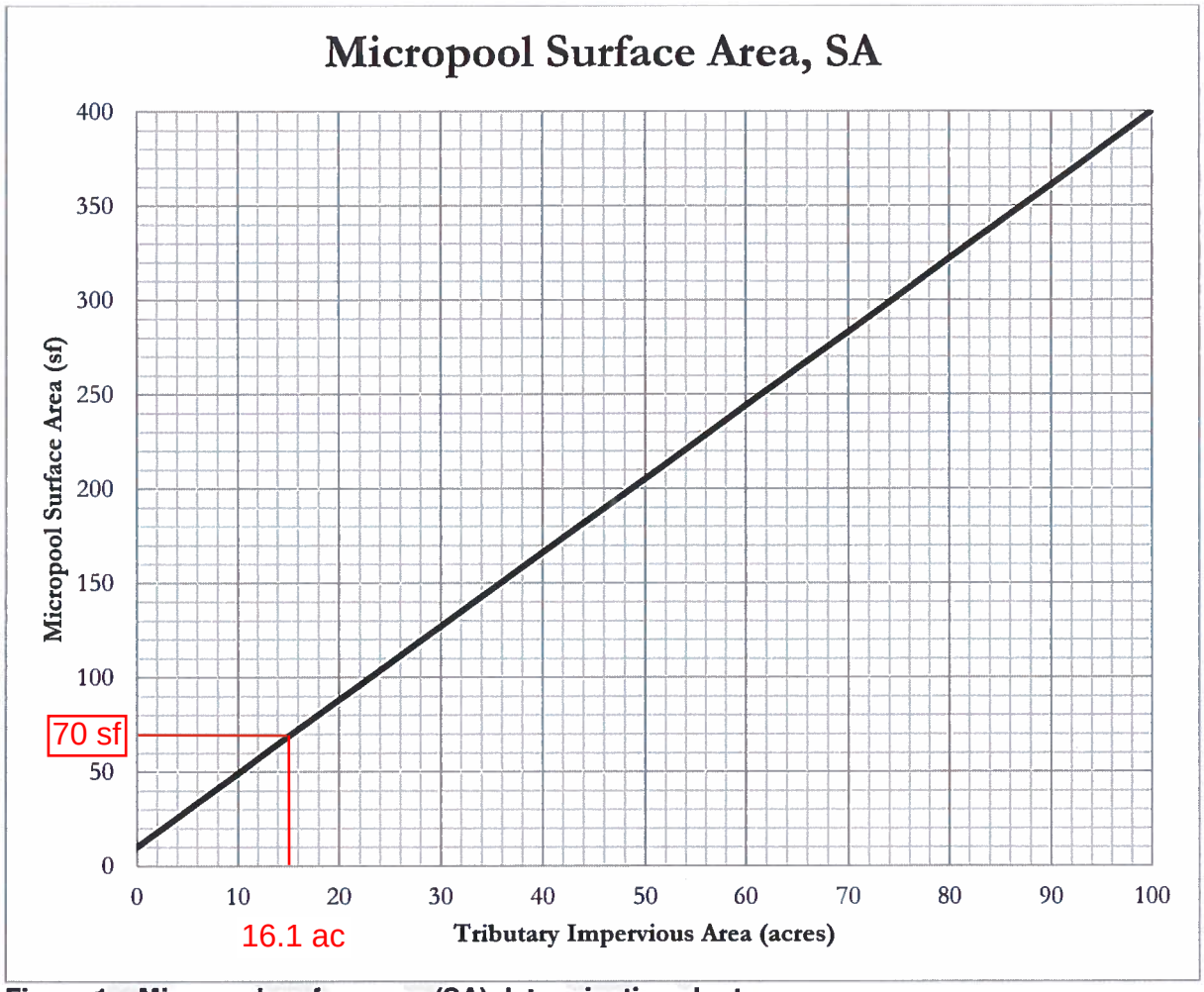


Figure 1 – Micropool surface area (SA) determination chart

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.

$$TIA = I \times A$$ = (60.2/100) x 26.4 ac = 15.9 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 C - ULTIMATE

Figure 13-12c. Emergency Spillway Protection

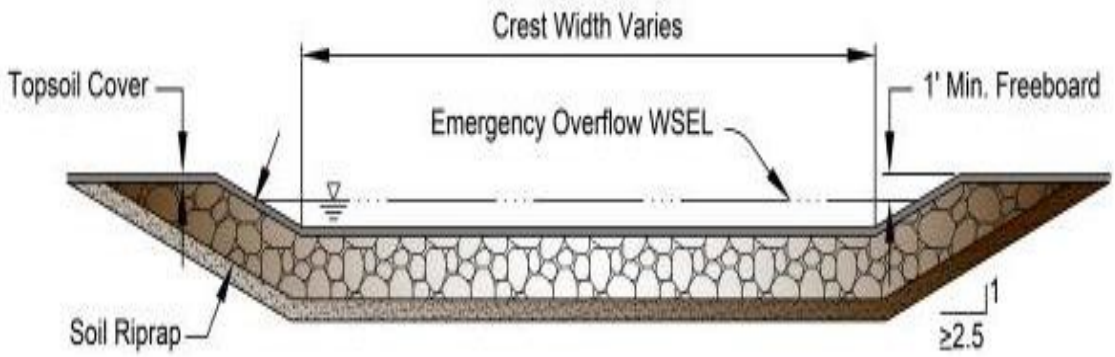
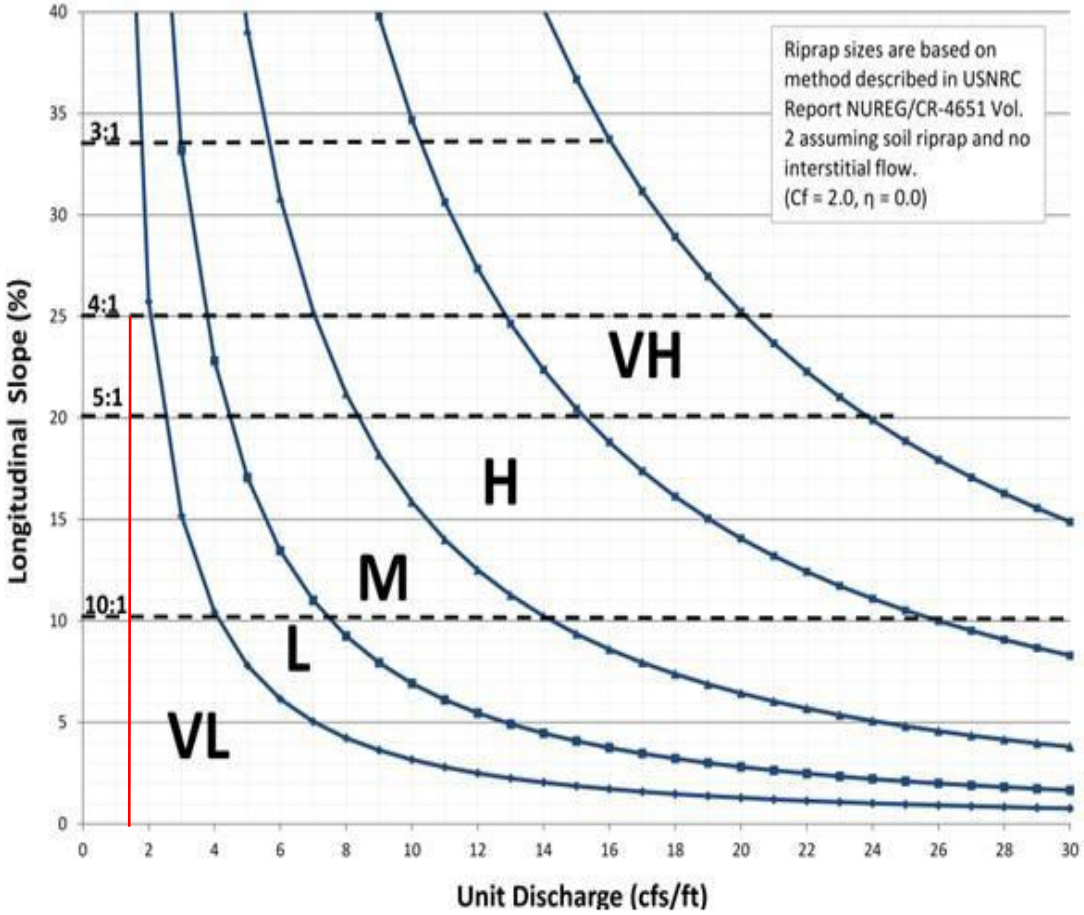


Figure 13-12d. Riprap Types for Emergency Spillway Protection



PEAK INFLOW Q100=82.4 cfs
Spillway length=50 ft
82.4 cfs/50 ft = 1.6 cfs/ft

Pond B - ULTIMATE DESIGN

FOREBAY VOLUME

Req'd V=3% x WQCV

West Forebay			*East Forebay*		
WQCV=	0.432	ac-ft	WQCV=	0.432	ac-ft
70% of WQCV=	0.302	ac-ft	30% of WQCV=	0.130	ac-ft
V=	0.0091	ac-ft	V=	0.0039	ac-ft
Actual V	0.0099	ac-ft	Actual V	0.0072	ac-ft

FOREBAY RELEASE NOTCH WIDTH

$Q=CLH^{3/2}$

West Forebay			*East Forebay*		
DP B7 Q_{100}=	56.0	cfs	DP B10 Q_{100}=	31.0	cfs
2% of Q=	1.12	cfs	2% of Q=	0.62	cfs
C=	2.6		C=	2.6	
H (height of forebay wall)=	1	ft	H (height of forebay wall)=	1	ft
L=	4	in	L=	2	in
				3	in (min)

TRICKLE CHANNEL FLOW DEPTH

Rectangular Channel

West Forebay		*East Forebay*	
Channel Slope (ft/ft)	0.01	Channel Slope (ft/ft)	0.01
Depth (ft)	0.5	Depth (ft)	0.5
Bottom Width (ft)	6	Bottom Width (ft)	6
2% Q_{100} (cfs)=	1.12	2% Q_{100} (cfs)=	0.62
Flow Depth (ft)	**0.11**	**Flow Depth (ft)**	**0.07**

Pond C - ULTIMATE DESIGN

FOREBAY VOLUME

Req'd V=3% x WQCV

West Forebay		
WQCV=	0.521	ac-ft
80% of WQCV=	0.4168	ac-ft
V=	0.0125	ac-ft
Actual V	0.0149	ac-ft

FOREBAY RELEASE NOTCH WIDTH

$Q=CLH^{3/2}$

Q_{100}=	86.3	cfs
2% of Q=	1.73	cfs
C=	2.6	
H (height of forebay wall)=	1.5	ft
L=	2	in
	3	in (min)

TRICKLE CHANNEL FLOW DEPTH

Rectangular Channel

West Forebay	
Channel Slope (ft/ft)	0.01
Depth (ft)	0.5
Bottom Width (ft)	6
2% Q_{100} (cfs)=	1.73
Flow Depth (ft)	**0.11**

DBPS Excerpts

Sub Regional Detention Alternative[1]						
Pond		Q_2 In (cfs)	Q_2 Out (cfs)	Q_{100} In (cfs)	Q_{100} Out (cfs)	Required Volume (AF)[2]
Paint Brush Hills Pond #4	PBH 4	38	29	200	150	1.34
Paint Brush Hills Pond A	PBH A	35	7	170	140	2.62
Paint Brush Hills Pond B1	PBH B1	80	51	420	270	9.17
Paint Brush Hills Pond B2	PBH B2	51	10	270	180	12.09
Paint Brush Hills Pond C	PBH C	56	3	300	140	6.77
Regional Pond MN	R MN	65	32	850	820	7.53
Regional Pond R1	R R1	110	77	1,600	1,500	25.00
Regional Pond R2	R R2	140	140	2,200	2,200	3.13
Regional Pond WU South	R WUs	47	22	1,100	930	39.54
Sub Regional Pond SR1	SR 1	54	42	610	510	11.03
Sub Regional Pond SR2	SR 2	65	65	840	840	2.05
Sub Regional Pond SR3	SR 3	72	72	910	910	1.03
Sub Regional Pond SR4	SR 4	130	27	1,000	730	19.37
Sub Regional Pond SR6	SR 6	74	9	390	200	11.82
The Meadows Pond #1	M 1	11	0	70	0	3.25
The Meadows Pond #2	M 2	28	5	210	100	7.94
Woodmen Hills Pond #1 North	WH 1N	65	61	390	260	7.13
Woodmen Hills Pond #1 South	WH 1S	61	10	260	260	8.78
Woodmen Hills Pond #2	WH 2	37	10	270	250	9.18
Woodmen Hills Pond #3	WH 3	110	13	530	360	8.35
Woodmen Hills Pond #4	WH 4	110	15	790	260	40.45
Woodmen Hills Pond #5	WH 5	40	1	130	20	4.10
Woodmen Hills Pond H	WH H	140	110	750	750	2.66

Notes

1: Represents future hydrology with retrofit existing detention ponds and 7 new sub regional detention ponds

2: Required volume to highest WSE not including embankment

Reach Alternative	Total (ft)
Natural Channel Design	13,216
Protect in Place	64,325
Roadside Ditch Improvement	7,519
Small Drop Structures w/ Toe Protection	50,750

please update this sheet accordingly

BURGESS RD
GOODSON RD
MERIDIAN RD
STAPLETON DR
DIVERSION
JUDGE ORR RD
WOODMEN RD
FALCON HWY
TAMLIN RD
GARRETT RD
MERIDIAN RD
24

FALCON FIELD SITE

pinto pony closure is here. revise

PINTO PONY ROAD CLOSED DUE TO EROSION FROM THE TRIBUTARY

address the immediate action item in your report per previous comment

LEGEND

Detention Pond

- Existing
- Proposed
- Existing Watershed Boundary
- Historical and Future Watershed Boundary
- Tributary Basin Boundary
- Subbasin Boundary
- Major Tributary
- Immediate Action Required to Preserve Existing Condition

Reach Alternative

- Natural Channel Design
- Protect In Place
- Roadside Ditch Improvement
- Small Drop Structures w/ Toe Protection

Note:
Infrastructure and channel improvements shown may vary slightly from the final list published in the accompanying report as a result of fee revisions that have occurred following the preparation of this figure. For current information as of September 2015, please see tables in Section 6 of the accompanying report.

Figure 6-1
Selected Plan
Falcon DBPS
El Paso County, CO

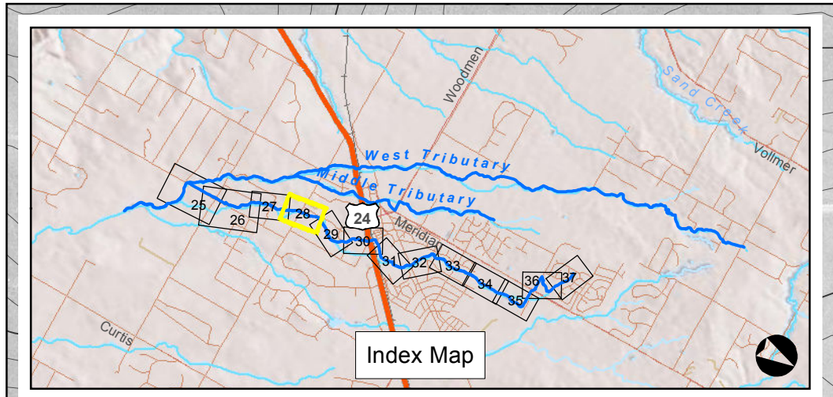
0 0.5 1
Miles

NOTE: FIGURE MUST BE VIEWED IN COLOR

FILE: G:\gis_projects\Falcon_Creek_DBPS\active\apps\20130617\Fig_6-1_selected_plan_20150925.mxd, 9/25/2015, jeff_clonts

Sheet 4-28

East Tributary Floodplain
Falcon DBPS
El Paso County, CO



Chief Rd
Falcon Hwy
Flow Diverted from East Tributary
8000
8200
8400
8600
8800
9000
9200
9400
9600
9800
7800
7600
7400
7200
7292
7692
8088
8268
8332
8488
8888
9292
9632

RAS Flow Chan Station	100-yr (Ex)	100-yr (Fut)
32631.8	150	200
31304.7	280	390
26646.3	460	580
23184.6	534	693
21057.8	489	585
19619.0	529	558
17786.6	490	480
15716.6	761	712
14440.0	370	390
14092.0	380	390
12092.0	410	440
9292.0	430	450
8087.7	590	680
5003.4	620	710
1984.9	620	710

Legend

- Approximate 100-yr Floodplain Existing
- Approximate 100-yr Floodplain Existing (Based on Assumed Split Flow Condition)
- Approximate 100-yr Floodplain Future
- Approximate 100-yr Floodplain Future (Based on Assumed Split Flow Condition)
- Shallow Flooding
- HEC-RAS Centerline
- XSCutLines (East Trib)
- FEMA Regulatory Floodplain (Effective as of 1999)*
- Study Limit

*Letters of Map Change completed after 1999 are not shown

N

0 100 200 400
Feet

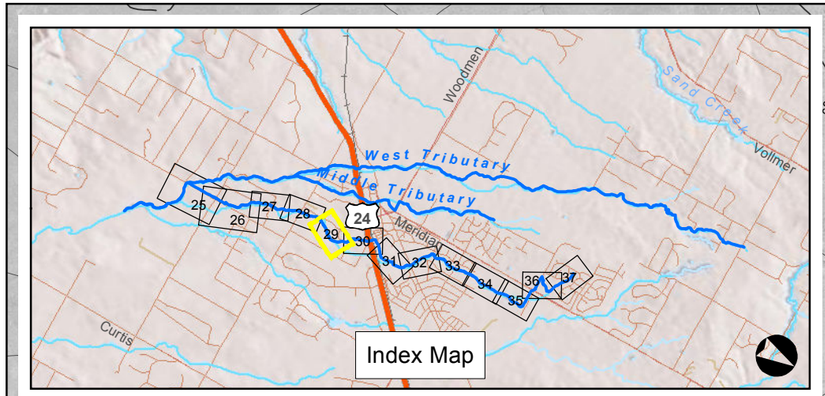
EL PASO COUNTY COLORADO EST. 1861

Matrix DESIGN GROUP

FILE: G:\gis_projects\Falcon_Creek_DBPStactive\apps\20111222\MapBook_FP_East_Trib.mxd, 12/22/2011, wilson_wheeler

Sheet 4-29

East Tributary Floodplain
Falcon DBPS
El Paso County, CO



Flow Diverted
from East Tributary

Chief Rd

Pinto Pony Rd

9692
9800
10000
10200
10400
10600
10800
11000
11200
11600
11800
12000
12200
12396
12457
12800
10092
10492
10892
11146
11425
11517
11552
11692
12092

RAS Flow Chan Station	100-yr (Ex)	100-yr (Fut)
32631.8	150	200
31304.7	280	390
26646.3	460	580
23184.6	534	693
21057.8	489	585
19619.0	529	558
17786.6	490	480
15716.6	761	712
14440.0	370	390
14092.0	380	390
12092.0	410	440
9292.0	430	450
8087.7	590	680
5003.4	620	710
1984.9	620	710

Legend

- Approximate 100-yr Floodplain Existing
- Approximate 100-yr Floodplain Existing (Based on Assumed Split Flow Condition)
- Approximate 100-yr Floodplain Future
- Approximate 100-yr Floodplain Future (Based on Assumed Split Flow Condition)
- Shallow Flooding
- HEC-RAS Centerline
- XSCutLines (East Trib)
- FEMA Regulatory Floodplain (Effective as of 1999)*
- Study Limit

*Letters of Map Change completed after 1999 are not shown

N

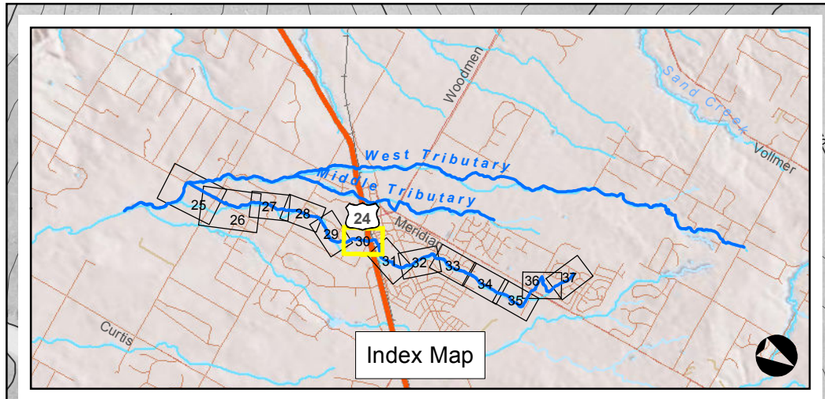
0 100 200 400

Feet

EL PASO COUNTY COLORADO EST. 1861

Matrix DESIGN GROUP

FILE: G:\gis_projects\Falcon_Creek_DBPS\active\apps\20111222\MapBook_FP_East_Trib.mxd, 12/22/2011, wilson_wheeler



RAS Flow Chan Station	100-yr (Ex)	100-yr (Fut)
32631.8	150	200
31304.7	280	390
26646.3	460	580
23184.6	534	693
21057.8	489	585
19619.0	529	558
17786.6	490	480
15716.6	761	712
14440.0	370	390
14092.0	380	390
12092.0	410	440
9292.0	430	450
8087.7	590	680
5003.4	620	710
1984.9	620	710

Sheet 4-30

East Tributary Floodplain
Falcon DBPS
El Paso County, CO

Legend

- Approximate 100-yr Floodplain Existing
- Approximate 100-yr Floodplain Existing (Based on Assumed Split Flow Condition)
- Approximate 100-yr Floodplain Future
- Approximate 100-yr Floodplain Future (Based on Assumed Split Flow Condition)
- Shallow Flooding
- HEC-RAS Centerline
- XSCutLines (East Trib)
- FEMA Regulatory Floodplain (Effective as of 1999)*
- Study Limit

*Letters of Map Change completed after 1999 are not shown

N

0 100 200 400
Feet

EL PASO COUNTY COLORADO EST. 1861

Matrix DESIGN GROUP

FILE: G:\gis_projects\Falcon_Creek_DBPS\active\apps\20111222\MapBook_FP_East_Trib.mxd, 12/22/2011, wilson_wheeler

CLOMR Excerpts & Approval

Federal Emergency Management Agency

Washington, D.C. 20472

July 23, 2024

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

IN REPLY REFER TO:
Case No.: 23-08-0708R
Community Name: El Paso County, CO
Community No.: 080059

104

Cami Bremer
Chair, El Paso County Board of Commissioners
200 South Cascade Avenue, Suite 100
Colorado Springs, CO 80903

Dear Cami Bremer:

We are providing our comments with the enclosed Conditional Letter of Map Revision (CLOMR) on a proposed project within your community that, if constructed as proposed, could revise the effective Flood Insurance Rate Map (FIRM) for your community.

If you have any questions regarding the floodplain management regulations for your community, the National Flood Insurance Program (NFIP) in general, or technical questions regarding this CLOMR, please contact the Director, Mitigation Division of the Federal Emergency Management Agency (FEMA) Regional Office in Denver, at (303) 235-4830, or the FEMA Mapping and Insurance eXchange (FMIX) toll free at 1-877-336-2627 (1-877-FEMA MAP). Additional information about the NFIP is available on our website at https://www.fema.gov/flood-insurance.

Sincerely,

Patrick "Rick" F. Sacbibit, P.E., Branch Chief
Engineering Services Branch
Federal Insurance and Mitigation Administration

Enclosure:
Conditional Letter of Map Revision Comment Document

cc: Keith Curtis, P.E., CFM
Floodplain Administrator
Pikes Peak Regional Building Department

Christina Prete
Stormwater Manager
El Paso County

Jeff Rice
Review Engineer
El Paso County

Michelle Iblings, P.E., CFM
Associate/Water Resources Group Leader
Drexel, Barrel & Co.

Terri Fead, P.E., CFM
Floodplain Mapping Coordinator
Colorado Water Conservation Board

Marta Blanco Castaño, GISP, CFM
Flood Mapping Program Assistant
Colorado Water Conservation Board

Kevin Houck, P.E., CFM
Chief, Watershed and Flood Protection Section
Colorado Water Conservation Board

REQUEST FOR CONDITIONAL LETTER OF MAP REVISION
UNNAMED TRIBUTARY TO BLACK SQUIRREL CREEK
FALCON FIELD

1.0 INTRODUCTION

1.1 Background

The following report and supporting documentation are being submitted to FEMA for the purpose of requesting a Conditional Letter of Map Revision (CLOMR) for a portion of the Unnamed Tributary to Black Squirrel Creek (UTBSC) in El Paso County, Colorado.

Falcon Field consists of approximately 57 acres adjacent to and southeast of Highway 24 near Rio Lane as shown in **Figure 1**. The UTBSC flows southeast across the property and is proposed to be contained within an 8'x4' box culvert and open channel that will discharge into the existing tributary. A general site layout of the Falcon Field development is shown in the construction drawings included in **Appendix 1**.

The improvements associated with Falcon Field are in general conformance with the Falcon Basin, Drainage Basin Planning Study (Falcon DBPS), prepared by El Paso County in 2015. The hydrologic analysis completed for the Falcon DBPS was used as the basis for the current CLOMR.

The Effective FEMA Flood Insurance Rate Map (FIRM) Numbers 08041C0553G and 08041C0561G in **Appendix 5** show the UTBSC 100-year Zone A floodplain across the center of the Falcon Field. This report includes detailed hydraulic models showing that the proposed 100-year floodplain will be contained within a proposed box culvert and open channel.

It is the Owner/Developer's intent to comply with all floodplain regulations.

1.2 General Location and Project Description

This CLOMR is limited to the 57-acre parcel located at the southwest corner of Highway 24 and Rio Lane, in the east half of Section 7, Township 13 South, Range 64 West of the 6th P.M. in El Paso County, Colorado. The subject property will be developed with a mixed-use commercial and residential development (Falcon Field).

The Falcon Field development includes regrading the site and containing the UTBSC across the site. Approximately 1024 feet of the tributary will be impacted by the development, which intercepts the existing creek south of Highway 24 and conveys it via an 8'x4' box culvert and open channel to the existing creek downstream. The box culvert and open channel are designed to convey the full 100-year discharge.



Figure 1 – Vicinity Map

1.3 Regulatory Floodplain

The Effective Zone A limits for the UTBSC on the Falcon Field site are defined on Map Numbers 8041C0553G and 08041C0561G dated December 7, 2018. No flow rates, floodway data or flood profiles were defined for this section of UTBSC in the effective FIS for El Paso County, Colorado, Revised December 7, 2018.

2.0 PREVIOUS STUDIES

El Paso County completed hydrologic and hydraulic analyses summarized in a report titled Falcon Basin, Drainage Basin Planning Study, Selected Plan Report, Final, September 2015 (Falcon DBPS). The Falcon DBPS encompasses three unnamed tributaries to Black Squirrel Creek, including the "East Tributary" which flows across the subject property. Select output from the Falcon DBPS is included in **Appendix 2**.

3.0 HYDROLOGIC ANALYSIS

The Falcon DBPS completed hydrologic analysis for the Falcon Basin Watershed, using HEC-HMS v3.5 software, for historical, existing, and future land use conditions by applying a 24-hour storm event with 2-, 5-, 10-, 25-, 50-, and 100-year recurrence intervals and current drainage infrastructure. Chapter 3 and Appendix A of the Falcon DBPS include a detailed discussion of the hydrologic analysis. An electronic copy of the HEC-HMS model (File: Aug15_Working_Falcon_DBPS_S.hms) is also provided.

El Paso County requires regional drainage infrastructure to be sized for future land use conditions. Therefore, peak discharges with existing drainage infrastructure and future land use conditions near Falcon Field are summarized in Table 3-1.

Table 3-1. Future Land Use Conditions Peak Discharges near Falcon Field on the East Tributary, Falcon DBPS

Model Location	Physical Location	Proximity to Falcon Field	Q100 (cfs)
JET090	Highway 24	Upstream of Site	390
JET100	Pinto Pony Road	Downstream of Site	390

4.0 HYDRAULIC ANALYSIS

4.1 General

The effective FIRM identifies an approximate Zone A floodplain across the Falcon Field property with no flood profiles, discharges, or BFE's defined. The Falcon Field development includes filling and regrading the site and rerouting the UTBSC through a box culvert and open channel across the site.

4.2 Vertical Datum

The effective FIRM is on the North American Vertical Datum of 1988 (NAVD88). The survey completed for the site, the design and construction drawings, and the hydraulic analysis completed for this CLOMR are all on the NAVD88. The Falcon DBPS was completed on the NGVD29.

4.3 Horizontal Datum

The field survey, design, construction drawings and hydraulic modeling for the Falcon Field project were completed on the North American Datum of 1983 (NAD83), Colorado State Plane coordinate system, Central Zone.

4.4 Box Culvert Hydraulic Analysis

Under existing conditions, the UTBSC discharges to an open channel through the site from 2-12’H x 4.83’W box culverts under Highway 24. The Falcon Field property limits are approximately 46 feet downstream of the Highway 24 box culvert exit. There is an 8-foot concrete vertical wall/drop immediately downstream of the culvert, then a short riprap channel section (shown in the photo below), before the open channel returns to a vegetated

section through the site. This section of the tributary was realigned with the construction of the upstream railroad and highway and does not follow the historic flow path.



Existing 2-12'H x 4.83' W box culverts under Highway 24

The proposed 8' x 4' box culvert will begin at the upstream property boundary (approximately the fence line shown in the photo above) at a headwall and convey the tributary flows 750 feet downstream to a proposed open channel. StormCAD was used to evaluate the hydraulic performance of the box culvert. The profile and output for the 100-year storm event is included in **Appendix 3**, and the model files are provided.

4.5 Open Channel Hydraulic Analysis

The proposed box culvert discharges to a proposed open channel via a headwall. The proposed open channel conveys the UTBSC 275 feet downstream to the existing creek, and will be vegetated with mowable short grasses. The open channel has a 20-foot bottom width in a v-shape with two 10-foot sections set at a 2% slope to the invert. The side slopes above the v-shape bottom are set at a 3H:1V slope. HEC-RAS version 6.2 was used to model the proposed open channel and existing creek downstream. The profile and output for the 100-year storm event is included in **Appendix 3**, and the model files are provided.

The proposed geometry includes six cross sections over a modeled reach of 400 feet. Roughness coefficients (n-values) of 0.04 and 0.08 were used for the proposed and existing channel, respectively. The model was computed in a subcritical flow regime for the design flow of 390 cfs, with a normal depth starting water surface elevation.

5.0 NFIP REGULATION COMPLIANCE

5.1 Floodplain Work Map and Annotated FIRM

The effective Zone A 100-year floodplain delineation for the UTBSC begins downstream of Highway 24. The 100-year flood discharge will be contained in the proposed box culvert. The proposed floodplain for the on-site open channel is delineated on the Floodplain Work Map and Annotated FIRM in **Appendix 5**. The proposed Zone AE floodplain ties into the effective Zone A floodplain approximately 225 feet downstream of the Falcon Field downstream property limits.

5.2 Forms and Notifications

The appropriate FEMA forms are located in **Appendix 4**. Modifications to 100-year floodplain elevations and delineations are limited to the Falcon Field development. Furthermore, there are no proposed increases to the BFE's or floodplain extents. Therefore, individual legal notices are not required for this CLOMR submittal.

5.3 Compliance with Section 65.12

Although there are no increases to BFE's due to the proposed project, an alternatives evaluation was performed to evaluate options for closed conduit and open channel conveyance of the UTBSC. The alternatives evaluation can be provided upon request.

Furthermore, no structures are located in areas that would be impacted by the floodplain modifications proposed by this CLOMR.

5.4 Endangered Species Act (ESA)

ESA Compliance information is provided in **Appendix 6**.

6.0 CONCLUSIONS

The Falcon Field development will relocate a portion of an Unnamed Tributary to Black Squirrel Creek (East Tributary). This report and supporting documentation are being submitted to FEMA for the purpose of requesting a CLOMR to conditionally change the floodplain in accordance with NFIP regulations.

7.0 REFERENCES

Bentley (formerly Haestad Methods, Inc.), StormCAD v4.1.1.

El Paso County, *Drainage Criteria Manual*, October 2018.

FEMA, *FIRM Numbers 08041C0553G and 08041C0561G, El Paso County, Colorado and Incorporated Areas,* Revised December 7, 2018.

FEMA, *FIS Number 08041CV001A, El Paso County, Colorado and Incorporated Areas,* Revised December 7, 2018.

Matrix Design Group, *Falcon Drainage Basin Planning Study, Selected Plan Report, Final,* September 2015.

USACE, *Hydrologic Engineering Center River Analysis System (HEC-RAS), Version 6.2,* March 2022.

EX. 2-12'X4.83' CONCRETE BOX CULVERT INV. (OUT)=6853.40

PR. INV. (IN)=6841.99

50.9 LF 2.25% 8'X4' CBC

PR. INV.=6840.85

PROPOSED 1% ANNUAL CHANCE FLOOD CONTAINED WITHIN 8'X4' CONCRETE BOX CULVERT

279.9 LF 2.25% 8'X4' CBC

PR. INV. (IN) 6834.56

261.5 LF 2.25% 8'X4' CBC

PR. INV.=6828.69

112.5 LF 0.92% 8'X4' CBC

PR. INV.=6827.65

29.2 LF 0.92% 8'X4' CBC

PR. INV.(OUT)=6827.38

UNNAMED TRIBUTARY TO BLACK SQUIRREL CREEK

ROCK ISLAND TRAIL

HIGHWAY 24

RIO LANE

SAPOYA PLACE

PERULA WAY

AVOCET PLACE

WOODMEN RD

RETAIL ROW ST

JACKDAW DRIVE

JACAMAR PLACE

MOTMOT WAY

BUTEOS LANE

BARBET DRIVE

PINTO PONY RD

ZONE AE

ZONE A

400

333

198

133

88

0

LEGEND

- EX. CONTOUR
- PR. CONTOUR
- EX. STORM SEWER
- OR
- PR. CBC STORM SEWER
- PR. ON-SITE STORM DRAINAGE
- EFFECTIVE FEMA FLOODPLAIN (ZONE A)
- PROPOSED FLOODPLAIN (ZONE AE)
- CROSS SECTION
- CROSS SECTION LABEL
- FLOW DIRECTION
- PR. ON-SITE DETENTION
- PR. EASEMENT
- PR. LOT
- EX. PROPERTY LINE
- PR. SITE BOUNDARY
- PROPOSED CURB LINE & SIDEWALK

NOTES

1. SPATIAL PROJECTION IS NAD83 COLORADO STATE PLANE, CENTRAL ZONE (FEET).
2. VERTICAL DATUM IS NAVD88.

80 40 0 80 160

SCALE IN FEET

PREPARED BY:

DBC
Drexel, Barrell & Co.
Traditional Surveying, Innovative Solutions
Since 1978

Drexel, Barrell & Co.
Engineers • Surveyors
1376 MINERS DRIVE, STE 107
LAFAYETTE, COLORADO 800026
CONTACT: MICHELLE IBLINGS, P.E.
(303) 442-4338

LAFAYETTE
COLORADO SPRINGS

OWNER/CLIENT:

PJ ANDERSON
FALCON FIELD, LLC
3230 ELECTRA DR. N
COLORADO SPRINGS, CO 80906

EXHIBIT FOR:
FALCON FIELD
FALCON, COLORADO

ISSUE	DATE
EXHIBIT	8/3/23

DESIGNED BY:	MLI
DRAWN BY:	CAF
CHECKED BY:	MLI
FILE NAME:	21705-00 FPWM

COLORADO LICENSED
MICHELLE IBLINGS
43515
PROFESSIONAL ENGINEER

DRAWING SCALE:
HORIZONTAL: SEE PLAN
VERTICAL: N/A

CLOMR FLOODPLAIN WORK MAP

PROJECT:21705-00BLWR

DRAWING NO.

FPWM

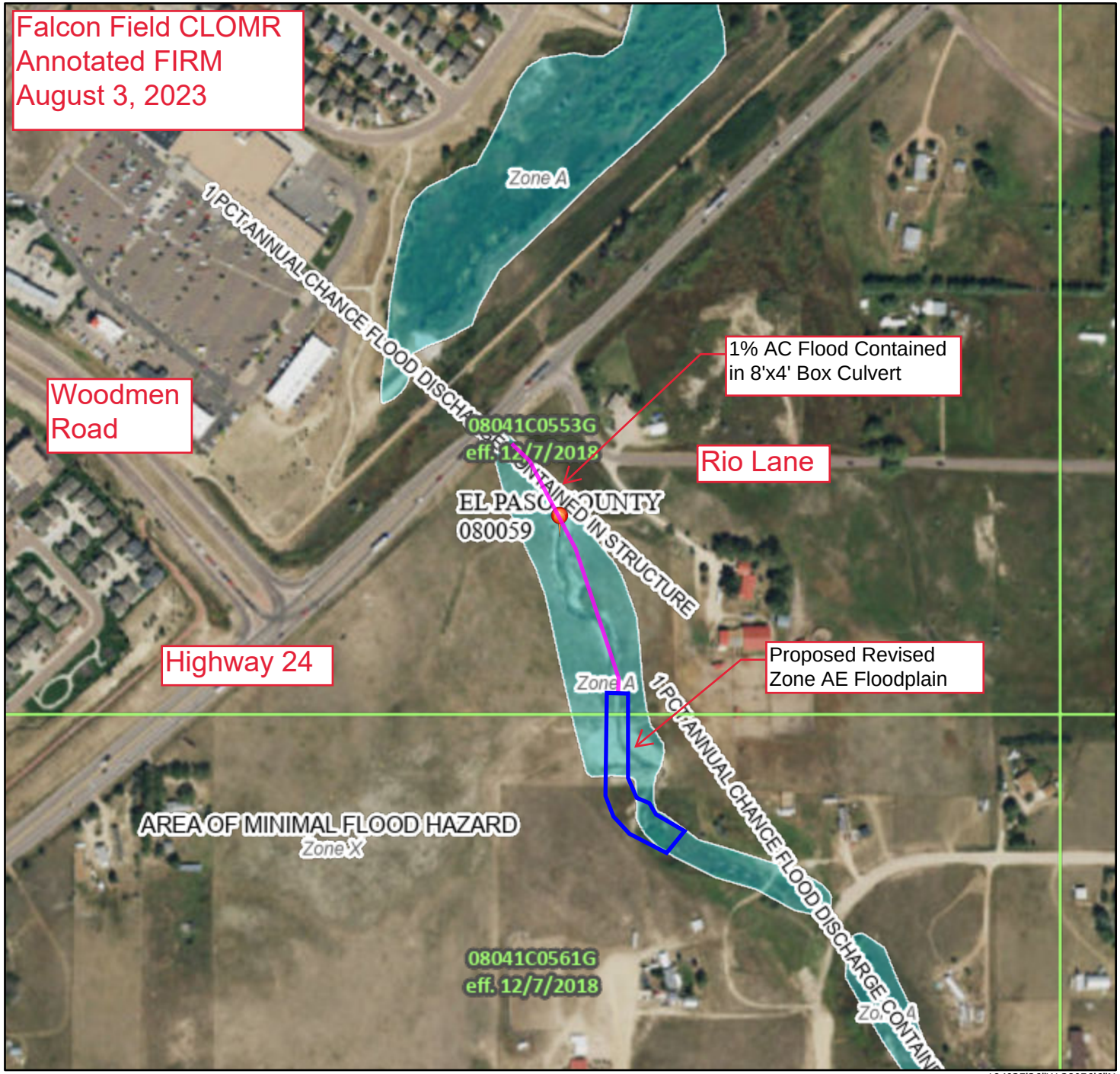
SHEET: 1 OF 1

H:\21705-00BLWR\Plans\Sheets\21705-00 FPWM.dwg, 8/3/2023 2:02:51 PM

National Flood Hazard Layer FIRMette

FEMA

104°36'13"W 38°56'34"N



104°35'36"W 38°56'6"N

Feet

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

1:6,000

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
- 20.2 / 17.5 Cross Sections with 1% Annual Chance / Water Surface Elevation
- Coastal Transect
- 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 10/11/2021 at 10:04 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.

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, ALBUQUERQUE DISTRICT
SOUTHERN COLORADO REGULATORY BRANCH
201 WEST 8TH STREET, SUITE 350
PUEBLO, COLORADO 81003

August 26, 2022

Regulatory Division

SUBJECT: Jurisdictional Determination – Action No. SPA-2021-00180, Falcon Field

P. J. Anderson
Falcon Field, LLC
31 North Tejon Street, Suite 516
Colorado Springs, CO 80903
pja5713@gmail.com

Dear P.J. Anderson:

This letter responds to your request for a jurisdictional determination (JD) for property located at latitude 38.936555635255, longitude -104.600429740897, in El Paso County, Colorado. We have assigned Action No. SPA-2021-00180 to your request. Please reference this number in all future correspondence concerning the site.

Based on the information provided, we have determined that the site does not contain waters of the United States that are subject to regulation under Section 404 of the Clean Water Act. The attached JD form describes the area that was evaluated and determined to contain no waters of the United States. If you intend to conduct work that could result in a discharge of dredged or fill material into waters of the United States, please contact this office for a determination of Department of the Army permit requirements and refer to Action No. SPA-2021-00180.

The basis for this approved JD (attached) is that the project site contains isolated wetlands and/or other waters. Wetland 1 through 5 are intrastate, isolated waters that do not flow into a traditional navigable waterway (attached). A copy of this JD is also available at http://www.spa.usace.army.mil/reg/JD. This approved JD is valid for 5 years unless new information warrants revision of the determination before the expiration date.

You may accept or appeal this approved JD or provide new information in accordance with the attached Notification of Administration Appeal Options and Process and Request for Appeal. If you elect to appeal this approved JD, you must complete Section II of the form and return it to the Army Engineer Division, South Pacific, CESPD-PDS-O, Attn: Travis Morse, Administrative Appeal Review Officer, P.O. Box 36023, 450 Golden Gate Avenue, San Francisco, CA 94102 within 60 days of the date of this notice. Failure to notify the Corps within 60 days of the date of this notice means that you accept the approved JD in its entirety and waive all rights to appeal the approved JD.

If you have any questions, please contact Kraig Jashinsky at (719) 439-7281 or by email at Kraig.A.Jashinsky@usace.army.mil. At your convenience, please complete a Customer Service Survey online at https://regulatory.ops.usace.army.mil/customer-service-survey/.

Sincerely,

Kara A. Hellige
Chief, Southern Colorado Regulatory Branch

cc:
Daniel Maynard, Bristlecone Ecology, LLC, dmaynard@bristleconeecology.com

APPROVED JURISDICTIONAL DETERMINATION FORM
U.S. Army Corps of Engineers

This form should be completed by following the instructions provided in Section IV of the JD Form Instructional Guidebook.

SECTION I: BACKGROUND INFORMATION

A. REPORT COMPLETION DATE FOR APPROVED JURISDICTIONAL DETERMINATION (JD): August 26, 2022

B. DISTRICT OFFICE, FILE NAME, AND NUMBER: Albuquerque District, Falcon Field AJD Request, SPA-2021-00180

C. PROJECT LOCATION AND BACKGROUND INFORMATION:

State: **Colorado** County/parish/borough: **El Paso County** City:
Center coordinates of site (lat/long in degree decimal format): Lat. **38.936555635255°**, Long. **-104.600429740897°**
Universal Transverse Mercator: **13 534630.43 4309812.02**
Name of nearest waterbody: **Jimmy Camp Creek**
Name of nearest Traditional Navigable Water (TNW) into which the aquatic resource flows:
Name of watershed or Hydrologic Unit Code (HUC): **Chico, 11020004**
☐ Check if map/diagram of review area and/or potential jurisdictional areas is/are available upon request.
☐ Check if other sites (e.g., offsite mitigation sites, disposal sites, etc…) are associated with this action and are recorded on a different JD form:

D. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):

☒ Office (Desk) Determination. Date: **July 14, 2022**
☒ Field Determination. Date(s): **June 28, 2022**

SECTION II: SUMMARY OF FINDINGS

A. RHA SECTION 10 DETERMINATION OF JURISDICTION.

There **Are no** "*navigable waters of the U.S.*" within Rivers and Harbors Act (RHA) jurisdiction (as defined by 33 CFR part 329) in the review area. [*Required*]

☐ Waters subject to the ebb and flow of the tide.
☐ Waters are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce.
Explain:

B. CWA SECTION 404 DETERMINATION OF JURISDICTION.

There **Are no** "*waters of the U.S.*" within Clean Water Act (CWA) jurisdiction (as defined by 33 CFR part 328) in the review area. [*Required*]

1. **Waters of the U.S.**
   a. **Indicate presence of waters of U.S. in review area (check all that apply):** [1]
      ☐ TNWs, including territorial seas
      ☐ Wetlands adjacent to TNWs
      ☐ Relatively permanent waters[2] (RPWs) that flow directly or indirectly into TNWs
      ☐ Non-RPWs that flow directly or indirectly into TNWs
      ☐ Wetlands directly abutting RPWs that flow directly or indirectly into TNWs
      ☐ Wetlands adjacent to but not directly abutting RPWs that flow directly or indirectly into TNWs
      ☐ Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs
      ☐ Impoundments of jurisdictional waters
      ☐ Isolated (interstate or intrastate) waters, including isolated wetlands

   b. **Identify (estimate) size of waters of the U.S. in the review area:**
      Non-wetland waters: linear feet, wide, and/or acres.
      Wetlands: acres.

   c. **Limits (boundaries) of jurisdiction** based on: **Pick List**
      Elevation of established OHWM (if known):

2. **Non-regulated waters/wetlands (check if applicable):**[3]
   ☒ Potentially jurisdictional waters and/or wetlands were assessed within the review area and determined to be not jurisdictional.
   Explain: **The review area contains five wetlands totalling 7.15 acres. A review of the downstream connectivity of the associated wetlands found there to be a lack of a connection to downstream waters. The drainage features and associated wetlands presented a southward flow path until reaching E. Blaney Road. The flow path consisting of a varying degree of broken stream channel and connected wetlands terminated across a portion of flat terrain with not apparent wetland vegetation. Flow does not appear to reach any downstream waters via the nearby roadside ditch. Flow also does not cross E. Blaney Road due to the lack of culverts and a slight elevation rise. Due to a lack of downstream connectivity, the drainage features and associated wetlands under review are found to be isolated.**

[1] Boxes checked below shall be supported by completing the appropriate sections in Section III below.
[2] For purposes of this form, an RPW is defined as a tributary that is not a TNW and that typically flows year-round or has continuous flow at least "seasonally" (e.g., typically 3 months).
[3] Supporting documentation is presented in Section III.F.

SECTION III: CWA ANALYSIS

A. TNWs AND WETLANDS ADJACENT TO TNWs

The agencies will assert jurisdiction over TNWs and wetlands adjacent to TNWs. If the aquatic resource is a TNW, complete Section III.A.1 and Section III.D.1. only; if the aquatic resource is a wetland adjacent to a TNW, complete Sections III.A.1 and 2 and Section III.D.1.; otherwise, see Section III.B below.

1. TNW
Identify TNW:

Summarize rationale supporting determination:

2. Wetland adjacent to TNW
Summarize rationale supporting conclusion that wetland is "adjacent":

B. CHARACTERISTICS OF TRIBUTARY (THAT IS NOT A TNW) AND ITS ADJACENT WETLANDS (IF ANY):

This section summarizes information regarding characteristics of the tributary and its adjacent wetlands, if any, and it helps determine whether or not the standards for jurisdiction established under *Rapanos* have been met.

The agencies will assert jurisdiction over non-navigable tributaries of TNWs where the tributaries are "relatively permanent waters" (RPWs), i.e. tributaries that typically flow year-round or have continuous flow at least seasonally (e.g., typically 3 months). A wetland that directly abuts an RPW is also jurisdictional. If the aquatic resource is not a TNW, but has year-round (perennial) flow, skip to Section III.D.2. If the aquatic resource is a wetland directly abutting a tributary with perennial flow, skip to Section III.D.4.

A wetland that is adjacent to but that does not directly abut an RPW requires a significant nexus evaluation. Corps districts and EPA regions will include in the record any available information that documents the existence of a significant nexus between a relatively permanent tributary that is not perennial (and its adjacent wetlands if any) and a traditional navigable water, even though a significant nexus finding is not required as a matter of law.

If the waterbody[4] is not an RPW, or a wetland directly abutting an RPW, a JD will require additional data to determine if the waterbody has a significant nexus with a TNW. If the tributary has adjacent wetlands, the significant nexus evaluation must consider the tributary in combination with all of its adjacent wetlands. This significant nexus evaluation that combines, for analytical purposes, the tributary and all of its adjacent wetlands is used whether the review area identified in the JD request is the tributary, or its adjacent wetlands, or both. If the JD covers a tributary with adjacent wetlands, complete Section III.B.1 for the tributary, Section III.B.2 for any onsite wetlands, and Section III.B.3 for all wetlands adjacent to that tributary, both onsite and offsite. The determination whether a significant nexus exists is determined in Section III.C below.

1. Characteristics of non-TNWs that flow directly or indirectly into TNW

(i) General Area Conditions:
Watershed size: **Pick List**
Drainage area: **Pick List**
Average annual rainfall: inches
Average annual snowfall: inches

(ii) Physical Characteristics:
(a) Relationship with TNW:
☐ Tributary flows directly into TNW.
☐ Tributary flows through **Pick List** tributaries before entering TNW.

Project waters are **Pick List** river miles from TNW.
Project waters are **Pick List** river miles from RPW.
Project waters are **Pick List** aerial (straight) miles from TNW.
Project waters are **Pick List** aerial (straight) miles from RPW.
Project waters cross or serve as state boundaries. Explain:

Identify flow route to TNW[5]:
Tributary stream order, if known:

[4] Note that the Instructional Guidebook contains additional information regarding swales, ditches, washes, and erosional features generally and in the arid West.
[5] Flow route can be described by identifying, e.g., tributary a, which flows through the review area, to flow into tributary b, which then flows into TNW.

(b) General Tributary Characteristics (check all that apply):

Tributary is: ☐ Natural
☐ Artificial (man-made). Explain:
☐ Manipulated (man-altered). Explain:

Tributary properties with respect to top of bank (estimate):
Average width: feet
Average depth: feet
Average side slopes: **Pick List.**

Primary tributary substrate composition (check all that apply):

☐ Silts	☐ Sands	☐ Concrete
☐ Cobbles	☐ Gravel	☐ Muck
☐ Bedrock	☐ Vegetation. Type/% cover:	
☐ Other. Explain:		

Tributary condition/stability [e.g., highly eroding, sloughing banks]. Explain:
Presence of run/riffle/pool complexes. Explain:
Tributary geometry: **Pick List**
Tributary gradient (approximate average slope): %

(c) Flow:
Tributary provides for: **Pick List**
Estimate average number of flow events in review area/year: **Pick List**
Describe flow regime:
Other information on duration and volume:

Surface flow is: **Pick List.** Characteristics:

Subsurface flow: **Pick List**. Explain findings:
☐ Dye (or other) test performed:

Tributary has (check all that apply):
☐ Bed and banks
☐ OHWM[6] (check all indicators that apply):

☐ clear, natural line impressed on the bank	☐ the presence of litter and debris
☐ changes in the character of soil	☐ destruction of terrestrial vegetation
☐ shelving	☐ the presence of wrack line
☐ vegetation matted down, bent, or absent	☐ sediment sorting
☐ leaf litter disturbed or washed away	☐ scour
☐ sediment deposition	☐ multiple observed or predicted flow events
☐ water staining	☐ abrupt change in plant community
☐ other (list):	

☐ Discontinuous OHWM.[7] Explain:

If factors other than the OHWM were used to determine lateral extent of CWA jurisdiction (check all that apply):

☐ High Tide Line indicated by:	☐ Mean High Water Mark indicated by:
☐ oil or scum line along shore objects	☐ survey to available datum;
☐ fine shell or debris deposits (foreshore)	☐ physical markings;
☐ physical markings/characteristics	☐ vegetation lines/changes in vegetation types.
☐ tidal gauges	
☐ other (list):	

(iii) Chemical Characteristics:
Characterize tributary (e.g., water color is clear, discolored, oily film; water quality; general watershed characteristics, etc.).
Explain:
Identify specific pollutants, if known:

(iv) Biological Characteristics. Channel supports (check all that apply):
☐ Riparian corridor. Characteristics (type, average width):
☐ Wetland fringe. Characteristics:
☐ Habitat for:

[6]A natural or man-made discontinuity in the OHWM does not necessarily sever jurisdiction (e.g., where the stream temporarily flows underground, or where the OHWM has been removed by development or agricultural practices). Where there is a break in the OHWM that is unrelated to the waterbody's flow regime (e.g., flow over a rock outcrop or through a culvert), the agencies will look for indicators of flow above and below the break.
[7]Ibid.

☐ Federally Listed species. Explain findings:
☐ Fish/spawn areas. Explain findings:
☐ Other environmentally-sensitive species. Explain findings:
☐ Aquatic/wildlife diversity. Explain findings:

2. Characteristics of wetlands adjacent to non-TNW that flow directly or indirectly into TNW

(i) Physical Characteristics:

(a) General Wetland Characteristics:
Properties:
Wetland size: acres
Wetland type. Explain:
Wetland quality. Explain:
Project wetlands cross or serve as state boundaries. Explain:

(b) General Flow Relationship with Non-TNW:
Flow is: **Pick List**. Explain:

Surface flow is**: Pick List**
Characteristics:

Subsurface flow: **Pick List**. Explain findings:
☐ Dye (or other) test performed:

(c) Wetland Adjacency Determination with Non-TNW:
☐ Directly abutting
☐ Not directly abutting
☐ Discrete wetland hydrologic connection. Explain:
☐ Ecological connection. Explain:
☐ Separated by berm/barrier. Explain:

(d) Proximity (Relationship) to TNW
Project wetlands are **Pick List** river miles from TNW.
Project waters are **Pick List** aerial (straight) miles from TNW.
Flow is from: **Pick List.**
Estimate approximate location of wetland as within the **Pick List** floodplain.

(ii) Chemical Characteristics:

Characterize wetland system (e.g., water color is clear, brown, oil film on surface; water quality; general watershed characteristics; etc.). Explain:
Identify specific pollutants, if known:

(iii) Biological Characteristics. Wetland supports (check all that apply):

☐ Riparian buffer. Characteristics (type, average width):
☐ Vegetation type/percent cover. Explain:
☐ Habitat for:
☐ Federally Listed species. Explain findings:
☐ Fish/spawn areas. Explain findings:
☐ Other environmentally-sensitive species. Explain findings:
☐ Aquatic/wildlife diversity. Explain findings:

3. Characteristics of all wetlands adjacent to the tributary (if any)

All wetland(s) being considered in the cumulative analysis: **Pick List**
Approximately acres in total are being considered in the cumulative analysis.

For each wetland, specify the following:

Directly abuts? (Y/N)	Size (in acres)	Directly abuts? (Y/N)	Size (in acres)

Summarize overall biological, chemical and physical functions being performed:

C. SIGNIFICANT NEXUS DETERMINATION

A significant nexus analysis will assess the flow characteristics and functions of the tributary itself and the functions performed by any wetlands adjacent to the tributary to determine if they significantly affect the chemical, physical, and biological integrity of a TNW. For each of the following situations, a significant nexus exists if the tributary, in combination with all of its adjacent wetlands, has more than a speculative or insubstantial effect on the chemical, physical and/or biological integrity of a TNW. Considerations when evaluating significant nexus include, but are not limited to the volume, duration, and frequency of the flow of water in the tributary and its proximity to a TNW, and the functions performed by the tributary and all its adjacent wetlands. It is not appropriate to determine significant nexus based solely on any specific threshold of distance (e.g. between a tributary and its adjacent wetland or between a tributary and the TNW). Similarly, the fact an adjacent wetland lies within or outside of a floodplain is not solely determinative of significant nexus.

Draw connections between the features documented and the effects on the TNW, as identified in the *Rapanos* Guidance and discussed in the Instructional Guidebook. Factors to consider include, for example:

- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to carry pollutants or flood waters to TNWs, or to reduce the amount of pollutants or flood waters reaching a TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), provide habitat and lifecycle support functions for fish and other species, such as feeding, nesting, spawning, or rearing young for species that are present in the TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to transfer nutrients and organic carbon that support downstream foodwebs?
- Does the tributary, in combination with its adjacent wetlands (if any), have other relationships to the physical, chemical, or biological integrity of the TNW?

Note: the above list of considerations is not inclusive and other functions observed or known to occur should be documented below:

1. **Significant nexus findings for non-RPW that has no adjacent wetlands and flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary itself, then go to Section III.D:

2. **Significant nexus findings for non-RPW and its adjacent wetlands, where the non-RPW flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D:

3. **Significant nexus findings for wetlands adjacent to an RPW but that do not directly abut the RPW.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D:

D. DETERMINATIONS OF JURISDICTIONAL FINDINGS. THE SUBJECT WATERS/WETLANDS ARE (CHECK ALL THAT APPLY):

1. **TNWs and Adjacent Wetlands.** Check all that apply and provide size estimates in review area:
   - ☐ TNWs: linear feet, wide, Or acres.
   - ☐ Wetlands adjacent to TNWs: acres.

2. **RPWs that flow directly or indirectly into TNWs.**
   - ☐ Tributaries of TNWs where tributaries typically flow year-round are jurisdictional. Provide data and rationale indicating that tributary is perennial:
   - ☐ Tributaries of TNW where tributaries have continuous flow "seasonally" (e.g., typically three months each year) are jurisdictional. Data supporting this conclusion is provided at Section III.B. Provide rationale indicating that tributary flows seasonally:

   Provide estimates for jurisdictional waters in the review area (check all that apply):
   - ☐ Tributary waters: linear feet wide.
   - ☐ Other non-wetland waters: acres.
     Identify type(s) of waters:

3. **Non-RPWs[8] that flow directly or indirectly into TNWs.**
   - ☐ Waterbody that is not a TNW or an RPW, but flows directly or indirectly into a TNW, and it has a significant nexus with a TNW is jurisdictional. Data supporting this conclusion is provided at Section III.C.

   Provide estimates for jurisdictional waters within the review area (check all that apply):
   - ☐ Tributary waters: linear feet, wide.
   - ☐ Other non-wetland waters: acres.
     Identify type(s) of waters:

[8]See Footnote # 3.

4. **Wetlands directly abutting an RPW that flow directly or indirectly into TNWs.**
☐ Wetlands directly abut RPW and thus are jurisdictional as adjacent wetlands.
☐ Wetlands directly abutting an RPW where tributaries typically flow year-round. Provide data and rationale indicating that tributary is perennial in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW:

☐ Wetlands directly abutting an RPW where tributaries typically flow "seasonally." Provide data indicating that tributary is seasonal in Section III.B and rationale in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW:

Provide acreage estimates for jurisdictional wetlands in the review area: acres.

5. **Wetlands adjacent to but not directly abutting an RPW that flow directly or indirectly into TNWs.**
☐ Wetlands that do not directly abut an RPW, but when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisidictional. Data supporting this conclusion is provided at Section III.C.

Provide acreage estimates for jurisdictional wetlands in the review area: acres.

6. **Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs.**
☐ Wetlands adjacent to such waters, and have when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional wetlands in the review area: acres.

7. **Impoundments of jurisdictional waters.[9]**
As a general rule, the impoundment of a jurisdictional tributary remains jurisdictional.
☐ Demonstrate that impoundment was created from "waters of the U.S.," or
☐ Demonstrate that water meets the criteria for one of the categories presented above (1-6), or
☐ Demonstrate that water is isolated with a nexus to commerce (see E below).

E. ISOLATED [INTERSTATE OR INTRA-STATE] WATERS, INCLUDING ISOLATED WETLANDS, THE USE, DEGRADATION OR DESTRUCTION OF WHICH COULD AFFECT INTERSTATE COMMERCE, INCLUDING ANY SUCH WATERS (CHECK ALL THAT APPLY):[10]
☐ which are or could be used by interstate or foreign travelers for recreational or other purposes.
☐ from which fish or shellfish are or could be taken and sold in interstate or foreign commerce.
☐ which are or could be used for industrial purposes by industries in interstate commerce.
☐ Interstate isolated waters. Explain:
☐ Other factors. Explain:

Identify water body and summarize rationale supporting determination:

Provide estimates for jurisdictional waters in the review area (check all that apply):
☐ Tributary waters: linear feet, wide.
☐ Other non-wetland waters: acres.
Identify type(s) of waters:
☐ Wetlands: acres.

F. NON-JURISDICTIONAL WATERS, INCLUDING WETLANDS (CHECK ALL THAT APPLY):
☐ If potential wetlands were assessed within the review area, these areas did not meet the criteria in the 1987 Corps of Engineers Wetland Delineation Manual and/or appropriate Regional Supplements.
☒ Review area included isolated waters with no substantial nexus to interstate (or foreign) commerce.
☒ Prior to the Jan 2001 Supreme Court decision in "*SWANCC*," the review area would have been regulated based solely on the "Migratory Bird Rule" (MBR).
☐ Waters do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction. Explain:
☐ Other: (explain, if not covered above):

[9] To complete the analysis refer to the key in Section III.D.6 of the Instructional Guidebook.
[10] Prior to asserting or declining CWA jurisdiction based solely on this category, Corps Districts will elevate the action to Corps and EPA HQ for review consistent with the process described in the Corps/EPA *Memorandum Regarding CWA Act Jurisdiction Following Rapanos.*

Provide acreage estimates for non-jurisdictional waters in the review area, where the sole potential basis of jurisdiction is the MBR factors (i.e., presence of migratory birds, presence of endangered species, use of water for irrigated agriculture), using best professional judgment (check all that apply):

☐ Non-wetland waters (i.e., rivers, streams): linear feet, wide.
☐ Lakes/ponds: acres.
☒ Other non-wetland waters: acres. List type of aquatic resource:
☒ Wetlands: **7.15** acres.

Provide acreage estimates for non-jurisdictional waters in the review area that do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction (check all that apply):

☐ Non-wetland waters (i.e., rivers, streams): linear feet, wide.
☐ Lakes/ponds: acres.
☐ Other non-wetland waters: acres. List type of aquatic resource:
☐ Wetlands: acres.

SECTION IV: DATA SOURCES.

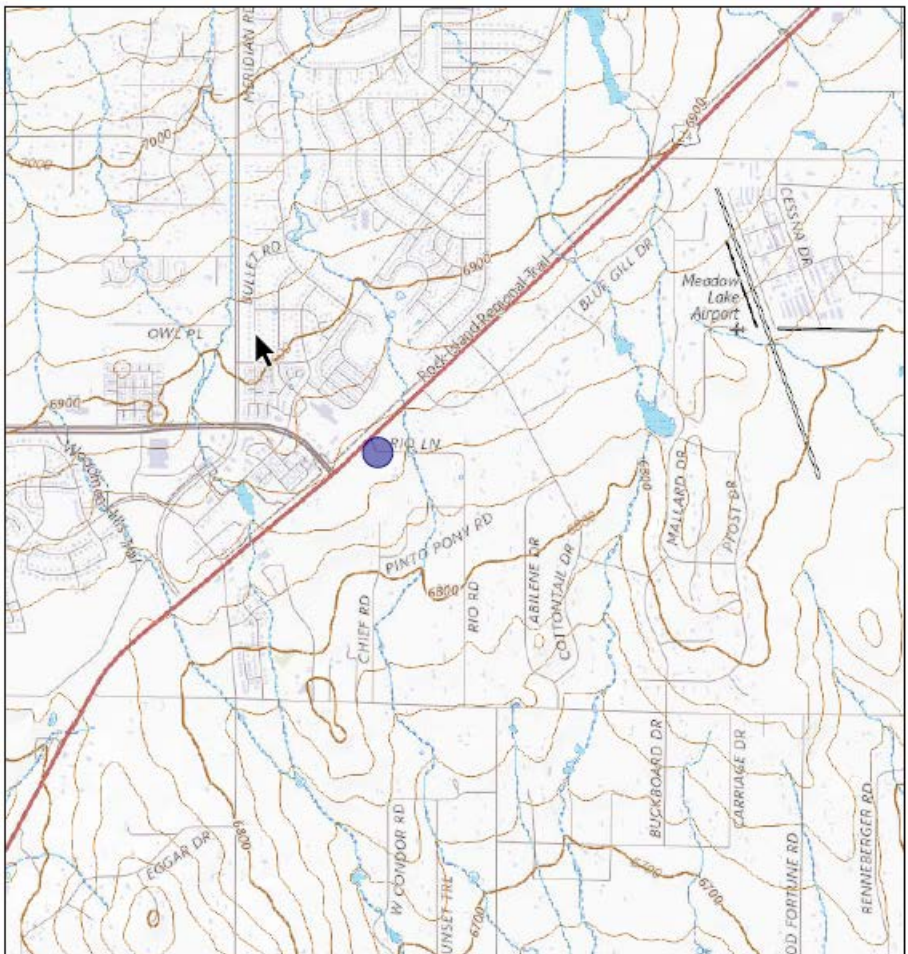
A. SUPPORTING DATA. Data reviewed for JD (check all that apply - checked items shall be included in case file and, where checked and requested, appropriately reference sources below):

☒ Maps, plans, plots or plat submitted by or on behalf of the applicant/consultant: **2021-180 Falcon Field AJD Request 12-15-2020_29-Nov-21.pdf**
☐ Data sheets prepared/submitted by or on behalf of the applicant/consultant.
  ☐ Office concurs with data sheets/delineation report.
  ☐ Office does not concur with data sheets/delineation report.
☐ Data sheets prepared by the Corps:
☐ Corps navigable waters' study:
☐ U.S. Geological Survey Hydrologic Atlas:
  ☐ USGS NHD data.
  ☐ USGS 8 and 12 digit HUC maps.
☐ U.S. Geological Survey map(s). Cite scale & quad name: **1:24K; Falcon**
☒ USDA Natural Resources Conservation Service Soil Survey. Citation: **2021-180 Soil Map**
☒ National wetlands inventory map(s). Cite name: **2021-180 NWI Map**
☐ State/Local wetland inventory map(s):
☐ FEMA/FIRM maps:
☐ 100-year Floodplain Elevation is: (National Geodectic Vertical Datum of 1929)
☐ Photographs: ☒ Aerial (Name & Date): **2021-180 Aerial - May 2020**
  or ☐ Other (Name & Date):
☐ Previous determination(s). File no. and date of response letter:
☐ Applicable/supporting case law:
☐ Applicable/supporting scientific literature:
☒ Other information (please specify): **2021-180 EPA Watershed Report, 2021-180 Flow Path and Pictures, 2021-180 Inspection Report - June 2022, 2021-180 NE Stream StreamStats, 2021-180 SW Stream StreamStats, 2021-180 USGS Topo**

B. ADDITIONAL COMMENTS TO SUPPORT JD:

A review of the downstream connectivity of the associated wetlands found there to be a lack of a connection to downstream waters. The drainage features and associated wetlands presented a southward flow path until reaching E. Blaney Road. The flow path consisting of a varying degree of broken stream channel and connected wetlands terminated across a portion of flat terrain with not apparent wetland vegetation. Flow does not appear to reach any downstream waters via the nearby roadside ditch. Flow also does not cross E. Blaney Road due to the lack of culverts and a slight elevation rise. Due to a lack of downstream connectivity, the drainage features and associated wetlands under review are found to be isolated.

2021-180 USGS Topo



7/25/2022, 4:06:58 PM

1:36,112

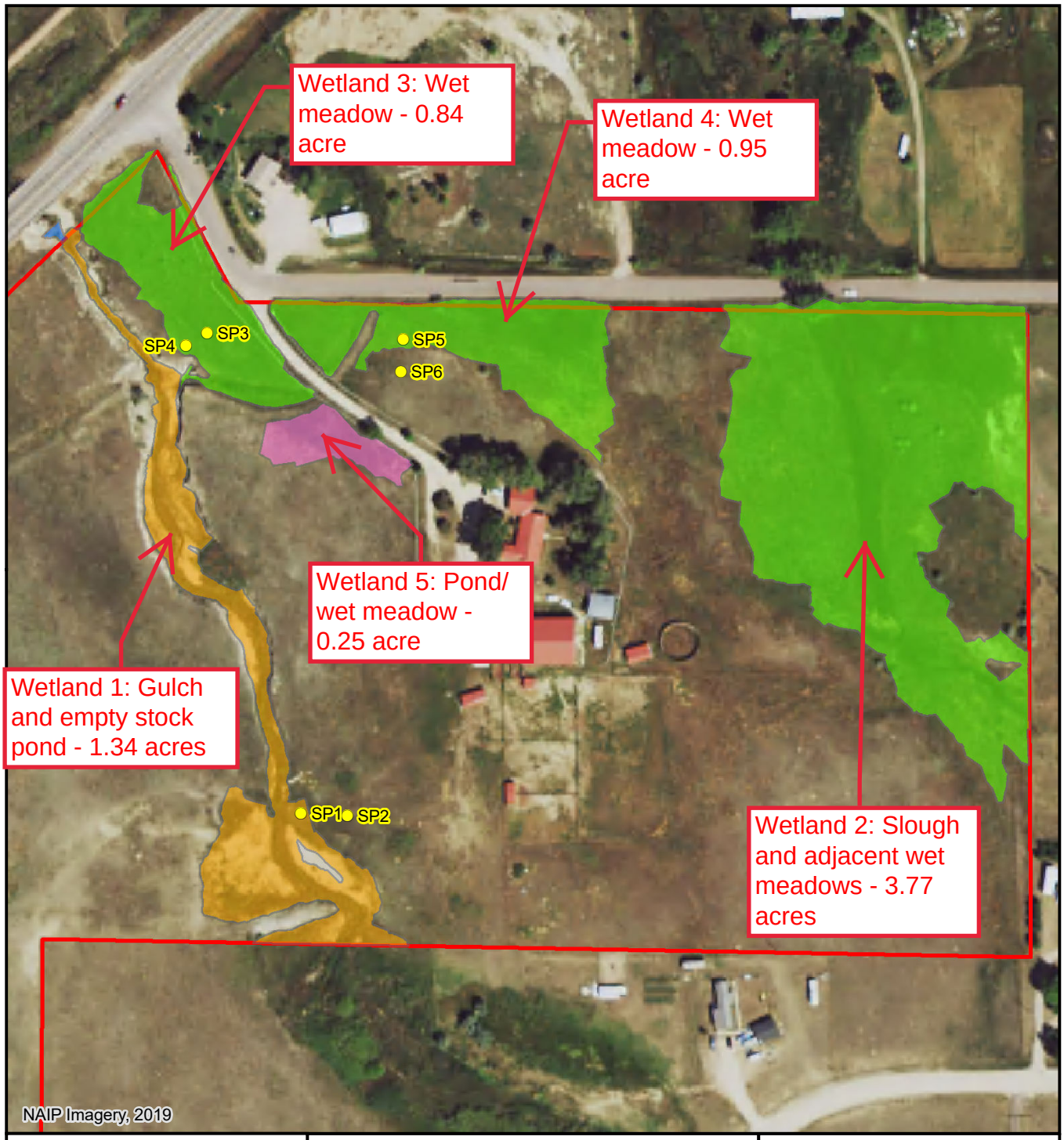
0 0.23 0.45 0.9 mi

0 0.38 0.75 1.5 km

- Override 1
- Forest/shrub Wetlands
- Emergent Wetlands
- Inland Waters
- Normal Intermediate Contours
- Normal Index Contours

USGS The National Map: National Boundaries Dataset, 3DEP Elevation Program, Geographic Names Information System, National Hydrography Dataset, National Land Cover Database, National Structures Dataset, and National Transportation Dataset; USGS Global Ecosystems; U.S. Census

USGS
2021 USGS



Colorado

El Paso County

Project Area
Data Point
Open Water
Pond
Slough
Wet Meadow

Feet
0
200
400

N

Falcon Field

Wetlands

bristlecone ecology

12/8/2020 C:\GIS_Projects\Bristlecone_Ecology\20_013_Falcon_Field\Wetlands_Zoomed.mxd

Downstream Analysis

Falcon Field Downstream Assessment
Updated February 2026

The previously approved Drainage Basin Planning Study (DBPS) for the UTBSC was performed in 2015. The Colorado Water Conservation Board (CWCB) recently performed Base Level Engineering (BLE) studies for various watersheds in El Paso County. The BLE hydrologic modeling (in HEC-HMS) for the UTBSC was approved in 2024. The BLE HMS model (v4.9) includes design points at Highway 24 (J_FalconE1_3) and Falcon Highway (J_FalconE1_4) as shown in Figure 1.

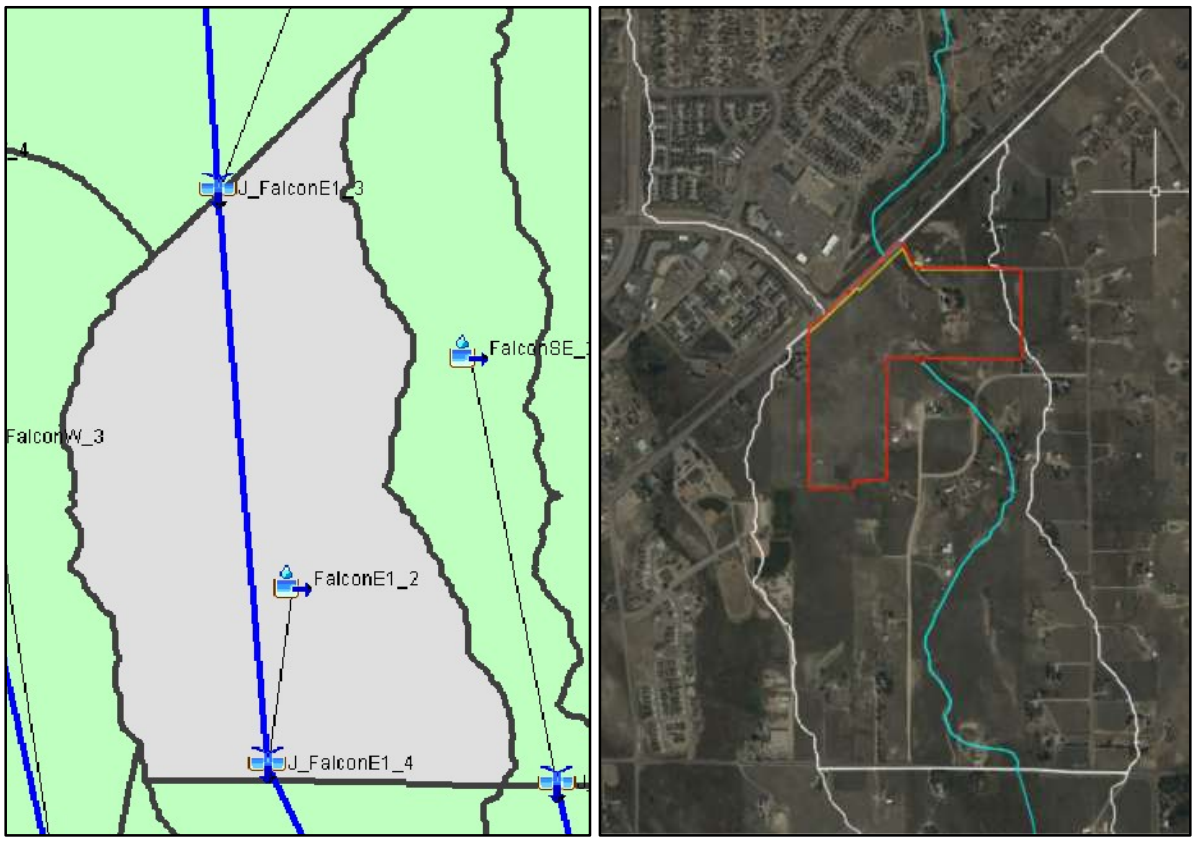


Figure 1. HMS Basin Model schematic (Basin 1 from the CWCB)

DBC modified the basin model by subdividing FalconE1_2 between the two design points. The area of the Falcon Field (FF) basin (in red) is 0.095 mi^2, so area of FalconE1_2 was decreased from the original area of 0.5095 to 0.451 mi^2. No other changes were made to the FalconE1_2 basin. The FF basin was assigned a CN=74 based on the proposed 61% imperviousness, and a lag time of 20 minutes. A new junction (J_Falcon_E1_3a) was created to represent the downstream limit of the FF development. The length of R_FalconE1_2 (the reach routing between the two original design points) was reduced to 5,193 feet (blue line in Figure 1). This model was prepared to assess the downstream impact of the FF development without onsite detention.

An on-site detention model was also prepared to assess the downstream impact of the FF development with detention. The stage-storage-discharge curves from the proposed Ponds A, B, and C on the FF site were combined to represent one reservoir unit in HMS, shown in Figure 2.

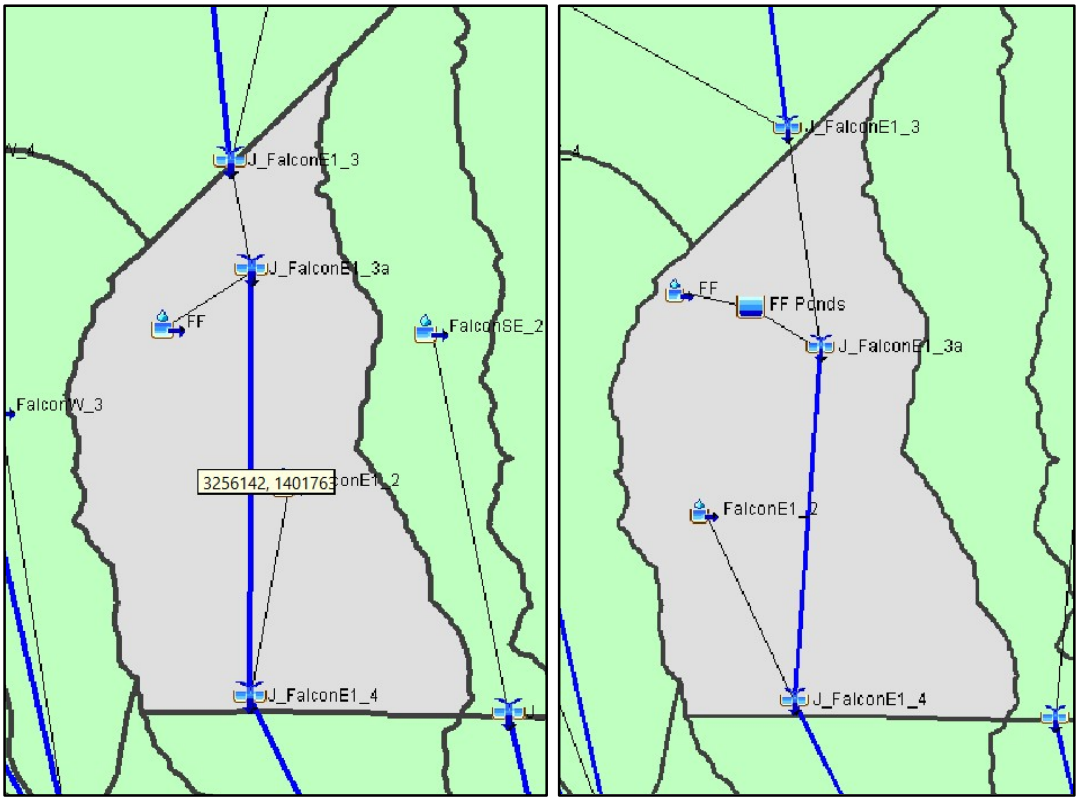


Figure 2. HMS Basin Model schematics (DBC Proposed without and with detention)

The results from the HMS models are shown in Table 1. Ex, Pr, and Pr Pond represent the three model scenarios described above. The results are provided at the downstream limits of the FF development, as well as at Falcon Highway (one mile downstream), for both the 10- and 100-year events. The proposed ponds affect the peak flows by less than 5% for the 10- and 100-year events. The hydrographs from these scenarios are provided in Figure 3.

Table 1. HMS Results

Falcon Highway	10-year					100-year				
	Ex	Pr*	% Diff	Pr Pond	% Diff	Ex	Pr*	% Diff	Pr Pond	% Diff
Qp (cfs)	67.8	73.8	8.8	66.9	-1.3	640.4	636	-0.7	641.7	0.2
Vol (acft)	20.7	23.9	15.5	21.9	5.8	126	132.5	5.2	129.5	2.8
Dur (min)	924	930	0.6			978	1038	6.1		

Falcon Field DS Limit	10-year					100-year				
	Ex	Pr	% Diff	Pr Pond	% Diff	Ex	Pr	% Diff	Pr Pond	% Diff
Qp (cfs)	56.6	61.2	8.1	54.7	-3.4	502.1	515.7	2.7	521.5	3.9
Vol (acft)	15.4	18.7	21.4	16.8	9.1	99.6	106.2	6.6	103.2	3.6
Dur (min)	894	924	3.4			948	1044	10.1		

It is noted that the storage routing calculations and methodology used in HMS differ from the MHFD-Detention workbook, and the workbook should be used for the site design. The basin modeling in HMS is performed on a larger scale and has less detail, and the storage analysis in HMS is only performed to roughly estimate volume and discharge impacts downstream.

A hydraulic model of the UTBSC was also prepared for both existing and proposed geometric conditions. The current design includes a proposed open channel downstream of the box culvert. The proposed channel has a 30-ft bottom width with 2% slopes draining to the centerline, and 3H:1V side slopes. The 100-year channel velocities are provided in Table 2, as well as allowable velocities for average grass cover from Fischenish and Allen (2000). Downstream grass cover conditions are consistent with those assumed by the average grass cover parameter noted above. The average proposed velocity of 4.18 ft/s is below the 1-hour allowable velocity of 6.56 ft/s. In addition all proposed channel velocities are lower than existing conditions along the modeled reach.

Table 2. Peak 100-year Velocities along the UTBSC

	Channel V (Ft/s)	
XS*	**Proposed at 0.3%**	**Existing**
400	5.42	6.26
333	4.17	5.77
198	4.27	
133	3.87	
88	4.2	4.21
0	3.15	3.17
MIN	3.15	3.17
MAX	5.42	6.26
AVG	4.18	4.85

*XS 88 and 0 are downstream of the FF development

Flow Duration (hour)	Allow V for average grass cover*	
	m/s	ft/s
1	2	6.56
10	1	3.28
50	1	3.28

*Fischenish and Allen (2000)

The hydrographs for the modeled scenarios are shown in Figure 3. The 100-year flow at the 10-hour flow duration ranges from 34 to 40 cfs downstream of the development. Proposed channel velocities at 40 cfs range from 1.6 to 2.1 ft/s along the reach, which are all below the allowable velcoity of 3.28 ft/s at and beyond 10 hours of flow.

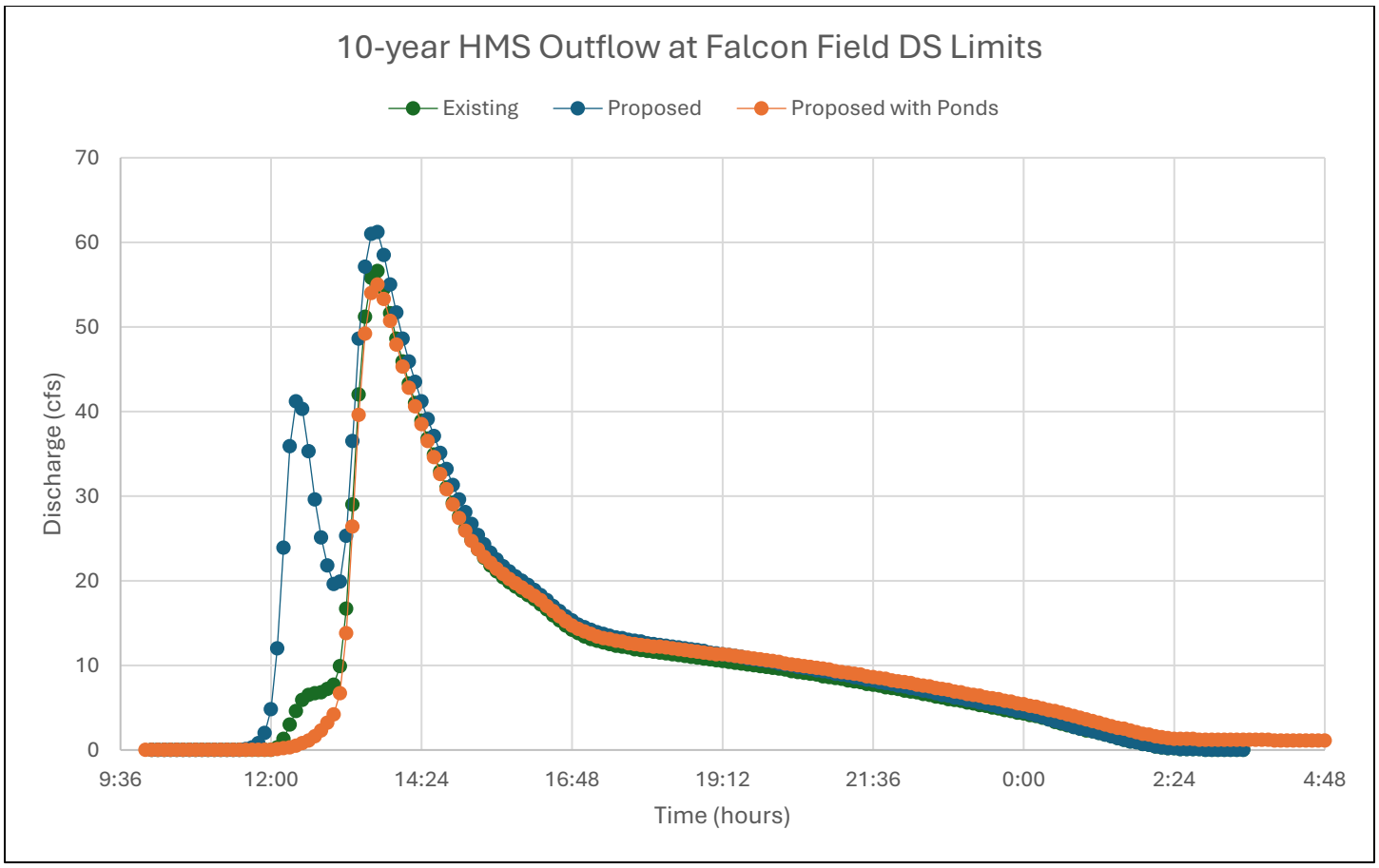
Model results, parameters, and electronic files have been provided to the County.

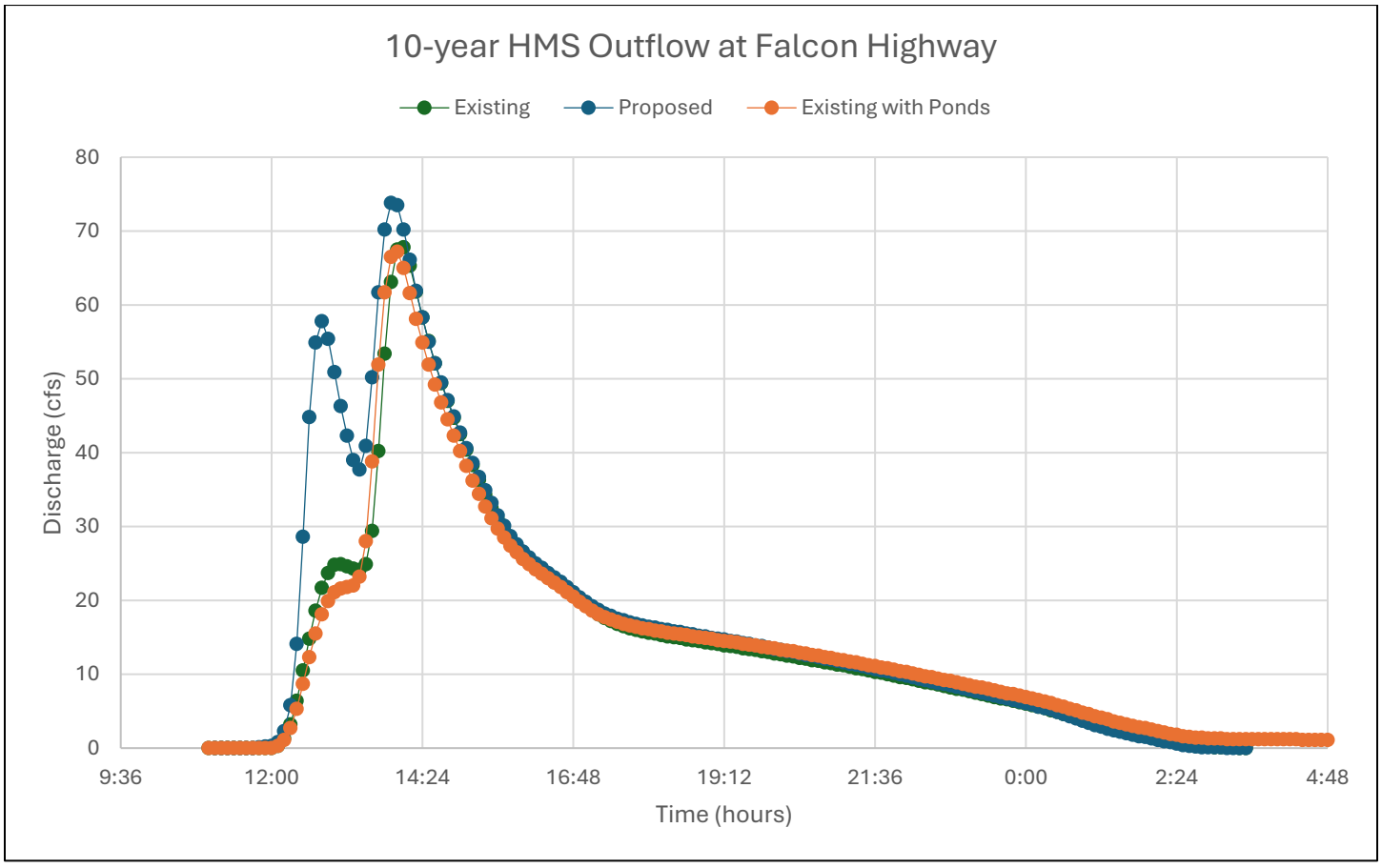
The Falcon DBPS Figure 6-1 identified an area of immediate action along the UTBSC at Pinto Pony Road in 2016. The photo below shows the road closed in 2019 due to erosion from the tributary. The assessment above shows that the Falcon Field development will not significantly affect downstream flow volumes, durations, and velocities. Therfore, the project does not need to address further improvement activities downstream.

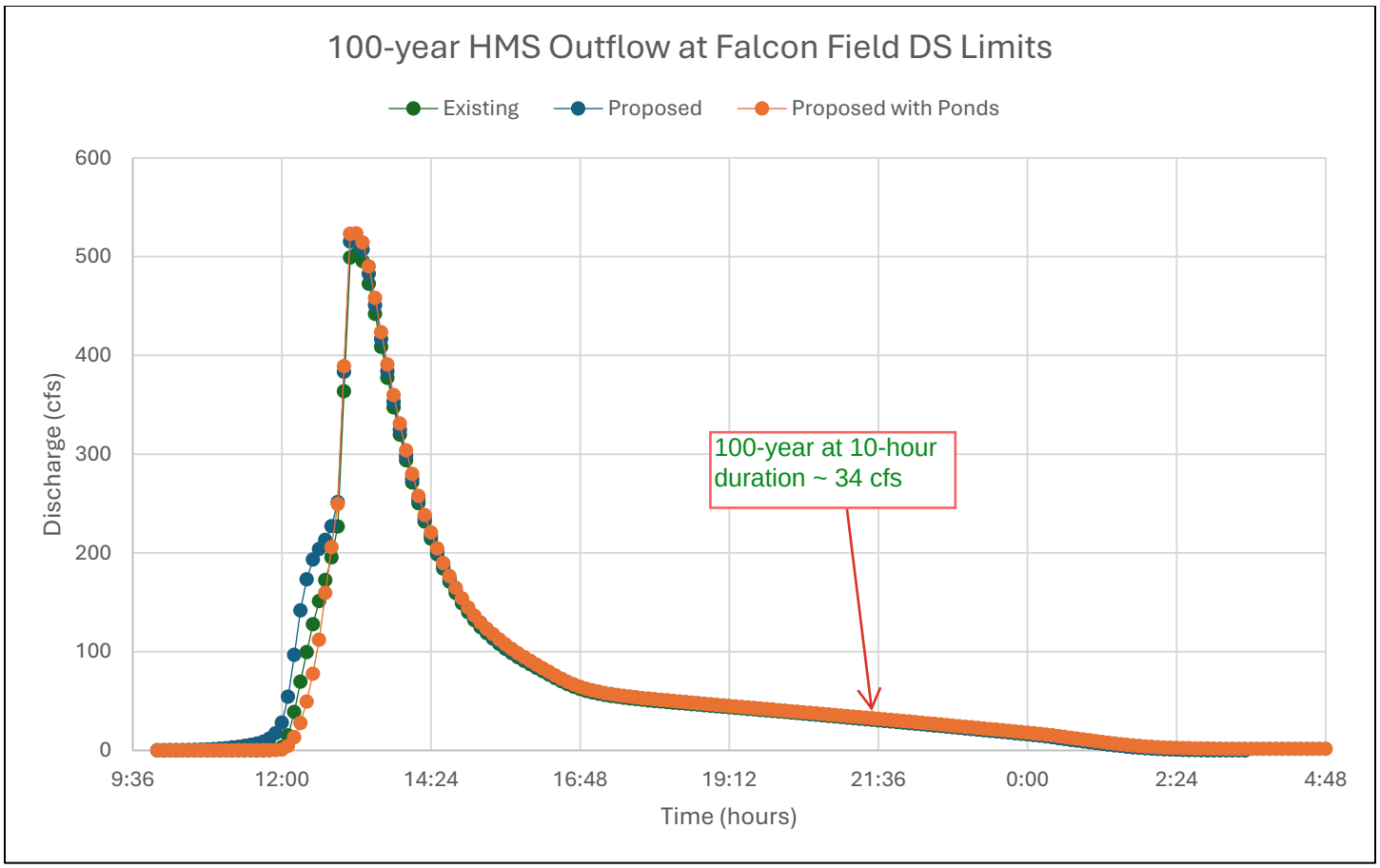


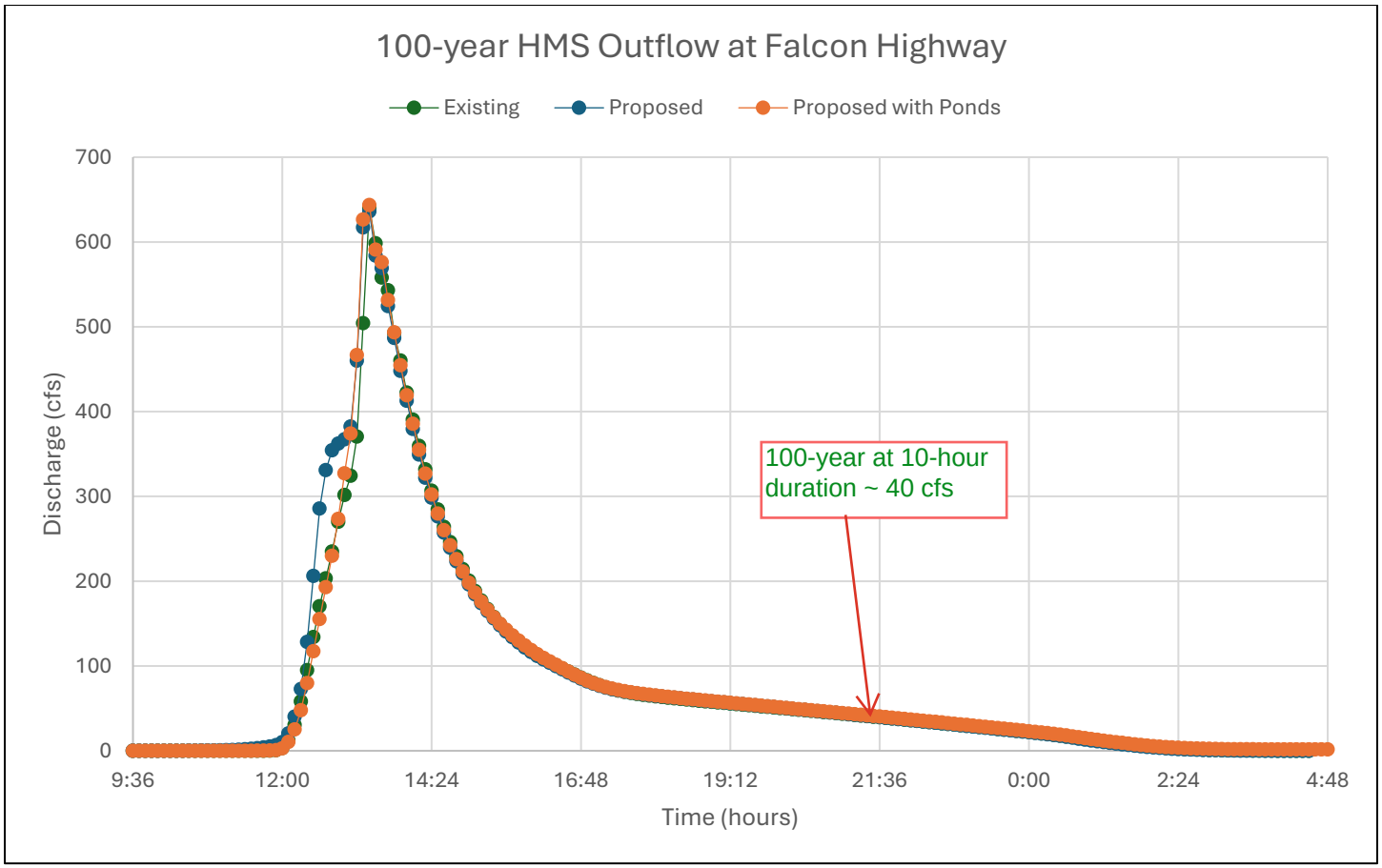
Picture 1. Pinto Pony Road at the UTBSC (Google 2019)

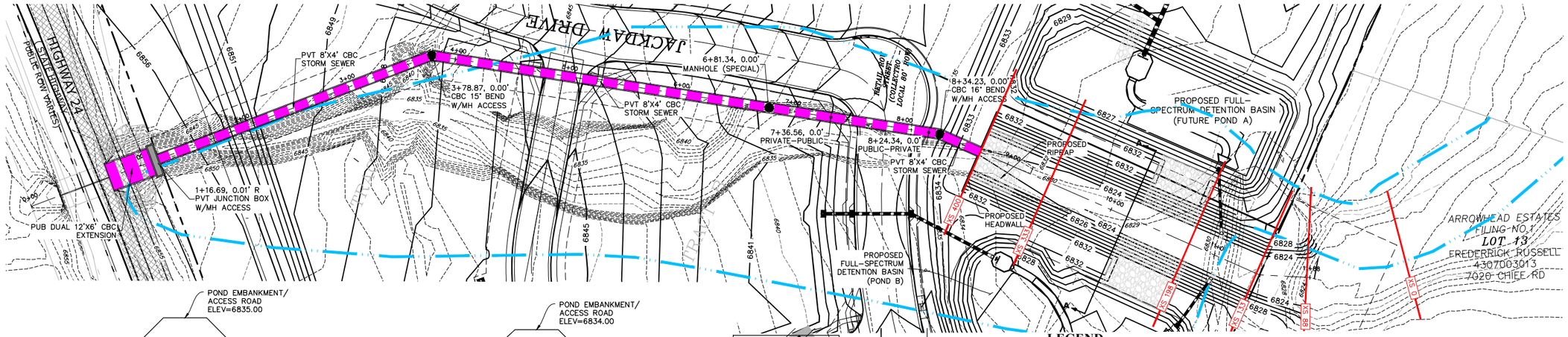
Figure 3. HMS Outflow Hydrographs

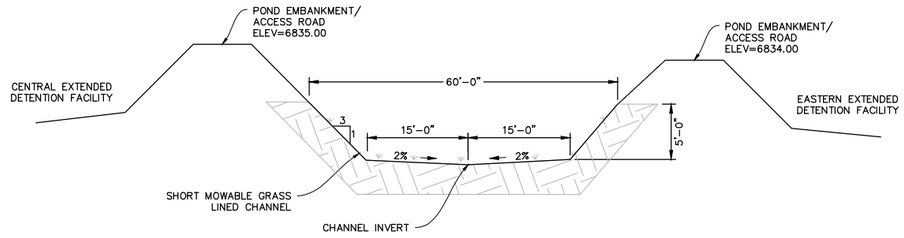




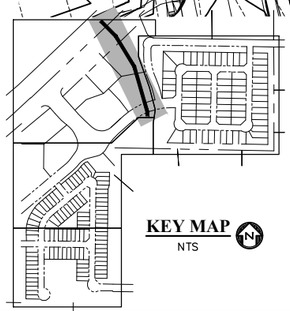

100-year HMS Outflow at Falcon Field DS Limits
Existing
Proposed
Proposed with Ponds
600
500
400
300
200
100
0
Discharge (cfs)
9:36
12:00
14:24
16:48
19:12
21:36
0:00
2:24
4:48
Time (hours)
100-year at 10-hour duration ~ 34 cfs


100-year HMS Outflow at Falcon Highway
Existing
Proposed
Proposed with Ponds
700
600
500
400
300
200
100
0
Discharge (cfs)
9:36
12:00
14:24
16:48
19:12
21:36
0:00
2:24
4:48
Time (hours)
100-year at 10-hour duration ~ 40 cfs





OPEN CHANNEL SECTION A-A
SCALE: NTS

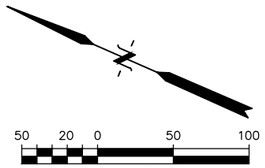


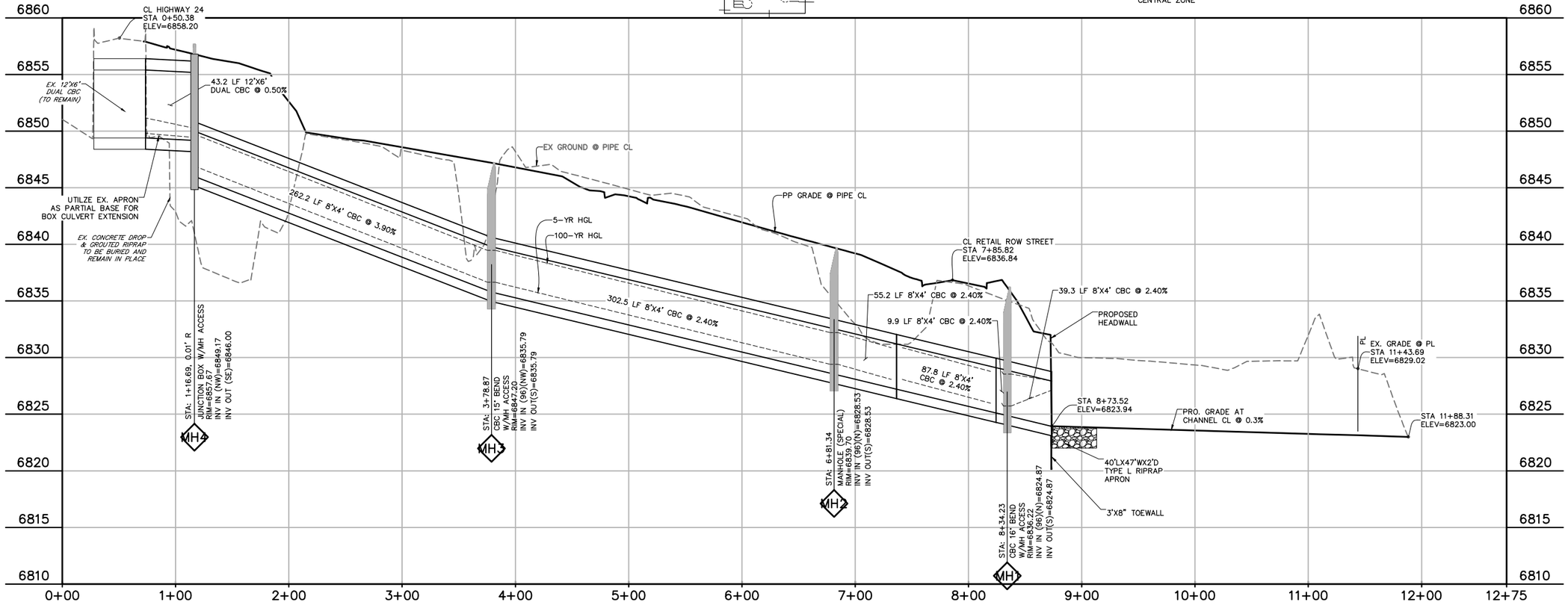
LEGEND

PROPERTY LINE	
LOT LINE	
EASEMENT	
CURB & GUTTER	
SIDEWALK	
PRO. STORM SEWER	
EX. STORM SEWER	ST
EFFECTIVE 100-YEAR FLOODPLAIN	

VERTICAL DATUM: NAVD88

HORIZONTAL DATUM: NAD83 COLORADO STATE PLANE CENTRAL ZONE





PREPARED BY:

DREXEL, BARRELL & CO.
Engineers • Surveyors
3 SOUTH 7TH STREET
COLORADO SPGS, COLORADO 80905
CONTACT: TIM D. McCONNELL, P.E.
(719)260-0887
BOULDER • COLORADO SPRINGS • GREELEY

CLIENT:

FALCON FIELD, LLC.
3230 ELECTRA DR N.
COLORADO SPRINGS, CO 80906
(719) 475-7474
CONTACT: PJ ANDERSON

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

ISSUE	DATE
INITIAL ISSUE	8/20/2023
REVISED	3/2/2026

DESIGNED BY:	KGV
DRAWN BY:	CGH
CHECKED BY:	TDM
FILE NAME:	21604-00STM1

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

NOT FOR CONSTRUCTION

DRAWING SCALE:
HORIZONTAL: 1" = 50'
VERTICAL: 1"=5'

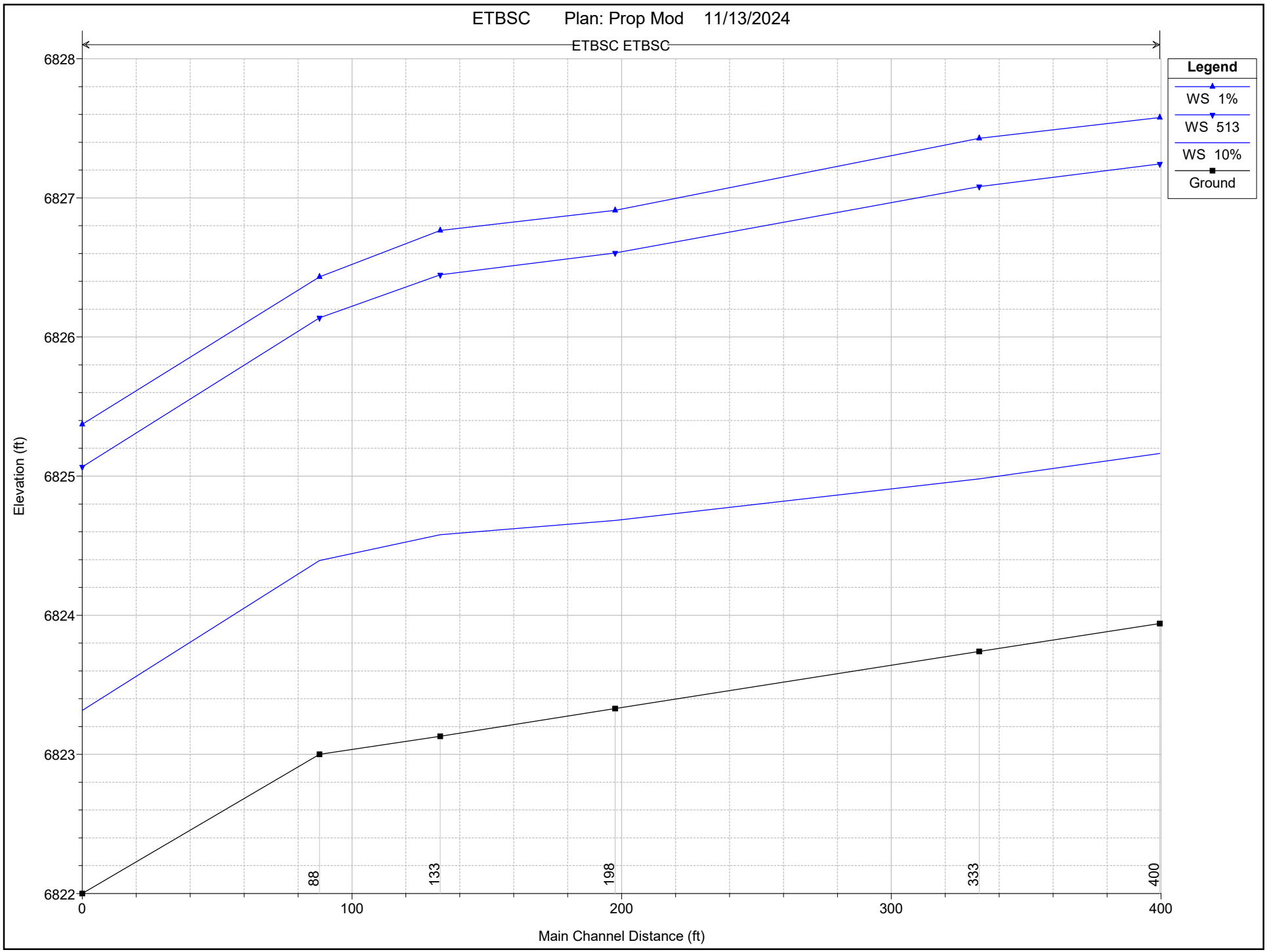
BOX CULVERT PLAN & PROFILE

PROJECT NO. 21604-00CSCV

DRAWING NO.

EX01

SHEET: 1 OF 1


ETBSC Plan: Prop Mod 11/13/2024
ETBSC ETBSC
Legend
WS 1%
WS 513
WS 10%
Ground
Elevation (ft)
6828
6827
6826
6825
6824
6823
6822
0
100
200
300
400
Main Channel Distance (ft)
88
133
198
333
400

HEC-RAS Plan: Prop Mod River: ETBSC Reach: ETBSC

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Vel Total	Flow Area	Top Width
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(ft/s)	(sq ft)	(ft)
ETBSC	400	10%	68.00	6823.94	6825.16	6824.63	6825.23	0.002940	2.11	2.11	32.20	35.74
ETBSC	400	1%	640.00	6823.94	6827.58	6826.52	6828.16	0.005131	6.12	6.12	104.61	50.48
ETBSC	400	513	513.00	6823.94	6827.25	6826.19	6827.70	0.004604	5.42	5.42	94.64	48.50
ETBSC	333	10%	68.00	6823.74	6824.98		6825.04	0.002733	1.92	1.92	35.48	35.89
ETBSC	333	1%	640.00	6823.74	6827.43		6827.75	0.003414	4.60	4.51	141.91	50.92
ETBSC	333	513	513.00	6823.74	6827.08		6827.35	0.003276	4.17	4.12	124.59	48.84
ETBSC	198	10%	68.00	6823.33	6824.68		6824.73	0.001958	1.72	1.72	39.52	36.56
ETBSC	198	1%	640.00	6823.33	6826.91		6827.26	0.003857	4.77	4.69	136.32	50.18
ETBSC	198	513	513.00	6823.33	6826.60		6826.89	0.003566	4.27	4.23	121.21	48.35
ETBSC	133	10%	68.00	6823.13	6824.58		6824.62	0.001478	1.55	1.55	44.00	38.78
ETBSC	133	1%	640.00	6823.13	6826.77		6827.02	0.002794	4.22	3.83	167.06	69.60
ETBSC	133	513	513.00	6823.13	6826.45		6826.67	0.002708	3.87	3.54	144.90	69.60
ETBSC	88	10%	68.00	6823.00	6824.39		6824.46	0.015865	2.03	2.03	33.46	41.17
ETBSC	88	1%	640.00	6823.00	6826.43		6826.76	0.018152	4.59	4.49	142.68	66.01
ETBSC	88	513	513.00	6823.00	6826.14		6826.41	0.017942	4.20	4.15	123.75	62.42
ETBSC	0	10%	68.00	6822.00	6823.32	6822.84	6823.35	0.010008	1.55	1.55	43.77	57.10
ETBSC	0	1%	640.00	6822.00	6825.37	6824.13	6825.56	0.010007	3.44	3.37	189.89	84.97
ETBSC	0	513	513.00	6822.00	6825.07	6823.91	6825.22	0.010002	3.15	3.12	164.48	80.81

Imported Soils Report

These are borings provided from the import site. This doesnt tell us what soils were actually utilized for this site. Please also see stormwater comments regarding the imported soils

UC Health Pavements and Detention Pond

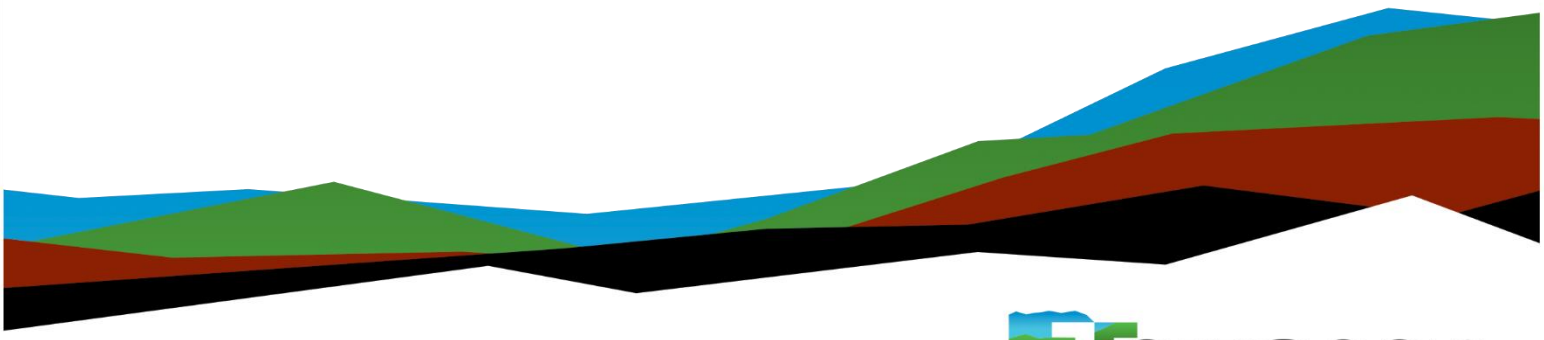
Geotechnical Engineering Report

North of Briargate Parkway and Brainard Drive

May 1, 2024 (Revised May 22, 2024) | Terracon Project No. 23245001

Prepared for:

Kimley-Horn and Associates, Inc.
767 Eustis Street, Suite 100
St. Paul, Minnesota 55114



Terracon
Explore with us

Nationwide
Terracon.com

- Facilities
- Environmental
- Geotechnical
- Materials

Terracon
4172 Center Park Dr
Colorado Springs, CO

Boring Log No. P-4

Model Layer	Graphic Log	Location: See Exploration Plan Latitude: 38.9680° Longitude: -104.7505° Depth (Ft.)	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Swell (%)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL-PL-PI	Percent Fines
1		**FILL - SILTY SAND (SM)**, trace clay and gravel, fine to coarse grained, brown to gray				15-39		12.9	123	NP	23
		4.0									
4		**SANDSTONE**, fine to coarse grained, brown, medium hard to hard, moderate cementation	5			24-50/5"		6.9	128		
						35-40					
						11-20-28 =48					
		10.0	10								
		Boring Terminated at 10 Feet									

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation Reference: Elevations were interpolated from the grading plan prepared by N.E.S Inc. on 4/24/2024

Water Level Observations
None encountered while drilling

Drill Rig
Mobile B-57

Hammer Type
Automatic

Driller
Terracon

Logged by
JP

Boring Started
03-12-2024

Boring Completed
03-12-2024

Notes

Advancement Method
4-inch diameter, soild-stem, continuous-flight power auger

Abandonment Method
Boring backfilled with Auger Cuttings and/or Bentonite

Terracon
4172 Center Park Dr
Colorado Springs, CO

Boring Log No. P-5

Model Layer	Graphic Log	Location: See Exploration Plan Latitude: 38.9686° Longitude: -104.7491° Depth (Ft.)	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Swell (%)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL-PL-PI	Percent Fines
1		**FILL - SILTY SAND (SM)**, trace clay and gravel, fine to coarse grained, brown to gray 2.0									
2		**SILTY SAND (SM)**, trace clay and gravel, fine to coarse grained, brown to tan, loose to medium dense				8-20				NP	24
			5			7-7		12.6	112		
		CLAYEY SAND (SC), fine to coarse grained, gray, loose to medium dense 7.0				4-3					
			10			6-11		13.2	103		
		Boring Terminated at 10 Feet									

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation Reference: Elevations were interpolated from the grading plan prepared by N.E.S Inc. on 4/24/2024

Water Level Observations
None encountered while drilling

Drill Rig
CME-55

Hammer Type
Automatic

Driller
Terracon

Logged by
JP

Boring Started
03-07-2024

Boring Completed
03-07-2024

Notes

Advancement Method
4-inch diameter, soild-stem, continuous-flight power auger

Abandonment Method
Boring backfilled with Auger Cuttings and/or Bentonite

Terracon
4172 Center Park Dr
Colorado Springs, CO

Boring Log No. P-6

Model Layer	Graphic Log	Location: See Exploration Plan Latitude: 38.9678° Longitude: -104.7505° Depth (Ft.)	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Swell (%)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL-PL-PI	Percent Fines
2		**SILTY SAND (SM)**, fine to coarse grained, brown to light brown, medium dense				6-17		6.6	119	NP	13
			5			14-25					
						12-24		9.3	96		
3		9.0 **SANDY LEAN CLAY (CL)**, dark gray to gray, stiff 10.0				7-7					
		Boring Terminated at 10 Feet	10								

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation Reference: Elevations were interpolated from the grading plan prepared by N.E.S Inc. on 4/24/2024

Water Level Observations
None encountered while drilling

Drill Rig
Mobile B-57

Hammer Type
Automatic

Driller
Terracon

Logged by
JP

Boring Started
03-12-2024

Boring Completed
03-12-2024

Notes

Advancement Method
4-inch diameter, soild-stem, continuous-flight power auger

Abandonment Method
Boring backfilled with Auger Cuttings and/or Bentonite

Terracon
4172 Center Park Dr
Colorado Springs, CO

Boring Log No. I-1

Model Layer	Graphic Log	Location: See Exploration Plan Latitude: 38.9671° Longitude: -104.7505° Depth (Ft.)	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Swell (%)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL-PL-PI	Percent Fines
1		**FILL - SILTY SAND (SM)**, trace clay, fine to coarse grained, brown to dark brown									
						13-21		13.3	115	NP	14
						12-20					
			5								
		7.0									
4		**SANDSTONE**, fine to coarse grained, brown to gray, firm to hard, moderate cementation									
						16-30		6.3	133		
						30-50/5"					
		10.0	10								
		Boring Terminated at 10 Feet									

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation Reference: Elevations were interpolated from the grading plan prepared by N.E.S Inc. on 4/24/2024

Water Level Observations
None encountered while drilling

Drill Rig
Mobile B-57

Hammer Type
Automatic

Driller
Terracon

Logged by
JP

Boring Started
03-12-2024

Boring Completed
03-12-2024

Notes

Advancement Method
6-inch diameter, hollow-stem, continuous-flight power auger

Abandonment Method
6 inch diameter piezometer installed with 10 feet of soild riser pipe, with screen and gravel at the bottom

Terracon
4172 Center Park Dr
Colorado Springs, CO

Boring Log No. I-2

Model Layer	Graphic Log	Location: See Exploration Plan Latitude: 38.9665° Longitude: -104.7504° Depth (Ft.)	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Swell (%)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL-PL-PI	Percent Fines
2		**SILTY SAND (SM)**, trace gravel, fine to coarse grained, dark brown, loose				10-8		5.8	119	NP	21
						4-4		8.8	111		
		5.0 ***Boring Terminated at 5 Feet***	5								

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation Reference: Elevations were interpolated from the grading plan prepared by N.E.S Inc. on 4/24/2024

Water Level Observations
None encountered while drilling

Drill Rig
Mobile B-57

Hammer Type
Automatic

Driller
Terracon

Logged by
JP

Boring Started
03-12-2024

Boring Completed
03-12-2024

Notes

Advancement Method
6-inch diameter, hollow-stem, continuous-flight power auger

Abandonment Method
6 inch diameter piezometer installed with 5 feet of soild riser pipe, with screen and gravel at the bottom

Infiltration Report

ENTECH
ENGINEERING, INC.
505 ELKTON DRIVE
COLORADO SPRINGS, CO 80907
PHONE (719) 531-5599

November 5, 2025

PT Falcon Field, LLC
1864 Woodmoor Drive, Suite 100
Monument, Colorado 80132

Attn: Steve Rossoll

Re: Geotechnical Report – Infiltration Rate Testing
The Commons at Falcon Field – Infiltration Basin
El Paso County, Colorado
Entech Job No. 240260

Dear Mr. Rossoll:

Personnel of Entech Engineering, Inc. (Entech) drilled three borings and installed temporary piezometers designated (P-22 through P-24) to depths of 15 to 20 feet. In addition, nine shallow borings for infiltration/percolation testing designated (P1 through P9) were drilled in the area of the piezometers. The investigation was performed to evaluate the proposed infiltration basin for the proposed dewatering system. This letter presents the results of our soils investigation, infiltration testing, and laboratory testing for the proposed project.

Field Investigation and Laboratory Testing Program:

The test borings were advanced with a power-driven, continuous flight auger drill rig. Samples were obtained during drilling using the standard penetration test (ASTM D1586) utilizing a 2-inch O.D. split-barrel California sampler. Results of the standard penetration tests are shown on the Test Boring Logs included in Appendix A.

Moisture content (ASTM D2216) was obtained in the laboratory for all recovered samples. Grain size (ASTM D422) and Atterberg limits (ASTM D4318) were determined on samples for the purpose of classification and to obtain pertinent engineering characteristics. One-dimensional swell or collapse testing were performed on selected samples to evaluate the expansion/compression characteristics of the soils. Laboratory test results are included in Appendix B. Percolation testing and adjusted infiltration rates are included in Appendix C.

Soil and Groundwater Conditions:

Three general soil types were encountered during drilling. The soils were classified using the Unified Soil Classification System (USCS).

Soil Type 1 classified as clayey to silty sand (SC, SM). The clayey to silty sand was encountered in P-22 and P-24 at the ground surface and extended to a depths of 9 to 12 feet below ground surface (bgs).

Soil Type 2 classified as sandy clay (CL). The clay was encountered in P-23 at the existing surface grade and extended to 6 feet bgs.

Soil Type 3 classified as highly weathered sandstone or a very dense clayey sand when classified as a soil (SC). The sandstone was encountered in the borings at 6 to 12 feet bgs and extended to the termination of the borings (15 to 20 feet).

Additional descriptions and engineering properties of the soil encountered during drilling are included on the boring logs. Laboratory testing results are presented in Appendix B. It should be understood that the soil descriptions reported on the boring logs may vary between boring locations and sample depths. Similarly, the lines of stratigraphic separation shown on the boring logs represent approximate boundaries between soil types and the actual transitions between types may be more gradual or variable.

Groundwater was encountered in all of the borings at depths ranging from the existing surface grade to 6.8 to 6.9 feet bgs subsequent to drilling.

Infiltration Testing Results (Percolation Test Method):

P1 through P9 were placed in the area of P-22 through P-24 to the south of The Commons at Falcon Field. The testing was completed at approximate depths ranging from 12 to 48 inches below the existing surface. The adjusting infiltration rates obtained from P1 through P9 are presented in Exhibit 1 below.

Exhibit 1: Adjusted Infiltration Rates

Percolation Test No.	Percolation Rate (min./in.)	Adjusted Infiltration Rate (in./hr.)
P1	80	0.085
P2	120	0.049
P3	80	0.130
P4	120	0.087
P5	80	0.232
P6	34	0.423
P7	16	0.712
P8	40	0.263
P9	30	0.607

The higher infiltration rates were measured in the shallower test locations in P5 through P9. The infiltration basin for the drain outfall should be located in the area of P5 through P9. The field should be installed at a depth of 18 to 24 inches. An infiltration rate of 0.45 in/hr can be used to size the field. Cover ca be places over the field as required. The surface grading around the field should direct surface water around the basin.

Closing:

In the event that the project scope changes, the conclusions and recommendations in this report should not be considered valid unless the changes are reviewed and the conclusions of this report are verified in writing or, if necessary, modified. This report has been prepared for the site at Waterbury Phase I for application to the proposed development and underdrain in accordance with generally accepted soil and foundation engineering practices. No other warranty, expressed or implied, is made.

Respectfully Submitted,

ENTECH ENGINEERING, INC.

Logan L. Langford, P.G.
Sr. Geologist

Reviewed by:

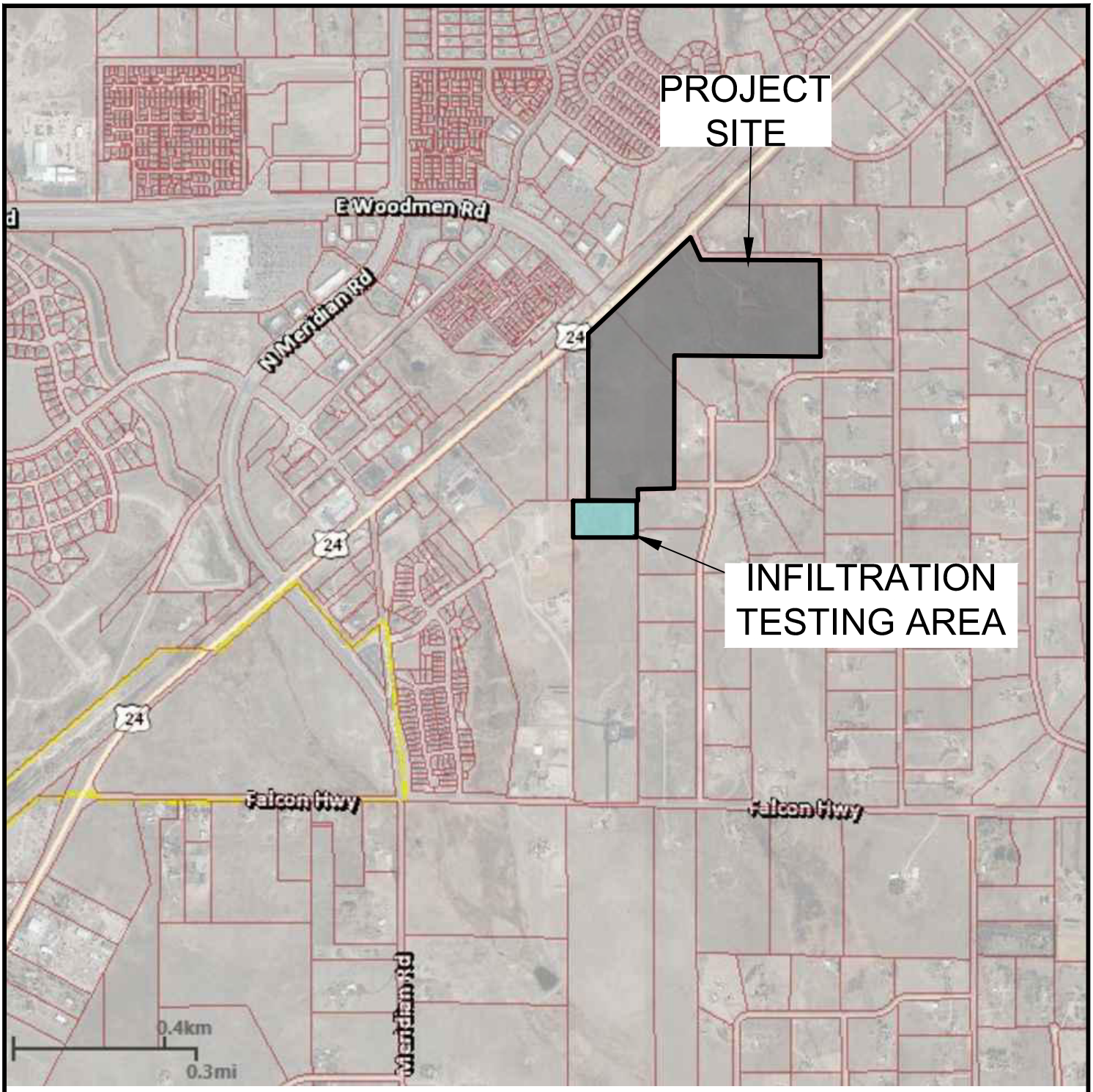


Joseph C. Goode, Jr., P.E.
President

Encl.

LLL:JCG
F:\AA Projects\2024\240260-PT Falcon Field, LLC-The Commons at Falcon Field-Geotech\09-Reports\Infiltration Basin\240260 gr-infiltration.docx

FIGURES



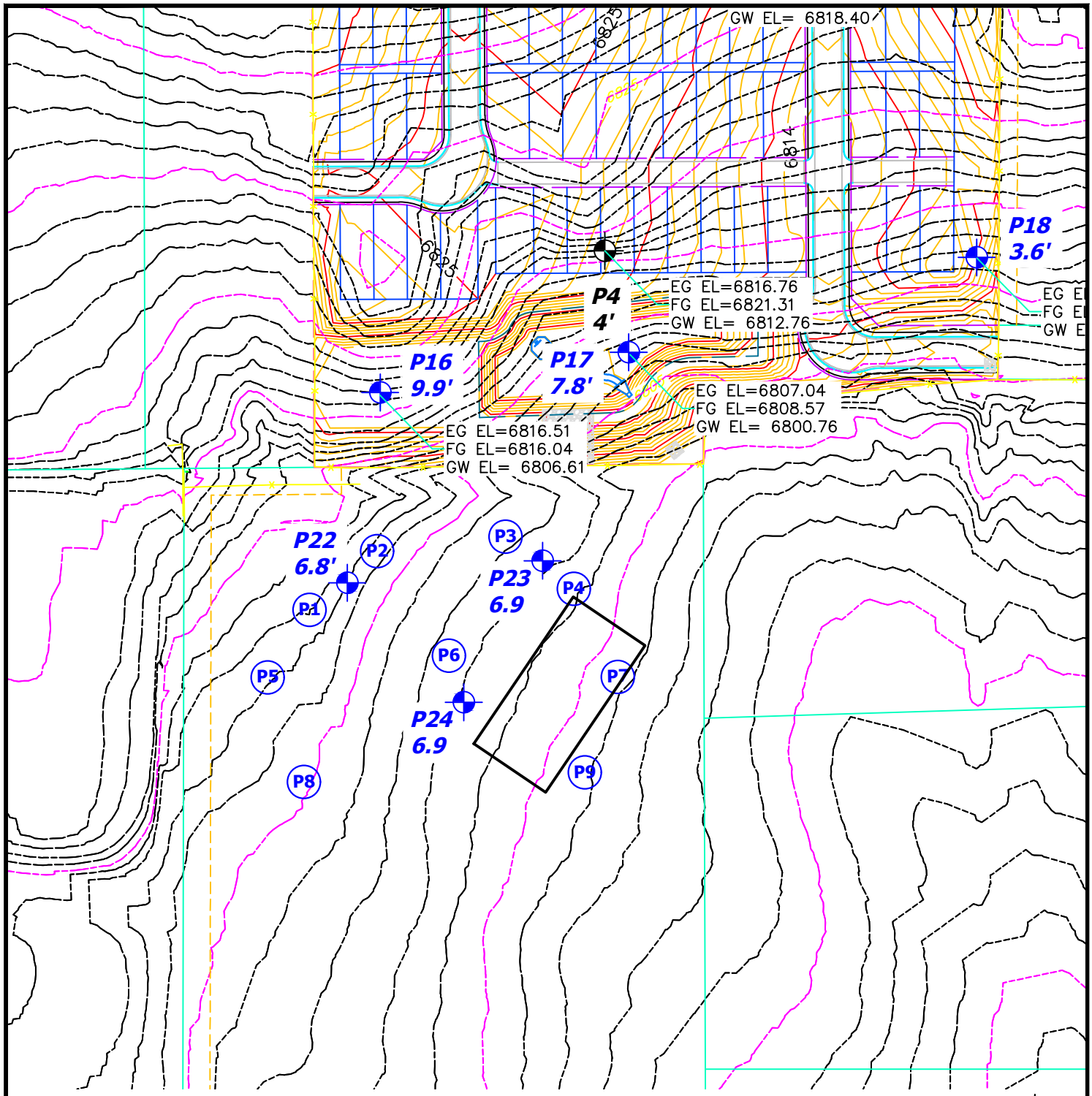
ENTECH ENGINEERING, INC.

VICINITY MAP

THE COMMONS AT FALCON FIELD FILING NO. 1
PT FALCON FIELD, LLC

JOB NO. 240260

FIG. 1



P- APPROXIMATE PIEZOMETER LOCATION AND NUMBER

P2 - APPROXIMATE PERCOLATION TEST LOCATION AND NUMBER

ENTECH ENGINEERING, INC.

SITE AND EXPLORATION PLAN

THE COMMONS AT FALCON FIELD FILING NO. 1
PT FALCON FIELD, LLC

JOB NO.
240260

FIG. 2

APPENDIX A: Test Boring Logs

TEST BORING P-22
DATE DRILLED 7/2/2025

REMARKS

WATER @ 10', 7/2/25

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
			17	2.5	
5			21	7.8	
10			50	13.7	
15			50 7"	13.4	
20			50 6"	14.8	

SAND, SILTY, BROWN to LIGHT BROWN, MEDIUM DENSE, DRY to MOIST

SANDSTONE, VERY WEAK, GRAY, HIGHTLY WEATHERED (SAND, CLAYEY, VERY DENSE, MOIST)

TEST BORING P-23
DATE DRILLED 7/2/2025

REMARKS

WATER @ 6', 7/2/25

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
			17	14.9	
5			19	21.1	
10			50 10"	18.8	
15			50 7"	16.6	
20			50 8"	20.3	

CLAY, SANDY, GRAY, VERY STIFF, MOIST

SANDSTONE, VERY WEAK, GRAY, HIGHTLY WEATHERED (SAND, CLAYEY, VERY DENSE, MOIST)

ENTECH ENGINEERING, INC.

TEST BORING LOGS

THE COMMONS AT FALCON FIELD
PT FALCON FIELD

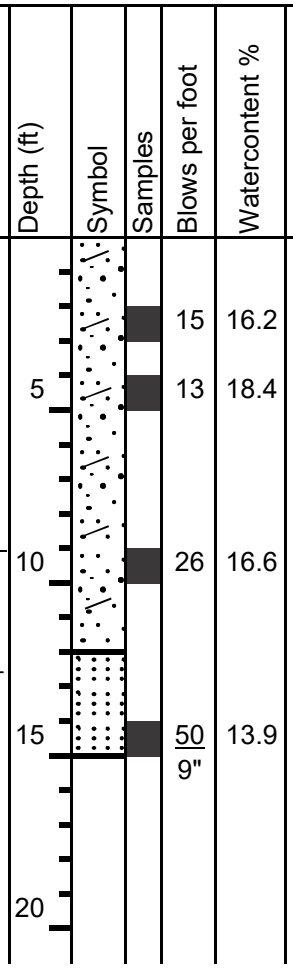
JOB NO. 240260

FIG. B-1

TEST BORING P-24
DATE DRILLED 8/20/2025

REMARKS

WATER @ 9', 8/20/25



ENTECH ENGINEERING, INC.

TEST BORING LOGS

THE COMMONS AT FALCON FIELD
PT FALCON FIELD

JOB NO. 240260

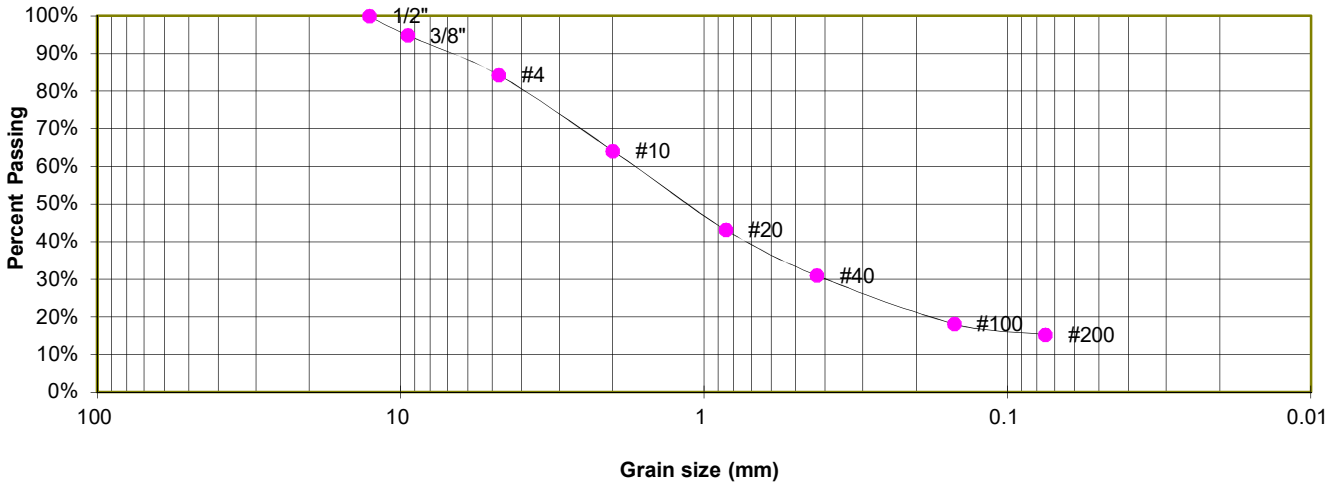
FIG. A-2

APPENDIX B: Laboratory Testing Results

TABLE B-1
SUMMARY OF LABORATORY TEST RESULTS

SOIL TYPE	TEST BORING NO.	DEPTH (FT)	WATER (%)	DRY DENSITY (PCF)	PASSING NO. 200 SIEVE (%)	SWELL/ CONSOL (%)	USCS	SOIL DESCRIPTION
1	P-22	2-3			15.3		SM	SAND, SILTY
1	P-22	5			14.6		SM	SAND, SILTY
1	P-24	2-3			40.8		SC	SAND, CLAYEY
2	P-23	2-3	17.2	89.6	64.6	-1.3	CL	CLAY, SANDY

TEST BORING	P-22	SOIL DESCRIPTION	SAND, SILTY
DEPTH (FT)	2-3	SOIL TYPE	1



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	100.0%
3/8"	94.8%
4	84.3%
10	64.1%
20	43.2%
40	31.0%
100	18.2%
200	15.3%

SOIL CLASSIFICATION

USCS CLASSIFICATION: SM

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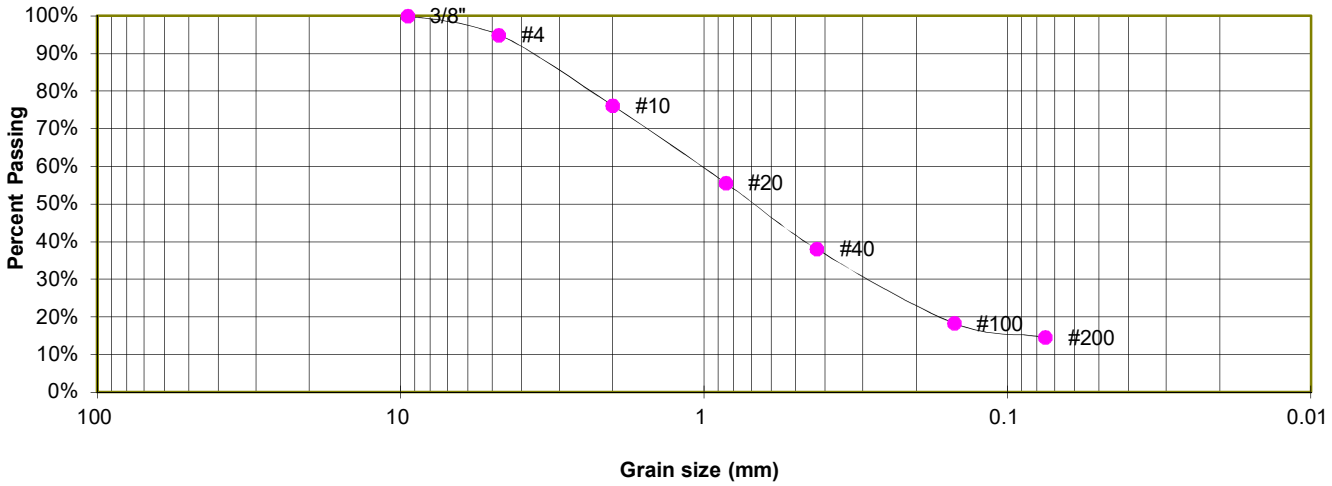
LABORATORY TEST RESULTS

THE COMMONS AT FALCON FIELD
PT FALCON FIELD

JOB NO. 240260

FIG. B-1

TEST BORING	P-22	SOIL DESCRIPTION	SAND, SILTY
DEPTH (FT)	5	SOIL TYPE	1



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	94.9%
10	76.1%
20	55.6%
40	38.0%
100	18.4%
200	14.6%

SOIL CLASSIFICATION

USCS CLASSIFICATION: SM

ENTECH ENGINEERING, INC.

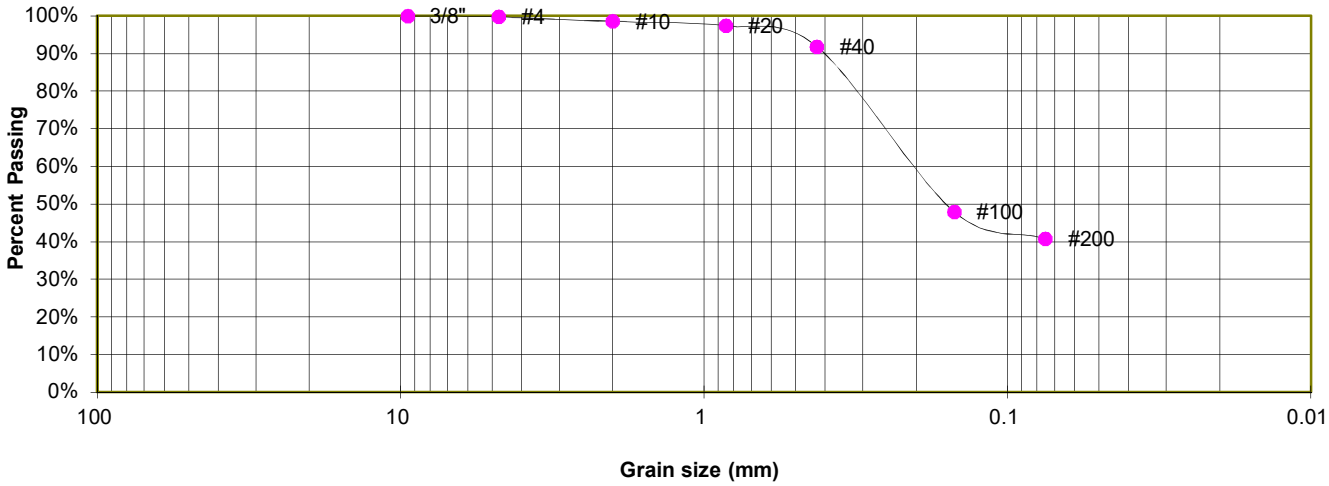
LABORATORY TEST RESULTS

THE COMMONS AT FALCON FIELD
PT FALCON FIELD

JOB NO. 240260

FIG. B-2

TEST BORING	P-24	SOIL DESCRIPTION	SAND, CLAYEY
DEPTH (FT)	2-3	SOIL TYPE	1



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	99.7%
10	98.5%
20	97.4%
40	91.9%
100	48.0%
200	40.8%

SOIL CLASSIFICATION

USCS CLASSIFICATION: SC

ENTECH ENGINEERING, INC.

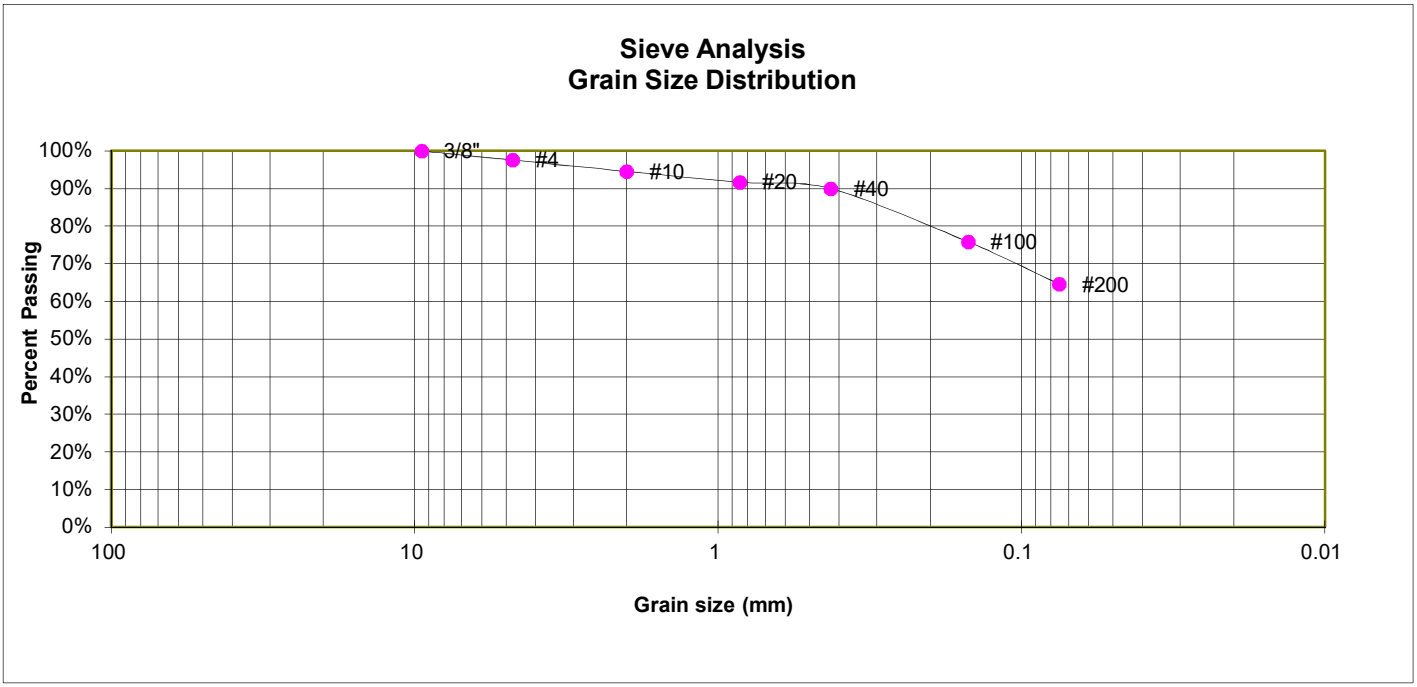
LABORATORY TEST RESULTS

THE COMMONS AT FALCON FIELD
PT FALCON FIELD

JOB NO. 240260

FIG. B-3

TEST BORING	P-23	SOIL DESCRIPTION	CLAY, SANDY
DEPTH (FT)	2-3	SOIL TYPE	2



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	97.6%
10	94.6%
20	91.7%
40	89.9%
100	75.9%
200	64.6%

SOIL CLASSIFICATION

USCS CLASSIFICATION: CL

ENTECH ENGINEERING, INC.

LABORATORY TEST RESULTS

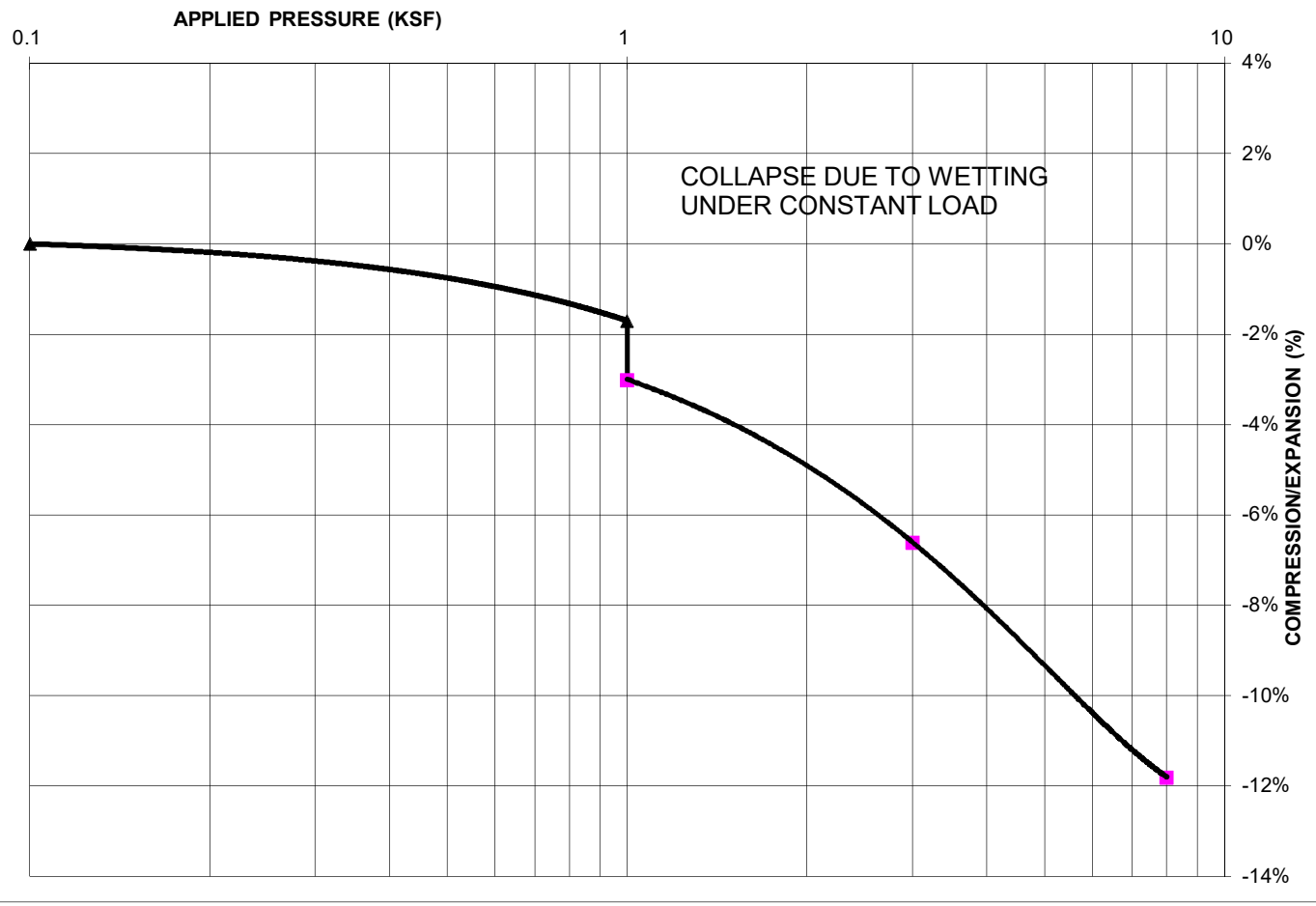
THE COMMONS AT FALCON FIELD
PT FALCON FIELD

JOB NO. 240260

FIG. B-4

TEST BORING	P-23	SOIL DESCRIPTION	CLAY, SANDY
DEPTH (FT)	2-3	SOIL TYPE	2

SWELL CONSOLIDATION



SWELL/COLLAPSE TEST RESULTS

NATURAL UNIT DRY WEIGHT (PCF): 90
NATURAL MOISTURE CONTENT: 17.2%
SWELL/COLLAPSE (%): -1.3%

ENTECH ENGINEERING, INC.

SWELL TEST RESULTS

THE COMMONS AT FALCON FIELD
PT FALCON FIELD

JOB NO. 240260

FIG. B-5

APPENDIX C: Infiltration Rate (Percolation Test Method)

Client: PT Falcon Field, LLC Job Number: 240260
Test Location: The Commons at Falcon Field

PERCOLATION HOLES P-22

Date Holes Prepared: 7/2/2025

Hole No. 1
Depth: 34"

Trial	Time (min.)	Water Level Change (in.)
1	10	1/8
2	10	1/8
3	10	1/8

Perc Rate (min./in.): 80

Hole No. 2
Depth: 50"

Trial	Time (min.)	Water Level Change (in.)
1	10	1/8
2	10	0
3	10	1/8

Perc Rate (min./in.): 120

Average Perc Rate (min./in.) 100

PROFILE HOLE

Date Profile Hole Completed: 7/2/2025

Depth	Visual Classification	Remarks
0-9'	Sand, silty, brown	
9-20'	Sandstone, clayey, gray	Sandstone Bedrock at 9' Groundwater at 10'

17 Blows / ft. @ 2'
21 Blows / ft. @ 4'
50 Blows / ft. @ 9'

Observer: L. Langford By:

ENTECH ENGINEERING, INC.

PERCOLATION TEST RESULTS

JOB NO. 240260

FIG. C-1

Client: PT Falcon Field, LLC Job Number: 240260
Test Location: The Commons at Falcon Field

Infiltration Rate (I) = Percolation Rate (P)/ Reduction Factor(R_F)
$I=P/R_F$

$R_f = [(2d_1 - \Delta d) / dia] + 1$

d_1 = initial water depth (in.)

Δd = final water level drop (in.)

dia = diameter of the percolation hole (in.)

Test No. P1 (P-22)			**Test No. P2 (P-22)**		
Perc Rate	0.75	in/hr	Perc Rate	0.50	in/hr
diameter	8		diameter	8	
P1	(inches)		**P2**	(inches)	
d_1 =	31.3		d_1 =	37.1	
Δd =	0.13		Δd =	0.13	
R_f =	8.8		R_f =	10.3	
I =	**0.085**	**in/hr**	**I =**	**0.049**	**in/hr**

I_{AVG}= 0.067 in/hr

ENTECH ENGINEERING, INC.

INFILTRATION TEST RESULTS

JOB NO. 240260

FIG. C-2

Client: PT Falcon Field, LLC Job Number: 240260
Test Location: The Commons at Falcon Field

PERCOLATION HOLES P-23

Date Holes Prepared: 7/2/2025

Hole No. 3
Depth: 29"

Trial	Time (min.)	Water Level Change (in.)
1	10	1/8
2	10	1/8
3	10	1/8

Perc Rate (min./in.): 80

Hole No. 4
Depth: 48"

Trial	Time (min.)	Water Level Change (in.)
1	10	0
2	10	1/8
3	10	1/8

Perc Rate (min./in.): 120

Average Perc Rate (min./in.) 100

PROFILE HOLE

Date Profile Hole Completed: 7/2/2025

Depth	Visual Classification	Remarks
0-6'	Clay, sandy, gray	
6-20'	Sandstone, clayey, gray	Sandstone Bedrock at 6' Groundwater at 6'

17 Blows / ft. @ 2'
19 Blows / ft. @ 4'
20 Blows / 10" @ 9'

Observer: L. Langford By:

ENTECH ENGINEERING, INC.

PERCOLATION TEST RESULTS

JOB NO. 240260

FIG. C-3

Client: PT Falcon Field, LLC Job Number: 240260
Test Location: The Commons at Falcon Field

Infiltration Rate (I) = Percolation Rate (P)/ Reduction Factor(R_F)
$I=P/R_F$

$R_f = [(2d_1 - \Delta d) / dia] + 1$

d_1 = initial water depth (in.)

Δd = final water level drop (in.)

dia = diameter of the percolation hole (in.)

Test No. P3 (P-23)			**Test No. P4 (P-23)**		
Perc Rate	0.75	in/hr	Perc Rate	0.50	in/hr
diameter	8		diameter	8	
P1	(inches)		**P2**	(inches)	
d_1 =	19.1		d_1 =	41.5	
Δd =	0.13		Δd =	0.13	
R_f =	5.8		R_f =	11.4	
I =	**0.130**	**in/hr**	**I =**	**0.044**	**in/hr**

I_{AVG}= 0.087 in/hr

ENTECH ENGINEERING, INC.

INFILTRATION TEST RESULTS

JOB NO. 240260

FIG. C-4

Client: PT Falcon Field, LLC Job Number: 240260
Test Location: The Commons at Falcon Field

PERCOLATION HOLES P-24

Date Testing Complet 9/3/2025

Hole No. 5
Depth: 31"

Trial	Time (min.)	Water Level Change (in.)
1	10	0
2	10	1/4
3	10	1/8

Perc Rate (min./in.): 80

Hole No. 6
Depth: 24"

Trial	Time (min.)	Water Level Change (in.)
1	10	3/8
2	10	3/8
3	10	1/8

Perc Rate (min./in.): 34

Hole No. 7
Depth: 32"

Trial	Time (min.)	Water Level Change (in.)
1	10	5/8
2	10	3/4
3	10	1/2

Perc Rate (min./in.): 16

Hole No. 8
Depth: 31"

Trial	Time (min.)	Water Level Change (in.)
1	10	5/8
2	10	1/8
3	10	0

Perc Rate (min./in.): 40

Hole No. 9
Depth: 22"

Trial	Time (min.)	Water Level Change (in.)
1	10	1/2
2	10	3/8
3	10	1/8

Perc Rate (min./in.): 30

PROFILE HOLE

Date Profile Hole Completed: 8/31/2025

Depth	Visual Classification	Remarks
0-12'	Sand, clayey, gray to brown	
12-15'	Sandstone, clayey, green-gray	Sandstone Bedrock at 12'
		Groundwater at 9'

17 Blows / ft. @ 2'
21 Blows / ft. @ 4'
50 Blows / ft. @ 9'

Observer: P. Kent By:

ENTECH ENGINEERING, INC.

PERCOLATION TEST RESULTS

JOB NO. 241962

FIG. C-5

Client: PT Falcon Field, LLC Job Number: 240260
Test Location: The Commons at Falcon Field

Infiltration Rate (I) = Percolation Rate (P)/ Reduction Factor(R_F)
$I=P/R_F$

$R_f = [(2d_1 - \Delta d) / dia] + 1$

d_1 = initial water depth (in.)

Δd = final water level drop (in.)
dia = diameter of the percolation hole (in.)

Test No. P5 (P24)

Perc Rate	0.75	in/hr
diameter	8	
P1	(inches)	
d_1 =	9.0	
Δd =	0.13	
R_f =	3.2	
I =	**0.232**	**in/hr**

Test No. P6 (P-24)

Perc Rate	1.75	in/hr
diameter	8	
P2	(inches)	
d_1 =	12.6	
Δd =	0.13	
R_f =	4.1	
I =	**0.423**	**in/hr**

Test No. P7 (P-24)

Perc Rate	3.75	in/hr
diameter	8	
P2	(inches)	
d_1 =	17.1	
Δd =	0.13	
R_f =	5.3	
I =	**0.712**	**in/hr**

Test No. P8 (P24)

Perc Rate	1.50	in/hr
diameter	8	
P1	(inches)	
d_1 =	18.9	
Δd =	0.13	
R_f =	5.7	
I =	**0.263**	**in/hr**

Test No. P9 (P-24)

Perc Rate	2.00	in/hr
diameter	8	
P2	(inches)	
d_1 =	9.3	
Δd =	0.13	
R_f =	3.3	
I =	**0.607**	**in/hr**

I_{AVG}= 0.447 in/hr

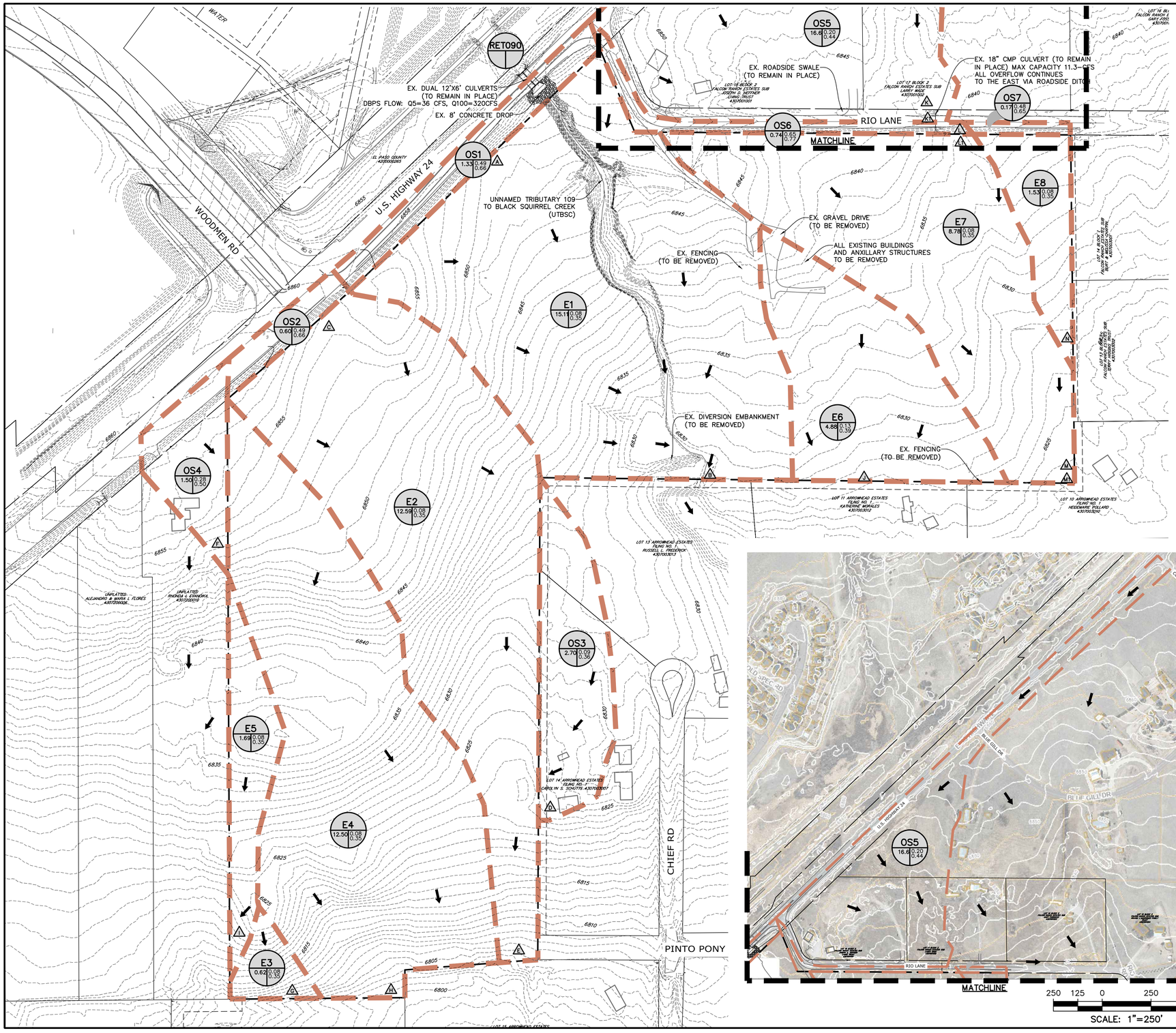
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INFILTRATION TEST RESULTS

JOB NO. 240644

FIG. C-6

Drainage Maps



BASIN & DESIGN POINT SUMMARY				
BASIN	DP	AREA (AC)	Q5 (cfs)	Q100 (cfs)
OS1	A	1.33	3.4	7.5
E1		15.11	3.4	24.0
RET090 (DBPS)		0.00	36.0	320.0
DPA+E1+RET090	B	16.44	41.1	347.9
OS2	C	0.60	1.4	3.2
OS3	D	2.70	0.7	4.7
E2		12.59	2.4	17.3
DPC+DPD+E2	E	15.88	3.6	22.6
OS4	F	1.50	1.5	4.5
E3	G	0.62	0.2	1.4
E4		12.50	2.4	17.9
DPF+E4	H	14.00	3.5	20.9
E5	I	1.69	0.4	2.7
E6	J	4.88	2.0	10.1
OS5	K	16.62	7.8	28.2
OS5 @ 18" culvert (max capacity)	K1	0.00	7.8	11.3
OS6	L	0.74	2.5	5.0
DPK1+DPL	L1	0.00	10.2	16.3
E7		8.78	1.5	10.9
DPL+E7	M	9.51	2.5	12.9
DPM+DPK1	M1	0.00	10.3	24.2
OS7		0.17	0.4	0.9
E8		1.53	0.4	3.1
OS7+E8	N	1.70	0.7	3.8

120 60 0 120 240
SCALE: 1"=120'

LEGEND

- EX. MINOR CONTOUR
- 6800 EX. MAJOR CONTOUR
- EX. FENCE LINE
- ST EX. STORM DRAIN
- BASIN BOUNDARY
- FLOW DIRECTION
- DESIGN POINT
- AREA (ACRE) — E5 5.91 0.12 0.38 — BASIN, C5, C100

PREPARED BY:

DREXEL, BARRELL & CO.
Engineers • Surveyors
101 SAHWATCH STREET, STE #100
COLORADO SPGS, COLORADO 80903
CONTACT: TIM D. McCONNELL, P.E.
(719)260-0887
COLORADO SPRINGS • LAFAYETTE

CLIENT:

PROTERRA
PROPERTIES

1864 WOODMOOR DR
MONUMENT, CO 80132
(719) 476-0800
CONTACT: STEVE ROSSOLL

DRAINAGE PLANS FOR
THE COMMONS AT FALCON FIELD
FILING NO. 1
12445 RIO LANE, AND VACANT LAND
PEYTON, EL PASO COUNTY, COLORADO

ISSUE	DATE
INITIAL ISSUE	10/1/24
RESUBMITTAL	4/2/26

DESIGNED BY:	TDM
DRAWN BY:	CGH
CHECKED BY:	KGV
FILE NAME:	21604-00F1-EXDR

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

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

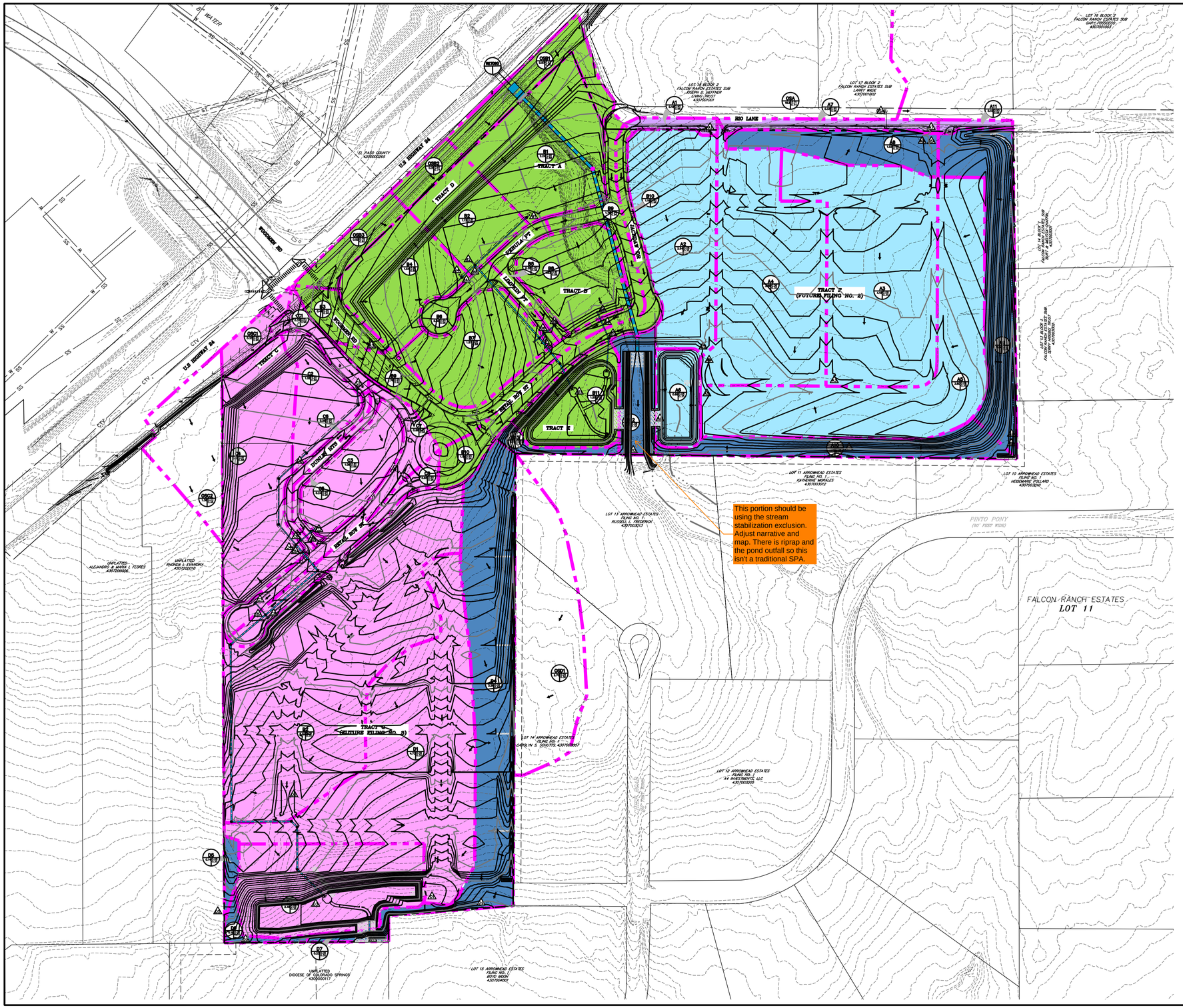
OVERALL
EXISTING
DRAINAGE MAP

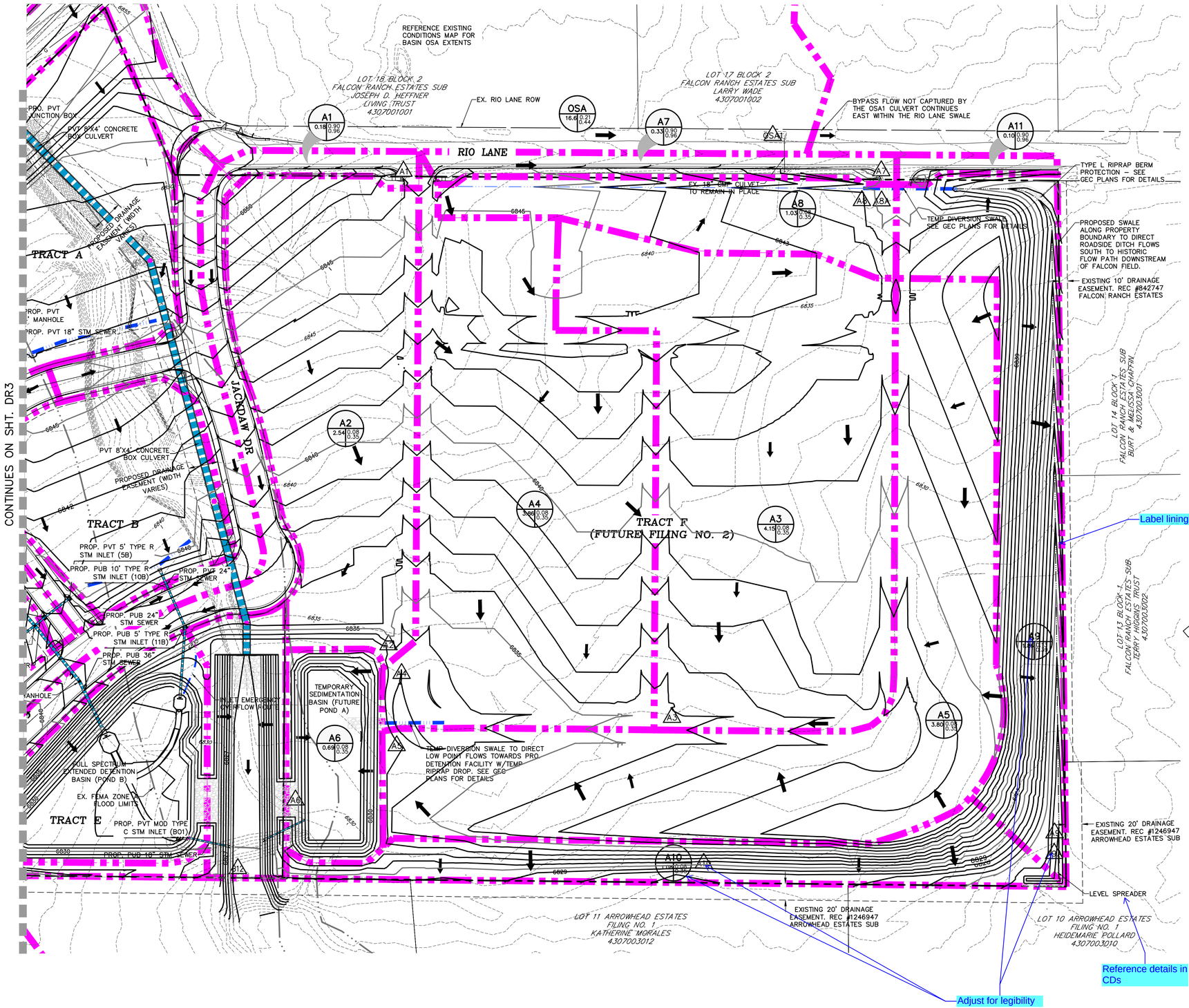
PROJECT NO. 21604-00CSCV

DRAWING NO.

EDR1

SHEET: 1 OF 5


RIO LANE
TRACT A
TRACT B
TRACT C
TRACT D
TRACT E
TRACT F
TRACT G
TRACT H
TRACT I
TRACT J
TRACT K
TRACT L
TRACT M
TRACT N
TRACT O
TRACT P
TRACT Q
TRACT R
TRACT S
TRACT T
TRACT U
TRACT V
TRACT W
TRACT X
TRACT Y
TRACT Z
TRACT AA
TRACT BB
TRACT CC
TRACT DD
TRACT EE
TRACT FF
TRACT GG
TRACT HH
TRACT II
TRACT JJ
TRACT KK
TRACT LL
TRACT MM
TRACT NN
TRACT OO
TRACT PP
TRACT QQ
TRACT RR
TRACT SS
TRACT TT
TRACT UU
TRACT VV
TRACT WW
TRACT XX
TRACT YY
TRACT ZZ
TRACT AAA
TRACT BBB
TRACT CCC
TRACT DDD
TRACT EEE
TRACT FFF
TRACT GGG
TRACT HHH
TRACT III
TRACT JJJ
TRACT KKK
TRACT LLL
TRACT MMM
TRACT NNN
TRACT OOO
TRACT PPP
TRACT QQQ
TRACT RRR
TRACT SSS
TRACT TTT
TRACT UUU
TRACT VVV
TRACT WWW
TRACT XXX
TRACT YYY
TRACT ZZZ
TRACT AAAA
TRACT BBBB
TRACT CCCC
TRACT DDDD
TRACT EEEE
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TRACT HHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
TRACT IIIIIIIIIIIIIIIIIIIIIIIIIIIIII
TRACT JJJJJJJJJJJJJJJJJJJJJJJJJJJJJJ
TRACT KKKKKKKKKKKKKKKKKKKKKKKKKKKKKK
TRACT LLLLLLLLLLLLLLLLLLLLLLLLLLLLLL
TRACT MMMMMMMMMMMMMMMMMMMMMMMMMMMMMM
TRACT NNNNNNNNNNNNNNNNNNNNNNNNNNNNNN
TRACT OOOOOOOOOOOOOOOOOOOOOOOOOOOOOO
TRACT PPPPPPPPPPPPPPPPPPPPPPPPPPPPPP
TRACT QQQQQQQQQQQQQQQQQQQQQQQQQQQQQQ
TRACT RRRRRRRRRRRRRRRRRRRRRRRRRRRRRR
TRACT SSSSSSSSSSSSSSSSSSSSSSSSSSSSSS
TRACT TTTTTTTTTTTTTTTTTTTTTTTTTTTTTT
TRACT UUUUUUUUUUUUUUUUUUUUUUUUUUUUUU
TRACT VVVVVVVVVVVVVVVVVVVVVVVV


REFERENCE EXISTING CONDITIONS MAP FOR BASIN OSA EXTENTS
LOT 18 BLOCK 2 FALCON RANCH ESTATES SUB JOSEPH D. HEFFNER LIVING TRUST 4307001001
LOT 17 BLOCK 2 FALCON RANCH ESTATES SUB LARRY WADE 4307001002
EX. RIO LANE ROW
BYPASS FLOW NOT CAPTURED BY THE OSA1 CULVERT CONTINUES EAST WITHIN THE RIO LANE SWALE
RIO LANE
EX. 18" CMP CULVERT TO REMAIN IN PLACE
TYPE L RIPRAP BERM PROTECTION – SEE GEC PLANS FOR DETAILS
TEMP. DIVERSION SWALE SEE GEC PLANS FOR DETAILS
PROPOSED SWALE ALONG PROPERTY BOUNDARY TO DIRECT ROADSIDE DITCH FLOWS SOUTH TO HISTORIC FLOW PATH DOWNSTREAM OF FALCON FIELD.
EXISTING 10' DRAINAGE EASEMENT. REC #842747 FALCON RANCH ESTATES
PRO. PVT JUNCTION BOX
PVT 8'X4' CONCRETE BOX CULVERT
PROPOSED DRAINAGE EASEMENT (WIDTH VARIES)
TRACT A
PROP. PVT MANHOLE
PROP. PVT 18" STM SEWER
JACKDAW DR
CONTINUES ON SHT. DR3
PVT 8'X4' CONCRETE BOX CULVERT
PROPOSED DRAINAGE EASEMENT (WIDTH VARIES)
TRACT B
PROP. PVT 5' TYPE R STM INLET (5B)
PROP. PUB 10' TYPE R STM INLET (10B)
PROP. PVT 24" STM SEWER
PROP. PUB 24" STM SEWER
PROP. PUB 5' TYPE R STM INLET (11B)
PROP. PUB 36" STM SEWER
MANHOLE
INLET EMERGENCY OVERFLOW RIPRAP
TEMPORARY SEDIMENTATION BASIN (FUTURE POND A)
FULL SPECTRUM EXTENDED DETENTION BASIN (POND B)
EX. FEMA ZONE "A" FLOOD LIMITS
TRACT E
PROP. PVT MOD TYPE C STM INLET (B01)
PROP. PUB 18" STM SEWER
TRACT F (FUTURE FILING NO. 2)
TEMP. DIVERSION SWALE TO DIRECT LOW POINT FLOWS TOWARDS PRO. DETENTION FACILITY W/TEMP. RIPRAP DROP. SEE GEC PLANS FOR DETAILS
EXISTING 20' DRAINAGE EASEMENT. REC #1246947 ARROWHEAD ESTATES SUB
LEVEL SPREADER
LOT 14 BLOCK 1 FALCON RANCH ESTATES SUB BURT & MELISSA CHAFFIN 4307003001
LOT 13 BLOCK 1 FALCON RANCH ESTATES SUB TERRY HIGGINS TRUST 4307003002
LOT 11 ARROWHEAD ESTATES FILING NO. 1 KATHERINE MORALES 4307003012
EXISTING 20' DRAINAGE EASEMENT. REC #1246947 ARROWHEAD ESTATES SUB
LOT 10 ARROWHEAD ESTATES FILING NO. 1 HEIDEMARIE POLLARD 4307003010
Label lining
Reference details in CDs
Adjust for legibility
A1 0.18 0.90 0.96
OSA 16.6 0.21 0.44
A7 0.33 0.90 0.96
OSA1
A11 0.10 0.90 0.96
A8 1.03 0.94 0.35
A8A
A2 2.54 0.08 0.35
A4 3.86 0.08 0.35
A3 4.15 0.08 0.35
A6 0.69 0.08 0.35
A5 3.80 0.08 0.35
A9 1.86 0.08 0.35
A9A
A10 1.08 0.08 0.35
A12
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A51

BASIN & DESIGN POINT SUMMARY				
BASIN	DP	AREA (AC)	Q5	Q100
B-BASINS				
RET090 (DBPS)			36.0	320.0
OSB1		0.87	1.6	4.0
OSB2		0.31	1.0	2.0
OSB3		0.52	2.0	3.9
B1		2.24	9.4	17.1
OSB1+B1	B1	3.12	9.3	17.8
B2		1.12	4.7	8.6
OSB2+B2	B2	1.43	5.4	10.1
B3	B3	0.44	2.1	3.7
B4		1.54	6.5	11.8
OSB3+B4	B4	2.07	7.8	14.4
DPB3+DP4	B4A	2.51	10.2	18.7
DPB1+DPB2+DPB4A	B4B	7.06	22.3	41.7
B5	B5	0.35	1.6	2.9
B6		0.50	2.3	4.2
DPB5+B6	B6	0.85	3.9	7.1
B7		1.57	6.6	12.0
DPB4B+DPB6+B7	B7	9.49	30.1	56.0
B8	B8	1.33	5.6	10.2
B9		1.76	7.4	13.2
DPB8+B9	B9	3.09	12.4	22.3
B10		1.18	5.4	9.7
DPB9+B10	B10	4.27	17.2	31.0
B11		1.20	0.5	3.6
DPB7+DPB10+B11	B11	14.96	45.2	85.3
B12		0.72	0.3	2.0
Pond A (TSB) Out			1.0	1.0
Pond B Out (Ultimate)			0.3	3.8
B12+Pond A+Pond B+RET090	B12	0.00	37.6	326.8
B13		0.19	0.1	0.6

BASIN & DESIGN POINT SUMMARY				
BASIN	DP	AREA (AC)	Q5	Q100
C-BASINS				
OSC1		0.33	1.5	2.7
C1	C1	0.37	1.7	3.1
C2		0.91	3.8	6.9
DPC1+C2	C2	1.27	5.0	9.1
C3	C3	1.08	4.5	8.2
OSC2		1.36	1.5	5.1
C4		2.62	11.0	20.0
OSC1+OSC2+C4	C4	4.31	12.4	24.8
C5		0.24	1.1	2.0
DPC3+C5	C5	1.32	5.6	10.2
C6		0.25	1.2	2.1
DPC5+C6	C6	1.58	6.7	12.2
DPC2+DPC4+DPC6	C6A	7.16	23.2	42.9
C7	C7	0.88	3.8	6.8
C8	C8	0.65	3.0	5.4
DPC6A+DPC7+DPC8	C8A	8.69	28.7	52.7

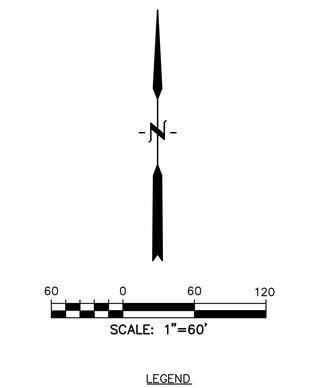
fix the contour labels throughout. difficult to tell which are proposed and existing.

revise to private as these are collecting flows from the private lots and private roadways. License agreement will be needed.

24"?

Adjust for legibility

Adjust for legibility



PREPARED BY:

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CONTACT: STEVE ROSSOLL

DRAINAGE PLANS FOR
THE COMMONS AT FALCON FIELD
FILING NO. 1
12445 RIO LANE, AND VACANT LAND
PEYTON, EL PASO COUNTY, COLORADO

ISSUE	DATE
INITIAL ISSUE	10/1/24
RESUBMITTAL	4/2/26

DESIGNED BY:	TDM
DRAWN BY:	CGH
CHECKED BY:	KGV
FILE NAME:	21604-00F1-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

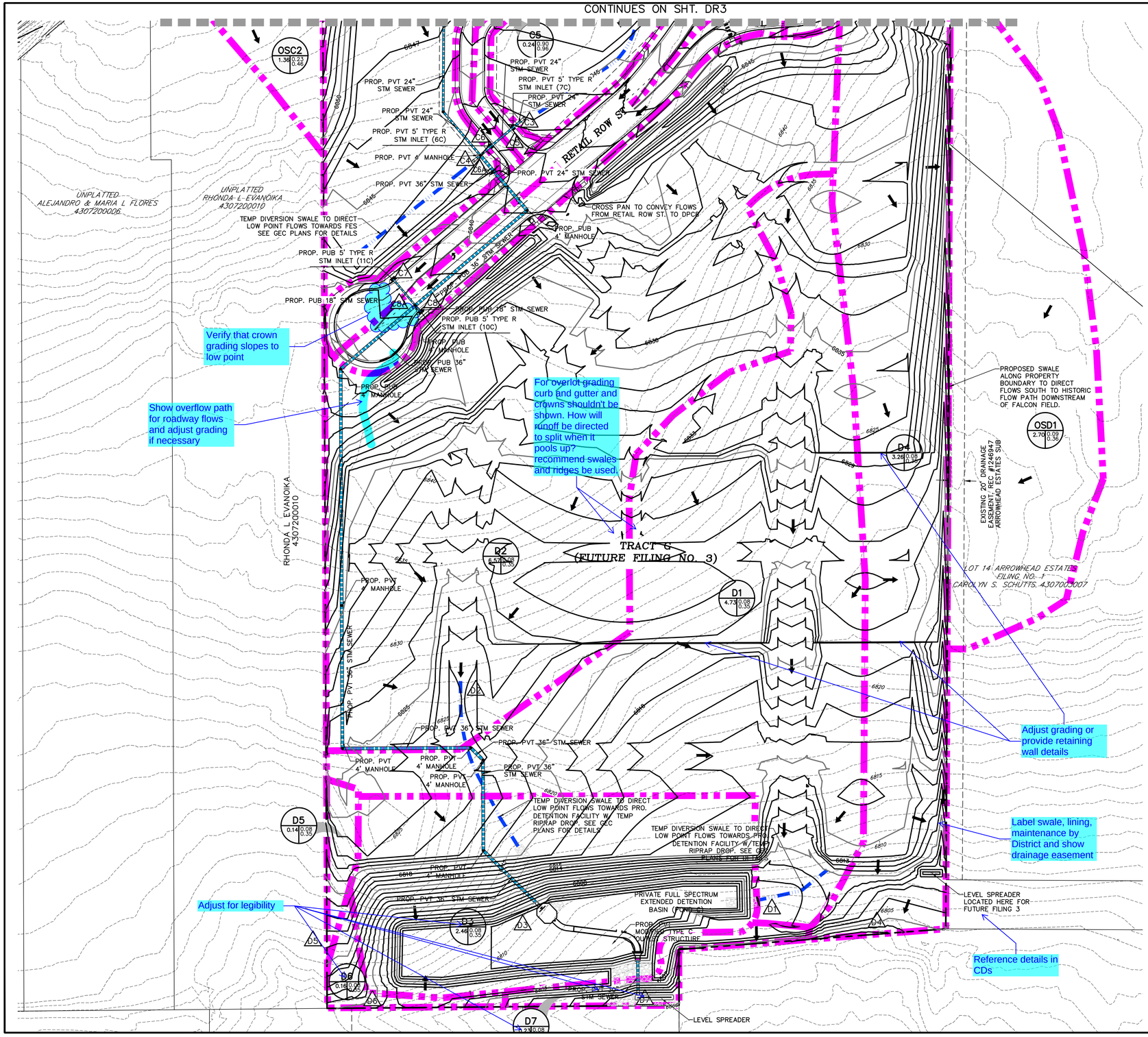
PROJECT NO. 21604-00CSCV

DRAWING NO.

DR3

SHEET: 4 OF 5

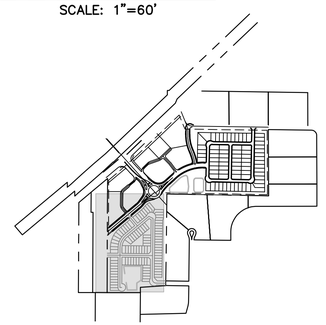
CONTINUES ON SHT. DR3



LEGEND

- EX. MINOR CONTOUR
- 6800 EX. MAJOR CONTOUR
- PR. MINOR CONTOUR
- 6800 PR. MAJOR CONTOUR
- STORM DRAIN
- ST EX. STORM DRAIN
- BASIN BOUNDARY
- TEMP. DIVERSION SWALE
- FLOW DIRECTION
- DESIGN POINT
- BASIN
- AREA (ACRE) — E5 — 5.91 0.12 0.38 — C5 C100

60 0 60 120
SCALE: 1"=60'



BASIN & DESIGN POINT SUMMARY

BASIN	DP	AREA (AC)	Q5	Q100
C-BASINS				
OSC1		0.33	1.5	2.7
C1	C1	0.37	1.7	3.1
C2		0.91	3.8	6.9
DPC1+C2	C2	1.27	5.0	9.1
C3	C3	1.08	4.5	8.2
OSC2		1.36	1.5	5.1
C4		2.62	11.0	20.0
OSC1+OSC2+C4	C4	4.31	12.4	24.8
C5		0.24	1.1	2.0
DPC3+C5	C5	1.32	5.6	10.2
C6		0.25	1.2	2.1
DPC5+C6	C6	1.58	6.7	12.2
DPC2+DPC4+DPC6	C6A	7.16	23.2	42.9
C7	C7	0.88	3.8	6.8
C8	C8	0.65	3.0	5.4
DPC6A+DPC7+DPC8	C8A	8.69	28.7	52.7

BASIN & DESIGN POINT SUMMARY

BASIN	DP	AREA (AC)	Q5	Q100
D-BASINS				
OSD1		2.70	0.8	5.5
D1	D1	4.91	1.3	9.4
D2	D2	6.53	1.8	13.0
D3		2.46	0.7	4.8
DPD1+DPD2+D3+DPC8A	D3	22.59	24.1	63.6
D4		3.26	1.0	7.3
OSD1+D4	D4	5.96	1.6	11.2
D5	D5	0.14	0.1	0.4
Pond C Out (Interim		0.00	0.2	1.0
D6	D6	0.16	0.1	0.5
D7		0.23	0.1	0.6
D7+POND OUT	D7	0.00	0.3	1.6

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DRAWN BY:	CGH
CHECKED BY:	KGV
FILE NAME:	21604-00F1-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. 21604-00CSCV

DRAWING NO.

DR4

SHEET: 5 OF 5